



## Volume 3:

# CONSTRUCTION SPECIFICATIONS

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## CITY OF COTATI CONSTRUCTION SPECIFICATIONS

### **Part I: DEFINITIONS**

Public improvements within the City of Cotati shall be constructed in accordance with the 2010 Standard Specifications of the State of California, Department of Transportation, Division of Highways (Caltrans), latest edition, which specifications are hereinafter referred to as the Standard Specifications, and in accordance with the following modifications and revisions herein stated in the City of Cotati Standards and Specifications.

Whenever in the Standard Specifications the terms, State of California, Department of Transportation, Director, Division of Highways, Engineer, or Laboratory are used, the following terms shall be understood and interpreted to mean and refer to such substituted terms as follows:

For State of California substitute City of Cotati.

For Department substitute the Public Works Department of the City of Cotati.

For Director substitute the City Engineer of the City of Cotati.

For Division of Highways substitute the Engineering Division of the City of Cotati.

For Engineer substitute the City Engineer, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

For Laboratory substitute Private Laboratory as authorized by the City to test materials and work involved in the contract.

Specifications pertaining to the administration of the City contracts will be contained in the special provisions for the contract.

References to contract administration, measurement, and payment shall not apply to non-City contracts.

Abbreviations:

“City Std.” means City of Cotati Standard Detail

“City Spec.” means City of Cotati Construction Specification

“Standard Specifications” means State of California Department of Transportation Standard Specifications, 2010 Edition.

## **Part II: MODIFICATIONS**

Part II includes modifications and revisions to the Standard Specifications.

Only those subsections which are modified or revised will be noted herein. The Standard Specifications number sequence will be followed.

Subsections to be modified will be noted as "(Subsection number) (Title)" followed by the modifications or additional requirements. In case of conflict between the Standard Specifications and the modification, the modification shall apply.

Subsections to be deleted without modification will be noted as "(Subsection number) (Title) (Deleted)".

Subsections which are completely revised will be noted as "(Subsection number) (Title) (The following shall apply in lieu of Section\_\_\_\_)".

## **SECTION 6 – CONTROL OF MATERIALS**

All materials, parts, and equipment furnished by the Contractor in the Work shall be new, high grade, and free from defects. Quality of work shall be in accordance with the generally accepted standards. Material and work quality shall be subject to the Engineer's approval.

Materials and work quality not conforming to the requirements of the Specifications shall be considered defective and will be subject to rejection. Defective work or material, whether in place or not, shall be removed immediately from the site by the Contractor, at its expense, when so directed by the Engineer.

## SECTION 10 – DUST CONTROL

### 10-1.01 Description

Attention is directed to the provisions in Section 10, "Dust Control", of the Standard Specifications.

### 10-1.02A Dust Mitigation Measures

1. All dust-producing work and unpaved construction sites shall require at a minimum watering in the late morning and at the end of the workday; the frequency of watering shall be increased if wind speeds exceed 15 mph.
2. Contractor shall maintain dust control to the satisfaction of the City Engineer, seven (7) days a week, 24 hours per day.
3. The Engineer at his discretion may require sprinkling at any time or place.
4. Where recycled water is available potable water shall not be used for dust control.

## SECTION 12 – TRAFFIC CONTROL

### 12-1.01 Description

Construction area traffic control devices shall be installed and maintained in accordance with the applicable sections as specified herein, the Standard Specifications, Part VI of the City Traffic Standards, the current edition of the Manual of Traffic Controls published by Caltrans, and as directed by the Engineer.

### 12-1.02 Traffic Control Plan

Prior to commencing construction which will affect existing traffic, the Contractor shall submit for review by the Engineer, a Traffic Control Plan on an 11" x 17" sheet of paper which contains only information specifically related to work zone traffic control. If the Contractor proposes to use Manual of Traffic Controls Published by Caltrans in lieu of a traffic control plan, in specific work operations, he/she shall submit in writing for consideration which Standard Plan will be used for each work operation. A Traffic Control Plan or proposal shall be submitted for review at least two weeks prior to implementation.

The Traffic Control Plan shall contain a title block which contains the Contractor's name, address, phone number, project superintendent's name, contract name, dates and hours traffic control will be in effect, and a space for review acknowledgment.

The content of the Traffic Control Plan shall include, but is not limited to, the following:

1. Show location and limits of the work zone.
2. Give dimensions of lanes affected by traffic control that will be open to traffic.
3. Indicate signing, cone placement, and other methods of delineation and reference to appropriate City or Caltrans standard.
4. Dimension location of signs and cone tapers.
5. Identify side streets and driveways affected by construction and show how they will be handled.
6. Show how pedestrian traffic will be handled through the construction site.
7. Demonstrate how two-way traffic will be maintained.

No work except for installation of project identification signs will be allowed to commence prior to approval of the Work Zone Traffic Control Plan.

### **12-1.03    Traffic Control**

Attention is directed to Section 7-1.03, "Public Convenience" and to Section 5-1.05, "Order of Work" of the Standard Specifications.

Exact locations of Project Identification signs (Section 7-1.03 "Public Convenience") shall be determined in the field by the Engineer.

Lane closures will be permitted between the hours of 8:30 a.m. and 4:00 p.m. only. Only one lane at a time may be closed and no lanes shall be closed at any other hours unless specifically approved by the Engineer. The Contractor shall maintain vehicle access to homes and other properties at all times while work is in progress.

The Contractor shall keep the City of Cotati Police and Fire Department informed regarding the closure of any traveled way. At a minimum, the Contractor shall call the Police Department at 792-4611 **daily** to report any traveled way closure. This means immediately upon closure for that day and again immediately after removal of the closure. For closures over multiple days, the daily notification still applies.

If the Contractor has been given an approved Traffic Control Plan that includes road closures, he/she will be required to maintain vehicular access to homes and other properties where work is in progress within the closure area.

Seventy-two (72) hours prior to construction, the Contractor shall place a notice on each front door, and attempt to notify each owner or tenant verbally that work will be underway within his block between stated hours, and request that cars be parked out of the roadway by 8:00 a.m. Service of notice shall not bar use of local cars within the block.

Barricades and flaggers shall be positioned to allow safe turns at intersections.

The Contractor shall maintain traffic control as necessary and as directed by the Engineer. Flaggers, barricades, signing, etc., shall remain in place for protection of City personnel until such time as all temporary lane delineation is complete.

### **12-5        MATERIAL RECYCLING**

#### **12-5.01    Description**

The Contractor shall dispose of all Portland cement concrete and asphalt concrete, generated from removal or demolition activities on the project, at a recycler for these materials. The Contractor shall provide receipts verifying delivery and approximate quantity (in tons) of the material delivered to a material recycler.

All other excess materials from the project shall become the property of the Contractor and shall be disposed of by the contractor, at their expense.

## SECTION 15 – EXISTING HIGHWAY FACILITIES

### 15-3 CONCRETE REMOVAL

#### 15-3.01 Removal of Concrete

Concrete removal shall conform to applicable provisions of Section 15-3 of the Standard Specifications and as specified herein.

All concrete to be removed shall be disposed of by the Contractor away from the site of the work. Burying of broken concrete within the limits of the project will not be allowed.

All concrete which is to be removed from sidewalk, curb, gutter, and driveway areas shall be removed to the nearest score mark or construction joint as directed by the Engineer.

## SECTION 17 – CLEARING AND GRUBBING

### 17-2.01 Description

Clearing and grubbing shall conform to the applicable provisions of Section 17 of the Standard Specifications, with the following modifications and additional requirements.

Clearing, grubbing, and access shall be confined to the limits shown on the Plans and shall not exceed the minimum necessary to complete operations.

The Contractor shall not remove any trees, brush, shrubs, or other natural objects outside the limits of construction as shown on the Plans, unless directed by the Engineer.

Any trees, brush, shrubs, or other natural objects not ordered removed by the Engineer which have been removed, altered, or damaged shall be replaced in kind by the Contractor before completion of the project.

All unsuitable material shall be disposed of away from the site by the Contractor. The Contractor shall make all necessary arrangements for disposal of material.

### 17-2.02 Preservation of Property

All existing street designation and traffic control signs and posts within the limits of work shall be carefully removed, cleaned of excess earth and delivered to the City Corporation Yard at 1 Trevino Court except those required for traffic control as determined by the Engineer.

### 17-2.03A Construction

The area to be cleared and grubbed shall be the area within the right-of-way 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 3 feet below finished grade in the area of construction. The resulting spaces shall be backfilled with material suitable for the planned use. Such suitable material shall be placed and compacted in layers as specified in Section 19-6 "Embankment Construction" of the Standard Specifications.

### 17-2.03D Removal and Disposal of Materials

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

## SECTION 19 – EARTHWORK

### 19-1.01 Description

Unsuitable material may be removed and replaced, or may be stabilized in accordance with the provisions of Section 19-1.03B, "Unsuitable Material".

### 19-1.03B 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.

When unsuitable material is removed and disposed of, the resulting space 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.

Stabilization of unsuitable material shall comply with the following provisions:

- A. Unsuitable material may be processed in place, may be excavated and placed on the grade or other locations suitable for further processing, or may be partially excavated and partially processed in place.
- B. Processing may consist of drying to provide a stable replacement material, or mixing with hydrated lime or granular quicklime.
- C. Stabilized material shall be placed and compacted in layers as hereinafter specified for constructing embankments.

### 19-1.03C Grade Tolerance

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

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

### 19-1.03E Ditch Excavation

Ditch excavation shall conform to the applicable provisions of Section 19-1.03E of the Standard Specifications. Ditches shall be constructed in conformance with the details and at the locations as shown on the Plans, as directed by the Engineer, and as specified herein.

**19-2 ROADWAY EXCAVATION**

**19-2.02 Subgrade Stabilization**

Unsuitable material shall be stabilized per Section 19-1.03B of the Standard Specifications with the following additions:

In the event that the subgrade material is unstable and cannot be made stable by drying the top six inches as determined by the Engineer, then the Contractor shall excavate an additional six inches, install soil stabilization fabric and install six inches of Class 4 aggregate sub-base.

Prior to placement of soil stabilization fabric, the Contractor shall remove all loose dirt as left from excavation operations.

Soil stabilization fabric shall be installed per manufacturer's recommendations and shall meet or exceed the following specifications:

- Grab Tensile Strength 290 lb.
- Mullin Burst Strength 500 psi
- Trapezoid Tear Strength 120 lb.
- Modulus (Load at 10% Elongation) 120 lb.
- Equivalent Opening Size 40-70 Sieve
- Water Permeability Coefficient(K) .003 cm/sec.
- Soil stabilization fabric shall be Mirafi 600-X, Supac 6WS, Fibretex TEN-5, or equal.

Aggregate sub-base shall be Class 4 with a minimum sand equivalent value of 21, a minimum R-value of 50 and shall conform to the following gradings:

<u>Sieve Size</u>	<u>Percent Passing</u>
2"	100
1-1 1/2"	90-100
3/4"	50-85
#4	25-45
#200	2-11

The material contained on the #4 screen shall consist of 100% crushed particles.

Aggregate sub-base shall be end-dumped on the soil stabilization fabric without disrupting fabric or basement soil as directed by the Engineer. Rolling shall commence immediately after spreading of the damp material and before the material has dried sufficiently to allow separation between the fine and coarse particles. Compactor shall be a non-vibratory type and compaction shall be to 92% R.C.

**19-3.02B Structure Backfill**

Specifications for pipe bedding, trench backfill and surfacing shall be as shown on City Std. 126, "Standard Trench Detail."

Except for structural backfill placed at specific locations described and enumerated in Section 19-3.02B of the Standard Specification, structural backfill material specifications and compaction requirements shall be as follows:

Structure backfill shall have a Sand Equivalent value of not less than 20 and shall conform to the following gradation:

<u>Sieve Sizes</u>	<u>Percentage Passing</u>
3"	100
No. 4	40-100
No. 30	20-100

Structural backfill shall be compacted to not less than 90 percent relative compaction, except that when placed under any roadbed, relative compaction shall be not less than 95 percent within 3 feet of finished grade.

**19-5.03B Relative Compaction (95 Percent)**

(95 percent – California Test 216 and 231) (The following shall apply in lieu of Section 19-5.03B)

Relative compaction of not less than 95 percent shall be obtained for a minimum depth of 0.75-foot below the grading plane for the full width of the planned structural section, whether in excavation or embankment.

Any area of the subgrade determined by the Engineer to be unstable, as evidenced by excessive deflection under the movement of equipment, shall be brought to satisfactory stability by additional rolling, reworking, removal, and replacement of unsuitable material, or stabilization with lime, as directed by the Engineer.

Lime treated materials shall be compacted to not less than 95 percent relative compaction in accordance with the provisions of Section 24.

Relative compaction of not less than 95 percent shall be obtained for embankment under bridge and retaining wall footings without pile foundations within the limits established by incline planes sloping 1.5:1 out and down from lines one foot outside the bottom edges of the footing.

**19-5.03C Relative Compaction (90 Percent)**

(90 percent – California Test 216 and 231) (The following shall apply in lieu of Section 19-5.03C)

Relative compaction of not less than 90 percent shall be obtained in all materials in embankment except as specified herein to be 95 percent. Material placed in accordance with the provisions of Section 19-1.03B, "Unsuitable Materials," shall be compacted to not less than 90 percent relative compaction.

**19-7.02C Imported Borrow**

Imported borrow shall conform to Section 19-7.02C of the Standard Specifications with the following additions:

Imported borrow shall be free of any regulated hazardous materials.

**Note 1.** Nitrolized soil amendment shall be a composted wood byproduct combined with one pound of actual nitrogen per cubic yard of shavings.

**Note 2.** Planting tablets shall be a commercial fertilizer in tablet form yielding 20% nitrogen, 10% phosphorus and 5% potash. The tablet shall be compressed and yield a slow release of nutrient over a 12-month period.

## SECTION 20 - LANDSCAPE

### 20-7 HIGHWAY PLANTING

#### 20-7.03I Planting

Trees shall have a minimum height of twelve feet including root ball, and a minimum container size of fifteen gallons, with a caliper of 1" at 12" above the top of the root ball.

Conditions of the plants shall be symmetrical, typical for variety and species, sound, healthy, vigorous, free from plant disease, insect pests or their eggs, and shall have healthy, normal root systems, well filling their containers, but not to the point of being root bound. Plants shall not be pruned or topped prior to delivery.

Each tree shall be tagged to indicate genus and species.

All plant material shall be subject of the inspection and approval of the City. The City has the right to reject any item offered.

1. 48-hour notification shall be given prior to any inspection.
2. Upon initial notification, the Contractor shall indicate the number of sequences or planting phases necessary to complete the entire project.
3. 24-hour notice shall be given the City prior to starting any additional phase.
4. At the time of final inspection, the City may select at random one tree from each planting phase, to be removed and inspected for compliance to planting specification.

#### Parkway Tree Planting Operations:

All pits shall be dug with bottoms level, the width equal to two times the diameter of the root ball, and the bottom 4 inches less than the depth of the root ball. The City upon notification shall inspect pits prior to planting of trees.

Pits shall be backfilled with a thoroughly mixed "prepared soil". When planting tablets are required, they shall be placed prior to placing the tree in the pit. Five (21 gram) planting tablets shall be evenly spaced around perimeter of pit on top of prepared soil.

"Prepared soil" mix for backfill of the pits for 15-gallon trees shall consist of excavated soils and the following:

- a. 50% by volume of nitrolized soil amendment.
- b. 50% by volume native soil.
- c. Five 21-gram planting tablets. (20-15-5 analysis)

Set plants in center of pit, in vertical position, so that crown of ball will be level with finish grade after allowing for watering and settling.

Prepare a depressed earth water basin capable of holding 10 gallons of water. Water shall be applied in that quantity at time of planting.

Each tree must be properly supported by two Lodgepole Pine stakes. Stakes shall be a minimum of 2" x 2" and not less than eight feet in length. Stake all trees at time of planting by placing stake in prepared hole and driving stake a minimum of 30 inches into soil. Stakes shall be placed perpendicular to direction of prevailing winds.

All trees shall be secured to stakes as detailed (or approved equal).

Six-penny scaffold nails shall be used to secure the ties to the stakes – two per side.

#### Root Barriers/Bio Barriers

Install root barriers in the locations indicated on the details/plans. Contractor responsible for actual quantity of root barrier to match design intent on plans.

#### Guarantees

Fifteen-gallon trees shall be guaranteed as to growth and health for a period of one year after final acceptance by the City.

Trees that fail to grow or are injured or damaged during planting operations, shall be replaced within 30 days. Replacement material shall be guaranteed as specified as original guaranteed material.

Trees not installed according to the requirements will be rejected by the City.

## SECTION 21 – NOTIFICATION

### 21-1.01 Notification

The Contractor shall notify the Project Engineer or Project Inspector of any work to be performed on any given work day either on the afternoon of the prior working day or before 8:30 a.m. on the given working day. Any work completed for which the Project Engineer or Project Inspector has not received prior notification of its scheduling MAY NOT BE ACCEPTED.

## SECTION 24 – LIME TREATMENT

### 24-2.01 Description

(The following shall apply in lieu of Section 24-2.01)

This work consists of stabilizing basement soil, mixing in place material, lime and water, and spreading and compacting the mixture to the lines, grades, and dimensions shown on the Plans and as specified herein.

#### 24-2.01A Applying Lime

Where designated by the Engineer, basement soil below the planned lime treated subgrade shall be stabilized in the following manner:

The material shall be excavated to the lines and grades specified by the Engineer and spread in a uniform layer over another portion of the grade.

Dry lime in the amount specified by the Engineer shall be spread and mixed into the material as provided in Section 24-2.01D (4), "Mixing". The material shall then be used to backfill the original excavation in 6" compacted layers. Each layer below a plane 12" below the grading plane shall be compacted to not less than 90 percent relative compaction. Each successive 6" layer up to the bottom of the planned lime treated subgrade shall be compacted to not less than 92 percent relative compaction.

#### 24-2.02 Materials

Lime to be used shall be granular quicklime and shall be added to the existing material at the approximate rate of four percent by weight of the dry material, the exact percentage to be determined by the Engineer, based on geotechnical tests provided by the contractor.

Lime treatment must be approved by the Engineer in writing, and accompanied by an adequate safety program to be proposed by the Contractor. Granular quicklime shall conform to the specifications of ASTM Designation C51. Hydrated lime shall be used only when permitted by the Engineer in writing.

When sampled by the Engineer at the point of delivery, the sample of quicklime shall contain not less than 90 percent Calcium Oxide, CaO, as determined by ASTM: C 25-67.

Granular quicklime initial mixing shall continue until the quicklime is uniformly distributed throughout the material. Water shall be added as required to provide sufficient moisture for hydration. The mixture shall be cured for not less than 16 hours prior to final mixing.

The Contractor shall provide a grade checker to insure mixing to the full depth as specified. Water shall be added during the final mixing operations until the water content of the mixture is approximately 2% above the test optimum moisture content.

**24-2.01D (4) Mixing**

Mixing shall be in accordance with Section 24-2.01D (4) of the Standard Specification.

**24-2.01D (5) Spreading and Compacting**

Lime treated material shall be a minimum of 12 inches deep except where required elsewhere to be greater and finished to the lines and grades as shown on the Plans.

Lime treated material shall be compacted to not less than 95 percent, as determined by Test Method No. California 216 and 231. The sample of lime treated soil used for determining the maximum wet density shall be obtained from the test site at the time of testing.

The surface of the lime treated material shall not vary more than 0.05-foot above or below the grade established by the Engineer

**24-2.03G Curing**

Curing of lime treated material shall be in accordance with Section 24-2.03G of the Standard Specifications.

The Contractor may, at his option, omit the curing seal if the first lift of A.C. Base is placed within twenty-four (24) hours after the final compaction of the lime treated material.

## SECTION 25 – AGGREGATE SUBBASE

### 25-1.01 General

Aggregate subbase shall be Class 4 conforming to and placed in accordance with the requirements of Section 25 of the Standard Specifications, with the following modifications and additional requirements.

Class 4 aggregate subbase will have a minimum sand equivalent value of 21, a minimum R-value of 50 and shall conform to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
3"	100
1-1/2"	90-100
3/4"	50-90
#4	25-55
#200	2-11

The material contained on the #4 screen shall consist of 100% crushed particles.

Rolling shall commence immediately after spreading of the damp material and before the material has dried sufficiently to allow separation between the fine and coarse particles.

### 25-1.03 Construction

The subgrade to receive aggregate subbase, immediately prior to spreading, shall not vary more than 0.05-foot above or 0.1-foot below the grade established by the Engineer.

#### 25-1.03D Compacting

The surface of the finished aggregate subbase shall be firm and unyielding. Any visible movement vertically or horizontally of the aggregate subbase under the action of construction equipment or other maximum legal axle loads shall be considered as evidence that the aggregate subbase does not meet this requirement.

## SECTION 26 – AGGREGATE SUBBASE

### 26-1.01 General

Aggregate base shall be Class 2 conforming to and placed in accordance with the requirements of Section 26 of the Standard Specifications, with the following modifications and additional requirements.

Rolling shall commence immediately after spreading of the damp material and before the material has dried sufficiently to allow separation between the fine and coarse particles.

### 26-1.02 Materials

The minimum sand equivalent shall be 22 for any individual test.

### 26-1.03D Compacting

The surface of the finished aggregate base shall be firm and unyielding. Any visible movement vertically or horizontally of the aggregate base under the action of construction equipment or other maximum legal axle loads shall be considered as evidence that the aggregate base does not meet this requirement.

## SECTION 37 BITUMINOUS SEALS

### 37-3 SLURRY SEAL

#### 37-3.01 General

This item shall consist of furnishing and placing a slurry seal coat on City of Cotati streets as designated herein in conformance with the requirements of Section 37-3, "Slurry Seal", of the Standard Specifications, the International Slurry Seal Association Publication A105 and as specified herein.

This work consists of preparation and application of a Type II latex modified slurry seal on various roadway sections as indicated on the plans, these specifications or as directed by the engineer in the field. A roadway will include all travel lanes, shoulders, acceleration and deceleration lanes, truck turnouts and intersections. Repair any roads, driveways, walls and curbs which are damaged during construction, to their original or better condition.

Slurry Seal shall consist of mixing asphalt emulsion, aggregate, and water and spreading the mixture on a surface or pavement where shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

#### 37-3.01D(4)(b) Mix Design

The tests and mix design shall be performed by a laboratory capable of performing the applicable International Slurry Seal Association (ISSA) tests. Provide the Engineer with the test results and the proposed mix design from a City approved laboratory conforming to the following tests in ISSA A105. The plot of Wet Loss on Wet Track Abrasion and Excess Asphalt verses percent emulsion shall be supplied to the Engineer with the mix design. The proposed slurry seal mixture shall conform to the requirements specified when tested in accordance with the following tests:

Test	SSA Test Method	Requirement
Slurry Seal Consistency, cm	T106	3 max.
Wet Stripping	T114	Pass
Compatibility	T115	Pass (a)
Cohesion Test (b), kg - cm within 1 hour	T139	20 min.
Wet Track Abrasion, g/sq. ft.	T100	75 max.
Excess Asphalt by LWT Sand Abrasion	T109	38 g/m <sup>2</sup> max
a. Mixing test must pass at the maximum expected air temperature at the project site during application.		
b. Using project source aggregate asphalt emulsion and set-control agents if used.		

The laboratory report shall be signed by the laboratory that performed the tests and mix design and shall show the results of the tests on individual materials, comparing the test results to those required by the specifications. The report shall clearly show the proportions of aggregate, filler (as determined from the tests, minimum and maximum), water (minimum and maximum), and asphalt solids content based on the dry weight of aggregate and set-control agent usage.

Previous laboratory reports covering the same materials may be accepted provided they are made during the same calendar year.

**37-3.02 Materials**

The materials used shall conform to Section 37-3.02 "Materials" of the Caltrans Standard Specifications, with the exceptions noted in these Technical Specifications.

Mineral filler shall be either Portland cement or other approved mineral fillers, if required. Portland cement, if used, shall be commercially available Type I-II and shall be free of lumps and clod

**37-3.02B (2) Aggregate**

Aggregate shall consist of sound, durable, crushed gravel and approved mineral filler. The material shall be free from vegetable matter and other deleterious substances. Aggregate shall be 100% crushed, with no round particles, and shall be volcanic in origin and black in color. The use of gray or light-colored aggregate will not be allowed. The percentage composition of the aggregate shall conform to the following grading:

PERCENT PASSING

Sieve Size	Type II
No. 3/8"	100
No. 4	94 – 100
No. 8	65 – 90
No. 16	40 – 70
No. 30	25 – 50
No. 200	5 – 15

	Type II
Theoretical asphalt content range, % dry aggregate	7.5 to 13.5
Approximate application rate (pounds per square yard)	15 to 20

The aggregate shall conform to the following additional quality requirements:

Test	California test	Type II
Sand Equivalent	217	70 min.
Durability Index fine	229	70 min

**37-3.02B (3) Asphaltic Emulsion**

Latex emulsified asphalt shall be a quick traffic, quick cure (QT-QC) type, conforming to Section 94. This emulsion shall be homogeneous and show no separation after thorough mixing. It shall break and set on the aggregate within five (5) minutes and be ready for cross-traffic within five to thirty minutes. The latex asphalt emulsion shall conform to the following requirements:

Test on Emulsion	Method of Test	Requirements
Viscosity, SSF @ 77 degrees F, sec	ASTM D244	15-90
PH	ASTM D244	2 +/- 1
Residue by Distillation	ASTM D244	60% minimum

Test on Residue from Distillation Test:

Test on Residue	Method of Test	Requirements
Penetration @ 77 degrees	ASTM D5	40 – 80
Softening Point (Ring & Ball) degrees, F	ASTM D36	130 +
Ductility @ 75 degrees F, 5 cm/min., min.	ASTM D113	25
Fraass-Breaking Point (degrees C)	DIN 52012	- 18

**37-3.02B(3)(a) Water**

Water shall be free of harmful soluble salts and shall be of such quality that the asphalt will not separate from the emulsion before the slurry seal is in place in the work.

**37-3.02B(3)(b) Polymer Latex.**

Styrene Butadiene Rubber latex shall be added to the water/soap phase by injection prior to the mill manufacture of the asphalt emulsion by the emulsion producer. The latex shall be BASF NX 1118 or approved equal. The amount of latex solids shall be between 2.5 and 3 percent of the asphalt residual content and shall be certified by the emulsion producer on each load of emulsion delivered to the job site. No post or field addition of Polymer Latex will be allowed. Samples of

Test	Requirement
Total solids, minimum %	60
Bound Styrene %	24-60
PH at 25 degrees C	4.2-5.2
Brookfield viscosity RVT	1000-4000
Residual Monomer %	0.08 max.

latex shall be provided and shall conform to the following requirements:

### **37-3.02C (4) Mineral Filler**

The mineral filler shall be either Portland cement or other approved mineral fillers, if required. Portland cement, if used, shall be commercially available Type I-II and shall be free of lumps and clods.

### **37-3.03B Proportioning**

Asphalt emulsion shall be added at a rate determined by the mix design and in the range of the table above. A job mix design shall be submitted by the Contractor for approval by the Engineer that conforms to the specification limits, and that is suitable for the traffic, climate conditions, curing conditions and final use. This will include recommended application rate of slurry to suit the job conditions.

Calibrated flow meters shall be provided to measure both the addition of water and liquid additives to the pug mill. If necessary for workability, a retarding agent, that will not adversely affect the seal, may be used.

Water, and retarder if used, shall be added to ensure proper workability and (a) permit uncontrolled traffic on the slurry seal no more than three (3) hours after placement without the occurrence of bleeding, raveling, separation or other distress; and (b) prevent development of bleeding, raveling, separation or other distress within thirty (30) days after placing the slurry seal.

### **37-3.03C Mixing and Spreading Equipment**

Mixing and spreading equipment shall be in accordance with the Caltrans Standard Specifications, Section 37-3.03C respectively, and as specified herein.

The Slurry Seal shall be mixed in a self-propelled mixing machine equipped with a continuous flow pug mill capable of accurately delivering and automatically proportioning the aggregate, emulsified asphalt, water and additives.

The slurry seal retention time in the pug mill shall be less than three seconds. No retention of mixed slurry seal shall be allowed within the pug mill by gate shut-off or other mechanical means. The mixing machine shall have sufficient storage capacity of aggregate, emulsified asphalt, and water to maintain an adequate supply to the proportioning controls.

The mixing machine shall be equipped with controls for proportioning the material to the mix. Each material control device shall be calibrated, properly marked, and lockable at the direction of the Engineer.

The mixing machine shall be equipped with an approved fines feeder that provides a uniform, positive, accurately metered, amount of a mineral filler, if used, at the same time and location that the aggregate is fed.

The mixing machine shall be equipped with measuring device that allows for quick accurate measurement of the volume.

The mixing machine shall be equipped with a water pressure system and nozzle type spray bars to provide a water spray immediately ahead of the spreader box.

Gages or approved means of measurement shall be provided on the equipment so that the proportional rates of aggregate, water and asphalt emulsion can be checked at intervals determined by the Engineer.

The spreader shall be capable of spreading a traffic lane width and shall have strips of flexible rubber belting or similar material on each side of the spreader box and in contact with the pavement to prevent loss of slurry from the box. The box shall have baffles, or other suitable devices, to insure uniform application on super-elevated sections and shoulder slopes. Spreader boxes shall be maintained in such a manner as to prevent chatter (wash boarding) or other surface defects that will affect the aesthetic value of the finished slurry seal mat.

The rear flexible strike-off blade shall be capable of being adjusted to the various crown shapes so as to apply a uniform slurry seal. Any burlap drag used shall be replaced when it loses its flexibility.

The Contractor shall calibrate the spreader vehicle(s) to be used on the project to the approved mix design prior to their arrival at the job site, and shall furnish the Engineer a copy of the calibration settings for each vehicle. Thereafter, no adjustments in the aggregate and emulsion settings shall be made without the approval of the Engineer.

The Contractor shall demonstrate the ability to mix and apply slurry in a satisfactory manner and to the approved mix design with each spreader vehicle. The Contractor may not begin work until the ability to apply slurry as specified is demonstrated to the Engineer.

### **37-3.03D Placing**

Prior to sealing each street, the Contractor shall verify that each street to be sealed has been "approved for sealing" by the Inspector.

Surface to receive slurry seal shall be prepared in accordance with the requirements specified for preparing surfaces to receive asphaltic emulsion as specified in Section 37-3.03D(2)(b) "Slurry Seal", of the Caltrans Standard Specifications.

Before placing the slurry seal, the pavement surface shall be cleaned by sweeping, and other means necessary to remove all loose particles of paving, all dirt and all other extraneous material. Power sweepers shall be required to sweep from face of curb to face of curb. This shall involve a minimum of three passes with a power broom street sweeper (Mobile or equivalent). Pavement missed by or inaccessible to broom sweepers shall be swept clean by other approved methods. Contractor shall provide whatever flushing, compressed air, or other cleaning methods necessary to remove all dirt and loose material from the pavement.

Three working days prior to the slurry seal operations, the contractor shall notify all residents, businesses and agencies with an approved written notice detailing the streets and limits of work to be done along, with the hours of work. The contractor shall also post all streets with temporary "No Parking - Tow Away" signs at 50-foot staggered intervals. These signs shall also state the day of the week and hours of no parking.

Immediately preceding the seal application, the Contractor shall cover all grates, slotted manholes, and other appurtenances on and adjacent to the pavement that would allow the entry of the sealing materials; mask with roofing paper, all closed manhole covers, water and gas valve box covers, monuments, monument boxes, etc.; and remove all existing raised pavement markers, paint and thermoplastic pavement markings.

No adhesive material shall be permitted to cover, seal or fill the joint between the frame and cover of the structure. Drainage inlets, shall be uncovered and cleaned to the satisfaction of the Engineer as soon as the seal sets. The other surface utilities shall be uncovered and cleaned of slurry material by the end of the same work day at each location. If they are not uncovered within this time frame, no additional seal shall be placed until they are uncovered.

Gutters, curbs, sidewalks, driveways, shoulders and other structures adjacent to the pavement to be slurry sealed shall be cleaned of excess seal to the satisfaction of the Engineer.

Asphalt pavement, concrete curb, gutter, sidewalk, and other concrete surface structures along existing streets damaged by the Contractor's operations, including but not limited to walkways, lawns and other landscaping, fences, gates, driveways, walls and mail boxes shall be replaced in kind by the Contractor.

Hand tools shall be available in order to remove spillage. Ridges or bumps in the finished surface will not be permitted. The mixture shall be uniform and homogeneous after spreading on the existing surface and shall not show separation of the emulsion and aggregate after setting.

Full compensation for protecting and repairing property as specified herein shall be considered as included in the price paid for other items of work, and no additional compensation will be allowed therefore.

The slurry seal shall be mixed, spread, and placed in accordance with the provisions of Caltrans Standard Specifications Section 37-3, with the following exceptions and additions:

The slurry seal shall not be applied when either atmospheric or pavement temperature is 55° F and falling but may be applied when both the atmospheric or pavement is 50° F and rising. The slurry seal shall not be applied during periods of abnormally high relative humidity that prolongs the curing beyond a reasonable time. Slurry seal shall not be applied when raining or foggy. Slurry seal shall not be applied when freezing or rain is expected within 24 hours.

The slurry seal mixture shall not be applied prior to 8:00 A.M. Also, the slurry seal mixture shall not be applied after 3:00 P.M., except if approved by the Engineer. Approval of applications after 3:00 P.M. will only be for the purpose of completing the section of work then underway. Beginning

a new section of work after 3:00 P.M. will not be permitted.

The surface shall be fogged with water directly preceding the spreader. The slurry mixture shall be of the desired consistency when deposited on the surface. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that complete coverage is obtained. No lumping, balling or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse aggregate will be permitted. If coarse aggregate settles to the bottom of the mix, the slurry will be removed from the pavement. No excessive breaking of the emulsion will be allowed in the spreader box. No streaks such as caused by oversize aggregate will be left in the finished pavement. Ridges (especially at existing raised pavement markers) and washboarding in the finished product will not be allowed.

The slurry mixture shall be uniformly spread. The rear flexible strike-off blade shall make close contact with the pavement.

The slurry seal shall be placed at a rate indicated in these specifications, unless approved by the Engineer prior to start of work. The completed mixture shall be such that the slurry seal mixture has proper workability and will permit traffic flow within four hours after placement without the occurrence of bleeding, raveling, polishing, separation or other distress, and prevent the development of bleeding, raveling, polishing, separation, or other distress within 30 days after its placement.

The quantity of asphaltic emulsion to be used in the slurry seal mixture will be determined from the design asphalt binder content, as approved by the Engineer, and the asphalt solids content of the asphaltic emulsion finished.

The slurry seal mixture shall be applied to the lip of gutter. On streets that have no concrete gutter, the slurry seal shall extend to the face of curb. Any application or spillage beyond this limit shall be removed or cleaned up by the Contractor to the satisfaction of the Engineer. Gutter spills shall be cleaned immediately.

The seal coat shall be applied in such a manner that the joint between the new and existing surface is neat and uniform in appearance true to the line shown on the typical cross section and established by the Engineer. Roofing paper or a comparable substitute shall be used at all ends of slurry seal limits to provide for a clean, neat, and straight definition of the end of the slurry. This includes starts and stops and handwork on turnouts.

Longitudinal joints shall be at the crown of the street or at the edge of travel lanes. Avoid joints in wheel paths.

No excessive buildup or unsightly appearance shall be permitted on longitudinal or transverse joints. Burlap drags shall be used. Overlaps shall not exceed 3 inches.

Approved squeegees shall be used to spread slurry in non-accessible areas to the slurry mixer. Care shall be exercised in leaving no unsightly appearance from hand work.

Slurry seal shall be rolled with a rubber tire roller 9-wheel assembly with a minimum tire pressure of 60 psi.

At any time, the quality of the mix or workmanship is not to the satisfaction of the Engineer, the job shall be discontinued until a correction is made which is satisfactory to the Engineer.

Adequate means shall be provided to protect the slurry seal from damage from traffic until such time that the mixture has cured sufficiently so that the slurry seal will not adhere to and be picked up by the tires of the vehicles.

A sand blotter shall be spread at selected intersections and where required by the Engineer, to accommodate pedestrian or vehicular traffic until slurry sets. Sand blotter shall be placed by lightly broadcasting slurry aggregate so the wet slurry seal is not displaced. Sand blotters at intersections shall be swept within 24 hours of placement or sooner if directed by the Engineer.

Any traffic control devices (barricades, cones, or signs), which are moved in the process of applying the slurry, are to be returned to a proper position by the Contractor as soon as possible.

Wheel tracks, footprints, and other undesired markings in the slurry seal shall be repaired to the satisfaction of the Engineer.

Treated areas will be allowed to cure until such time as the Engineer permits their opening to traffic.

Fourteen days after completion of the slurry sealing, the contractor shall sweep the roadway section including all slurry sealed areas and all gutters to remove accumulated fines from the roadway surface.

Thirty days after completion of the slurry sealing, the contractor shall sweep the roadway section including all slurry sealed areas and all gutters to remove accumulated fines from the roadway surface.

**SECTION 39 – HOT MIX ASPHALT**

**39-1.01A Summary**

Asphalt concrete surface and the placing thereof shall conform to the requirements of Section 39 of the Standard Specifications.

A minimum of two weeks prior to the placement of any Asphalt Concrete, the Contractor shall notify the Engineer of which asphalt plant will be used to supply the mix. For any job, Asphalt Concrete shall be supplied from a single plant.

**39-1.02C Asphalt Binder**

The amount of asphalt binder to be mixed with the aggregate will be specified by the Engineer at the time of paving. A different asphalt binder content may be specified for each lift and each location.

Asphalt binder to be mixed with aggregate for Asphalt Concrete surface, leveling, or Open Graded courses shall be PG-64 grade paving asphalt.

**39-1.02E Aggregate**

The aggregate grading of the various types of Asphalt Concrete shall conform to one of the following as directed by the Engineer:

Surface Course	Type A - ½" Maximum, Medium or Course or ¾ " Maximum, Course
Leveling Course	Type A - ¾ " Maximum, Medium
Asphalt Concrete Base	Type A or B - ¾ " Maximum, Medium
Open Graded	3/8" Maximum

**39-1.09B Subgrade**

The subgrade to receive Asphalt Concrete or Asphalt Concrete Base immediately prior to applying prime coat, shall not vary more than 0.05-foot above or below the grade established by the Engineer.

**39-1.09C Tack Coat**

Prime coat shall consist of either SC-70 or 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, and when the air temperature in the shade is above fifty (50) degrees Fahrenheit, unless otherwise permitted by the Engineer.

- A. Ensure area is clean and dry. All material accumulations which would interfere with the adhesion of the tack coat or with the placing and performance of the asphalt course shall be removed, including dust, loose aggregate, soil, leaves, and pieces or lumps of other foreign material deposited on the surface.
- B. A paint binder (Tack Coat) shall be applied on asphalt to asphalt seams and joints as specified in Section 39-1.09C. Prime Coat and Paint Binder (Tack Coat)," of the State Standard Specifications.
- C. Before placing asphalt concrete, an asphalt emulsion tack coat of 70 percent CSS-1 and 30 percent water shall be furnished and applied uniformly to contact surfaces of all cold pavement joints, curbs, gutters, and all existing pavement to be surfaced in conformance with Section 39 of the Caltrans Standard Specifications. Apply a tack coat of emulsion at a rate of approximately 1 liter/m<sup>2</sup> (0.2 gal/yd<sup>2</sup>) to the sides of the repair area.
- D. If cut does not extend to subgrade, apply prime coat to prepared subbase at 0.2 to 0.25 gallons per sq. yard to fill all void and interstices and uniformly coat subgrade
- E. Asphalt emulsion tack coat shall be applied to any course in advance of spreading the next course at 0.10 to 0.15 gallons per sq. yard. Tack coat shall be applied between all asphalt concrete lifts. If successive lifts are paved on the same day and when the surface temperature of the lower lift has not fallen below 150°F, and the surface of the lower lift is clean, then the tack coat between lifts can be eliminated.
- F. Asphaltic Concrete shall not be placed until the asphaltic emulsion tack coat has cured.

Following application of the prime coat, at least twenty-four (24) hours shall elapse before placing Asphalt Concrete. Any excess asphalt primer shall be blotted up with sand and removed from the grade.

Tack coat shall be diluted SS1 or CSS1, or undiluted RS-1 or CRS-1 type asphalt emulsion.

### **39-3.03 Spreading, and Compacting Equipment**

### **39-3.04 Transporting, Spreading, and Compacting**

- A. From mixing site in trucks having tight, clean compartments.
- B. Coat hauling compartments with lime-water mixture to prevent sticking.
- C. Elevate and drain compartment of excess solution before loading mix.

- D. Provide covers over asphalt concrete mixture to protect from weather and to prevent loss of heat.
- E. During periods of cold weather or for long distance deliveries, pre-insulation around entire truck bed surfaces.

#### **39-3.04A Spreading and Compacting Equipment**

The Asphalt Concrete shall be deposited from the haul vehicle into the hopper of the paving machine.

The practice of depositing the material on the roadbed in a windrow and subsequently using a pick-up machine to deposit the material in the hopper of the asphalt paver will not be allowed. All asphalt shall be placed in such a manner as to avoid separation.

Compaction rollers shall be either 2-axle steel-tired rollers, pneumatic-tired rollers, or approved double-drum vibratory rollers. Steel-tired static compaction rollers shall weigh not less than 12 tons.

Double-drum vibratory rollers shall be operated at a maximum speed of 135-feet per minute (approximately 1.5 mph). Double drum-vibratory rollers shall have a minimum frequency of 2400 VPM and the amplitude shall be field-adjustable.

All pneumatic-tired rollers shall be equipped with an approved wind skirt unless otherwise permitted by the Engineer. Pneumatic-tired rollers used for compaction of Asphalt Concrete Base shall be so equipped that the air pressure in all tires may be regulated uniformly by the operator while the roller is in motion.

Finish rollers shall be 2-axle steel-tired tandem rollers weighing not less than 8 tons.

#### **39-3.04B Spreading and Compacting**

Asphalt Concrete shall not be placed on any roadbed until all utility construction beneath the roadbed has been completed, sewer and water lines have been tested, and water lines chlorinated. The surface course of Asphalt Concrete shall not be placed until final utility connections have been made, unless otherwise permitted by the Engineer.

Asphalt Concrete shall not be placed after thirty (30) minutes before sunset, as established by weather bureau, except as otherwise authorized by the Engineer.

Asphalt Concrete or Asphalt Concrete Base shall not be placed during rainy weather or on a wet surface. Asphalt Concrete shall not be placed when the atmospheric temperature is below fifty

(50) degrees Fahrenheit or conditions indicate it will drop below fifty (50) degrees Fahrenheit before the material can be satisfactorily compacted. Asphalt Concrete Base shall not be placed when the atmospheric temperature is below forty (40) degrees Fahrenheit or conditions indicate it will drop below forty (40) degrees Fahrenheit before the material can be satisfactorily

compacted. Material which cannot be placed in compliance with these requirements shall be rejected.

The compacted thickness of Asphalt Concrete layers shall be as directed by the Engineer. The normal minimum and maximum compacted lift thickness for Asphalt Concrete surfacing are 0.17' and 0.25' respectively. The normal minimum and maximum compacted lift thickness for Asphalt Concrete Base are 0.25' and 0.33' respectively. No layer shall be placed over a layer until the temperature at mid depth is not more than 160 degrees Fahrenheit.

The temperature of the Asphalt Concrete shall be specified by the Engineer. Unless lower temperatures are specified by the Engineer, all mixtures shall be spread, and the first coverage of initial or breakdown compaction shall be performed, when the temperature of the mixture is not less than 250<sup>o</sup> Fahrenheit at mid-depth, and all breakdown compaction shall be completed before the temperature of the mixture drops below 200<sup>o</sup> Fahrenheit at mid-depth. Additional rolling equipment shall be required or the rate of spread shall be reduced to permit compliance with this requirement.

A. Asphalt Concrete surface course and leveling courses.

1. Equipment Required:

If production in any one hours exceeds the limits set forth below, the Contractor shall cease his paving operation until additional rolling equipment has arrived on the project.

i. 125 tons per hour or more:

The Contractor will be required to furnish a minimum of two approved double-drum vibratory rollers and one 8-ton tandem finish roller for each asphalt paver, with a separate operator for each roller.

A pneumatic roller may be substituted for one of the vibratory rollers if approved by the Engineer.

ii. 50-125 tons per hour:

The required minimum rolling equipment specified above may be reduced to one approved double-drum vibratory roller and one 8-ton tandem roller for each asphalt paver, with a separate operator for each roller when the compacted thickness is not less than 0.17'.

iii. 50 tons per hour or less, at any location:

The required minimum rolling equipment specified above may be reduced to one approved double-drum vibratory roller, weighing not more than 12 tons, for each paving machine.

2. Compaction Requirements:

Compaction rolling shall consist of a minimum of four complete vibratory coverages with an approved double-drum vibratory roller.

Finish rolling shall consist of one or more coverages with an 8-ton tandem roller immediately following completion of compaction rolling.

B. Asphalt Concrete Base.

1. Equipment required.

The Contractor shall be required to furnish one approved double-drum vibratory roller and a minimum of one pneumatic-tired roller, with a separate operator for each roller.

An approved double-drum vibratory roller may be substituted for the pneumatic-tired roller specified above.

2. Compaction requirements.

Compaction rolling shall consist of the following: a minimum of two complete vibratory coverages with an approved double-drum vibratory roller, and two complete coverages with a pneumatic-tired roller. The order of rolling shall be specified by the Engineer.

Final rolling shall consist of one coverage with the vibrating units turned off.

Approval of vibratory rollers: The Engineer may approve initial use of a double-drum vibratory roller not previously approved on the basis of tests by other agencies or other information provided by the Contractor.

Approval for subsequent use of the roller shall be based on cores taken from test sections designated by the Engineer and compacted with different numbers of coverages.

Test sections shall be compacted under the following conditions:

- A. Asphalt Concrete temperature at mid-depth shall be between 270- and 280-degrees Fahrenheit at the beginning of rolling. Rolling shall not continue after the mix temperature has dropped to 200 degrees Fahrenheit. The compacted thickness shall be between 2" and 3.5".
- B. The Contractor or manufacturer's representative shall specify the operating conditions of frequency and amplitude.

The basis for approval shall be the attainment of 97% relative compaction and satisfactory surface condition following final rolling. The number of coverages required shall be the minimum number required to obtain 97% relative compaction.

The mix will be sampled during paving of the test sections, and the test maximum density will be the average density of specimens compacted in accordance with California Test 304. The in-place density for each test section shall be the average of three core densities. Relative density will be the ratio of in-place density to test maximum density as determined by California Test 375.

**39-7 SIDE STREET CONFORMS**

**39-7.01 Description**

Side street conforms shall conform to the requirements of City of Cotati Std. 112 with the following additions: The side street structural section shall be 3.5 inches of asphalt concrete base and 2.5 inches of asphalt concrete surfacing between the limits of the main street and the conform line. Beyond the conform line the existing asphalt shall be removed and replaced as directed by the Engineer to provide a smooth transition.

**39-8 EDGE GRINDING**

**39-8.01 Description**

Edge grinding shall be done per City of Cotati Std. 112, 113 and 114.

**39-9 PAVEMENT REINFORCING FABRIC**

**Pavement reinforcement fabric is allowed only with the permission of the City Engineer.**

**39-9.01 Description**

The fabric shall be a needle-punched non-woven 100% polypropylene fabric which conforms to the following properties:

<u>Property</u>	<u>Minimum Value</u>
Tensile Strength, either direction (Per ASTM D1682-64)	90 Lbs.
Elongation at Break, either direction (Per ASTM D1682-64)	50%
Weight, oz./Sq. Yd. (Per ASTM D-1910)	4.0 ± 0.5
Asphalt Retention by Fabric (Army Corps by Engineers Method)	0.20 gsy Residual
Mullin Burst Strength (Per ASTM D-751)	160 psi

Prior to placing the fabric, the existing pavement to receive the fabric shall be cleaned to the satisfaction of the engineer of all materials such as, but not limited to, leaves, sand, dirt, gravel, water and vegetation.

Placement of the fabric shall be made only under the following conditions:

1. The ambient air temperature is above 50 degrees Fahrenheit and rising.
2. The pavement is dry and the pavement temperature is above 40 degrees Fahrenheit and rising.

The surface area to receive the fabric shall be sprayed with steam refined pavement asphalt type AR-4000 at the rate of 0.22 -0.28 gallons per square yard. The Contractor's attention is directed to Section 93-1.03C, "Application" of the Standard Specifications. The exact rate of application will be determined by the Engineer. The asphalt shall be sprayed with a suitably metered truck or the truck must have been recently calibrated by test method California No. 399A. The temperature of the asphalt binder must be spread in the range of 290 degrees Fahrenheit and 365 degrees Fahrenheit.

The width of asphalt application will be the fabric width plus 4 inches. Paving asphalt shall be applied no further in advance of the overlay than the distance which the Contractor can maintain free of traffic and in no case more than 100 yards. The paving operation shall closely follow fabric placement and no more fabric than can be covered up with the hot mix that working day shall be placed.

The fabric shall have no overlap. Fabric shall be butted at all joints. Transverse joints shall be shingled in the direction of paving to prevent edge pick-up by the paver.

The fabric shall be placed into the asphaltic binder with a minimum of wrinkles and broomed or squeegeed to remove any bubbles prior to the binder cooling substantially enough so that the fabric will not adhere to it. The equipment for placing the fabric shall be mechanized and capable of handling full rolls of material and shall be capable of laying the fabric without forming excessive wrinkles and/or folds. As directed by the Engineer, if fabric folds or wrinkles ½ inch in height or greater exist, the fabric shall be slit and allowed to lay flat. Brooming will maximize fabric contact with the pavement surface. The equipment used to place the fabric is subject to approval by the Engineer.

At each utility cover which could be covered with fabric, the fabric shall be neatly cut around the cover to allow for raising the cover to finished grade.

Turning of the paving machine or other vehicles should be gradual and shall be kept to a minimum to avoid damage to the membrane. Should equipment tires tend to stick to the fabric during pavement operations, small quantities of asphalt concrete shall be broadcast ahead to prevent sticking.

Pavement reinforcing fabric shall be Glasspave 25 or equivalent.

## SECTION 39A – ASPHALT CONCRETE TRENCH PAVING

### 39A-1.01 Description

Asphalt concrete surfacing and asphalt concrete base and the placing thereof shall conform to the requirements of Section 39 of the Standard Specifications and as specified herein.

### 39A-2.01 Asphalts

Asphalt thickness for final asphalt surfacing shall conform to City Std. 126 or as shown on the Plans.

**Note to Designer:** State existing section and proposed new trench asphalt concrete thickness.

For temporary paving, use 1/2" maximum, medium grade aggregate and SC 3000 asphalt for use the same day, or SC 250 for use over a one-week period.

The amount of asphalt binder to be mixed with the aggregate will be specified by the Engineer at the time of paving. A different asphalt binder content may be specified for each lift and each location.

### 39A-3.01 General Requirements

The Contractor shall provide compaction of backfill and base material as the job progresses, each day. Temporary paving (2" minimum) will be placed each day over the work, leaving not more than 25 feet unpaved. The balance of the trench shall be covered with steel plates, capable of sustaining normal traffic loads. Temporary A.C. paving shall be used around all edges of steel plates.

Finished asphalt trench paving shall be even, smooth riding and have an appearance that is compatible to the surrounding surface.

Upon placement of the last lift of Class 2 aggregate base as shown for Type A trench on City Std. 126, the Contractor shall cut the edges of pavement in a neat manner to the locations shown on said Std. 126.

## SECTION 40 – PORTLAND CEMENT CONCRETE PAVEMENT

### 40-1.01 General

Portland Cement Concrete Pavement shall be constructed in accordance with Section 40 of the Standard Specifications and as specified herein.

### 40-1.03C Subgrade Preparation

The subgrade to receive concrete pavement, immediately prior to placing, shall conform to the compaction and elevation tolerances specified for the material involved and shall be free of loose or extraneous material.

### 40-1.03E Joints

Expansion joints shall be constructed in accordance with the details and at the locations shown on the Plans and in conformance with the requirements of Section 73 of the Standard Specifications.

### 40-1.03K Bar Reinforcement

Reinforcement, where required, shall conform to the provisions of Section 52 of the Standard Specifications, the details as shown on the Plans, and as directed by the Engineer.

## SECTION 51 – CONCRETE STRUCTURES

### 51-1.02F Mortar

Mortar shall consist of a mixture of Type II Portland Cement complying with ASTM C150, sand, and water. Sand for mortar shall be clean, dry, well-graded sand, free of organic or other deleterious matter, silt or other objectionable matter, and shall be of such size as determined by laboratory sieves, that all will pass a No. 30 sieve size, square openings.

Mortar shall consist of one part by volume of cement and three parts by volume of sand. The mortar shall contain only enough water to permit placing and packing. Mixed mortar shall be used before initial set and in no case will re-tempering with additional water be permitted.

Mortar shall conform to the requirements of Section 51-1.02F of the State Standard Specifications.

After placing, all surface of mortar shall be cured by the water method in accordance with Section 90-1.03B, "Curing Concrete" of the State Standard Specifications, for a period of not less than 3 days.

### 51-1.03H Curing

After placing, all surface of mortar shall be cured by the water method in accordance with Section 90-1.03B, "Curing Concrete" of the State Standard Specifications, for a period of not less than 3 days.

### 51-7 Minor Structures

Catch basins shall be constructed to the details and at the locations shown on the plans and in accordance with these Specifications. Catch basin covers shall be concrete with cast iron frame.

Storm drain manholes and drop inlets shall be constructed in conformance with the details and at the locations shown on the plans and in accordance with these Specifications.

Storm drain manholes shall be standard 48" diameter precast concrete manholes or 60" diameter precast concrete manhole at the locations shown on the plans and in accordance with City Standard Details.

Concrete for manhole bases shall be Class A Portland cement concrete conforming to the applicable requirements of Section 90 of the Standard Specifications and shall be poured full thickness against the sides of the manhole excavation or shall be formed.

Manhole barrels and taper sections shall be precast concrete sections using Type II Portland cement complying with ASTM Designation: C150. The barrel and taper sections shall be constructed in accordance with the applicable provisions of ASTM Designation: C478.

Top of manhole frames and covers shall be set accurately to the final finished grade in paved

streets and to the elevation shown in unimproved areas.

Concrete for catch basins shall be Class "A" Portland cement concrete conforming to the requirements of Section 90 of the Standard Specifications.

In lieu of inspection of reinforcing steel as provided under Section 52-1.02B of the Standard Specifications, upon request the Contractor shall furnish the Engineer with a certificate from the supplier of the reinforcing steel stating that the steel delivered complies with the requirements of Section 52-1.02B of the Standard Specifications.

Bar reinforcing shall conform to and be placed in accordance with Section 52-1.02B of the Standard Specifications.

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 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.

Drop inlets and grates shall be bicycle-safe and designed for H20 loading. Frame and grate shall be hot-dipped galvanized after fabrication.

## **SECTION 56 – SIGNS**

Street name signs and traffic regulatory signs and hardware which are not to be mounted on traffic signal mast arms or poles shall be provided and installed by the Contractor at the locations shown on the Cotati Std. 401, 402 and 403.

Existing street name signs and traffic regulatory signs which are not on traffic signal mast arms/poles shall be relocated as shown on the Plans by the Contractor.

New street name signs and traffic regulatory signs and brackets to be mounted on traffic signal mast arms/poles shall be provided and installed by the Contractor.

Existing street name signs and traffic regulatory signs on traffic signal mast arms/poles will be relocated by the Contractor.

## SECTION 63 - CAST-IN-PLACE CONCRETE PIPE

### 63-1.02 Materials

Consistency of the concrete shall be determined in accordance with ASTM C143. Maximum slump shall be 2-inches.

### 63-1.03 Inspection

For private development projects, full time inspection of all public cast-in-place concrete pipe shall be provided by the project developer. The name and contact information for the specialty inspector shall be submitted to the City Public Works Department two weeks prior to commencement of pour. No pipe shall be poured without the presence of the specialty inspector onsite. Within 30 days of completion of pour, the private inspector shall submit to the City an inspection report listing dates, locations, measured wall thickness, and other details of the inspection. The private inspector's report shall certify that the pipe meets the requirements of the specifications and shall be stamped and signed by a registered civil engineer. No paving or other construction over the pipe, except backfilling, shall proceed prior to City approval of the private inspector's report. The private inspector shall comply with OSHA requirements for permit-required confined spaces per Federal Register 29 CFR part 1910.146.

### 63-1.05A Structures

Where shown on the plans, inlet and outlet structures shall be constructed or installed in connection with cast-in-place concrete pipe. Where such structures are constructed or installed, the ends of pipes shall be placed flush or cut off flush with the structure face, unless otherwise directed by the Engineer.

A starter section shall be used where the beginning of a run of cast-in-place concrete pipe is at a structure, and a closing section shall be used where a run cannot be completed because of lack of clearance ahead in the trench. Starter sections, as required, shall be 6 feet in length and of the same inside diameter as the cast-in-place concrete pipe. Manhole bases and or structures may be formed by opening and troweling the cast-in-place concrete pipe on continuous runs.

Structures shall be as described in Section 51-7 of the City of Cotati Construction Specifications for Public Improvements.

### 63-1.06 Curing and Protecting Concrete

Backfill shall be placed in accordance with Std. 126 of the City of Cotati Standard Plans except that the pipe bedding specifications shall not apply.

Curing and protecting concrete shall comply with the following requirements: The concrete shall be cured by placing trench backfill complying with the specifications contained in Std. 126 to an approximate depth of 0.5-foot following application of either a waterproof membrane or a pigmented curing compound as provided in Section 90-1.03B, "Curing Concrete."

Hand spraying of the curing compound will be permitted. During the period following the placement of the concrete, the ends of the pipeline shall be covered with suitable material to maintain a humid condition within the pipe for a minimum of 7 days.

Initial backfill placement shall be made immediately after the concrete has hardened sufficiently to prevent damage to the pipe during backfill operations.

The concrete pipe shall be protected as provided in Section 90-1.03C, "Protecting Concrete."

After the pipeline has been completed, but not prior to 7 days following the placement of the concrete, the Contractor shall backfill the pipe trench in accordance with the requirements of Std. 126.

In all cases, the Contractor shall be responsible for correcting any damage to cast-in-place concrete pipe caused by premature or excessive loading prior to the end of a 7-day curing period.

**63-1.07 Television Inspection of Cast-in-Place Concrete Storm Drain Pipe**

Television inspection of cast-in-place concrete storm drain pipe shall be as described in Section 79 of these Specifications.

**SECTION 63 – ASBESTOS CEMENT PIPE**

**SECTION REPLACED**

Asbestos cement pipe is not authorized for use within the City of Cotati.

## SECTION 64 – PLASTIC PIPE

### 64-1.02 Materials

Plastic pipe for use in public storm drain systems shall be Type S, smooth interior wall, corrugated exterior wall, high density polyethylene pipe (HDPE) as specified in AASHTO designation M294. Pipe shall be manufactured from virgin compounds with no plasticizers. HDPE compounds used in the manufacture of plastic pipe shall be per the Standard Specifications.

Pipe couplings and fittings shall be a bell and spigot joint with a rubber gasket on the spigot meeting ASTM F-477 and shall provide a soil-tight seal and be made of the same material and from the same manufacturer as the pipe. The method of joining pipes and fittings shall be as recommended by the pipe manufacturer. Pipes and fittings coupled together shall have no more than one corrugation distance of separation between them.

### 64-1.02B Excavation and Backfill

Excavation and backfill shall be as shown on Std. 126 of the City of Cotati Standard Plans and the following provisions.

The space between the pipe and trench wall shall be wider than the compaction equipment used in the pipe zone, regardless of the dimensions shown on the Std. 126 unless CLSM backfill material is used.

Pipe bedding will be placed in 6" (maximum) lifts to 6" above the top of pipe with each lift hand or mechanically tamped. The final lift may be compacted with a plate type vibrating compactor.

During construction, heavy equipment vehicle loads shall be avoided over the pipe or additional cover shall be placed at vehicle crossings.

### 64-1.03C Laying Pipe

Plastic storm drain pipe shall be installed in accordance with the Standard Specifications, generally accepted practice and on the alignment and grade as shown on the plans. When long radius curves are permitted, adjustments in horizontal alignment will be achieved through adjustments at each coupling, within manufacturer's specification, and not by bending of the pipe.

Pipe shall be centered in the trench.

Unless otherwise specifically permitted by the Engineer, all pipe shall be laid upgrade.

Where ground water or surface drainage occurs, pumping shall continue until backfilling has progressed to a sufficient height to prevent flotation of the pipe.

**64-1.05 Television Inspection of Plastic Storm Drain Pipe**

Television inspection of plastic storm drain pipe shall be as described in Section 79 of these Specifications.

**64-1.06 Trench Shoring and Bracing - Storm Drain**

All bracing and shoring shall conform to Section 65-5 of these Specifications.

## SECTION 65 – REINFORCED CONCRETE PIPE

### 65-1.01 Description

Reinforced concrete pipe shall be installed on the alignment and grade as shown on the plans and in accordance with the applicable provisions of Section 65 of the City of Cotati Construction Specifications and as directed by the Engineer. Reinforced concrete pipe shall be Class III, Class IV, or Class V, as shown on the plans, and shall conform to the provisions of ASTM C76.

### 65-2.02 Materials

All concrete pipe shall conform to the provisions of Section 65-2.02 of the Standard Specifications prior to shipment from the manufacturer.

### 65-2.03B Earthwork

Excavation and backfill shall conform to the City of Cotati Construction Specifications. Backfill shall be in accordance with Std. 126 and as shown on the plans.

If, during excavation for any culvert or structure, material is encountered which is unsuitable as a foundation for such culvert or structure, such unsuitable material shall be removed to a depth as required by the Engineer and the resulting space shall be refilled with approved material.

Trenching operations shall be conducted in such a manner as not to disturb the existing curb and gutter and existing utilities.

Trenching operations for pipelines and structures shall be conducted in such a manner to minimize damage to existing tree roots. Hand digging shall be used where necessary to protect tree roots. Where tree roots are encountered, root pruning shall be accomplished by use of sharp tools appropriate for the size of root to be cut. Each cut shall be clean with no torn bark or splintered wood remaining on the tree. All tree work shall be performed by a certified arborist from the list approved by the City.

All raised pavement markers, street striping, chatter bars or any other traffic markings disturbed during work shall be replaced in kind by the Contractor to the satisfaction of the Engineer.

Excavation and backfill shall be as shown on Std. 126.

### 65-2.03D Laying Pipe

Unless otherwise specifically permitted by the Engineer, all pipe shall be laid upgrade. No pipe shall be laid which is cracked, checked, spalled, or damaged and which, in the opinion of the Engineer, is unsuitable for use.

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 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.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the contractor for the safe and efficient execution of the work. All pipe, fittings, and accessories shall be carefully lowered into the trench by means of derrick, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. The pipes and accessories shall be inspected for visible defects prior to lowering into the trench. Any visibly-defective or unsound pipe shall be replaced.

The line and grade of existing utilities designated to remain shall not be altered. Any leakage caused in existing utilities by reason of the Contractor's operations shall be immediately repaired at the Contractor's expense.

Existing water lines shall be supported in place maintaining service during construction. The Contractor shall be responsible for any damage to the water lines during construction and any damage resulting from improper backfilling techniques. Water services shall be relocated where encountered during construction and as shown on the plans.

Existing sewer lines shall be supported in place maintaining service during construction. The Contractor shall be responsible for any damage to the sewer lines during construction and any damage resulting from improper backfilling techniques.

#### **65-4 Television Inspection of Reinforced Concrete Storm Drain Pipe**

Television inspection of cast-in-place concrete storm drain pipe shall be as described in Section 79 of these Specifications.

#### **65-5 TRENCH BRACING AND SHORING – STORM DRAIN**

##### **65-5.01 Description**

All bracing and shoring shall conform to the Division of Industrial Safety Construction Safety Orders which are currently in use.

The Contractor shall take all necessary measures to protect the workers and adjacent areas and structures from the hazards of the trenching or excavation operations.

## SECTION 66 – CORRUGATED METAL PIPE

### 66-1.02 Description

All corrugated metal pipe shall meet the requirements of Section 66 of the Standard Specifications. Corrugated aluminum pipe, if used, shall meet the requirements of Section 66-1.02F of the Standard Specifications.

## SECTION 71 – SEWERS

### 71-1.02 Materials

Sewer pipe to be installed shall be ductile iron pipe, high density polyethylene, or polyvinyl chloride pipe, in conformance with the appropriate provisions of the City of Cotati Construction Specifications, as noted on the Plans and as specified herein. Asbestos cement pipe shall not be allowed.

#### 71-1.02A Polyvinyl Chloride (PVC) Pipe

PVC solid wall sewer pipe and fittings for gravity sewer shall be made from all new, rigid, unplasticized polyvinyl chloride in accordance with ASTM Standard Specifications D3034 and F679 and shall have a wall thickness of at least SDR 26. Joints shall consist of an integral thickened bell-and-rubber ring and shall provide for expansion and contraction at each joint. The rubber ring shall be compatible with the pipe manufacturer's recommended lubricant.

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

All PVC pipe entering or leaving a concrete structure shall have an elastomeric waterstop firmly clamped around the pipe exterior and cast into the structure base per City Standard 500.

#### 71-1.02B Restrained Joint (PVC) Pipe and Fittings

Restrained joint PVC pipe and fittings shall conform to the requirements of ASTM D2241. Joints shall be gasketed and conform to the requirements of ASTM D3139 and ASTM F477. Use only full circle type restraint clamps. Restraint systems that use set screws that impose point loads on the pipe will not be permitted.

#### 71-1.02C Ductile Iron Pipe

Ductile iron pipe shall be cement lined, new pipe conforming to ANSI A 21.51-197s or most recent issue, if any 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 specifically specified on the Plans.

Ductile iron pipe used in force mains shall be polyethylene or epoxy lined.

All ductile iron pipe buried underground shall be encased in polyethylene film in the tube form. Polyethylene material and installation procedure for the encasement shall conform to ANSI/AWWA C105/A21.5-82 or most recent issue, if any. Installation Method "A" as described in aforementioned specification shall apply.

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

### **71-1.02D Ductile Iron Restrained Joint Fittings**

Restrained joint fittings shall be ductile iron in accordance with applicable requirements of ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53 of latest revision and shall be compatible with the type and pressure class of pipe used.

### **71-1.02E Sewer Force Main and Gravity HDPE Pipe**

The Contractor shall provide high density polyethylene pipe (HDPE) as specified. The pipe shall be made to diameter and tolerances in accordance with ASTM F714. All pipe shall be made from virgin grade material. The pipe shall be of the diameter and class shown or specified and shall be furnished complete with all fabricated fittings, and other appurtenances as necessary for a complete and functional system.

Markings: Pipe materials shall be legibly marked by the pipe manufacturer. The following shall be printed on the pipe:

1. Name and trademark of manufacturer.
2. Nominal pipe size.
3. Standard Dimension Ratio.
4. The letters PE followed by the polyethylene grade per ASTM D1248 followed by the Hydrostatic Design Basis in hundreds of psi.
5. Manufacturing Standard Reference.
6. A production code from which the date and place of manufacture can be determined.

The Contractor shall provide submittals to the Engineer for approval on all materials.

Quality Control Submittals:

1. HDPE Pipe, Butt-Fusion Welded Joints:
  - a. The Contractor shall provide written verification that personnel using the fusion joining equipment are trained in the skills necessary for the correct joining of HDPE pipe and recommended methods for service connections to the satisfaction of the pipe supplier. Certification of the training shall be provided from the certified representative of the pipe manufacturer.
  - b. Fusion equipment shall be operated only by technicians who have been certified by the pipe manufacturer or supplier and who have a minimum of five (5) years of experience fusion welding pipelines. The technician's experience shall be documented in the HDPE pipe submittal, including a current (within the past three years) training certificate.
  - c. The Contractor shall perform trial fusion welds and submit samples to the Engineer for review prior to installation of the pipe. Full penetration welds shall provide a homogeneous material across the cross section of the weld. The fusion machine and technicians employed for the trial welds shall be the same utilized for the installation work.
  - d. Quality assurance procedures certified by the pipe manufacturer to be in full

accordance with the requirements of this Specification shall be submitted by the Contractor.

2. Certification. The Contractor shall furnish a certified affidavit of compliance for all HDPE pipe and fittings furnished confirming that the materials supplied fully conform to the requirements specified herein.
3. Certifications of Calibration: Approved testing laboratory certificate or manufacturer's calibration certificate.
4. Quality assurance procedures shall be performed by the pipe manufacturer fully in accordance with the requirements of this specification. The certification shall include certified laboratory data confirming that said tests have been performed on a sample of the pipe to be provided under this contract, or pipe from that production run, and that satisfactory results were obtained.

#### Shop Drawings:

1. The Contractor shall submit catalog cuts, specifications, dimensioned drawings, installation details and sketches, and other pertinent information for the HDPE pipe installation work. All materials provided shall be in full accordance with the requirements of the reference specifications specified above.
2. The Contractor shall verify with the pipe manufacturer all connection details.
3. The Contractor shall submit detail drawings and a written description of the construction procedure to install pipe.

Pipe shall be high molecular weight, high-density polyethylene pipe. The material shall be listed by the Plastic Pipe Institute (PPI) with a designation of PE 3608 and have a minimum cell classification of 345464C, D, or E as described in ASTM D3350. The pipe material shall meet the requirements for Type III, Class B or C, Category 5, Grade P34 material as described in ASTM D1248. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material pipe. Pipe and fittings shall be made in conformance with ASTM F714 and ASTM D3261 as modified for the specified material. The pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other injurious defects. It shall be uniform in density and other physical properties. Any pipe not meeting these criteria shall be rejected.

Only tools approved by the pipe manufacturer or the Engineer shall be used for assembly of pipe fittings and service connections to ensure proper installation.

The heater plate used for pipe joining shall be equipped with suitable means, such as thermometers or pyrometers, to measure the temperature of plate surfaces and to ensure uniform heating.

Butt fusion fittings shall be in accordance with ASTM D3261 and shall be manufactured by injection molding, a combination of extrusion and machining, or fabricated from HDPE pipe conforming to this specification. All fittings shall be pressure rated to provide a working pressure rating no less than that of the pipe. Fabricated fittings shall be manufactured using a McElroy Data logger to record fusion pressure and temperature. A graphic representation of the temperature and

pressure data for all fusion joints made producing fittings shall be maintained as part of the quality control. The fitting shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

Each polyethylene fusion fitting shall meet all the material requirements established for the pipe to which the fitting is to be jointed. Fittings fabricated from pipe shall be manufactured from pipe stock with a wall thickness at least 25% greater than that of the pipe to which the fitting is to be jointed or shall be otherwise externally reinforced so that the fitting carries a pressure rating equal to that of the pipe from which it is made. Each fitting shall be designed and manufactured to operate at not less than the design pressure of the pipe system for which it is intended.

Polyethylene pipe shall be joined by butt fusion welding, as specified herein.

**RESTRAINED JOINTS:**

Mechanical restraint for HDPE may be provided by mechanical means separate from the mechanical joint gasket sealing gland. The restrainer shall provide wide, supportive contact around the full circumference of the pipe and be equal to the listed widths. Means of restraint shall be machined serrations on the inside surface of the restrainer equal to or greater than the listed serrations per inch and width. Loading of the restrainer shall be by a ductile iron follower that provides even circumferential loading over the entire restrainer. Design shall be such that restraint shall be increased with increases in line pressure.

Serrated restrainer shall be ductile iron ASTM A536-80 with a ductile iron follower; bolts and nuts shall be corrosive resistant, high strength alloy steel.

The restrainer shall have a pressure rating of, or equal to that of the pipe on which it is used or 150 PSI whichever is lesser. Restrainers shall be JCM Industries, Sur-Grip or pre-approved.

<u>Nominal Size</u>	<u>Restraint Width</u>	<u>Serrations per inch</u>
4", 6"	1-1/2"	8
8", 10" & 12"	1-3/4"	8

Pipe stiffeners shall be used in conjunction with restrainers. The pipe stiffeners shall be designed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless steel to the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE. Stiffeners shall be by JCM Industries or pre-approved equal.

Install in accordance with manufacturer's recommendations and as directed herein.

**JOINING:**

**BUTT FUSION:** Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in

the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a McElroy Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records.

**SIDEWALL FUSION:** Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.

**MECHANICAL:** Bolted joining may be used where the butt fusion method cannot be used. Flange joining will be accomplished by using a HDPE flange adapter with a ductile iron back-up ring. Mechanical joint joining will be accomplished using either a molded mechanical joint adapter or the combination of a Sur-Grip Restrainer and Pipe Stiffener as manufactured by JCM Industries, Inc. Either mechanical joint joining method will have a ductile iron mechanical joint gland.

**OTHER:** Socket fusion, hot gas fusion, threading, solvents, and epoxies may not be used to join HDPE pipe.

**QUALITY AND WORKMANSHIP:** The pipe and/or fitting manufacturer's production facility shall be open for inspection by the owner or his designated agents with a reasonable advance notice. During inspection, the manufacturer shall demonstrate that it has facilities capable of manufacturing and testing the pipe and/or fittings to the standards required by this specification.

**PIPE PACKAGING, HANDLING & STORAGE:** The manufacturer shall package the pipe in a manner designed to deliver the pipe to the project neatly, intact and without physical damage. The transportation carriers shall use appropriate methods and intermittent checks to insure the pipe is properly supported, stacked and restrained during transportation such that the pipe is not nicked, gouged, or physically damaged.

Pipe shall be stored on clean, level ground to prevent undue scratching or gouging. If the pipe must be stacked for storage, such stacking shall be done in accordance with the pipe manufacturer's recommendations. The pipe shall be handled in such a manner that it is not pulled over sharp objects or cut by chokers or lifting equipment.

Sections of pipe having been discovered with cuts or gouges in excess of 10% of the pipe wall thickness shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the heat fusion joining method.

Fused segments of the pipe shall be handled so as to avoid damage to the pipe. Chains or cable type chokers must be avoided when lifting fused sections of pipe. Nylon slings are preferred. Spreader bars are recommended when lifting long fused sections.

### **71-1.03 Excavation and Backfill**

Backfill shall be in accordance with City Standard 126 except trench backfill section in roadways and paved areas shall be CDF.

Sheet piling and other sheeting shall be withdrawn in such a manner as to prevent caving at the walls of excavations or damage to piping or other structures. Except as may be hereinafter modified, no sheeting shall be left in the trench and no backfill shall be made against the sheeting before it is removed. Any sheeting extending below the invert of the pipe shall be left in place by cutting off in a manner satisfactory to the Engineer.

Trenching operations shall be conducted in such a manner not to disturb the existing curb and gutter and the existing utilities. Flow shall be maintained in any sanitary sewers, storm drains, water lines, or water courses encountered in trenching.

The Contractor shall remove all water which may accumulate in the excavation during the progress of the work can be done in the dry. Trenches shall be kept free from water while the pipe or other structures are installed and until backfilling has progressed to a sufficient height to anchor the work against possible flotation or leakage. At all times, the Contractor shall have sufficient pumping machinery available for immediate use. Water shall be disposed of in such a manner as to cause no injury to public or private property, or be a menace to public health.

Blasting will not be permitted.

All trench excavation materials from trenches shall be the property of the Contractor. None of the excavation material shall be disposed of on the work site. Prior to disposal of any material, the Contractor shall submit to the Engineer written authorization for such disposal of material and entry permission signed by the owners of the disposal site, and shall comply with any other requirements of disposal, such as City and County permits, as may be required.

All raised pavement markets, street striping, chatter bars or any other traffic markings disturbed shall be replaced in kind by the Contractor to the satisfaction of the Engineer.

All cutting, handling and disposal of asbestos cement pipe shall be done in compliance with the Contractor's State Licensing Law and all other applicable laws and regulations.

### **71-1.03A Trench Bracing and Shoring**

All bracing and shoring shall conform to the Division of Industrial Safety Construction Safety Orders which are currently in use.

The Contractor shall take all necessary measures to protect the workmen and adjacent areas and structures from the hazards of the trenching or excavation operations.

Settlement monitoring shall be required for major excavations where shown on the plans, next to existing improvements or as directed by the City 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 details shown on City Standard 500.

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 therefore a shorter section of barrel.

Trimming of taper sections is not permitted.

All sections of removed and or replaced manhole barrels shall be sealed with a preformed mastic seal, Ram-Nek or approved equal. Exterior joints shall be taped using a 6-inch wide 60 mil tape, Infi-shield or approved equal.

After placing the surface course of asphalt concrete, all manholes and cleanouts shall be located and marked with white paint before the close of that working day.

Within two working days of paving, all manholes and cleanouts shall be adjusted to grade and inspected.

Existing grade adjustment rings in the adjustment of manhole frames shall become the property of the Contractor.

#### **71-1.05**    **Pipe Laying**

Where groundwater occurs, pumping shall continue until back filling 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 damage or not be a hazard to public health.

Where construction consists of constructing a new main or extension of an existing main, the downstream end of the new main shall be securely closed with a tight-fitting plug until the construction is accepted by the Engineer.

If the new sewer main is connecting to an existing main at a location other than a manhole, prior to requesting the staking, the Contractor shall pothole the existing sewer main to verify invert grades and locations.

Sewer pipe shall be laid in straight lines and on uniform rates of grade between points where changes in alignment or grade are shown on the Plans. The interior of the pipe shall be free of

foreign matter before lowering into the trench.

The pipe manufacturer's written instructions covering the installation of the pipe shall be closely followed unless otherwise directed by the Engineer or as specified herein. After each pipe section is laid, the pipe joints shall be checked by the Contractor with a feeler gauge to determine if the rubber ring is properly seated for push on joint PVC or D.I. pipe. The trench shall not be backfilled until authorized by the Engineer. Pipe laying shall proceed upgrade with the spigots pointing in direction of flow. The invert of the pipe shall be set at required line and grade as determined from batter boards set not over 25 feet apart. Electro-optical grade setting devices may be used provided the Contractor certifies that the device will be operated by a person proficient in its operation.

Any section of pipe found to be defective or which has had grade or joints disturbed shall be re-laid by the Contractor at his expense.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and efficient execution of the work. All pipe, fittings, and accessories shall be carefully lowered into the trench by means of derrick, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. The pipe and accessories shall be inspected for visible defects prior to lowering into trench. Any visibly defective or unsound pipe shall be replaced.

The line and grade of existing utilities shall not be altered. Any leakage caused in existing utilities by reason of the Contractor's operations shall be immediately repaired at the Contractor's expense.

Existing storm drains shall be supported or removed and replaced at the Contractor's option. In any case, the Contractor shall be responsible for maintaining the existing line and grade of the storm drains. If the Contractor elects to remove and replace, backfill shall be in conformance with City Standard 126.

Existing water lines shall be supported in place with service maintained during construction. The Contractor shall be responsible for any damage to the water lines during construction and any damage resulting from improper backfilling.

Existing sewer lines shall be supported in place with service maintained during construction. The Contractor may, at his option, remove and replace any sewer laterals which are not in use during construction. The Contractor shall be responsible for repairing damage to sewer lines during construction and any damage resulting from improper backfilling.

Sewer lateral inverts shall be set at or above the midpoint of the sewer main. Sewer laterals shall be placed at the locations shown on the Plans or as directed by the Engineer. The Engineer shall have the authority to direct the Contractor as to the location of laterals to be placed in the field. Typically, each sewer lateral found to exist shall be replaced, unless specifically deleted by the Engineer. In all cases, a minimum separation of five (5) feet shall be left between parallel sewer

laterals and water services.

#### **71-1.07 Sewer Structures**

Manholes shall be standard precast concrete manholes as detailed on City Standard 500, and as shown on the Plans. Mains larger than 27" in diameter require 60" diameter manholes. Concrete manhole bases may be precast or cast-in-place. Precast concrete manhole bases must be approved by the City Engineer.

Manhole bases may be poured-in-place concrete on undisturbed earth. The bases shall be poured a minimum full thickness as shown on City Standard 500 against the side of the manhole excavation or to dimensions shown on the Plans if the dimension exceeds the minimum required. The manhole excavation site shall be dewatered before pouring.

Pre-cast manhole bases, conforming to City Standard 500 in dimensions and the requirements outlined below for materials may be used. Such pre-cast bases shall be placed on a minimum 6-inch-thick cushion of drain rock, as specified in City Standard 500. The drain rock shall extend a minimum of 6 inches beyond the outside edges of the base.

Concrete for manhole bases shall be Class A Portland cement concrete conforming to the applicable requirements of Section 90 of the Standard Specifications. The Portland cement shall be Type V conforming to ASTM C 150 or low-alkali-Type II cement meeting the requirements for Type V cement.

Where steel reinforcement is required in manhole base construction, such reinforcement shall be furnished and placed as shown on the plans and in accordance with the applicable provisions of Section 52 of the Standard Specifications.

The base slab and initial riser section shall be connected to create a watertight joint per City Standard 500. Flow channels shall be constructed as shown on the Plans. Changes in size or grade shall be made gradually and changes in direction by smooth curves. All finished surfaces shall be smoothly troweled with a steel trowel. All manhole barrels and taper section shall be precast concrete sections using Type V Portland cement complying with ASTM C150 or low-alkali Type II cement meeting the requirements for Type V cement.

The 48-inch and 60-inch diameter barrels and taper sections shall be constructed in accordance with the applicable provisions of ASTM C478 and shall be inspected by the Engineer to determine that the interior surfaces are smooth and free of pockets or depressions.

Manhole frames and covers shall be in accordance with City Standard 512.

Tops of manhole frames and covers shall be set accurately to finished grade in paved streets and one foot above finished grade in unimproved areas. The frames shall be evenly set per City Standard 500. Where manholes are set above finished grade, the earth shall be mounded up around the manhole in a neat and acceptable manner to the satisfaction of the Engineer.

Where sewer pipe is to be installed into or out of existing manholes, and the invert of the new connection penetrates the manhole barrel section, the barrel section wall shall be core drilled. The Contractor shall install an elastomeric seal and silicone caulk per City Standard 533. Where sewer pipe is to be installed into or out of existing manholes, and the invert of the new connection penetrates the manhole base the manhole base may be chipped and the Contractor shall install an elastomeric waterstop and 316 stainless steel band per City Standard 500. Form a smooth channel in the manhole base using Dam-It by Euclid. For either method the Contractor shall backfill the area around the pipe with a non-shrink grout to insure a watertight connection.

All joints in manholes shall be sealed by means of a preformed, self-bonding, self-sealing plastic gasket, such as "Ram-Nek" manufactured by the K.T. Snyder Company, Houston, TX, or approved equal. Joint seals shall be installed in full compliance with the manufacturer's current recommendations.

#### **71-1.07A Chimney Sections**

All manhole castings shall be adjusted to meet final paving elevation with the installation of concrete grade rings shall be installed per City Standard 500 and as described herein.

After final installation a final deviation of more than 0.25 inch between the top of the manhole lid and the surrounding paving at any location shall be cause for rejection. Installation of Adjusting Rings shall be per manufacture's recommendations. In order to achieve a flush finish between the top of the concrete cone section and the first grade ring the alignment tab on grade ring bottom may need to be removed so that the grade ring will sit on the manhole cone section flush and not have point loading.

Clean and inspect the top surface of the concrete cone. The surface should be smooth and free of bumps and pits that may prevent a good water tight seal. Smooth the top of the concrete cone with a chisel or grind the surface as needed to remove protrusions. Clean the concrete cone or top slab with a whisk broom. Ensure a flat seating surface free of rocks, gravel, blacktop, protruding concrete or debris. Utilize compressed air to blow dust and debris from the surface after grinding. Where the top of the concrete cone is rough, use non-shrink hydraulic cement, according to manufacturer's recommendations, to fill in depressions and smooth the concrete cone. Grinding and grouting shall be done when required to:

1. Remove any protrusions over ¼ inch.
2. Make the manhole ring stable without any rocking prior to foaming.

The HDPE adjusting ring system shall be measured in place dry prior to final assembly. The annular space between the rings and cone basin, the rings, and the rings and cover frame shall be sealed utilizing an approved construction foam in accordance with manufacturer's instructions. With the sealant applied, place the first ring down onto the cone or top slab with the male lip into the opening. The ring must be stable prior to foaming. Point loading on the ring is cause for rejection of the finished work.

Prior to setting the cover frame in place, construction foam sealant shall be placed on the top of the last ring. Be sure to apply the sealant in a location so that it contacts the cover frame the full 360 degrees. With the sealant applied, set the cover in place verifying that it is centered on the top ring. Install external joint seal over the entire chimney area, extending from the cover to three inches below the top of the cone. Wrap with 60 mil 6-inch-wide corrosion prevention tape.

## **CONCRETE COLLARS**

No backfilling, except with concrete, will be permitted, except over excavated areas may be filled with CLSM. Seal all saw cut grooves beyond the edge of concrete. Concrete collars shall be constructed with quick set concrete, mixture to be approved by the Engineer. Except as approved by the Engineer, Contractor shall keep traffic off of raised facilities for 24 hours.

The surface of the finished concrete shall be finished 2 inches below flush with the pavement. The top surface of the cast collar shall be screeded off at the correct elevation to receive and support the full depth of the pavement surface course. Contractor shall let the 8" concrete collar cure for 24 hours prior to traffic loading. Cover manhole with steel plate during curing process. The concrete shall attain a modulus of rupture of 1,000 pounds per square inch prior to beginning paving operations.

### **71-1.08 Trench Resurfacing**

Trench resurfacing shall be as shown on Standard 126, "Standard Trench Detail," except that aggregate base shall be replaced with asphalt concrete paving and as specified in Section 39A, "Asphalt Concrete Trench Paving," of the City of Cotati Construction Specifications.

### **71-1.09 Testing of Sewers**

Testing of all portions of the sewer including manholes will be required.

All sewer pipes shall be tested per the appropriate test as described in City Standard 530 and 530A guidelines or as described below. Manholes shall be tested per City Standard 530B. The Contractor shall furnish to the City a 5% deflection mandrel and proving ring for gravity mains as shown on City Standard 518 at the City's request.

GRAVITY HDPE PIPELINES: Trunk sewers with no lateral connections between manholes constructed of HDPE shall be tested in accordance with ASTM F1417. All other HDPE sewers shall be tested per City Standard 530A, 530B and 530C.

HDPE Force Mains shall be tested as referenced in City Standard 530B.

## SECTION 72 – SLOPE PROTECTION

### 72-1.01 Description

Slope protection shall consist of loose rock riprap. The slope protection shall be placed at the location shown on the Plans in conformance with the requirements of the Standard Specifications and the Sonoma County Water Agency Flood Control Design Criteria Manual.

### 72-2.02 Materials

Loose Rock Riprap - Rocks shall be angular and well graded from an average diameter of four

(4) inches to an average diameter of fifteen (15) inches with approximately fifty (50) percent by weight smaller than nine (9) inches in average diameter. Not more than ten (10) percent of the rock riprap by weight shall be less than four (4) inches average diameter. An occasional rock having an average diameter of not more than 20 inches may be included, provided that no more than five (5) percent of the rock riprap area shall have these larger rocks projecting above the neat lines, but in any event the total rock mass shall be dense and well-integrated.

#### 72-2.02C Grouted Rock Riprap

Grouted rock riprap shall be constructed in accordance with the details as shown on the Plans, Standard Specifications, as specified herein, and at the direction of the Engineer.

Concrete for grouted rock riprap shall be in accordance with Section 90 of the Standard Specifications and shall be Class "C".

Rocks shall not exceed a one-foot diameter and shall not be less than three inches in diameter. Rocks shall be so placed as to provide a minimum of voids and the larger rocks shall be placed in the toe course and on the outside surface of the slope protection. The rock may be placed by dumping and may be spread in layers with suitable equipment. Local surface irregularities of the grouted rock riprap shall not vary from the plan slopes by more than six inches, measured at right angles to the slope.

The surfaces of the rock to be grouted shall be cleaned of adhering dirt and clay and moistened. Grout shall be brought to the place of final deposit by means of chutes, tubes, or buckets, or may be placed by means of pneumatic equipment or other mechanical methods. In no case shall grout be permitted to flow on the rock riprap a distance in excess of ten feet. Immediately after depositing, the grout shall be spaded and rodded into place with suitable spade trowels or other approved means until a minimum penetration of eight inches is achieved.

Grouted rock riprap shall be cured as provided in Section 90 of the Standard Specifications.

## SECTION 73 – CONCRETE CURBS AND SIDEWALKS

### 73-1.05C Curb Construction

Portland cement concrete curb and gutter shall be constructed in conformance with the details and at the locations shown on the Plans and in accordance with the applicable provisions of Section 73 of the Standard Specifications and as specified herein.

Curb openings, for driveways, shall be constructed at existing driveways, and at locations shown on the Plans or directed by the Engineer.

All concrete which is to be removed from curb, gutter, and driveway areas shall be removed to the nearest construction joint or as directed by the Engineer.

Median curb per City of Cotati Standard Details shall be constructed at the locations shown on the Plans and in accordance with the applicable provisions of Section 73 of the Standard Specifications and these modifications.

All oil, paint, tire marks, and other discoloring shall be removed from the curb and gutter by sandblasting prior to acceptance by the Engineer. Cement mortar will not be an acceptable substitute for sandblasting.

No deduction in measured length of curb and gutter to be paid for will be made for curb openings for driveways.

### 73-1.07 Sidewalk, Driveway, Island Paving, Handicap Ramp, and Valley Gutter Construction

Portland cement concrete sidewalk shall be constructed in accordance with the details and at the location shown on the Plans and in conformance with the requirements of Section 73 of the Standard Specifications and as specified herein.

All concrete which is to be removed from sidewalk and driveway areas shall be removed to the nearest transverse score mark across the full width of sidewalk or construction joint as directed by the Engineer.

Concrete for sidewalk shall conform to the requirements of Section 73 of the Standard Specifications.

All soft or spongy material shall be removed and replaced with suitable material as required by the Engineer.

Portland cement concrete driveways shall be constructed in conformance with the details and at the locations shown on the Plans and in accordance with the applicable provisions of Section 73 of the Standard Specifications, and as specified herein.

Island paving shall be constructed in accordance with the details and at the location shown on the Plans, and as directed by the Engineer.

Curb ramps shall be constructed in accordance with the details and at the locations shown on the Plans in accordance with 2015 Caltrans standard plans RSP A88A.

Portland cement concrete valley gutter shall be constructed in accordance with the details and at the location shown on the Plans and in conformance with the requirements of Section 73 of the Standard Specifications.

Concrete for valley gutter shall conform to the requirements of Section 73 of the Standard Specifications and as specified herein.

All soft or spongy material shall be removed and replaced with suitable material as required by the Engineer.

## SECTION 76 – CONCRETE CYLINDER PIPE

### 76-1.01 General

Concrete Cylinder Pipe or Reinforced Mortar Pressure Pipe shall meet the requirements of Section 76 as specified herein. If Concrete Cylinder Pipe is selected, it shall conform to the requirements specified in this section and cathodic protection shall be provided as specified in herein.

### 76-1.02 Description

Mortar lined and coated steel cylinder pipe shall be pretensioned concrete cylinder type in accordance with AWWA C303 and as noted herein. Piping shall be per AWWA C303 for piping inclusive of 60-inch diameter, unless otherwise noted.

Pretensioned concrete cylinder pipe shall conform to AWWA C303 and its appendix except as follows. All piping and appurtenances shall be designed for 100 psi working pressure minimum and shall be capable of withstanding a trench load of 20 feet. Rubber gaskets shall conform to Section 76-1.02 (4), "Flanges, Gaskets, and Bolts", as specified herein. Buttering material for sealing interior joints and grout for exterior sealing of joints shall conform to mortar specified in section 3.10 of AWWA C303.

Piping shall be designed in accordance with the appendix of AWWA C303. Pipe diameter referred to is inside diameter of pipe after installation of pipe lining.

Piping 48-inch diameter and larger shall be designed to limit deflection. When this type of pipe is used for 48-inch diameter and larger pipe, the Contractor shall assume complete responsibility for proper installation to prevent deflections in excess of the limits specified in Section 76-1.07, "Laying Concrete Cylinder Pipe", Part 50, "Pipe Deflection", as specified herein.

1. Materials: Cement shall be Portland cement in accordance with ASTM C150 and shall be Type II. Steel cylinders shall be ASTM A570 structural quality Grade C and shall be 10 gauge minimum. Steel for joint rings shall conform to ASTM A570 Grade A and shall be minimum 12 gauge for diameters up to 18 inches, minimum 3/16 inch for diameters 18 through 42 inches and ¼ inch for diameters 48 inches and larger. Spigot rings shall be formed from hot rolled steel having Carnegie Shape M3516.
2. Construction: Reinforcing bars shall be wound helically around the cylinder under a tensile stress in accordance with AWWA C303. A device shall be provided for stressing, measuring, and indicating the tension of the bar reinforcement during the winding operation.

As the circumferential bar reinforcement is wound, a Portland cement paste composed of one sack of cement to not more than five gallons of water shall be applied to the rod or to the cylinder in such a manner that the section of bar bearing on the cylinder shall be coated with cement paste.

Immediately preceding application of concrete encasement, a cement paste composed of one sack of Portland cement to not more than five gallons of water shall be applied uniformly over the steel surface.

3. Data Required: The manufacturer shall provide the following data in addition to the other requirements herein: an affidavit of compliance; design calculations; steel test reports; concrete test reports; rubber gasket test reports; and the pipe laying diagram. The pipe shall be marked in accordance with AWWA C303.
4. Flanges, Gaskets, and Bolts: Steel pipe flanges whose nominal diameter is 6 inches or greater shall conform to AWWA Standard C207, Class D. All flanges shall be furnished with gaskets, studs, or bolts and nuts. Where a flange is not connected to another appurtenance or pipe, a blind flange shall be attached.

Gaskets for flanges shall be 1/16-inch thick, rubber or asbestos composition. The gaskets shall conform to ASTM Designation F104 (112100-M6).

Unless otherwise specified, all bolts, studs, and nuts shall be steel conforming to the requirements of ASTM Designations A307, A325, or approved equal. Washers shall be forged or rolled steel. All bolting material shall be cadmium plated.

Unless otherwise specified, steel bolts shall be furnished with regular semi-finished hexagonal heads and nuts. Bolt heads and nuts shall be sufficient to break the bolt in the body portion when tested.

5. Protective Coatings for Appurtenances: This section covers the preparation of surfaces and the application of protective coatings and related materials as required to complete the work as specified herein.

Galvanized metal, non-ferrous metal parts, stainless steel parts, austenitic gray iron, and high nickel cast iron parts shall not be coated unless otherwise specified in these specifications. Surfaces not to be coated shall be protected from contamination and damage during the cleaning and coating of adjacent surfaces.

The items listed in the following schedule shall be shop-coated, unless otherwise specified. Field coating may be permitted on items not specified herein upon approval of the Engineer.

Coating materials, minimum number of coats, and minimum dry film thickness for the various items of work shall be as specified below, unless otherwise shown on the drawings. Surface preparation and undercoat(s) shall be in accordance with the coating manufacturer's recommendations.

<u>ITEM</u>	<u>COATING</u>
All bolts, nuts and washers.	Cadmium plated in accordance with ASTM Designation A165.
Exterior surfaces of buried blind flanges.	Two coats, 8 mils each, Kopper's Bitumastic 300 M coat-tar epoxy or ENGARD 800 coal tar epoxy or approved equal.
Interior ferrous surfaces of blind flanges and valves.	Same as Item "B".
All surfaces of buried valves.	Same as Item "B".
Exterior surfaces of pipe ends to coal-tar enamel coating and wrapping.	Same as Item "B"; extend for all sleeve-type couplings.
Exterior surfaces of nuts and sleeve-type couplings, and blind flanges.	One coat, 8 mils, of bolts for flanged joints, Kopper Bitumastic 300M coal-tar epoxy or Engard to be applied after installation and hand tool cleaning.

Compensation for furnishing and application of protective coatings will be deemed included in the contract prices for the various items of work and no additional payment will be made therefore.

6. Marking of Pipes. Each pipe section and special fitting shall be marked clearly on the interior surface with the manufacturer's name or trademark and the date of manufacture. In addition, special marks of identification, sufficient to show the proper location of the pipe or special fitting in the line, shall be placed on each pipe or special.

Each pipe shall be marked with a designation, e.g. 48 PT 100. The first number denotes pipe inside diameter in inches; "PT" denotes pretensioned pipe; and the last number denotes the operating head in psi, as specified herein.

The pipe coating shall be marked with the date the coating was applied.

#### **76-1.07 Laying Concrete Cylinder Pipe**

1. Alignment, Angles, and Bends. In general, the centerline of the pipe shall be as shown on the Plans. When necessary, and with the approval of the Engineer, the pipeline may deviate slightly from this alignment.

Changes in the direction of alignment or grade of the pipeline shall be accomplished by using specially fabricated bends, by beveling the ends of the pipe, or by pulling the joints. It is desirable to eliminate special sections or fittings wherever possible and the Contractor

may submit alternate curves for approval by the Engineer. Wherever a grade break is shown on the drawings at a specific station, it is permissible to alter said station so that the change in grade is more gradual and can be taken up in the joints without exceeding the allowable angle of deflection recommended by the pipe manufacturer.

In general, the Contractor shall hold the flow line of the pipe at or below the specific elevation denoted on the profile. When necessary, and with the approval of the Engineer, the pipeline may deviate slightly from this profile; however, in no case shall the top of the pipe have less than the cover indicated on the typical trench details shown on the Plans.

Beveling pipe ends to provide for angles in the pipeline, where fittings or specials are not used, shall be accomplished by cutting the pipe sections to the proper length and beveling one or both ends of each pipe section by welding the bell or spigot ring to the pipe cylinder at a deflection of no more than five degrees from the plane perpendicular to the longitudinal axis of the pipe section. Pulled joints will be permitted at beveled pipe ends.

2. Joints and Couplings. Field joints may be either welded or rubber gasketed type, except where specifically shown on the Plans and where welding is necessary to anchor pipe in tension.

Where the words "weld joints" are shown on the profile sheets, the Contractor is required to weld the joint. The weld may be on the inside or outside.

The Contractor shall weld all vertical and horizontal joints which deflect more than five degrees. The length of pipe to be welded shall be as shown on the Plans.

All field-welded joints shall conform to the requirements of AWWA Standard C206 as modified herein.

Bell and spigot joints shall be double-welded (an inside and outside weld) at concrete encasements and in casings under highways and railroads. Prior to backfilling this type of joint, the Contractor shall test the joint in accordance with AWWA Standard C206, Section A8-2, paragraph 2.2, or by soap or wash pass test.

Where flanged coupling adapters are specifically called for on the drawings, the coupling shall be harnessed against tension in accordance with AWWA Manual M-11 design details. Where there will be no tension across a joint and the Contractor uses a flexible coupling, at his option, the harness may be omitted. The outside of pipe cylinders to be fitted with flexible couplings shall be free from surface defects and shall have the longitudinal or spiral welds ground to plate or sheet surface for a distance of 10 inches back from the pipe ends. Pipe cylinders shall have tolerances within the limits required by the manufacturer of the coupling to be used.

3. Pipeline Anchorage. The Contractor shall provide such anchorage for the pipeline, fittings, and appurtenance structures as may be required to adequately resist 150% of the pipeline

working pressures specified herein.

Anchorage for the pipe against longitudinal thrust, when the bend is greater than 5 degrees, shall be provided by Portland Cement Concrete thrust blocks or by welding for the required distances on each side of the vertical or horizontal bends, as shown on the Plans. The length of welded joints each side of a mainline valve shall be the same as for a 90-degree deflection as shown on the Plans. Field-welded joints shall be as specified in Section 76-1.07 as specified herein.

The City retains the right to inspect any and all welds. Any welds found to be unacceptable shall be rewelded and retested. The Contractor will be responsible for the cost of any retesting of welds.

All welds shall be sandblasted prior to grouting of the joints.

In lieu of welding the pipe, Portland Cement Concrete thrust blocks shall be required at bends, tees, and reducers. The concrete thrust blocking shall be as shown on the Detail Sheet provided in these specifications.

4. Pipe Cleaning and Leakage Test. The Contractor, after placement of the pipe, shall remove all construction materials and shall sweep or otherwise clean the pipe of all dirt and debris.

After the backfill has been completed, the pipeline and valves shall be tested for water-tightness by filling it with water and bringing the hydrostatic pressure to not less than 25 percent and not more than 50 percent in excess of the "working pressure". "Working pressure" for the pipeline shall be 100 psi minimum.

The Contractor shall furnish necessary bulkheads, pumps, pressure gages, means of measuring water loss, water, and all other equipment, materials, and labor required for making the test.

The line shall be isolated for testing by placing temporary bulkheads in the pipe. The Contractor shall contact the Public Works Department (707) 665-3638 for information regarding allowable uses of City water and available sources of water, other than the City water system, for construction purposes.

The amount of water required to maintain the test pressure shall be measured accurately by means approved by the Engineer. While the pipe is under pressure, a survey shall be made by the Contractor along the pipeline for leaks. Regardless of the test results, all detectable leaks shall be repaired by the Contractor and the pipeline retested so that the remaining amount of leakage can be determined. If the leakage rate exceeds that specified, the repair and retest procedure shall be repeated until the pipeline passes the leakage test.

For the pipeline to satisfactorily pass the leakage test, the measured leakage under the test shall not exceed 40 U.S. gallons per inch of inside diameter per 24 hours per mile of pipe.

5. Pipe Deflection. Vertical ring deflection in pipe after backfill shall not exceed the following limits:

Pretensioned Steel Cylinder Concrete Pipe is  $\left(\frac{D^2}{4000}\right)$  inches.

Where "D" is nominal pipe diameter in inches.

If deflections are found to be in excess of the above, the pipe shall be uncovered and allowed to reround, and the bedding and backfill shall be re-compacted. If the pipe lining or coating is damaged or if the pipe does not reround to less than the above limits, it shall be replaced at the Contractor's expense.

6. Bedding. Pipe bedding shall conform to City Std. 126.
7. Dewatering. The Contractor shall perform all dewatering and maintain temporary drainage as required to keep the excavation free of water through the construction operations.

Wherever necessary for dewatering or to provide proper drainage, the Contractor shall, at his own expense, furnish and operate all necessary pumping equipment, drainage sumps, well point system, and other drainage facilities.

8. Warning Tape. After bedding is completed and before backfilling begins, the Contractor shall furnish and install underground line warning ribbon or tape, one foot above the pipeline. The tape shall be made of high-quality polyethylene base material that will resist acids, alkalis, and other substances normally found in soils. The tape shall have a thickness of at least .004-inch and have a width of at least 6 inches. The tape shall be color-coded (nonfading bright green) with overcoating printing which reads continuously:

"CAUTION CAUTION"  
"PRESSURIZED WATER"

The tape shall be Brady Identoline or approved equal. The cost of furnishing and installing this tape shall be considered as included in the contract price for the appropriate pipe item.

## SECTION 77 – PIPE CASING

### 77-1.01 Description

Pipe casing shall conform to the requirements of the Plans, Sections 65 and 66 of the Standard Specifications and as specified herein.

The method of installing the casing shall be at the Contractor's option. The casing may be either 5/8" thick corrugated galvanized steel liner plate, 5/8" thick steel pipe, or reinforced concrete pipe, Class III minimum. The casing shall be of sufficient strength to withstand surface loads imposed by E80 railroad loads under the railroad area and H20 highway loads under the highway area and must also be of sufficient strength to withstand all additional construction loads. Method of installation and materials to be used shall be submitted to the Engineer for approval. If corrugated steel liner plate or steel pipe is used, the liner or the pipe shall be galvanized and bituminous lined and coated. Bituminous coating shall be either field applied or furnished by the manufacturer and shall conform to the following specification. Coating may be either asphalt mastic or tar base.

Corrugated steel liner plate or steel pipe shall be galvanized in accordance with ASTM A-123-71. Bolts, nuts, and pipe plugs shall be galvanized in accordance with ASTM A-153-67.

Bituminous coating shall be as per AASHTO Designation M243-73 Asphaltic Mastic or Tar Base. All galvanized surfaces shall be coated.

The excavated hole shall be as per AASHTO Designation M243-73 of one-part Type II Portland Cement and two parts sand conforming to ASTM C33 and graded so that 100% by weight will pass a standard No. 8 mesh sieve, and at least 48% by weight will pass a standard No. 40 mesh sieve, and the minimum amount of water required for mixing and placing. Sluicing and jetting with water will not be permitted.

## SECTION 78 – REINFORCED PLASTIC MORTAR PRESSURE PIPE

### 78-1.01 General

Reinforced Plastic Mortar Pressure Pipe shall only be used with the permission of the City Engineer.

Concrete Cylinder Pipe or Reinforced Plastic Mortar Pressure Pipe shall conform to the requirements of the Standard Specifications and as specified herein. If Reinforced Plastic Mortar Pressure Pipe is selected, it shall conform to the requirements specified in this section and cathodic protection shall not be required, except for the "Pipe Casing" specified in Section 77 if corrugated steel liner plate or steel pipe is used.

### 78-1.02 Description

Reinforced Plastic Mortar Pressure Pipe shall be manufactured in accordance with ASTM D3517 and as specified herein.

All piping and appurtenances shall be designed for 100 psi working pressure minimum and shall be capable of withstanding a trench load of 20 feet.

All Reinforced Plastic Mortar Pressure Pipe shall be designed to limit deflection. When this type of pipe is used, the Contractor shall assume complete responsibility for proper installation to prevent deflections in excess of the manufacturer's recommendations.

1. Data Required: The manufacturer shall provide the following data in addition to the other requirements herein: an affidavit of compliance; design calculations; test reports on pipe and joints; pipe laying diagram; and five copies of the manufacturer's installation guide.
2. Marking of Pipes: Each pipe section and special fittings shall be marked clearly on interior surface with the manufacturer's name or trademark and the date of manufacture. Pipe markings shall be in accordance with ASTM D-3517. In addition, special marks of identification, sufficient to show the proper location of the pipe or special in the line, shall be placed on each pipe or special.

### 78-1.04 Laying Reinforced Plastic Mortar Pressure Pipe

1. Angles, and Bends: Laying of reinforced Plastic Mortar Pressure Pipe shall be as specified in Section 76-1.07, "Laying Concrete Cylinder Pipe", Part 1, except that the last paragraph is not applicable.
2. Joints, Couplings, and Adapters: Joints shall be as specified in ASTM D-3517. Couplings and adapters shall be as recommended by the manufacture.
3. Pipeline Anchorage: The Contractor shall provide such anchorage for the pipeline, fittings, and appurtenance structures as may be required to adequately resist 150% of the pipeline working pressures specified herein.
4. Portland Cement: Concrete thrust blocks shall be required at bends, tees, and reducers. The concrete thrust blocking shall be as shown on the detail sheet provided in these specifications.

5. Pipe Cleaning and Leakage Test: The Contractor, after placement of the pipe, shall remove all construction materials and shall sweep or otherwise clean the pipe of all dirt and debris.

After the backfill has been completed, the pipeline and valves shall be tested for water tightness by filling it with water and bringing the hydrostatic pressure to not less than 25 percent and not more than 50 percent in excess of the "working pressure". "Working pressure" for the pipeline shall be 100 psi minimum.

The Contractor shall furnish necessary bulkheads, pumps, pressure gages, means of measuring water loss, water, and all other equipment, materials, and labor required for making the test.

The line shall be isolated for testing by placing temporary bulkheads in the pipe. The Contractor shall contact the Public Works Department at (707) 665-3638, for information regarding allowable uses of City water and available sources of water, other than the City water system, for construction purposes. **CORRECT REFERENCE NUMBER?**

The amount of water required to maintain the test pressure shall be measured accurately by means approved by the Engineer. While the pipe is under pressure, a survey shall be made by the Contractor along the pipeline for leaks. Regardless of the test results, all detectable leaks shall be repaired by the Contractor and the pipeline retested so that the remaining amount of leakage can be determined. If the leakage rate exceeds that specified, the repair and retest procedure shall be repeated until the pipeline passes the leakage test.

For the pipeline to satisfactorily pass the leakage test, the measured leakage under the test shall not exceed 40 U.S. gallons per inch of inside diameter per 24 hours per mile of pipe.

6. Bedding: Pipe bedding shall conform to City Std. 126 except that pipe bedding material shall be 4 sack Portland Cement concrete with aggregate graded as follows: 100% passing 3/4", 30% to 70 % passing #4, and 0% to 10% passing a No. 200.
7. Dewatering: Dewatering shall be as specified in Section 76-1.07, "Laying Concrete Cylinder Pipe", Part 7.
8. Warning Tape: Warning tape shall be as specified in Section 76-1.07, "Laying Concrete Cylinder Pipe", Part 8.

## SECTION 79 – VIDEO INSPECTION OF STORM DRAINS

### 79-1.01 Description

Television inspection of all new and modified storm drain pipes and structures is required.

The contractor shall hire an independent pipe video inspection service to perform the inspection. The camera used shall be self-propelled or pulled, be able to pan and tilt and shall be equipped with high-intensity lights. A digital video on DVD in an acceptable format of the television inspection shall be produced along with a printed log of the inspection and delivered to the Engineer. The pipe video inspection service shall be pre-approved by the City.

The pan and tilt color camera used for the inspection shall be specifically designed and constructed for such inspection. The camera shall be mounted on adjustable skids or tractor to keep it in the center of the pipe. Lighting for the camera shall be supplied by a lamp(s) on the camera, capable of being dimmed or brightened remotely from the control panel. The lighting system shall be capable of illuminating the entire periphery of the pipe. The color camera shall be operative in 100% humidity conditions and shall have a minimum of 330 lines of resolution but must be capable of discerning small, hairline cracks and other minor defects.

The pan and tilt color camera shall be moved through the line at a uniform slow rate of 30 feet per minute maximum. A 2- inch depth gauge shall be pulled or pushed in front of the camera.

All pipe cleaning prior to the video inspection will be at the contractor's expense. All cleaning water and debris shall be captured, removed and properly disposed. Cleaning water will not be allowed to discharge to the storm drain system.

The contractor is responsible for all stuck, broken or lost equipment and shall bear all necessary cost to retrieve said equipment including dig ups.

All work performed must meet quality and clarity standards set by the City of Cotati and are subject to Public Works review. A pan and tilt color camera will be used for all video inspections of storm drains within the jurisdiction of the City of Cotati.

The following conditions shall exist prior to the television inspection:

- All storm drain pipes shall be installed, grouted, backfilled to 5 feet over the top of the pipe or to subgrade, and compacted;
- Conduits or pipelines for all underground utilities (sewer, water, cable television, telephone, electrical, gas, street light) that cross storm drain trench shall be installed;
- The bases of all structures shall be in place and grouted;
- The system shall be cleaned and all debris removed;

- Street shall be unpaved;

When the above work has been completed, the contractor shall notify the Engineer 48 hours in advance of the date for television inspection. Immediately before inspection the system shall be flushed with clean water. During this inspection, the contractor or authorized representative shall be present to observe the video as provided by the television camera.

At the beginning of each run of storm drain pipe the video shall display:

1. The project name;
2. Date;
3. Company performing the inspection;
4. Run number (unique designation for each section of pipe);
5. Street name (if applicable);
6. Pipe size;
7. Pipe material;
8. Structure numbers (as labeled on the plans) at each end of the pipe;
9. Direction of the camera;
10. Type of structure.

The video tape shall display the following information continuously during the run:

1. The camera's location via a continuously updated footage counter measuring the distance from point of entry;
2. Project name;
3. Structure numbers (as shown on the plans) at each end of the run;
4. Run number.

The camera shall stop at all structures, connections or defects (sags, bad joints, etc.) for a period of at least 10 seconds and be noted on the log sheet. The camera will be panned or tilted toward the connection or defect so that any portion of the connection or defect that is visible from within the pipe or structure can be completely inspected.

1. A printed record shall be made for each pipe run and shall clearly show the:
2. Run number;
3. Structure number at each end of the run;
4. Direction of camera travel;
5. Location and description of each defect discovered by the camera;
6. Line size;
7. Length of run;
8. Structure depths;
9. Location of blind connections.

The video inspection disk or tape and report shall be delivered together to the Engineer and become the property of the City of Cotati.

The following video tape observations shall be considered defects in the construction of the storm drain system and will require corrections prior to acceptance:

- Off grade - 0.08' or more deviation from grade;
- Joint separations;
- Offset joints;
- Cracked or damaged pipe or evidence of the presence of an external object bearing upon the pipe (rock, root, etc.);
- Debris or other foreign objects;
- Pipe deflections greater than 7.5% of base diameter, measured inside the pipe;
- Other obvious deficiencies when compared to approved Plans and Specifications, these Standards and City Design and Construction Standards.

The contractor will be notified in writing of any deficiencies revealed by the television inspection that will require repair, following which the contractor shall excavate and make the necessary repairs and request a television re-inspection. Television re-inspection shall be at the contractor's expense.

Any subsequent televising of the lines, if deemed necessary by the City, shall be completed at the City's expense. Any defects found prior to or during the warranty period shall be corrected by the contractor.

**SECTION 80 - FENCES**

**80-3 CHAIN LINK FENCES**

**80-3.01 General**

The chain link fence, gates, and appurtenances to be erected under this contract shall be constructed in accordance with Section 80 of the Standard Specifications, the details shown on the Plans, as specified herein, and as directed by the Engineer.

The fence and gates shall consist of six-foot-high steel mesh fabric with a top rail and topped by three strands of barbed wire equally spaced six inches apart on angled extension arms for a total fence height of approximately seven feet. Existing cross fences shall be connected to the new fences. Corner posts with braces for every direction of strain shall be placed at the junction with existing fences. The wire in the new and existing fences shall be fastened to the posts.

**80-3.02 Materials**

Fabric: Chain link fence fabric shall be galvanized steel fabric conforming to the specifications of AAFHP Designation M-181. The fabric shall be #9-gauge, 72" high, and woven into approximately a two-inch mesh. All chain link fabric shall be galvanized after weaving by the hot dip process with a minimum of 1.2 ounces of zinc retained per square foot of uncoated wire service.

Posts and Framework: All posts, gate frames, and top rails shall be steel pipe galvanized according

O.D. Minimum Weight Per L.F.

Line Posts	2"	2.72
Terminal and Corner Posts	2½"	3.65
Gate Posts	4"	9.11
Top Rails	1-5/8"	2.27
Gate Frames	1-5/8"	2.27

to the specifications of AASHO Designation M-111 and shall conform to the following dimensions and weights:

Line post spacing shall not exceed ten-foot centers. All line and corner posts shall be a minimum of nine feet in length and gate posts a minimum of ten feet in length.

Braces: All terminal and corner posts shall be truss braced from a first line post to the bottom of the terminal post with a 3/8" galvanized truss rod assembly.

Gates: Two 8-foot drive gates providing a 16-foot wide clear opening shall be provided and installed where shown on the Plans and as directed by the Engineer. Gates shall be provided with catch and locking attachment of an approved design which will not rotate around the latch post. Stops to hold gates open and a center rest with catch shall be provided. Gate hinges shall provide a 90-degree opening. All fittings shall be hot dip galvanized.

### **80-3.03    Construction**

The fence shall be installed by skilled and experienced fence erectors on lines and grades furnished by the Engineer. Line and corner posts shall be set in concrete foundations a minimum of 36" inches deep and gate posts a minimum of 48" deep. Concrete foundations shall be no less than three times the diameter of the posts.

### **80-5        REDWOOD FENCES**

#### **80-5.01    Description**

Redwood fencing shall be constructed in accordance with the details shown on the Plans as specified herein and as directed by the Engineer.

#### **80-5.02    Materials**

Fencing materials shall consist of the following:

- 4"x4" Posts @ 6'0" O.C.
- 2"x4" Running Rails, Top and Bottom
- 1"x6" or 1"x8" Fence Boards (5')

All fencing material shall be standard, rough-sawn redwood.

#### **80-5.03    Gates**

Existing gates shall be relocated as shown on the Plans and as directed by the Engineer. Gates shall be rehung from 4"x4" redwood posts.

## SECTION 81 – MONUMENTS

### 81-1.01 General

All City monuments shown on the Plans shall be placed in accordance with the requirements of Section 81 of the Standard Specifications and as specified herein.

The exact location of the monuments will be established by the Engineer as shown on subdivision map and upon completion, the monuments will be checked and the center point stamped by the Contractor's/Developer's Engineer.

## SECTION 83 – RAILING AND BARRIERS

### 83-1.02B Railing

The work shall consist of constructing metal tube bridge railing (Type 116) at the locations and in accordance with the details shown on the Plans, and as specified in Section 83 of the Standard Specifications and as specified herein, and as directed by the Engineer.

Metal beam guard railing shall conform to the provisions in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications and as specified herein. Line posts and blocks shall be wood.

When metal beam guard railing is connected to structures, walls or abutments, the structure, wall or abutment will be considered the end post and the point used for measuring the rail length shall be the midpoint between the 2 bolts attaching the rail element to the structure, wall or abutment.

The quantities of return and end sections and the various types of terminal sections will be determined as units from actual count.

### 83-1.02D Steel Bridge Railing

Metal tube bridge railing, metal beam guard railing, terminal end sections and all hardware shall be ASTM A-588 structural steel (USS Cor-10 or Bethlehem MAYARI or equal).

## SECTION 84 – TRAFFIC STRIPES AND PAVEMENT MARKINGS

### 84-1.01 General

Traffic stripes and pavement markings shall conform to the applicable provisions of Section 84 of the Standard Specifications, Part IV of the City Traffic Standards, and as specified herein and shall be done at the locations shown on the Plans.

Existing stripes and pavement markings which are damaged by the work shall be replaced.

## SECTION 85 – PAVEMENT MARKERS

### 85-1.01 Description

Raised pavement markers shall be placed in conformance with the details and at the locations shown on the Plans and in accordance with the applicable provisions of Section 85 of the Standard Specifications, as specified herein and of SECTION 4: City Traffic Standards, Part IV.

The exact location and limits of raised pavement markers will be determined in the field by the Engineer.

Existing raised pavement markers conflicting with the proposed striping shall be removed immediately prior to placement of new markers.

Existing raised pavement markers to remain, which are damaged by the Contractor, shall be replaced.

Raised pavement markers shall be installed the day following pavement overlay.

**SECTION 86 – TRAFFIC SIGNAL DETECTOR LOOPS AND VIDEO DETECTION SYSTEM  
(ELECTRICAL SYSTEMS)**

**86-1.01    Summary**

The Contractor shall furnish and install traffic signal detector loops or video detection system shown on the Plans in conformance with the applicable provisions of Section 86, "Electrical Systems", of the Standard Specifications and Standard Plans, the SECTION 4: City Traffic Standards, as specified herein, and as directed by the Engineer.

**86-2        MATERIALS AND INSTALLATION**

**86-2.01    Excavation & Backfill**

Trenching depth shall be as specified herein.

**86-2.05    Conduit**

Conduit shall conform to the Standard Specifications and SECTION 4: City Traffic Standards.

**86-2.06    Pull Boxes**

Pull boxes shall conform to SECTION 4: City Traffic Standards and as specified herein. All existing pull boxes to receive new conductors and/or conduits shall be cleaned out, all existing grout removed, and the bottoms regouted with a drain hole or the boxes replaced to meet current City Traffic Standards.

**86-2.08    Conductors and Cables**

All conductors for traffic signal or street lighting systems shall conform to Section 86 of the Standard Specifications SECTION 4: City Traffic Standards, as shown on the Plans, or as specified herein.

**86-2.09    Wiring**

Wiring shall conform to the Standard Specifications and SECTION 4: Traffic Design Standards.

**86-2.14C   Functional Testing**

The functional test for each traffic signal detector loops or video detection system shall consist of not less than 48 hours of continuous, satisfactory operation. If unsatisfactory performance of the system develops, the conditions shall be corrected and the test shall be repeated until the 48 hours of continuous, satisfactory operation is obtained.

**86-5        DETECTORS**

**86.5        Inductive Loop Detectors**

Inductive loop detectors shall conform to V-J and V-K of the City Traffic Standards. Detector handholes shall be Type A installed per Caltrans Standard Specifications. Any existing traffic signal detectors shown on the Plans to remain that are damaged shall be replaced at the Contractor's expense within five (5) working days or as directed by the Engineer.

## SECTION 90 - CONCRETE

### 90-1.01A Summary

Class A concrete shall be truck-mixed, ready-mixed concrete consisting of a mixture of Type II Portland Cement complying with ASTM C150, sand, fine aggregate, coarse aggregate, and water. The proportions of the water, sand, and aggregate shall be regulated so as to produce a plastic, workable, and cohesive mixture. All materials required, and the procedure of mixing, shall conform to the provisions of Section 90 of State Standard Specifications.

Class A concrete shall contain 564 pounds (six sacks) of Portland Cement per cubic yard and shall have a 28-day compressive strength of 4000 pounds per square inch. Placement and consolidation of concrete shall conform to the provisions of Section 90 of State Standard Specifications.

### 90-1.01C(6) Mix Design

Reports of concrete mix designs shall be provided for review by the Engineer.

### 90-1.03B Curing Concrete

Curing of concrete shall conform to the provisions of Section 90-1.03B of State Standard Specifications.

## SECTION 99 – WATER MAIN CONSTRUCTION

### 99-1.01 Description

All water mains and related appurtenances shall be constructed in accordance with the City of Cotati Standard Details and Specifications and “Approved Materials List”, the Standard Specifications for Public Works Construction “Greenbook” and the Plans.

### 99-1.02 Pipe

The pipe, except where otherwise specified on the Plans, can be either ductile cast iron or polyvinyl chloride (PVC), all in accordance with the following:

1. Ductile iron pipe shall be cement lined, new pipe conforming to AWWA C151 or most recent issue, if any, 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 end, “Tyton Joints” or mechanical joints except where otherwise specified on the Plans.
2. Polyvinyl chloride (PVC) pipe shall be new pipe, minimum Class 150, or as shown on the Plans and conforming to the requirements of AWWA C900 “Standard for Polyvinyl Chloride Pressure Pipe, 4 inch through 12-inch for Water” and shall be furnished with either bell ends or couplings designed to affect an elastomeric pressure seal.
3. 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.

The pipe shall be tested in accordance with the most recent American Water Works Standard Specifications and amendments thereto for the pipe furnished. The testing shall be performed in a State licensed materials testing laboratory where the testing standards meet or exceed State of California testing standards.

Accompanying or preceding each load of pipe delivered, a certificate shall be furnished to the City certifying that the pipe which is (to be) delivered has been tested and meets the requirements of the American Water Works Association Standard Specifications. The certificate shall identify the pipe by manufacturer’s name, lot number, and date tested by a State certified materials testing laboratory.

4. Number 12 insulated copper wire (THWN) shall be laid on top of and along the entire length of all non-metallic service laterals and mains, and shall be extended to the surface at all valve location blow-offs and meter boxes sufficiently for locator equipment to be attached.

### 99-1.03 Polyethylene Water Service Tubing

All polyethylene water service tubing shall conform to the latest AWWA Standards as described in ANSI/AWWA of the latest revision for 3/4-inch and 1-inch tubing.

#### **99-1.04 Fittings**

All fittings shall be new gray iron or ductile iron fittings conforming to ANSI/AWWA C110/C153 of latest revision and shall have the proper type of ends to match the type of pipe used.

Gray iron fittings shall be coated inside and outside with a petroleum asphaltic coating conforming to AWWA C110 and shall meet or exceed the pressure rating of the pipe to be installed.

Ductile iron fittings shall be cement mortar lined in accordance with AWWA C104 of latest revision and shall have a petroleum asphaltic coating conforming to AWWA C110. Ductile iron fittings shall have a minimum pressure rating of 250 psi and shall otherwise meet or exceed the pressure rating of the pipe to be installed and shall have a minimum Class 53 thickness rating.

#### **99-1.05 Gate Valves**

Gate valves shall conform to AWWA Standard C509 of latest revision and shall be the resilient seat type with non-rising stem opening counter-clockwise with O-ring stem seal and suitable ends for connections to type of pipe or fitting used. The working pressure rating of gate valves shall meet or exceed the pressure rating of the pipe specified on the Plans. External bolts and nuts shall be 304 stainless and poly wrapped per standard.

#### **99-1.06 Butterfly Valves**

Butterfly valves shall conform to AWWA Standard C504 of latest revision and shall be of the rubber seat type. Valve discs shall rotate 90 degrees from the fully 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 counter-clockwise rotation of the operating nut.

#### **99-1.06A Cut-in Tee and Valve Assembly**

The Contractor shall cut-in tee and valve assemblies at the location(s) shown on the Plans per City Std. 850A, note 26 as directed by the Engineer, as specified herein.

#### **99-1.06B Air Relief Valve Assembly**

The Contractor shall install air relief valve assemblies at the location(s) shown on the Plans, per City Std. 883, as directed by the Engineer, and as specified herein.

#### **99-1.07 Valve Boxes**

Each gate valve shall be covered by a precast 8-inch valve box set flush with street surface with cast iron ring and cover marked "WATER". The valve boxes are to be Christy G 5, G 8, or approved equal.

**99-1.08 Locating and Adjusting Water Valve Boxes**

After a street has been paved, mark the location of all water valve boxes in white paint before the close of that workday.

Within 48 hours of paving, adjust all water valve boxes up to grade.

**99-1.09 Fire Hydrant and Lateral Assembly**

At the location(s) shown on the Plans, the Contractor shall provide and install a fire hydrant and lateral assembly per City Std. 857.

No bends will be allowed in fire hydrant laterals without approval of the Engineering Department.

Fire hydrants shall conform to the list of approved fire hydrants shown on City Approved Materials List.

Residential fire hydrants will have one 2-1/2-inch outlet and one 4-1/2-inch outlet.

Commercial fire hydrants will have two 2-1/2-inch outlets and one 4-1/2-inch outlet.

All hydrants shall be painted in accordance with the specifications shown in City Approved Materials List.

Before a fire hydrant may be placed in service, a high velocity flushing of the hydrant lateral shall be witnessed and approved by the Public Works Inspector.

Barrels of existing fire hydrants to be abandoned shall be removed carefully and delivered to the City Corporation Yard at 1 Trevino Court, Cotati.

**99-1.10 Asbestos Cement Pipe**

The installation of asbestos cement pipe is prohibited. All cutting, handling and disposal of asbestos cement pipe shall be done in compliance with the Contractor's State Licensing Law and all applicable laws and regulations.

**99-1.11 Trench Excavation, Backfill, and Resurfacing**

Excavation, backfill, and resurfacing of the water main trench under this contract shall conform to City Std. 126, as specified on the Plans and as specified herein.

Excess material from excavation shall become the property of the Contractor and shall be disposed of to the satisfaction of the engineer.

Prior to disposal of any materials or operation of any equipment on sites provided by the Contractor for disposal of excess trench excavation owned by him/her, the Contractor shall submit to the engineer written authorization for such disposal of materials and entry permission signed by the owners of the disposal site and the required permits.

Attention is directed to Section 7-1.03, "Public Convenience" of the Standard Specifications.

Caution shall be exercised when trenching through signalized intersections. Location(s) of traffic detector loops, as shown on the Plans, is schematic only.

If trenching or other construction operations cause damage to any traffic detector loops, the Contractor shall notify the Engineer immediately. Five (5) days prior to cutting any traffic detector loop, the Contractor shall contact the Public Works Department at (707) 665-3638.

The Contractor shall replace the traffic detector loops per City Traffic Standards V-J and V-K, and as directed by the Engineer. Replacement shall be accomplished within two (2) working days of damage, as determined by the Engineer, minimizing interruption of full operation of the traffic signal.

Blasting will not be permitted.

All raised pavement markers, street striping, chatter bars or any other traffic markings disturbed during this contract work shall be replaced in kind by the Contractor to the satisfaction of the Engineer.

#### **99-1.11A Trench Bracing and Shoring - Water**

All bracing and shoring shall conform to the Division of Industrial Safety Construction Safety Orders which are currently in use.

The Contractor shall take all necessary measures to protect the workmen and adjacent areas and structures from the hazards of the trenching or excavation operations.

#### **99-1.12 Laying and Handling Pipe Materials**

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 cast iron pipe rung with a light hammer to detect cracks. Any defective, damaged or unsound pipe shall be rejected and sound material furnished. Curing of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to pipe. All pipe stockpiled on the job shall be stored with the ends covered to prevent the entrance of foreign matter.

Whenever it is necessary 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 be free 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.

Pipe shall be laid in accordance with the Plans, and as specified herein.

All pipe stockpiled on the job shall be stored with the ends covered to prevent the entrance of foreign matter. At times when pipe laying is not in progress, the open ends of any pipe which have been laid shall be closed by mechanical plug or other means approved by the Engineer.

Excavations shall begin by exposing end(s) of existing main(s) to determine individual lines and grades. New mains shall begin eight (8) feet from and on the same line as the existing main. Minimum depth of cover from finished grade shall be 36 inches for 8-inch mains, 44 inches for 12-inch mains and 48 inches for 16-inch and larger mains or as shown on the Plans.

#### **99-1.13 Laying PVC Pipe**

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.

Fittings for PVC pipe shall be either the mechanical joint type or push-on type.

PVC pipe shall be as specified in and installed per AWWA C900 of latest revision and in accordance with the manufacturer's recommendations.

#### **99-1.14 Laying Ductile Iron Pipe**

The flame cutting of pipe by means of oxyacetylene touch shall not be allowed.

Ductile iron pipe shall be as specified in and installed per AWWA C600 of latest revision and in accordance with the manufacturer's recommendations.

#### **99-1.15 Service Laterals**

Service laterals other than those shown or noted on the Plans shall not be installed prior to obtaining City approval. Service laterals encountered in construction that will not be used shall be abandoned.

#### **99-1.6A Thrust Backing**

All tees, bends, and plugs shall be provided with thrust backing and/or harness as shown on the Plans or in accordance with City Stds. 853 and 854 and as specified herein.

**99-1.16B Thrust Blocking and/or Restrained Joints**

Thrust blocking and/or restrained joints shall conform to City Stds. 851 and 852 and as specified herein.

**99-1.17 Abandoning Water System Components**

For all abandoned water services up to and including 2-inch, remove the valve and saddle and install a full circle clamp on main under Public Works Department inspection.

For flanged or mechanical joint tees, remove the valve and install a blind flange or mechanical joint plug under Public Works Department inspection.

For push-on tees, the tee, valve and concrete thrust block must be removed and the main repaired with approved pipe and suitable couplings.

**99-1.18 Hydrostatic 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/her 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 thirty minutes. Valves on existing mains in services situated in the public right of way or PUE required to be operated shall be operated only by personnel of the City forces. Each 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, and all necessary apparatus including gauge and measuring devices shall be furnished by the Contractor. The Contractor shall make the taps into the pipe and shall furnish all necessary assistance for conducting the tests. 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, and afterwards tightly plugged.

Suitable means shall be provided by the Contractor for determining the quantity of water leakage under the test pressure. No pipe installation will be accepted until or unless this leakage is less than 40 U.S. gallons per 24 hours, per mile of pipe, per inch nominal diameter of pipe. Should any test of combined sections of pipe laid disclose leakage per mile of pipe greater than that water specified, or if individual sections show leakage greater than the specified limit, the Contractor shall, at his/her own expense, locate the cause and repair the defect until the leakage is within the specified allowance.

Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section of it, 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 prescribed limits above.

**99-1.18A Permanent Blow-Offs**

Permanent blow-off(s) shown on the Plans shall be installed per City Std. 861 and 862, as directed by the Engineer, and as specified herein.

Blow-off ball valve and plug shall be installed a minimum of two (2) inches and a maximum of six (6) inches below meter box lid.

**99-1.18B Temporary Blow-Offs**

Temporary blow-off(s) shown on the Plans shall be installed per City Std. 859, with thrust blocking and harness when required, as directed by the Engineer, and as specified herein.

**99-1.19 Chlorination of Water Main**

Chlorine may be applied by any of the AWWA standard methods, subject to the approval of the Engineer. The point of application of the chlorination agent shall be at the beginning of the pipe extension, or any valved section of it, and through a corporation stop inserted in the newly laid pipe.

Water from the existing distribution system shall be controlled to flow very slowly in the newly laid pipe during the application of chlorine. Precautions shall be taken to prevent backpressure causing a reversal of flow into the pipe being treated. In the process of chlorinating, all valves and other appurtenances on the new pipe shall be operated in such a way as to provide that the chlorine mixture shall be fully distributed to all parts of the new water system. Valves on existing pipes in service shall be operated only by City forces.

The rate of chlorine feed shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall be at least 100 ppm. The chlorine mixture shall be retained in the pipe for a period of twenty-four hours. After the chlorine mixture has been retained for the required time, the chlorine residual at the pipe extremities and at representative points shall be at least 5 ppm.

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipeline. The water throughout its length shall, upon test, both chemically and bacteriologically be proved equal to the water quality served the public from the existing water supply system. The necessary samples will be taken and tests made by the City of Cotati Public Works Department Personnel. Should the initial treatment, in the opinion of the engineer, prove ineffective, the chlorination procedure shall be repeated until confirmed tests show that the water sampled from the newly laid pipe conforms to the above requirements. The first test will be paid for by the City. Subsequent tests will be paid for by the Contractor.

There shall be a 24-hour waiting period after blowing off the main prior to taking bacteria samples.

The initial bacteria tests shall be of the 72-hour duration type. If the initial bacteria test fails, two consecutive passing bacteria tests must be obtained prior to making the tie-in. The first of these two subsequent tests shall be of the 24-hour duration type, and the second shall be of the 72-hour duration type. Bacteria tests are valid for only 30 days. If there is more than a 30-day lapse between a passing bacteria test and the applicable tie-in, the bacteria test must be repeated prior to water main tie-in.

Chlorinated water used to disinfect the pipe is the property of the Contractor and its disposal is the responsibility of the Contractor. Chlorinated water used to disinfect the pipe shall be disposed of in accordance with all laws and regulations.

The following criteria must be met prior to disposal of chlorinated water to storm sewers or other inland waterways:

1. Water to be disposed of must contain no chlorine residual.
2. pH must be between 6.5 and 7.5.
3. North Coast Regional Water Quality Control Board, at (707) 576-2220, must be notified of discharge.

Discharges not meeting the above criteria may be allowed to be disposed of into the sanitary sewer system, but must first meet the following requirements:

1. The Contractor shall obtain permission from the City of Cotati Public Works Department at (707) 665-3638 prior to the discharge being disposed of in the sanitary sewer system. The payment of any fees required will be the responsibility of the Contractor.
2. The pH of the water shall be between 6.0 and 9.5.
3. The discharge rate shall be sufficiently slow to keep from surcharging to sewer collection system at any point.

Should the initial treatment, in the opinion of the Engineer, prove ineffective, the chlorination procedure shall be repeated until confirmed tests show that the water sampled from the newly laid pipe conforms to the above requirements.

The initial bacteria samples will be taken and tests made by the City of Cotati. There shall be a 24-hour waiting period after blowing off the pipe prior to taking bacteria samples. If the initial bacteria test fails, two consecutive passing bacteria tests must be obtained prior to making the tie-in. The Contractor will pay for additional individual bacteria sample tests. If additional testing is required, it will be necessary for the Contractor to arrange for and to pay for the tests at a State of California certified laboratory. In extreme cases, at the discretion of the Engineer it may be necessary to require, at the Contractor's expense, a complete Title 22 potable water test prior to tie-in.

Bacteria tests are valid for 30 days. If there is more than a 30-day lapse between a bacteria test and

the applicable tie-in, the bacteria test must be repeated prior to performing tie-in.

#### **99-1.20 Water Main Connection Work**

The Contractor shall notify the City inspector 48 hours prior to individual mainline shutdowns required to facilitate his tie-in operations. The Contractor shall schedule tie-in work with the Public Works Inspector at (707) 665-3638. Tie-ins will not be scheduled until a written passing bacteria test has been received by Public Works. All shutdowns and valve turning operations shall be performed by City Water Utility personnel only. A Public Works Department Inspector must be present during all tie-in operations. All shutdowns and valve turning operations shall be performed by City Water Utility personnel only. No tie-ins shall be performed without prior authorization of the Engineer.

Pipe and fittings furnished for tie-ins shall be no smaller than the existing water main to which each tie-in is made.

Contractors or parties who fail to keep field appointments shall be billed for scheduled Utilities Crew waiting or standby time which was used and the Contractor shall bear the costs incurred by the Utility for re-notification of its customer.

As a general rule, customer service shall not be terminated or interrupted on Monday.

Interruption of service to commercial customers shall, as much as practical, be coordinated with the customer's needs. The City will contact the customers, consider the customer's interests and inform the Contractor accordingly.

After hours work or weekend work is to be avoided whenever possible and any overtime costs shall be borne by the Contractor requesting such afterhours work. Normal working hours are Monday through Fridays, 8:00 a.m. to 5:00 p.m.

Contractors or parties requiring work of any kind by the City forces shall request such services a minimum of 48 hours in advance of the time such services are desired. Work requests, which will involve City forces for more than 8 hours or an extensive number of City supplied parts, shall be requested a minimum of 7 calendar days in advance.

If it is necessary to terminate service to any customer, the Contractor shall make the request for such work an additional 72 hours (three additional working days for a total of five working days advance notice) in advance of the time such services are desired to allow the customers affected to have a minimum of 72-hour notice.

During the work, the Contractor shall exercise all necessary precautions to prevent the entrance of trench water or any other foreign material into the water main and shall conduct all operations in accordance with the most stringent sanitation practices. The interior of all appurtenances being installed shall be thoroughly swabbed with a strong HTH solution prior to installation.

Upon completion of construction, final connection will be made by the Contractor under

inspection by City Public Works Inspector, unless otherwise specified on the Plans.

The Contractor shall notify the City inspector 48 hours prior to individual mainline shutdowns required to facilitate a tie-in. The Contractor shall schedule tie-in work with the Public Works Inspector at (707) 665-3638. Tie-ins will not be scheduled until a written passing bacteria test has been received by Public Works. All shutdowns and valve turning operations shall be performed by City Utilities personnel only. A Public Works Department Inspector must be present during all tie-in operations. No tie-ins shall be performed without prior authorization of the Engineer.

Contractors or parties who fail to keep field appointments shall be billed for scheduled City Crew waiting or standby time which was used and the Contractor shall bear the costs incurred by the City for notification of its customers for the subsequent appointment.

When installing a cut-in-tee that is larger than the existing pipe, the new assembly must be installed at the depth sufficient to allow the valve to remain below the subgrade of the street which may necessitate lowering the existing pipe.

When a connection is required to an existing water pipe, the Contractor shall provide all excavation, shoring, backfill and trench resurfacing per City Std. 126. Where the connection is to be a "hot tap", the Contractor shall provide and install the tapping valve and sleeve, and any other hardware required and City forces will make the tap at the developer's expense. When any joint on an existing water pipe is disturbed, that joint and any proposed hot tap 4 inch and larger shall be replaced with a "cut-in" tee. When a "cut-in" tee and valve(s) assembly is required on the Plans, the Contractor shall provide and install the entire assembly (including valves), and any other hardware necessary under City Public Works Department inspection, and shall provide all other work and materials necessary to complete the installation to City Standards.

During the work, the Contractor shall exercise all necessary precautions to prevent the entrance of trench water or any other foreign material into the water main and shall conduct all operations in accordance with the most stringent sanitation practices. The interior of all appurtenances being installed shall be thoroughly swabbed with a strong HTH solution prior to installation.

Tie-in or cut-in tee connections to cast iron, PVC, or ductile iron pipes shall be made with mechanical joint solid sleeves. Flexible connections shall only be used when connecting to asbestos cement pipe.

Pipe and fittings furnished for tie-ins shall be no smaller than the existing water main to which each tie-in is made.

Fire hydrant tie-in shall be considered as a water main tie-in, including the gate valve.

Fire service tie-in shall be considered as a water main tie-in, including the gate valve.

#### **99-1.21 Water Main Component Reporting.**

The Contractor shall submit the material type, manufacturer, and model number of all water

system components to the City inspector prior to final testing. A water system materials form will be provided to the Contractor for this reporting.

#### **99-1.22 Construction Water**

Construction water shall be obtained from the City water system only at the point(s) designated by the Engineer.

The Contractor must obtain permission from the City Public Works Department for each metered construction water connection.

A deposit for each meter/hydrant will be required which is refundable upon removal of the meter by City forces, less any charges for water used. A non-refundable set-up/removal fee will be charged. Hydrant meters are obtained through the City Finance Department.

Contractors are prohibited from operating gate valves or fire hydrants on the City system.

Acquisition of water through appropriation at unmetered fire hydrants or other facilities is a violation of City ordinance and State law. Use of construction water from sources other than the City Water System must be approved by the Engineer.

The Contractor shall obtain water as specified herein.

#### **99-1.23 Water Services**

The Contractor shall install new polyethylene service laterals at the location(s) shown on the Plans, including service saddles, ball valve corporation stop, spacer, inlet and outlet meter valves, meter box(es), traffic loading lids when required, and removal and disposal of old meter box(es) when required. Typically, new service laterals shall be as close as possible to existing laterals and as directed by the Engineer in the field. New service laterals shall be installed with a minimum horizontal clearance of five (5) feet from sewer laterals.

Upon completion and successful testing of new water system, the Contractor shall transfer the existing meter and tie-in the new service to the new meter box under City Public Works Inspector. The Contractor shall coordinate this work to provide minimum customer out-of-service time and inconvenience.

Contractor shall notify customers before transferring meter. The Contractor shall turn off house valve and blow off the new service before meter transfer. After transfer, the Contractor shall open hose bib to flush out air and sediment and then turn on house valve.

#### **99-1.24 Fire Service Lateral Assembly**

Fire service lateral assembly with appropriately sized tee, pipe, gate valve, and other appurtenances shall be installed at the location(s) shown on the Plans in conformance with City Std. 854, Std. 877, with reference to Std. 879, as directed by the Engineer, and as specified herein.

**99-1.25 Remove and Relocate Existing Fire Hydrant**

At the location(s) shown on the Plans, the Contractor shall install a hydrant lateral, including tapping sleeve or tee, gate valve, pipe, bury and riser per City Std. 857 with a blind flange for testing, as directed by the Engineer, and as specified herein.

Upon satisfactory completion of the new water system, including tie-ins and testing, the Contractor shall remove the blind flange and relocate the existing hydrant barrel to the new lateral. Relocated hydrants shall be out of service no longer than 24 hours. The riser on the old hydrant shall be removed carefully and delivered to the City Corporation Yard at 1 Trevino Court, Cotati.

**99-1.26 Valve Removal**

The Contractor shall remove the existing valve, riser, valve box, cover, plug or cap the tee or water main and replace structural section and asphalt surfacing as required at the location(s) shown on the Plans. Salvaged material shall be delivered to the City Corporation Yard at 1 Trevino Court, Cotati.

**99-1.27 Valve Box Removal**

The Contractor shall remove existing valve boxes, (including boxes for blow-offs when required) risers, and covers and replace structural section and asphalt surfacing at the location(s) shown on the Plans. Salvaged material shall be delivered to the City Corporation Yard at 1 Trevino Court, Cotati.

**99-1.28 Meter Box Removal**

The Contractor shall remove existing abandoned meter boxes, remove and replace sidewalk per City Std. R-1 at the locations shown on the Plans, as directed by the Engineer, and as specified herein. Salvaged material shall be delivered to the City Corporation Yard at 1 Trevino Court, Cotati.

**99-1.29 Backflow Assembly (Typical Backflow Preventer)**

The Contractor shall install a double-check valve assembly per City Std. 875 and/or 876 at the location shown on the Plans, as directed by the Engineer, and as specified herein.

**99-1.30 Cleaning and Flushing New Water Mains**

The Contractor shall clean and flush water mains in the following manner:

The Contractor shall insert a flexible polyurethane foam "swab" (density: 2# per cu. ft.) complete with polyurethane drive seal, into the beginning section of pipe. The "swab" shall remain there until the remainder of the pipeline is completed.

Cleaning and flushing shall be accomplished by propelling the "swab" down the

pipeline to the exit point with potable water. Flushing shall continue until the water is completely clear.

If the cleaning and flushing exit point is through a fire hydrant (8-inch line or smaller) the Contractor shall remove the hydrant internal valve assembly to allow passage of the "swab".

After swabbing, proper disinfectant procedures shall be used per Section 99-1.19 specified herein.

## SECTION 100-2 ADJUST VALVE COVERS, CLEANOUTS AND MONUMENTS TO GRADE

Existing valve covers, cleanouts, and monuments located within the street section shall be adjusted to conform to finished pavement grades.

Contractor shall accurately locate and record the location of existing valve covers cleanouts, and monuments to be raised to grade and shall furnish the Engineer a copy of said record prior to starting construction.

All sections of valve covers, cleanouts, monuments, and grade rings shall be set in cement mortar the same day that the grade rings are placed. Asphalt concrete paving over cement mortar shall be installed by the end of the following work day.

All silt and debris shall be removed from valve boxes and monument vaults. This shall include all existing silt and debris plus material caused by the Contractor's operation.

## **SECTION 100-7 SACKED CONCRETE RIPRAP**

Sacked concrete riprap shall be constructed at the location and in accordance with the details shown on the Plans and as directed by the Engineer.

Sacked concrete riprap shall conform to the applicable provisions of Section 72-3 of the Standard Specifications.

## **SECTION 100-8 REINFORCED CONCRETE HEADWALL**

A reinforced concrete headwall shall be constructed with the details and at the location shown on the Plans. Bar reinforcing steel shall conform to and be placed in accordance with the applicable provisions of Section 52 of the Standard Specifications, with the following modifications.

In lieu of the sampling of reinforcing steel, the Contractor shall furnish the Engineer with a certificate of compliance per Section 52-1.01C (2) from the supplier of the reinforcing steel stating that the steel delivered complies with the requirements of Section 52-1.02B of the Standard Specifications.

Concrete for the headwall shall be Class "A" Portland Cement Concrete conforming to the requirements of Section 90 of the Standard Specifications.

## SECTION 100-10 REMOVE AND RESET MAILBOX

Existing mailboxes shall be removed and reset in accordance with the Plans and as specified herein.

Existing posts that are not suitable shall be replaced with temporary timber posts of good, sound material suitable for the purpose intended.

Concrete for the pedestals shall be produced from commercial quality aggregates and cement shall contain not less than 5 sacks of cement per cubic yard.

Redwood posts and planks shall be constructed of construction clear redwood, free of heart center, rough.

Existing mailboxes shall be removed and reset on portable mounts consisting of concrete pedestals formed in 5-gallon cans or buckets during construction.

Newspaper boxes attached to existing mailbox posts shall be removed and fastened to the new mailbox posts.

During the construction operations, the mailboxes shall be moved as necessary to clear the way for the Contractor's operations, but at all times shall be accessible for rural delivery.

When construction is complete, the posts and pedestals shall be removed and disposed of as provided in Section 15-2 of the Standard Specifications and the mailboxes shall be installed in final position on new redwood posts and planks.