THE CITY OF BRENTWOOD
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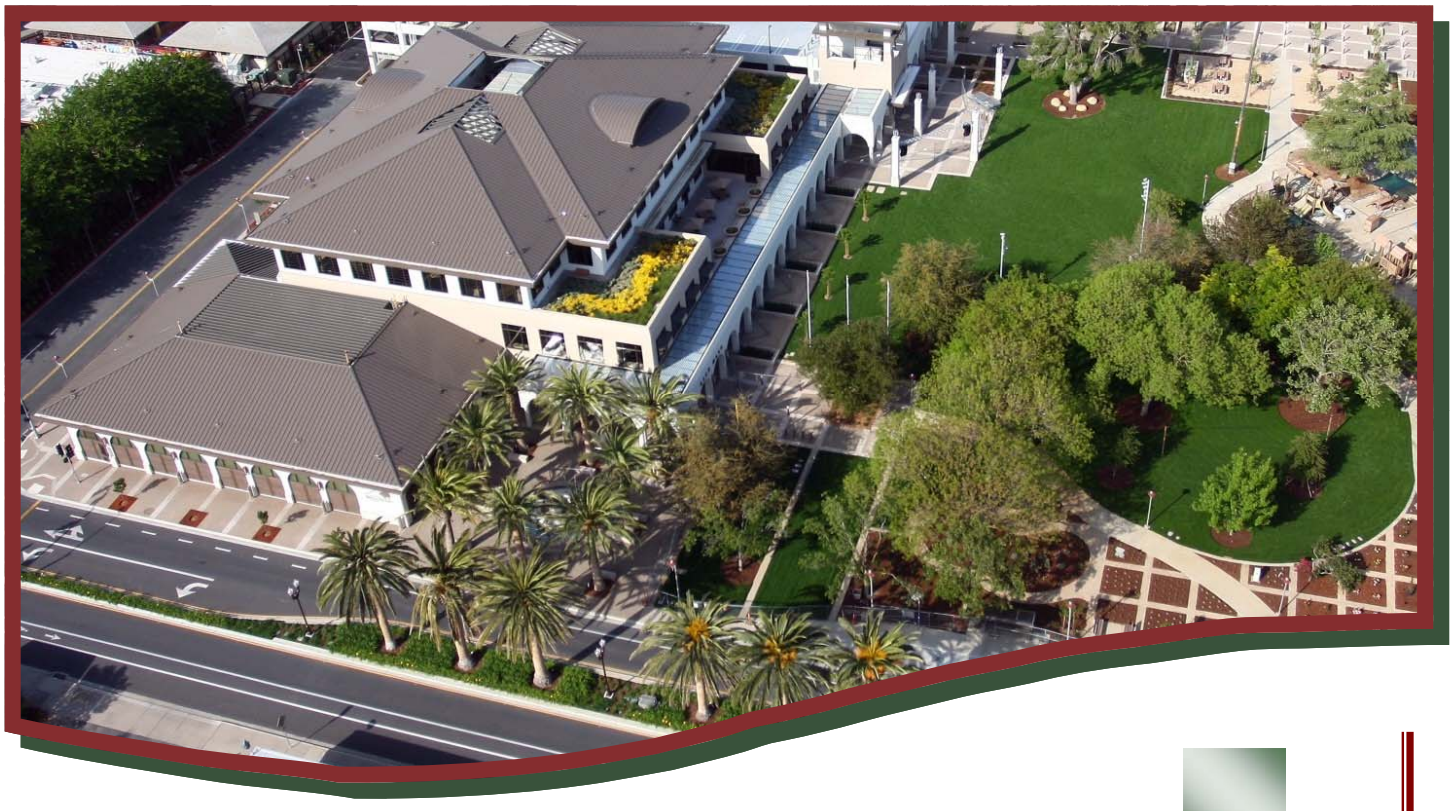
Engineering Department

Standard Plans and Specifications



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150 City Park Way ~ Brentwood ~ California ~ 94513

CITY OF BRENTWOOD

STATE OF CALIFORNIA

STANDARD PLANS AND SPECIFICATIONS

REMARK

The City Engineer, on behalf of and as authorized by the CITY OF BRENTWOOD, STATE OF CALIFORNIA, requires that all public and private improvements within the City of Brentwood shall be constructed in accordance with these Standard Plans and Specifications. The Standard Plans and Specifications are defined as these Standard Plans and Specifications and supplemented by the State of California, Department of Transportation (Caltrans), Standard Plans and Specifications dated July 2010.

In case of conflict, the Standard Plans of the City of Brentwood take precedence over the City of Brentwood Specifications, which take precedence over the Caltrans Standard Plans and Specifications.

The Standard Plans and Specifications may be modified in special cases on a case-by-case basis by the City Engineer as per Resolution No. 97-72 (see Appendix A).

Amendments to the Caltrans Standard Specifications may be issued by the State of California and will require adoption by the City Engineer to become a part of the City of Brentwood Standard Specifications.

The City Engineer may also issue clarifications and amendments to these Standard Plans and Specifications as required.

Interpretations of the Standard Plans and Specifications can be obtained from the City Engineer.

The date of the last revision of these Standard Specifications is February 5, 2016. It is the responsibility of all persons to utilize the Standard Plans and Specifications containing the latest revision.

Exceptions

Whenever a Developer submits a tentative plan, grading plan, facility plan or other, all exceptions to the City of Brentwood Standards shall be indicated in a separate block on either the 1st or 2nd page. Each exception approved shall have the City Engineer's signature next to each exception.

In the event any or all exceptions are not listed in a separate block and regardless of items overlooked during plan checking, the Developer/Contractor will be required to provide construction as per the Standard Plans and Specifications.

Standard Plans and Specifications Availability and Comments

Copies of these Standard Plans and Specifications may be obtained by downloading, in a PDF format, from the City's website: (https://www.brentwoodca.gov/government/engineering/reference-information/-folder-306)

Interested parties who wish to suggest changes or amendments to these Standard Plans and Specifications may contact the City Engineer at (925) 516-5420 or send an e-mail to engineering@brentwoodca.gov, for consideration.

INDEMNIFICATION NOTICE

To the fullest extent allowed by law, Developer and its agents, including but not limited to contractors performing work required by the City of Brentwood, shall defend, indemnify, and hold harmless the City of Brentwood, its elected and appointed officials, agents and employees, from all liability, penalties, cost, losses, damages, expenses, causes of action, claims, or judgments, including attorney's fees and other defense costs, resulting from injury to or death sustained by any person (including Developer's and any contractor's employees), or damage to property of any kind, or any other damage whatsoever, which injury, death, or damage arises out of or related to the performance of work under this contract, including any of the same resulting from the City of Brentwood's alleged or actual negligent act or omission, or that of its officials, agents or employees; except that the obligation to indemnify shall not be applicable to injury, death, or damage to the property arising from the active negligence or willful misconduct of the City of Brentwood. This indemnification agreement shall extend to claims asserted after termination of this contract for whatever reason.

Without limiting the generality of the foregoing indemnity, such indemnity obligation expressly extends to and includes any and all claims, demands, damages, costs, expenses, fines, penalties, or liability occasioned as a result of:

1. Damages to adjacent property related to construction of the work;
2. The violation by Developer's agents, employees, or independent contractors or subcontractors, or any provisions of federal, state, or local law, including applicable administrative regulations;
3. Injury to or death of any person, or any property damage to property owned by any person, while on or about the project site or as a result of the work, whether such persons are on or about the project site by right or not, whenever the work is alleged to have been a contributing cause in any degree whatsoever.

In the event the Developer and its agents, including but not limited to contractors performing work required by the City of Brentwood, enter into any agreement with owners of any adjacent property to enter upon or adjacent to such property for the purpose of performing this contract, shall fully indemnify, defend, and save harmless such person, firm, corporation, or state or other governmental agency which owns or has any interest in such adjacent property. The form and content of such indemnification agreement shall be approved by the City of Brentwood prior to commencement of any work on or about such property. These provisions shall be in addition to any other requirements of owners of said property.

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SECTION 1

DEFINITIONS AND TERMS

1.01 General: Whenever the following terms occur in the Standard Plans and Specifications, the meaning shall be interpreted as follows:

State of California - The City of Brentwood

Standard Specifications - Standard Specifications, State of California, Department of Transportation, July 2010 Edition

Department of Transportation - The Engineering Department of the City of Brentwood

Division of Highways - The Engineering Department of the City of Brentwood

Director - The City Engineer of the City of Brentwood

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

Laboratory - The Laboratory of the Engineering Department of the City of Brentwood or such other laboratory as may be authorized by the City Engineer to test materials and work.

SECTION 16

CLEARING AND GRUBBING

The following is added to Section 16 of the Standard Specifications:

16-1.01 Preservation of Property: Salvage street signs and return to the City Corporation Yard at 2201 Elkins Way.

16-1.03 Construction: Where roots of existing trees are to be pruned, the following procedure shall be followed:

1. All tools shall be clean, sharp, in proper working order and shall be checked for safety before each job.

2. All roots pruned shall be cut as smooth as possible with the least amount of surface wood exposed or at a 90^{o} angle to the root end cut.

3. All root cuts made over one (1) inch in diameter shall be painted to seal with an approved type of tree seal paint.

4. All recommendations of the Soils or Geotechnical Report shall be adhered to unless superseded by more stringent Standard City Specification.

SECTION 19

EARTHWORK

The following is substituted in place of Section 19-5.03 and 19-5.04 of the Standard Specifications:

19-5.03B Compaction Section (95 Percent): A dry compaction of not less than 95 percent (ASTM 1557) shall be obtained for a minimum depth of 0.5 foot below the grading plane for the full width of any street, curb and gutter, and concrete flatwork.

In addition, relative compaction of not less than 95 percent shall be obtained for a minimum depth of 2.5 feet below finished grade for the width of the traveled way plus 3 feet on each side thereof, whether in excavation or in embankment.

Except for the outer 5 feet measured horizontally from the embankment side slopes, the full width of embankment within 150 feet of bridge abutments shall be compacted to a relative compaction of not less than 95 percent. The 150-foot limit of 95 percent compaction will be measured horizontally from the bridge abutment and either parallel or concentric with the roadway centerline. In addition, a relative compaction of not less than 95 percent shall be obtained for embankment under retaining wall footings without pile foundations within the limits established by inclined planes sloping 1.5:1 out and down from lines one foot outside the bottom edges of the footing.

19-5.03C Compaction (90 Percent): Ninety percent (90%) compaction shall generally be restricted to open land or landscape area to be determined by the City Engineer.

A dry compaction of not less than 90 percent (ASTM 1557) shall be obtained in all material except as specified herein to be 95 percent or as may be otherwise specified in the contract plans, or in the City of Brentwood Standard Plans.

19-8.01 Geogrid Installation: Prior to the placement of the aggregate base rock section, Contractor shall install geogrid, Tensar TX 130S or approved equal, whenever the soil 'R' value is less than ten (10), or when soil movement and/or pumping occurs during proof rolling with a full-water truck. No structural allowance will be made for the geogrid.

SECTION 26

AGGREGATE BASES

The following is added to Section 26 of the Standard Specification:

26-1.02 Materials:

1. No recycled class 11 Aggregate base will be allowed.

2. Aggregate base shall not consist of any recycled material or product such as, "Sierra-Crete" by DuPont or the like.

SECTION 39

HOT MIX ASPHALT

The following is added to Section 39 of the Standard Specification:

39-1.02 Materials:

1. All surface courses of Hot Mix Asphalt shall have 1/2" maximum medium aggregate.

2. Bottom lift of asphalt shall be ¾" maximum medium Hot Mix Asphalt.

3. Asphalt shall not exceed more than 15% Recycled Asphalt Pavement (RAP) Materials.

4. Asphalt concrete shall extend both 1/4" above and 1/4" past the lip of gutter.

The following is added to Section 39 of the Standard Specifications:

39-9.0 Deep Strength (or Deep Lift) Asphalt Concrete:

39-9.01 Description: Where deep strength is specified, it shall be placed on a previously prepared subgrade as specified in Section 39-1.09B (Subgrade) to a tolerance of 0.05 foot above or below the subgrade established by the City Engineer.

39-9.02 Grades: The final grade of the lift below the surfacing course shall not vary more than 0.05 foot above or below the planned grade for that course. The finished surface grade tolerance shall conform to Section 39-1.12 "Smoothness" of the Standard Specifications.

39-9.03 Thickness: The thickness of the traveling course shall be as specified in the approved and signed Improvement Plans or the Special Provisions, when available. All other asphalt concrete below this point is considered base course.

39-9.04 Tack Coat: Tack coat paint binder shall be a penetration type emulsion RS-l conforming to Section 94 of the Standard Specifications. Tack coating as covered in Section 39-1.09C, of the Standard Specifications will be required before placement of the surface course. Tacking between base courses is required at the rate of 0.01 to 0.03 gallons per square yard. Application in excess of 0.03 gallon per square yard will be at Contractor's expense. Placement of materials will be determined by the City Engineer.

39-9.05 General Requirements: Where deep strength sections are placed in existing streets with established gutter sections, a continuous wedge shape section of asphalt paving shall be placed against the gutter edge, held below the gutter lip by the amount of the thickness of the surface course and feathered to subgrade in a width of not less than three feet before placement of the level courses, unless otherwise permitted by the City Engineer.

Upon completion of all portions of the construction, the surface course shall be placed for the entire length of the project to provide a smooth uniform riding surface with a minimum of transverse joints.

Side street construction shall have a section varying from a uniform cross-slope at ends of curb return to variable or parabolic section as required to match the existing street section. Transition shall be smooth and uniform between the points described above.

39-9.06 Material: Asphalt concrete shall be Type A on arterial and collector streets, Type B on residential streets and all other paving surfaces not specified, and shall conform to the provisions of Section 39 of the Standard Specifications.

The viscosity grade of paving asphalt shall be AR-4000; aggregate shall be three fourths (3/4) inch maximum, medium grading. The amount of asphalt to be used by weight shall be determined by California Test Method 367.

39-9.07 Spreading and Compacting: The maximum compacted thickness of any one base course of asphalt concrete shall be three (3) inches, the maximum compacted thickness of the surface course of asphalt concrete shall be (2) inches and the minimum thickness shall be one (1) inch. Minimum compacted base course shall be two (2) inches. Minimum thickness of asphalt concrete shall be four (4) inches. Seam shall be overlaid 1-½" and shall only be located on centerlines.

An automatic self-propelled paving machine shall be required for spreading the surface course and any leveling courses required.

In lieu of the conflicting provisions of Section 39-3 of the Standard Specifications, asphalt concrete base courses may be spread and compacted by such mechanical means as will provide a surfacing of uniform smoothness and textured in such a manner as to prevent segregation of materials.

Rolling of the deep lift base courses shall be from the center of the paving pass to the edge.

The Contractor shall use either a 10-ton steel wheel tandem roller or a 15-ton pneumatic tired roller.

Tire pressure of the pneumatic tired roller at the time of breakdown rolling shall be 90 psi unless a lesser tire pressure is permitted by the City Engineer. It is suggested that the pneumatic tire roller have twenty (20) inch rims to help prevent boiling down.

The pneumatic tired roller shall be used to break down the spread on asphalt concrete base and shall operate immediately behind the paver or spreader.

All mixtures shall be spread at a temperature of not less than 250^{o}F. Base material compaction shall be completed before the mix reaches 200^{o}F. There shall be a minimum of twelve (12) hours elapsed time between the placing of successive course in any area.

Roller tires shall be preheated and operated hot and dry or have proper spray equipment for use of Roller-Ease to prevent pick up of hot mix.

Rolling shall continue until ruts are eliminated and the proper degree of compaction is achieved. Final rolling of the surface course shall be accomplished with a steel wheel tandem roller.

39-9.08 Testing:

1. The compacted density of each layer of asphalt concrete placed will be tested. Minimum field compaction shall be 95% of maximum laboratory density based upon California Test Method 304. The Contractor shall furnish a certified copy of the above test prior to placing asphalt concrete for the asphalt concrete mix to be used on project along with plotted stability curve with at least one point plot each side of figure established by California Test Method 304. The City Engineer may adjust percent of asphalt based upon curve submitted.

2. The Developer or Contractor pays for the testing performed by the City. Compaction tests shall be made on the asphalt base and surface course while the asphalt concrete is still hot enough to allow compaction to the required densities. All associated costs related to a test failure shall be borne by the Contractor.

3. The Contractor shall be responsible for requesting testing with a minimum notice of 24 hours.

SECTION 75

MISCELLANEOUS METAL

The following is added to section 75-1.02 of the Standard Specifications:

75-1.02B Manhole Frames, Grates and Covers: Gray iron castings shall conform to and/or exceed the requirements stated in the miscellaneous Iron and Steel Materials Table. Current certified test reports shall be furnished with units furnished.

In addition, current certified test reports for testing in accordance with AASHO H-20 loadings shall be furnished.

Units furnished must be identifiable with reference to the above tests.

Machined surface tolerances shall produce true, uniform bearing surfaces.

All frames and lids shall be interchangeable with like seat design and dimensional fit tolerances shall not exceed those allowed on designated specified units detailed on the Standard Plans.

Manhole frame and covers and catch basin frames and covers shall be galvanized.

75-1.02BB Identifying Castings: All gray iron castings shall be marked on the top surface with the manufacturer's name, initials or logotype. Such marking shall be made by means of stamping, cast-in-mold lettering, etching, or engraving. In addition, the manhole cover shall have the “City of Brentwood” labeled on it as well as the facility (i.e. storm drain, sewer, water, etc.). All materials shall be made in U.S.A.

SECTION 81

MONUMENTS

This section supersedes in its entirety the like numbered section of the Standard Specification:

81-1.01 General: This work shall consist of constructing cast-in-place Portland cement concrete survey monuments at the location shown on the plans or directed by the City Engineer and as specified in these Specifications.

81-1.02 Materials: The concrete portion of monuments shall be constructed in accordance with the provisions in Standard Specifications Section 51, "Concrete Structures", and Section 90, “Concrete".

Concrete shall be Class B or minor concrete at the option of the Contractor. A one-inch maximum aggregate shall be used.

All concrete shall be thoroughly compacted and shall be cured in accordance with the provisions in Section 90-1.03B “Curing Concrete”.

At the option of the Contractor, the frame and cover for Type D survey monuments shall be fabricated from either cast steel or gray cast iron. The covers shall fit into the frames without rocking.

The cast steel and gray cast iron frames and covers shall conform to the provisions in Standard Specifications Section 55-1.02, “Materials”.

Granular material for Type D survey monuments shall be gravel, crushed gravel, crushed rock, or any combination thereof. Granular material shall not exceed 3/4 inches in greatest dimension.

81-1.03 Construction: Survey monuments may be cast-in-place in neat holes without the use of forms, except where forms are shown on the plans.

Survey marker disks shall be placed in survey monuments before the concrete has acquired its initial set and shall be firmly bedded in the concrete. The concrete monument shall be so located that when the disk is placed in the center of the monument, the point being referenced will fall within a one-inch circle in the center of the disk.

After the monuments have been constructed as specified, any space around them shall be filled with earth, free from rock, or with base and surfacing materials. Earth material shall be watered and tamped into place.

Surplus excavated material remaining after the monuments have been constructed shall be disposed of.

SECTION 86

ELECTRICAL SYSTEMS

The following specification shall be added to this section of the Standard Specification:

86-1.01 Summary: The work described in this section shall be done in accordance with Section 86 of the latest edition of the State Standard Specifications, the latest edition of the State Standard Plans, the City Standard Plans, and the Improvement Plans.

In case of conflict between any of the contract documents, the document, which takes precedence over, and shall be used in lieu of such conflicting portions, shall be as specified in the City Standard Specifications.

86-1.07 Scheduling of Work: The initial installation and turn-on of the new or modified equipment shall not be made on a Monday, Friday, or the day preceding a Legal Holiday. Immediately prior to turning on the signals, Construction Type III Barricades with a sign "Signal Ahead," and a portable flashing yellow warning light shall be placed on all approaches to the intersection. These barricades shall remain in place for a minimum of two days.

Present at the time of the turn-on shall be a representative from the electrical contractor, controller manufacturer, City of Brentwood Engineering Staff and the design engineer.

In the event that the Contractor is unable to respond to a problem that develops during the functional test, or that for any reason is unable to correct the problem in a timely fashion as determined by the City, the City may have its own maintenance personnel work on the problem. Any such work performed by the City shall not invalidate the guarantee provided for in these Specifications, and shall be at the Contractor's expense.

86-2.01 Excavating and Backfilling: All backfill within the roadway area and adjacent to signal foundations shall conform to City of Brentwood Standard Plan ST-25, ST-25a and ST-25b.

86-2.03 Foundations: Exterior dimensions and bolt pattern for the Controller cabinet foundation shall be as recommended by the cabinet manufacturer. An 8-foot ground rod shall be installed in the foundation.

86-2.04 Standards, Poles, Steel Pedestals and Posts: Section 86-2.04, "Standards, Poles, Steel Pedestals and Posts," of the Standard Specifications is amended by adding the following:

All galvanized nuts used on assemblies with a specified preload or torque, shall be lubricated in accordance with the requirements specified for galvanized Grade DH nuts in ASTM Designation: A563.

86-2.05 Conduit: Conduit installed in non-pavement areas shall be covered with plastic underground warning tape 6 inches above the conduit. Conduit installed to a Pacific Gas and Electric (PG&E) service pole shall extend up the pole 1 foot and be temporarily capped. PG&E will extend the conduit up the pole to the actual service point.

The ends of conduits in pull boxes shall be a minimum of 4 inches above surface of rock and a minimum of 6 inches below the top of the pull box.

86-2.06 Pull Boxes: All pull boxes shall be of quartzite construction and shall be gray in color. Pull box lids shall have a non-skid surface with the words "Traffic Signal," Street Lighting" or "Service" on the lid, as appropriate.

On long runs, the spacing of pull boxes shall not exceed 200 feet measured along the conduit. No drain hole or grout shall be placed in sump area.

86-2.08 Conductors and Cables: Each new conductor shall be installed with 3 feet of slack in each signal or lighting standard and 6 feet of slack in each pull box.

All low voltage conductors (less than 50 volts) shall be spliced by methods shown on State Standard Plan ES-13, with the addition that splices shall be soldered using 60-40 non-acid core solder. Splices shall be insulated by Method "B" as shown on State Standard Plan ES-13.

Conductors shall not be spliced in the pull boxes nearest the controller, but shall be continued to terminals in the cabinet.

86-2.09F Fused Splice Connectors: The fused splice connector to each luminaire shall be installed in the base of the electrolier pole next to the handhole area. Fused splice connectors shall NOT be placed in the pullboxes.

86-2.11 Service: The Contractor shall coordinate with the Pacific Gas and Electric (PG&E) Company for any necessary service modification. Any fees and costs required by the utility company shall be borne by the contractor.

The service cabinet shall be a Type III-AF, Tesco Model No. 26-100 or equivalent as approved by the City Engineer. Service shall have a 100-ampere, 2P, main circuit breaker with a 50-ampere, 1P, signal circuit breaker, a 30-ampere, 1P, lighting circuit breaker, a 15-ampere, 1P, illuminated street name sign circuit breaker, a 30-ampere, 1P, "spare" circuit breaker. A 30-ampere, 125 volt twist lock receptacle shall be mounted in the dead-front panel for the convenience receptacle.

Traffic signals, illuminated street name signs, convenience receptacle, and "spare" shall be metered; street lighting shall be un-metered.

86-2.14 Testing: Prior to field installation the contractor, or manufacturer, shall deliver to the County for testing, the traffic signal controller assembly, (wired cabinet, controller, and all auxiliary control equipment).

The County will test the controller assembly for continuous, satisfactory operation (without failure) for 21 consecutive calendar days.

When the controller assembly has been satisfactorily shop tested, the City Traffic Engineer will so notify the Contractor by telephone, with a follow-up in writing, of the scheduled pick up date.

All testing shall be paid for by the contractor.

86-2.16 Painting: Controller and service cabinet exteriors shall not be painted.

86-3.01 to 86-3.04 Controller Assemblies: The contractor shall supply a Naztec 981 NEMA TS-2 controller in a completely wired Type P cabinet assembly with inductive loop detector sensor units, and anchor bolts. Except as modified below, it shall conform to the latest State of California "Traffic Signal Control Equipment" Specifications with the Caltrans District 4 addenda.

1. The monitoring device shall meet the Caltrans Model 210-P standard with the addition that it shall also trip and indicate the failure mode under the following conditions:

    a. When all signal heads for any phase are dark.

    b. When there is a load switch failure.

    c. When there is a power interrupt after failure.

    d. When the program card is ajar.

2. The load switches shall meet the Caltrans Model 200 standard with the addition that upon conflict, they shall latch-in the last display.

3. Conductors within cabinets shall be cabled together with self-clinching nylon cable ties. All connectors for cabinet equipment shall have wires installed on all pins. Spare or unused wires shall be long enough to reach the farthest terminal on the termination panel, with 2 inches to spare. All unused ends shall be identified, insulated and folded back in a wire bundle.

4. A convenience receptacle shall be installed and have ground-fault circuit interruption as defined by the National Electrical Code. Circuit interruption shall occur on 6 milliamperes of ground-fault current and shall not occur on less than 4 milliamperes on ground-fault current.

86-3.05A Pre-emption Equipment: The Contractor shall install "3-M" Brand "Opticom" or approved equal, optical detectors, cables complete and operable, as shown on the plans and according to the manufacturer's recommendations and the latest adopted version of the East Diablo Fire Protection District "Specifications for Emergency Vehicle Controls on Traffic Signals."

The Engineer will mark the optical detector location for the contractor. The contractor shall notify the Engineer at least 24 hours prior to installing the optical detector.

Mounting of the optical detector on a ¾-inch diameter conduit stub shall conform to the following:

1. Signal Mast Arm - Install by drill and tap method or Pelco Bracket AB-132-29 with 1½-inch to ¾-inch reducer.

2. Type 1 Standards - If necessary, retrofit signal framework and hardware.

3. Optical cables shall be labeled in the controller cabinet and in the pull boxes adjacent to the signal standards with appropriate phase designations.

4. Cable shall be 3M, Model #138, Clifford 3C20T70S8, or approved equal, and shall be installed with a minimum of 4 feet and a maximum of 6 feet of slack in controller cabinet and pull boxes. The cable shall not be spliced.

5. One "3-M" brand, or approved equal, high priority emitter shall be provided by the Contractor, complete with control switch, cable and mounting hardware, to the City Engineer.

6. The City and/or the East Diablo Fire Protection District (EDFPD) will test the optical detection system. Test will be performed from a distance of between 300 feet and 1,800 feet between the emitter and the detector being tested.

86-3.05B Solid State Switching Devices: Load switches shall monitor, with LED's, both input from the controller and output to the field conductors. Upon conflict, the load switch shall latch in the last display.

86-3.05C Flash Transfer Relay: Sleeves of the appropriate color, red or yellow, shall be installed on the flash bus wire.

86-4.01 Vehicle Signal Faces: Until ready for use, new or relocated signal faces shall be securely covered so that no signal indications are visible. A flash hole no larger than 1-inch diameter may be placed in front of each lens.

All new vehicle signal faces shall utilize 12-inch lenses. New left turn signal faces shall be composed of sections with arrow lenses.

86-4.03 Pedestrian Signal Faces: All pedestrian signal faces shall be modular solid state with international symbol indications and shall utilize Z-crate type front screens. Pedestrian signals shall be Type "C."

86-5.01 Vehicle Detectors: Six-foot diameter circular Type E loops shall be installed as per Standard Plan ES-5B and shall conform to the following:

1. The circular loop shall be sawcut. The sides of the slot shall be vertical. The minimum radius of the slot entering and leaving the circular part of the loop shall be 1-½ inches. The slot width shall be a maximum of ¼-inch, or as approved by the City Engineer.

2. Loop wire shall be Type 2. Lead-in cable shall be Type "C." Curb terminations shall be per ES-5E, Curb Termination Details, utilizing a Type "A" detector handhole.

3. Installation of new detector loops installed in pavement constructed under this project shall be completed prior to the installation of the final lift of AC pavement.

86-6.01 High Pressure Sodium Luminaires: Luminaires shall be per Standard Plan SL-2 or equal.

Luminaires shall contain a locking type mounting receptacle in accordance with EEI-NEMA standards for photoelectric control. The receptacle shall be pre-wired to the terminal board and mounted by a spring-loaded retainer ring allowing orientation without the use of tools.

Luminaire shall consist of a precision die-cast aluminum housing, glove ring, and access door.

86-6.01A High Pressure Sodium Lamp Ballasts: Ballasts shall be reactor type.

86-6.01B High Pressure Sodium Lamps: Lamps shall be 250w high-pressure sodium, with initial lumens of 27,500, a minimum rated life of 24,000 hours, and suitable for use on 120v AC circuit.

86-6.09 Internally Illuminate Street Name Signs: Internally illuminated street name signs shall be Type A with an integral Type IV photoelectric control.

86-6.11 Photoelectric Controls: Type IV shall be used unless otherwise indicated.

Technical Assistance and Back-Up Services

The manufacturer's representative shall provide the City with a California telephone number for the ordering of replacement parts that are required and for providing technical advice to City personnel.

The manufacturer shall have on hand at this number a complete file of the City's equipment, including all pertinent serial numbers.

The manufacturer shall have available at the telephone number a person with competence in parts, nomenclature and functional characteristics of the City's signal controller equipment. This person shall be able to provide descriptions, part numbers, prices and availability of the City's requirements.

A fully qualified electronics technician with a capacity to expertly advise on all matters relating to the City's equipment shall be available immediately, or by return telephone call within 24 hours (normal work days only, holidays and weekends accepted).

There shall be no charge to the City for any advice or information provided in this manner.

SECTION 90

CONCRETE

The following is added to Section 90 of the Standard Specifications:

90-1.01 General: On reconstruction and removal projects, of less than five (5) linear feet of sidewalk, match existing score pattern. If more than five (5) linear feet use new score pattern.

90-1.01C(4) Admixtures: For all concrete work, excluding sound walls and retaining walls, fibrous concrete reinforcement shall be added unless otherwise directed by the City Engineer. The reinforcement shall be 100 percent virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured for use as concrete secondary reinforcement. Volume per cubic yard shall equal a minimum of 0.1% (1.5 pounds). Fiber manufacturer must document evidence of 5-year satisfactory performance history, compliance with applicable building codes and ASTM C-1116 Type III 4.1.3 and ASTM C-1116 (Ref: ASTM C-1018) Performance Level II outlined in Section 21 Note 17.

SECTION 110

STORM DRAIN FACILITIES

110-1.01 Description: This work shall consist of installing storm drain pipe and constructing storm drain structures as shown on the plans, in accordance with these Standard Specifications, and as directed by the City Engineer.

The type of storm drain pipe and storm drain structures will be designated in the improvement plans.

110-1.01A Right of Way: All publicly owned and maintained storm drains shall meet the more restrictive of the following criteria:

1. Minimum width of any easement shall be 15 feet for one (1) utility, with greater widths required for multiple utilities.

2. All easements shall have a minimum width in feet to the required trench width according to the standard detail for trench backfill, plus two (2) additional of width for every foot of depth of the pipe as measured from the bottom of the pipe to finished grade. All pipes shall be centered within their easements.

110-1.02 Materials: Pipe, fittings, miscellaneous materials and the most common joint materials are described in this Section.

1. The pipe materials, which may be used for storm drainage improvements within the City right-of-way and easements, shall be Class III as specified in Sections 63 and 65 of the Caltrans Standard Specifications. Under no circumstances shall storm drain (top of bell) encroach into subgrade material. Cover less than two (2') feet requires concrete cap and City Engineer's approval. CMP, CAP, PVC, and ABS shall not be used.

2. Contractor may elect to use cast-in-place pipe for storm drain lines 36" or greater.

110-1.02A Reinforced Concrete Pipe: Reinforced Concrete Pipe shall conform to ASTM Designation: C-76 for the size and classes indicated on the plans.

110-1.03 Excavation and Backfill: Excavation and backfill shall conform to the provisions of City of Brentwood Standard Plans ST-25, ST-25a and ST-25b.

The pipe shall be laid in a trench excavated to the line and grade shown on the approved plans. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing surface for the entire length of the pipe barrel.

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

The use of recycled A.B. material shall not be allowed.

Trenches shall not be left open farther than 100 feet in advance of pipe laying operations or 100 feet to the rear thereof, unless otherwise permitted by the City Engineer. All trenches are to remain open until inspected and approved by the City Engineer.

The excavation shall be supported so that it will be safe and that the ground alongside the excavation will not slide or settle and all existing improvements, either on public or private property, will be fully protected from damage.

Backfill around manholes shall be Class II A.B. and shall be compacted to a minimum of 95%. In case of difficulty, a two-sack cement slurry may be used around the manholes as backfill.

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

110-1.04 Bedding and Initial Backfill: Bedding shall be defined as that material supporting, surrounding and extending to one foot above the top of the pipe. Where it becomes necessary to remove boulders or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with the bedding material designated in the Standard Plans and Specification.

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

Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of

0.13 times the outside diameter of the barrel or 4" minimum whichever is greater. Densification of bedding for pipe shall be accomplished after the sheeting or shoring has been removed from the bedding zone. Alternate methods of pipe laying recommended by the pipe manufacturer may be used if approved by the City Engineer.

Bedding material shall be Class II A.B. Pea gravel is not acceptable. No aggregate shall exceed 3/4".

110-1.05 Pipe Laying: Pipe shall be protected during handling against impact shocks and free fall. Pipe will be carefully inspected in the field before and after laying. If any damage is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the City Engineer and shall be at no cost to the City.

When connections are to be made to any existing pipe, conduit, or other appurtenances, of which the actual elevation or position cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit at no cost to the City. City of Brentwood inspection shall be prior to the connection. When the new facilities interfere with the existing flow of sewage, the Contractor shall provide satisfactory bypass facilities at his expense.

The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade.

All joints shall be cleaned and then sealed with the type of materials approved by the City. The material shall be recommended by the pipe manufacturer for the purpose intended and approved by the City Engineer, in order to obtain a watertight joint against leakage and infiltration under all conditions of expansion, contraction, and settlement.

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

Whenever existing pipes are to be cut or abandoned, the open ends of said pipes shall be securely closed by a tight fitting plug or wall of concrete not less than 2 feet thick, or by a tight brick wall no less than 8 inches thick with cement mortar joints.

Where groundwater occurs, the bottom of the trench shall be kept entirely free of water during the pipe laying, filling the joints, and as long thereafter as approved by the City Engineer.

Stoppers for pipes and branches left unconnected shall be constructed of a double brick and mortar bulkhead.

Concrete pipe with elliptical reinforcement shall be laid with the minor axis of the reinforcement cage in a vertical position.

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

Pipe sections shall be laid and joined in such a manner that the offset of the inside of the pipe at any joint will be held to a minimum at the invert. The maximum offset at the invert of pipe shall be 1 percent of the inside diameter of the pipe or 3/8-inch (9.5 mm), whichever is smaller.

In joining bell and spigot pipe, the spigot of each pipe shall be so seated in the bell of the adjacent pipe as to give a maximum of 3/8-inch (9.5 mm) annular space all around the pipe in the bell. Unavoidable offsets shall be distributed around the circumference of the pipe in such a manner that the minimum offset occurs at the invert.

When pipe is laid in a sheeted trench, all sheeting against which concrete cradle is to be placed shall be faced with at least one thickness of building paper and the sheeting shall be withdrawn without displacing or damaging the cradle.

After the joints have been made, the pipe shall not be disturbed in any manner.

110-1.06 Pipe Joints: Joints shall be watertight and flexible. Each joint shall contain a solid gasket of rubber or other material approved by the Engineer, which shall be the sole element responsible for water-tightness of the joint. This gasket shall be of circular cross section unless otherwise approved by the City Engineer. The length and cross sectional diameter of the gasket, the annular space provided for the gasket, and all other joint details shall be such as to produce a watertight joint. The slope of the longitudinal gasket contact surfaces of the joint with respect to the longitudinal axis of the pipe shall not exceed 2 degrees.

Under ordinary laying conditions, the work shall be scheduled so that the bell end of the pipe faces in the direction of laying. Prior to placing the spigot into the bell of the pipe previously laid, the spigot groove, the gasket and the inside of the bell shall be thoroughly cleaned. Then the spigot groove, the gasket and the first 2 inches (50.8 mm) of the inside surface of the bell shall be lubricated with a soft vegetable soap compound.

The gasket shall be uniformly stretched when placing it on the spigot so that the gasket is distributed evenly around the circumference. The gasket shall be lubricated as per manufacturer's recommendations.

For pipe in which the inside joints are to be pointed, suitable spacers shall be placed against the inside shoulder of the bell to provide the proper space between abutting ends of the pipe.

After the joint is assembled, a thin metal feeler gage shall be inserted between the bell and the spigot and the position of the gasket checked around the complete circumference of the pipe. If the gasket is not in the proper position, the pipe shall be withdrawn, the gasket checked to see that it is not cut or damaged, the pipe re-laid, and the gasket position again checked.

110-1.07 Existing Manholes: Existing manholes shall be adjusted to grade, removed and replaced, repaired or abandoned as shown on the plans and in accordance with the provisions of Section 15 of the Standard Specifications, "Existing Highway Facilities."

When designated on the plans, or directed by the City Engineer, existing manhole frames and covers shall be reset on new structures. Upon completion of the adjustment of existing manholes to grade, the manhole cover shall conform to the planed surface as specified for the finished hot mix asphalt surface, Section 39 of the Standard Specifications.

Unless otherwise specified on the plans, all existing manholes, catch basins, drain inlets, and other appurtenances that are removed become the property of the City of Brentwood and shall be delivered to the City Corporation Yard.

110-1.08 Storm Drain Structures: New manholes for storm drain shall be constructed in accordance with the details shown on the Standard Plans, as specified in this Section and as directed by the City Engineer.

Precast manholes shall conform to City of Brentwood Standard Plans SD-1, SD-2 and SD-3, and as shown on the plans as well as to the applicable sections in Section 70 of the Standard Specifications, "Miscellaneous Drainage Facilities" except for measurement and payment.

Manhole frames shall be secured to the manhole structure or riser barrels with full mortar bed or full circle concrete collar that will effectively secure the frame to the manhole structure and provide a uniform bearing for the frame.

Concrete for storm drain structures shall be Class A as described in Section 90 unless otherwise shown on the plans.

When the manhole is located in the pavement area, it shall not be constructed to final grade until pavement has been completed.

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

No pipe shall project into a manhole and in no case shall the bell of a pipe be built into the wall of a manhole or structure.

All concrete shall be cured for a period of not less than 7 days after being placed and shall be protected in place from damage.

110-1.09 Trench Resurfacing: Trenches in existing streets, except streets which are to be closed or abandoned, shall be resurfaced with the type and thickness of bases, surfacing or pavement shown on the plans or designated by the City Engineer. Unless otherwise specified, trench resurfacing shall be accomplished in accordance with the Standard Plans ST-25a and ST-25b.

Upon notice from the City Engineer, the Contractor shall proceed immediately to resurface any part of any excavation, without waiting for completion of the full length of the sewer.

All trenches shall be backfilled, patched with a minimum of 3" of cutback, and rolled to provide a smooth transition between the temporary and existing pavement at the end of each working day. Any temporary trench patching shall be subject to the approval of the City Engineer. Using tires of heavy equipment to roll the temporary paving is not considered acceptable.

110-1.10 Testing: Visual and TV testing of pipeline and manholes is required as specified by site inspector. All joints and manholes shall be constructed and tested per manufacturer's recommendations.

SECTION 120

SEWER FACILITIES

This section supersedes in its entirety the like numbered section of the Standard Specification:

120-1.01 Description: This work shall consist of laying sewer pipe and constructing sewer structures as shown on the plans, in accordance with these Specifications, the Special Provisions and as directed by the City Engineer.

The type of sewer pipe and sewer structures will be designated in the improvement plans.

120-1.01A Right of Way: All publicly owned and maintained sanitary sewers shall meet the more restrictive of the following criteria:

1. Minimum width of any easement shall be 15 feet for one (1) utility, with greater widths required for multiple utilities.

2. All easements shall have a minimum width in feet to the required trench width according to the standard detail for trench backfill, plus two (2) additional of width for every foot of depth of the pipe as measured from the bottom of the pipe to finished grade. All pipes shall be centered within their easements.

120-1.02 Materials: Pipe, fittings, miscellaneous materials and the most common joint materials are described in this Section.

Portland cement used in the production of concrete products set forth in this Section 120-1.02 shall be Type II Modified cement conforming to the provisions in Section 90 of the Standard Specifications, "Concrete."

120-1.02A Reinforced Concrete Sewer Pipe: Reinforced concrete pipe shall conform to ASTM Designation: C-76 shall no longer be in use for conveying sewer.

120-1.02B Clay Sewer Pipe: Vitrified clay pipe shall conform to the specifications for extra strength pipe of ASTM Designations: C-700 and C-301.

120-1.02C Ductile Iron Pipe: Ductile iron pipe shall comply with ANSI A21.51 (AWWA C151).

120-1.02D Polyvinylchloride (PVC) Sewer Pipe: Polyvinylchloride (PVC) sewer pipe and fittings up to fifteen inches (15") in diameter shall conform to one of ASTM Standard Specifications D-2680, D-3034, or F-949. Solid wall pipe shall have a pipe diameter to wall thickness ratio (SDR) of 35.

Polyvinylchloride (PVC) sewer pipe and fittings from eighteen (18") to thirty-six (36") inches in diameter shall conform to one of ASTM Standard Specifications S679 or F949. Solid wall pipe shall have an SDR value of 35.

Joints for the Polyvinyl pipe shall be push-on bell and spigot joints using elastomeric ring gaskets. The gaskets shall be securely fixed into place in the bells so that they cannot be dislodged during joint assembly. The gaskets shall conform to ASTM Standard Specification F-477 for Elastomeric Seals (gaskets) for Joining Plastic Pipe, and shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will permanently endure under the conditions of the proposed use. The joints shall conform to ASTM Standard Specifications D-3212, "Joints for Drain and Sewer Pipe Using Flexible Elastomeric Seals."

120-1.02E Resilient Joint Material: Flexible compression joints in bell and spigot clay pipe and resilient joint materials to be used therein shall conform to the requirements of ASTM Designation: C 425.

120-1.02F Rubber Gasketed Joints: Rubber gasketed joints shall conform to the provisions in Section 65-2.02E, Note 2 referring to "Rubber Gasketed Joints".

120-1.02G Reinforcement: Reinforcement shall conform to the provisions in Section 52 of the Standard Specifications, "Reinforcement".

120-1.02H Concrete: Concrete shall conform to the provisions in Section 51 of the Standard Specifications, "Concrete Structures," and Section 90 of the Standard Specifications, "Concrete".

120-1.03 Excavation and Backfill: Excavation and backfill shall conform to the provisions of City of Brentwood Standard Plan ST-25, ST-25a and ST-25b.

The pipe shall be laid in a trench excavated to the line and grade shown on the approved plans. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing surface for the entire length of the pipe barrel.

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

The use of recycled Aggregate Base (A.B.) material shall not be allowed.

Trenches shall not be left open farther than 100 feet in advance of pipe laying operations or 100 feet to the rear thereof, unless otherwise permitted by the City Engineer. All trenches are to remain open until inspected and approved by the City Engineer.

The excavation shall be supported so that it will be safe and that the ground alongside the excavation will not slide or settle and all existing improvements, either on public or private property, will be fully protected from damage.

Backfill around manholes shall be Class II A.B. and shall be compacted to a minimum of 95%. In case of difficulty, a two-sack cement slurry may be used around the manholes as backfill.

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

120-1.04 Bedding and Initial Backfill: Bedding shall be defined as that material supporting, surrounding and extending to one foot above the top of the pipe. Where it becomes necessary to remove boulders or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with the bedding material designated in the Standard Plans and Specification. Where concrete is specified to cover the pipe, the top of the concrete shall be considered as the top of the bedding.

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

Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of 0.13 times the outside diameter of the barrel or 4" minimum whichever is greater. Densification of bedding for pipe shall be accomplished after the sheeting or shoring has been removed from the bedding zone. Alternate methods of pipe laying recommended by the pipe manufacturer may be used if approved by the City Engineer.

Bedding material shall be Class II A.B. Pea gravel is not acceptable. No aggregate shall exceed 3/4".

120-1.05 Pipe Laying: Pipe shall be protected during handling against impact shocks and free fall. Pipe will be carefully inspected in the field before and after laying. If any damage is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the City Engineer and shall be at no cost to the City.

When connections are to be made to any existing pipe, conduit, or other appurtenances, of which the actual elevation or position cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit at no cost to the City. City of Brentwood inspection shall be prior to the connection. When the new facilities interfere with the existing flow of sewage, the Contractor shall provide satisfactory bypass facilities at his expense.

The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade.

All joints shall be cleaned and then sealed with the type of materials approved by the City. The material shall be recommended by the pipe manufacturer for the purpose intended and approved by the City Engineer, in order to obtain a watertight joint against leakage and infiltration under all conditions of expansion, contraction, and settlement.

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

Whenever existing pipes are to be cut or abandoned, the open ends of said pipes shall be securely closed by a tight fitting plug or wall of concrete not less than 2 feet thick, or by a tight brick wall no less than 8 inches thick with cement mortar joints.

Where groundwater occurs, the bottom of the trench shall be kept entirely free of water during the pipe laying, filling the joints, and as long thereafter as approved by the City Engineer.

Stoppers for pipes and branches left unconnected shall be made of the same material as the pipe or of resilient joint material conforming to Section 120-1.02E, "Resilient Joint Material". After placing the stopper, it shall be covered with a layer of sealant. The sealant shall be sufficiently fluid to ensure free flow around the stopper.

Concrete pipe with elliptical reinforcement shall be laid with the minor axis of the reinforcement cage in a vertical position.

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

Pipe sections shall be laid and joined in such a manner that the offset of the inside of the pipe at any joint will be held to a minimum at the invert. The maximum offset at the invert of pipe shall be 10 percent of the inside diameter of the pipe or 3/8-inch (9.5 mm), whichever is smaller. The following are the maximum offsets for a given pipe diameter:

6" Φ pipe	-	0.75"
8" Φ pipe	-	1.00"
10" Φ pipe	-	1.25"
12" Φ pipe	-	1.25"

In joining bell and spigot pipe, the spigot of each pipe shall be so seated in the bell of the adjacent pipe as to give a maximum of 3/8-inch (9.5 mm) annular space all around the pipe

in the bell. Unavoidable offsets shall be distributed around the circumference of the pipe in such a manner that the minimum offset occurs at the invert.

When pipe is laid in a sheeted trench, all sheeting against which concrete cradle is to be placed shall be faced with at least one thickness of building paper and the sheeting shall be withdrawn without displacing or damaging the cradle.

After the joints have been made, the pipe shall not be disturbed in any manner.

120-1.06 Pipe Joints:

1. Vitrified Clay Pipe - Either polyvinyl chloride or polyurethane compression joints may be used. Materials shall conform to ASTM Designation: C-425.

   Joints shall contain two sealing components, one bonded to the outside of the spigot and the other bonded to the inside of the bell. Sealing components shall be a plasticized polyvinyl chloride compound or polyurethane elastomer bonded to pipes and fittings at the pipe factory, and shall be cured to a uniform hardness and compressibility. The sealing components shall be shaped, sized, bonded, and cured in such a manner as to form a tight, dense, and homogeneous compression coupling when the joint is assembled. Any imperfection in the sealing components will be cause for rejection.

   Upon installation, the meeting surfaces shall be wiped clean of dirt and foreign matter, then an approved lubricant shall be applied to the joint surfaces. The spigot shall be positioned inside the bell and the joint shoved home. For large diameter pipe, a lever attachment or bar cushioned with a wooden block shall be used to shove the joint into place.

In no case shall a bar be used on an unprotected joint surface. Mating surfaces shall be in tight contact with each other upon completion of the joint installation.

2. Cast Iron or Ductile Iron Pipe - Cast and ductile iron pipe joints shall comply with the following requirements for the types shown:

Type of Joint	**Specification**
Slip-on	ANSI A21.11 (AWWA C111)
Mechanical Joint	ANSI A21.11 (AWWA C111)
Flanged Joint	ANSI B16.1, B.16.2, ANSI A21.10 (AWWA C110)
Flanged Joint (Threaded Flanges)	ANSI B2.1

All rubber gaskets, push-on, mechanical and flanged joint fittings for cast iron or ductile iron pipe shall be manufactured in accordance with ANSI A21.10 (AWWA C110).

Slip-on Joint - The gasket and gasket seal inside the bell shall be wiped clean before the gasket is inserted. A thin film of soft vegetable soap compound shall be applied to the gasket and the outside of the spigot end of the pipe. The spigot shall then be positioned inside the bell and shoved home. Lubricant other than that furnished with the pipe shall not be used unless approved by the City Engineer.

Mechanical Joints - The outside of the spigot and the inside of the bell shall be thoroughly cleaned of foreign matter. The gland and gasket shall then be slipped onto the spigot end of the pipe. The gasket shall be pressed evenly into the bell only after the spigot is seated in the bell. The gland shall be brought up evenly by tightening alternately the nuts spaced 180 degrees apart. Bolts and nuts shall be coated with mastic following tightening.

Flanged Joints - Flanged joints shall be firmly and fully bolted with machine bolts of proper size. Full circle reinforced neoprene rubber gaskets 1/16" thick shall be used at all flanged joints. Bolts and nuts shall be coated with mastic following tightening.

120-1.07 Existing Manholes: Existing manholes shall be adjusted to grade, removed and replaced, repaired or abandoned as shown on the plans and in accordance with the provisions of Section 15 of the Standard Specifications, "Existing Highway Facilities."

When designated on the plans, or directed by the City Engineer, existing manhole frames and covers shall be reset on new structures. Upon completion of the adjustment of

existing manholes to grade, the manhole cover shall conform to the planed surface as specified for the finished hot mix asphalt surface, Section 39 of the Standard Specifications.

Unless otherwise specified on the plans, all existing manholes, lampholes and terminal cleanout frames and covers that are removed become the property of the City of Brentwood and shall be delivered to the City Corporation Yard.

120-1.08 Sewer Structures: New manholes for sewers shall be constructed in accordance with the details shown on the Standard Plans, as specified in this Section and as directed by the City Engineer.

Precast manholes shall conform to City of Brentwood Standard Plans SS-2 and SS-3, and as shown on the plans as well as to the applicable sections in Section 70 of the Standard Specifications, "Miscellaneous Drainage Facilities" except for measurement and payment.

Manhole frames shall be secured to the manhole structure or riser barrels with full mortar bed or full circle concrete collar that will effectively secure the frame to the manhole structure and provide a uniform bearing for the frame.

Concrete for sewer structures shall be Class A as described in Section 90-1.01 unless otherwise shown on the plans.

When the manhole is located in the pavement area, it shall not be constructed to final grade until pavement has been completed.

Water stops shall be required at all sewer manholes; location will be at the discretion of the City Engineer.

Where new work is jointed to the surface of unfinished work, the latter shall be thoroughly cleaned.

All joints on the inside of structures and sewers shall be neatly struck and pointed where plastering is not specified on the plans.

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

No pipe shall project into a manhole and in no case shall the bell of a pipe be built into the wall of a manhole or structure.

All concrete shall be cured for a period of not less than 7 days after being placed and shall be protected in place from damage.

120-1.09 Coating Manholes:

General - The interior of all sanitary sewer manholes downstream from pump stations, drop manholes, manhole pumping stations, all manholes constructed on sewer lines 10 inches and larger, and any other structure where the City Engineer determines that hydrogen sulfide gas may be a problem shall receive a polyurethane coating.

Material - The coating shall be a high build, two-component, 100% solid, non-solvented, hybrid polyurethane material. The flash point of the individual components and the fluid mixture shall be a minimum of 415 degrees F (COC). Application shall be 50 mils or greater in thickness.

The cured coating shall have a Shore D hardness of 57 at 77 degrees F and shall be capable of passing the flexibility test as prescribed by ASTM D-1737 using an 8-mm diameter mandrel. The coating shall have a minimum tensile strength of 2,500 PSI and a recoverable elongation of 30% minimum. It shall have good impact resistance and shall be able to bridge up to 1/8-inch settling crack, which may take place in the concrete structure, without damage to the coating.

At a minimum, the coating shall be resistant to attack from the following but not limited to: Oxidizing agents such as bleaches, sulfuric, acetic, hydrochloric, phosphoric, nitric, chromic, oleic, and stearic acids, sodium and calcium hydroxides, ammonium, sodium, calcium, magnesium, and ferric chlorides, ferric sulfate, petroleum oils and greases, vegetable and animal oils, fats, greases, soaps and detergents. The coating shall be impermeable to sewage gases and liquids and shall be non-conducive to bacterial or fungus growth.

Surface Preparation - New concrete shall be cured 30 days. All foreign matter shall be removed from the surface of old concrete using solvents (no alcohol shall be used) if necessary to remove grease. For old concrete all surfaces to be coated will be sandblasted or waterblasted to remove all residue, loose grout or loose brick. Surfaces of new concrete shall be washed with ten percent (10%) muriatic acid solution and flushed with water to remove lime. Surfaces, which have retained a glossy smooth surface, shall be abrasive waterblasted, sandblasted or power wire brushed to produce a satisfactory anchor for the coating. The surface must be dry when applying the coating. Cracks shall be sealed by spraying directly into the crack and then overcoating while still tacky.

Any steel surfaces in the area to be coated will be prepared and primed as required.

After blast cleaning the surface as described above, the surfaces of the concrete shall be dried by air blowing for four hours.

Application - The polyurethane coating shall be applied by high-pressure airless spray with the two components mixing just before the spray gun. During application, the applicators, including any persons in the immediate area, shall wear protective clothing including facemasks, and anyone in the manhole during spraying shall be supplied a respirator.

120-1.10 Trench Resurfacing: Trenches in existing streets, except streets which are to be closed or abandoned, shall be resurfaced with the type and thickness of bases, surfacing or pavement shown on the plans or designated by the City Engineer. Unless otherwise specified, trench resurfacing shall be accomplished in accordance with the Standard Plans ST-25a and ST-25b.

Upon notice from the City Engineer, the Contractor shall proceed immediately to resurface any part of any excavation, without waiting for completion of the full length of the sewer.

All trenches shall be backfilled, patched with a minimum of 3" of cutback, and rolled to provide a smooth transition between the temporary and existing pavement at the end of each working day. Any temporary trench patching shall be subject to the approval of the City Engineer. Using tires of heavy equipment to roll the temporary paving is not considered acceptable.

120-1.11 Testing:

120-1.11A Cleaning: Prior to performing tests, the pipe installation shall be thoroughly cleaned. Cleaning shall be performed by the Contractor by means of an inflatable rubber ball. The ball shall be of a size that will inflate to fit snugly into the pipe to be tested. The ball shall be controlled with a tag line. The ball shall be placed in the last manhole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the pressure of the water propelling it. All debris flushed out ahead of the ball shall be removed at the first downstream manhole. In the event cement or wedged debris or a damaged pipe shall stop the ball, the Contractor shall remove the obstruction.

120-1.11B General: All leakage tests shall be completed and approved following the placement and densification of the backfill, but prior to placing of permanent surfacing.

When leakage or infiltration exceeds the amount allowed by the Specifications, the Contractor at his expense shall locate the leaks and make the necessary repairs or replacements in accordance with the Specifications to reduce the leakage or infiltration to

the specified limits. Any individually detectable leaks shall be repaired, regardless of the results of the tests. Air pressure tests shall be made on completed pipelines.

120-1.11C Air Pressure Test: The Contractor shall furnish all materials, equipment and labor for making an air test. Air test equipment shall be approved by the City Engineer.

Each section of sewer shall be tested between successive manholes by plugging and bracing all openings in the main sewer line and the upper ends of all house connection sewers. Prior to any air pressure testing, all pipe plugs shall be checked with a soap solution to detect any air leakage. If any leaks are found, the air pressure shall be released, the leaks eliminated, and the test procedure started over again.

The final leakage test of the sewer main line and branching house connection sewers, shall be conducted in the presence of the City Engineer in the following manner:

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

2. Plug all pipe outlets with suitable test plugs. Brace each plug securely.

3. If the pipe to be tested is submerged in ground water, insert a pipe probe by boring into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

4. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.

5. After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

6. When pressure decreases to 3.5 psig, start stopwatch.

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3½ TO 2½ PSIG

PIPE DIAMETER

Secs	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"
25	4	10	18	28	40	62	89	121	158	200	248	299	356	418
50	9	20	35	55	79	124	178	243	317	401	495	599	713	
75	13	30	53	83	119	186	267	364	475	601	743	898	1020	837
100	18	40	70	110	158	248	356	485	634	765	851	935		
														1105
125	22	50	88	138	198	309	446	595	680					
150	26	59	106	165	238	371	510							
175	31	69	123	193	277	425								
200	35	79	141	220	317									
225	40	89	158	248	340									
250	44	99	176	275										
275	48	109	194	283										
300	53	119	211											
350	62	139	227											
400	70	158												
450	79	170												
500	88													
559	97													
600	106													
650	113	170	227	283	340	425	510	595	680	765	851	935	1020	1105

NOTES:

(1) To be used when testing one diameter only.

(2) The above air pressure test procedure is based on ASTM C828. Any special situations or conditions shall conform to this ASTM Standard.

SAFETY NOTE:

The air test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. Inasmuch as a force of 250 lbs. is exerted on an 8" plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be dangerous.

As a safety precaution, pressurizing equipment should include a regulator set at 6-8 psi to avoid over pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

IF THE TIME LAPSE IS LESS THAN THAT SHOWN IN THE TABLE, THE CONTRACTOR SHALL MAKE THE NECESSARY CORRECTIONS TO REDUCE THE LEAKAGE TO ACCEPTABLE LIMITS.

120-1.11D Televising of Sanitary Sewers: Following the placement and densification of backfill and completion of other required testing, but prior to the placing of pavement, the City requires the Contractor to televise all sewer lines for conformance to the plans and specifications. If any defective pipe or condition is discovered by televising, it shall be corrected at no cost to the City. Any corrective work proposed shall be approved by the City Engineer.

The City may also require televising of sewer lines, at no cost to the City, prior to the expiration of the one-year warranty. If a defective condition is unaccountably found, it shall be presumed to be caused by defective workmanship or materials. The Contractor shall be notified and shall correct the work in a manner approved by the City Engineer.

The Contractor shall furnish to the City the results of the televising on a CD format. The Contractor shall assume all labor and material costs to televise the pipelines.

120-1.11E Manhole Vacuum Test: All manhole testing shall be done in the presence of the City Engineer or his authorized representative. The Contractor shall furnish all labor, materials, tools and equipment necessary to perform the test and any work incidental thereto. Any damage resulting from testing shall be repaired by the Contractor at his/her expense.

All sanitary sewer manhole vacuum tests shall be completed and approved by the City Engineer following placement and densification of the backfill around the manhole, but prior to placing of permanent surfacing.

The Contractor shall test the manhole up to and including the cone, and shall make all repairs necessary to achieve a final passing test. All lift holes shall be filled with non-shrink grout prior to testing. All manhole sections shall be visually inspected for leaks. Any cracks or leaks shall be repaired by the Contractor prior to any testing. All repairs shall be made with non-shrink grout. Any alternate repair methods shall be approved by the City Engineer.

All pipe inlets and outlets in the manhole shall be securely plugged to sufficiently hold against vacuum pressure during testing, and removed following successful completion of the testing. A rubberized test plate shall be placed on the manhole dome after potential leaks on the top of the dome have been sealed.

A suitable vacuum pump shall be used to reduce the pressure inside the manhole to a vacuum of ten (10) inches of mercury, stabilizing the vacuum at ten (10) inches of mercury for one (1) minute. The vacuum pump shall be shut off, and with the valves closed, the pressure increase (loss of vacuum) shall be measured inside the manhole

during the test hold period. The maximum allowable pressure increase (loss of vacuum) shall be one (1) inch of mercury over a 60-second test hold period.

If the vacuum drops below nine (9) inches of mercury within the test period, the leakage shall be considered excessive. The Contractor shall make all repairs necessary to achieve a passing test and the manhole shall be retested. Manhole repairs and retesting shall proceed until a passing test is completed.

SECTION 130

POTABLE WATER FACILITIES

130-1.01 Description: This work consists of furnishing and installing pressure water pipe, control valves, thrust blocks, fire hydrant tees, fire hydrants and service lines, all as shown on the Standard Plans or as directed by the City Engineer, and as specified in these Specifications.

130-1.01A Right of Way: All City owned and maintained potable water facilities located on private property shall meet the more restrictive of the following criteria:

1. Minimum width of any easement shall be 15 feet for one (1) utility, with greater widths required for multiple utilities.

2. All easements shall have a minimum width in feet to the required trench width according to the standard detail for trench backfill, plus two (2) additional of width for every foot of depth of the pipe as measured from the bottom of the pipe to finished grade. All pipes shall be centered within their easements.

130-1.02 Materials: All pipes and fittings (except valves) shall have a minimum working pressure of two hundred (200) pounds and shall conform to the following requirements.

130-1.02A Ductile Iron Pipe: Ductile iron pipe for water and other liquids shall be furnished in the sizes, classes, grades or nominal thickness, and joint types designated on the Standard Plans and these Standard Specifications.

Ductile iron pipe shall comply with ANSI A21.51 (AWWA C151).

Ductile iron pipe is to be used on all water crossings or where required by State Health Code sanitary sewer/water line clearance regulations. Pipe shall utilize either flange, mechanical or push on rubber gasketed joints. Pipe shall be minimum standard thickness Class 50 with standard cement lining (USA Std. A21.4).

Ductile iron pipe joints shall comply with the following requirements:

Type of Joint	Specification
Rubber Gasket Push-on Joint	ANSI A21.11 (AWWA C111)
Mechanical Joint	ANSI A21.11 (AWWA C111)

Flanged Joint	ANSI B16.1, B.16.2 and A21.10 (AWWA C110)
Flanged Joint (Threaded Flanges)	ANSI B2.1.

All rubber gaskets, push-on, mechanical and flanged joint fittings for ductile iron water pipe shall be manufactured in accordance with ANSI A21.10 (AWWA C110).

Unless otherwise specified, the internal surfaces of ductile iron water pipe and fittings shall be lined with a uniform thickness of cement mortar then sealed with a bituminous coating in accordance with ANSI A21.4 (AWWA C104). The outside surfaces of cast iron and ductile iron pipe and fittings for general use shall be coated with a bituminous coating 1 mil (0.0254 mm) thick in accordance with ANSI A21.10-93 (AWWA C110 Section 10-10).

130-1.02B Polyvinylchloride (PVC) Pipe: Polyvinyl Chloride pipe shall meet the requirements of AWWA C-900 "Polyvinyl Chloride (PVC) Pressure Pipe" for pipe sizes 4" through 12", AWWA Class 200 minimum. For pipe sizes greater than 12", PVC pipe shall meet the requirements of AWWA C-905, "Polyvinyl Chloride Pressure Pipe."

All pipe*s* shall be suitable for use as a pressure conduit. Provisions shall be made for expansion and contraction at each joint with a double "O" ring elastomeric gasket seal meeting the requirements of ASTM D-1869 and F-477. Solvent welded joints will not be permitted. The bell section shall be designed to be at least as strong as the pipe wall.

Fittings for PVC pipe shall be Class 200 ductile iron only. Thrust block with mechanical joint fitting are required at every joint along a curve and at every joint 20 feet on either side of an alignment change. All PVC taps shall have stainless steel tapping sleeve.

Reverse kickers shall be required on all hydrant runs.

130-1.02C Valves: This specification includes six (6") inches through twelve (12") inches diameter gate valves and butterfly valves larger than 12" in diameter and operators intended for buried service in a potable water system.

Gate valves shall have a resilient wedge with non-rising stem meeting or exceeding the latest revisions of AWWA C509 with a design working pressure of two hundred-fifty (250) psi.

Butterfly valves shall meet or exceed the latest revisions of AWWA C504-00, Class 150B with a design working pressure of one hundred fifty (150) psi.

6” thru 8” valve ends shall be mechanical joint or flanged in accordance with AWWA C-500 unless otherwise specified; 10” or larger valves shall be flanged with flange by mechanical adaptors bolted to the valve.

Valves for use with flanged pipe shall be cast with Class 200 flanges; dimensions and drilling shall conform to ASA B16.1. Flange bolt holes shall be spot faced if flange fillets interfere with bolt heads and nuts.

All valves shall receive a minimum of a 5-pound anode or as specified herein.

Tapping sleeves for ductile iron water mains shall be full body shell, with full body gasket or split sleeve, end and side gasket seal. Inlet flange and tapping gate valve flanges shall be Class 200 flange. Tapping sleeves shall be M & H 1174 and 1274 (all sizes); Romac SST, Clow 3490-AS (over 12 inch only), Mueller H-304 or an approved equal. All taps shall have restrainers.

All stem seals, gate valves and butterfly valves, shall be O-rings only.

Wrench nuts shall the top of the valve stem and secured by nut or key and shall be one and fifteen sixteenths (1-15/16) inch square at the top and two (2) inches square at the bottom.

All nuts, bolts and stems on valves shall be Type 304 stainless steel.

The open direction shall be left (counter-clockwise) and the closed direction right (clockwise).

Appropriate appurtenances of each new air-relief, air vacuum, or combination valve, and any such valve installed to replace an existing valve found to be subject to flooding hazards shall be:

1. Installed above grade and screened vent caps (see City Std. W-11) shall be one (1) foot above the calculated 100-year flood water level or as otherwise approved by City Engineer;
2. Readily accessible for inspection, maintenance and replacement;
3. Constructed and designed to prevent the entry of rainwater or runoff, and bird, insects, rodents or other animals;
4. Installed pursuant to AWWA C-512 and AWWA Manual 51.

130-1.02D Cast Iron Fittings: Cast iron fittings shall be Class D fittings conforming to ASTM Designation: 126 and shall be one hundred fifty (150) pounds standard.

130-1.02E Valve Boxes: Valve boxes and covers shall conform to City of Brentwood Standard Plans.

130-1.02F Gaskets: Gaskets for flanged joints shall be full circle one-sixteenth (1/16) inch rubber composition gaskets.

130-1.02G Thrust Blocks: Thrust blocks shall conform to City of Brentwood Standard Plans. Concrete for thrust blocks shall be Class B with one and one-half (1-1/2) inch max. size aggregate in accordance with Section 90 of the Standard Specifications.

130-1.02H Fire Hydrants: Fire hydrants shall conform to the requirements of the local Fire District and the City of Brentwood and as shown on the Standard Plans and the following:

1. All hydrants shall comply with ANSI/AWWA C503-88, “Wet-Barrel Fire Hydrants,” latest revision.

2. All operating valves shall be located below grade and protected by "break-off" features so that no water flows if hydrant is knocked off.

3. Hydrant main valve seat shall be a minimum 5-1/4 inches.

4. Hydrant valve shall be molded non-swelling rubber.

5. Hydrant main valve seat shall be threaded into a bronze-to-bronze subseat.

6. Hydrant bury shall be 36 inches from connection to ground flange. Materials to extend the length of bury must be readily available.

7. Hydrant shall be painted with Kelly-Moore 1700-63 Safety Yellow Gloss Alkyd Rust Inhibitive Enamel or approved equal.

130-1.02I Service Lines: Service lines up to and including meter connection shall be as detailed in City of Brentwood Standard Plans as applicable for the service intended and with the AWWA Standard C-800, except as hereinafter modified.

1. Threads for line pipes shall be as specified in the AWWA standard for threads for underground service line fittings.

2. Type of service line pipe shall be limited to the following:

    a. Copper water tube, Type K or ASTM B-88.

    b. Services two (2) inches and larger shall be considered as a special condition and will require the prior approval of the City Engineer.

    c. Six (6)-inch PVC pipe may be tapped for 3/4" maximum service. Eight (8) inch PVC pipe may be tapped for one (1) inch maximum service. Saddles or service clamps shall be used on all PVC taps and shall be designed specifically for PVC pipe. Saddles or service clamps shall be Mueller or approved equal.

130-1.02J Water Meters: Unless otherwise specifically noted, water meters will be purchased and installed by the Developers/Contractors per the City's requirements.

A minimum of ¾" water meter size shall be used for a single family residential with a yard. However, a minimum 1" meter size shall be installed if one of the following conditions exists:

1. A minimum static pressure in the street is fifty (50) psi or less during the morning peak summer months, or;

2. The lot size is seven thousand (7,000) square feet or greater, or;

3. Fire sprinklers are installed.

130-1.03 Installation:

130-1.03A Installation of Water Mains:

130-1.03A1 Description: The Contractor shall, unless specified otherwise, furnish all material, equipment, tools, and labor necessary to do the work required, and unload, haul and distribute all pipe, castings, fittings, valves, hydrants and accessories. The Contractor shall also remove pavement as needed; excavate trenches and pits to the required dimensions; excavate bell holes; construct and maintain all bridges for traffic

control sheet, brace, and support the adjoining ground or structures where necessary; handle all drainage or ground water; provide barricades, guards, and warning lights; lay and test the pipe, castings, fittings, valves, hydrants, and accessories; backfill and consolidate the trenches and pits; restore the roadway surface; remove surplus excavated material; clean the site of the work; and maintain the street or other surface over the trenches as specified. All connections to existing lines shall be flanged by fittings with isolation plates.

130-1.03A2 Excavation: Trench excavation shall conform to the requirements of the City of Brentwood Standard Plans.

The bottom of the trench shall be carefully graded in conformance with Section 120-1.03 of the Sewer Specifications.

130-1.03A3 Jacking and Boring: Jacking and boring of water pipe shall conform to the City of Brentwood Standard Plans.

130-1.03A4 Pipe Laying: The pipe shall be handled with care at all times and in a manner that meets the approval of the City Engineer. Extreme care shall be exercised in the use of any mechanical devices used in laying the pipe to avoid scarring or other damage.

The City Engineer shall be the judge of whether a pipe is seriously damaged and any pipe so classified shall be permanently removed from the site of the work.

The inside of all pipes and couplings shall be free from dirt, grease, deleterious materials or any other foreign material. The open ends of all pipe previously laid shall be adequately plugged water tight whenever pipe laying operations are suspended at the end of each work day, or for any other reason.

Imported material shall be placed and thoroughly compacted across the bottom of the trench to provide full support of all the pipe. Bells and/or couplings shall have soil removed to provide a uniform bearing.

130-1.03A5 Backfilling: Backfilling shall not be completed until the pipe has been properly installed and inspected by the City Engineer.

Backfill materials shall be hand placed on both sides of the pipe simultaneously to prevent any undue strain on the pipe.

The trench shall be backfilled and compacted 95% by mechanical means as shown on the Standard Plans. This Standard shall be used as a minimum in all construction.

Imported backfill material shall be of a granular, sandy nature, free of vegetation, silt, clay and shall have a minimum sand equivalent (S.E) value of 20 as determined by the State of California, Division of Highways, Standard Test Procedures.

Backfilling and bedding for PVC pipe shall be performed in accordance with Section 120-1.04 “Bedding and Initial Backfill” of these Specifications for PVC pipe.

All pipe damaged during construction operations shall be replaced by the Contractor as his expense to the satisfaction of the City Engineer.

130-1.03A6 Trench Resurfacing: Trenches in existing streets, except streets which are to be closed or abandoned, shall be resurfaced with the type of thickness of bases, surfacing or pavement shown on the Standard Plans for that street section.

Upon notice from the City Engineer, the Contractor shall proceed immediately, without waiting for completion of the full length of line, to resurface any part of any excavation

130-1.03B1 Testing: The test for hydrostatic pressure shall commence no sooner than seven (7) days after the last concrete thrust block has been cast with standard cement or at least after thirty-six (36) hours with high early strength cement, and after backfilling and compacting the trench to the plane upon which the asphalt concrete surfacing is to be placed. The Contractor shall take the necessary precautions to insure that the pipefittings, couplings, valves, and other appurtenances are not displaced during the test.

Test shall consist of one hundred fifty (150) psi for four (4) hours.

Non-potable pressure testing shall be the same as the domestic water line.

It shall be the Contractor's responsibility to locate and repair the points of line failure; fill, recompact the trench and retest the section of line (including pressure test) in the event the line fails the leakage test.

130-1.03B2 Interruption of Service: No valve or other control on the existing system shall be operated for any purpose by the Contractor. The City of Brentwood will operate all valves, hydrants, blowoffs and curb stops.

The contractor shall submit a written valve manipulation request to the City Engineer a minimum of two (2) working days prior to the shutdown schedule.

130-1.03C Disinfecting Water Mains: Newly installed water mains, or water mains that have been taken out of service for maintenance or repair, shall be disinfected

and sampled for bacteriological quality in accordance with AWWA Standard, "Disinfecting Water Mains," C-651-05. The samples shall be negative for coliform bacteria prior to the main(s) being placed into service.

130-1.03C1 General: The interior of all pipe, fittings, and other accessories shall be kept free of dirt and foreign material. When the City Engineer suspects bacterial contamination of interior pipe surfaces during pipe laying operations, the City Engineer may order said surfaces to be swabbed with an approved bactericidal solution.

130-1.03C2 Isolation of New Mains: All new water lines shall be completely isolated from any existing main until they have been tested and disinfected to the satisfaction of the City Engineer. New mains may be filled from existing mains only by temporary tap thereto and through a system of one (1) shut-off valve and two (2) check valves so arranged as to provide positive backflow prevention. When new main is properly disinfected and the isolation dam is removed from connection flange or other type connection is made, extreme care shall be exercised to prevent the entry of any foreign material or contaminant. Connection fittings shall be thoroughly swabbed with an approved disinfectant immediately prior to their installation.

Flush the mains thoroughly at the end of the installation period. The orthotolidine test shall show no more chlorine in the water leaving the main than in the water entering the main. At no time the contractor shall flush chlorinated water onto private property or within the public right of way without the written consent of the City Engineer. The Contractor shall submit a plan for disposing of the chlorinated water to the City Engineer five (5) working days prior to flushing.

The Contractor shall have an EPA certified lab collect a sample for bacteriological examination at the Contractor's expense. On the label, give the date, address, and the name of the job. Where possible the sample should be taken from a service located near the end of the chlorinated section. Otherwise, it may be taken through the same blowoff used for flushing the heavily chlorinated water out of the main so that the blowoff is sterilized.

If the bacteriological tests are unsatisfactory, the main shall be re-sterilized using Method No. 2, and the sterilization repeated, if necessary, until satisfactory results are obtained.

130-1.03C3 Method No. 1 - H.T.H. Tablet Method: This method is preferred for short jobs and for a small diameter pipe of any kind. It cannot be used where trench water has entered the main. The main cannot be flushed prior to sterilization, so the method requires that the pipe be kept clean during installation.

Using Permatex No. 1 as an adhesive, fasten the required number of tablets (see Table I) to the inside top of each length of pipe. The tablets may be fastened to the pipe before it is placed in the trench. To be sure that these tablets start to dissolve as the water enters the main, they should be placed in rows about half an inch above the bottom of the pipe.

Table I
NUMBER OF TABLETS REQUIRED FOR PIPE STERILIZATION

	PIPE DIAMETER			
Length of Section	**6”**	**8”**	**10”**	**12”**
13’ or less	4	4	6	10
18’	4	6	10	12
20’	4	6	10	14
30’	6	10	20	
40’	8	12	18	28

When using dresser or similar couplings, an additional tablet shall be crushed and placed in the annular space between the coupling and the pipe.

130-1.03C4 Method No. 2 - H.T.H. Solution with Hand Pump Method: This method is general in scope and must be used when it is necessary to re-chlorinate an existing main. When this method is used on a main coupled with dresser or similar couplings, a pinch of H.T.H. powder shall be placed in each coupling as the main is laid.

Equipment required includes an ordinary hand test pump, solution hose, and a five-gallon can to contain the chlorine solution.

Make up chlorine solution according to Table II. The quantity required is estimated from Table II. An excess volume should be prepared so as not to empty the container before the job is complete.

Table II CHLORINE SOLUTION STRENGTH HAND PUMP METHOD OF MAIN CHLORINATION Amount of Chemical in 5 Gallons of Solution		
Discharge Rate	**GPM**	**H.T.H.**
10		0.50 lbs.
20		1.00 lbs.
35		1.75 lbs.
50		2.00 lbs.
75		3.00 lbs.
100		4.00 lbs.

Connect pump to main. Use a corporation cock for this purpose and make connection at or ahead of the inlet end of the new line.

After flushing the line, thoroughly adjust flow by timing the period required to fill a five-gallon can.

Pump chlorine solution into the line at a rate of one gallon of solution in three minutes.

Continue pumping until orthotolidine tests on a sample taken from discharge end of line being treated, shows a red color, or until the odor of chlorine is noticed.

After finishing application of chlorine, close valve or blow-off. Disconnect and flush pump thoroughly with fresh water.

Refer to instruction flushing and sampling.

If the above procedure has to be varied because of some unusual condition, it will be necessary only to regulate the pump, control the water flow, or adjust the strength of the chlorine solution to give a dose of at least 50 ppm.

Choose a suitable discharge rate and determine the time required to apply the chlorine from Table III.

TABLE III
Time in Minutes to Apply Chlorine to 100 Feet of Pipe

Discharge Rate GPM	6"	8"	10"	12"
10	15	26	41	59
20	7	13	20	29
35	4	8	12	17
50	3	5	8	12
75	4	6	8	
10	3	4	6	

Compute the gallons of solution required by dividing this time by 3.

Use Table II to determine the strength of solution required. Example: If the estimate time from Table III is 35 minutes, 11-2/3 gallons will be required; and if the discharge rate is 50 GPM, the solution should contain two pounds of H.T.H. in five gallons. Prepare fifteen gallons of solution so as to be sure of having an adequate amount.

Operate the hand pump at a rate of five gallons in fifteen minutes, or one gallon in three minutes.

Table III is used to estimate the time required to apply chlorine. For example: 700' of 8" main can be filled with chlorine solution in 35 minutes with a discharge rate of 50 GPM.

130-1.04 Existing Pipes:

130-1.04A Removal and Disposal: All existing pipes slated for renewal and disposal shall first be identified by the material and the methods available for removal and disposal.

Contractor shall comply with air quality, public health and safety, storm water pollution prevention plan, water quality, noise and hazardous material during the removal and disposal process. All hazardous materials encountered shall be handled per the current Federal, State and Local Laws.

SECTION 140

NON-POTABLE WATER FACILITIES

Section 140 will comply with Section 130, "Potable Water Facilities" with the number 130 replaced with 140 respectively with the following additions or exceptions.

140-1.02B Polyvinylchloride (PVC) Pipe: Polyvinyl chloride (PVC) pipe shall conform to AWWA C900, Class 200 and shall be purple colored. Gaskets for PVC shall be furnished by the pipe manufacturer and shall conform to ASTM F477. All pipes shall be purple in color and embossed or be integrally stamped / marked "Caution: Recycled Water in use – Do Not Drink" or similar. Pipe shall be PW Purple Plus or JM Purple Save, or approved equal.

Materials and construction of the non-potable water line shall confirm with the "Potable Water Notes" noted on the plans, except as modified herein; Title 22, Chapter 3 Regulations of the California Code of Regulations; guidelines for distribution of non-potable water developed by the American Water Works Association (AWWA); and the requirements specified herein.

Valve covers on reclaimed water line shall be of non-interchangeable shape with potable water covers and a recognizable "RW" inscription cast on the top surface.

Any above ground, exposed reclaimed water facilities shall be consistently color-coded (purple) and identified using suitable, waterproof identification tags to differentiate reclaimed water facilities from potable water facilities. Tags shall be purple in color with the words "Caution: Recycled Water in use – Do Not Drink" or similar.

SECTION 150

CORROSION CONTROL FACILITIES

All Standard Plans depicting anodes shall be sized according to the following specifications without exception or as approved by the City Engineer:

150-1.0 Soil Corrosivity Investigation:

150-1.01 General: In order to determine what corrosion control measures are required for a buried pipeline, a soil investigation shall be performed before the pipeline is installed. The following table, Table 150-1, indicates the soil investigation that must be performed for each pipeline project.

Table 150-1: SOIL INVESTIGATION REQUIREMENTS

PIPE TYPE	SOIL CORROSIVITY INVESTIGATION
Steel and Ductile Iron	In-situ soil resistivities at 500-ft. intervals and oil chemical analysis at 1000 ft. intervals.
Mortar Coated and Concrete Cylinder	In-situ soil resistivities at 500 ft. intervals and oil chemical analysis at 1000 ft. intervals
Non-Metallic Pipe with Metallic Fittings	In-situ soil resistivities at 500 ft. intervals or oil chemical analysis at 1000 ft. intervals

150-1.02 Soil Resistivity Measurements: The basic method of performing soil resistivity shall be the Wenner 4-Pin Method (Standard Plan CP-17). This test shall be performed in accordance with ASTM G-57 standard. The soil resistivity measurements and their locations shall be tabulated and submitted for review. A typical data sheet is provided in Table 150-3.

The corrosion control requirements for a particular pipeline, valve or fitting depend on the soil corrosion rating. Table 150-2 provides the corrosion rating and corresponding corrosion classification based on soil resistivity.

Table 150-2: CORROSION RATING AND CLASSIFICATION

RESISTIVITY (OHM-CM)	CORROSION RATING	CORROSION CLASSIFICATION
0 - 500	1	Extremely Corrosive
501 - 2,000	2	Corrosive
2,001 - 8,000	3	Moderately Corrosive
8,001 - 32,000	4	Mildly Corrosive
> 32,000	5	Negligibly Corrosive

Table 150-3
City of Brentwood
In-Situ Soil Resistivities
Wenner 4-Pin Method

Pipeline Location: _____Sheet _____ of _____
Pipe Size: _____Date_____
Depth to Bottom of Pipe: _____By: _____

TEST NO.	SAMPLE DEPTH ('D' FT.)	LOCATION	PIN SPACING ('D' FT.) (1)	RESISTANCE (OHM) (2)	RESISTIVITY (OHM-CM) (1)x(2)x191.5	CORROSION RATING

Resistivity Range (ohm-cm)	Corrosion Rating
0 - 500	1
501 – 2,000	2
2,001 – 8,000	3
8,001 – 32,000	4
>32,000	5

150-1.03 Soil Chemical Analysis: Corrosion control requirements for mortar coated steel and concrete cylinder pipe depends on the pH, chlorides, and sulfates found in the soil in addition to the soil resistivity. Additional corrosion ratings for mortar-coated steel and concrete cylinder pipe based on soil chemistry parameters are provided below.

Chlorides: If chlorides of 300 parts per million (ppm) or higher are found in the soil, it shall be given a corrosion rating of 1.

Sulfates: If water-soluble sulfate in soil samples exceeds 2,000 ppm and/or sulfate in water samples exceeds 1,500 ppm, the soil shall be given a corrosion rating of 1.

pH: If soils with a pH of less than 5.0 are found, the soil shall be given a corrosion rating of 1.

150-1.04 Laboratory Evaluation: Soil samples shall be tested by an approved soils testing laboratory for pH, chlorides, conductivity, sulfates and sulfides using ASTM or Caltrans test methods as detailed in Table 150-4. The preparation of the soil sample for corrosion evaluation shall be in accordance with the applicable specification.

Table 150-4
Soil Laboratory Analysis

	ASTM Method	Caltrans Method
Chlorides	D512C	422
pH	D2976/D4972/G51	532/643
Conductivity	D1125	424
Sulfate	D516(SM 4500)	417
Sulfide	D4568	

150-2.0 Corrosion Control Requirements:

150-2.01 General: The external corrosion control requirements for various types of pipe are based on the soil corrosion rating as provided in Table 150-5.

150-2.02 New Water Mains and Extensions:

Steel, Ductile Iron, Mortar Coated Steel and Concrete Cylinder Pipe: Each new main extension, of any length, from an existing metallic main, shall be electrically isolated from the existing main via an isolation flange or joint. This requirement may be altered by the City at their sole discretion. The requirements for corrosion control shall be as specified in Table 150-5. If cathodic protection is required, it shall be designed by a Corrosion Engineer as specified in 150-3.01.

Non-metallic Pipe: Extensions which are constructed out of non-metallic piping material and which utilize metallic fittings shall be provided with corrosion control as specified in Table 150-5 and section 150-2.05.

150-2.03 Test Station Spacing: Test stations shall be spaced at 1000 feet maximum intervals for all major metallic transmission and distribution metallic pipelines as directed by the City Engineer or Corrosion Engineer. In addition, test stations may be required at the starting point and ending point for each new pipeline or extensions to existing pipelines, at crossings with foreign metallic pipelines, at cased crossings and at buried insulating flanges.

150-2.04 Copper Service Laterals: Copper service laterals shall be electrically isolated from metallic water mains via an isolation fitting placed at the corporation stop. If copper piping is used to connect the water meter to the building or residence, the copper lateral shall also be isolated at the water meter. For soil types rated as 1 or 2 galvanic cathodic protection shall be implemented as shown in Table 150-5.

150-2.05 Non-Metallic Pipe with Metallic Fittings and Valves: Types of anodes and required anode sizes for various types of fittings based on soil resistivity are as presented in Tables 150-6 and 150-7. These tables contain the minimum weights for the bare anodes which does not include the weight of the anode backfill material.

Table 150-5
CORROSION CONTROL REQUIREMENTS

	Soil Resistivity (ohm-cm)			
	0 - 500	**501 - 2,000**	**2,001 - 8,000**	**Greater Than 8,000**
PIPE MATERIAL	**Rating 1**	**Rating 2**	**Rating 3**	**Rating 4&5**
Steel and Ductile Iron Pipe	1. Bonded Coating or Polybag 2. Joint Bonding 3. Test Stations 4. Cathodic Protection 5. Electrical Isolation 6. High Resistance Backfill	1. Bonded Coating or Polybag 2. Joint Bonding 3. Test Stations 4. Cathodic Protection 5. Electrical Isolation 6. High Resistance Backfill	1. Polybag Coating 2. Joint Bonding 3. Test Stations 4. Cathodic Protection 5. Electrical Isolation 6. High Resistance Backfill	1. Polybag Coating 2. Joint Bonding 3. Test Stations 4. Electrical Isolation 5. High Resistance Backfill
Mortar Coated Steel and Concrete Cylinder Pipe	1. Joint Bonding 2. Test Stations 3. Cathodic Protection 4. Electrical Isolation	1. Joint Bonding 2. Test Stations 3. Cathodic Protection 4. Electrical Isolation	1. Joint Bonding 2. Test Stations 3. Electrical Isolation	1. Joint Bonding 2. Test Stations 3. Electrical Isolation
Metallic Valves and Fittings	1. Fusion Bonded Epoxy Coating 2. Cathodic Protection	1. Fusion Bonded Epoxy Coating 2. Cathodic Protection	1. Standard Coating 2. Cathodic Protection	1. Standard Coating
Copper Piping	1. Isolation From Ferrous Piping 2. Cathodic Protection	1. Isolation From Ferrous Piping 2. Cathodic Protection	1. Isolate From Ferrous Piping	1. Isolate From Ferrous Piping
Repair Clamps	1. Stainless Steel 2. Cathodic Protection	1. Stainless Steel 2. Cathodic Protection	1. Stainless Steel	1. Stainless Steel

Table 150-6
Required Zinc Anode* Sizes**
Soil Resistivity < 1000 ohm-cm

Pipe Size (inches)	Valve (lb.)	Cross (lb.)	Tee (lb.)	Elbow (lb.)	Valveplus Fitting* (lb.)	Fire Hydrant** (lb.)	Fire Hydrant plus Tee and Valve (lb.)
4	5	5	5	5	5	5	12
6	5	5	5	5	5	12	12
8	5	5	5	5	12	12	12
10	5	5	5	5	12	12	18
12	5	5	5	5	12	12	18

* Cross, Tee or Elbow
** Includes Elbow plus Riser
*** All anodes shall be pre-packaged

Table 150-7
Required Magnesium Anode* Sizes**
Soil Resistivity > 1000 ohm-cm

Pipe Size (inches)	Valve (lb.)	Cross (lb.)	Tee (lb.)	Elbow (lb.)	Valveplus Fitting* (lb.)	Fire Hydrant** (lb.)	Fire Hydrant plus Tee and Valve (lb.)
4	5	5	5	5	5	5	9
6	5	5	5	5	5	9	9
8	5	5	5	5	5	9	9
10	5	5	5	5	9	9	17
12	5	5	5	5	9	9	17

* Cross, Tee or Elbow
** Includes Elbow plus Riser
*** All anodes shall be pre-packaged

150-3.0 Design:

150-3.01 Cathodic Protection System Design: Cathodic protection system designs for distribution and transmission pipelines will be performed and stamped by a qualified Corrosion Engineer. This person shall be responsible for the design, supervision, inspection and testing of the cathodic protection system. Corrosion Engineer refers to a person who is either a licensed Professional Corrosion Engineer in the state of California or certified as a "Cathodic Protection Specialist" by the National Association

of Corrosion Engineers (NACE). The qualifications for the Corrosion Engineer shall be submitted to the City for approval prior to commencement of the design work.

150-4.0 Materials:

150-4.01 General: Materials and workmanship shall be in accordance with all applicable state and local codes. The use of a manufacturer's name and model or catalog number is only for the purpose of establishing the standard of quality and general configuration desired. Products of other manufacturers will be considered.

150-4.02 Joint Bond Wires: Joint bond wires shall be single-conductor, stranded copper wire with 600-volt HMWPE insulation. Supply all joint bonds complete with a formed copper sleeve on each end of the wire.

Push-on, Mechanical, Ball or Flanged Joints - No. 4 AWG wires, 18 inches long.

Flexible Coupling Joints - No. 4 AWG wires, 24 inches long, with two 12-inch long insulated No. 8 AWG wire pigtails.

Insulated Flexible Coupling Joints - No. 4 AWG wire, 18-inch long, with one 12-inch long No. 8 AWG wire pigtail.

Concrete Cylinder Pipe - Joint bonds shall be supplied by the manufacturer and shall include the following:

1. Shop manufactured rod-cable-rod bonding cable as shown in the details. Rods shall be welded to the bell-and-spigot on opposite sides of the pipe at the spring line of the pipe.

2. AWG bond wires, for each joint. Total resistance of the bond or bonds at each joint shall not be greater than 120 percent of the linear resistance of a pipe section.

1. Conduct electrical continuity testing utilizing the circulating current method.

150-4.03 Galvanic Anodes:

High Potential Magnesium Alloy: (Soil resistivities > 1000 ohm-cm)
Composition:

Aluminum	0.010% Max.
Manganese	0.5 to1.30%
Zinc	0
Silicon	0
Copper	0.02% Max.
Nickel	0.001% Max.
Iron	0.03% Max.
Total Others	0.05% each or 0.3% Max. Total
Magnesium	Remainder

Zinc Anodes (ASTM B418, Type II): (Soil resistivities < 1000 ohm-cm)
Composition:

Iron	0.0014% Max.
Cadmium	0.003% Max.
Aluminum	0.005% Max.
Lead	0.003% Max.
Copper	0.002% Max.
Zinc	Remainder

Furnish a laboratory analysis guaranteeing that all anodes supplied meet all the requirements of this Specification.

Supply each anode with No. 12 AWG solid copper wire with THHN insulation, 10-feet long.

Silver braze the wire to a galvanized steel rod or strap which is cast into the anode. Seal this connection completely with electrical potting compound. The anode connection shall be stronger than the wire**.**

Anode Backfill Composition:

Ground Hydrated Gypsum	75 percent
Powdered Wyoming Bentonite	20 percent
Anhydrous Sodium Sulfate	5 percent

Anode backfill shall have a grain size so that 100 percent is capable of passing through a 20-mesh screen and 50 percent will be retained by a 100-mesh screen. The backfill mixture shall be thoroughly mixed and firmly packaged around the galvanic anode within the cloth bag by means of adequate vibration. Provide anode packaged in a plastic or heavy paper bag of sufficient thickness to protect the anode, backfill, and cloth bag during normal shipping and handling.

150-4.04 Cathodic Protection Test Stations: Flush mounted test boxes shall have a concrete body cast with a cast iron ring, with a minimum weight of 55 pounds and minimum dimensions of 8-inch inside diameter and 12-inch length. Brooks Type 1RT Traffic Box, or approved equal. Provide with a 12-pound cast iron lid with the words "CP-Test" cast into the lid.

Terminal boxes shall be high-impact molded Lexan plastic, Model T-3 as manufactured by Tinker and Rasor manufacturing Company or approved equal. The test box shall be provided with sufficient terminals for each cable. Provide terminal block with nickel-plated brass studs, washers, and lock washers.

150-4.05 Test Station Wire: Wire shall be single conductor, No. 10 AWG stranded copper with 600-volt TW, THWN, or THHN insulation and single-conductor, No. 8 AWG stranded copper with 600-volt TW, THWN, or THHN insulation.

150-4.06 Permanent Reference Electrodes:

Prepackaged Zinc Reference Electrodes
Material: ASTM B418, Type II.
Dimensions: 1.4 inches by 1.4 inches by 9 inches.

Wire: No. 12 AWG stranded copper wire with yellow, 600-volt TW, THWN, or THHN insulation. The wire shall be a minimum of 25 feet long and attached to the electrode core by the manufacturer's standard connection. Connection shall be stronger than the wire.

Backfill: 50 percent gypsum, 50 percent bentonite, in a permeable cloth bag, or approved equivalent.

Packaging: Provide electrode packaged in a plastic or heavy paper bag of sufficient thickness to protect the electrode, backfill, and cloth bag during normal shipping and handling.

150-4.07 Shunts: Anode metering shunts shall be 0.01 ohm, 6-amp capacity with 1% accuracy.

150-4.08 Thermite Weld Materials: Thermite weld materials shall consist of wire sleeves, welders, and weld cartridges according to the weld manufacturer's recommendations for each wire size and pipe or fitting size and material. All welding

materials and equipment shall be the product of a single manufacturer such as “Cadweld” by Erico Products, Inc., “Thermoweld” by Continental Industries, Inc., or approved equal. Each cable shall be fitted with a copper sleeve for accomplishing the weld. Interchanging materials of different manufacturers is not acceptable.

150-4.09 Ground Clamp: Ground clamp shall be sized to fit the copper tubing and wire size, made out of high copper alloy, and rated for direct burial.

150-4.10 Thermite Weld Caps: Coating material for cable-to-pipe connections shall be Handicaps as manufactured by Royston Products or Propoxy 20 epoxy putty as manufactured by the Hercules Chemical Company or approved equal.

150-4.11 Wire Connectors: One-piece, tin-plated crimp-on ring connector.

150-4.12 Insulated Joints: Insulating joints shall be dielectric unions, flanges, or couplings. The complete assembly shall have an ANSI rating equal to or higher than that of the joint and pipeline. All materials shall be resistant to the intended exposure, operating temperatures, and products in the pipeline**.**

Gaskets - 1/8” thick full-faced neoprene faced phenolic.

Insulating Sleeves - Full-length 1/32” thick Grade G-10 fiberglass epoxy.

Insulating Washers - 5/32” thick Grade G-10 fiberglass epoxy.

Washers - Same material as bolts, 1/8-inch thick.

150-4.13 Casing Insulator: Casing insulators shall be molded high-density polyethylene with plastic runners and shall consist of bolted segments, complete with stainless steel bolts for assembly.

150-4.14 Casing Seals: Casing seals shall be flexible molded rubber seals and shall be supplied complete with two stainless bands for sealing. Split seals are not acceptable.

150-4.15 Wall Seals: Wall seals shall be interlocking links of molded synthetic rubber. The links are to be connected together with stainless steel bolts. The wall seal shall be sized for the pipe size and type and the wall hole.

150-4.16 Pipe Backfill: Imported backfill placed around the pipes shall be a good quality sand backfill with a minimum resistivity of 5,000 ohm-cm, a minimum pH of 6.0, a maximum chloride concentration of 300 ppm and a maximum sulfate concentration of 1,000 ppm.

150-4.17 Coatings for Buried Insulating Flanges: Coat buried insulating flanges with Trenton Wax Tape #1 by The Trenton Corporation or approved equal.

150-5.0 Installation:

150-5.01 General: Installation of the specified corrosion control materials shall conform to the guidelines as set forth herein. Any changes in design or method of installation of any item as specified shall be reviewed and approved by the City Engineer prior to installation.

150-5.02 Pipe Joint Bonding: Bond all buried non-welded, rubber gasket joints, mechanical joints and fusion-bonded epoxy coated flanges for continuity. Install one or two joint bond wire assemblies at each joint that requires bonding, in accordance with Table 150-5, of this document and the following:

Pipe Size	No. Of Bond Wires Required
Smaller than 20-in diameter	1
20-inch diameter & larger	2

The electrical connection of all wires to pipes and fittings shall be performed using the exothermic welding process.

150-5.03 Exothermic Welds: Exothermic weld connections shall be installed in accordance with Standard Plan CP-16. Coating materials shall be removed from the surface over an area just sufficient to allow proper searing of the graphite weld mold to the pipe surface. The coating shall be entirely removed in the area of the actual weld by using a sanding wheel or metal file. White metal shall be achieved free from resin films. After the weld is complete, strike the weld with a hammer using a moderate amount of force. Welds that dislodge from the pipe surface shall be replaced. Care shall be taken to prevent damage to the wires. All rough edges of the weld and slag shall be removed during this structural test.

150-5.04 Anode Storage and Handling: Store all prepackaged anodes off the ground and keep them dry at all times. Protect them against weather, condensation, and

mechanical damage. Immediately remove all wet or mechanically damaged prepackaged anodes from the site. Prepackaged anodes shall be handled with care to prevent loss of backfill material. Anodes shall not be lifted or installed by the lead wire.

150-5.05 Galvanic Anode Installation: Remove the plastic or heavy paper bag used for shipping. 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. Anode shall then be flooded with 5 gallons of fresh water. The remainder to the trench shall then be backfilled with native soil.

Install galvanic anode 1 foot below the pipe invert and at a minimum distance of 3 feet from the pipeline, valve or fitting. Provide a minimum anode spacing of 5 feet from other unprotected pipelines. Install anodes at intervals determined by the cathodic protection design.

Valves and Fittings For Non-Metallic Pipe: Each buried ductile/cast iron and steel fitting, and valve used in conjunction with nonmetallic pipe shall be cathodically protected with zinc anodes (soil resistivity < 1000 ohm-cm) or magnesium anodes (soil resistivity $\geq$ 1000 ohm-cm). Where two or more metallic fittings are adjacent to each other, they can be bonded together for the purposes of cathodic protection as shown on the Standard Drawings.

Anode connections to ductile/cast iron and steel fittings and valves shall be made by the exothermic weld method. Any damage to the interior coating shall be repaired in accordance with the manufacturer's recommendations.

150-5.06 Wires: Provide a minimum cover of 30 inches over all cables. Use care during installation to avoid punctures, cuts and similar damage to the insulation. Replace entire cable run where any damage to insulation occurs. Yellow caution tape shall be placed a minimum of 6 inches above any buried cables.

150-5.07 Test Station Installation: Test stations shall be installed as shown on the Standard Drawings. A concrete collar shall be set flush with the top of curb or finish grade in paved areas and two inches above grade in landscaped areas. The terminal end of each cable shall be identified with permanent cable markers as shown in the Standard Drawings. The locations for the test stations shall be as specified in the cathodic protection design.

Provide a minimum of 18 inches of slack for each cable in each test station. Sufficient slack shall be provided to allow removal of the terminal box from the test station without disconnecting any of the cables.

150-5.08 Insulating Flanged Joints: 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 Digital Low Resistance Ohmmeter (DLRO) 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 below grade insulating joints shall be coated as specified above.

150-5.09 Casing Insulator and Seals: At all locations where water system piping is cased with metal casing, casing insulators and end seals shall be installed. Type and spacing of insulators required shall be at manufacturer's written recommendations and depend on type and size of casing and carrier pipe.

150-6.0 Testing:

150-6.01 General: The Contractor shall furnish all necessary equipment, material, and qualified personnel required to perform all tests described herein.

NOTE: Qualified personnel are California Registered Corrosion Engineers and/or those who possess a valid current NACE certification who shall furnish qualification documentations upon request by the City Engineer. All those who do not meet any of the required qualifications shall refrain from performing any kind of work under this requirement in the City of Brentwood.

All electronic test equipment such as multimeters, DLRO, etc., shall be calibrated. A Certificate of Calibration shall be submitted together with the report and shall be current within one year.

All test results shall be submitted to the City using the form, “Cathodic Protection System Survey, Table 150-8”.

150-6.02 Electrical Continuity Testing: Conduct continuity testing on all buried joints that are required to be bonded both before backfilling and after backfilling.

150-6.03 Insulation Joints and Casings: The Contractor shall test each insulated joint and cased crossing. All damaged or defective insulation parts shall be replaced and retested.

All electrical shorts to the casing shall be cleared and retested. Records shall be made of all insulated joints and cased crossing test and submitted for approval.

150-6.04 Test Stations: The Contractor shall test all test leads to ensure they were installed in accordance with the Specifications. All defective test leads shall be repaired and/or replaced and retested. Records shall be made of all test stations tested and submitted for approval.

150-6.05 Cathodic Protection System: The Contractor shall test all cathodically protected pipelines to ensure that the protection levels are within the most recent NACE RPO 169-2002 Standards. Records shall be made of all anode current output and pipe to-soil potential measurements performed and submitted for approval.

150-6.06 Acceptance: All tests performed shall be reviewed and approved by the City Engineer before the corrosion control work is accepted. The City reserves the right to spot-check any or all tests performed by the Contractor. All construction defects must be repaired and retested before the final acceptance is made. The Contractor at no additional cost to the City shall retest all unacceptable tests.

***Important:* Prior to paving, all tests shall be performed and corrections made to the satisfaction of the City Engineer.**

Table 150-8
Cathodic Protection System Survey

Testing Agency: _____ **Date: _____**
Engineer/Technician: _____ **Sheet No.: _____**
NACE Certification No.: _____ **Project Name: _____**
Location: _____ **Project No.: _____**

No.	Location/Station #	Structure / Test Point	Structure-to-Soil Potential			Polarized Potential (Off-Static) (-mV)	Anode Current Output (mA)	Remarks
			Static (-mV)	Anode Connected (On) (-mV)	Anode Temporarily Disconnected (Instant Off) (-mV)			

Comments/Sketch :

SECTION 160

FIBER OPTIC FACILITIES

160-1.0 General: The premise of the fiber optic design is that in the future when the fiber optic plant is pulled, the conversion from coaxial (C) to fiber optics (F) will take place at the Node Vault (Vn). The Vn vault is the only junction where the coaxial conduit (C) and fiber optic conduit (F) will interconnect. After that, the fiber conduit (F) goes into the Fiber Splice Vault (Vf) and the coaxial conduit (C) goes into the Service Vault (Vs). (See attached sheet depicting the functions for each vault).

160-2.0 Material:

160-2.01 Conduit Material:

	Quantity and Diameter Size	**Material of Conduit**
Fiber Optic Trunk Line (T): "Fiber Optic Master Ring" carries all optical fibers throughout the trunk line system from the point(s) of connection to the node vaults (Vn)	2 – 4" Φ	PVC - Schedule 40
Fiber Optic Main Line (F): Carries all optical fibers from node vaults (Vn) to fiber optic splice boxes (Vf)	1 – 4" Φ	PVC - Schedule 40
Coaxial Distribution (C): Carries distribution cables from node vaults (Vn) to service vaults (Vs).	2 – 2" Φ	PVC - Schedule 40 (color orange)
Services (S): Carries service drop cables from service vaults (Vs) to served residences.	2 – 1-1/4" Φ	PVC - Schedule 40 (color orange)

160-2.02 Vault Material:

1. Vault for Fiber Optic Node (Vn)

   A. Minimum size: 3'(W) x 5'(L) x 4'-6" (D)

B. Type and material of box: concrete, Pac Bell – 3660 standard

C. Type and material of lid: Utility Vault or equal, H10 loading, torsion assist, adjustable frame style, penta head bolts, diamond, and painted black

D. Marking of lid: "City of Brentwood"

E. Conduit Entrance into Box: from the side

F. Maximum number of terminations: 12 (4 - 4" Φ, plus 4 - 2" Φ pairs)

G. Only the fiber optic trunk line (T), main line (F) and/or coaxial conduits (C) shall interconnect this node vault.

2. Vault for Splices of Fiber Optic Main (Vf)

A. Minimum size: 30" (W) x 48" (L) x 34" (D)

B. Type and material of box: reinforced concrete

C. Type and material of lid: reinforced concrete, single lid – type "D"

D. Marking of lid: "City of Brentwood"

E. Acceptable Manufacturer: Christy B48 Utility Box, or equal, with two extensions

F. Maximum number of terminations: 4 - 4" Φ

G. Conduit Entrance into Box: from the side

H. After installation of box and conduits, pour concrete sump.

I. Only the fiber optic trunk line (T) and/or main line (F) enters and exits this splice vault.

3. Vault for Services (Vs)

A. Minimum size: 24"(W) x 36"(L) x 34"(D)

B. Type and material of box: reinforced concrete

C. Type and material of lid: reinforced concrete, single lid – type "D"

D. Marking of lid: "City of Brentwood"

E. Acceptable Manufacturer: Christy B40 Utility Box, or equal, with two extensions

F. Maximum number of terminations: 20 (4 - 2" Φ pairs, plus 6 - 1 ¼ " Φ pairs)

G. Conduit Entrance into Box: from the side

H. Only the coaxial conduit (C) and services (S) shall interconnect at this service vault.

160-3.0 Conduit Placement:

160-3.01 All Conduits: Sweep minimum radius: 24" horizontal or vertical

A pull rope shall be installed in all conduits that are to receive future cables. A pull rope shall be nylon or polypropylene with a minimum tensile strength of 500 pounds. At least 2 feet of pull rope shall be doubled back into the conduit at each termination. Prior to acceptance by the City of Brentwood, all fiber optic and coaxial conduits shall be cleaned with a mandrel.

160-3.02 Fiber Optic Trunk Line (T), Fiber Optic Main Line (M) and Distribution Conduits (C): No cable segment between enclosures may include more than 360 degrees of total bend, including an allowance of 90 degrees for the transition into each enclosure. In other words, there may no more than two 90-degree bends in the conduit placed in the street, not counting the transition bends into the vault at each end of the segment.

Maximum length of conduit shall be 400' for runs with bends greater than 90^{o}, but less than 180^{o} (excluding the bends in and out of vaults).

Maximum length of conduit shall be 500' for runs with bends greater than 0^{o}, but less than 90^{o} (excluding the bends in and out of vaults).

Maximum length of conduit shall be 600' for straight runs (excluding the bends in and out of vaults).

Terminations into node vaults shall be gradually swept (15 to 30 degree bends) to the elevation where the conduit enters through the side of the vault.

160-3.03 Service Conduits (S): Service conduits extend between the service vault and the termination panel at each dwelling. Two service conduits must extend between each service vault and each dwelling served from that vault.80% of such conduits must be no greater than 120 feet in length and no conduit may be greater than 180 feet in length.

In order to limit cable tension during installation, no service conduit may include more than 270 degrees of bend, including the 90-degree sweep up into the service panel at the dwelling and an allowance of 90 degrees for the sweep transition out of the service vault. Where bending in excess of 270 degrees is required, intervening service vaults must be employed.

Each service shall terminate, without gap, in a separate prewired box in wall of dwelling. The prewire boxes shall be Multilink part number RNSB-69 or equal, mounted for access from outside the dwelling. Supply separate #10 copper ground wire from the UFER common building electrode to each box. A dedicated 20 amp circuit shall be located adjacent to the distribution hub and installed on the inside wall of the structure.

160-4.0 Vault Placement:

160-4.01 Node Vaults (Vn): Every new subdivision shall contain at least one node vault. These vaults shall be located near the entrance points of subdivisions in landscape parcels, so that the nodes can also serve homes in existing or future adjacent subdivisions.

The total length of the distribution conduit (C) between the node vault and the most distance served home shall not exceed 2400 feet. If the distribution run is split to create multiple distribution branches, then the maximum length must be shortened by 150 feet per branch circuit.

No more than four distribution conduits may originate from any give node vault.

No more than 300 homes may be served from any node vault.

120/240-volt electric power (at least 5 kW) must be available within 200 feet of the node vault location and must not require boring of streets to access.

Natural gas must be available within 200 feet of the node vault location and must

not require boring of streets to access.

160-4.02 Fiber Splice Vaults (Vf): Fiber splice vaults shall be placed where each road leaves the subdivision and shall extend to the Fiber Optic Master Ring, if applicable. If the trunk line of the Fiber Optic Master Ring is existing, interconnection of the trunk line to the vault is required.

Fiber splice vaults shall be placed as required to meet the maximum requirements for fiber optic trunk line (T) and main line (F) conduit lengths and total bend angle.

Vaults must also be placed such that they can easily be accessed for service.

160-4.03 Service Vaults (Vs): Service vaults are placed at locations where the two distribution conduits intersect pairs of drop conduits serving several homes. Wherever possible, each service vault should provide service to 2, 4, or 6 homes, with a strong preference for serving 4 home groups. It is occasionally permissible to serve 3 homes from a tap location, but serving 5 homes is not allowed.

In addition of providing a transition between distribution and service conduits, service vaults must be provided at every point where the service is stubbed-off for future expansion.

Finally, additional service vaults may be required to limit pulling tension on cables in accordance with the criteria on distribution conduit placement.

160-5.0 Right-of-Way: The developer shall dedicate a five (5) feet public utility easement (PUE) beyond the Right-of-Way, which is typically 10 feet from face of curb. This easement shall also be shown on the Final Map and Joint Trench Plans.

SECTION 170

STREET AND PAVEMENT RESTORATION REGULATIONS

170-1.0 Moratorium: Permission to excavate in newly surfaced streets will not be granted for three years after completion of street surfacing. For those streets with chip seal or slurry seal coatings, the moratorium shall be for 36 months. Utilities shall determine alternate methods of making necessary repairs to avoid excavating in newly resurfaced streets. Exceptions to the above are as follow:

1. Emergency which endangers life or property.

2. Interruption of essential utility service.

3. Work that is mandated by City, State or Federal legislation.

170-2.0 General: The following regulations pertain to street excavations:

170-2.01 Permits:

1. Except in extreme emergency, encroachment permits must be taken out in advance of excavation work. An extreme emergency is considered to exist only when life or property is endangered or when an essential utility service is interrupted during weekends, holidays, or outside the hours of 8:30 a.m. and 4:30 p.m. of normal working days.

2. A plan showing the approximate location of excavation must be provided. Record Drawings shall be submitted prior to acceptance of the project.

3. Permits for street opening shall be valid for a maximum of six (6) months. The estimated date of commencement and completion of work shall be indicated in all permits. Conflicts in the schedules of work under two or more permits shall be resolved by the parties involved.

4. As a condition of the permit to excavate, the applicant must have been provided an inquiry identification number by a regional notification center (USA) pursuant to Section 4216, Chapter 1153 of the California State Law.

5. Permit Inspector, telephone number (925) 516-5420, shall be notified 24 hours in advance of any work. (A CONTROL NUMBER WILL BE PROVIDED FOR EACH NOTIFICATION BY THE PERMIT INSPECTOR.)

170-3.0 Excavation:

1. All excavated material not suitable for backfill shall be removed from the job site within twenty-four (24) hours. Excavated material suitable for backfill may be stored on the job site for a maximum of five (5) working days. The suitable backfill material shall be stored in a location outside the public right of way, shall not occupy any more space than the permit allows and shall be completely prevented from blowing, washing, or being thrown about at all times.

2. No trench shall be opened on any street, which is not backfilled at the end of the day. With prior approval of the permit inspector, the trench may be left open at the end of the day with adequate safety precautions for vehicular and pedestrian traffic.

170-4.0 Backfill:

1. Trenches on existing streets shall use Class II A.B., free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base. Compaction of backfill shall be in accordance with City of Brentwood Standard Plan ST-25a and these Specifications.

2. Where undermining has occurred, remove existing pavement as directed by the City Engineer to compact backfill.

3. Certificates shall be obtained from an independent testing laboratory verifying that compaction meets requirements. The number of tests will be specified by the City Engineer or his inspector. The intent of this test is to assure that pavement is properly restored. Tests will generally be required on all excavations. The number of tests required at the inspector's option will increase if results are poor and decrease if good compaction is consistently obtained.

170-5.0 Paving:

1. Trenches shall be paved. Sawcutting of the existing pavement shall be in neat straight lines. To allow for proper placement of the new pavement section, damaged pavement outside of the original trench cut lines shall be removed by cutting in lines perpendicular to or parallel to the original trench lines. No diagonal cuts are to be made. Undamaged pavement of three (3) feet or less between two damaged areas shall also be removed.

2. Pavement shall be restored using the "T" Section. For trenches in moratorium streets parallel to the centerline of the street, the entire lane shall be key-cut one and one-half inches (1-1/2") deep and repaved with asphalt concrete. For trenches in moratorium streets with chip seal or slurry seal coatings, the entire lane shall be resurfaced with these coatings.

3. Grind down the existing asphalt pavement to a minimum of 2" for a distance of 1' from the limits of the trench. Trench shall be paved within 2" of the finished surface and compacted. The final lift shall be the top 2" to the finished surface with a smooth surface with the existing pavement. Paving shall be slurry-seal coated twenty-four (24) hours after the top lift paving, the trench paving and the 1' outside the trench.

4. Trenches in concrete streets shall be paved with concrete pavement. The thickness of the new pavement shall be equal to the thickness of the existing pavement with the minimum thickness to be six (6) inches in the roadway. Doweling and color matching is required.

5. Trenches in major and minor thoroughfares with asphalt wearing surfaces shall be paved with not less than five and one-half inches (5-1/2") of asphalt concrete wearing surface.

6. Trenches in Collector Street and cul-de-sac streets shall be paved with a minimum of two inches (2") asphalt concrete wearing surface on a minimum of two inches (2") asphalt concrete.

7. Pavement shall be restored within fourteen (14) days from the time the trench is backfilled. For minor excavations such as service installations, the pavement shall be restored within two (2) working days from the time the trench is backfilled. The asphalt concrete wearing surface shall be placed

within two (2) working days after placement of asphalt concrete base, weather permitting.

8. When roadway widening is required, the existing pavement surface must be grinded to a minimum depth of 1-1/2” and an overlay shall be required over the entire street section.

9. Prior to placing asphalt concrete, the existing asphalt concrete shall have a vertical face so that new A.C. paving can be butt joined. No feathering of new paving to existing paving is allowed. The vertical faces shall be tack coated. In moratorium streets, placement of the final one and one-half inches of A.C. wearing surface shall be done by a paving machine or spreader box in order to eliminate the uneven, wash-board effect that results from hand spreading. Asphalt concrete shall be delivered and compacted in accordance with the Standard Specifications.

10. Asphalt pavement shall be compacted to obtain a minimum dry compaction of ninety-five percent (95%) (ASTM 1557). The asphalt concrete wearing surface will be smooth enough so that there is no irregularity greater than five-sixteenths of an inch (5/16") in ten feet (10') in any direction.

11. When ordered by the City Engineer, steel plates shall be used to facilitate traffic flow and to protect the excavation until finished pavement is restored. Steel plates used to bridge a street opening shall be ramped to the elevation of the adjacent pavement and secured against movement in any direction. Temporary ramps shall be constructed of asphalt and shall have a gradual slope. On all other streets, temporary asphalt cutback is permitted.

12. Utility trenches shall be color coded with a four (4) inch painted mark at the beginning and end of each trench at each intersection when paving is completed for inspection of record drawings. The color assigned to each franchised utility is as follows:

PG&E Electric (red)	Street Repair (dark green)
Pacific Bell (orange)	PG&E Gas (yellow)
City Water (blue)	Cablevision (orange)
City Non-Potable Water (purple)	City Fiber Optics (orange)
City Sewer (green)	City Storm Drain (white)

12. Wheelchair ramps shall be constructed where any portion of the curb at a legal pedestrian crosswalk or any portion of the sidewalk in immediate contact with such curb is removed; except where there is an existing wheelchair ramp in the crosswalk or where there is a sub-sidewalk basement behind the crosswalk.

170-6.0 Defects:

1. Depressed trench pavement shall be repaired as follows to 12 inches outside of perimeter depression:

    a. Wearing surface; defects remove and restore wearing surface.

    b. Major defects; excavate, remove and restore surface and base. The severity of the defect will be determined by the Permit Inspector.

2. Work not complying with the above requirements will be rejected, removed and redone to the satisfaction of the City Engineer.

3. Utilities shall be responsible to correct trench defects until such time as the street is resurfaced.

170-7.0 Miscellaneous:

1. Street excavation signs shall be installed at the project site at least two (2) days in advance or any construction work lasting five (5) days or more. Signs must state name of utility company and Contractor, twenty-four (24) hour telephone number, and type of construction.

2. Any violation of the above regulation may result in the revocation of the encroachment permit and/or be subject to a police citation or fine.

SECTION 200

IRRIGATION AND LANDSCAPE FACILITIES

The following supercedes in its entirety the like numbered section of the Standard Specifications.

200-1.0 Irrigation:

200-1.01 General:

200-1.01A Scope of Work: This section covers the furnishing and installation of complete irrigation systems as shown on the Improvement Plans; connection to existing water supply lines in street, related to trenching and backfilling; electrical connections to automatic irrigation controller and the guarantee.

200-1.01B 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 said irrigation system in such a manner that it shall operate efficiently in accordance with the State Water Conservation Act AB 1881 and City Ordinance of implementing the same.

200-1.01C Improvement Plans: The irrigation Improvement Plan is diagrammatic and is not intended to show exact locations of piping and valves. Locate these items as closely as possible to related curbs and edges of paving but not closer than 12". Pipelines shown parallel in the Improvement Plans may be installed in one trench.

Sprinkler heads shall be shown accurately and shall be installed as indicated by the center of the irrigation drawing symbol on the plans.

Locations of multi-outlet drip emitters shall be shown in the approximate location intended and shall be installed as indicated in the Improvement Plans detail.

Discrepancies in dimensions or sizes of areas to be irrigated shall be brought to the attention of the City Inspector before installation.

200-1.01D 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. If deficiencies are determined at this stage, they shall be repaired by the City and shall be noted by both the City and Contractor. At the final inspection, it is the responsibility of the Contractor to repair any deficiencies incurred during the course of construction as determined by the City.

Any property, including existing buildings, equipment, piping, pipe covering, sewers, sidewalks, landscaping, etc., damaged by the Contractor during the course of his work, shall be replaced or repaired by the Contractor in a manner satisfactory to the City Inspector and at the Contractor's expense before final payment will be made.

200-1.01E Damage by Leaks: The Contractor shall be responsible for damages to the ground, walks, roads, buildings, piping systems, electrical systems and their equipment and contents caused by leaks in the piping systems being installed or having been installed by him. He/she shall repair at his own expense all damages caused by him to the satisfaction of the City.

200-1.01F Inspections: The Contractor is required to notify the City at least 48 hours in advance of the time inspection and/or direction.

200-1.01G Verification of Dimensions: Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and report any variations to the City.

200-1.01H Record Drawings: Record Drawings shall serve as work progress sheets. The Contractor shall make neat and legible annotations daily as the work proceeds, showing the work as actually installed, noting changes from the originally submitted Improvement Plans. These Improvement Plans shall be available at all times for inspection and shall be kept on the job site.

The location of the following items shall be measured from two (2) permanent points of reference, building corners, sidewalk, road intersections, etc.:

- Connection to existing water lines;
- Connections 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 and location of extra wires;

- Quick coupling valves;
- Flow Sensors;
- Other related equipment as directed by the City;
- Record all utility locations revealed by construction.

On or before the date of the final inspection, the Contractor shall deliver the corrected and completed reproducible Record Drawings to the City. Delivery of reproducible Record Drawings shall not relieve the Contractor the responsibility of furnishing required information that may be omitted from the "As-built".

******USA Advisory only – exact locations are the responsibility of Contractor******

200-1.01I Controller Charts: The City shall approve "As-built Improvement Plans" before controller charts are prepared.

Two (2) controller charts shall be provided for each installed controller showing the area regulated by it. The charts shall be the reduced drawing of the actual "As-built" system, color-coded indicating the area of coverage for each station, on a paper size big enough to fit through the controller door. Any unreadable and illegible charts shall not be accepted.

These charts shall be completed and approved prior to final inspection of the irrigation system. Once completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum of 10 mils.

200-1.02 Materials: Wherever a name and number specify a material, 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 shall be permitted unless such substitution has been submitted for approval to the City within 10 days after the contract has been awarded. Six (6) copies of descriptive literature must be furnished for any materials submitted as equal substitutes.

200-1.02A Plastic Pipe:

1. Pressure Main Lines: Pipe sizes of 2-1/2 inch or smaller shall be Schedule 40 PVC, Polyvinyl-Chloride Solvent Weld Pipe, Simpson, Pacific Western or ASC; pipe sizes larger than 2-1/2 inch shall be Class 315 PVC Polyvinyl Chloride Solvent Weld Pipe, Simpson, Pacific Western or ASC.

2. Lateral Lines: Schedule 40, Polyvinyl-Chloride Solvent Weld Pipe, Simpson, Pacific Western or ASC.

3. Slip Fittings: PVC Schedule 40 on lateral lines, Schedule 80 on main lines. Same material type as pipe, solvent cement-welded slip socket, unless otherwise indicated shall be either 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 manufacturer.

6. Plastic Pipe Marking: All pipes 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.

200-1.02B Manufacturing Guarantee: All pipes shall be guaranteed by the manufacturer to be free of manufacturing defects in material or workmanship and shall further guarantee that all pipes had passed, or will pass, the Anhydrous Acetone Immersion Test.

Note: 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.

200-1.02C Risers:

1. Plastic: Schedule 80 PVC or as shown on Improvement Plans.

2. Metal: As shown on Improvement Plans.

200-1.02D Quick Coupling Valves: At grade on swing joint riser as noted on Improvement Plans and as per City of Brentwood Standard Plans and Specifications.

200-1.02E Valve Boxes:

1. For Remote Control Valves: Shall be fiberglass or plastic in shrub and groundcover areas. Concrete boxes with metal locking lids in all traffic areas.

No boxes in turf areas unless approved by Parks & Recreations Director. Size per plan or as required to accommodate valves, and all fittings as shown on detail drawings as per City of Brentwood Standard Plans and Specification; heat branded with station numbers; with stainless steel bolts and washers. All valves, ball valves and unions need to fit into the box.

2. For Gate Valves: Green fiberglass or plastic 10-inch diameter box with locking lid (or larger, as per plans). See Standard Plan W-13.

3. For Quick Coupling Valve: Green fiberglass or plastic 10-inch diameter round box with locking lid.

4. Green Rectangular Fiberglass or PVC Boxes on all master valves and flow sensors.

200-1.02F Sprinkler Heads: As indicated on Standard Plan I-1.

200-1.02G Automatic Sprinkler Controller: As described on Improvement Plans or approved equal, UL rated. Controller shall be electrically operated 24-volt AC output. Each station shall be independently variable as per the manufacturer's specification. Changes made in individual settings shall not affect other time settings.

The controller shall operate automatically, semi-automatically, manually or remotely.

All controllers, which require more than 6 stations, shall conform to the requirements of the City of Brentwood's central irrigation system.

200-1.02H Remote Control Valves: Globe pattern as noted on Improvement 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, capable of adjusting flow through the valve. The valve shall be normally closed until energized, and shall automatically close if electric powers fail. Valves shall be capable of manual operation without control wires of controller being installed.

See Standard Plan I-14.

200-1.02I 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 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 Wire: 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 ration of one wire per six valves. Spare wires shall be looped into each remote control valve box.

4. Mainline Locator Wire: One 10 gauge wire must be taped to the mainline at every 10 feet for the full length of the mainline and looped into each gate valve box. See Standard Plan W-17. Stub beginning of wire into controller.

5. Connectors: Scotch DBY, or approved equal. Splices must be buried. All spliced connectors must be in a 9" round valve box, set at grade.

6. Markers: Panduit Insta-Code PCM Series, or approved equal.

200-1.02J Gate Valves: Resilient seated gate with 2" shut off hex head. As noted in the Improvement Plans, installed with valve can.

200-1.02K Check Valves: PVC Swing check as manufactured by King Bros., Valcon or approved equal.

200-1.02L Ball Valves: Brass ball valves. Full ported resilient seated.

200-1.02M Backflow Unit: See Standard Plans W-8, W-8a and W-9. Install on concrete pad with locking enclosure.

200-1.02N Backflow Enclosure: See Standard Plans I-1 and I-5. Stainless steel, one-piece enclosure on concrete pad per manufacturer's detail drawings or approved equal.

200-1.03 Construction:

200-1.03A 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 sand or Class II aggregate base material to 12 inches above crown at pipe and tamped. Then, fill with earth and tamped to a 95% relative compaction in planting areas. All trenches shall be left flush with adjoining grade in a firm unyielding condition. Contractor shall correct any subsequent settlement of trench.

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.

No trenches shall be left open at the end of the day. Open trenches shall be protected with ¾" plywood, lighted barricades and caution tape.

200-1.03B General Requirements for Piping: Pipelines shall be installed in the locations and of the sizes shown on the Improvement Plans and these City Standard Specifications. All materials and workmanship shall conform to the Improvement Plans and these City Standard Specifications.

All pipes shall be assembled free from dirt and scale, shall be reamed, and burrs removed. All pipes shall be laid with markings up.

Before the connection of the lateral pipes and with the control valves in place, the main line shall be flushed out and tested for leaks.

Flush out each section of lateral pipe before sprinkler heads are attached.

200-1.03C Piping Depth: See Standard Plan I-2.

1. Main: 18" of cover for 8" or smaller pop-ups; for 8" and larger pop-ups, cover shall be 24".

2. Laterals: 12-inch of cover.

The bottom of the trench shall be free of rocks, clods and other sharp-edged objects.

No pipeline shall be installed directly over another pipeline in the same trench. There shall be a 6" horizontal separation between pipes.

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 City Engineer. No hydraulic driving will be permitted under asphaltic concrete paving.

See Standard Plan ST-25, ST-25a and ST-25b for backfilling of trench.

200-1.03D Plastic Pipes and Fittings: Install main line and lateral line in locations shown on Improvement Plans. Discrepancies shall be brought to the attention of the City Engineer prior to trenching.

1. Handling: Exercise care in handling loading, unloading, and storing plastic pipe and fittings. Store pipes and fittings under a covered area before using or transporting on a vehicle. The vehicle shall have a bed long enough to allow the pipe to lay flat to avoid undue bending or concentrated external load.

   Dented or damaged pipes shall be repaired by cutting out the dented or damaged section and rejoining them with a coupling.

2. Jointing: Apply "IPS WELD-ON P-70" primer prior to applying solvent cement. 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 with the steel connection first. Use a non-hardening pipe dope and 3 wraps of Teflon tape on all threaded plastic to steel joints. Apply a light wrench pressure on these joints.

3. Thrust Blocks: As per 130-1.02G, "Thrust Blocks," of the City Standard Specifications. Installation shall be approved before backfilling.

200-1.03E Check Valves and Ball Valves: Shall be installed at all remote control valves as shown on Standard Plan I-14.

200-1.03F Remote Control Valves: As specified on the Improvement Plans. Connect to automatic controllers in the operating sequence indicated on the Improvement Plans by numbers. Provide and install one (1) control valve box for each electric control valve.

200-1.03G Quick Coupling Valves: Top of the valve shall be 3 inches below the inside of the 10-inch diameter round box lid. Box shall be flush with the finish grade. See Standard Plan I-15.

200-1.03H Sprinkler Heads: Install as noted on Improvement. Final location shall be flush with grade and min. 12 inches clear of walkways, curbs or headers to facilitate edging. All sprinkler heads of the same type shall be of the same manufacturer. Heads in turf should be within 12" of concrete surfaces.

200-1.03I Electric Services: As per Improvement Plans.

200-1.03J Service: The Contractor shall coordinate with the Pacific Gas and Electric (PG&E) Company for any necessary service modification. Any fees and costs required by the utility company shall be the responsibility of the Contractor.

The service cabinet shall be type Milbank West CP3B11115A Stainless Steel. Service shall have a 100-ampere, 2P, main circuit breaker with a 50-ampere, 1P, signal circuit breaker, a 30-ampere, 1P, lighting circuit breaker, a 15-ampere, 1P, illuminated street name sign circuit breaker, a 30-ampere, 1P, "spare" circuit breaker. A 30-ampere, 125 volt twist lock receptacle shall be mounted in the dead-front panel for the convenience receptacle.

200-1.03K Controller and Control Wiring: As per Standard Plans I-6, I-6a and other requirements as noted in the approved plans.

1. Securely mount controller as directed by the manufacturer. Complete all electrical connections to controller.

2. Lay control wiring in trenches with main lines and tape every 10 feet into a common bundle.

3. At valves, both wires shall be brought into the valve box and shall have an excess loop of 24 inches before being spliced to the solenoid pigtails.

4. Place labels on control wiring at all terminus points indicating controller and valve number and station.

5. Provide a minimum of four (4) extra valve stations on each controller for future use.

200-1.03L Testing Main Lines: Scheduled testing shall require a 48-hour advance notice.

Before testing, after the valves have been installed, fill water line with water for at least 24 hours. Test all main lines for leaks at full pressure of 150 psi for a period of two hours with couplings exposed and pipe sections center-loaded. Pressure gauges shall be installed at the end of the main line being tested. Correct all leaks and retest until acceptance by the City.

Note: Backflow valve shall be installed and tested by a City-approved tester prior to filling irrigation main and lateral.

200-1.03M Testing Lateral Lines: After pipe and risers have been installed, and prior to head and swing joints being installed, test all lateral lines for at least one hour at 75 psi. Repair all leaks and retest until acceptance by the City.

200-1.03N 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 City.

200-1.03O Coverage Test for Sprinklers: The City shall verify proper irrigation coverage prior to any plant material being installed.

200-1.03P Final Inspection: Final inspection requires a 7-day advance notice! Contractor shall check, clean and adjust all systems and present at the time of final inspection a thoroughly workable, clean, balanced irrigation system. Contractor shall operate system in its entirety in the presence of the City Inspector.

All sprinkler heads shall be adjusted for radius of arc of coverage. All Remote Control Valves shall be properly balanced. Contractor shall attach the approved controller chart(s) inside controller door (see Section 200-1.01I Controller Charts).

200-1.03Q Guarantee: The entire sprinkler system, including all work done under the project 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 materials used shall carry a manufacturer's guarantee for a minimum of one year.

Any settling of backfill trenches which may occur during the one year period after final acceptance shall be repaired by the Contractor to the satisfaction of and without expense to the City. This includes 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 form on page 84. The Developer or Contractor shall fulfill the general conditions specified in the Improvement Plans and of this City Standard Specifications prior to the City's acceptance of the irrigation system.

The Guarantee form shall be retyped into the Contractor's letterhead and shall contain the following information:

1. Overtime letters will be submitted 48 hours prior to date of overtime, and will be approved by City.

2. All grading (rough) will be certified to be at +/- one tenth at area drains and inlets, and storm drains will be certified to be to proper elevations.

3. Any changes in storm drain locations or grade will be by architect, who designed plans and will be re-submitted prior to any work being done in field. All storm drain area and field inlet drain pipes shall to be installed as per the City of Brentwood Standard Plans and Specifications.

A copy of the completed Guarantee form shall be included in the operations and maintenance manual.

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler 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 expected. 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:_____

200-1.03R Certification: The manufacturers' representative shall certify all controllers and backflow units associated with the City's central irrigation system. This certification shall be provided to the City in writing before the start of the maintenance period.

200-1.04 Measurement: The backflow units, controllers, sleeving and enclosures shall be measured by the number of items. Other irrigation system items shall be measured as lump sum.

200-1.05 Payment: The contract price of irrigation shall include full compensation for layout, trenching, piping and fittings, valves, irrigation heads, electrical services, and all other irrigation system improvements, but excluding backflow units, controllers, sleeving and enclosures, completed and installed in place.

The contract price for backflow units, controllers, sleeving and enclosures shall include full compensation for these items completed, installed in place and tested as functional.

Irrigation system, including controller, shall be fully operational prior to any planting. Also, grade shall be within one-tenth +/- (1/10) of the finish grade.

200-2.0 Landscape (Plants and Planting):

200-2.01 General:

200-2.01A Scope of Work: The work includes all labor, materials, tools, equipment, transportation, and services necessary for 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
7. Maintenance
8. Guarantee

200-2.01B Protection: Contractor shall provide necessary safeguards, exercising caution against injury or defacement of any existing site improvements and plantings.

Contractor shall be responsible for any damage at his/her expense. No trucks or vehicles of any kind shall be allowed to pass over curbs, unless adequate curb protection is provided.

Planting materials, as well as all installed work and materials of other trades, shall be protected before, during and after the installation. In the event of plant material damage, including those caused by inadequate watering during all phases of construction, necessary repairs and replacements shall take place immediately at the Contractor's expense to the satisfaction of the City.

200-2.01C Job Conditions: Actual planting shall only be performed when weather and soil conditions are suitable in accordance with locally accepted practice.

Scheduling: All construction materials and debris shall be removed on site prior to planting. Install trees, shrubs and liner stock plant material before hydraulic seeding is commenced.

Samples and Tests: City Inspector shall take soil samples at the expense of the Contractor from no less than 3 locations as directed by City. These samples shall be taken after rough grading operations are complete, and shall be taken by Contractor for testing at a City approved testing facility. Soil shall be analyzed for nutrients, pH balance, composition, texture and structure. A copy of the test results shall be delivered to the City Inspector.

200-2.02 Materials: The City reserves the right to take and analyze samples of imported materials for conformity to the City's requirements and these Standard Specifications at any time. Contractor shall furnish samples upon request by the City. Rejected materials shall be immediately removed from the site at Contractor's expense. Any additional testing of materials required by the City due to non-conformance with these Standard Specifications shall be at the Contractor's expense.

Prior to planting, subsequent post amendment soil testing shall be done, verifying compliance of recommendations at the Contractor's expense.

200-2.02A Import Soil: Shall be from clean materials, free from rocks, rubble, clods, plants, roots and toxic matter.

Prepare and submit Soil Analysis report to City Inspector for review and approval prior to importing soil.

200-2.02B Amendments: The following organic soil amendments and fertilizers shall 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 taken and analyzed. A minimum of 6 yards per 1000 square foot of organic soil amendment shall be added to site planting areas.

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 City with sample of all supplied materials accompanied by analytical data from an approved laboratory source illustrating compliance or bearing the manufacturer's guaranteed analysis.

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Contractor shall verify soil balance of material before the construction begins.

200-2.02B.1 Organic Amendment: Submit sample for City approval prior to installation.

1. Nitrogen Stabilized: 0.56 to 0.84% N based on dry weight for rice hulls.

2. Particle Size:
   95% - 100% passing 6.35 mm standard sieve
   80% - 100% passing 2.33 mm standard sieve

3. Salinity: The saturation extract conductivity shall not exceed 3.5 milligrams/centimeter at 25 degrees centigrade as determined by saturation extract method.

4. Iron Content: Minimum 0.08% dilute acid soluble Fe on dry weight basis.

5. Ash: 0-6.0% (dry weight)

200-2.02B.2 Soil Amendment:

1. Soil Sulfur: Agricultural grade sulfur processed into pellets such as Tiger brand or approved equal, containing a minimum of 90% sulfur (expressed as elemental).

2. Iron Sulfate: 20% Iron (expressed as metallic iron), derived from ferric and ferrous sulphate, 10% sulfur (expressed as elemental).

3. Calcium Carbonate: 95% lime as derived from shells.

4. Gypsum: Agricultural grade product containing 98% minimum calcium sulphate.
5. Amend: Available from Kellogg Supply Company, or approved equal.

200-2.02B.3 Fertilizer:

1. Planting fertilizer: Pelleted or granular form shall consist of the following percents by weight and shall be mixed by commercial fertilizer supplier.

    - 6% nitrogen
    - 20% phosphoric acid
    - 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.

    - 5% nitrogen
    - 3% phosphoric acid
    - 1% potash
    - 50% humus
    - 15% humic acid

3. Planting Tablets

    a. Shall be slow released type with potential acidity of not more than 5% by weight containing the following percentages of nutrients by weight:

        - 20% nitrogen
        - 10% phosphoric acid
        - 5% potash
        - 2.6% combined sulfur
        - 35% iron (elemental) from ferrous sulfate

    b. Shall be 21-gram tablets as manufactured by Agriform or approved equal, applied per manufacturer's instructions.

4. Sulphate of Potash: 0-0-50

5. Single Super-phosphate: Commercial product containing 18-20% available Phosphoric Pentoxide, or equal.

6. Urea Formaldehyde: 38-0-0

200-2.02C Plant Material: Plant materials shall be in accordance with the "Nursery Stock Specifications," adopted in the City's "Urban Forest Guidelines" (*www.brentwoodca.gov/pdf/new/parks/Brentwood_Urban_Forest_Guidelines.pdf*).

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 branching systems and vigorous and fibrous root systems, which are, not root or pot-bound.

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 plants or more than two percent of the total number of plants of each species or variety. Where container-grown plants are from several sources, the roots of not less than two plants of each species or variety from each source will be inspected. In case the sample plants inspected were found to be defective, the City reserves the right to reject the entire lot or lots of plants represented by the defective samples. The City 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 and caliper of trees will correspond with that normally expected for species and variety of commercially available nursery stock or as specified on the Improvement Plans. The minimum acceptable size of all plants measurements, if any, shall be as specified on the Improvement Plans in the list of plants. Plants larger than specified may be used with the approval of the City, but the use of larger plants will make no change in Contract price. If the use of larger plants is approved, the ball of earth or spread of roots for each plant shall 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 replaced plants shall be of the species, variety, size and

conditions specified herein or as shown on the Improvement Plans. Under no conditions will there be any substitutions of plants or sizes as listed on the Improvement Plans, except with the express consent of the City.

Plant Material shall be true to its 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).

At no time shall trees or plant material be pruned, trimmed or topped prior to delivery. Any alteration of their shape shall be conducted only with the approval and in the presence of the City representative.

200-2.02C.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 that is well established in removable containers or formed homogenous soil sections.

4. Substitution of plant material shall not be permitted unless specifically approved in writing by the City.

200-2.02C.2 Seed:

1. All seeds used shall be labeled and furnished in sealed standard containers. Provide signed copies of a statement from the vendor certifying that each delivered seed container 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 that has become wet, moldy or otherwise damaged in transit or while in storage will not be accepted.

3. Lawn Seed Mix: Typical seed blend shall be as specified in the Improvement Plans: 100% Turf type Tall Fescue (from the top half list of the UC Coop Extension Field Trials, see Appendix C).

200-2.02C.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 disperses evenly and remains suspended in agitated water. It shall have a temporary green dye and the following property analysis:

1.	Moisture content	9.0% +/- OD Basis
2.	Organic Matter	99.2% +/-0.8%
3.	Ash content	0.8% +/-0.2%
4.	pH	4.8% +/- 0.5%
5.	Water Holding Capacity	1150 minimum (grams of H20 per 100 grams of fiber)

200-2.02C.4 Hydro-seeding Additive (Binder): Ecology Control-M-Binder organic seeding additive.

200-2.02D Guying and Staking Materials:

200-2.02D.1 Wood Tree Stakes: As per Standard Plan L-1, "Tree Planting": 2 inches (min. nominal size) diameter x 10 feet long for 15-gallon trees; 2 inches diameter x 12 feet long for 24-inch box size trees.

200-2.02D.2 Ties: As per City Standard Plan L-1.

200-2.02E Water: Furnished by City; transport as required.

200-2.02F Mulch: Shredded Cedar Bark as manufactured by Hypenex or approved equal. Submit sample for approval.

The mulch shall consist of fibrous, woody bark mixture of varied particle size such that physical properties:

Percent Passing	Sieve Size
90 – 100	25.4 mm (3/4")
80-100	12.7 mm (1/2")
20-60	6.35 mm (3/8")

200-2.02G Wood Headerboards: As per Improvement Plans and Standard Specification 200-3.03.

200-2.02H Sand: For play areas and volleyball courts: Lone Star Lapis B-16, or approved equal.

200-2.02I Sod: Sod shall be species as noted on the Improvement Plans with ¾-inch thick pads, classy grass, mellos, etc., 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. No nylon mesh shall be allowed.

200-2.02J Inspection: Obtain City's certification that final grades to 0.10 +/- feet have been established prior to commencing planting operations. Provide for inclusion of all amendments, settling, etc. Contractor shall be responsible for shaping all planting areas as indicated on Improvement Plans or as directed by the City Engineer.

Inspect trees, shrubs and liner stock plant material for injury, insect infestation and for improper pruning.

Planting shall not commence until deficiencies are corrected or plant material has been replaced. Rejected plant material shall be removed from site immediately.

200-2.02K Soil Preparation Prior to Planting: Soil shall be ripped to the depth of 12" by mechanical ripper, followed by 6" rototill. 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 6 inches of soil. The following organic soil amendments and fertilizer rates and quantities shall be used for bid basis only, except when there is a minimum requirement of 6 cubic yards/1000 of organic amendment.

Specific planting requirements will be concluded after rough grading operations are complete and soil samples are tested by a City approved testing laboratory.

Note: A City representative shall be on-site when the samples are taken and shall submit those samples to the testing laboratory.

Application Rates: (Per 1,000 square feet). To be used for bid price basis only. Specific amendments will be made following soil tests.

1. Nitrogen stabilized organic amendment – 6 cu yards minimum spec.

2. Planting fertilizer – 15 lbs.

3. Agricultural gypsum – 25 lbs.

4. Soil sulphur – 20 lbs.

At time of planting, the top two (2) inches of all areas to be planted shall be free of stones, stumps, construction material (including gravel, aggregate base rock) or other deleterious matter 1 inch in diameter or larger, and shall be free from all wire, plaster, or similar objects that would be a hindrance to planting or maintenance. Class II A.B. is not permitted in any planted area at any depth.

All materials shall be delivered directly to the project site. All transportation receipts shall be made available to the City.

200-2.02L 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 City.

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 Improvement Plans.

4. Surface drainage shall be away from all fences and walls. See grading and drainage Improvement Plans. For additional information refer to Section 110, Storm Drain Facilities.

5. Eliminate all erosion scars prior to commencing maintenance period.

6. Grades not to exceed 2-3% at area drains/catch basins.

7. Grades shall be certified to be within 1/10 ± prior to acceptance.

200-2.02M Disposal of Excess Soil: Dispose of any unacceptable or excess soil at a legal offsite location.

200-2.03 Planting Installation:

200-2.03A 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 City.

Irrigation system and automatic watering programs shall be fully functional before planting.

The amount of plants, which shall be distributed for daily planting within the given planting area, shall be based on as many plants that can be suitably watered on that same day.

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.

200-2.03B Pre-Plant Weed Control: If live perennial weeds exists 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 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. Before planting/seeding, apply contact herbicides and wait as needed before planting. Repeat, if required by City Inspector.

Maintain site weed-free until final acceptance by the City by utilizing mechanical and chemical treatment.

200-2.03C 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 City.

No trees shall be planted within 5’ of existing or designed water, sewer, storm drain and joint trench lines. If underground construction or utility line is encountered in the excavation of planting areas, other locations for planting may be selected by the City.

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 City and governing agencies the location and depth of all underground utilities, and obstructions.

200-2.03D Planting of Trees, Shrubs and Vines: Excavation for planting shall include the striping 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 not used to be as backfill or in establishing the final grades shall be removed from the site.

Protect all areas from excessive compaction from trucking plants or other materials in 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 shall be as per City Standard Plans L-1 and L-4.

All excavated holes shall be square in shape and have vertical sides with scarified/fractured surfaces and shall be of a size that is twice the diameter and the same 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 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.

Can Removal:

- Cut cans on two sides with an acceptable can cutter.

- Do not injure root ball.
- Do not cut cans with spade or ax.

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 1-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 that the required number of tablets to be used in each hole can be easily verified by the City.

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 2 inches of water. The basins shall be constructed of amended backfill materials and form a minimum radius of 36" around the plant trunk. Two-inch layer of fibrous bark mulch shall be applied within the basins after their construction.

Pruning: Pruning shall be limited to the minimum necessary to remove injured twigs and branches. Pruning may not be done prior to delivery of plants. Temporary branches below height of permanent scaffold branches will not be removed.

Root Control Barrier: Install per City Standard L-3.

200-2.03E Planting of Groundcovers: Groundcover plants shall be grown in flats, liners or 1-gallon containers as indicated on the Improvement 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.

Unless otherwise noted, groundcover shall be planted in straight rows and evenly spaced, in a triangular pattern at intervals specified in the Improvement Plans.

Each rooted plant shall be planted with its proportionate amount of soil. Plantings shall be immediately sprinkled after planting until the entire areas 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 shall be repaired immediately to the satisfaction of the City Engineer.

200-2.03F Mulch: City-approved mulch shall be placed in planting areas to a minimum depth of 2 inches unless otherwise specified on the Improvement Plans. Prior to the placement of mulch, pre-emergent herbicide shall be applied to all shrubs and groundcover areas. The pre-emergent herbicide shall be Ronstar or approved equal, granular and applied per the manufacturer's specifications. City shall verify the application of the pre-emergent prior to the placement of mulch.

200-2.03G Planting of Sod: The sod bed shall be tilled and amended with the following materials to a minimum depth of 6 inches. The following are minimum requirements:

- 6 cubic yards Nitrogen stabilized redwood shavings 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

Sod rolls shall be laid tightly in a straight line with tightly butted, staggered joints. There shall 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 laid parallel to slope contours.

Lightly water sod within 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 8 inches. Repeat watering at regular intervals to keep sod moist until firmly rooted. Sod-growing medium shall match soils texture and composition of athletic fields and other City soils.

Finish soil surface should be approximately 1 inch below adjacent pavement grades in order to accommodate sod pad thickness. Finish sod grade shall be flush to ½ inch maximum below adjacent paving

Protect turf areas with temporary fencing, if necessary. Maintain protective barriers in an orderly condition and repair any damage to turf until the City has accepted planting work.

200-2.03H Hydro-Seeding Preparation and Operation:

The ensuing process shall be followed in order listed:

1. See Pre-Plant Weed Control, Section 200-2.03B, "Pre-Plant Weed Control," of these City Standard Specifications.

2. Install trees if they occur in hydro-seeded area.

3. Hydro-seeding Operation:

    a. Mix shall be as shown in Section 200-2.02C.2, "Seed", of these City Standard Specifications.

    b. All hydro-seeding operation of areas shall be applied by an approved hydro-mulch company.

    c. The hydro-mulch shall be applied in the form of slurry consisting of cellulose fiber, seed, chemical additives, M-binder, commercial fertilizer, and water. When hydraulically sprayed on the soil surface, the hydro-mulching 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.

    d. Preparation: The slurry preparation shall take place at the worksite 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.

e. 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.

f. Application Rates: The seed mix shall be applied at a rate of 400 lbs. per acre. The fiber shall be applied at a rate of 1,800 lbs. per acre. The hydro-seeding 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.

g. Time Limit: All slurry mixture that has not been applied within 2 hours after mixing shall be rejected and removed from the project and disposed at the Contractor's expense.

h. Daily work sheets must be filled out by nozzlemen. One copy shall be sent to the City. 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

i. 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 City.

j. Immediately following application of hydro-mulch, the Contractor shall wash excess material from previously planted materials and architectural features. Care shall be exercised to avoid washing of eroding mulch materials from area.

k. 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 a 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.

l. 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.

m. 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 of 5 gallons per minute at 80 PSI.

200-2.03I Clean-Up: After all planting operations have been completed; remove all trash, excess soil, empty plant containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground shall be left in a neat and orderly condition throughout the site. 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-cleaned and shall wash down all paved areas within the worksite, leaving the premises in a clean condition.

200-2.03J Observation Schedule: The Contractor shall be responsible for notifying the City in advance for the following site visits, according to that indicated below. It is the responsibility of the Contractor to confirm all elevations shown on plans and the balance of cut and fill amounts.

- 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 someone other than the City performs the observation of the site, the Contractor shall show the City evidence in writing of when and to 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 City. Failure to accomplish punch list tasks or prepare adequately for desired inspections shall make the Contractor responsible for reimbursing the City at his current billing rates per hour (plus transportation costs) of inspection costs. No further inspections shall be scheduled until this charge has been paid and received.

200-2.04 Planting Maintenance:

200-2.04A General Requirements: The time duration of the plant establishment period shall be a minimum of 90 calendar days.

Plant establishment period shall commence upon completion of the project and a written approval of the City. The plant establishment period shall continue after all planting is completed, including the establishment of acceptable stands of thriving plants, and after any other additional punchlist items has been completed and accepted by the City Inspector.

- Protect all areas against damage; including erosion 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.

- Check sprinkler systems at each watering; adjust coverage and clean nozzles immediately. Adjust timing of sprinkler controller to prevent flooding. Repair all damages immediately.

- Maintain adequate moisture depth in soil to insure vigorous growth. Contractor is required to deep water all trees to insure adequate moisture level around said trees.

- Keep contract areas free of weeds by cultivating, hoeing 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.

- Submit irrigation schedule, including total precipitation, by plant area for approval.

200-2.04B Tree and Shrub Maintenance: During the entire maintenance period, trees and shrubs shall be maintained by regular watering, cultivating, weeding, repairing stakes and ties and spraying for insect pests. Prune when requested by the City.

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 the same but new stock immediately at no cost to City.

200-2.04C Turf Maintenance: During the entire maintenance period, cut turf as frequently as growth of grass requires to a height of two inches unless otherwise directed by the City Inspector. Maintain constant adequate moisture. Do not remove more than 1/3 of grass blade height at one mowing.

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. Provide 6 feet diameter area under trees free from turf at all times.

Keep turf areas free of undesirable weeds and grasses by the application of suitable, selective, and City-approved weed killers or simply by hand pulling.

Reseed all areas, which fail to adequately germinate as soon as evident, or as directed by the City.

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 fertilizers 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. Planting areas shall be watered thoroughly after applying fertilizer.

Perform all necessary operations to establish a uniform, thick and vigorous stand of grass.

200-2.05 Final Planting Inspection and Acceptance: Written notice requesting inspection shall be submitted at least 10 days before the anticipated date.

Final inspection for acceptance shall be made at the conclusion of the planting maintenance period provided that on such date, all improvements and all corrective works has been completed. If all project improvements and corrective work were not completed, the planting maintenance shall continue at no additional cost to the City until work has been completed and City Council has accepted project. This condition may be waived by the City under such circumstances wherein the City has granted an extension of time to permit the completion of a particular portion of the work beyond the time of completion set forth in the agreement.

Prior to being considered ready for inspection, the Contractor shall have done a final weeding and raking of all planting areas. Plant basins shall be repaired, re-plumb all tree stakes and snug all tire wires, and the job site cleared of all debris and presented in a neat, orderly fashion.

Upon completion and before final inspection, Contractor/Landscape Architect shall provide (See Appendix B):

- A complete inventory by square foot area of turf and ground cover areas.
- A complete inventory by size and species of all shrub and trees.
- Lineal and perimeter square foot measurement of all paved areas including asphalt and concrete.
- A complete inventory of play structures, including model number of structure and individual components and resilient surfaces, and manufacturer's warranty. Include manufacturer and sales representatives' addresses, phone numbers, and e-mail addresses.

- A manufacturer information inventory of all plant materials, irrigation equipment, lights, hardscape, benches, picnic tables, drinking fountains, garbage containers, bike racks, basketball courts and tennis courts.

200-2.05A Guarantee and Replacement: All plants and planting shall be guaranteed 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 one year from date of acceptance by City Council.

200-2.06 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.

200-2.07 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 in place.

The contract price for the maintenance period shall include full compensation for fulfilling all requirements of Section 200-2.04, "Planting Maintenance", of these City Standard Specifications.

200-3.0 Miscellaneous:

200-3.01 Monuments: Monument materials and construction shall conform to Standard Plan ST-26, "Boxed Survey Monument". Monuments shall not be installed until the asphalt concrete pavement has been completed and shall be installed at the locations shown on the Improvement 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.

200-3.02 Street Barricades: Street barricade materials and construction shall conform to Standard Plan ST-16 and shall be installed at the locations shown on the Improvement 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.

200-3.03 Headerboards: Headerboards shall be installed at locations shown on the Improvement Plans. Headerboards and stakes shall be recycled composite plastic, graded in accordance with Section 57-3.02, "Materials" of the State of California 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 2 inches by 6 inches, unless otherwise noted, and shall be held in place with 2 inches by 2 inches 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 4 feet on centers 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 linear foot.

The Contractor price for headerboards shall include full compensation for the headerboard, complete in place as specified in these City Standard Specifications and shown on the Improvement Plans.

200-3.04 Bollards: Bollard materials and construction shall conform to Standard Plan L-12, "Removable Metal Bollard." Bollards shall be installed at the locations shown on the Improvement 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.

RESOLUTION NO. 97-72

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BRENTWOOD PROVIDING FOR UPDATING THE CITY OF BRENTWOOD STANDARD PLANS AND SPECIFICATIONS, ESTABLISHMENT OF MINIMUM STANDARDS FOR CONSTRUCTION OF PUBLIC AS WELL AS PRIVATELY-OWNED IMPROVEMENTS WITHIN THE CITY, AND AUTHORIZING THE CITY ENGINEER TO MAKE APPROPRIATE REVISIONS TO THE STANDARD PLANS, SPECIFICATIONS AND MINIMUM STANDARDS AS NECESSARY TO MAINTAIN FUTURE QUALITY CONSTRUCTION.

WHEREAS, the current City of Brentwood Standard Plans and Specifications have been developed as needed, and should now be brought in line with current technology, materials and industry standards; and

WHEREAS, construction of sub-standard improvements on privately-owned lands within the City can result in future high maintenance burden to residents within these areas.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Brentwood, that the City's Standard Plans and Specifications be reviewed and updated; and

BE IT FURTHER RESOLVED that minimum standards for construction of public as well as privately-owned improvements within the City be established; and

BE IT FURTHER RESOLVED that the City Engineer is authorized to make future appropriate revisions to the Standard Plans, Specifications and minimum standards as necessary..

PASSED by the City Council of the City of Brentwood, at its regular meeting of April 22, 1997, by the following vote:

AYES: Councilmembers Guise, Petrovich, Kidd, McPoland & Mayor Morrill

NOES: None

ABSENT: None

ABSTAIN: None

Approved:

John Morrill, Mayor

Attest:

Donna J. Rogers, Deputy City Clerk

JES:PD:bd

stfrpts/res97-72

STAFF REPORT—NEW BUSINESS

TO BE CONSIDERED AT THE COUNCIL MEETING OF APRIL 22, 1997

FROM: ENGINEERING DEPARTMENT (J. Stevenson/P. Dodane)

SUBJECT: **PASSAGE OF RESOLUTION 97-72, PROVIDING FOR UPDATING THE CITY OF BRENTWOOD STANDARD PLANS AND SPECIFICATIONS, ESTABLISHMENT OF MINIMUM STANDARDS FOR CONSTRUCTION OF PUBLIC AS WELL AS PRIVATELY-OWNED IMPROVEMENTS WITHIN THE CITY, AND AUTHORIZING THE CITY ENGINEER TO MAKE APPROPRIATE REVISIONS TO THE STANDARD PLANS, SPECIFICATIONS AND MINIMUM STANDARDS AS NECESSARY TO MAINTAIN FUTURE QUALITY CONSTRUCTION.**

RECOMMENDATION: Staff respectfully recommends passage of Resolution No. 97-72, providing for updating the City of Brentwood Standard Plans and Specifications, establishment of minimum standards for construction of public as well as privately-owned improvements within the City, and authorizing the City Engineer to make appropriate revisions to the Standard Plans, Specifications and minimum standards as necessary to maintain future quality construction.

POLICY IDENTIFICATION: It is the policy of the City to update the City of Brentwood Standard Plans and Specifications on a regular basis to establish Minimum Standards for Construction of public as well as privately owned improvements. These updates are prepared by staff to maintain the latest standards and technology of engineering construction. When a significant amount of changes are proposed, the document is submitted to City Council for approval.

BACKGROUND: The current City of Brentwood Standard Plans and Specifications have been developed over a period of time as needed. In addition, construction of improvements on privately-owned lands within the City, over which the City currently does not have adequate regulatory standards, can result in future high maintenance costs to the residents within these areas. In keeping abreast of current technology, materials available and industry standards, it is appropriate at this time that the City performs a comprehensive review of its design and regulating standards as applied to construction within public as well as privately-owned areas in the City.

DISCUSSION: Staff believes that the City has a responsibility to all its residents to maintain the highest possible level of construction quality, while maintaining a reasonable balance between construction standards and prudent expenditure of funds. In keeping with this responsibility, members of staff have met to discuss and identify those sections within our standard plans and specifications that need a close review, and revision as applicable.

To maintain future high quality of construction it is recommended that on-going reviews be performed, and that the City Engineer be given authority by Council to make revisions to the Standard Plans, Specifications and minimum standards as necessary and appropriate.

ALTERNATIVES:

1) Staff recommends the passage of Resolution 97-72, providing for the updating of the City of Brentwood Standard Plans and Specifications and the establishment of minimum standards for construction of public as well as privately-owned improvements within the City of Brentwood.

2) Keep the old Standard Plans and Specifications as is and do not make the updates.

FISCAL IMPACT: Design, inspection and administrative costs can be expected to be reduced slightly as a result of clearer and more up-to-date City-construction-requirements. Meetings between developers, contractors and staff should lessen as information regarding City requirements is elevated to current industry standards.

JES:bd
Attachment

stfrpt/Rpt97-72

APPENDIX B

THE CITY OF BRENTWOOD
HERITAGE • VISION • OPPORTUNITY

PARK/MEDIAN FEATURES INVENTORY

Park Name/Street Median Location:			
Date:	Park:	LLD:	Name of Person Performing Inventory:

			Totals				Totals
Total Area	AC			Other Items			
Catch Basins	EA			Soccer Field/Ballfield	EA		
V-Ditch	LF			Lights	EA		
Signs	EA			Restrooms	EA		
Total Bedding Area	AC			Buildings	EA		
Ground Cover	AC			Playcourts	EA		
Turf	AC			Drinking Fountain	EA		
Edging	LF			Fence/Soundwall	LF		
Shrubs	EA			Playground	SF		
Annual Color	SF			Water Play Feature	EA		
Open Space	AC			Deck Cleaning	EA		
Gravel Path	SF			Trees	EA		
Asphalt Walkway	SF			BBQ Pits			
Concrete Walkway	SF			Tables	EA		
Painted Curb	LF			Benches	EA		
Hardscape	SF			Panel/Electrical	EA		
Arbor/Trellis				Trash Receptacles	EA		
Irrigation Systems				Other (Specify)			
Irrigation Controller	EA						
Irrigation Stations	STA						
Irrigation Head	EA						
Irrigation Valves	EA						
Backflow Device	EA						
Booster Pump	EA						

Comment:

APPENDIX C

MEAN TURFGRASS QUALITY RATINGS
Of Tall Fescue Cultivars in Sunnyvale, California (2007-2011)

Name	Turf score
Firecracker LS (MVS-MST)	6.6
Faith (K06-WA)	6.4
Monet (LTP-610 CL)	6.4
Bullseye	6.3
Cochise IV (RKCL)	6.3
Essential (IS-TF-154)	6.3
Falcon V (ATM)	6.3
RK 5	6.3
RK 4	6.2
Shenandoah Elite (RK 6)	6.2
Tanzania (IS-TF-159)	6.2
Traverse SRP (RK-1)	6.2
Wolfpack II (PST-5WMB)	6.2
3rd Millennium SRP	6.1
Cannavaro (DP 50-9440)	6.1
Garrison (IS-TF-153)	6.1

Name	Turf score
Jamboree (IS-TF-128)	6.1
LS 1200 (SC-1)	6.1
Shenandoah III (SH 3)	6.1
Sidewinder (IS-TF-138)	6.1
Spyder LS (Z-2000)	6.1
Turbo	6.1
Catalyst (NA-BT-1)	6.0
Firenza	6.0
Greenbrooks (TG 50-9460)	6.0
Guardian 41 (STR-8BB5)	6.0
Mustang 4 (M4)	6.0
Talladega (RP 3)	6.0
Terrier (IS-TF-135)	6.0
Toccoa (IS-TF-151)	6.0
Turbo RZ (BURL-TF8)	6.0
Van Gogh (LTP-RK2)	6.0

LSD Value* = 0.6

*LSD Value: To determine statistical differences between varieties, subtract one variety's mean from another variety's mean. Statistical differences between 2 varieties occur when this value is equal or lower than the LSD value (Least Significant Difference).