# CITY OF SUNNYVALE

## STANDARD SPECIFICATIONS

## FOR PUBLIC WORKS CONSTRUCTION

## 2006 EDITION

**Revised April 2007**

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# TABLE OF CONTENTS


| Description | | | Page No. |
|---|---|---|---|
| **PART 1 — GENERAL PROVISIONS** | | | |
| SECTION 1 | — | Terms, Definitions, Abbreviations, Units of Measure, and Symbols | 1 |
| SECTION 2 | — | Scope and Control of Work | ~~2~~ 1 |
| SECTION 5 | — | Utilities | 2 |
| SECTION 7 | — | Responsibilities of the Contractor | 2 |
| **PART 2 — CONSTRUCTION MATERIALS** | | | |
| SECTION 200 | — | Rock Materials | ~~4~~ 3 |
| SECTION 201 | — | Concrete, Mortar and Related Materials | ~~5~~ 3 |
| SECTION 202 | — | Masonry Materials | ~~5~~ 4 |
| SECTION 203 | — | Bituminous Materials | ~~6~~ 4 |
| SECTION 207 | — | Pipe | ~~6~~ 5 |
| SECTION 208 | — | Pipe Joint Types and Materials | ~~13~~ 11 |
| SECTION 209 | — | Electrical Components | ~~16~~ 14 |
| SECTION 212 | — | Landscape and Irrigation Materials | ~~26~~ 25 |
| **PART 3 — CONSTRUCTION METHODS** | | | |
| SECTION 7 | — | Responsibilities of the Contractor | ~~30~~ 29 |
| SECTION 207 | — | Pipe | ~~30~~ 29 |
| SECTION 300 | — | Earthwork | ~~33~~ 32 |
| SECTION 303 | — | Concrete and Masonry Construction | ~~33~~ 32 |

| Description | | | Page No. |
|---|---|---|---|
| SECTION 306 | — | Underground Conduit Construction | ~~35~~ 34 |
| SECTION 307 | — | Street Lighting and Traffic Signals | ~~39~~ 38 |
| SECTION 308 | — | Landscape and Irrigation Installation | ~~45~~ 44 |
| SECTION 310 | — | Painting | ~~49~~ 48 |
| SECTION 311 | — | Special Protective Materials | ~~50~~ 49 |

**PART 4**

Part 4, Alternate Rock Products, Asphalt Concrete, Portland Cement Concrete and Untreated Base Material ~~55~~ 50

**PART 5**

Part 5, System Rehabilitation ~~55~~ 50

**PART 6**

Part 6, Modified Asphalts, Pavements and Processes ~~55~~ 50

# PART 1 — GENERAL PROVISIONS

Part 1 — General Provisions, shall consist of the General Provisions of the "Greenbook" Standard Specifications for Public Works Construction, 2006 Edition, written and promulgated by Public Works Standards, Inc., as modified below.

## SECTION 1 — TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

Pages 1 and 2

UNDER **SUBSECTION 1-2**, REVISE THE DEFINITIONS OF "AGENCY," "BOARD," AND "ENGINEER":

Agency - The City of Sunnyvale

Board - The City Council of the City of Sunnyvale

Engineer - The City Engineer of the City of Sunnyvale, or his/her duly authorized agent(s).

Page 3

UNDER **SUBSECTION 1-2**, INSERT THE FOLLOWING DEFINITION BETWEEN DEFINITIONS FOR STATE AND STORM DRAIN:

**State Standard Specifications** — The July 2005 edition of the Standard Specifications issued by the State of California, Department of Transportation (Caltrans).

Page 7

DELETE **SUBSECTION 1-4.1** AND SUBSTITUTE WITH:

**1-4.1 General**. The U.S. Standard Measures (also called the U.S. Customary System) is the principal measurement system in these specifications, and shall be used for construction.

## SECTION 2 — SCOPE AND CONTROL OF WORK

Page ~~13~~ 12

ADD THE FOLLOWING **SUBSECTION 2-5.4:**

**2-5.4 Record Drawings.** The Contractor shall keep up-to-date a complete record set of prints of the Contract Drawings showing every change from the original drawings made during the course of construction including exact location, sizes, materials and equipment. A complete set of corrected and completed Record Drawing prints shall be submitted to the Engineer prior to final acceptance for review and approval by the Engineer.

## SECTION 5 — UTILITIES

Page ~~21~~ 22

IN THE THIRD PARAGRAPH OF **SUBSECTION 5-1,** REVISE THE REFERENCE TO "Underground Service Alert of Southern California" TO READ "Underground Service Alert."

Page 22

ADD THE FOLLOWING AFTER THE LAST PARAGRAPH OF **SECTION 5-1:**

The State of California Health Department has established dimensions for the separation of domestic water and sanitary sewer conduits, and the separation of domestic water and recycled water mains. The former requirements is 10 feet horizontal and 3 feet vertical separation. Designers shall comply with these requirements and address any exceptions according to DHS requirements.

## SECTION 7 — RESPONSIBILITIES OF THE CONTRACTOR

Page 28

DELETE THE NEXT-TO-THE-LAST PARAGRAPH OF **SUBSECTION 7-2.2:**

Each worker shall be paid ....., Department of Industrial Relations.

Page 34

ADD THE FOLLOWING **SUBSECTION 7-10.4.5:**

**7-10.4.5 Safety Vests.** Safety vests are required to be worn by all personnel on all construction projects.

# END OF PART 1

# PART 2 — CONSTRUCTION MATERIALS

Part 2 — Construction Materials, shall consist of the Construction Materials of the "Greenbook" Standard Specifications for Public Works Construction, 2006 Edition, written and promulgated by Public Works Standards, Inc., as modified below.

## SECTION 200 — ROCK MATERIALS

Page 47

ADD THE FOLLOWING **SUBSECTION 200-3:**

**200-3 COBBLESTONE**

Cobblestones shall be smooth, rounded in shape, water-worn stone. The size of the stone shall not be less than four (4) and no larger than six (6) inches in diameter and shall have no fractured sides. The stone color shall be varying natural tones, ranging from medium-dark grays to light-medium brown tans. The contractor shall furnish samples of the rock for approval. Only rocks meeting City approval shall be used.

## SECTION 201 – CONCRETE, MORTAR AND RELATED MATERIALS

Page 48

IN THE SECTION TITLE "Street Surface Improvements," OF TABLE 201-1.1.2 (A), ADD SUPERSCRIPT ~~"7"~~ "8" AFTER TITLE.

Page 48

ADD NEW FOOTNOTE TO **TABLE 201-1.1.2 (A):**

[78]For concrete used for curbs, gutters, sidewalk or driveway approaches, lampblack shall be added at the rate of 1 pint (powder) per cubic yard.

Page 66

ADD THE FOLLOWING AT THE END OF **SUBSECTION 201-6.2.5:**

The proportioning limits of fly ash (as a percentage of weight of cement) of Section 201-1.2.5 shall not apply.

Page 66

ADD THE FOLLOWING AT THE END OF **SUBSECTION 201-6.3.1:**

For CLSM used as trench pipe bedding and trench backfill, the cement quantity shall be 25 pounds per cubic yard. The 28-day compressive strength shall be a minimum of 100 psi and a maximum of 200 psi.

## SECTION 202 — MASONRY MATERIALS

Page ~~66~~ 69

ADD THE FOLLOWING **SUBSECTION 202-3:**

### 202-3 INTERLOCKING PAVERS

Interlocking concrete pavers shall be manufactured in accordance with ASTM C936-82, and shall be in accordance with the patterns shown on the plans where designated. These products shall be as noted on the plans, or approved equal.

All pavers shall conform to the following specification:

Concrete shall have a minimum compressive strength of 8,000 psi in accordance with testing procedures ASTM C-140.

Materials used to manufacture Concrete Interlocking Pavers shall conform to the following:

Cement — ASTM C-150 (Portland Cement)

Aggregates — ASTM C-33 (washed, graded sand and rock)

Sand laying course shall be a concrete sand with 100% passing a No. 200 sieve size. Thickness of the sand laying course should be uniform to insure an even surface. The designed thickness should be a maximum of one (1) inch.

## SECTION 203 — BITUMINOUS MATERIALS

Page 79

IN **TABLE 203-5.3 (A)**, ADD 2% LATEX ADDITIVE TO STANDARD TYPE II SLURRY SEAL.

Page 80

DELETE SECTION 203-6 ASPHALT CONCRETE AND SUBSTITUTE WITH:

**203-6.2 ASPHALT CONCRETE**

Asphalt to be mixed with aggregate shall be Performance Grade 64-10 per CalTrans standard practice.

Asphalt concrete shall conform to the State Standard Specifications, Section 39.

Base courses shall be ¾" maximum, medium. Surface courses and overlay shall be ½" maximum, medium.

## SECTION 207 — PIPE

Page 117

INSERT THE FOLLOWING BEFORE **SUBSECTION 207-1:**

NOTE: Use vitrified clay pipe (extra strength) or SDR 35 PVC (green) for sanitary sewer mains, ~~Class 52 ductile iron pipe or~~ PVC C-900 Class 200 ~~(required for areas north of SPRR)~~ for water mains, and RCP Class IV for storm sewers. Sanitary sewer laterals shall be VCP (extra strength), SDR 35 PVC (green), or ABS schedule 40. Storm drain laterals shall be Class III or IV RCP for pipes 12" in diameter or larger, or SDR 35 PVC (green) for pipes 10" diameter or less.

Page 139

ADD THE FOLLOWING TO **SUBSECTION 207-9.2.1:**

Ductile iron pipe shall be thickness Class 52 only.

ADD THE FOLLOWING **SUBSECTION 207-9.2.1.1** AND **SUBSECTION 207-9.2.1.2:**

**207-9.2.1.1 Fire Hydrants**. Fire hydrants shall be of the wet barrel type and have one 4-1/2" streamer outlet, one 2-1/2" fire hose outlet, a 6" bury and a 6" gate valve. The makes and models of hydrants listed below are approved for use. For makes and models of hydrants not listed below, but which the Contractor believes are "equal," they shall be submitted for review, and be approved, in writing, before the hydrants are delivered to the job site. Fire hydrants shall be set to correct street grade and the 4-1/2" streamer outlet shall face the street.

Approved Fire Hydrants: Clow 75 or approved equal.

### 207-9.2.1.2 Water Main — Ductile Iron Pipe.

Approved Appurtenances (Note 1):

| Item | Make & Model | Note |
|---|---|---|
| Corporation Stop (Compression Coupling) | Mueller Model H-15008 (1")<br>Mueller Model H-15013 (2") | 2 |
| Angle Meter Stop 1" and smaller (~~flared~~ compression) | Mueller Model B-24258 | 2 |
| Angle Meter Stop 1½" to 2" (~~flared~~ compression) | Mueller Model B-24276 | 2 |
| Tapping Sleeve CI, DI | Mueller Model H-615 | 3 |
| Tapping Sleeve AC | Mueller Model H-619 | 3 |
| Tapping Sleeve — C.C. Pipe Only | Custom made | |
| Tapping Valve — Corporation Stop 2" | Mueller Model H-15013 | 3 |
| Tapping Valve — Gate Valve 4"-12" | Mueller Model ***T***-2361- 16 (tapping) | 3 |
| Gate Valve — Mechanical Joint | Mueller Model A-2361-23 | 3 |
| Air Release Valve | APCO Model Comb. 143C - 1";<br>145C - 2"; 147C - 3"; etc. | 4 |
| Blow-off | See standard detail 3B | 6 |
| Service Saddles | Mueller Model BR2B | 5 |

Note 1: All gate valves shall be resilient seated and conform to AWWA Standard C509.
Note 2: Equivalent models manufactured by J.Jones, McDonald or Ford may be accepted if approved in writing by the City
Note 3: Equivalent models manufactured by Iowa, M&H or Smith Blair may be accepted if approved in writing by the City
Note 4: Equivalent models manufactured by Crispin, Clow or Valmatic may be accepted if approved in writing by the City
Note 5: Equivalent models manufactured by Smith Blair may be accepted if approved in writing by the City.
Note 6: Mueller part # B202003-3.

Page 158

ADD THE FOLLOWING **SUBSECTION 207-17.7:**

## 207-17.7 PVC Pipe, 12-inch diameter or smaller

### 207-17.7.1 General

#### 207-17.7.1.1 Description

This section includes materials, installation, and testing for pressure pipelines to be used for potable water, reclaimed water, and sewer force mains.

#### 207-17.7.1.2 References

AWWA References

C111 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

C115 Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges.

C153 Ductile Iron Compact Fittings, 4 inch through 12 inch, for Water and Other Liquids.

* C509 Resilient -Wedge Gate Valves, 4 inch through 12 inch, for Water.

C605 Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.

* Resilient Wedge to be EPDM rubber complying with ASTM D2000.

#### 207-17.7.1.3 Submittals

1. Contractor shall submit shop drawings and catalog cuts for the pipe, fittings, and valves in accordance with the Standard Specifications.

2. Contractor shall furnish operating and maintenance instructions and parts lists in four complete sets to the Engineer. These instructions shall fully describe the equipment being furnished, including all valves. Each set shall be bound in standard size, three-ring, loose-leaf, vinyl plastic hard cover binders suitable for bookshelf storage.

### 207-17.7.2 Materials

#### 207-17.7.2.1 PVC Pressure Pipe 4-inch through 12-inch diameter

1. Pipe shall be manufactured in accordance with AWWA C900, cast iron outside diameter, Class 200. The pipe shall have integral bell joints, complete with a gasket installed by the manufacturer. Contractor shall furnish certification that all PVC pipe supplied for this project has been manufactured in compliance with all requirements of AWWA C900. In geographic areas to be subject to liquefaction, pipe bell restraint harness (conforming to ASTM A536, coated with Megabond coating system, and fluoropolymer coated bolts) shall be used at each joint. (Integral joint restraint systems may be considered in lieu of above with prior approval by Senior Public Works Distribution Leader).

2. Potable water pipe shall either be colored blue, or shall be white with blue stenciling on both sides of the pipe reading "POTABLE WATER" in 5/8-inch high letters repeated at 1-foot intervals. Reclaimed water pipe shall be purple. Sewage force main pipe shall be green.

3. Material used to produce the pipe shall be made from Class 12454-A or B virgin compounds as defined in ASTM D 1784, with an established hydrostatic design basis rating of 4,000 psi for water at 73.4°F (23°C).

4. Laying lengths shall be 20 feet with the manufacturer's option to supply up to 15% random (minimum length 10 feet).

5. Each pipe length shall be marked showing the date of manufacture, nominal pipe size and O.D. base, the AWWA pressure class and the AWWA specification designation (AWWA C900).

6. Pipe shall be manufactured by PW Pipe, J-M Manufacturing, or approved equal.

### 207-17.7.2.2 Fittings 4-inch through 12-inch diameter

1. Buried fittings shall have mechanical joint restraint (Megalug Series 2000 with Megabond restraint coating system & Tripac fluorpolymer coated tee bolts), be cast from gray or ductile-iron, and meet the requirements of ANSI/AWWA C110/A.21.10, for use with C900 PVC Pipe, with a minimum pressure rating of 250 psi. Ductile iron compact body fittings may be used, and shall be manufactured in accordance with ANSI/AWWA C153/A21.53. All fittings shall be provided with restraining ears.

2. The interior and exterior of all fittings shall be coated with fusion-bonded heat cured thermo setting epoxy, meeting the application and performance requirements of AWWA C550.

3. Fittings shall be carried and placed into trench using fabric straps. Chains and cables shall not be used.

4. Buried fittings shall have flanged outlets adjacent to the valves and mechanical joint or flange by mechanical adapters on pipe runs where no valves are required.

5. Above ground fittings shall have flanged joints.

6. Fittings and all accessories shall be of domestic manufacture by U.S. Pipe, Pacific States, Union Foundry, Tyler, or approved equal.

### 207-17.7.2.3 PVC Pressure Pipe 3-inch and smaller diameter

1. PVC pressure pipe 3-inch and smaller diameter shall be Class 200 (SDR 21), iron pipe size (IPS) outside diameter, conforming to ASTM D 2241. The pipe shall have integral bell joints, complete with a gasket installed by the manufacturer. Pipe shall be colored blue or white for use with domestic water, purple for reclaimed water, and green for sewage.

2. Material used to produce the pipe and couplings shall be made from Class 12454-A or B virgin compounds as defined in ASTM D 1784, with an established hydrostatic design basis rating of 4,000 psi for water at 73.4°F (23°C).

3. Fittings shall be of the same material and have the same pressure rating as the pipe.

### 207-17.7.2.4 Service Laterals

1. Copper Pipe and Tubing

   a. Copper pipe and tubing shall meet the requirements of ASTM B 88, be cylindrical, of uniform wall thickness, and free from any cracks, seams, or other defects. Piping located above floors or suspended from ceilings shall be Type "L". Piping buried or located beneath floor slab shall be Type "K".

   b. Copper tubing shall be joined using Mueller 110 Compression Connection Series fittings, or approved equal. No soldered or flared joints are permitted.

2. Service saddle shall be constructed from bronze, with silicon bronze screws, specifically designed for C900 PVC pipe. The wide strap shall be specially shaped to fit the contour of the pipe, and seal dependably without pipe distortion. The strap on saddles with 1-1/2" or 2" tapped outlets shall be double-wide for added stability. Saddle shall be Mueller H-13000 series, or approved equal.

### 207-17.7.2.5 Coupling and Sleeves

1. Couplings and sleeves for 4-inch through 12-inch PVC pipe shall be fusion epoxy coated ductile iron, or Type 316 stainless steel, with a minimum working pressure equal to the connecting pipe. Couplings, sleeves, and accessories shall be of domestic manufacture.

2. Connections of 3" and smaller PVC pipe to pipe or fittings of other material shall be made with PVC pipe adaptors or flexible couplings.

Adaptors shall have ends specifically manufactured to receive the adjoining pipes.

3. Where flexible connections in the piping are specified or indicated on the plans, they shall be obtained by the use of sleeve-type couplings. All sleeve-type couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed. Sleeve-type couplings shall be made by Rockwell International, Pittsburgh, PA; Dresser Mfg. Div., Bradford, PA; or be approved equal products.

4. Couplings for buried PVC pipe shall be Rockwell 411, Dresser Style 38, or approved equal products.

### 207-17.7.2.6 Flanges and Flange Adapters

1. Unless otherwise noted, flanges on all DIP pipe shall conform to AWWA C115.

2. Flange adapters for PVC pipe 4-inch through 12-inch in diameter shall be constructed from fusion epoxy coated ductile iron, and designed specifically for the O.D. controlled PVC pipe being attached.

   a. Above ground connections shall use adapters of the split serrated design, providing 360° contact and support of the pipe wall. Adapters shall be Series 900 by Uni-Flange, or approved equal.

   b. Below ground connections shall be made using flange by mechanical joint adapters, with integral restraining ears, manufactured by Tyler Pipe, McWane, US Pipe, or approved equal.

3. Flange connections for PVC pipe 3-inch and smaller shall be made using a tapped and threaded ductile iron blind flange. The PVC pipe to be threaded into the blind flange shall have a minimum wall thickness equal to SCH 80 PVC.

### 207-17.7.2.7 Gaskets

1. Gasket for flanged joints shall be 1/8-inch thick, cloth-inserted rubber. Gaskets shall be suitable for a water pressure of 350-psi at a temperature of 108°F.

2. Full face type gaskets with pre-punched holes shall be used where both flanges are flat faced. Ring gaskets extending to inner edge of bolts may be used where raised face flange is present.

3. Gaskets for push-on, mechanical, and restrained joints shall be synthetic or natural rubber in accordance with AWWA C111.

#### 207-17.7.2.8 Bolts and Nuts

1. Bolts and nuts for flanges and couplings shall be Heavy Hex Head ASTM A 193 (Grade B7) for bolts, and Heavy Hex Head ASTM A 194 (Grade 2H) for nuts. Nuts and bolts (including threads) shall be coated using a three layer system consisting of a metallic base coat, an adhesion coat, and a heat cured fluoropolymer compound containing PTFE or TEFLON® as topcoat. Coating shall be FluoroKote#1 by Metal Coatings Corp., Tripac 2000 Blue Coating System by Tripac Fasteners, or approved equal.

2. Washers shall be provided for each nut, and shall be the same material and coating as the nut.

3. Apply a liberal coat of a white food grade anti-seizing compound containing PTFE or TEFLON® to the threads of all nuts and bolts, and to the face of all washers. The compound shall have operating range covering -20°F to 440°F, be NSF approved (or meet USDA-H1 and FDA requirements for incidental food contact), suitable for use on stainless steel, with a coefficient of friction no greater than K=0.13. Compound shall be White-Knight as manufactured by Jet-Lube, or approved equal.

## SECTION 208 – PIPE JOINT TYPES AND MATERIALS

PAGE ~~169~~ 175

ADD THE FOLLOWING **SUBSECTION 208-7**:

## 208-7 WATER VALVES AND APPURTENANCES

### 208-7.1 General

#### 208-7.1.1 Description

1. Furnish all labor, materials, equipment, and incidentals required, and install complete and ready for operation all valves and appurtenances as shown on the Drawings and specified herein.

#### 208-7.1.2 References

AWWA References

C111 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and

Fittings.

C115 Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges.

* C509 Resilient-Wedge Gate Valves, 4 inch through 12 inch, for Water.

* Resilient Wedge to be EPDM rubber complying with ASTM D2000.

Manual M-17 Installation of Fire Hydrants.

### 208-7.1.3 Submittals

1. Shop drawings shall be submitted in accordance with the Standard Specifications.

2. Submit manufacturer's catalog data. Show dimensions, materials of construction, coatings, and options to be provided.

## 208-7.2 Materials

### 208-7.2.1 Corporation Stop

1. Corporation stop shall be a ball-type valve constructed of 85-5-5-5 ASTM B62 brass, with straight through design, double o-ring stem seals, PTFE coated ball, 300-psi maximum working pressure, with AWWA tapered inlet threads (Mueller "CC"), and conductive compression connection outlet for CTS O.D. tubing (Mueller 110). Valve shall be Mueller B-25008, or approved equal.

### 208-7.2.2 Curb Stop

1. Curb stop shall be a ball-type valve constructed of 85-5-5-5 ASTM B62 brass, with straight through design, double o-ring stem seals, PTFE coated ball, 300-psi maximum working pressure, with conductive compression connection inlet and outlet for CTS O.D. tubing (Mueller 110), unless called for otherwise in the plans or where other end connections are required to connect to adjacent equipment. Valve shall be Mueller B-25209, or approved equal.

### 208-7.2.3 Insulated Meter Coupling

1. Couplings used to insulate the meters electrically from the customer side of the service lateral shall be straight meter couplings, MIP x meter swivel nut, with an integral nylon insulator in the tailpiece, constructed from 85-5-5-5 brass. Swivel nut shall be drilled for wire seal. Coupling shall be Mueller H-10871, or approved equal.

### 208-7.2.4 Resilient Seated Gate Valve (12" and Smaller)

1. The gate valves shall be of the resilient wedge type, non-rising stem (NRS), conforming to AWWA ~~C509~~ C550 & C515, latest revision, certified to ANSI/NSF 61 and be UL listed and FM approved.

2. Valve bodies, bonnets and seal plates shall be ~~cast~~ ductile iron. Wedges shall be ~~either cast or~~ ductile iron, and shall be completely encapsulated with resilient material, including the stem bare. The resilient material shall be made of EPDM (Ethylene Propylene Diene Monomer) complying with ASTM D2000 and shall be permanently bonded to the wedge with a rubber tearing bond meeting ASTM D429. Stems shall be bronze, and all nuts and bolts shall be 316 stainless steel.

3. Valve shall be capable of installation in any position with rated sealing in both directions. The valve body shall have integral guides engaging integral lugs in the gate, in a tongue and groove manner, supporting the gate throughout the entire open/close travel.

4. The stuffing box shall have two O-Ring seals above the thrust collar. These rings shall be field replaceable without removing the valve from service stuffing box shall be connected to the bonnet, and bonnet shall be connected to the body, using nuts and bolts. Blind bolts threaded directly into the body or bonnet is not acceptable.

5. The body and bonnet shall be coated both interior and exterior with fusion-bonded heat cured thermo setting epoxy, meeting the application and performance requirements of AWWA C550.

6. Zero leakage shall be maintained by the values at a water working pressure of 200-psi. Valve should be factory tested to 400-psi for structural integrity.

7. The end configuration of valves installed above ground or in vaults shall be flanged by flanged. Buried valves shall be flanged; flanged by mechanical joint or mechanical joint by mechanical joint. Mechanical joints shall be provided with Megalug Series 2000 restraint with Megabond restraint coating system and Tripac fluorpolymer coated tee bolts. Buried valves shall be provided with a 2-inch square operating nut. Valves located above ground, or in vaults, shall be provided with a handwheel, size as recommended by manufacturer. All valves shall be opened by turning counterclockwise.

8. Payment for valves shall include full compensation for all labor and materials including valve, anchor block, connection, valve box and cover where required and all work required to install each valve in place as specified.

9. Valves shall be Mueller ~~A-2360~~ A-2361 series with EPDM rubber wedges.

### 208-7.2.5 Tapping Sleeve and Valve

1. Tapping sleeves shall be fusion-bounded heat cured thermosetting epoxy coated cast iron, 200-psi working pressure; Mueller H-615/H-619, or approved equal (such as Smith Blair 622). Tapping valves (same ratings as 208-7.2.4 above) shall be 200-psi working pressure, resilient EPDM rubber wedge, non-rising stem with square operating nut turned counterclockwise to open, "O" ring packing, with flanged mechanical joint end; Mueller ~~A-2360-19~~ A-2361-19, with mechanical joint restraint (Megalug Series 2000 with Megabond restraint coating system and Tripac fluoroplymer coated tee bolts).

### 208-7.2.6 Water Valve Box

1. A valve box shall be installed for each buried valve, in accordance with Standard Drawing 1B. Water valve boxes shall be pre-cast concrete box with cast iron traffic cover marked "WATER", and shall be model G5 with G5C cover manufactured in the United States by Christy Concrete Products, BES Concrete Products, or approved equal.

### 208-7.2.7 Fire Hydrant

1. Fire hydrants shall be of the wet barrel type meeting the requirements of AWWA C503, constructed from heavy cast iron with bronze working parts, consisting of one 4-1/2" steamer outlet, and one 2-1/2" fire hose outlet, each with independent operating valves, and shall be installed with the 4-1/2" steamer outlet facing the street. Hydrants shall be Clow Model 75.

## SECTION 209 — ELECTRICAL COMPONENTS

Page 175

DELETE **SUBSECTION 209-1** AND SUBSTITUTE WITH:

**209-1 REGULATIONS AND CODES.** All electrical equipment shall conform to the latest City of Sunnyvale adopted edition of the following standards: National Electrical Manufacturers Association (NEMA); the Underwriters' Laboratories, Inc. (UL); International Municipal Signal Association (IMSA); Standards of the American Society for Testing and Material (ASTM); American National Standards Institute (ANSI); the Insulated Power Cable Engineers Association

(IPCEA); or the Electrical Industries Association (EIA); and the latest State of California Standard Specifications and Standard Plans, wherever applicable. ~~Additionally, where applicable and referenced, electrical systems relating to traffic signalization systems, including appurtenant lighting systems shall be in conformance with the State Standard Specifications and State Standard Plans.~~ In addition to any Referenced Requirements, the requirements of the Contract Specifications and Plans, these modifications and the Special Provisions, all materials and workmanship shall conform to the requirements of the National Electrical Code, as amended by the City of Sunnyvale, hereinafter referred to as the Code; Title 8 of Barclay's Official California Code of Regulations; Subchapter 5 of the Electrical Safety Code; CAL-OSHA Construction Safety Orders; and Rules for Overhead Electrical Line Construction, General Order No. 95 of the Public Utilities Commission.

Wire size shall be based on American Wire Gage (AWG) Standards.

~~These specifications~~ The latest State of California Standard Plans and Standard Specifications shall apply to materials to be used in the construction or installation of street lighting systems, ~~traffic signal systems~~ and other electrical work. These specifications set forth the product, equipment, materials, installation, workmanship, and fabrication of components as well as designation schedules of pole standards, conductors and cables.

Page 175

ADD THE FOLLOWING **SUBSECTION 209-2.1.1** THROUGH **SUBSECTION 209-2.1.8:**

**209-2.1.1 Description.** The electrolier standards shall be prestressed round tapered concrete poles manufactured under a properly controlled process to obtain optimum strength. Each pole shall consist of accurately placed high-tensile steel prestressing cables, a welded spirally wrapped wire cage for torsional reinforcement, dense, durable and high-strength centrifugally cast concrete, and surfaces treated to ensure uniform texture. The pole shall conform to the appropriate standards of the American Concrete Institute, AASHTO and UBC. Poles shall be type A, type B, or type C.

Type A poles shall be manufactured by Ameron (series 1-C2-25SV-A4, 6, or 8) or equal.

Type B poles shall be manufactured by Ameron (series 2-C2-25SV-A4, 6, or 8) or equal.

Type C poles shall be manufactured by Ameron (series 1-C3-30SV-E4, 6, or 8) or equal.

Aluminum luminaire arm shall be provided as a part of the electrolier standard. Refer to the Table of subsection 209-2.9 for sizes of arm, pole and luminaire.

Electrolier standards shall support the indicated loads and a 23 psi basic wind pressure with a 1.8 minimum on yield strength safety factor.

All poles and standards shall be provided with handholes. Handhole covers and access doors shall be secured with Allen-head screws or other tamper-resistant devices approved by the Engineer.

**209-2.1.2 Cement**. Portland cement used for construction of electrolier standards shall conform to the current specification for "Portland Cement," ASTM Designation C150, Type III.

**209-2.1.3 Aggregates**. Aggregates shall meet current requirements of ASTM Designation C33, except for grading requirements which may be altered to create the desired architectural effect.

**209-2.1.4 Water**. Water used in mixing concrete shall be clean and free from deleterious amounts of oil, acids, alkalis or organic materials.

**209-2.1.5 Prestressing Strand**. High-tensile prestressing strand shall conform to the current specifications for "Uncoated Seven-Wire Stress — Relieved Strand for Prestressed Concrete," ASTM Designation: A416, Grade 250.

**209-2.1.6 Spun Concrete**. Aggregate cement and water for concrete shall be batched by weighing or metering to assure correct proportions. Concrete shall be compacted in the mold to maximum density by centrifugation in a horizontal position.

**209-2.1.7 Surface Treatment**. All concrete poles shall be provided with blasted surface, uniform in lines and texture.

**209-2.1.8 Finishes**. All pole finishes shall be black and white aggregates. Poles shall be provided with a protective coating for preventive maintenance.

Page ~~176~~ 175

DELETE **SUBSECTION 209-2.2** AND SUBSTITUTE WITH:

**209-2.2 Anchor Bolts**. Anchor bolts shall be of the type and size shown on the Plans. Unless otherwise specified anchor bolts, anchor bars, studs and nuts shall conform to the provisions of ASTM Designation: A307. Where specified to be required high strength anchor bolts, bars, and studs shall conform to the provisions of ASTM Designation: A325 or A449 and shall comply with the mechanical requirements of ASTM Designation: A325 after galvanizing. Nuts and washers for high strength anchor bolts shall conform to ASTM Designation: A325.

Welding shall not be performed on any portion of the body of high strength anchor bolts. The minimum pitch diameter of the threaded portion of all anchor bolts shall conform to ANSI Standard: B1-1, having a Class 2A tolerance before galvanizing. After galvanizing, the pitch diameter of the nuts may be tapped over ANSI Standard: B1-1, Class 2B tolerance by the following maximum amounts:

$^{5}/_{8}$ inch - 1 inch.....0.023 inch oversize
1⅛ inch and larger .....0.033 inch oversize

Page 175

DELETE **SUBSECTION 209-2.3** AND SUBSTITUE WITH:

**209-2.3 Conduit**. Conduit to be used for electrical applications shall be as indicated on the plans and shall conform to UL Publication UL6 "Rigid Metallic Conduit" and UL Publication UL 651 "Rigid Non-Metallic Conduit" and the provisions as specified herein.

**209-2.3.1 Rigid Metallic Conduit**. Conduit and fittings to be installed in or on structures, through concrete foundations, or on the surface of poles shall be galvanized, rigid, mild steel.

Rigid conduit, threaded couplings and elbows to be installed underground shall be Polyvinyl-Chloride (PVC) externally coated galvanized rigid steel, Type A-40 conforming to the provisions of NEMA Standard Pub. No. RN 1. The PVC coating shall be 40 mils in thickness with a minimum tensile strength of 2000 psi and the adhesion shall be greater than the cohesive strength of the coating.

**209-2.3.2 Rigid Non-Metallic Conduit**. Rigid non-metallic conduit shall be rigid polyvinyl chloride Electrical Plastic Conduit (EPC) conforming to the provisions of NEMA Standard Pub. No. TC2, with fittings conforming to NEMA Standard Pub. No. TC3.

EPC schedule 40-PVC shall be used for underground installation underneath sidewalk. EPC schedule 80-PVC shall be used for heavy-duty applications above ground, such as riser conduit on wood poles above ten feet, and conduit runs within the roadway.

**209-2.3.3 Conduit Markers**. Conduit markers where required shall be embossed aluminum tape with ¼" high letters.

**209-2.3.4 Expansion Fittings**. Expansion deflection conduit fittings shall consist of a molded neoprene sleeve with a bonding jumper passing through a separate waterproof compartment and two silicon bronze couplings. Fittings shall permit a minimum of ¾ inch expansion and construction, and a ¾ inch deflection without deformation.

Page 176

DELETE **SUBSECTION 209-2.4** AND SUBSTITUTE WITH:

**209-2.4 Wire**. Conductors shall consist of solid or stranded copper, of the gage size indicated in Conductor Table, Section 86, State Standard Specifications, as shown on the plans, or as specified in the Special Provision. Wire sizes shall be based on American Wire Gage (AWG).

Copper wire shall conform to the specifications of ASTM Designations: B3 and B8.

Page 176

ADD THE FOLLOWING **SUBSECTION 209-2.4.1** AND **SUBSECTION 209-2.4.2**:

**209-2.4.1 Multiple Lighting Conductors**. Conductors for multiple lighting installations and all underground multiple or control circuits shall be UL listed and rated for 600-Volt operation.

The insulation shall be NEC type THW vinyl chloride plastic insulation conforming to the specifications of ASTM Designation: D2220.

Overhead service drop and feeder conductors shall be AWG No. 6 minimum size, seven strand insulated aluminum wire with a No. 6 steel reinforced bare aluminum neutral, 1170 pound ultimate strength, conforming to the provisions of PG&E service requirement specification.

**209-2.4.2 Conductor Identification**. All single conductors and cables shall have clear, distinctive and permanent markings on the outer surface throughout the entire length showing the manufacturer's name or trademark, insulation type letter designation, conductor size, voltage rating and the number of conductors if a cable.

Unless otherwise specified, conductor insulation shall be of a solid color or of basic colors with a permanent colored stripe as indicated in the Conductor Table included under Section 86-2.08A of the State Standard Specifications. Identification stripes shall be continuous over the entire length of the conductor.

Small permanent identification bands shall be marked as detailed in Conductor Table and fabricated from embossed six mil, oil resistant polyvinyl chloride tape with pressure sensitive backing. Tape shall be of a type such that embossed symbols contrast with the background color. The bands shall be securely attached to conductors in pull boxes and near the end of each conductor where conductors are terminated. Where circuit and phase are clearly indicated by color of conductor insulation, bands need not be used.

Size of bands shall be proportional to size of conductors being marked.

Conductors within cabinets shall be neatly cabled together with self-clinching nylon cable ties, waxed lacing or other such method approved by the Engineer.

Page 176

ADD THE FOLLOWING **SUBSECTION 209-2.5** THROUGH **SUBSECTION ~~209-2.11.1~~ 209-2.9**:

**209-2.5 Pull Boxes**. Pull boxes, covers and extensions for installation in the ground or in sidewalk areas shall be of the sizes and details shown on the plans and shall be precast reinforced concrete, or plastic if approved by the Engineer. Plastic Material shall be self-extinguishing when tested in accordance with ASTM Designation: D 635, and shall show no appreciable change in physical properties with exposure to the weather.

Pull boxes and covers for installation in structures shall be of the sizes and details shown on the plans. In lieu of the structure pull box shown on the plans, the Contractor may use a telescoping steel pull box, with interior dimensions, conduit entrances, and cast iron cover conforming to the details shown on the plans. Design of the steel pull box shall be submitted to the Engineer for review prior to fabrication.

Covers shall be secured with ⅜ inch bolts, capscrews, or studs, and nuts shall be brass,

stainless steel or other non-corroding material. Stainless steel hold-down bolts, capscrew or studs, nuts and washers shall have a chromium content of not less than 18 percent and a nickel content of not less than 8 percent. Nuts shall be recessed below surface of cover.

**209-2.5.1 Cover Marking**. Covers for pull boxes shall be marked as follows:

(a) "CSV TRAFFIC SIGNAL" where pull box contains traffic signal conductors with or without street lighting conductors.

(b) "STREET LIGHTING" where pull box contains street lighting conductors only.

(c) "COMMUNICATION" for pull boxes where communication conduit enters the pull box.

(d) "SPRINKLER CONTROL" for pull boxes where sprinkler control conduit enters the pull box.

(e) "CSV COMMUNICATIONS" for pull boxes where traffic signal communication conduit enters the pull box.

(f) "SERVICE" for pull boxes where conduit from utility facilities terminate.

Marking letters shall be between one and three inches high.

Marking shall be clearly defined and uniform in depth and may be placed parallel to either the long or short sides of the cover.

Marking shall be applied to each steel or cast iron cover prior to galvanizing by one of the following methods:

a. Cast in the cover.

b. Cast iron strips, at least ¼" thick, with the letters raised a minimum of $^{1}/_{16}$ inch. Strips shall be fastened to covers with ¼" flathead stainless steel machine bolts and nuts. Bolts shall be peened after tightening.

c. Sheet steel strips, at least 22-gage with the letters raised a minimum of $^{1}/_{16}$ inch above the surrounding surface of the strips. Strips shall be fastened to covers by spot welding, tack welding, brazing, or with ¼ inch roundhead stainless steel machine bolts and nuts. Bolts shall be peened after tightening.

d. Bead welding the letters on the covers. The letters shall be raised at least $^{3}/_{32}$ inch.

**209-2.6 Luminaires**. All luminaires shall conform to ANSI performance standards and the provisions as specified herein. Refer to the table of subsection 209-2.9 for type of luminaires required for each application. The luminaire shall conform to the dimensions as shown on the standard plans.

The housing shall be die-cast aluminum and shall have a natural aluminum or aluminum colored epoxy finish. The latch shall have a protruding handle and shall be made so that the ring and refractor assembly can be easily opened and positively latched closed again with one hand wearing a heavy lineman's glove.

The refractor, reflector and socket shall be provided with a high-temperature felt or elastomer gasket to produce a dust-proof seal when the luminaire is latched shut. The refractor shall be securely hinged to the housing in such a manner that the lower assembly cannot accidentally become detached and fall when the luminaire is opened.

Gaskets shall be resilient enough to seal the optical assembly without strain on the matching parts and shall not deteriorate under normal operating conditions or produce deposits inside the optical chamber.

Luminaires shall be provided for slip-fitter end mounting on two inch mast arms and shall be designed for easy installation and leveling, and shall be strong enough to withstand any impact on the pole standard which is not great enough to knock the pole to the ground.

The refractor shall be capable of producing the light pattern and optical characteristics specified. The optical system shall produce the maximum usable light with minimum glare. Light distributions obtainable shall conform to IES standards.

Conductor insulations shall be a high temperature formulation suitable for use in street lighting luminaires.

All wiring connections shall be at terminals or made with quick-disconnect plugs that are polarized or keyed to prevent incorrect connections.

All luminaires shall have wiring diagrams, voltage ratings, lamp wattage and all other pertinent electrical data prominently and permanently displayed on a durable label in each luminaire. The label shall be conspicuous when the luminaire is open for servicing.

All parts shall be smooth and free of sharp edges. All mating parts shall fit together easily and without strain and wiring shall be neatly arranged.

No luminaire supplied under this specification shall have appearance incompatible with those already in use in Sunnyvale nor shall it have any feature making it impractical, unsafe or expensive to use.

All high pressure sodium luminaires shall have NEMA 15 Amp twistlock photocell receptacles which shall be wired for 120/240 Volt operation. A shorting cap shall be installed in the receptacle when a photocell is not required.

Each luminaire shall be provided with an internal ballast assembly (including ballast, capacitor and lamp starter unit) mounted on a down opening door. The door shall be hinged to the luminaire housing and secured separately from the refractor door, and shall be easily removable and

replaceable. All connections from the ballast assembly shall be made with a single multi-circuit connector or individual color-coded NEMA tab connectors. Field connections to the luminaire shall terminate on a barrier type terminal block secured to the housing.

Glare shields are not required. Each luminaire shall be furnished without photoelectric unit receptacle unless otherwise indicated on the plans or in the Special Provisions.

**209-2.7 Photoelectric Controls**. Photoelectric controls shall be capable of switching multiple lighting systems directly.

**209-2.7.1 Types**. The types of photoelectric controls shall be as follows:

Type I photoelectric control shall consist of a photoelectric unit and a contactor in a single weatherproof housing.

Type II photoelectric control shall consist of a photoelectric unit in a weatherproof housing and a separate contactor located in a traffic signal controller cabinet.

Type III photoelectric control shall consist of a photoelectric unit and a separate contactor, each in a separate weatherproof housing.

Type IV photoelectric control shall consist of a photoelectric unit in a weatherproof housing which plugs into an EEI-NEMA twist lock receptacle integral with the luminaire.

A switch to permit manual operations of the lighting circuit shall be provided for Type I, Type II and Type III photoelectric control. Switches shall be of the single-hole-mounting toggle type, single-pole, single-throw, rated at 15 Amperes, 125 Volts. Switches shall be furnished with an indicating nameplate reading "Auto-Test" and shall be connected in parallel with the load contacts of the photoelectric unit.

**209-2.7-2 Photoelectric Unit**. The photoelectric unit shall provide an output in response to changing light levels. The response level shall remain stable throughout the life of the control unit. Components of the unit shall not require periodic replacement.

Units for street lighting shall have a "turn-on" between one and five foot-candles and a "turn-off" at between 1 1½ and 5 times "turn-on."

Units for illuminated signs shall have a "turn-on" level of between 20 and 30 foot-candles. (Turn-on level specified above corresponds to a switching level of approximately 40 to 60 foot-candles measured in the horizontal plane.) "Turn-off" level shall not exceed 3 times "turn-on" level.

Measurements shall be by the procedures set forth in EEI-NEMA Standards for Physical and Electrical Interchangeability of Light-Sensitive Control Devices Used in the Control of Roadway Lighting.

Photoelectric controls, except Type IV, shall be furnished with a 4-inch minimum inside

diameter slipfitter containing a terminal block and with cable supports or clamps to support pole wires.

The photoelectric unit receptacles shall be the EEI-NEMA type. Mounting brackets shall be used where pole-top mounting is not possible. Photoelectric controls shall be installed at the locations shown on the plans and oriented north.

Photoelectric units shall be screened to prevent artificial light from causing cycling.

The photoelectric unit shall also conform to the following:

The supply voltage rating shall be 60 Hz, 120 Volts or 240 Volt as specified.

The load rating shall be 800 Watts minimum.

The operating temperature range shall be from minus 20E F. to plus 150E F.

The power consumption shall be less than 10 Watts.

The base of the unit shall be provided with a 3-prong, EEI-NEMA standard twist-lock plug mounting.

**209-2.7.3 Lighting Contactors.** Lighting contactors shall be rated 600 Volts, 60 Hertz industrial duty, or as designated on the plans. The contacts shall be rated to switch the actual connected load, but shall be not less than 30 Amps per pole nor less than the rating shown on the plans. Contactors shall be capable of making and breaking any load within the rating of the contactor without the assistance of auxiliary arcing contacts. Auxiliary arcing contacts are not acceptable and shall not be used in the work. All contacts must be removable without disturbing line or load wiring.

Contactors shall be electrically held. Unless otherwise shown on the plans, coils shall operate on both 208 or 240 Volts interchangeably, and shall be continuously rated and fully encapsulated.

**209-2.7.4 Contactor and Test Switch Housing.** For Type I control, the enclosure shall house the test switch only. For Type III control, the contactor and test switch shall be housed in a suitable NMA Type 3R enclosure. The enclosure shall be provided with a factory-applied rust resistant prime coat and baked enamel finish coat. Two coats of aluminum paint shall be applied. At the Contractor's option, the enclosure may be hot-dip galvanized in lieu of painting. A minimum of 2½ inches shall be provided between contactor terminals and end of enclosure for wiring connections. The enclosure shall be mounted on the same standard as the photoelectric unit at a height of approximately 6 feet above the base.

~~For Type II control, the test switch shall be housed in the traffic signal controller cabinet with the contactor.~~

**209-2.7.5 Wiring.** Conductors between the photoelectric unit and an external contactor

shall be No. 14 AWG and shall be run inside the lighting standard, or in conduit, unless otherwise shown on the plans.

**209-2.8 Ballasts.** Unless shown on the plans, ballasts for high intensity discharge lamps shall be integral with the luminaire. Power factor shall be 0.9 or better. Ballasts shall be designed specifically to operate the specified lamp at the available supply voltage.

Ballast coils shall be heavily encapsulated in epoxy, electrical varnish or other suitable compounds to prevent ballast noise.

The lamp current wave-shape crest factor shall not exceed two at rated line voltage.

Ballast shall be magnetic regulator type and shall maintain wattage output within 2% of rated value, with 10% fluctuation of supply voltage.

After a warm-up period of fifteen minutes, input current and output Watts shall not vary more than 5% from the ballast rating when operated at the rated voltage with a lamp of the correct type and wattage.

Ballasts shall conform to the provisions in Section 86-6, "Lighting", of the State Standard Specifications and these specifications.

Suspension of ballasts by the handle and hanger method will not be required.

The ballast for each high pressure sodium lamp to be used in a mast arm mounted luminaire shall be of the regulator type and shall be mounted in the luminaire housing.

Each regulator type high pressure sodium lamp ballast shall operate at a minimum power factor of 98 percent and shall provide proper operation of its respective lamp within a range of +/- 10 percent of rated line voltage.

**209-2.9 Lamps.** High intensity discharge lamps for street lighting luminaires shall be of the power absorption (Watts) characteristics that are suitable for the type of luminaires as designated on the plans.

The lamps shall meet or exceed the requirements as shown in the table below and shall operate at the design voltage shown on the Plans.

ELECTROLIER REQUIREMENTS

| Street Width F.C. to F.C. | Luminaires | Spacing | | Pole and Arm Details | | |
|---|---|---|---|---|---|---|
| | | Sidewalk | Median | Sidewalk | | Median |
| | | | | Center of Pole Foundation 3'-0" or less from Face of Curb | Center of Pole Foundation Greater than 3'-0" from Face of Curb | |
| 36' | 70W HPS | 120'-150' Staggered | N/A | 25' pole (4' arm) | 25' pole (8' arm) | N/A |
| 40' | 70W HPS | 120'-150' Staggered | N/A | 25' pole (4' arm) | 25' pole (8' arm) | N/A |
| 44' | 70W HPS | 120'-150' Staggered | N/A | 25' pole (4' arm) | 25' pole (8' arm) | N/A |
| 64' | 200W HPS | 100'-120' Staggered | N/A | 30' pole (6' arm) | 30' pole (8' arm) | N/A |
| Over 64' without median | 200W HPS | 120' Opposite | N/A | 30' pole (6' arm) | 30' pole (8' arm) | N/A |
| Over 64' with median | 200W HPS | N/A | 120' | N/A | N/A | 30' pole 8' double arms (also, see note) |

Note: Electroliers installed in the median at a left turn pocket, shall have a 4' arm over the ~~turn~~ thru lane and an 8' arm over the left turn lane.

| Class of Lamp | Watts | Avg. Initial Lumens | Mean Lumen Output | Avg. Rated Life (Hrs.) | Bulb | Lamp Designation |
|---|---|---|---|---|---|---|
| High Pres. Sodium | 70 | 5800 | 5220 | 24000 | E-17 | LU 70 |
| | 200 | 22000 | 98000 | 24000 | E-18 | LU 200 |

## SECTION 212 — LANDSCAPE AND IRRIGATION MATERIALS

Page 186

ADD THE FOLLOWING AT THE END OF **SUBSECTION 212-1.1.1**:

Topsoils shall meet the following additional requirements:

Analysis Report and Approval - Provide the Engineer with three (3) copies of horticultural and structural soils analysis report on all proposed import topsoil. Field testing of imported topsoil shall be performed by an independent soil testing laboratory, selected and paid for by the City. The selection of the soil testing laboratory shall not be subject to the approval of Contractor.

Page 187

ADD THE FOLLOWING AT THE END OF **SUBSECTION 212-1.2.5**:

Wood chips shall be clean green softwood sized ½" x ½" to ½" x 3" by ⅛" to ½" thickness.

Page 188

ADD THE FOLLOWING **SUBSECTION 212-1.2.6:**

**212-1.2.6 Soil Conditioners and Nitrified Sawdust**. Wood sawdust or shavings shall be Redwood or mixed Redwood and hardwoods, 5% nitrogen, free of soil, rocks, bark strips, wood blocks or other foreign matter. Sample and lab analysis must be submitted for approval before delivery to site.

Controlled Release Fertilizer Tablets: 20-10-5 Agriform planting tablets, 21 gram tablet.

All fertilizers and soil conditioners shall be first quality, standard brand, agricultural products.

**212-1.2.6.1 Materials Delivery and Storage**. Manufactured materials shall be delivered in original containers with brand and maker's name marked thereon. Material in broken containers or showing evidence of damage will be rejected and must be immediately removed from the site. Odorous materials shall not be brought to the site until they are to be used.

**212-1.2.6.2 Certificates**. Contractor shall furnish a certificate or delivery slip to the Engineer with each delivery of material, in containers or in bulk. Certificate shall state source, quantity or weight, type and analysis, and date of delivery.

Page 188

ADD THE FOLLOWING **SUBSECTION 212-1.4.1.1** THROUGH **SUBSECTION 212-1.4.1.5**:

**212-1.4.1.1 Contract Growing**. All shrubs and trees shall be contract grown by a certified nursery approved by the Engineer. Submit proof of purchase of materials to the Engineer no later than thirty (30) calendar days after Notice to Proceed under the Contract. In the event that substitution of plant materials is allowed, the Contractor shall furnish plants of the next larger size than specified.

**212-1.4.1.2 Tagging**. All plants shall be true to name, and one of each bundle or lot shall be tagged with the name and size of the plant, in accordance with the standards of practice recommended by the American Association of Nurserymen.

**212-1.4.1.3 Dimensions**. Specimen plant materials are specified by height and spread. The first figure following the name of the plant is the height and the second figure is the spread. All measurements shall be made with material in an normal position without support of the branches. Plants specified by container size only shall be equal in size to similar plants in local retail nurseries.

DIMENSION EXAMPLE:

15 gallon broadleaf evergreens, 8-9 x 2-3 feet
15 gallon deciduous trees, 9-10 x 2-3 feet

**212-1.4.1.4 Inspection Procedures**. Right of inspection for approval or rejection is reserved at the place of growth or on the project site at any time upon delivery or during the work. Plants shall be inspected for size, variety, condition, defects or injury. Notify the Engineer of source of material no later than thirty (30) days after Notice to Proceed under the Contract. Provide transportation for the Engineer to place of growth for inspection of plants. Rejected material shall be promptly removed from the site.

**212-1.4.1.5 Substitutions**. Substitutions will be allowed only when specified material is proven unavailable and only with approval of the Engineer. Proposals will be considered for use of nearest equivalent size and variety with equitable adjustment to the contract price.

Page 190

DELETE **SUBSECTION 212-2.1.4** AND SUBSTITUTE WITH:

**212-2.1.4 Plastic Pipe for Use with Rubber Ring Gaskets**. Lateral line irrigation pipe shall be Class 200 NSSF 1120-1220 polyvinyl chloride (PVC) of the size indicated on the plans.

Mainline pipe shall be Schedule 40 up to 2" diameter and Class 315 for 2" and above diameter NSSF 1120-1220 polyvinyl chloride (PVC) of the size indicated on the plans.

All fittings for lateral or main line piping shall be Schedule 40 polyvinyl chloride (PVC) up to 2" and Class 315 for 2" and over, or as specified on plans.

PVC Schedule 80 nipples shall be used with molded threads. Machine threaded nipples will not be allowed.

Solvent weld joints shall be of make and type approved by the manufacturer(s) of pipe and fitting. Solvent cement shall be at proper consistency throughout use. Mixing thinner with solvent will not be allowed.

Teflon tape shall be designed specifically for use on threaded connections in water carrying pipes.

Page 190

ADD THE FOLLOWING **SUBSECTION 212-2.1.6**:

**212-2.1.6 Dissimilar Metals.** Where pipe of dissimilar metals are connected, dielectric fittings shall be provided.

Page 190

DELETE **SUBSECTION 212-2.2.7** AND SUBSTITUTE WITH:

**212-2.2.7 Valve Boxes**. Valve boxes shall be heavy duty plastic with locking lids labeled "Irrigation", except as noted on the plans. Valve boxes shall be sized as required for easy access to equipment, one valve per box, and shall be manufactured by Ametaek, Brooks, Carson, or equal. In addition to ID tags on solenoid wires, as noted on the plans, stencil numbers on tops of box lids.

Page 190

ADD THE FOLLOWING AT THE END OF **SUBSECTION 212-2.3**:

Backflow prevention devices shall be as indicated on the plans. All exposed metal shall be painted with one coat of primer and two coats of black rust inhibiting paint.

Page 191

ADD THE FOLLOWING AT THE END OF **SUBSECTION 212-3.2.2**:

Common, control and extra wires shall be solid copper, UL approved for direct burial installation, minimum gauge No. 14-1 AWG TYPE UF. Common wire shall be white, control wire shall be minimum No. 14-1 AWG-UF (red) and extra wires shall be minimum No. 14 AWG-UF (black).

Page 191

ADD THE FOLLOWING **SUBSECTION 212-3.2.3**:

**212-3.2.3 Splicing Materials**. Splicing materials shall be Scotchlock No. 3576, Rainbird Pentile Connectors, Aqua Splice Heat Shrink Splice, or equal.

Page 191

ADD THE FOLLOWING AT THE END OF **SUBSECTION 212-3.3**:

Irrigation controllers shall be as specified and as indicated on the plans. Controllers shall have a 120 V, 10 Ampere disconnect switch mounted and accessible inside the controller enclosure. The irrigation controllers shall be serviced with 120 V, No. 12, Type T.W. electrical wiring in rigid galvanized steel conduit and shall extend from the power source to the controller via the disconnect switch.

Keys for all locks shall be compatible with installed equipment. Supply owner with two (2) keys for each controller enclosure. At the time the controllers are delivered for testing, a complete schematic wiring diagram, including any wiring modifications, for each controller shall be submitted to the Engineer for approval. Prior to completion of the Contract, four (4) copies of each approved wiring diagram shall be furnished to the Engineer.

# END OF PART 2

# PART 3 — CONSTRUCTION METHODS

Part 3 — Construction Methods, shall consist of the Construction Methods of the "Greenbook" Standard Specifications for Public Works Construction, 2006 Edition, written and promulgated by Public Works Standards, Inc., as modified below.

## SECTION 7 – RESPONSIBILITIES OF THE CONTRACTOR

Page 32

ADD THE FOLLOWING **SUBSECTION 7-10.1.1** THROUGH **SUBSECTION 7-10.1.2**:

**7-10.1.1**

The City of Sunnyvale Public Works Traffic Division maintains "STANDARD OPERATING PROCEDURES FOR BICYCLE AND PEDESTRIAN SAFETY THROUGH WORK ZONES". All persons and organizations performing work in public streets shall be responsible to obtain and implement precautions contained in this document.

**7-10.1.2**

The City of Sunnyvale Public Works Traffic Division publishes guidelines for the time of day construction roadway closures are allowed. All work in the public right of way shall be governed by these guidelines. All persons and organizations performing work in public streets shall be responsible to obtain and implement precautions contained in this document.

## SECTION 207 – PIPE

Page 158

ADD THE FOLLOWING **SUBSECTION 207-17.6.1**:

**207-17.6.1 Execution**

**207-17.6.1.1 Installation**

1. Pipe shall be installed per AWWA C605 using a Type 5 trench unless otherwise specified.

2.. The new water main shall not be connected to any existing water main or service until after the new main has successfully passed hydrostatic and disinfection testing.

3. Pipe and fittings shall be carried and placed into trench using wide fabric straps. Chains and cables shall not be used, and items shall not be dropped into trenches. . All items shall be inspected by City prior to placing into trench and backfilling.

4. Inspect bell and remove any foreign materials.

5 Clean off the spigot end of the pipe and apply a lubricant (approved by the manufacturer) to the spigot end covering the beveled nose and sealing surface. Place beveled end in companion bell and provide straight alignment. Push pipe straight home with a block and bar until the stop mark on the spigot is even with the end of the bell. Assembling the joint by swinging or stabbing, or by using a backhoe bucket, is not allowed. After assembly to the stop mark, the pipe may be bent or the joint may be deflected, up to the limit defined by the manufacturer.

### 207-17.6.1.2 Thrust Blocks and Alternate Thrust Restraints

1. Thrust blocks shall be constructed of concrete having a cement content of not less than six sacks of cement per cubic yard of concrete, and shall be mixed and delivered to the jobsite by an approved ready-mix concrete supplier.

2. Thrust block locations may not be shown on the drawings, but blocks shall be provided for all pressure pipe fittings, valves, changes in pipe size or direction, and at all other points where there is a possibility of joint separation under pressure **in conjunction with mechanical joint restraint**. Provide anchors and supports where necessary for fastening work into place. Make proper provisions for expansion or contraction of pipelines. Thrust blocks shall be placed between solid ground and the pipe or fittings to be anchored as detailed. Thrust blocks shall be as shown in the Standard Details, and in accordance with AWWA C600 and pipe manufacturer's recommendations.

3. Where concrete thrust blocking is not possible due to space limitations or unstable soil conditions, mechanical joint restraints may be used **alone** if special approval is obtained from City.

   a. Fittings shall be mechanical joint (MJ) with Megalug Series 2000 restraint coating system and Tripac fluouropolymer coated tee bolts.

b.. Pipe shall be restrained on both sides of the fitting to a length recommended by EBAA Iron's "PVC Pipe Thrust Restraint Design Handbook", using split serrated style restraints, Series 1600 by EBAA Iron, Series 1390 by Uni-Flange, or approved equal.

4. Fittings in the vicinity of thrust blocks shall be wrapped in visqueen to protect bolts, nuts, and other material from concrete.

5. Backfilling operations at thrust blocks shall not begin until concrete has set for a minimum of 12 hours. After thrust blocks have been backfilled, water may be carefully introduced into the new pipe and appurtenances for disinfection. Care shall be used not to subject the new pipe to any pressure loading at this time. Concrete shall not be disturbed or pressure loaded for at least five days after placing thrust blocks unless otherwise permitted by the Engineer.

**207-17.6.1.3 Tracing Wire**

A continuous insulated AWG 10 tracing wire shall be installed upon on top of non-metallic pipe, attached at 10-foot intervals. The wire shall run along the entire pipe, and be stubbed out at valves, blowoffs, and air release/relief valves.

**207-17.6.1.4 Warning Tape**

3-inch wide detectable warning tape shall be installed over the entire pipe length of all mains. The tape shall be installed at the top of the pipe zone, and shall be color coded.

1. Tape for potable water pipelines shall be blue with white lettering, with the wording: "CAUTION: WATERLINE BURIED BELOW".

2. Tape for reclaimed water pipelines shall be purple with black lettering, with the wording: "CAUTION: RECLAIMED WATERLINE BURIED BELOW – DO NOT DRINK".

3. Tape for sewer force mains shall be green with black lettering, with the wording: "CAUTION: SEWER FORCE MAIN BURIED BELOW – DO NOT DRINK".

Page 119

ADD THE FOLLOWING AT THE END OF **SUBSECTION 207-1.6.1**:

Prior to placing any pipeline facilities to be used for domestic water, those facilities shall be flushed and disinfected according to established procedures contained herein. Upon completion of disinfection and flushing procedures, bacteriological testing shall be completed. Samples shall be

gathered and tests conducted by the City. Samples shall be taken at representative points as required by the Engineer.

The new facilities shall remain isolated and out of service until satisfactory test results have been obtained with meet the requirement of California Department of Health Services and the Engineer has accepted the results as indicative of the bacteriological condition of the facilities.

If unsatisfactory or doubtful results are obtained from the initial sampling and testing, the disinfection process shall be repeated until acceptable results are reported. The follow-up sampling costs shall be borne by the contractor or developer.

## SECTION 300 — EARTHWORK

Page 218

REVISE LAST LINE OF THIRD PARAGRAPH OF **SECTION 300-11.3.2** TO READ:

Penetration is that shown in Table 300-11.3.1.

## SECTION 303 — CONCRETE AND MASONRY CONSTRUCTION

Page 278

ADD THE FOLLOWING **SUBSECTION 303-4.3**:

### 303-4.3 Cobblestone Paving

**303-4.3.1 General**. Cobblestones shall be laid flat on a four (4) inch mortar bed. Mortar shall conform to Section 201-5.1 Class D. Mortar shall be tinted with Conrad Sovig Company LAB-X2874-4G (4lb/sack of cement), or approved equal.

**303-4.3.2 Installation**. Prior to installation, screed and float the area to ¾" below final grade to allow for displacement, and wet the stones. While mortar bed is still moist, the cobblestones shall be hand-set within the concrete mortar bed so that $^1/_3$ or ½ of the stone's thickness becomes embedded. The stones shall be placed tight together so that a minimum of concrete mortar is exposed between the stones. Each stone shall be positioned to expose the rounded, smooth, aestethically best-appearing side of the stone. Care shall be exercised in achieving a uniform, aesthetically pleasing appearance to the overall surface of the cobble paving. All cobblestone shall be washed clean and free of any excess concrete mortar.

Initially, a 50 square foot section will be installed and approved, and shall serve as a standard of quality for the remaining areas of cobblestone paving.

**303-4.3.3 Measurement and Payment.** Cobblestone paving shall be paid for at the contract unit price as shown in the bid schedule. The Contract unit price for cobblestone paving shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, including excavation, subgrade preparation, formwork, aggregate base, mortar bed and hand placement of stones.

Page 278

ADD THE FOLLOWING **SUBSECTION 303-4.4**:

**303-4.4 Interlocking Pavers**

**303-4.4.1 Construction.** Cutting of pavers can be done with either a double bladed breaker or a masonry saw. However, when cutting is required in roadways or precision-designed areas, a masonry saw is recommended.

Pavers shall be clean and free of foreign materials before installation. Installation shall start from a corner or straight edge and proceed forward over the undisturbed sand laying course. Paving work shall be plumb, level, and true to line and grade, and shall be installed properly to coincide and align with adjacent work and elevations. All edges must be retained to secure the perimeter stones and sand laying course. Pavers shall be installed hand-tight and level on the undisturbed sand course. String lines shall be used to hold pattern lines true.

Concrete sand shall be spread over the installed pavers and vibrated into the joints between the stones. A roller vibrator or plate vibrator shall be used to compact the stones and to vibrate the sand into the joints between the stones. Excess sand shall be swept into the joints or disposed of from the surface area. The completed pavers installation shall be washed down and cleaned to provide a clean, finished workman-like installation.

**303-4.4.1 Measurement and Payment.** The contract unit price paid per square foot of concrete interlocking pavers shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing such work, including subgrade preparation and processed miscellaneous base, as called for on the plans or in the technical specifications, and as directed by the City and no additional compensation will be allowed therefore.

Page 282

ADD THE FOLLOWING AT THE END OF **SUBSECTION 303-5.5.3**:

Replace existing curb markings and paint after installation of curb and gutter.

## SECTION 306 — UNDERGROUND CONDUIT CONSTRUCTION

Page 306

ADD THE FOLLOWING BEFORE SUBSECTION 306-1:

**306-0.1 Water Services.**

A. Water Service Saddle and Tapping Sleeve Requirements

Service saddle or tapping sleeves are required as tabulated below:

The minimum size of service of residential and duplex is 1"; for commercial or industrial it is 2".

| Type of Pipe | | | | | | |
|---|---|---|---|---|---|---|
| Diameter of Street Water Main (Inches) | Cast Iron or Ductile Iron | | | Asbestos Cement (AC) (EXISTING ONLY) | American Concrete Cylinder Pipe (A.C.C.P.) | PVC C900 (Note 7) (ANSI/AWWA C605-05) |
| 4" | Service Size | | | Service Size | Service Size | Service Size |
| | 1" | 2" | 4"+ | All | All | All |
| through 30 " | Direct Tap Allowed | Service Saddle Req'd (Note1) | See Note 2. | Service saddles required on all 1" & 2" taps (see note 3 below. For services 4" and larger, see Note 2 below | Service saddles required on all 1" and 2" taps (see Note 4 below) | Service saddles required on all 1" & 2" taps (See Note 5 below. For services larger than 2", see Note 6 below) |

Note 1: Cast Iron or Ductile Iron Pipe — Saddles shall be double strap bronze - cc thread (Mueller BR2B, or approved equal).

Note 2: Tapping Sleeve and Tapping Valve — All 4 inch and larger services on C.I. or D.I. pipe requires Mueller A2360-19 flange x MJ valves and Mueller H-615 (D.I.) sleeves, or approved equals. The tapping sleeve shall be the same size as the service.

Note 3: A.C. Pipe — Saddles shall be double strap bronze - cc thread (Mueller BR2B or approved equal).

Note 4: A.C.C.P. Pipe — All 4" and larger services on A.C.C.P. shall use a Mueller H-619 sleeve or approved equal. The method of installation of a service saddle shall be in accordance with manufacturer's recommendations subject to approval by the City.

Note 5: PVC – C900 Pipe – Service clamps or saddles shall provide a sufficient bearing area. A minimum of 2" total width along the pipe's axis shall be required for taps up to 1" in size to prevent pipe distortion when saddle is tightened. Taps 1-1/4" through 2" should have a minimum of 3" total band width with full circumference support. Mueller H-13000 Series saddles or approve equal are required.

Note 6: PVC – C900 Pipe – Tapping sleeve for 4" and larger pipe requires Mueller H-615 with Mueller HP epoxy coating and fluropolymer (Tripac) coated T-bolts and sleeve connecting bolts and washers.

Note 7: Use PVC C905 for sizes over 12 inches diameter.

B. Marking Valve Locations

The location of all valves in the street shall be marked on the nearest curb with an incised "W" on the top of the curb and the distance in feet marked with incised roman numerals on the face of the curb, all in 2" high characters.

C. Taps

All wet (or live) taps made to existing water mains 12" and smaller shall be performed by the City. Taps made to A.C., D.I.P., PVC, or C.I.P. water mains larger than 12" shall be done by a qualified contractor, approved by City. The City does not perform live taps to A.C.C.P. 4" or larger.

All taps require a minimum of 48 hours advance notification of City. The Contractor and/or owner shall be responsible for the complete installation of the service saddle or tapping sleeve and valve.

D. Water Shut-Down Notification

It is the contractor's responsibility to notify affected residents and businesses 48 hours prior to the start of a water main shut-down. The water main shut-down will be completed by City crews only.

E. Fire and Domestic Water Service and Water Service Location

Fire and domestic water services:

| Fire Service Size (in.) | Domestic Water Service Size (in.) | | | | | | |
|---|---|---|---|---|---|---|---|
| See Note 3 below | 1 | 2 | 4 | 6 | 8 | 10 | 12 |
| 4 | See Note 1 Below | | See Note 2 Below | | | | |
| 6 | | | | | | | |
| 8 | | | | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |

Notes:

1. Domestic and Fire services shall be separately tapped into the street water main and individual water services extended there from to the water meter or detector check locations.

2. Fire services shall be sized by fire protection engineers and as approved by City Fire Prevention.

Water Service Location:

The location of the water meter shall be at the back of sidewalk or back of curb within the public right-of-way where possible, and will require approval.

F. Backflow Prevention Devices

Backflow Prevention Devices shall be installed in compliance with the "City of Sunnyvale Water System Cross Connection Control Program Policies and Regulations". A backflow prevention assembly shall consist of 2 check valves and a pressure relief valve connected in series with 2 non-rising stem gate valves. Backflow prevention assemblies shall be the same size as the pipe main in which they are installed. The assembly shall be UL listed and approved by the Research Foundation for Cross Connection Control, University of Southern California. Backflow devices shall be painted with two coats of rust inhibiting gloss black paint, except for fire department connections which shall be painted safety yellow.

G. Meter and Meter Box Installation

The meter and meter box shall be furnished and installed by the City upon acceptance of the lateral service line, and the property owner has assumed responsibility for the connection on the discharge side of the meter. A backflow prevention device is required for all services 2" and larger. If deemed necessary by the City, a backflow prevention device may be required for smaller services. No meter shall be installed prior to full compliance with the cross connection control program.

H. Warranty Period

Installation of Water Services: The Contractor is responsible for maintenance and repairs to the service trench and pavement for a one-year warranty period after acceptance of the work by the City. One year after acceptance, the City will make a final inspection. If repairs have to be made, the contractor or developer will be notified to make repairs.

Page 324

DELETE **SUBSECTION 306-1.4.1 7)** AND SUBSTITUTE WITH:

7) Hydrostatic Pressure Test:

Each run of pipe between two (2) sectionalizing valves or between a valve and a cap or plug as directed by the Engineer shall be tested for leakage. Only one (1) run of pipe shall be tested at a time, but pressure may be applied through sections of pipe already successfully tested. Services and fire hydrant runs may be tested individually or with sections of water main. It is the intention of these tests to test the water tightness of the closed gate valves as well as the piping.

The Contractor shall furnish all necessary equipment, materials and labor to perform the pressure tests.

The hydrostatic test pressure shall be two hundred (200) pounds per square inch based on the elevation of the lowest point of the section under test and corrected to the elevation of the test gauge.

The test pressure shall be maintained for not less than two (2) hours. No pressure drop is permissible. The Contractor shall, at its own expense, take whatever steps are necessary to eliminate the leakage, after which the test shall be repeated as often as necessary until acceptable results are obtained.

Page 327

ADD THE FOLLOWING **SUBSECTION 306-1.4.7**:

**306-1.4.7 Disinfecting Mains.** Disinfecting and Flushing. Disinfecting the completed work, including all pipelines, valves, and fittings shall be performed by the Contractor who will supply all materials, equipment, supplies, and labor required for the operation. The required concentration of the chlorine throughout the system is fifty (50) parts per million. The pipeline shall be disinfected in accordance with AWWA Standards B300 and C651, and as specified herein:

a. Liquid Chlorine Solution Method: Flush all foreign matter from mains, branch runs, hydrant runs, and installed services. Introduce liquid chlorine solution at appropriate locations to assure uniform distribution through the facilities at the proper concentration. Installed copper service lines shall not be used to convey the concentrated solution to the mains. The sanitizing solution shall be retained in the facilities for a period of twenty-four (24) hours, after which each service, hydrant run, branch run, and dead end shall be flushed until the residual chlorine is less than one (1) part per million, or is no greater than the chlorine concentration in the water supplied for flushing.

b. HTH Tablet Method: Tablets are to be fastened to the inside top surface of each length of pipe using "Permatex Number 2" at the time of pipe laying. Tablets shall not be available at any time for casual pilferage by the general public or by children. The new facilities are to be slowly filled with water. Air is to be exhausted from each dead end, branch run, hydrant run and installed service. Retain water for a period of twenty four (24) hours, after which each service, hydrant run, branch run, and dead end shall be thoroughly flushed to clear foreign matter and until residual chlorine concentration is less than one (1) part per million or is no greater than the concentration of chlorine in the water supplied for flushing.

Chlorine tablets (e.g. HTH) shall be fastened to the top of the pipe with tar or permatex #2 according to the following schedule:

| Length of Run (feet) | Number of Tablets for Pipe Line or Main Diameter of: | | | | | |
|---|---|---|---|---|---|---|
| | 2" | 4" | 6" | 8" | 10" | 12" |
| 13 | 1 | 1 | 1 | 2 | 3 | 3 |
| 18 | 1 | 1 | 2 | 2 | 3 | 5 |
| 20 | 1 | 1 | 2 | 3 | 4 | 5 |
| 30 | 1 | 1 | 2 | 4 | 5 | 7 |
| 40 | 1 | 2 | 3 | 5 | 7 | 10 |

## SECTION 307 — STREET LIGHTING AND TRAFFIC SIGNALS

Page 352

DELETE **SUBSECTION 307-1.3** AND SUBSTITUTE WITH:

**307-1.3 Equipment List and Drawings.** The Contractor shall, within ten days of the Notice to Proceed, submit to the Engineer for review and approval, a list of equipment and material which he proposes to install. The list shall be complete as to name of manufacturer, size and identifying number of each item. The list shall be supplemented by such other data as may be required, including detailed scale drawings and wiring diagrams of any special equipment, and any proposed minor deviation from the plans. All of the above data shall be submitted in duplicate for approval. Following approval, any correction or modifications shall be made, and not less than six complete sets shall be resubmitted to the Engineer. The City will not be liable for any material purchased, labor performed, or delay to the work prior to such approval. Where the electrical work is to be constructed as detailed on the plans, the submission of detailed drawings and diagrams will not be required.

If ordered by the Engineer, the Contractor shall submit for approval, sample articles of the material proposed for use. After approval, said sample articles will be returned.

The intent of the plans and drawings is to show the approximate locations for signals, beacons, standards, lighting fixtures, signs, controls, conduits, services and appurtenances; the location of such may be changed in the field by the Engineer.

Page ~~352~~ 353

ADD THE FOLLOWING AT THE END OF **SUBSECTION 307-1.5**:

Where facilities are to remain in operation for public use, existing electrical systems (signal, lighting, or other systems) or approved temporary replacements thereof, shall be kept in effective operation for the benefit of the public during the progress of the work, except when shutdown is permitted to allow for alterations or final removal of the systems. Traffic signal shutdowns shall be limited to periods during normal working hours, or those hours specified in the Special Provisions or to those hours designated by the Engineer. Street lighting system shutdown shall not interfere with the regular lighting schedule, unless otherwise permitted by the Engineer.

Where a facility requires continuous electrical power, the shutdown time for cut over shall be limited to one-half hour as scheduled by the Engineer, unless shown otherwise on the plans.

The Contractor shall notify the Engineer 24 hours prior to performing any work on existing systems. The Public Safety Department shall be notified 24 hours prior to any operation shutdown of a traffic signal system.

Page ~~352~~ 353

ADD THE FOLLOWING **SUBSECTION 307-1.6** THROUGH **SUBSECTION 307-1.9**:

**307-1.6 Schedule of Work.**

**307-1.6.1 Utility Company Notification.** Twenty-four hour notice shall be given to ATT/SBC, Pacific Gas and Electric Company, and the City of Sunnyvale, Department of Public Works, before the beginning of any operation involving their facilities or systems.

**307-1.6.2 Systems Integration.** Work shall be so scheduled that each traffic signal system, safety lighting system or other electrical installation shall be completed and ready for operation prior to integrating into the system and to the opening to traffic of the corresponding sections of the roadway.

If street lighting exists or is being installed in conjunction with the traffic signals, traffic signal systems shall not be placed in operation for use by public traffic without the energizing of street lighting at the intersection to be controlled.

The initial turn-on shall be made between 9:00 a.m. and 2:00 p.m., Tuesday through Thursday only unless specified otherwise in the Special Provisions. The Contractor shall schedule the turn-on with the Engineer at least one week in advance of the proposed date of turn-on.

For vehicular undercrossings, soffit lights shall be placed in operation as soon as practicable after falsework has been removed from the structure. Lightings for pedestrian structures shall be placed in operation prior to opening the structures to pedestrian traffic.

**307-1.7 Inspection.**

**307-1.7.1 Installation of Systems.** Prior to backfilling of conduit trenches or the pouring of concrete foundations, the Contractor shall notify the Department of Public Works and request

inspection of all conduits and foundation forms. All conduits, conduit couplings, bends, ground bushings shall be tightened and all anchor rods, bolts, and ground rods shall be in place in the foundation form prior to request for inspection. Wire shall not be pulled in conduits until inspection and backfilling and pouring of foundations are completed. Stub ends of all conduits shall have approved caps and ground bushings installed prior to backfilling or pouring of foundations.

The contractor shall not backfill, enclose or otherwise cover up any electrical work prior to inspection and/or testing. Should any of the work be backfilled, enclosed or covered up, the Contractor shall, at his expense, expose such work for inspection and/or testing.

**307-1.7.2 Correction of Faults and Damages.** The Contractor shall guarantee the work against defects and shall, upon notification by the City of Sunnyvale, immediately correct any fault or damage caused by overloading, over-voltage, lack of fuse protection, use of incorrect or defective material, or defects of workmanship. Corrections shall be effected either by repair or replacement in a manner approved by the Engineer.

When existing facilities are damaged by the Contractor's operation during construction and said damage is not evident at the time of acceptance, the Contractor shall, when notified by the Engineer, repair or correct damage promptly in accordance with these specifications. Should the Contractor fail to correct the discrepancies within 24 hours after notification or such other time indicated by the City; or if the public safety requires emergency repairs, the City shall perform the necessary work and the Contractor will be charged for all associated costs. Said charges will be deducted from any money's due, or to become due the Contractor.

**307-1.8 Compliance Tests.**

**307-1.8.1 Field Tests.** Prior to completion of the work, the Contractor shall cause the following tests to be made on lighting circuit installations, and such other electrical installation work as the Engineer may direct. All tests shall be made in the presence of the Engineer.

1. Continuity Test. Each circuit shall be tested for continuity.

2. Ground Test. Each circuit shall be tested for grounds.

3. Insulation Resistance Test. Insulation resistance test shall be made on each circuit using a megohmmeter insulation tester (Megger). The tests shall be at 500-Volts DC between the circuit and a ground. The insulation resistance shall not be less than 10 megOhms on all circuits.

4. Functional Test. A functional test shall be made in which it is demonstrated that each and every part of the system functions as specified.

The functional test for each new or modified system shall consist of not less than five days of continuous satisfactory operation. If unsatisfactory performance of the system develops, the conditions shall be corrected and the test shall be repeated until the five days of continuous satisfactory operation is obtained.

During the five-day test period, City of Sunnyvale forces will maintain the system or systems. The cost of any extraordinary necessary maintenance, except electrical energy and maintenance due to damage by the public, shall be at the Contractor's expense.

The functional tests shall not start on a Friday or on the day preceding a legal holiday.

Shutdown caused by factors beyond the Contractor's control shall not constitute discontinuity of the functional tests.

**307-1.8.2 Faulty Material.** Any fault in any material or in any part of the installation revealed by these tests shall be replaced or repaired by the Contractor at his expense in a manner approved by the Engineer, and the same test shall be repeated until no fault appears.

**307-1.9 Safety Precautions.**

**307-1.9.1 Safety Orders.** The Contractor shall adhere to all industry, utility company and California safety regulations for working on, and around power and telephone poles and underground vaults.

The operation, erection, or handling of tools, machinery, equipment, apparatus, materials, or supplies or any part thereof within 10 feet of any high-voltage line between 750 Volts and 50,000 Volts is prohibited. Higher voltages require greater clearances as specified in Article 86, Table X of "High-voltage Electrical Safety Orders", Title 8 of Barclay's Official California Code of Regulations, Subchapter 5 Electrical Safety Orders.

Prior to commencing any work where overhead high-voltage lines are involved, the procedure as specified herein shall be rigidly adhered to.

If the clearance from the top of improvement to be installed to the lines is in excess of 15 feet, no restrictions will be imposed; however, if the clearance required is within 5 feet of the 10 foot prohibited zone then the following requirements shall be followed:

1) A snubbing device shall be installed on the crane or other lifting or erecting device. The snubbing device shall be attached and adjusted so that the boom when fully raised or extended shall be outside of the 10 foot prohibited zone.

2) The electrolier standard shall be laid with the top pointing toward the base and the sling so fastened to the standard so that no part will be above the boom when fully erected. The electrolier shall be raised by taking in the cable, with the boom fully extended as snubbed and stationary.

Failure to comply with existing safety regulations of Cal OSHA, ATT, or the Pacific Gas and Electric Co. shall constitute non compliance.

**307-1.9.2 Safety Clearance.** All cuts and splices in existing City maintained systems shall be as approved by the City. Before starting work on any existing series circuit, the Contractor shall

obtain a daily written safety circuit clearance from the Engineer. Cut-out plugs must be pulled, shorting and grounding devices in place, and "Men at Work" signs posted at cut-out switches, switch boxes and shorting stations before any work is done on a series circuit. The circuit will be re-energized only on the request of the same individual who obtained the safety clearance. The series circuit shall be in operating condition and re-energizing request made before 3:00 p.m. of each day the circuit is opened. Pacific Gas and Electric Company safety regulations, in addition to other pertinent safety regulations, shall be observed when working on series circuits.

Page 357

ADD THE FOLLOWING AT THE END OF **SUBSECTION 307-2.7**

Bonding and grounding conductors shall be copper wire or copper braid of the same cross sectional area as AWG No. 6 for series lighting systems and AWG No. 8 for all other systems.

The grounding electrode conductor shall be AWG No. 8 or the size specified in article 250-95 of the Code, whichever is larger. Where exposed to physical damage, minimum grounding electrode conductor size shall be AWG No. 4.

Grounding electrodes shall be $^{5}/_{8}$" x 10' copper-clad rods or ¾" x 10' galvanized steel rods. The resistance to ground from the grounding electrode shall not exceed 5 Ohms. The Engineer may order the use of other available electrodes to reduce ground resistance to less than 5 Ohms.

Page 358

ADD THE FOLLOWING AT THE END OF THE **SUBSECTION 307-2.8**:

All circuits except overhead fed electroliers shall be provided with services which include a disconnecting means, circuit protection, and service ground suitable for use as service equipment under the prevailing conditions.

Services shall include the service entrance conductors, service drops or service laterals, service conductors, cabinets, service equipment, street lighting contactors, and other materials as required for a complete working system.

Electric service materials, devices and equipment shall conform to the plans, these specifications, Pacific Gas and Electric Co. "Electric and Gas Service Requirements," and conditions of the applicable Public Utilities Commission Rate Schedule.

**307-2.8.1 Distribution Cabinet.** All cabinets and equipment enclosures installed outdoors shall be NEMA 3/3R construction, conforming to NEMA Publication No. 1CS 1-110.12 and 1CS 1-110.13 and shall be lockable in the manner shown on the plans. Service cabinets shall be factory manufactured, pre-wired units conforming to the plans and specifications, delivered to the job site ready to bolt to the foundation and for connection of service conductors and field wires.

Panelboard and circuit breakers shall be approved and listed by UL. The operating mechanism

of the circuit breakers shall be enclosed and shall be trip-free from operating handle or overload and shall be quick-make, quick-break on either automatic or manual operation.

At each circuit breaker, a laminated phenolic name plate, designating the connected circuit, shall be permanently fixed to the panel board.

The equipment shall conform to "Type III Service" of State Standard Specifications, unless otherwise specified.

The contractor shall furnish three sets of wiring diagrams of the service and distribution cabinet showing location and description of components and all wiring connections. One set shall be sealed in plastic and attached to inside of cabinet door.

**307-2.8.2 Metering Equipment.** Meter socket shall meet the requirements of the serving utility and shall be equipped with manual closing devices or space for a test block as per requirement.

**307-2.8.3 Service Disconnect.** Service disconnecting means shall be designed to disconnect all ungrounded conductors simultaneously. Service switches and main breakers shall be installed in dead-front panels or shall be externally operable and lockable in both "On" and "Off" positions.

Electrolier circuits fed from an overhead service drop shall not require a disconnecting means unless shown on the plans.

The disconnecting means in Type 'G' services shall be fused spliced connectors.

**307-2.8.4 Circuit Protection.** All services shall be provided with overcurrent protection in each ungrounded service-entrance conductor. Overcurrent protection devices shall be suitable for the prevailing condition and rated higher than any branch circuit protection device but not higher than the allowable ampacity of the conductors.

Circuit protection for overhead services to electroliers shall be indicating-flag type fuse links installed in the drip loop. Capacity of fuse links shall be 10 Amps when used on a single electrolier where there are no branch circuit protection devices, or 30 Amps when used with branch protection devices, or as specified on the plans. Unless otherwise shown on the plans, the types of fuses to be used where the fused splice connector is to be used as a disconnect shall be NEMA number: FNM-10, FNQ-10, BAF-15, BAN-15 or KTK-15 for service to a single electrolier without branch protection devices, and BAF-30 or KTK-30 when used on circuits with branch protection devices.

All other circuits shall be protected with type NON fuses of suitable capacity or with circuit breakers conforming to Section 307-2.8.1.

Page 363

RENUMBER **SUBSECTION 307-8** "PAYMENT" TO BE **SUBSECTION 307-9** AND INSERT NEW **SUBSECTION 307-8**:

**307-8 TRAFFIC SIGNS.** All signs shall conform to the applicable Manual of Uniform Traffic Control Devices (MUTCD), 2003 Edition, MUTCD LA Supplement, and the State Sign Specification Sheets (issued by the State of California, Department of Transportation). The installation of street and traffic signs shall include all work and materials, including posts and mounting hardware necessary for installation, complete, in place. In the event that the size of sign is not noted, the Contractor shall supply the `standard' size. `Minimum' size signs will not be acceptable.

## SECTION 308 — LANDSCAPE AND IRRIGATION INSTALLATION

Page 364

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-1.**

The irrigation system shall efficiently and evenly irrigate all areas and shall be complete in every respect, and shall be ready for operation to the satisfaction of the Engineer.

The Contractor shall provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the types of materials being installed and the manufacturer's recommendations as to the method of installation and who shall direct all work performed under this section.

Page 364

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-2.1**:

No import topsoil shall be procured or placed on site prior to Engineer's approval.

Page 365

ADD THE FOLLOWING **SUBSECTION 308-2.4.1** THROUGH **SUBSECTION 308-2.4.3**:

**308-2.4.1 Required Density.** Density of all topsoil to be eighty-five percent (85%) relative compaction as determined by California Test Method No. 216.

**308-2.4.2 Layers.** Topsoil shall be brought up to grade in layers not exceeding twelve inches (12"). Final lift to be placed to eighty percent (80%) maximum relative compaction.

**308-2.4.3 Finish Surfaces and Drainage.** All ground surfaces are to be finished to uniform grades and slopes as shown on the plans, to drain properly and to be free from depressions which may cause areas of standing water.

Page 365

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-4.1**:

Planting shall not be performed during rainy or other inclement or hazardous weather conditions.

Page ~~365~~ 366

DELETE THE FOURTH PARAGRAPH OF **SUBSECTION 308-4.5** AND SUBSTITUTE WITH:

Special Backfill Mix for Tree and Shrub Holes — Backfill all tree and shrub holes with the following proportioned mix per cubic yard:

a) 2/3 cubic yard of loose measure soil from excavated holes

b) 1/3 cubic yard of loose measure redwood nitrogenized (0.5% nitrogen) sawdust

c) Agriform planting tablets at the rate of:

| | |
|---|---|
| 1 gallon plants - | 1 tablet |
| 5 gallon plants - | 3 tablets |
| 15 gallon plants | 5 tablets |
| Boxed material | 1 tablet per 1/2 inch tree trunk diameter measured one foot from top of root ball |

Thoroughly mix, leaving no layers of amendments.

Page 368

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-4.9.3**:

Furnish and install mulch at 2" depth throughout all planted shrub and tree areas.

Page 369

ADD THE FOLLOWING **SUBSECTION 308-4.10** THROUGH **SUBSECTION 308-4.13**:

**308-4.10 Anti-Transpirant Spray**. Two applications of an anti-transpirant material shall be sprayed on trees. The first spraying shall be applied when directed by the Engineer and in accordance with the manufacturer's recommendation.

**308-4.11 Preemergent**. Upon completion of all planting operations, and prior to placing mulch, apply Ronstar, Surflan, or equivalent preemergent herbicide at recommended label rates and upon completion activate the irrigation system to soak the preemergent. Basins shall be left around

plants unless otherwise specified or directed by the Engineer.

**308-4.12 Root Control Barrier.** A root control barrier shall be installed in all tree wells located in median noses. Median noses are defined to be the narrow portions of the median islands at the beginning and end of each island where tree roots are surrounded by concrete planting areas, limiting allowable root spread. Root control barrier shall be installed in accordance with the manufacturer's specifications and to the approval of the Engineer.

**308-4.13 Planting – General Clean Up.** After all planting operations are completed, all planted areas shall be cultivated to a 2" depth, and then shall be maintained watered and free of weeds until final job acceptance. In addition, the Contractor shall remove all cans, surplus materials, and other debris from the site, and shall neatly dress and finish all planting areas and flush clean all walk and paved areas to the satisfaction of the Engineer.

Page 369

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-5.1**:

One copy of the approved schematic wiring diagram and one copy of the "RECORD DRAWINGS" irrigation plan, showing the equipment controlled by the irrigation controller and the location and station number for each electric remote control valve, shall be laminated in plastic and securely mounted inside the controller door. The installation date and controller's guarantee expiration date shall be permanently marked inside the controller. A maintenance and operations manual for each controller shall be submitted to the Engineer when the approved wiring diagram is placed inside the controller.

**308-5.1.1 Sleeves.** Sleeves and conduits for underground installations shall conform to requirements of this Subsection; and shall be of size, type and location, as indicated on the plans, and as directed by the engineer.

Contractor shall install PVC sleeves and conduit around pipe and wire that pass through or under concrete paving and walks and as required to facilitate a smooth construction sequence. Sleeves and conduit shall be sized as indicated on the plans. Rigid metal sleeves and conduits shall be provided for all irrigation lines and control wires located under asphalt pavement. Contractor shall coordinate sleeve installation with other trades, as required.

Page ~~369~~ 370

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-5.2.1**:

Concrete thrust blocks shall be as detailed on the plans.

Page 372

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-5.4.3**:

Contractor shall install check valves on sprinkler riser assemblies as detailed, or where otherwise needed if low head drainage occurs for a pipe run.

Page 372

ADD THE FOLLOWING AT THE END OF **SUBSECTION 308-5.4.4**:

Contractor shall prevent water spraying onto non-irrigated areas.

Page 372

AT THE END OF THE FIRST SENTENCE OF THE SECOND PARAGRAPH OF **SUBSECTION 308-5.5**, ADD THE FOLLOWING:

... or as directed by the Engineer.

Page 374

ADD THE FOLLOWING SUBSECTION **308-5.7**:

**308-5.7 Inspection.** The Contractor shall submit written requests for inspections to the Engineer at least 48 hours prior to time(s) of the required inspections. Inspections of completed installation will be made by the Engineer during the performance of hydrostatic testing and prior to backfilling of trenches.

Page 374

ADD THE FOLLOWING AT THE BEGINNING OF **SUBSECTION 308-6**:

Immediately replace any plant materials that die or are damaged. Replacements shall be made to the same specifications as required for original plantings.

Page 374

DELETE **SUBSECTION 308-7** AND SUBSTITUE WITH:

**308-7 GUARANTEE.** All trees, shrubs, ground covers, and other plant materials shall be guaranteed to take root, grow, and thrive for a period of one year after final acceptance of work.

Any trees or other plant materials that die back and lose the form and size originally specified, shall be replaced, even though they have taken root and are growing after the dieback.

Within 15 days of written notification by the City, remove and replace all guaranteed plant materials which, for any reason, fail to meet the requirements of guaranty. Replacements, at the contractor's expense, shall be made to same specifications as required for the original materials and shall carry the same guarantee from the time they are replaced.

## SECTION 310 — PAINTING

Page 383

ADD THE FOLLOWING AT THE END OF **SUBSECTION 310-5.6.1**:

All legends, striping and markers shall be placed in locations as shown on the plans. Any crosswalks, legends, arrows, or striping installed prior to the installation of the inductive loop detectors will be rejected by the Engineer. The rejected work shall be completely removed and reinstalled at the expense of the Contractor.

Pavement markers shall conform to the provisions of Section 85, "Pavement Markers", of the State Standard Specifications and shall be of the type shown on the plans. Conflicting pavement markers shall be removed as required.

Paint shall be fast drying traffic paint, as manufactured by Minnesota Mining and Manufacturing Company or J.E. Bauer, or equal.

All markings for all crosswalks, legends and 8" solid white lines shall be thermoplastic in accordance with Section 84, Traffic Stripes & Pavement Markers", of the State Standard Specifications.

All paving surfaces to which painted markings are to be applied shall be dry and "broom clean".

The Contractor shall be responsible for accurately locating the lines and positions of all traffic lines directional lines, arrows and other markings in accordance with the plans and City standard markings by cat tracking with painted marks. Where new detector loops are to be installed, the Contractor shall mark the new lane lines so that the new detector loops can be installed accurately.

Prior to painting, the Contractor shall call for review and approval of the proposed striping by the Engineer. The City shall have the right to make changes in the location and alignment of lane stripes and pavement markings.

Painting shall be done either by spray method using masking templates as required, or the striping shall be done by means of a mobile device approved by the Engineer. The method used shall produce markings with clearly defined edges and with no paint splatter on adjacent surfaces.

Paint shall be applied in sufficient quantity to cover the surface completely in one application. Rate of application of paint and beads shall be 8 to 11 gallons per mile for broken single stripe and 17 to 18 gallons per mile for double solid stripe. Minimum thickness of application shall be 10 mils.

The Contractor shall provide suitable barriers, warning signs and/or other arrangements to keep

both foot, bicycle and vehicular traffic away from the freshly painted surfaces until the paint is thoroughly dry.

Page 388

ADD THE FOLLOWING AT THE END OF **SUBSECTION 310-5.6.10**:

All required pavement striping, and marking will be performed by the Contractor unless otherwise noted on the Plans or otherwise specified elsewhere in these Specifications

## SECTION 311 — SPECIAL PROTECTIVE MATERIALS

Page 394

IN THE FIRST AND THIRD PARAGRAPHS OF **SUBSECTION 311-1.10,** CHANGE THE SUBSECTION REFERENCES FROM 210-2.3.7 TO 210-2.3.6.

# END OF PART 3

# PART 4 — ALTERNATE ROCK PRODUCTS, ASPHALT CONCRETE, PORTLAND CEMENT CONCRETE AND UNTREATED BASE MATERIAL

Part 4 — Alternate Rock Products, Asphalt Concrete, Portland Cement Concrete And Untreated Base Material, shall consist of Part 4 of Alternate Rock Products, Asphalt Concrete, Portland Cement Concrete And Untreated Base Material Provisions of the "Greenbook" Standard Specifications for Public Works Construction, 2006 Edition, written and promulgated by Public Works Standards, Inc.

# PART 5 — SYSTEM REHABILITATION

Part 5 — System Rehabilitation, shall consist of Part 5 of System Rehabilitation Provisions of the "Greenbook" Standard Specifications for Public Works Construction, 2006 Edition, written and promulgated by Public Works Standards, Inc.

# PART 6 — MODIFIED ASPHALTS, PAVEMENTS AND PROCESSES

Part 6 — Modified Asphalts, Pavements and Processes, shall consist of Part 6 of Modified Asphalts, Pavements and Processes of the "Greenbook" Standard Specifications for Public Works Construction, 2006 Edition, written and promulgated by Public Works Standards, Inc.

# END OF PARTS 4, 5, AND 6

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