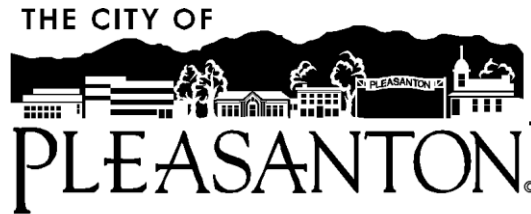


STANDARD SPECIFICATIONS AND DETAILS

NOVEMBER 2016

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CITY ENGINEER



2016 Edition of the Standard Specifications and Details

Updating the City of Pleasanton Standard Specifications and Details was completed by hard work and dedication of several City employees. Special thanks and appreciation are given to the following individuals:

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SECTION 1. GENERAL

1-01 Scope and Purpose

The scope and purpose of these City Standard Specifications are to provide minimum standards for materials used and methods of construction for the City's public infrastructure including streets, water, sanitary sewer, and storm drainage facilities. The City Standard Specifications are to be used in conjunction with the City Standard Details. These minimum standards shall apply to City capital improvement and private development projects. All references to industry standards shall mean to the latest version of the standard at the time of the bid.

1-02 Definition and Terms

As used in these City Standard Specifications unless the context otherwise requires, the following terms have the meanings indicated:

Addenda: Written or graphic instruments, clarifications, or corrections, issued prior to the execution of the contract, which modify or interpret the Contract Documents.

Bidder: Any individual, partnership or corporation submitting a Bid Proposal for the work described in the Contract Documents.

Bidding Documents: Includes the Notice to Bidders; the Bid Proposal; Bid Bond; Contractor's Information Forms, including the Contractor's past experience, financial responsibility, and Subcontractors; and Instructions to Bidders.

City: The City of Pleasanton.

City Project: A public improvement project contracted by the City of Pleasanton.

City Standard Specifications and Standard Details: The latest edition of the City's Standard Specifications and Standard Details.

Contractor: Any individual, partnership, or corporation that has entered into a Contract with the City to perform the work described in the Contract Documents for Capital Improvement projects or with the Developer for private development improvements.

Contract Documents: Includes the Bidding Documents, the Award and Execution of Contract Requirements, the Contract, the Labor and Material Bond, the Performance Bond, the Maintenance Bond, the City General Provisions, the Special Provisions, Project Plans, the City of Pleasanton Standard Specifications and Details, the State Standard Specifications and Standard Plans, all Addenda issued by the City, and all Change Orders executed by the City.

Developer: A person, firm, or corporation with whom the City has executed a written improvement agreement.

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

General Provisions: Those Specifications that apply to all projects unless specifically modified by Special Provisions.

Private Development Project: A commercial or residential improvement contracted by a private developer.

Project Plans: Drawings specifically prepared for a particular project.

Public Right-of-Way: Any real property within a street or public utility easements dedicated to the City.

Public Works Inspector: A representative of the City Engineer assigned to inspect Public Improvements to ascertain that the material and workmanship are in accordance with the requirements of these City Standard Specifications, the Special Provisions, and the Project Plans.

Special Provisions: Specifications specifically prepared for a particular project.

State Standard Specifications and Standard Plans: Except where specified, the 2015 edition, including all updates at time of the bid opening date, of the Standard Specifications and Standard Plans of the State of California, Department of Transportation. Any reference therein to the State of California or a State agency, office, or officer shall be interpreted to refer to the City or its corresponding agency, office, or officer acting under the contract.

Subcontractor: Any individual, partnership, or corporation that has contracted with the Contractor to provide labor, equipment, and/or materials described in the Contract Documents which is an amount in excess of 0.5% of the prime Contractor's total bid or ten-thousand dollars (\$10,000), whichever is greater.

Work: Material, equipment, tools, and labor to be provided by Contractor as defined by the Contract Documents.

1-03 Abbreviations

The City Standard Specifications make reference to standards materials and specifications of other published data of various national, regional, or local organizations in the form of abbreviations. In the City Standard specifications, the following abbreviations have the following corresponding meaning:

AASHTO	American Association of State Highway and Transportation Officials
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ABAG	Association of Bay Area Governments
ACP	Asbestos Cement Pipe
ANSI	American National Standards Institute
ASA	American Standards Association
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
BASMAA	Bay Area Storm Water Management Agencies Association
BMP	Best Management Practices
CSA	Canadian Standards Association
C	Celsius (temperature)
CALTRANS	Department of Transportation-State of California
CPM	Critical Path Method
CTS	Copper Tube Size
DIP	Ductile Iron Pipe
DOHS	Department of Health Services
DSRSD	Dublin San Ramon Services District
F	Fahrenheit (temperature)
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineers Society
MSDS	Material Safety Data Sheets
MUTCD	Manual on Uniform Traffic Control Devices
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
OSHA	Occupational Safety and Health Administration
PE	Polyethylene
PG&E	Pacific Gas & Electric
PGS	Pleasanton Garbage Service
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
RWQCB	Regional Water Quality Control Board-State of California
SDR	Standard Dimension Ratio
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traffic Control Plan
UL	Underwriters Laboratories
USA	Underground Service Alert
USCC	United States Composting Council
USCFCCCHR	University of Southern California Foundation for Cross Connection Control and Hydraulic Research
VCP	Vitrified Clay Pipe
Zone 7	Alameda County Flood Control and Water Conservation District, Drainage Area 7-1

1-04 Order of Precedence of Specifications and Reference to Other Specifications

The Work presented in the Contract Documents shall be done in accordance with the following documents: (1) the Special Provisions and Project Plans, (2) the City Standard Specifications and Details, (3) the State Standard Specifications and Standard Plans including all updates at time of bid, and (4) City-approved shop drawings. In case of conflicting portions, the above order of precedence shall prevail. In case of conflict between the specifications and drawings, the specifications shall prevail.

1-05 Operation of Existing Facilities

Existing water, sanitary sewer, storm drainage, traffic signals, street lighting, irrigation system facilities, and other utilities must be kept in continuous operation throughout the construction period. Existing City-owned water valves shall be operated only by City personnel. If interruption of City-owned facilities is required, the Contractor shall give the Engineer a minimum of two (2) working days' notice. Only interruption which does not adversely affect the degree of service provided will be permitted and is subject to permission obtained from the Engineer in advance.

Contractor shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period.

All fire hydrant and water control valves shall be kept free from obstruction and available for use at all times.

Contractor shall notify affected residences in writing forty-eight-hours (48) before any possible service interruptions. Door hangers are available from the City.

1-06 Protection of Existing Utilities and Property

Contractor shall comply with Section 5-1.36, "Property and Facilities Preservation," and Sections 7-1.05, "Indemnification," and 7-1.06 "Insurance," of the State Standard Specifications.

Contractor shall be held responsible for any damage to existing utilities and property, both public and private, due to Contractor's work. Contractor shall repair or replace any such damaged utilities and property according to the requirements of the Engineer at no additional cost to the City.

Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by construction operations.

The Contractor shall be responsible for the removal of all Underground Service Alert markings and other reference marks at the completion of the project as directed by the Construction Services Inspector. For City Projects, all costs associated with this marking

removal work shall be included in the prices paid for the items of work involved and no additional compensation shall be made.

In the event that private water services or sewer laterals are damaged, the Contractor shall immediately, at the Contractor's own expense, repair such damage in a manner satisfactory to the Engineer so that service will not be interrupted for a period greater than one (1) hour. If such interruption is sustained, it shall be the Contractor's responsibility to notify the occupants of the premises to which said services were connected and make necessary arrangements so that no damage will occur on said premises.

Whenever damage is done by the Contractor to public water, sewer, storm drainage facilities, traffic signals, street lights, irrigation systems, or other utilities, the Contractor shall immediately notify the Engineer. Repair of public sewer and storm drainage facilities shall be made directly by the Contractor under the supervision of City personnel. Repair to existing public water facilities, including main and water service to the meter, shall be performed only by City personnel, but at the Contractor's expense. Contractor shall provide access of existing City water facilities to City personnel for repair purposes. Trenching and backfill activities for water service repair shall be performed by the Contractor. Water service line damage between the meter and house shall be repaired by the Contractor.

Contractor shall restore all pavement, striping, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, landscaping, and other surface structures to their original condition. All repairs and replacements shall be made with new materials.

No trees shall be removed except where authorized by the Engineer. Contractor shall follow the requirements of Section 3-03F, "Protection of Trees," of these City Standard Specifications.

Contractor shall comply with Section 15, "Existing Facilities," of the State Standard Specifications.

1-07 Location of Existing Utilities

The Project Plans show underground utilities in locations as they are known from record plans and reasonable inference from physical conditions. The Contractor shall be required to contact Underground Services Alert (USA) at 1-800-227-2600 to request marking of all underground facilities known to be in the area of construction a minimum of forty-eight-hours (48) in advance of any excavation. It shall be the responsibility of the Contractor to pothole all potential underground conflicts before start of trenching operations. All potholes are to be repaired at the direction of the Engineer.

1-08 Site Protection

Contractor shall be responsible for leaving the site in a safe condition each day before leaving the site. This shall include any temporary flagging, fencing, and street sweeping necessary for site safety. For City Projects, all costs associated with this Work shall be

included in the prices paid for the items of Work involved, and no additional compensation will be made.

1-09 Dust Control

Dust control shall be in accordance with these City Standard Specifications and Section 13, "Water Pollution Control," of the State Standard Specifications and Construction General Permit.

The Contractor shall provide an acceptable plan for preventing the generation of dust due to their operations in the construction zones, along the haul routes, or equipment parking areas, including having a water truck on the site seven (7) days a week during grading operations. The plan shall consist of water sprinkling or an equivalent service every day including days that work is not conducted on the project to maintain adequate dust control during construction. Other measures of dust control may be required as directed by the Engineer. For City Projects, no separate payment will be made for dust control, and all costs in connection therewith shall be included in the payment items to which the work is incidental.

City water shall be furnished by the City at points designated by the City's Water Department. A refundable deposit will be charged by the City's Water Department for the fire hydrant meter and backflow device. Information regarding deposits and meter and backflow devices required can be obtained from the City's Utility Billing Division and can be contacted at 925-931-5565. For City Projects, the Contractor will not be charged for water needed and used in association with the project. For Private Development Projects, the Contractor will be charged for water used according to the City's latest fee schedule. Alternatively, the City may require use of reclaimed water on any project at its sole discretion. If required, payment terms for City projects will be included in the project Special Provisions.

During filling operations, tanker trucks must either use a backflow prevention device approved by the Engineer or have a visible air gap mounted on the outside of the water tank approved by the Engineer. For overhead or "Tower Tanks," water fills to the tank shall be accomplished by either an air gap or a City-approved backflow prevention device.

In the event the control of dust is not satisfactory to the Engineer, the Engineer shall take such measures as may be necessary to ensure satisfactory dust control and, for City Projects, deduct the cost of such measures from any payments due the Contractor. For Private Development Projects, the cost of such measures shall be deducted from the hazard bond, and no work shall continue until the hazard bond is replenished.

1-10 Noise Control

The Contractor shall abide by the City of Pleasanton Municipal Code, Chapter 9.04, which specifies that *between the hours of 8:00 a.m. and 8:00 p.m. daily, except Sundays and holidays, when the exemption shall apply between 10:00 a.m. and 6:00 p.m., construction,*

alteration, or repair activities which are authorized by a valid City permit shall be allowed if they meet at least one of the following noise limitations:

- A. No individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 feet. If the device is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close to 25 feet from the equipment as possible; or*
- B. The noise level at any point outside of the property plane of the project shall not exceed 86 dBA.*

For additional information and for exceptions to this restriction, the Contractor is referred to Chapter 9.04 of the City of Pleasanton Municipal Code.

1-11 Security

The Contractor shall be responsible for the protection against vandalism of the construction site, including all work performed, materials, equipment, tools, and existing facilities related to the Work. Access to all existing City facilities shall be maintained throughout the duration of the project, regardless of whether the site is secured during non-working hours. The Contractor shall use due diligence in protecting the work from vandalism. The Contractor is responsible for all costs for the repair or replacement of work due to vandalism until the project is accepted by the City.

1-12 Storage

Contractor shall store materials in accordance with Section 6, "Control of Materials," of the State Standard Specifications and Section 1-25B, "Materials Storage," of these City Standard Specifications. Unless specifically designated on the Project Plans, the Contractor's storage site shall be approved by the Engineer.

The Contractor shall not be allowed to stockpile any waste materials on the project site beyond the day on which the waste was generated.

1-13 Quality Control

Contractor shall comply with Section 6, "Control of Materials," of the State Standard Specifications and the following requirements: Material and equipment to be incorporated into the Work shall be new and unused unless otherwise approved and shall bear the manufacturer's stamp or marking. In case a reference is not clear as to which of several available grades is desired, the highest quality material shall be used.

Where articles or materials are specified by brand or trade name, alternate materials or articles equal to those specified may be approved provided the request for approval is in writing, accompanied by supporting data, in ample time as determined by the Engineer, to

permit investigations without delaying the work. Unless substitutions are approved, no deviation from the standards will be allowed.

All Work shall be done by persons experienced in the specific work, under competent supervision, and in a manner to the Engineer's complete satisfaction as specified in Section 5-1.16, "Representative," and Section 5-1.17, "Character of Workman," of the State Standard Specifications.

Materials not conforming to the requirements of these specifications shall be considered defective and all such materials, whether in place or not, shall be rejected and shall be removed from the site of the Work unless otherwise permitted by the Engineer. If the deficiencies of a reject material are subsequently corrected, the material shall not be used until it has been inspected and approved by the Engineer.

1-14 Shop Drawings and Product Data Submittals

The Contractor shall submit shop drawings and product data to meet the quality control requirements of Section 1-13, "Quality Control," of these City Standard Specifications. These submittals shall contain sufficient detail to show the type, dimensions, and installation of all materials and equipment.

All submittals shall include a letter of transmittal and shall identify by reference, the sheet and detail numbers on the Project Plans and City Standard Details and sections of the Special Provisions and these City Standard Specifications. The Contractor's transmittal represents that the Contractor accepts full responsibility for determining and verifying field measurements and installation requirements. The Contractor shall confirm that the quality and quantity of all materials and equipment have been reviewed and are in compliance with the Contract Documents.

The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Engineer's review of shop drawings and product data submittals unless the Contractor has specifically informed the Engineer in writing of such deviation with the submittal and has received written approval by the Engineer of the specific deviation. The Engineer's review of shops drawings and product data submittals will cover only general conformity to the Contract Documents. The Engineer's review of submittals shall not relieve the Contractor from responsibility for errors, omissions, or deviation in compliance with the Contract Documents.

Contractor shall submit seven (7) hard-copy sets of shop drawings and product data submittals along with one (1) electronic copy of all sheets (pdf format) required for distribution. Two (2) sets will be retained by the Engineer. Submittals shall be consecutively numbered, followed by a letter to indicate sequence of resubmittal. Resubmittal resulting from non-compliance will not be cause for contract time extension. Contractor shall verify that all exceptions previously noted by the Engineer have been corrected in the resubmittal. Unless modified by the Special Provisions, the Engineer shall

return the submittal with disposition to the Contractor within ten (10) working days of receipt.

The Contractor shall, at any time, when requested, submit to the Engineer, proper authenticated documents or other satisfactory proofs of compliance with the requirements of these specifications. This shall include certified copies of factory or laboratory test reports showing the strength characteristics of any materials used in the Work.

Suppliers of material, upon request, shall furnish a certified statement signed by an authorized representative of the manufacturer that materials furnished under these specifications comply in all respects. All physical and chemical tests must be performed within the United States.

1-15 Easements, Rights of Way, and Right of Entry

Easements and rights of way are shown on the Project Plans. The Contractor shall confine the Work within the limits of those easements and rights-of-way with the exception of Work on private property, which is specifically called for on the Project Plans and for which the City has obtained a right of entry.

1-16 Lines and Grades and Construction Staking

All Work shall be done in accordance with the lines, grades, and elevations shown on the Project Plans. Staking and marking shall be provided in accordance with Section 5-1.26, "Construction Surveys," of the State Standard Specifications. Stakes and marks shall be carefully preserved by the Contractor. In case such stakes and marks are destroyed or damaged on City projects, they will be replaced by the Engineer at the expense of the Contractor. In the case of City projects, the City will provide the staking and marking. For private development projects, sufficient staking and markings shall be provided to allow for required inspection as determined by the Engineer.

1-17 Cleanup

Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish. Debris piles must be removed from the project site on a daily basis. Contractor shall provide adequate trash receptacles about the site and shall promptly empty the containers when filled. When required by plans and/or special provisions or conditions of approval for private development projects, debris shall be separated in bins and containers for collection as recyclable waste.

Construction materials, such as concrete forms and scaffolding, shall be neatly stacked by the Contractor when not in use. The Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.

Volatile wastes shall be properly stored in covered metal containers and removed daily.

Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All waste shall be removed from the site and disposed of in a manner complying with antipollution laws and Section 1-25B, "Materials Storage," of these City Standard Specifications.

Construction dumpsters shall be provided by the Contractor in conformance with the City's existing Waste Collection Franchise Agreement. The Contractor shall contact the City's current waste collection company regarding policies for the storage, disposal, and recycling of materials.

The contractor shall remove all USA markings at the end of the project.

1-18 Working Hours

The Contractor shall restrict working time to Monday through Friday, 8:00 a.m. to 5:00 p.m., unless otherwise specified by the Engineer. Specific working hours may be set by the Engineer in the project Special Provisions or in the Conditions of Approval for Private Development Projects. There shall be no work allowed on weekends or city holiday unless approved by the Engineer.

1-19 Mobilization

Mobilization shall consist of preparatory work and operations, including, but not limited to , those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of all offices, building and other facilities necessary for work on the project; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the project site. Full compensation for any necessary mobilization required shall be considered as included in the prices paid for the various contract items of work involved, and no additional compensation will be allowed therefore unless a specific bid item is shown on the bid form.

1-20 Permits and Licenses

Contractor shall be responsible for obtaining and paying for all necessary permits, including all required City permits. The Contractor shall also be required to obtain a City of Pleasanton Business License. The Contractor shall submit copies of all permits to the Engineer prior to the start of work.

1-21 Progress Schedule

A progress schedule shall be submitted to the Engineer in accordance with Section 8-1.02, "Schedule," of the State Standard Specifications. The schedule shall be prepared using the critical path method (CPM) format.

1-22 Inspection

Contractor's requirements with respect to "Inspection of Work" shall be in accordance with Section 5, "Control of Work," of the State Standard Specifications.

The Engineer shall, at all times, have safe access to the work during its construction, and shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of these specifications, the special provisions and the plans. All work done and all materials furnished shall be subject to the Engineer's inspection.

The inspection of the work or materials shall not relieve the Contractor of any of the Contractor's obligations to fulfill the contract as prescribed. Work and materials not meeting the requirements shall be made good, and unsuitable work or materials may be rejected, notwithstanding that the work or materials have been previously inspected by the Engineer or that payment therefor has been included in a progress estimate.

Projects financed in whole or in part with Federal funds shall be subject to inspection at all times by the Federal agency involved.

1-23 Modifications

Any modifications to the Contract Documents shall be made in accordance with Section 4-1.05, "Changes and Extra Work," of the State Standard Specifications.

1-24 Requirements of Other Agencies

Contractor shall be aware of and follow all applicable requirements of other agencies before proceeding with the Work.

1-25 Storm Water Management and Discharge Control

1.25A General

The contractor shall abide by the latest version of the "National Pollutant Discharge Elimination system general permit for storm water discharges associated with construction and land disturbance activities" for Alameda county. The intent of these requirements is to enforce Federal, State, and other local agencies regulations that prohibit storm water pollution at construction sites. Storm drains discharge directly to creeks and the Bay without treatment, and, therefore, discharge of pollutants (i.e., any substance, material, or waste other than uncontaminated storm water) into the storm drain system is strictly prohibited.

In this section, the term "storm drain system" shall include storm water conduits, storm drain inlets, and other storm drain structures, street gutters, channels, watercourses, and creeks.

For the purpose of eliminating storm water pollution, the Contractor shall implement effective control measures at construction sites. There are several publications which provide guidance on selecting and implementing effective control measures known as Best Management Practices (BMPs). BMPs include schedules of activities, prohibition of practices, general good housekeeping practices, operational practices, pollution prevention practices, maintenance procedures, and other management procedures to prevent the discharge of pollutants directly or indirectly to the storm drain system. BMPs also include the construction of some facilities, which may be required to prevent, control, and abate storm water pollution.

The reference publications are as follows:

California Stormwater Best Management Practice Handbook - Industrial/Commercial

California Stormwater Best Management Practice Handbook - Construction Activity

These handbooks may be purchased from the California Stormwater Quality Association (CASQA). Their website address is: <https://www.casqa.org/resources/bmp-handbooks>

The following flyers are available, free of charge, at the City of Pleasanton's Engineering Division at 200 Old Bernal Avenue, Pleasanton, CA 94566, as well as on the City's website, <http://www.cityofpleasantonca.gov>.

1. General Construction and Site Supervision.
2. Fresh Concrete and Mortar Application.
3. Paint and Application of Solvents and Adhesives.
4. Heavy Equipment Operation.
5. Roadwork and Paving Activities Guidelines.
6. Building Maintenance and Remodeling Best Management Practices.
7. The Pour Right (Guidelines for Small, "Weekend" Concrete Jobs), Best Management Practices.
8. Bay Area Storm Water Management Agencies Association (BASMAA)/Alameda Countywide Clean Water Program Blueprint for a Clean Bay.

The Contractor shall comply with all stormwater management and discharge control provisions contained in Chapter 9.14 of the City of Pleasanton Municipal Code.

The Contractor shall comply with SWPPP when applicable to project as defined in latest version of NPDES general permit.

1-25B Material Storage

Storage and exposure of raw materials, by-products, finished products, and containers shall be controlled as described in the following paragraphs.

All construction materials shall be stored at least ten feet away from inlets, catch basins, and curb returns. The Contractor shall not allow any material to enter the storm drain system. At the end of each working day, the Contractor shall collect and dispose of all scrap, debris, and waste material.

During wet weather or when rain is forecast, the Contractor shall shelter materials that can contaminate rainwater or be transported by storm water or other runoff to the storm drain system. Shelter shall be provided by either storing potentially contaminating material inside a building or covering them with a tarp or other waterproof material secured with weighted tires or sandbags to prevent contact with rain.

At the end of each working day or as directed by the Engineer, the Contractor shall clean and sweep roadways and on-site paved areas of all materials attributed to or involved in the Work. The Contractor shall not use water to flush down streets in place of street sweeping unless an approved storm drain protection system is in place.

At the end of each working day, the Contractor shall collect all scrap, debris, and waste material and dispose of such materials properly.

The Contractor is reminded that storage and disposal of all hazardous materials, such as paints, thinners, solvents, and fuels, and all hazardous wastes, such as waste oil, must meet all Federal, State and local laws, standards and requirements.

The Contractor shall store all hazardous materials and all hazardous wastes in accordance with secondary containment regulations; it is recommended that these materials and wastes be covered, as needed, to avoid potential management of collected rainwater as a hazardous waste.

The Contractor shall keep an accurate, up-to-date inventory, including Material Safety Data Sheets (MSDS), of hazardous materials and hazardous wastes stored on-site to assist emergency response personnel in the event of a hazardous materials incident.

1-25C De-watering Operations

All groundwater removed from the trench must be desilted prior to discharging it into the storm drain system through filtering materials and methods meeting the Association of Bay Area Governments (ABAG) Standards For Erosion & Sediment Control Measures and/or through methods and procedures described in the California Storm Water Best Management Practice Handbook - Construction Activity (latest edition), or as defined in approved SWPPP.

The Contractor shall reuse the water for other needs, such as dust control and irrigation, to the maximum extent practicable.

1-25D Pavement Saw Cutting Operations

The Contractor shall be knowledgeable of and apply the most recent BMPs for pavement saw cutting operations. This shall include the installation and monitoring of water pollution control measures, cleanup, and disposal.

Prior to beginning a saw cutting operation, the Contractor shall locate all storm drain inlets, culverts, and catch basins through which sediment discharges may flow to a waterway. The Contractor shall contain discharges from saw cutting to the immediate work area and minimize runoff of the resulting slurry to the maximum extent practicable.

When slurry from a saw cutting operation is within access of a storm drain inlet, the Contractor shall use water pollution control measures that will effectively eliminate sediment discharges into the storm drain inlet. Such acceptable water pollution control measures shall include one or more of the following:

1. Sand/Gravel Bags

Bags shall be made of burlap or woven polyester filled with sand and gravel.

To ensure adequate filtering, the bags shall be filled with five parts sand and one part pea gravel. Other mixtures of materials may be used providing comparable or superior filtering is demonstrated.

Sand/gravel bags shall be arranged in such a manner to completely surround the storm drain inlet and provide an adequate barrier in preventing any saw cutting slurry runoff from entering the inlet.

Sand/gravel bags shall be stacked with overlap and tightly butted together.

Sand/gravel bags shall be stacked to the height of the closest adjacent curb or a minimum height of six (6) inches.

2. Inlet Filters

Inlet filters shall completely cover the opening of the inlet and be properly installed as according to the manufacturer's recommendations.

3. Drain Plugs or Covers

Inlet devices shall be properly installed as according to the manufacturer's recommendations.

4. Vacuum Cleaning Equipment

Equipment shall be properly operated as according to the manufacturer's recommendations.

Sandbags shall be placed at appropriate locations to catch any residual sediment from escaping during the vacuum cleaning process and proceeding to downstream storm drain inlets.

The Contractor shall monitor and ensure the effectiveness of the water pollution control measures for the duration of the saw cutting operation.

Upon completion of the saw cutting operation, the Contractor shall remove all sediment and residue resulting from the saw cutting operation. Areas of cleanup and sediment removal include, but are not limited to, roadways, walkways, parking areas, and storm drain inlets and catch basins. The Contractor shall be responsible for transporting and disposing of the slurry runoff at a properly classified waste disposal site.

1-25E Pavement Operations

The Contractor shall prevent the discharge of pollutants from paving operations by using measures to prevent run-on and run-off pollution, properly disposing of wastes, and implementing the following BMPs:

1. No paving during wet weather.
2. Store materials as required under Section 1-25B of these City Standard Specifications.
3. Cover inlets and manholes when applying asphalt, seal coat, tack coat, slurry seal, fog seal, etc.
4. Place drip pans or absorbent materials under paving equipment when not in use. During wet weather, store contaminated paving equipment indoors or cover with tarp or other waterproof covering.
5. Sweep site daily to prevent sand, gravel, or excess asphalt from entering or being transported by rain into the storm drain system.
6. Keep ample supplies of drip pans or absorbent materials on-site.
7. If paving involves Portland Cement Concrete, refer to Section 1-25F of these City Standard Specifications.

1-25F Concrete Operations

The Contractor shall prevent the discharge of pollutants from concrete operations by using measures to prevent run-on and run-off pollution, properly disposing of waste, and implementing the following BMPs:

1. Store all materials in waterproof containers or under cover away from drain inlets or drainage areas.
2. Avoid mixing excess amounts of Portland cement materials.
3. Do not wash out concrete trucks into storm drains, open ditches, streets, streams, planting areas, etc. Whenever possible, perform washout of concrete trucks off-site where discharge is controlled and not permitted to discharge to the storm drain system. For on-site washout:
 - Locate washout area at least fifty feet (50') from storm drains, open ditches, or other water bodies, preferably in a dirt area. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for the liquid and solid waste.
 - Wash out concrete waste into a temporary lined pit where the concrete can set, be broken up, and then disposed of properly. If the volume of water is greater than what will allow concrete to set, allow the wash water to evaporate, if possible. Remove or vacuum the remaining silt and debris from the ponding or bermed area and dispose of it properly.
4. Collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in trash container.

1-25G Grading and Excavation Operations

The Contractor shall implement erosion and sedimentation control measures to prevent sediments or excavated material from entering the storm drain system. Refer to Section 5, "Erosion and Sediment Control," of these City Standard Specifications for related specific requirements.

1-25H Spill Prevention and Control

The Contractor shall take any and all precautions to prevent accidental spills during the work under this contract. However, in the event of a spill:

1. The Contractor shall immediately contain and prevent leaks and spills from entering the storm drain system and properly clean up and dispose of the waste and clean up materials. If waste is hazardous, the Contractor shall comply with all Federal, State, and local hazardous waste requirements.
2. The Contractor shall not wash any spilled material into the streets, gutters, storm drains, or creeks.
3. The Contractor shall report any hazardous materials spill immediately to the Livermore Pleasanton Fire Department, the Alameda County Hazardous Materials Division, and other State and local agencies as required by state and local regulations.

1-25I Vehicle/Equipment Cleaning, Fueling and Maintenance

The Contractor shall not perform vehicle or equipment cleaning on-site or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods. The Contractor shall perform vehicle or equipment cleaning with water only in a designated, bermed area that will not allow rinse water to run off-site or into the storm drain system.

The Contractor shall dispose of wash water from the cleaning of water-based paint equipment and tools to the sanitary sewer.

If using oil-based paint, to the maximum extent practicable, the Contractor shall filter the paint thinner and solvents for reuse and dispose of the waste thinner and solvent, and sludge from cleaning of equipment and tools as hazardous waste.

1-25J Contractor Training and Awareness

The Contractor shall train all employees on the water pollution prevention requirements contained in these Specifications. The Contractor shall inform all Subcontractors of the water pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.

1-25K Good Housekeeping Practices

The Contractor shall implement the following applicable good housekeeping practices:

1. Use tarps on the ground to collect fallen debris or splatters that could contribute to storm water pollution.
2. Secure opened bags of cement and of other light or powdered materials which can be transported by wind.
3. Pick up litter, construction debris, and other waste daily from outside areas, including the sidewalk area, gutter, street pavement, and storm drains impacted by

the project. All waste shall be stored in covered containers or disposed of or recycled immediately.

4. Inspect vehicles and equipment arriving on-site for leaking fluids and promptly repair leaking vehicles and equipment. Use drip pans to catch leaks until repairs are made.
5. Avoid spills by handling materials carefully. Keep a stockpile of spill materials, such as rags and adsorbents, readily accessible on-site. Clean up all spills immediately to prevent any material from being discharged to the storm drain system. Refer to Section 1-25H of these City Standard Specifications.
6. Maintain and replace all sediment and water pollution control devices as necessary to ensure that said controls are working effectively (i.e., inspect all sediment ponds or sandbag sedimentation/filtering systems after each rain; remove accumulated sediment and debris and replace or repair damaged sandbags immediately.).

1-25L Payment

Unless a separate pay item is provided in the bid schedule, the Contractor shall include in all bid items all costs incurred from these specified water pollution control requirements.

1-25M Enforcement

The City has the authority, through various sections of the Pleasanton Municipal Code, to enforce any portion of this section. City enforcement may include, but is not limited to: citations, orders to abate, bills for City cleanup costs and administration, civil suits, and criminal charges. Enforcement action by the City does not void or suspend any enforcement actions by other agencies. As a minimum, the Contractor shall implement the Urban Runoff Clean Water Program BMPs listed in Section 1-25A of these City Standard Specifications, or implement equally effective alternatives approved by the Engineer on all projects within the City of Pleasanton.

1-26 Soils and Material Testing

In the case of City Projects, soils and material testing shall be performed by the Engineer. In the event of a failed test to meet contract compliance, the Contractor shall pay for additional testing.

Native soils and imported material (i.e., aggregate base) compaction tests shall be performed on the basis of the ASTM D-1557 Modified Proctor Test.

1-27 Alameda County Fair (Fair & Rodeo Events)

The City restricts construction activity during the Alameda County Fair or any other major events within certain areas surrounding the fairground facilities. Prior to construction, the Contractor must contact the City as well the Alameda County Fairgrounds to confirm schedule of events that may affect the project. The Contractor shall contact the Engineer to determine if work will be affected by this restriction.

1-28 Record Drawings

Prior to the acceptance of Work and creation of the punch list, the Contractor shall provide the Engineer one (1) set of neatly and legibly marked Project Plans and one (1) copy of each of the electronic files of marked plans showing changes in the final location and depth of all underground utilities, subsurface drains, cross sectional street sections, and location of aboveground utility appurtenances. In addition, changes in the extent of asphalt paving, areas of lime treatment of subgrade, changes in concrete work, and street grade elevations and slopes shall be indicated. Marking of the drawings shall be kept current and made available to the Engineer upon request and at the time of the monthly pay estimate. Payment shall be withheld if the Record Drawings do not represent the current condition of the Work. Electronic files shall be submitted only in jpg, gif, or pdf format, on CDs or uploaded to the City of Pleasanton's FTP site.

1-29 Overtime

The regular working hours and days of the week of City Inspectors are 8:00 a.m. to 4:30 p.m., Monday through Friday excluding City holidays. If the Contractor needs to perform the Work outside of this time frame, then the Contractor shall submit a written request for scheduled overtime 48-hours in advance. The Engineer's approval shall be required before overtime work begins. The Contractor and/or Developer may be held responsible for overtime cost incurred by the City of Pleasanton for after-hours operations.

1-30 Bonds

The Contractor shall submit to the City within ten (10) working days after notice of award the following contract bonds.

1. Faithful Performance Bond for 100 percent (100%) of contract price.
2. Labor and Material Bond for 100 percent (100%) of contract price.
3. Maintenance Bond for 10 percent (10%) of contract price.

For Private Development Projects:

The project applicant/developer shall submit a refundable cash bond or surety bond for hazard and erosion control prior to approval of the final map or issuance of an Engineering permit, whichever occurs first. The amount of this bond will be determined by the Engineer.

The cash bond will be retained by the City until all the permanent landscaping is installed for the development, including individual lots, unless otherwise approved by the Engineer.

1-31 Pre-construction Meeting

For City Projects, following award of contract, submittal of executed contract, and approval of certificates of insurance and bonds, but before start of the Work, a pre-construction meeting shall be held at a mutually agreed time and place. For Private Development Projects, the pre-construction meeting shall be held following receipt of approved plans by Public Works Inspection. The Contractor shall contact public works inspection to setup a pre-construction meeting and allow a minimum of ten (10) days to coordinate the meeting.

The conference shall be arranged by the City and attended by City representatives, including the Inspector, the Contractor, Contractor's superintendent, and major Subcontractors. The Contractor shall present at the conference the progress and submittal schedules, progress payment format, emergency phone numbers, and a trench shoring plan designed and signed by a registered civil engineer for trenches over five feet (5') in depth.

The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established.

1-32 Project Identification Signs (PIS)

A minimum of one Project Identification Sign (PIS) per City Standard Detail No. 604 shall be installed on every Capital Improvement Project. Location of PIS will be marked by the City. For projects with several locations with less than 5 working days at each location contractor shall place sign on movable supports and relocate signs to active working areas on a weekly basis. Projects in duration less than nineteen (19) working days are exempt from PIS sign requirement unless noted otherwise. PIS shall be removed by contractor within thirty (30) days after construction completion and turned over to the City. Contractor shall fill-in all project information required on PIS and submitted to City for approval prior to fabrication.

1-33 Measurement and Payment

Measurement and payment for bid items are described in each respective section of these City Standard Specifications. Full compensation for Work not appearing as a specific bid item but required by the contract documents shall be considered as included in the contract unit price paid for the various items of work and no additional compensation will be allowed therefore.

The following language shall apply for each respective section of these City Standard Specifications:

Payment for Work shall be made on the basis of unit price bid according to the units of measure described in Subsection 4 of each section of these City Standard Specifications. Payment shall include full compensation for furnishing all materials, equipment, tools, and labor to complete the Work as required by the Contract Documents.

1-34 Enforcement

The City has the authority, pursuant to the terms of the Contract, through various provisions of the Pleasanton Municipal Code, as well as in law and in equity, to enforce any portion of these Standards. City enforcement may include, but not be limited to: a civil suit, administrative citation, order to stop work, and criminal charges. City enforcement actions are distinct and cumulative to any other right or remedy afforded by law or equity and may be exercised concurrently, independently, or successively. Any forbearance by the City in exercising any right or remedy will not be a waiver of the exercise of any such right or remedy.

SECTION 2. TRAFFIC CONTROL

2-01 General

This section covers traffic control for City and private development projects, including public convenience and safety, construction area traffic control devices, haul routes, traffic control plans, traffic control restrictions, and temporary pavement delineation.

2-01A Public Convenience and Safety

The Contractor shall comply with Sections 7-1.03, "Public Convenience," and Section 7-1.04, "Public Safety," of the State Standard Specifications.

Upon completion of each day's work, the Contractor shall be responsible for leaving the work area free of hazards and shall provide all necessary temporary signs, warning devices and barricades at no additional cost to the city. Access is to be provided for all adjacent residences and businesses during non-construction hours.

2-01B Construction Area Traffic Control Devices

The Contractor shall comply with flagging and traffic handling equipment and device requirements of Section 12, "Temporary Traffic Control," of the State Standard Specifications with the exception of Section 12-1.04 "Payment".

The Contractor shall furnish and plan all barricades, arrowboards, lights, construction signs, no parking signs, and flagmen as necessary. The Contractor shall furnish to the Engineer for review and comment a construction signing plan, five (5) working days before construction begins.

"No Parking" signs shall be furnished and installed by the contractor forty-eight (48) hours in advance of any work that requires parking to be temporary removed. The "No Parking" signs shall include the time and the day the work is to be performed. It shall indicate that any vehicles in violation of the "No Parking" signs will be towed in accordance with the California Vehicle Code, and shall be posted conspicuously in adequate quantities to sufficiently notify the public. The Contractor shall post "no parking" signs no later than the Thursday at noon prior to a Monday "no parking" request.

If identified on plans or special conditions contract shall supply Changeable Message Sign/s (CMS). The CMS shall be delivered and be in operation at least seven (7) days in advance of the start of work and shall be maintained in continuous operation until completion of the project. The contractor shall modify the message on the CMS devices to convey accurate messages. The city reserves the right to direct the contractor to relocate locations of CMS devices at no additional cost to the city.

Contractor shall be responsible for notifying each resident and business in writing, forty-eight (48) hours and seven (7) days in advance of any street closure, including notification of any resident/business on adjacent streets directly affected by the closure of the main street.

Contractor shall not be permitted to work on any roadways that have not been adequately posted forty-eight (48) hours prior to the beginning of work. As an example, if the contractor skips a roadway that was previously signed and scheduled for slurry seal, the contractor shall reschedule the missed roadway in such a manner that a new forty-eight (48) hour advance notification is achieved prior to the beginning of the work.

The contractor shall be responsible for maintenance of any and all traffic control devices that are required by the Traffic Control Plan. The contractor shall ensure that all devices are maintained in the proper location at all times including holidays, overnight, and on weekends.

Should it become necessary to use City forces to maintain the traffic control devices, the contractor will be billed at the overtime rate for two (2) technicians and a vehicle, with a minimum of two (2) hours per incident/call.

2-01C Haul Route

The haul route shall be determined for each project by the Engineer and shown on the Project plans or in the conditions of approval. For private development projects, the Contractor shall submit a haul-route plan for approval by the Engineer prior to obtaining an encroachment permit. The plan shall include routing, the daily number and size of trucks, and the duration of trucking. The plan shall address the stacking/temporary parking of trucks.

2-01D Traffic Control Plan

The Contractor shall provide the Engineer with a traffic control plan (TCP) with a schedule for each phase of the Work in accordance with the latest edition of California Manual on Uniform Traffic Control Devices and Caltrans Standard Plans . The Contractor shall not start the Work until the TCP has been reviewed and commented on by the City Traffic Engineer. The Contractor shall allow for at least five (5) working days for the Engineer to review and comment on the TCP. If, after the Engineer's review and comment on the TCP, the Engineer finds no reason to object to the TCP, the Contractor shall proceed with the Work in accordance with the TCP. Plans shall be prepared by qualified professional (Traffic Engineers, or by Traffic Control Specialists).

Any revisions required shall be resubmitted prior to commencing work. The Contractor shall allow five (5) working days for the Engineer to review any resubmittals. The Contractor will not be entitled to claim any delays in the project schedule or be entitled to any additional days to the duration of the contract due to the review and resubmittal process.

Contractor to provide pedestrian/ADA access plan (including bike lanes) for various construction phases. No demolition work for pedestrian access is to be initiated until a pedestrian plan is approved and all detour measures are in place and operational.

2-01E Traffic Control Restrictions

The following traffic control restrictions listed are a minimum requirement and may be modified by the Engineer or the conditions of approval on a project by project basis.

No work shall be allowed in signalized intersections between the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. unless specifically approved by the Engineer.

Additional conditions may be placed on working hours in certain locations dependent upon specific activities in the area (e.g., school schedules, events at the County Fairgrounds, etc.) at the discretion of the Engineer. These conditions shall be included in the project Special Provisions.

The Contractor shall give the Engineer at least forty-eight (48) hours' notice for requests to alter timing of signalized intersections.

The full width of the travel way shall be open for use by the public on Saturdays, Sundays, and legal holidays and when construction operations are not actively in progress.

At least one lane of through traffic for each direction shall be provided at all times unless otherwise approved in the Project Special Provisions. Access to bicycle and pedestrian facilities shall be provided at all times unless otherwise approved in the Special Provisions.

The Contractor shall cooperate with local authorities relative to handling traffic through the working area and shall make arrangements relative to keeping the working area clear of parked vehicles.

The Contractor shall be responsible for notifying business establishments, each resident, Livermore Amador Valley Transit Authority (LAVTA), Pleasanton Garbage Service, the Pleasanton Post Office, the Pleasanton Unified School District, and any other agencies identified by the City of Pleasanton forty-eight (48) hours prior to the commencement of work.

Prior to commencing work, the Contractor shall submit a proposed schedule of work for approval by the Engineer.

2-01F Temporary Pavement Delineation

Whenever the work causes obliteration of pavement delineation, temporary pavement delineation shall be in place prior to opening the traveled way to public traffic. Lane line, centerline, and limit line (i.e., stop bars and crosswalks) pavement delineation shall be provided at all times for traveled ways open to public traffic.

All Work necessary, including any required lines or marks, to establish the alignment of temporary pavement delineation shall be performed by the Contractor. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers and removable traffic type tape which conflicts with a new traffic pattern or which is applied to the final layer of surfacing or existing pavement to remain in place shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

Whenever lane lines and centerlines are obliterated, the minimum lane line and centerline delineation to be provided shall be temporary reflective raised pavement markers placed at longitudinal intervals of not more than twenty-four feet (24'). The temporary reflective raised pavement markers shall be the same color as the lane line or centerline the markers replaced. Temporary reflective raised pavement markers shall be the following or equal:

- FOL Tape, LLC, Flex-O-Line Pavement Marking Tape – Metallic Backing
- Bunzl Extrusion Tacoma, Inc., T.O.M., Type W-1 or W-2 or Type Y-1 or Y-2, or Grade WZ

Temporary reflective raised pavement markers shall be placed in accordance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place pavement markers in areas where removal of the markers will be required.

Temporary lane line or centerline delineation consisting entirely of temporary reflective raised pavement markers placed on longitudinal intervals of not more than twenty-four feet (24') shall be used on lanes opened to public traffic for a maximum of fourteen (14) days. Prior to the end of the fourteen (14) days, the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within fourteen (14) days, the Contractor shall provide, at the Contractor's expense, additional temporary pavement delineation. The Contractor will be required to refresh the temporary pavement delineation when directed by the Engineer due to inclement weather or traffic volume conditions, if less than the already required fourteen-day (14) period. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

Pedestrian crosswalks and stop bars shall be installed in four-inch (4") temporary white removable traffic type at all arterial streets and near all high traffic areas such as schools, elderly care facilities, business, hospitals, etc.

2-02 Not Included

2-03 Not Included

2-04 Measurement

Traffic control shall be measured on a lump sum basis if included on the bid form.

2-05 Payment

The contract price for traffic control shall include full compensation for doing all the Work involved in furnishing, placing, removing, storing, maintaining, temporarily relocating, replacing and disposing of the components of the traffic control system. The Contractor shall bear all costs in compliance with the approved traffic control plan, including costs for flagging operations.

SECTION 3. CLEARING AND GRUBBING

3-01 General

Clearing and grubbing shall consist of removing vegetable growth and deleterious materials, such as designated trees, stumps, roots of down trees, brush, grass, weeds, rocks, concrete, curb, gutter, sidewalk and driveway, and asphalt concrete pavement and all other objectionable material to a depth of eighteen inches (18") defined herein and from within the limits of the project as defined in the Project Plans and Special Provisions. All clearing and grubbing shall conform to the applicable requirements of Section 17,"Clearing and Grubbing", of State Standard Specifications.

The Contractor shall protect from damage all improvements and facilities which are to remain. Any such improvements which are damaged as a result of the Contractor's operations shall be replaced as directed by the Engineer at the Contractor's expense.

3-02 Materials

Not Used

3-03 Construction

3-03A Burning and Blasting

No burning or blasting of material by the Contractor shall be allowed.

3-03B Extent of Work

Objectionable material shall be removed to a minimum depth of eighteen inches (18") below subgrade within the entire street and easement right of way area. All trees, existing stumps, and large roots within fill areas where the grading plane is two feet (2') or more above the natural ground and shown for removal shall be cut off flush with the natural ground and need not be completely removed except where a structure is to be built or piles are to be placed or driven. All concrete and asphalt shall be sawcut at conform lines.

3-03C Temporary Relocation of Signs and Street Furniture

Existing warning, regulatory and guide signs, mail boxes, and street furniture shall be temporarily relocated if necessary. All signs and sign poles removed by the Contractor shall be stored in a location designated by the Engineer. If necessary for public safety or directed by the Engineer, removed signs shall be temporarily installed until a permanent location and installation is determined.

3-03D Wells, Tanks, and Basements

All wells shown on the Project Plans shall be abandoned or sealed according to Zone 7, Water Agency requirements prior to the start of grading. All tanks and basements encountered shall be removed in their entirety to native soil. All rubble from tank and basement removal shall be properly disposed at a designed landfill site.

3-03E Demolition Permit

A demolition permit shall be acquired by the Contractor from the City Building and Safety Division prior to demolition of any building structures on the project site. A SWPPP shall be provided as part of obtaining a demolition permit on a project disturbing one acre or more.

3-03F Protection of Trees

Only those trees that are specifically designated on the Project Plans for removal shall be removed. All other remaining trees shall be protected by the Contractor against injury from construction activities. The Contractor shall take whatever measures are necessary, such as trimming, erecting barricades, and performing work by hand, to protect those trees not designated to be removed. Construction activities, such as stockpiling materials or scarifying the ground surface, shall not be allowed within the drip line of a protected tree. If required by the Project Plans, work within the drip line of a protected tree shall only be performed by use of hand labor in the presence of the Engineer. Pruning shall only be performed by a qualified arborist at the Contractor's expense to the minimum extent necessary as directed by the Engineer.

All roots that are one inch (1") in diameter or larger and that are to be removed shall be cleanly cut with a hand saw. Roots that are smaller than one inch (1") in diameter are not considered to be significant and may be removed by the most efficient means.

Roots that are larger than two inches (2") in diameter and are within eight feet (8') of the tree trunk shall not be cut or ground unless prior approval has been received from the Engineer.

Roots that are larger than two inches (2") in diameter and are within eight feet (8') of the tree trunk, which are in conflict with the proposed work may be ground a maximum of one-half (1/2) of their diameter. Work of this nature shall only be performed using a mechanical stump grinder and only by personnel familiar with its operation.

Roots of any diameter that are farther than eight feet (8') from the tree trunk, may be ground a maximum of one-half (1/2) of their diameter if they are in conflict with the proposed work. Work of this nature shall only be performed using a mechanical stump grinder and only by personnel experienced with its operation.

Roots that are up to six inches (6") in diameter and farther than eight feet (8') from the tree trunk may be removed if they are in conflict with the proposed work. Roots that are removed shall be cleanly cut using a hand saw.

The following protection measures, as required by Pleasanton Municipal Code Chapter 17.16, Tree Preservation, otherwise known as the Heritage Tree Ordinance, shall be practiced during the course of construction. These measures may be modified or eliminated by the Engineer if it is determined that they do not apply to the specific situation or are contrary to the design intent of the project. Exemption of any one or part of the listed measures shall be confirmed in writing and in any event shall not release the Contractor of the obligation to take whatever measures are necessary to protect those trees not designated to be removed.

1. If required by the project tree report or the Engineer and prior to the commencement of construction, install a sturdy fence at the dripline of any tree which will be affected by the construction and prohibit any storage of construction materials or other materials inside the fence. The dripline shall not be altered in any way so as to increase the encroachment of the construction.
2. Prohibit excavation, grading, drainage, and leveling within the dripline of the tree unless approved by the Engineer.
3. Prohibit disposal or depositing of oil, gasoline, chemicals, or other harmful materials within the dripline or in drainage channels, swales, or areas that may lead to the dripline.
4. Prohibit the attachment of wires, signs, and ropes to any Heritage tree.
5. Retain the services of a certified or consulting arborist at the Contractor's expense for periodic monitoring of the project site and health of those trees to be preserved. The certified or consulting arborist shall be present whenever activities occur which pose a potential threat to the health of the trees to be preserved.
6. Notify the Engineer of any damage that occurs to a tree during construction so that proper treatment may be administered.

3-03G Spoil Area and Off-haul

The spoil areas shall only be used for the purpose of temporarily stockpiling objectionable material on site before transfer to a permanent disposal site. All materials removed from the project site shall be properly disposed of in accordance with Section 17-2.03D, "Disposal of Materials" of the State Standard Specifications.

3-03H Utility Abandonment

Utility pipes more than or equal to twelve inches (12") in diameter to be abandoned shall be sealed with concrete for a length equal to or exceeding the pipe diameter but not less than two feet (2') unless otherwise shown on the Project Plans. (See Sections 14-03I and 13-03M

for Water and Sewer abandonment provisions). Utility pipes less than 12” in diameter shall be grout-injected for entire volume and valves removed unless otherwise shown on the Project Plans.

3-03I Archaeological Finds

For City Projects:

If, during the course of work, archaeological artifacts are encountered, all work in the immediate area of the find shall be discontinued. The City shall acquire the services of an archaeologist to determine the nature of the find. Only after a preservation plan has been initiated shall the Contractor proceed with the Work.

For Private Development Projects:

If an archaeological deposit is encountered, all soils disturbing activities in the vicinity of the deposit shall cease and the City shall be immediately notified. The Project Developer shall retain the services of a qualified archaeological consultant having expertise in California prehistoric archaeology. The archaeological consultant shall determine if the planned development could potentially impact important archaeological resources and shall then design an appropriate archaeological monitoring program. Upon completing the archaeological monitoring program, the archaeological consultant shall submit a written report of findings to the Engineer. At a minimum, the archaeological monitoring program shall include the following:

1. An archaeological monitor shall be on site during any further soils disturbing activities.
2. The archaeological consultant shall advise all project contractors to be on the alert for evidence of expected resources, of how to identify the evidence of the expected resources, and of the appropriate protocol in the event of discovering an archaeological resource.
3. The archaeological monitor shall be present on site until the City Engineer, in consultation with the archaeological consultant, determines that project construction activities could have no effects on significant archaeological resources.
4. The archaeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis.
5. The Project Developer shall empower the archaeological monitor to temporally redirect demolition/excavation/construction crews and heavy equipment until the resource is evaluated. The archaeological consultant shall immediately notify the City Engineer of the encountered resources.

6. The Project Developer shall consult with City and tribal representatives to determine the appropriate disposition of findings. Mitigation measures shall include one of the three alternatives below:
- In-Situ Preservation: The Project Developer shall preserve artifacts and resources as found and shall apply suitable open space, capping, or monumentation to the site. The Project Developer shall alter development plans to accommodate this alternative, as necessary.
 - Excavation/Recovery: The archaeological consultant shall excavate the site, evaluate the site for historical references, recover artifacts as appropriate, and cover the site to preserve remaining artifacts. The Project Developer shall maintain sufficient buffering between development subsurface construction and the location of resources.
 - Excavation/Removal: The archaeological consultant shall excavate and recover the cultural resources as described above and remove artifacts as necessary.

The archaeological consultant shall prepare an Archaeological Data Recovery Plan that shall be submitted to the Engineer for review and approval.

If human remains are discovered, the Project Developer shall contact the County Coroner immediately. If the coroner determines that the human remains are Native American remains, the Project Developer shall notify the California State Native American Heritage Commission.

The archaeological consultant shall prepare a Final Archaeological Resources Report, meeting City and state standards, evaluating the historical importance of the archaeological resource, and describing the archaeological and historical research methods employed in the testing, monitoring, and data recovery programs. The City Engineer shall review and approve this document. The Project Developer shall file the report with appropriate state offices.

3-04 Measurement

Clearing and grubbing shall be measured on a lump sum basis.

3-05 Payment

The contract price for clearing and grubbing shall include full compensation for excavation, removal, disposal, sawcutting, protection of existing improvements to remain, and obtaining all applicable permits and associated costs, including City of Pleasanton permits.

SECTION 4. ROADWORK EXCAVATION AND GRADING

4-01 General

Roadwork excavation and grading shall consist of performing all operations necessary to excavate all materials, regardless of character and subsurface conditions, from the roadway prism or adjacent thereto including grading of sidewalk, driveway and conform areas, and other work items as described in Section 19-1, "General," and Section 19-2, "Roadway Excavation," of the State Standard Specifications. Contractor shall comply with Section 19, "Earthwork," of the State Standard Specifications except as modified by the Special Provisions and Project Plans and these City Standard Specifications. For cases when required by the Engineer, this section also covers lime stabilization of basement material within the roadway prism.

4-02 Materials

4-02A Basement Material

Basement material is defined as that material in excavation or embankment under the lowest layer to be placed. The basement material shall meet all the conditions of acceptability as specified in Section 19-1.03B, "Unsuitable Material," of the State Standard Specifications.

4-02B Borrow-Import

Borrow-import shall be defined as materials which are obtained from sources outside the project site. Such materials shall comply with Section 19-7.02C, "Imported Borrow," of the State Standard Specifications and shall be subject to approval by Engineer before use. Only in the case when all selected materials have been depleted from the project site shall borrow-import be used for roadway fill.

4-02C Selected Materials

Selected materials shall be defined as materials which are excavated from the project site and which are satisfactory for use in fills, embankments, backfill or other uses as directed. Such material shall be suitable for compaction, have no cemented lumps or rock larger than three inches (3") measured in any direction, shall be free of topsoil, organic, and other deleterious materials and shall be approved by the Engineer. Selected material shall be used as specified in Section 19-2.03D, "Selected Material," of the State Standard Specifications.

4-02D Lime

Lime used for basement material stabilization shall conform to the requirements of Section 24-1.02 "Materials," of the State Standard Specifications.

4-03 Construction

4-03A Roadway Excavation and Grading Procedures

Roadway excavation shall conform to the provisions of Section 19-2, "Roadway Excavation," of the State Standard Specifications. Roadway excavation shall consist of all excavation involved in grading and construction of the roadway, including grading of sidewalk, driveway, and conform areas.

When directed by the Engineer, the Contractor shall excavate unsuitable basement material. The resulting voids shall be filled with either select materials or aggregate base material as specified in the Special Provisions. The use of fabric for basement stabilization shall only be considered after all other alternatives have been implemented and upon approval of the Engineer.

All material removed and surplus excavated material shall become the property of the Contractor.

All select materials or aggregate base used to replace basement material shall be compacted to a minimum of ninety-five percent (95%) at a moisture content of within \pm two percent ($\pm 2\%$) to within six inches (6") directly below the grading plane for the full width of the roadbed between and including curbs. The minimum compaction requirement under sidewalks shall be ninety percent (90%). No material shall be placed above any layer of prepared basement material which does not meet the relative compaction requirement and until the basement material has been approved by the Engineer.

Immediately prior to placing subsequent layers of materials thereon, the grading plane shall conform to Section 19-1.03C, "Grade Tolerance," of the State Standard Specifications.

4-03B Ditch Excavation

Ditch excavation shall be in conformance with Section 19-2.03H "Ditch Excavation," of the State Standard Specifications. An excavation with a bottom width of less than twelve feet (12') shall be classified as ditch excavation.

4-03C Embankment

Embankment construction shall be in conformance with Section 19-6, "Embankment Construction," of the State Standard Specifications. Embankment construction shall include the construction of roadway embankments, including preparation of the areas upon which they are to be placed; the construction of any temporary surcharge embankment above the grading plane; the construction of dikes within or outside of the right of way; the placing and compacting of approved material within roadway areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits, and other depressions within the roadway area.

4-03D Utility Protection

The Contractor shall be responsible for the protection of all existing pipelines, manholes, catch basins, valve boxes, and other utility structures that are to remain within the excavation work area.

Any such utility facilities that are damaged from roadway excavation work performed by the Contractor shall be either repaired or replaced to the satisfaction of the Engineer at no cost to the City in accordance with Section 1-06, "Protection of Existing Utilities and Property," of these City Standard Specifications.

4-03E Finishing Roadway

Finishing roadway work shall conform to the provisions of Section 22, "Finishing Roadway," of the State Standard Specifications.

4-03F Watering

Watering shall be in conformance with Section 10-6, "Watering," of the State Standard Specifications and Section 1-09, "Dust Control," of these City Standard Specifications.

4-03G Lime Stabilization

Lime stabilization of basement material shall conform to Section 24-2, "Lime Stabilized Soil," of the State Standard Specifications.

4-04 Measurement

Roadway excavation and grading, excluding lime stabilization, shall be measured on a lump sum basis. Lime stabilization of basement material, if required by the Special Provisions and Project Plans, shall be measured by the square foot. Removal of unsuitable materials as directed by the engineer shall be measured on a per cubic yard basis and include over-excavation, haul away of spoil materials, and compaction of selected materials filling the voids.

4-05 Payment

The contract price for roadway excavation and grading shall include full compensation for excavation, removal of unsuitable basement material, and placement of select material in resulting voids; grading of the roadway prism; watering; compaction of basement material; grading conform cut; and finishing roadway work. The contract price for lime stabilization of basement material shall include full compensation for preparing material and spreading and mixing lime. Payment for compacting lime stabilized basement material shall be included in the contract price for roadway excavation and grading. Over-excavation of unsuitable material and replacement with suitable material shall be on a per-cubic-yard basis

and include removal and disposal of unsuitable material and the replacement and compaction of suitable material as directed by the Engineer.

SECTION 5. EROSION AND SEDIMENTATION CONTROL

5-01 General

The Contractor shall implement erosion and sedimentation control measures to prevent sediments or excavated material from entering the storm drain system and/or leaving the site. A SWPPP shall be implemented for all sites that disturb one (1) acre or more in conformance with the NPDES regional permit.

The erosion and sedimentation control materials and methods shall be in accordance with the "Erosion and Sediment Control Field Manual," by the California Regional Water Quality Control (latest edition), and the "Manual of Standards for Erosion & Sediment Control Measures," by ABAG (latest edition). In case of conflicting information or requirements between these two manuals, the California Regional Water Quality Control Manual shall prevail.

A specific erosion and sedimentation control plan shall be developed for every project. Work shall not proceed until the Engineer has approved the project specific erosion and sedimentation control plan. Types of erosion and sedimentation control measures that may be required include but are not limited to: preservation of existing vegetation; temporary seeding and planting; permanent seeding and mulching; mulching; soil stabilizers; geotextiles, mats/plastic covers, and erosion control blankets; temporary stream crossings; stabilized construction entrances; entrance/outlet tire washes; check dams; slope roughening/terracing/rounding; silt fences; straw bale barriers; sand bag barriers; straw wattles; brush or rock filters; storm drain inlet protection; sediment basins; and sediment traps.

At a minimum, the Contractor shall install filter materials (such as sandbags, filter fabric, etc.) at the storm drain inlets located in and downstream of the project site between October 15 through April 15 and/or, when rain is forecast, within twenty-four (24) hours. The Contractor shall install filter materials or seal all surface inlet openings during the dry season if there is potential for sediment or excavated material to be discharged to the storm drain system during the construction operation (e.g., sediments and debris tracked by construction vehicles, windblown, or transported by other runoff). The storm drain inlets shall be sealed in such a manner that they can be opened in an emergency and unblocked at the end of each working day so that no property is damaged as a result of accidents or other overflows.

Contractor shall prevent erosion of materials by wind at all times. Sedimentation and erosion control/filter materials shall be placed in a manner that will retain any debris or sediment from flowing into the storm drain system and/or off site. Such materials or control devices shall also be maintained and/or replaced as necessary to ensure effective sediment control and to prevent flooding.

The Contractor shall be responsible to monitor and update erosion control plans to accommodate phased construction and, as necessary, modify plans to fit existing conditions.

Changes in plans will require City review and approval.

5-02 Not Included

5-03 Not Included

5-04 Measurement

Erosion and sedimentation control shall not be a measured item unless specified in the Special Provisions.

5-05 Payment

Full compensation for erosion and sedimentation control shall be considered as included in the contract unit price paid for the various items of work and no additional compensation will be allowed therefore.

SECTION 6. AGGREGATE SUBBASE

6-01 General

Aggregate subbase shall conform to the provisions of Section 25, "Aggregate Subbases," of the State Standard Specifications, and to these City Standard Specifications.

6-02 Materials

6-02A Aggregate Subbase

Aggregate subbase shall be Class 2 and shall conform to the grading and quality requirements as specified in Section 25-1.02, "Materials," of the State Standard Specifications. Aggregate subbase exceeding workable moisture content will be rejected by the Engineer and shall be immediately removed from the project site by the Contractor.

6-03 Construction

6-03A Spreading and Compaction

Aggregate subbase shall be spread in accordance with the provisions of Section 25-1.03D, "Spreading," and Section 25-1.03E, "Compacting," of the State Standard Specifications. Spreading and compacting shall be performed by methods that will produce a uniform subbase, firmly compacted and free from pockets of coarse or fine material. No spreading operation shall begin until the physical characteristics of aggregate subbase and subgrade have been approved by the Engineer.

Aggregate subbase under a roadway shall be compacted to a minimum ninety-five percent (95%) relative compaction.

Select materials shall not be considered acceptable for the placement of AC pavement or sidewalk pavement until base materials, meeting the compaction requirements above, are determined to be firm and stable. When required by the Engineer, the Contractor shall demonstrate the base course's stability by "proof rolling" the prepared surface with equipment approved by the Engineer.

6-04 Measurement

Quantity of aggregate subbase used under roadway, including aggregate subbase used to fill voids from removal of unsuitable basement material, shall be measured by the ton. The weight of water in the aggregate will not be determined and no deduction will be made from the weight of material delivered to the site of work.

6-05 Payment

The contract price for aggregate subbase shall include full compensation for supplying, spreading and compacting aggregate subbase material.

SECTION 7. AGGREGATE BASE

7-01 General

Aggregate base shall conform to the provisions of Section 26, "Aggregate Bases," of the State Standard Specifications, and to these City Standard Specifications. Cement treatment of aggregate base shall be in accordance with Section 27, "Cement Treated Bases," of the State Standard Specifications.

7-02 Materials

7-02A Aggregate Base

Aggregate base shall be Class 2 and shall conform to the grading and quality requirements for three-quarter-inch (3/4") maximum as specified in Section 26-1.02B, "Class 2 Aggregate Base," of the State Standard Specifications. Aggregate base exceeding workable moisture content will be rejected by the Engineer and shall be immediately removed from the project site by the Contractor.

Recycled Class 2 aggregate base shall be allowed from Caltrans-approved suppliers.

7-03 Construction

7-03A Spreading and Compaction

Aggregate base shall be spread in accordance with the provisions of Section 26-1.03D, "Spreading," and Section 26-1.03E, "Compaction," of the State Standard Specifications. Spreading and compacting shall be performed by methods that will produce a uniform base, firmly compacted and free from pockets of coarse or fine material. No spreading operation shall begin until the physical characteristics of aggregate base have been approved by the Engineer.

Aggregate base under roadway from back of curb to back of curb and under driveways shall be compacted to a minimum ninety-five percent (95%) relative compaction. Aggregate base under sidewalk shall be compacted to a minimum ninety-two percent (92%) relative compaction.

7-04 Measurement

Quantity of aggregate base used under roadway, including aggregate base used to fill voids from removal of unsuitable basement material, shall be measured by the ton. The weight of water in the aggregate will not be determined and no deduction will be made from the weight of material delivered to the site of work. Aggregate base used under curb and gutter, sidewalks, ADA access ramps, driveways, driveway conforms, and valley gutters shall be measured on the basis as specified in Section 15 Concrete Improvements of these City Standard Specifications.

7-05 Payment

The contract price for aggregate base shall include full compensation for supplying, spreading, and compacting aggregate base material.

SECTION 8. HOT MIX ASPHALT, LIQUID ASPHALT, AND ASPHALTIC EMULSION

8-01 General

This section covers requirements for hot mix asphalt, liquid asphalt, and asphaltic emulsion. For requirements relating to hot mix asphalt paving excluding hot mix asphalt, liquid asphalt, and asphaltic emulsion, refer to Section 9, "Hot Mix Asphalt Paving," of these City Standard Specifications.

8-02 Materials

8-02A Hot Mix Asphalt

Hot Mix Asphalt (HMA) previously known as asphalt concrete to be used for HMA paving shall conform to the provisions of Section 39 "Hot Mix Asphalt," of the 2010 State Standard Specifications and to these City Standard Specifications.

Hot mix asphalt shall be produced from commercial quality asphalt and aggregates and shall be produced at a central mixing plant. A Certificate of Compliance shall be furnished to the Engineer for all asphalt concrete.

Recycled asphalt concrete up to 15% shall be allowed. Only material from Caltrans approved plants shall be deemed acceptable to use on City projects.

8-02A.1 Type

HMA shall be Type A, Rubberized or Open Graded, as provided in the project Special Provisions and shall be produced under the Standard Construction Process.

8-02A.2 Aggregate Grading

Aggregate grading for Type A HMA shall conform to the requirements of one-half-inch (1/2") maximum, medium gradation for surface course and three-quarters inch (3/4") maximum, medium gradation, for base course.

Aggregate grading for Open Graded Asphalt Concrete shall conform to the requirements of three-eighths inch (3/8") maximum for all courses.

8-02A.3 Hot Mix Asphalt Mix Design

The following shall be added to Section 39.1.03, "Hot Mix Asphalt Mix Design Requirements" of the 2010 State Standard Specifications:

-The City will accept a previously Caltrans approved mix design and shall not require job start up verification. The mix shall have been validated by Caltrans within the last 18 months. Contractor shall submit Job Mix Formula (JMF), Job Mix Formula Verification, Contractor

Hot Mix Asphalt Design Data, Suppliers Quality Control Plan, density core results from previous job, briquettes test data from previous job.

-The City will not provide verification of JMF. JMF must be previously approved by Caltrans within the last 18 months and provide to the Engineer prior to the start of HMA production.

-The City reserves the right upon request by the Engineer for contractor to assist the City's 3rd party inspector to perform density cores in accordance with section 39-104.G. Contractor is not required to have density cores taken by an independent party. This does not relieve the supplier from performing testing as identified in their Quality Control Plan. Contractor shall submit test results from previous job with same JMF.

-The City reserves the right upon request by the Engineer for contractor to assist the City's 3rd party inspector to sample the mix to make and tests briquettes in accordance with section 39-104.G. Contractor is not required to have briquettes made and tested by an independent party. This does not relieve the supplier from performing testing as identified in their Quality Control Plan. Contractor shall submit test results from previous job with same JMF.

-The City reserves the right to use Contractor's/Supplier's Quality Control data for acceptance. Contractor to submit Suppliers quality control data from testing identified in Supplier's Quality Control Plan.

-The City reserves the right to perform production start-up evaluation by third party if deemed necessary by Engineer upon review of submittals and previous test data.

8-02A.3 Asphalt Binder

Asphalt binder to be mixed with the aggregate shall be paving asphalt PG 64-10 in conformance with Section 92, "Asphalts Binders" of the State Standard Specifications, unless otherwise directed by the Engineer.

8-02B Liquid Asphalt

Liquid asphalt to be used as a prime coat on compacted base material shall be SC-70 in conformance with Section 93, " Liquid Asphalt," of the 2010 State Standard Specifications, unless otherwise directed by the Engineer. Liquid asphalt shall be used on all aggregate bases under pavement unless otherwise approved by the Engineer. Contractor shall take measures to prevent truck out of equipment driving on treated base.

8-02C Asphaltic Emulsion

Asphaltic emulsion to be used as a tack coat on existing asphalt concrete surfaces shall be SS1 in conformance with Section 94, "Asphaltic Emulsions," of the State Standard Specifications, unless otherwise directed by the Engineer.

8-03 Construction

8-03A Hot Mix Asphalt

8-03A.1 Spreading and Compacting

Spreading and compacting shall be performed by methods that will produce an asphalt concrete surface of uniform smoothness, texture and density. The Contractor shall comply with provisions of Section 391.11, "Transporting, Spreading and Compacting," of the 2010 State Standard Specifications.

The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

When a straightedge twelve feet (12') long is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01-foot from the lower edge of the straightedge. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 0.02-foot are present when tested with a straightedge twelve feet (12') long laid in a direction transverse to the center line and extending from edge to edge of a 12-foot traffic lane.

Pavement within fifty feet (50') of a structure or approach slab shall conform to the smoothness tolerances specified in Section 51-1.01 D(4) "Testing Roadway Surfaces.", of the 2010 State Standard Specifications.

The Contractor shall comply with smoothness per Section 39-1.12 "Pavement Smoothness" of the 2010 State Standard Specifications. Profilograph only required by request of the Engineer. The Contractor shall be required to use a "ski" at the time of spreading of HMA pavement to level irregularities.

The Contractor shall furnish and operate a self-loading motor sweeper with spray nozzles before and after paving operations, where feasible. All other areas will require hand-sweeping. All sidewalks, driveways and ADA ramps shall be swept clean by the end of each day where paving operations occurred.

The procedure whereby material is deposited in a windrow, then picked up and placed in the asphalt paver with loading equipment, will not be permitted unless otherwise authorized by the Engineer.

Rolling shall be performed in such a manner that cracking, shoving, or displacement will be avoided. Any displacement occurring as a result of reversing the direction of the roller or

from any other cause shall at once be corrected by the use of rakes and fresh asphalt mixture, where required.

Not less than one breakdown roller and two finish rollers shall be used with each paving operation, and shall meet minimum equipment requirements as specified in Section 39 "Hot Mix Asphalt," of the 2010 State Standard Specifications, in accordance with applicable pavement and design method.

Areas inaccessible to the rollers shall be compacted by use of a power compactor of the high-impact vibroplate type, capable of attaining the same compaction as the rolled areas.

Segregation shall be avoided and the surface shall be free from pockets of coarse or fine material. Asphalt concrete or asphalt concrete base containing hardened lumps shall not be used.

Type A HMA for base and surface courses shall not be applied when the air temperature is below 60° Fahrenheit and is falling, but it may be applied when the air temperature is above 50° Fahrenheit and is rising. Air temperature shall be taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.

Open Graded HMA shall be placed when the atmospheric temperature is above 50°F. However, open graded HMA may be placed when the atmospheric temperature is below 70° Fahrenheit but above 55° Fahrenheit, provided the following requirements are met:

1. Open graded HMA shall not be placed in a windrow or stockpile. Open graded HMA shall be transferred directly from the hauling vehicle to the asphalt paver hopper.
2. Maximum aggregate temperature at hot mix plant shall not be more than 275° Fahrenheit before adding the asphalt binder to the open graded HMA mixture.
3. Open graded HMA shall not be less than 0.10 foot in compacted thickness.
4. Open graded HMA shall be spread at a temperature of not less than 220° Fahrenheit measured in the hopper of the asphalt paver.
5. Complete rolling before pavement temperature falls below 220° Fahrenheit.
6. The compaction operation shall be performed such that the maximum distance between the asphalt paver and the initial breakdown rolling shall be no greater than 50 feet.
7. Open graded HMA shall be covered with tarpaulins in the hauling vehicle until the open graded asphalt concrete has been completely transferred into the asphalt paver hopper.

8-03A.2 Thickness at Lip of Gutter

Hot Mix Asphalt placed adjacent to any gutter designed to carry water shall be 1/4-inch (1/4") maximum above the gutter lip after final compaction. At ADA ramps, the asphalt concrete shall be flushed with lip of gutter.

8-03A.3 Paving Joint

No excessive build-up or unsightly appearance shall be permitted on longitudinal or transverse joints. Paving joints shall be constructed in accordance with Section 39-1.11, "Transporting, Spreading, and Compacting," of the 2010 State Standard Specifications. Lap joint shall be constructed in accordance with the City Standard Details. Longitudinal joints in top layers must match specified lane markings unless approved otherwise by Engineer.

8-03A.4 Weight Certificates

The Contractor shall furnish two licensed weighmaster's certificates (the original and duplicate copy) showing the actual net weight of material and the date and time of weighing. The weight certificates shall be given to the Engineer on the job as soon as the truck arrives at the work site. All trucks used for hauling asphalt concrete shall be weighed empty daily and at such times as directed by the Engineer.

8-03B Liquid Asphalt

Liquid asphalt shall be applied as a prime coat to compacted aggregate base surfaces prior to HMA paving in accordance with Section 37, "Bituminous Seals," of the State Standard Specifications.

8-03C Asphaltic Emulsion

Asphaltic emulsion shall be applied as a tack coat to existing asphalt concrete surfaces prior to asphalt concrete paving in accordance with Section 39-1.09C , "Tack Coat," of the 2010 State Standard Specifications.

8-04 Measurement

HMA shall be measured by the ton in accordance with Section 39-6., "Payment," of the 2010 State Standard Specifications. Asphalt binder, liquid asphalt, and asphaltic emulsion shall not be measured items.

8-05 Payment

The contract price paid for Hot Mix Asphalt shall include full compensation for supplying, spreading and compacting asphalt concrete; supplying and applying liquid asphalt and asphaltic emulsion; and supplying and mixing asphalt binder with HMA.

SECTION 9. HOT MIX ASPHALT PAVING

9-01 General

This section covers all requirements relating to hot mix asphalt paving of existing and new streets excluding hot mix asphalt, liquid asphalt, and asphaltic emulsion. Refer to Section 8, "Hot Mix Asphalt, Liquid Asphalt, and Asphaltic Emulsion," of these City Standard Specifications for material and installation requirements for hot mix asphalt, liquid asphalt, and asphaltic emulsion. The types of asphalt concrete paving projects presented in this section include:

1. New Street: Application of hot mix asphalt over a new base.
2. Existing Street: Application of asphalt concrete over existing, recycled and new bases; and existing asphalt pavement surfaces.
3. Rip-Off: Removal of existing asphalt concrete but reuse of existing base.
4. Total Recycle: Reuse of existing asphalt concrete and base with or without stabilizing agent mixture.
5. Total Reconstruction: Removal of existing asphalt concrete and aggregate base and installation of new aggregate base.
6. Isolated Pavement Repair/Base repair: Same as a rip-off or total reconstruction but only performed for relatively small and defined pavement failures.
7. Overlay: Preparation of existing asphalt concrete surface and placement of a new asphalt concrete pavement surface layer.

9-02 Materials

Material requirements for aggregate base, liquid asphalt, and hot mix asphalt used for new and existing streets shall conform to the following sections of these City Standard Specifications.

- Aggregate base: Section 7-02A, "Aggregate Base"
- Liquid asphalt: Section 8-02B, "Liquid Asphalt"
- Asphalt concrete: Section 8-02A, "Hot Mix Asphalt"

9-02A New Streets

Refer to Section 9-02, "Materials," of these City Standard Specifications.

9-02B Existing Streets

Refer to Section 9-02, "Materials," of these City Standard Specifications.

9-02B.1 Rip-Off

(No additional materials specific to rip-off included in this section.)

9-02B.2 Total Recycle

9-02B.2.1 Base Stabilizing Agents

Base stabilizing agents used for existing recycled base and asphalt concrete composite mixtures before overlay of new asphalt concrete surface shall be either Portland cement, Lime, Fly ash, or bituminous stabilizing agents depending on existing and site condition (structure and type of subgrade soil) as specified on Project Plans & Specifications. The Contractor shall perform sampling and pre-testing of the site and determine the appropriate type of stabilizing agent to be used based on results obtained on soil classification type, percent of material passing (No. 200 sieve), plasticity index, and liquid limit, if it not specified on the Project Plans & Specifications.

9-02B.3 Total Reconstruction

(No additional materials specific to total reconstruction included in this section.)

9-02B.4 Isolated Pavement Repair

(No additional materials specific to isolated pavement repair included in this section.)

9-02B.5 Overlay

9-02B.5.1 Asphaltic Emulsion

Material requirements for asphaltic emulsion used for existing street overlays shall conform to Section 8-02C, "Asphaltic Emulsion," of these City Standard Specifications.

9-02B.5.2 Pavement Fabric

Pavement fabric material used on existing asphalt concrete surfaces shall conform to the provisions of Section 96, "Geosynthetics," of the State Standard Specifications and these City Standard Specifications.

Pavement fabric shall retain the physical properties required by the State Standard Specifications after being in contact with asphalt concrete at temperatures of up to 325°F for five (5) minutes (± 15 seconds).

Pavement fabric shall be accompanied with a Certificate of Compliance conforming to the provisions in Section 6-2.03C, "Certificates of Compliance," of the State Standard Specifications.

Pavement fabric shall be protected from exposure to ultraviolet rays until placed.

Asphalt binder for pavement fabric shall conform to the provisions of Section 92, "Asphalt Binders," of the State Standard Specifications and shall be Grade PG 64-10.

Pavement fabric shall consists of either Trupave paving mat manufactured by Owens Corning or GlasPave25 paving mat manufactured by Saint-Gobain Technical Fabric/Tensar International Corporation, or approved equal. The material shall be a "single layer non-woven paving mat" in accordance with ASTM D7239 Type 1 Classification and shall meet the following physical properties table when tested in conformance with the listed Test Method designation.

PHYSICAL PROPERTIES OF HYBRID/FIBERGLASS POLYESTER PAVING MAT			
Property	Test Method	Units	Value
Mass per unit area	ASTM D5261	g/m ²	125
Tensile strength, MD	ASTM D5035	N/50mm (lb/2 in)	200 (45)
Tensile Strength, CD	ASTM D5035	N/50mm (lb/2 in)	200 (45)
Ultimate Elongation	ASTM D5035	percent	<5
Melting point	ASTM D276	C (F)	>205 (>400)

Material submitted as "or equal" shall provide project lists showing placement of the "or equal" material on at least 5 years of projects in California prior to the current year. The material shall have a proven record that it can be recycled and milled via written documentation from milling contractors and recycle facilities. Asphalt binder for application of the mat shall be PG 64-10 or pre-approved by the engineer. Refer to manufacture's recommendations for proper asphalt binder application rates.

9-02B.6 Stress Absorbing Membrane Interlayer (SAMI):

Refer to Section 10-02, "Materials" of these Project Special Provisions.

9-03 Construction

For both hot mix asphalt paving of new and existing streets, the Contractor shall raise structures to grade after all paving operations are complete. On streets where full milling is to take place, the Contractor shall lower all structures prior to the full mill grind.

Adjustments of frames and covers for manholes, water valves, monuments, detection handholes, and cleanouts shall be in accordance with the applicable City Standard Details. All utility covers shall be marked and referenced prior to paving. This shall be accomplished by removing the existing concrete collar around the frame, installing concrete adjusting rings, raising the frame and cover, constructing concrete collar and placing two inches (2") of asphaltic concrete. No metal riser adjustment rings will be allowed. When raising structures to grade, the contractor shall use Caltrans Minor concrete batched from a certified batch plant along with a weight tag from a certified weigh master unless otherwise approved by the City Engineer. All existing water valve and monument boxes shall be removed and replaced with new boxes at the time of construction. Water valves shall be accessible immediately after paving and water valve covers must be raised within 48 hours after paving. All structures raised to grade shall be paved within 48 hours or the Contractor shall be required to furnish temporary paving. The City shall have the right to assess a penalty of \$250.00 per day for each street where the water valve boxes have not been raised after 48 hours. All manholes, lamp holes, and water valve risers shall be covered and protected to avoid any debris or foreign materials entering these systems. Installation of temporary false bottom in manhole is required to collect debris.

Sequence of Work:

The contractor shall perform all work in the following sequence (if required):

- Full width milling
- Full Depth HMA Repair
- Asphalt concrete leveling
- Grinding or wedge cutting at gutter lip/end conform
- Traffic detector loop installation
- Crack sealing
- Rubberized chip seal placement
- Hot mix asphalt placement
- Raising of irons
- Striping and signing

Crack sealing shall be completed a minimum of 3 days prior to resurfacing.

Hot mix asphalt overlay shall be placed within 10 calendar days, from the day lip of gutter or end conform grinding/wedge cutting started, or 7 calendar days from the day rubberized chip seal work begins on each individual street. A penalty of \$700 per calendar day shall be assessed against the Contractor for each individual street after the above mentioned 10 and 7 calendar day period, whichever is more restrictive. The contractor shall schedule their work accordingly.

The contractor shall complete all traffic striping operations on major arterial streets within 7 calendar days of the final HMA placement. A penalty of \$1000 per calendar day shall be

assessed against the Contractor for each individual street after the above mentioned 7-day period. The contractor shall schedule their work accordingly.

9-03A New Streets

Aggregate base shall be applied to the newly graded basement material of new streets in accordance with Section 7, "Aggregate Base," of the City Standard Specifications.

9-03B Existing Streets

Aggregate base shall be placed on basement material for the total reconstruction of existing streets and used as make-up base material for rip-off, total recycle, and isolated pavement repair projects for existing streets in accordance with Section 7, "Aggregate Base," of these City Standard Specifications.

For rip-off, total recycle, total reconstruction, and isolated pavement repair projects, prime coat shall be applied to the compacted aggregate base surface prior to application of asphalt concrete. Refer to Section 8, "Hot Mix Asphalt, Liquid Asphalt, and Asphaltic Emulsion," of these City Standard Specifications for prime coat requirements.

9-03B.1 Rip-Off

The Contractor shall remove existing asphalt concrete and scarify, grade, and compact to 95-percent (95%) minimum, the top six inches (6") of base material for the full width of the street between gutter lips. The Contractor shall provide import base material needed to meet the desired grade or to replace soft spots. Contractor is required to proof roll the compacted grade.

9-03B.2 Total Recycle

9-03B.2.1 Preparation

Total recycle process includes the in-place pulverization/grinding and uniform blending of existing asphalt concrete roadway and predetermined thickness of underlying material, creating a homogeneous mixture of recycle base material. The process also consists of shaping, finishing, fine grading, and compaction of recycle base material to the depth and grade shown on the Project Plans..

Any ground particles larger than 2½ inches (2½") in diameter shall be removed. Existing asphalt concrete and base materials shall be ground and mixed to a minimum distance of 15 inches (15") from the edge of all utility structures and the remaining sections removed by hand or suitable equipment.

The Contractor shall cut and/or fill the existing ground asphalt concrete and base materials to meet the desired grades shown on the Project Plans. The minimum relative compaction requirement shall be 95 percent (95%). Grading and compaction shall be performed for the

full width of the street between gutter lips. After compaction and trimming, the recycled composite mixture shall be firm and unyielding. The Contractor is required to proof roll the compacted material. The Contractor shall haul away and properly dispose of all excess materials. All manholes and valve covers shall be protected with metal-plate lids during grading and compaction.9-03B.2.2 Stabilization

Base stabilizing agent, as specified in Section 9-02D, "Base Stabilizing Agents," of these City Standard Specifications shall be added to: (1) the composite mixture specified in Section 9-03B.2.1 of these City Standard Specifications, (2) remaining existing base materials, and (3) basement material to the depth and at a rate as described in the Special Provisions or as shown on the Project Plans. Base stabilization shall conform to Section 24, "Stabilized Soils," of the State Standard Specifications, except as modified in these City Standard Specifications. All base stabilization work shall be performed by a specialty soil stabilization contractor. After application of curing seal, stabilized recycled base shall be ready for cross traffic within 24 hours. The Contractor shall stabilize the materials described herein surrounding the existing utility structures to 15 inches (15") from the edge of those existing structures.

The recycled composite mixture should be allowed to cure for the specified time as approved in the mix design or in the Project Plans & Specifications. Curing is the Contractor responsibility, who should consider all factors, including but not limit to, limitation and restrictions to weather and work zone traffic.

Quality Assurance:

The approved mix design shall conform to the following strength parameters and test procedures based on the stabilizing agent used:

- For Portland cement, Lime, Fly ash stabilizing agent: Use Unconfined Compressive Strength Test parameters in conformance with ASTM D1633 Method A. Minimum strength shall be 350 psi (2413 kPa) but less than 800 psi (516 kPa).
- For Bituminous Stabilizing Agent (s): Use Modified Proctor Density, ASTM D1557 and/or Marshall Method, ASTM D6927.

On the first day of production, the Contractor will take the appropriate QC samples of reclaimed mix in accordance with appropriated test method mentioned above. Two additional samples will also be tested by the Contractor's laboratory for aggregate gradation and percent stabilizer content. Test results will be submitted to the Engineer before the end of next working day.

For each subsequent day of production, a minimum of one sample of the reclaimed mix will be taken from each street or from each 3000 center line feet of production. These samples will be tested as noted for the first day of production. Test results will be delivered to the Engineer within 2 working days.

9-03B.3 Total Reconstruction

The Contractor shall remove existing asphalt concrete and base material and prepare existing basement material in accordance with Section 4, "Roadway Excavation and Grading," of these City Standard Specifications prior to application of new aggregate base in accordance with Section 7, "Aggregate Base," of these City Standard Specifications.

9-03B.4 Full Depth HMA Repair

The Contractor shall perform isolated pavement repairs for various types of projects as required by the Special Provisions and the Project Plans. The construction requirements in the following paragraph shall apply to isolated pavement repair.

The Contractor shall remove existing asphalt concrete pavement by cold plane grinding, blade cutting, or jack hammering areas shown on the Project Plans and marked in the field. The edge of the outside perimeter cut of the base repair shall be straight and firm, with no up-heaving, and free of loose material. The Contractor shall scarify, grade, and compact the top six inches (6") of base materials. Any import base materials needed to meet the requirement for this work shall be provided by the Contractor. The minimum relative compaction for this work shall be 95 percent (95%). The Contractor shall replace asphalt concrete with materials meeting the requirements of these City Standard Specifications. The thickness of this asphalt concrete shall be a minimum of four inches (4") or equal to the depth of the existing asphalt concrete, whichever is greater

9-03B.5 Overlay

9-03B.5.1 Cleaning

Prior to commencing paving, existing pavement shall be cleaned of all loose material by a self-loading motor sweeper to the satisfaction of the Engineer. The Contractor shall also be responsible for removing all painted or thermoplastic striping, markings, and buttons.

9-03B.5.2 Grinding and Milling of HMA Pavement

The Grinding and Milling of HMA pavement shall be performed in advance of the resurfacing operation and in accordance with the requirements of these City Standard Specifications and as shown on the Project Plans. The grinding machine cutter head shall be at least six feet (6') wide.

All loose material removed shall become the property of the Contractor and be disposed of outside of the street right-of-way. The Contractor shall make his own arrangements for a disposal site and shall be responsible for all costs involved.

The Contractor shall furnish and operate a self-loading motor sweeper with spray nozzles for final cleanup work and shall keep the ground area cleaned and maintained at all times until the street has been resurfaced.

Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the Engineer, in such condition that the quality of the completed joint will be affected.

The average depth of cut shall be as shown on the Project Plans along the edge of pavement or gutter lip and tapered out to zero over a six-foot (6') minimum width or as directed by the Engineer. The final cut shall result in a uniform surface conforming to the cross-section of each street. The adjacent concrete shall have all asphalt concrete removed where required. The outside lines of the ground area shall be neat and uniform. The street surface to remain in place and the existing concrete curb and gutter shall not be damaged in any way.

Grinding widths of pavement shall be continuous and 15 feet (15') wide along conform lines, as directed by the Engineer. All loose material ground from the street surface, including material deposited in the existing gutter or on the adjacent traveled way, shall be immediately removed from the work site. The removal operation shall follow within 50 feet (50') of the grinder, unless otherwise directed by the Engineer. Cutback shall be placed in all 15-foot (15') wide conform areas immediately after grinding operation is completed for a minimum width of five feet (5'). The Contractor shall also be responsible for placing cutback around any protruding structures in the grind area.

Asphalt concrete shall be removed from driveways and gutters and around all structures in the ground area as directed by the Engineer as part of the grinding asphalt concrete pavement work and no additional compensation will be made therefore.

On streets where full milling is to take place; the Contractor shall lower all structures prior to performing the full mill grind.

Overlay of grinding areas must be completed within ten (10) working days of the grinding.

9-03B.5.3 Hot Mix Asphalt Leveling Course

If an HMA leveling course is required by the Special Provisions and Project Plans, then all leveling course aggregate shall conform to the ½-inch (½") maximum medium grading specified in Section 39-1.02E, "Aggregates," of the 2010 State Standard Specifications.

The Contractor shall apply an SS-1 tack coat to all surfaces receiving the leveling course prior to spreading the leveling course.

The Contractor shall spread and compact the leveling course at all dip areas, depressions and voids greater than ½ inch (½") thickness.

Spreading and compacting shall be performed by methods that will produce a surface of uniform smoothness, texture, and density to allow subsequent layers to be of uniform thickness.

9-03B.5.4 Pavement Fabric

The surface on which the engineered paving mat is to be placed shall be reasonably free of dirt, water, vegetation or other debris. The engineered paving mat shall be placed on a drainable surface, and any rutting or low spots in the pavement shall be removed by milling or by the use of a leveling course as shown on the plans or directed by the Engineer in the field. Cracks exceeding 1/4 inch in width shall be filled with suitable crack filler. Potholes shall be properly repaired as directed by the engineer. Fillers shall be allowed to cure prior to placement of the engineered paving mat.

Neither the asphalt binder nor the engineered paving mat shall be placed when weather conditions, in the judgment of the engineer, are not suitable. Air and pavement temperatures shall be sufficient to allow the tack coat to hold the engineered paving mat in place. The air temperature shall be $50^{\circ} F$ and rising for placement of the asphalt tack coat.

The application rate of tack coat shall be .20 gal/SY +/- .03 gal/SY. This application rate is necessary for an effective moisture barrier. Tack coat application rate shall be sufficient to satisfy the asphalt retention properties of the engineered paving mat and to bond the engineered paving mat and HMA overlay to the existing pavement.

Application of the tack coat shall be by a calibrated distributor truck spray bar. Hand spraying, squeegee and brush application will only be allowed where the distributor truck does not have room to operate and shall be kept to a minimum. Temperature of the tack coat shall be at least $350^{\circ} F$.

The target width of the tack coat application shall be the width of the engineered paving mat material plus 4 inches. Tack coat application shall be wide enough to cover the entire width of engineered paving mat material overlaps. The tack coat shall be applied only as far in advance of the engineered paving mat material installation as is appropriate to ensure a tacky surface at the time of the engineered paving mat material placement. Traffic shall not be allowed on the tack coat.

The engineered paving mat shall be placed onto the tack coat with minimum folds or wrinkles and before the tack coat has cooled and lost tackiness. As directed by the engineer, wrinkles or folds in excess of 1 inch shall be slit and laid flat or pulled out and replaced. In these repaired areas, additional tack coat shall be applied as needed to achieve a sound bond to the substrate. Damaged engineered paving mat shall be removed and replaced, per the manufacturer's recommendations, at the contractor's expense with the same type of material.

Overlap of engineered paving mat joints shall be lapped 2 to 4 inches to ensure full closure of the joint. Transverse joints shall be lapped in the direction of paving to prevent edge pickup by the paver. A second application of tack coat shall be placed beneath the overlapping engineered paving mat to ensure proper bonding of the double material layer.

Brooming, squeegee or pneumatic rolling shall be used to remove any air bubbles and to maximize engineered paving mat contact with the pavement surface and shall be done in accordance with the manufacturer's specifications and to the satisfaction of the engineer.

Excess tack coat that bleeds through the engineered paving mat under normal construction traffic shall be countered by broadcasting clean sand or hot mix to create a bond break between the excess tack and the construction equipment tires. If sand is applied, any excess sand shall be removed from the interlayer prior to placing the HMA overlay. No other material, such as asphalt release agents or diesel, shall be used for this purpose.

No traffic, except necessary construction traffic or emergency vehicles, shall be driven on the engineered paving mat, unless approved by the engineer. If traffic on the interlayer is approved by the engineer, clean sand shall be lightly broadcasted over the engineered paving mat interlayer, and any loose sand shall be removed prior to paving.

Placement of the first lift of the HMA overlay shall closely follow placement of the engineered paving mat. All areas in which the engineered paving mat has been placed shall be paved during the same day, unless approved otherwise by the engineer. In the event of rainfall on the engineered paving mat prior to the placement of the first HMA overlay lift, the engineered paving mat shall be allowed to dry before the HMA is placed. The compacted thickness of the first lift of the HMA overlay on the engineered paving mat shall not be less than 1.5 inches, and the temperature of the mix at placement shall not exceed the engineered paving mat melting point temperature. Where the total HMA overlay thickness is less than 1.5 inches, engineered paving mat shall not be placed.

At locations where the contractor is overlaying the gutter pan with asphalt concrete, and at the direction of the city engineer, the contractor shall zero grind or knock off the existing asphalt concrete at the lip of gutter without damaging the existing concrete gutter in order for the new asphalt concrete to be placed properly. This is not a measured item of work and no additional payment shall be allowed therefor.

A manufacturer representative shall be present, at minimum, for the first two days of installation of the engineered paving mat and available thereafter upon request by the engineer. This shall be arranged by the contractor with the manufacturer. This is not a measured item of work and no separate payment to the contractor shall be allowed for full compliance to this provision.

9-03B.7 Stress Absorbing Membrane Interlayer (SAMI)

Stress Absorbing Membrane Interlayer construction consisting of existing surface preparation, Asphalt Rubber Binder Seal Coat (rubberized chip seal) application, and overlay with hot mix asphalt.

1. Existing surface preparation: The existing street surface shall be prepared in accordance with Section 9-03B.4, "Full Depth HMA Repair", Section 9-03B.5.2, "Grinding and Milling of Hot Mix asphalt Pavement", and Section 9-03B.5.3, "Hot Mix Asphalt Leveling Course" of these City Standard Specifications.
2. Rubberized chip seal application: Rubberized chip seal shall be placed in accordance with Section 37-2.05, "Asphalt Binder Seal Coats," of the State Standard Specifications, except a flush coat is not required and to City Standard

Specifications. Prior to commencing chip seal, existing pavement shall be cleaned of all loose material to the satisfaction of the Engineer.

3. Overlay: The Contractor shall overlay the street with hot mix asphalt as required by the Special Provision and Project Plans. Hot mix asphalt overlay shall be in accordance with Section 8-03, "Construction" of these City Standard Specifications.

9-03B.8 Pavement Crack Sealing

The Contractor shall seal all pavement cracks on streets that are scheduled for preventative maintenance, overlay and overlay with fabric treatments and as directed by the Engineer. Crack sealing is not required on SAMI streets. Crack seal material shall be joint sealant Crafc0 Polyflex Type 3, or approved equal. Cracks shall be free of dirt, vegetation, debris and loose sealant. Cleaning shall be done by air blasting. Old sealant which protrudes above the asphalt concrete surfacing shall be completely removed prior to receiving a sealant treatment. Crack sealants shall be squeegeed until sealant is flush with the existing asphalt concrete surfacing. Crack seal shall generally be performed after full depth HMA repair. Therefore, the existing pavement condition during the bidding period may not necessarily reflect the actual condition of the pavement prior to crack sealing. Work shall be performed in conformance with section 37-5 "Crack Treatment" of the State Standard Plans.

The conform joint construction between the new overlay and all concrete approach slabs shall be completed by providing a straight line pavement cut directly along the joint after the overlay is completed and filling the space flush to the pavement surface with crack seal material. The pavement cutting shall be half inch wide by two inch deep. Measurement and payment to complete this work shall be measured in pounds of crack seal material used and paid for under the unit bid price for crack seal material. Pavement cutting and all other associated miscellaneous work to conform to this provision shall not be a measured item of work and shall be considered included in the price paid for under crack seal material and no separate payment shall be allowed therefor.

9-04 Measurement

The basis of measurement for crack sealant shall be by actual weight of applied crack sealant in pounds.

Measurement of asphalt concrete used for paving and leveling course shall be in accordance with Section 8-04, "Measurement," of these City Standard Specifications. The basis of measurement for asphalt concrete paving shall be as follows.

Square Yard:	Remixing.
	Pavement fabric.

Square Foot:	Preparation of recycled base and hot mix asphalt material.
	Base stabilization.
	Isolated pavement repair.
	Base Repair.
Linear Foot:	Grinding along the gutter lip or conform and removal of grindings. (Each linear foot of grinding shall have a required width and an average depth of cut as shown on the Project Plans at the gutter lip or conform.)
Per Each:	Raising structures to grade.

9-05 Payment

The contract unit price for crack seal shall include full compensation for providing all labor, materials, tools, equipment and incidentals, and for doing all of the work involved in crack sealing, complete and in place, and shall include furnishing, storing, providing traffic control, cleaning cracks, applying crack sealant, etc. and no separate payment shall be allowed therefor.

The contract unit price paid for all hot mix asphalt paving measured items, identified in Section 9-04, "Measurement," of these City Standard Specifications, shall be considered full compensation for completing all Work associated with that item.

Payment of hot mix asphalt used for paving and leveling course shall be in accordance with Section 8-05, "Payment," of these City Standard Specifications.

The contract price paid for pavement fabric shall include full compensation for furnishing and applying pavement fabric and asphalt binder including lapping, complete in place.

The contract price paid for preparation of recycled existing base and asphalt concrete material shall include full compensation for grinding, mixing, grading, and compacting recycled existing base and asphalt concrete material to the depth shown on the Project Plans; hauling and disposal of all excess materials; and protection of all utility covers.

The contract price paid for base stabilization shall include full compensation for supplying, adding, and mixing base stabilizing agent to the mixture of recycled existing base and asphalt concrete material; existing base; and basement material. The contract price paid shall also include full compensation for the application of a curing seal.

No adjustments of the unit price shall be made for any increase or decrease in the quantity of preparation of recycled base and asphalt concrete material and base stabilization required by

the Special Provisions and Project Plans, regardless of the reason for such increase or decrease.

The contract unit price for isolated pavement/base repairs, grinding and milling shall include full compensation for the removal and disposal of existing pavement including pavement fabric, if any; the scarification, grading, and compaction of base materials; and the replacement and compaction of asphalt concrete.

The contract price paid for grinding shall include full compensation for grinding existing asphalt concrete along gutter and conform lines; removal of all loose material; and final cleanup until the street has been resurfaced.

The contract price paid for raising structures to grade shall include full compensation for removal of frame collars, installation of concrete adjustment rings, raising of frame and cover, constructing a concrete collar and replacing surrounding asphalt concrete; removal and replacement of new water valve and monument boxes; protection of raisers from foreign materials; and installation of temporary false bottoms in manholes.

No adjustments of the unit price shall be made for any increase or decrease in the quantity of rubberized chip seal, base repair, HMA leveling course, crack sealing, and grinding required by these Special Provisions and Project Plans regardless of the reason for such increase or decrease. The Provision in Section 4-1.05, "Changes and Extra Work," of the State Standard Specifications shall not apply to these mentioned items.

SECTION 10. BITUMINOUS SEALS

10-01 General

Bituminous seals including fog seal, slurry seals and rubberized chip seal (asphalt rubber binder seal coat) shall conform to the provisions of Section 37, "Bituminous Seals," of the State Standard Specifications and to these City Standard Specifications.

Prior to commencing work, the Contractor shall submit a proposed schedule of work for approval by the Engineer. This schedule shall list the dates on which individual streets are to be closed to traffic for surfacing. Work on each street shall be completed in one working day.

The Contractor shall be responsible for notifying business establishments, each resident, Livermore Amador Valley Transit Authority (LAVTA), Pleasanton Garbage Service, Pleasanton Post Office, Pleasanton Unified School District, and any other agencies identified by the City of Pleasanton 48 hours prior to the commencement of work. The Contractor shall be responsible to re-notify each of the above with regard to changes in schedule should they occur.

Requirements for using City water for bituminous seals projects shall be in accordance with Section 1-09, "Dust Control," of these City Standard Specifications.

10-02 Materials

10-02A FOG Seal Coat

Fog seal coat material shall conform to the provisions of Section 37-2.02B, "Materials," of the State Standard Specifications.

10-02B Slurry Seal

10-02B.1 Latex Emulsified Asphalt

Latex emulsified asphalt shall be a quick traffic, quick cure (QT-QC) type, shall be homogeneous and show no separation after thorough mixing, shall break and set on the aggregate within five (5) minutes, and be ready for cross-traffic within fifteen (15) to thirty (30) minutes. The latex asphalt emulsion shall conform to the following requirements:

<u>Test</u>	<u>Test Method</u>	<u>Requirements</u>
Emulsion:		
Viscosity, SSF, @ 77° Fahrenheit, sec PH	ASTM D244	15 - 100 6.7Max
Distillation Residue %, Minimum		60

Residue From Distillation:

Penetration, 77° Fahrenheit, 100g, 5s	ASTM D5	40 - 80
Softening Point (Ring & Ball), degrees, F	ASTM D36	+130
Ductility, 75° Fahrenheit, 5CM/Min, Min	ASTM D113	25
Torsional recovery	CTM 332	20 Min

10-02B.2 Aggregate

Aggregate used shall either be type II gray aggregate or type II black aggregate in accordance with Section 37-3.02C(2), "Aggregate," of the State Standard Specifications, as specified by the Engineer.

10-02B.2.1 Type II - Gray Aggregate

Aggregate shall consist of sound, durable, crushed stone or crushed gravel, and approved mineral filler. The material shall be free from vegetable matter and other deleterious substances. The percentage composition by weight of the aggregate shall conform to the following grading:

<u>Percentage Passing</u>		
<u>Sieve Sizes</u>	<u>Type II</u>	<u>Stock Pile Tolerance*</u>
3/8"	100	-5%
No. 4	90-100	± 5%
No. 8	65-90	±/- 5%
No. 16	40-70	± 5%
No. 30	25-50	± 5%
No. 200	5-15	± 2%

* The job mix (target) gradation shall be within the gradation band. After target gradation has been submitted, the percentage passing each sieve shall not vary by more than the stockpile tolerance and still remain within the gradation band.

The aggregate shall also conform to the following quality requirement:

<u>Test</u>	<u>Test Method</u>	<u>Requirement</u>
Sand Equivalent	California Method 217, or ASTM D2419	60 Minimum
Durability Index	California Method 229	55 Minimum

A certificate of compliance of all materials shall be furnished to the Engineer. Weight tags shall be furnished to the Engineer.

10-02B.2.2 Type II - Black Aggregate

The same requirements as Section 10-02B.2.1 above and as modified herein. Aggregate shall be 100 percent (100%) crushed with no rounded particles, volcanic in origin, and black in color, as supplied by George Reed, Table Mountain Plant, Sonora, CA, or equal. The use of gray or light-colored aggregate will not be allowed as a substitute for black aggregate.

10-02B.3 Mineral Filler

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

10-02B.4 Water

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

10-02B.5 Polymer Latex

Styrene Butadiene Rubber latex shall be added to the water/soap phase by injection prior to the mill manufacture of the emulsified asphalt by the emulsion producer. The latex shall be BASF NX 1118 or approved equal. The amount of latex shall be between three percent (3%) and four percent (4%) of the asphalt residual content and shall be certified by the emulsion producer on each load of emulsion delivered to the job site. No post or field addition of Polymer Latex will be allowed. Samples shall be provided and shall conform to the following requirements.

<u>Test</u>	<u>Requirement</u>
Total solids, min, %	60
Bound styrene %	24 - 26
PH at 25° Celsius	4.2 - 5.2
Brookfield viscosity RVT	1000 - 4000
Residual Monomer %	0.08 max

10-02 C Rubberized Chip Seal

Rubberized chip seal shall conform to the provisions of Section 37-2.05B, "Asphalt Rubber Binder Seal Coat" of the State Standard Specifications.

10-02 C.1 Asphalt Binder

Asphalt binder shall be PG-10 or PG-16 and must comply to Section 92-1.02B, "Performance Grade Asphalt Binder," of State Standard Specifications.

10-02 C.2 Asphalt Modifier

The asphalt modifier will be resinous, high flash point, aromatic hydrocarbon compound and shall conform to the following requirements:

ASPHALT MODIFIER

Test Parameter	ASTM Designation	Requirement
Viscosity, cSt. At 100 °C	D445	X+/-3*
Flash Point, COC, °F	D92	207 min.
Molecular Analysis:		
Asphaltenes, percent		
By weight	D2007	0.1 max.
Aromatics, percent by		
Weight	D2007	55 min.

The symbol "X" is the viscosity of the asphalt modifier the contractor proposes to furnish. The value "X" which the Contractor proposes shall be between the limits 19 and 36 and shall be submitted in writing to the engineer. Any proposed change requested by the Contractor, in the value "X" shall require a new asphalt-rubber design.

The asphalt modifier shall be proportionately added to the paving asphalt at the production site where the asphalt rubber binder is blended and reacted. Asphalt modifier shall be added at an amount of 2.5 to 6.0 percent by weight of the paving asphalt based on the recommendation of the asphalt rubber binder supplier. The paving asphalt shall be at a temperature of not less than 375 °F. nor more than 440 °F. when the asphalt modifier is added. If the asphalt modifier is combined with the paving asphalt before being blended with the CRM, the combined paving asphalt and asphalt modifier shall be mixed by circulation for a period of not less than 20 minutes. This premixing of asphalt modifier and the paving asphalt will not be required when all ingredients of the asphalt rubber binder are proportioned and mixed simultaneously. Asphalt modifier and paving asphalt shall be measured for proportioning.

10.02C.3 Crumb Rubber Modifier (CRM):

Crumb rubber modifier shall consist of high natural CRM. The high natural CRM shall consist of ground or granulated rubber derived from materials that utilize high natural rubber sources.

Steel fiber separation may be accomplished by any method. Cryogenic separation, if utilized, shall be performed separately from, and prior to grinding or granulating.

All CRM shall be ground or granulated at ambient temperature. Cryogenically produced CRM particles that can pass through the grinder or granulator without being ground or granulated respectively, shall not be used.

CRM shall not contain more than 0.01 percent wire (by weight of CRM) and shall be free of all other contaminants, except for fabric. Fabric shall not exceed 0.05 percent by weight of CRM. The test and method for determining the percent by weight of wire and fabric is available at the Transportation Laboratory, Pavement Consulting Services Branch, Sacramento, California, Telephone (916 227-7300 and will be furnished to interested persons upon request. A certificate of compliance certifying these percentages shall be furnished to the engineer in accordance with Section 6-2.03C, "Certificated of Compliance," of the State Standard Specifications.

The length of any individual particle shall not exceed 3/16 inch.

The CRM shall be sufficiently dry so as to be free flowing and not produce foaming when combined with the blended paving asphalt and asphalt modifier mixture. Calcium carbonate or talc may be added at a maximum of 3 percent by weight of CRM to prevent CRM particles from sticking together. The CRM shall have a specific gravity between 1.1 and 1.2 as determined by California Test 208. High natural CRM shall be delivered to the production site in bags and shall be sampled and tested. CRM material shall conform to the following requirements as determined by ASTM Designation D 297:

HIGH NATURAL CRUMB RUBBER MODIFIER

Test Parameter	Percent	
	Min.	Max.
Acetone Extract	4.0	16.0
Rubber Hydrocarbon	50.0	-
Natural Rubber Content	40.0	48.0

The CRM for asphalt rubber binder shall conform to the gradations specified below when tested in accordance with ASTM Designation C 136 amended as follows:

Split or quarter 100 grams +/- 5 grams from the CRM sample and dry to a constant weight at a temperature of not less than 135°F. nor more than 145°F. and record the dry sample weight. Place the CRM sample and 5.0 grams of talc in a one-pint jar, and then shake it by hand for a

minimum of one minute to mix the CRM and the talc. Continue shaking or open the jar and stir until the particle agglomerates and clumps are broken and the talc is uniformly mixed.

Place on rubber ball on each sieve. Each ball shall have a weight of 8.5 +/- 0.5 grams, have a diameter of 25.5 +/- mm, and shall have a Shore Durometer "A" hardness of 50 +/- 5 per ASTM Designation D 2240. After sieving the combined material for 10 minutes +/- 1 minute, disassemble the sieves. Any material adhering to the bottom of a sieve shall be brushed into the next finer sieve. Weigh and record the weight of the material retained on the No. 8 sieve and leave this material (do not discard) on the scale or balance. Any observed fabric balls shall remain on the scale or balance and shall be placed together on the side of the scale or balance to prevent the fabric balls from being covered or disturbed when placing the material from finer sieves onto the scale or balance. The material retained on the next finer sieve (No. 10 sieve) shall be added to the scale or balance. Weigh and record that weight as the accumulative weight retained on that sieve (No. 10 sieve). Continue weighting and recording the accumulated weights retained on the remaining sieves until the accumulated weight retained in the pan has been determined. Prior to discarding the CRM sample, separately weigh and record the total weight of the fabric balls in the sample.

Determine the weight of material passing the No. 200 sieve (or weight retained in the pan) by subtracting the accumulated weight retained on the No. 200 sieve from the accumulated retained weight in the pan. If the material passing the No. 200 sieve (or weight retained in the pan) has a weight of 5 grams or less, cross out the recorded number for the accumulated weight retained in the pan and copy the number recorded for the accumulated weight retained on the No. 200 sieve and record that number (next to the crossed out number) as the accumulated weight retained in the pan. If the material passing the No. 200 sieve (or weight retained in the pan) has a weight greater than 5 grams, cross out the recorded number for the accumulated weight retained in the pan, subtract 5 grams from that number and record the difference next to the crossed out number. The adjustment to the accumulated weight in the pan is made to account for the 5 grams of the talc added to the sample. For calculation purposes, the adjusted accumulated weight is the same as the adjusted accumulated weight retained in the pan. Determine the percent passing based on the adjusted total sample weight and recorded to the nearest 0.1 percent.

CRM GRADATIONS

<u>Sieve Size</u>	<u>Scrap Tire CRM Percent Passing</u>	<u>High Nature CRM Percent Passing</u>
No. 8	100	100
No. 10	98-100	100
No. 16	45-75	95-100
No. 30	2-20	35-85
No. 50	0-6	10-30
No. 100	0-2	0-4
No. 200	0	0-1

10.02C.4 Asphalt-Rubber-Binder:

Asphalt rubber binder shall consist of a mixture of paving asphalt, asphalt modifier and crumb rubber modifier.

At least two weeks before its intended use, the contractor shall furnish to the engineer 4 one-quart cans filled with the asphalt rubber binder proposed for use on the project. The contractor shall supply to the engineer for approval a binder formulation and samples of all materials to be used in the asphalt binder, at least two weeks before construction is to begin.

The binder formulations shall consist of the following information:

Paving and Asphalt Modifiers

1. Source and grade of paving asphalt.
2. Source and identification (or type) of modifiers used.
3. Percentage of asphalt modifier by weight of paving asphalt.
4. Percentage of the combined blend of paving asphalt and asphalt modifier by total weight of asphalt rubber binder to be used.
5. Laboratory test results for the test parameters shown elsewhere in the special provisions.

Crumb Rubber Modifier (CRM)

1. Source and identification (or type) of scrap tire and high natural CRM.
2. Percentage of scrap tire and high natural CRM by total weight of the asphalt rubber blend.
3. If CRM from more than one source is to be used, the above information will be required for each CRM source uses.
4. Laboratory test results for test parameters shown elsewhere in these special provisions.

Asphalt Rubber Binder

- 1) Laboratory test results of the proposed blend for the test parameters shown elsewhere in these special provisions.
- 2) The minimum reaction time and temperature.

The method and equipment for combining the paving asphalt, asphalt modifier and CRM shall be so designed and accessible that the engineer can readily determine the percentages by weight for each material being incorporated into the mixture.

The proportions of the materials, by total weight of the asphalt rubber binder shall be 79 percent +/- 1 percent combined paving asphalt and asphalt modifier, and 21 percent +/- 1 percent CRM. However, the minimum amount of CRM shall not be less than 20 percent. Lower values that are rounded up shall not be allowed. The CRM shall be combined at the

production site and shall contain 76 percent +/- 2 percent scrap tire CRM and 24 percent +/- 2 percent high natural CRM, by weight.

The paving asphalt and asphalt modifier shall be combined into a blended mixture that is chemically compatible with the crumb rubber modifier to be used. The blended mixture is considered to be chemically compatible when it meets the requirements for asphalt rubber binder (after reacting) found elsewhere in these special provisions.

The blended paving asphalt and asphalt modifier mixture, and the CRM shall be combined and mixed together at the production site in a blender unit to produce a homogenous mixture.

The temperature of the bended paving asphalt and asphalt modifier mixture shall not be less than 375°F. not more than 440°F. when the CRM is added. The combined materials shall be reacted for a minimum of 45 minutes after incorporation of all the CRM at a temperature of not less than 375°F. nor more than 425°F. The temperature shall not be higher than 10°F. below the actual flash point of the asphalt rubber binder.

After reacting, the blended asphalt rubber binder shall conform to the following requirements:

BLENDING ASPHALT RUBBER BINDER

Test Parameter	ASTM Test Method	Requirement	
		Min.	Max.
Cone Penetration @ 77°F., 1/10 mm	D217	25	60
Resilience @ 77°F.	D5329	18	- 50
Field Softening Point °F.	D36	53	88
Viscosity @ 375°F. Centipoise	See Note	1,500	2,500

The reacted asphalt rubber binder shall be maintained at a temperature of not less than 375°F. nor more than 415°F.

If any of the material in a batch of asphalt rubber binder is not used within four hours after the 45-minute reaction period, heating of the material shall be discontinued. Any time the asphalt rubber binder cools below 375°F. and is then reheated, it shall be considered a reheat cycle. The total number of reheat cycles shall not exceed 2. The material shall be uniformly reheated to a temperature of not less than 375°F. nor more than 415°F. prior to use. Additional scrap tire CRM may be added to the reheated binder and reacted for a minimum of 45 minutes. The cumulative amount of additional scrap tire CRM shall not exceed 10 percent of the total binder weight. Reheated asphalt rubber binder shall conform to the requirements for blended asphalt rubber.

10-02C.5 Screenings:

Screenings shall conform to the requirements in these special provisions and Section 37-2.01B "Materials", of the State Standard Specifications.

Stockpiling of screenings after preheating and precoating with paving asphalt will not be permitted.

Canvas or similar covers that completely cover each load of precoated screenings shall be used during hauling to minimize temperature drop of the precoated screening.

If the ambient temperature is below 65°F or the haul time exceed 30 minutes, canvas or similar covers that completely cover each load of precoated screenings shall be used during hauling to minimize temperature drop of the precoated screening.

The screenings grading shall conform to the following requirements prior to precoating with paving asphalt:

SCREENINGS GRADING REQUIREMENT

<u>Sieve Size</u>	<u>3/8" Maximum Percentage Passing</u>
3/4	100
1/2	95-100
3/8	70-85
No. 4	0-15
No. 8	0-5
No. 200	0-1

Screenings shall conform to the following quality requirements immediately prior to preheating:

SCREENINGS QUALITY REQUIREMENT

<u>Test Parameters</u>	<u>California Test</u>	<u>Requirements</u>
Los Angeles Rattler Loss (100 Revolutions)	211	10 max.
Los Angeles Rattler Loss (500 Revolutions)	211	40 max.
Film Stripping	302	25 max.
Cleanness Value	227	80 min.
Durability	229	52 min.

Screenings for asphalt rubber seal coat shall be preheated between 260°F. and 325°F. uniformly coated at a rate of 0.5 to 1 percent by weight of dry aggregate with any of the

asphalts specified in the table “Performance Grade Asphalt Binder” in Section 92, “Asphalts Binders,” of State Standard Specifications. Screening shall be coated at a central mixing plant that has been approved in conformance with the requirements in California Test 109 and the Material Plant Quality Production (MPQP) requirements of the California Department of Transportation. The coating will be determined upon a visual inspection of the first load and thereafter as deemed necessary by the engineer.

10-02C.6 Quality Control Testing

Attention is directed to Section 6, “Control of Materials,” of the State Standard Specifications. The name of an independent testing laboratory that participates in the AASHTO Proficiency Sample Program shall be submitted to the Engineer for approval at least 10 days before beginning rubberized asphalt binder seal coat operations. The independent testing laboratory shall conduct quality control testing on the rubberized asphalt binder for all specifications listed in these Special Provisions, within 5 business days of sampling. The results shall be submitted to the Engineer within 7 days of the receipt of the samples. Within 10 days of beginning the rubberized asphalt binder seal coat operation, the Contractor’s independent testing laboratory shall conduct the Vialit Test Method for aggregate in Chip Seals, French Chip for the retention requirement and submit a signed copy of test results report to the Engineer.

The report will not be considered for acceptability for testing. The Vialit Test Method is available at:

<http://www.dot.ca.gov/hq/esc/ctms/index.html>

Crumb Rubber Modifier (CRM) shall be tested, except for the grading requirement, at least once for every 250 tons with a minimum of once per project. CRM shall be tested for grading every truckload delivered to the project.

Paving asphalt shall be tested at least once for every 200 tons of production with a minimum of once per project.

Asphalt modifier shall be tested at least once for every 25 tons of production with a minimum of once per project.

A copy of the laboratory test results for the test parameters specified in these special provisions for CRM, paving asphalt and asphalt modifier shall be submitted to the engineer with the certificate of compliance for each truckload of individual material delivered to the project.

Certified volume or weight slips shall be delivered to the engineer for all materials supplied.

10-03 Construction

10-03A Fog Seal Coat

The preparation, application, and finishing of fog seal coat surface shall be in accordance with Sections 37-2.02 “Fog Seal Coats” of the State Standard Specifications.

10-03B Slurry Seal

10-03B.1 Mix Design

During the pre-construction meeting, the Contractor shall submit to the Engineer for approval complete laboratory report tests and proposed mix design covering the specific materials to be used on the project. The mix design and laboratory testing shall be performed and dated within 30 days prior to the application of slurry seal. Compatibility of the aggregate, emulsion, mineral, filler, pre-wet water, and other additives shall be verified by the mix design.

The testing and mix design shall be performed by a laboratory capable of performing the applicable International Slurry Seal Association (ISSA) tests. The proposed slurry seal mixture shall conform to the requirements specified when tested in accordance with the following tests:

<u>Test</u>	<u>ISSA Test Method</u>	<u>Requirement</u>
Slurry Seal Consistency, cm	T106	3 max.
Wet Stripping	T114	Pass (90% min)
Compatibility	T115	Pass (a)
Cohesion Test (b), Kg-cm within 1 hour	T139	20 min.
Wet Track Abrasion, g/sq. ft	T100	75 max
Excess Asphalt by LWT Sand Adhesion, g/sq.ft.	T109	50 max

1. Mixing test must pass at the maximum expected air temperature at the project site during application.
2. Using project source aggregate asphalt emulsion and set control agents if used.

The Laboratory report shall be signed by the laboratory that performed the tests and mix design and shall show the results of the tests on individual materials, comparing the test results to those required by the specifications. The mix design shall be performed and dated within 30 days prior to application of slurry seal.

The Engineer shall approve the mix design and all slurry seal materials and methods prior to use. The component materials shall be within the following limits:

<u>Residual Asphalt</u>	7.5% - 13.5%
	Based on dry weight of aggregate.

<u>Mineral Filler</u>	0.5% - 2-0% Based on dry weight of aggregate.
<u>Additive</u>	As needed to control mixing and setting times.
<u>Water</u>	As needed to achieve proper mix consistency.

10-03B.2 Proportioning

Asphalt emulsion shall be added at a rate within the range of 12 percent (12%) to 18 percent (18%) by weight of the dry aggregate. The exact rate will be determined by the Engineer from the approved mix design.

A job mix design mix submitted by the Contractor for approval by the Engineer shall conform to the specification limits and shall be suitable for the traffic, climate conditions, curing conditions, and final use. This will include the recommended application rate of slurry to suit the job conditions.

Latex emulsion mix shall be proportioned by the operation of a single start/stop switch or lever which automatically sequences the introduction of aggregate, latex emulsified asphalt, mineral filler, admixture, and water to the pugmill.

Calibrated sight flowmeters shall be provided to measure both the addition of water liquid admixtures to the pugmill. If necessary for workability, a retarding agent that will not adversely affect the seal may be used.

Water and retarder, if used, shall be added to ensure proper workability and permit uncontrolled traffic on the slurry seal no more than three (3) hours after placement without the occurrence of bleeding, raveling, separation, or other distress within fifteen (15) days after placing the slurry seal.

10-03B.3 Mixing and Spreading Equipment

Slurry vehicles must be certified by City's Water Department at least three (3) days before the project begins.

The latex emulsion mix shall be mixed in a self-propelled mixing machine, equipped with a continuous flow pugmill, capable of accurately delivering and automatically proportioning the aggregate, latex emulsified asphalt, mineral filler, water, and admixtures to a double shafted, multi-blade pugmill mixer capable of minimum speeds of 200 revolutions per minute. Latex emulsion mix retention time in the pugmill shall be less than three (3) seconds. The mixing machine shall have sufficient storage capacity of aggregate, latex emulsified asphalt, mineral filler, and water to maintain an adequate supply to the proportioning controls. A minimum of two operational mixing machines of 12 cubic yard capacity or larger shall be maintained on the project site and operating in the same general vicinity (i.e., not across town).

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

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

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

The slurry mixture shall be uniformly spread by means of a controlled spreader box conforming to the following requirements:

1. The spreader shall be capable of spreading a layer of slurry mixture the full width of the travel lane.
2. The spreader shall have strips of flexible belting or similar material on each side of the spreader box that is in contact with the pavement to prevent loss of slurry from the box.
3. The spreader box shall have baffles, or other suitable devices, to ensure uniform application on elevated sections and shoulder slopes.
4. The spreader box shall be maintained in such a manner as to prevent chatter, wash boarding, or other surface defects that will affect the aesthetic value of the finished mat.
5. The rear flexible strike-off blade shall maintain close contact with the pavement and shall be adjustable to the various crown shapes so as to apply a uniform slurry seal.

Slurry mixture to be spread in areas inaccessible to a controlled spreader box may be spread by other approved methods.

10-03B.4 Placing

Immediately before commencing the slurry seal operation, all utility covers within the slurry seal area shall be protected thoroughly by applying an appropriate cover/protection or by other methods acceptable to the Engineer. These cover/protection(s) shall be removed and the utility covers cleaned of any slurry material by the end of the same workday for each and every roadway.

Through traffic lanes shall be spread in full lane widths only. The contractor shall be responsible to make sure that all longitudinal joints for the slurry sealing work correspond only with the edges of the new proposed through traffic lanes. Longitudinal joints that are common to 2 traffic lanes shall be butt joints with an overlap not to exceed three inches, unless approved otherwise by the Engineer. Ridges or bumps in the finished surface will not be permitted and shall be rejected.

Slurry sealing for multilane roadways shall begin on the inside lane(s), allowing traffic to use the outside lanes for through movements then switching traffic to the inside lane for the final outside lane pull. Left turn movements will be prohibited as needed and appropriate detour signs, "Fresh Oil" signs, No U-turn signs and all necessary lane coning shall be shown on a submitted and reviewed traffic control plan.

Pneumatic tire rolling is required for all roadways. Pneumatic-tired rollers shall be the oscillating type having a width of not less than 4 feet with pneumatic tires of equal size, diameter and having treads satisfactory to the Engineer. Wobble-wheel rollers will not be permitted. The tires shall be spaced so that the gaps between adjacent tires will be covered by the following tires.

The tires shall be inflated to 90 psi, or a lower pressure as designated by the Engineer, and maintained so that the air pressure will not vary more than 5 psi from the designated pressure. Pneumatic-tired rollers shall be constructed so that the total weight of the roller can be varied to produce an operating weight per tire of not less than 2000 pounds. The total operating weight of the roller shall be varied as directed by the Engineer.

Sanding for cross traffic is strictly limited and only allowed upon the approval by the Engineer. Only screened aggregate (no dust) shall be used for cross traffic sanding.

Special pavement sections with decorative pavers, colored concrete and/or concrete band, and bus turnouts exist within the project limits. It is understood that these special pavement/concrete sections are not to be slurry sealed and shall be protected to prevent tracking of slurry sealing material, including and up to the next intersection. The contractor is held fully responsible for ensuring that these special pavement/concrete sections are kept clean and free from traces of slurry sealing materials. Cleaning of any slurry sealing material that is outside the limit of work shall be the full responsibility of the contractor. This is not a measured item of work.

Additional street sweeping shall be scheduled by the contractor at the end of the first and third week, from the completion of each run, and on an as needed basis as directed by the Engineer. The contractor shall also sweep/clean median islands, sidewalks and driveways from aggregates that is generated from the slurry sealing work, to the satisfaction of the Engineer.

Contractor shall provide a 2 quart minimum sample of the emulsion for each tanker delivered. Sample shall be taken at the presence of the project inspector.

Slurry seal shall be placed at the rate between thirteen (13) and eighteen (18) pounds per square yard. The exact rate will be determined by the Engineer based upon the unit weight of the aggregate, the gradation of the aggregate, and the demand of the street surface. The Contractor shall suspend spreading operations prior to 2:30 p.m. each day.

Latex emulsion mix shall not be placed when the atmospheric temperature is below 55° Fahrenheit (55°F) and falling or during unsuitable weather, but may be applied when both the air and pavement temperature is 45° Fahrenheit (45°F) or above and rising.

The surface shall be pre-wetted by fogging with a water mist directly preceding the spreader box as needed for field performance. The rate of application of the fog shall be adjusted during the day to suit temperatures, surface texture, humidity, and the dryness of the pavement with no apparent flowing water from the slurry distributor. The pre-wet fog shall not exceed the allowable pre-wet limit indicated in the approved mix design.

Immediately prior to placing the latex emulsion mix, the surface shall be thoroughly cleaned of all vegetation including but not limited to the weeds/growth between the asphalt concrete joint and the concrete gutter lip, loose materials, dirt, mud, and all other deleterious materials. All utility covers, monument boxes, valve covers and miscellaneous irons shall be neatly covered along the edge and protected in a manner which can be uncovered and cleaned to the satisfaction of the Engineer.

The slurry seal shall be of the desired consistency upon leaving the mixer. A sufficient amount of material shall be carried in all parts of the spreader at all times so that a complete coverage is obtained. No lumping, balling, or unmixed aggregate shall be permitted. No streaks such as those caused by oversized aggregate shall be left in the finished surface.

Driveway aprons and returns shall be done concurrently with the street preparation. The joint between the edge of pavement and the concrete gutter shall be slurry sealed and overlap the lip of the gutter by a minimum of 3/4 inch (3/4") and a maximum of one inch (1"). The Contractor shall complete all uncovering and clean up operations of each street the same day after applying slurry seal on said street.

The latex emulsion mixture shall fill all minor cracks, depressions, or low areas and leave a uniform surface free from ruts, humps, depressions, or irregularities.

Construction joints shall be neat in appearance and shall be tapered or feathered to conform to the existing surfacing. All excess material shall be removed from surfaces upon completion of each run. Additional street sweeping shall be scheduled at the end of first and third week upon the completion of each run.

Sanding for cross traffic is strictly limited and allowed upon the approval by the Engineer. Only screened aggregate (no dust) shall be used for cross traffic sanding.

A minimum of two (s) complete coverages as defined in Section 39-6.03, "Compacting," of the State Standard Specifications with pneumatic tired rollers shall be made on the slurry seal coat within 24 hours after the placement of slurry seal. Pneumatic tired rollers shall conform to the equipment specified in Section 39-5.02, "Compacting Equipment", of the State Standard Specifications.

10-03B.5 Quality Control

Quality Control shall be in accordance with Section 1-13, "Quality Control," of these City Standard Specifications and as follows.

Traffic control for bituminous seal projects shall be in accordance with Section 37-2 "Seal Coats," of the State Standard Specifications and Section 2, "Traffic Control," of these City Standard Specifications.

The Contractor shall provide the Engineer the following materials each day. Each sample shall be clearly labeled as to its contents.

1. One pint of the base asphalt.
2. Two pints of asphalt emulsion
3. Two gallons of slurry seal.
4. Thirty (30) pounds of aggregate.

These samples will be randomly tested by an independent testing laboratory at the City's expense. Any additional testing the Contractor deems necessary shall be done at the Contractor's sole expense.

The residual asphalt content of the slurry seal shall be within the acceptable tolerance of minus point six percent (-0.6%) to plus two percent (+2%) from the Engineer approved mix design, residual asphalt content.

When the test indicates that the residual asphalt content of the slurry mix is below the acceptable tolerance, the entire area shall receive an additional slurry seal at the Contractor's expense.

When the test indicates that the residual asphalt content of slurry mix is above the acceptable tolerance, a deduction of thirty percent (30%) shall be made from the bid amount paid per square feet for that area.

When the test indicates that the percentage of aggregate passing each sieve is outside stockpile tolerance specified, the slurry seal represented by such test shall be removed.

The rate of slurry seal application shall be within acceptable tolerance of \pm two pounds (± 2) per square yard from the Engineer approved application rate while remaining in the range specified in Section 10-03B.4, "Placing," of these City Standard Specifications.

When the test for an area indicates that the aggregate application rate is less than the specified rate of application, the entire area shall receive an additional slurry seal at the Contractor's expense.

At the end of each day's production, the Contractor shall send to the Engineer a report containing the following information:

1. Tons of dry aggregate consumed that day.
2. Tons of asphalt emulsion consumed that day.
3. Surface area covered that day.

This report shall be submitted no later than 10:00 a.m. the following work day.

10-03C Rubberized Chip Seal

10-03C.1 Certificate of Compliance

A certificate of compliance shall be furnished to the engineer in accordance with Section 6-2.03C, "Certificates of Compliance", of the Standard Specifications for each material conforms to the requirements of these special provisions. When requested by the engineer, the contractor shall also submit samples with certificates of compliance. The contractor shall provide the engineer with a Material Safety Data Sheet (MSDS) for each of the constituent components of the asphalt-rubber binder and for the completed mixture of the rubberized asphalt binder.

Certified volume or weight slips shall be delivered to the engineer for all materials supplied.

10-03C.2 Equipment:

The contractor shall utilize the following equipment for asphalt rubber seal coat operations:

1. Self-propelled power brooms capable of cleaning the existing pavement and removing loose screenings without dislodging screenings set in the asphalt rubber binder. Gutter brooms or steel tinned brooms shall not be used. Pneumatic tired rollers conforming to the requirements specified in Section 39-2.01C(2), "Spreading and Compacting Equipment", of the State Standard Specifications except that the rollers shall have an air pressure of 100 pounds per square inch and maintained so that the air pressure will not vary more than +/- 5 psi in each tire. A sufficient number of rollers shall be used so that one complete coverage will be provided in one pass.
2. A self-propelled, computerized screenings spreader, equipped with a screenings hopper in the rear, belt conveyors to carry the screenings to the front of the spreader hopper. The screenings spreader shall be capable of providing a uniform spread rate over the entire width of the traffic lane in one application.
3. An asphalt-heating tank equipped to heat and maintain the blended paving asphalt and asphalt modifier mixture at the necessary temperature before blending with crumb rubber modifier (CRM). This unit shall be equipped with a thermostatic heat control device and a temperature reading device and shall be accurate within 5°F. and shall be of the recording type.

4. A mechanical mixer for the complete, homogeneous blending of paving asphalt, asphalt modifier, and CRM. Paving asphalt and asphalt modifier shall be introduced into the mixer. The blending system shall be capable of varying rate of delivery of paving asphalt and asphalt modifier proportionate with the delivery of CRM. During the proportioning and blending of the liquid ingredients, the temperature of paving asphalt and the asphalt modifier shall not vary more than $\pm 25^{\circ}\text{F}$. The paving asphalt feed, the asphalt modifier feed, and CRM feed shall be equipped with devices by which the rate of feed can be determined during the proportioning operation. The liquid and dry ingredients shall be fed directly into the mixer at a uniform rate. The rate of feed to the mixer shall not exceed that which will permit complete mixing of all the materials. Dead areas in the mixer, in which the material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments. Mixing shall continue until a homogeneous mixture of uniformly distributed and properly blended asphalt rubber binder of unchanging appearance and consistency is produced. The contractor shall provide a safe sampling device capable of delivering a representative sample of completed asphalt rubber binder of sufficient size to permit required tests.
5. An asphalt rubber binder storage tank equipped with a heating system to maintain the proper temperature of the asphalt rubber binder and an internal mixing unit capable of maintaining a homogeneous mixture of blended paving asphalt, asphalt modifier, and CRM.
6. A self propelled truck or trailer mounted distributor, equipped with an internal mixing unit capable of maintaining a homogeneous mixture of blended paving asphalt, asphalt modifier, and CRM. The distributor shall have a pump or pumps capable of spraying asphalt rubber binder with ± 0.05 gallons per square yard of the specified rate. The distributor shall have a fully circulating spray bar capable of applying the asphalt rubber without a streaked or otherwise irregular pattern. The distributor shall be equipped with a tachometer, pressure gages, volume measuring devices, and a thermometer. The distributor shall have a platform on the rear of the vehicle and an observer shall accompany the distributor. The observer shall ride in such a position that all spray nozzles are in full view and readily accessible for unplugging any plugged nozzles, should they occur.
7. Tailgate discharge trucks for hauling screenings shall be equipped with a device to lock on to the hitch at the rear of the screenings spreader. Haul trucks shall be compatible with the screenings spreader so that the dump bed will not push down on the spreader when fully raised or have too short of a bed which results in spilling while dumping into the receiving hopper.

All equipment shall be approved by the engineer prior to use.

10-03C.3 Applying Rubberized Asphalt Binder

Rubberized asphalt binder shall be applied in accordance with the requirements specified for applying asphaltic emulsion in these special provisions and in Section 37-2-.05B (3), "Construction", of the State Standard Specifications.

Rubberized asphalt binder shall be applied where shown on the plans at the rate of 0.55 to 0.70 gallons per yard. The exact rate will be determined by the engineer. The binder shall be applied at a minimum temperature of 325°F.

Rubberized asphalt binder shall be placed upon a clean, dry surface. The pavement surface temperature shall be a minimum of 50°F. where rubberized asphalt binder is to be applied. The atmospheric temperature shall be a minimum of 50°F. and a maximum of 105°F. Rubberized asphalt binder shall not be applied until sufficient screenings are available to immediately cover the binder being applied.

Distributor bar height, distribution speed, and shielding materials shall be utilized to reduce the effects of wind upon spray distribution as directed by the engineer. The engineer shall delay or reschedule work when high gusting or dirty winds prevent or adversely affect binder or screening application operations. All necessary equipment shall be in position and ready to commence operations before starting.

The contractor shall comply with all Federal, State and local environmental laws, rules, regulations, and ordinances including but not limited to air quality requirements.

The binder application shall not spread in excess of that which can be covered with screening within 2 minutes. The crumb rubber asphalt rubber binder shall be applied to the roadway immediately following mixing and reacting and shall be applied at a temperature of not less than 385°F. nor more than 415°F.

When placing rubberized asphalt binder seal coat at intersections, turn pockets, gore points, and other irregular areas, asphalt rubber application shall not be in excess of that which can be covered with screenings within 15 minutes.

When joining edges against areas with screenings, the joint shall be swept clean of excess screenings prior to the adjacent application of rubberized asphalt binder. Transverse joints of this type shall be constructed by placing roofing paper across and over the edge of the previous asphalt rubber seal coat application. Once the spraying has progressed beyond the paper, the paper shall be removed immediately.

The longitudinal joint between adjacent applications of screenings shall coincide with the line between designated traffic lanes. At longitudinal joints with screenings, the edge shall be broomed back and blended to eliminate any difference in elevation. They shall be free from ridges and depressions and have a uniform appearance consistent with the adjacent sealed surface. All defects shall be corrected at the contractor's expense.

Joints between areas of rubberized asphalt binder without screenings shall be made by overlapping rubberized asphalt binder distributions. The excess material shall be properly dispersed by spreading with a squeegee or rake over a larger area of freshly applied rubberized asphalt binder.

The application of rubberized asphalt binder to areas not accessible with the distributor bar on the distributor truck shall be accomplished by using pressurized hand wands or other means approved by the engineer.

Immediately prior to placing rubberized asphalt binder, the surface shall be thoroughly cleaned of all vegetation, loose materials, dirt, mud and all other extraneous materials by use of power sweeper with vacuum. All utilities covers shall be neatly covered along the edge of each individual cover and protected in a manner which can be uncovered and cleaned to the satisfaction of the Engineer.

Existing raised pavement markers and reflectors, when no longer required for traffic lane delineation as directed by the Engineer, shall be removed and disposed of.

All regular and thermoplastic traffic striping, pavement legends and markers shall be scarified prior to placing rubberized asphalt binder. Scarification shall be performed by grinding or sandblasting such that approximately 20% of the underlying pavement is exposed.

10-03C.4 Spreading Screenings:

Screenings for rubberized chip seal shall be spread in accordance with the requirements specified for spreading screenings on asphaltic emulsion in these special provisions and in Section 37-2.05B(5), "Construction", of the State Standard Specifications.

Following the application of the rubberized asphalt binder, screenings shall be placed on all areas receiving rubberized asphalt binder.

Screenings for rubberized chip seal shall be applied at a temperature of not less than 225°F after applying the rubberized asphalt binder.

The contractor shall prevent any vehicle, including construction equipment, from driving on the rubberized asphalt binder prior to application of screenings.

Screenings shall be applied at a rate of 23 to 30 pounds per square yard or at a rate shown on the Project Plans. The exact rate will be determined by the engineer. The completed spread rate shall be within 10 percent of the rate determined by the engineer. The completed surface shall be free of gaps, ridges, depressions, or other irregularities caused by the application of the rubberized asphalt binder.

The screening spreader shall not be more than 50 feet behind the binder distribution truck unless otherwise ordered by the Engineer. Trucks hauling screening shall be kept clear of

the freshly placed screenings until ready to dump screenings in the spreader equipment, except on staggered truck will be allow to follow the binder seal coat operations.

10-03C.5 Finishing:

Rubberized chip seal shall be finished in accordance with the requirements for finishing screenings spread on asphaltic emulsion in these special provisions and in Section 37-2.05B(3) (f), “Rolling and Sweeping”, of the State Standard Specifications. Initial rolling of the rubberized asphalt seal coat shall consist of a minimum of one complete coverage with one or more pneumatic tired rollers and shall begin within 90 seconds after the placement of screenings.

The distance between the rollers and the screenings spreader shall not exceed 200 feet at any time during the screenings spreading operation.

A minimum of three complete coverages with pneumatic tired rollers, after the initial coverage, shall be made on the asphalt rubber seal coat. At the contractor’s option, if approved by the engineer, the final roller coverage may be made with a steel-wheeled roller weighing between 8 to 10 tons. It shall be operated in static mode only.

Sweeping shall be multi-step operation following final rolling of the screenings. Loose screenings shall be removed from the roadway surface and abutting adjacent areas. Loose screenings shall be disposed of at least 150 feet from the nearest waterway and areas shall be provided and identified for this purpose.

Initial sweeping shall be completed before controlled traffic is permitted on the rubberized asphalt seal coat. Removal of excess screening shall be completed before uncontrolled traffic is permitted on the completed rubberized chip seal. Sweeping shall also be done at 48 hours interval on each street until the street is overlayed. Final sweeping shall be done and all loose screenings shall be removed without dislodging the screenings set in the rubberized asphalt binder prior to overlay. Prior to final sweeping all sidewalks, ramps and driveways shall be cleaned by sweeping or other methods to ensure all loose stone is removed.

10-04 Measurement

Fog seal coat and slurry seals shall be measured by the square foot for the actual surface area covered.

Rubberized Chip Seal shall be measured by the square yard of the actual surface area covered.

Pneumatic-tired rolling as required for slurry seal will be measured as lump sum. Street sweeping is not a measured item of work.

10-05 Payment

The contract price for fog seal and slurry seal shall include full compensation for furnishing all labor, material, tools, equipment, incidentals, and for all work involved in slurry sealing, as specified in these Special Provisions and as directed by the Engineer.

The contract price for rubberized chip seal shall include full compensation for completing all of the work involved in the furnishing and placing of rubberized asphalt binder and screenings for seal coats complete in place, including the removal of all traffic striping, pavement markers and legends, protecting existing utility covers, cleaning the surface, and sweeping/removal of excess screening.

No adjustments of the unit price shall be made for any increase or decrease in the quantity required by these Special Provisions and Project Plans, regardless of the reason for such increase or decrease. The Provision in Section 9-1.06B, "Increases of More than 25 Percent" and Section 9-1.06C "Decreases of More Than 25 Percent" of the State Standard Specifications shall not apply.

SECTION 11. TRENCH EXCAVATION AND BACKFILL

11-01 General

Trench excavation and backfill shall consist of all work involving the excavation of pavement, rock, and dirt necessary to prepare a trench bedding to install water, sanitary sewer, storm drain pipelines, and electric, gas, telephone, and cable utilities and the backfilling with required materials and repaving the surface.

Trench backfill includes multiple backfill zones as shown in Detail No. 113, "Trench Backfill for Streets," and Detail No. 114, "Trench Backfill for Undeveloped Areas," of the City Standard Details. The lowest backfill zone surrounding the pipe is referred to in these City Standard Specifications as pipe embedment. The remaining zone is referred to in these City Standard Specifications as the upper trench backfill zone from the top of the pipe embedment zone to bottom of the street base course or to the native cap in the case of undeveloped areas.

11-02 Materials

11-02A Pipe Embedment Material for Water, Sanitary Sewer, and Storm Drain Pipelines

Pipe embedment material for all water, sanitary sewer, and storm drain pipelines shall be "Pleasanton Fine Fill" meeting the following requirements:

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/4"	100
3/8"	85-100
No. 4	55-80
No. 30	5-10
No. 200	2-5

A minimum of one gradation report shall be submitted per day for material delivered to the site or as directed by the Engineer.

11-02B Pipe Embedment Material for Electric, Gas, Telephone, and Cable Utilities

Pipe embedment material for electric, gas, telephone, and cable utilities shall meet the following requirements:

<u>Sieve Size</u>	<u>Percentage Passing</u>
3/8"	100
No. 4	95-100

No. 8	90-100
No. 16	80-100
No. 30	65-100
No. 50	40-70
No. 100	0-10
No. 200	0-5

A minimum of one gradation report shall be submitted per day for material delivered to the site or as directed by the Engineer.

11-02C Upper Trench Backfill Material

Upper trench backfill material for water, sanitary sewer, and storm drain pipelines in existing streets and undeveloped areas shall be class 2 aggregate base as specified in Section 7, "Aggregate Base," of these City Standard Specifications. Upper trench backfill for electric, gas, telephone, and cable utilities in existing streets and undeveloped areas shall be pipe embedment material as specified in Section 11-02B, "Pipe Embedment Material for Electric, Gas, Telephone, and Cable Utilities," of these City Standard Specifications. For the case of sloping trench walls and in undeveloped areas, native material may be used when specifically approved by the Engineer.

11-02D Drain Rock

Drain rock, when required by the Engineer for unusual trench conditions, shall be granular material consisting of clean crushed rock or gravel with 100 percent (100%) passing a 3/4-inch (3/4") sieve and conforming to Section 68-2.02F, "Permeable Material," of the State Standard Specifications, Class 1, Type A. Drain rock shall be hard and durable and shall not flake or disintegrate in water.

11-03 Construction

11-03A Excavation

Unless otherwise indicated, excavation shall be by open cut method except where jack and bore is indicated on the Project Plans.

Coupling holes and depressions for bells or couplings shall be excavated after the trench bottom has been graded and pipe embedment material placed and shall be only of such length, depth, and width as required for properly making the particular type of joint. Over-excavations shall be backfilled with the same material as the pipe embedment.

The trench bottom shall be of even grade such that it will provide uniform bearing and support for each section of pipe and shall be free of clods, rocks, and excess spoil material.

11-03A.1 Shoring and Safety

The Contractor shall furnish, put in place, and maintain appropriate ground support or shoring, both in open cut and tunneling, as may be required to support the sides of the excavation and prevent any movements which could in any way injure persons or structure.

All excavations shall be supported in the manner to comply with the Division of Industrial Safety (OSHA) standards. The Contractor shall be responsible for preparing an excavation safety plan as specified in Section 7-1.02K(6)(b), "Excavation Safety," of the State Standard Specifications.

11-03A.2 Trench Length, Width, and Depth

The maximum length of open trench, including trenching, pipe laying, and backfilling, shall not exceed 200 feet (200').

Trenches shall be of sufficient width to provide free working space on either side of the pipe. The minimum width of vertical trench for water, sanitary sewer, and storm drain pipe shall in no event be less than the outside diameter of the pipe plus 12 inches (+12"). The maximum width of vertical trench for water, sanitary sewer, and storm drain pipe shall be the outside diameter of the pipe plus two feet (+2'). If shoring or sheeting is used, the above widths shall apply to the inside faces of the shoring or sheeting. Upon approval of the Engineer, the Contractor may excavate the trench with sloping walls starting at a point 18 inches (18") above the outside top of the pipe. Whenever the maximum allowable trench width is exceeded, the Contractor shall, at the Contractor's expense, embed or cradle the pipe in concrete in a manner satisfactory to the Engineer.

The trench shall be excavated to a depth to allow a minimum cover of 42 inches (42") over storm drain lines and water mains and 60 inches (60") over sanitary sewer lines relative to finished grade. The minimum cover for all lines relative to subgrade shall be 18 inches (18"). A pipe cover less than minimum shall only be allowed if approved by the Engineer. The trench bottom shall be on a uniform grade and within 0.03 feet (0.03') of the specified grade for gravity lines at a grade of two percent (2%) or less and within 0.1 foot (0.1') for all pressure lines and gravity lines or at a grade steeper than two percent (2%). When unstable material is encountered at the specified depth, the trench shall be over-excavated an additional one foot (1') and backfilled with pipe embedment material or drain rock as determined by the Engineer. Unstable material shall be soil containing excessive amounts of water or organic matter in the opinion of the Engineer. When rock is encountered, the Contractor shall over-excavate an additional six inches (6") and backfill with pipe embedment material.

11-03A.3 Removal of Existing Pavement

Prior to trenching, the Contractor shall remove existing pavement as follows:

1. Portland Cement Concrete Pavement: The pavement to be removed prior to trenching shall be cut with a concrete saw along the limits of the trench to a depth of at least four inches (4") or fifty percent (50%) of the existing thickness, whichever is greater; and then shall be broken up and removed from the job site. If a construction or control joint is located three feet (3') or less from the limit of the trench, the Contractor shall remove all pavement between the limit of the trench and the joint.
2. Asphalt Concrete Pavement: The pavement to be removed prior to trenching shall be cut six inches (6") away from and parallel to the limits of the trench with equipment which produces a straight line cut.
3. Damage to Pavement Outside of Trench Limits: If damage such as spalling or cracking occurs to pavement outside the trench limits as a result of the Contractor's operations, the Contractor shall remove the damaged pavement as directed and replace it as a part of its final paving operations.

11-03A.4 Dewatering

The trench shall be maintained in a dry condition until backfilling is completed. The Contractor shall furnish, install, and operate such equipment as may be necessary to maintain the trench in a dry condition. Water shall be disposed of in such a manner as not to cause damage to property or present a danger to traffic. The Contractor shall comply with the applicable provisions of Section 1-25, "Stormwater Management and Discharge Control," of these City Standard Specifications when conducting dewatering operations.

11-03B Backfill

11-03B.1 Placement and Compaction of Pipe Embedment

Before placement of embedment material, the trench shall be cleared of all timber and debris such as wood blocks, grade stakes, paper, rope, rags, broken pavement, and other such materials. Embedment material shall be placed and compacted in the trench to the full width, as shown in the City Standard Details. Embedment material above the pipe bottom shall only be placed after the pipe has been properly laid, inspected, and found satisfactory. Embedment material shall be hand-shoveled and uniformly distributed on both sides of the pipe. Embedment material shall not be dropped directly upon the pipe in such a manner or above a certain height which would cause damage to the pipe. Sufficient material shall be hand-shoveled to securely anchor the pipe so that no change in alignment or grade will occur when the next section of pipe is installed.

The Contractor shall obtain a relative compaction of 90 percent (90%) in the pipe embedment zone. Jetting or flooding shall not be allowed. The compaction device may either be manually, mechanically, or pneumatically driven; however, the compaction device used shall in no manner cause displacement, instability, or damage to the pipe. In the event that damage occurs to the pipe, the Contractor shall be responsible for total repair.

Compaction lifts within the embedment zone shall be of appropriate depth to achieve required compaction and protect the pipe. All compaction lifts shall be compacted as required before the next lift is deposited.

The embedment material shall be uniformly compacted throughout the entire pipe embedment zone so no voids exist. If testing performed by the City indicates that the required compaction has not been achieved, the trench shall be re-compacted and retested. Re-compaction and retesting shall be paid for by the Contractor.

During the process of backfilling embedment material, any timbering, sheeting, shoring, and sheet piling used to shore the excavation shall be carefully removed by the Contractor in such a manner as will result in a minimum of caving, lateral movement, or flowing of the soil.

11-03B.2 Placement and Compaction of Upper Trench Backfill

The contractor shall obtain a relative compaction of 95 percent (95%) in the upper trench backfill zone. The maximum depth of each lift shall be twelve-inches (12") prior to compaction. No material shall be deposited in depths greater than that which will allow the minimum percent relative compaction to be achieved in any portion of that lift. No subsequent lifts shall be placed until the previously compacted lift has been approved. No mechanical tamping will be allowed over the pipe without sufficient cover to avoid damage.

11-03C Pavement Replacement

In existing streets, trenches shall be paved with temporary or permanent paving on the same working day after backfilling has been completed. Temporary paving shall be maintained in first class condition until permanent paving is placed. Material for temporary paving shall consist of not less than 1-1/2 inches (1-1/2") of premixed bituminous treated aggregate (cut-back). Permanent paving shall match the adjacent existing pavement except that in no event shall the section be less than three inches (3") of asphalt concrete and eight inches (8") of aggregate base. Prior to placing permanent paving, the area shall be thoroughly cleaned, the opening shaped, and the sides trimmed vertically. The subbase and base courses shall be thoroughly compacted, and the base and edges shall be primed with an asphaltic emulsion prior to placing the asphalt surface. Permanent paving shall be completed within fourteen (14) calendar days unless approved by City Engineer.

Under certain conditions for existing streets, including the absence of a certified soils engineer, the Engineer shall require use of cement treated base. If required by the Engineer, trenches in major thoroughfares shall have a minimum 15 inches (15") of cement-treated base placed directly beneath a minimum of three inches (3") of asphalt concrete. If required

by the Engineer, minor streets shall have a minimum of ten inches (10") of cement-treated base beneath a minimum of three inches (3") of asphalt concrete. Cement-treated base shall be Class 1 as defined in Section 27-1.02, "Materials," of the State Standard Specifications and shall contain one sack of Type II Modified Portland cement per ton of aggregate used. Cement-treated base may be road-mixed or plant-mixed at the contractor's option as defined in Section 27-1.03C(3), "Mixing," of the State Standard Specifications. Regardless of the method the Contractor elects to use, all requirements of Section 27 will apply. Alternate mixing methods must be approved by the Engineer.

11-03D Horizontal Directional Drilling (Bore and Jack)

When approved by the Engineer, conduit may be placed under existing pavement using the Horizontal Directional Drilling (Directional Bore) method. Pavement shall not be disturbed without permission from the Engineer. Adherence to the specifications contained herein, or the Engineer's approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

In the event obstructions are encountered, small potholes may be cut in the pavement to locate or remove obstructions, upon approval of the Engineer. All potholes shall be repaired per these specifications. Boring pits shall be kept two feet (2') clear of the edge of any type of pavement wherever possible. In addition, boring pits shall be kept two feet (2') clear of any pedestrian or bicycle facilities. Unless directed by the Engineer, pedestrian and bicycle facilities shall remain open at all times. At the end of each work day, all boring pits shall be covered and work areas properly coned off to warn and prohibit potential pedestrian and/or vehicular traffic to the satisfaction of the Engineer.

Excessive use of water, such that pavement might be undermined or subgrade softened, is not permitted.

Conduit to be placed as part of the completed work shall not be used for drilling or jacking. Type 2 and Type 3 conduit may be installed under existing pavement if a hole larger than the conduit is pre-drilled and the conduit installed by hand.

Conduit to be placed beneath railroad tracks shall comply with the following: The conduit shall be either Type 1 or 2, 1-1/2 inch-(1-1/2") minimum diameter and shall be placed to a minimum depth of three feet (3') below bottom of tie. The near side of each conduit jacking pit shall be constructed not less than 13 feet (13') from the centerline of track. When the jacking pit is to be left overnight, the pit shall be covered with substantial planking.

Prior to beginning work, the Contractor must submit to the Engineer a general work plan outlining the procedure and schedule to be used to execute the project. The Plan shall document the thoughtful planning required to successfully complete the project.

The Contractor shall submit specifications on directional boring equipment to be used to ensure that the equipment will be adequate to complete the project.

Specifications on material to be used shall be submitted to Engineer. Material shall include the pipe, fittings, and any other item which is to be an installed component of the project.

Documentation of training and relevant experience of personnel shall be submitted prior to any work taking place.

The Engineer must be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made. The Engineer's approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.

All personnel shall be fully trained in their respective duties as part of the directional boring crew and in safety. Training shall be provided specific to the project if any potential hazards may be encountered which have not already been included in the personnel's training.

Upon request from the Engineer, the Contractor shall photograph or video tape the entire work area, including entry and exit points, prior to the beginning of work and after work is completed.

The work site, as indicated on the drawings, within the right-of-way, shall be graded or filled, if needed, to provide a level working area. No alterations beyond what is required for operations are to be made. The Contractor shall confine all activities to designated work areas.

The entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If the Contractor is using a magnetic guidance system, the drill path shall be surveyed for any surface geo-magnetic variations or anomalies.

The Contractor shall place silt fence between all boring operations and any drainage, wetland, waterway, or other area designated for such protection by contract documents and State, Federal and local regulations. Additional environmental protection necessary to contain any hydraulic or boring fluid spills shall be put in place, including berms, liners, turbidity curtains, and other measures. The Contractor shall adhere to all applicable environmental regulations. Fuel or oil may not be stored in bulk containers within 200 feet (200') of any water-body or wetland.

The Contractor shall notify all companies with underground utilities in the work area using the Underground Service Alert (USA) hotline at (800) 227-2600 to obtain utility locations. Once utilities have been located, the Contractor shall physically identify the exact location of the utilities by potholing to determine the actual location and path of any underground utilities which might be within five feet (5') of the bore path. The Contractor shall not commence boring operations until the location of all underground utilities within the work area have been verified.

The Contractor shall adhere to all applicable State, Federal and local safety regulations, and all operations shall be conducted in a safe manner. Safety meetings shall be conducted at least weekly with a written record of attendance and topic submitted to the Engineer.

Pipe shall be connected together in one length prior to pull-back operations, if space permits. Steel pipe welds will be X-rayed prior to being placed in bore hole. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.

The pilot hole shall be drilled on the bore path with no deviations greater than five percent (5%) of depth over a length of 100 feet (100'). In the event that the pilot hole does deviate from the bore path more than five percent (5%) of depth in 100 feet (100'), the Contractor shall notify the Engineer immediately. The Engineer may require the Contractor to pull-back and re-drill from the location along the bore path before the deviation.

In the event that a boring fluid fracture, inadvertent returns, or returns loss occurs during pilot hole boring operations, the Contractor shall cease boring, wait at least 30 minutes, then inject a quantity of boring fluid with viscosity exceeding 120 seconds as measured by a Marsh Funnel (quart) and wait another 30 minutes. If mud fracture or returns loss continues, the Contractor will cease operations immediately and notify the Engineer. The Engineer and the Contractor will discuss additional options and work will then proceed accordingly.

Upon successful completion of the pilot hole, the Contractor shall ream bore the hole to a minimum of 25 percent (25%) greater than the outside diameter of the pipe using the appropriate tools. The Contractor will not attempt to ream at one time more than the boring equipment and mud system are designed to safely handle.

After successfully reaming the bore hole to the required diameter, the Contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel. Once pull-back operations have commenced, operations must continue without interruption until the pipe is completely pulled into the bore hole. During pull-back operations, the Contractor shall not apply more than the maximum, safe, pipe pull pressure at any time.

In the event that the pipe becomes stuck, the Contractor shall cease pulling operations to allow any potential hydro-lock to subside and then shall commence pulling operations. If the pipe remains stuck, the Contractor shall notify the Engineer. The Engineer and the Contractor will discuss options and then work will proceed accordingly.

If required by the Engineer, the Contractor shall hydro-test the pipe using potable water for a period of two (2) hours at a pressure of 150 psi. A calibrated pressure recorder shall be used to record the pressure during the test period. This record shall be presented to Engineer. After successful completion of hydro-test, the pipe shall be pigged dry.

Following boring operations, the Contractor shall demobilize the equipment and restore the site to its original condition. All excavations shall be backfilled and compacted to 95 percent (95%) of original density. Landscaping shall be restored to its original condition.

The Contractor shall maintain a daily project log of boring operations and a guidance system log with a copy given to the Engineer at the completion of the project. As-built drawings shall be certified as to accuracy by the Contractor and submitted to the Engineer.

11-03E Plating of Trenches

In no case shall the plating of trenches overnight be greater than 40 feet (40') in length, unless prior written approval is obtained from the Engineer. Plating shall be of a non-skid surface and be secured in such a manner to eliminate plate movement; this may include welding or pinning of the plate(s). Cutback shall be placed in such a manner to provide a smooth transition for vehicles and to reduce noise. Plating that is left in place for longer than fourteen (14) calendar days shall require key cutting and set flush with pavement.

11-04 Measurement

Trench excavation and backfill is not a measured quantity.

11-05 Payment

Full compensation for trench excavation and backfill shall be included within the unit price of pipe; service or lateral installed; and shall include: removal of existing surfacing; excavation and hauling; disposing or storing of material; sheeting; shoring; dewatering; placing and compacting of pipe embedment and trench backfill; and installation of new street surface pavement on existing streets. Where cement treated base is required, payment shall be by change order negotiated between the Engineer and Contractor.

SECTION 12. STORM DRAIN

12-01 General

This section covers all storm drain related facilities including pipe, concrete structures, and appurtenances. All storm drain pipe shall be reinforced concrete unless otherwise approved by the Engineer.

12-02 Materials

12-02A Reinforced Concrete Pipe

Reinforced concrete pipe materials shall conform to the provisions of Section 65-2.01D(3), "Circular Reinforced Concrete Pipe, Described or Chosen by Class," of the State Standard Specifications; the specifications of AASHTO Designation, M 170; or ASTM Designation, C76; and these City Standard Specifications. All reinforced pipe shall be Class III, unless otherwise shown on the Project Plans.

Reinforced concrete pipe joints shall be bell and spigot having "O" ring rubber gaskets retained in a groove on the spigot end in accordance with Section 65-2.02F, "Joints," of the State Standard Specifications.

Pipe shall be marked in accordance with AASHTO M170. All pipes shall be rejected if there is indication of poor quality control or improper handling of product. Pipe rejection criteria shall be in accordance with ASTM C76.

12-02B Not Included

12-02C Subsurface Drains

Subsurface drain piping shall be perforated smooth-wall SDR 35 polyvinyl chloride plastic pipe in accordance with Section 68-2.02D, "Perforated Plastic Pipe," of the State Standard Specifications, AASHTO M278, and ASTM F758. Material for backfilling subsurface drain trenches shall be Class 2 permeable, in accordance with Section 68-2.02F, "Permeable Material," of the State Standard Specifications. Filter fabric for subsurface drains shall be in accordance with Section 68-2.02G, "Filter Fabric," of the State Standard Specifications. Subsurface drains shall terminate flush with the face of the sidewalls of the structure or vaults.

12-02D Curb Through Drains

Curb through drains shall be three-inch (3") I.D. schedule 40 PVC and shall terminate flush with the curb face and only installed upon City Engineer approval. Down spout drains are to be directed to vegetated areas.

12-02E Concrete Structures

Concrete structures including storm drain manholes, junction boxes, headwalls, inlets, and outfalls shall conform to the City Standard Details, the applicable provisions of Section 51, "Concrete Structures," of the State Standard Specifications and the modifications and additions of these City Standard Specifications.

12-02E.1 Cast-In-Place Concrete Structures

All concrete structures shall be constructed of minor concrete with 3/4 inch (3/4") maximum aggregate in accordance with Section 90-2, "Minor Concrete," of the State Standard Specifications. Admixtures may be used only when approved by the Engineer. All manhole bases and inlets shall be constructed of cast-in place concrete.

12-02E.2 Precast Concrete Structures

All manhole barrel, tapered cones, and adjustment rings shall be concentric precast reinforced concrete sections conforming to ASTM C 478 and the size, shape, and details shown on the City Standard Details. Eccentric rings shall only be used upon approval of the Engineer. Precast manhole bases and catch basins shall not be allowed within the public right-of-way.

12-02E.3 Mortar

Mortar shall conform to the applicable provisions of Section 65-2.02F, "Joints," of the State Standard Specifications.

12-02E.4 Precast Joint Filler

Precast joint filler shall be Ramneck with primer or approved equal.

12-02E.5 Reinforcement

Reinforcement materials shall conform to the applicable provisions of Section 52-1.02, "Materials," of the State Standard Specifications with the following modifications:

1. Reinforcing steel shall be intermediate grade Billet-Steel Bars only.
2. All bends in reinforcing steel shall be cold bends.
3. Where concrete is deposited directly against earth the minimum clear distance between the reinforcing steel and the earth shall be two (2) inches.

12-02E.6 Manhole Frames and Covers

Manhole frames and covers shall be gray iron castings conforming to the requirements of ASTM Designation A 48, Class 30B and accurately to the form and dimensions shown in the City Standard Details. The surface of the casting shall be reasonably smooth, free from defects. Frames and covers shall be non-rocking and shall be the heavy duty traffic type designed for HS-20 traffic loading. All castings shall be thoroughly cleaned and subject to a hammer inspection after which they shall be twice dipped with asphalt or coal tar coating applied at a temperature of not less than 290° Fahrenheit or more than 310° Fahrenheit. Frame and cover shall match to an exact fit. The cover shall be clearly embossed with the label "Storm-drain" on the manhole cover.

12-02E.7 Inlet Frames and Grates

Inlet frames and grates shall be fabricated of structural steel conforming to the requirements of ASTM Designation, A36, and accurately to the form and dimensions shown in the City Standard Details. Frame and grate shall be of the same manufacturer as the pre-cast inlet and shall be hot dipped galvanized after fabrication. Frames and grates shall be assembled and made to fit before delivery to the job site. After erection all abraded surfaces shall be cleaned free of rust and oil and painted with two (2) applications of un-thinned zinc-rich primer (organic vehicle type) conforming to section 91 "Paint," of the State Standard Specifications. The grate and frame details are shown in Detail Nos. 201A through 201E, "Type I Storm Drainage Curb Inlet," of the City Standard Details. All grates shall satisfy the requirements of the Bicycle Proof Grate Details contained in the State Standard Plans.

12-03 Construction

12-03A Reinforced Concrete Pipe

Trench excavation and backfill shall be in accordance with Section 11 of these City Standard Specifications.

Reinforced concrete pipe shall be laid and joined in conformance with Section 65-2.03C, "Laying Pipe," of the State Standard Specifications. Installation of reinforced concrete pipe in prepared trenches shall start at the lowest point with the spigot ends pointing in the direction of flow. Bell holes shall be excavated at each joint to provide full length barrel support of the pipe and to prevent point loading at the bells.

The rubber gasket joint shall be made by properly lubricating the rubber gasket with a suitable vegetable compound soap before being placed in the groove at the spigot end. The gasket shall be stretched over the spigot end of the pipe and seated in the groove with care taken to equalize the stress in the gasket around the circumference of the joint. The gasket shall not be twisted, rolled, cut, crimped, or forced out of position during the closure of the joint. A feeler gauge shall be used to check the position of the rubber gasket after the joint has been assembled.

12-03B Cast-In-Place Concrete Pipe

Upon approval by City Engineer

12-03C Subsurface Drains

Installation of perforated plastic pipe, permeable material and filter fabric shall be in accordance with Section 68-2, "Underdrains," of the State Standard Specifications. Subsurface drains shall terminate flush with the face of the structure or vault.

12-03D Manholes

Manholes shall be located as shown on the Project Plans and constructed in accordance with the requirements of the City Standard Details.

The concrete for the manhole base shall be placed by a continuous pour. It shall be poured only on dry, firm, undisturbed earth. The concrete shall be consolidated manually or mechanically so as to eliminate all voids and secure a dense watertight mass. An approved form ring shall be on the job site so that a level keyed slot may be formed in the fresh concrete. The finish work of all concrete and mortar is to be absent of any voids.

All precast manhole sections shall be set plumb on joints using Ramneck with primer or an approved equal. Excess filler shall be trimmed away from all joints.

After the manhole frame is set to grade a concrete collar shall be poured around the manhole as shown in the City Standard Details. All manholes shall be raised to grade after the street paving is complete. All voids between precast adjustment rings and shims shall be filled with mortar. The distance between the final or highest precast adjustment ring and the manhole frame where shims are used shall not exceed three inches (3"). The area shall be filled with mortar and troweled to a smooth finish. There shall not be any space between the manhole cone sections and precast adjustment rings or space between stacked precast adjustment rings. The entire manhole riser area shall be coated with mortar and troweled to a smooth finish. The distance between the riser rings shall not exceed three inches (3"). The cumulative height of the precast adjustment rings and frame shall not exceed 18 inches (18").

12-03E Inlets

Inlets within the City's right-of-way shall be located as shown on the Project Plans and constructed according to the requirements of the City Standard Details. Inlets shall be Type I. Type II shall only be allowed if approved by the Engineer. All inlets shall have the wording "NO DUMPING! DRAINS TO BAY" installed as a thermoplastic legend on the curb above the inlet as according to the City Standard Details.

12-03F Outfalls

Outfalls shall be constructed in accordance with the Standard Details of Zone 7 - Alameda County Flood Control and Water Conservation District. Rip rap used at outfalls shall be natural rock approved by the Engineer. Product data submittal for natural rock shall be in accordance with Section 1-14, "Shop Drawings and Product Data Submittal," of these City Standard Specifications.

12-03G Lug Connections

Lug connections shall not be allowed.

12-03H Television Inspection of New Storm Drains

The Contractor shall arrange with the Engineer for television inspection by the City prior to paving in accordance with the following procedures. The Contractor shall not be charged for the initial television inspection. Work rejected by the Engineer shall be corrected by the Contractor to the satisfaction of the Engineer and re-inspected by the City. The Contractor will be charged for all television inspections after the initial television inspection in accordance with the City's latest fee schedule. Storm drain pipe segments to be inspected shall be selected by the Engineer. Twenty-five percent (25%) of all new storm drain work shall be inspected. If the television inspection shows that acceptable workmanship and construction standards have been maintained, then the inspection will be concluded at 25 percent (25%). If the television inspection shows problems in the installation, the Engineer will require more or all of the storm drain system to be inspected at the Contractor's sole expense.

Television inspection shall not be performed until all of the following conditions are met:

1. All storm drain pipelines have been installed, backfilled and compacted.
2. All storm drain structures are in place and pipelines are accessible from these structures.
3. All other underground facilities, utility piping and conduits have been installed.
4. Final street grading has been completed and 80 percent (80%) of aggregate base has been installed.
5. Pipelines to be inspected have been cleaned and flushed.

After the above work is complete, the Contractor shall request the Engineer to have the City establish a date for television inspection. A minimum of 48 hours advanced notice is required.

The Contractor will be notified by the Engineer of the scheduled date of the television inspection.

1. If the job site will not be ready or accessible for the television inspection on the scheduled date, the Contractor shall notify the City of the necessary cancellation at least twenty-four (24) hours in advance of the scheduled inspection.
 - If the City's television crew arrives at the job site and the work is not ready or accessible, the Contractor will be billed a cancellation fee as accordance with the City's latest fee schedule prior to the date of rescheduled television inspection.
 - The Contractor shall reschedule the inspection as outlined above.
2. The work will be initially televised by the City.
 - If no deficiencies are observed, the work will be considered satisfactory.
 - If deficiencies are observed, videotape will be made and defects serious enough to require correction will be determined by the City.
3. The Engineer shall notify the Contractor of any deficiencies revealed by the television inspection that will require repair. If corrective work is indicated and viewing of the videotapes is desired, the Contractor shall be contacted to set a time for a viewing with the Engineer.
4. The Contractor shall submit a plan for correcting defects to the Engineer. The plan shall be approved by the Engineer prior to starting corrective work. The City reserves the right to require retesting as defined in Section 13-03I, "Testing," of these City Standard Specifications following completion of any repair.
5. Those portions of the pipeline system that have been corrected shall be re-televised by the City at a cost to the Contractor in accordance with the City's latest fee schedule.
6. The procedure outlined in Conditions 1 through 5 above will be repeated until all deficiencies observed by television inspection have been corrected to the complete satisfaction of the City.
7. All storm stubs will be televised.
8. The following observations from television inspections will be considered defects in the construction of storm drain and will require correction prior to paving:

Television inspection of new work and the correction of observed defects will not relieve the Contractor of responsibility for the one-year guarantee period. The City may televise new work at any time during the one year guarantee period. Contractor shall repair any defective new work discovered during the one year guarantee period within five (5) working days from notice. Repair work determined by the City as emergency in nature shall be performed within 48 hours of notification.

- Any storm drain pipeline that has low spots more than that shown in the table below shall be removed and laid to the required grade:

• PIPE DIAMETER	• MINIMUM DEVIATION OF PIPE GRADE / 4 FEET OF RUN OR GREATER • (DEPTH OF STANDING WATER)
• 12"	• 2"
• 15"	• 2.4"
• 18"	• 2.8"
• 21"	• 3.7"
• 24"	• 3.8"
• 27" OR GREATER	• 4" MAXIMUM

- No pipe offsets shall be accepted; the pipe shall be removed and replaced.
- Any pipe that is not round and is showing diameter distortion shall be replaced.

12-04 Measurement

Storm drain pipe shall be measured on a horizontal linear foot basis for the various strengths and sizes along the centerline of the pipe less the distance between the ends of the pipe in manholes and inlets through which the pipe does not continuously pass. Subsurface drains and curb through drains shall be measured on a linear foot basis. Concrete storm drain structures, including manholes and inlets, shall be measured by the number of items. Connection of new pipe to existing structures shall not be measured.

12-05 Payment

The contract price for storm drain facilities including pipe, pipe appurtenances, and structures shall include full compensation for all materials; and labor including excavation, installation, backfill, compaction, and resurfacing. The contract price for storm drain pipe shall include full compensation for connections to storm drain structures. The contract price for inlets shall include the material cost and installation of thermoplastic legends.

SECTION 13. SANITARY SEWER

13-01 General

This section covers requirements for materials and methods of installation for sanitary sewer mains (up to and including 15 inches (15") in diameter), laterals, manholes, and appurtenances within the City's sanitary sewer system. All sanitary sewer system improvements shown on Project Plans and City Standard Details shall conform to the following specifications.

13-02 Materials

Approved pipe materials for City sanitary sewer mains and laterals shall be polyvinyl chloride (PVC), epoxy-lined ductile iron pipe (DIP), and vitrified clay pipe (VCP). Asbestos cement pipe (ACP) shall not be permitted. Unless a pipe material is specifically referenced in the bid form or on the construction plans, the following criteria for pipe material selection shall apply:

1. Sanitary sewer mains installed with less than 60 inches (60") of cover relative to finished grade shall be epoxy-lined ductile iron pipe.
2. Sanitary sewer mains installed with equal to or greater than 60 inches (60") but less than 20 feet (20') of cover shall be PVC, epoxy-lined DIP or VCP.
3. Sanitary sewer mains installed with equal to or greater than 20 feet (20') of cover shall require the Engineer to approve the pipe material selection.
4. The minimum cover for all lines relative to subgrade shall be 18 inches (18").
5. PVC gravity lines shall be ASTM D3034 SDR 26 (see table in Section). PVC force mains shall be AWWA C-900.
6. For sanitary sewer mains within 12 inches (12") above other pipeline utilities, pipe main material shall be either AWWA C-900 or epoxy-lined DIP as shown on Detail No. 403, "New Pipe Installation Under Existing Pipe," or Detail No. 404, "Sanitary Sewer and Water Main Separation," of the City Standard Details.

Material requirements of manholes and other appurtenances are included in this section.

13-02A PVC Pipe and Fittings

PVC pipe and fittings for gravity sewer lines of diameters from four inches (4") up to and including 15 inches (15") shall conform to the requirements of ASTM D3034, Cell Classification 12454-B or 12454-C, with a minimum thickness of SDR 26 and minimum pipe stiffness of 46 psi, according to ASTM Test D2412. Material for PVC pipe shall conform to the requirements of ASTM D1784.

PVC pipe for force mains shall conform to the requirements specified in AWWA C-900 and the material requirements specified in Section 14-02A, "Polyvinyl Chloride Pipe," of these City Standard Specifications.

13-02A.1 Joints

Joints for PVC pipe and fittings shall be bell and spigot type and conform to the requirements of ASTM D3212 with integral bell push-on type elastomeric gasket joints. Gaskets shall be factory installed and meet the requirements of ASTM F477.

13-02B Epoxy-lined Ductile Iron Pipe and Fittings

Ductile iron pipe and fittings shall conform to the requirements of ANSI Standards A21.51 (AWWA C151) and shall be epoxy-lined. All pipe shall have the minimum pressure rating as indicated below, or higher ratings as indicated in the contract documents:

Pipe Sizes Inches	Pressure Class (psi)
4 - 12	350
14 - 20	250
24	200
30 - 64	150

A higher thickness class may be required to meet certain design conditions, as determined by the Engineer and as shown on the Project Plans.

The exterior of DIP and fittings shall be coated with a bituminous coating one (1) mil thick in accordance with ANSI A21.51(AWWA C151).

Cement-lined ductile iron pipe shall not be used for gravity sanitary sewer use.

13-02C Vitrified Clay Pipe and Fittings

Vitrified clay pipe and fittings shall be extra strength, unglazed and conform to the requirements of ASTM C700 except for the minimum test loads which shall conform to the requirements listed in the "Standard Specifications for Public Works Construction." Crushing strength shall be determined by the three-edge bearing method designated in ASTM C301. Both pipe and fittings shall be supplied by the same manufacturer. Each section of pipe shall be clearly stamped with either the words "Extra Strength" or the symbol "ES" designating the strength class.

13-02C.1 Joints

Joints for vitrified clay pipe and fittings shall be bell and spigot type with compression gaskets conforming to the requirements of ASTM C425. Preformed rubber gaskets and sleeves shall only be used for tie-ins and repairs.

13-02D Manholes

Sanitary sewer manholes shall conform to the requirements of Section 12-02E, "Storm Drain Concrete Structures," of these City Standard Specifications.

13-02E Lateral Cleanouts

All four-inch (4") and six-inch (6") cleanouts shall be two-way wye branch fittings of the same diameter as the lateral sewer with an internal baffle.

Four-inch (4") diameter cleanouts shall be cast iron Anaco or approved equal.

Six-inch (6") cleanouts shall be cast iron.

Cleanout boxes shall be Christy F8 box with Christy V1-71C Grate marked "S" or "sewer."

13-02F Flexible Couplings

Flexible couplings shall either be considered banded rubber couplings with adjustable stainless steel shear rings; or bell or mechanical joint.

13-02G Polyethylene Encasement

Material requirements for polyethylene encasement used with DIP shall be in accordance with ANSI 21.5 (AWWA C105).

13-02H Taps

Taps shall be Tap-Tite or approved equal. All taps shall be installed to achieve a maximum angle of 45° to the direction of flow.

13-03 Construction

The general pipe and fittings installation requirements for water systems specified in Section 14-03 of these City Standard Specifications shall also apply to sanitary sewer systems with the exceptions that: (1) sanitary sewer pipe laying shall proceed upgrade with the spigot ends of bell and spigot pipe pointing in the direction of flow, (2) disinfection procedures are not applicable and (3) grade tolerance differs between gravity and pressure pipelines as according to Section 11-03A.2, "Trench Length, Width, and Depth," of these City Standard Specifications.

Horizontal and vertical curves shall be achieved in accordance with manufacturer recommendations.

13-03A PVC Pipe

Installation of PVC gravity pipe shall meet the requirements of ASTM D2321. All field-cut PVC pipe shall be beveled and lubricated before joining.

At manhole connections, Contractor shall use flexible water stops, resilient connectors, or other flexible systems recommended by the pipe manufacturer and approved by the Engineer to make watertight connections to manholes and other structures.

Empty pipelines shall be prevented from floating due to flooding of the trench by ground water, rain water, or backfill consolidation. Should any pipe sections float in the trench, the affected reach of pipeline will be removed, the trench dewatered and re-excavated, and pipe reinstalled at the Contractor's expense.

Installation of AWWA C900 PVC force main pipe shall be in accordance with AWWA Manual No. 23, "PVC Pipe - Design and Installation," with exception to references specific to water main installations. Twelve (12) gauge insulated copper tracer wire shall be installed on the top of all PVC force main pipe and made accessible at each manhole.

13-03B Ductile Iron Pipe (DIP)

Installation of epoxy-lined DIP shall be in accordance with AWWA C600 with exception to references specific to water main installations.

For corrosion protection purposes, ductile iron pipe and fittings shall be wrapped in polyethylene encasement, eight (8) mil thick minimum in accordance with the requirements of ANSI A21.5 (AWWA C105). Contractor shall use two-inch (2") wide ten (10) mil tape to secure the ends of the polyethylene encasement.

Soil shall be checked every 500 lineal feet of trench line for corrosivity, and if soil is determined to be moderate-to-hot, cathodic protection shall be installed.

13-03C Vitrified Clay Pipe (VCP)

Installation of vitrified clay pipe shall be in accordance with ASTM C12.

13-03D Manholes

Sanitary sewer manholes shall be installed in accordance with the requirements of Section 12-03D, "Storm Drain Manhole Construction," of these City Standard Specifications and shall be labeled "Sanitary Sewer."

Drop type manholes shall not be allowed, unless approved by the Engineer.

13-03E Lateral Cleanouts

Unless indicated differently on the Project Plans, two way cleanouts shall be installed on the sewer lateral within the public right-of-way or public service easement, according to Detail No. 407, "Cleanout," of the City Standard Details.

13-03F Sewer Laterals

Sewer laterals shall be installed in accordance with Detail No. 408, "Standard Sewer Lateral," of the City Standard Details and at the stations indicated on the Project Plans. Sewer lateral connections shall be made at the main using a wye branch fitting or in the case of a cul-de-sac on the upstream side of a manhole. Wye branch fittings shall be constructed of the same material and installed at the same time as the sanitary sewer main. Tee connections shall not be allowed.

For sewer laterals in vacant lots or where no concrete curbs exist, the Contractor shall furnish and install a two-inch x two-inch x four-foot (2" x 2" x 4') minimum wood post five feet (5') beyond the two-way clean out directly above the end of the sewer lateral with the letter "S" and the depth to the sewer lateral marked with paint on the hub.

For existing sewer replacement, trenchless replacement is acceptable upon video review of existing conditions; offsets greater than half the pipe diameter or impacted by tree roots causing movement, and all sags over three-quarter-inches (3/4") deep shall be excavated and repaired prior to trenchless replacement. Existing laterals not meeting the minimum slope per building code are not candidates for trenchless. Two-way cleanouts shall be installed at the back of the sidewalk/curb.

13-03G Connections to Existing Sanitary Sewer Facilities

When connections to existing sanitary sewer facilities disrupt sewer flows, the Contractor shall provide necessary bypassing in accordance with Section 13-03N, "Sewer Bypassing," of these City Standard Specifications.

Connection of new sanitary sewers to existing mains shall be made at existing manholes or by constructing a new manhole over the point of connection.

When connection of new sewer mains to existing facilities is at existing manholes, the Contractor shall make the connection by breaking through the manhole base, cutting a rough channel through the manhole shelf to the existing channel, installing the new pipe with a water stop if PVC sewer, finishing a new channel within the manhole and repairing any damage to the structure. Connection to the existing manhole shall not be made until immediately before the cleaning and flushing operation commences.

Contractor shall install a flexible coupling within twelve inches to eighteen inches (12"–18") of a manhole base where pipe enters or exits a manhole.

Approved mechanical expanding type temporary plugs shall be installed as necessary to separate new and existing sanitary sewer facilities during construction. Removal of this plug will not be allowed until the new work has been cleaned and tested and specific approval has been given by the Engineer. The Contractor may be required to ball, flush and televise all affected existing downstream sanitary sewer facilities should the Contractor remove this plug and connect new work to the existing sanitary sewer system without specific approval of the Engineer. Such an incident may also result in the Contractor being required to pay for any additional costs or damages incurred at either the City's pump stations or the Dublin San Ramon Sanitation District (DSRSD) wastewater treatment facilities as a result of sediment, rocks or other debris.

Where wyes have been previously installed in the existing sanitary sewer main, the new sewer lateral shall be directly connected to the wye. Tapping shall only be allowed for connecting the new sewer lateral to the existing sewer main when an existing wye is not in place and the new sewer lateral is no more than fifty percent (50%) of the existing main size. A wye shall be installed in the existing main when an existing wye is not in place and the new sewer lateral is more than fifty percent (50%) of the existing main size.

Taps shall only be performed in the presence of the Engineer.

13-03H Pipe Crossings

Sanitary sewer and water pipeline crossings shall be in accordance with the requirements of Detail Nos. 403 and 405, "Sanitary Sewer and Water Main Separation," of the City Standard Details.

13-03I Testing

All completed sanitary sewer mains, force mains, and laterals shall be tested by the Contractor in the Engineer's presence prior to acceptance of the work and prior to connection to the residential service. All testing shall be performed using the air testing procedure between each adjacent pair of manholes. The conditions under which testing shall be performed shall be as follows.

1. After all proposed work, including mains, manholes, laterals and connections has been completed.
2. After the installation of all other underground utilities.
3. After all sanitary sewer facilities are adequately protected from destructive loadings and the surface is no longer subjected to continuous abnormal construction traffic. Testing shall be conducted after eighty percent (80%) of the street base material has been placed and compacted. In unimproved areas, the backfill shall be satisfactorily compacted.

13-03I.1 Air Test

Air testing of PVC pipe shall be performed in accordance with the latest edition of Uni-Bell PVC Pipe Association publication, UNI-B-6, "Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe," except as modified in this section. Air testing of DIP and VCP shall be performed in accordance with the latest edition of ASTM C828, except as modified in this section.

After plugging all openings and providing thrust blocking as necessary, air shall be admitted into the section under test at an inlet pressure not exceeding 5 psi from a source regulated by an adjustable pressure control valve and measured by a sensitive pressure gage calibrated from zero to no more than 10 psi. When the internal gage pressure has reached 3.5 psi for PVC pipe and 4.0 psi for ductile iron and vitrified clay pipe under stabilized temperature conditions, the air supply to the test section shall be cut off. The Engineer shall then observe the time interval during which the internal pressure drops 0.5 psi for PVC pipe and 1.0 psi for ductile iron and vitrified clay pipe from at least 3.5 psi.

For PVC, DIP, and VCP, the length of time for such loss shall not be less than that shown in the following tables for the main sewer size and length being tested.

PVC PIPE - TIME REQUIRED FOR 0.5 PSI PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED

Pipe Dia- meter, Inches	Min Time, Minute: Seconds	Length for Min Time, Feet	Time for Longer Length, Seconds	Specification Time (Minutes:Seconds) for Length, L (Feet) Shown							
				<u>100</u>	<u>150</u>	<u>200</u>	<u>250</u>	<u>300</u>	<u>350</u>	<u>400</u>	<u>450</u>
4	1:53	597	0.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	2 0:02

DUCTILE IRON PIPE AND VITRIFIED CLAY PIPE - TIME REQUIRED FOR 1.0 PSI PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED

Pipe Diameter, Inches	Specification Time (Minutes:Seconds) for Length, L (Feet) Shown							
	<u>100</u>	<u>150</u>	<u>200</u>	<u>250</u>	<u>300</u>	<u>350</u>	<u>400</u>	<u>450</u>
4	0:18	0:27	0:36	0:45	0:54	1:03	1:12	1:21
6	0:42	1:03	1:24	1:45	2:06	2:27	2:48	3:09
8	1:12	1:48	2:24	3:00	3:36	4:12	4:48	5:24
10	1:30	2:15	3:00	3:45	4:30	5:15	6:00	6:45
12	1:48	2:42	3:36	4:30	5:24	6:18	7:12	8:06
15	2:06	3:09	4:12	5:15	6:18	7:21	8:24	9:27

Test plugs for air tests shall not be removed until the pressure is no longer measurable. Air shall be released slowly through a valve. If the pipe to be tested is submerged in ground

water, Contractor shall determine the back pressure due to ground water submergence and increase all gage pressures in the test by that amount. If the calculated test pressure is greater than 8 psi results, then air testing shall not be used and an exfiltration test will be required.

During air testing, the Contractor shall be responsible for providing uninterrupted sewer service to all services affected by the Contractor's Work.

13-03I.1.1 Air Test Failure

If the air test indicates leakage greater than the specified limits, the Contractor shall locate the defects by inspection and shall make such repairs and replacements as are necessary and approved by the Engineer. All defective portions shall be exposed and repaired or replaced including defective bedding to the satisfaction of the Engineer. The air test shall be repeated until it passes, at the sole expense of the Contractor.

13-03I.2 Water Exfiltration Test

A water exfiltration test will not substitute for a required air test but when calculated air test pressures are greater than 8 psi due to high groundwater conditions, then a water exfiltration test shall be required. Water exfiltration test procedures are as described below.

Sanitary sewer mains shall be tested between successive manholes by plugging the inlets of the lower and upper manholes. The pipe and manhole shall be filled with water to a point four feet (4') above the invert of the center of the upper manhole or in the presence of ground water, four feet (4') above the average adjacent ground water level.

The allowable leak shall be computed as follows over a period of at least a one-hour test:

$$E = 0.00002(LD)(H)^{1/2}$$

L = Length of line being tested including laterals in feet

D = Internal diameter of pipe in inches

E = Allowable leakage in gallons per minute (gpm)

H = Elevation between the upper manhole water surface and invert of the pipe at lower manhole (or if ground water present, upper manhole water surface and ground water at the lower manhole)

13-03I.3 Testing Deflection of PVC Sewer Pipe

The inside diameter of an installed section of PVC sewer pipe shall not be allowed to deflect more than five percent (5%). All PVC pipe main sewers shall be checked by means of a pipe deflection gauge. The pipe deflection shall be checked in the presence of the Engineer after placement of all trench backfill and pipe cleaning but prior to surface restoration.

The pipe deflection gauge shall be fabricated to permit passage through installed sections of pipeline within the specified maximum five percent (5%) deflection of the base inside diameter of the PVC pipe. Any section or sections of plastic pipe that do not permit deflection gauge passage will not be accepted and said section or sections shall be properly repaired or replaced and rechecked as directed by the Engineer. The gauge shall pass through the pipe without the use of mechanical force.

Re-rounding through the use of a vibratory machine will not be permitted.

13-03J Cleaning

Upon satisfactory completion of the testing and after all necessary repairs and adjustments have been made, including setting manhole frames to final elevations after paving, the entire new system of sewers and manholes shall be cleaned. Before beginning the cleaning operation, a standard sand trap shall be placed in the manhole at which the new work connects to the City's existing sanitary sewer system, and it will remain in place until all solid matter has been removed. Under no conditions shall material other than clear flushing water be discharged into the City's existing sanitary sewer system before final acceptance of the work. Splattered mortar and all irregularities shall be removed from the flow channels to leave a smooth uniform surface.

A hydraulically propelled ball shall be used to thoroughly clean the interior of all new sanitary sewer mains. The ball shall be inflated to snugly fit into the sewer main to be cleaned. The rate at which the ball is allowed to pass through the sewer pipe shall be controlled by a rope attached to the ball at all times. Care shall be taken not to release the ball too rapidly as the sediment and debris flushed out ahead of the ball must be removed at each downstream manhole. Those sections of main which cannot be visually inspected by mirroring between manholes will be cleaned only in the presence of the Engineer. Prior to the beginning of this cleaning operation, excessive amounts of debris shall be directly removed by the Contractor.

Solid materials washed into the lowest manhole or manholes shall be removed from the system. The sand trap between the new work and existing system shall be removed only after all phases of work have been approved after final inspection. The Contractor shall prevent wash water from entering the existing sanitary sewer system, and sediment and debris from entering the new sanitary sewer mains after cleaning. Should any of these events occur, the Contractor shall be responsible for cleaning the City's affected sanitary sewer system from the point of connection through the City's pumping stations to the DSRSD treatment plant at no cost to the City. Unauthorized connection to the existing sanitary sewer system or failure to properly plug lines as required will be considered satisfactory evidence that sediment or debris has entered the system and cleaning as specified above will be required.

13-03L Television Inspection of New Sanitary Sewer Mains

The Contractor shall arrange with the Engineer for television inspection by the City prior to paving in accordance with the following procedures:

1. The Contractor shall not be charged for the initial television inspection.
2. Work rejected by the Engineer shall be corrected by the Contractor to the satisfaction of the Engineer and the television inspection repeated by the City. The Contractor shall be charged for all television inspections after the initial television inspection in accordance with the City's latest fee schedule.
3. The complete job is ready for television inspection when the following work has been completed:
 - All sewer pipelines are installed, backfilled, and compacted.
 - All plugs and pull ropes are removed and manholes are accessible and free of construction debris.
 - All structures are in place and pipelines are accessible from structures.
 - All other underground facilities, utility piping and conduits are installed.
 - Final street grading is complete and 80 percent (80%) of aggregate base has been installed.
 - Final air test has been completed.
 - Pipelines to be inspected have been cleaned and flushed.
 - Deflection test has been completed.
4. After the above work is complete, the Contractor shall request the Engineer to have the City schedule the for television inspection. A minimum of 48 hours advanced notice is required.
5. The Contractor will be notified by the Engineer of the scheduled date of the television inspection.
6. If the job site will not be ready or accessible for the television inspection on the scheduled date, the Contractor shall notify the City of the necessary cancellation at least twenty-four (24) hours in advance of the scheduled inspection.
 - a. If the City's television crew arrives at the job site and the work is not ready or accessible, the Contractor will be billed a cancellation fee as according to the City's latest fee schedule prior to the date of rescheduled television inspection.

- b. The Contractor shall reschedule inspection as outlined above.
- 7. The work will be initially televised by the City.
 - o If no deficiencies are observed, the work will be considered satisfactory.
 - o If deficiencies are observed, a videotape will be made and defects serious enough to require correction will be determined by the City.
- 8. The Engineer shall notify the Contractor of any deficiencies revealed by the television inspection that will require repair. If corrective work is indicated and viewing of the videotapes is desired, the Contractor shall be contacted to schedule a time to review the tapes with the Engineer.
- 9. The Contractor shall submit a plan for correcting defects to the Engineer, who must approve the plan prior to the Contractor starting corrective work. The City reserves the right to require retesting as defined in Section 13-03I, "Testing," of these City Standard Specifications following completion of any repair.
- 10. Those portions of the pipeline system that have been corrected shall be re-televised by the City at a cost to the Contractor as according to the City's latest fee schedule.
- 11. The procedure outlined in Conditions 1 through 10 above will be repeated until all deficiencies observed by television inspection have been corrected to the complete satisfaction of the City.
- 12. All sewer main stubs will be television inspected.
- 13. The following observations from television inspections will be considered defects in the construction of sewer pipelines and will require correction prior to paving:
 - o Low spot (1" or greater - mainlines only)
 - o Joint separations (one-half [1/2] inch or greater opening between pipe sections)
 - o Cocked joints present in straight runs or on the wrong side of pipe curves
 - o Chips in pipe ends
 - o Cracked or damaged pipe
 - o Dropped joints
 - o Infiltration

- Debris or other foreign objects
- Other obvious deficiencies
- Irregular condition without logical explanation

Television inspection of new work and the correction of observed defects will not relieve the Contractor of responsibility for the one-year guarantee period. The City may televise new work at any time during the one year guarantee period. Contractor shall repair any defective new work discovered during the one year guarantee period within five (5) working days from notice. Repair work determined by the City as emergency in nature shall be performed within 48 hours.

13-03M Abandonment of Sewer Lines and Structures

Sewer pipes less than 12" in diameter shall be grout-injected with 2 sack slurry for entire volume between manholes unless otherwise shown on the Project Plans.

Sewer lines more than or equal to twelve inches (12") in diameter to be abandoned shall be securely closed at all pipe ends by an approved cap or, at manhole entries, by a watertight plug of concrete or brick and cement mortar not less than two feet (2') thick. When lateral sewers are abandoned, they will be capped with an approved fitting at locations determined by the Engineer.

Structures to be abandoned shall have all openings, inlets, and outlets sealed off as set forth for sewer lines. The structure shall be removed to a point three feet (3') below the proposed street grade and filled with backfill material, as specified in Section 11-02A, "Pipe Embedment Material," of these City Standard Specifications.

Salvaged metal castings, such as frames and covers and other metal appurtenances, unless otherwise specified, shall be delivered to the City of Pleasanton, Operations Service Center.

13-03N Sewer Bypassing

Sewer bypassing shall be accomplished by pumping or diverting the upstream flow around the Contractor's work. The Contractor shall submit a sewer bypassing plan, which shall be reviewed and approved by Engineer.

The Contractor shall provide temporary pumps, conduits, and other equipment to bypass the sewer flow. The Contractor shall furnish the necessary labor and supervision to set up and operate the pumping and bypass system. Engines shall be equipped with mufflers and/or enclosed to keep the noise level within local ordinance requirements. Pumps and bypass lines shall be of adequate capacity and size to handle the flows. All bypassed flow shall be discharged to the nearest downstream sanitary sewer manhole.

Unless otherwise specified, the Contractor shall bypass flow around the Work whenever the depth of flow, as measured at the inlet pipe to the upstream manhole adjacent to the Contractor's work, exceeds the crown elevation of the pipe or whenever the Contractor's equipment operating in the sewer provides an obstruction that restricts flow and causes the depth of flow to exceed the crown elevation.

No sanitary sewer flow shall be allowed in the new sewer main line trench.

The contractor shall maintain, on site, sufficient equipment and materials to ensure continuous and successful operation of the bypass and dewatering systems. Standby pumps shall be fueled and operational at all times. The Contractor shall maintain, on-site, a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping and other parts or system hardware to ensure immediate repair or modification of any part of the system as necessary.

13-04 Measurement

Sewer laterals with cleanouts and sanitary sewer structures, such as manholes, shall be measured by the number of items. New sanitary sewer main and casing pipe shall be measured on the basis of linear feet of pipe from center of manhole to center of manhole.

13-05 Payment

The contract price of new sanitary sewer main pipe installed in trenches shall include full compensation for all Work described in Section 11, "Trench Excavation and Backfill," of these City Standard Specifications; abandonment of existing mains; pipe material and installation; connections to manhole structures; bypassing; cleaning; testing; and restoration of all asphaltic and concrete surfaces affected by trenching operations.

The contract price of new sanitary sewer laterals shall include full compensation for all Work described in Section 11, "Trench Excavation and Backfill," of these City Standard Specifications; abandonment of existing laterals; new materials including lateral pipe, wyes and cleanouts; connections to the sanitary sewer main and private sanitary sewer lateral; installation of all sanitary sewer materials; and restoration of all asphaltic and concrete surfaces.

The contract price of new manholes shall include full compensation for all associated materials and installation of base; manhole sections; frame and cover; concrete collar; and adjustment to grade.

SECTION 14. WATER

14-01 General

This section covers requirements for materials and methods of installation for the water mains, fittings, and appurtenances within the City water distribution system. All water distribution system improvements shown on Project Plans and City Standard Details shall conform to the following specifications.

14-02 Materials

Approved pipe materials for the City water distribution mains shall be polyvinyl chloride (PVC) and ductile iron (DIP).

Service lines shall ServiceGuard by Underground Solutions for 1" and smaller and 1.5" or larger be polyethylene (PE).

Material requirements of valves, meters, hydrants, and other appurtenances are included in this section.

All materials shall be manufactured and approved for potable water systems and must be in compliance with State of California AB 1953 and contain less than 0.25 percent (0.25%) Lead by average weight.

All bolts shall be stainless steel bolts; anchor bolts, nuts, and washers shall be Type 316 stainless steel in accordance with ASTM 193, Class 2, Grade 8M or ASTM F593, Condition SH. Threads on stainless steel bolts shall be protected with antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-07E. Buried bolts shall be coated if specified for Cathodic Protection measures.

1. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.
2. Antiseize lubricant shall be "Pure White" by Anti-Seize Technology, Franklin Park, IL; or equal.

14-02A Polyvinyl Chloride Pipe

Polyvinyl chloride (PVC) pipe shall conform to the requirements as specified in AWWA C-900/905 and shall have a minimum pressure rating of Class 235 (SDR18). A higher class may be required to meet certain design conditions as determined by the Engineer and as indicated on the Project Plans.

14-02A.1 Joints

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

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

All PVC couplings shall be manufactured of the same material as the pipe and shall be furnished with two (2) rubber rings. The couplings shall be designed to insure a water-tight joint with the pipe. The couplings body and sockets shall have a wall thickness equal to the pipe barrel thickness with which the coupling is to be used.

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

14-02A.2 Fittings

All fittings for use with PVC pipe shall be mechanical joint ductile iron with the exception of fittings with valves which shall be flanged joint ductile iron. Tapered ends on PVC pipe shall be removed prior to installation into a mechanical joint fitting to allow for full insertion. Mechanical joint ductile iron fittings shall be in accordance with AWWA C-153. Flanged ductile iron fittings shall be in accordance with AWWA C-110. All fittings for use with PVC pipe shall be cement mortar lined in accordance with AWWA C-104 and shall have manufacturer's standard bituminous or asphaltic coating.

14-02B Ductile Iron Pipe

Ductile iron pipe (DIP) shall conform to the requirements as specified in AWWA C-150 and C-151. All pipe six inches (6") and greater in diameter shall have a minimum thickness class of 50. A higher thickness class may be required to meet certain design conditions as determined by the Engineer and as shown on the Project Plans.

Pipe and fittings shall be cement mortar lined in accordance with AWWA C-104 and shall have manufacturer's standard bituminous or asphaltic coating.

Soil corrosivity shall be tested every five hundred (500) lineal feet minimum. If results identify moderate or greater, a cathodic protection system shall be designed.

14-02B.1 Joints

Joints for DIP shall either be push-on, mechanical, or flanged, as selected to suit installation conditions as determined by the Engineer. Acceptable joint gaskets include neoprene or synthetic rubber. Natural rubber gaskets will not be accepted. Push-on and mechanical joints shall be in accordance with AWWA C-111. Flanged joints shall be in accordance with AWWA C-115. The minimum pressure rating of all joints shall be 250 psi.

Restrained mechanical joints to be used only if specified in the project plans and special provisions or approved by engineer. The use of restraint mechanical joints does not negate the need for concrete kickers.

14-02B.2 Fittings

Fittings used for DIP shall be in accordance with Section 14-02A.2 of these City Standard Specifications.

14-02C Services and Related Appurtenances

14-02C.1 Service Line

Unless otherwise required by the Engineer, all water service lines shall be no less than one inch (1") in size.

14-02C.1.1 Copper

Copper tubing service lines shall only be used for certain site conditions upon approval of the Engineer. Copper tubing shall be Type K soft copper conforming to the requirements of AWWA C-800.

14-02C.1.2 Plastic

For pipe sizes greater than one-inch (1"), use polyethylene. For one-inch (1") pipe sizes, use Service Guard© from Underground Solutions.

Polyethylene tubing shall be copper tube size conforming to the requirements of ASTM D 2737 and AWWA C-901 with a required pressure rating of 200 psi (SDR 9) and minimum size of one inch (1"). The material designation code of polyethylene tubing shall be PE 3408 with classification 334434C. All polyethylene tubing used for water service lines shall meet the requirements of Standard No. 14 as published by the National Sanitation Foundation.

14-02C.2 Corporation Stops

Unless otherwise approved by the Engineer, single residence water service taps at the main shall be one inch (1") in diameter with corporation stop connection. Corporation stops shall be ball valves Ford Company FB-1100 series, copper tube size (CTS) or approved equal with packed joint outlet. All Corporation Stops must be in compliance with State of California AB 1953 and contain less than 0.25 percent (0.25%) Lead by average weight.

14-02C.3 Saddles

Saddles shall be suitable for the diameter and pipe material of pipe to be tapped. Saddles shall be shaped to accurately fit the contour of the main and shall have double straps. Straps

shall have a flattened design to provide large bearing surfaces for a secure installation. All saddles shall have a neoprene gasket wedged in place at the tapping box to provide a tight seal at the main. Saddles shall have no bushings to accommodate corporation stops.

Saddles for use with C900/905 PVC pipe shall be constructed of bronze two piece two bolts single strap and shall be Ford model S912 or approved equal.

Saddles for use with AC pipe shall be constructed of Bronze top with single wide stainless steel strap four bolts and shall be Ford model 202BS or approved equal.

Saddles for use with DIP/Cast shall be constructed of Cast top with two stainless steel straps and shall be Ford model FSD202 or approved equal.

The taps shall all be iron pipe size.

14-02C.4 Angle Meter Valves

All angle meter valves shall have padlock wirings and packed joint inlets. Angle meter valves for meter sizes greater than one inch (1") shall have flanged outlets. Angle meter valves shall be Ford Company models, BA or BFA 43 Series or approved equal as detailed by meter size in Detail No. 301, "Standard Water Service for Residential," of the City Standard Details. All Angle Meter Valves must be in compliance with State of California AB 1953 and contain less than 0.25 percent (0.25%) Lead by average weight.

14-02C.5 Meters

In the case of new water service installations, new water meters shall be provided and installed by the City. In the case of replacement of existing water services, Contractor shall reinstall existing meters.

Water meters and boxes shall be placed in public service easements.

14-02C.6 Meter Boxes

Meter boxes shall be Christy models or approved equal as detailed by service size in Detail Drawing No. 301, "Standard Water Service for Residential," of the City Standard Details. For meter sizes of one inch (1") and less, meter boxes shall be covered with one piece concrete lids. For meter sizes greater than one inch (1"), meter box concrete lids shall be two-piece. For meter boxes in traveled areas, the box and cover shall be traffic bearing.

14-02D Valves

All main line valves shall be resilient wedge-type gate valves rated for a minimum working pressure of 200 psi. Valves connecting directly to tees or crosses shall be flanged directly to the tee or cross. All valves connecting to PVC pipe shall be mechanical joint. Butterfly valves shall only be used with the approval of the Engineer. Valves at all tie-ins or isolating

from existing system need to be pressure tested prior to installation and witnessed by an inspector.

14-02D.1 Gate Valves

Gate valves shall be resilient wedge-type valve conforming to AWWA C-509 with "O" ring seals, non-rising bronze stem, counterclockwise opening and a two-inch (2") operating square wrench nut. All gate valves shall have stainless steel or fusion epoxy coated hardware on the bonnets.

14-02D.2 Butterfly Valves

Butterfly valves shall be tight-closing, rubber-seated with rubber seats securely fastened to the valve body, counterclockwise opening with a two-inch (2") operating square nut conforming to AWWA C-504. Gear operators designed for buried service shall be provided with each butterfly valve.

14-02D.3 Air and Vacuum Air Release Valves and Enclosure

Air and vacuum air release valves shall be the combination type, APCO 143C for one-inch (1") tubing and APCO 145C for two-inch (2") tubing, or approved equals. The combination air valve shall be designed for an operating working pressure of 200 psi and shall have a stainless steel float. All other working parts shall be brass, stainless steel, or other non-corroding materials. The minimum inlet/outlet size shall be one inch (1") for pipe sizes up to ten inches (10"). The maximum inlet/outlet size shall be two inches (2") for pipe sizes 12 inches (12") and larger. Air and vacuum air release valves shall be installed above grade in a dual swing sixteen-inch (16") diameter by twenty-four-inch (24") high pipeline product model V-VCDD-1624E or approved equal. See "Combination Air-Vacuum Release" City Standard Detail 312.

14-02D.4 Valve Boxes, Covers and Risers

Valve boxes and covers shall be Christy model G5 or approved equal with "Water" marked on the cover. Valve risers shall be eight-inch (8") AWWA C-900 PVC or SDR 35 PVC.

Valve boxes and covers for recycled water shall be Christy Model G4 with "recycled water" marked per Detail 316. Risers for potable water shall be blue; risers for recycled shall be purple.

14-02E Fire Hydrants

Fire hydrants for potable water shall be the wet barrel type with cast iron body conforming to the requirements of AWWA C503. All fire hydrants shall have two 2½-inch (2½") outlets and one 4½-inch (4½") outlet and shall have a minimum weight of 190 pounds. Fire hydrants shall be Clow model F-960, Long Beach Iron Works model Anacapa 615 or equal. Fire hydrants shall be fusion epoxy lined having a total minimum thickness of six (6) mils.

Hydrant buries and break-off spools shall be either factory cement mortar lined or fusion epoxy lined having a total minimum thickness of six (6) mils. A break-off spool with two (2) cast score marks or one (1) machined score mark shall be provided between the hydrant head and the hydrant bury. The top score mark shall be located within three inches (3") of the flange which connects to the hydrant head. Fire hydrant bolts shall be a breakaway type. City-owned and maintained fire hydrants shall be painted Kelly Moore Yellow Rust Inhibitor Safety Yellow #1700-63 or approved equal. Privately owned fire hydrants shall be painted Kelly Moore Kel Guard Rust Inhibitive Siren Red #1700-62 or approved equal.

Fire hydrants for recycled water shall be CLOW F900 series wet barrel hydrants with hydrant shield hydrant security cap.

14-02F Blowoffs

Blowoff shall be constructed of the materials and to the sizes indicated in City Standard Details 310 & 309, "Blowoff At Dead End," and "Mid Line Blow Off," of these City Standard Details.

14-02G Solid Mechanical Sleeve and Flexible Coupling

Solid sleeves used for pipe closure shall be AWWA C153 mechanical joint ductile iron fittings. Flexible couplings shall be fusion epoxy coated, shall only be used upon approval by the Engineer, and shall be Power Seal–Power Max Coupling Model 3506LB with 304 Stainless Steel Bolts or JCM Coupling Model 242 with 304 Stainless Steel Bolts or approved equal.

14-02H Thrust Blocks

Thrust blocks shall be constructed of minor concrete in conformance with Section 90-2, "Minor Concrete," of the State Standard Specifications. Minimum dimensions of thrust blocks shall be in accordance with "Typical Thrust Blocks," of the City Standard Details. Contractor shall be responsible for adequate sizing of thrust blocks.

14-02I Tapping Sleeve Tees and Tapping Valve

Tapping sleeves for wet tapping of asbestos cement shall be Ford Meter Box "Fast Stainless Steel Tapping Sleeve with 360° Gasket" or approved equal.

Tapping sleeves for wet tapping twelve-inch (12") or smaller PVC, cast iron, or ductile iron shall be Ford Meter Box "FTSS Stainless Steel Tapping Sleeve with Removable Bolts and 360° Gasket" or approved equal.

Tapping sleeves for wet tapping sixteen-inch (16") or larger of PVC, asbestos cement, cast iron, or ductile iron pipe shall be mechanical joint cast iron tapping sleeve assembly complete with gaskets and bolts. The tapping valve shall be a resilient wedge gate valve

equal in size to the branch of the tapping sleeve. The tapping sleeve and valve shall have a minimum rating of 200 pounds per square inch working pressure. The tapping valve shall have a two-inch (2") square nut for operation. Tapping sleeves for PVC, cast iron and ductile iron pipe shall be Mueller H-615 or approved equal. Tapping sleeves for asbestos cement pipe shall be Mueller H-619 or approved equal. Tapping valves shall be Mueller A-2360 or approved equal.

Tapping sleeves tap shall be limited to fifty percent (50%) of mainline pipe size, rounded down.

14-02J Backflow Prevention and Fire Services

Backflow prevention and fire service facilities shall be constructed in accordance with the drawings presented in the City Standard Details and the latest edition of approved devices from University of Southern California Foundation for Cross Connection Control and Hydraulic Research (USCFCCCHR).

14-02K Warning Tape and Tracer Wire

Warning tape for potable water shall be two inches (2") wide, blue, and carry the inscription: "Caution Buried Water Line Below." Warning tape shall be manufactured by Calpico or approved equal.

Tracer wire shall be continuous 12 A.W.G. gauge, insulated, solid core copper wire, and installed for all underground piping.

14-03 Construction

All pipe, fittings, and appurtenances shall be handled with care and protected from damage during loading and unloading operations, while in storage, and during installation, according to the manufacturers' recommendations.

Prior to installation of pipe, roadway subgrade shall be within 0.1 feet (0.1') of finished subgrade. All pipe shall be laid with full uniform support on compacted pipe embedment material and maintained at the required grade and alignment shown on the project plans. No mounding shall be allowed. Adjustments to avoid obstructions and major relocations to avoid unforeseen obstructions shall only be allowed if approved by the Engineer. Backfill operations shall only proceed once the pipe has been inspected and is continuously supported in its final grade and alignment position.

Prior to connecting pipe joints, all surfaces of the portion of the pipe to be jointed shall be cleaned, dried, and prepared as recommended by the manufacturer. Pipe joints shall only be connected with the couplings and rubber rings furnished with the pipe and in accordance with the manufacturer's recommendations. Disruption of the pipe joint after the connection has been made will not be permitted.

Pipe shall be laid with the bell end facing in the direction the work is proceeding. The interior of the pipe shall be kept clean and free from dirt and foreign matter at all times. Whenever the work ceases, the end of the pipe shall be securely closed with a tight fitting plug or cover. If, in the opinion of the Engineer, the interior of the pipe is not kept clean or if the pipe was found to be open-ended at any time, the Contractor shall be required to thoroughly and completely swab and flush the end pipe section and all connecting pipe sections as necessary to the satisfaction of the Engineer.

Damage to lining or coating shall be repaired to the satisfaction of the Engineer before the pipe or fitting is installed.

Pipe shall not be laid when, in the opinion of the Engineer, the condition of the trench is unsuitable.

A maximum of half-inch ($\frac{1}{2}$ ") spacing shall be allowed between pipes joined by solid mechanical sleeve.

14-03A PVC Pipe

In addition to general pipe installation procedures, installation requirements particular to PVC pipe shall be followed in accordance with AWWA Manual No. 23, "PVC Pipe - Design and Installation."

PVC pipe shall be deflected in accordance with the manufacturers' recommendations. The Contractor shall not install PVC pipe at less than the manufacturer's required minimum radius of curvature. Significant alignment changes shall only be achieved through the use of angular fittings.

Tracer wire shall be required for all PVC mains. Tracer wire shall be taped on top of the PVC main and be made accessible at each valve box according to the City Standard Details.

14-03B Ductile Iron Pipe (DIP)

In addition to general pipe installation procedure, installation requirements particular to DIP shall be followed in accordance with AWWA C-600, "Installation of Ductile Iron Water Mains and their Appurtenances."

Curved alignments shall be obtained through deflection of joints in accordance with manufacturers' recommendations.

All DIP and fittings shall be encased in polyethylene tubing, eight (8) mil thick minimum, for external corrosion protection. Installation of polyethylene encasement shall be in accordance with the requirements of AWWA C105. Contractor shall use two-inch (2") wide ten (10) mil tape to secure the ends of the polyethylene tubing.

14-03C Services

Service lines shall be installed in accordance with the City Standard Details and shall rest on compacted bedding material placed above an undisturbed earth trench bottom. All service line connections to mains regardless of main pipeline material shall be made using a saddle. Polyethylene lines shall be installed from the corporation stop horizontal at the main to the angle meter stop in accordance with manufacturer recommendations. Warning tape and tracer wire shall be required for all services. The minimum distance between service taps shall be 25 inches (25").

14-03D Valves

All valves shall be set plumb and properly fitted to the adjacent sections of main. A valve box shall be installed over each valve. The valve box must not bear on the valve or pipe so that traffic loads are not transferred to the water pipe. The top of the valve box shall be placed flush with finished grade unless otherwise directed. Valves shall be fitted with suitable extension stems when the valve operating nut is greater than 60 inches (60") in depth. The extension stem shall bring the valve operating nut to within 36 inches (36") of the finished grade.

The location and type of all valves shall be permanently marked, either on the curb face or on four-inch by four-inch (4" x 4") posts where there is no curb. There shall be two (2) triangulation ties to each valve box labeled with the corresponding distance in feet from the post or curb to the valve box.

14-03E Connection to Existing Lines

14-03E.1 Type and Conditions

All connections to the City's existing water system shall be the cut-in, dry, connection type. Wet taps shall only be considered on a case-by-case basis and shall only be performed if approved by the Engineer. If a wet tap is approved by the Engineer, then the tapping sleeve branch shall not exceed 50 percent (50%) of the diameter of the existing main.

Before proceeding with a connection to the City's existing water system, the following conditions shall be met:

1. The Engineer has approved the connection and is on the job site.
2. The new water main has passed both the pressure and bacteriological tests.
3. Proper notifications have been made for interruption of service.
4. City personnel are available to operate the existing water system. {See 14-03E.3}

5. Materials have been on-site 24 hours prior to the start of trenching and have been inspected and approved by the Engineer.

14-03E.2 Interruption of Services

The Contractor shall notify the City no less than 48 hours prior to the start of any scheduled shut-down so that advance notice can be given to the Fire Department by City personnel. The Contractor shall notify affected residences and businesses 48 hours in advance of possible service interruptions. The Contractor shall specify the expected length and time of day of the shut-down in the notification. The Contractor shall take into account high demand periods and shall complete the connection to existing lines in such a manner as to minimize the inconvenience to water users.

14-03E.3 Valve Operation

Only City Utilities Department personnel shall operate all potable water system valves.

14-03F Pipe Crossings

The Contractor shall comply with the requirements of the State Department of Health Services with regard to separation distances and pipe material specifications at water main-sanitary sewer crossings as shown in Detail Nos. 405 and 406, "Sanitary Sewer and Water Main Separation," of the City Standard Details.

All pipe crossings and siphons shall be constructed with TR Flex type Ductile Iron Pipe.

14-03G Pressure and Leakage Testing

14-03G.1 General

All water lines shall be pressure and leakage tested in the presence of the Engineer. Pressure and leakage testing shall be done only after the following items are completed:

1. The new pipe segment has been flushed.
2. The trench has been satisfactorily backfilled and compacted.
3. All other underground utilities have been installed.
4. All water facilities are adequately protected from destructive loadings and the surface is no longer subjected to continuous abnormal construction traffic. Testing shall be conducted after 80 percent (80%) of the street base material has been placed and compacted.
5. The use of jumpers with a certified backflow device is required for the disinfection of all new mains prior to final tie-ins being completed. The only exception would be if

placement of the device causes a safety hazard. The Engineer must approve all exceptions.

Make-up water pumped into the new pipe segment for both the pressure and leakage tests shall be adequately chlorinated to prevent contamination.

14-03G.2 Pressure Test

After the Contractor has met all of the required preconditions in Section 14-03G.1, "General," of these City Standard Specifications, the Contractor shall conduct a pressure test of restricted segment lengths at a required pressure not less than 200 pounds per square inch for two (2) hours and sustained during this period within a tolerance of ± 10 pounds per square inch. For hillside areas, the length of the pipe segment tested shall be determined to allow a maximum test pressure of not less than 200 psi on the low end and a minimum test pressure of not less than 175 psi on the high end. In no case shall the tested pipe segment length exceed one-thousand feet (1,000'). The maximum rated pressure of pipe, pipe appurtenances, valves, or hydrants at low points in the system shall not be exceeded.

All valves used for isolation shall be pressure tested above-grade prior to installation.

14-03G.3 Leakage Test

Following the pressure test, a leakage test shall be conducted at a pressure not less than 150 pounds per square inch for four (4) hours and sustained during this period within a tolerance of ± 10 pounds per square inch. The allowable leakage shall be dependent upon the type of pipe material as specified in the following sections of these City Standard Specifications.

14-03G.4 Polyvinyl Chloride Pipe Leakage Test

The rate of leakage of polyvinyl chloride pipe during the four-(4) hour test time period shall be accurately measured and not exceed the following:

<u>Nominal Pipe Size, Inches</u>	<u>Allowable Leakage-150 psi, Gallons/Hr/1000 Ft</u>
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99

14-03G.5 Ductile Iron Pipe Pressure Test

The rate of leakage of ductile iron pipe during the four- (4) hour test time period shall be accurately measured and not exceed the following:

<u>Nominal Pipe Size, Inches</u>	<u>Allowable Leakage-150 psi, Gallons/Hr/1000 Ft</u>
4	0.37
6	0.55
8	0.74
10	0.92
12	1.10
14	1.29
16	1.47
18	1.66
20	1.84
24	2.21

14-03H Disinfection

14-03H.1 General

Bacteriological samples are not to be taken until the proposed lines have passed hydrostatic and leakage tests. Loading, chlorinating, flushing, and bacteriological testing of all new water facilities shall be conducted in the presence of the Engineer in accordance with the latest version of AWWA C-651, "Disinfecting Water Mains," and as modified in these standard specifications. Water samples from the disinfected potable water system shall be collected by the City of Pleasanton Utilities Department.

Responsibilities of the Contractor, the City of Pleasanton Construction Services Division, and the City of Pleasanton Utilities Division shall be as stated in the following paragraphs. Generally, the City Utilities Division will operate all existing facilities, collect water samples, monitor chlorine residuals, and conduct bacteriological tests; and the Contractor shall be responsible for all other areas of work including assisting City Utilities Division personnel as necessary and operation of new water facilities before passing of bacteriological tests.

Contractor Responsibilities:

1. Provide Construction Services Inspector a minimum of 24 hours' notice though three working days is preferred) advanced notification to schedule the chlorination.
2. Ensure that all main line and hydrant valves are raised, accessible, and in the open position.

3. Ensure that all blow-offs have a riser pipe above-grade that includes a sampling hose bib and a separate outlet with an independent shut-off valve to attach a fire hose to for flushing.
4. Ensure that all pre-arranged sampling locations have a hose bib above-grade prior to starting the disinfection process.
5. Monitor the injection of the chlorine and related injection equipment.
6. Provide personnel to assist the City Utilities Division staff with expelling of air and achieving a chlorine residual of not less than 50 mg/L at all blow-offs, fire hydrants and water services.
7. Bag hydrants and secure water services after chlorination until results from the bacteria testing is obtained to ensure that no water is discharged from the new system. Failure to secure the new system will result in an automatic failure and require the disinfection process to start over. Services are to be secured at the curb stops through the use of heavy duty ZIP TIES or padlocks by the Contractor.
8. Provide personnel and all required equipment necessary for the flushing of the chlorine.
9. Dispose of the chlorinated water in accordance with all applicable Federal, State, and local agency regulatory requirements. Refer to AWWA Standard C651-92, Section 6.2, "Disposing of Heavily Chlorinated Water," for procedures.
10. Meet with the Inspector and Utilities Division staff to review plans and establish bacteriological sampling locations at the time of scheduling the chlorination. The distance between sample locations shall not exceed 500 feet (500'). Sampling shall not be allowed through fire hydrants.
11. Schedule all new main chlorination for Monday or Tuesday only.

Construction Services Responsibilities:

1. Provide the Utilities Division a minimum of 24 hours' notice (though three working days is preferred) advanced notification to schedule the chlorination.
2. Meet with Utilities Division staff and the Contractor to review plans and establish bacteriological sampling locations at the time of scheduling the chlorination. The distance between sample locations shall not exceed 500 feet (500'). Sampling shall not be allowed through fire hydrants.
3. Schedule new main chlorination to begin on Monday or Tuesday. If Utilities Division and Laboratory staffs are willing and available to work overtime, coordinate those efforts and ensure that the Contractor understands that they are responsible to

reimburse the City for all overtime costs incurred from new main chlorination that does not begin on Monday or Tuesday.

4. Review the New Main Disinfection Procedures and Contractor Responsibilities with the Contractor.

Utilities Division Responsibilities:

1. Operate all existing City-owned valves and facilities.
2. Monitor chlorine residuals during the disinfection and flushing of all new water mains.
3. Monitor Turbidity at the time the new main is flushed.
4. Collect all bacteriological samples.
5. Process and analyze all bacteriological samples (laboratory technician).
6. Notify PWI of bacteriological testing results immediately upon availability.

14-03H.2 Pipe Loading and Chlorination

Pipe sections to be bacteriologically tested shall be slowly filled with water by City Utilities Division personnel and all air shall be expelled by the Contractor from the pipe. Air shall be released through opening hydrants, service line curb stops at high points in the system and blowoffs at all dead ends. Water for pipe loading shall be supplied directly from the closest existing main line valve operated only by City Utilities Division personnel. After the system has been filled with water, chlorinated, and all air has been expelled, all valves controlling the section to be tested shall be closed and the system isolated. The line will then be allowed to sit for a period of at least 24 hours, and not more than 36 hours, to permit the pipe to absorb water and allow the escape of trapped air.

Disinfection shall be accomplished through chlorination with the initial introduction of water into the system. The method of disinfection shall be the continuous feed method. The tablet or slug method shall not be allowed. Chlorine shall be introduced into the pipe section to be tested no greater than 50 feet (50') from the existing line valve being used for loading. During the 24-hour disinfection period, the free chlorine residual shall not be less than 50 mg/l.

Acceptable chemicals for disinfection shall comply with AWWA standards listed below:

1. Hypochlorite, AWWA B300
2. Liquid Chlorine, AWWA B301
3. Ammonia Sulfate, AWWA B302
4. Sodium Chlorite, AWWA B303

Disinfection of repaired sections of pipe shall be done by swabbing with sodium hypochlorite solution. Special procedures for disinfecting tapping sleeves as described in AWWA C 651 86 shall be followed.

The interior of the tapping sleeve and the exterior surfaces of the main to be enclosed by the tapping sleeve are to be disinfected by swabbing the assembly with chlorine prior to tapping.

Following a tie-in, the area affected by the tie-in shall be thoroughly flushed and bacteriological samples taken to verify compliance.

14-03H.3 Flushing and Bacteriological Testing

Following the 24-hour disinfection period, chlorinated water shall be flushed from the main until the turbidity is 5.0 NTU or less, and chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or that which is acceptable for domestic use. As during the loading operation, the existing main line valve used for flushing shall only be operated by the City Utilities Division personnel. Chlorinated water shall be disposed of by the Contractor in a manner consistent with all applicable Federal, State, and local agency regulatory requirements.

After flushing the line and prior to connection for final service, the City Utilities Division personnel will check for chlorine residual, and samples will be drawn after a 24-hour minimum incubation period by the City for bacteriological analysis to verify compliance with primary drinking water regulations.

14-03I Abandonment of Water Facilities

Existing water mains shall be abandoned as according to Section 3-03H, "Utility Abandonment," of these City Standard Specifications. For One-inch (1") through two-inch (2") water services which are connected to a water main to remain in service, the water service shall be abandoned by closing the corporation valve and severing the water service within two inches (2") of the corporation valve. For four-inch (4") and larger water services which are connected to a water main to remain in service, the water service shall be abandoned by closing the valve, severing the service within two feet (2') of the valve, plugging the service with concrete, blind flanging the valve, removing the valve pot, backfilling the hole left after removing the valve pot, and repairing the surface. The valve pot shall be returned to the City Operations Services Center. For the case of when both the water service and water main are to be abandoned, the water service shall be turned off at the angle meter stop water meter and the water meter box removed and delivered to the City Operations Services Center.

14-03J Warning Tape and Tracer Wire Installation

Warning tape shall be installed approximately one foot (1') above the centerline of all mains and services as shown in the City Standard Details.

14-04 Measurement

Installation of new water services, fire hydrants, fire services, meter boxes, and blowoffs shall be measured by the number of items. New water main pipe installed shall be measured on the basis of linear feet of pipe. New water main tie-ins to existing water mains shall be measured on a lump sum basis per tie-in.

14-05 Payment

The contract price of new water main pipe installed in trenches shall include full compensation for: all Work described in Section 11, "Trench Excavation and Backfill," of these City Standard Specifications; abandonment of existing mains; new pipe, main line valve, warning tape and tracer wire, appurtenance and fitting materials; installation of new pipe, main line valve, warning tape and tracer wire, appurtenances and fittings; disinfection; pressure and leakage testing; and restoration of all asphaltic and concrete surfaces affected by the trenching operation.

The contract price of new water services shall include full compensation for: all Work described in Section 11, "Trench Excavation and Backfill," of these City Standard Specifications; the abandonment of existing services; new materials including service line, fittings, warning tape and tracer wire, appurtenances and meter box (excludes new meter to be provided by City as necessary); connections to the water main and private water service; installation of all water service materials; and restoration of all asphaltic and concrete surfaces.

The price of new water main tie-ins to existing water mains shall include new closure pipe, fittings and valve materials, and installation including trenching, backfill and pavement restoration per Section 11, "Trench Excavation and Backfill," of these City Standard Specifications and as defined in the details of the Project Plans.

The contract price of new fire hydrant installations shall include full compensation for: the fire hydrant, breakaway spool, bury elbow, piping, and valve materials, installation of materials, connection to the main, and restoration of all asphaltic and concrete surfaces.

SECTION 15. CONCRETE IMPROVEMENTS

15-01 General

The Contractor shall provide all materials, equipment, and labor to furnish and install all concrete improvements including concrete curbs, gutters, valley gutters, sidewalks, ADA access ramps, bus turnouts, driveways, median nose surfacing, pads, miscellaneous concrete footings and all appurtenant work, complete in place, as specified in these City Standards.

15-02 Materials

15-02A Portland Cement Concrete

Portland cement concrete for all concrete surface improvements shall be minor concrete in conformance with Section 90, "Concrete," of the State Standard Specifications and shall have a maximum slump of three inches (3"). Portland cement concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, admixtures if approved by the Engineer and water, proportioned and mixed as specified in these City Standard Specifications.

The maximum water to cement ratio shall be 0.50. Minimum 28-day compressive strength shall be 3,000 psi. The air content shall be 0-3%. Maximum concrete temperature shall not exceed 85° Fahrenheit or per ACI 305. Minimum concrete temperature shall not drop below 55° Fahrenheit or per ACI 305. Maximum Time of batch 1.5 hours or per ACI 305/306. Maximum number of revolutions: 250.

15-02B Lampblack and Other Admixtures

Lampblack shall be of an approved quality, mixed at the rate of one (1) pint per cubic yard of minor concrete mix and shall be used in Hardscape concrete applications only.

Use of concrete admixtures shall be in conformance with Section 90-1.02E, "Admixtures," of the State Standard Specifications and only upon the approval of the Engineer.

15-02C Curing Compounds

Materials for curing concrete shall be in conformance with Section 90-1.03B(3), "Curing Compound Method," of the State Standard Specifications. All curing compounds shall be of the non-pigmented type with fugitive dye in conformance with ASTM C 309, Type 1-D, Class A.

15-02D Base Material

Granular material used as a base cushion shall be Class 2, 3/4-inch (3/4") maximum size aggregate in conformance with Section 26, "Aggregate Bases," of the State Standard Specifications.

15-02E Reinforcement and Dowels

Steel bar for concrete reinforcement and dowels shall be deformed billet-steel bars of the size or sizes as specified on the Project Plans and shall conform to the requirements of ASTM A 615 for Grade 40 or Grade 60 bars.

Sidewalk, driveways, and curb and gutter shall have a minimum of #3 bar spaced at sixteen-inches (16") on center.

15-02F Fiber Reinforcement

Fibrous Reinforcement shall be used for all curb and gutters, sidewalks and driveways.

Fibrous Reinforcement shall be delivered in bagged reinforcing fibers in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, and weight of fibers. Store reinforcing fibers in dry area in accordance with manufacturer's instructions. Keep bags sealed until ready for use. Protect reinforcing fibers during handling to prevent contamination.

Add reinforcing fibers into concrete mixture in accordance with manufacturer's instructions and ASTM C 94. Mix synthetic fiber reinforcement in concrete mixer in accordance with mixing time and speed of ASTM C 94 to ensure uniform distribution and random orientation of fibers throughout concrete. Allow a minimum of four (4) minutes at mixing speed.

Fibrous Reinforcing shall be Fibermesh 300 manufactured by Propex Concrete Systems Corp., 6025 Lee Highway, Ste 425, PO Box 22788, Chattanooga, Tennessee 37422. Toll Free (800) 621-1273. Phone (423) 892-8080. Fax (423) 892-0157. Website www.fibermesh.com. E-mail fibermesh@propexinc.com.

Or Approved Equal by City Engineer.

15.03 Construction

Concrete improvements shall be constructed in accordance with the Special Provisions and Project Plans, City Standard Specifications, all applicable City Standard Details and Section 73, "Concrete Curbs and Sidewalks," of the State Standard Specifications.

When the Project Plans require monolithic curb, gutter, and sidewalk, the Contractor shall place concrete for the curb, gutter, and sidewalk as one continuous pour.

Where new concrete is placed against existing concrete, the existing concrete shall be drilled and dowelled with steel dowels or reinforcing steel. The dowels or reinforcing steel shall be set into the existing concrete with adhesive. Dowel or reinforcing steel size and spacing shall be according to the following schedule (HIT-HY10 or approved equal):

<u>Application</u>	<u>Bar Size</u>	<u>Length, Inches</u>	<u>Dowel Spacing, Inches</u>
Sidewalk	4	12	18
Sidewalk to curb	4	12	18
Curb and gutter	4	12	3 per curb

Batch weight tickets to be included with delivery ticket. Batch weight tickets shall include weights/volumes of all materials included in the mix including admixtures and time of batch. Delivery and batch weight tickets shall have approved mix design number, date, and any additional water added after batching written on the sheets.

Concrete shall be placed per ACI 306 "Cold Weather Concreting" if applicable per the discretion of the City. ACI 306 may apply if the average daily air temperature is less than 40°F and the air temperature is not greater than 50° Fahrenheit for more than one-half of any 24-hour period.

Concrete shall be placed per ACI 305 "Hot Weather Concreting" if applicable per the discretion of the City. ACI 305 may apply if any combination of the following conditions occurs that tends to impair the quality of the freshly mixed or hardened concrete:

- High ambient temperature, temperature above 90° Fahrenheit
- High concrete temperature, temperature above 85° Fahrenheit
- Low relative humidity, humidity less than 30 percent (30%)
- Wind speed greater than ten (10) mpg
- Solar radiation (Poured in direct sunlight between 10:00 a.m. and 4:00 p.m.)

15-03A Subgrade and Base Preparation

Subgrade and base preparation shall be constructed in accordance with Section 4, "Roadway Excavation and Grading," and Section 7, "Aggregate Base," of the City Standard Specifications.

15-03B Sawcutting Existing Concrete Improvements

Where a portion of existing concrete surface improvements is to be removed and replaced, the section to be removed shall be sawcut with an approved concrete saw to a minimum depth of 1½ inches (1½"). For sidewalks, ADA access ramps, and driveways, the limit of the saw cut shall be at a minimum the first score line beyond the limits of the area to be replaced or as directed by the Engineer. For curb and gutter, the limit of the sawcut shall be the nearest deep joint or as directed by the Engineer.

15-03C Forms

No forms shall be placed prior to approval of the subgrade and aggregate base by the Engineer.

Timber forms shall be surfaced on the side placed next to the concrete and shall have a true surfaced upper edge and shall not be less than 1½ inches (1½") thick after being surfaced except on curb returns, horizontal curves, and vertical curves where laminated timber forms, bender boards, or thin plank forms may be used.

The depth of forms for the toe and back of curbs shall be equal to the full depth of the curb. The depth of the face forms for concrete curbs shall be equal to the full face height of the curb.

Forms shall be carefully set to alignment and grade and shall conform to the required dimensions. Forms shall be held rigidly in place by stakes. Clamps, spreaders, and braces shall be used where required to insure rigidity in the forms.

15-03D Portland Cement Concrete

No concrete shall be placed until the subgrade, aggregate base, forms, reinforcement, and curb-through drains have been approved by the Engineer.

Concrete improvements shall not exceed the tolerances established in Section 73, "Concrete Curbs and Sidewalks," of the State Standard Specifications.

15-03E Deep Joints and Score Lines

Deep joints and score lines shall be placed at the interval spacing as according to the City Standard Details. Deep joints shall be a maximum of 1½ inches (1½") in depth. Score lines shall be maximum 1/4 inch in depth. Expansion joints shall not be allowed.

15-03F Water Test

All curb and gutter work shall be water-tested before final finish.

15-03G Sidewalk Slope

Sidewalk shall drain toward the street, with a maximum slope of 1/4 inch per foot.

15-03H Extruded Curb

Extruded curbs shall only be allowed upon approval of the Engineer. Extruded curb construction shall conform to Section 73-2.03C, "Extruded or Slip Formed Methods," of the State Standard Specifications.

15-03I Finishes

All concrete surface improvements, except miscellaneous concrete footings, shall receive a soft broom finish. The sidewalk shall be broomed transverse to the curb; and the curb and gutter shall be broomed longitudinally.

15-03J Curing

All exposed surfaces of Portland cement concrete shall be cured in conformance with Section 90-1.03BC, "Curing Compound Method," of the State Standard Specifications.

15-04 Measurement

Concrete sidewalk, driveways, bus turnouts, median nose surfacing, and sidewalk and driveway conforms shall be measured on the basis of square footage. Concrete curb and gutter and valley gutters shall be measured on the basis of linear feet including driveways. ADA access ramp shall be measured and counted as a complete unit in place and shall include the fronting curb and gutter, the truncated domes, the retaining curb(s) at the back or at the sides, and the potential enlargement of the side areas up to the nearest expansion joints.

15-05 Payment

The contract price for concrete surface improvements including concrete curbs; gutters; valley gutters; sidewalks; ADA access ramps; bus turnouts; driveways; median nose surfacing; and walk and driveway conforms shall include full compensation for concrete saw cutting; aggregate base; forms; reinforcement; adhesive; dowels; Portland cement concrete; scoring; water-testing; final finish work; and curing of concrete surface improvements complete in place.

SECTION 16. STREET NAME AND TRAFFIC SIGNS

16-01 General

This section covers requirements for materials and methods of installation of street name signs and traffic signs.

Street name signs shall be in accordance with these City Standard Specifications and Detail Nos. 116 through 122 of the City Standard Details.

Traffic signs shall be in accordance with these City Standard Specifications; Detail No. 120, "Traffic Sign," of the City Standard Details; Section 82, "Signs and Markers" in the State Standard Specifications, and shall conform to the requirements of the latest edition of the California Manual on Uniform Traffic Control Devices (CA MUTCD). The CA MUTCD is available on the State Department of Transportation website via the following link: <http://mutcd.fhwa.dot.gov/>

Unless otherwise noted, all signs shall be of "Standard" size.

16-02 Materials

Fabrication of all metal parts shall be accomplished in a uniform and workmanlike manner. The tolerance of the panels shall be plus or minus 1/32 inch. Panels shall be cut to size and shape and shall be free of buckles, warp, dents, cockles, burrs and any other defects resulting from fabrication. The surface of all sign panels shall be flat.

All sign plates shall be 0.080 inch aluminum alloy.

The cantilever bracket supports for all signs installed on round street light standards shall conform to the requirements of SIGNFIX Cantilever Sign System or equal. For sign blanks up to 20 inches (20") in length, with a maximum area of two square feet, use SIGNFIX Stainless Steel Mini Cantilever Brackets, with 5/8-inch stainless steel band and buckle BAND-IT or equal. For sign blanks up to 42 inches (42") in length, with a maximum area of six square feet, use SIGNFIX V-Back Aluminum Cantilever Brackets, with 5/8-inch stainless steel band and buckle BAND-IT or equal.

All signs are to be of Diamond grade reflectivity.

16-02A Signs

Street name signs shall be nine inches (9") wide by 24 inches (24") minimum length and may be up to 36 inches (36") long when necessary to accommodate the sign legend, and lettering shall be six inches (6") in height. The sign shall include the abbreviated street category and block number each three inches (3") in height. Street name and category letters and block numbers shall be orientated as shown in Detail Nos. 117, "Street Name Sign," and 119, "Arch Street Name Sign," of the City Standard Details. Sign background shall be green with reflective white lettering. All plates shall have a half-inch (1/2") radius on the corners. All

signs shall be sheeted with 3M's DG3 and 3M's EC film in appropriate colors. All Arch Street Name signs shall be purchased from the City of Pleasanton Sign Shop. Contact the Street Maintenance Division at (925) 931-5551 to place orders or obtain pricing.

Traffic sign materials shall conform to Section 82-2 , "Sign Panels" of the State Standard Specifications.

16-02B Posts and Mounting Hardware

Posts shall be two-inch (2") standard weight galvanized iron pipe with thickness dimension of 0.154 inches. Mounting hardware for street name signs shall be Hawkins Heavy Duty Aluminum "Slotted Lock," (HD)SL or approved equal.

Posts for traffic signs in concrete median areas and traffic islands shall be square formed steel tube, telescoping metal breakaway type, Unistrut Sign Support System or equal. Tubing shall be 12 gauge strip steel, structural quality, conforming to ASTM A-570 Grade 33. Galvanized tubing shall be 12 gauge strip steel, structural quality, conforming to ASTM A 446 Grade A; hot-dipped galvanized with a 1.25-ounce zinc coat, interior and exterior, conforming to ASTM C 653 coating designation G90; and the corner welds shall be zinc coated after scarfing operations.

Hardware for formed steel tube posts shall conform to the requirements of Unistrut Telespar Sign Support System or equal. Drive rivets shall be Unistrut TL 3806 or equal.

Posts for traffic signs in all other areas shall be two-inch (2") standard weight galvanized iron pipe with thickness dimension of 0.154 inches as shown on Detail No. 117, "Street Sign Post," of the City Standard Details. Under certain conditions as determined and approved by the Engineer, posts may also be four-inch by four-inch (4" x 4") redwood construction heart S4S, per the CA MUTCD.

Hardware for galvanized iron pipe posts shall be Hawkins sign bracket #M2-C2B with vandal proof bolt M2G-BTP or equal.

16.03 Construction

All sign locations shall be inspected and approved by the Engineer prior to installation. The Contractor shall notify the Engineer no later than 48 hours prior to the start of the scheduled sign installation. The Contractor shall contact Underground Services Alert (USA) at 1-800-227-2600 to request marking of all underground facilities known to be in the area of construction. All reference markings made by the Contractor shall be done with spray chalk and shall be removed by the Contractor after installation of the signs.

Pipe posts shall be set at least two feet (2') into the ground and shall be encased in Caltrans minor concrete poured against undisturbed earth, with a minimum thickness of 6 inches of concrete outside the pipe at any point.

For posts installed in existing sidewalks, a six-inch (6") core shall be drilled, the anchor installed, the core filled with Caltrans minor Portland cement concrete. Existing surface other than Portland cement concrete shall be replaced in kind, with the replacement matching the existing product, depth and pattern, to the satisfaction of the Engineer. The sleeve shall be protected such that concrete will not enter the inside of the square post.

Signs on street light standards shall be installed using cantilever support brackets in accordance with the manufacturer's recommendations. Cantilever bracket system shall be installed on both the top and bottom of each sign.

16-03A Street Name Signs

Street name signs shall consist of an assembly of one, two, or three street name plates, as appropriate. There shall be at least one (1) street name sign assembly installed at each undivided street intersection and at least two (2) street name sign assemblies installed at each divided street intersection. The street name signs shall be installed at the locations shown on the Project Plans. If specific locations are not indicated on the Project Plans, then the street name signs shall be installed in the quadrant of the intersection at the lower end of the block represented by the particular block number.

Signs shall be mounted one over the other on the top of a two-inch (2") (inside diameter) standard weight galvanized iron pipe post.

16-03B Traffic Signs

Traffic sign types, locations and offsets shall be in accordance with the Project Plans.

Traffic signs supported by pipe posts shall be installed in accordance with Detail No. 117, "Street Sign Post," of the City Standard Details and Sections 82-2.03 , "Construction," of the State Standard Specifications. Traffic signs supported by wood posts shall also be installed in accordance with Sections 82-2.03 , "Construction," of the State Standard Specifications.

Traffic signs supported by formed steel tubes shall be installed in accordance with the requirements of Unistrut Telespar Sign Support System or equal.

16-04 Measurement

Street name and traffic signs shall each be measured by the number of items.

16-05 Payment

The contract price for street name and traffic signs shall include full compensation for street name and traffic sign plates, reflective sheeting, lettering, posts and mounting complete in place.

SECTION 17. TRAFFIC STRIPES AND PAVEMENT MARKINGS

17-01 General

Traffic stripes shall be either thermoplastic or raised pavement markers as shown on the Project Plans. Thermoplastic traffic stripes shall be in accordance with Section 84-2, "Traffic Stripes and Pavement Markings," of the State Standard Specifications. Raised pavement markers shall be in accordance with Section 81-3 , "Pavement Markers ," of the State Standard Specifications. All legends, crosswalks, arrows, and other pavement markings shall be thermoplastic in accordance with Section 84-2, "Traffic Stripes and Pavement Markings," of the State Standard Specifications. Details for traffic stripes and pavement markings shall be in conformance with A20A through A24F of the State Standard Plans.

17-02 Materials

17-02A Thermoplastic

Thermoplastic material shall conform to the requirements of Section 84-of the State Standard Specifications.

17-02B Paint

Paint shall only be used for traffic stripes and pavement markings when shown on the Project Plans and approved by the Engineer. Paint for traffic stripes and pavement markings shall conform to Section 84, "Materials," of the State Standard Specifications.

17-02C Pavement Markers

Pavement marker materials shall conform to Sections 81-3 "Pavement Markers" of the State Standard Specifications. Non-reflective pavement markers shall be ceramic. The adhesive used for pavement markers shall be the rapid-set type conforming to Section 95, "Epoxy," of the State Standard Specifications or hot melt bituminous adhesive conforming to Section 81-3.02D, "Hot Melt Bituminous Adhesives," of the State Standard Specifications.

17-03 Construction

Approximate locations of all traffic stripes and pavement markings are shown on the Project Plans. Exact locations shall be approved by the Engineer before placement.

Traffic stripes and pavement markers shall be placed in accordance with the control lines established by the plans Project Plans, or as directed by the Engineer.

Temporary striping and markings shall conform to Section 2-01F, "Temporary Pavement Delineation," of these City Standard specifications.

All layouts shall be inspected and approved by the Engineer prior to permanent placement of the traffic stripes and pavement markings. The Contractor shall notify the Engineer no later than two (2) working days prior to the start of the scheduled traffic stripe and pavement marking installation.

Any overlap, dripping or tracking of fresh thermoplastic or paint onto unmarked surfacing shall be removed to the satisfaction of the Engineer.

Any layout markings or cat-tracking remaining after installation of the permanent marking shall be removed or painted over at the direction of the Engineer.

Thermoplastic and paint shall be placed as close as possible to existing utility structures and monument frames and covers without covering them.

The Contractor shall protect all fresh thermoplastic and paint after installation. All damage to traffic stripes and/or pavement markings caused by the Contractor's failure to do so shall be repaired or replaced at the Contractor's own expense.

17-03A Removal

All removed traffic stripes and pavement markings and excess material shall become the property of the Contractor and shall be removed and disposed of in a legal and proper manner in accordance with Section 15, "Existing Facilities," of the State Standard Specifications.

The Contractor shall not damage existing pavement and public improvements to remain. Any resultant damage shall be repaired by the Contractor at the Contractor's expense. Damage to the pavement resulting from removal of pavement markers shall be considered as any depression more than 1/4 inch in depth. Such damage shall be repaired by the Contractor by filling the depression with hot bituminous adhesive to the satisfaction of the Engineer.

Where sand blasting is used for removal of traffic stripes and pavement markings or objectionable material, the sand residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation. Where removal of traffic stripes and pavement markings is done by grinding or sandblasting methods, the affected pavement surface shall be completely covered by applying asphaltic emulsion conforming to Section 94, "Asphaltic Emulsions," of the State Standard Specifications.

All temporary traffic stripes and pavement markings shall be removed by the Contractor after placement of permanent striping and markings.

17-03A.1 Hazardous Materials

The existing yellow thermoplastic/paint striping is understood and assumed to contain lead. Any work that disturbs the existing paint system will expose workers to health hazards and will (1) produce debris containing heavy metal in amounts that exceed the thresholds

established in Titles 8 and 22 of the California Code of Regulations or (2) produce toxic fumes when heated. All debris produced when the existing paint system is disturbed shall be contained.

Debris Containment and Collection Program

Prior to starting work, the Contractor shall submit a debris containment and collection program prepared by a CIH (Certified Industrial Hygienist) to the Engineer in conformance with the provisions in Section 5-1.02, "Contract Components," of the State Standard Specifications, for debris produced when the existing yellow thermoplastic/paint striping is disturbed. The program shall identify materials, equipment, and methods to be used when the existing yellow thermoplastic/paint striping is disturbed and shall include removal and collection methodologies, work area monitoring, and worker safety considerations.

At the option of the Contractor, the removal shall consist of either: (1) scraping with mechanical equipment with vacuum recovery and wet wiping if necessary, (2) high pressure water removal with full vacuum recovery, or (3) an equivalent method approved by the CIH and the City. The containment system shall contain all water, resulting debris, and visible dust produced when the existing yellow thermoplastic/paint striping is disturbed.

If the measures being taken by the Contractor are inadequate to provide for the containment and collection of debris produced when the existing yellow thermoplastic/paint is disturbed, the Engineer will direct the Contractor to revise the operations and the debris containment and collection program. The directions will be in writing and will specify the items of work for which the Contractor's debris containment and collection program is inadequate. No further work shall be performed on the items until the debris containment and collection program is adequate and, if required, a revised program has been approved for the containment and collection of debris produced when the existing yellow thermoplastic/paint striping is disturbed.

The Engineer will notify the Contractor of the approval or rejection of the debris containment and collection program or revised program within two (2) weeks of its receipt.

The City will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised debris containment and collection program, nor for delays to the work due to the Contractor's failure to submit an acceptable program.

Full compensation for the debris containment and collection program shall be considered as included in the contract prices paid for various items of work causing the existing yellow thermoplastic/paint striping to be disturbed, and no additional compensation shall be allowed therefore.

Safety and Health Provisions

Attention is directed to Section 7-1.02K, "Occupational Safety & Health Standards," of the Standard Specifications. Work practices and worker health and safety shall conform to the

California Code of Regulations, Title 8, Construction Safety Orders, including Section 1532.1 "Lead."

The Contractor shall furnish the Engineer a written Code of Safe Practices and shall implement an Injury and Illness Prevention Program and a Hazard Communication Program in conformance with the requirements of Construction Safety Orders, Section 1509 and 1510.

Prior to starting work that disturbs the existing yellow thermoplastic/paint striping, and when revisions to the program are required by Section 1532.1, "Lead," the Contractor shall submit the compliance programs required in subsection (e) (2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer in conformance with the provisions in Section 5-1.02, "Contract Components," of the Standard Specifications. The compliance program shall include the data specified in subsections (e) (2) (B) and (e) (2) (C) of Section 1532.1, "Lead." Approval of the compliance programs by the Engineer will not be required. The compliance programs shall be reviewed and signed by a Certified Industrial Hygienist (CIH) who is certified in comprehensive practice by the American Board of Industrial Hygiene (ABIH). Copies of all air monitoring or jobsite inspection reports made by or under the direction of the CIH in conformance with Section 1532.1, "Lead," shall be furnished to the Engineer within 24 hours after monitoring or inspection.

Full compensation for furnishing the Engineer with the submittals and for implementing the programs required by this safety health section shall be considered as included in the contract prices paid for items of work causing the existing yellow thermoplastic/paint striping to be disturbed, and no additional compensation shall be allowed therefore.

Debris Handling

Debris produced when the yellow thermoplastic/paint striping is disturbed shall not be temporarily stored on the ground. Debris accumulated inside the containment system shall be removed before the end of each work shift. Debris shall be stored in approved, leak proof containers and shall be handled in such a manner that no spillage shall occur.

Disposal of debris produced when the existing paint system is disturbed shall be performed in conformance with all applicable Federal, State and local hazardous waste laws. Laws that govern this work include:

- Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act.)
- Title 22; California Code of Regulations, Division 4.5, (Environmental Health Standards for the Management of Hazardous Waste).
- Title 8, California Code of Regulations.

Except as otherwise provided herein, debris produced when the existing yellow thermoplastic/paint striping is disturbed shall be disposed of by the Contractor at an approved Class 1 disposal facility in conformance with the requirements of the disposal facility

operator. The debris shall be hauled by a transporter currently registered with the California Department of Toxic Substances Control using correct manifesting procedures and in a vehicle displaying current certification of compliance. The Contractor shall make all arrangements with operator of the disposal facility and perform any testing of the debris required by the operator.

At the option of the Contractor, the debris produced when the existing yellow thermoplastic/paint is disturbed may be disposed of by the Contractor at a facility equipped to recycle the debris, subject to the following requirements:

- The debris produced when the existing yellow thermoplastic/paint striping is disturbed shall be tested by the Contractor to confirm that the solubility of the heavy metals is below regulatory limits and that the debris may be transported to the recycling facility as a non-hazardous waste.
- The Contractor shall make all arrangements with the operator of the recycling facility and perform any testing of the debris produced when the existing yellow thermoplastic/paint striping is disturbed that is required by the operator.
- Full compensation for debris handling and disposal shall be considered as included in the contract prices paid for items of work causing the existing yellow thermoplastic/paint striping to be disturbed, and no additional compensation shall be allowed therefore.

Work Area Monitoring

The Contractor shall perform work area monitoring of the ambient air and ground surfaces in and around the work area to verify the effectiveness of the containment system. The work area monitoring shall consist of collecting, analyzing, and reporting air and sample testing results and recommend the required corrective action when specified exposure levels are exceeded. The work area monitoring shall be carried out under the direction of a CIH hired and compensated by the Contractor. The samples shall be collected at locations designated by the Engineer.

Air samples shall be collected and analyzed in conformance with National Institute for Occupational Safety and Health (NIOSH) methods. Air samples for lead detection shall be collected and analyzed in conformance with NIOSH Method 7082, with a limit of detection of at least 0.5 microgram per cubic meter. Air samples for detection of other metals shall be collected and analyzed in conformance with NIOSH Method 7300, with a limit of detection of at least one percent (1%) of the appropriate Permissible Exposure Limits (PELs) specified by the California Occupational Safety and Health Administration (Cal/OSHA). Alternative methods of sample collection and analysis, with equivalent limits of detection, may be used at the option of the Contractor, if approved by the Engineer.

The airborne metals exposure, outside either the containment system or work areas, shall not exceed the lower of either: (1) ten percent (10%) of the Action Level specified for lead by

Section 1532.1, "Lead," of the Construction Safety Orders, or (2) ten percent (10%) of the appropriate Permissible Exposure Levels (PELs) specified for other metals by Cal/OSHA.

The air samples shall be collected at least once per each location during progress of work that disturbs the existing yellow thermoplastic striping. All air samples shall be analyzed within 24 hours at a facility accredited by the Environmental Lead Laboratory Accreditation Program of the American Industrial Hygiene Association (AIHA). The Contractor shall obtain procedure compliance from the CIH by performing on site operation before proceeding to other locations in the City. When corrective action is recommended by the CIH, Contractor shall revise all procedure and testing at Contractor's expense.

Air sample laboratory analysis results, including result of additional samples taken after corrective action as recommended by the CIH, shall be submitted to the Engineer. The results shall be submitted both verbally within 24 hours after sampling and in writing with a copy to the Contractor, within two (2) days after sampling. Sample analysis reports shall be prepared by the CIH as follows:

- For the sample laboratory analysis results, the date and location of sample collection, sample number, contract number, street location, and section and sheet number on plan will be required.
- For air sample laboratory analysis, the following will be required:
 1. List of emission control measures in place when air samples were taken.
 2. Air sample results shall be compared to the appropriate PELs.
 3. Chain of custody forms.
 4. Corrective action recommended by the CIH to ensure airborne metals exposure, outside either the containment system or work areas, is within specified limits.

17-03B Thermoplastic

Thermoplastic traffic stripes and pavement markings shall be installed in accordance with Section 84-2.03, "Construction," of the State Standard Specifications with the exception that only the extrusion application method shall be allowed. Thermoplastic material for traffic stripes and pavement markings shall be applied at a minimum thickness of 0.100 inch.

17-03C Painted Stripes

Painted traffic stripes and pavement markings shall be installed in accordance with Section 84-2.03C(3) "Painted Traffic Stripes and Pavement Markings," of the State Standard Specifications.

17-03D Pavement Markers

Pavement markers shall be installed in accordance with Section 81-3 "Pavement Markers," of the State Standard Specifications. The adhesive used for pavement markers shall be the

rapid-set type conforming to Section 95, "Epoxy," of the State Standard Specifications, or hot melt bituminous adhesive conforming to Section 81-3.02D, "Hot Melt Bituminous Adhesives," of the State Standard Specifications.

Raised pavement markers shall be installed on the 14th calendar day after asphalt concrete is placed.

Blue raised pavement markers shall be installed opposite fire hydrants, according to the City Standard Details.

17-04 Measurement

Traffic stripes shall be measured by the linear foot. Thermoplastic legends shall be measured by the square foot, as provided for in the State Standard Plans. Hydrant markers shall be measured by the number of markers.

17-05 Payment

The contract price for traffic stripes and pavement markings shall include full compensation for: removing existing traffic striping and pavement markings; establishing alignment and layout work; application of thermoplastic complete in place; placing reflective pavement markers including adhesives complete in place; and cleanup including removal and disposal of residue from grindings or recess construction, including monitoring by a Certified Industrial Hygienist (CIH).

SECTION 18. STREET LIGHTING

18-01 General

The Contractor shall furnish and install standard street lights per the Project Plans, Special Provisions, these City Standard Specifications, the City Standard Details, and the provisions in Section 86, "Electrical Work," of the State Standard Specifications (2015 Revised Standard Specifications "Division X Electrical Work").

The locations of PG&E service drops are shown on the Project Plans.

All poles, mast arms, pole foundations, conduits, pull lines, wiring, luminaires, and pull boxes shall be supplied and installed by the Contractor and shall meet the requirements of the Project Plans, Special Provisions, these City Standard Specifications, the City Standard Details and the provisions in in Section 86, "Electrical Work," of the State Standard Specifications (2015 Revised Standard Specifications "Division X Electrical Work").

All poles, mast arms, pole foundations, conduits, pull lines, wiring, luminaires, and pull boxes shall be subject to inspection by the City.

18-01A Scope

The Contractor shall install street lights and underground service to the PG&E service point and terminate conduit and wiring in boxes as shown on the Project Plans.

All work and materials shall be in full accordance with the latest rules and regulations of the State Fire Marshall; all applicable City, County, State, and Federal Regulations; the latest standards of IEEE, ASA, NEC, and OSHA where applicable; in Section 86, "Electrical Work," of the State Standard Specifications (2015 Revised Standard Specifications "Division X Electrical Work"); and as modified in these City Standard Specifications.

In addition to complying with all applicable codes and regulations as noted above, the Contractor shall comply with all local utility company regulations.

18-02 Materials

A certificate of compliance shall be required for all material prior to delivery at the project site.

Conduit which is installed underground shall be rigid, nonmetallic type, 1½ inches (1½"), Schedule 40 minimum. Conduit shall enter all pull boxes with a 90-degree elbow, unless otherwise permitted by the Engineer.

All street light wiring shall be Type THW No. 8 copper wire rated to operate at 600 volts. All fixture wiring within the pole shall be Type THW No. 10 copper wire rated to operate at

600 volts. All wire sizes are those that are minimally acceptable. Any substitution shall be approved by the Engineer prior to installation.

All street light standards shall have a No. 3.5 Pull Box adjacent to the foundation facing away from traffic, unless otherwise noted.

All street lights shall be fused with a waterproof disconnect splice connector with a 5 Amp. Buss "TRON" fuse enclosure (or approved equal) located in a pull box next to each standard.

All street light fixtures shall have a Type IV photoelectric control mounted on top of each luminaire or the top of each pole which plugs into an EEI-NEMA twist lock receptacle.

Brushing on PVC rigid non-metallic conduit is required per Section 347-12 of the NEC.

The Contractor shall be responsible for attaching reflective identification number to each pole.

18-02A LED Luminaire

This specification is for the purchase of light emitting diode (LED) roadway lighting luminaires (herein referred to as luminaires) mast-arm applications.

All devices must meet the general specifications of the Transportation Electrical Equipment Specifications (TEES), in Section 86, "Electrical Work," of the State Standard Specifications (2015 Revised Standard Specifications "Division X Electrical Work") as well as the following specification. In case of conflict, this specification shall govern over the TEES, Chapter 1.

For additional luminaire specifications please refer to the Caltrans LED Roadway specifications.

Glossary

Wherever the following terms or abbreviations are used, the intent and meaning shall be interpreted as follows:

CALiPER: Commercially Available LED Product Evaluation and Reporting A US DOE program for the testing and monitoring of commercially available LED luminaires and lights.

CCT: correlated color temperature. A visible light characteristic of comparing a light source to a theoretical, heated black body radiator. Measured in Kelvin.

Cd: Candela. Unit of measurement of light intensity.

Chromaticity: The property of color of light

fc: foot-candle. Unit of illuminance

IP: International Protection rating, sometimes referred to as ingress protection, that delineates the level at which foreign objects and water can intrude inside a device.

LED: Light Emitting Diode.

METS: Material Engineering and Testing Services of the Translab.

NEMA: National Electrical Manufacturers Association

NVLAP: National Voluntary Laboratory Accreditation Program A program under the USDOE to accredit independent testing laboratories to qualify

Power factor: The ratio of the real power component to the total (complex) power component

Rated power: The power consumption that the luminaire was designed and tested for at ambient temperature (70° Fahrenheit or 21° Celsius)

SPD: Surge Protection Device. A subsystem or component(s) that can protect the unit against short duration voltage and current surges

TEES: Transportation Electrical Equipment Specifications. A package of standard specifications for transportation related electrical equipment to be used on State Highways. This document is compiled by Caltrans Traffic Operations Program.

THD: Total Harmonic Distortion. The amount of higher frequency power on the power line

General Requirements

Each luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).

Luminaires shall be listed on the “PG&E Pre-Qualified LED Street Lighting for Rebate & Incentive Programs” list (see www.pge.com/led) unless otherwise approved by the engineer. These fixtures have been approved by the PG&E LED Street Light Program and may be eligible for rebates and incentives. Luminaires shall be the GE ERSI series unless otherwise directed by the engineer.

The LED lamps utilized in the luminaire shall be individually capable of producing white light, and shall be the ultra-bright or hi-flux/hi-power type rated to produce a minimum of 70 percent (70 %) of initial intensity at 50,000 hours of life.

Each luminaire shall be rated for a minimum operational life of 74,000 hours of operations at an average operating time of 11.5 hours per night based on their LM-80 test. Each luminaire shall be designed to operate at an average temperature of 70° Fahrenheit. The operating

temperature range shall be -40° Fahrenheit to +130° Fahrenheit. Each luminaire shall meet all parameters of this specification throughout the minimum operational life when operated at the average nighttime temperature. The individual LEDs shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire. Each luminaire shall be listed with Underwriters Laboratory, Inc. under UL 1598 for luminaires, or an equivalent standard from a recognized testing laboratory.

Technical Requirements

Power Consumption

Luminaires shall not exceed the following wattages identified to replace traditional High Pressure Sodium (HPS), Metal Halide (MH), or Mercury Vapor (MV) applications unless otherwise approved by the Engineer. Alternate applications and LED equivalents shall be approved by the Engineer.

Traditional Application Wattage	Maximum LED Luminaire Wattage
70W MV	37W
70W HPS / 100W MH	51W
100W HPS	73W
150W HPS, 175W MH	105W
200W HPS, 250W MH	147W
250W HPS, 400W MH	204W
310W HPS	204W

Operation Voltage

The luminaire shall operate from a 60 HZ ± 3 HZ AC line over a voltage ranging from 95 VAC to 285 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.

The standard operating voltages are 120 VAC, 207 VAC 240 VAC, and 277 VAC.

Power Factor

The luminaire shall have a power factor of 0.90 or greater.

THD

Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent (20%).

Surge Suppression

The luminaire on-board circuitry shall include surge protection devices (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference.

- The SPD shall protect the luminaire from damage and failure for transient peak voltages up to 10 kV (minimum) and transient peak currents up to 5 kA (minimum).
- SPD shall conform to UL 1449, or UL 1283, depending of the components used in the design.
- SPD performance shall be tested per the procedures in ANSI/IEEE C62.41-1992 (or current edition).

Operational Performance

The LED circuitry shall prevent perceptible flicker to the unaided eye over the voltage range specified above.

Compatibility

The luminaire shall be operationally compatible with currently used lighting control systems and photoelectric controls as detailed in 2006 Caltrans Standard Specification 86-6.07.

RF Interference

The luminaires and associated on-board circuitry must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise.

Photometric Requirements

Illuminance

The use of the Illuminating Engineering Society of North America's (IESNA) publication RP-8 entitled "American National Standard Practice for Roadway Lighting" provides recommended guidelines for the design, operation and maintenance of roadway lighting systems. These guidelines are neither intended as, nor does it establish, a legal standard for roadway lighting systems.

Light Color/Quality

The City requires that LED luminaires shall have a correlated color temperature (CCT) range of 3,500K to 4,500K. Luminaires with CCT's above 4500k will not be accepted.

The color rendition index (CRI) shall be 50 or greater.

Cut-Off Distribution

The luminaire shall conform to the IESNA definition of "full cutoff"

- The luminaire shall not allow more than 10 percent of the rated lumens to project above 80 degrees from vertical.
- The luminaire shall not allow any of the rated lumens to project above 90 degrees from vertical.
- The luminaire IES Backlight, Uplight, Glare ("BUG") Rating shall be 1,1,1, or better.

LED luminaires on most local residential streets and 2-lane collector streets shall produce a Type II light distribution. LED luminaires on most multilane arterial roadways and at signalized intersections shall produce a Type III light distribution. Photometric performance of the LED fixture shall be evaluated per LM-79 by a qualified independent photometric testing laboratory, and the manufacturer shall be required to submit the resulting data in "I.E.S." format and the associated photometric test report. Additionally, a photometric layout demonstrating performance to the stated parameters of this specification shall be submitted by the manufacturer.

Thermal Management

The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life. The designed maximum junction temperature shall not exceed 105° Celsius. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed. On request the manufacturer shall provide thermal tests showing that the junction temperature will not exceed 105° Celsius in 100°+ Fahrenheit temperatures.

Physical and Mechanical Requirements

The luminaire shall be a single, self-contained device, not requiring on-site assembly for installation. The power supply for the luminaire shall be integral to the unit. The maximum weight of the luminaire shall be 35 lbs. The maximum effective projected area (when viewed from either side or either end) shall be 1.4 square feet. The housing shall be a light or medium gray color with a flat or semi-gloss sheen.

Each housing shall be provided with a slip-fitter capable of mounting on a two-inch (2") pipe tenon. The housing shall include a 4 bolt attachment to the 2 inch pipe tenon.

- This slip-fitter shall fit on mast-arms from 1-5/8 to 2-3/8 in (O.D.)
- The slip-fitter shall be capable of being adjusted a minimum of $\pm 5^\circ$ from the axis of the tenon in a minimum of five steps (+5, +2.5, 0, -2.5, -5).
- The clamping brackets of the slip-fitter shall not bottom out on the housing bosses when adjusted within the designed angular range.
- No part of the slip-fitter mounting brackets on the luminaires shall develop a permanent set in excess of 1/32 in. when the two or four 3/8 in. diameter cap screws used for mounting are tightened to 10 ft-lb.

The assembly and manufacturing process for the LED luminaire shall be designed to assure all internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources. Luminaires to be mounted on horizontal mast arms, when tested in conformance with California Test 611, shall be capable of withstanding cyclic loading. The housing shall be designed to prevent the buildup of water on the top of the housing. Exposed heat sink fins shall be oriented so that water can freely run off the luminaire, and carry dust and other accumulated debris away from the unit. The optical assembly of the luminaire shall be protected against dust and moisture intrusion per the requirements of IP-66 (minimum) to protect all internal components. Optical assembly specifically the area around the LED itself shall not have any gel or other liquids to assist in its thermal management or optics. The electronics/power supply enclosure shall be sealed and protected per the requirements of IP-54 (minimum). The receptacle shall conform to requirements of State Standard Specification 86-1.02M "Photoelectric Controls" (2015 Revised Standard Specifications "Division X Electrical Work").

Each mounted luminaire may be furnished with or without a photoelectric unit receptacle.

- If a photoelectric unit receptacle is included, a rain tight shorting cap shall be provided and installed. The receptacle shall conform to requirements of State Standard Specification 86-1.02M "Photoelectric Controls" (2015 Revised Standard Specifications "Division X Electrical Work").
- If the luminaire housing is provided with a hole for the receptacle, the hole shall be closed, covered and sealed with weatherproof material, in a permanent manner.

When the components are mounted on a down opening door, the door shall be hinged and secured to the luminaire housing separately from the refractor or flat lens frame. The door shall be secured to the housing in a manner to prevent its accidental opening.

Field wires connected to the luminaire shall terminate on a barrier type terminal block secured to the housing. The terminal screws shall be captive and equipped with wire grips for conductors up to No. 6. Each terminal position shall be clearly identified.

The circuit board and power supply shall be contained inside the luminaire. Circuit boards shall conform to Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications."

- Electrolytic capacitors used in the power supplies shall be rated for -40° Fahrenheit to 220° Fahrenheit (-40° Celsius to +105° Celsius), long life (> 5000 hours), and operated at no more than 70% of their rated voltage, and 70% of rated current.

Materials

Housings shall be fabricated from materials that are designed to withstand a 3000-hour salt spray test as specified in ASTM Designation: B117.

Each refractor or lens shall be made from UV inhibited high impact plastic such as acrylic or polycarbonate, and be resistant to scratching.

Polymeric materials (if used) of enclosures containing either the power supply or electronic components of the luminaire shall be made of UL94VO flame retardant materials. The lens of the luminaire is excluded from this requirement.

Paint or powder coating of the housing shall conform to the requirement of the Caltrans Standard Specifications and the Caltrans Standard Special Provisions.

Luminaire Identification

Each luminaire shall have the manufacturer's name, trademark, model number, serial number, date of manufacture (month-year), and lot number as identification permanently marked inside the each unit and the outside of each packaging box.

The following operating characteristics shall be permanently marked inside each unit: rated voltage and rated power in Watts and Volt-Ampere.

Quality Assurance

The luminaires shall be manufactured in accordance with a manufacturer quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance, and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of the modules built to meet this specification, and a documented process of how problems are to be resolved.

QA process and test results documentation shall be kept on file for a minimum period of seven years. LED luminaire designs not satisfying design qualification testing and the production quality assurance testing performance requirements described below shall not be labeled, advertised, or sold as conforming to this specification. The manufacturer of the LED

Street light shall be certified to ISO 9001 by a qualified accrediting body. Documentation of current ISO certification status shall be provided by the manufacturer.

Warranty

In addition to meeting the performance requirements for the minimum period of 72 months, the manufacturer shall provide a written warranty against defects in materials and workmanship for the luminaires for a period of 72 months after acceptance of the luminaires. Replacement luminaires shall be provided promptly after receipt of luminaires that have failed at no cost to the City.

18-03 Construction

Trench backfill shall be import as specified in Section 11-02B, "Pipe Embedment Material for Electric, Gas, Telephone, and Cable Utilities," of these City Standard Specifications and as shown in Detail Nos. 113, "Trench Backfill for Streets" and 506, "Street Light Standard Trench Detail & System Connection Diagrams" of the City Standard Details.

It is the Contractor's responsibility to have all installations inspected and approved prior to any backfilling.

Grounding and bonding shall properly interconnect all metal parts of the system. All connections shall be secured with lock nuts and insulated bushings.

No splices shall be permitted between pull boxes. All splices within boxes shall be watertight, Type "C" per CALTRANS Standard Plan ES-13, insulated by Method "B" or by heat-shrink tubing.

Foundation mounted street light standard shall be plumbed by adjusting the nuts on the anchor bolts before the foundation cap is placed. Shims or other similar devices for plumbing or raking will not be permitted. After plumbing the standard, anchor bolts shall be cut off 1/4 inch (1/4") above nuts and the exposed surfaces shall be repaired as necessary.

All conduits shall enter or exit perpendicular to pull box walls and have no more than 270 degrees in total bends between pull boxes.

It shall be the Contractor's responsibility to coordinate construction with PG&E, giving 48 hours' notice prior to the need for PG&E connection. After the connection is made, the Contractor shall initiate a five-day burn test.

18-04 Measurement

Street lights and pull boxes shall be measured by the number of items. Conduits and conductors shall be measured by the linear foot.

18-05 Payment

The contract price for street lights shall include full compensation for supply and installation of pole, mast arm, pole foundation, internal wiring and luminaire. The contract price for conduits and conductors shall include full compensation for supply and installation of conduit and conductors and pull lines including trenching, backfill, surface restoration, and termination at pull boxes. The contract price for pull boxes shall include full compensation for supply and installation of pull box including excavation, placement, backfill, and surface restoration.

SECTION 19. IRRIGATION

19-01 General

19-01A Scope of Work

This section covers the furnishing and installation of complete irrigation systems as shown on the Project Plans and specified in the Special Provisions; connection to existing water supply lines in street, related trenching and backfilling; electrical connections to automatic irrigation controller and the guarantee.

19-01B Purpose of Specifications

The purpose of this section of the City Standard Specifications is to accomplish the Work of installing a sprinkler system which will operate in an efficient and satisfactory manner according to the workmanlike standard established for sprinkler operation. Notwithstanding the fact that these City Standard Specifications may be deficient in setting forth a complete, detailed description, it is the responsibility of the Contractor to install the irrigation system in such a manner that it shall operate efficiently.

19-01C Project Plans

The irrigation Project Plan is diagrammatic and is not intended to show exact locations of piping and valves. The Contractor shall locate these items as closely as possible to related curbs and edges of paving. Pipe lines shown parallel in the Project Plans may be installed in one trench.

Sprinkler heads are shown accurately and shall be installed as indicated by the center of the symbol. Discrepancies in dimensions or sizes of areas to be irrigated shall be brought to the attention of the Engineer prior to trenching.

Locations of bubblers, backflow preventers, valves and other equipment are shown in the approximate locations intended and shall be installed as indicated in the detail drawings. Discrepancies in dimensions or sizes of areas to be irrigated shall be brought to the attention of the Engineer prior to installation.

19-01D Damage to Property

Prior to the start of construction, the City and Contractor shall perform an irrigation test to determine that all existing equipment is working properly. All deficiencies shall be repaired by the City and shall be noted by both the City and Contractor. At the end of the job, a final check shall be performed. The Contractor shall be responsible to repair any deficiencies that did not exist prior to the start of construction.

Any property including existing buildings, equipment, piping, pipe covering, sewers, sidewalks, landscaping, etc., damaged by the Contractor during the course of its work shall

be replaced or repaired by the Contractor in a manner satisfactory to the Engineer and at the Contractor's sole expense and before final payment will be made.

19-01E Damage by Leaks

The Contractor shall be responsible for damages to the ground, walks, roads, buildings, piping systems, and electrical systems and their equipment and contents caused by leaks in the piping systems being installed or having been installed by them. The Contractor shall repair at its own expense, all damage so caused to the satisfaction of the Engineer.

19-01F Inspections

The Contractor shall notify the Engineer at least 24 hours in advance of the time inspection and/or direction is required.

19-01G Verification of Dimensions

Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and report any discrepancy to the Engineer.

19-01H Project Plans and Records

The Contractor shall provide and keep up to date, a complete set of Record Drawings, corrected daily and showing all changes from the original Project Plans and Special Provisions with the exact locations, sizes, and kinds of equipment. Prints for this purpose may be obtained from the Engineer. This set of Project Plans shall be kept on the site and shall be used only as a record set.

Record Drawings shall serve as work progress sheets, and the Contractor shall make neat and legible annotations daily as the work proceeds, showing the work as actually installed. These Record Drawings shall be available at all times for inspection and shall be kept on the job.

The Contractor shall dimension from two (2) permanent points of reference, such as building corners, sidewalk, or road intersections, etc., the location of the following items:

- Connection to existing water lines
- Connection to existing electrical power/Controller Shut-off
- Gate valves
- Routing of sprinkler pressure lines (dimension max. 100 feet along routing)
- Sprinkler control and master valves
- Routing of control wiring & location of extra wires

- Quick coupling valves
- Flow Sensors
- Other related equipment as directed by the Engineer

On or before the date of the final inspection, the Contractor shall deliver the corrected and completed reproducible Record Drawings to the Engineer. Delivery of reproducibles shall not relieve the Contractor of responsibility for furnishing required information that may be omitted from the "as-builts."

19-01I Controller Charts

As-built Project Plans shall be approved by the Engineer before controller charts are prepared.

The Contractor shall provide two (2) controller charts for each controller supplied.

The controller chart shall show the area controlled by the automatic controller and shall be the maximum size which the controller door will allow.

The controller chart shall be a reduced drawing of the actual as-built system. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.

The chart shall be a blackline or blue line ozalid, or xerox print and a different color shall be used to indicate the area of coverage for each station.

When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum ten (10) mils.

All controller charts shall be completed and approved prior to final inspection of the irrigation system.

19-02 Materials

Wherever a material is specified by name and number, such specification is to facilitate a description and establish quality. Unless two or more brand names are listed, it shall be construed that the words "or approved equal" shall follow the name. No substitution will be permitted which has not been submitted for approval to the Engineer within ten (10) days after the contract has been awarded. Six (6) copies of descriptive literature must be furnished for any materials submitted for consideration as equal substitutes.

19-02A Plastic Pipe

1. Pressure Lines: Pipe sizes of 1½ inch (1½") or smaller shall be Schedule 40 PVC 1120 or 1220 PSI, Polyvinyl-Chloride Solvent Weld Pipe, Simpson, Pacific Western or ASC; pipe sizes of two (2) inches or larger shall be PVC 1120 or 1220 PSI, Polyvinyl Chloride Solvent Weld Pipe, Simpson, Pacific Western or ASC.
2. Lateral Lines: PVC 1120 or 1220 PSI, Polyvinyl-Chloride Solvent Weld Pipe, Simpson, Pacific Western or ASC.
3. Slip Fittings: PVC, Schedule 40. Same material type as pipe, solvent cement-welded slip socket, unless otherwise indicated shall be GSR or LASCO.
4. Threaded Fittings: Schedule 80 PVC, all fittings same IPS as head. Threaded fittings by LASCO or Spears.
5. Plastic Pipe Solvent: Type and make as recommended by the pipe manufacturer and appropriate to the pipe type. Clean all PVC joints with cleaner then prime with "IPS weld-on #P-70" as recommended by the manufacturer.
6. Plastic Pipe Marking: All pipe shall be continuously and permanently marked with the following information: Manufacturer's name, pipe size, IPS size (Schedule No.), type of material and code number.

19-02B Distribution Piping

All pipe shall be guaranteed by the manufacturer to be free of manufacturing defects in material or workmanship. Manufacturer's liability may be limited to replacement or credit for defective pipe if the use has been within the limits of pressure and temperatures recommended. The manufacturer must guarantee that all pipe has passed, or will pass, the Anhydrous Acetone Immersion Test.

19-02C Risers

1. Plastic: Schedule 80 PVC or as shown on Project Plans
2. Metal: As shown on Project Plans

19-02D Quick Coupling Valves

On swing joint riser, as noted on Project Plans.

19-02E Utility Boxes

All boxes located in turf areas shall be made of concrete with cast iron locking lids. All boxes located in mulch areas may be green fiberglass or plastic with locking lids. Boxes shall be sized to accommodate the valve or appurtenance and related fittings, as shown

on the detail drawing. Lids shall be labeled per the content of the box: Remote Control Valve, Gate Valve, Quick Coupling Valve, Flow Sensor, Electrical, etc.

Boxes used in recycled water systems are to have purple lids.

19-02F Sprinkler Heads

As indicated on Irrigation Plan Legend.

19-02G Automatic-Sprinkler Controllers

As described on Project Plans or approved equal, UL rated. Controller shall be electrically operated 24 volt A.C. output. Each station shall be independently variable from zero to 60 minutes without affecting setting of other stations. Changes made in individual settings shall not affect other time settings. The controller shall operate automatically, semi-automatically, or manually. All controllers shall conform to the current requirements of the City of Pleasanton's central irrigation system. Prior to project acceptance, the contractor is required to provide the City written certification from Enhanced Technical Services, (or other provider as applicable), that the irrigation controller was installed properly.

19-02H Remote Control Valves

Globe pattern as noted on Project Plans. Diaphragm type actuated by means of a 24-volt solenoid valve attached directly to the sprinkler valve body. Solenoid coils shall be molded waterproof construction and capable of normal operation in any position. Valves shall be equipped with positive shut-off which also permits flow regulating. The valve shall be normally closed until energized, and shall automatically close if electric power fails. Valves shall be capable of manual operation without control wires of controller being installed.

19-02I Control Wiring

Shall be single conductor, solid copper type UF-AWG, 600-volt rated, permanently marked as to manufacturer, size and type:

1. Pilot or Control Wire: AWG 14-1; Black - install a minimum of one extra control wire for each six (6) stations; loop into valve boxes and label as "spare."
2. Common Wire: AWG 12-1; Separate solid color (other than black) for each controller.
3. Spare Wires: One spare common wire shall follow the entire main line and shall be looped into each remote control valve box. There shall be spare control wires installed at a ratio of one wire per six valves. Spare wires shall be looped into each remote control valve box.
4. Connectors: Scotch DBY, or approved equal.

5. Markers: Panduit No. Insta-Code PCM Series, or approved equal.

19-02J Isolation Valves

As noted in plan legend.

19-02K Check Valves

PVC swing check as manufactured by King Bros. or Valcon.

19-02L Ball Valves

Model #B11 Series as manufactured by Ford or approved equal.

19-02M Backflow Units

As noted on plan legend. Install on concrete pad with locking enclosure.

19-02N Backflow Enclosures

Shall be Strongbox as manufactured by V.I.T. Products, Inc. or approved equal. Brushed aluminum; one piece enclosure on concrete pad per manufacturer's detail drawings.

19-02O Water Meter Sizing

Water meter size and volume of water supplied shall be sufficient to enable the programming at the irrigation controller such that a minimum of 0.30inches (0.30”) of water can be applied uniformly, system-wide, within a continuous nine- (9) hour period (water window) each night. Refer to Section 14 of these Standard Specifications for material and installation.

19-03 Construction

19-03A Excavation and Backfill

The Contractor shall do all necessary excavation for the installation of all work included in the contract. After the work has been installed, inspected and approved, all excavations shall be backfilled with approved backfill material to four inches (4") above crown at pipe and tamp. Then fill with earth and tamp to eighty-five percent (85%) relative compaction in planting areas. All trenches shall be left flush with adjoining grade in a firm unyielding condition. The Contractor shall correct any subsequent trench settlement.

Mechanical trench diggers used on the site shall be of an approved type with straight sides. Trenches shall be no wider at any point than is necessary to lay the pipe and to obtain proper compaction.

19-03B General Requirements for Piping

Pipelines shall be installed in the locations and shall be of the sizes shown on the Project Plans and these City Standard Specifications. All materials and workmanship shall conform to the Project Plans and these City Standard Specifications.

All pipe shall be assembled free from dirt and scale and shall be reamed and burrs removed. All pipe shall be laid with markings up.

The main line with control valves in place and before lateral pipes are connected shall be flushed out and tested for leaks before backfilling. Flush out each section of lateral pipe before sprinkler heads are attached.

All new pipe installations under paving shall be placed in sleeves. Sleeves shall be schedule 40 PVC or approved equal, shall not be bent or jointed, and shall be no less than twice the diameter of the piping to be sleeved. Sleeves shall extend a minimum of six inches (6") beyond paving into planting areas in order to facilitate their location at some future date.

19-03C Piping Depth

1. Main: 24 inches of cover.
2. Laterals: 18 inches of cover.

The bottoms of the trench shall be free of rocks, clods, and other sharp-edged objects.

No line shall be installed directly over another line in the same trench.

Piping under existing pavement shall be done by jacking, boring, or hydraulic driving, but where any cutting or breaking of pavement is necessary; it shall be done and replaced by this

Contractor as part of the contract cost. Permission to cut or break pavement must be obtained from the Engineer. No hydraulic driving will be permitted under asphaltic concrete paving.

19-03D Plastic Pipe and Fittings

Install main line and lateral line in locations shown on Project Plans. Discrepancies shall be brought to the attention of the Engineer prior to trenching.

1. Handling: Exercise care in handling loading, unloading, and storing plastic pipe and fittings. Store pipe and fittings under cover before using and transport on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending or concentrated external load. Repair dented or damaged pipe by cutting out the dent or damaged section and rejoin with a coupling.
2. Jointing: Apply "IPS WELD-ON P-70" primer prior to applying solvent cement. Use WELD-ON 2711 Grey Glue on all PVC fittings. Use only the solvent recommended by the manufacturer to make plastic pipe joints. Solvent welded joints should be given at least 15 minutes set-up curing time before moving or handling and 24 hours curing time before water is placed in PVC Pipe. Center-load pipe with small amount of backfill to prevent arching and slipping under pressure. Plastic to steel connections, work the steel connection first. Use a non-hardening pipe dope on all threaded plastic to steel joints. A light wrench pressure is all that is necessary for these joints.
3. Thrust Blocks: As per Detail No. 311, "Typical Thrust Blocks," of the City Standard Specifications. Installation shall be approved before backfilling.

19-03E Ball Valves

Shall be installed at all remote control valves as shown on detail.

19-03F Remote Control Valves

As detailed on the Project Plans. Connect to automatic controllers in the operating sequence indicated on the Project Plans by numbers. Provide and install one control valve box for each electric control valve.

19-03G Quick Coupling Valve

Top shall be one inch (1") below the inside of the ten-inch (10") diameter round box. Box shall be installed so as to be flush with finish grade.

19-03H Master Valve

19-03I Flow Sensor

19-03J Sub-meter

19-03H Sprinkler Heads

Install as noted on Project Plans. Final location shall be flush with grade and two inches (2") clear of walkways, curbs, or headers to facilitate edging. All sprinkler heads of the same type shall be of the same manufacturer.

19-03I Electric Services

As per Project Plans and the Special Provisions.

19-03J Controller and Control Wiring

Refer to the Special Provisions for related work items.

Securely mount controller as specified by the manufacturer and install as directed. Complete all electrical connections to controller.

Lay control wiring in trenches with main lines and tape every ten feet (10') into a common bundle. Separation from main lines shall be maintained at all times.

At valves, both wires shall be brought into the valve box and shall have an excess loop of twenty-four inches (24") before being spliced to the solenoid pig tails.

Place labels on control wiring at all terminus points indicating controller and valve number, and station.

19-03K Testing Live Water Lines

After valves have been installed, test all live water lines for leaks at full pressure of 150 psi for a period of six hours with couplings exposed and pipe sections center-loaded. Before testing, fill line with water for at least 24 hours. Provisions shall be made for thoroughly bleeding the line of air and debris. Correct all leaks and retest until acceptance by the Engineer.

19-03L Testing Lateral Lines

After pipe and risers have been installed, and prior to heads being installed, test all lateral lines for leaks for one hour at 50 psi. Repair all leaks and retreat until acceptance by Engineer.

19-03M Closing in Uninspected Work

The Contractor shall not allow nor cause any of his work to be covered or enclosed until it has been inspected, tested, and approved by the Engineer.

19-03N Final Inspection

Contractor shall clean and adjust all systems and present at the time of final inspection a thoroughly workable, clean, balanced system. The system shall be checked for proper coverage and adjusted as necessary. Contractor shall operate system in its entirety in the presence of the Engineer.

All heads shall be adjusted for radius and arc of coverage. All RCV's shall be properly balanced. Contractor shall attach the approved controller charts inside controller door.

19-03O Guarantee

The entire sprinkler system, including all work done under this contract, shall be guaranteed against all defects and faults of material and workmanship for one year from date of acceptance by City Council without expense to the City. All material used shall carry a manufacturer's guarantee for a minimum of one year.

Any settling of backfill trenches which may occur during a one year period after final acceptance shall be repaired to the Engineer's satisfaction by the Contractor without expense to the City including the complete restoration of all damaged planted areas, plants, paving or other improvements of any kind.

The guarantee for the sprinkler irrigation system shall be made in accordance with the attached form. The general conditions and supplementary conditions of these City Standard Specifications shall be filed with the Owner or his representative prior to acceptance of the irrigation system.

A copy of the guarantee form shall be included in the operations and maintenance manual.

The guarantee form shall be retyped onto the Contractor's letterhead and contain the following information:

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and that work has been completed in accordance with the Drawings and Specifications, ordinary wear and tear, and unusual abuse or neglect excepted. We agree to repair or replace any defects in material or workmanship which may develop during the period of one year from date of acceptance by City Council and also to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the City. We shall make such repairs or replacements within 48 hours, after receipt of written notice. In the event of our failure to make such repairs or replacements within 48 hours after receipt of written notice from the City, we authorize the City to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT: _____

LOCATION: _____

SIGNED: _____

ADDRESS: _____

PHONE: _____

DATE OF ACCEPTANCE: _____

19-03P Certification

All controllers associated with the City's central irrigation system shall be certified by the manufacturers' representative. This certification shall be provided to the City in writing before the start of the maintenance period.

19-04 Measurement

Irrigation, excluding backflow units, controllers, sleeves, and enclosures shall be measured as lump sum. Backflow unit, controllers, sleeves, and enclosures shall be measured by the number of items.

19-05 Payment

The contract price of irrigation shall include full compensation for layout; trenching; piping, sleeves and fittings, controllers, backflow preventers, valves; irrigation heads; electrical services; water main tie-in and all other irrigation system improvements complete in place.

SECTION 20. PLANTS AND PLANTINGS

20-01 General

20-01A Scope of Work

The Work includes all labor, materials, tools, equipment, transportation, and services necessary for and properly incidental to the completion of planting. In general, work includes:

1. Finish Grading
2. Soil Testing, Preparation, Furnishing and Incorporation of Fertilizer
3. Furnishing All Plant Materials
4. Planting and Fertilizing All Plant Materials
5. Tree staking
6. Clean-up and Site Restoration
7. Maintenance
8. Guarantee

20-01B Protection

The Contractor shall provide necessary safeguards and exercise caution against injury or defacement of any existing site improvements and plantings including avoiding soil compaction. The Contractor shall be responsible for any damage at his expense. No trucks or vehicles of any kind shall be allowed to pass over curbs, unless adequate protection is provided.

Use all means necessary to protect planting materials before, during and after installation and to protect the installed work and materials of other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer at no additional cost to the City.

The Contractor shall replace all plant material damaged due to inadequate care and inappropriate storage during all phases of construction, e.g., trees, shrubs, and groundcover areas during installation, etc.

Plant health and vigor shall not decline after plants arrive at the job site.

20-01C Grading

Refer to Section 4, "Roadwork Excavation and Grading," of these City Standard Specifications.

20-01D Job Conditions

Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.

Scheduling: Install trees, shrubs and liner stock plant material before hydraulic seeding is commenced.

Samples and Tests: Contractor shall take soil samples at his expense from no less than three (3) locations as directed by Engineer. These samples shall be taken after rough grading operations are complete, and shall be taken by Contractor for testing at: Waypoint Analytical, P.O. Box 153, Santa Clara, California 95052-0153, (408) 727-0330, or approved equal. Soil shall be analyzed for nutrients, pH balance, composition, texture and structure. A copy of the results of these tests shall be delivered to the Engineer.

20-02 Material

The Engineer reserves the right to take and analyze samples of imported materials for conformity to the Special Provisions and these City Standard Specifications at any time. Contractor shall furnish samples upon request by the Engineer. Rejected materials shall be immediately removed from the site at Contractor's expense. Cost of testing of materials not meeting the Special Provisions and these City Standard Specifications shall be paid by Contractor.

20-02A Import Soil

All material shall be from clean materials; free from rocks, rubble, clods, plants, weeds, roots and toxic matter.

Prepare and submit Soil Analysis report to Engineer for review and approval prior to importing soil.

The following organic soil amendments and fertilizer are to be used for bid price basis only. Specific amendments and fertilizer specification will be made after rough grading operations are complete and soil samples are tested by Contractor.

All materials shall be standard, approved and first-grade quality and shall be in prime condition when installed and accepted. Any commercially processed or packaged material shall be delivered to the site in the original unopened container bearing the manufacturer's guaranteed analysis. Contractor shall supply Engineer with sample of all supplied materials

accompanied by analytical data from an approved laboratory source illustrating compliance or bearing the manufacturer's guaranteed analysis.

20-02A.1 Organic Amendment

Per the Project plans and specifications, compost shall be a well decomposed, stable, weed-free organic matter source. The product shall be certified through the United States Composting Council (USCC) Seal of Testing Assurance Program (STA). It shall be derived from agricultural, food waste or yard trimming sources. The product shall contain no substances toxic to plants, will possess no objectionable odors and shall not resemble the feedstock (the original materials from which it was derived).

Before delivery of the compost, the supplier must submit a copy of lab analysis performed by a laboratory that is enrolled in the USCC's Common Agricultural Policy (CAP) and must use approved Test Methods for Evaluating of Composting and Compost (TMECC). The lab report shall verify the following:

1. Feedstock Materials shall be specified
2. Organic Matter content: fifty percent – sixty percent (50%- 60%)
3. Carbon and Nitrogen Ratios: C – less than 25:1
N – less than 25:1
4. Maturity/Stability: Shall have a dark brown color and soil-like odor
5. Non-toxicity
6. Nutrient Content:
 - N-P-K
 - Ca
 - Na
 - Mg
 - S
 - B
7. pH
8. Particle Size
9. Bulk Density
10. Inerts
11. Weed seeds
12. Select pathogens, including Salmonella and Coli form Bacteria
13. Trace metals

20-02A.2 Soil Amendment

1. Soil Sulfur: Agricultural grade sulfur containing a minimum of 99 percent (99%) sulfur (expressed as elemental)
2. Iron Sulfate: 20 percent (20%) Iron (expressed as metallic iron), derived from ferric and ferrous sulphate, 10 percent (10%) sulfur (expressed as elemental)

3. Calcium Carbonate: 95 percent (95%) lime as derived from shells
4. Gypsum: Agricultural grade product containing 98 percent (98%) minimum calcium sulphate
5. Amend: Available from Kellogg Supply Company, or approved equal.

20-02A.3 Fertilizer

1. Planting fertilizer: Pellet or granular form shall consist of the following percents by weight and shall be mixed by commercial fertilizer supplier:
 - a. 6 percent (6%) nitrogen \
 - b. 20 percent (20%) phosphoric acid
 - c. 20 percent (20%) potash
2. Gro-Power planting fertilizer: Shall be Gro-Power Plus (bacteria included) with soil penetrant or approved equal and shall consist of the following percents by weight:
 - a. 5 percent (5%) nitrogen
 - b. 3 percent (3%) phosphoric acid
 - c. 1 percent (1%) potash
 - d. 50 percent (50%) humus
 - e. 15 percent (15%) humic acid
3. Planting Tablets
 - 1) Shall be slow-release type with potential acidity of not more than 5 percent (5%) by weight containing the following percentages of nutrients by weight:
 - 20 percent (20%) nitrogen
 - 10 percent (10%) phosphoric acid
 - 5 percent (5%) potash
 - 2.6 percent (2.6%) combined sulfur
 - 35 percent (35%) iron (elemental) from ferrous sulfate
 - 2) Shall be 21 gram tablets as manufactured by Agriform or approved equal, applied per manufacturer's instructions.
1. Sulphate of Potash: 0-0-50

2. Single Super-phosphate: Commercial product containing 18 percent–20 percent (18%-20%) Phosphoric Pentoxide, or equal

3. Urea Formaldehyde: 38-0-0

20-02B Plant Material

Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules and rating. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous, and free of insect infestations, plant diseases, sunscalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements.

Tree trunks shall be sturdy and have well "hardened" systems and vigorous and fibrous root systems which are not root or pot-bound. Trees shall have a strong, central leader.

In the event of disagreement as to condition of root system, the root conditions of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two (2) plants or more than two percent (2%) of the total number of plants of each species or variety.

If container-grown plants are obtained from several sources, the roots of not less than two (2) plants of each species or variety from each source will be inspected. In case the sample plants inspected are found to be defective, the Engineer reserves the right to reject the entire lot or lots of plants represented by the defective samples. The Engineer is the sole judge as to acceptability. Any plants rendered unsuitable for planting because of this inspection will be considered as samples and will be provided at the expense of the Contractor.

The size of the plants will correspond with that normally expected for species and variety of commercially available nursery stock or as specified on the Project Plans. The minimum acceptable size of all plants measured before pruning with the branches in normal position, shall conform to the measurements, if any, specified on the Project Plans in the list of plants. Plants larger in size than that specified may be used with the approval of the Engineer, but the use of larger plants will not constitute a change in the Contract price. If the use of larger plants is approved, the ball of earth or spread of roots for each plant will be increased proportionately.

All plants not conforming to the requirements herein specified shall be considered defective; and such plants, whether in place or not, shall be marked as rejected and immediately removed from site of the work and replaced with new plants at the Contractor's expense. The plants shall be of the species, variety, size, and conditions specified herein or as shown on the Project Plans. Under no conditions will there be any substitutions of plants or sizes listed on the accompanying Plans, except with the written consent of the Engineer.

Plant material shall be true to botanical and common name and variety as specified in "Annotated Checklist of Woody Ornamental Plants in California, Oregon and Washington," published by the University of California School of Agriculture (1979).

Pruning: At no time shall trees or plant material be pruned, trimmed or topped prior to delivery and any alteration of their shape be conducted only with the approval and when in the presence of the Engineer.

20-02B.1 Nursery Grown and Collected Stock

1. Grown under climatic conditions similar to those in locality of project.
2. Container-grown stock in vigorous, healthy condition, not root-bound or with root system hardened off.
3. Use only liner stock plant material which is well established in removable containers or formed homogenous soil sections.
4. Substitute plant material will not be permitted unless specifically approved in writing by the Engineer.

20-02B.2 Seed

1. All seed used shall be labeled and shall be furnished in sealed standard containers with signed copies of a statement from the vendor certifying that each container of seed delivered is fully labeled in accordance with the California Seed Agricultural Code and is equal to or better than the requirements of these Specifications.
2. Seed which has become wet, moldy or otherwise damaged in transit or storage will not be accepted.
3. Lawn Seed Mix: Seed mix shall be Pleasanton Sports Field Mix, available from Pacific Coast Seed, Livermore, CA, or approved equal.

20-02B.3 Hydro-Mulch

The Hydro-Mulch shall be composed of wood cellulose fiber and contain no germination or growth-inhibiting factors. It shall have a consistent texture which disburses evenly and remains suspended in agitated water. It shall have a temporary green dye and the following property analysis:

- | | |
|---------------------|-------------------------|
| 1. Moisture content | 9.0% \pm 3% O.D.Basis |
| 2. Organic Matter | 99.2% \pm 0.8% |
| 3. Ash content | 0.8% \pm 0.2% |

4. pH 4.8% \pm 0.5%

5. Water Holding Capacity 1150 minimum (grams of H₂O per 100 grams of fiber)

20-02B.4 Hydroseeding Additive (Binder)

Ecology Control-M-Binder's organic seeding additive.

20-02C Guying and Staking Materials

20-02C.1 Wood Tree Stakes

As per Detail No. 806, "Tree Planting Detail," of the City Standard Details: three inches (3") (min. nominal size) diameter x ten feet (10') long for 15-gallon and for 24-inch-box size trees. Trees shall be doubled staked.

20-02C.2 Ties

As per City Standard Detail, four ties minimum per tree.

20-02C.3 Root Control Barriers

Root control barriers shall be of the "panel type," as manufactured by the Deep Root Corp; Model No. UB 24-2(or approved equal). Refer to detail drawings to determine the quantity and location of panels for each particular planting situation. Root barriers shall be installed for all newly planted trees within six feet (6') of paved areas.

20-02D Water

Shall be furnished by the City; the Contractor shall be responsible for any type of transportation, if required.

20-02E Mulch

Mulch shall be wood chip mulch made from ground or chopped live tree branches or trunk wood. Mulch must be aged such that a minimum of 80 percent (80%) of the green, organic matter has decomposed.

The Contractor must submit a sample of any proposed mulch for approval.

The mulch shall generally consist of fibrous, woody mixture of varied particle size which conforms to the following:

<u>Percent Passing</u>	<u>Sieve Size</u>
90 - 100	25.4 mm (3/4")
80 - 100	12.7 mm (1/2")
20 - 60	6.35 mm (3/8")

20-02F Wood Headerboards

As per Project Plans and City Standard Details.

20-02G Sand

For play areas and volleyball courts: Lone Star Lapis B-16, or approved equal.

20-02H Sod

Sod shall be species as noted on the Project Plans with 3/4 inch thick pads, free of weeds. Sod shall be purchased from a commercial grower such as Nunes, Cal Turf, Warren's or equal. Care shall be taken to prevent drying during shipping and handling.

20-02I Inspection

City certification that final grade, plus or minus 0.10 feet ($\pm 1.10'$), has been established must be obtained prior to commencing planting operations. Provide for inclusion of all amendments, settling, etc. The Contractor shall be responsible for shaping all planting areas as indicated on Project Plans or as directed by Engineer.

Inspect trees, shrubs and liner stock plant material for injury and insect infestation; and trees and shrubs for improper pruning and vigor.

All plant material shall be labeled and inspected by the Engineer prior to any planting.

No installation of plant material may begin until deficiencies are corrected or plant material has been replaced.

Rejected plant material shall be removed from site immediately.

20-02J Soil Preparation

After approximate finished grades have been established, soil shall be conditioned and fertilized in the following manner: Amendments shall be uniformly spread and cultivated thoroughly by means of mechanical tiller into the top six inches (6") of soil.

The following organic soil amendments, fertilizer rates, and quantities are to be used for bid basis only. Specific planting requirements will be made after rough grading operations are complete and soil samples are tested by the Contractor.

Application Rates: (Per 1,000 square feet). To be used for bid price basis only. Specific amendments will be made following soil tests.

1. Organic amendment – 6 cu yds.
2. Planting fertilizer – 15 lbs.
3. Agricultural gypsum – 25 lbs.
4. Soil sulphur – 20 lbs

At time of planting, the top two inches (2") of all areas to be planted shall be free of stones, stumps, or other deleterious matter one inch (1") in diameter or larger, and shall be free from all wire, plaster, or similar objects that would be a hindrance to planting or maintenance.

All material shall be delivered directly to the project site. All transportation receipts shall be made available to the Engineer upon request.

20-02K Final Grades

1. Minor modifications to grade may be required to establish the final grade.
2. Finish grading shall insure proper drainage of the site as determined by the Engineer.
3. All areas shall be graded so that the final grades will be 1 inch below adjacent paved areas, sidewalks, valve boxes, clean-outs, drains, manholes, etc., as indicated on the Project Plans.
4. Surface drainage shall be away from all fences, and walls. See grading and drainage Project Plans.
5. Eliminate all erosion scars prior to commencing the maintenance period.

20-02L Disposal of Excess Soil

Dispose of any unacceptable or excess soil at a legal offsite location.

20-03 Planting Installation

20-03A General

Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, as approved by the Engineer.

All plants shall be planted within 72 hours of their arrival at the project site, unless a written exception is provided by the Engineer.

Only as many plants as can be planted and watered on that same day shall be distributed in a planting area.

Containers shall be opened and plants shall be removed in such a manner that the ball or earth surrounding the roots remains intact and they shall be planted and watered as herein specified immediately after removal from the containers. Containers shall not be opened prior to placing the plants in the planting area.

20-03B Pre-Plant Weed Control

If live perennial weeds exist on-site at the beginning of work, spray with a non-selective systemic contact herbicide, as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least 15 days to allow systemic kill.

Clear and remove these existing weeds by mowing or grubbing off all plant parts at least three inches (3") below the surface of the soil over the entire area to be planted.

After irrigation system is operational, apply water for 14 days, as needed, to achieve weed germination. Apply contact herbicides and wait as needed before planting. Repeat, if required by Engineer.

Maintain site weed-free until final acceptance by the Engineer, utilizing mechanical and chemical treatment.

See Hydroseeding.

20-03C Lay-Out of Major Plantings

Locations for plants and outlines of areas to be planted shall be marked on the ground by the Contractor before any plant pits are dug. All such locations shall be approved by the Engineer. If underground construction or utility line is encountered in the excavation of planting areas, other locations for planting may be selected by the Engineer. Layout shall be accomplished with flagged grade stakes indicating plant names and specified container size on each stake. It shall be the Contractor's responsibility to confirm with the Engineer and governing agencies the location and depth of all underground utilities, and obstructions.

20-03D Planting of Trees, Shrubs, and Vines

Excavation for planting shall include the stripping and stacking of all acceptable topsoil encountered within the areas to be excavated from trenches, tree holes, plant pits, and planting beds.

Excess soil generated from the planting holes and not used as backfill or in establishing the final grades shall be removed from the site.

Protect all areas from excessive compaction when trucking plants or other material to the planting site.

Center plant in pit or trench.

Face plants with fullest growth into prevailing wind.

Set plant plumb and hold rigidly in position until soil has been tamped firmly around ball or roots.

Plant pit to be as per City Standard Details.

All excavated holes shall have vertical sides with roughened surfaces and shall be of a size that is twice the diameter and one and one-half (1½) times the depth of the root ball for all trees and shrubs.

Container plants shall be backfilled with:

- 6 parts by volume on-site soil
- 4 parts by volume organic amendment
- 1 lb. 6-20-20 fertilizer mix per cubic yard of mix
- 2 lbs. iron sulphate per cubic yard of mix

The bottom of the planting pit shall be compacted after amending and before planting.

All plants which settle deeper than the surrounding grade shall be raised to the correct level. After the plant has been placed, additional unamended backfill shall be added to the hole to cover approximately one-third of the height of the root ball. At this stage, water shall be added to the top of the partly filled hole to thoroughly saturate the root ball and adjacent soil.

Container Removal:

- If metal, cut container on two sides with an acceptable cutter. If plastic, gently loosen the root ball from the sides of the container.
- Do not injure root ball.
- Do not cut containers with spade or ax.
- Recycle containers appropriately.

Box Removal:

- Remove bottom of plant boxes before planting.
- Remove sides of box without damage to root ball after positioning plant and partially backfilling.

Plant Tablets:

After the water has completely drained, planting tablets shall be placed as indicated below:

- One tablet per 4 inch liner
- One tablet per one-gallon container
- Two tablets per 5 gallon container
- Three tablets per 15 gallon container

Planting tablets shall be set with each plant on the top of the root ball while the plants are still in their containers so the required number of tablets to be used in each hole can be easily verified by the Engineer.

Backfill:

The remainder of the hole shall then be backfilled with amended backfill and tamped firm.

After backfilling, an earthen basin shall be constructed around each plant. Each basin shall be of a depth sufficient to hold at least two inches (2") of water. The basins shall be constructed of amended backfill materials.

Pruning:

Approval must be obtained from the Engineer prior to any pruning being performed.

Pruning shall be limited to the minimum necessary to remove injured twigs and branches. Pruning may not be done prior to delivery of plants.

Staking:

Staking of all trees shall be completed immediately after planting. All stakes shall be installed plumb and as shown on Project Plans.

Root Control Barrier:

Install per Project Plans and City Standard Details.

20-03E Planting of Groundcovers

Groundcover plants shall be grown in flats, liners, or one- (1) gallon containers as indicated on the Project Plans. Plants shall remain in their containers until transplanting. The container's soil shall contain sufficient moisture so that it will not fall apart when lifting the plants.

Groundcover shall be planted in straight rows and evenly spaced, unless otherwise noted, and at intervals called out in the Project Plans. Triangular spacing shall be used unless otherwise noted on the Project Plans.

Each rooted plant shall be planted with its proportionate amount of soil. Plantings shall be immediately sprinkled after planting until the entire area is soaked to the full depth of each hole.

Care shall be exercised at all times to protect the plants after planting. Any damage to plants by trampling or other operations of this Contract shall be repaired immediately to the satisfaction of the Engineer.

20-03F Mulch

Approved mulch shall be placed in planting areas to a minimum depth of three inches (3") unless otherwise specified on the project plans. Prior to the placement of mulch, pre-emergent herbicide shall be applied to all shrub and groundcover areas. The pre-emergent herbicide shall be Ronstar granular, and shall be applied per the manufacturer's specifications. Engineer shall verify the application of the pre-emergent prior to the placement of mulch.

20-03G Planting of Sod

The sod bed shall be tilled and amended with the following materials to a minimum depth of six inches (6"):

- 6 cubic yards organic matter per 1,000 SF
- 15 pounds planting fertilizer per 1,000 SF
- 25 pounds agricultural gypsum per 1,000 SF
- 20 pounds soil sulphur per 1,000 SF

Roll and rake to a smooth, even and compact grade which is free of ridges and depressions and drains properly. Finish soil surface should be approximately one inch (1") below adjacent pavement grades in order to accommodate sod pad thickness. Finish sod grade shall be flush to ½ inch (½") maximum below adjacent paving.

Sod rolls are to be laid tightly in a straight line, with tightly butted staggered joints. There are to be no open or overlapping joints. A sharp edge knife shall be used to cut sod to fit around sprinklers, tree roots, paved edges, etc.

Sod shall be lightly watered within one (1) hour of the time it is laid. Sod shall then be rolled smooth to eliminate any surface irregularities and insure complete soil contact. After rolling, water thoroughly to penetrate subsoil to a depth of at least eight inches (8"). Repeat watering at regular intervals to keep sod moist until firmly rooted.

Protect turf areas with temporary fencing if necessary. Maintain protective barriers in an orderly condition and repair any damage to turf until planting work has been accepted by the Engineer.

20-03H Hydroseeding Preparation and Operation

The ensuing process shall be followed in order listed:

1. See Pre-Plant Weed Control, Section 20-03B, "Pre-Plant Weed Control," of these City Standard Specifications.
2. Install trees if they occur in hydroseeded area. Operation contained elsewhere in these City Standard Specifications.
3. Hydroseeding Operation:
 - Mix shall be that which is specified or approved by the City Landscape Architect.
 - All hydroseeded areas to be applied by an approved hydromulch company.
 - The hydromulch shall be applied in the form of a slurry consisting of cellulose fiber, seed, chemical additives, M-binder, commercial fertilizer, and water. When hydraulically sprayed on the soil surface, the hydromulching shall form a blotter-like groundcover impregnated uniformly with seed and fertilizer and shall allow the absorption of moisture and rainfall to percolate to the underlying soil.
 - Preparation: The slurry preparation shall take place at the site of work and shall begin by adding water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, full recirculation shall be established; and at this time the seed shall be added. Fertilizer shall then be added, followed by mulch. The mulch shall only be added to the mixture after the seed and the tank is at least one-third filled with water. All the mulch shall be added by the time the tank is two-thirds to three-fourths full. Spraying shall commence immediately when the tank is full.

- Application: The operator shall spray with a uniform visible coat by using the green color of the mulch as a guide. The slurry shall be applied in a sweeping motion, in an arched stream so as to fall like rain allowing the wood fibers to build on each other until a good coat is achieved and the material is spread at the required rate per acre.
- Application Rates: The seed mix shall be applied at the rate specified in the project documents. The fiber shall be applied at a rate of 1,800 lbs. per acre. The hydroseeding fertilizer shall be applied at a rate of 200 lbs. (16-20-0) per acre and 150 lbs. urea formaldehyde (38-0-0) per acre. The M-binder shall be applied at a rate of 60 lbs. per acre.
- Time Limit: All slurry mixture which has not been applied within two (2) hours after mixing will be rejected and removed from the project and disposed at the Contractor's expense.
- Daily work sheets must be filled out by nozzlemen. One copy shall be sent to the Engineer. The following information shall be recorded:
 - Seed - type, amount
 - Fertilizer - analysis, amount
 - Mulch - type, amount
 - Seeding Additive - type, amount
 - Number of Loads - amount of water
 - Area covered in acres
 - Equipment used - capacity, license number if applicable
- Protection: Special care should be exercised by the Contractor in preventing any of the slurry being sprayed inside any reservoir basin or into drainage ditches and channels which may impede the free flow of rain or irrigation water. Any slurry spilled into restricted areas shall be cleaned up at the Contractor's expense to the satisfaction of the Engineer.
- Immediately following application of hydromulch, the Contractor shall wash excess material from previously planted materials and architectural features. Care shall be exercised to avoid washing or eroding mulch materials from area.
- Equipment: Hydraulic equipment used for the application of the fertilizer, seed and slurry or prepared wood pulp shall have a built-in agitation system and operating capacity sufficient to agitate, suspend, and homogeneously mix slurry

containing not less than 40 lbs. of fiber mulch plus a combined total of 7 lbs. fertilizer solids for each 100 gallons of water.

- The slurry distribution lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic spray nozzles which will provide a continuous no-fluctuating discharge. The slurry tank shall have a minimum capacity of 1,500 gallons and shall be mounted on a traveling unit, either self-propelled or drawn by a separate unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded.
- The hydraulic equipment for pesticide applications shall consist of a clean 150-gallon minimum capacity fiberglass tank with complete mechanical agitation. The pump volume shall be 10 gallons per minute while operating at a pressure of 100 pounds per square inch. Distribution lines shall be large enough to carry the volume of water necessary for even chemical distribution. The spray nozzle must cover a 15-foot swath, with a minimum output of 5 pm at 80 psi.

20-03I Clean-Up and Site Restoration

After all planting operations have been completed; remove all trash, excess soil, empty plant containers, and rubbish from the property. All scars, ruts, compaction, or other marks in the ground caused by this work shall be repaired and the ground left in a neat, uncompacted, and orderly condition throughout the site. The top six inches (6") of soil shall not exceed 85 percent (85%) relative compaction. Contractor shall pick up all trash resulting from this work no less frequently than each Friday before leaving the site, once a week, and/or the last working day of each week. All trash shall be removed completely from the site.

The Contractor shall leave the site area broom-clean and shall wash down all paved areas within the Contract area, leaving the premises in a clean condition.

All cleaning and restoration activities shall conform to the provisions of Section 5 of the City Standard Specifications, "Erosion and Sedimentation Control."

20-03J Observation Schedule

The Contractor shall be responsible for notifying the Engineer in advance for the following site visits, according to that indicated below:

- Pre-Job Conference - 7 days
- Final grade review - 48 hours
- Plant material review - 48 hours
- Plant layout review - 48 hours

- Soil preparation and planting operations.
- One tree with each type of specified staking shall be approved prior to planting of trees - 48 hours
- Pre-Maintenance - 7 days
- Final walk-through - 10 days

When observations are conducted by someone other than the Engineer, the Contractor shall show evidence in writing of when and with whom these inspections were made.

No site visits shall commence without all items noted in previous Observation Reports either completed or remedied unless such compliance has been waived by the Engineer. Failure to accomplish punch list tasks or prepare adequately for desired inspections shall make the Contractor responsible for reimbursing the Engineer at his current billing rates per hour (plus transportation costs). No further inspections shall be scheduled until this charge has been paid and received.

20-03K Planting Maintenance

20-03K.1 General Requirements

The time duration of the maintenance period shall be 90 calendar days.

The maintenance period shall commence following the second mowing of turf and upon written approval of Engineer and substantial completion of the project. On projects where turf is not called for, the maintenance period shall commence immediately following all planting improvements upon written approval of the Engineer and substantial completion of the project. Maintenance shall continue per these specifications for a minimum period of 90 days, or longer, where necessary, to establish acceptable stands of thriving plants or to complete punch list items when determined to be necessary. Extensions in the length of the maintenance period will be made at no additional costs to the City.

- Protect all areas against damage, including erosion, animals, and trespass, and provide proper safeguards. Maintain and keep in good repair all temporary barriers erected to prevent trespass.
- Keep all walks and paved areas clean. Keep site free from debris resulting from landscape work or maintenance.
- Repair all damaged planted areas and replace plants immediately upon discovery of damage or loss.

- Check sprinkler systems at each watering; adjust coverage and clean heads as necessary. Adjust timing of sprinkler controller to prevent flooding. Repair all damages immediately.
- Maintain adequate moisture depth in soil to ensure vigorous growth. Contractor is required to deep water all trees to ensure adequate moisture level around said trees.
- Keep contract areas free of weeds by cultivating, or hand pulling. Use of chemical weed killers will not relieve the Contractor of the responsibility of keeping areas free of weeds over one inch high at all times.
- Control gopher, ground squirrel, vole, or other animal damage continuously throughout the maintenance period.

20-03K.2 Tree and Shrub Maintenance

Maintain during entire maintenance period by regular watering, cultivating, weeding, repair stakes and ties and control of insect pests, rodents, and animals. Prune only when requested by the Engineer.

Keep watering basins in good condition and weed -free at all times.

All damaged, unhealthy or dead trees, shrubs, and vines shall be replaced with new stock immediately without cost to City, size as indicated on the Project Plans.

20-03K.3 Turf Maintenance

Maintain during entire maintenance period. Cut as frequently as growth of grass requires. Cut to a height of two inches unless otherwise directed by the Engineer.

Maintain constant adequate moisture.

Trim edges of turf at paving and headerboards at time of second cutting and at each cutting thereafter.

Trim around trees in the turf areas. After 30 days, provide an area 3 feet in diameter under trees free of turf and watering basins at all times.

Keep turf areas free of undesirable weeds and grasses by the application of suitable selective weed killers as approved by Engineer or by hand pulling.

Reseed all areas which fail to adequately germinate as soon as evident, or as directed by the Engineer.

Remove all rocks over one inch which emerge on the surface.

Repair any hollow, settled or eroded areas by filling, rolling, top dressing and reseeding, or as directed.

Fertilize all planting areas with 16-6-8 commercial fertilizer at the rate of 6 lbs. per 1,000 square feet prior to the end of the first 30 days after planting and at 30-day intervals thereafter. Water thoroughly after applying fertilizer.

Perform all necessary operations to establish a uniform, thick, and vigorous stand of turf.

20-03L Final Planting Inspection and Acceptance

Final inspection for project acceptance shall be made at the conclusion of the specified maintenance period provided that on such date all project improvements and all corrective work has been completed. If all project improvements and corrective work are not completed, the maintenance period shall continue at no additional cost to the City until work has been completed, and has been determined to be satisfactory by the Engineer. The project will then be placed on the City Council's agenda for acceptance. The Contractor shall continue to maintain the project per these specifications until the City Council has accepted project.

Written notice requesting inspection shall be submitted by the Contractor to the Engineer at least ten (10) days before the completion of the maintenance period.

Prior to being considered ready for inspection, the Contractor shall have done a final weeding and clean-up of all planting areas. Plant basins shall be repaired or removed if directed, all tree stakes replumbed, all tie wires pulled snug, and the entire job cleared of all debris and presented in a neat, orderly fashion.

20-03M Guarantee and Replacement

Guarantee all plants and planting to be in a healthy, thriving condition until the end of the maintenance period or beyond that time until active growth is evident. Guarantee all trees for a minimum of one (1) year from date of acceptance by City Council.

20-04 Measurement

Plants and plantings, excluding mulching and the maintenance period, shall be measured by the number of items. Mulching and the maintenance period shall each be measured as lump sum items.

20-05 Payment

The contract price for plants and plantings shall include full compensation for the plant pit, root barrier, plant, backfill mix, fertilizer, and staking.

The contract price for mulching shall include full compensation for pre-emergent herbicide and mulch complete and in place.

The contract price for the maintenance period shall include full compensation for fulfilling all requirements of Section 20-03K, "Planting Maintenance," of these City Standard Specifications.

SECTION 21. RECYCLED WATER

21-01 GENERAL

This section covers recycled water system construction specifications. All recycled water design and construction work shall conform to Sections 14 of the City Standard Specifications as amended, unless otherwise noted. In addition, all recycled water pipes and fittings shall be purple or wrapped in purple polyethylene sleeve conforming to AWWA C105 specifications. Piping or piping wrap shall be permanently labeled “Caution: Recycled Water – Do Not Drink” or similar as approved by the City Engineer.

21-02 MATERIALS OF CONSTRUCTION

This section covers materials for recycled water pipes, fittings, and appurtenances for City recycled water facilities.

21-02A Pipes and Fittings

21-02A.1 Polyvinyl Chloride (PVC) Pipe and Fittings

PVC pipe and fittings for City facilities shall conform to City Standard Specification Section 14 for potable water.

21-02A.2 Ductile Iron Pipe Materials

Ductile iron pipe and fittings shall conform to City Standard Specifications for potable water, Sections 14-02B and 14-03B.

21-02A.3 Pipe Identification

All recycled water piping shall be clearly marked as recycled water pipe by the use of purple-colored and stenciled pipe, permanent recycled water warning tape continuously applied to the pipe, or marked plastic encasement. All marking and coloring shall be durable enough to be easily recognizable and legible for the design life of the piping. PVC pipe material shall be purple infused color at time of extrusion.

Plastic pipe, permanent warning tape, or encasement shall be purple in color with the words “CAUTION: RECYCLED WATER – DO NOT DRINK,” or similar, printed on it as approved by the City Engineer or Inspector. The lettering shall be repeated continuously on two (2) sides of the pipe, warning tape, or encasement for the full length of the pipe, warning tape, or encasement. If purple pipe is used, it shall be PW PurplePlus, or JM Purple Save, or approved equal. If encasement or warning tape is used, it shall be Pantone 512 or equivalent in color with 1” minimum black or white lettering. Encasement or warning tape shall be T.Christy Enterprises, Rencor, or equivalent.

All piping shall be continuously and permanently marked with the manufacturer's name or trademark, nominal size, and schedule or class indicating the pressure rating.

All riser pipes for valves and blowoffs on recycled water lines shall be purple piping.

Recycled water service lines shall conform to City Standard Details as referenced in the Drawings. The line shall be purple or purple wrapped.

21-02A.4 Cathodic Protection of Buried Metallic Recycled Water System Components

Ductile iron pipe and fittings shall be encased in 8 mil polyethylene sheeting in conformance with AWWA C105. The polyethylene sheeting shall be purple.

See Section 22, "Cathodic Protection" of the City Standards and 1100 of the City Plans.

21-02B Appurtenances

21-02B.1 General

Unless otherwise specified below, appurtenances for City recycled water facilities shall conform to City specifications for potable water, Section 14-02C.

21-02B.2 Above-Ground Equipment

Exposed or above-ground equipment, such as blowoffs, valves, pumps, and water meters, shall be labeled with recycled water tags. Tags shall be provided by City and fastened as specified in Section 22-01B.7 of this document.

21-02B.4 Valve and Meter Boxes

All recycled water valve boxes shall be Christy G-4, or approved equal with a cast iron triangular, purple powder-coated cover for heavy traffic areas. All valve covers shall have a recognizable "RW" inscription cast or otherwise permanently marked on the top surface.

All meter boxes and customer facility valve boxes shall be purple in color and have a warning label permanently molded into or affixed onto the lid with rivets, bolts, etc. Warning labels shall be constructed of a purple weatherproof material with the warning "RECYCLED WATER" permanently stamped or molded into the label, T.Christy Enterprises 3800, or equivalent.

Valve stem riser pipe shall be purple PVC pipe.

21-02B.5 Pressure Reducing Valves

Pressure reducing valves (PRV) for customer services shall be Wilkins Model 500XL with HLR (10 psi to 125 psi spring range, factory set at 50 psi) and SC (sealed cage bell housing

and stainless steel adjustment screw) options or approved equal for irrigation systems serviced by ¾-inch to 3-inch water meters. City Engineer shall review proposed PRV installations for larger sizes on an individual basis. All pressure reducing valves shall be factory union inlet, red brass nipple and brass union connection to allow for easy removal of the valve. The valve shall have a minimum of 6" of clearance all the way around the valve.

21-02B.7 Identification Tags

All meters, valves, blowoffs, and controllers shall be identified using recycled water identification tags, T.Christy Enterprises 3150, or equivalent. Tags shall be weatherproof plastic, 3-inch by 4-inch, purple in color with the words "WARNING – RECYCLED WATER – DO NOT DRINK," or similar imprinted on one side, and "AVISO – AGUA IMPURA – NO TOMAR" on the other side, or similar as approved by the City Engineer. Imprinting shall be permanent and black in color. One tag shall be attached to each valve as follows:

- Attach to valve stem directly or with plastic tie wrap; or
- Attach to solenoid wire directly or with plastic tie wrap; or
- Attach to valve cover with existing valve cover bolt.

Weatherproof stickers of equivalent color and lettering may be used as an alternative for controller units.

21-02B.9 Tracer Wire and Warning Tape

Underground tracer wire shall be insulated #10 AWG THWN copper wire. The Contractor shall demonstrate the continuity of the buried tracer wire to the City between each valve box or locator station box. Locator stations to be spaced no further than 500'.

21-02C Thrust Blocks

Thrust blocks for recycled water systems shall conform to City specifications for potable water, Section 14-02H. Where allowed, thrust blocks to resist static thrust loads caused by pipeline system pressure are allowed on pipe up to 12-inch diameter. For larger pipe, thrust restraint shall be accomplished using restrained joints and over the restrained joint lengths shown on the Drawings, unless otherwise noted. All pipe restrained utilizing cross trench kicker thrust blocks shall be ductile iron.

All new additions to the existing recycled water system shall have concrete thrust block restraint at the point of connections to the existing system.

21-02E Joint Restraints

Mechanically restrained joints shall be suitable to the application and pressure rated equal to the pressure rating of the adjoining pipe in accordance with the manufacturer's specifications. Mechanical restraints shall be the following or approved equal:

1. Restraining gland for plain end PVC pipe spigot to ductile iron mechanical joint fittings: Uni-Flange Series 1500 (Ford Meter Box Company); Megalug 2000PV (EBAA Iron); Sigma One-Lok Series SLCE or approved equal.
2. Restraining gland for plain end DI pipe spigot to ductile iron mechanical joint at fittings and valves shall be Uni-Flange Series 1400 (Ford Meter Box Company); Megalug Series 1100 (EBAA Iron); One-Lok SLDE (Sigma); or approved equal.
3. Ductile Iron Pipe Restrained Joints to Utility Undercrossing: Push-on type restrained joints shall be of the locking segment, boltless type, TR FLEX (US Pipe Company); Snap Lok (Griffin Pipe Company); Flex Ring (American Cast Iron Pipe Company); or approved equal. Joint restraint systems shall be rated to at least 250 psi working pressure.
4. PVC Pipe Restrained Joints: The restraints can be via fusing joints, installing bell restraints, or use internal restraining gasket systems. Internal restraining gaskets are allowed on 12" diameter and smaller pipes and shall be Bulldog Integral Joint Restraint System, JM EAGLE LOC 900 or approved equal. Restraining harness for PVC pipe bell and spigot push on joints sized larger than 12" diameter: Ford Meter Box Co. Uni-Flange Series 1350, EBAA Iron Series 2800, Sigma PV-Lok PWP or equal.

21-02E: Service Taps on Recycled Water Mains

Recycled water services shall be installed in conformance with Section 14-02C of the City Standard Specifications, the same as for the construction of potable water services.

21-02F: Nuts and Bolts for Buried Pipelines

Nuts and bolts for buried pipelines shall be stainless steel per Section 14-02. Nuts and bolts shall be bitmastic protective coated.

21-03 INSTALLATION OF RECYCLED WATER PIPE AND APPURTENANCES

Recycled water pipe and appurtenances shall be installed in conformance with Section 14-03 of City Standard Specifications, the same as for the construction of potable water pipe and appurtenances, with the following exceptions:

1. At the point where a service line crosses beneath a curb, the point shall be permanently marked with an "RW" to signify recycled water, rather than a "W," which is used for potable water.
2. Plastic warning tape specified in Section 14-02K used for recycled water lines shall be purple in color, a minimum of three (3) inches wide and printed continuously with the words "CAUTION: RECYCLED WATER LINE BELOW," or similar as approved by the City Engineer. Plastic warning tape shall be installed at 12 inches above all recycled water mains.
3. During construction, above ground risers for recycled water pipe and appurtenances shall be purple in color.

4. All metallic pipe, fittings, couplings and appurtenances shall be cathodically protected as specified in Attachment A, Section 16640 – Cathodic Protection and as shown in the Drawings.

21-04 INSPECTION AND TESTING

Recycled water piping shall be tested using recycled water. If the Contractor demonstrates a need to use potable water for testing and with the approval of the City, the recycled water piping may be tested using potable water with an approved backflow prevention device. The testing shall be performed in accordance with City Standard Specifications, Section 14-03G.2 to Section 14-03G.5. The minimum flushing velocity is 3feet per second for a minimum of 10 exchanges of water and until a NTU 2 + source water. Disinfection is not required on recycled water mains.

After completion of testing, the Contractor shall thoroughly flush all recycled water from the line with recycled water from the existing system to remove debris from the pipeline. The Contractor is responsible for proper disposal of the flush water in a manner that will not cause damage and/or nuisance to the environment and in compliance with state and local regulations.

21-04B Cross-Connection Inspection and Coverage Test

The Contractor shall be advised that the City will be conducting customer side retrofit work to allow for conversion to recycled water for irrigation purposes. The City will be performing mandated cross connection inspections and tests, irrigation system coverage tests and removing of potable water cross connections within the customer side irrigation system. The Contractor shall cooperate and support the City in these testing activities by preparing work areas under its responsibility to allow testing and inspection on the customer side of the irrigation meter.

SECTION 22. CATHODIC PROTECTION

22-01 General

This section covers requirements for materials and methods of installation for cathodic protection on the recycled water system with PVC piping and Ductile Iron Fittings. All other pipe combinations shall not be applicable. All new main line piping that is to be installed shall have the soil tested for corrosively and if any of the prescribed tests are deemed “mild corrosively” or higher per general corrosion engineering standards cathodic protection is required for new pipeline installations. Soil samples shall be taken at a minimum of 500 feet or soil characteristics change whichever is shorter.

See 1100’s details of the City Standard Plans for additional details.

The Contractor shall furnish all materials, install all equipment and provide all labor necessary to complete the work shown on the Drawings and or/listed below and all other work and miscellaneous items not specifically mentioned but reasonably inferred, including all accessories and appurtenances required for a complete system. The intent of this specification is to provide for a complete, functional cathodic protection system and or corrosion protection system for the Pleasanton Recycled Water Infrastructure.

Work included in this section consists of all components of the cathodic protection system; including anodes, cables, and any other work necessary to complete the installation.

Work on this project includes a combination of the following items, depending on the pipe material selected for the Project:

- Cathodic protection of pipeline, pipe segments and/ or metallic fittings.
 - Polyethylene encased ductile iron pipe segments
 - Polyethylene encased ductile iron fittings.
- Bonding of flanges, flexible couplings and other non-welded fittings.
- Joint bonding of ductile iron pipe & fittings
- Coating of buried harness sets
- Installation of magnesium anodes, cables, insulating blankets, insulating joints, coatings for buried insulating joints, and test stations, where required.
- Backfill and compaction of backfill.
- Provide shop Drawings, reports, permits, and obtain City’s approval where required.
- Correction of all deficiencies.

- The work shall include the provision of all materials, equipment, and apparatus not specifically mentioned herein or noted on the plans, but which are obviously necessary to complete the work specified.

Reference Specifications

This section contains references to the following documents. They are a part of this section as specified and modified. In case of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

- American Society of Testing and Materials (ASTM)
- National Electrical Manufacturers Association (NEMA)
- American Water Works Association (AWWA)
- National Association of Corrosion Engineers (NACE)
- American National Standards Institute (ANSI)

Codes And Regulations

All materials, workmanship, and installation shall conform to all requirements of the legally constituted authority having jurisdiction. These authorities include, but are not limited to, the latest revision of the State of California, Department of Industrial Relations, Division of Industrial Safety Orders of the Industrial Accident Commission, and all other applicable State, County, or City codes and regulations. Nothing in the Drawings or specifications is to be construed to permit work not conforming to these regulations and codes. Where larger size or better grade materials than required by these regulations and codes are specified, the specifications and Drawings shall have precedence.

22-0A Minimum Testing Requirements

Soil samples shall be taken at a minimum of 500 feet or where soil characteristics change whichever is shorter.

The following minimum tests shall be conducted and results turned over to the City for evaluation: Redox (mV) shall be tested in conformance with ASTM D1498, pH per ASTM 4972, Conductivity (umhos/cm) per ASTM D1125M, Resistivity (100% saturation, ohms-cm) ASTM G57, Sulfide (mg/kg) ASTM D4658M, Chloride (mg/kg) per ASTM D4327, Sulfate (mg/kg) per ASTM D4327

22-02 Materials

22-02A General

All materials shall conform to the requirements set forth herein or as designated on the Drawings, unless otherwise specified. All materials must be new, free from defects, and

shall be of the best commercial quality for the purpose specified. The Contractor shall furnish all necessary items and accessories not shown on the Drawings or specified herein, but which are required to fully carry out the specified intent of the work, without additional cost to the City.

22-02B Magnesium Galvanic Anodes

Magnesium anodes shall be of the H-1 alloy with composition as indicated below. Each anode shall be cast with a steel core and the core shall protrude from one end and shall be of sufficient length to permit attachment of a lead wire. Each anode shall conform to the following chemical composition and dimensions:

1. Chemical Composition

<u>Element</u>	<u>Range</u>
Aluminum	5.0 – 7.0%
Zinc	2.0 – 4.0%
Manganese	0.15% Min.
Copper	0.10% Max.
Nickel	0.003% Max.
Iron	0.003% Max.
Other Impurities	0.05% each or 0.3% Max Total.
Magnesium	Balance

2. Bare Anode Dimensions:

Nominal Wt. Bare (lbs)	Height (in.)	Width (in.)	Length (in.)
5	3	3	7.5
9	3	3	13.5
17	4	4	17
32	5	5	21
50	8	-	15

Anode Core Strap: Galvanized steel, with one end of anode recessed to provide access to the rod for connection of the lead wire

Lead Wire: No. 10 AWG, Type THHN (Black) silver brazed to the rod, making a mechanically secure connection

Soldered Connection and Core: Seal entirely with electrical potting compound

Magnesium Anode Packaging: Prepackaged in a cloth bag containing low resistivity backfill consisting of 75% hydrated gypsum, 20% bentonite, and 5% sodium sulfate.

Manufacturers, or equal

- Farwest Corrosion.
- Corpro Companies.

22-02C - Cables

All underground cables utilized for drain and bonding cables shall be single conductor, stranded copper, Type CP, insulated for 600 volts with High Molecular Weight Polyethylene (HMWPE) in accordance with the requirements of ASTM D1248, Type 1, Class C, Category 5, Grades E-4 and E-5.

All cables for galvanic anodes and test stations shall be Type THHN, solid, copper, sized as shown on the plans, and shall conform to Federal Specifications JC-30B

Test Leads and Anode Leads: Extend 18 inches minimum above grade after connection to test station panel board.

22-02D Cable-To-Pipe Connections

The cable connections to the steel pipelines shall be accomplished utilizing an exothermic welding process as shown on the Drawings. Each cable shall be fitted with a copper sleeve for accomplishing the weld and cartridge, sleeves and molds for each weld shall be furnished by the same manufacturer. All materials for welding shall be sized and in accordance with recommendations in manufacturers' literature.

Manufacturers, or equal

1. "Cadweld" by Erico Products, Inc.
2. "Thermoweld" by Continental Industries, Inc.

22-02E Cable-To-Pipe Connections (Pin Brazing)

Pin brazing equipment based upon Electric-arc silver soldering using a specially designed portable Pin Brazing unit, a hollow brazing pin containing silver solder and flux shall be utilized for cable-to-stainless steel pipe connections. The unit may be battery powered or powered with a welding generator. Battery pack, pins with fuse wire, ceramic ferrules and cable lugs shall be in accordance with the manufacturer's recommendations for each wire size and pipe or fitting size and material. Brazing materials and equipment shall be the product of

a single manufacturer. All material and equipment utilized for brazing shall be from one manufacturer.

Subject to Compliance with the Contract Documents the following Manufacturers are acceptable:

- BAC - GMC Electrical, Ontario, CA
- Safetrack Baavhammar AB
- Farwest Corrosion Control
- Or equal.

22-02F Cable-To-Pipe Coating Material

Corrosion protection for exothermic cable-to-pipe connections shall utilize two part epoxy resin.

Manufacturers, or equal

- Durcon-164, by Duriron Company
- Scotchcast Resin No. 4, by 3-M Company
- CC-1 Potting Compound, by PSI Products
- Propoxy 20 epoxy putty by the Hercules Chemical Company

23-02G Test Station Metering Shunts (N/A)

Anode metering shunts shall be 0.01 ohm, 6 amp capacity, with 1% accuracy.

Provide only where shown on the Drawings.

Manufacturers, or equal

- Tinker & Rasor

22-02H Flush Grade Test Station

Flush grade test stations shall be traffic boxes with cast iron cover as shown on the Drawings. Terminal boxes shall be locking type, constructed of high-impact, molded Lexan plastic. The test box shall be provided with sufficient hardware and binding post terminals for each cable as shown on the Drawings. All test station hardware, including nuts, bolts and shorting straps shall be nickel plated brass.

Provide only where shown on the Drawings.

Manufacturers, or equal

- Christy G5 traffic box with a cast iron lid as shown on the Drawing. The cover shall be manufactured with "CP-TEST" markings for easy identification.
- Terminal Boxes shall be Model "T-3" by Tinker & Rasor

22-02I Cable Warning Tape

All buried test station cables shall have plastic warning tape installed a minimum of 12 inches above the top of the cables for the entire buried length of the cables. The warning tape shall be 4 inches wide and shall be yellow with black lettering with the legend "CAUTION, CATHODIC PROTECTION CABLES BURIED BELOW" in 3 inches high lettering printed at a minimum of seven foot intervals along the entire buried length of the cable.

22-02J Cable Splices

All cable splices shall be accomplished utilizing a steel split bolt connector or crimp-type connector. The connector appropriately sized for the #10 AWG anode lead cable and the #8 AWG anode header cable. The connector shall be installed and wrapped with two layers of half-lapped rubber tape, followed with two layers of half-lapped PVC tape.

22-02K Cable Identification Tag

All cables in the terminal boxes shall be identified. The identification tags shall be white plastic "zip-tie" type straps with a plastic tab of sufficient size to allow the pipeline station to be written on the tab with a permanent felt tip marker.

22-02 L Insulating Joints

Insulating Flange

- Each insulating flange set shall consist of a full-face central gasket, a full-length sleeve for each flange bolt, and two insulating washers with two steel washers for each bolt. The ring-type central gasket shall be 1/8-inch thick sheet packing, having a dielectric constant of 300 volts per mil, minimum. Bolt sleeves shall be fabric reinforced phenolic resin or mylar, and insulating washers shall be constructed of fabric reinforced phenolic resin. The complete assembly shall have an ANSI pressure rating equal to that of the flanges between which it is installed.

Insulating Flanged Coupling Adapters

- Insulating elements shall be installed to electrically isolate the water pipeline from existing pipelines. The insulating elements shall consist of a full-face central gasket, two sleeves for each end of the flange bolt, and two insulating washers with two steel washers for each bolt. The ring-type central gasket shall be 1/8-inch thick sheet packing, having a dielectric constant of 300 volts per mil, minimum. Bolt sleeves shall be fabric reinforced phenolic resin or mylar, and insulating washers shall be constructed of fabric reinforced phenolic resin. The complete assembly shall have an ANSI pressure rating equal to that of the flanges between which it is installed.

Insulating Flexible Coupling

- A double boot assembly shall be installed on the flexible coupling to electrically isolate the water pipeline from existing pipelines.

22-02M Rigid PVC Conduit And Fittings

Rigid polyvinylchloride (PVC) conduit and fittings shall be Schedule 40, manufactured to NEMA TC-2 and WC-1094 specifications and shall be U.L. approved.

22-02N Buried Insulating Joint & Harness Set Coating Material

Viscous Elastic Coatings and Sealants (VEC) or a three part wax tape coating system shall be used for coating all buried insulating flange as well as insulating flanges inside of Vaults.

- Viscous Elastic Coatings & Sealants (VEC)

Manufacturers, or equal

- Viscotaq Coatings
- Stopaq Coatings

- Three part wax tape coating system

Coatings for buried insulating flanges and insulating couplings shall consist of a non-conductive, petrolatum-based coating system, such as Trenton Wax Tape #1 by The Trenton Corporation, or approved equal. The coating system shall consist of a prime coat as an initial surface preparation to displace moisture on the surface and to improve adhesion of the wax tape. A wrap material shall be used to provide a smooth contour on the surface of the joint as well as for protection of the substrate. An over wrap shall be used as a final coating to provide increased mechanical strength of the coating. The prime coat shall be a

petrolatum material with corrosion inhibitors and plasticizers. The wrap coat shall be a synthetic fabric saturated with a blend of petroleum wax, plasticizers and corrosion inhibitors. The over wrap shall be plasticized, self-adhesive PVC tape.

22-02O Bitumastic

Coating for all buried bolts, nuts and metallic washers of the ductile iron pipe and the copper insulating corporation stops shall be Bitumastic 300M coal tar mastic coating, as manufactured by Carbolite or approved equal..

23-02P Polyethylene Sheets for Pipe Encasement

The polyethylene sheets used for encasement of the ductile iron pipe and fittings shall be minimum 8-mils thick in accordance with AWWA C-105. The polyethylene sleeves used for encasement of the copper pipe shall be a minimum 6-mils thick, and shall be of sufficient diameter to slip over the pipe without getting damaged.

22-03 Construction

22-03A Material Delivery, Storage And Protection

All materials and equipment to be used in construction shall be stored in such a manner to be protected from detrimental effects from the elements. If warehouse storage cannot be provided, materials and equipment shall be stacked well above ground level and protected from the elements with plastic sheeting or other method as appropriate.

22-03B General

All materials, workmanship and installation shall conform to all requirements of the legally constituted authority having jurisdiction. These authorities include, but are not limited to, the latest revision of the State of California, Department of Industrial Relations, Division of Industrial Safety, Electrical Orders; The National Electric Code, General Construction Safety Orders of the Industrial Accident Commission; and all other applicable State, County, or City codes and regulations. Nothing in the Drawings or specifications is to be construed to permit work not conforming to these regulations and codes. Where larger size or better grade materials than required by these regulations and codes are specified, the Specifications and Drawings shall have precedence.

22-03C Galvanic Anodes

Galvanic anodes shall be installed in the trench horizontally in native soil, after excavation to proper depth, equal to the bottom of the pipeline, a minimum of 3 feet from fittings and a minimum of 5 feet from the pipelines. Spacing between anodes shall be a minimum of 10

feet, if multiple anodes are installed at a single test station location. Prior to placing anodes in the trench or hole, paper or plastic bags shall be removed, but the cloth bag shall remain around the anode. Care shall be exercised during installation to prevent damage to the cloth bag and loss of backfill material. After placing anodes in the trench, native soil, free of rocks and other foreign objects shall be placed around the anode to a minimum cover of one foot above the anode. Flood the anode hole with 5 gallons of fresh water when the backfill reaches one foot above the anode. Remainder of the trench shall then be backfilled with native soil. During installation, anodes shall not be supported or handled by use of attached wires.

The number of anodes to be installed at each test station is designated on the City Standard Drawings or as specified by Engineer.

22-03D Cables

Cables buried in the ground shall be direct buried and shall be laid straight, without kinks. The cable shall have a minimum cover of 30 in. Each cable run shall be continuous in length and free of joints or splices. Care shall be exercised during installation to avoid punctures, cuts, and similar damage to insulation. Any damage to insulation will require replacement of the entire cable length. Backfill surrounding the cables shall be native soil free of foreign materials. Cable warning tape shall be installed 12-inches above the entire buried length of the cable.

22-03E Cable-To-Pipe Connections

Cable-to-pipe connections shall be installed in the manner and at the locations shown on the Drawings. Coating materials shall be removed from the pipe surface over an area just sufficient to make the connections. The surface shall be cleaned to white metal by grinding or filing prior to welding the conductor. Grinding with resin impregnated wheels shall not be allowed. The conductor shall be welded to the pipe by the exothermic process with a copper sleeve fitted over the conductor, and only sufficient insulation shall be removed from the conductor to allow placing in welding mold. After the weld has cooled, all slag shall be removed and the weld shall be tested with a sharp blow from a 22 ounce hammer to assure proper metallurgical bond. All defective welds shall be removed and replaced. All exposed surfaces of copper and steel shall be covered with a minimum thickness of 1/4 in. of insulating materials as shown on the Drawings.

22-03F Mortar Coated Pipe Connection Coating

The exposed metal and surrounding surface shall be cleaned of contaminants and coated with ¼ inch thick application of epoxy. After the epoxy has dried, restore the coating by using non-shrink mortar.

22-03G Cable-To-Pipe Connections (Pin Brazing)

Cable-to-pipe connections for stainless steel pipe shall be installed in the manner shown on the Drawings utilizing a pin-brazing technique. Cut wire with a wire cutter to prevent deforming the wire ends. Do not deform the wire. Remove only enough insulation from the wire to allow the brazed connection to be made. The surface of the stainless steel structure shall be ground or filed to a bright, shiny, clean and dry surface before brazing the wire connection. The wire is to be held at a 90 degree angle to the surface when brazing. Only one wire is to be attached with each braze. All wire to structure braze shall be a minimum of 6 inches apart. As soon as the braze has cooled, the brazed connection shall be tested for strength by striking a sharp blow with a two-pound hammer while pulling firmly on the wire. All unsound brazed connections are to be redone and retested. Assure that the area to be coated is thoroughly cleaned by wire brushing. All exposed surfaces of copper, steel and surrounding surface shall be cleaned of contaminants and covered with a minimum thickness of 1/4-inch of epoxy as shown on the Drawings.

22-03H Test Stations

Test stations shall be installed at locations designated on the Drawings anode installation locations. The test station shall be located directly above the pipe or fitting. Exact locations of test stations shall be determined by the City in the field. The terminal end of each cable shall be identified with the structure identification using the permanent cable identification tags.

The test station leads shall be tested by the Contractor and results approved by the City prior to backfill.

22-03I Joint Bonding

All non-welded rubber gasket joints, mechanical joints, flange joints and threaded joints shall be bonded with an insulated copper cable, sized as shown on the Drawings. The overall length of the conductor shall permit maximum movement of the pipe joint without transferring any tensile stress to the cable, per pipe manufacturer's recommendations.

22-03J Insulating Flanged Joints (N/A)

All insulating components of the insulating flanged gasket set shall be cleaned of all dirt, grease, oil and other foreign materials immediately prior to assembly. Bolt holes in mating flanges shall be properly aligned at the time bolts and insulating sleeves are inserted to prevent damage to the insulation. After flanged bolts have been tightened, each insulating

washer shall be inspected for cracks or other damage. All damaged washers shall be replaced. After assembly, resistance between each bolt and flange shall be measured with an approved ohmmeter, and the minimum resistance shall be 50,000 ohms. Where the insulating joint is assembled in the shop and shipped as a unit, resistance shall be measured in the shop between the flanges and between each bolt and flange and shall meet the above requirements. All insulating flanged joints shall be coated as shown on the Drawings and specified below.

The completed assembly shall be tested with a flange insulation tester such as Gas Electronics Model 601, or equal for the integrity of the insulation. This testing shall be conducted in the presence of the City and approved prior to backfill.

22-03K Coating Buried Insulating Flanged Joints and Harness Sets

Viscous Elastic Coatings & Sealants (VEC) Option

- Use wire brush, power brush or an abrasive cleaning pad to remove all loose material, dirt and grime from substrate to a minimum cleanliness of SSPC SP2. Clean pipe/substrate with denatured alcohol. Apply VEC coating and overlap 10% or 1/2 inch minimum to substrate. For uneven areas, around bolts and in voids apply Viscous Elastic Paste materials. Paste should be packed into these areas leaving as few air pockets as possible. Once the substrate is coated using the VEC an outer wrap shall be applied for mechanical protection.

Three Part Wax Tape Coating System Option

- Surfaces shall be cleaned of all dirt, grease, oil and other foreign materials immediately prior to coating. Remove loose rust, paint and other foreign matter in accordance with SSPC SP2 or SP3. A prime coating shall be applied in a uniform coating over the entire surface to be wrapped. A liberal coating shall be applied to threads, cavities, shoulders, pits and other irregularities. A fill coating shall be molded and packed onto irregular surfaces such as flanges, valves or flexible couplings to create a smooth profile prior to wrapping. A wrap coating shall be spirally wrapped using a minimum of 55 percent overlap to ensure a double thickness of material. At the completion of each roll the overlaps shall be smoothed by hand in the direction of the spiral to ensure sealing of the overlap. A 2-inch overlap shall be maintained when overlapping one roll with the end of a new roll. Overlap shall occur on the top half of the pipeline. A guard coating shall be spirally over-wrapped using a 55 percent overlap to ensure a double coating.

22-03L Field Coating of Buried Flange Hardware

All buried nuts and bolts shall be coated with bitumastic prior to polyethylene encasement. After flange hardware is installed use wire brush, power brush or an abrasive cleaning pad to remove all loose material, dirt and grime from substrate to a minimum cleanliness of SSPC SP2. Apply Bitumastic coating liberally with a medium bristle brush to the extent that all surfaces are completely covered with no bare spots visually evident. Coat exposed surfaces of bolts, washers and nuts, giving special attention to the bottom-side surfaces. Follow the manufacturer's recommendations for drying times required before polyethylene encasement and backfill.

22-03M Polyethylene Encasement of Pipe and Fittings

Encase the buried ductile iron pipes and fittings in minimum 8-mil polyethylene in accordance with AWWA C-105. Encase copper pipe in polyethylene sleeves a minimum 6-mils thick.

22-03N System Commissioning

After installation of the cathodic protection facilities, the system shall be tested, and adjusted by the Project's corrosion engineer, to assure conformance with the Specifications. Testing shall include a determination of proper installation of each component, adequacy of test stations and insulating joints, anodes, dielectric insulation and electrical continuity of bonded pipe fittings. Upon completion of tests, a detailed report will be submitted describing any deficiencies detected. Any and all deficiencies shall be corrected by the Contractor and site conditions restored prior to final acceptance. All retesting shall be at the Contractor's expense.

After the final acceptance, if at the Insulating Joint Test Stations both the project pipe and the existing pipe show adequate levels of cathodic protection, then the Project's corrosion engineer shall bond across the insulating joints to make the new and existing pipe electrically continuous. If the existing pipelines do not show adequate cathodic protection, the insulating joint shall not be bonded across.

The Contractor shall notify the City 48 hours prior to installation of any cathodic protection components so that inspections can be scheduled. Phone messages left with others will not be considered adequate notification. The Contractor shall not backfill any cathodic protection components prior to inspection and approval by the City.

22-03O Quality Assurance

All work shall be performed to the satisfaction of the City.

The Contractor shall not substitute for the specified materials unless approved by the City.

Compaction of backfill and trenches shall match the existing conditions and shall be approved by the City.

22-03P Interference and Exact Locations

The Contractor shall coordinate and properly relate this work to the site and to the work of all trades. The general locations of the facilities are shown on the Drawings. However, the Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, verify existing conditions in the field, determine the exact locations of existing pipelines and structures and advise the City of any discrepancy that may prevent or hinder the specified work from being completed. The Contractor shall be solely responsible for location and marking underground structures so as to avoid damage during construction.

22-03Q Pre-Construction Cathodic Protection Coordination Meeting

Prior to the start of pipe installation conduct a field meeting with all installation crew foremen to go over cathodic protection installation requirements and field testing.

22-04 Measurements

Measurement of Cathodic Protection shall be lump sum.

22-05 Payment

The contract price for Cathodic Protection shall include full compensation for complete cathodic protection system including but not limited: soil testing, polyethylene encasement, bonding, jointing of pipe, coating of buried hardware, installation of magnesium anodes, cables, insulating blankets, insulating joints, coatings for buried insulating joints, test stations, backfill and compaction, over excavation of trench line for bury of anodes, shop drawings, reports, testing and any apparatus not specifically mentioned herein or noted on the plans, but which are obviously necessary to complete the work specified.

SECTION 23. MISCELLANEOUS

23-01A Monuments

Monument materials and construction shall conform to Detail No. 128, "Monument," of the City Standard Details. Monuments shall not be installed until the asphalt concrete pavement has been completed. Monuments shall be installed at the locations shown on the Project Plans.

Monuments shall be measured by the number of items.

The contract price for monuments shall include full compensation for the monument complete in place according to Detail No. 128, "Monument," of the City Standard Details.

23-01B Street Barricades

Street barricade materials and construction shall conform to Detail No. 116, "Street Barricade," of the City Standard Details. Street barricades shall be installed at the locations shown on the Project Plans.

Street barricades shall be measured by the linear foot.

The contract price for street barricades shall include full compensation for the street barricade complete in place according to Detail No. 116, "Street Barricade," of the City Standard Details.

23-01C Headerboards

Headerboards shall be installed at locations shown on the Project Plans. Headerboards and stakes shall be construction-grade, pressure-treated, Douglas fir S4S, graded in accordance with Section 57-2.01B(2), "Structural Timber and Lumber," of the State Standard Specifications. Nails shall be hot-dipped galvanized.

When headerboards are installed along unprotected edges of pavement, the top edges of the headerboard shall conform to the line and grade of pavement.

Headerboards shall be two inches (2") by six inches (6"), unless otherwise noted, and shall be held in place with two-inch by three-inch (2" x 3") stakes of lengths necessary to extend 12 inches into solid ground.

Stakes shall be of sound material, neatly pointed, driven vertically, located at butt joints and elsewhere, spaced not over four feet (4') on center and securely nailed to the headerboards. Headerboards shall have a continuous bearing on undisturbed earth or compacted earth or base rock.

Headerboards shall be measured by the lineal foot.

The contract price for headerboards shall include full compensation for the headerboard complete in place as specified in these City Standard Specifications and shown on the Project Plans.

23-01D Bollards

Bollard materials and construction shall conform to Detail No. 126, "Removal Pathway Bollard," and 117A, "Pathway Bollard," of the City Standard Specifications. Bollards shall be installed at the locations shown on the Project Plans.

Bollards shall be measured by the number of items.

The contract price for bollards shall include full compensation for the bollard complete in place as according to Detail No. 126, " Removal Pathway Bollard," and Detail No. 127 "Pathway Bollard" of the City Standard Specifications.

23-01E Not used

23-01F Main Street/Downtown Furniture

The following paragraphs provide a summary of the existing furniture, fixtures, and materials currently in use for Main Street in Downtown Pleasanton. The list is provided to assist in the replacement of existing fixtures and to maintain the continuity established for the area. Note the numbers listed are for convenience only and are not intended as an endorsement for any particular vendor.

1. Trash Receptacles

Manufacturer: Urban Accessories, Model No. ST-55

Corresponding Lid: Model No. ST-55

Color: Cardinal Industrial Coatings, High Solids Polyurethane, City of Pleasanton Light Pole Green, 6403-EO 423 4-U

Anchor bolt attachment to sidewalk

32 gallon high density plastic liner

Contact: Stephanie or Tom at David F. O'Keefe Company (925-837-4440) which represents Urban Accessories (206-487-0488)

2. Tree Grates

Ironsmith 48"-M4814 and 60"-M6018

Contact: Ironsmith (800) 338-4766

3. Utility Box Lids

Shall match existing color and texture of surrounding paving, whether stamped concrete or cobblestone.

Contacts: Central Wholesale, Pleasanton (925) 417-6900

Westco, Livermore (925) 449-2550

Platt Electric, Livermore (925) 449-6774

4. Bicycle Rack

Custom per attached Detail #828.

Color: Cardinal Industrial Coatings, High Solids Polyurethane, City of Pleasanton
Light Pole Green, 6403-EO 423 4-U

Original Contact: David O'Keefe Company (925- 837-4440) representing P-W
Athletic Co. (408-988-3066) model # 1609-01

5. Pavers

CalPave "Classico" Tan/brown – two sizes (7" x 4" x 2.5" and 4" x 4" x 2.5")

Random pattern with seams perpendicular to Main Street

6. Newspaper Rack

Manufacturer: Quick Crete Model #Q-NR with green "PLEASANTON" inset and
painted on top arch

(23 ¾" D x 110" W x 56 1/8"H; 67 ½" to top of arch)

Color: Quick Crete Latte, smooth texture

Anti-graffiti

Original Contact: Quick Crete (925) 256-1265

7. Planter & Planter Stands

Stanford Series Planter, Quick Crete Model #QRST3622P w/interior water sealant

Planter stand –40" dia. X 22" ht. custom precast

Gloss sealer (anti-graffiti) with 1 ½" dia., centered drain hole

Color of planters not on a stand - Scofield beige cream, T3-Santa Fe Sandblast

Color of planters on a stand - Scofield Westwood brown

Color of all planter stands - Scofield beige cream

Original Contact: Quick Crete – Greg Caron (925) 256-1265

8. Benches

8'L x 2'9"W custom precast concrete curved bench slab

Color – Scofield beige cream, brush blast texture

Std. gloss sealer, anti-graffiti

Original Contact: Quick Crete – Greg Caron (925) 256-1265

Metal supports per City Std Detail 827 & 827A

Color: Cardinal Industrial Coatings, High Solids Polyurethane, City of Pleasanton Light Pole Green, 6403-EO 423 4-U

Original Contact: F and F Steel and Stairway, (408) 279-6558

9. Concrete Curbs, Band Between Stamped Concrete and Pavers and in Front of Buildings

Lamp black pigment

10. Telephone Boxes

Telephone enclosures are “Traditional Enclosures” by Philip Brooks, Inc.

Telephone: (404) 887-9901

11. Streetlights

Mc-Graw Edison Fixtures: Morton Powder Paint #VMS3174 or LED per City Standard Detail 509

Poles are manufactured by Ameron Pole division

Pole Color: Cardinal Industrial Coatings, High Solids Polyurethane, City of Pleasanton Light Pole Green, 6403-EO 423 4-U

12. Stamped Concrete

Color: Weathered Pleasanton Buff

Stamped Concrete Supply

Telephone: 1-800-427-8781

Stamp pattern: 30" x 30"

13. Street Curb

Curb width - 12 inches

23-01G Trail Construction – Earthen Areas

The specific design elements of the trail should follow the specifications and details from the U.S. Forest Service's "National Trails Drawings and Specifications (EM-7720-103), September 1996," available at www.fs.fed.us/ftpoot/pub/acad/dev/trails/trails.htm.

In addition, the trail is to be designed and constructed within the following parameters:

- The average downward slope of the trail shall not exceed eight percent (8%). Any individual section shall not exceed ten percent (10%) for more than 50 feet. The maximum slope shall not exceed 15 percent (15%).
- The grade of any portion of the trail shall not exceed half the grade of the hillside or side slope that the trail traverses (Half Rule).
- Trail corridors shall be cleared of overhead obstructions to eight feet (8') for pedestrians and bicyclists and 12 feet (12') for equestrians. Brush shall be cleared five feet (5') from the edge of the trail tread.
- On contouring trails, trail tread shall consist of a full bench cut. Dirt spoils shall be spread evenly on the down slope side.
- On bench-cut trails, the uphill back slope shall be shaped to more closely match the original slope grade.

- Except as approved by City Staff, all trail beds shall have an outward angled slope of five percent (5%) to eight percent (8%).
- Trail tread shall be compacted to eighty percent (80%).
- Any sections of trail with a downward slope shall have a design element to dewater the trail every fifty feet (50'), preferably a rolling dip/grade reversal type.
- When contour trails require directional changes, climbing turns shall be used for slope grades of seven percent (7%) or less. Switchbacks shall be used for trail slopes greater than seven percent (7%). The upper and lower approaches for both climbing turns and switchbacks shall be immediately preceded by grade reversals to divert water.
- In areas where natural terrain features concentrate water runoff or runoff is accelerated by degree of slope, design elements shall be included to manage water, erosion and chronically muddy conditions.
- Two weeks prior to beginning trail construction, the City Parks Division shall approve the final layout of the trail in the field.

23-01H Surface Applied Detectable/Tactile Warning Surfaces

23-01H.01 Related Documents

Drawings and general provisions of Contract, including General and Special Conditions and Division 1 Specifications Section, apply to this Section.

23-01H.02 Description

This Section specifies furnishing and installing Surface Applied Detectable/Tactile Warning Surface Tiles where indicated. Not recommended for asphalt applications.

23-01H.03 Submittals

- Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.
- Samples for Verification Purposes: Submit two (2) tile samples minimum six inches by six inches (6"x6") of the kind proposed for use.
- Shop drawings are required for products specified showing fabrication details, composite structural system, tile surface profile, fastener locations, sound on cane contact amplification feature, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.

- Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratories to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated on the specifications. All tests shall be conducted on a Surface Applied Detectable/Tactile Warning Surface Tile system as certified by a qualified independent testing laboratory and be current within a 24-month period.
- Maintenance Instructions: Submit copies of manufacturer's specified installation and maintenance practices for each type of Detectable Warning Surface Tile and accessory as required.

23-01H.04 Quality Assurance

- Provide Surface Applied Detectable/Tactile Warning Surface Tiles and accessories as produced by a single manufacturer with a minimum of three (3) years experience in the manufacturing of Surface Applied Detectable/Tactile Warning Surface Tiles.
- Installer's Qualifications: Engage an experienced Installer certified in writing by Surface Applied Detectable/Tactile Warning Surface Tile manufacturer as qualified for installation, who has successfully completed installations similar in material, design, and extent to that indicated for Project.
- Americans with Disabilities Act (ADA): Provide Surface Applied Detectable/Tactile Warning Surface Tiles which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (Title III Regulations, 28 CFR Part 36 ADA STANDARDS FOR ACCESSIBLE DESIGN, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).
- California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Part 2, Section 202 definition of "Detectable Warning." Section 1116A.5 and 11B-406.5.12 for "Curb Ramps", 11B-406.6 at "Islands" and Section 11B-705 for "Detectable Warnings and detectable directional texture."
- Vitrified Polymer Composite (VPC) Surface Applied Detectable/Tactile Warning Surface Tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2-inch (0.2") height, 0.9-inch (0.9") base diameter, and 0.45-inch (0.45") top diameter, spaced center-to-center 2.35 inches (2.35") as measured on a diagonal and 1.67 inches (1.67") as measured side by side. For wheelchair safety, the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 0.045 inch (0.045") high, per square inch; "Armor-Tile" as manufactured by Engineered Plastics Inc., Tel: 800-682-2525, or approved equal.

1. Dimensions: Surface Applied Detectable/Tactile Warning Surface Tiles shall be held to latest standard approved by the California State Architect.
2. Water Absorption of Tile when tested by ASTM D 570-98 not to exceed 0.05 percent (0.05%).
3. Slip Resistance of Tile when tested by ASTM C 1028-96 the combined Wet and Dry Static Co-Efficient of Friction not to be less than 0.80 on top of domes and field area.
4. Compressive Strength of Tile when tested by ASTM D 695-02a not to be less than 28,000 psi.
5. Tensile Strength of Tile when tested by ASTM D 638-03 not to be less than 19,000 psi.
6. Flexural Strength of Tile when tested by ASTM D 790-03 not to be less than 25,000 psi.
7. Chemical Stain Resistance of Tile when tested by ASTM D 543-95 (re-approved 2001) to withstand without discoloration or staining - 10% hydrochloric acid, urine, saturated calcium chloride, black stamp pad ink, chewing gum, red aerosol paint, 10% ammonium hydroxide, 1% soap solution, turpentine, Urea 5%, diesel fuel and motor oil.
8. Abrasive Wear of Tile when tested by BYK - Gardner Tester ASTM D 2486-00 with reciprocating linear motion of $37 \pm$ cycles per minute over a 10" travel. The abrasive medium, a 40 grit Norton Metallite sand paper, to be fixed and leveled to a holder. The combined mass of the sled, weight and wood block is to be 3.2 lb. Average wear depth shall not exceed 0.060 after 1000 abrasion cycles when measured on the top surface of the dome representing the average of three measurement locations per sample.
9. Resistance to Wear of Unglazed Ceramic Tile by Taber Abrasion per ASTM C501-84 (re approved 2002) shall not be less than 500.
10. Fire Resistance of Tile when tested to ASTM E 84-05 flame spread shall be less than 15.
11. Gardner Impact to Geometry "GE" of the standard when tested by ASTM D 5420-04 to have a mean failure energy expressed as a function of specimen thickness of not less than 550 in. lbf/in. A failure is noted when a crack is visible on either surface or when any brittle splitting is observed on the bottom plaque in the specimen.
12. Accelerated Weathering of Tile when tested by ASTM G 155-05a for 3000 hours shall exhibit the following result – $\Delta E < 4.5$, as well as no deterioration, fading or chalking of surface of tile color No 33538
13. Accelerated Aging and Freeze Thaw Test of Tile and Adhesive System when tested to ASTM D 1037-99 shall show no evidence of cracking, delaminating, warpage, checking, blistering, and color change, loosening of tiles or other detrimental defects.

14. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM B 117-03 not to show any deterioration or other defects after 200 hours of exposure.

23-01H.05 Delivery, Storage and Handling

- Surface Applied Detectable/Tactile Warning Surface Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings and tile type shall be identified by part number.
- Surface Applied Detectable/Tactile Warning Surface Tiles shall be delivered to location at building site for storage prior to installation.

21-01H.06 Site Conditions

- Environmental Conditions and Protection: Maintain minimum temperature of 40° Fahrenheit in spaces to receive Surface Applied Detectable/Tactile Warning Surface Tiles for at least 24 hours prior to installation, during installation, and for not less than 24 hours after installation.

The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the general public. Provide barricades or screens to protect the general public.

23-01H.07 Guarantee

Surface Applied Detectable/Tactile Warning Surface Tiles shall be guaranteed in writing for a period of five (5) years from date of final completion. The guarantee includes defective work, breakage, deformation, fading and loosening of tiles.

23-01H.08 Manufacturers

- The Vitrified Polymer Composite (VPC) Surface Applied Detectable/Tactile Warning Surface Tile specified is based on Armor-Tile manufactured by Engineered Plastics Inc. (800-682-2525). Existing engineered and field tested products, which have been in successful service for a period of three (3) years are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.
- Color: Yellow conforming to Federal Color No. 33538 unless noted otherwise and shall be homogeneous throughout the tile

23-01H.09 Materials

- Fasteners: Color matched, corrosion resistant, flat head drive anchor: ¼” diameter x 1 ½” long as supplied by Engineered Plastics Inc.

- Adhesive: Armor-Bond as supplied by Engineered Plastics Inc.
- Sealant: Armor-Seal as supplied by Engineered Plastics Inc.

23-01H.10 Installation

- During all surface preparation and Surface Applied Detectable/Tactile Warning Surface Tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- The application of all tiles, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers. Not recommended for asphalt applications.
- Coordinate with the Contractor or Engineer to ensure that the surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review manufacturer and contract drawings with the Contractor prior to the construction and refer any and all discrepancies to the Engineer.
- Set the tile true and square to the curb ramp area as detailed in the design drawings, so that its location can be marked on the concrete surface. A thin permanent marker works well. Remove tile when done marking its location.
- The surface to receive the Surface Applied Detectable/Tactile Warning Surface Tile is to be mechanically cleaned with a diamond cup grinder or shot blaster to remove any dirt or foreign material. This cleaning and roughening of the concrete surface should include at least 4 inches around the perimeter of the area to receive the tile, and also along the cross pattern established by the corresponding areas on the backside of the tile. Those same areas should then be cleaned with a clean rag soaked in Acetone.
- Immediately prior to installing the Surface Applied Detectable/Tactile Warning Surface Tile, the concrete surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oil, grease, sealers and determined to be structurally sound and cured for a minimum of 30 days.
- Using Acetone, wipe the backside of the tile around the perimeter and along the internal cross pattern, to remove any dirt or dust particles from the area to receive the adhesive.
- Apply Armor-Bond adhesive to the backside of the tile, following the perimeter and internal cross pattern established by the tile manufacturer. Sufficient adhesive must be placed on the prescribed areas to have full coverage across the 2" width of the adhesive locator and shall be applied to within 1/4" continuously around the perimeter edge of the tile. The entire tube of adhesive shall be applied to the back of each tile.
- Set the tile true and square to the curb ramp area as detailed in the design drawings.

- Working from the center of the tile outwards, proceed to drill and install all fasteners in the tile's molded recesses.
- Standing with both feet applying pressure around the molded recess provided in the tile, drill a hole true and straight to a depth of 3½" using a 1/4" masonry drill bit. Drill through the tile without hammer option (on the drill) until the tile has been successfully penetrated, then with hammer option (on the drill) to drill into the concrete. Maintaining foot pressure on both sides of the hole while drilling prevents concrete dust from accumulating between the tile and concrete which can affect the tile being installed flush and may compromise installation integrity.
- Immediately after drilling each hole, before moving on to the next, and while still applying foot pressure, mechanically fasten tiles to the concrete substrate using a leather bound or hard plastic mallet to set the fasteners. Ensure the fastener has been placed to full depth in the dome, straight, and flush to the top of dome. Drive the pin of the fastener with the mallet, taking care to avoid any inadvertent blows to the truncated dome or tile surface.
- Following the installation of the fasteners, the concrete dust should be vacuumed, brushed or blown away from the tile's surface and adjacent concrete. Using Acetone on a rag, wipe the concrete around the tile's perimeter to ensure a clean, dry surface to receive perimeter sealant.
- Armor-Seal perimeter caulking sealant should be applied following the sealant manufacturer's recommendations. Tape all perimeter edges of the tile back 1/16" from the tile's perimeter edge and tape the adjacent concrete back 1/2" from the tile's perimeter edge to maintain a straight and even caulking line. Apply sealant around tile perimeter using care to work sealant into any void between the tile and concrete interface. Tool the perimeter caulking with a rounded plastic applicator or spatula to create a cove profile between the tile and adjacent concrete. Remove tape immediately after tooling perimeter caulking sealant.
- Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured sufficiently to avoid tracking. Curing time is weather dependant (average cure time at 75° Fahrenheit is 30 minutes). Adhesive or caulking on the surface of the Armor-Tile can be removed with Acetone.
- If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Armor-Tile is required in order that the truncated domes on adjacent tiles line up with each other.
- In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered edge should be trimmed off using a continuous rim diamond blade in a circular

saw or mini-grinder. The use of a straightedge to guide the cut is required. All cuts should be made prior to installation of the tiles. If installing adjacent tiles, care should be taken to leave a 1/8 inch gap between each tile to allow for expansion and contraction.

- If tiles are custom cut to size, if pre-molded recesses (to receive fasteners) are removed by the cut, or to maintain a tight installation to the substrate then any truncated dome can be center-drilled with a 1/4 inch masonry drill bit to create a through hole, and the through hole must be countersunk with a suitable carbide countersink bit to receive mechanical fasteners. Care should be taken to not countersink too widely or deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.

23-01H.11 Cleaning, Protecting and Maintenance

- Protect tiles against damage during construction period to comply with Tactile Tile manufacturer's specification.
- Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.
- Clean Tactile Tiles not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean Tactile Tile by method specified by Tactile Tile manufacturer.
- Comply with manufacturers maintenance manual for cleaning and maintaining tile surface and it is recommended to perform annual inspections for safety and tile integrity.

23-01H.12 Measurement

Surface applied detectable warning surface tile shall be measured by the number of ramps completed in place. In the event that an existing ramp used more than one regular sheet of surface-applied detectable/tactile warning surface to complete the installation per plan, the Contractor understands that this shall be measured as one complete installation.

23-01H.13 Payment

Full compensation for furnishing all labor, materials, tools, equipments, and incidentals and for doing all the work involved in the installation of detectable warning surface to existing access ramps (surface-applied) shall be considered included in the unit price bid for Install Detectable Warning Surface to Existing Access Ramp (Surface-Applied) and no additional compensation shall be allowed therefore.

23-01I Commercial and Multifamily Trash Enclosure Design

This section covers the design guidelines for commercial and multifamily trash enclosures. Trash enclosures shall conform to City Standard.

23-01I.01 Department Approvals

The City of Pleasanton requires approvals and permits for the construction of trash enclosures by the following divisions and outside agencies:

Planning Division - Design Review (925) 931-5600
Engineering Division - Storm Water Pollution Control (925) 931-5650
Building Division - Construction (925) 931-5300
Livermore/Pleasanton Fire Department – Fire Sprinklers (925) 454-2361
Alameda County Health Department (510) 567-6700
Pleasanton Garbage Service (925) 846-2042

23-01I.02 Minimum Requirements

The minimum requirements for the design of trash enclosures include:

1. Trash enclosure location on site.
2. Size of enclosure based on the required number of trash bins, trash containers for recyclables and organic waste. Contact the Pleasanton Garbage Service for bin/trash container sizes.
3. Trash enclosures are required to have an automatic fire sprinkler protection system.

Exception: A fire extinguishing system may not be installed when **all** of the following conditions are met.

- The enclosure, including the door(s) and roof shall be constructed of non-combustible materials.
 - If the enclosure is a stand-alone structure, it shall be a minimum of 20 feet away from adjacent buildings and 10 feet from property line(s).
 - Maximum size of the enclosure shall be 180 square feet.
 - The trash enclosure shall be used exclusively for waste garbage contained within approved trash bins/containers.
4. For restaurants, cafeterias and similar uses having food, grease and oil waste, the trash enclosure floor shall be designed to slope to an interior trapped area floor drain and connected to a grease interceptor before entering the sanitary sewer system. The designed floor shall contain all interior run off and not allow outside run off entering the enclosure. Cold running water shall be required at the enclosure for wash down purposes. Hot running water shall be required by the Alameda County Health Dept. for food establishments and similar uses. Retail, office and like uses may design the trash enclosure floors without the drain and grease interceptor requirement.
 5. Trash enclosures shall have a roof to prevent the entrance of rain water.
 6. Provide an accessible path to the trash enclosure.
 7. A posted sign prohibiting the dumping of hazardous materials into the sanitary sewer system.

8. All trash enclosure plans shall be designed by a licensed architect and a licensed structural engineer.

DETAILS