CITY OF VALLEJO

REGULATIONS AND STANDARD SPECIFICATIONS

FOR

PUBLIC IMPROVEMENTS

Prepared by John H. Duane, Director of Public Works
Registered Civil Engineer No. 20398
and signed by him on the

25th day of August, 1992

JOHN H. DUANE
Director of Public Works

I hereby certify that these Standard Specifications were prepared under the direciton of the City Manager of the City of Vallejo and submitted to the City Council on the 25th day of August, 1992, and were adopted by said Council by its Resolution No. 92-473 N.C.

ALLISON VILLARANTE
City Clerk

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Part A STANDARD SPECIFICATIONS

SECTION 1.

1.1 General Provisions

1.1.1 Purpose - The purpose of these specifications is to provide certain minimum standards for the design, methods of construction, and use of materials for streets, alleys, concrete structures, traffic signals, water distribution systems, and landscaping after constructed, altered, or repaired within the City of Vallejo; and to provide minimum standards for surveys, preparation of maps, preparation of improvement plans, and monumenting in connection with the aforesaid improvements within the City of Vallejo. These specifications are minimum standards based on sound accepted engineering practices, but are subject to revision as the "state of the art" may mandate for particular cases or practices in general.

1.1.2 Definition of Terms

A. Standard Specifications: The Standard Specifications of the State of California, Business and Transportation Agency Department of Transportation, current issue. Any reference therein to a State Agency or officer shall be interpreted as the corresponding city office or officer acting under this contract, with address at City Hall, Vallejo, California. In the case of subdivisions, the person or persons, firm, partnership, corporation, or combination thereof, who have entered into an agreement with the City, shall conform to the requirements stipulated for the "Contractor" in the Standard Specifications.

B. Vallejo Sanitation and Flood Control District Specifications: The Standard Specifications of the Vallejo Sanitation and Flood Control District, current issue, and any subsequently modified specifications of the District. Any permitted deviation from these specifications must be acknowledged in writing by said District and the City.

C. City: The City of Vallejo.

D. City Council: The governing body of the City.

E. Engineer: The City Engineer or his authorized agent who shall represent the City.

F. Laboratory: The laboratory of the City of Vallejo to the extent of its capability; otherwise as defined in the Standard Specifications, or hereunder noted in these specifications.

1.1.3 Application These specifications shall apply to, and the

City Engineer is hereby authorized to make inspection and to enforce the provisions of these specifications within all the incorporated territory of the City of Vallejo. Any reference to quantities and/or payment refer to projects which are funded by the City of Vallejo.

1.1.4 Control of Work: Attention is directed to the provisions of Section 5 of the Standard Specifications for the requirements concerning the control of the work.

1.1.5 Control of Materials: Attention is directed to the provisions of Section 6 of the Standard Specifications for the requirements and conditions for control of materials.

All laboratory tests required under these specifications will be performed by the City of Vallejo or by a qualified Soils Engineer employed by the contractor who shall be under direct supervision of a Registered Soils Engineer. Charges for Soils Engineer will be paid by the contractor or subdivider.

1.1.6 Legal Relations and Responsibility

A. General: Attention is directed to the provisions of Section 7 of the Standard Specifications, as supplemented herein, for the requirements and conditions concerning legal relations and responsibility.

B. Laws to be Observed: In connection with the laws to be observed and responsibility of the Contractor, attention is directed to Section 7 of the Standard Specifications and the laws therein referred to, all of which are applicable to this contract.

C. Public Convenience and Safety: The Contractor shall furnish, install, and maintain traffic warning and directional signs at the work site as required by the latest Traffic Manual of the California Department of Transportation or as directed by the Engineer.

   The Contractor shall designate in writing the name, address, and telephone number of the employee to contact after working hours for the proper maintenance of barriers and signs. Attention is directed to Section 5-1.06 of the Standard Specifications which provides that the Contractor shall similarly designate in writing the Superintendent of the Work.

D. Damage to Private Property: Any damage to private property caused by the Contractor and adjudged to be the responsibility of the Contractor by the Engineer shall be rectified to the satisfaction of the Engineer within a reasonable time, depending on the extent of the damage. Said reasonable time shall be as determined by the Engineer, and if the condition is not rectified, the Engineer shall

have the power and authority to rectify said damage and the cost thereof to be paid for by the Contractor, either by direct payment to the City of Vallejo, or by deducting said amount from monies due the Contractor.

1.1.7 Construction Plans

A. General

Complete plans and specifications for all proposed improvements, grading, landscaping, irrigation, and fencing, including any necessary dedications and easements, shall be submitted to the Department of Public Works for review and must receive the required approval prior to the beginning of construction of any such grading or improvements. Such plans shall be prepared by or certified by a Registered Civil Engineer in accordance with the provisions of "Civil Engineer's Act" Chapter 7 - Division 3 of the Business and Professions Code, relating to the practice of Civil Engineering.

B. Preparation: Construction plans and specifications shall be prepared in accordance with the following requirements, unless otherwise approved by the City Engineer.

1. Dimensions - Construction plans shall be clearly and legibly drawn in ink on engineering tracing paper 24 by 36 inches with a 1-1/2 inch clear margin on the left edge and 1 inch margins on all other edges.

2. Scale - Horizontal scale shall be 1" = 40'; vertical scale shall be 1" = 4' or as approved.

3. Title Sheet

   a. Name of Subdivision or Project

   b. Vicinity Map with North Arrow

   c. Index of sheets

   d. Signature blocks

4. Second Sheet

   a. Plan view showing the entire street right of way layout (Scale 1" = 100'), proposed water and sewer mains, storm drainage system, lot numbers, and other miscellaneous improvements to be installed.

   b. Complete legend.

   c. Typical Street Section.

d. Title Block - located in lower edge or right edge of paper. See Drawing No. 3-1.

e. Temporary and permanent bench marks including their descriptions.

f. Provision for future benchmarks in subdivision.

g. General and special notes relating to construction methods.

5. Street Plan and Profile

a. Plan view of each street to be improved shall be shown on separate sheets indicating existing improvements, proposed improvements and future improvements if known. Proposed improvements shall include sidewalk, curb, gutter, driveways, sewer mains, water mains, water service and sewer lateral locations, storm drains, manholes, valves, survey stationing, signing, striping, street lights, and other data as required by the City Engineer. The survey stationing shall normally read from left to right with the north arrow pointing either to the top or left edge of the sheet. All stationing shall be a continuation of existing improvements where possible.

b. Profile view of each street shall be shown immediately above its plan view. The profile shall include existing grade lines, sewer mains, storm drains, water mains, public utility mains, all utility crossings, and top of curb. Elevations shall be shown on top of curb at grade break points, manhole and catch basin inverts, and water main crossings with other utilities.

6. Grading Plan

For additional information refer to Section 2.3 -Grading Permit Requirements

After formal approval of the plans by the City Engineer has been received, four copies blue line plus one Mylar (polyester film 3 mill) copy (with matte surface up) shall be filed with the City Engineer's office for City records. Additional copies of reduced improvement plans (11" x 17") may be required by the City Engineer at his discretion and shall be furnished to the City without cost.

1.1.8 Hours of Work

A. Straight Time

Regular working hours are 8:00 a.m. to 4:30 p.m., Monday through Friday, excluding holidays observed by the City. The Contractor shall keep the Engineer fully informed of all work outside these working hours in order to assure proper scheduling of required inspection and materials testing personnel. The costs of inspection of such work shall be charged to the Contractor. All inspection work and vehicle usage outside the regular working hours as described above or beyond 8 hours per day on any particular job, shall be charged at each inspector's current overtime rate with applicable overhead.

B. Night & Weekend Work

If at any time, the Engineer deems it necessary for proper progress of the work or to avoid unacceptable interruption of customer service, the Contractor may be required to prosecute the work at night or on weekends. In addition, if the Contractor requests to do work at night or on weekends, he may be allowed to do so if approved by the Engineer. The Contractor shall bear all costs for inspection of night and weekend work. No such work shall be done unless previously approved in writing by the Engineer.

1.1.9 As-Built Drawings - Provide and keep up to date a complete set of record prints, which shall be corrected regularly, showing every change from the original Contract set of Drawings, including all Addendum, Change Orders, Job Decisions, etc. Upon completion of the work, two sets of prints and one set of 3 MIL mylars shall be delivered to the City and all changes as noted on the record set of prints shall be incorporated thereon. All changes shall be neatly and legibly drawn to scale on the set of prints using standard architectural or engineering drafting practices. As-built drawings shall be signed on each sheet by the Civil Engineer and City Inspector, see DW No. 3-1 for City Inspector's signature block.

1.1.10 Warranty Bond - As a condition precedent to the acceptation of any project, the Contractor or Developer shall furnish a bond of a surety company authorized to do business in the State of California acceptable to the City in an amount ten percent (10%) of the total contract price to be held by the City for a period of one year after the completion and acceptance of the work, to protect the City against the results of defective materials, work quality and equipment during that time. This bond shall be delivered to the City before acceptance of the project by the City.

1.1.11 Pre-construction Meeting - Pre-construction meetings shall be held for citizens affected by sensitive construction

projects. Pre-construction notification in lieu of meeting shall be acceptable if deemed appropriate by the City Engineer.

1.2 Special Procedures for City Funded and/or Administrator Projects

1.2.1 Proposal Requirements and Conditions

A. General: The bidder's attention is directed to the provisions of Section 2 of the Standard Specifications as supplemented herein, for the requirements and conditions which he must observe in the preparation of the proposal form and the submission of the bid.

B. Proposal Form: The proposal form is bound in the Special Specifications which may be obtained from the Office of the City Engineer, City Hall, Vallejo, California, as advertised in the "Notice to Contractors."

C. Disqualification of Bidders: In addition to the other requirements the bidder must declare in the proposal that he has not accepted any bid from any subcontractor or vendor through any bid depository, the bylaws, rules or regulations of which prohibit or prevent the contractor from considering any bid from any subcontractor or vendor, which is not processed through said bid depository, or which prevent any subcontractor or vendor from bidding to any contractor who does not use the facilities of or accept bids from or through such bid depository.

D. Competency of Bidders: Upon demand bidders shall submit evidence to the City as to their ability, financial responsibility and experience in order to be eligible for consideration of their proposal.

1.2.2 Award and Execution of Contract

A. General: The bidder's attention is directed to the provisions of Section 3 of the Standard Specifications, as supplemented herein, for the requirements and conditions concerning award and execution of the contract.

B. Contract Bonds - The successful bidder shall furnish with the contract a FAITHFUL PERFORMANCE BOND in the amount of 100% of the total bid and a PAYMENT (LABOR AND MATERIALS) BOND, in the amount of 100% of the total bid, on the forms prescribed by the City.

C. Responsibility of Contractor, Hold Harmless & Indemnity Agreement

The contractor shall take all responsibility for the work and shall defend, indemnify, release and hold harmless the

City, its officers, officials, directors, employees, agents and volunteers, from all claims, loss, damage, injury, and liability of every kind, nature, and description, directly or indirectly arising from the performance of the contract of work regardless of responsibility for negligence (including costs and expenses, which include attorney's fees, incurred in connection therewith) and from any and all claims, loss, damage, injury, and liability, howsoever the same may be caused, resulting directly or indirectly from the nature of the work covered by the contract, regard-less of responsibility for negligence (including costs and expenses, which include attorney's fees, incurred in connection therewith), but excluding liability due to the sole negligence or willful misconduct of the City.

The Engineer of Work, pursuant to this contract and indemnity agreement, may, at the time of preparing and certifying the final voucher, an as a condition of pre-paring and certifying the same, require the Contractor to continue his bond or any part thereof, as security against any such unsatisfied claims, for a time not exceeding the time when such claims would be legally barred. Approval of the insurance contracts required does not relieve the Contractor or sub-contractors from liability under this hold harmless and responsibility clause.

D. Responsibility for Damage and Insurance Requirements for Contractor

BIDDERS' ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT BIDDERS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF AN APPARENT LOW BIDDER FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT BIDDER MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

The Contractor shall assume all responsibility for damage to property or injuries to persons caused by any equipment of any kind furnished by him under the con-tract or the operation thereof.

The Contractor shall procure and maintain for the duration of the contract insurance against claims for in-juries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors. Such insurance shall not be construed to relieve the Contractor of any liability in excess of such coverages. The cost of such insurance shall be included in the Contractor's bid.

1. Minimum Scope of Insurance

Coverage shall be at least as broad as:

a. Insurance Services Office form number GL 0002 (Ed. 1/73) covering Comprehensive General Liability and Insurance Services Office from number GL 0404 covering Broad Form Comprehensive General Liability; or Insurance Services Office Commercial General Liability coverage ("occurrence" form CG 0001).

b. Insurance Services Office form number CA 0001 (Ed. 1/78) covering Automobile Liability, code 1 "any auto" and endorsement CA 0025.

c. Workers' Compensation insurance as required by the Labor Code of the State of California and Employers Liability insurance.

2. Minimum Limits of Insurance

Contractor shall maintain limits no less than:

a. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

b. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

c. Workers' Compensation and Employers Liability: Workers' compensation limits as required by the Labor Code of the State of California and Employers Liability limits of $1,000,000 per accident.

3. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

4. Other Insurance Provisions

The policies are to contain, or be endorsed to contain the following provisions:

a. General Liability and Automobile Liability Coverages

1. The City, its officers, officials, employees and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor, including the insured's general supervision of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers.

2. The Contractor's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.

3. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

4. The Contractor's coverage apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

b. Workers' Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the City.

c. All Coverages

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

5. Acceptability of Insurers

Insurance is to be placed with insurers with a Best's rating of no less than A: VII.

6. Verification of Coverage

Contractor shall furnish the City with certificates of insurances and with original endorsements effecting coverage required by this section. The certificates and endorsements for each insurance policy are to be signed by a person

authorized by that insurer to bind coverage on its behalf. The certificates and endorsements are to be on forms provided by the City. Where by statute, the City's workers' compensation-related forms cannot be used, equivalent forms approved by the Insurance Commissioner are to be substituted. All certificates and endorsements are to be received and approved by the City before work commences. The City reserves the right to require complete, certified copies of all required insurance policies, at any time.

7. Subcontractors

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

8. Sample forms for General Liability Endorsement, Automobile Liability Endorsement, Workers' Compensation/Employers Liability Endorsement and Certificate of Insurance are shown in Appendix A. The most current forms and coverage requirement may be obtained from the Office of the Director of Public Works.

E. Builder's Risk Insurance - The Contractor shall effect and maintain in the name of the Contractor and the City, "All Risk" builders Risk Insurance upon the entire work of this contract to 100% of replacement cost valuation thereof, including items of labor and materials in place including surplus miscellaneous materials and supplies incident to the work, and such scaffoldings, staging, towers, forms, and equipment as are not owned or rented by the contractor, the cost of which is not included in the cost of the work.

F. Exclusions - This insurance does not cover tools owned by mechanics, any tools, equipment, scaffoldings, staging, towers, and forms rented or owned by the Contractor, the capital value of which is not included in the cost of the work or any shanties or other structures erected for the sole convenience of the workers.

G. Beginning of Work, Time of Completion and Liquidated Damages - Time is of the essence on this contract. The Contractor shall show evidence that all necessary materials have been ordered within TEN (10) days from the date the Notice to Proceed is issued by the City Engineer.

The Contractor shall begin work within TEN (10) days after the City Engineer has signed the Notice to Proceed, and shall diligently prosecute the same to completion.

It is understood that failure of the Contractor to complete the work within the above stipulated number of days will or

may subject the City to serious loss or damage.

Should the Contractor fail to complete the work provided for herein, within the time fixed for such completion, due allowance being made for unavoidable delays, he/she shall become liable to the City in the amount of TWO HUNDRED AND FIFTY DOLLARS ($250.00) per calendar day (minimum) for each day said work remains incomplete beyond the time for completion, as and for liquidated damages and not as a penalty, agreed upon by the parties to the contract, it being expressly stipulated that it would be impracticable and extremely difficult to fix the actual amount of damage. If it appears to the Contractor that he will not complete the work provided in this contract in the time agreed, he/she shall make written application to the City at least FIVE (5) CALENDAR DAYS PRIOR TO THE EXPIRATION OF THE TIME FOR COMPLETION, stating the reason why and amount of extension which he/she believes should be granted. The City may then, in its discretion, grant or deny, such extension.

Any money due, or to become due, the Contractor may be retained to cover the said liquidated damages, and should such money not be sufficient to cover such damages, the City shall have the right to recover the balances from the Contractor, or his/her sureties.

1.2.3 Payment

A. General - Attention is directed to the provisions of Section 9 of the Standard Specifications, as herein supplemented, for the requirements and conditions concerning measurement and payment for the work.

B. Claims Against the Contractor - The City may withhold from any estimate due the Contractor, a sum sufficient to protect the City from loss on account of (1) Claims filed or reasonable evidence indicating probable filing of claims; (2) Defective work not remedied; (3) Failure of Contractor to make payments properly to Subcontractors or for material or labor; (4) A reasonable doubt that the contract can be completed for the balance then unpaid; (5) Damage to another Contractor on the project, which amounts withheld will be paid upon removal of grounds for withholding payment; or (6) Any other reason specified in the contract as grounds for withholding such payments.

C. Force Account Payment - The force account payment shall be made as specified in Section 9-1.03 of the Standard Specifications.

D. Partial Payments - The City will make monthly progress payments to the Contractor for the value of work done in the previous month, less proper deduction, within 30 (thirty) days after receipt and approval of the invoice.

E. Final Payments - Upon satisfactory completion of the work and the receipt of the warranty bond and as-built drawings, the Engineer shall recommend the acceptance of the work to the City Council. Upon acceptance of the completed work by the City Council, the said

Council shall cause to be filed and recorded in the office of the County Recorder a NOTICE OF COMPLETION.

Thirty-Five (35) days after the recording of the Notice of Completion, the Contractor shall be entitled to the balance due for the completion and acceptance of the work, provided that all claims for labor and materials have been paid, and that no claims shall have been filed with the City based upon acts of omission of the Contractor and that no liens or stop notices shall have been filed against the work or the property on which the work was done. Attention is directed to Sections 1.1.12 and 1.1.13 of this specification.

F. Adjustment of Overhead Costs - No adjustment of overhead costs will be made for percentage deviation of the actual final contract amount from the total bid price.

1.2.4 Scope of Work

A. General: Attention is directed to the provisions of Section 4 of the Standard Specifications, as supplemented herein, for the requirements and conditions concerning the scope of the work.

B. Increased or Decreased Quantities: All contract items of work will be paid for at the respective prices listed in the contract for any quantities of such work done and accepted by the City. No adjustment to unit prices will be made for percentage deviation of actual quantities from the Engineer's estimated quantities.

1.2.5 Prosecution and Progress

A. General: Attention is directed to the provisions of Section 8 of the Standard Specifications, as supplemented herein, for the requirements and conditions concerning the prosecution and progress of the work.

B. Designation of Subcontractors: In compliance with the provisions of Section 4100 - 4108 inclusive, of the Public Contracts Code of the State of California, and any amendments thereof, each bidder shall set forth in the Proposal Form:

1. The name and location of the place of business of each subcontractor who will perform work or labor or render service to the contractor in or about the construction of

the work or improvement in an amount in excess of one-half (1/2) of one percent of the contractor's total bid or ten thousand dollars ($10,000) whichever is greater.

2. The portion of the work which shall be done by each subcontractor.

If the contractor fails to specify a subcontractor for any portion of the work to be performed under the contract in excess of one-half of one percent of the contractor's total bid, he agrees to perform that portion himself.

The contractor shall not, without the consent of the City, either:

a. Substitute any person or subcontractor in place of the subcontractor designated in the original bid;

b. Permit any such subcontractor to be assigned or transferred or allow it to be performed by any one other than the original subcontractor listed in the bid;

c. Sublet or subcontract any portion of the work in excess of one-half of one percent of the contractor's total bid as to which his original bid did not designate a subcontractor.

The City may consent to the substitution of another person as subcontractor when the subcontractor named in the bid, after having had a reasonable opportunity to so do, fails or refuses to execute a written contract, when said written contract, based upon the general terms, conditions, plans and specifications for the project involved, or the terms of such subcontractor's written bid, is presented to him by the contractor.

Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the contractor's total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the City Council setting forth the facts constituting the emergency or necessity. If the contractor violates any of the provisions of said Sections 4100-4108 inclusive, of said Public Contracts Code, or any amendments thereof, he violates his contract and the City may cancel the contract. After any such violation, the contractor shall be penalized to the extent of twenty percent (20%) of the amount of the subcontract involved. Funds recovered through the application of this penalty shall be paid to the City of Vallejo.

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SECTION 2. EARTHWORK

2.1 General

2.1.1 Regulatory - Earthwork shall conform to the City Regulations, Standard Specifications and general notes, State of California Standard Specifications (Sections 19 & 20), Uniform Building Code (Chapter 70), and the City of Vallejo Flood Damage Protection (No. 967 N.C. (2d)) and Excavations, Grading and Filling (No. 400 N.C. (2d)) ordinances and as supplemented herein. When the requirements of the above mentioned standards have over-lapping requirements the highest standard shall be held to apply, unless otherwise approved by the City Engineer.

2.1.2 Definitions

Approval shall mean a written engineering or geological opinion by the responsible engineer, geologist of record or responsible principal of the engineering company concerning the progress and completion of the work.

Approved plans shall mean plans prepared and signed by a civil engineer or architect and reviewed and signed by the soils engineer of record, City Planning Division, and Engineer.

Approved testing agency shall mean a facility whose testing operations are controlled and monitored by a registered geotechnical/soils engineer and which is equipped to perform and certify the tests required by this standard and formulate an opinion of the testing performed.

Archaeological Resource for the purposes of CEQA are "important archaeological resource" is one which is associated with an event or person and can provide information which is both of demonstrable public interest and useful in addressing scientifically consequential and reasonable archaeological research questions.

Borrow is earth material acquired from an on or off-site location for use in grading on a site.

Civil engineer shall mean a professional engineer registered in the State of California to practice in the field of civil engineering.

Civil engineering shall mean the application of the knowledge of the forces of nature, principles of mechanics and the properties of materials for the evaluation, design, and construction of civil works for the beneficial uses of mankind.

Architect shall mean licensed architect registered in the

State of California to practice in the field of architecture engaging in preparation of plans including site grading and site drainage.

Clearing, brushing, and grubbing shall mean the removal of vegetation (grass, brush, trees, and similar plant types) by mechanical means.

Director shall mean Director of Public Works.

Earth material is any rock, natural soil or fill and/or any combination thereof.

Engineer the City Engineer or his authorized agent who shall represent the City.

Engineering geologist shall mean a geologist registered in the State of California to practice engineering geology.

Engineering geology shall mean the application of geologic knowledge and principles in the investigation and evaluation of naturally occurring rock and soil for use in the design of civil works.

Erosion is the wearing away of the ground surface as a result of the movement of wind, water, and/or ice.

Erosion control system is a combination of desilting facilities, and erosion protection, including effective planting, to protect adjacent private property, watercourses, public facilities and receiving waters from an abnormal deposition of sediment or dust. This system must be designed by an authorized Registered Professional Engineer.

Excavation is the mechanical removal of earth material.

Fill is a deposit of earth material placed by mechanical means which shall be tested and result in an acceptable engineered fill.

Grade shall mean the vertical location of the ground surface.

Natural grade is the original ground surface unaltered by artificial means.

Existing grade is the ground surface prior to grading.

Rough grade is the stage at which the grade approximately conforms to the approved plan.

Finish grade is the final grade of the site which conforms to the approved plan.

Grading is any excavation or filling or combination thereof.

Grading contractor is an engineering general contractor licensed and regulated by the State of California who specializes in grading work or is otherwise licensed to do grading work.

Hillside site is a site which entails cut and/or fill grading of three (3) feet or more in vertical height below or above natural ground; or a combination fill-over-cut slope equal to or greater than five (5) feet in vertical height; or where the existing grade is ten (10) percent or greater; and which may be adversely affected by drainage and/or stability conditions within or from outside the site, or which may cause an adverse affect on adjacent property.

Interim grading permit is a permit that is issued on the basis of approved plans which may show a structure location but must show interim building pad drainage to the degree required by the Engineer.

Land grading permit is an official document issued by the Engineer authorizing grading activity as specified by approved plans and specifications.

Owner is any person, agency, firm, or corporation having a legal or equitable interest in a given real property.

References - Unless indicated otherwise, or as reasonably appears from the context, references in this Standard apply to the project civil engineer, the soil engineer, the geologist, and the engineering geologist referring to the professional person(s) preparing, signing, or approving the project plans and specifications which comprise the approved grading plan, and which professional person appears of record or his successor appearing pursuant to Transfer of Responsibility for Approval.

Site is any lot or parcel of land or contiguous combination thereof, under the same ownership or written contractual relationship establishing permission, where grading is performed or permitted.

Slope is an inclined ground surface, the inclination of which is expressed as a ratio of horizontal distance to vertical distance or a percentage thereof.

Soil is naturally occurring surficial deposits overlying bedrock.

Soils engineer shall mean a registered professional engineer who has successfully passed the State professional examination and is authorized to use the "Geotechnical" designation. The titles "Geotechnical Engineer" and "Soils

Engineer" are considered synonymous.

Special inspector is an inspector duly licensed and authorized by the Engineer to perform inspection of asphalt concrete placement and related construction work or other grading related work approved by the Engineer.

Terrace is a relatively level step constructed in the face of a graded slope surface for drainage and maintenance purposes.

Topsoil is the native undisturbed soil cover or imported soil as in Sections 2.5.5 and 5.2.3.1 hereunder which is capable of sustaining healthy plant life.

For additional terminologies and grading details see Drawing Nos. 2-1 to 2-7.

2.2 Permits Required

2.2.1 Grading Permits - No person shall conduct any grading, clearing, brushing, or grubbing on natural or existing grade that is preparatory to grading, without first having obtained a grading permit from the Engineer. Exceptions to this requirement are provided in Chapter 12.40.030 of City Municipal Code.

2.2.2 Purpose and intent - It is the intent of this Standard to safeguard life, limb, property, archaeological resource and the public welfare by regulating grading on private property in the areas of the City of Vallejo.

2.2.3 Scope - This Standard sets forth rules and regulations to control excavation, grading, and earthwork construction, including fills and embankments, and establishes administrative requirements for issuance of permits and approval of plans and inspection of grading construction in accordance with the requirements for grading and excavation as contained herein.

2.2.4 Grading permit, drainage alteration - No person shall alter an existing drainage flow, watercourse, channel, or revetment by excavating, or placing fill, rock protection or structural improvements without a valid grading permit by the Engineer and written authorization from the Vallejo Sanitation and Flood Control District and any other agencies having jurisdiction or unless waived by the Engineer and the Vallejo Sanitation and

Flood Control District to perform interim protection under emergency flood fighting conditions.

2.2.4.1 Structural Elevation in the Flood Plain - New construction and substantial improvements of any structure within the floodplain shall be in conformance with the City Flood Damage Protection Ordinance and shall have the lowest floor, including

basement, elevated to or above one-half (6 inches) foot above the base flood elevation. Base flood elevation or 100 year flood elevation is shown on the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency.

2.2.5 Excavation blasting permit - No person shall possess, store, sell, transport or use explosives and blasting agents to do any excavation without a permit from the City Fire Prevention Division.

2.2.6 Types of grading permits

Either an Interim grading permit or a Land grading permit may be issued for grading work upon completion of an application in accordance with the regulations of the earthwork standards and approval by the Engineer. The Interim or Land permit is the option of the permittee provided that the plans satisfy the requirements of the earthwork standards, City Planning Division, and the Engineer.

2.2.7 Discharge of Storm Water Associated with Construction Activity

A Notice of Intent (NOI) shall be filed with the State Water Resources Control Board before commencement of any construction activities that will result in disturbance of five acres or greater of total land area.

2.3 Grading Permit Requirements

2.3.1 Permits required - Except as exempted, a separate permit may be required for each project site and may cover both excavations and fills.

2.3.2 Application - To obtain a grading permit, the applicant must file an application in writing on a form furnished by the Engineer. The permit application shall be accompanied by information and documents required for issuance of a permit.

2.3.3 Grading permit application - A grading permit application shall consist of, but not be limited to, the following items and forms completed, submitted, and signed by the applicant or his representative for review and approval:

a. Three sets of grading plans

b. Two copies of a site specific soil and geology report

c. Three sets of erosion control plans

d. Cost estimates, which include but are not limited to earthwork quantities, subdrains, V-ditches, erosion control, etc.

e. Grading permit fees

f. Surety bonds, letter of credit, etc.

g. Any other supporting information or technical data required by the Engineer.

2.3.4 Grading plan clearances - Prior to issuance of a grading permit, written clearance will be required from other agencies. Depending on site conditions and location, written clearance or permits may be required from, but not limited to, the following agencies:

a. Vallejo Sanitation & Flood Control District

b. California Water Resources Control Board

c. California Department of Fish and Game

d. California Coastal Conservation Commission

e. California Division of Industrial Safety

f. Army Corps of Engineers

g. Bay Conservation and Development Commission

h. Utility companies having easement interest on the site

The applicant shall be responsible for submitting copies of the grading plans and information required by those agencies and obtaining the required clearances or permits. Copies of permit clearances shall be submitted to the Engineer.

2.3.5 Grading plan - Information on Plans and Specifications: Plans submitted for plan check shall be drawn to scale and shall be of sufficient clarity to indicate the nature and extent of the work proposed and show in detail that they will conform to the provisions of all relevant laws, ordinances, rules and regulations and Section 1.1.9 of this specification.

The first sheet of each set of plans shall give the location of the work and the name and address and telephone number of the owner, the person by whom they were prepared, the project soil engineer, or engineering geologist and when required the project paleontologist and archaeologist.

2.3.6 Interim Grading Permit - The plans shall include but not be limited to the following information:

1. Vicinity map of the site.

2. Property limits clearly labeled or otherwise identified and accurate contours of existing ground and details of terrain and area drainage a minimum of fifty (50) feet beyond property limits (spot elevations may be used on flatland sites).

3. Prominent existing or natural terrain features.

4. Limiting dimensions including setbacks between property lines and top and toe of slopes, keyways, elevations of finish contours to be achieved by the grading, elevations of top and bottom of proposed retaining walls, proposed drainage and related construction.

5. Details (plan and section) of all surface and subsurface drainage devices, walls, cribbing, dams and other protective devices to be constructed with, or as a part of the proposed work together with a map showing the drainage area and estimated runoff from the area served by any drains.

6. Location of any existing buildings or structures on the property where the work is to be performed and the location of any buildings or structures on land of adjacent owners which are within fifteen (15) feet of the property, or which may be adversely affected by the proposed grading operations.

7. If the grading project includes the movement of earth material to or from the site in an amount considered substantial by the Engineer, the permittee shall submit the haul route for review and approval by the Engineer prior to the issuance of a grading permit. The Engineer may suggest alternate routes or special requirements in consideration of the possible impact on the adjacent community environment or effect on the public right-of-way itself, which the Engineer shall prescribe as a condition of the grading permit. Detail Drawing No. 2-6 illustrates City truck route map.

8. Additional plans, drawings, calculations, environmental impact information, or other reports required by the Engineer.

2.3.7 Land Grading Permit - The plans shall include the following details in addition to the above items listed for Interim Grading Permits:

1. The footprint or allowable building area of all proposed structures (including appurtenances).

2. Setback distances between structures and top and toe of slopes, including retaining walls.

3. Detailed finish grade and finish floor elevations.

4. Flowlines for lot drainage.

5. Details for building footing and side-yard swale relationship (including extra-height of footing).

6. All proposed concrete flatwork and/or driveways.

The Land Grading Plan shall identify all previous Interim grading permits issued for the project site. It may include sheets from the Interim grading plan which show original topography in lieu of reproducing original contours on the precise plan.

2.3.8 Grading Plan Correction - A Grading Plan Correction Sheet (checklist) is available at the Department which identifies additional items typically required on grading plans depending on site conditions.

2.4 Soil and Engineering Geology Report Content

Two copies of each report required in this section shall be submitted as part of the application for grading permit. Each report shall contain all information applicable to the project. Guidelines are available at the Department, "Technical Guidelines for Soil and Geology Reports."

Recommendations contained in the approved reports shall be incorporated into the grading plans and specifications and shall become part of the grading permit.

2.4.1 Investigative Soil Report - Soil engineering reports shall be required for all subdivision, commercial/industrial, multi-residential and similar developments involving structures and/or earthwork for which a grading permit is required. Soil reports shall also be required for grading or building permits on single lot projects when specified by the Engineer.

The investigative soil engineering report shall include information and data regarding the nature, distribution, and the physical properties of existing soils; conclusions as to adequacy of the site for the proposed grading; recommendations and details for general and corrective grading procedures; foundation and pavement design criteria and shall provide other recommendations, as necessary, to commensurate with the project grading and development.

2.4.2 Investigative Engineering Geology Report - Engineering geology reports shall be required for all developments where geologic conditions are considered to have a substantial effect on existing and/or future site stability. This requirement may be extended to other sites suspected of being adversely affected by faulting.

The investigative engineering geology report shall include a comprehensive description of the site topography and geology; an opinion as to the adequacy of the proposed development from an engineering geologic standpoint; an opinion as to the extent that instability on adjacent properties may adversely affect the project; a description of the field investigation and findings; conclusions regarding the effect of geologic conditions on the proposed development; and specific recommendations for plan modification, corrective grading and/or special techniques and systems to facilitate a safe and stable development, and shall provide other recommendations as necessary, to commensurate with the project grading and development. The engineering geology report may be combined with the soil engineering report.

2.4.3 Seismicity and Liquefaction Reports - Seismicity and Liquefaction reports shall be required as a condition for issuance of a grading permit for all subdivisions (tracts); and all sites for critical structures (fire stations, nursing homes, etc.) and major structures as determined by the Engineer. Additionally sites containing earthquake sensitive earth materials and/or sites that are located on or near potentially active or active faults shall also require a seismicity report.

The report shall be prepared by an engineering geologist, geophysicist, or a civil engineer with knowledge in earthquake technology and its application to buildings and other civil engineering works. The scope of the report shall be commensurate with the proposed development and shall reflect the state of art. The seismic report may be combined with the soil and engineering geology reports.

2.4.4 Monthly Progress Soils Report - The Engineer may require the soils engineer to submit a progress report for grading operations which require more than 25 working days to complete. Any progress reports due shall be submitted to the City within five working days after each 25 days thereafter.

2.5 Permit Issuance

(Refer to the City of Vallejo Municipal Code Chapter 12.40 Excavation, Grading, Filling, Sections 12.40.060 and 12.40.070)

2.5.1 Time of grading operations - Grading and equipment operations within 1,000 feet of a structure for human occupancy shall not be conducted between the hours of 6:00 p.m. and 7:00 a.m. nor on Sundays and federal holidays. The Engineer may, however, permit grading or equipment operations during specific hours after 6 p.m. or before 7 a.m. or on Sundays and federal holidays if he determines that such operations are not detrimental to the health, safety, or welfare of the inhabitants of such a structure. Permitted hours of operating may be shortened by the Engineer's finding of a previously unforeseen

effect on the health, safety, or welfare of the surrounding community. However, no permit that has been issued, nor any provision of this section shall be construed to be a waiver of the applicability of the provisions set forth in Codified Ordinances of the City relating to noise control.

2.5.2 Responsibility of permittee - It shall be the responsibility of the permittee to be knowledgeable of the conditions and/or restrictions of the grading permits outlined in applicable sections of this Standard or City ordinances, and as contained on the approved grading plans and in the approved soil and geology reports. The permittee shall also be responsible to maintain in an obvious and accessible location on the site, a copy of the grading plans bearing the stamp of approval by the Engineer.

2.5.3 Protection of adjoining property - Each adjacent owner is entitled to the lateral and subjacent support which his land receives from the adjoining land, subject to the right of the owner of the adjoining land to make proper and usual excavations on the same for purposes of construction or improvement as provided by law, Section 832 of the California Civil Code.

2.5.4 Import and export of earth material - Where an excess of fifty (50) cubic yards of earth per project site is moved on public roadways from or to the site of an earth grading operation, all the following requirements shall apply:

a. Either water or dust palliative or both must be applied for the alleviation or prevention of excessive dust resulting from the loading or transportation of earth from or to the project site on public roadways. The permittee shall be responsible for maintaining public rights-of-way used for handling purposes in a condition free of dust, earth, or debris attributed to the grading operation.

b. Loading and transportation of earth from or to the site must be accomplished within the limitations established by the time of grading operations of this earthwork standard.

c. Access roads to the premises shall be only at points designated on the approved grading plan.

d. The last fifty (50) feet of the access road, as it approaches the intersection with the public roadway, shall have a grade not to exceed three (3) percent and be constructed of Class II roadbase material. There must be three hundred (300) feet clear, unobstructed sight distance to the intersection from both the public roadway and the access road. If the three hundred (300) feet sight distance cannot be obtained, flagmen shall be posted.

e. A stop sign conforming to the requirements of the California Vehicle Code shall be posted at the entrance of the access

road to the public roadway.

f. An advance warning sign must be posted on the public roadway four hundred (400) feet on either side of the access intersection, carrying the words 'truck crossing.' The sign shall be diamond shape, each side being thirty (30) inches in length, shall have a yellow back-ground, and the letters thereon shall be five (5) inches in height. The sign shall be placed six (6) feet from the edge of the pavement and the base of the sign shall be five (5) feet above the pavement level. The advance warning sign shall be covered or removed when the access intersection is not in use.

g. All traffic signing shall conform to the State of California, Department of Transportation, Manual of Traffic Controls for Construction and Maintenance Work Zones.

2.5.5 Topsoil - Each finished parcel or lot shall be provided with minimum of 6 inches of fertile friable topsoil of loamy character. Topsoil may be obtained from sources within the project or shall consist of imported topsoil obtained from sources outside the project or from both sources. Topsoil obtained from sources within the project shall be excavated to the depths as directed by the Soils Engineer. All lumps or clods shall be broken up before the topsoil is spread. Topsoil obtained from within the project will be considered as selected material within the meaning of the State Standard. Topsoil shall be stockpiled in accordance with Section 7-707.2 of the "Highway Design Manual" of the California Department of Transportation.

Imported topsoil shall consist of material obtained from sources outside the limits of the project. Unless designated in the special provisions, the Contractor shall make his own arrangements for obtaining imported topsoil and he shall pay all costs involved.

Imported topsoil shall consist of fertile, friable soil of loamy character, and shall contain an amount of organic matter normal to the region. It shall be obtained from well-drained arable land and shall be reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than 3/4 inch in size, noxious seeds, sticks, brush, litter, toxic substances and other deleterious substances. Imported topsoil shall be capable of sustaining healthy plant life and approved as such by a testing laboratory and shall comply with Section 5.2.3.1 of this specification.

2.5.6 Spoils - Spoils are to be defined as excessive material removed in making excavations, etc. All grading, site preparation, placing and compacting of spoils fill after the completion of mass grading shall be done under the direct supervision of the soils engineer. Subsequent to completion of work, the soils engineer shall submit to the City of Vallejo Public Works Department, a report stating that all fills

consisting primarily of spoils has been done to his satisfaction. Recommendations of the soils report shall be strictly adhered to unless otherwise ap-proved by the City Engineer.

2.5.7 Dust control - All earthmoving operations within the City shall be subject to control of airborne nuisance. Dust control operation, if ordered by the Engineer, shall be done as provided in Section 10 of the Standard Specifications and shall be paid for by the contractor.

2.5.8 Permit Expiration - Chapter 12.40.120 states: "If the work authorized by any permit under this chapter is not commenced within nine months of the date of issuance, or as otherwise indicated on the face of the permit, or if the work is not complete within two years of the date of issuance, or sooner, as indicated on the face of the permit, the permit shall expire and become null and void.

2.6 Completion and Acceptance of Work

2.6.1 Final Reports - General - Rough grade and final soil and engineering geology reports shall be submitted in accordance with City of Vallejo Municipal Code Chapter 12.40.130 - Acceptance of Work.

2.6.2 Notification of Completion - The permittee or his agent shall notify the Engineer when the grading operation is ready for final inspection. All work including installation of all drainage facilities and their protective devices and all erosion control measures must be completed in accordance with the final approved grading plan and the required reports approved by the City. He may approve the grading work prior to completion of all work in special cases of extreme hardship and if no hazard exists and an adequate bond is posted to assure completion of all remaining work.

2.6.3 Final Reports - Upon completion of the mass grading work and at the final completion of the earthwork under the grading permit but prior to building any structure or release of grading bonds or issuance of a certificate of use and occupancy, the Engineer may require:

2.6.3.1 An as-graded plan prepared by a civil engineer or an architect which shall include corrected original ground surface elevations if necessary, graded ground surface elevations, lot drainage pat-terns, graded slope inclination, keyways, and location of all drainage facilities and subdrains.

2.6.3.2 A written opinion by the soils engineer of record describing the grading as being completed in conformance with the soils report in accordance with the approved grading plan.

2.6.3.3 A written approval by the project civil engineer stating the grading as being substantially in conformance with the

grading plan and which specifically provides the following items as appropriate to the project and stage of grading:

A. Construction of line and grade for all engineered drainage devices and retaining walls.

B. Staking of property corners for proper building location and elevation.

C. Setting of all monuments in accordance with the record-ed tract map.

D. Location of permanent walls or structures on property corners of property lines where monumentation is not required.

E. Location and inclination of all graded slopes.

F. Construction of earthen berms and positive building pad drainage.

2.7 Grading Inspection

2.7.1 General - All grading operations for which a permit is required shall be subject to inspection by the Engineer or designated Special Inspector.

2.7.2 Grading Requirements

2.7.2.1 It shall be the responsibility of the project civil engineer who prepares the grading plan approved by the Engineer to incorporate all recommendations from the soil and geological engineering reports into the grading plan. This responsibility shall include, but need not be limited to, the establishment of line, grade, drainage, and archaeological resources within the development area. The general grading contractor shall act as the coordinating agent in the event the need arises for liaison between the Engineer and the project civil engineer or soils engineer. Included shall also be responsibility for preparation of revised plans requiring approval from the Engineer, erosion control plans, and submission of as-graded plans upon completion of the work.

2.7.2.2 Soil engineering and engineering geology reports shall be required as specified. During grading, all necessary progress and final reports, compaction data, soil engineering and engineering geology supplemental recommendations shall be generated by the soil engineer and engineering geologist. The permit holder (permittee) shall submit copies of the report to the civil engineer and two copies of all reports to the Engineer.

2.7.2.3 Prior to the preparing of any grading plans and specifications, the project Engineer shall inspect the site to

determine that the plans and specifications are current and reflect existing conditions.

2.7.2.4 If the City finds the soil or other conditions not as stated in the approved plans and soil or geology reports or as in additional information which was required for issuance of the grading permit, he may, using reasonable judgment, refuse to allow further work until approval is obtained for a revised grading plan which will conform to the existing site conditions.

2.7.2.5 The provisions of Stop Orders, Chapter 12.40.150 Violations - Creation of a dangerous or hazardous condition - criminal penalties shall apply to all grading work and whenever the Engineer determines that any work does not comply with the terms of a permit, or this Standard, or that the soil or other conditions are not as stated on the permit, he may order the work stopped by notice in writing served on any persons engaged in doing or causing of such work to be done and any such persons shall forthwith stop such work until authorized by the Engineer to proceed with the work.

2.7.2.6 Prior to the building of any structure on a graded site, the rough grading shall be completed to the satisfaction of the responsible civil engineer, engineering geologist, soil engineer, and the Engineer.

2.7.2.7 Whenever any work on which inspections are required is covered or concealed by additional work without first having been inspected, the Engineer may require by written notice, that such work be exposed for examination. The work of exposing and recovering shall not entail or be subject to expense by the City.

2.7.2.8 The Engineer may establish special inspection requirements in accordance with Section 306, Special Inspections, of the Uniform Building Code, as amended for special cases involving grading or paving related operations. Special cases may apply to work where in the opinion of the Engineer it is necessary to supplement the resources or expertise available for inspection.

2.7.2.9 The soil engineer's area of responsibility shall include, but need not be limited to, the professional observation and approval concerning the preparation of ground to receive fills, testing for required compaction, stability of all finish slopes, design of buttress fills, subdrain installation and incorporation of data supplied by the engineering geologist.

2.7.2.10 The engineering geologist's area of responsibility shall include, but need not be limited to, professional inspection and written approval of the adequacy of natural ground for receiving fills, the stability of cut slopes with respect to geological matters, and the need for subdrains or other ground water drainage devices. He shall report his finding to the soil engineer for engineering analysis.

2.7.2.11 The City may expeditiously inspect the project at the various stages of work requiring approval and at any more frequent intervals necessary to determine that adequate control is being exercised by the professional consultants.

2.7.3 Notification of Noncompliance - If in the course of fulfilling their responsibility under this Standard, the project civil engineer, the soil engineer, the engineering geologist, the grading contractor or the testing agency finds that the work is not being done in conformance with the provisions of the approved specifications and grading plans, the discrepancies shall be reported immediately in writing to the person in charge of the grading work and the Engineer.

2.7.4 Transfer of Responsibility for Approval - If the project civil engineer, the soil engineer, the engineering geologist, the testing agency, or the grading contractor of record are changed during the course of the work, the work shall be stopped unless: (1) the permit holder (permittee) submits a letter of notification verifying the change of the responsible professional; and (2) the new responsible professional submits in writing that he has reviewed all prior reports and/or plans (specified by date and title) and work performed by the prior responsible professional and that he concurs with the findings, conclusions, and recommendations, and is satisfied with the work performed. He may modify or revise recommendations, specifications or work per-formed if accompanied by supporting data and approved by the Engineer. He must state that he assumes all responsibility within his purview on a specified date. All exceptions must be justified to the satisfaction of the Engineer.

Exception: Where clearly indicated that the firm, not the individual engineer and/or geologist, is the contracting party, the designated engineer or geologist may be reassigned and another engineer and/or geologist within the firm may assume responsibility.

2.8 Site Inspections by Department

2.8.1 Pregrade Meeting - Prior to any grading, brushing or clearing, there shall be a pregrade meeting held on the site. The permittee, or his agent, shall notify the Engineer at least two (2) working days prior to the meetings and shall be responsible for notifying all principals responsible for grading or related operations.

2.8.2 Notification - It shall be the duty of the superintendent doing the work authorized by a permit to notify the Engineer at least twenty-four (24) hours prior to the work being completed for the following inspections.

2.8.3 Excavation and Fill Inspection

A. Canyon Cleanout: After all brush and unsuitable material has been removed and an acceptable base has been exposed, but before any fill is placed.

B. Keyway or Toe Bench: After the natural ground or bed-rock is exposed and prepared to receive fill, but be-fore fill is placed.

C. Over-Excavation: After the area has been excavated but before fill is placed.

D. Excavation: After the excavation is started, but be-fore the vertical depth of the excavation exceeds ten (10) feet, and every ten (10) foot interval thereafter.

E. Fill: After the fill has started, but before the ver-tical height of the fill exceed ten (10) feet, and every ten (10) feet interval thereafter.

F. Slide repair: Before slide removal begins during any additional headscarp or down slope soil movement and finally the complete slide removed as observed with the certified engineering geologist.

2.8.4 Concrete V-Ditch

A. Staking and Subgrade: Prior to placement of welded wire mesh or reinforcing steel.

B. Reinforcement: Thickness control wire and reinforcing steel or welded wire mesh are to be installed but prior to placement concrete.

C. Concrete Placement.

2.8.5 Other Drainage Devices

2.8.5.1 Subdrains:

A. After excavation but prior to placement of filter material and pipe. The subdrain pipe and filter material shall be on-site for inspection.

B. After filter material and subdrain has been placed but prior to covering with backfill.

C. The contractor shall flush and test subdrain lines in the presence of the soils engineer.

D. Must be as built surveyed before placement of engineered fill.

2.8.5.2 Earth Swales:

A. Prior to rough grading approval or lumber drop.
B. Prior to final grading approval.

2.8.6 Retaining Walls - Public right-of-way or public open space:

A. Review of offset staking for location and observation of footing bottoms.

B. Upon completion of footings with reinforcement and forms, prior to placement of concrete.

C. After removal of forms and substantial completion of fine grade.

D. Prior to backfill of subdrains and permeable filter material on-site.

E. Private retaining walls shall not be vertically excavated for until the Building Permit has been obtained; see 2.9.9 Retaining Walls.

2.8.7 Rough Grade Inspection - When all rough grading has been completed. This inspection may be called for at the completion of rough grading without the necessity of the City having previously reviewed and approved the required final reports if the grading was performed under a grading permit. All subdrains and slope drains shall be in place and approved as a condition for rough grading inspection.

2.8.8 Final Inspection - After all work, including installation of all drainage structures and other protective devices (see Section 2.6.2) , has been completed and all written professional approvals and the required final reports have been submitted. An As-Graded Plan will be required when the finished site deviates from the approved grading plan.

2.8.9 Siltation Control Facilities (Rainy Season: October 15 to April 15)

A. After excavation of desilting basins but prior to fill placement. Prefabricated devices are to be available on-site for inspection.

B. After fill placement for desilting basins but prior to placement of concrete or other non-erosive materials.

C. After completion of an erosion control system in accordance with an approved erosion control plan and the requirements of the Engineer.

2.9 Embankment Standards

2.9.1 Cut Slopes - Cut slopes shall be no steeper than two horizontal to one vertical (2:1). In special circumstances where no evidence of previous instability exists and when recommended in the soil engineering or engineering geology report and approved by the Engineer, slopes may be constructed steeper than 2:1. In no case shall slopes steeper than 2:1 be approved if 2:1 or flatter slopes are required as a condition of approval of any project by the Planning Commission, Planning Director, Public Works Director or City Council without appropriate revision of said condition by the approving body.

Recommendations in the soil engineering and/or engineering geology report for cut slopes to be steeper than 2:1 shall be accompanied by a slope stability analysis for all slopes greater than three (3) feet in height. The soil engineer shall consider both gross and surficial stability of the slope and provide a written opinion approving the slope stability.

2.9.2 Fill Location - Fill slopes shall not be constructed on natural slopes steeper than two (2) horizontal to one (1) vertical (2:1) or where the fill slope daylights out within twelve (12) feet horizontally of the top of existing or planned cut slopes, outside the permit area boundary, unless designed by the soils engineer and approved by the Engineer.

2.9.2.1 Preparation of Ground - The ground surface shall be prepared to receive fill by removing vegetation; noncomplying fill; topsoil and other unsuitable materials; and by scarifying to provide a bond with the new fill. Where existing slopes exceed five (5) feet in height and/or are steeper than five horizontal to one vertical (i.e., 5:1), the ground shall be prepared by benching horizontally into sound bedrock or other competent material, as determined by the soil engineer and/or engineering geologist and approved by the Engineer. The lowermost bench (key) beneath the toe of a fill slope shall be a minimum ten (10) feet in width or as approved by the soils engineer. The ground surface below the toe of fill shall be prepared for sheet flow runoff, or a paved drain shall be provided.

Where not specified in the approved plans and fill is to be placed over a cut slope, the bench (key) under the toe of the fill shall be at least fifteen (15) feet wide, the cut slope must be made before placing fill and shall meet the approval of the soil engineer and/or engineering geologist as suitable foundation for fill.

Unsuitable soil is soil which is not dense, firm or unyielding, is highly fractured or has a high organic content and in the opinion of the Engineer, civil engineer, soil engineer, or engineering geologist is not competent to support other soil or fill, to support structures or to satisfactorily perform the

other functions for which the soil is intended.

2.9.2.2 Fill Material - Detrimental amounts of organic material shall not be permitted in fills. Except as outlined below, no rock or similar irreducible material with a maximum dimension greater than twelve (12) inches shall be buried or placed in fills without the consent of the soils engineer.

The Engineer may permit placement of larger rock when the soil engineer properly devises a method of placement, continuously inspects placement, and approves the fill stability and competency. The following conditions shall also apply:

A. Prior to issuance of the grading permit, potential rock disposal area(s) shall be delineated on the grading plan.

B. Rock sizes greater than twelve (12) inches in maximum dimension shall be fifteen (15) feet or more below grade, measured vertically. This depth may be reduced upon recommendation of the soil engineer and approval of the Engineer providing that the permitted use of the property will not be impaired.

C. Rocks greater than twelve (12) inches shall be placed so as to be completely surrounded by soils; no nesting or rocks will be permitted (see Detail Drawing No. 2-5).

2.9.3 Compaction - All engineered fills shall be compacted to a minimum relative compaction of the maximum by density as determined by ASTM D-1557-78 of ninety (90) percent. The geotechnical engineer may recommend greater compaction should geotechnical conditions warrant such specifications. Nuclear gauge testing methods shall conform to ASTM D-2922-81 (Density of Soil & Soil Aggregate, by Nuclear Methods) and ASTM D-3017-78 (Moisture Content of Soil & Soil Aggregate in Place by Nuclear Methods). Field in-place density shall be determined by the above standard or equivalent to the Uniform Building Code Standard No. 70-1 or 70-2.

2.9.3.1 Locations of field density tests shall be determined by the soil engineer and shall be sufficient in both horizontal and vertical placement to provide representative testing of all fill placed. Testing in areas of a critical nature or special emphasis shall be in addition to the normal representative samplings.

2.9.3.2 Exceptions:

A. Fills where the Engineer determines that compaction is not a necessary safety measure to aid in preventing saturation, settlement, slipping, or erosion.

B. Where lower density and very high potential expansion characteristics as defined by Table No. 29-C of the Uniform

Building Code exist, lesser compaction may be granted by the Engineer upon justification and recommendation by the soil engineer.

2.9.3.3 Fill slopes shall be compacted to the finish slope face as specified above. The soil engineer shall provide specifications for the method of placement and compaction of the soil within the zone of the slope face (see Standard Drawing No. 2-2).

2.9.3.4 Sufficient maximum density determinations by test method shall be performed during the grading operations to verify that the maximum density curves used are representative of the material placed throughout the fill.

2.9.4 Slope - Fill slopes shall be no steeper than two horizontal to one vertical (2:1). In special circumstances where no evidence of previous instability exists and when recommended in the soil engineering report and approved by the Engineer, slopes may be constructed steeper than 2:1. In no case shall slopes steeper than 2:1 be graded if 2:1 or flatter slopes are required as a condition of approval of any project by the Planning Commission, Planning Director, Public Works Director or City Council without appropriate revision of said condition by the approving body.

2.9.4.1 Recommendations in the soil engineering report for fill slopes to be steeper than 2:1 shall be accompanied by a slope stability analysis of all slopes greater than five (5) feet in height. The soil engineer shall consider both the gross and surficial stability of the slope and provide a written statement approving the slope stability. In addition, the soil engineer shall recommend alternative methods of construction or compaction requirements necessary for surficial stability.

2.9.5 Terrace - Terraces at least six (6) feet in width shall be established at not more than thirty (30) foot vertical intervals on all cut or fill slopes to control surface drainage and debris, except that where only one (1) terrace is required, it shall be at mid-height. All terrace widths and spacing for cut and fill slopes shall be designed by the project civil engineer in accordance with recommendations of Soils Engineer and approved by the Engineer. Suitable access shall be provided to permit proper cleaning and maintenance.

Concrete ditches on terraces shall have a minimum gradient of two (2) percent and must be paved with reinforced concrete, or approved equal, not less than four (4) inches in thickness (see Standard Drawing No. 2-7 for details and type of ditch).

A single run ditch shall not collect runoff from a tributary area exceeding 15,000 square feet (projected) without discharging into a down drain.

2.9.6 Subsurface Drainage - Cut and fill slopes shall be provided with approved subsurface drainage as necessary for stability and protection of adjacent properties from the influence of ground water. The design of such facilities shall be contained in the approved preliminary (initial) soil engineering or engineering geology report and shall appear on the approved grading plan pursuant to the recommendation of the soil engineer and/or the engineering geologist. Subsurface drainage shall be designed to be such that no maintenance is required to keep them functioning properly.

Subsurface drainage facilities shall be installed where natural and/or artificially introduced ground water affects or is likely to affect the project in a potentially unstable, hazardous or otherwise deleterious manner.

2.9.7 Disposal of Surface and Subsurface Drainage - All drainage facilities shall be designed to carry waters to the nearest practicable drainage way approved by the Engineer and appropriate jurisdiction as a safe place to deposit such water. Drainage capacity shall comply with the Vallejo Sanitation and Flood Control design criteria for area drained and a connection permit would be required by the Vallejo Sanitation and Flood Control District. Erosion of ground in the area of discharge shall be prevented by installation of non-erosive down drains, rip rap, energy dissipaters or other approved devices including a return of flow to a natural sheet flow condition.

2.9.7.1 Where surface waters are to be conducted or directed onto adjacent property in an unnatural manner, the Engineer and VSFCD shall require the applicant, prior to issuance of a grading permit, to obtain written permission from the owner of said property, accepting the surface waters.

2.9.7.2 Building sites shall have a sheet flow drainage gradient minimum of two (2) percent from the structure toward approved swales and/or drainage facilities, unless otherwise approved by the Engineer. The maximum drainage gradient of an earth swale shall be 2 percent and should have cross section and gradient sufficient to carry fifteen (15) year storm.

2.9.7.3 Grading of future building sites under an interim grading permit for the purpose of lot sales shall have a sheet flow drainage gradient of two (2) percent toward approved drainage facilities. The Engineer may reduce this minimum gradient to one and one half (1 1/2) percent upon the written request of the applicant or his agent, providing the applicant demonstrates the following:

A. Finish grades for drainage of building sites can be constructed in accordance with the requirements of this subsection without importing additional fill, and

B. Sufficient approved swales and/or drainage facilities are

constructed to prevent water from ponding on any lot supported by a natural slope or cut or fill slope over five (5) feet in height.

2.9.7.4 Finish grades, other than above, shall conform to the following minimum drainage gradient standards:

		Minimum Gradient
A.	Earth Swales	1.5%
B.	Earth (sheet flow)	1.5%
C.	Concrete Lined Ditch	2.0%

2.9.8 Interceptor Ditch - Concrete (interceptor) ditch shall be installed along the top of all slopes where the tributary drainage area has a drainage path to top of slope greater than forty (40) feet measured horizontally. Interceptor drains shall be paved with a minimum of four (4) inches of reinforced concrete. They shall have a minimum depth of eighteen (18) inches and a paved minimum width of forty eight (48) inches measured horizontally across the drain. Ditches shall have hydraulic capacity with four (4) inch freeboard sufficient to convey fifteen (15) year flows as determined by VSFCD tables and graphs. The slope of the drain shall be approved by the Engineer. (See Detail Drawing No. 2-7.

2.9.9 Retaining Walls - Retaining walls shall be designed to resist the lateral pressure of the retained material and structures in accordance with accepted engineering principles. All walls within a public right-of-way or public open space shall be of reinforced masonry or concrete construction (unless otherwise approved by the Engineer) and if exceeding six (6) feet in vertical height may be subject to provisions of 2.7.1 General -...Special Inspector. All other walls are private and are under the review and required inspections of the Building Division.

2.10 Erosion Control

2.10.1 Erosion Control System

A. The faces of cut and fill slopes and project site shall be prepared and maintained to control against erosion in accordance with the most current issue of Manual of Standards for Erosion and Sediment Control Measures, Association of Bay Area Governments (ABAG).

B. Where necessary, temporary and permanent erosion control devices such as desilting basins, check dams, rip rap or other devices or methods, as approved by the Engineer, shall be employed to control erosion and provide safety during the rainy season from October 15th to April 15th.

C. No grading work in excess of fifty (50) cubic yards will be allowed between October 15th and April 15th on any single grading site under permit unless an erosion control system has been approved by the Engineer.

D. Paved streets, sidewalks, or other improvements shall be maintained in a neat and clean condition free of loose soil, construction debris and trash. Street sweeping or other equally effective means shall be used on a regular basis to prevent storm flows from carrying sediment and debris outside the project boundaries. Watering shall not be used to clean streets except for fine material not otherwise removed by sweeping or other mechanical means.

E. The permittee is responsible to retain a civil engineer or an authorized individual for inspection and modification of the devices, as necessary during the rainy season.

F. Desilting facilities shall be provided at drainage out-lets from the graded site.

G. Desilting basins shall be designed to provide a minimum desilting capacity equal to the current Manual of Standards (ABAG). Acceptable visual maximum silt level indicators shall be provided in each basin.

H. Desilting basins shall be constructed around the perimeter of projects whenever feasible when it provides improved maintenance access from paved roads during wet weather.

I. Desilting basins constructed of compacted earth shall be compacted to a relative compaction of ninety (90) percent of maximum density as determined by ASTM 1557 test methods. A soil engineering report, prepared by the soil engineer, which includes the type of field testing performed, location and results of testing shall be submitted to the City for approval upon completion of the desilting basins.

J. Equipment and workers for emergency work shall be made available at all times during the rainy season. Necessary materials shall be available on-site and stock-piled at convenient locations to facilitate rapid construction of temporary devices when rain is imminent.

K. Erosion protection shall consist of effective planting or hydroseeding of all slopes in excess of five (5) feet high unless otherwise approved by the City.

Protection for the slopes shall be installed as soon as practicable which may be prior to rough grade acceptance and October 15. Effective planting or hydroseeding shall be installed, fully germinated and effectively cover the required slopes prior to final approval unless otherwise approved by the City.

L. The erosion control provisions shall take into account drainage patterns during the current and future phases of grading throughout the rainy season.

M. All removable protective devices shown shall be in place at the end of each working day when the five (5) day rain probability forecast exceed forty (40) percent.

N. Graded areas around the tract perimeter must drain away from the face of slopes at the conclusion of each work-ing day.

2.10.2 Erosion Control Plans

2.10.2.1 Erosion control plans prepared with this Standard shall be submitted to the Engineer with project grading plan for approval by September 15 each year for projects under grading permit. The erosion control plan may be waived for grading projects on single residential lot projects providing that an erosion control system, meeting the approval of the City, has been installed, placed, planted or constructed before October 15.

2.10.3 Erosion Control Maintenance

A. After each rainstorm, silt and debris shall be removed from check berms and desilting basins and the basins pumped dry.

B. After each rainstorm, the performance of the erosion control system shall be evaluated and revised and re-paired as necessary.

C. Excessive silt and construction debris shall not be permitted to be conveyed from the site with storm drainage flows.

D. Devices shall not be moved or modified without the approval of the City.

E. The contractor shall be responsible and shall take necessary precautions to prevent public trespass onto areas where impounded water creates a hazardous condition.

F. The contractor, permittee and project owner shall be responsible for continual maintenance of the devices during the rainy season. In the event of failure or refusal by the contractor, permittee or project owner to properly maintain the devices, the Engineer may cause emergency maintenance work to be done to protect adjacent private and public property. The cost shall be charged to the owner and shall include an initial mobilization cost plus the cost of doing the work.

G. In the event the Engineer must cause emergency maintenance work to be done, he may revoke the grading per-mit in

writing. The permit shall not be renewed until an erosion control system approved by the Engineer is installed.

H. If any grading has commenced on private property with-out a valid grading permit, the property owner may be required to prepare and implement an erosion control plan which has been approved by the Engineer. In the event of failure by the property owner to install an approved erosion control system, the Engineer may cause emergency work to be done to protect adjacent private and public property (See "E" above).

SECTION 3. STREETS

3.1 Street Design Standards

A. General - The design of streets shall conform to the following standards, standard detail drawings and to any Master Plan of Streets and Highways approved by the City Council:

(a) A minimum six (6) foot wide public utility and planting easement shall be provided on each side of the street right-of-way.

(b) Any deviation from the standards outlined in the above table must be approved by the City Engineer.

(c) Hillside street standards may be used in the design of streets only when such streets are to be constructed in an area of previously undeveloped land having natural grades in excess of ten (10) percent and the same area meets all the criteria for designation as hillside land as provided in the City of Vallejo Hillside Development Guidelines. In the design of hillside streets, accepted engineering practices relating to roadway geometrics and safe sight distance must be strictly adhered to.

(d) Cul-de-Sac streets should not exceed 500 feet in length.

(e) Street name shall be approved by the Public Works Director.

3.1.1 Horizontal and Vertical Alignments

A. For the purpose of geometric design of streets, the following minimum design speeds shall be used:

Type of Facility	Design Speed (MPH)
Arterials	45 mph
Collectors	40 mph
Residential and Cul-de-Sac	30 mph
Hillside Street	25 mph

B. Streets shall intersect as near to ninety degrees as practicable. Offset or staggered intersections shall be avoided. Spacing of intersections closer than 200 feet shall be avoided.

C. Horizontal curves shall have a minimum centerline radius as follows:

(1) Arterial 700 feet

(2)	Collectors	550 feet
(3)	Residential, Cul-de-Sac	300 feet
(4)	Hillside Street	100 feet

Smaller radii may be used only when specifically approved by the City Engineer.

D. Broken-back horizontal curves consisting of two curves in the same direction jointed by a short tangent shall be avoided.

E. All temporary dead-end streets shall have turnarounds unless approved otherwise by the City Engineer. If the elevation of the dead-end street does not correspond with the elevation of the adjoining property, a level bench of four (4) feet and a slope of cut or fill shall be provided outside the dead-end street right-of-way and a slope easement provided to the City of Vallejo.

F. All street grades shown on improvement plans shall refer to the City of Vallejo datum. (Zero elevation of City of Vallejo datum is equal 6.34 feet of USCGS Elevation.)

G. Minimum grade rate for all streets shall be 0.5 percent, unless otherwise approved by the Engineer.

H. Vertical curves shall be used to connect grade profiles where the algebraic difference in grade rates exceed one (1) percent.

I. The length of vertical curve shall be adequate to assure safe stopping sight distance and shall be based on vehicular speed and the algebraic difference in grade rates in accordance with State Highway Design Manual.

J. The cross slope on all tangent street sections shall be two (2) percent. The cross slope on horizontal curve sections shall be determined based on the vehicular speed, the degree of curvature, and the side friction factor using the computation methods endorsed by the Institute of Traffic Engineers. Any deviation from these conditions must be approved by the City Engineer.

H. In design of streets superelevation shall be considered in accordance with State Highway Design Manual.

I. In design of streets consideration shall be given to street drainage such that street gutter shall be capable of carrying a 15-year storm flow without flooding the travel lane. (Refer to Vallejo Sanitation & Flood Control District Guide to Existing Policies & Engineering Design Standards.)

3.1.2 Sidewalks, Curbs and Gutters

A. The width of sidewalks shall conform to Section 3.1 of these specifications.

B. Sidewalks, curbs and gutters shall be designed as shown on the Standard Details, Drawing 3-10.

C. Handicapped ramps shall be provided at all curb returns, Standard Detail Drawing 3-17.

D. Construction of sidewalks, curbs and gutters shall conform to Section 3.3.37 of these Specifications.

E. Sidewalk cross drains shall conform to Standard Drawings Nos. 3-14 and 3-15.

3.1.3 Driveway Approaches

A. No driveway shall be constructed any closer than five (5) feet measured at the top of the curb at the weakened plane joint from any property line on residential or commercial properties. Refer to Drawing No. 3-11.

B. No driveway shall be constructed closer than 15 feet from the curb return if the parcel is adjacent to an intersection.

C. In commercial districts, no more than 60 percent of the frontage of any parcel shall be devoted to driveways and no one driveway shall be wider than 36 feet.

D. The spacing between driveways shall not be less than twenty (20) feet measured at the top of curb unless otherwise approved by the City Engineer.

E. Driveway grades shall be in accordance with Ordinance No. 1018 N.C.(2d).

F. Entrances to private streets or project shall be a standard driveway approach, unless otherwise approved by the City Engineer.

G. Where sidewalk serves a maintenance access road instead of a standard driveway approach the sidewalk shall be reinforced by 6 x 6 #10 welded wire mesh, the reinforcement will be extended 5' nominally on either side of the limits of the access road width. The thickness of sidewalk in this area shall be 6" thick.

3.1.4 Pavement Section - The design of the structural section shall be done by a qualified soils engineer and shall be based on:

A. The effects of traffic as expressed by the Traffic Index as shown on Sheets 3-27 and 3-28 of the Standard drawings.

B. The R-value of the subgrade derived from the Standard Stabilimeter Test (Test Method No. Calif. 301). Sufficient samples shall be tested to represent all of the streets within the project. An R-value of 5 shall be used, if no soils tests are determined necessary by the Engineer.

C. The pavement section thickness shall be determined using the California Design (Hveem) method and based on the relationship of traffic, the tensile property of the material comprising the structural section and the strength characteristics of the particular layer under consideration.

D. The structural section shall not be less than 2.5 inches asphalt over 8 inches aggregate base.

E. Street and Alley Overlay

The minimum overlay thickness of street and alley shall be 1.5 inches and maximum grading for the aggregate shall be 1/2 inch.

3.1.5 Lighting

A. Street Lighting - The street lighting system shall be underground fed unless otherwise specified and shall consist of conduit, integral ballast, luminaries, high pressure sodium lamps, metal standard (Upsweep bracket arm or mast arm), wires, all necessary grounds, photo electric switches, concrete foundations, pull boxes, and all other materials, labor and equipment and charges required to construct a complete and operating street light system.

The information given in the following table is general design criteria and is subject to change if in the opinion of the City Engineer, an alternate type of lamp, wattage, mounting height, arm length or spacing is more suitable for a particular location. Also refer to Drawings Nos 3-24, 3-25 and 3-26.

ROADWAY ILLUMINATION TABLE
(HIGH PRESSURE SODIUM0

ROADWAY CLASSIFICATION	R/W (FEET)	MIN. Av. FC	UNIFORMITY Av FC/Min FC	WATTS

B. Design - The street lighting system shall be shown on the project improvement plans or utility plans. The plans shall include the following items:

- Location of electroliers
- Location of pull boxes
- Intensity of luminaries
- Size and length of wire and conduit (shown in tabular form)
- Mounting height and arm length
- Transverse light distribution pattern
- Location of service points(both primary and secondary)
- Street light number

Transverse Distribution Pattern

Curb-to-Curb Width	Type
Less than 30'	II
30' to 45'	III
Greater than 45'	IV

C. Luminaires - General Notes

1. All luminaires shall be high pressure sodium vapor luminaires.

2. Photoelectric control shall be weatherproof dual voltage photoelectric relay with twist lock receptacle integral with luminaire.

3. Ballast shall be regulator type with 90% power factor per Section 86-6.01A, Caltrans Standard Specifications.

4. Light control shall be semi-cutoff, vertical light distribution pattern shall be medium, and transverse light distribution pattern shall be per plans.

5. All luminaires shall have optical filter system.

Note: Public street lighting is being furnished by PG&E to the City under PG&E Lighting Schedule LS-2B.

3.1.6 Bus Parking Bay - Bus parking bay shall be constructed off the normal roadway section. Bus parking bays shall be provided on high volume streets, narrow streets or high speed streets to provide for increased merging and boarding safety. Design of bus parking bay shall provide for acceleration and deceleration on pavement areas separate from the through traffic lanes. Refer to Standard Drawing No. 3-18. Location of bus parking bays shall be approved by the Engineer.

3.1.7 Bike Lane - Bike lane shall be per Standard Specification, Standard Drawings and Drawing No. 3-38 and as shown on plans.

3.2 Streets Material Standards

3.2.1 Portland Cement Concrete - Portland cement concrete shall conform to Section 90 of the Standard Specifications.

3.2.2 Paint - Paint shall conform to Section 91 of the Standard Specifications.

A. White Traffic Paint shall be 250 (volume organic compound) Pervo No. 5940 or approved equal.

B. Yellow Traffic Paint shall be 250 V.O.C. Pervo No. 5941 or approved equal.

3.2.3 Pavement Markers - Pavement markers shall conform to Standard Specifications Section 85.

3.2.4 Thermoplastic Material - Thermoplastic material shall conform to Section 84 of the Standard Specifications.

3.2.5 Asphalts - Asphalts shall conform to Section 92 of the Standard Specifications.

3.2.6 Liquid Asphalts - Liquid asphalts shall conform to Section 93 of the Standard Specifications.

3.2.7 Asphaltic Emulsions - Asphaltic emulsions shall conform to Section 94 of the Standard Specifications.

3.2.8 Corrugated Metal Pipe Casing - Corrugated metal pipe casing shall comply with the applicable requirements of the Standard Specifications.

3.2.9 Steel or Concrete Pipe Casing - Steel or concrete casing if used under State Highway shall be approved by the Division of Highways prior to use.

3.2.10 Timber Piling - Timber piling shall comply with the applicable requirements of the Standard Specifications.

3.3 Street Construction Standards

3.3.1 Existing Facilities - Before start of any underground work, notify all utility companies or Underground Service Alert and obtain field location markings of facilities ten (10) days prior to commencing construction. Attention is directed to Section 15 of the Standard Specifications as supplemented herein.

Before any excavation in City streets obtain from the office of

the Public Works Director a Street Excavation Permit in accordance with the requirements of Chapter 10.08 of the Municipal Code.

Before constructing pavement restorations the edge of the existing pavement shall be neatly sawcut to lines outside the disturbed or damaged pavement, and all shattered, broken, or loose material removed from the site. The subgrade shall be excavated and thoroughly compacted for six (6) inches below the bottom of the base material of the pavement adjacent to the area to be re-stored. The thickness of the pavement base course to be reconstructed shall be the thickness of the existing base plus one (1) inch and compacted to 95% relative density by mechanical methods. The type and thickness of surfacing to be reconstructed shall be the type and thickness of that which is existing. In no event, however, shall restored pavement be less than ten (10) inches of base material and three (3) inches of surfacing or its equivalent based on Section 3.1.4 of these Specifications.

3.3.2 Clearing and Grubbing - Attention is directed to Section 16 of the Standard Specifications.

3.3.3 Watering - Furnishing and applying water shall conform to Section 17 of the Standard Specifications as modified herein. Water for use in the work may be taken from metered fire hydrants along the site after the Contractor has obtained the proper permit of the Commercial Office of the Water Division.

3.3.4 Dust Palliative - Attention is directed to Section 18 of the Standard Specifications as modified herein, and to Section 2.5.7 of these Specifications concerning dust control.

3.3.5 Earthwork

3.3.5.1 General - Earthwork shall conform to Section 19 of the Standard Specifications and as supplemented herein.

3.3.5.2 Compaction Test - Compaction tests shall be required on all engineered fills, subgrade, subbase course, base course and trench backfill. The project soils engineer shall furnish to the City test results in written form and the contractor will be permitted to proceed with the subsequent work only if the compaction tests meet the relative compaction requirements for the particular course under consideration.

3.3.5.3 Trench Excavation

1. Trench Excavation - Trench excavation shall include the removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water necessary to construct the work as shown. Unless otherwise indicated on the drawings or permitted by the Engineer excavation for sewers shall be open cut. Trenching machines may be used, except where

their use will result in damage to existing facilities.

Except as permitted by the Engineer, the trench at the end of the day shall not be excavated more than 100 feet in advance of pipe laying, nor left unfilled for more than 100 feet where pipe has been laid.

If the trench is excavated below the bottom grade required by the Plans, it shall be filled to grade at the Contractor's expense with Class II aggregate base according to the Standard Specifications, Section 26- 1.02B, or other acceptable material as approved by the Engineer.

2. Trench in Existing Pavement - Where trenching operation is to be done through existing bituminous pavement, the sidelines of the trench shall be scored or sawcut through the surfacing so that trenching operations shall cut through the existing pavement to clean, straight lines leaving no loosened paving or ragged edges. The trench in the existing pavement shall be cut twice. First at the initial trench width and then after the trench is backfilled to subgrade, another cut shall be made one foot beyond the edge of the broken asphalt concrete. See Drawing No. 3-19.

   Existing concrete pavement, curbs, gutters, sidewalks, or driveways shall be removed by saw cut. If a sawcut in pavement falls within four (4) feet of a construction joint, cold joint, expansion joint or edge, the concrete shall be removed and replaced to the joint or edge. Saw cuts and removal of sidewalks, curbs, gutters, and driveways shall conform to Section 3.3.37 of these Specifications.

   The materials excavated from the trench shall be so placed as to offer minimum obstruction to traffic. Gutters shall be kept clear or other provisions shall be made for handling street or road drainage.

3. Trench Width - The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe exclusive of bells and collars, plus 16 inches, and such maximum width shall be inclusive of all trench timbers.

   The trench shall be braced and drained so that the workmen may work safely and efficiently therein.

   It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels or a storm drain system.

   The trench shall be so excavated that the pipe can be laid to the alignment and depth required.

   The width of the trench shall be ample to permit the pipe to

be laid and jointed properly, and the backfill to be placed and compacted as hereinafter specified. Trenches shall be of such extra width, when required, as will permit the proper placing of timber supports, sheeting and bracing and handling of pipe, fittings, etc.

The minimum width of the trench shall be not less than eighteen (18) inches in width for a pipe 8 inches in nominal diameter, and shall be equal to the outside diameter of the pipe plus twelve (12) inches for pipe over 8 inches in nominal diameter.

If, for any reason, the width of trench measured at the top of the pipe (inclusive of any timbering or other trench supports) is excavated to a width greater than the designed width as shown on the Plans or in the Specifications, and if the design load on the pipe will be exceeded, one of the following shall control:

a) Shape bottom of trench to increase pipe support.

b) Combination of bedding and partial concrete encasement to increase pipe support.

c) Complete concrete encasement to increase pipe support. In no case shall the design load on the pipe be exceeded. Where concrete encasement is used the concrete shall contain at least 376 pounds of cement per cubic yard, and have a slump not to exceed 4 inches.

4. Subgrade in Poor Soil - Where soft or yielding material or other detrimental condition is encountered at the bottom of any trench or excavation which, in the opinion of the Engineer, shall not provide a satisfactory or firm bearing for the pipe, such materials shall be removed for the full width of the trench or excavation until firm material is reached. The space so excavated shall then be refilled with Class 2 aggregate base thoroughly compacted with mechanical tampers in layers four inches (4") thick after compaction so as to provide a uniform and continuous bearing and support for the pipe at every point between bell and coupling holes.

5. Subgrade in Rock - Where ledge rock, boulders or large stones are encountered at the bottom of any trench or excavation, such material shall be removed to provide a clearance of at least six inches (6") below and on each side of all pipe, valves and fittings refilled with Class 2 aggregate base rock thoroughly compacted with mechanical tampers so as to provide a uniform and continuous bearing and support for the pipe at every point between bell or coupling holes.

6. Bell Holes - Bell holes shall be excavated on the sides and bottom on the trench at pipe joint locations, of such size

that the process of making joints and inspection can be carried on satisfactorily and so that the pipe barrel shall bear evenly on the bottom of the trench.

Bell holes shall be so excavated that the bell of the pipe shall not support the weight of the pipe. The use of blocks to support the pipe shall not be permitted except when expressly agreed to by the Engineer.

7. Barricades and Lights - To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lights, beacons and guards shall be placed and maintained during the progress of the construction work until it is safe for pedestrian and vehicle traffic. All material, piles, equipment, and pipe which may serve as an obstruction to traffic shall be protected by placing and maintaining proper barricades and lights when visibility is poor.

8. Trench Bracing - Excavation shall be supported as set forth in the rules, orders and regulations, State Construction Safety Orders. Sheet piling and other timbers shall be withdrawn to prevent additional backfill that might overload the pipe. No bracing shall be removed from backfill after compaction.

9. Control of Water - The Contractor shall furnish, install and operate all necessary machinery, reasonably free from water during construction and shall dispose of the water so as not to cause injury to public or private property, or to cause or menace to the public. He shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies and shall have available at all times competent mechanics for the operation of all pumping equipment. During pouring of concrete and until concrete has set hard, excavations shall be kept free of water. Discharge of any liquids or other materials from the trench or other construction activity into the storm or sanitary sewer systems requires Vallejo Sanitation and Flood Control District approval prior to such discharge.

10. Disposal of Excess Excavated Materials - All excavated materials not suitable or required for trench backfill shall be disposed of by the Contractor in a City approved location.

    Broken concrete, paving, large stones and vegetable material are considered unsuitable for backfill and shall be disposed of by the Contractor.

11. Line and Grade Stakes

    Line and grade stakes conforming with the Plans and Profiles will be set by the Contractor's Engineer on an offset line

parallel to each main or other structure at convenient spacing. Prior to commencing work by the Contractor, the project engineer shall furnish to the Inspector a cut sheet giving the layout and the elevation of the work with respect to said line and grade stakes. These stakes and marks shall be carefully maintained by the Contractor in place until that portion of the work and improvement for which said stakes and marks were set has been completed, inspected and approved by the Inspector and if disturbed, shall be replaced by the Contractor's Engineer. All work shall conform to the cut sheet or revision thereof furnished to the Inspector.

3.3.5.4 Bedding - Bedding shall be defined as that material under the pipe providing firm and continuous support to the pipe couplings.

Except where concrete or clean natural sand is specified, bedding material supporting the pipe or conduit shall be Class II A/B as specified in these specifications.

When water is encountered in the trench, pipes shall be laid over a minimum of six (6) inches of Type I bedding. The trench shall be kept dry until placing of bedding, material, applying and jointing the pipe have been completed, inspected and approved.

When construction takes place in a dry trench and above the ground water table, a minimum of six (6) inches of Class II A/B bedding shall be provided below the pipe.

Bedding shall be true to grade and thoroughly compacted by tamping to a minimum relative density of 90% as determined by ASTM Designation D-1557 before the pipe is laid.

3.3.5.5 Bedding and Backfill Materials

1. Type I bedding shall meet all of the quality requirements of Section 26-1.02B of the Standard Specifications for Class 2 aggregate base and shall have the following grading:

U.S. Standard Sieve	Percent Passing
1 1/4"	100%
3/4"	5%

2. Type II bedding shall be Class 2 aggregate base, 3/4" maximum grading and shall have the quality requirements as specified in Section 26-1.02B of the Standard Specifications.

3. Select backfill shall be Class 2 aggregate base, 3/4" maximum grading and shall have the quality requirements as specified in Section 26-1.02B of the Standard Specifications.

4. Native Material for backfill shall be material obtained from project excavation and shall be clear of all organic matter, rubbish, debris and other objectionable material and shall contain no rocks larger than three (3) inches in any dimension.
The Engineer may approve an alternate bedding and backfill material.

3.3.5.6 Trench Backfill

1. General - Initial backfill shall be placed on the bed- ding material, around the pipe, and to a depth of one (1) foot over the top of the pipe. Also refer to Drawing No. 3-19.

Subsequent backfill shall be that backfill placed above the initial backfill to the ground surface or roadway subgrade.

Backfill shall not be placed until the facility in the trench has been inspected and approved for backfilling by the City Inspector. Once approval has been given, the contractor shall proceed as soon as possible with backfilling operations.

Compaction test for each lift of backfill shall be required on backfill over trenches. Test results in written form from the project soils engineer taking the test shall be provided to the City Inspector and shall meet the compaction requirements specified in this section prior to the contractor proceeding with subsequent work over the backfill.

2. Densification Methods by Mechanical Method

a. Backfill shall be mechanically compacted by means of tamping, rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers or other mechanical tampers. All such equipment shall be of size and type approved by the Engineer. Impact type pavement breakers (stompers) will not be permitted over clay, cast iron or non-reinforced concrete pipe.

Material for mechanical compacted backfill shall be placed in lifts which prior to compaction shall not exceed the depths specified below for the various types of equipment;

1. Impact, free fall or stomping equipment -maximum lift depth of 3 feet.

2. Vibratory equipment including vibratory plates, vibratory smooth wheel rollers and vibratory pneumatic-tired rollers - maximum lift depth of 2 feet.

3. Rolling equipment, including sheepsfoot (both vibratory and

non-vibratory), grid, smooth-wheel (non-vibratory), pneumatic-tired (non-vibratory), and segmented wheels - maximum lift depth of 1 foot.

4. Hand directed mechanical tampers - maximum depth of 4 inches.

Mechanically compacted backfill shall be placed in horizontal layers of such depths (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary) and then tamped or rolled until the specified relative compaction has been obtained.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent grounds, existing improvements, or improvements installed under the contract. The Contractor shall make his own determination in this regard.

3. Backfill Placement Requirements

a. Existing Paved Street

Initial backfill shall be select backfill as specified in these Specifications and shall be thoroughly compacted by tamping to 90% relative compaction as determined by test method No. California 216E before further backfilling will be permitted.

Subsequent backfill shall be select backfill as specified in these Specifications and shall be compacted by mechanical compaction vibration or by combination of mechanical compaction and vibration.

Backfill shall have a minimum relative compaction of ninety percent (90%) as determined by Test Method No. Calif. 216 except in the upper 2.5 feet measured from finish grade, relative compaction of backfill shall not be less than 95%.

After trench is properly backfilled, a temporary layer of asphalt cutback shall be placed over the compacted subgrade to grade. This temporary cut-back shall be maintained by the Contractor until permanent paving is installed.

The type and thickness of surfacing to be placed over a properly backfilled trench in existing paved area shall be the type and thickness of that which is existing plus one (1) inch.

4. Street Right-of-Way in Previously Undeveloped Land

Initial backfill shall be select backfill as specified in these Specifications and shall be thoroughly compacted by tamping to a minimum relative compaction of 90% as determined by Test Method No. Calif. 216.

Subsequent backfill may be native material and shall be densified by mechanical methods to a minimum relative compaction of 90% as determined by Test Method No. Calif. 216 except in the upper 2.5 feet measured from finish grade, backfill shall have a minimum relative compaction of 95%. See Drawing No. 3-19.

3.3.6 Adjustment of Manhole Frame - Manhole frames and within asphaltic concrete pavement area shall not be set to finish grade until the pavement has been completed. The manhole openings shall be temporarily covered by suitable means during the construction of the subgrade, sub-base and base courses and the spreading and rolling of the asphalt concrete.

After the pavement has been completed, the necessary portion of the subgrade, sub-base, base and pavement shall be neatly cut away, the manhole built up and the frame set to finished grade of the adjacent pavement. See Drawing No. 3-16.

The surrounding area from which the pavement, base, sub-base or subgrade has been removed shall be backfilled to within 1 1/2 inches of the surface with Portland cement concrete. The remaining 1 1/2 inches shall be backfilled with asphalt concrete and compacted.

In the case of Portland cement concrete pavement, manhole frames shall be set to finish grade before paving.

Compaction of base course shall conform to Section 26-1.05 of the Standard Specifications.

3.3.7 Subgrade Preparation - Subgrade preparation consists of preparation of natural, filled or excavated roadbed material prior to the placement of sub-base or base material, pavement, curbs and gutters, driveways, sidewalks or other roadway structures.

Subgrade preparation shall conform to Section 19 of the Standard Specifications. Special attention should be directed to Section 19-5 of said Specifications pertaining to compaction.

When curb and gutter, driveways or sidewalks are to be placed on the subgrade material outside the travel way, the top 6 inches of such subgrade material shall be compacted to a relative compaction of not less than 90%.

After compaction and trimming, the subgrade shall be firm, hard and unyielding.

3.3.8 Finishing Roadway - Finishing roadway shall conform to Section 22 of the Standard Specifications.

3.3.9 Aggregate Sub-Bases - Aggregate sub-bases shall be Class 2 unless otherwise indicated in the special provision and shall conform to Section 25 of the Standard Specifications.

3.3.10 Aggregate Base - Aggregate base shall conform to Section 26 of the Standard Specifications and as supplemented herein.

Aggregate base shall be Class 2, 3/4" or 1 1/2" maximum. The percentage moisture in the aggregate shall be approximately 7% or as ordered by the Engineer to give maximum compaction.

Material placed in trench sections too narrow to accommodate a regular road roller shall be thoroughly compacted by means of pneumatic tampers or by other methods approved by the Engineer.

3.3.11 Cement Treated Bases

Cement treated based shall conform to Section 27 of the Standard Specifications.

3.3.12 Penetration Treatment

A. Prime Coat

When required, prime coat shall be applied to all un-treated aggregate base twenty-four (24) hours prior to placing asphaltic surfacing. Prime coat shall be liquid asphalt grade MC-250, and shall be applied at a rate of approximately 0.25 gallon per square yard. If excess liquid asphalt remains on the surface of the base after the 24-hour penetration period, a thin layer of sand shall be spread over the "fat" spots. All loose sand shall be completely removed from the treated area before any surfacing material is placed thereon. See Section 36 of the Standard Specifications for other requirements.

Prime coat will be paid for at the contract price per ton for the designated grade of liquid asphalt used unless otherwise specified in the special provisions.

B. Tack Coat (Paint Binder) - A tack coat shall be ap-plied to existing asphaltic or concrete paved surface and to those areas designated by the Engineer prior to placing a new asphalt surfacing on it. Tack coat shall be SS-1 grade asphalt emulsion diluted with water and applied at a rate of 0.02 - 0.10 gallon per square yard. No greater area shall be treated in any one day than will be covered by the asphalt concrete during the same day. See Section 36 of the Standard Specifications for additional requirements.

3.3.13 Bituminous Seals

A. Seal Coat - Where called for in the plans or special provisions, a seal coat shall be applied to existing pavements. The grade of liquid asphalt, the method of application and payment for seal coat shall conform to Section 37 of the Standard Specifications.

B. Fog Seal - Fog seal shall be applied to all new asphal-tic concrete pavements within 24 hours of final paving unless otherwise specified in the special provisions. Fog seal shall consist of SS-1 grade asphalt emulsion diluted to 50% with water and applied at a rate of ap-proximately 0.05 gallons per square yard.

Fog seal shall be paid for as provided in Section 37 of the Standard Specifications.

3.3.14 Road Mixed Asphaltic Surfacing - Road mixed asphaltic surfacing shall conform to Section 38 of the Standard Specifications.

3.3.15 Asphaltic Concrete - Asphaltic concrete for pavement shall conform to Section 39 of the Standard Specifications. It shall be Type B with bituminous binder of steam refined paving asphalt of AR4000 penetration, 3/4 inch maximum "medium" grading for the aggregate. The surface coarse asphalt shall be 1/2 inch aggregate.

Placing of the asphaltic concrete adjacent to the lips of gutters shall be such that a rise above said lips of 1/4 inch shall re-main after compaction.

Asphalt concrete pavement shall be compacted to a relative density of at least 95 percent.

3.3.16 Full Depth Asphalt Concrete

A. General - Full depth asphalt pavement is an asphalt pavement in which asphalt mixtures are employed for all course above the subgrade. Full depth asphalt pavement section shall have a minimum thickness of seven (7) inches. The top two (2) inches of the section is the surface course. All asphaltic concrete below this point is considered base course. A tack coat shall be applied to the base course prior to placement of the surface course. Subgrade shall have a relative compaction of not less than 95 percent.

B. Material - Asphalt concrete shall be Type B 3/4 inch maximum, medium grading aggregate for the base course and 1/2 inch maximum, medium grading aggregate for the surface course and shall conform to the provisions of Section 39 of the Standard Specifications.

C. Placement & Compaction - The base course shall be spread and compacted in layers not to exceed five (5) inches in compacted thickness by any method which will achieve the required finished grade and a relative com-paction of not less than 95 percent. The finish base course at any point shall not vary more than 0.05 foot above or below the grade established by the Engineer.

If soft spots in the subgrade are encountered and re-quired compaction cannot be obtained, that area shall be removed to a depth approved by the Engineer and then brought back to grade with asphalt concrete. All mixture shall be spread, and the first coverage of initial or breakdown compaction shall be performed when the temperature of the mixture is not less than 250 degrees F.

Base course compaction shall be completed when the temperature of the mixture is at 180 degrees F.

Placement and compaction of surface course shall con-form to Section 39 of the Standard Specifications.

3.3.17 Portland Cement Concrete Pavement - Portland cement concrete pavement shall conform to Section 40 of the Standard Specification, and as supplemented herein.

Spreading concrete between the side forms on alleys will not require a spreading machine. The spread concrete shall be vibrated by some method that produces equivalent machine results without segregation. The rate of vibration shall not be less than 3500 vibrations per minute and the amplitude of vibration shall be sufficient to be presentable on the surface of the concrete more than one foot from the vibrating element.

Compacting and shaping alleys shall be performed with a hand tamper constructed of a heavy plant whose length exceeds the width of pavement by a minimum of one foot; shall be shod with a heavy strip of metal for a tamping surface; and shall be stiffened adequately to maintain the required shape during use.

The hand tamper shall be used with a combined tamping and longitudinal motion raising it from side form and dropping it to consolidate the concrete.

A surplus of concrete shall be kept in front of the tamper and tamping shall continue until the required cross-section is obtained and the mortar flushed slightly to the surface.

Where hand compaction is performed on grades in excess of five (5) percent, a light strike board constructed similar to the heavy tamper shall be used following the heavy tamper to correct any displacement caused by the flow of the concrete.

3.3.18 Pavement Sub-Sealing - Pavement sub-sealing shall conform

to Section 41 of the Standard Specifications.

3.3.19 Piling - Piling shall conform to Section 49 of the Standard Specifications.

3.3.20 Pre-stressed Concrete Members – Pre-stressed concrete members shall conform to Section 50 of the Standard Specifications.

3.3.21 Concrete Structures - Concrete structures shall conform to Section 51 of the Standard Specifications.

3.3.22 Reinforcement - Reinforcement shall conform to Section 52 of the Standard Specifications.

3.3.23 Air Blown Mortar - Air blown mortar shall conform to Section 53 of the Standard Specifications.

3.3.24 Waterproofing - Waterproofing shall conform to Section 54 of the Standard Specifications.

3.3.25 Steel Structures - Steel structures shall conform to Section 55 of the Standard Specifications.

3.3.26 Sign Structures - Sign structures shall conform to Section 56 of the Standard Specifications.

3.3.27 Timber Structures - Timber structures shall conform to Section 57 of the Standard Specifications.

3.3.28 Preservative Treatment - Preservative treatment shall conform to Section 58 of the Standard Specifications.

3.3.29 Painting - Painting shall conform to Section 59 of the Standard Specifications.

3.3.30 Reinforced Concrete Pipe - Reinforced concrete pipe shall conform to Section 65 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue. The size and class of pipe shall be specified in the Special Provisions.

3.3.31 Corrugated Metal Pipe - Corrugated metal pipe shall conform to Section 66 of the Standard Specifications.

3.3.32 Structural Plate Pipe, Arches and Pipe Arches - Structural plate pipe, arches and pipe arches shall conform to Section 67 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.33 Sub-Surface Drains - Sub-surface drains shall conform to Section 68 of the Standard Specifications.

3.3.34 Oversize Drains - Oversize drains shall conform to Section 69 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.35 Miscellaneous Facilities - Miscellaneous facilities shall conform to Section 70 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.36 Sewers - Sewers shall conform to Section 71 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

Backfill material shall conform to Section 3.3.5.5 of these Specifications.

3.3.37 Slope Protection - Slope protection shall conform to Section 72 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.38 Curbs, Gutters, Sidewalks, Driveways & Islands

A. Portland cement concrete curbs, gutters, sidewalks, driveways and islands shall conform to the details on the Plans and to the provisions of Section 73 of the Standard Specifications and as supplemented herein (Class "B" concrete).

1) Existing sidewalks, curbs and gutters - In lieu of the provisions of Section 73 of the Standard Specifications, the removal of only the sidewalk portion of an existing monolithic pour of curb, gutter, and sidewalk will be allowed to repair a broken sidewalk. The removal of the curb and gutter may be required when installing or removing a driveway approach, the entire approach including curb and gutters must be removed before replacing with new sidewalk, curb and gutter. Where existing sidewalk, curb and gutter must be removed, the section to be removed will be cut at a minimum depth of 4 inches with an abrasive type saw at the nearest score mark. If, when removing the concrete some of the remaining concrete gets cracked or broken it must be resown at the nearest score mark and removed.

2) Concrete sidewalk, curb and gutter driveway and island construction - Concrete sidewalks to be constructed adjacent to existing curb and gutter shall be anchored to the existing curb by means of dowels of No. 4 reinforcing steel or approved anchor bolts at twenty four inches (24") on center.

When the construction of sidewalk and curb and gutter is non-monolithic, the sidewalk and driveway entrances shall be

anchored at the back face of the curb and a dowel of No. 4 reinforcing steel shall be placed at twenty-four inches (24") on center. See Standard Drawing No. 3-8.

Concrete curb constructed over an existing pave-ment shall conform to Section 73-1.05 of the Standard Specifications.

Forms for sidewalk, curb and gutter, driveway and island construction shall conform to Section 73-1.04 of the Standard Specifications.

Subgrade preparation for concrete curbs and gutters, sidewalks and driveway, shall conform to the requirements of Section 3.3.7 of these specifications.

A two inch Class 2 aggregate base shall be placed under all concrete curbs, gutters, sidewalks, driveways and islands. The aggregate base shall be compacted to a minimum of 90% relative compaction as determined by Test Method No. Calif. 216 and thoroughly watered after placing. Fine grading below the bottom plane of the aggregate base may be constructed with aggregate base fill.

Aggregate for Class B concrete shall conform to the grading for 1 1/2 inch maximum combined aggregate.

Weakened plane joints shall be used at the beginning and the ending of a return, in aprons as shown on the City of Vallejo Drawings and at the top of the roll on each side of a driveway en-trance. Expansion joints shall also be placed between the public walks and the private walks and driveways.

Expansion joint material shall be pre-molded fillers 1/2 inch thick. The expansion material used in the curb and gutter section shall be one solid piece shaped to the cross section of the curb and gutter. The material used in the side-walk shall be 1/2 inch thick, by 4 inches wide and the length of the walk width.

Weakened plane joints shall be placed every 12 lineal feet transversely along the sidewalk, curb and gutters or as otherwise directed by the Engineer. The joints shall be 1/4 the depth of the concrete.

Score markings shall be placed every four (4) lineal feet transversely along the sidewalk, and in no case shall the scored squares occupy more than sixteen (16) square feet. Score markings shall match as nearly as possible those in adjacent existing curbs, gutters and sidewalks, or shall be placed as directed by the Engineer.

Finished sidewalk, curb and gutter, driveway and island shall conform to Section 73 of the Standard Specifications.

Backfill along the back of the newly constructed sidewalk to the finished sidewalk grade must be completed before acceptance of the work.

3) Extruded curb, gutter & sidewalk construction -Extruded curb, gutter and sidewalk construction shall conform to Section 73-1.06 of the Standard Specifications except as modified herein.

Sidewalk, curb and gutter may be placed by using an extrusion machine where the grade of the finished curb, gutter and sidewalk is greater than one percent (1%).

Class B concrete shall be used with combined aggregate conforming to 1 1/2 inch maximum grading.

Guidelines for extrusion machine shall be sup-ported at no greater than fifteen feet (15') interval on tangent sections. For horizontal curve sections, guides shall be supported at such intervals that the finished curb, gutter and sidewalk is of uniform width, free from humps, sags or other irregularities.

B. Asphalt concrete sidewalks and driveways shall be approved by the Public Works Director prior to construction and shall conform to the details on the plans and as supplemented herein.

1) Existing sidewalks, curbs & gutters - Replacement of existing Portland cement concrete sidewalks and driveways with asphalt concrete sidewalk and driveways will be permitted only when entire block frontages are replaced. Permanent patches with asphalt concrete will not be permitted.

2) Asphalt sidewalk & driveway construction - Asphalt sidewalks and driveways shall be comprised of two and one-half (2.5) inches asphalt concrete over four inches and six inches of compacted Class II aggregate base respectively. Asphalt concrete shall be Type B 1/2 inch maximum, medium grading and shall conform to the provisions of Section 39 of the Standard Specifications. Subgrade preparation for asphalt sidewalks and driveways shall conform to the requirements of Section 3.3.7 of these Specifications. Backfill along the back of the newly constructed sidewalk to the finished sidewalk grade must be completed before acceptance of the work.

3.3.39 Standard Sign Installation

A. Traffic Signs - Traffic regulatory, warning and directional signs shall be furnished and erected in locations as shown on improvement plans. For sidewalks greater than four (4)

feet wide, the centerline of the post for traffic signs shall be eighteen (18) inches from the face of curb. Where the sidewalk width is four (4) feet or less, the traffic signs shall be installed at the back of the sidewalk, the centerline of the post for traffic signs shall be eighteen (18) inches from the back of the sidewalk. Said signs shall conform in size, shape, material, color, and design to the signs as shown in the current Traffic Manual of the Department of Transportation, State of California, and as supplemented herein.

Signs shall be aluminum blank (0.080) gage minimum with a reflective sheeted face per State of California Specifications.

Pipe to which signs shall be attached shall be 2" (in-side diameter) galvanized steel pipe schedule 40. Length of said posts shall be as directed by the Engineer. Traffic sign posts shall be buried in the earth not less than 2 feet and when so required by the Engineer, shall be embedded in concrete.

1" x 1" x 1/8" brace required for unbalanced signs 30" and greater width.

Hardware shall be heavy duty aluminum of a type approved by the Engineer. See Drawings Nos. 3-30 to 3-33.

B. Street Name Signs - Street name signs shall be located as shown on Improvements Plans.

1. Blade Material - All blades are to be flat, six inches in height with radius corners. The blades shall be .125 thick aluminum. The length of each blade will range from a minimum of 18 inches to a maximum of 36 inches, with the most common blade being 30 inches. If the street name is of such length that the sign exceeds these limits, the extra space needed will be provided for by reducing the distance between letters or condensing the print by a minimal amount. The finished blades shall have smooth, clean cuts at each end with no distortion. The blades are to be drilled to accommodate the hardware as shown on Drawing No. 3-36.

2. Layout - The blades shall be sheeted with 3M white reflective sheeting or approved equal. After sheeting they shall be silk screened transparent blue to expose a 1/4 inch margin, the City logo in white. All information regarding these requirements shall be obtained from the Traffic Engineer or his representative. The street name, suffixes, block numbers, and directional arrows shall be white reflective letters and numbers, 3M type or approved equal. The street name lettering shall be 4", white reflective, series B. The block numbers and suffix designation lettering shall be 1-1/2" white reflective, series B. The

directional arrow shall be 1-3/4" x 1-3/4" white reflective.

3. Hardware - All hardware shall be of the heavy duty, slotted, bolt-through, vandal-proof type and meet the specifications shown on the enclosed drawings. See Drawing Nos. 3-35, 3-36.

4. Mounting - All street name signs shall be mounted on two inch (inside diameter), schedule 40, galvanized steel pipe, nine feet and no inches from the ground surface to the bottom of the lower sign on the assembly. Each sign post shall have one double faced sign for each street branch (two at normal full crossings). Wherever two streets intersect, or where any street bends more than 45 degrees, there shall be no less than one signpost and set of signs. The mounting pipe is to be set in concrete, six inches in diameter and eighteen to twenty-four inches deep. See Drawing No. 3-34. Street name signs, when combined with R1 stop sign, use stop sign location. Otherwise use far right side of major street. Two (2) signs required for four (4) leg intersection of major street.

   All street names shall be approved by the City of Vallejo Fire, Police and Public Works Departments.

3.3.40 Fences - Fences shall conform to the provisions of Section 80 of the Standard Specifications.

3.3.41 Survey Monuments

A. Street Monument

1. General - This work consists of constructing con-crete based cast iron covered survey monuments complete in place, where and as shown on the Plans, Drawings Nos. 3-21 to 3-23 and as herein specified.

2. Materials and Construction - Concrete bases shall be Class A Portland cement concrete conforming to the provisions of Section 51 and Section 90 of the Standard Specifications.

   Cast iron frames and covers shall conform to the applicable provisions of Section 55 of the Standard Specifications.

   Exact locations will be given by the Subdivision Engineer.

   The brass discs pins or bench markers will be furnished and grouted in place by the Subdivision Engineer after completion of the monuments by the Contractor.

   Attention is directed to Section 3.3.6 of this specification regarding construction of structures to final grade after the surfacing has been completed.

B. Subdivision Boundary - The final subdivision map, record of survey, and parcel map shall be made by a registered civil engineer or by a licensed land surveyor who shall find or set a durable monument at every change in direction of the exterior boundary of the tract. The exterior boundary of the tract shall be monumented before the final map may be recorded. "Durable monument" shall be defined as one of the following:

1. An iron pipe not less than one and one-half (1 1/ 2) inches in outside diameter, not less than twenty-four (24) inches in length, set not less than twenty-four (24) inches in the ground, and with either a plastic survey monument marker affixed to the inside diameter of the pipe, or a concrete (mortar) plug not less than six (6) inches in length poured and tamped in the top of pipe. A galvanized metal nail shall be set in the top of the concrete plug.

2. An iron reinforced rod (re-bar) not less than five-eights (5/8) inch in diameter, not less than twenty-four (24) inches in length, set not less than twenty-four (24) inches in the ground affixed with a plastic survey monument marker.

3. The registered license number of the engineer or surveyor shall be permanently indicated on the monument.

4. Each final map subdivision shall provide one on-site monument with State of California Coordinate System.

C. Interior Property Lines - All lot corners and angle points within the boundary of the subdivision shall be marked in the same manner as the exterior boundary or by other approved methods. Crosses (offset) cut in the top of curb will be acceptable.

D. Benchmarks - Benchmarks elevations shall be at the top of the pin as shown on Standard Detail Drawing No. 3-32 and located at points shown on the as-built construction plans.

The Subdivision Engineer shall provide for establishment of permanent benchmarks within the limits of the subdivision project. The number of benchmarks to be set will be evaluated during the plan checking process. Benchmarks shall be set on well monuments at major street intersections, or as determined by the City Engineer. Differential level notes, tied to the existing "city datum" shall be submitted with the as-built drawing. Level notes shall be dated and stamped with the registered license number of the engineer or land surveyor.

3.3.42 Markers - Markers shall conform to the provisions of Section 82 of the Standard Specifications. Markers for water line blow-offs and air valves on water transmission lines traversing open land shall be precast Portland cement concrete

and shall conform to the dimensions and details shown on the Plans.

3.3.43 Guard Railings - Guard railings shall conform to the provisions of Section 83 of the Standard Specifications.

3.3.44 Traffic Stripes & Pavement Markings - Traffic stripes and pavement markings shall be thermoplastic material unless otherwise approved by the City Engineer.

3.3.45 Sandblasting - Sweeping service shall be provided during the sandblasting operation.

3.3.46 Barrier Posts - Barrier posts shall conform to the provisions of Section 83 of the Standard Specifications.

3.3.47 Signals & Lighting - Signals and lighting shall conform to the provisions of Section 86 of the Standard Specifications and as supplemented herein.

A. Signal Controller - Controller shall be a type 170 installed in an anodized aluminum 332 cabinet.

1. Service cabinet shall be a Type III - BF, 120/240 volt, 100 amp split load, and shall conform to local utility requirements and specifications. The deadfront panel shall be hinged. The foundation anchor bolts shall be set so that the securing nuts are inside the service cabinet.

   Service cabinet equipment:

   Main - 100A, 120/240V 3P circuit breaker Signals (metered)
   Circuit Breaker - 50A, 120V, 1P
   Street Lighting (unmetered)
   Circuit Breaker - 30A, 240V, 2P
   Test Switch - 15A, 1P
   Contactor - 60A, 2PNO Mercury Contactor Sign Lighting (metered)
   Circuit Breaker - 15A, 120V, 1P
   Test Switch - 15A, 1P
   Contactor - 30A, 2PNO Mercury Contactor

2. Vehicle signal sections shall be metal. All vehicle signal sections shall be 12 inch unless otherwise specified. All vehicle signal assemblies shall have back plates.

3. Pedestrian signal faces shall be Type A. Front screens shall be 1 1/2" deep eggcrate or Z-crate type screen of 0.03 inch nominal thickness poly-carbonate. A visor is not required.

4. Fittings, slip-fitters and terminal compartments shall be bronze. Screws shall be bronze.

5. Inductive loop detectors shall be 2-channel Type 222B (Detector Systems or approved equal).

6. Loop wire shall be Type XHHW, No. 14 stranded cop-per wire.

7. Detector lead cable shall be Type B. Splices for detector lead cables shall be insulated using method C (handcrafted insulation). Shields shall be insulated at pull box end and terminated within the controller cabinet at the equipment ground.

8. The sealant for filling detector slots shall be an asphaltic emulsion sealant.

9. Pedestrian push buttons shall be Type B. Push button signs shall be installed using brass theft proof screws with PDL type hards. Installation tools shall be supplies to the City.

10. Internally illuminated street name signs shall be installed for each leg of the signalized intersection unless otherwise specified. Signs shall be Type A.

11. Photoelectric control for street name signs shall be integral with the photoelectric control for street lighting except that separate contactors shall be used.

12. Photoelectric control shall be Type II.

B. Electrical Equipment - All materials used shall bear the label of the Underwriters Laboratories, Inc., and all work performed shall conform to the Standards of the National Electric Manufacturers' Association, and, in addition to the requirements of the plans and special provisions, all materials and work shall conform to the requirements of the National Electric code, hereinafter referred to as the Code; the Electrical Safety Orders of the Division of Industrial Safety, Department of Industrial Relations of the State of California, and the rules for overhead and underground

line construction of the California Public Utilities Commission; local ordinances of the City of Vallejo, California, regulations of the local utilities and to the satisfaction of the City Engineer of the City of Vallejo, California, or his authorized representative.

C. Location of Lighting Standards - All standards shall be placed on concrete bases, as hereinafter specified. The base shall so be constructed that the centerline of the standard shall be no more than three (3) feet (unless otherwise stated) behind the sidewalk. The location of the base shall be approved in the field by the Inspector before the forms are constructed. The base shall be located behind

the sidewalk except when the sidewalk is wider than 6.0 feet. In this case, the centerline of the standard shall be 2' behind the face of the curb. See Drawing No. 3-24.

D. Foundation for Electrolier Standards - The foundation shall conform to these provisions as well as the applicable provisions of Section 86 of the Standard Specifications.

The foundation shall be a cylinder two feet 6 inches (2'6") in diameter. The bottom of the foundation shall be five (5) feet below the top of curb and the bottom shall rest on firm ground. Where obstructions prevent the construction of the planned foundation, the Contractor shall construct an effective foundation satisfactory to the Engineer. Forms shall be true to line and grade, rigidly and securely braced in place, and they shall not be removed until the concrete has thoroughly set. When setting the forms, the Contractor shall place all conduit ends in their proper position and bond them securely together as mentioned herein. Both forms and foundations shall be thoroughly moistened before placing concrete. The finished foundation grade shall be at the level set by the Engineer and generally shall be at the grade of the top of sidewalk at that location. The initial pour of the foundation shall terminate five (5) inches below finish grade to facilitate the adjustment of the leveling nuts when erecting the standard. After the standard has been set in a vertical position, the five (5) inch space shall be filled with concrete and shall be extended to the junction box. Tie rods, bolts, nuts and other electrolier standard hardware shall be galvanized or cadmium plated unless otherwise specified herein or on the Plans. Anchor bolts and conduit shall be held in place by means of a template until the concrete sets and no bending of anchor bolts will be permitted thereafter.

E. Conduit - All conductors shall be run in conduit except when in the lighting standard. Conduit shall be either Schedule 40 PVC or rigid metal type conforming to Articles 346 and 347 of the NEC. All metal conduit and fittings shall be zinc coated, inside and out, by the hot dip process. Each length shall bear the label of the Underwriters Laboratories, Inc.

Installation - The installation shall conform to the appropriate Article of the NEC. The ends of all conduit shall be well reamed to remove burrs and rough edges. When nipples or pieces of conduit are cut, the ends shall be reamed and made square. When the coupling is tightened, the ends shall butt or come together for the full diameter thereof.

Where two pieces of conduit are to be jointed together, a slip joint or running thread will not be permitted and an "Appleton" or other approved coupling shall be used. All threads on conduit shall be well painted with a good quality

red lead or P & B paint before couplings are put on and made up. All couplings shall be tightened until the ends of the conduit are brought together so that a good electrical connection will be made throughout the entire length of the conduit run. Where coating on conduit has been injured in handling or installing, such injured places shall be thoroughly painted with P & B paint or equal.

All conduit ends shall be threaded and capped with standard pipe caps until wiring is started. When caps are removed, the threaded ends shall be provided with approved conduit bushings equipped with grounding lugs.

Conduit shall be bent to the proper radius (minimum 18") without crimping or flattening. Eight (8) inch minimum radius may be used at electrolier base.

The size of the conduit used shall conform to Article 346 of the NEC. The installation of PVC conduit shall conform to the Article 347 of the NEC. All cut ends shall be trimmed, inside and outside, to remove rough edges. All joints between lengths of conduit, and between conduit couplings, fittings and boxes shall be made by a method specifically approved for the purpose. Field bends shall be made only with bending equipment specifically approved for the purpose, and the radius of the curve of the inner edge of such bends shall not be less than shown on Table 346-10 of the NEC.

It shall be the option of the Contractor, at his expense, to use larger size conduit if desired, and where larger size conduit is used, it shall be for the entire length of the run from outlet to outlet. No reducing couplings will be permitted. The diameter of the conduit shall not be less than 1 1/2" inside diameter.

Backfill - Conduit shall be laid to a depth of not less than twenty-four (24) inches or greater than thirty-six (36) inches below the top of pavement when crossing the street and shall be placed at 18" depth and directly behind and adjacent to the back of side- walk when paralleling the street. No more than ten (10) feet of conduit shall be used to align the conduit from the back of the sidewalk to the junction box "knock out". The placing of conduit shall be within one (1) foot of the back of sidewalk around returns at intersections. Backfilling of conduit trenches by standard methods are required when placed under existing pavement and sidewalk. Conduit shall be placed by approved jacking methods. Pavement shall not be disturbed without the written permission of the Engineer, and then only in the event insurmountable obstructions are encountered. Jacking pits shall be kept two (2) feet clear of the edge of any type of pavement. Excessive use of water, such that pavement might be undermined or subgrade softened, will not

be permitted. Each run of conduit (without conductor) shall be capped at the end.

F. Conductor and Cable - All cable shall be in accordance with the Insulated Power Cable Engineers' Association Standard No. S-19-81, Appendix I.

All conductors shall be continuous from the junction box to junction box without splice. Conductors from secondary box to the pole box shall be No. 8 copper wire and from pull box to the luminaire shall be No. 10 copper wire. Splices are to be made only in junction boxes. All connectors shall be waterproof.

An inert lubricant shall be applied to conductors before pulling them into conduit. Where more than one cable is to be installed in the same conduit, they shall be drawn into the conduit at the same time to insure installation without injury to the insulation.

Two feet of slack shall be provided at all conductor ends and splices. Conductors shall be color coded according to pertinent sections of the NEC.

G. Pull Boxes - The minimum size shall be State No. 3 1/2 for street lights and No. 5 for traffic signals. Pull boxes are located as shown on the plans. Under no circumstances shall pull length exceed 200 feet and a pull box at each street light location.

3.3.48 Street Trees - Street trees shall be installed in conformance with applicable ordinances of the City of Vallejo, Section 5 and Drawing No. 5-10 of this specification.

The types and size of trees to be planted shall conform to the "City of Vallejo Approved Tree List for Street and Median Planting" on file in the Public Works Director's Office.

A. Trees shall be well established nursery stock. They shall be from fifteen (15) gallon containers or field grown stock of same quality and conform to A.N.S.I. standards. Trees shall have a well developed taper from trunk base to tree crown. The height shall be minimum of six (6) feet and three quarters (3/4) of an inch. There shall be a nursery tag on each tree which denotes the scientific name.

Between November and February and option to install bare root street trees may be approved pursuant to an agreement with the City Engineer.

B. Root Quality - Container grown and bare root plants shall have a well formed root system, branching shall be symmetrical and main roots should go down and out to provide trunk support. Plants should have fibrous roots

sufficiently developed that the root mass will retain its shape and hold together when removed from the container or when handled during planting. The main roots should be free of kinked and circling roots in the trunk, surface and center root zone. Circling roots in the peripheral root zone should be thinned and straightened, however if peripheral roots are large, entwined and matted the tree will be rejected. The main roots of bare root plants should be sound and free from breaks, torn or bruised bark, crown gall, and nematodes. (Dr. Richard Harris, 1983. Arboriculture. Prentice Hall, Inc., Englewood Cliffs, New Jersey, pp. 62-64).

C. Planting Pits - for street trees shall have a minimum diameter of four (4) times the container width. The depth shall be equal to the length of the root ball plus six (6) inches. The pit walls and floor shall be scarified to ensure that soil compaction and/or glazing does not occur. Plant pits shall be inspected by a City Landscape Inspector prior to installation.

D. Planting Locations - Since plant spacings on landscape plans are diagrammatic, contractors should request that a City Landscape Inspector or City Arborist mark planting locations. Adjustments to the approved plan locations will be made based on proximity to utilities, easements, services, street lighting, obstructions and individual plant spread at maturity. Trees shall not be planted within six (6) feet of utilities (PG&E vaults, water and sewer lines, irrigation main lines) and twelve (12) feet of street lights.

E. Tree Staking shall be installed as per the City of Vallejo's street tree planting detail. However, per the City Engineer's discretion tree staking may be eliminated on certain trees. Tree taper, caliper and stem rigidity will be used to evaluate which trees may be left unstaked. Stakes may be removed during the one year maintenance period upon request of City Arborist or City Inspector.

F. Watering Well Removal - Tree and shrub watering wells shall be removed forty five (45) days after planting in irrigated landscapes.

G. Diversity of Tree Species - No single species shall make up more than 15% of the total City tree population. This is to prevent uniform disease susceptibility and eventual uniform senescence. Therefore, the following requires a minimum for tree species variation for a given site.

Number of Trees at Site	Min. Number of Tree Species to be Planted
10 - 19 trees	One Species

20 - 39 trees	Two Species
40 - 69 trees	Three Species
70 - 99 trees	Four Species
100+ trees	Six Species

H. Tree Stock Quality - Trees shall be well established nursery stock in five (5) and/or fifteen (15) gallon containers. Height and caliper standards shall conform to the following table:

	Min. Dia. at Stem at 4' Height	Height Overall (Ft.) In.	Height From Ground to Branch: Min. Clearance	Max. Height
5 gallon				
Feathered	3/4"	4'-0"-6'0"	18"-2'0"	6'
15 gallon				
Light Standard	3/4"	6'0"-8'0"	3'0"-4'0"	8'
Standard *	3/4"	7'0"-9'0"	3'0"-4'0"	9'

*Street Tree Size

Between November and February an option to install bare root or field grown balled and burlapped trees may be approved pursuant to an agreement with the Director of Public Works. Bare root trees shall be stored in soil only; no bark mulch or chips. For bare root and field grown trees standards for height and caliper, height and root ball sizes shall be in conformance with American National Standard Institute (ANSI) Z60.1, 1980.

I. Structural - Trees shall have a well developed taper from trunk base to tree crown. Low trunk lateral branches should be left on the tree since these "lower limbs nourish the trunk and shade it, resulting in a tree with greater caliper and taper". (Harris)

Main branches of a tree should have a uniform radial distribution and form wide angles of attachment with the trunk. Included bark between trunk and branches or branches with narrow angles or attachment will not be accepted.

Trees should not be topped, headed, or have co-dominant leaders. A tree's crown configuration shall have "one-half or more of the foliage on branches originating on the lower two-thirds of the trunk and one-half or less (of the foliage) on the upper one-third" (Harris). This type of branch (foliage) distribution will center the wind load acting of the tree and provide a uniform distribution of stress.

Trees should be free and disease. Tree foliage should be green to dark green, and shoot growth should be healthy and

vigorous. Tree bark should be smooth and bright. "Rough, cracked, dull, and dark bark may be an indication of low vigor" (Harris). Tree trunks with sunburn or mechanical wounds are not acceptable.

J. Grated Trees - Many tree cultivars have been granted on to a related root stock. To ensure that grafted stock will have a stable union and to prevent the potential incompatibility between root stock and graft, the City requires that the root stock be of the same genus as the cultivar stock. Information on the name or designation of root stock should be obtained from the supplier and presented to the City inspector.

Tree Guards - All street trees installed in single family residential lots shall have a protective sleeve, known as an arbor guard, placed around the trunk base. This perforated plastic spiral guard will provide protection to the basal region against string line and mower blight damage.

Labeling - When plans are delivered to the site, "at least one plant, cultivar, or species should be labeled with the correct botanical name" (Harris). If more than one clone of a species is delivered (i.e. Pyrus C. "Aristocrat" and "Cantilever"), every plant needs to be labeled.

3.3.49 Street Barricade - Street barricades shall be constructed at all dead end streets and at locations selected by the Engineer and shall conform to the Standard Detail Drawings No. 3-35 and No. 3-36. A W31 and Type "N-2" marking dead end reflector sign shall be mounted at the center of each barricade.

3.3.50 Traffic Control - Traffic control shall conform to Standard Specifications, Standard Plans and Caltrans Traffic Manual, unless otherwise approved by the City Engineer.

SECTION 4. WATER

4.1 DESIGN STANDARDS

4.1.1. Water System Design Standards

4.1.1.1. Design Guidelines

1. Fire flow and pressure requirements of the Fire Department shall be satisfied. Fire flow at no less than 25 psig residual pressure shall be available within 1000 ft. of any structure. One half of the fire flow shall be available within 300 ft. of any structure. For single family residential units, the fire flow is 1500 gpm. For commercial units the fire flow is 3500 gpm. For other developments, see the Vallejo Water System Master Plan, 1985, including modifications/updates thereafter, prepared by Kennedy Jenks.

2. Fire hydrant placement and fire sprinkler system installation, if any, shall meet the requirements of the Fire Department.

3. Fire flow velocity shall not exceed 10 fps.

4. Peak hour demand flow velocity shall not exceed 7 fps.

5. Hazen-Williams pipe roughness coefficient shall be C=110 for mortar lined pipe and C=120 for PVC.

6. Mainline pipe sizes shall be 6" minimum.

7. Easements shall be provided for water system improvements installed outside the public right of way; 15 ft. wide for mains, 10 ft. wide for meters, backflow devices, air valve, fire hydrants, double detector check valves, etc.

8. Fire hydrants shall be spaced at a maximum of 500 feet on streets or 1000 feet on parkways or as required by the Fire Marshal. Fire hydrants shall not be located at the ends of "cul-de-sacs."

9. Combination Air Vacuum relief assemblies shall be provided at all high points and as directed by the Engineer and shall be situated outside of travelled ways.

10. Systems shall be looped wherever possible.

11. Blow-offs shall be installed at all low points, zone valves and as required by the Engineer.

12. Mains shall be a minimum of 10 ft. horizontally from sanitary or storm sewers. Waterlines shall generally cross above sewer/sanitary lines. Alignment and separation

criteria for water lines and sanitation facilities shall be specified in "California Waterworks Standards", Section 64630, Title 22, California Administrative Code, Vertical clearance between mains shall be 12" minimum at crossings.

13. Permanent or temporary blow-offs shall be installed at the dead-ends of all main lines.

14. The Uniform Plumbing Code shall be used to size all commercial and multifamily meters. Standard service sizes are 3/4", 1", 1-1/2", 2", 4", 6" & 8". Minimum service size for a fire sprinkler system shall be 1" diameter.

15. Condos and commercial developments shall have a minimum of one meter per building.

16. Meters shall be located at back of sidewalk and are not permitted in driveways.

17. Generally use 2 - 45 degree bends instead of 1 - 90 degree bend for all mainline or transmission main changes in direction.

18. Main line pipe alignment may be curved at a "radius of curvature" not to exceed the pipe manufacturer's recommendations. For tighter radiuses, use regular fittings.

19. Taps to mains shall be spaced 5 feet minimum. Parallel services shall have 12" minimum clearance between pipes.

20. Backflow prevention devices shall be installed on all new water service connections per City Ordinance 922 N.C. (2d). They shall be located at areas hidden from public view and/or mitigated by landscaping.

4.1.1.2. Calculations - Hydraulic calculations shall be submitted to the Water Superintendent demonstrating that the fire flow and fire prevention requirements are satisfied. These shall include pipeline diagrams and tabulated results for easy reference.

Among the results presented shall be the maximum and minimum pressures, critical nodes water velocities, head loss inflows and outflows.

4.1.1.3. Plans

1. Master Plan - The proposed water system master plan for a new development shall comply with the following:

1. "Water System Master Plan and Hydraulic Network Analysis, City of Vallejo 1985," including latest modifications by Kennedy/Jenks Engineers.

2. City of Vallejo Municipal Code Chapter 11.

3. City of Vallejo Standard Specifications, latest edition.

4. City of Vallejo Fire Department and current Fire Code regulations.

5. Approved Subdivision Agreement.

2. Water System Improvement Plans shall be submitted to the Water Superintendent for review and approval, and shall contain at least:

1. Location and size of fire sprinkler service connection(s).

2. Location and size of domestic service connection(s).

3. Location and size of irrigation service connection(s).

4. Location of fire hydrants.

5. Location of structures with respect to existing public water system improvements, such as mains, meters, etc.

6. Alignment, profile, size and material of new water mains.

7. Location, size and material of any off-site water system improvements.

8. Location, elevation and capacity of new reservoir.

9. Location, elevation and capacity of new pump station.

10. Relocation plan and details for any displaced transmission mains or other facilities.

11. Location and size of air reliefs.

12. Location, size and type of blow-offs.

13. Location of check valve assemblies.

14. Location of zone valve assemblies and indication of differing zones on piping plan.

15. Current City of Vallejo Water Notes and Standard

Drawings as applicable.

16. Location, size and point of connection to existing water distribution system.

17. Location, size and type of mainline valves and facility isolation valves.

3. Grading Plans - shall include note requiring the installation of an elevated (Klein) tank for temporary water service from a fire hydrant.

4. Landscaping Plans - shall indicate location and size of all taps, irrigation meters and backflow devices. Drought resistant species selection is recommended for all landscaping plans.

5. As-Built Plans - The Engineer shall submit 1 set of 24" x 36" reproducible, ink on mylar or photo mylar, "As Built" drawings for final record drawings. "As Builts" shall include all information derived from marked up "red lined" prints, design/build subcontractor drawings, electrical wiring diagrams and other pertinent job related data.

4.1.1.4 Fees - Water service will be provided by the City of Vallejo following completion of the required water system improvements and payment of applicable fees. Performance and payment bonds shall be provided to the City of Vallejo prior to construction of water system improvements. Fees include those fees specified in the Vallejo Municipal Code, and fees for tapping, tie-ins, inspections, disinfection, construction water, and other services provided by the City with respect to the water system improvements. The Water Superintendent may be contacted for description of applicable fees.

4.1.2 Pumping Plant Design Standards

4.1.2.1 General Layout

A. Upon entering pumping plant, normal control panel configuration shall be as follows:

1. a. Zone Schematic

b. Pumping Plant Piping and Main Valve Schematic

c. Wall Mounted Desk

d. Storage for all "As-Built" Drawings

2. Instrument Cabinet

a. Local flow and pressure recorders

b. Suction and discharge pressure switches and gauges.

c. Flow and pressure transmitters.

3. Remote Terminal Unit (RTU) Cabinet

4. Pumping Plant Control Panel

5. Auxiliary Panels (on large 4160 volt plants, auxiliary panel follows motor starters)

6. Motor Starters (in ascending numerical order, left to right)

B. All electrical panels (A.2 through A.6 above) shall be same height, depth, and color. (Except 5KV PG&E metering section depth.) All panel faces shall be flush with adjacent panels.

C. Electrical panels shall be on three (3) inch raised platforms.

D. Water tubing and electrical conduit shall be cast in concrete wherever practical. Underground piping and tubing within pumping plant footprint shall be concrete encased. Exposed tubing and conduit shall be minimal. Corrosion protection shall be provided.

E. Multiple zone pumping plants shall have separate metering, motor control, instrumentation, telemetry, and pumping hydrants.

4.1.2.2 Design Criteria

A. Maximum day demand shall be calculated as specified in Water System's Master Plan and Hydraulic Network Analysis, a 1985 report, including modifications, prepared for the City by Kennedy/Jenks/Chilton, Engineers.

1. Pumping plant capacity shall be 1.5 times maximum day demand.

2. Sole source of supply pumping plants at the top of zones shall have a capacity of 2.0 times maximum day demand.

4.1.2.3 Control Scheme

A. 480 volt pumps shall normally be controlled as detailed in City of Vallejo "Standard Control Panel Drawings (available upon request).

B. All pump shut-downs shall be initiated by ball valve

closure except emergency stop.

4.1.2.4 Electrical Equipment

A. Pumping Plant Control Panel

1. Standard pump control panel layout available by request.

2. Control cabinet shall be NEMA 12 with power supplied through main breaker and separate control panel transformer.

3. Standardized layout with pump identification label and switches numbered from left to right. (Detail Drawing available upon request)

B. Pumping Plant Instrument Panel

1. Instrument cabinet shall be NEMA 1.

2. Recorders shall be installed on the face of instrument cabinet door.

a. All recorders 7-day circular charts.
b. 4 to 20 mA dc input signal.
c. Single pen flow recorder.
d. Two pen suction and discharge pressure recorder.

3. All tubing and fittings shall be copper or brass except in-slab tubing shall be stainless steel.

C. Motor Starters

1. Motor starter cabinet shall be a NEMA 12.

2. Pump motor starters with large black Arabic unit identification numbers matching numbers on pump units.

3. An elapsed time meter shall be installed on the face of each motor starter cabinet to show operating time in hours for that motor.

4. Starters shall be circuit-breaker MCP type and magnetic contactor, 120 volt operating coil, with three (3) manual reset thermal overload relays and control transformers.

5. Solid state motor starter shall be used on 75 HP and larger.

6. Motor heaters shall be used on 75 HP and larger.

7. Conductors for all power and control circuits shall be copper.

8. Simultaneous motor starts shall be prevented through time delay interlocks.

9. Each pump shall have a red emergency stop button installed on the face of panel.

D. Auxiliary Panels

1. Auxiliary cabinets shall be NEMA 12.

2. Lighting panel

3. Circuit breakers, etc.

E. Outlet Boxes

1. Electrical receptacles shall be GFI protected and labeled with the corresponding circuit breaker code number. Receptacles shall be located 4' off of finished floor and at intervals not to exceed 15 feet.

F. Remote Terminal Unit

1. Remote Terminal Unit (RTU) shall be mounted inside the NEMA 12 cabinet.

2. RTU shall use 4 to 20 mA dc shielded two-wire system for analog variables and will transmit the following information.

a. Flow

b. Suction pressure with low alarm and cut-out.

c. Discharge pressure with low and high alarms and cut-outs.

d. Pumps "RUN" status

e. Entry alarm

f. High sump alarm (underground plants only)

g. Power fail

h. Communications failure

i. Pump fail

j. Surge relief alarm

k. Discharge valve fail to open with alarm and cut-out

l. Discharge valve fail to close with alarm and cut-out.

3. RTU shall receive the following information and, through voltage isolating relays, forward the signals to the pump motor controls:

a. Pump start commands: "PUMP REQUIRED"

b. Pump stop commands: "PUMP OFF"

c. RTU fail status: "COMM. FAIL"

4. RTU cabinet shall also contain:

a. Radio

b. Battery charger

c. Batteries, with low-charge indicator

d. Terminal strips

5. Antenna for underground pumping plants shall be mounted on a street lighting pole a minimum of 25' high.

G. Transmitters

1. Flow and pressure transmitters shall be mounted inside the instrument cabinet panel with blow-off tees at point of connection.

2. 4 to 20 mA dc output signal linear to flow

H. Plant Pressure Switches

1. Pressure switch(es) with surge chamber shall be mounted inside the instrument cabinet panel.

a. High discharge pressure switch for closed line valve.

b. Low discharge pressure switch for pipe break, low pressure, etc.

c. Low suction pressure switch for pipe break, low pressure, etc.

d. Pressure switches shall be metal bellows actuated type with blow-off tees at point of connection.

I. Transformer

1. Pad mounted and located at ground level.

2. Has rated capacity to run all pumps, including spare, simultaneously.

3. Screened to minimize visibility and noise, generally with landscaping except for special conditions.

4. Meets PG&E standards for location, protection, construction, etc.

J. Plant Voltage

1. Large pumps (250 H.P.) shall be 4160 volts.

2. Small pumps (under 250 H.P.) shall be 4 wire, 480/ 277.

3. Buried pumping plants shall have shunt-trip on master disconnect switch wired to high sump alarm.

4. 4160 volt pumping plants shall have amp meters with a selector switch for each phase and leg to leg voltage meters.

5. Phase failure protection.

6. Low-voltage protection.

K. PG&E Service

1. For services 200 AMPs and less, metering and disconnect switch shall be outside pumping plant.

2. For service greater than 200 AMPs, metering and a shunt-trip connected to master disconnect switch shall be outside pumping plant.

4.1.2.5 Mechanical Equipment

A. Pumps shall be vertical turbines.

B. Pump Identification

1. Large (4") black Arabic unit number shall be painted on motor on side visible from control panel.

C. Pump Control Valves

1. Motorized ball valves with handwheels shall be used on discharge piping 12 inches or smaller.

2. Motorized butterfly or ball valves with handwheels shall be used on discharge piping larger than 12 inches.

D. Pumps shall be equipped with a discharge, split-disc, wafer check valve.

E. Pressure surge anticipator valve shall be installed in a separate pipeline directly from discharge to suction to permit dead-end pumping when reservoir is out of service.

1. Surge anticipator shall be Bailey Model 417 with accumulator or approved equal and shall automatically open on power failure (when pumping) and then close slowly to reduce pressure surges.

2. The surge anticipator valve shall be set to open at 10 psi higher than total dynamic head.

F. Isolation valves shall be provided on the suction side of each pump inside the pump station. Isolation valves shall also be provided on the discharge side as required by the Engineer.

G. Sound Control Ventilation openings through exterior walls shall be provided with sound traps to minimize noise emitted.

H. Interior sound levels shall be limited to a maximum of 85 dBA at maximum day output conditions with fans and auxiliaries operating. Interior sound levels for one pump operation shall not exceed 81 dBA. When procuring pump motors, sound levels shall be specified consistent with best industry standards.

I. Flow meter shall be venturi.

J. Plant piping shall be welded steel with high build or fusion bonded epoxy coating and lining.

K. Pressure gauges shall be mounted inside the instrument cabinet with blow-off tees at point of connection.

L. Intake vents shall normally be located on north side of structure.

M. Plant piping shall use 45 degree bends wherever possible.

N. Instrumentation tubing shall be stainless steel and shall not contain any buried or concrete encased fittings.

O. A 1" diameter pitot tube tap shall be provided in each pump discharge line.

4.1.2.6 Structure

A. Pumping plants shall be constructed of non-combustible material normally cast-in-place concrete or reinforced masonry.

B. Pumping plant design, horizontal seismic "q" force shall not be less than 0.3q's.

C. Normally structures will be above ground, provided sufficient access is available (12 ft. high x 10 ft. wide) to allow removal of equipment.

D. All buildings shall be designed to limit outside noise levels at the property line to satisfy acceptable community requirements.

E. Access hatches shall be provided for removal of pumps and motors.

F. Below grade structures shall have waterproof coating and perimeter sub-drains.

G. Plants shall have trolley rails for removable hoists.

H. Provide drainage trench with sump pump or gravity piping to storm drain.

4.1.2.7 Painting

A. General

1. All Cal/OSHA requirements related to colors for safety will be met, i.e. overhead cranes, fire extinguishers, etc.

2. Metallic surfaces, not subject to direct sunlight shall be coated with polyamide epoxy (not alkyd enamel) unless incompatible with previously applied paints or primers.

3. Metallic surfaces subject to direct sunlight shall be coated with acrylic-aliphatic polyurethane.

B. Control panels, electrical panels, structural ceiling beams, doors and trim, service platform, support beams, and miscellaneous metal (except galvanized metal) shall be painted gray (ANSI 255.1-R1973).

C. Suction and discharge piping, pumps, and motor shall be painted safety blue (ANSI 253.1-1971).

D. Interior walls and ceiling shall be painted off white (TNEMEC color "Cloud" BF82).

E. Concrete

1. Above ground exterior walls shall be sealed with a urethane anti-graffiti coating.

2. Concrete roof shall be coated with liquid applied water proofing.

F. Galvanized metal, handrails, etc., shall not be painted.

4.1.2.8 Office and Records

A. A wall mounted desk shall be installed.

B. Two 11 x 17 schematics with standardized format, legend, size, etc., shall be installed on the wall above the desk:

1. Zone reservoir pumping plant relationships

2. Pumping plant piping with all valves identified Both schematics shall be framed and covered with a clear plastic or glass marking surface.

C. Provide one 24" x 36" ink on mylar or photo mylar reproducible set of "as built" drawings and six sets of prints.

D. Provide six bound sets of instruction, operation, parts, and maintenance manuals.

E. Provide complete written description of system operation including sequence of operation, emergency shut down, alarm set points, etc.

F. Provide six sets of submittals for City approval of all materials and equipment.

4.1.2.9 Site Work

A. Access

1. Pumping plant entrance shall be designed for ease of entry, maintenance, and safety.

2. Entrance to underground plants shall be outside street right-of-way.

3. Paved access to allow the City's boom truck to reach all pump access hatches shall be provided. Truck and crane specifications are available.

B. Parking

1. Paved off-street parking shall be provided for at least two maintenance vehicles and a fire truck.

C. Security

1. Pumping plant shall be enclosed with 6' galvanized link fence with 3 strands barbed wire located on or adjacent to the property line, wherever needed to protect above ground facilities. Single or dual gates shall be at least 12 feet wide.

2. All doors shall have local intrusion alarms telemetered to the filter plant.

3. Ventilation openings shall have tamper proof protective gratings.

D. Storm drainage shall be in accordance with Vallejo Sanitation and Flood Control District Standards.

E. Landscaping shall be used for aesthetics and shielding. The landscaping design shall comply with the City of Vallejo, "Hillside Planting Ordinance", as adopted 6 February 1978, and the City of Vallejo Standard Specifications for Public Improvements, Section 5.

F. Irrigation.

1. Irrigation water service shall be metered.

2. Irrigation systems shall be timer controlled.

3. Irrigation system shall have reduced pressure backflow prevention devices.

4. Drip irrigation shall be used for shrubs.

5. Bubbler type irrigation shall be used for trees until established.

4.1.2.10 Emergency Connections

A. All pumping plants shall have pumping hydrants.

1. Suction hydrant shall be City of Vallejo standard hydrant.

2. Discharge hydrant shall have three, 2 1/2 inch hydrant nozzles (female thread).

4.1.3 Reservoir Design Standards

4.1.3.1 Geotechnical

A. A preliminary field reconnaissance investigation and report shall be prepared to identify potential reservoir sites. Reconnaissance team shall include a City representative.

B. The preliminary field reconnaissance report shall include

the following:

1. A summary of the suitability and feasibility of each alternative site including a recommendation.

2. A topographic map indicating the location of landslides and the approximate trace of different types of rock formation.

3. General description of engineering properties of various formation types.

C. After City selection of a reservoir site, a site specific geotechnical report shall be prepared and include the following:

1. A minimum of three borings extending to at least 30 feet below the footing ring elevation.

2. A seismic refraction survey performed by a registered geophysical engineer.

3. Recommendations and detailing for site and reservoir underdrain system.

4. Recommendations on footing ring detailing i.e. should footing ring bear on bedrock or drain rock, etc.

5. Allowable bearing pressures.

6. Recommendation for seismic site "amplification factor" to be used by reservoir designer.

7. Recommendation for minimum acceptable distances from footing ring to edge of bedrock.

D. Reservoir site shall not be excavated closer than three feet from final grade unless reservoir footing ring construction will commence within 30 days or unless expressly permitted by the Geotechnical Engineer.

E. Geotechnical Engineer and City Engineer shall inspect and approve final excavation and verify "bedrock" condition prior to reservoir construction.

4.1.3.2 Site Work

A. Reservoir site shall be surrounded by a chain link fence.

1. Fence shall extend around top of reservoir cut slope and no closer than 12 feet from reservoir wall.

2. Fence shall be eight feet high and topped by a "V arm" with six strands of barbed wire and top rail.

3. A double swing lockable gate shall be provided with a width equal to the access road width or 12 feet, which ever is larger.

4. Fencing materials and installation shall be per Caltrans standards.

B. Access

1. Paved access roads to each reservoir site shall be provided.

2. A barrier gate shall be provided at the foot of access road.

3. A paved parking area large enough for at least two maintenance vehicles shall be provided at the reservoir.

4. Reservoir shall be encircled by a minimum 12' wide paved area.

5. Access roads shall meet the following criteria:

a. Maximum desired grade = 10%; maximum absolute grade = 15%. If possible, roadway should be level 30 feet in front of and 30 feet behind gate.

b. Minimum desired horizontal radius of curvature = 100 feet; minimum absolute horizontal radius of curvature = 60 feet.

c. Minimum vertical curve length shall vary linearly from 20 feet at 5% grade break to 100 feet a 20% grade break.

d. Minimum aggregate base thickness = 8 inches. Minimum AC thickness = 3 inches.

e. Guard rails shall be provided if side slopes exceed 2:1 and vertical drops exceed 30 feet.

C. Site Drainage

1. General

a. Storm drain system including drop inlets shall conform with Vallejo Sanitation and Flood Control District standards.

b. Storm drain system shall be designed to convey the largest of the following flows:

i. Design criteria for the area drained shall be as specified by Vallejo Sanitation and Flood Control District.

ii. Full pumping plant capacity.

iii. 24-hour emergency reservoir drain.

c. Minimum size storm drain shall be 12 inches. Minimum cover shall be three feet.

d. Concrete "V" ditches shall be max 9" deep and have 1-1/2:1 maximum side slopes. (See Drawing 2-7)

2. Access Road

a. Concrete reinforced "V" ditches or concrete curb and gutter shall be provided on the cut slope side of access roadway.

b. Access road surface shall slope continuously at 2% minimum toward concrete "V" ditch or curb and gutter.

c. Access road drop inlets shall be provided at a maximum spacing of (350) three hundred fifty feet.

3. Reservoir

a. Concrete reinforced "V" ditches or concrete curb shall be provided around the outside edge of reservoirs perimeter paving.

b. Perimeter paving shall slope continuously away from tank at 2% minimum.

c. Perimeter drains shall discharge into storm drain system.

D. Landscaping

1. The landscaping design shall comply with the City of Vallejo, "Hillside Planting Ordinance", as adopted 6 February 1978, and the City of Vallejo Standard Specifications for Public Improvements.

2. Visual screening of the reservoir shall be accomplished using Coast Live Oak (Quercus Agrifolia) planted in a random pattern with a maximum center to center spacing of 40 feet. Trees shall be in 5 gallon containers.

3. Planting between Coast Live Oaks shall consist of native shrubs and trees selected from the following list:

a. California Bay Trees (Umbellularia california)

b. California Lilac (Ceanothus arboreus)

c. Flannel Bush (Fremontodendron californicum)

d. Valley Oak (Quercus lobata)

e. Blue Oak (Quercus douglasii)

f. Santa Barbara Ceanothus (Ceanothus impressus)

g. Blue Blossom Ceanothus (Ceanothus thyrsiflorus)

h. Tan Bark Oak (Lithocarpus densiflorus)

i. Red Cedar (Calocedrus decurrens)

Shrub and tree planting shall have maximum center to center spacing at 10 feet.

4. All landscaping shall be planted inside of the perimeter fence line.

5. Minimum clearance between the center of a planting pit and the fence line, or edge of pavement shall not be less than 15 feet.

6. An irrigation pump shall be provided (unless higher zone pressure is available).

7. Irrigation water service shall be metered.

8. Irrigation system shall have reduced pressure backflow prevention devices.

9. Irrigation system shall be electric timer controlled.

10. Irrigation shall be installed as per City of Vallejo detail drawings for drip emitters or as adjustable bubbler heads.

11. Irrigation pump and reduced pressure backflow prevention device shall be located inside valve pit.

4.1.3.3 Structure

A. Reservoir shall be wire wound prestressed concrete designed and constructed in accordance with the latest edition of AWWA D110 and ACI 344R.

1. Reservoir shell shall not be pre-cast concrete.

2. A minimum of 2" of shotcrete cover shall be provided over prestressing wire.

3. "Die-drawing" will not be permitted for inducing prestress force.

4. Diaphragm and prestressing wire shall be hot-dip galvanized.

B. Seismic design shall be in accordance with the latest edition of AWWA D110 Appendix A, except:

1. Horizontal seismic force shall not be less than 0.3 g's.

2. Importance factor for sole source of supply reservoirs shall equal 1.33 (I-1.33).

C. Calculations shall indicate that the horizontal and vertical foundation forces do not exceed soil allowables.

D. A minimum of 3 copies of structural calculations shall be submitted.

E. Reservoir volume criteria shall be as specified in **Water Systems Master Plan and Hydraulic Network Analysis**, a 1985 report prepared for the City by Kennedy/Jenks/Chilton Engineers.

F. Removable steel appurtenances within reservoir shall be seal welded and hot dip galvanized.

G. Non-removable appurtenances within reservoir shall be 316 stainless steel except I & O pipeline and overflow.

H. Corrosion protection between dissimilar metals shall be provided.

I. Interior and exterior ladders shall meet OSHA standards. Ladder anchor bolts shall be stainless steel.

Reservoir drain and overflow shall be designed to convey the largest of the following flows:

i. Full pumping plant capacity.

ii. 24 hour emergency reservoir drain.

J. A 4' x 6' aluminum roof access hatch shall be cast into a raised concrete curb.

K. Reservoir underdrain and leak detection piping shall slope continuously to storm drain system.

L. Leak detection piping shall section reservoir floor areas as follows:

1. 3 MG or less, floor shall be sectioned into 90 degree wedges.

2. More than 3 MG floor shall be sectioned into 45 degree wedges.

4.1.3.4 Altitude Control Valve

A. Structure

1. Valve pit shall be constructed of cast-in-place concrete.

2. Valve pit shall be covered with pre-cast removable panels weighing no more than 5,000 lbs. each.

a. A flush aluminum access hatch shall be cast into one panel.

b. Panels shall be designed to provide passive ventilation of valve pit.

c. Panels shall be provided with a lifting device at each corner.

3. Valve pit shall have access ladder.

4. Valve pit shall have floor drain piped to storm drain system.

B. Mechanical Equipment

1. I & O pipeline shall have a check valve with a smaller by-pass that contains the altitude valve.

2. Reservoir check valve shall be wafer split disc type with two half discs hinged on a vertical shaft.

3. Isolation valves shall be provided on both sides of check valve and altitude valve.

a. Valves shall be butterfly valves with handwheel operator.

4. Altitude valve shall be a hydraulic cylinder operated butterfly valve. Valve operating torque shall be as specified in AWWA C504, Table 4, Class 25B.

a. Hydraulic cylinder shall operate at 80% of shut-off pressure.

b. Altitude valve control strainer shall be 1 1/2 inch brass w/8 mesh brass screen and mounted 0.25 feet below overflow.

5. A 0-50 foot altitude gauge shall be installed level with the footing ring and so it may be easily read from outside valve pit.

6. Sample tap hose bib shall be located so it may be easily operated from outside valve pit.

7. I & O line shall have two 2" taps on the top of the pipe a minimum of 12' apart. The tap closest to the tank shall have a bronze gate valve, the other tap shall have bronze corporation stop.

C. Electrical Equipment

1. Waterproof light and switch shall be provided.

2. A G.F.I. protected electrical receptacle shall be provided.

4.1.3.5 Control Scheme

A. Reservoir levels shall normally be maintained by pumping plants remotely controlled from Fleming Hill Filter Plant.

4.1.3.6 RTU and Electrical Cabinet

A. Reservoir shall have underground electrical power with a minimum of 50 amps at 120/240 volts single phase.

B. Combined remote terminal unit and power cabinet.

1. Cabinet shall be approximately 48" wide; 18" deep and 72" high NEMA 3R gasketed enclosure.

2. Level transmitter shall be located inside valve pit.

3. Cabinet shall have three inner compartments with a hinged interior door. Cabinet shall be as detailed in "City of Vallejo" Standard Reservoir Control Cabinet.

a. Upper half RTU

b. Lower half Power Panel

4. Cabinet shall have interior light.

C. Remote Terminal Unit

1. Remote Terminal Unit (RTU) shall be mounted on interior mounting pan.

2. RTU shall use shielded 4 to 20 mA dc two-wire system for analog variables and will transmit the following information:

a. High level alarm

b. Low level alarm

c. Level indicator

d. Power failure alarm

e. Communication failure alarm

f. Reservoir, valve pit or cabinet entry alarm

3. RTU cabinet shall also contain:

a. Radio

b. Battery charger

c. Batteries

d. Terminal strips

e. Thermostatically controlled space heater

D. Power Panel

1. Single phase, three wire 120/240 with solid neutral bus

2. 100 amp bus with solderless connector for 12 circuit breakers

3. Irrigation timer shall be located in power compartment

E. Outlet Boxes and Conduits

1. A GFI protected electrical receptacle shall be provided.

2. A 1" SCH 80 electrical conduit shall be run on the reservoir inside wall for antenna and intrusion alarm.

4.1.3.7 Filling and Disinfection

A. Preparation

1. All visible cracks in the floor and cove area are to be chiseled out and repaired with an approved patching or injection epoxy material.

2. All interior work is to be completed.

3. The interior of the reservoir is to be thoroughly cleaned and shall comply with AWWA D105-80, Section 2.

4. After final cleaning, the developer shall give the City 7 day written notification that the facility is ready for disinfection and filling.

B. Backflow Protection

1. The City of Vallejo Water Superintendent has designated new reservoirs to be high hazard facilities.

2. Protection of the existing water system shall be accomplished through the use of a reduced pressure backflow device or an approved air gap system.

C. Filling

1. The contractor shall be completely responsible for providing all necessary, pumps, fittings, hoses and related appurtenances for filling the reservoir.

2. The contractor shall submit a complete description of the proposed system including an 8 1/2 x 11 scale drawing showing the reservoir, the backflow device, pump, piping, valves, etc.

3. The City will provide water for filling the tank one time only. If the tank fails its leakage test and is drained for repairs, the City will charge the developer or contractor for the cost of the water to re-fill the tank.

4. The City will provide water at a flow rate of approximately 500 gpm during normal working hours only. Greater flow rates or extended hours are subject to the approval of the Water Superintendent.

D. Disinfection

1. After expiration of the 7 day written notification and formal approval of the proposed filling system, the contractor may proceed with disinfection.

2. The disinfection procedure used shall comply with AWWA D105-80, methods 2 and 3 as described in Sections 4.2, 4.3 and C652.

4.1.3.8 Leakage & Bacteriological Testing

A. Leakage Test

1. Allowable leakage shall be as specified in AWWA D-110, Section 4.13.

2. All visible leaks shall be repaired.

B. Bacteriological Test

1. After the reservoir has passed its leakage test it shall be sampled and tested by the City in accordance with the latest regulations governing potable water. At that time, the chlorine residual will be tested.

C. Tie-in and removal of backflow protection will be permitted following successful test results and 48 hour written notice to Water Maintenance.

4.1.3.9 <u>Painting</u>

A. General

1. Reservoir exterior surfaces shall be coated above grade with 2 coats of Tnemec Series 156 "Envirocrete" and below grade with 2 coats of "Sikapruf Membrane" or approved equal.

2. Metallic surfaces not subject to direct sunlight shall be coated with polyamide epoxy (not alkyd enamel) unless incompatible with previously applied paints or primers.

3. Metallic surfaces subject to direct sunlight shall be coated with acrylic aliphatic polyurethane.

B. Reservoir exterior shall be painted "Vallejo Smoke" (TNEMEC #156-D1010) or Sherwin Williams #MC-67.

C. Electrical panels and miscellaneous metal (except galvanized metal) shall be painted gray (ANSI Z55.1-R 1973).

D. Valve pit piping shall be painted safety blue (ANSI Z53.1-1970).

E. Exterior of precast panels shall be coated with liquid applied water proofing.

F. Galvanized metal, handrails, etc., shall not be painted.

4.1.3.10 Records

A. Provide a 24" x 36" reproducible set of in on Mylar, or photo mylar, "As-Built" drawings and six sets of prints within 90 days of completion of project. The contractor shall maintain a set of red-lined "As-Built" drawings on the job-site at all times. "As-builts" shall be signed by City inspector prior to acceptance of project.

B. Provide six bound sets of instruction, operation, parts, and maintenance manuals.

C. Provide complete written description of system operation including sequence of operation, emergency shut down, alarm set points, etc.

D. Provide six sets of submittals for City approval of all materials and equipment.

4.2. Material Standards

4.2.1. Ductile Iron Pipe - All ductile iron pipe 6 inches and greater in nominal internal diameter shall be manufactured in nominal 18 foot laying lengths and conform to ANSI/AWWA Specifications C-150, A 21.50-81, C-151, A 21.51-81 and Erratum, and unless otherwise called for by the approved plan or in the Special Provisions of the Specifications, be the thickness class hereinafter indicated for the various internal diameters:

4" diam. -thickness Class 51 or better

6" through 20" -thickness class 50 or better

Ductile iron pipe shall be lined with cement mortar in accordance with the requirements of the "American National Standard for Cement Mortar Lining for Cast Iron and Ductile Iron Pipe and Fittings for Water" (ANSI A21.4 AWWA C104) except that lining thickness shall be not less than 3/16 of an inch for pipe smaller than 24 inch diameter and 1/4 of an inch for pipe 24 inch diameter and larger.

All ductile iron pipe materials furnished and/or delivered pursuant to these specifications shall be manufactured with one bell and one spigot end for push on joint assembly (Tyton type joint or approved gasket to effect the joint seal conforming to ANSI Specification A21.11-80 (AWWA C111). Not less than one (1) rubber gasket shall be furnished with each length of pipe simultaneously with the delivery of the pipe.

Ductile iron pipe shall be installed in accordance with the "American National Standard for Installation of Gray and Ductile Cast Iron Water Mains and Appurtenances" (ANSI/AWWA C600). Buried pipe shall be polyethylene encased in accordance with the "American National Standard for Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids" (ANSI A21.5/AWWA C105).

4.2.2. Polyvinyl Chloride Pipe

4.2.2.1 PVC Treated Water Mains - All PVC pipe for treated water mains shall comply with AWWA Standard C900 Class 200 DR-14 for pipes 12 inches and smaller in diameter and shall conform with AWWA Standard C905 PR 235 DR 18 for pipes 14 inches in diameter and larger.

4.2.2.2 PVC Raw Water Mains - All PVC pipe for use as raw water mains shall conform with AWWA Standard C900 Class 150 DR 18 for pipes 12 inches and smaller in diameter and shall conform with AWWA Standard PR 165 DR 25 for pipes 14 inches in diameter and larger.

All **PVC raw water piping shall be purple color** coded for use as non potable reclaimed/reuse pipe. Each pipe shall be **marked on opposite sides to read " Caution Reclaimed Water - Do Not Drink "** in intervals not to exceed 5 feet. The height of the print is as follows: 2" through 24" diameter pipe - 3/8" high letters.

4.2.2.3 All PVC pipe shall be manufactured in nominal twenty (20) foot laying lengths with push-on joint assembly employing a single continuous rubber gasket to effect a joint seal. The wall thickness of the bell in the gasket groove and bell entry section

shall be not less than that of the pipe barrel. The outside diameter of pipe barrel shall conform with that of ductile iron pipe.

4.2.2.4 When PVC pipes are installed with butterfly valves, the inner wall of the PVC pipe shall be beveled in such a manner as to provide enough clearance for the valve disc to clear the said inner wall during the valve's closing and opening operation.

4.2.3 Main Pipeline Fittings - All main pipeline fittings shall conform to ANSI Specification A21.10-82 (AWWA C110 or C153).

4.2.3.1. All fittings for ductile iron pipelines shall be ductile iron, coated on the exterior with a protective coating of standard tar varnish and lined on the interior with a bituminous seal coated cement mortar lining. All fittings shall be pressure rated at not less than 350 psi and be manufactured for Push-on joint assembly employing a single continuous rubber gasket to effect a joint seal (**Tyton or Griptite**), or Mechanical Joint conforming to ANSI/AWWA C111/A21.11.

4.2.3.2. All cast iron flange fittings shall be furnished with Class 125 flanges per ANSI/AWWA C115/A21.15 for use with Class 250 cast iron pipe, except on mainlines where the working pressure exceeds 150 psi.

4.2.4. Fire Hydrants - All fire hydrants shall be James Jones Company, El Monte, CA, Model 4060; or Clow Corp., Series Model 900; or Long Beach, CA, Model No. 615; or Mueller Co., Decatur, Illinois, Model A481; no substitutes. Equipped with plastic caps, having two 2-1/2" hose outlets and one 4-1/2" hose outlet (National Standard Hose Thread) including "break-off" hydrant bolts, nuts and gaskets.

Fire hydrant burys shall be Mechanical Joint, cement lined, six holes with accessories. Fire hydrant extensions shall be machined grooved, cement lined, six holes with the following accessories: one gasket and six low alloy steel bolts and nuts.

4.2.5 Valves

4.2.5.1. Gate Valves - All valves 10" diam. and smaller shall be resilient seat gate valves conforming to AWWA C509 and C550. Valve I.D. shall be nominal or larger.

1. Cast iron or ductile iron body with "push-on" Tyton type joints or Mechanical Joints (MJ), suitable for buried insulation. Fire hydrant valves shall be flanged x MJ.

2. All interior and exterior ferrous surfaces shall be lined and coated with factory applied epoxy in accordance with AWWA C550. Minimum thickness shall be 8 mils.

3. Bronze or stainless steel mounted resilient rubber encapsulated disc or seat.

4. Stationary stem with O-ring type seal 2 inch square operator non rising stem.

5. Valve shall open left (counter clockwise). Acceptable manufacturers: American Darling, Clow, U.S. Pipe, M & H, Mueller, Kennedy, or Waterous. No substitutes.

4.2.5.2. Butterfly Valves - Valves 12" and larger shall be butterfly valves conforming to AWWA C504 Class 150b.

1. Cast iron or ductile iron body with flange or MJ type joints.

2. All interior and exterior ferrous surfaces shall be lined and coated with factory applied epoxy in accordance with AWWA C550. Minimum thickness shall be 8 mils.

3. Valves 24" diameter and larger shall have mechanically retained seats that are field adjustable and replaceable. Adjusting segments and retainer screws shall be 316 stainless steel. Seat mating surface shall be 316 stainless steel or monel.

4. Valve shafts for 24" diameter and larger valves shall be 316 stainless steel. Stub shafts or through shafts are acceptable. The valve shaft/disc connection shall be made through the use of on-center taper pins and lock nuts. The taper pins and lock nuts shall be of the same materials as the valve shaft. The material shall be 316 stainless steel.

5. Valve shall have a 2" sq. operating nut and shall open left (counter clockwise).

6. When PVC pipes are installed with butterfly valves, the inner wall of the PVC pipe shall be beveled in such a manner as to provide enough clearance for the valve disc to clear the said inner wall during the valve's closing and opening operation.

Acceptable manufacturers: Pratt "Groundhog", Mueller "Line Seal", American Darling, Kennedy, Waterous, and M & H. No substitutes.

4.2.5.3. Tapping Valves - Shall be generally the same specifications as for gate valves, except that they shall be flanged on one end with conventional Mechanical Joint on the opposite end. The valve shall be Mueller A-2370-16 or approved equivalent models of American Darling, Clow, U.S. Pipe, Waterous, Kennedy, or M & H. No substitutes.

4.2.5.4 Check Valves - All check valves not exceeding twelve

inches (12") in size to be installed in main pipelines shall be iron or ductile iron body, BUNA-N rubber seat, bronze or stainless steel mating surface, equipped with outside lever and adjustable sliding weight. They shall be manufactured with flanged ends for jointing. The check valves shall be Mueller A-2602-6-01 as manufactured by the Mueller Company of Decatur, Illinois, or APCO No. 6000 CLW as manufactured by the APCO Valve and Primer Corporation.

The Check valves shall be lined and coated with a minimum of 8 mils of factory applied epoxy.

4.2.5.5. Flanged Valves - Flanged valves shall be as specified above for gate and butterfly valves except flanged valves shall be flat-faced without projections or raised face. Face shall be smooth or may have serrated finish of approximately 32 serrations per inch, approximately 1/64 inch deep.

4.2.5.6. Valve Extensions - When the top of the valve nut is greater in depth than four feet (4') from the valve box lid, the valve nut must be equipped with a steel or ductile iron valve extension coated with an asphalt varnish that will bring the valve nut to a point two feet (2') in depth from the valve box. All valve extensions must be equipped with a "centering ring" located 6" below the nut, which will place the extended valve nut in the center of the valve riser.

4.2.6 Tapping Sleeves and Accessories

4.2.6.1. Mechanical Joint type tapping sleeves shall be used for all taps into existing mains. Bolts shall be low alloy steel with heavy hex nuts. Approved MJ tapping sleeves are "Mueller #H-615/#-H616," for Cast Iron, Ductile Iron Pipe, and PVC C900 Pipe; and Mueller H-619 for Asbestos Cement Pipe or approved equal.

4.2.6.2. Reserved

4.2.7 Couplings and Adapters, Mainline

4.2.7.1. Mechanical Joint solid-sleeve type couplings Shall be used for all spigot to spigot pipe connections in all new main installations. Mechanical Joint (M.J.) sleeves shall comply with AWWA C110 Table 10.10 or C153 Table 53.5. The pressure class shall be 350 psi. In cases of differing pipe O.D.'s, an M.J. transition sleeve shall be used. For transition couplings larger than 12" diameter, submit manufacturers specification data for approval.

4.2.7.2. Flange x M.J. Connecting Piece - Where underground flanged connections occur, the transition from plain end pipe to a flanged connection shall be accomplished using an AWWA C110 Flange x M.J. connecting piece as listed in Table 10.13. The pressure class for connecting pieces shall be 250 psi, the flange drilling pattern shall match ANSI Class 125.

4.2.7.3. Flange Coupling Adapters - Cast iron F.C.A.'s are permitted in manhole or vault type installations where minimal laying length dimensions are required. Acceptable manufacturers are Rockwell #912, Dresser Style #127 or Ford Style FFCA.

4.2.7.4. Repair Couplings for Existing Mains

1. Compression Cast Couplings - Compression cast couplings shall be Rockwell 441 or approved equal, for ductile

iron pipe and shall be furnished with compound rubber gaskets, 5/8" low-alloy steel bolts with no less than six (6) low-alloy steel hex head bolts and nuts for each coupling. The overall length of each coupling shall be not less than six (6) inches.

2. Full Circle Clamp Couplings - Full circle clamp couplings shall be Rockwell 227 super range double band full circle or approved equal. Each clamp shall have adequate O.D. range to repair all classes of ductile iron pipe in one nominal pipe size. Lugs shall have mutually supporting sliding fingers and shall be firmly attached to the double stainless steel bands by a coining process during the closing operations. The stainless steel armor plate shall be recessed flush into the gasket. All bolts and nuts shall be low alloy steel.

3. Mechanical-Type Couplings - Mechanical-type couplings shall be designed for a water working pressure not less than 150 psi and shall be equipped with Grade H rubber gaskets. All ferrous surfaces shall be fusion bonded epoxy lined and coated. Couplings shall be Gustin-Bacon or Victaulic Style 44 when pipe ends are grooved. Buried or submerged couplings shall be provided with low-alloy steel bolts and nuts.

4.2.8 Service Pipe

4.2.8.1. Copper Service Pipe - Copper service pipe shall be soft annealed type K made in conformance with the following specifications:

1. Federal Specification W W-T799.

2. ASTM Specification B 88-55.

3. AWWA Specification 75-CR.

4. All copper service pipe shall be furnished in 60 foot coils except 1-1/2" and 2" diameter which shall be furnished in 20 foot lengths. **1-1/2" and 2" coils shall not be permitted**. Splicing of service pipe is not permitted except where the

distance between the main and the meter exceeds 60 feet for 3/4" and 1" services, or 20 feet for 1-1/2" and 2" diameter services.

4.2.8.2. Brass Service Pipe - All red brass pipe shall comply with AWWA C-800.

4.2.9 Service Fittings - All service fittings shall comply with the latest edition of AWWA C-800. Acceptable manufacturers are James Jones Company of El Monte, CA; Ford Meter Box Company of Wabash, Indiana; Mueller Co. of Decatur, Illinois. Flared or compression fittings are permitted on 3/4", 1", 1-1/2" and 2" diameter services.

4.2.9.1. Corporation Stops, 3/4" and 1" - Shall be Corporation Stop (C.C.) for D.I.P. and PVC mains. Shall be iron pipe thread on concrete cylinder mains.

J. Jones: J-1500, J-1505 (Flared) or J-3401 SG, J-3403 SG (Compression); Ford: F-600 (Flared) or F1000 (Compression), F-700 (Flared) or F-1100 (Compression); Mueller: H15000, H-15025 (Flared) or H-15008, H-15028 (Compression). Inlet thread of each catalog number is C.C. Thread, or Iron Pipe Thread, respectively. No substitutes.

4.2.9.2. Corporation Stops, 1-1/2" and 2" - CC thread on D.I.P. & PVC mains shall be iron pipe thread on concrete cylinder mains.

J. Jones: J-1930, J-1929 (Flared), or J-1937 SG, J-1935 SG (Compression); Ford: FB-600, FB-700 (Flared), or FB-1000, FB-1100 (Compression); Mueller H15000, H-15025 (Flared), or H-15013, H15023 (Compression). Inlet thread of each catalog number is C.C. Thread, or Iron Pipe Thread, respectively. No substitutes.

4.2.9.3. Unions, 1-1/2" and 2", Flare and Compression

Unions are permitted only when the length of a 1-1/2" or 2" service run exceeds 20 linear feet. James Jones: J-2609; Ford: C44-66 (1-1/2"), C44-77 (2"); Mueller: H-15403. Each catalog number is for Flare and Compression, respectively. Unions are not permitted in 3/4" or 1" diameter service runs that are less than 60 linear feet.

For service runs greater than 60 linear feet on 3/4" or 1" service: James Jones J-2609; Ford C44-33 (3/4"), C44-44 (1"); Mueller H-15403. Each catalog number refers only to Compression fittings. No substitutes.

4.2.9.4 Adapters

IPT X Flare

James Jones: J-1531; Ford: C28-XX; Mueller: H-15425, No

substitutes.

IPT X Compression

James Jones: J-2605 SG; Ford: C-85-XX; Mueller: H-15428. No substitutes.

4.2.9.5. Quarter Bends, Flared Copper

On 1" and 2" air relief valve assemblies, the corporation stop IPT outlet and 90 degree threaded elbow may be replaced with a standard corporation stop and flare outlet quarter bend. J. Jones: J-1536; Ford: L21-XX; Mueller: H-15460, or H-15045 (Corporation Stop, Quarter Bend combination). No substitutes.

4.2.9.6. Curb Stops 3/4" and 1"

Shall be angle meter stop ball valve design with meter nut outlet and lockwing. James Jones: J-1964W, J-1963W SG; Ford: BA23-332W (3/4"), BA23-444W (1"); Mueller: B-24255, B-24258. Each catalog number cited is for Flare and Compression, respectively. No substitutes.

4.2.9.7. Angle Meter Ball Valves 1-1/2" and 2"

Shall be angle meter stop ball valve design with lockwing, and with IPT, Flared, or Compression inlet and meter flange outlet. Those with IPT inlets are James Jones: J-1974W; Ford: BFA13-666W (1-1/2") and BFA13-777W (2"); Mueller: B-24286, or Compression inlets, Mueller B-24276 or approved equal.

4.2.9.8. Curb Stops Air Relief/Blow-off Assemblies

James Jones: J-1900; Ford: B11-xxx; Mueller: H-10203. No substitutes.

4.2.10 Service Saddles

4.2.10.1 General - Bronze service saddles are required for all taps into PVC mains and for all 1-1/2" and 2" service taps into Ductile Iron Pipe (D.I.P.) mains. D.I.P. mains 4" and larger may be direct tapped only for 3/4" and 1" diameter services.

4.2.10.2. Double Strap Bronze Service Saddles - Shall be double strap , four bolt type. James Jones: J-979 (CC); Ford: Style 202B; Mueller: H-16123 through H-16137; Rockwell/Smith-Blair: Type 323 (CC). No substitutes.

4.2.11 Valve Boxes - Valve boxes shall be reinforced concrete adjustable traffic type, Model #G5 with a machined cast iron lid and ring seat rattle proof lid without danger of lid pop off in heavy traffic, as manufactured by Christy Concrete Products,

Inc., Fremont, CA.; or Bes Concrete Products, Tracy, CA. Each cover shall be cast with a recessed lettering "Water" across the upper face. No substitutes.

4.2.12 Water Meter Boxes - All water meter boxes shall be of high density reinforced concrete with non-settling shoulders positioned to maintain grade and facilities backfill. Lids shall be reinforced concrete with recessed lettering "Water Meter" marked across each lid as manufactured by Christy Concrete Products, Inc., Fremont, CA.; or Bes Concrete Products, Tracy, CA. No substitutes.

All water meter boxes shall be sized correspondingly with the following water meters:

Meter Size	Water Meter Box
3/4"	B-16
1"	
1-1/2"	
2"	
4"	"Christy R33" pit with R33-52H lid
6" and larger	as specified by the Engineer

4.2.13 Air Release Valves - Combination Air Vacuum (CAV) valves shall be of the size shown and shall have flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and all moving parts shall be constructed of Type 18-8 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be lined and coated with a minimum of 8 mils of factory applied epoxy. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise shown. Valves shall be the type that purges air from the system at start up, and vent small pockets of air while the system is pressurized and prevent critical vacuum conditions during draining of the system, and shall be "Standard Combination Air Valves, Bulletin #623," as manufactured by APCO Valve and Primer Corporation; or Crispin; or G.A. Industries, Inc.; or approved equal.

4.2.14 Gaskets and Bolts

4.2.14.1. Except as otherwise provided, gaskets for flanged joints shall be 1/16 inch thick. Asbestos gaskets shall not be permitted.

4.2.14.2. Except as otherwise provided, bolts shall be of low-alloy steel.

4.2.15 Polyethylene Wrap - All ductile iron pipe, ductile iron fittings and all bolted fittings shall be wrapped in 8 mils of

polyethylene in accordance with AWWA C105. Polyethylene shall normally be supplied by the pipe manufacturer unless otherwise permitted by the engineer. Valves and fittings shall be double wrapped to 16 mil (min.). On PVC mains, the polyethylene wrap shall extend 12" onto the barrel of the pipe. All openings shall be securely taped. Service saddles on all pipes shall be double wrapped with polyethylene and securely taped.

4.2.16 Dielectric Fittings and Coatings for Cathodically Protected Pipelines, Valve Pits, and Pump Stations

4.2.16.1. General - Brass, copper and stainless steel shall be kept electrically isolated from ductile iron and low alloy steel. Eliminate points of direct metallic contact through the use of insulating bushings, PVC Sch. 80 nipples, insulating couplings, or other approved insulating system. Also isolate nonferrous pipe from steel supports and pipe straps by means of insulating sleeves or dielectric tape.

4.2.16.2. Threaded Bushings - Shall be PVC.

4.2.17 Insulating Flanged Joints - Insulating flanged joints shall be provided between D.I.P., Steel Pipe, and Concrete Cylinder Pipe. Insulating flanged sets shall have laminated phenolic gaskets and shall be provided with laminated phenolic sleeves and washers. Plain phenolic flange kits shall have 1/16" back-up gaskets on each side of the phenolic gasket to aid in sealing. Acceptable manufacturers are "CALPICO" of So. San Francisco and P.S.I., Pipeline Seal & Insulator Inc., of Houston, Texas.

4.2.18 Tape & Mastic

4.2.18.1. Tape - Materials and method of application shall comply with AWWA C209. Tape shall be 10 mil (minimum) polyvinyl tape, half lapped to provide 20 mils of coating. All miscellaneous metals shall be protected from direct contact with soil or concrete. Acceptable manufacturers: Polyken Technologies, Pacific Pipeline Products, Emeryville, CA; CALPICO Inc. of San Francisco, CA; Scotchwrap, 3M Company, St. Paul, MN.

4.2.18.2. Mastic Coating - All buried metallic appurtenances (bolts, nuts, tie-rods, clamps, brackets, etc.) shall be coated with cold applied, self priming, "Bitumastic." Minimum dry thickness shall be 16 mils. Mastic shall comply with V.O.C. requirements as established by Bay Area Air Quality Management Standards.

Where metal is partially embedded in concrete (fence posts, risers, brackets, etc.) wrap pipe with tape, or coat with "Bitumastic," for a minimum distance of 3" into concrete and 3" exposed. Acceptable manufacturers: Protecto Wrap CA1200; GACO NA-62 with GACO NA-62 Prime Coat; Tapecoat TC Mastic; Royston A-51; Koppers Bitumastic No. 50; Polyguard CA14.

4.2.19 Backfill

4.2.19.1. General - Subsequent backfill material, above the pipe zone shall comply with the Standard Typical Trench Backfill (Dwg #3-19) and Section 3 of these specifications.

4.2.19.2. Sand - Sand backfill is required in the pipe zone of polyethylene encased D.I.P. Sand quality and gradation shall comply with PG&E and PacBell standards for joint trench backfill in the City of Vallejo.

4.2.19.3. Class II AB, 3/4" - The pipe zone of all PVC pipe, copper services, valve risers, meter boxes and other pipeline appurtenances shall be backfilled with 3/4" Class II Aggregate Base as specified in Section 26-1.02B in the Standard Specifications.

4.3 CONSTRUCTION STANDARDS

4.3.1 General

4.3.1.1. Earthwork - Earthwork shall conform to Section 19 of the Standard Specifications and as supplemented herein.

4.3.1.2. Compaction Test - Compaction tests shall be required on all engineered fills, subgrade, subbase course, base course and trench backfill. The project soils engineer shall furnish to the City test results in written form before the contractor will be permitted to proceed with subsequent work and only if the compaction tests meet the relative compaction requirements for the particular course under consideration.

4.3.1.3. Grading Over Watermains - No excavation or fill shall take place over an existing watermain which will result in a cover depth over the same main of less than two (2) feet or greater than five (5) feet unless specifically approved by the City Engineer.

4.3.1.4. Clearing and Grubbing - Attention is directed to Section 16 of the Standard Specifications and as specified herein.

4.3.1.5. Construction Water - Furnishing and applying water shall conform to Section 17 of the Standard Specifications as modified herein. It is the contractor's responsibility to make

arrangements for a temporary water meter for use in obtaining construction water from the City water system.

Contact: Office of the Director of Public Works Water Division
(707) 648-4307

"Evasion of payment for water; tapping or injuring pipes or meters is a misdemeanor and is punishable by fine or jail or both." (Section 499, California Penal Code, 1970 Supplement)

4.3.1.6. Dust Control - Attention is directed to Section 18 of the Standard Specifications as modified herein, and to Section 2.5.7. of these Specifications concerning dust control.

4.3.1.7. Hours of Work - (See Section 1.1.10 of these specifications)

4.3.1.8. Traffic Control

1. General - Traffic control shall meet the requirements of State of California Department of Transportation, Manual of Traffic Controls for Construction and Maintenance Work Zones, 1985 and Work Area Traffic Control Handbook.

2. Traffic Control Plan - Three weeks prior to excavation, the contractor shall submit for approval, a detailed traffic control plan to the City Traffic Engineer. The plan shall identify locations and types of devices, dates and times of work, and other pertinent data as required by the Engineer.

3. Posting and Notification - The Contractor shall post the construction area at least one week prior to the start of construction, advising the public of the work to be done.

The Contractor shall notify the adjacent private property owners and/or lessees of the construction work area, at least 48 hours prior to beginning work in that area. These notices shall describe the nature of the work, the traffic control measures and anticipated driveway closures, and the approximate duration of the work in that area.

4. Lane Restrictions - The contractor may restrict traffic to one (1) 12-foot traffic lane between 8:30 a.m. and 4:00 p.m. At all other times, the two (2) existing traffic lanes shall be open for traffic throughout the work area.

Whenever the traveled way is reduced to one lane or when equipment is impeding or crossing a lane of traffic, the following conditions shall be met:

1. Proper traffic control shall be in effect at all times as described in the State of California Division of Highways pamphlet, Instructions for Flagmen.

2. There shall be two (2) full-time flagpersons, one at each end of the work area. Each flagperson shall be equipped with a red vest, "STOP/SLOW" paddle and a red flag. In addition, portable radio communication shall be used as directed by the Engineer.

3.* Signs warning motorists of the upcoming obstructions shall be placed an adequate distance ahead of the work area. Proper coning shall be maintained to direct traffic safely.

4.* Failure to comply with the above rules or to maintain traffic control in a safe manner shall be cause for the immediate shutdown of the work.

* To be in effect at all times.

The Contractor shall furnish all necessary flagpersons and traffic control equipment in the areas where work is being performed and routing and directing of traffic is required.

All excavations within the vehicular travel way shall be back-filled and temporary pavement installed by 4:00 p.m. The Contractor shall take necessary precautions for pedestrian traffic.

5. Temporary Surfacing - All temporary surfacing shall conform to existing pavement elevation within 1/2" plus or minus. Prior to final paving, the Contractor shall maintain temporary paving surfaces to insure safe, convenient travel by users of the roadway. Temporary paving shall be patched on a daily basis as directed by the Engineer.

6. Barricades and Lights - To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, yellow lanterns and guards shall be placed and maintained during the progress of the construction work and until it is safe for pedestrian and vehicle

traffic. All materials, piles, equipment and pipe which may serve as an obstruction to traffic shall be protected by the placing and maintaining of proper barricades and lights when the visibility is poor.

4.3.2 Inspection & Submittals

4.3.2.1 Inspection - All work and material (including the manufacture and preparation of such material) from the beginning of the construction until final completion and acceptance of the proposed work, shall be subject to the inspection and approval of the Engineer.

Unless otherwise authorized, work shall be done only in the presence of the Engineer. Any work done without proper inspection shall be subject to rejection. The Engineer shall at all times have access to the work during its construction or fabrication at shops and yards as well as the project site.

Any work or material found to be in any way unsatisfactory or defective before the acceptance of the proposed work, shall be corrected or replaced immediately by the Contractor at his own

expense, regardless of the fact that it may have been previously overlooked or passed by the Engineer. Inspection of the work shall not relieve the Contractor of the obligation to fulfill all conditions of the contract.

Whenever required by the Engineer, the Contractor shall furnish all labor, material, tools and equipment necessary to make an examination of any work under the contract that may be completed or in progress, even to the extent of uncovering or taking down portions of the previously inspected, finished work.

4.3.2.2. Submittals - Contractor shall submit seven (7) copies of shop drawings, valves, fittings, coatings, couplings, service saddles and all other pipeline, pump station and reservoir materials. Unless said methods and materials have been previously accepted in the appropriate section of these specifications.

Make all submittals far enough in advance of scheduled dates of installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.

Allow at least fifteen (15) working days for the engineer's review plus transit time.

Guidelines for submittal processing are available on request. The Contractor shall deliver to the Engineer one complete set of Final "As-Built" Drawings of contractor supplied equipment. Said drawings shall be ink on mylar or photo mylar and shall be incorporated into Final "As-Built" Project Record Drawings. Final acceptance of project shall not occur until after "as built" drawings have been submitted and accepted.

4.3.3 Existing Facilities

4.3.3.1 General - Attention is directed to Section 15 of the Standard Specifications as supplemented herein.

4.3.3.2. Underground Service Alert - The Contractor shall contact U.S.A. (800) 642-2444 to request surface marking of all underground utilities. The Engineer shall field mark a final pipeline alignment based on potholing information developed by the Contractor and on the surface markings of adjacent and crossing utilities. No final alignment decisions shall be made until all utilities have been marked and potholed to the Engineer's satisfaction.

4.3.3.3. Potholing Existing Facilities - When connections are to be made to any existing pipe or other appurtenances the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate and expose the existing facility before trenching for laying pipe. The existing facility shall be inspected before the connection is made.

As directed by the Engineer, the Contractor shall also pothole along the proposed alignment of the new waterline the locations of adjacent and probable conflict with utilities prior to final construction staking.

4.3.3.4. Repair of VSFCD Facilities - The Vallejo Sanitation and Flood Control District is responsible for the maintenance of all sewer mains in Vallejo including sewer laterals with cleanouts. Any sewer facility broken or damaged by the Contractor shall be repaired by the Contractor to District standards. The Contractor shall promptly notify Vallejo Sanitation and Flood Control District concerning damaged facilities. All costs for repairing broken sewer facilities to District standards including materials and labor shall be Contractor's responsibility.

4.3.3.5. Repair of Other Utilities - In the event of damage to other utilities, the Contractor shall notify the owner of the facility to arrange for the necessary shut-down and repairs. The Contractor shall not proceed with further trench work until arrangements for repair have been made and the affected utility has declared that the situation is safe for further work.

4.3.3.6. Asphalt Pavement - Before constructing pavement restorations the edges of the existing pavement shall be sawcut to lines outside the disturbed or damaged pavement and all shattered, broken or loose material removed from the site. The thickness of the pavement base course to be reconstructed shall be the thickness of the existing base plus one (1) inch and compacted to 95% relative density by mechanical methods. The type and thickness of surfacing to be reconstructed shall be the type and thickness of that which is existing. (See Section 3.3.1 for further requirements)

4.3.3.7. Gutters, Sidewalks, Curbs, Etc. - Existing concrete pavement, curbs, gutters, sidewalks or driveways shall be removed by saw cut. If a saw cut in pavement falls within three (3) feet of a construction joint, cold joint, expansion joint or edge, the concrete shall be removed and replaced to the joint or edge. Saw cuts and removal of sidewalks, curbs, gutters and driveways shall conform to Section 3.3.37 of these Specifications.

4.3.4 Trench Excavation

4.3.4.1. General - Trench excavation shall include the removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water necessary to construct the work as shown. Unless otherwise indicated on the drawings or permitted by the Engineer excavation for sewers shall be open cut. Trenching machines may be used, except where their use will result in damage to existing facilities.

The trenching or excavation operations shall not extend more than

two hundred fifty feet (250') in advance of the pipe installation operations. In existing streets all open trenches shall be backfilled and capped, with temporary pavement, by the end of the day. Trench plates are not permitted except with written permission from the City Engineer.

No watermain shall be installed in the same trench with any other utilities without special written permission to do so, signed by the Engineer.

In any event, all weeds, shrubbery and other dense vegetation shall be removed from the line of the work prior to beginning of any trenching operations.

Where any trenching operation is to be done through existing pavement, the side lines of the trench shall be sawcut through the existing pavement to neat lines leaving no loosened paving or ragged edges.

The trench shall be so braced and supported that the workmen may work therein safely and efficiently.

It is essential that the discharge of the trench de-watering pumps be conducted to natural drainage channels, drains or sewers.

The trench shall be so excavated that the pipe can be laid to the alignment and depth required.

No trenching shall be done until the line stakes have been set to control the work, and similarly grade stakes where necessary.

The Contractor shall exercise due caution to minimize breakage of existing sewers and water laterals (services) and shall repair and replace to the satisfaction of the Engineer any such service damages.

4.3.4.2. Line and Grade Stakes - Line and grade stakes conforming with the Plans and Profiles will be set by the Engineer on an offset line parallel to each main or other structure at convenient spacing. Prior to commencing work by the Contractor, the project engineer shall furnish to the Inspector a cut sheet giving the layout and the elevation of the work with respect to said line and grade stakes. These stakes and marks shall be carefully maintained by the Contractor in place until that portion of the work and improvement for which said stakes and marks were set has been completed, inspected and approved by the Inspector and if disturbed, shall be replaced by the Contractor's Engineer. All work shall conform to the cut sheet or revision thereof furnished to the Inspector.

4.3.4.3. Width of Trench - The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as hereinafter specified.

Trenches shall be of such extra width when required, as shall permit the proper placing of timber supports, sheeting and bracing, and handling of pipe, fittings, etc.

The minimum width of the trench shall be equal to the outside diameter of the pipe plus twelve inches (12") for pipe over eight inches (8") in nominal diameter, and not less than eighteen inches (18") in width for pipe eight inches (8") in nominal diameter or less.

The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe exclusive of bells and collars, plus 16 inches, and such maximum width shall be inclusive of all trench timbers.

The trench shall be braced and drained so that the workmen may work safely and efficiently therein.

The discharge of the trench de-watering pumps shall be conducted to natural drainage channels, drains or sewers.

If, for any reason, the width of trench measured at the top of the pipe (inclusive of any timbering or other trench supports) is excavated to a width greater than the designed width as shown on the Plans or in the Specifications, and if the design load on the pipe will be exceeded, one of the following shall control:

a) Shape bottom of trench to increase pipe support.

b) Combination of bedding and partial concrete encasement to increase pipe support.

c) Complete concrete encasement to increase pipe support. In no case shall the design load on the pipe be exceeded. Where concrete encasement is used the concrete shall contain at least 376 pounds of cement per cubic yard, and have a slump not to exceed 4 inches.

4.3.4.4. Excavation to Grade - The contractor shall make the required excavations for the construction of the watermain in an open trench except where tunneling may be necessary to pass obstacles and specially permitted by the Engineer.

The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe on solid ground at every point between bellholes and couplings, except that it shall be permissible to disturb and otherwise damage the finished subgrade over a maximum length of eighteen inches (18") near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle, for ductile iron pipe only.

Any part of the bottom of the trench excavated to a grade which shall result in an excessive vertical deflection angle at any

pipe joint shall be refilled to the proper grade with quarry waste or earth thoroughly compacted as directed by the Engineer.

The finished pipe subgrade shall be prepared accurately by means of hand tools to such elevation that beneath the centerline of the pipe the bed shall be within 0.03 feet of a straight line between pipe joints.

The minimum cover from top of pipe to finished grade shall be 42 inches. The minimum depth of cover is subject to changes which may become necessary as conditions develop in the field.

All existing utilities shall be protected and repaired to the satisfaction of the Engineer.

4.3.4.5. Subgrade in Poor Soil - Where soft or yielding material or other detrimental condition is encountered at the bottom of any trench or excavation which, in the opinion of the Engineer, shall not provide a satisfactory or firm bearing for the pipe, such materials shall be removed for the full width of the trench or excavation until firm material is reached. The space so excavated shall then be refilled with Class II aggregate base thoroughly compacted in layers six inches (6") thick after compaction with mechanical tampers so as to provide a uniform and continuous bearing and support for the pipe at every point between bell and coupling holes. For polyethylene encased dip a 3" thick layer of sand shall be placed between the Class II AB and the pipe.

4.3.4.6. Subgrade in Rock - Where ledge rock, boulders or large stones are encountered at the bottom of any trench or excavation, such material shall be removed to provide a clearance of at least six inches (6") below and on each side of all pipe, valves and fittings refilled with Class II aggregate base thoroughly compacted with mechanical tampers so as to provide a uniform and continuous bearing and support for the pipe at every point between bell or coupling holes.

4.3.4.7. Bell Holes - Bell holes shall be excavated across the bottom of the trench at pipe joint locations. They shall be of such size that the process of making joints and inspection can be carried on satisfactorily and so that the pipe barrel shall bear evenly on the bottom of the trench.

Bell holes shall be so excavated that the bell of the pipe shall not support the weight of the pipe. The use of blocks to support the pipe shall not be permitted except when expressly agreed to by the Engineer.

4.3.4.8. Coupling Holes - Coupling holes shall be so excavated that the coupling shall not support the weight of the pipe The use of blocks to support the pipe shall not be permitted.

4.3.4.9. Blasting - Blasting shall be permitted after the Con-

tractor has received the expressed permission of the Council of the City of Vallejo and the need for such blasting has been approved by the Engineer.

No blasting shall be done except by licensed operators under the direction of a competent foreman whose credentials have been submitted to and approved by the Director of Public Works.

All explosives shall be stored, handled and used in accordance with the provisions of Division XI of the Health and Safety Code, Chapter 60, Statutes of 1939, as amended, and in compliance with any and all State and local laws and ordinances applicable thereto.

Damages or injuries resulting to persons or property resulting from the use, storage or handling of explosives shall be the liability of the Contractor. The City of Vallejo, its officers and representatives are hereby relieved of any liability connected therewith.

4.3.4.10. Bracing and Shoring Plan - All trenches and excavations shall be adequately braced, shored and sheeted in a manner to conform with the rules of the California Industrial Accident Commission. Any damage resulting from the lack of adequate bracing, shoring or sheeting shall be the responsibility of the Contractor.

Prior to excavation of any trench 5 feet or more in depth, the Contractor shall submit to the City a detail plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground. If the plan varies from the standard shoring systems indicated in the State Division of Industrial Safety, CAL/OSHA Construction Safety Order,the plan shall be prepared by a registered civil or structural engineer. No excavation shall start until the Engineer has accepted the plan and the Contractor has furnished the Engineer with a copy of the CAL/OSHA permit pertaining to the work. In addition, no excavation shall be allowed until the Contractor furnishes the Engineer with a copy of the project notification forms or (letters) he has forwarded to the CAL/OSHA District Office.

The required trench widths are to be maintained clear inside all supports.

All of said bracing, shoring and sheeting shall be removed in advance of the backfilling operation in such a manner as shall insure the adequate protection of the completed watermain, street surfaces or existing structures.

4.3.4.11. Disposal of Excavated Materials - The materials excavated from the trench shall be so placed as to offer minimum obstruction to traffic. Gutters shall be kept clear or other provisions shall be made for handling street or road drainage.

All materials from trench excavations shall become property of the contractor and shall be removed from the site and disposed off in accordance with Section 2 of these specifications.

No materials shall be dumped on private or public property without securing the proper permits from the appropriate authority.

All excess material shall likewise be disposed of in a manner acceptable to the Engineer and in accordance with Section 2 of these specifications.

4.3.4.12. Hazardous Waste in Excavation - If the contractor encounters material in excavation which he has reason to believe may be hazardous waste as defined by Section 25117 of the Health and Safety Code,He shall immediately so notify the Engineer in writing. Excavation in the immediate area of the suspected hazardous material shall be suspended until the Engineer authorizes it to be resumed. If such suspension delays the current controlling operation, the Contractor shall be granted an extension of time as provided in section 8-1.07, "Liquidated Damages", of the Standard Specifications.

If such suspension delays the current controlling operation by more than 2 working days, the delay shall be considered a right of way delay and the contractor shall be compensated for such delay as provided in Section 8-1.09, "Right of Way Delays", of the Standard Specifications.

The City reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing the hazardous material from such area.

4.3.5 Bedding and Backfill

4.3.5.1. Bedding - Bedding shall be defined as that material under the pipe providing firm and continuous support to the pipe couplings.

Except where concrete or clean natural sand is specified, bedding material supporting the pipe or conduit shall be Class II AB as specified in these specifications.

When construction takes place in a dry trench and above the ground water table, a minimum of six (6) inches of Class II AB bedding shall be provided below the pipe.

All D.I.P. mains and ductile iron fittings shall be bedded and backfilled with clean sand to 12" above the top of the pipe. Sand quality and gradation shall conform to PG&E and PacBell standards for joint trench.

4.3.5.2. Initial Backfill - Initial backfill shall be defined as

that material surrounding the pipe and to 12" above the top of the pipe. Except for D.I.P. mains, all pipes including service pipes, blow-off pipes and other appurtenances shall be backfilled to a minimum of 12" over the top of the pipe with Class II AB.

D.I.P. mains shall be backfilled with sand.

4.3.5.3. Subsequent Backfill - Subsequent backfill shall be defined as that material above the initial backfill. Subsequent backfill shall be Class II AB in existing streets or roadways and

may be native material in unimproved areas. See standard trench detail and Section 3.3.5.5 in these specifications for details.

4.3.5.4. Compaction Methods

1. General - (See Section 3.3.5.6 for compaction requirements)

2. Sand - Compact by simultaneously vibrating and saturating with water. Plate type vibrators or immersion type are permitted. Saturate sand to near flooded conditions, provide sumps as necessary to pump out excess water. Generally sumps are required at all low points in the pipeline profile.

3. Temporary Paving - Cutback or other temporary paving material approved by the Engineer shall be placed and compacted by mechanical methods on a daily basis to protect the base prior to final paving. Wheel rolling shall not be allowed. The Contractor shall install cutback so as to conform to existing pavement elevation within plus or minus 1/2". Temporary paving shall be patched on a daily basis as directed by the Engineer.

4. Testing - In general compaction tests are required at intervals not to exceed 200 linear feet or at a minimum of two locations, if pipe length is less than 200 feet. Compaction tests are required at all tie-in and hot-tap locations. A compaction test shall consist of individual tests of each lift of backfill material including the initial lift over the pipe.

4.3.6 Installation of Water Pipe and Appurtenances

4.3.6.1. Handling of Materials - All handling and hauling of the pipe, fittings, valves, hydrants and accessories shall be done with care and said material shall be lowered into the trench piece by piece by means of a derrick or other suitable equipment in such a manner as to prevent damage to said materials, the protective coatings and/or linings. Any damage to said material shall be repaired or the material replaced at the expense of the Contractor. Under no circumstances shall said materials be dropped or dumped into the trench.

4.3.6.2. Inspection for Defects - The Contractor shall inspect the pipe, fittings, etc., for defects. All valves shall be operated through one open and closing cycle before installation in the pipeline. Any valve displaying defective operating characteristics shall not be installed.

4.3.6.3. Cleaning Pipe and Fittings - The outside of the spigots and the inside of the bells on all pipe and fittings shall be wire brushed or wiped clean and free of coating materials, oil, grease, mud and/or foreign matter before the pipe is laid.

4.3.6.4 Laying Pipe - Every precaution shall be taken to prevent foreign matter from entering the pipe and fittings while they are placed in the line.

At all times when the pipe laying is not actively in progress, the open end of the pipe already laid shall be closed by a water-tight plug or cap.

After placing a length of pipe in the trench, the spigot end shall be centered in the bell after placing the rubber ring by forcing the spigot home against the bell shoulder. No "bumping home" of the pipe shall be allowed.

Pipe deflections at bell & spigot joints shall not exceed manufacturer's recommendations and shall not result in "metal to metal contact where any portion of the bell is in direct contact with the spigot end of the pipe.

4.3.6.5. Corrosion Protection for Ductile Iron - All ductile iron pipe shall be encased with a loose tube or sleeve of poly-ethylene of 8 mils minimum thickness in accordance with the latest edition of AWWA C105.

All ductile iron fittings and valves shall be double wrapped with polyethylene (minimum 16 mils thickness) securely taped in place covering the entire exterior metal, except under stem and operating nut of valves and shall extend along the axis of the pipe for not less than one foot beyond the face of the joint, all so done as to insulate the metal from any direct contact with backfill material.

4.3.6.5.1. Installation of Polyethylene Wrap

1. Cut polyethylene tube approximately 2 feet longer than pipe section.

2. Center tube on pipe section, bunching up ends to expose bell and spigot.

3. Excavate bell hole to accommodate double overlapping of polytube sections. Both ends of polytube shall be independently secured with 2" wide, 10 mil, vinyl tape. Tape shall securely cover all openings in the polyethylene

barrier.

4. Take up slack along the barrel of the pipe by loosely folding over excess tubing and spot securing with short pieces of tape.

5. Valves, fittings, and other odd shaped pieces shall be double wrapped to provide 16 mils of protection. Double wrapping shall extend 12" beyond the ends of the fitting. Sharp edges shall be taped prior to installation of polywrap to prevent puncturing. Polywrap shall completely cover the valve to just below the operating nut where it shall be secured with 3 wraps of tape.

6. Openings for 3/4" and 1" services and air relief assemblies shall be made by making a 12" long x-shaped cut in the polywrap.

4.3.6.6 Tracer Wire, Locator Tape - All pipe, including D.I.P., shall have a tracer wire (No. 10 solid copper with TW or THHN insulation) laid on the trench bottom centered under the pipe. A contact lead shall be provided inside the valve pot. Each valve pot shall also have a bare #10 ground lead which shall be continuous from a coil placed under the valve bedding, and in direct contact with the subgrade, to inside the valve pot. At intervals not to exceed 500 linear feet, a contact lead shall connect the tracer wire to a "short-side" service line.

All wire connections shall be made with copper crimps encased by PT-S5 sealer (or approved equal) and snap tite caps (or approved equal). Epoxy type sealers or electricians tape and wire nuts will not be allowed for wire connections.

All pipe shall also have a 3" wide non-detectable blue plastic tape labeled "Waterline Below" laid 12" above the top of the pipe.

4.3.6.7 Operation of Existing Valves - **No gate valves, fire hydrants, or corporation stops in any portion of the subject water distribution system previously accepted and/or in use by the City of Vallejo or in any other City watermain shall be operated by anyone other than authorized City employees.**

Where installation of the new watermains requires the operation of existing valves, fire hydrants, or corporation stops, the Contractor shall notify the Engineer two working days in advance of such needs in order that notice of shutdown may be given to consumers affected and/or other necessary arrangements made by Water Maintenance. In no event shall any shutdown be allowed where the same shall deprive the consumers of water in excess of six hours during any one day unless a temporary or bypass pipeline, satisfactory to the Engineer, has been installed by the Contractor.

4.3.6.8. Setting Fire Hydrants - Fire hydrants of the type and number called for by the Plans shall be installed as shown on the Plans or as directed by the Engineer. Hydrants shall be installed so that the center of the hydrant is one (1) foot four (4) inches behind the back of sidewalk or "face of curb." No portion of the hydrant shall extend within 6 inches of the back of sidewalk or "face of curb." Fire hydrants shall not be located further than 10 feet behind face-of-curb.

All hydrants when installed shall stand plumb and the face of the flange at the bottom of the hydrant barrel shall be two (2) inches above the established sidewalk or ground surface grade. Type I and Type IV hydrants shall be set so that each of the two 2 1/2" nozzles shall face the curb at the angle of 45 degrees. Type II and Type III hydrants shall be set so that the 4 1/2" pumper nozzle faces the curb and each of the two 2 1/2" nozzles face the curb at an angle of 45 degrees.

Each hydrant shall be connected to the watermain with a six (6) inch pipe branch line and controlled by an independent 6 inch gate valve, except when otherwise called for or directed.

Each hydrant shall be covered with a burlap bag until it is activated following permanent connection of mainline piping to the existing system. The Contractor shall protect fire hydrants whenever the Engineer determines that the situation warrants such protection.

4.3.6.9. Setting Valves

4.3.6.9.1. General - Immediately before installation, each valve shall be operated through one complete open/close cycle and shall be visually checked for proper operation and seating. On butterfly valves installed on Class 200 PVC the pipe shall be beveled on the inside as required for disc clearance.

Butterfly operating nuts shall be located between the center-line of the street and the centerline of the main. In unimproved areas the operating nut shall be on the north or east side of the main.

4.3.6.9.2 Valve Risers and Boxes - A valve box and 8" diameter riser shall be installed plumb and directly over the center of the valves operating nut. Risers and boxes shall be set so that no shock or stress can be transmitted to the valve by construction equipment or street traffic. Riser material may be 8" diameter PVC or G-5 concrete extensions.

Boxing of valves and installation of pipeline appurtenances shall begin immediately after pipe sections containing or adjacent to such appurtenance have been installed. All valve boxes, concrete

collars, paving rings, and lids shall be brought to grade after

pavement has been constructed.

Before a new main is tied in to the existing water system, all valve boxes shall be exposed and all risers shall be cleaned. In new subdivisions, a 2 x 4 marker stake or painted reference point shall identify all valve locations. Stakes shall be located behind back of sidewalk and shall be painted blue, with black numbers indicating distance to valve.

4.3.6.9.3 Valve Extensions - When the top of the valve nut is greater in depth than four feet (4') from the valve box lid, the valve nut must be equipped with a steel or ductile iron valve extension coated with an asphalt varnish that will bring the valve nut to a point two feet (2') in depth from the valve box. All valve extensions must be equipped with a "centering ring" located 12" below the nut which will place the extended valve nut in the center of the valve riser.

4.3.6.10 Combination Air/Vacuum Relief Assemblies - Shall be installed at all high points in the pipeline profile as shown on the approved drawings and as may be required by the engineer in the field. 6" through 14" diameter mainlines shall have at least 1" diameter air relief assemblies, 16" through 20" shall have 2" diameter C.A.V.'s, 24" and larger shall have 4" diameter A.R.V.'s. Larger C.A.V.s maybe specified by the Engineer if conditions warrant.

4.3.6.11 Services - All new services shall be a minimum of 3/4" diameter unless otherwise specified. All 3/4 through 2" diameter services shall be type K copper. After 2" diameter the next service size shall be 4" diameter. There shall not be any 1/2", 1-1/4", 2-1/2", or 3" diameter services permitted. Splicing of service pipe is not permitted except when the length of the service run exceeds 20 LF for 1-1/2" and 2" services or 60 LF for 3/ 4" and 1" services. In general the sequence of construction shall be as follows:

4.3.6.11.1 Pressure Test - New services shall be tested at the same time as the mainline. The test shall be held against a closed curb stop which shall be located approximately 2 feet above finish grade.

4.3.6.11.2. Lowering to Grade - After the sidewalk is poured and the roadway is complete, the contractor shall lower the curb stop and install the meter box. The centerline of the curb stop shall be lowered to 10" below finish grade and to 10" behind the back of sidewalk. The meter box shall be set and the utility pad poured.

4.3.6.12 Permanent Blow-offs - Shall be installed at the end of all mainlines which will not be extended at a future date. Permanent blow-offs shall be 2" diameter for all mainlines. Permanent blow-offs shall be constructed as shown in the standard drawings and shall have thrust blocks poured to restrain the cap

or plug.

4.3.6.13. Temporary Blow-offs - Shall be identical to permanent blow-offs except the cap shall be restrained with a reverse anchor to permit future extension of the main. For mains that are 12" in diameter or less, all restraint shall be developed by the reverse anchor. For mains 14" and larger, the cap shall be restrained with a combination of 12" diameter reverse anchor and a thrust block sized to resist the remaining thrust.

4.3.6.14 Test/Sampling Blow-off - Shall be installed at the ends of all new mains at a location approximately 6' to 10' away from the point of connection to the existing system. When a new main is to be "hot-tapped" into an existing main, the "point-of-connection" to the existing system shall be defined as the down-stream side of the tapping valve. These blow-offs shall be used for pressure testing, flushing, and for taking bacteria samples. After passing the bacteria test, and within 30 days maximum, the test/sampling blow-off shall be removed and the line shall be "tied-in." If the line is not "tied-in" within 30 days, then a new bacteria test shall be performed at additional expense to the contractor. Design of thrust restraint for a sampling/test blow-off shall be at the contractor's option. For mains larger than 12" diameter, the design details for thrust restraint shall be submitted to the Water Superintendent for approval.

4.3.6.15 Concrete Anchors and Thrust Blocks - Plain and reinforced concrete anchors for the watermain shall be constructed at the locations shown and as called for on the Plans. The anchors shall be constructed so as to obtain a full bearing, opposed to axial and lateral thrusts, against solid undisturbed material.

Ground and forms against which concrete is to be placed shall be moistened before placing the concrete. Forms shall be smooth, mortar tight and of sufficient strength to maintain shape during the placing of the concrete. All concrete shall be rodded and spaded to insure smooth surfaces and to eliminate rock pockets.

Forms for anchors shall be removed to a depth of at least two (2) feet below the established street or ground surface grade before any backfill material is placed.

Steel reinforcement bars, if required, shall be cleaned of all loose mill and rust scale, mortar, oil, dirt or other foreign substances; shall be bent to the prescribed dimensions and shall be placed accurately to the dimensions shown on the drawings.

Where bars are spliced, they shall be lapped thirty bar diameters. All reinforcing bars shall be fully encased in concrete or mortar. Minimum cover shall be three (3) inches.

4.3.6.16. Special Provisions for Concrete Cylinder Pipe - After laying the pipe in the trench to true alignment and grade, the exterior joint cavity shall be completely filled with Portland

cement grout in an approved manner. After completion of exterior joint, the trench shall be backfilled immediately in vicinity of and around the joint to prevent shrinkage cracks. The backfilling shall be sufficiently moist or, if for any reason immediate backfilling with moist earth is undesirable, the joint shall be kept moist and protected from open air for a period of not less than seven (7) days. The grout shall be poured in such a manner that all exposed portions of the metal joint sleeve shall be completely protected with cement mortar. Grout shall be mixed in proportions of one part Portland cement to two parts sand. Steel wedges or spacers shall be placed in the interior annular space between the pipes, if necessary, to insure a sufficient space for bonding of inside joint and removed before jointing with mortar.

The inside joint shall then be filled with mortar of stiff consistency and troweled to a smooth surface. Completion of the inside joints shall take place after the trench has been backfilled and the initial settlement of the line is complete. An approved curing compound shall be applied to the completed inside joints.

Where concrete cylinder pipe or reinforced concrete pipe is jacked under railroads or highway crossings, the pipe shall be assembled outside the casing at the line and grade of the casing. A poured bituminous joint equal to Pioneer Flintkote Company's "Flintseal" shall be used instead of grout to fill the outside annular space between pipe sections, and sufficient material poured to completely cover all exposed portions of the metal joint sleeves. Steel wedges or spacers which are locked into proper position shall be placed in the interior annular space between the pipe to insure proper spacing of pipes while jacked into position. After pipes are in final position the spacers shall be recovered. The inside joints shall be completed as specified above.

4.3.7 Filling and Pressure Testing

4.3.7.1 General - The new pipeline shall have a 2" blow-off installed at each end of the pipe and at any additional locations required by the Engineer.

The Contractor shall furnish all materials, tools and equipment necessary to conduct proper tests as hereinafter specified. Gauges and water meters for the tests shall be supplied by the City.

Contractor shall furnish and install an approved backflow device between the water source and the pipeline to be filled.

The pipe shall be filled with water from the City Water System, taking care to see that all air vents are open during the filling. After filling, the pipeline shall stand full for not less than twenty-four hours to allow the escape or absorption of

slight air pockets.

During this period of time all pipe valves connecting fittings and temporary plugs shall be examined for leaks. If any leaks are found, they shall be stopped, except in the case of main line valves or temporary plugs, provision may be made for measuring the leakage through the gate or plug during the test.

In making the test of any particular section, the gate valves at both ends of that section, if such exist, shall be tightly closed and all outlets therefrom shall be closed. Where such gate valves do not exist, temporary watertight plugs shall be installed at end of pipe. The completely closed pipeline section shall be subjected then to an internal hydrostatic pressure test of 175 p.s.i. for a period of not less than four hours and all repetitions of this test shall be for a similar period of time, and at the same pressure.

The test pump shall be tested by the Engineer before it is used on the pipeline and found satisfactory to him. The pump shall be of a type which will measure accurately the quantity of water pumped into the pipeline while under test or a standard water meter furnished by the City may be used.

All cracked pipe, special castings, fittings, valves, loose joints and/or leaky joints shall be repaired or removed and re-placed with sound work and the test repeated in sequence until satisfactory pipe tightness has been obtained.

No section of pipe shall be considered acceptable for further backfilling or paving until the leakage from the line does not exceed the allowable leakage specified in the following section.

4.3.7.2. Allowable Leakage D.I.P. and PVC Mains - The allowable leakage for "push-on" rubber gasketed joints shall be as described in AWWA C-600, Section 4, except the test pressure shall not be less than 175 psi at the highest point in the pipeline and not less than 4 hours:

$$L = \frac{SD\ \sqrt{175\ psi}}{133{,}200}$$

Where:

L = Allowable leakage, in gallons per hour
S = Length of pipe tested, in feet
D = Nominal diameter of the pipe, in inches

4.3.7.3 Allowable Leakage Concrete Cylinder Pipe

1. Test Pressure: Shall be one and a half (1-1/2) times the operating pressure at the lowest elevation of the pipeline, but not less than 150 psi.

2. Leakage Rubber gasket joints shall not exceed five (5) gallons per inch diameter per twenty-four (24) hours per mile of pipe.

3. Leakage Welded or flanged joints shall not exceed one and a half (1-1/2) gallons per inch diameter per twenty-four (24) hours per mile of pipe.

4.3.8 Sterilization and Bacteria Testing

4.3.8.1 Disinfection - Disinfection of all new watermains shall comply with the latest edition of AWWA C651. All labor, materials and equipment necessary to perform the sterilization of the completed work shall be done by the Contractor. The Contractor shall furnish and place H.T.H. sterilization tablets in each length of pipe as it is placed in the trench. The tablets must be secured to the upper inside surface of each length of pipe by using Permatex No. 1 compound or equal.

The number of 5 gram, 65% free chlorine, calcium hypochloritic tablets required per length of pipe are:

Inside Diameter of Pipe	Number of 5 gram tablets
4"	1
6"	1
8"	2
10"	3
12"	4
14"	5
16"	7 (Continued)

Inside Diameter of Pipe	Number of 5 gram tablets (Cont.)
18"	8 (18' joints)
20"	9 " "
24"	12 " "

4.3.8.2 Flushing and Sampling - The City of Vallejo Maintenance Division shall flush the new water main and take samples to the lab for bacteria testing prior to the Contractor making the final tie-in to the existing system.

In the event that the samples taken by the City result in positive bacteria in the sampled main, the main shall be re-sterilized by the Contractor using a chlorine injection method and supervised by City personnel. The water main shall again be blown off and resampled by the City. Any resterilization and resampling will be paid for by the Contractor. Further, if the new main is not tied in within 30 days, then it shall be resampled at additional expense to the contractor. Bacteria samples are only taken on Mondays, Tuesdays and Wednesdays. Results are known after 48 hours.

4.3.9 Connections to Existing Mains

4.3.9.1. General - After notification that the new main successfully passed its bacteria test, the Contractor shall tie in the new watermains to the existing mains, under the supervision of the City's Water Maintenance Inspector. The Contractor shall complete the tie-in at the locations shown on the drawings and shall do all the excavating, de-watering, and backfill required for tie-ins. The "point-of-connection" for a hot-tap is defined as the down stream side of the tapping valve.

The new main shall be tied-in to the existing system within 30 calendar days following notification of test results. Failure to complete the tie-in within 30 days shall require a re-test for bacteria. All costs for re-sampling and re-testing shall be paid for by the contractor.

4.3.9.2 Tie-Ins Involving Shut Down - All fittings, valves and materials to accomplish all tie-ins shall be on the job, and existing lines exposed and checked for proper fit prior to any shutdown.

Since connections shall result in temporary interruption of service in the area, it shall be essential for the City to give at least two working days of advance notice to the affected consumers. Therefore, the Contractor shall coordinate his scheduling of connections with City activities. In addition, the Contractor may be required to supply by-pass connections to maintain service to consumers as directed by the Engineer. The Contractor shall receive no additional compensation for such

bypasses. The connections shall normally be made on Tuesday through Thursday. Although there may be times when a connection must be made at night, this shall not normally be the case. The Contractor is advised of this situation and no additional compensation shall be allowed for any costs resulting from such required connections and resultant delays. When requested by the Engineer, the Contractor shall provide such assistance as may be required in notifying consumers of water service interruption.

4.3.9.3 Hot-Taps - Existing watermains will be tapped by City forces unless otherwise approved by the City Engineer. Contractor is responsible for providing and installing the tapping sleeve, tapping saddle, tapping valve and all other materials necessary to perform the tap. Traffic control, excavation, backfill and completion of the work to finished grade shall be done by the Contractor. The Contractor shall pressure test the tapping sleeve connection, in the presence of the City Maintenance Inspector, prior to City forces making the tap. The remaining closure piece between the tapping valve and the previously installed new main shall be inspected by the City Maintenance Inspector. City forces shall operate the tapping valve, for final flushing, before the new main is placed in service.

4.3.9.4 Temporary By-Pass Pipes - When a shutdown is required that will cause any customer or customers of the City of Vallejo to be deprived of water service for periods of time in excess of six (6) hours during any one day or where so directed by the Engineer, the Contractor shall install a temporary by-pass pipe, generally located on top of the ground. Such temporary by-pass pipe shall include the provisions for service outlets to the water customers.

In the event the shutdown involves the interruption of water service to a fire hydrant, the Engineer shall have the authority to require that the temporary by-pass pipe include provision for fire service. In such case the temporary by-pass pipe shall not be less than four (4) inches nor greater than six (6) inches of nominal diameter and the fire service shall be a single four and one-half (4 1/2) inch hose connection with a control valve of a type approved by the Engineer.

4.3.10 Jacked Steel Casing

4.3.10.1 General - The Contractor shall install jacked steel casings to the lines and grades shown on the plans.

The wall thickness of the casing shall be at the Contractor's option, with a minimum of 1/4 inch. The Contractor shall be fully responsible for the sufficiency of the casing provided.

The joints of sections of casing to be jacked shall be welded with a continuous circumferential weld. It shall be the Contractor's responsibility to provide stress transfer across the joints which is capable of resisting the jacking forces involved.

4.3.10.2 Jacking Operations - Before starting excavation, the Contractor shall submit drawings of jacking pit bracing, casing, and jacking head proposed to be used.

Unless otherwise specified, the methods and equipment used in jacking casing shall be optional with the Contractor, provided that the proposed method is approved by the Engineer. Such approval, however, shall in no way relieve the contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein. Only workers experienced in jacking operations shall be used in performing the work.

The diameter of the excavated hole shall not be more than 0.1 foot greater than the outside diameter of the pipe. Sluicing or jetting with water shall not be permitted. When material tends to cave in from outside these limits a shield shall be used ahead of the first section of pipe or the face of excavation shall not extend beyond the end of the pipe more than 1-1/2 feet, unless permitted by the Engineer.

Excavated material shall be removed from the conduit as

excavation progresses, and no accumulation of such material within the conduit shall be permitted.

Upon completion of the jacking operations, all voids around the outside face of the conduit shall be filled by grouting with sand or mortar by a method approved by the Engineer.

Grouting equipment and material shall be on the job site before jacking operations and drilling of grout holes are completed in order that grouting around the jacked conduit may be started immediately after the jacking operations have finished.

Should appreciable loss of ground occur during the jacking operation, the voids shall be backpacked promptly to the extent practicable with soil cement consisting of a slightly moistened mixture of 1 part cement to 5 parts granular material. Where the soil is not suitable for this purpose, the Contractor shall import suitable material at his expense. The soil cement shall be thoroughly mixed and rammed into place as soon as possible after the loss of ground.

Should the Contractor meet refusal during the jacking operation, he shall determine the cause of refusal, and take additional measures as required to proceed. Should it become impossible to proceed on the plan alignment, the Engineer shall provide a

revised alignment adjacent to the plan alignment. The contractor shall leave the jacked casing in place, fill it with a sand slurry mix and seal the exposed end of the casing. The Contractor shall then proceed with the installation of a jacked casing on the revised alignment. In no case shall the Contractor remove any casing installed.

Contractor shall install stainless steel casing insulators with polypropolene skids at 10 feet on center, and 5 feet from the ends of each watermain segment.

The ends of each jacked casing shall be sealed with an AWWA-approved concentric rubber end seal, with stainless steel bands and clamps.

4.3.11 Clean-up

4.3.11.1 General - During the progress of the work, the Contractor shall keep all his work areas in a neat and clean condition. As directed by the Engineer, refuse shall be removed in a satisfactory manner as often as may be necessary to prevent any accumulation of rubbish.

4.3.11.2 Discharge to Streams - The discharge of solid or liquid waste materials into stream channels from the construction area shall not be permitted at any time. Any substances which are individually, cumulatively or collectively considered toxic or harmful to humans, wildlife, vegetation or aquatic biota, shall

be kept under control at all times and shall not be allowed to escape from the construction area. All such substances shall be completely contained during transportation and storage, and used safely without spillage.

4.3.11.3 Materials and Equipment - Following the completion of any portion of the work, the Contractor shall promptly remove all his equipment, temporary structures and surplus material, except as otherwise provided, and shall satisfactorily dispose of all refuse resulting from the work, leaving the premises in a neat and clean condition.

Each job site shall be clean at the end of each working day. The Contractor shall remove all dirt, debris, material, etc., which might be an inconvenience or hazard to vehicular or pedestrian traffic. All clean-up operations shall be done to the satisfaction of the Engineer, and final clean-up shall not lag behind the completion of the construction operation by more than 3 working days.

4.3.11.4 Material Salvage - During the work, all salvageable material, equipment or appurtenances which are removed from existing facilities shall remain the property of the City and shall be returned to the City yard or location designated by the

Engineer. The determination of which material is salvageable shall be made by the Engineer whose decision shall be final. Material which is not designated salvageable shall become the property of the Contractor and be removed from the site of the work.

4.3.11.5 Disposal of Materials - (See Section 2.0 of these specifications)

1. Concrete and AC Pavement - Broken concrete and asphaltic concrete shall be removed from the site and disposed off by the Contractor to approved disposal land fill site.

2. Trench Spoils - All materials from trench excavations shall become property of the contractor and shall be removed from the site and disposed off in a lawful manner.

No materials shall be dumped on private or public property without securing the proper permits from the appropriate authority.

4.3.12 Incidental Work

1. Maintain flow in existing sewers by diverting or redirecting and discharging the flow as approved, sanitary sewage to be so treated in closed conduits.

2. Dispose off all ground water, storm water, and sewage from the work, especially from excavations and subgrade. The

contractor shall employ pumps for this purpose whenever necessary and such work shall be considered as incidental to protection of the excavations and the subgrade.

If the proposed work may be performed during the rainy season, the Contractor shall act to maintain existing drainage facilities by working carefully around them. He shall not divert water on private land nor permit water to pond. He shall not inconvenience the public or jeopardize its safety.

3. All Stockpiled material and parked equipment at the job site shall be located to avoid interference with private property and to prevent hazards to the public. Locations of stockpiles and parking areas must be approved by the Engineer.

4. Remove all surplus concrete and mortar from the site of the work and not dump any portion thereof, or any washings from concrete mixers or mixing boxes, upon paved streets, into catchbasins, or otherwise into the City sewer system.

5. At all times during work performance, the Contractor shall exercise proper and efficient measures to prevent his operations from producing dust in amounts which may cause damage to property or a nuisance to persons in the general vicinity of the work. Water to settle the dust may be available from the City's facilities. If City water is not available, the Contractor, at his expense, shall arrange for alternate sources of water.

6. Protect the public from dust nuisances and avoid damage to property affected by the work by adequately sprinkling the work site with water as often as necessary to effectively control dust.

7. Remove from the site of the work all rubbish, unused material falsework, loose earth, rock paving materials, and any other materials, leaving the site in a clean and neat condition.

8. At the end of the work day, all streets affected by the construction work shall be broom swept. Once a week, they shall be power swept and vacuumed.

9. When any work is performed at night, in a tunnel or in a place where there is little or no daylight, the Contractor shall provide artificial light sufficient to prosecute the work properly and safely and to permit thorough inspection of the work.

10. The Contractor shall take all necessary steps to minimize the inconvenience to the general public throughout all the work under this contract. No driveways or private roads shall be blocked without notifying the property owner and

access must be restored during all non-working hours. Safe access must be maintained for pedestrian and traffic throughout the work area at all times.

SECTION 5. LANDSCAPING

5.1 Landscape Design Standards

5.1.1 General - The design of landscapes shall conform to Section 7-902 of the California Department of Transportation Highway Design Manual, as well as the following applicable standards:

- "General Notes for Installation of Landscape Maintenance Areas in the City of Vallejo,"
- "Landscape Guidelines for Hillside Developments,"
- "City of Vallejo Approved Tree List for Street and Median Planting,"
- "City of Vallejo Wildflower Hydroseeding Standards for Erosion Control on Slopes and for Open Space areas,"
- "City of Vallejo Approved Wildflower Seed List for Erosion Control on Slopes and for Open Space Areas,"
- "Section C of Specifications for Maintenance of Landscape Districts Within the City of Vallejo" (for the current year),
- "City of Vallejo Xeriscaping Guidelines for Model Homes in New Developments."
- "Design Guidelines: Hiking and Equestrian Trails."

Copies of the above, and other related standards can be obtained from the Engineer. Clarification as to the applicability of such standards to a particular project can be obtained from the Engineer. Failure to conform to applicable standards or these specifications will result in the Engineer directing corrections of deficiencies any time during plan review, landscape installation or the maintenance periods.

5.1.2 Specialists - The developer/owner shall retain the services of a landscape architect, soils engineer and pest control advisor, all of whom are currently licensed in the State of California. The services of these specialists shall be coordinated to produce the best landscape design acceptable to the City. The developer/owner shall be responsible to include the comments and certifications of the soils engineer and/or a civil engineer in the landscape design where there is any concern about irrigation and slope stability or drainage.

5.1.3 Soils Analysis Report - A lab test shall be made of the topsoil on site to determine suitability for landscaping. The selection of plant material, fertilizers, soil amendments, soil conditioners, and irrigation systems, shall address, in particular, the needs as indicated in the soils analysis report. A copy of the soils analysis report shall be given to the Engineer prior to design submittal. Soil PH, composition, organic content, and chemical analysis shall be indicated in the report. Known or suspected toxins or infestations on site shall also be investigated by means of preparing the soils analysis report. Another soils analysis report shall be submitted to the City Engineer 90 days before the one year landscape maintenance period is scheduled to end.

5.1.4 Landscape Site - The design shall exhibit familiarity with the site in the following areas of concern:

1. Topography and drainage.

2. Available water source(s), quality and pressure(s).

3. Existing trees and other features desirable for preservation.

4. The location of existing and planned hardscape features and utilities.

5. Available power sources for irrigation controllers.

6. The method of containment or neutralization of existing toxins, infestations and noxious weeds.

7. Suitability of plant, irrigation and fence type selection for local environmental concerns as follows:

a. Vandalism

b. Predictable foot and vehicle traffic

c. Prevailing winds

d. Exposure to the sun

e. Frost and cold

f. Fire hazards

g. Rates of predictable aging and replacement

h. Relation of the mature landscape to all of the above.

i. Compatibility of selected plant material, e.g., drought tolerant versus high water usage plants.

8. History of the site and concerns raised by the City, Developer/owner, or any specific area plan.

9. Relation to adjoining landscapes as follows:

a. Street tree selection and location

b. Type and quality of fencing

c. Successful plant material in the area

d. Planting themes in the area

e. Continuation of public pathways

f. Preservation of views

g. Protection of privacy

h. Protection of environmentally sensitive areas

i. Consideration for crime prevention.

5.1.5 Water Conservation - The City of Vallejo is actively engaged in a water management plan. Pursuant to that plan water conservation for any site landscape shall be designed from the following requirements:

1. Plant selection for the majority of the area to be irrigated shall be made from specimens that are documented as being drought resistant, or otherwise water conserving in nature. Plants shall be grouped together according to water conserving habits. Specimens which only obtain drought tolerance with maturity cannot be mixed with those which naturally adapt to arid situations or those natives which turn truly drought resistant at a young age. Groupings shall take into account habits of water retention, early dormancy, early stomatal closure, decreased transpiring surfaces, photosynthetic adaption, or other methods of drought avoidance.

2. High water using specimens shall be confined to specific areas of high visibility constituting no more than 5% of the total area to be irrigated on a square foot basis. The drip line of water demanding street trees, annual flower bed areas, and container plantings shall be counted as part of the high water using areas.

3. Lawn areas shall constitute no more than 25% of the total area to be irrigated. Only those areas that are clearly intended for team sports or other recreational activity recognized as demanding turf, may be exempt. All lawn and turf areas shall have perimeters with the least lineal

footage possible. No plantings other than turf may be included within the perimeter of a lawn area. At no time may lawns occupy medians, gores, park strips, islands, or any long, narrow or odd shaped areas. Turf shall not be planned for any slope greater than 6 to 1. Isolated mounds or undulations shall be avoided within a lawn. All objects that may disrupt even precipitation over the turf shall be excluded from the lawn areas. Grass selection shall be made from deep rooted tall or improved type fescue or from several warm season grasses where winter dormancy can be tolerated. Blue grasses and other high water using cool season selections shall be limited to no more than 10% of any grass mix.

4. Ground cover areas which require overhead (non- bubbler) irrigation shall be limited to no more than 25% of the total area. Such ground cover areas, lawn areas (#3 above), and high water use areas (#2 above) together cannot exceed 40% of the total square footage to be irrigated.

5. A water consumption analysis shall be made for all plant material to be irrigated. Such an analysis shall account for each of the following:

a. Projected mean maturity for each plant grouping (including lawn areas).

b. Gross water demand of each plant grouping at maturity (including lawn areas) under optimum conditions. The demand shall be clearly stated in U.S. gallons per minute hour or day. The basic explanation for optimum conditions shall be presented in terms of canopy/leaf type size, native precipitation and soil field capacity, or documented studies of specific specimens selected.

c. The gross water demand adjusted for the local (Vallejo) evapotranspiration (ETo) rate for 12 months.

d. The ETo adjusted demand adjusted again for soil field capacity, as the site soils analysis may indicate.

e. Square footage of each plant grouping (including lawn areas) factored to account for slope conditions.

f. The analysis compiled as a brief and included with the design submission.

6. The irrigation system shall be designed around the water consumption analysis. Stations of the irrigation controller shall coincide with plant habit groupings.

7. At no time can lawn irrigation be combined with irrigation for other plant groupings. The specific water demand (adjusted by the ETo rate) of a plant habit grouping shall

be supplied by the station system not exceeding the U.S. gallons per minute, hour or day indicated in the analysis. Where individual specimens within a grouping have a demand much greater than others of the same group habit (as naturalized trees may have amongst native shrubs) extra emitter outlets shall be placed as needed or a separate drip emitter or bubbler head system shall be supplied. All overhead spray systems shall be situated so as not to wet sidewalks, streets and other improvements as well as other non-irrigated areas. Above ground spray rotor and impact heads shall not be specified where pop-up type heads can be used. All areas to receive overhead applications shall have 100% overlap (head to head) coverage. Overhead spray systems shall be kept to a minimum at roadside and in slope areas. The majority method of irrigation for any landscaped site shall

be by drip emitters type heads. All irrigation for the City including drip emitter systems, shall be designed and installed as permanent automated systems.

5.2. Landscape Materials

5.2.1 General - All materials provided by the contractor shall be new or viable. Materials shall be free of any contamination or damage. Materials not specifically addressed in these specifications or associated notes and drawings but are understood as necessary to complete a project as a matter of industry standards shall nevertheless be provided by the contractor. Substitutions of materials must be approved by the Engineer. Any materials deemed unacceptable by the Engineer, his representative or the landscape architect must not be shipped to the landscape site or be removed from said site the same day. All materials which conform with the standards of these specifications shall be installed.

5.2.2 Materials Furnished by the City - The following materials unless otherwise noted by the City shall be furnished by the City and paid for by the owner/developer. The Contractor shall prepare the pits for installation by City crews.

1. Water meter, the water meter box and adjustable spuds.

2. Backflow prevention device - A Febco double check device and assembly.

5.2.3 Soil Improvements

1. Imported topsoil - Should topsoil have to be imported to the landscape site it shall be predominantly a friable loam in nature, obtained from well drained arable land. It shall be free of roots, rocks, debris, and other heavy materials. It

shall have a PH between 7.0 and 6.0 and meet only the following allowable analysis or composition: as verified by an agricultural suitability test.

a. Sodium (SAR), 0-4 maximum

b. Salinity (ECeX10 3), 0-2.5 maximum

c. Boron (in PPM saturated extraction), 0-2

d. Decomposed organic material, 5-50%

e. Gravel no greater than 3/4", 0-10%

f. Coarse sand, 5-20%

g. Fine sand, 20-50%

h. Silt, 15-25%

i. Clay, 5-15%

2. Fertilizers - All fertilizers must contain the manufacturer's warranted analysis on each container which will clearly state the compositions of N (Nitrogen), P (Phosphorus) and K (Potassium) as well as any secondary or micro nutrients. Each type of fertilizer applied as a general soil improvement must be able to respond to the particular soil composition, PH, solubility, and species demand of an area to ensure optimum usage. The fertilizer should be the one that best addresses the shortages revealed in a soils analysis as compared to the needs of the plants introduced area by area. Changes of or additions made in fertilizers must also anticipate other improvements made in the soil. Fertilizers applied during the establishment maintenance period should obtain approximately 1 pound N minimum per 1000 square feet bimonthly for most selections of plant material. At no time can N derived from an ammonium be used in a mix. The final application of fertilizer at the end of the establishment period must address deficiencies shown in the final soils analysis taken near the end of that same period.

3. Mulches and top dressing - unless otherwise specified for specialized situations, all mulches and top dress- ing shall be small grade "walk on" type bark with an aggregate particle size of approximately 1/4 inch. It shall be well aerated and free of debris (both organic and man made). Mulch which has been allowed to "sour" at the bottom of stockpiles cannot be used.

4. Gypsum and other soil modifiers can be used as the soils analysis indicates.

5. No soil conditioners for planting pits shall be required.

6. For non-irrigated plantings synthetic based water absorbent polymer gels shall be added to the backfill at the manufacturer's recommended rates.

5.2.4 Irrigation Equipment

1. Pipe and fittings - All mainline and lateral pipe and fittings shall be Schedule 40 NSP PVC solvent welded. The pipe shall meet ASTM-D-1784 Standards. The fittings shall meet ASTM-D-2466 and NSP 14 standards. All pipe shall be marked continuously and permanently with the manufacturer's identification of type and quality control. Pipe Joining Materials - PVC solvent cement shall be IPS Weld-on #711 (or approved equal). It shall conform to ASTM-D-2564 standards and rated for all classes and schedules of PVC up to 12 inch pipe. No fast setting solvent cement may be used. Primer shall be IPS Weld-on #P-68 (or approved equal). It shall conform to ASTM-F-656 standards. Only Teflon tape may be used to join threaded fittings. No pipe dope may be used. Sleeves and conduits for paving crossings shall also be Schedule 40 NSP PVC pipe.

2. Valves and Valve Boxes

a. Remote control valves shall be a dirty water series capable of working in low flow and high pressure situations. Plastic valves are not acceptable. Use only brass body and bowl assemblies. Assemblies shall be as shown in the City Detail Drawings.

b. Isolation valves shall be the non-rising stem all brass gate valves such as the 'T' model by Nibco. A ball valve such as the 'TU' series by Chemtrol or 'BLT' series by Rainbird can be placed directly ahead of remote control valves.

c. Quick coupler valves shall be the two part all brass type with self closing and locking rubber cover such as 'LVC' series by Rainbird. Each site shall be provided with 2 all brass quills mounted by all brass swivel hose bib as well as 2 quick coupler cover keys. Swing riser assembly and staking shall be as per the City Detail Drawing.

d. Flush valves for drip system laterals and assemblies shall be as shown in the City Detail Drawing. The flush valves can be the KBI model 'MIP- 750-S' or ball valves as noted in 'b' above.

e. Check valves (or anti-drain valves) can be the Valcon 'ADV-5000' series or the KBI 'CV' series located in-riser (or approved alternatives).

f. Valve boxes for all remote control valve assemblies and flush valves assemblies servicing lateral runs longer than 60 feet shall be the Brooks model #1419 with bolt down lid (or approved equal). Valve boxes for isolation valves,which stand alone and flush valve assemblies servicing lateral runs 60' or shorter shall be the Brooks model #70 with bolt down lid (or approved equal). Only one valve assembly per box will be allowed. The top of the lid shall be marked as called for in the City Detail Drawings. Locate all boxes as noted in the City Detail Drawings 5-5, 5-7 and 5-9.

g. Pea type gravel free of other aggregates, fines, debris, soils and organic materials shall be placed at the base of the valve box pits to the depths indicated in the City Detail Drawings 5-3, 5-5, 5-7 and 5-9.

3. Head Assemblies

a. All heads shall be installed on the swing joint assembly as indicated in the City Detail Drawing. Fittings shall meet ASTM-D-2464 standards.

b. No above ground head shall be employed in lawn areas or shrub areas. No above ground head shall be used where a 'high-pop' type head can be employed.

c. Heads shall be those specified in the approved drawings (or approved substitutions).

d. All heads shall be set perpendicular to finished grade unless otherwise designated by approved drawings, the Landscape Architect or the Engineer.

e. Heads shall be added, adjusted or relocated to assure optimum precipitation over the area to be covered. No head shall be situated so that it shoots directly into the opening end of the controller box or other utility boxes.

4. Drip Emitter Assemblies

a. All drip emitter assemblies shall be installed on Schedule 40 PVC lateral lines.

b. All drip emitter assemblies shall be installed as shown in the City Detail Drawing 5-8.

c. The single outlet emitter shall be the Bowsmith 'S10L' 1 gal. (or approved equal) mounted on a length of IPS flex-PVC hose and 90 degrees Marlex street ell.

d. The multiple, outlet emitter shall be the Bowsmith 2000 series or the Rainbird 'EMG-M-101' (or approved equal) mounted on a Schedule 80 riser and encased by the Rainbird SEB-6 access sleeve (or approved equal). Lengths of

polyethylene distribution tube shall be held by AG Products 'S2' stakes (or approved equal) underground.

5. Electrical Service

a. All wire connections shall be made with copper wire crimps enclosed with a DBY (or approved equal). Epoxy type sealers or electrician's tape and wire nuts will not be allowed for wire connections.

b. Wire for all 24 volt or 120 volt service shall be #14 gauge solid strand copper for damp and wet locations. It shall be rated at 600 VAC THHN/ THWN AWG and meet the National Electric Code and Underwriter's Laboratory standards. Protect all wire bundles from damage during assembly of bundle or during burial.

c. Electrician's tape or duct tape can be used to bind bundles of 24 volt wire at 10 foot intervals for direct burial. Direct burial shall be made in irrigation pipe trenches as shown in Detail Drawing No. 5-1.

d. Insulation for common wire shall be white in color, black or red for station/signal wire and yellow or blue for extra/spare wires. Four spare wires will be provided for each controller.

e. All 120 volt power wire shall be housed in heavy-walled utility class PVC conduit with factory made bends, couplings and fittings where permitted by the NEC. Burial for all 120 volt power service shall be made at a minimum depth of 18".

f. The ground rod shall be copper coated and 8 feet by 3/4 inches diameter. It shall be attached to the junction box at the controller by means of a solid copper ground jumper and approved clamp.

g. The junction box shall contain a 120 volt SPST off/on switch, standard plug receptacle, and ground screw. It shall be attached to the inside of the controller pedestal or security enclosure chassis.

h. Pull boxes shall be the Brooks 1100 series (or approved equal) with bolt-down lids.

i. Before burial, wiring shall be proved to be continuous and protected by coating.

6. Controllers

5.2.5 Planting Materials

1. Hydroseed - Refer to the "City of Vallejo Wildflower Hydro-

seeding Standards for Erosion control on slopes and for Open Space Areas."

2. Seeded lawn - Seed shall be a minimum of 98 percent pure and zero percent noxious weed seed. Only re-cleaned Grade A "new crop" seed delivered in unopened containers bearing the dealer's label showing guaranteed analysis shall be used. The seed shall be pre-treated with a fungus preventative. Any seed allowed to become wet or moldy or otherwise damaged will not be accepted. Packages must display date of harvest.

3. Sodded Lawn - Sod shall be at least 9 months old and no more than 16 months old, and field grown by a commercial sod nursery. It shall be healthy and well knitted containing no more than 1/2" of thatch and free from unspecified grasses, pest or noxious weeds, insect eggs, debris or infestations of any type. Sod shall be delivered in moist rolls within 24 hours of harvesting. Sod will be cut with a thickness of 5/8" to 3/4" and dimensions of 18" x 72".

4. Rooted Cuttings - Only healthy rooted cuttings or flat grown material may be used. Material shall be grown by a commercial nursery and be delivered moist to the job site within 24 hours. Material that is too wet or too dry or showing signs of fungus or other infestation shall not be acceptable. All material shall exhibit good root growth. Roots shall constitute at least 20 percent of individual plant material for all specimens (except Carpobrotus chilensis which may be employed as sprig cuttings with little or no rooting). No root girdled material will be accepted.

5. Container Grown Specimens - Only the No. 1 grade of nursery stock as provided in the State of California Grading Code may be planted. Plants shall conform to the American Association of Nurserymen Standards, AAN- SI Z60.1 as well as any height, spread, symmetry, or caliper as indicated in drawings or specifications. Plants shall be delivered unpruned in the original nursery containers bearing tags which show genera, species, cultivars, and/or varieties. All shipments of container grown specimens shall show documented compliance with Federal, California, and regional laws having to do with diseases and infestations. Plants which do not comply with the above or are shown to be broken, root bound, too young for the container, sun burned, wind burned, too dry, infested, trunk damaged or in any other way damaged will be rejected by the Engineer. Any boxed, balled, and burlap or bare root specimens shall comply with the above as is applicable.

6. Transplanted Specimens - Only healthy unpruned specimens shall be delivered to the job site within 24 hours of uprooting. Root mass shall be sufficient to anchor and

sustain the plant. Roots shall be cut clean. Broken, stripped, or frayed roots will not be acceptable. Any trunk or branch which has been girdled, stripped, broken, or marred during uprooting, transport, or planting will not be acceptable.

7. Tree Stakes - Only treated 2" x 8' straight, close grained, lodge pole pine shall be used. Stakes will have been given a point at one end prior to treatment with copper napthante. Treatment shall penetrate the stake surface to a minimum depth of 1/4". The blunt end of the stake will be cut to the appropriate height for individual trees on-site.

Tree Ties - rubber tire strips (or approved alternatives) shall be used.

Tree Tie Nails - Only galvanized steel nails shall be used.

Tree Guys - Use aircraft cable, inserted through white 1/2" PVC pipe (as markers for pedestrian safety). Use sections of rubber tree ties (for protection of tree limbs). Fastened to dead man buried below grade (or approved alternatives) and wire rope type clasps. Deadmen, if employed as alternatives, shall be durable materials (not wood).

8. Street Trees - Refer to the "City of Vallejo Approved Tree List for Street and Median Planting."

5.2.6 Hardscape Features

1. Headerboard - Only green 2 x 4 construction heart grade Redwood shall be used. Sapwood can only appear on one side of the board.

Headerboard Splices - Only 1 x 4 Redwood lumber, the same as above shall be used (2 feet in length).

Headerboard Stakes - Only 1 x 2 clear Fir shall be used, one foot in length sharpened at one end and bevel cut at the other end after installation.

Headerboard Nails - Only galvanized steel nails shall be used.

2. River Cobble - Only 4" to 6" aggregate Lodi or Linn Creek type cobble shall be used where better than 66% are unbroken, better than 66% are near 5" size, and 66% are smooth spherical or egglike in shape.

Mortar for River Cobble - As per Section 51-1.135 of the Standard of Specifications.

3. Decomposed Granite - Only decomposed granite in an aggregate grade between 3/4" and fines can be used as specified. They shall be free of other aggregates, debris, and organic

materials.

4. Imprinted Concrete - Only the Bomanite process (or approved equal) shall be used. The concrete shall have a minimum compressive strength of 3000 psi. Portland cement shall conform to ASTM C 150, Type I, II, or V, depending on soil conditions. Aggregates shall conform to ASTM C33. Only potable water may be used. At no time can calcium chloride be introduced into the concrete mix. Only Bomanite Heavy Duty Hardener and Bomanite Color Curing Compound (or approved equals) may be used.

5.2.7 Pesticides - Only those pesticides (including herbicides) that are recommended, in writing by the Pest Control Advisor shall be used (or authorized alternatives).

5.3 Landscape Construction Standards

5.3.1 General - All work performed as site preparation, planting, and installation of irrigation systems shall comply with Standard Specifications Section 20, "Erosion Control and Highway Planting" as well as hereunder. The contractor performing such work shall be currently licensed with the State of California and hold or obtain all other licenses, certificates, permits or waivers during the course of said work necessary to performance. Clean up shall be a part of any installation work.

5.3.2 Site Preparation

1. Site conditions - The landscape site shall be free of all debris, stock piles, toxic spills, equipment, structures, and other unnecessary appurtenances left by other trades and former property users. The landscape site shall lay as or be rough graded to within a 10th of a foot of finish grade. It shall have a 6 inch minimum cover of topsoil free of subsoil or spoil. Topsoil shall be one, or a combination of the following:

a. Original native cover.

b. Redistributed native from stockpiles the developer has had on site.

c. Imported.

2. Sleeves and conduits - All necessary crossings for irrigation systems shall be in place prior to paving or V-ditch construction as per the "General Notes for Installation of Landscape Maintenance Areas in the City of Vallejo". Indicate sleeve locations on As Built. Show location using triangulation from fixed objects (minimum two locations).

3. Points of connection - A secondary box or meter pedestal for 120 volt service and water meter, box and backflow prevention device for irrigation shall be prepaid and installed as per the "General Notes". The concrete meter box shall be set to finish grade. At no time can materials capable of deterioration (such as wooden boards) be employed to raise any meter or valve box to finish grade. Durable materials (such as basalt blocks or fire hardened bricks) shall be used in sufficient quantities to support any valve or meter box in order to raise it to finish grade. Care shall be taken throughout all phases of installation and maintenance to protect materials provided by PG&E and the City.

4. Grub and clear - All noxious weeds on-site must be destroyed. Other weeds may be removed as needed. Groundcovers that had been provided by hydroseeding for erosion control can only be removed during the rainy season (between October 15 and April 15), upon approval by the Engineer. To obtain such approval, the contractor must provide proof or assurance of timely revegetation. A combination of pre-emergent and post-emergent spray programs as designed by the Pest Control Advisor and manual and mechanical means may be employed by the contractor as needed. All weed or related debris shall be disposed of in an approved manner and/or outside of the city.

5. Fuel suppression for fire safety - In the event of any delay between completion of mass grading and the start of landscape installation during the fire season the developer/owner shall remove fuel from the site. Such removal may entail mowing hydroseeded areas to 2" height as well as weed populations. The developer/owner is to understand hereby that time is of the essence in performing such fuel suppression during the fire season.

6. Fence and property lines - Such lines shall be established as per the "General Notes for Installation of Landscape Maintenance Areas in the City of Vallejo".

7. Hydroseeding - Shall be done as per the "City of Vallejo Wildflower Hydroseeding Standards for Erosion Control on Slopes and for Open Space Areas".

8. Prework meeting - Such a meeting shall be held as per the "General Notes". No further landscape related work may commence save any of the above necessary to site preparation. The prework meeting shall be the time and place to determine that any other work (as in the below) may proceed.

5.3.3 Irrigation Systems

1. All irrigation systems shall be installed and tested as per the "General Notes" and pertinent City Detail Drawings. The contractor shall provide a certified irrigation technician as supervisor of foreman to concern himself with close on site supervision.

2. Excavation for irrigation trenches shall be performed to cause the least possible damage to streets, sidewalks utilities and other improvements. No trenching of paved streets will be permitted. Care shall be taken not to interfere with trees. Route the trench a minimum of 6 feet away from tree planting locations and outside the drip line of existing trees. In the event tree roots have to be cut such cuts shall be made clean without any ragged stripping, fraying or twisting of the roots. Where roots of a diameter greater than 2 inches are encountered the City Landscape Inspector shall be contacted for direction. Trenches shall be cut consistent with grade and uniform bearing for the full length of the line. Any improvements or plantings disturbed by excavation shall be replaced or reconstructed in an approved manner. Excavated material shall be placed so as not to cause damage to improvements or plantings nor obstruct traffic (vehicular and pedestrian) or surface drainage.

3. PVC pipe shall be cut with a fine tooth hack saw and any burrs shall be removed. The pipe and fittings shall be clean and dry prior to application of solvent cement. All pipe ends and fitting sockets shall be treated with primer prior to application of solvent cement. Both primer and solvent cement shall be applied uniformly over three quarters of both insertion surfaces. Any pipe or fitting where solvent cement had been allowed to thicken prior to joining shall be discarded. Immediately after cement has been applied pipe and fittings shall be joined with a twisting motion to the full depth of the socket and any excess wiped away. At no time can cement be allowed to cover threaded fittings. Joined pipe and fittings shall be allowed to set up prior to any further handling. Time for curing will increase with damp and/or cold weather. Only pipe with completely cured welds can be filled with water. The male connection of threaded joints shall be wrapped with a modest strip of teflon tape. Excessive layers of teflon tape and/or any pipe dope will not be allowed on threaded joints. Also, excessive cinching will not be allowed. No PVC pipe shall be exposed above ground. Mainline shall be placed a minimum depth of 18" and lateral line 12" in the trench.

4. Valves shall be installed in such a way that easy access and service are possible. No valve (except in-line check valves) shall be buried or silted over. No valve shall be

placed inside a box in such a way that handles and bleeder cocks are held tight against the box wall. If necessary, a larger valve box shall be set. It shall be possible to lift the bonnet of the remote control valve without dirt and debris sliding inside the valve body. It shall be possible to remove filters from "Y" strainers without digging. The valve stem of the remote control valve shall not be left in a fully open position. It shall be throttled part way down to avoid the valve becoming "stuck on" but still allowing optimum operation. All valve boxes shall be bolted securely shut. No debris from valve assembly or wiring shall be left inside the valve box. The locations of quick coupling valves shall be marked in an approved fashion.

5. Heads shall be installed as specified. All risers shall be flushed prior to assembly of clean head units. Subsequent flushes of end risers on each lateral line shall be performed during each maintenance period. Dissimilar heads shall not be placed on any station system.

6. Drip emitter distribution tubing shall be installed subterraneously. Drip emitter systems shall be flushed and filters cleaned monthly throughout each maintenance period.

7. All electrical service shall be installed strictly as specified. No wire splices shall be made in the field outside approved controller box, valve box, and pull box locations. Upon installation of irrigation wiring a test shall be run to demonstrate successful laying and hook up of wiring. A voltage meter shall be used to demonstrate that there are no dead shorts or earth ground connection along wiring or at valve hook up. Do not walk on wiring during layout or installation. Lay wire bundles on clean non-abrasive surfaces. Nicked or cut wire shall be removed and discarded and new wire installed. Wire shall not be pulled taut at any location. Expansion loops, coils and serpentinous runs shall be liberally turned into every pull of 24 V wire. Wire splice ends shall not be exposed to wet or damp conditions. In the event of delay between pulling and connecting wires the splice ends shall be covered securely with electricians tape and pulled up out of the bottom of boxes or water catching depressions in the soil. New splice ends will be cut at the time of connection. The controller shall be supplied with backup batteries and penciled (not penned) schedule at time of installation. Electrical service shall not be tested by touching any charged wire to the circuit board or battery wires of the controller (an Ohm-meter is best used for such tests).

8. All irrigation lines (main and lateral) shall be hydrostatically pressure tested at 125 p.s.i. with all joints and fittings clearly exposed. There shall be a pressure gauge at the pump and another at the end of the section of line that is to be tested. The line shall hold

the required pressure for a minimum of four hours. If there is any drop in pressure, the line shall be retested until there is no drop in pressure. The lines shall be filled with water from the low end and the air expelled from the high point. All air must be removed from the line before the test shall begin. Testing the lateral lines will necessitate the capping of all risers. Such tests will not be required for drip lateral lines or where marlex street elbows are employed in swing assemblies.

9. A coverage test shall be made of the irrigation system via manual control or pre-timed control from the irrigation controller. Spot checks may be made by "bleeding" individual remote control valves, but this method shall not be substituted for an overall coverage test. Adjustments and cleaning of irrigation components shall be made, as needed, as a result of a coverage test and a new coverage test subsequently made.

10. All tests are subject to City inspection and approval.

5.3.4 Soil Preparation and Fine Grade

1. All areas to be landscaped shall be prepared according to the "General Notes", "Landscape Guidelines for Hillside Developments" and related standards and specifications. All specified soil conditioners, soil amendments and fertilizers shall be thoroughly mixed with the topsoil in areas to be planted as lawns and groundcovers. All clumps and clods of topsoil shall be broken and mixed in.

2. All rocks, debris, and excess soil shall be removed from the site and disposed of in an approved manner and/or outside of the city.

3. Wherever possible topsoil native to the site shall be utilized as fill in the fine grading process. The developer/owner will have provided for stockpiles of native topsoil during mass grading. Though such topsoil will have been distributed, remnants of the stockpiles might be located and utilized.

4. Tops and toes of slopes shall be rounded to produce a gradual and natural appearing transition between relatively level areas and slopes.

5. Fine grade is to provide a smooth even finish and positive surface drainage without low spots or pockets. Undulations in slope-sides which result in specific grades steeper than the overall intended grade of the slope shall be corrected. Finish grade at edges shall lay the following inches below the level of pavement and header boards:

a. 1/4" - 1/2" for bare ground, hydroseeded, and non-mulched

groundcovers

b. 1/2" - 3/4" for lawn areas

c. 1" - 2" for mulched areas

6. The site shall be checked to be sure that soil preparation and fine grading have not resulted in bringing subsoils to the surface or causing public and private properties to drain into each other. Any such problems shall be brought to the Landscape Inspector's attention.

7. All phases of soil preparation and fine grading are subject to City inspection and approval. The finish grade must be complete and irrigation systems fully operational before planting can begin.

5.3.5 Planting

1. All planting shall be performed as per the City Detail Drawings, all related standards and specifications and the approved landscape plan.

2. The contractor shall provide a certified landscape technician as supervisor or foreman, capable of reading the landscape plans and related specifications and who is familiar with cur- rent California horticultural practices, to oversee all aspects of planting. Such a foreman shall concern himself with close on-site supervision of the following:

a. Proper species identification and location.

b. Excavation of the planting pits with particular attention given to scarification.

c. Identification and application rates of fertilizers and amendment (matched with soil test recommendations) to be used in the backfill mix.

d. Proper manipulation of the root ball to encourage future outward growth of roots.

e. Planting techniques which do not allow the root ball to be set too low or the root crown covered with backfill or siltation.

f. Approved staking and pruning techniques.

3. Planting pit amendment must match soils report recommendations.

4. Seeding for lawn areas shall be performed only during the warm months between March 1 and October 15. The lawn area

shall be free of weeds and debris and be fertile and friable the day of seeding. Seeding may be done either by double passes of a mechanical spreader or by hydroseeding. Mechanically sown seed shall be raked into the surface and rolled. Either application shall be kept moist until full germination. Bare spots shall be reseeded at 10 day intervals until a full stand of grass is germinated.

5. Sod can be placed in lawn areas any time during the year. The soil shall be in the same condition as for seeding (in #4 above) and fertilizer applied the same day as sod delivery. Lay sod in a tight fitting staggered brick layer pattern against any grade. Rolls of sod shall be kept moist throughout installation. All sod shall be installed the same day as delivery. Keep sod moist until first mowing. Roll sod twice within two days of installation. Care shall be taken not to leave footprints in the soil surface or sod.

6. Ground covers taken from flats or rooted cuttings shall be planted in the bare soil surface prior to any mulching so as to ensure true root to soil contact. A staggered or triangular pattern shall be employed. Specimens shall be placed in a pit of sufficient size to prevent roots from doubling over. Newly planted ground covers shall be kept moist.

7. Areas (other than lawns and hydroseeded wildflowers) shall be mulched.

8. Newly planted trees will have to be deep watered during hot months.

9. All specimen locations and plantings are subject to City inspection and approval.

10. Replacement plantings will be expected, no matter what caused the loss, at the end of the installation period, at the end of the interim maintenance period and at the end of the one year maintenance period. Seasonal considerations may necessitate replacements at other times.

5.3.6 Hardscape Installation - The subgrade of all areas in 2, 3 and 4 below shall be compacted to 90% and treated with an approved soil sterilant which shall remain stationary in the soil. Application shall be that as specified by the pest control advisor (or other approved method).

1. Headerboards - Headerboards shall be installed true to line and finished grade and set flush with adjacent paving. Lengths shall be no less than 12 feet and stakes placed at intervals of 8 feet. All corner connections shall be miter cut to receive each board as an exact fit and securely staked. All strait joints shall be spliced and securely staked.

2. River Cobble - A tight fitting random pattern of river cobble shall be set firmly into freshly poured mortar to half the depth of each individual cobble. Broken or odd shaped cobbles shall be discarded. All smooth rounded cobble within 3 inches of the mean size of 5 inches wide shall be used. The planting side edge of the mortar shall be formed or troweled so as to present a smooth even edge. All spoil shall be removed from the street, curb and planting bed. As the mortar begins to set-up the mortared cobble shall be sprinkled lightly with water so as to clean the cobble and settle the mortar surface. After mortar has cured all dirt and excess materials shall be cleaned off of the cobble and two coats of Thompson's clear sealer (or approved equal) shall be applied.

3. Decomposed Granite - Decomposed granite shall be put true to grade and compacted to 92%. The finished surface shall have a smooth appearance and lay flush with any adjacent paving and headerboards. Soil tackifier shall be incorporated into last 3" lift to stabilize the D.G. against washout.

4. Imprinted Concrete - The concrete shall be placed and screened to the proper grade and floated to a uniform surface in the normal manner. Bomanite Color Hardener (or approved equal) shall be applied evenly to the surface by the dry-shake method using a minimum of 60 pounds per 100 square feet. It shall be applied in two or more shakes, floated after each, and troweled only after the final floating. While the concrete is still in the plastic stage of set-up, the imprinting tools by Bomanite (or approved equal) shall be applied to make the desired patterned surface. Bomanite Color Curing Compound (or approved equal), thinned in the proportion of 1 part cure to 1 part mineral spirits (paint thinner) shall be applied uniformly with a sprayer or roller. Coverage shall be approximately 1200 to 1300 square feet per gallon of solution. The cured surface shall be cleaned to remove residual dust or grout. At no time can acid or caustic solutions be used for cleaning. For the Bomanite process, only contractors certified by the Bomanite International Society may perform the work.

5.3.7 Pesticide Use - All applications shall be made in strict conformance with the pest control advisor's written recommendations, the manufacturer's label, and industry standards for safe use and disposal. Applications shall be made under the supervision of a licensed pesticide applicator who is registered with and reporting to the Solano County Agriculture Commissioner. A material safety data sheet and the adviser's recommendations shall be provided to the engineer before application begins. No pre-emergent or post emergent herbicide shall be applied within 12" of the dripline of any plants.

5.4 Landscape Maintenance

5.4.1 General - Landscape maintenance performed during installation, during the interim maintenance period and during the one year maintenance period shall be in compliance with applicable portions of the current "Section C of Specifications for Maintenance of Landscape Districts Within the City of Vallejo."

5.4.2 Non-irrigated planting - Non-irrigated plantings shall have a maintenance period which encompasses two full rainy seasons.

SECTION 6 PUBLIC FENCING

6.1 Fencing Design Standards

6.1.1 General - The design of fencing shall comply with project area guidelines, specific area plans, sound abatement conditions, traffic control and related conditions, as well as these standards. Gates and other opening designs shall also be in compliance, where applicable.

6.1.2 Continuity - All frontage, perimeter and other public fences shall exhibit consistent or complementary materials, colors, detailing, height and alignment. Where contiguous with other developments and improvements, similar fence designs shall be employed.

6.1.3 Accessibility - Where access will have to be made to park sites, school sites, open space areas, or other public landscapes as well as to specific utility improvements specially created easements or dedicated parcels will connect traffic from such areas through frontage or perimeter fencing to the public right of way. All such fences shall allow safe and convenient gate access for emergency and maintenance vehicles of various City departments, other agencies, districts and utility companies or their representatives. Additional gates or openings may be required for other forms of maintenance, recreational or through traffic (pedestrian, equestrian or bicycle). Private access gates through public frontage or perimeter fences to public lands cannot be allowed (except, where easement rights or other special conditions prevail). At no time can a fence be located in such parallel proximity to another fence (existing or planned) that weed abatement for fire safety cannot be conveniently performed between the two. No grading, improvements, structures or landscaping can be located next to a public fence in such a way that the integrity or future maintenance or repairs of that fence are compromised. Access control may be required off of public right of ways into open space areas. In these situations fence and gate or related structures (including appropriate signage for the site) are to be installed.

6.1.4 Durability - These standards set the minimum criteria to ensure a long lasting fence and gate installation in Vallejo. Fencing shall also comply with applicable requirements of the Standard Specifications Section 80. Where these and the Standard Specifications do not provide guidance for particular types of fences, gates, monuments, railings, walls, sound walls, bollards, and other fence like appurtenances the design shall provide adequate enough

specifications as to materials, finishes or sealers, and workmanship that the best the "industry" can provide will ensure longevity, ease of maintenance and resistance to vandalism. Reference shall be given to California Landscape Standards by the California Landscape Contractors Association as well as other notable industry publications to determine what industry standards are.

6.1.5 Property Lines and Monuments - Any public fencing fronting a major traffic artery shall be considered a public fence and is to be placed on the public controlled side of any right of way/property or easement line. The Engineer shall determine which roadways are major traffic arteries through developments. Any other fence considered to be public in nature shall also be placed on the public controlled side of such lines. Private fences shall be located within the private side of such lines. The entire fence structure, including footings and drainage, shall be located entirely on the appropriate side of the right of way/property or easement line. Specific instructions shall be included in plans and specifications for any fencing operations to diligently protect and keep clear to view all property markers and monuments.

6.1.6 Traffic Protection - No fence, or related structure, shall be located in such a way as to obstruct clear line of sight for traffic safety. The location of such structures on corners must be confirmed with the Engineer. No gate shall be located in such a way that it can swing out into the path of pedestrian or vehicle traffic. A gate shall be set back in such a way that a parked vehicle will not protrude into the path of traffic while the gate is being unlocked and opened. Signage and reflectors shall be affixed to gates and fences as the location may require. Required signage may pertain to, but not be limited to, restrictions on trespassing, dumping and motorized access as well as information about habitat or trail routes. Gate design shall account for the height, width, materials and finishes to accommodate expected traffic use.

6.1.7 Locks - Where access at gates must be controlled gate hasps, drop bolts or other latching mechanisms must be able to fit a common keyed lock provided by the City. Where other agencies, contractors or utilities require access such mechanisms shall accommodate looped or otherwise multiple locking systems. At no time can the Engineer be locked out of a public gate.

GENERAL LIABILITY ENDORSEMENT

_____("the City")
_____
_____
Attn:_____

A. POLICY INFORMATION **Endorsement #**_____

Insurance Company_____Policy #_____

Policy Term (From)_____(To)_____

Endorsement Effective Date_____

Name Insured_____

Address of Named Insured_____

Limit of Liability
Any One Occurrence / Aggregate: $_____/_____

General Liability Aggregate (check one):

( ) Applies "per location/project"
( ) Is twice the occurrence limit

Deductible of Self-Insured Retention (nil unless otherwise specified): $_____

Coverage is equivalent to:

( ) Comprehensive General Liability form GL001 (Ed 1/73)
( ) Commercial General Liability "occurrence" form CG0001
( ) Commercial General Liability "Claims-made" form CG0002

Bodily Injury and Property Damage Coverage is:

( ) "claims-made"
( ) "occurrence"

If claims-made, the retroactive date is: _____

Note: The City's standard insurance requirements specify "occurrence" coverage "Claims made" coverage requires special approval. If commercial general liability form or equivalent is used, the general aggregate must apply separately to this location/project or the general aggregate must be twice the occurrence limit.

B. POLICY AMENDMENTS

This endorsement is issued in consideration of the policy premium. Notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any other endorsement attached thereto, it is agreed as follows:

1. **INSURED.** The City, its elected or appointed officers, officials, employees, and volunteers are included as insureds with regard to damages and defense of claims arising from (a) activities performed by or on behalf of the Named Insured, (b) products and completed operations of the Named Insured, or (c) premises owned, leased, or used by the Named Insured.

2. **CONTRIBUTION NOT REQUIRED.** As respects: (a) work performed by the Named Insured for or on behalf of the City; or (b) products sold by the Named Insured to the City; or (c) premises leased by the Named Insured from the City, the insurance afforded by this policy shall be primary insurance as respects the City, its elected or appointed officers, officials, employees, or volunteers; or stand in an unbroken chain of coverage excess of the Named Insured's scheduled underlying primary coverage. In either event, any other insurance maintained by the City, its elected or appointed officers, officials, employees or volunteers shall not contribute with it.

3. **SCOPE OF COVERAGE.** This policy, if primary, affords coverage at least ass broad as:

   a. Insurance Services Office form number GL 0002 (Ed. 1/73), Comprehensive General Liability Insurance and Insurance Services Office form number GL 0404 Broad Form

   b. Insurance Services Office Commercial General Liability Coverage, "occurrence" form CG 0001 or "claims-made" form CG 0002; or

   c. If excess, affords coverage which is at least as broad as the primary insurance forms referenced in the preceding sections a. and b.

4. **SEVERABILITY OF INTEREST.** The insurance afforded by this policy applies separately to each insured who is seeking coverage or against whom a claim is made or a suit is brought, except with respects to the Company's limit of liability.

5. **PROVISIONS REGARDING THE INSURED'S DUTIES AFTER ACCIDENT OR LOSS.** Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the City, its elected or appointed officers, officials, employees, or volunteers.

6. **CANCELLATION NOTICE.** The insurance afforded by this policy shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail return receipt requested has been given to the City. Such notice shall be addressed as shown in the heading of this endorsement.

C. **INCIDENT AND CLAIM REPORTING PROCEDURE**

Incidents and claims are to be reported to the insurer at:

_____
(Title) (Department)

_____
(Company)

_____
(Street Address)

_____
(City) (State) (Zip Code)

_____
(Phone Number)

D. **SIGNATURE OF INSURER OR AUTHORIZED REPRESENTATIVE OF THE INSURER**

I, _____ (print or type name), warrant that I have authority to bind the below listed insurance company and by my signature hereon do so bind this company.

_____
Signature of Authorized Representative
(original required on endorsement furnished to the City)

ORGANIZATION: _____ **TITLE:** _____

ADDRESS: _____ **PHONE:** _____

AUTOMOBILE LIABILITY ENDORSEMENT

_____("the City")

_____

_____

Attn:_____

A. **POLICY INFORMATION** Endorsement # _____

Insurance Company_____Policy No._____

Policy Term (From) _____(To)_____
Endorsement Effective Date_____

Address of Named Insured_____
Limit of Liability Any One Occurrence/ Aggregate: $_____

B. **POLICY AMENDMENTS**

This endorsement is issued in consideration of the policy premium. Notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any other endorsement attached thereto, it is agreed as follows:

1. **INSURED.** The City, its elected or appointed officers, officials, employees, and volunteers are included as insureds with regard to damages and defense of claims arising from: the ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired, or borrowed by the Named Insured, regardless of whether liability is attributable to the Named Insured and the City, its elected or appointed officers, officials, employees, or volunteers.

2. **CONTRIBUTION NOT REQUIRED.** As respects work performed by the Named Insured for or on behalf of the City, the insurance afforded by this policy shall: (a) be primary insurance as respects the City, its elected or appointed officers, officials, employees, or volunteers; or (b) stand in an unbroken chain of coverage excess of the Named Insured's primary coverage. In either events, any other insurance maintained by the City, its elected or appointed officers, officials, employees or volunteers shall be in excess of this insurance and shall not contribute with it.

3. **SCOPE OF COVERAGE.** This policy, if primary, affords coverage at least as broad as:

   a. Insurance Services Office form number CA 0001 (Ed. 1/78), Code 1 ("any auto") and endorsement CA 0025.
   b. If excess, affords coverage which is at least as broad as the primary insurance forms referenced in the preceding section a.

4. **SEVERABILITY OF INTEREST.** The insurance afforded by this policy applies separately to each insured who is seeking coverage or against whom a claim is made or a suit is brought with respects to the Company's limit of liability.

5. **PROVISIONS REGARDING THE INSURED'S DUTIES AFTER ACCIDENT OR LOSS.** Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the City, its elected or appointed officers, officials, employees, or volunteers.

6. **CANCELLATION NOTICE.** The insurance afforded by this policy shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail return receipt requested has been given to the City. Such notice shall be addressed as shown in the heading of this endorsement.

C. **INCIDENT AND CLAIM REPORTING PROCEDURE**

Incidents and claims are to be reported to the insurer at:

_____
(TITLE) (Department)

_____
(Company)

_____
(Street Address)

_____
(City) (State) (Zipcode)

_____
(Phone Number)

D. SIGNATURE OF INSURER OR AUTHORIZED REPRESENTATIVE OF THE INSURER

I, _____(print or type name), warrant thate authority to bind the below listed insurance company and by my signature hereon do so bind this company.

_____
Signature of Authorized Representative (original required on endorsement furnished to the City)

ORGANIZATION:_____ **TITLE:** _____

ADDRESS: _____ **PHONE:** _____

f:\risk\save\genauto.end

APPENDIX A

WORKERS' COMPENSATION/EMPLOYER LIABILITY ENDORSEMENT

_____ **("The City")**

_____

_____

Attn:_____

A. **POLICY INFORMATION** **Endorsement #**_____

Insurance Company_____ Policy No._____

Effective Date of This Endorsement_____

Name Insured _____

Employer's Liability Limit (Coverage B)_____

B. POLICY AMENDMENTS

In consideration of the policy premium and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any other endorsement attached thereto, it is agreed as follows:

1. **Cancellation Notice.** The insurance afforded by this policy shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail return receipt requested has been given to the City. Such notice shall be addressed as shown in the heading of this endorsement.

2. **Waver of Subrogation.** The Insurance Company agrees to waive all rights of subrogation against the City, its elected or appointed officers, officials, agents, and employees for losses paid under the terms of this policy which arise form work performed by the Named Insured for the City.

C. **SIGNATURE OF INSURER OR AUTHORIZED REPRESENTATIVE OF THE INSURER**

I, _____(print or type name), warrant that I have authority to bind the below listed insurance company and by my signature hereon do so bind this company.

_____

Signature of Authorized Representative (original required on endorsement furnished to the City)

ORGANIZATION:_____ TITLE:_____

ADDRESS: _____ PHONE:_____

CERTIFICATE OF INSURANCE TO

Return Completed Certificate to
_____(City)
_____
Attn:_____

Only this Certificate of Insurance form will be accepted

_____
(City)

This certifies to the City that the following described policies have been issued to the Insured named below and are in force at this time.

Insured_____

Address_____

Description of operations/locations/products insured (show contact name and/or number, if any)_____

_____

POLICIES AND INSURERS	LIMITS	POLICY #	EXPIRATION DATE

_____

Workers' Compensation Employers Liability $_____

_____
(Name of Insurer)

Best's Rating _____

_____

Check policy type:

_____Comprehensive General Liability

_____Commercial General Liability

_____

Best's Rating_____

Claims-Made_____or

Occurrence_____

Comprehensive General Liability

Each Occurrence $_____

Aggregate $_____

- -

Commercial General Liability

Each Occurrence $_____

General Aggregate either

per project/location $_____

or

twice occurrence limit $_____

_____

Business Auto Policy

Each Person $_____

Each Accident $_____

Liability Coverage Symbol _____

_____
(Name of Insurer)

Each Accident, Property Damage $_____

or

Best's Rating_____ Combined Single Limit $_____

Umbrella Liability Occurrence/ Aggregate $_____

_____
(Name of Insurer)

Self-Insured Retention $_____

Best's Rating_____

Claims-Made _____ or

Occurrence_____

NOTE: If commercial general liability insurance is used or if aggregate limits are endorsed to the comprehensive general liability form, the general aggregate must apply per location/project or the aggregate limit must be at least twice the occurrence limit.

The following coverage or conditions are in effect:	YES	NO
The City, its officials, officers, employees are named on all liability policies described above as insured as respects; (a) activities performed for the City by or on behalf of the named insured, (B) products and completed operations of the Named Insured, and (c) premises, owned, leased, or used by the Named Insured.		
Products and Completed Operations		
The undersigned will mail to the City 30 days' written notice of cancellation or reduction of coverage or limits.		
Cross Liability Clause (or equivalent wording)		
Personal Injury, Perils A, B, and C		
Broad Form Property Damage		
X, C, U Hazards included		
Contractual Liability Coverage applying to this Contract		
Coverage afforded the City, its officials, officers, employees, and volunteers as Insured applies as primary and not excess or contributing to any insurance issues in the name of the City.		
Waiver of subrogation form Workers' Compensation insurer.		

PART B STANDARD DRAWINGS

Earthwork Details

2-1 Terms used with Hillside Homes
2-2 Structural Finish Fill Detail
2-3 Typical Toe of Key Fill
2-4 Rock Disposal Detail 1 of 2
2-5 Rock Disposal Detail 2 of 2
2-6 Import or Export Truck Route
2-7 Concrete Lined Ditch

Street Construction Details

3-1 City Approval Blocks
3-2 Street Improvement Cross-Sections
3-3 Cul-de-sac & Half Cul-de-sac Details
3-4 Normal Industrial Streets Serving Abutting Property
3-5 Alley Pavement Cross-Sections
3-6 Street Barricade
3-7 Apron & Joint Details
3-8 Curb, Gutter, & Sidewalk Doweling Detail
3-9 Expansion & Other Joint Details
3-10 Curb, Gutter, & Sidewalk
3-11 Residential Driveway Entrance Through Curb
3-11A Commercial/Multi Family Driveway Entrance Through Curb
3-12 Alternate Curb, Gutter, & Sidewalk
3-13 Monolithic Curb Wall
3-14 Sidewalk Drain
3-15 Multiple Sidewalk Drain
3-16 To Raise a Water Valve, Manhole, or Street Monument
3-17 Curb Ramp Detail
3-17A Curb Ramp Detail
3-18 Bus Parking Bay
3-18A Bus Shelter with Tri-AD
3-19 Typical Trench Backfill Standard Detail
3-20 PCC Alley Wing Crossing
3-21 Monument Castings
3-22 Alternate Cast Iron Monument Castings
3-23 Installation Details, City City Survey Monument & Bench Mark Elevations
3-24 Street Light Pole
3-25 Light Pole Number
3-26 Street Light Luminaire
3-27 Chart for Estimation of Traffic Index using a Housing Chart
3-28 Conversion Chart - Average Daily Traffic to Traffic Index
3-29 Stop Sign Installation
3-30 Traffic Sign Locations
3-31 Traffic Signs Installation 1 of 3
3-32 Traffic Signs Installation 2 of 3
3-33 Traffic Signs Installation 3 of 3
3-34 Street Name Sign Specification
3-35 Street Sign Bracket - 90 degree Separator

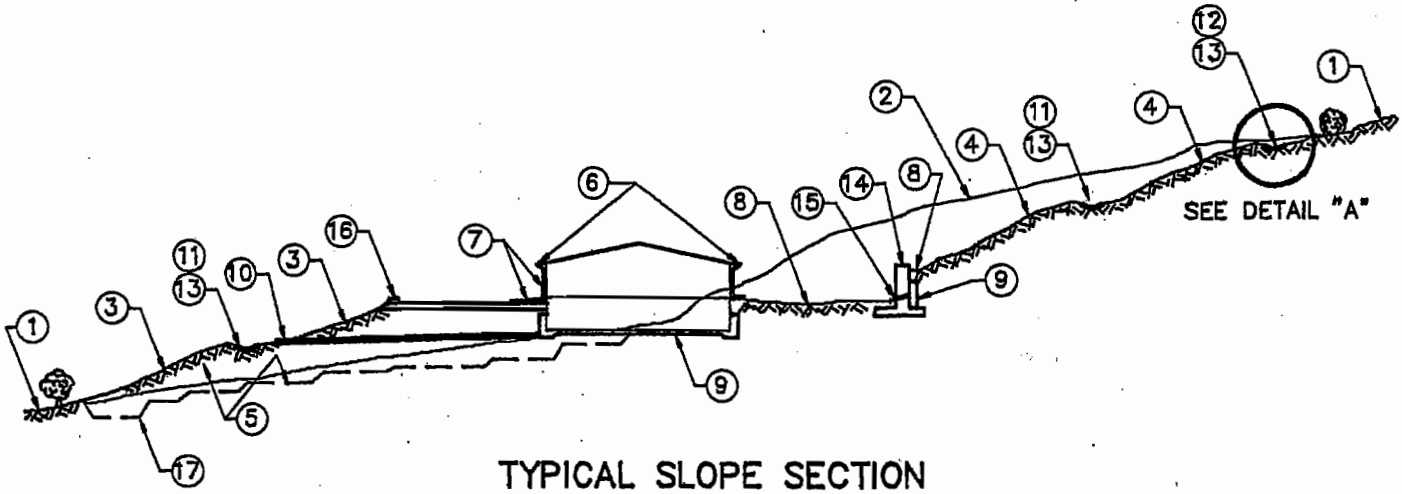
PART B STANDARD DRAWINGS

3-36 Street Sign Bracket - Post Cap & Sign Hole Detail
3-37 Typical Median Islands Pavement Markings & Signs
3-38 Typical Bikelane Cross Sections & Lane Markings
3-39 Typical Pavement Stop Layout
3-40 Typical Pavement Arrow Layout
3-41 AC Pavement Key Cutting Detail

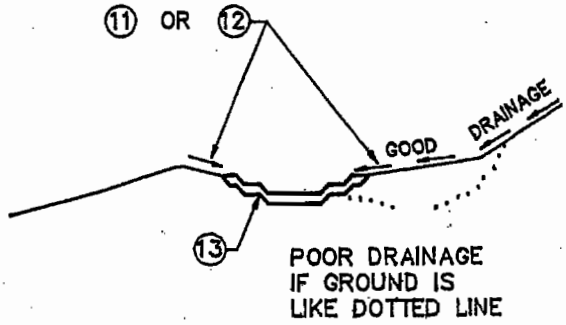
Water System Details
4-1 Backflow Preventer Installation for Fire Sprinkler Service
4-2 Standard 3/4" & 1" Water Meter Installation
4-3 Standard 3/4" & 1" Water Service Installation
4-4 Standard 1 1/2" & 2" Water Service Installation
4-5 Fire Hydrant Installation Water Distribution System
4-6 Thrust Block & Anchor Block Details for 4", 6", 8" & 12" Fittings
4-7 Reverse Anchor & Temporary Blow Off
4-8 2" Diameter Blow Off Assembly
4-9 6" Blow Off Assembly (Unimproved Areas)
4-10 6" Blow Off Assembly (Improved Areas)
4-11 Check Valve Assembly
4-12 Zone Valve Assembly
4-13 1" & 2" Air Relief Valve - Combination Air/Vacuum & Air Release Valve
4-14 Valve Assembly & Tracer Wire Installation
4-15 Manhole Frame & Cover 24"
4-16 Standard 6" Pressure Reducing Station

Landscape Construction Details
5-1 Irrigation Line Trenching Details
5-2 Irrigation Controller Mounting Detail
5-3 Isolation Valve Installation Detail
5-4 Quick Coupling Valve Detail
5-5 Remote Control Valve Assembly Detail
5-6 Swing Joint & Sprinkler Head Details
5-7 Valve Assembly Detail for Drip Emitter System
5-8 Drip Emitter Assembly Detail
5-9 Flush Valve Detail for Drip Emitter System
5-10 Planting Details
5-11 Slope Planting Trees/Shrubs
5-12 Median & Gore Planting Detail
5-13 Entry Posts for Entries to Open Space and Trail Head

Public Fencing
6.1 Public Fence Details
6.2 Pipe Barrier Gates - To PG&E Tower Pads or Open Spaces, 1 of 3
6.3 Pipe Barrier Gates - Latch/Lock & Pivot Post Details, 2 of 3
6.4 Pipe Barrier Gates - List of Materials, 3 of 3



TYPICAL SLOPE SECTION



DETAIL "A"

NOTES

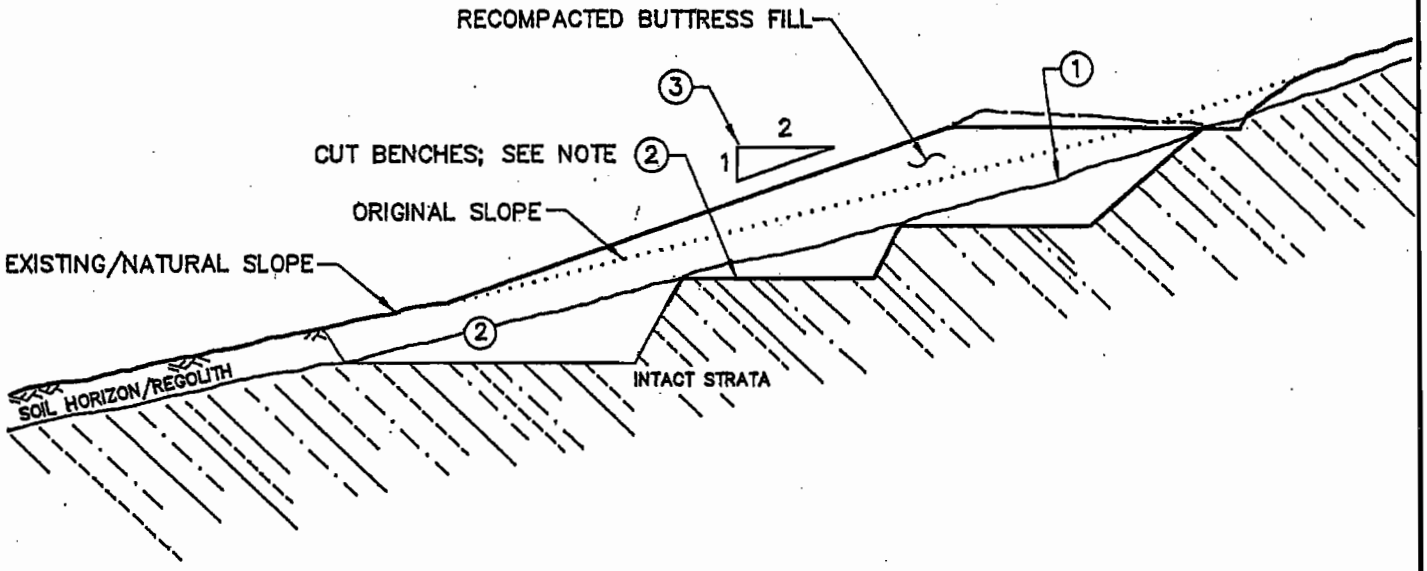
1. NATURAL GROUND SLOPE
2. ORIGINAL GROUND SLOPE
3. FILL SLOPE
4. CUT SLOPE
5. FILL COMPACTED TO ENGINEERING SPECIFICATIONS AND BENCHED INTO FIRM GROUND
6. ROOF GUTTER
7. DOWNSPOUT CONNECTED TO AN UNPERFORATED PIPE OR LINED DITCH WATER COLLECTION SYSTEM
8. DRAINAGE SWALE OR DITCH
9. SUBDRAIN (PERFORATED PIPE AND PERMEABLE MATERIAL)
10. SUBDRAIN DISCHARGE (UNPERFORATED PIPE)
11. DRAINAGE TERRACE AND DITCH (SEE DETAIL "A", CONSTRUCTED AS APPROVED)
12. BROW DITCH
13. LINED DRAINAGE DITCH (SEE DETAIL "A", CONSTRUCTED AS APPROVED)
14. RETAINING WALL (BUILDING PERMIT REQUIRED)
15. WEEP-HOLES THROUGH RETAINING WALL
16. COMPACTED BERM TO DIRECT WATER OFF SLOPE
17. KEYWAY

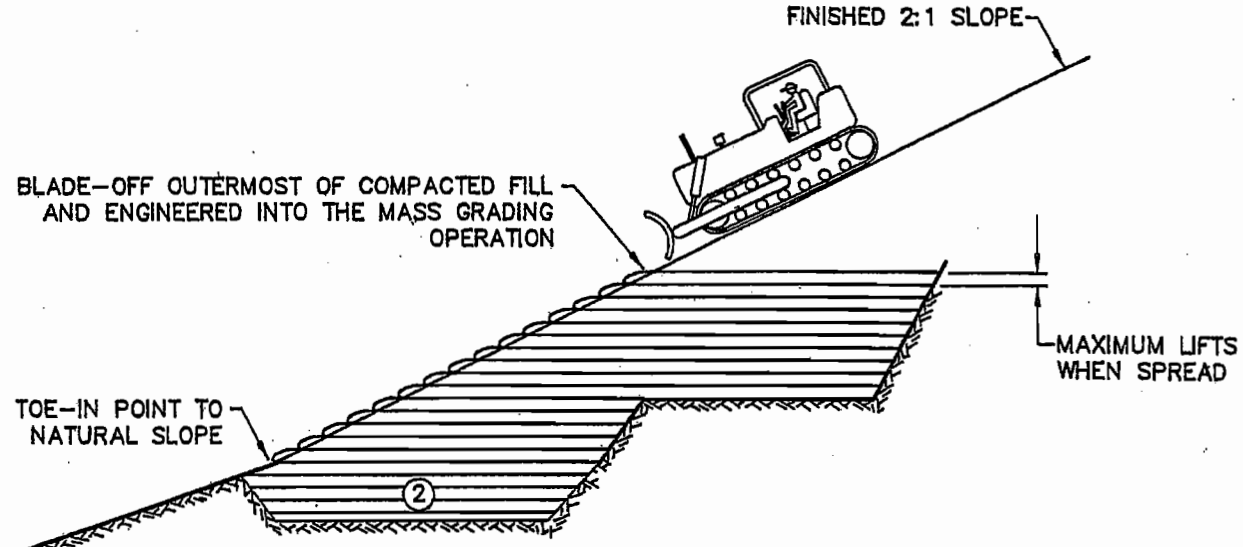
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 2-1	SHEET ____ OF ____
DRAWN BY EVA	FILE NO. ____

STANDARD TERMS USED WITH HILLSIDE HOMES





COMPACTION: ALL STRUCTURAL FILL IS TO BE COMPACTED TO A MINIMUM VALUE OF 90% RELATIVE COMPACTION.

NOTES

1. GRUB & SCARIFY SLOPE PRIOR TO EARTHWORK ACTIVITIES.
2. BENCHES, KEYING, AND EXCAVATION TO EXTEND BENEATH THE SOIL OR REGOLITH HORIZON AT ALL LOCATIONS. THE REQUIRED DEPTH OF EXCAVATION IS TO BE CONFIRMED IN THE FIELD DURING CONSTRUCTION BY EITHER THE SOILS ENGINEER OR THE ENGINEERING GEOLOGIST.
3. THE MAXIMUM FINISH SLOPE IS TO BE 2:1 (HORIZONTAL TO VERTICAL).

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 2-2
DRAWN BY EVA
DATE 4-20-90

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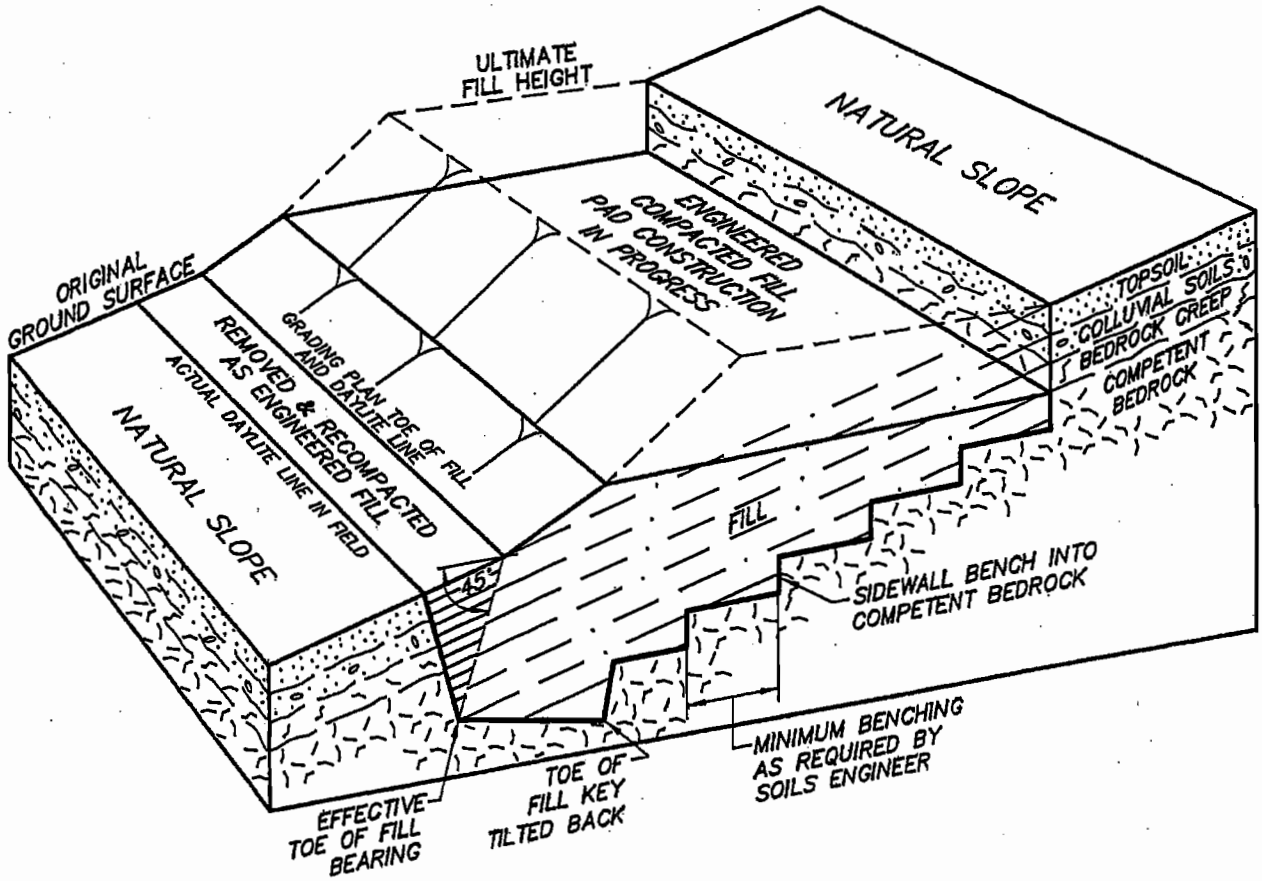
FILE NO. ____
REF. ____

STANDARD STRUCTURAL FINISH FILL DETAIL



NOTE

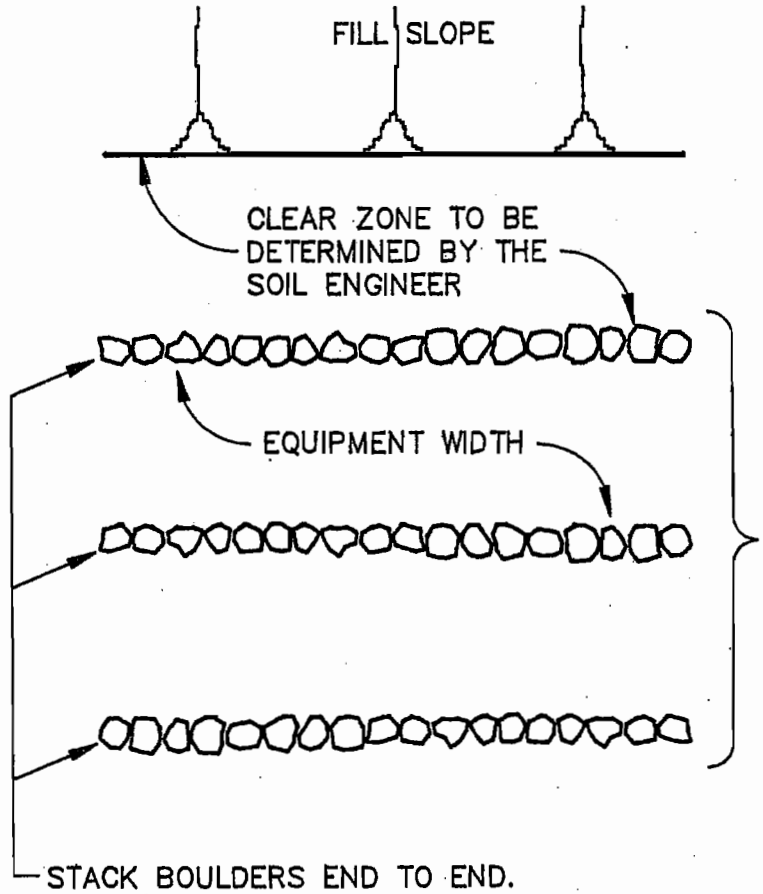
ALL KEYWAYS, BENCHING DIMENSIONS AND SUBDRAINS TO BE DETERMINED IN THE FIELD BY THE PROJECT SOILS ENGINEER AND/OR THE ENGINEERING GEOLOGIST.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

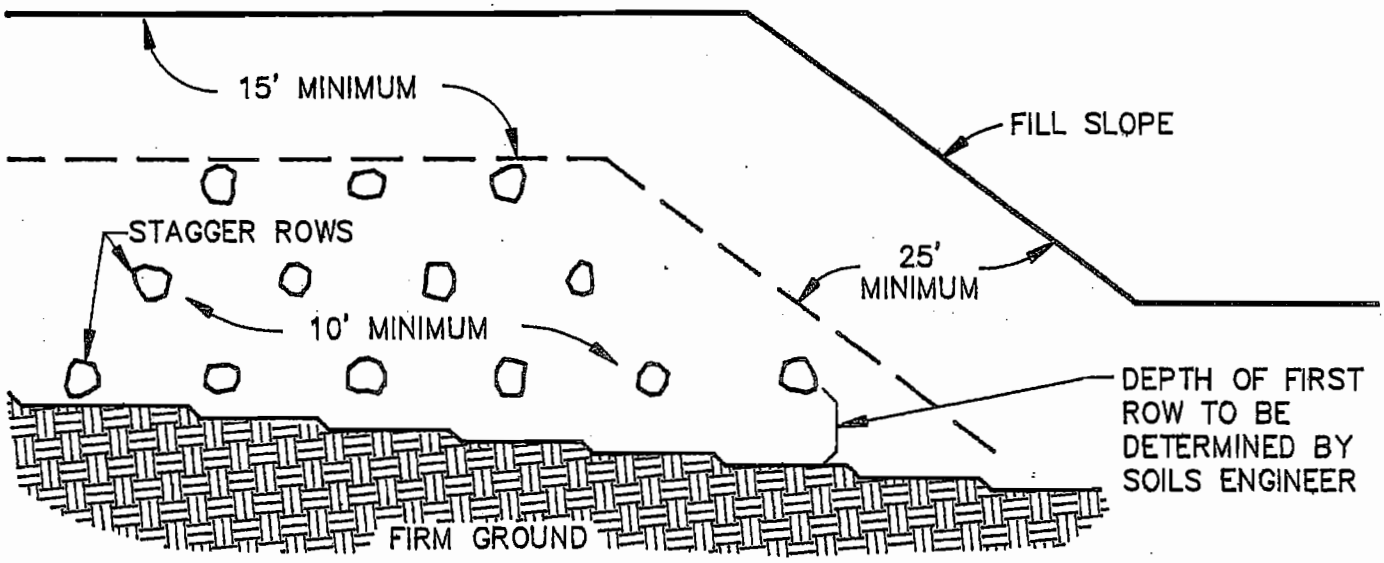
DWG. NO. 2-3
DRAWN BY EVA
DATE 4-20-90
SHEET ____ OF ____
FILE NO. ____
REF. ____

STANDARD
TYPICAL TOE OF KEY FILL



SPECIAL NOTE:
THE PROJECT SOIL ENGINEER, DUE TO GEOTECHNICAL CRITERIA, COULD REFUSE PLACEMENT OF BOULDERS AS SHOWN IN THE ROCK DISPOSAL DETAIL.

SOIL SHALL BE PUSHED OVER ROCKS AND FLOODED INTO VOIDS. COMPACT AROUND AND OVER EACH WINDROW.



CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

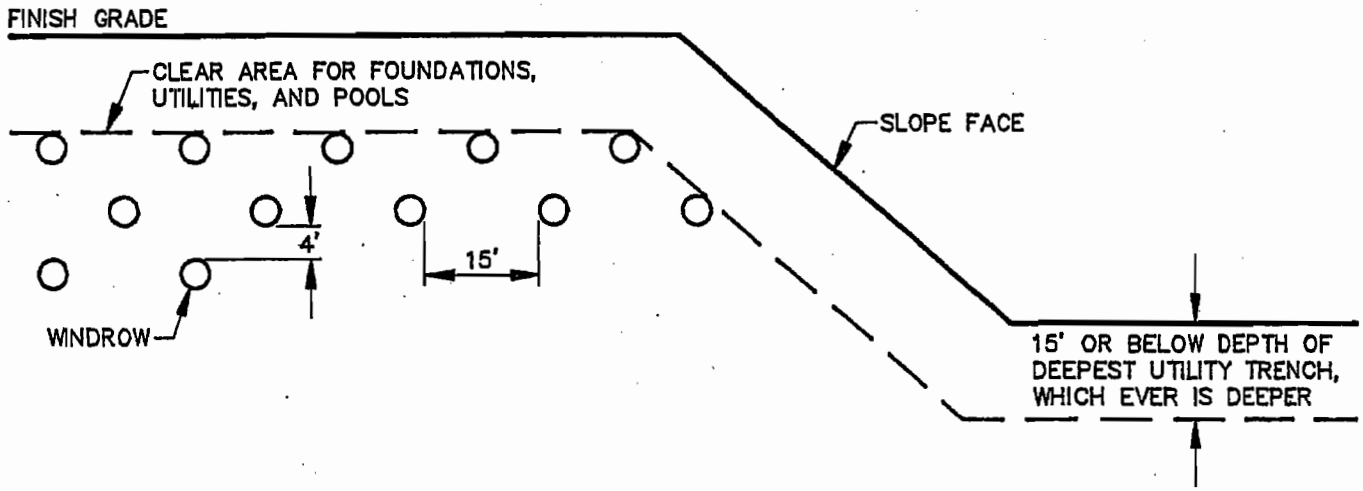
DWG. NO. 2-4
DRAWN BY EVA
DATE 4-20-90

SHEET 1 OF 2
FILE NO.
REF.

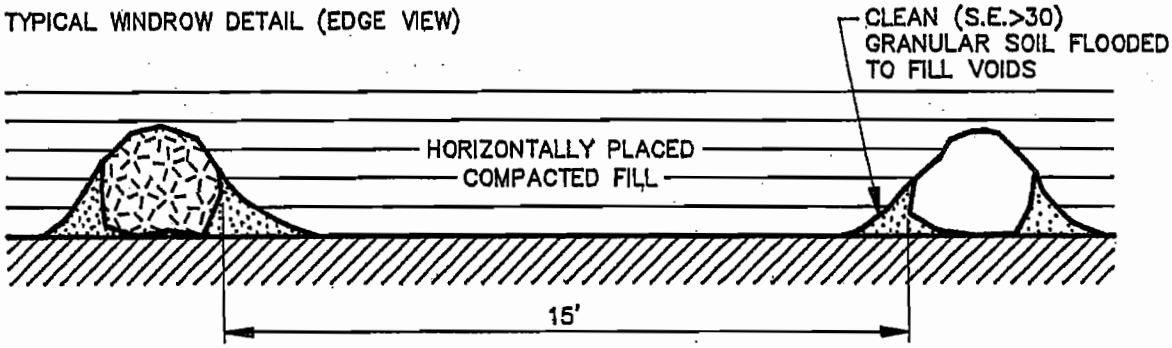
STANDARD
ROCK DISPOSAL DETAIL

ROCK DISPOSAL DETAIL

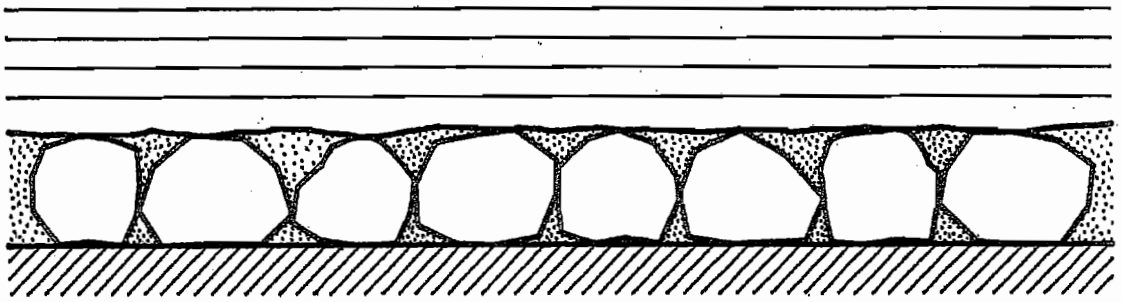
(BOULDERS GREATER THAN
TWO FEET IN DIAMETER)



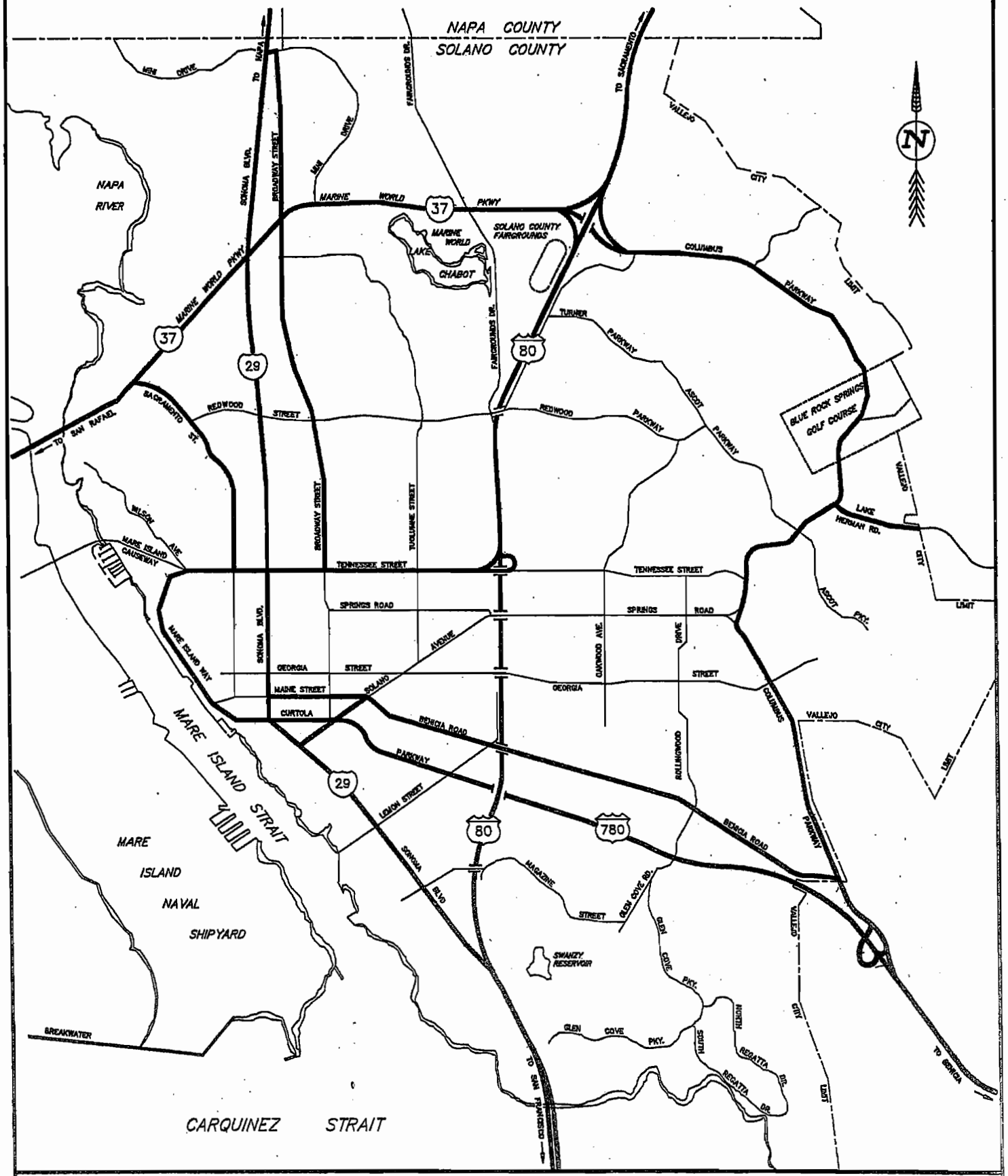
TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW



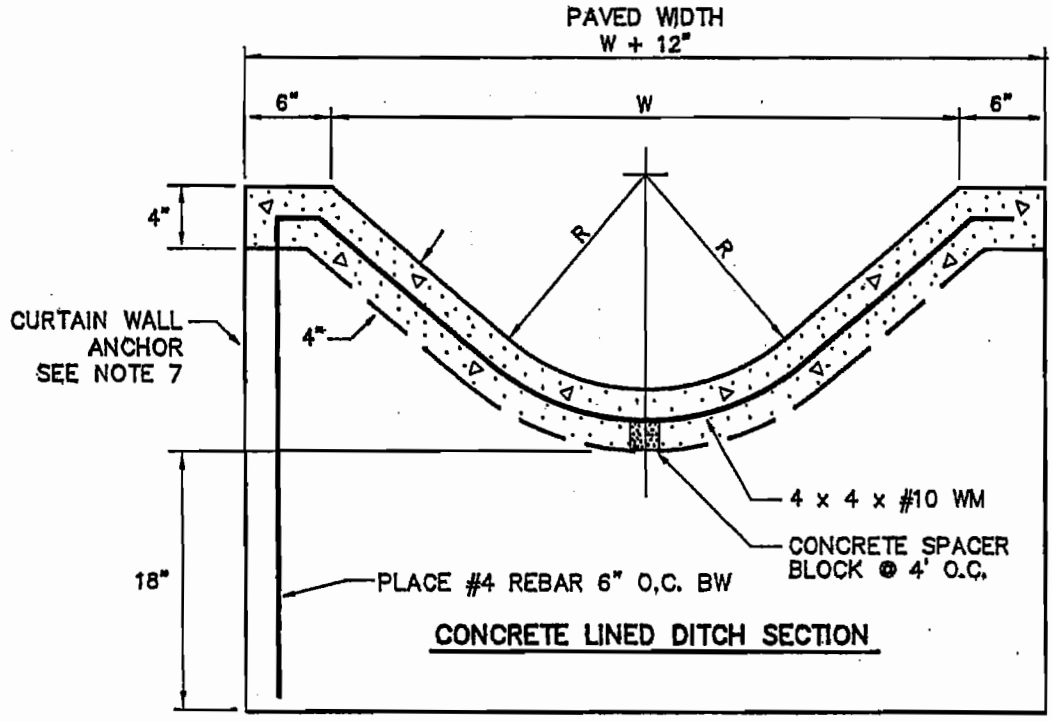
CITY OF VALLEJO		**DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION**
DWG. NO. 2-5	SHEET 2 OF 2	**STANDARD ROCK DISPOSAL DETAIL**
DRAWN BY EVA	FILE NO.	
DATE 4-20-90	REF.	



CITY OF VALLEJO

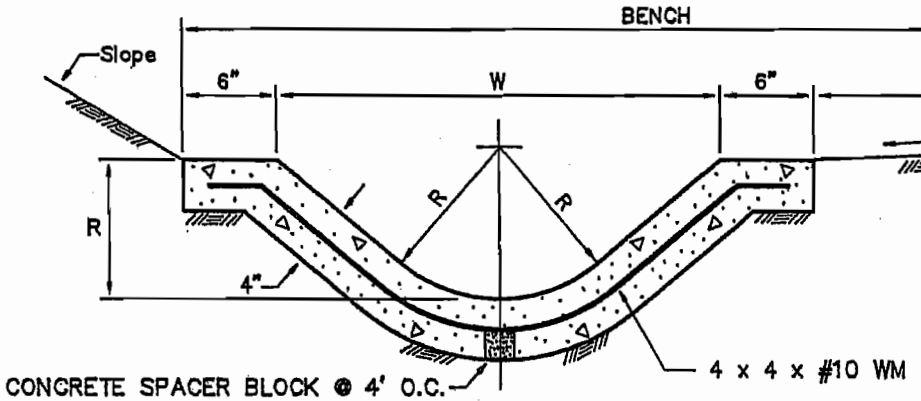
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 2-06	SHEET ____ OF ____	IMPORT/EXPORT TRUCK ROUTE
DRAWN BY JJM	FILE NO. ____	
DATE 11-21-91	REF. ____	



CONCRETE LINED DITCH SECTION

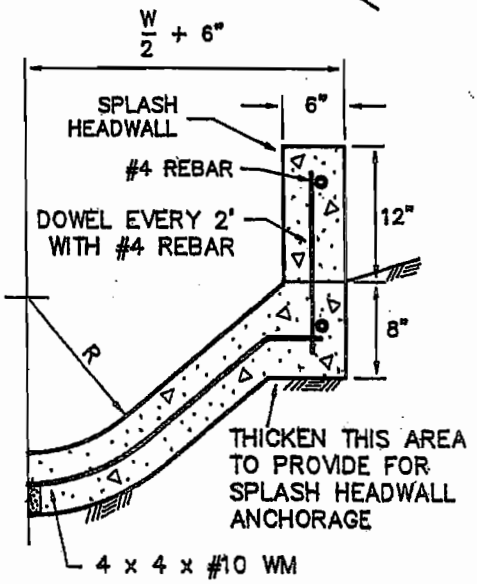
TYPE	R	W
A	12"	36"
B	18"	48"



BENCH CONCRETE LINED DITCH SECTION

NOTES

1. Finished backfill shall be flushed as shown after compaction.
2. Concrete shall be Class B.
3. Install a deep joint at every 12' O.C.
4. Provide a SPLASH HEADWALL on curves or as directed by the City Inspector.
5. Compact finished ground on both sides of the ditch to minimum 90%.
6. Where a concrete lined ditch connects to a catch basin place 4 #4 rebar a minimum of 6" into the catch basin and concrete lined ditch.
7. Install a 6" thick CURTAIN WALL ANCHOR at each 10' of elevation change.
8. CONCRETE SPACER BLOCKS shall be used at all times.



BENCH CONCRETE LINED DITCH SECTION SHOWING SPLASH HEADWALL

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 2-7 | SHEET ____ OF ____
DRAWN BY EVA | FILE NO. ____
DATE 4-20-90 | REF

STANDARD CONCRETE LINED DITCH

PLANS REVIEWED FOR CONSTRUCTION

DEVELOPMENT SERVICES DEPARTMENT – PLANNING DIVISION

GRADING PLANS – Reviewed for compliance with the Hillside Development Guidelines of the Vallejo Planning Commission adopted pursuant to Chapter 16.54 of the Vallejo Municipal Code.

By _____

Name _____ Chf. of Plan'g
PRINT

Date _____

Reviewed for compliance with Permit No. _____

By _____

Name _____ Chf. of Plan'g
PRINT

Date _____

CITY of VALLEJO

SHOWN AT REDUCED SCALE, OVERALL DIMENSIONS TO BE 8–1/2" x 3"

PLANS REVIEWED FOR CONSTRUCTION

DEPARTMENT of PUBLIC WORKS – ENGINEERING DIVISION

GRADING PLANS– Reviewed for compliance with Chapter 12.40 of the Vallejo Municipal Code.

By _____

Name _____ City Engineer
PRINT

R.C.E. _____ Expr. _____

Date _____

STREET IMPROVEMENT PLANS – Reviewed for compliance with Chapter 15.06 of the Vallejo Municipal Code.

By _____

Name _____ City Engineer
PRINT

R.C.E. _____ Expr. _____

Date _____

CITY of VALLEJO

SHOWN AT REDUCED SCALE, OVERALL DIMENSIONS TO BE 8–1/2" x 3"

RECORD DRAWING

THIS RECORD PLAN HAS BEEN REVIEWED

By _____

Name _____ City Inspector
PRINT

Title _____

Date _____

SHOWN AT REDUCED SCALE, OVERALL DIMENSIONS TO BE 5–1/2" x 2"

NOTES

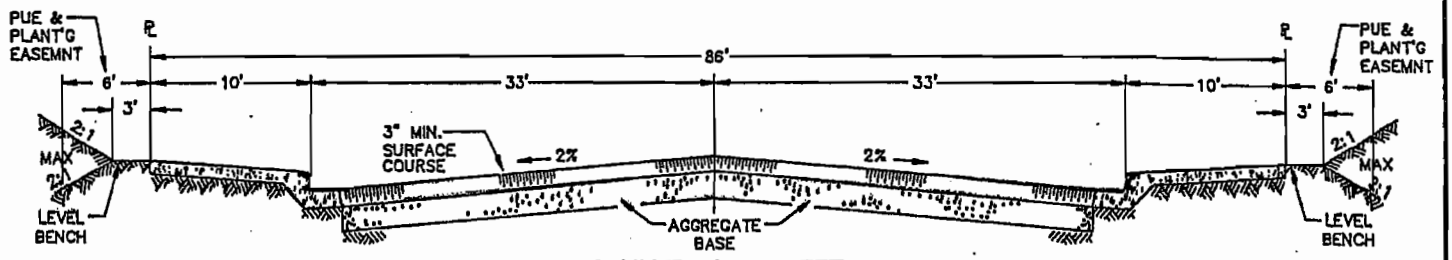
1. BLOCK TO BE LOCATED IN LOWER RIGHT HAND CORNER OF SHEET OR (ALTERNATIVELY) IN LOWER RIGHT CORNER OF THE MAIN FIELD AND SHALL BE ORIENTED TO READ FROM THE BOTTOM.
2. SIGNATURE BLOCK SHALL BE PROVIDED ON EACH SHEET FOR THE PROJECT ENGINEER.
3. EACH REVISION SHALL BE REVIEWED AND INITIATED BY THE CITY ENGINEER.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

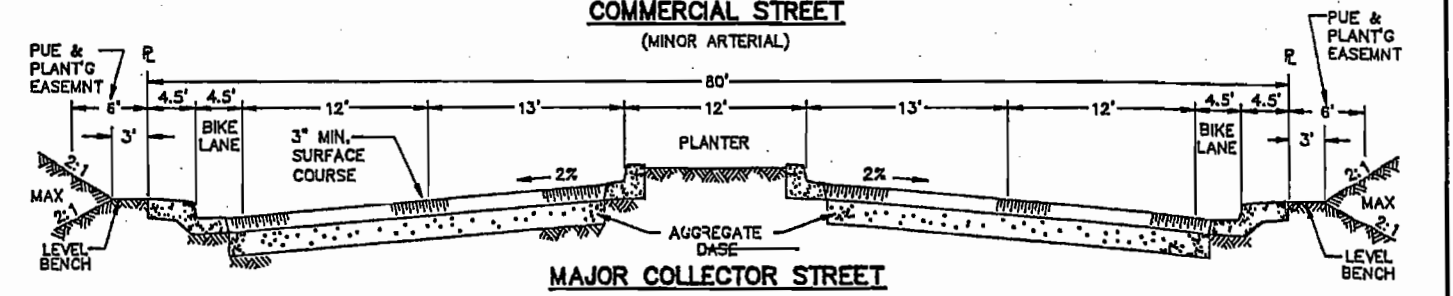
DWG. NO. 3-1 | SHEET 1 OF 1
DRAWN BY JJM | FILE NO. _____
DATE 5-4-92 | REF. _____

STANDARD CITY APPROVAL BLOCKS



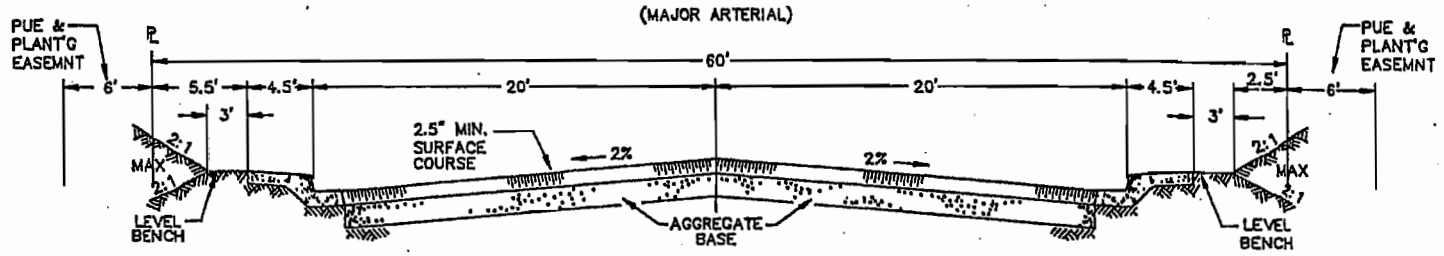
COMMERCIAL STREET

(MINOR ARTERIAL)

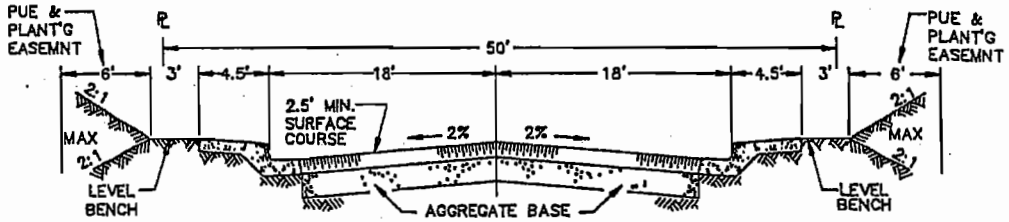


MAJOR COLLECTOR STREET

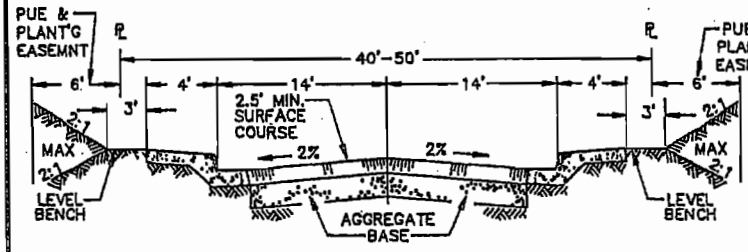
(MAJOR ARTERIAL)



MINOR COLLECTOR STREET

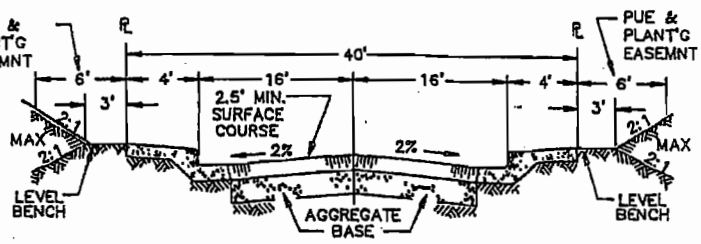


RESIDENTIAL STREET



SPECIAL 28' STREET

(AS AUTHORIZED)



CUL DE SAC

(SERVING 20 RESIDENTIAL UNITS OR LESS)

GENERAL NOTES:

1. CROSS-FALL SHALL NOT EXCEED 2% FROM CURB TO CURB EXCEPT WITH THE APPROVAL OF THE PUBLIC WORKS DIRECTOR.

2. IN ADDITION TO THE SIDEWALK WIDTHS SHOWN ON THE STREET CROSS-SECTIONS, 6 ft. SIDEWALKS SHALL BE INSTALLED WHERE DESIGNATED IN BLOCKS WITHIN 1000 ft. OF SCHOOLS, PARKS, SHOPPING OR OTHER AREAS THAT ATTRACT PEDESTRIAN TRAFFIC.

CITY OF VALLEJO

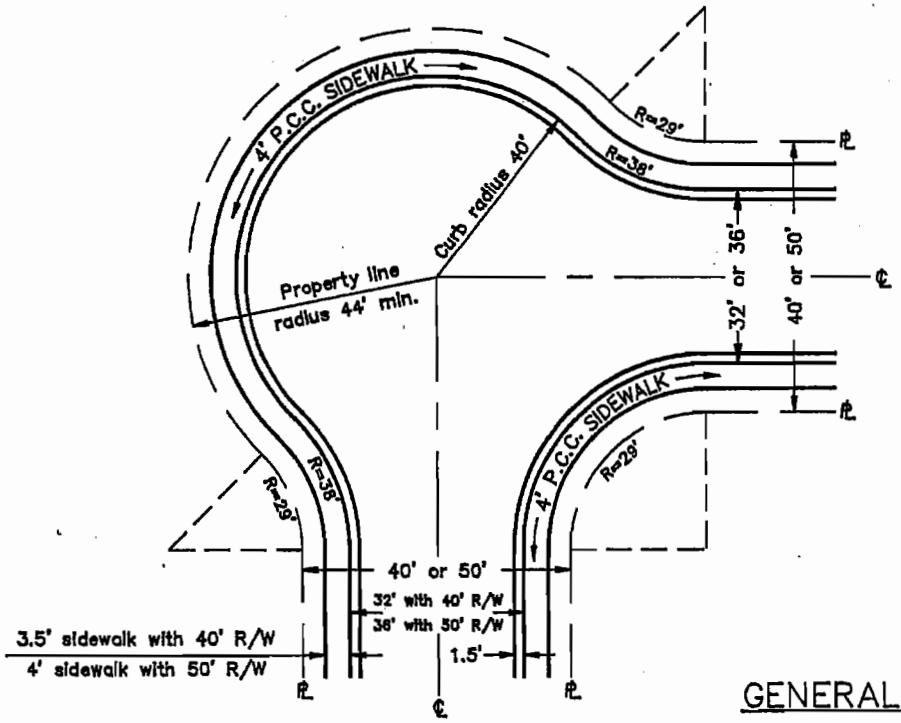
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-2
DRAWN BY JJM
DATE 12-20-91
EAH

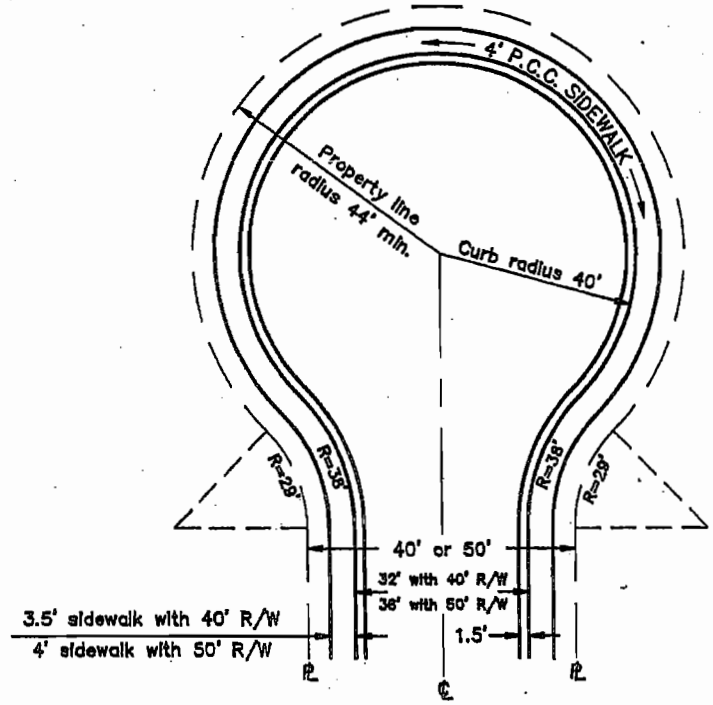
SHEET 1 OF 1
FILE NO.
REF.
NONE

STANDARD STREET IMPROVEMENT CROSS-SECTIONS

APPROVED:



HALF CUL DE SAC



CUL DE SAC

GENERAL NOTES

Minimum Cul De Sac street R/W widths

(1) 20 lots or less with 40' R/W and 32' street.

(2) More than 20 lots with 50' R/W and 36' street.

(3) Sidewalk width on 40' R/W shall be 3.5 feet.

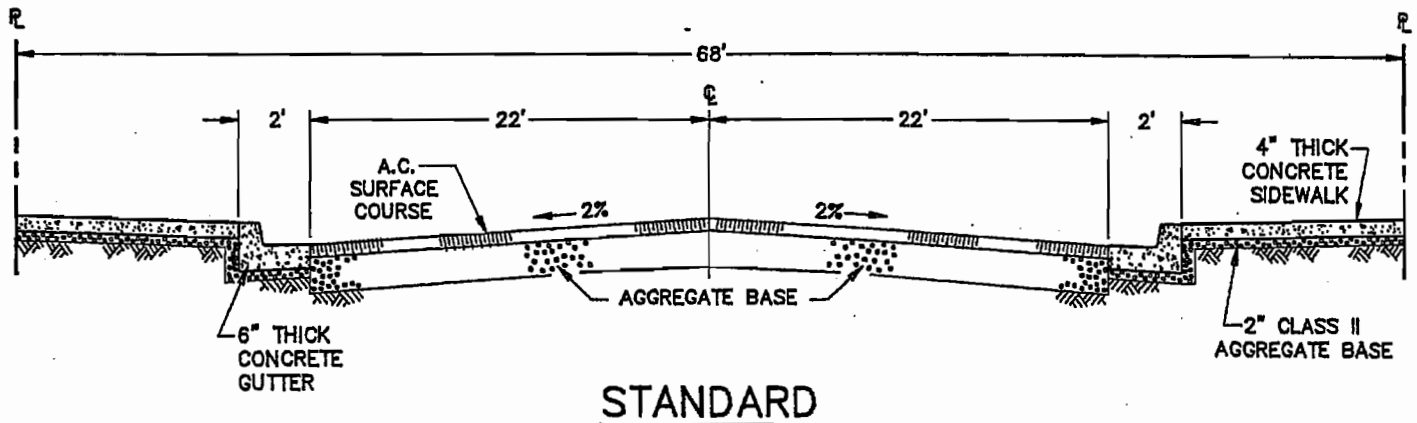
(4) Sidewalk width on 50' R/W shall be 4 feet.

CITY OF VALLEJO

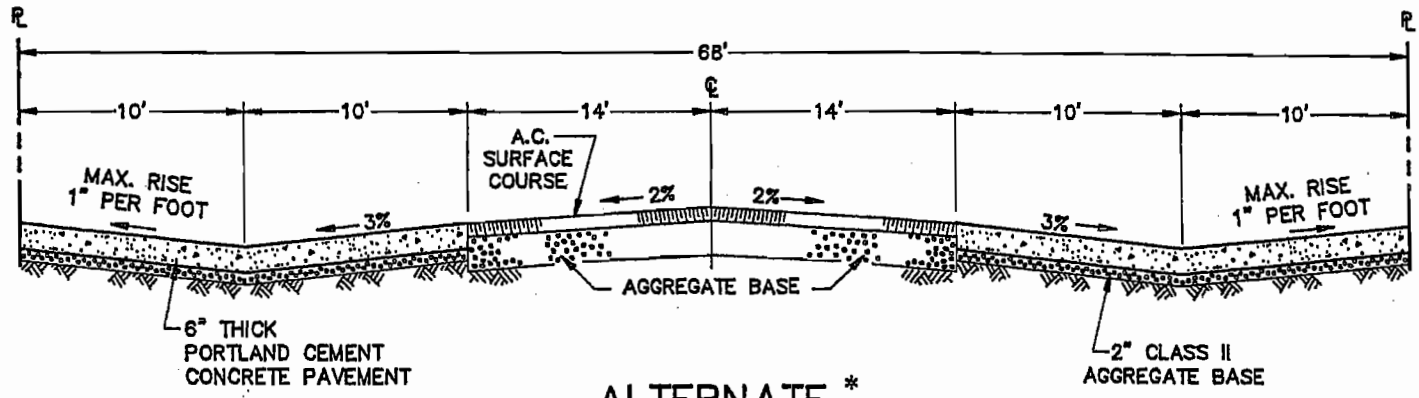
DEPARTMENT OF PUBLIC WORKS
MAINTENANCE DIVISION

DWG. NO. 3-3 | SHEET ____ OF ____
DRAWN BY DCY | FILE NO. ____
DATE 7-24-92 | REF

STANDARD CUL DE SAC AND HALF CUL DE SAC DETAILS



STANDARD



ALTERNATE *

NOTES

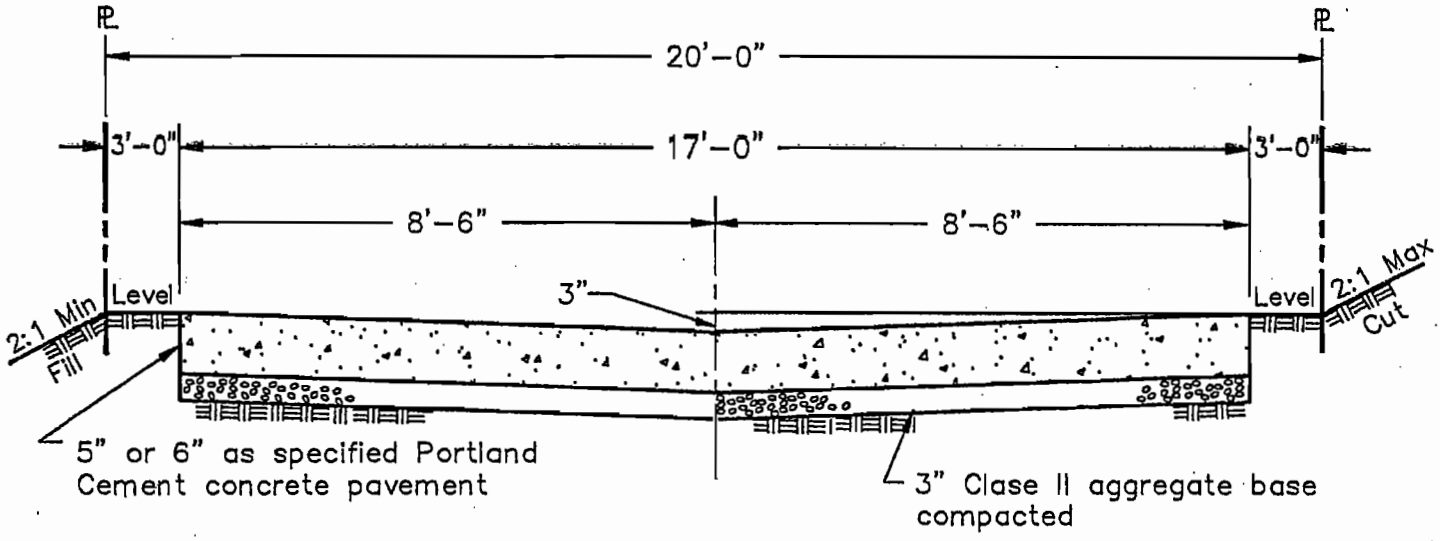
1. PAVEMENT THICKNESS SHALL VARY DEPENDING ON TYPE OF SUBGRADE.
2. SOIL TESTS SHALL BE MADE, AND DESIGN BASED ON RESULTS OF TESTS IN ACCORDANCE WITH SPECIFICATIONS.
3. INDUSTRIAL STREETS SHALL HAVE A MINIMUM OF 3" A.C. SURFACE COURSE.

* 4. SUBJECT TO APPROVAL BY CITY ENGINEER.

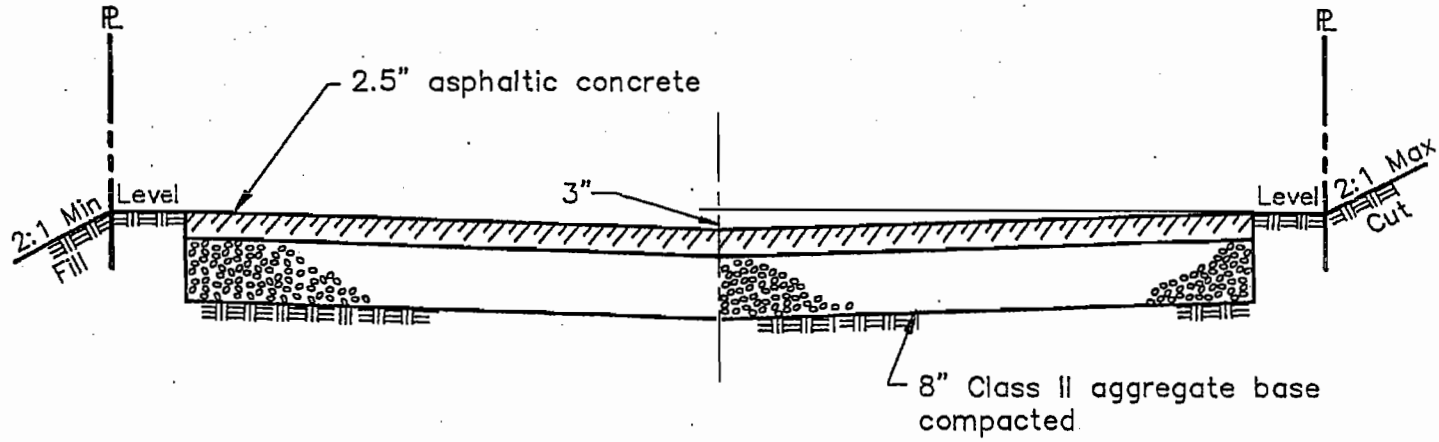
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-4	SHEET 1 OF 1	NORMAL INDUSTRIAL STREET SERVING ABUTTING PROPERTY
DRAWN BY EVA	FILE NO.	
DATE 7-28-92	REF.	



CROSS-SECTION OF ALLEY PAVEMENT FOR HEAVILY TRAVELED AND COMMERCIAL AREAS

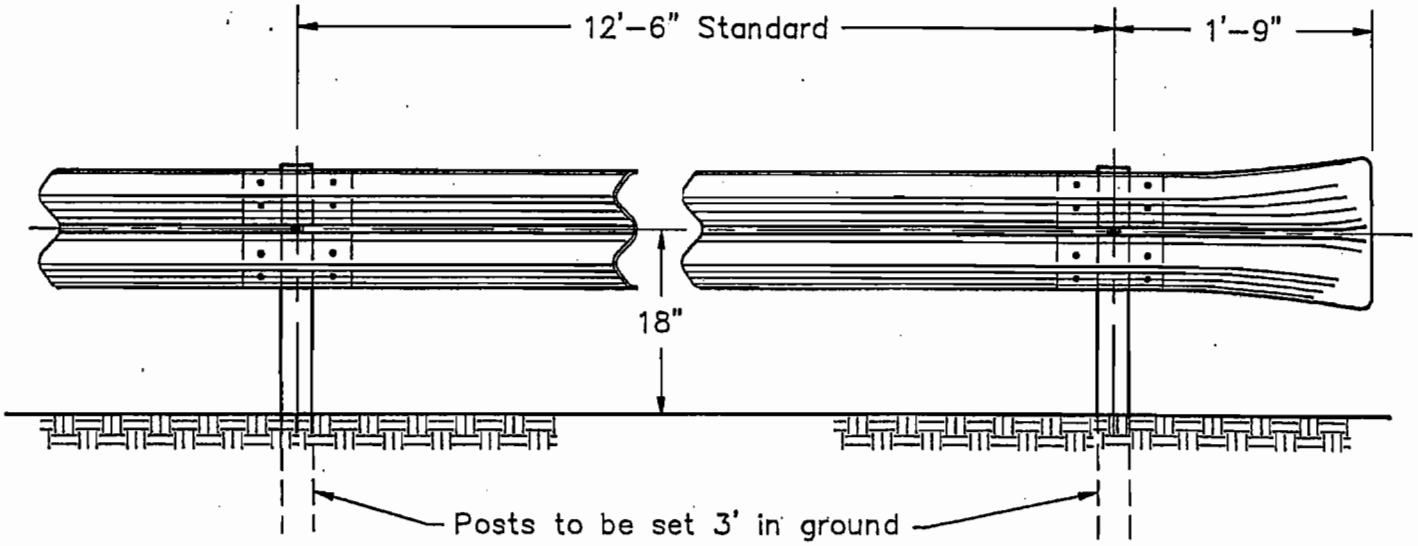


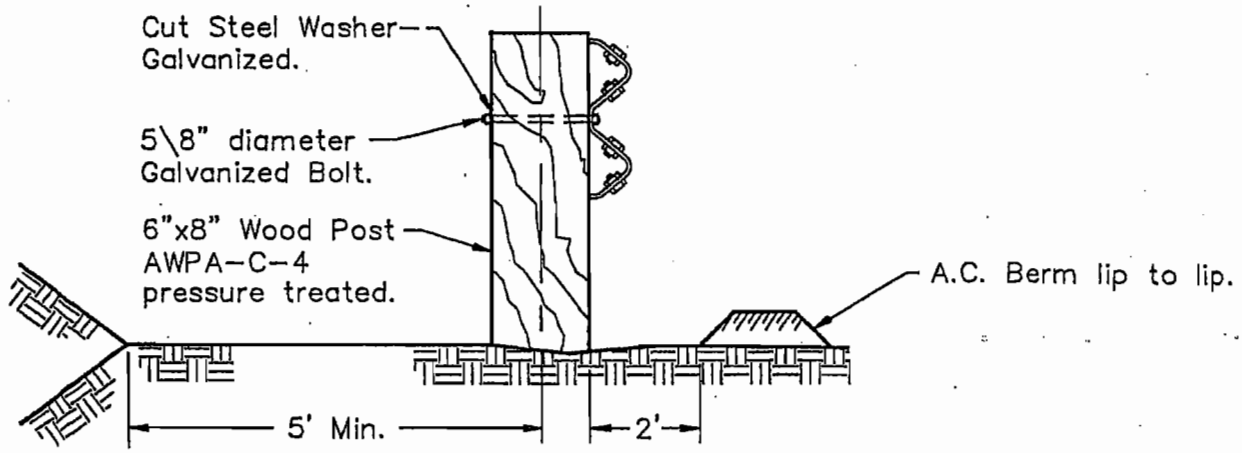
CROSS-SECTION OF ALLEY PAVEMENT FOR RESIDENTENTAL AREAS WHERE DRAINAGE AND TRAFFIC PERMIT

NOTES:

1. REMOVE ALL HEADERS, STAKES, AND OTHER WOOD UPON COMPLETION OF CONCRETE PAVEMENT

CITY OF VALLEJO		DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION
DWG. NO. 3-5	SHEET ____ OF ____	STANDARD ALLEY PAVEMENT
DRAWN BY GLR	FILE NO. ____	CROSS - SECTION
DATE 5-4-92	REF. ____	





NOTES:

1. The barricade shall extend across the entire street, including sidewalks.
2. Barricade shall be "Armco Flex-Beam" or equivalent cross member with end pieces mounnted on 6"x8" pressure-treated wood posts. Posts to be set 3' in ground.
3. The cross member and end pieces shall be primed in accordance with the State Standard Specifications Section 91-2.07, current issue, and painted in accordance with State Standard Specifications Section 91-2.09, current issue.
4. Mount Standard Reflector at center of cross-member.

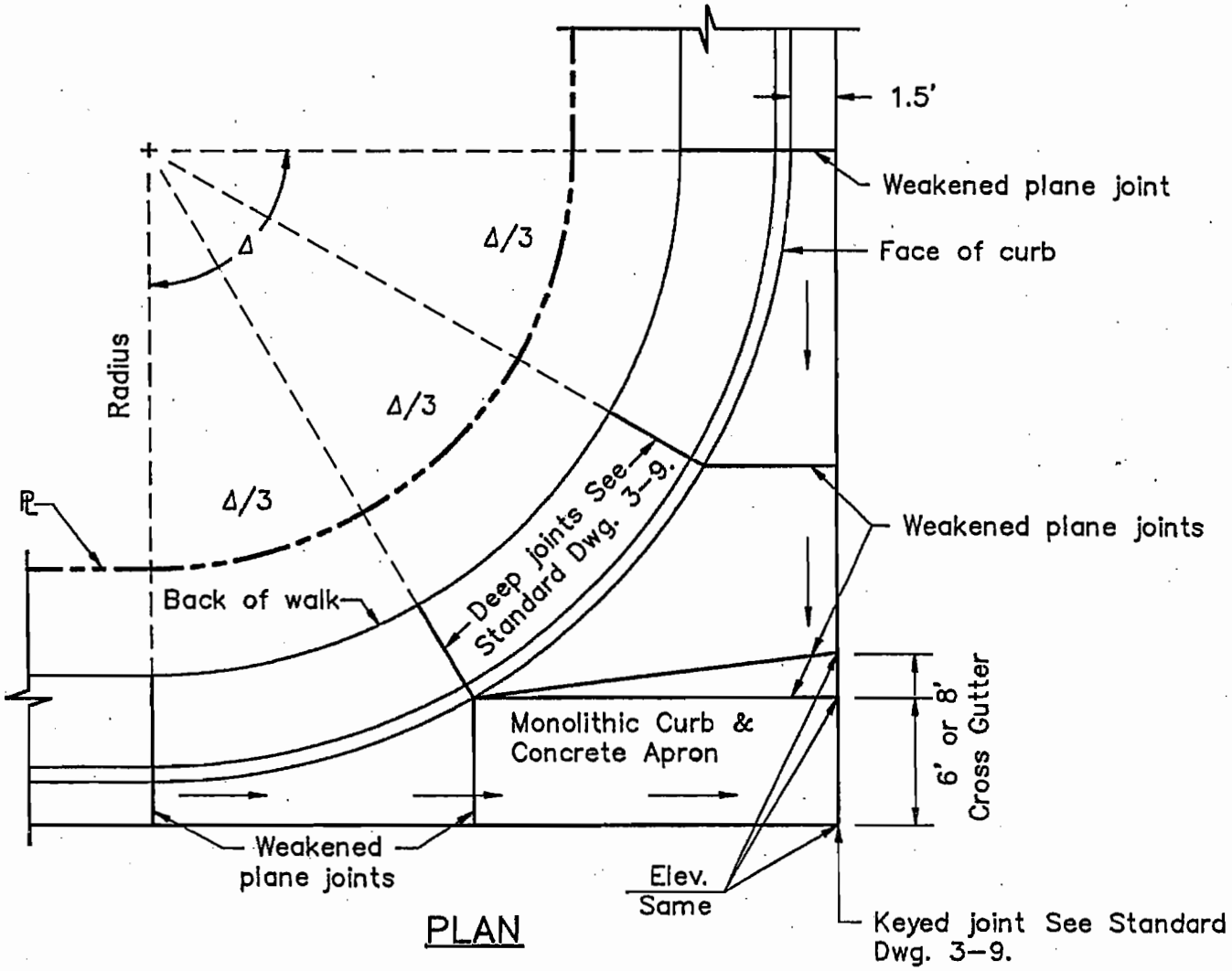
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

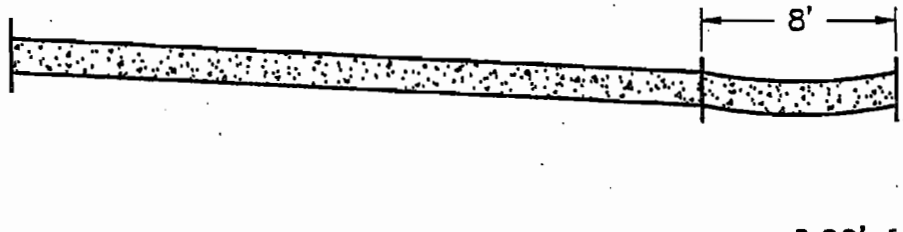
DWG. NO. 3-6
DRAWN BY GLR
DATE 12-20-91

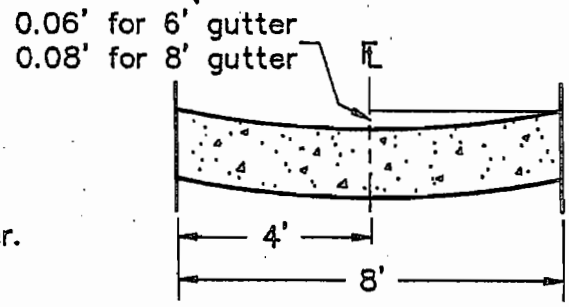
SHEET 1 OF 1
FILE NO.
REF.

STANDARD
STREET BARRICADE



PLAN





Cross Gutter

PROFILES

NOTES

1. Curb ramps must be installed within return area. See Standard Dwg. 3–17.
2. All aprons shall be Class "B" P.C.C. 7–1/2" thick throughout, over min. 2" of 3/4" Class II A.B.
3. Broom finish unless otherwise directed by engineer.
4. Use pigmented sealing compound for curing.
5. City discourages use of Cross Gutter and Std. Apron. To install Cross Gutter, special approval from City Engineer is required.

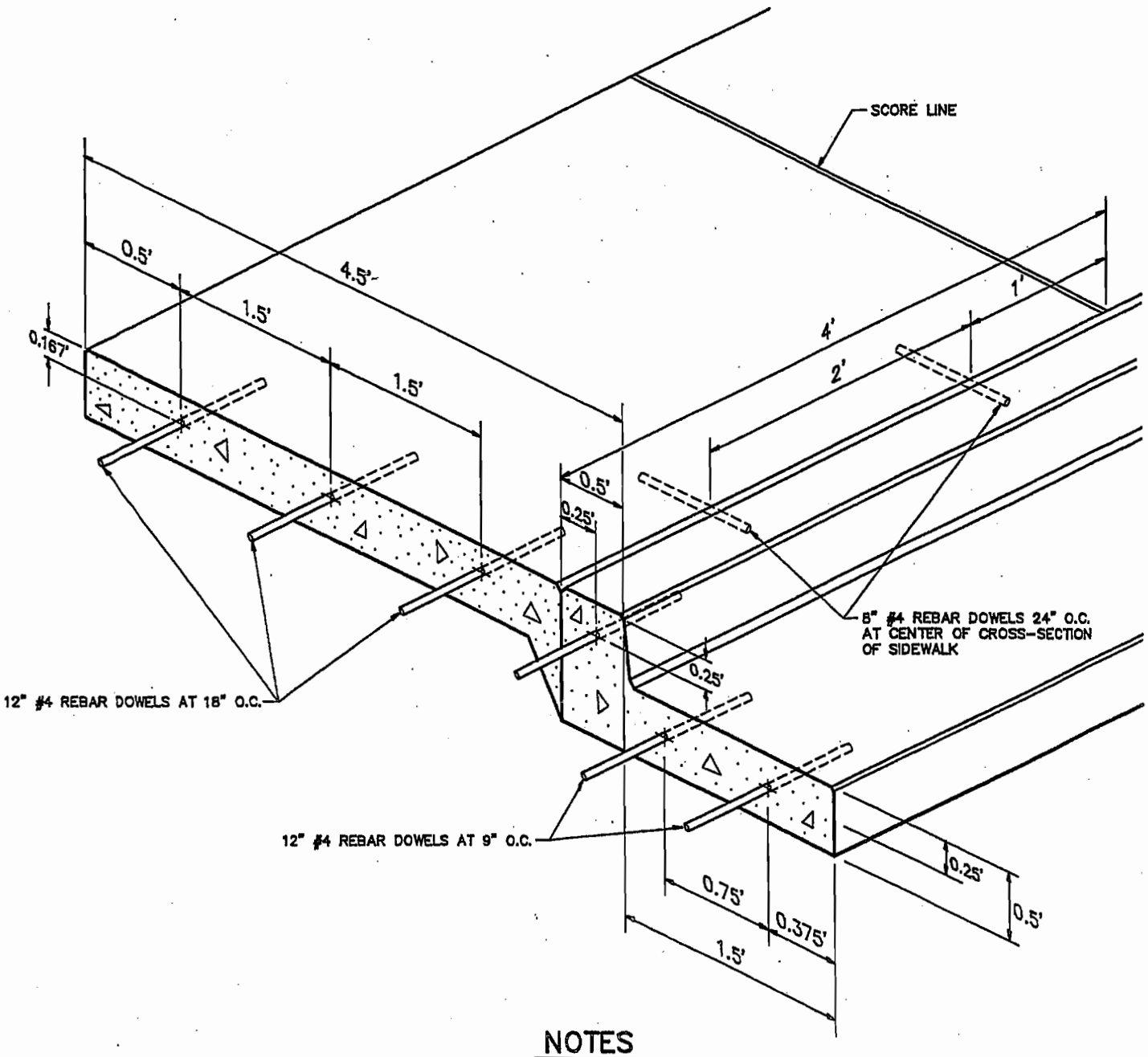
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3–7
DRAWN BY GLR
DATE 5–4–92

SHEET ____ OF ____
FILE NO. ____
REF. ____

STANDARD APRON AND JOINT DETAILS



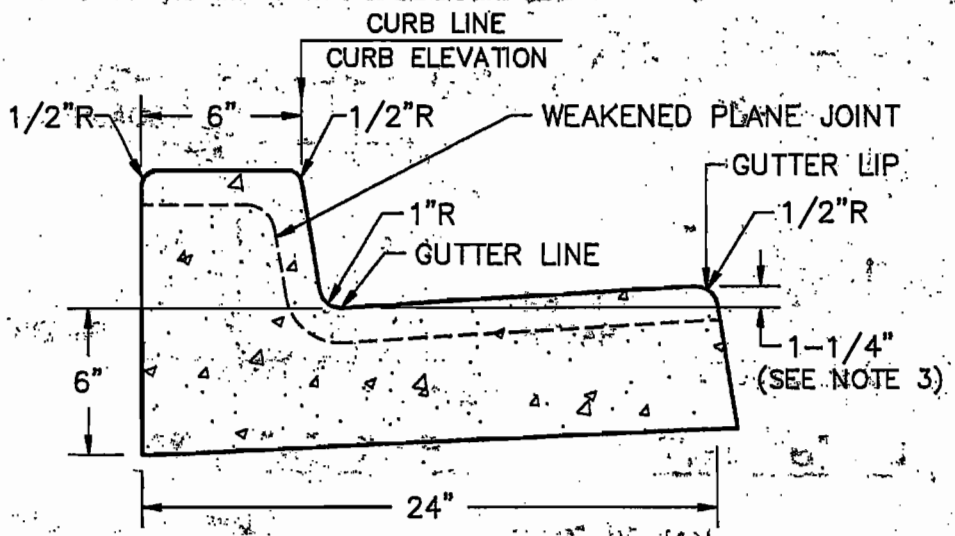
NOTES

1. DOWELS SHALL BE INSTALLED AS SHOWN BETWEEN NEW SIDEWALK AND EXISTING CURB AND GUTTER, OR VICE VERSA.
2. DOWELS SHALL BE INSTALLED AS SHOWN AT BOTH ENDS OF NEW IMPROVEMENTS AS THEY TIE INTO EXISTING SIDEWALK, AND/OR CURB AND GUTTER. (EXCEPTION – SEE NOTE 3)
3. DOWELS SHALL NOT BE INSTALLED WHERE AN EXPANSION JOINT EXISTS, OR IS REQUIRED. EXISTING EXPANSION JOINT SHALL BE REPLACED AS REQUIRED.
4. SAWCUTS ARE TYPICALLY MADE AT EXISTING SCORE LINES.

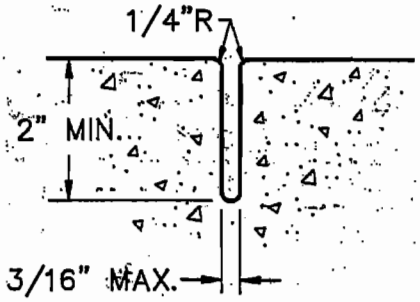
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

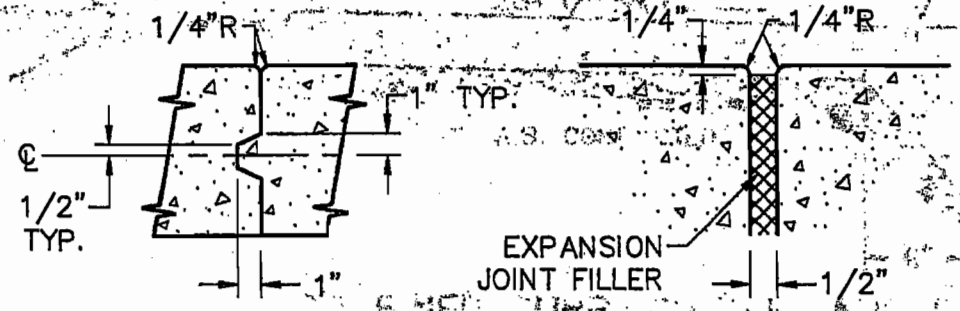
DWG. NO. 3-8	SHEET ____ OF ____	STANDARD
DRAWN BY EVA	FILE NO. ____	CURB, GUTTER, AND SIDEWALK
DATE 7-5-90	REF. ____	DOWELING DETAIL



CURB SECTION

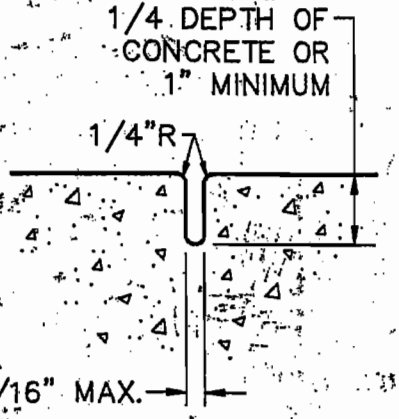


WEAKENED PLANE JOINT

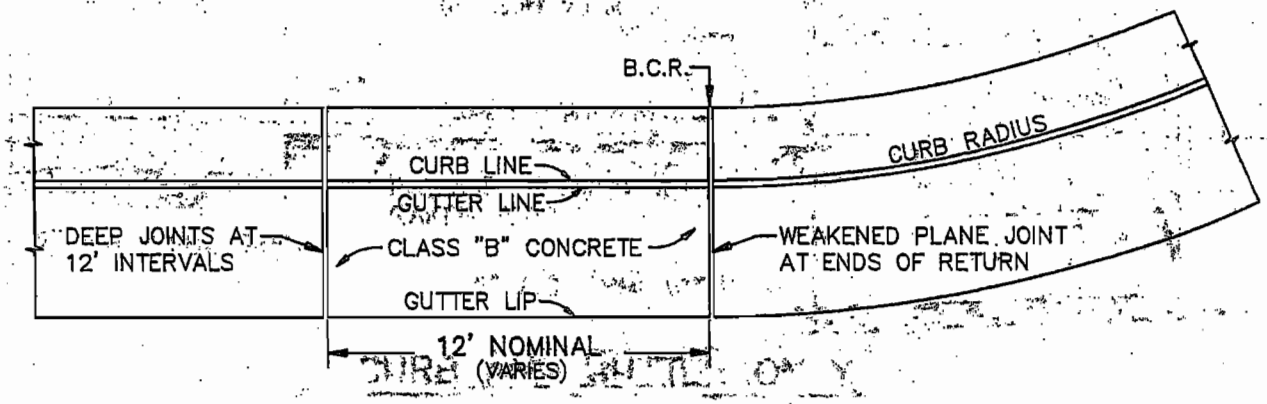


KEY JOINT

EXPANSION JOINT



DEEP JOINT



TYPICAL PLAN

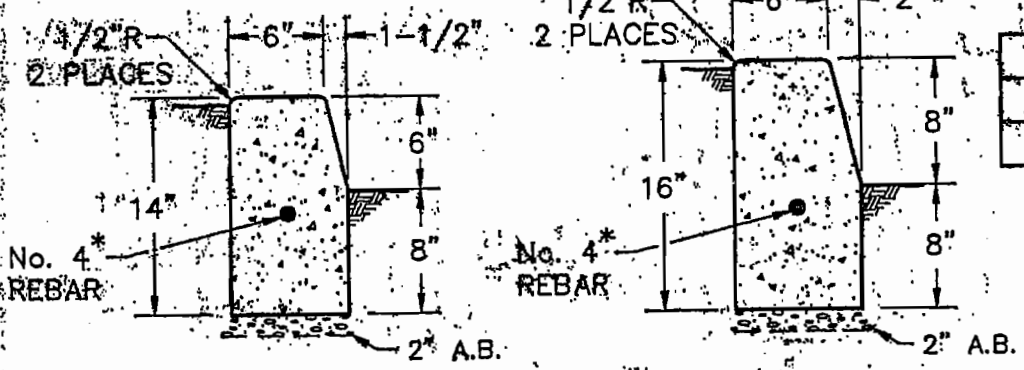
GENERAL NOTES

1. BROOM FINISH UNLESS OTHERWISE DIRECTED.
2. USE PIGMENTED SEALING COMPOUND FOR CURING.
3. EXCEPT WHERE ELEVATIONS SHOWN INDICATE OTHERWISE.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-9	SHEET ____ OF ____	STANDARD EXPANSION AND OTHER JOINT DETAILS
DRAWN BY EVA	FILE NO. ____	
DATE 12-2-91	REF. ____	

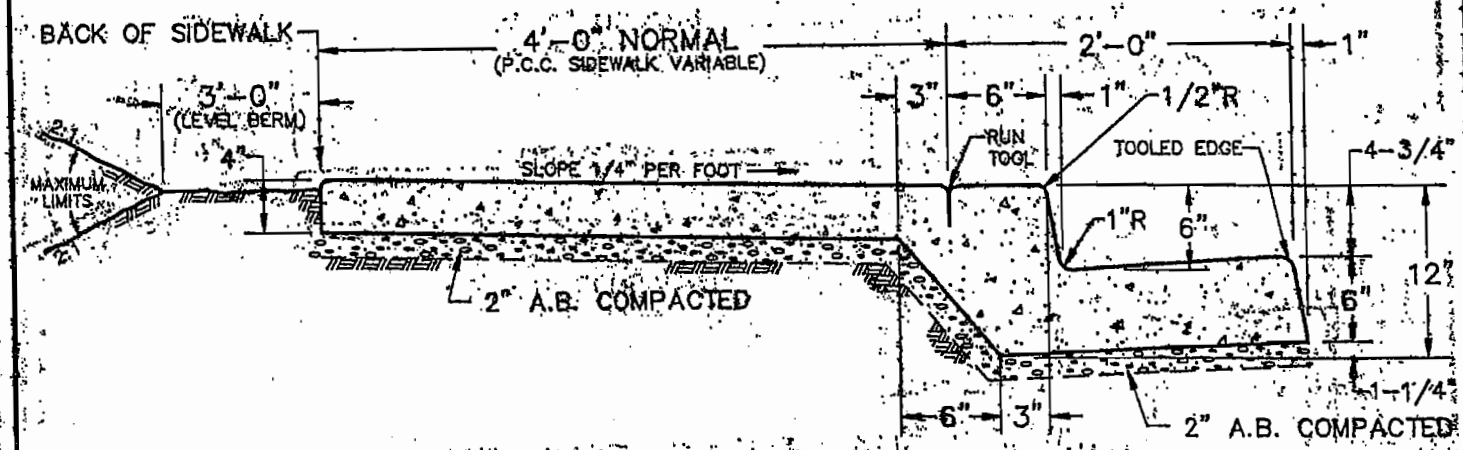


TYPE	CU. YDS./LIN. FT.
A	0.02585
B	0.03084

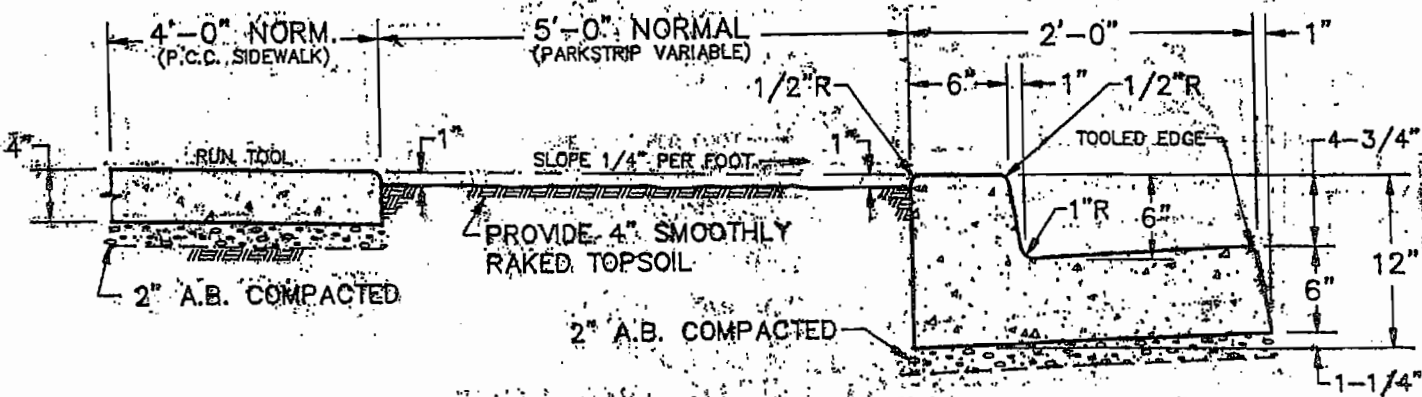
* ONE CONTINUOUS LONGITUDINAL

TYPE "A" CURB

TYPE "B" CURB



COMBINED CURB, GUTTER, AND SIDEWALK



CURB AND GUTTER ONLY

GENERAL NOTES

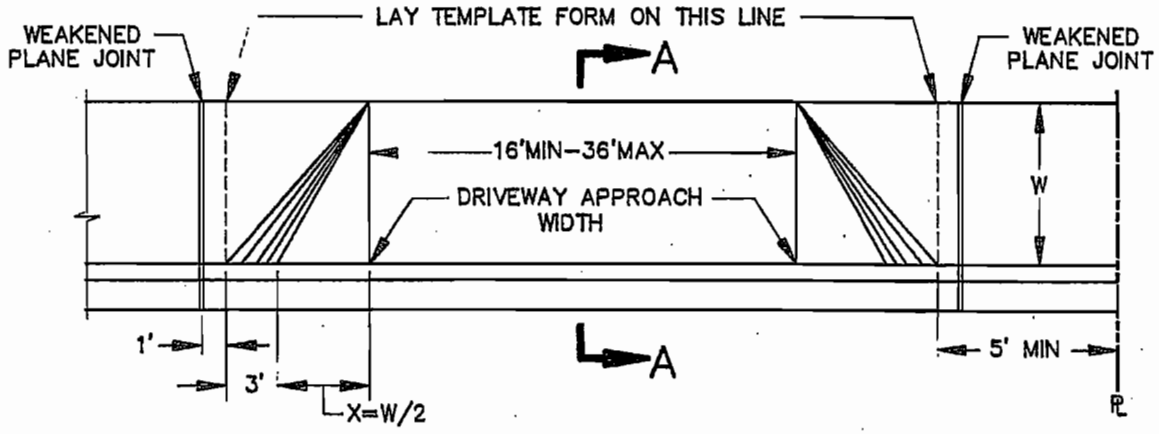
1. BROOM FINISH UNLESS OTHERWISE DIRECTED.
2. TOOL SCORE LINES EVERY 4'. LONGITUDINAL SCORE LINES TO SUIT CONDITIONS OR AS DIRECTED BY ENGINEER, 16 SQ. FT. MAXIMUM.
3. USE PIGMENTED SEALING COMPOUND FOR CURING.
4. 1/4" DEPTH OF CONCRETE OR 1" MINIMUM DEEP JOINTS EVERY 12'.

CITY OF VALLEJO

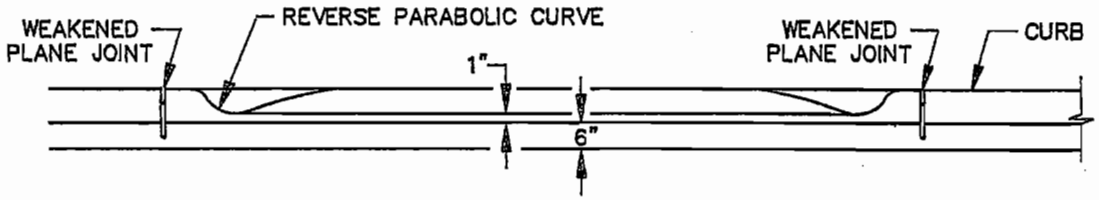
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-10	SHEET OF
DRAWN BY EVA	FILE NO.
DATE 5-4-92	REF.

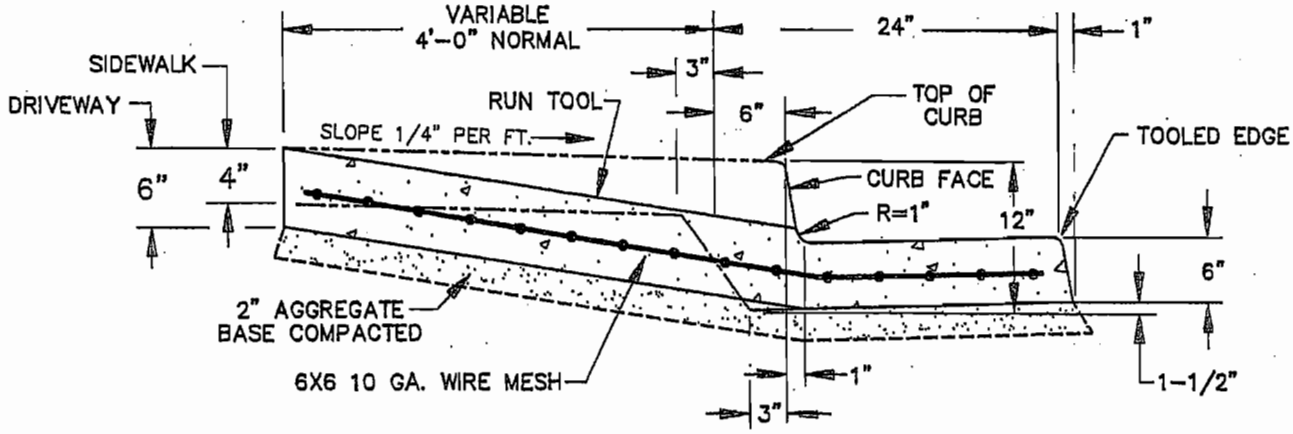
STANDARD CURB, GUTTER, AND SIDEWALK



PLAN



ELEVATION



SECTION A-A

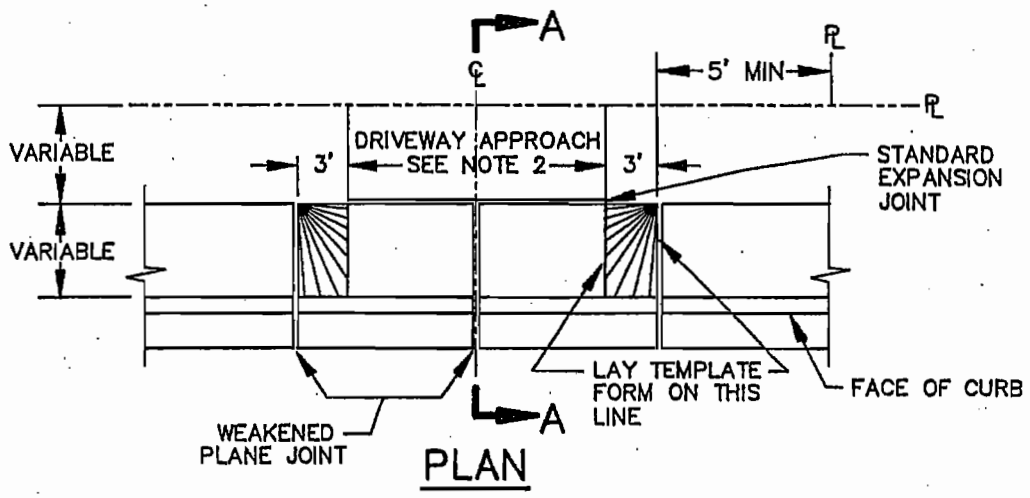
GENERAL NOTES:

1. DRAW SCREED LATERALLY ACROSS SIDEWALK. KEEP SCREED PARALLEL TO CENTERLINE OF SIDEWALK.
2. WIDTH OF DRIVEWAY APPROACH: 2-WAY TRAFFIC 30' OR 36' ; ONE-WAY TRAFFIC 16'
3. TOOL SCORE LINE EVERY 4'. LONGITUDINAL LINES TO SUIT CONDITIONS OR AS DIRECTED BY ENGINEER.
4. USE PIGMENTED SEALING COMPOUND FOR CURING.
5. WHEN DISTANCE BETWEEN DRIVEWAY FLARES IS LESS THAN 5' ELIMINATE ADJACENT FLARES AND CONSTRUCT AS COMMON DRIVEWAY.

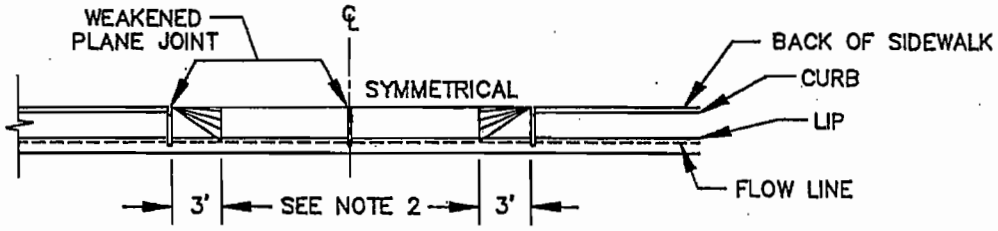
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

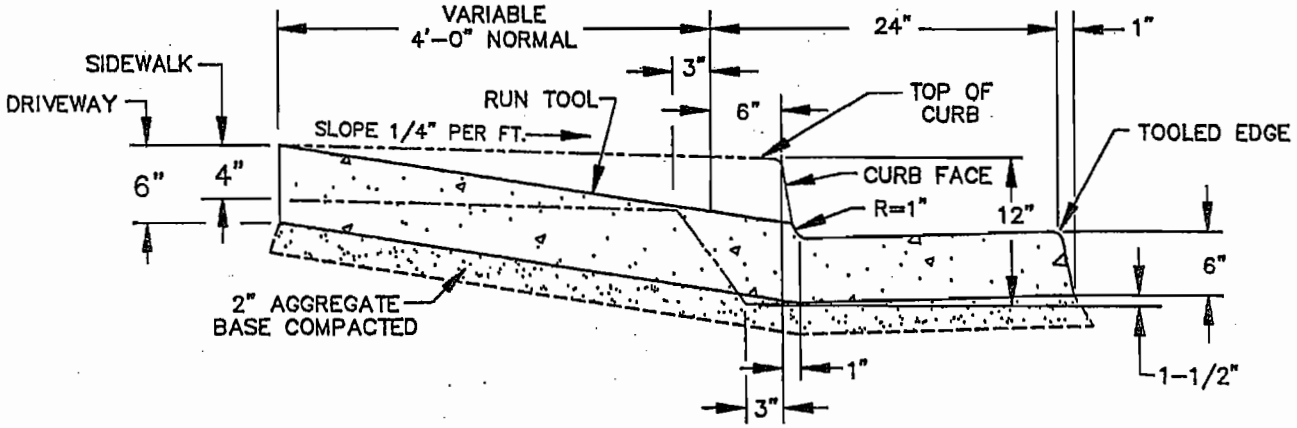
DWG. NO. 3-11A	SHEET ____ OF ____	STANDARD COMMERCIAL/MULTI-FAMILY
DRAWN BY JJM	FILE NO. ____	DRIVEWAY ENTRANCE THROUGH CURB
DATE 5-5-92	REF. ____	



PLAN



ELEVATION



SECTION A-A

GENERAL NOTES:

1. DRAW SCREED LATERALLY ACROSS SIDEWALK. KEEP SCREED PARALLEL TO CENTERLINE OF SIDEWALK.
2. WIDTH OF DRIVEWAY APPROACH:

ONE-WAY TRAFFIC OR 1 CAR GARAGE	2 CAR GARAGE	3 CAR GARAGE
10'	16' OR 20'	24'

3. TOOL SCORE LINE EVERY 4'. LONGITUDINAL LINES TO SUIT CONDITIONS OR AS DIRECTED BY ENGINEER.
4. USE PIGMENTED SEALING COMPOUND FOR CURING.
5. WIDTH OF DRIVEWAYS FOR TWO WAY TRAFFIC ACCESS WITH NO PARKING ON DRIVEWAYS:

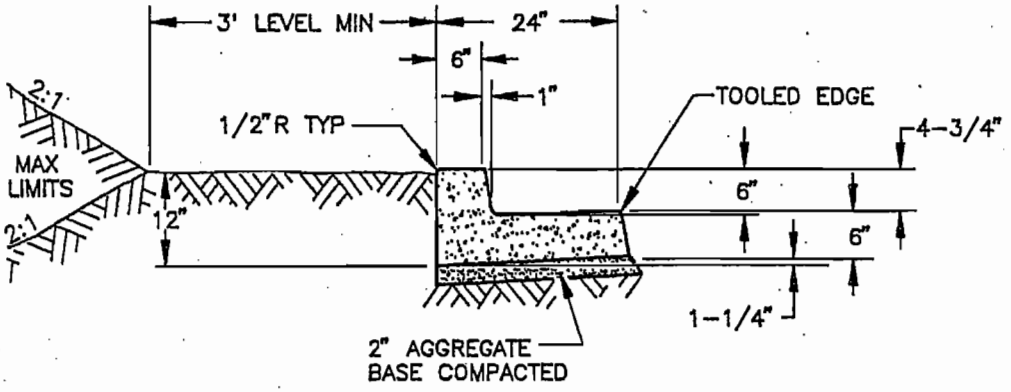
ONE SINGLE FAMILY	TWO TO FIVE SINGLE FAMILIES	MORE THAN FIVE SINGLE FAMILIES
16'	20'	24'-28'

CITY OF VALLEJO

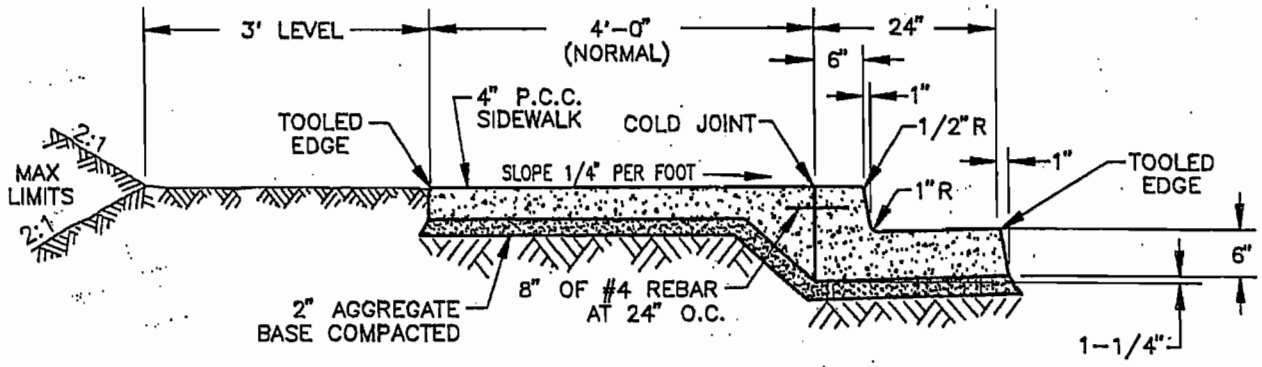
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-11
DRAWN BY JJM
DATE 4-5-92
SHEET ____ OF ____
FILE NO. ____
REF. ____

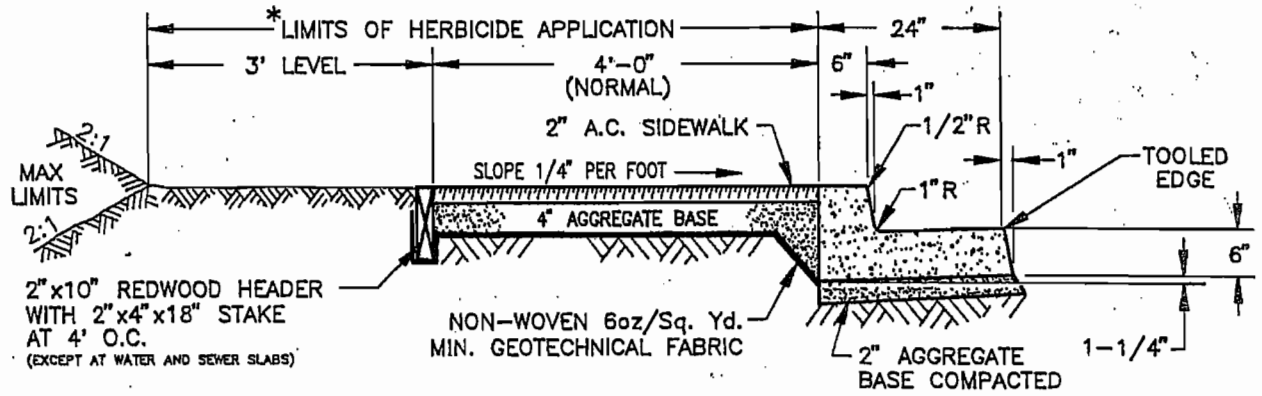
STANDARD RESIDENTIAL DRIVEWAY ENTRANCE THROUGH CURB



CURB AND GUTTER ONLY



COMBINED CURB, GUTTER, AND SIDEWALK



ALTERNATE ASPHALT CONCRETE SIDEWALK

(TEMPORARY SIDEWALK)

GENERAL NOTES

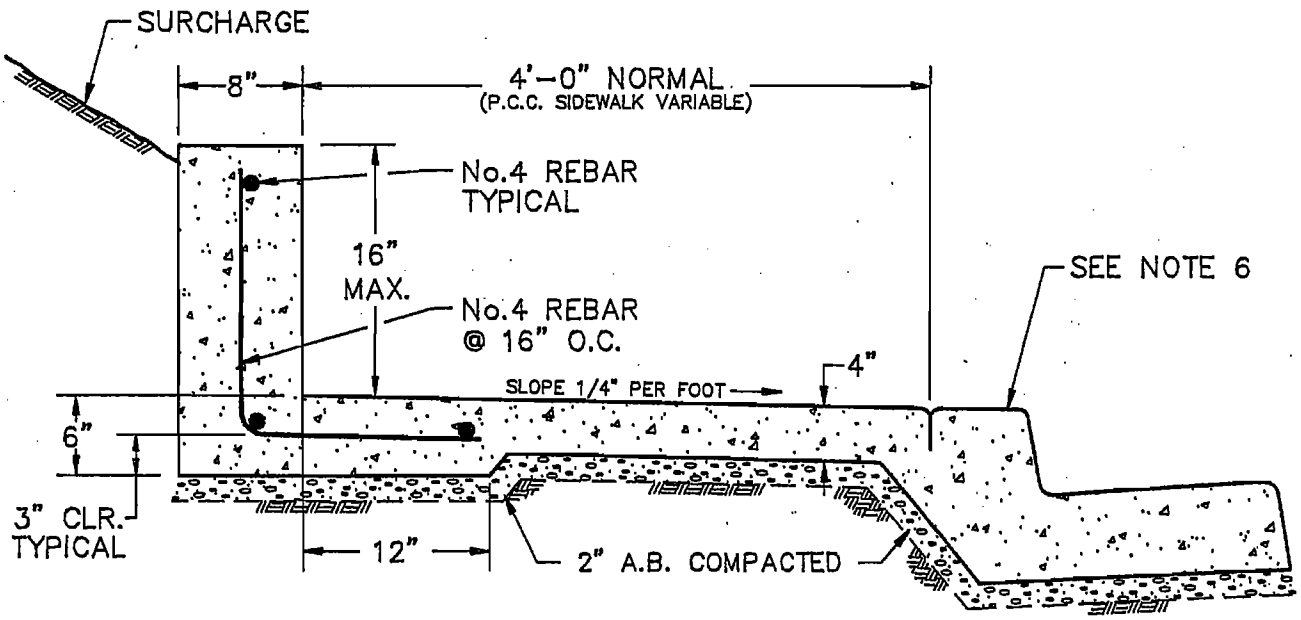
1. BROOM FINISH UNLESS OTHERWISE DIRECTED.
2. TOOL SCORE LINE EVERY 4'.
3. PLACE DEEP JOINT AT 12' O.C, LONGITUDINAL SCORE LINES TO SUIT CONDITIONS OR AS DIRECTED BY ENGINEER.
4. USE PIGMENT SEALING COMPOUND FOR SEALING.

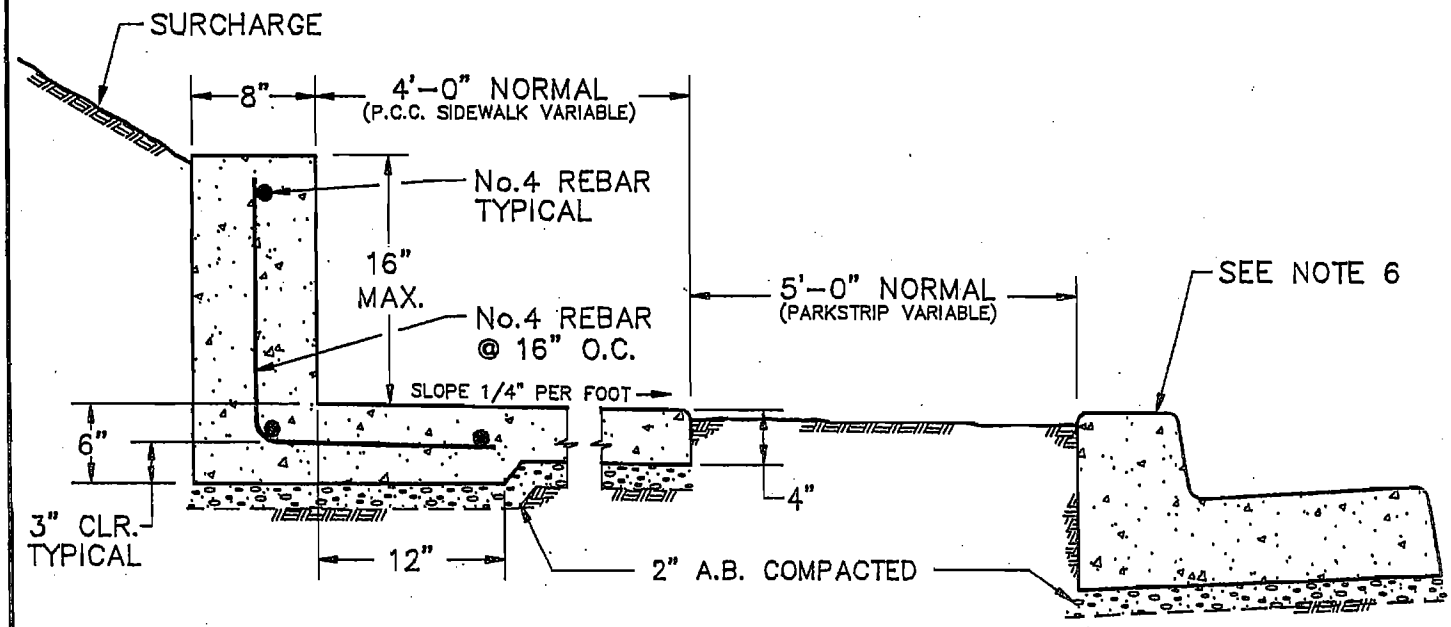
*5. PRIOR TO THE INSTALLATION OF THE HEADER AND FILTER FABRIC, A HERBICIDE SHALL BE APPLIED TO THE SUBGRADE AND SIDES. A LICENSED PESTICIDE APPLICATOR UNDER THE DIRECTION OF A LICENSED PEST CONTROL ADVISOR WILL PROVIDE A RATE OF APPLICATION WHICH WILL FORM A PERMANENT BARRIER TO ROOT GROWTH.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-12	SHEET 1 OF 1	ALTERNATE CURB GUTTER AND SIDEWALK
DRAWN BY JJM	FILE NO.	
DATE 6-3-92	REF	





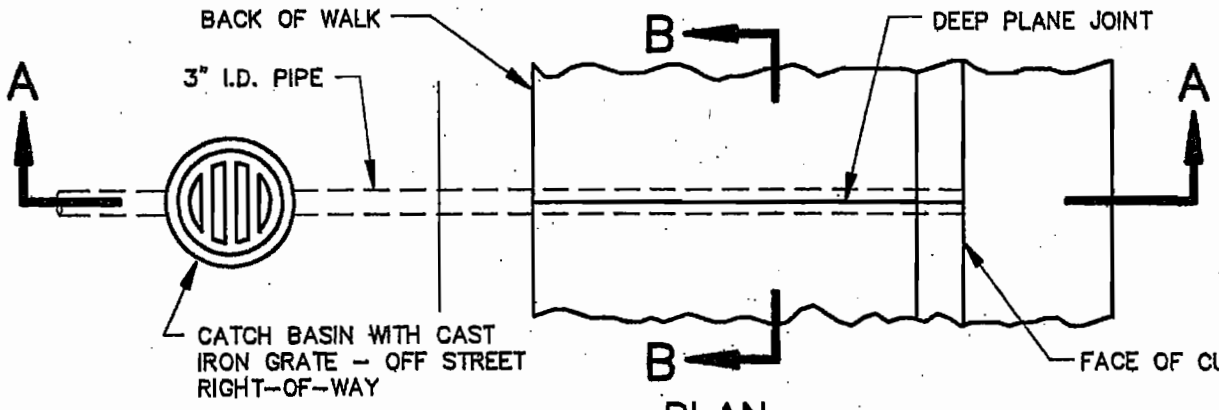
GENERAL NOTES

1. BROOM FINISH UNLESS OTHERWISE DIRECTED.
2. TOOL SCORE LINES EVERY 4'. LONGITUDINAL SCORE LINES TO SUIT CONDITIONS OR AS DIRECTED BY ENGINEER, 16 SQ. FT. MAXIMUM.
3. USE PIGMENTED SEALING COMPOUND FOR CURING.
4. ALL #4 REBAR SHALL BE GRADE 40 OR BETTER.
5. FOR STANDARD CURB, GUTTER, AND SIDEWALK DETAILS SEE STANDARD DRAWING #3-10.
6. REBAR IS NOT REQUIRED FOR CURB WALL, UNLESS THE WALL IS SURCHARGED

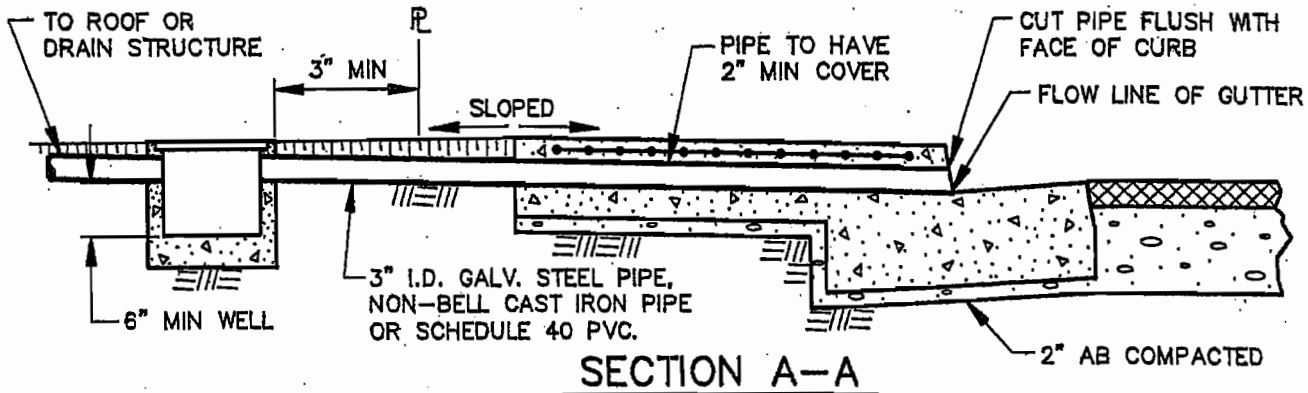
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

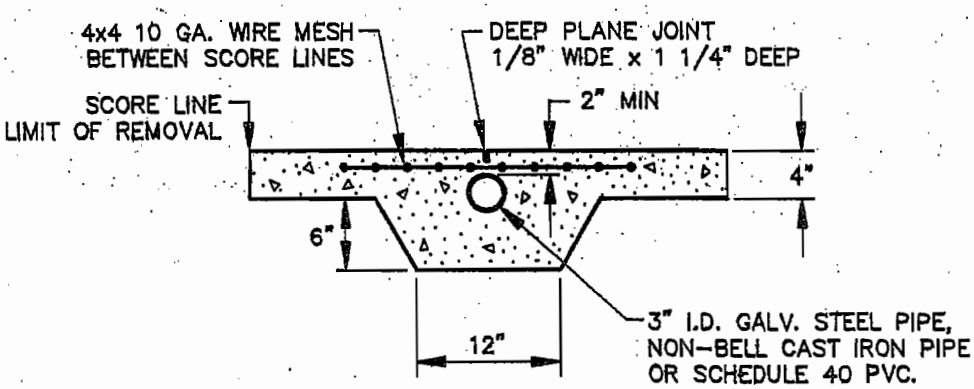
DWG. NO. 3-13	SHEET ____ OF ____	STANDARD MONOLITHIC CURB WALL
DRAWN BY EVA	FILE NO. ____	
DATE 8-24-92	REF. ____	



PLAN



SECTION A–A



SECTION B–B

NOTES

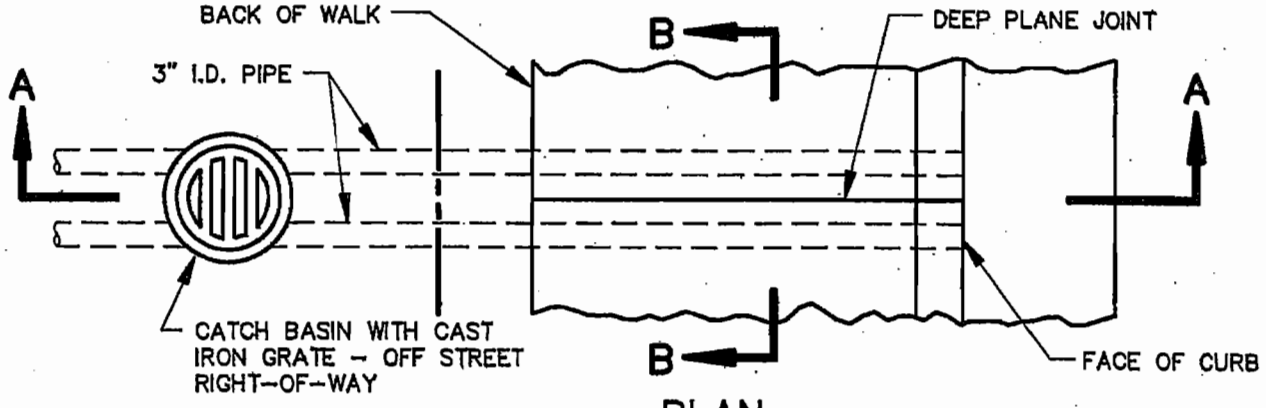
1. OWNER SHALL BE RESPONSIBLE FOR CLEANING AND MAINTAINING PIPE.
2. MINIMUM CROSS-SLOPE TO BE 1% FOR DRAIN PIPE.
3. PLACE 4 x 4 WIRE MESH FULL LENGTH 24" ON EACH SIDE OF PIPE.
4. SIDEWALK DRAINS TO BE USED ONLY BY APPROVAL OF CITY ENGINEER WHERE A STORM DRAIN DOES NOT EXIST, OR EXTENSION OF AN EXISTING STORM DRAIN IS IMPRACTICAL.
5. MINIMUM SIDEWALK, CURB, AND GUTTER REMOVAL IS ONE FLAG – SCORE LINE TO SCORE LINE.
6. DOWEL SIDEWALK, CURB AND GUTTER PER CITY STANDARDS.
7. ANGLE PIPE SO THAT FLOW IN SIDEWALK DRAINS DOES NOT FLOW INTO GUTTER PERPENDICULAR.

CITY OF VALLEJO

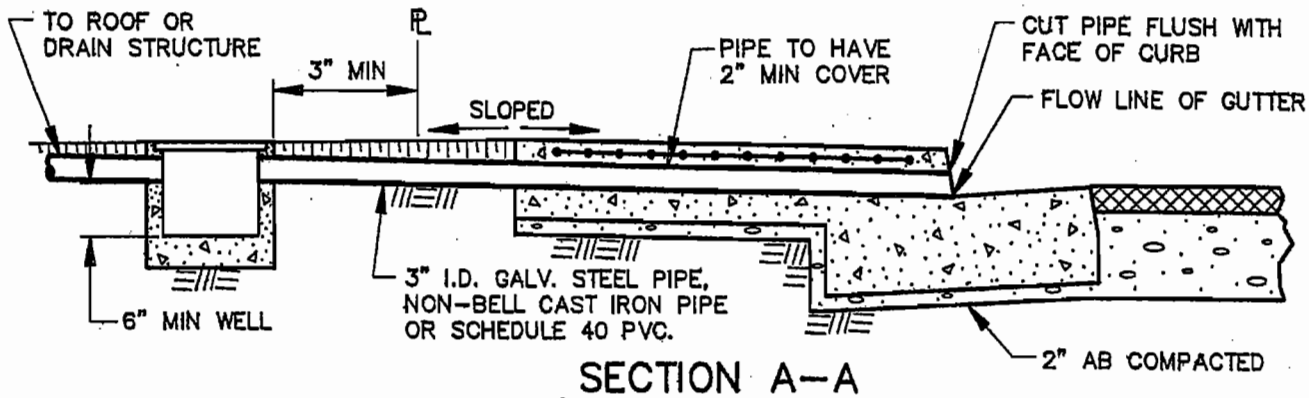
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-14 | SHEET ____ OF ____
DRAWN BY DAZ | FILE NO. ____
DATE 10-25-91 | REF

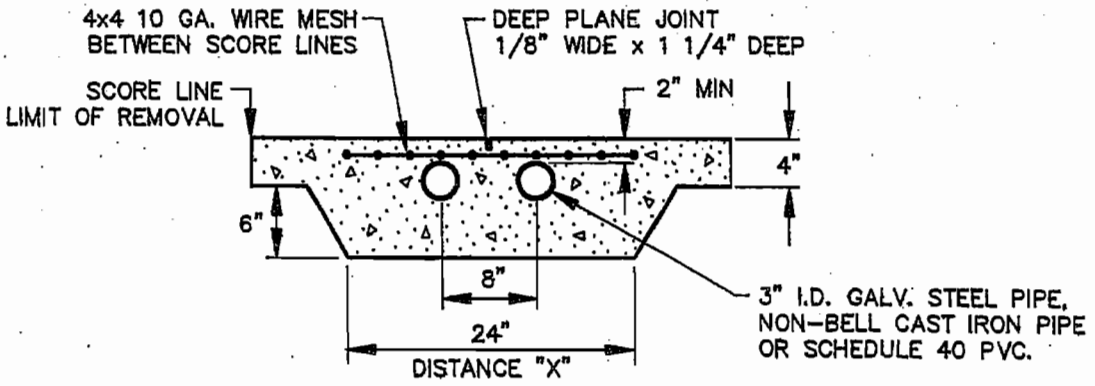
STANDARD SIDEWALK DRAIN



PLAN



SECTION A–A



SECTION B–B

NOTES

1. OWNER SHALL BE RESPONSIBLE FOR CLEANING AND MAINTAINING PIPE.
2. MINIMUM CROSS–SLOPE TO BE 1% FOR DRAIN PIPE.
3. PLACE 4 x 4 WIRE MESH FULL LENGTH 24" ON EACH SIDE OF PIPE.
4. SIDEWALK DRAINS TO BE USED ONLY BY APPROVAL OF CITY ENGINEER WHERE A STORM DRAIN DOES NOT EXIST, OR EXTENSION OF AN EXISTING STORM DRAIN IS IMPRACTICAL.
5. MINIMUM SIDEWALK, CURB, AND GUTTER REMOVAL IS ONE FLAG – SCORE LINE TO SCORE LINE.
6. DOWEL SIDEWALK, CURB AND GUTTER PER CITY STANDARDS.
7. TWO PIPES SHOWN ON SHEET. MORE PIPES CAN BE INSTALLED WITH MAX. OF 4 WITH INCREASING THE DISTANCE "X" PROPORTIONALLY.
8. ANGLE PIPE SO THAT FLOW IN SIDEWALK DRAINS DOES NOT FLOW INTO GUTTER PERPENDICULAR.

CITY OF VALLEJO

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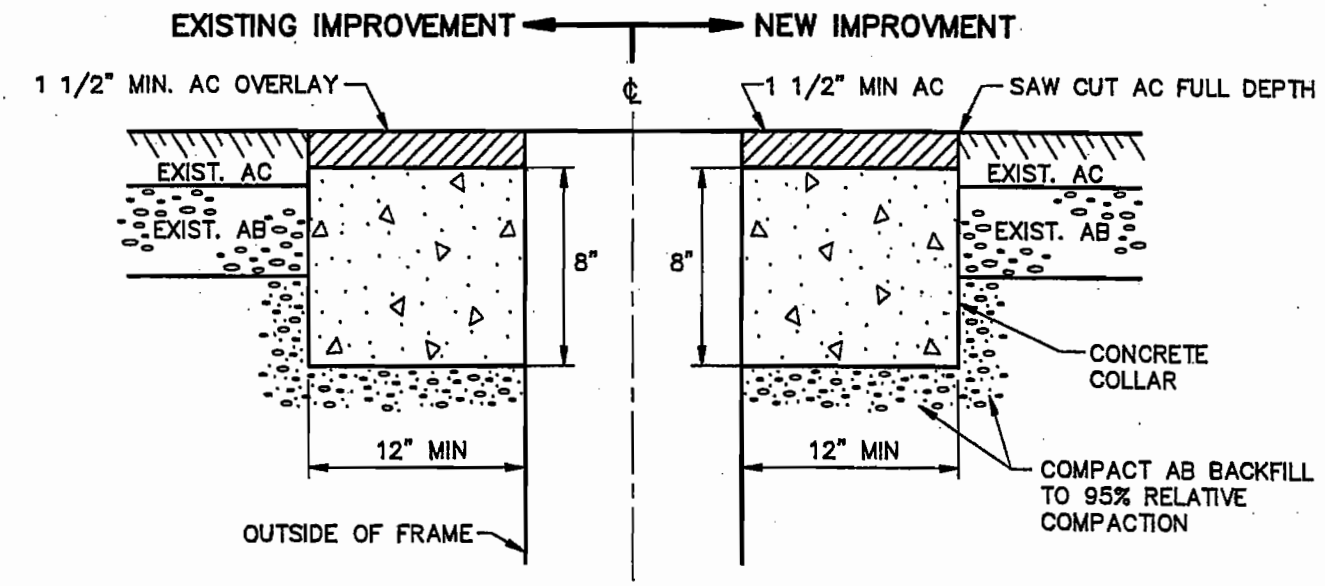
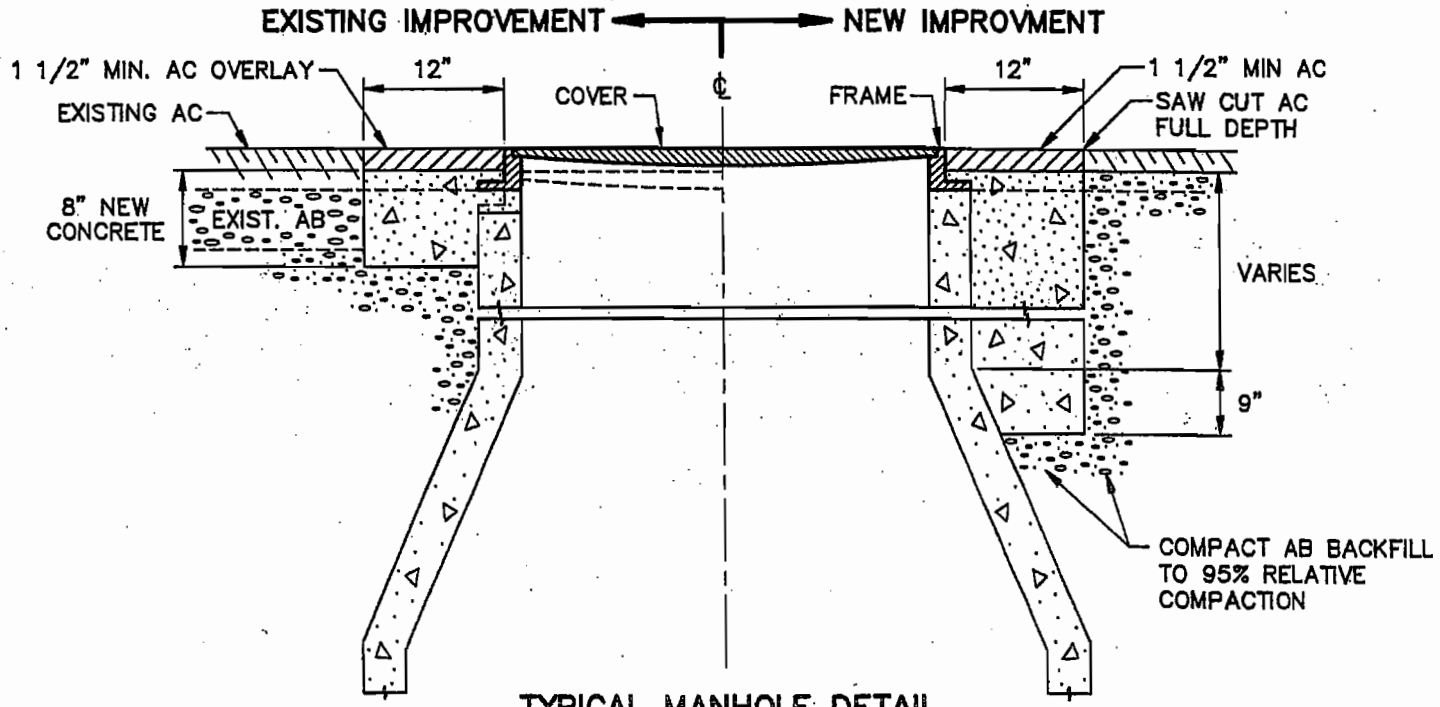
ENGINEERING DIVISION

DWG. NO. 3–15	SHEET ____ OF ____	STANDARD
DRAWN BY EVA	FILE NO. ____	MULTIPLE SIDEWALK DRAINS
DATE 10–25–91	REF. ____	



WATER VALVE OR STREET MONUMENT DETAIL



TYPICAL MANHOLE DETAIL

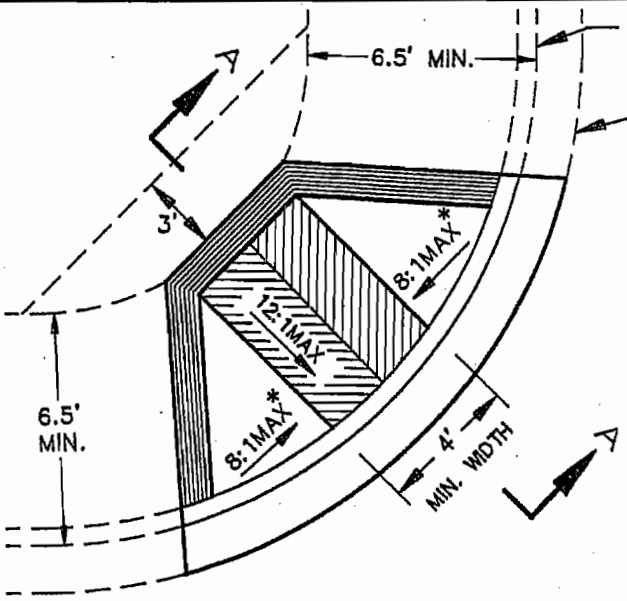
NOTES

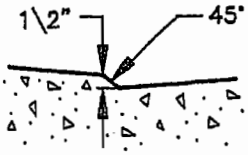
1. WATER VALVE OR MANHOLE OR STREET MONUMENT SHALL BE RAISED TO GRADE AFTER PAVING.
2. ASPHALT CONCRETE SHALL BE PLACED AFTER THE CONCRETE IS CURED 24 HOURS, MINIMUM.
3. ASPHALT CONCRETE SHALL BE TYPE "B" 3/8" MAXIMUM AGGREGATE.
4. A TACK COAT SHALL BE APPLIED TO THE CONCRETE COLLAR PRIOR TO THE PLACEMENT OF THE AC PER CITY STANDARDS.
5. AS AN ALTERNATIVE EXTENSION RINGS MAY BE USED FOR RAISING COVERS, SUBJECT TO APPROVAL OF THE ENGINEER.

CITY OF VALLEJO

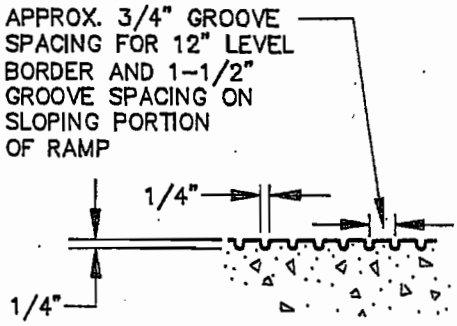
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-16	SHEET ____ OF ____	STANDARD TO RAISE A WATER VALVE, MANHOLE OR STREET MONUMENT
DRAWN BY EVA	FILE NO. ____	
DATE 10-25-91	REF. ____	

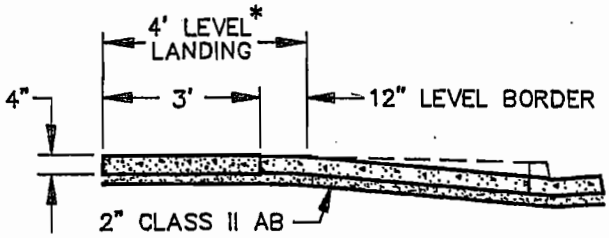




LIP DETAIL



GROOVING DETAIL



SECTION A-A

NOTES

1. ALL CURB RAMPS AT ANY LOCATION MUST COMPLY WITH CALIFORNIA BUILDING CODE TITLE 24. BACK OF SIDEWALK/CURB RAMP SHALL NOT EXTEND INTO PRIVATE PROPERTY. IF NEEDED, CONFORM TO BACK OF SIDEWALK AS DIRECTED BY ENGINEER.

2. ANCHOR NEW P.C.C. CONSTRUCTION TO EXISTING CURB, GUTTER AND SIDEWALK BY INSTALLING NO. 4 REINFORCING STEEL AS SHOWN IN STANDARD DWG. NO. 3-8. DEEP JOINTS AS DIRECTED BY ENGINEER.

3. IF ADJACENT AC GRADE DOES NOT MATCH NEW EDGE OF GUTTER LIP, OR IF AC IS FOUND TO BE DAMAGED, OR IN SUBSTANDARD CONDITION, REMOVE AND REPLACE ONE FOOT WIDTH OF AC AND AS DIRECTED BY THE ENGINEER.

4. WIDTH OF CURB RAMPS: CURB RAMPS SHALL BE MINIMUM OF 4 FEET IN WIDTH AND SHALL LIE IN A SINGLE SLOPED PLANE.

5. SLOPE OF RAMPS: THE SLOPE OF CURB RAMPS SHALL NOT EXCEED 1 VERTICAL TO 12 HORIZONTAL. THE SLOPE OF THE FANNED OR FLARED SIDES OF CURB RAMPS SHALL NOT EXCEED 1 VERTICAL TO 8 HORIZONTAL.

*6. LEVEL LANDING: A LEVEL LANDING 4 FEET DEEP SHALL BE PROVIDED AT THE UPPER END OF EACH CURB RAMP OVER ITS FULL WIDTH TO PERMIT SAFE EGRESS FROM THE RAMP SURFACE. IF 4 FOOT LANDING LEVEL IS NOT AVAILABLE, THE SLOPE OF THE FANNED OR FLARED SIDES OF THE CURB RAMP SHALL NOT EXCEED 1 VERTICAL TO 12 HORIZONTAL.

7. BEVELED LIP: THE LOWER END OF EACH CURB RAMP SHALL HAVE A 1/2" LIP BEVELED AT 45° (SEE LIP DETAIL).

8. FINISH: THE SURFACE OF EACH CURB RAMP AND ITS FLARED SIDES SHALL BE SLIP-RESISTANT BROOM FINISH AND SHALL BE OF ROUGHER TEXTURE FROM THAT OF THE ADJACENT SIDEWALK.

9. DIRECTIONAL GROOVES: ONLY FOR CURB RAMPS LOCATED IN THE CENTER OF THE CURB RETURN. THE RAMP SHALL BE GROOVED PARALLEL TO THE CENTER LINE OF THE CROSSWALKS TYPICALLY IN TWO DIRECTIONS AT A FOUR WAY INTERSECTION WITH 1/4" X 1/4" GROOVES APPROXIMATELY 1-1/2" O.C., AND AS DIRECTED AND APPROVED BY THE ENGINEER.

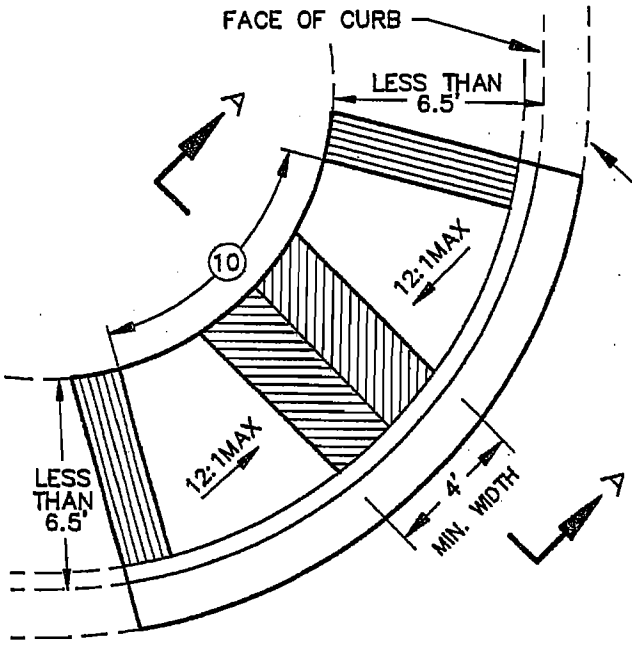
10. BORDER: ALL CURB RAMPS SHALL HAVE A GROOVED BORDER 12" WIDE AT THE LEVEL SURFACE OF THE SIDEWALK ALONG THE TOP AND EACH SIDE APPROXIMATELY 3/4" O.C..

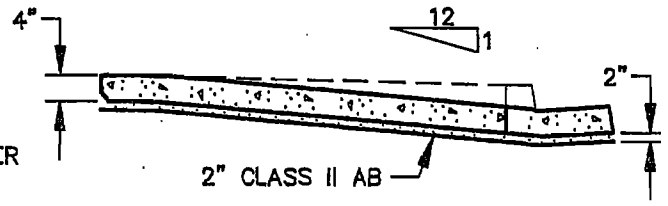
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

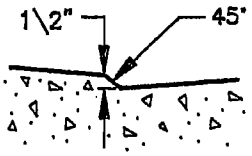
DWG. NO. 3-17	SHEET 1 OF 1
DRAWN BY JJM	FILE NO.
DATE 7-27-92	REF. TITLE 24

STANDARD CURB RAMP DETAIL

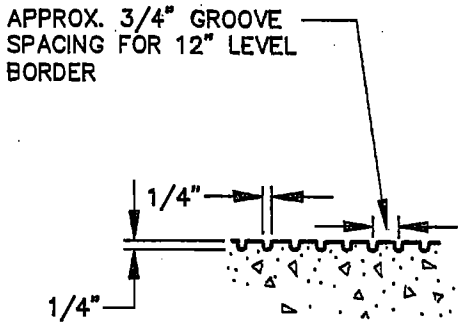




SECTION A–A



LIP DETAIL



GROOVING DETAIL

NOTES

1. ALL CURB RAMPS AT ANY LOCATION MUST COMPLY WITH CALIFORNIA BUILDING CODE TITLE 24. BACK OF SIDEWALK/CURB RAMP SHALL NOT EXTEND INTO PRIVATE PROPERTY. TYPICAL, TYPE "A" CURB RAMPS ARE USED IN EXISTING SIDEWALK AREAS WHICH ARE LESS THAN 6.5' FROM BACK OF SIDEWALK TO FACE OF CURB.
2. ANCHOR NEW P.C.C. CONSTRUCTION TO EXISTING CURB, GUTTER AND SIDEWALK BY INSTALLING NO. 4 REINFORCING STEEL AT 24" O.C. DEEP JOINTS AS DIRECTED BY ENGINEER.
3. IF ADJACENT AC GRADE DOES NOT MATCH NEW EDGE OF GUTTER LIP, OR IF AC FOUND TO BE DAMAGED OR IN SUBSTANDARD CONDITION, REMOVE AND REPLACE ONE FOOT WIDTH OF AC, AND AS DIRECTED BY ENGINEER.
4. WIDTH OF CURB RAMPS: CURB RAMPS SHALL BE MINIMUM OF 4 FEET IN WIDTH AND SHALL LIE IN A SINGLE SLOPED PLANE.
5. SLOPE OF RAMPS: THE SLOPE OF CURB RAMPS SHALL NOT EXCEED 1 VERTICAL TO 12 HORIZONTAL. THE SLOPE OF THE FANNED OR FLARED SIDES OF CURB RAMPS SHALL NOT EXCEED 1 VERTICAL TO 8 HORIZONTAL.
6. BEVELED LIP: THE LOWER END OF EACH CURB RAMP SHALL HAVE A 1/2" LIP BEVELED AT 45° (SEE LIP DETAIL).
7. FINISH: THE SURFACE OF EACH CURB RAMP AND ITS FLARED SIDES SHALL BE SLIP–RESISTANT BROOM FINISH AND SHALL BE OF ROUGHER TEXTURE FROM THAT OF THE ADJACENT SIDEWALK.
8. DIRECTIONAL GROOVES: ONLY FOR CURB RAMPS LOCATED IN THE CENTER OF THE CURB RETURN. THE RAMP SHALL BE GROOVED PARALLEL TO THE CENTER LINE OF THE CROSSWALKS TYPICALLY IN TWO DIRECTIONS AT A FOUR WAY INTERSECTION WITH 1/4" X 1/4" GROOVES APPROXIMATELY 1–1/2" O.C., AND AS DIRECTED AND APPROVED BY ENGINEER.
9. BORDER: ALL CURB RAMPS SHALL HAVE A GROOVED BORDER 12" WIDE AT THE LEVEL SURFACE OF THE SIDEWALK ALONG THE TOP AND EACH SIDE APPROXIMATELY 3/4" O.C..
10. IF REQUIRED DEPRESS BACK OF RAMP AS NEEDED OR AS DIRECTED BY ENGINEER.

CITY OF VALLEJO

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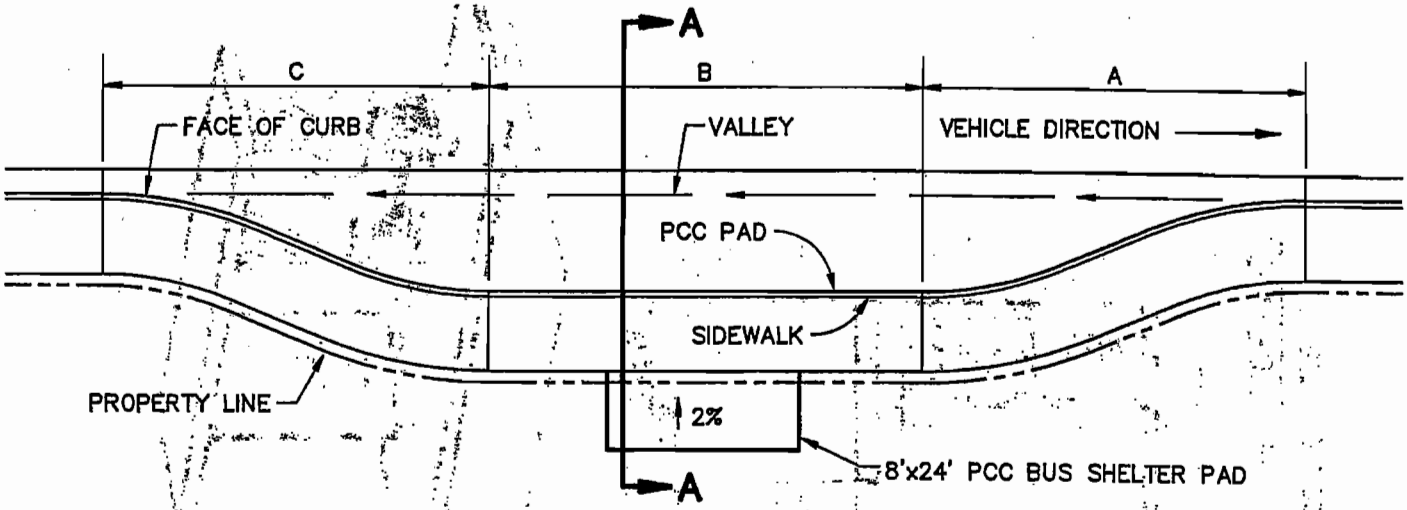
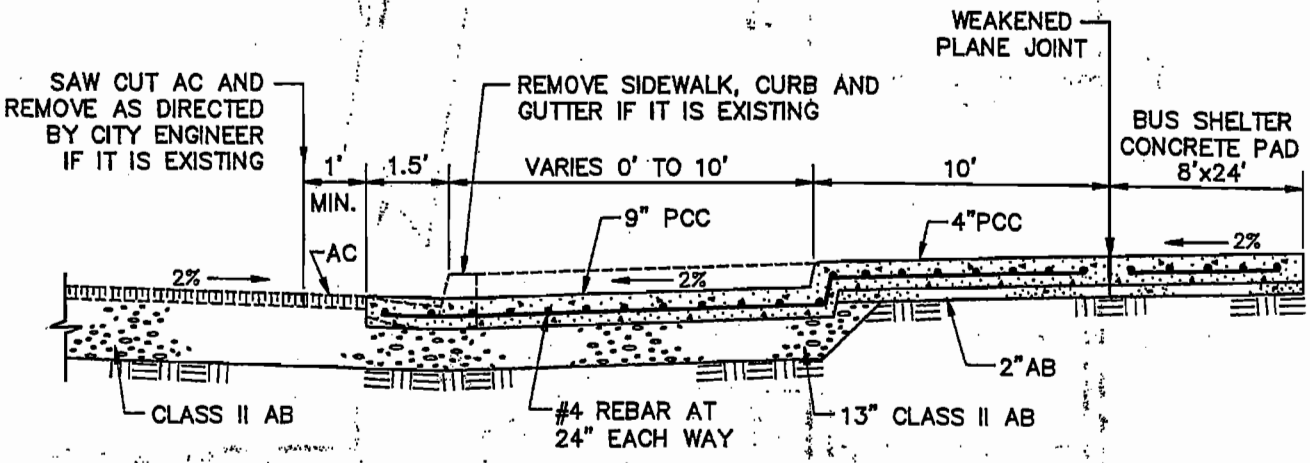
ENGINEERING DIVISION

DWG. NO. 3–17A	SHEET 1 OF 1
DRAWN BY JJM	FILE NO.
DATE 8–10–92	REF TITLE 24

TYPE A CURB RAMP DETAIL



PLAN



SECTION A–A

MINIMUM DISTANCES

	1 BUS			2 BUS		
POSTED SPEED OF STREET (MPH)	<20	20–30	30–40	<20	20–30	30–40
A (FT)	50	80	125	50	80	125
B (FT)	50	50	50	90	90	90
C (FT)		100	225	50	100	225

NOTES:

1. THE SIDEWALK IS TO BE CONSTRUCTED PER THE CITY OF VALLEJO STANDARD DRAWING #3–10
2. THE PCC PAD FOR THE BUS BAY AND SHELTER SHALL:
   a) BE BROOM FINISH UNLESS OTHERWISE DIRECTED BY THE CITY
   b) USE PIGMENTED SEALING COMPOUND FOR CURING
   c) HAVE A DEEP JOINT EVERY 12 FEET PER CITY OF VALLEJO STANDARD DRAWING #3–9

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3–18
DRAWN BY EVA
DATE 11–19–91

SHEET ____ OF ____
FILE NO. ____
REF. ____

STANDARD BUS PARKING BAY

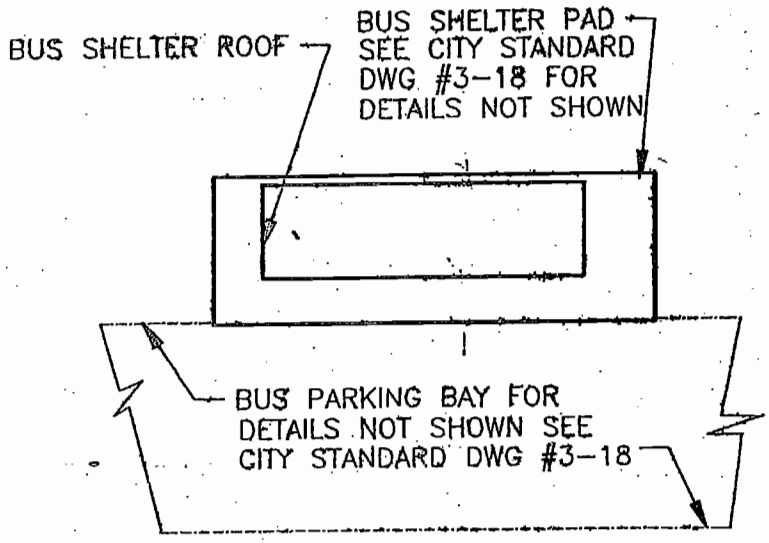
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

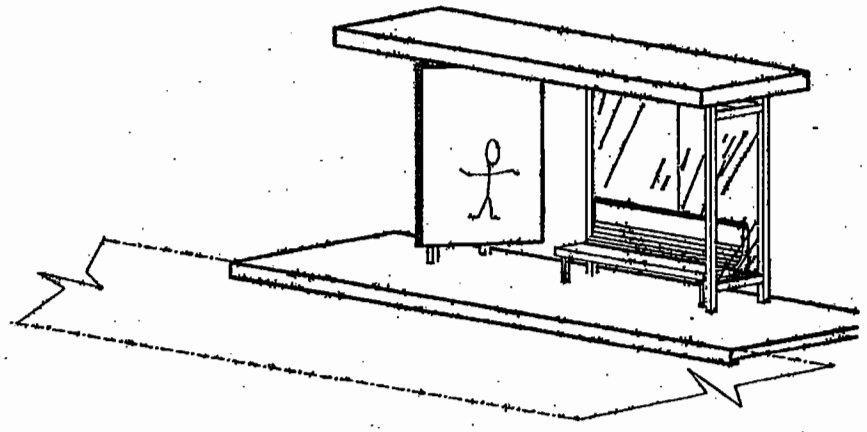
DWG. NO. 3-18A
DRAWN BY SRT
DATE 2/07/92

SHEET 1 OF 1
FILE NO.
REF.

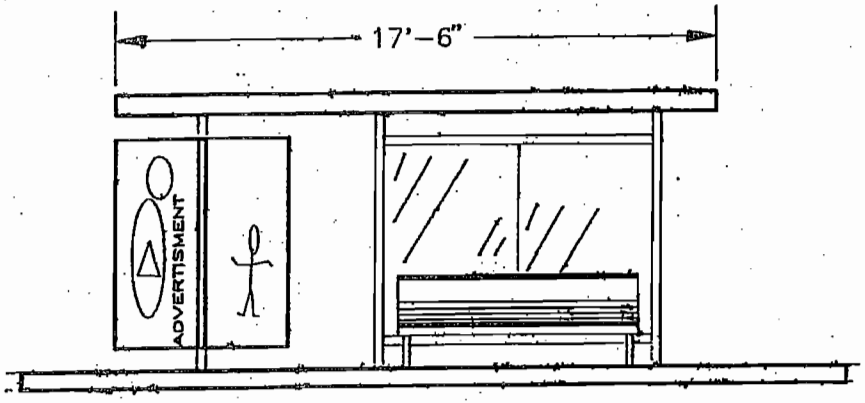
BUS SHELTER WITH TRI-AD



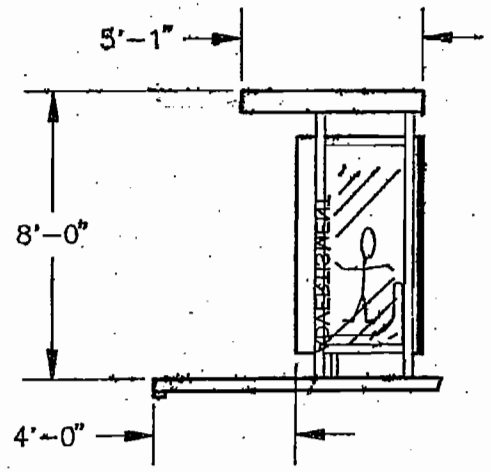
PLAN VIEW
SCALE N.T.S.



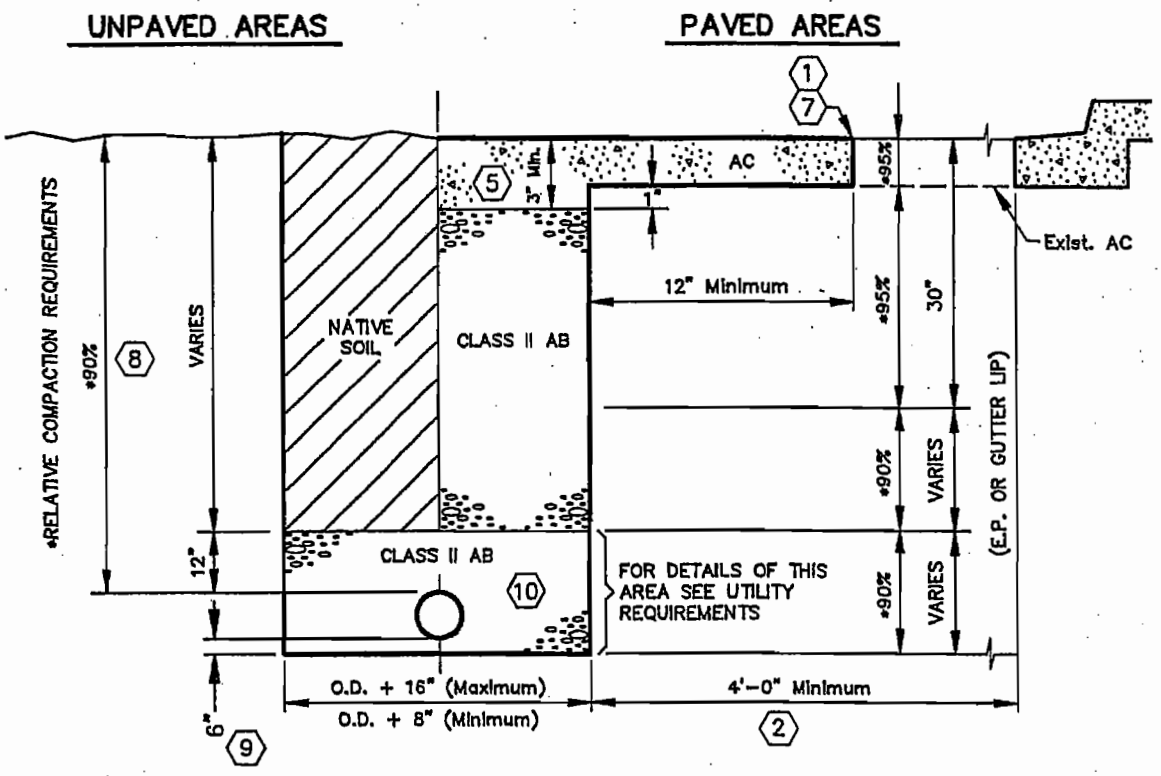
ISOMERIC VIEW
SCALE: N.T.S.



FRONT ELEVATION
SCALE: N.T.S.



RIGHT SIDE VIEW
SCALE: N.T.S.



NOTES

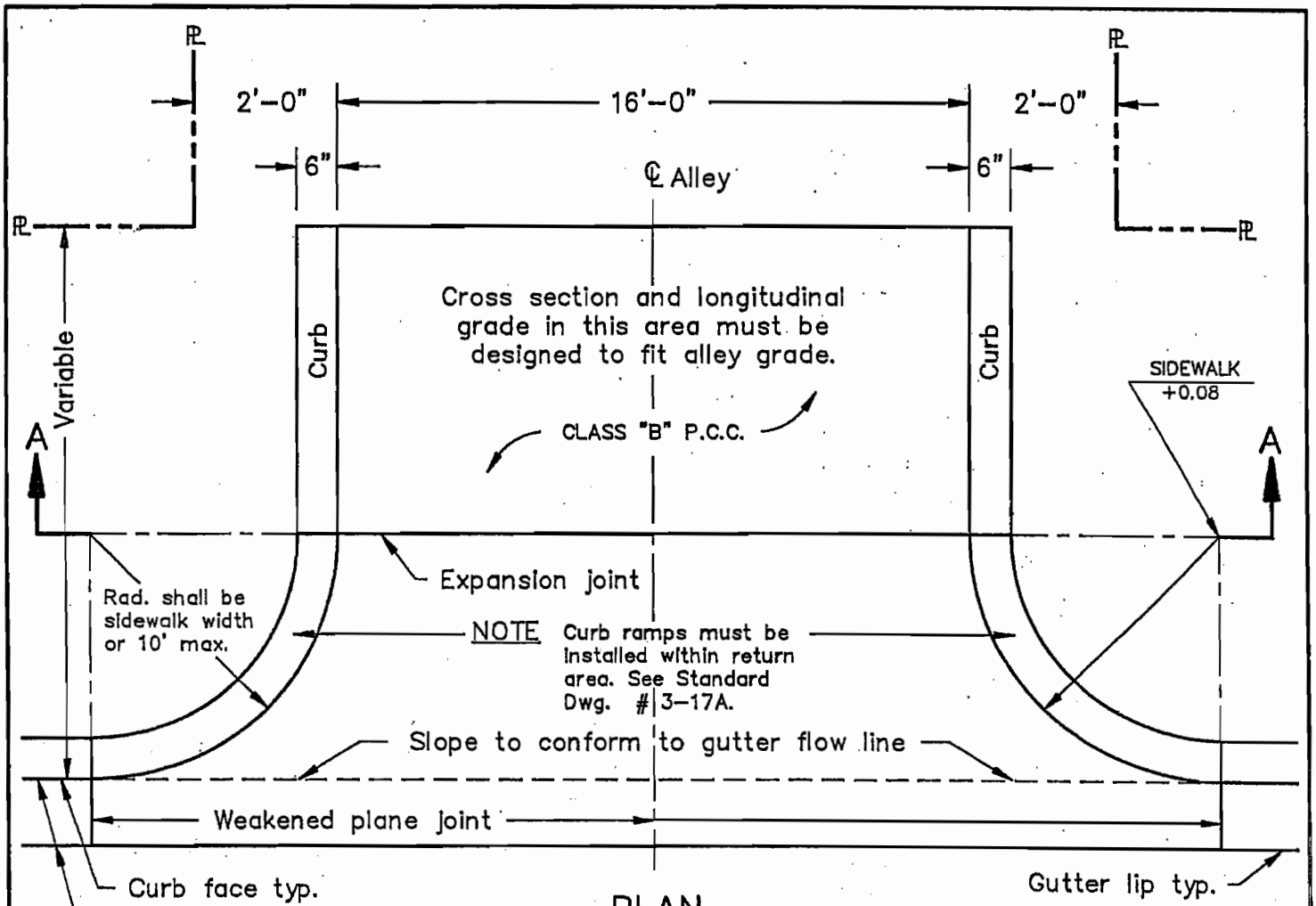
1. ASPHALT CONCRETE (AC) MUST BE SAWCUT FULL DEPTH.
2. IF DISTANCE BETWEEN EDGE OF TRENCH TO GUTTER LIP (OR EDGE OF PAVEMENT) IS 4' OR LESS, THEN REMOVE ALL AC UP TO GUTTER LIP (OR E.P.) AND REPAVE
3. SHORING SHALL BE REQUIRED FOR TRENCH DEPTH OF 5'-0" OR GREATER AND WHERE UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED.
4. IN BACKFILLING UTILITY WIRES, A MAXIMUM OF 12" OF SAND ABOVE THEM WILL BE PERMITTED.
5. AC SHALL BE TYPE B; 1/2" MAX.; AND MEDIUM GRADING. TO INSURE ADEQUATE BONDING; A TACK COAT (SS-1) SHALL BE APPLIED OVER EXISTING AC PAVEMENT AND A PRIME COAT (MC-250) SHALL BE APPLIED OVER COMPACTED AB (SS-1 MAY BE SUBSTITUDED FOR EXISTING STREETS). USE OF MC-250 SHALL COMPLY WITH E.P.A. (ENVIRONMENTAL PROTECTION AGENCY) REGULATIONS.
6. TRAFFIC CONTROL AND WARNING SIGNS SHALL BE PER THE MANUAL OF TRAFFIC CONTROLS; PUBLISHED BY THE DEPARTMENT OF TRANSPORTATION, STATE OF CALIFORNIA.
7. SPRAY AC JOINT WITH SS-1.
8. IN PREVIOUSLY UNDEVELOPED AREAS TO BE PAVED; THE RELATIVE COMPACTION REQUIREMENT IS AS SHOWN UNDER PAVED AREAS.
9. IF SURROUNDING MATERIALS ARE OF A HIGHLY IMPERMEABLE COMPOSITION, THEN TYPE I BEDDING IS REQUIRED.
10. USE SAND BACKFILL FOR DUCTILE IRON PIPE.

CITY OF VALLEJO

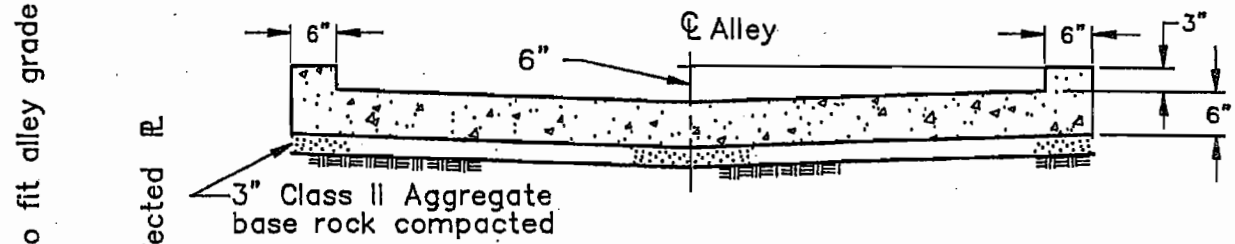
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-19
DRAWN BY EVA
DATE 5-11-92
SHEET ____ OF ____
FILE NO. ____
REF. ____

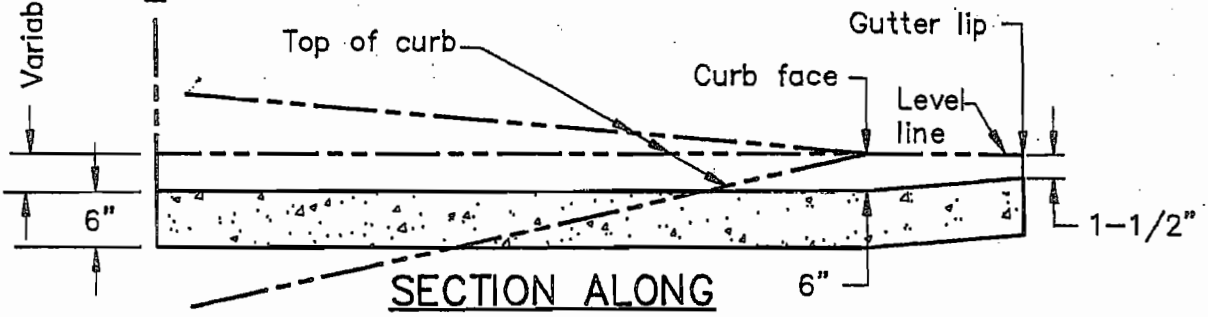
STANDARD TYPICAL TRENCH BACKFILL STANDARD DETAIL



PLAN



SECTION A-A



SECTION ALONG LONGITUDINAL CENTERLINE

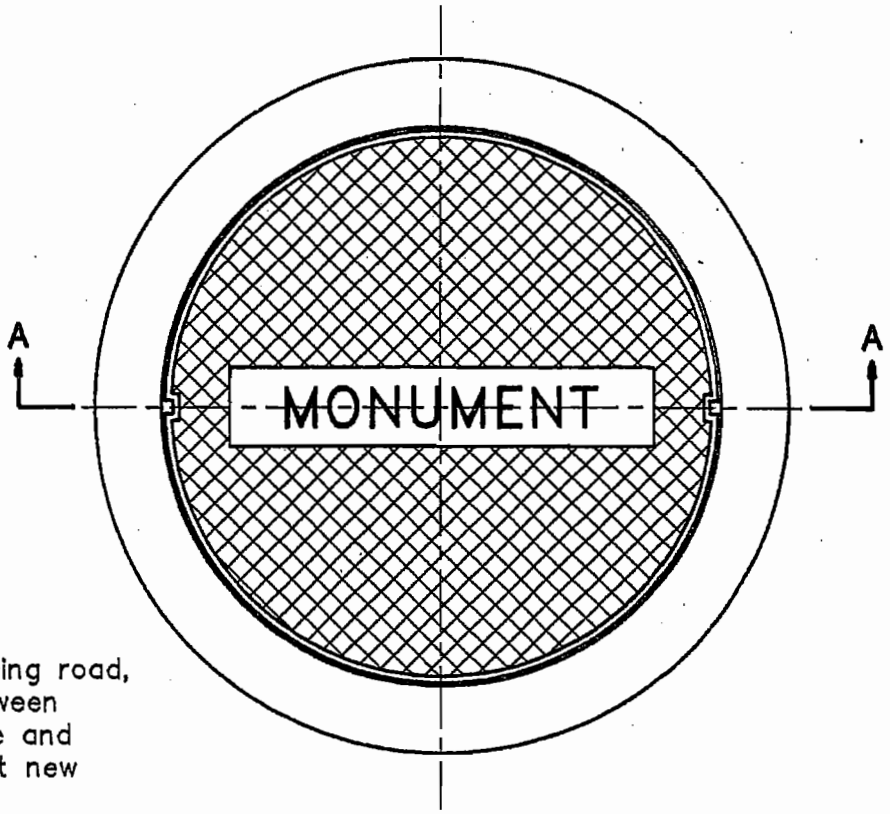
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-20
DRAWN BY GLR
DATE 11-15-91

SHEET 1 OF 1
FILE NO.
REF.

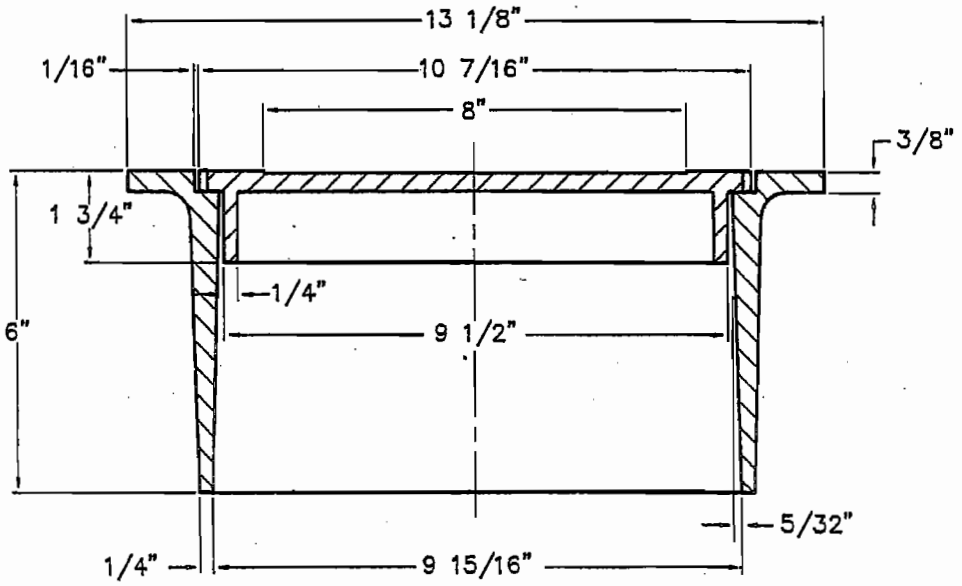
STANDARD P.C.C. ALLEY WING CROSSING



PLAN

NOTES

1. When resurfacing road, add riser between existing frame and cover to meet new road grade.
2. Base and installation to be as shown on City Std. Dwg. 3–23.

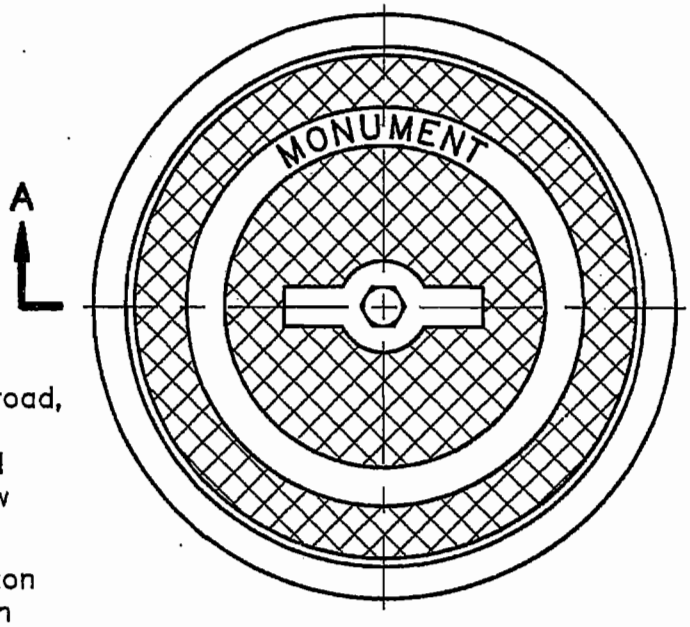


SECTION A–A

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3–21	SHEET ____ OF ____	STANDARD MONUMENT CASTING
DRAWN BY DCY	FILE NO. ____	
DATE 8–3–92	REF. ____	



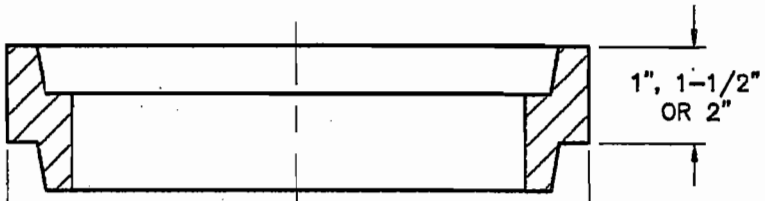
CAST IRON COVER

NOTES

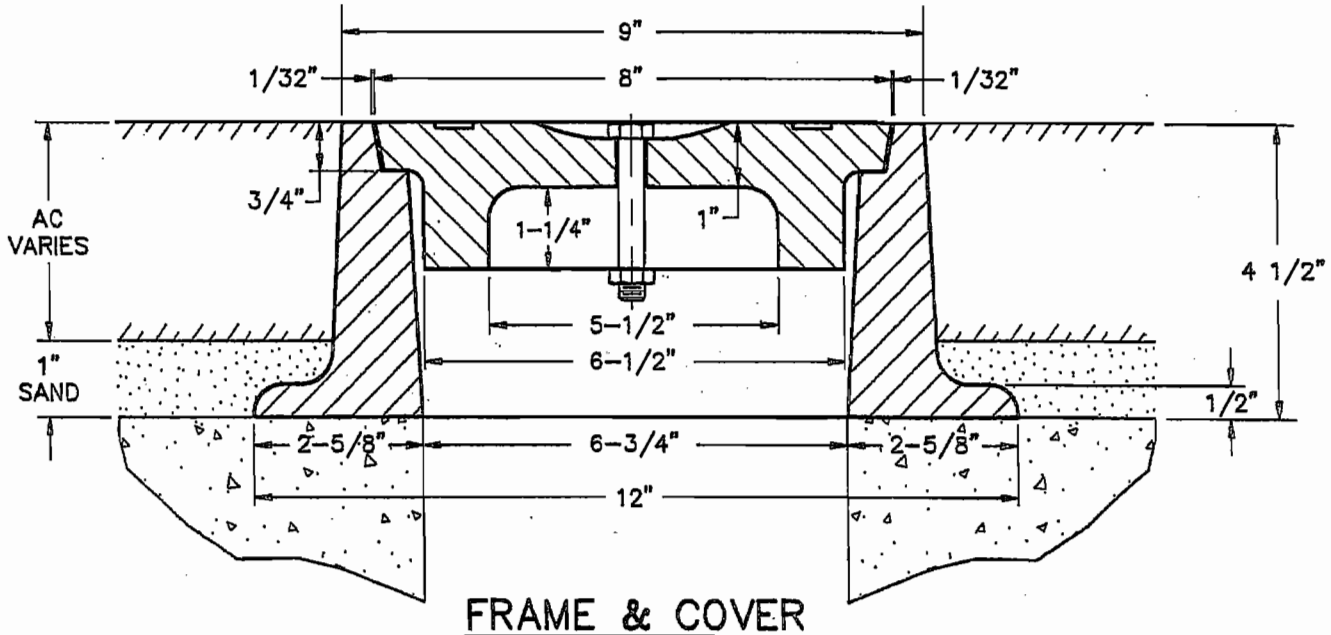
1. When resurfacing road, add riser between existing frame and cover to meet new road grade.
2. Base and installation to be as shown on City Std. Dwg. 3–23.

WEIGHTS

FRAME	36.9 lbs.
COVER	13.5 lbs.



RISER RING
SECTION A–A



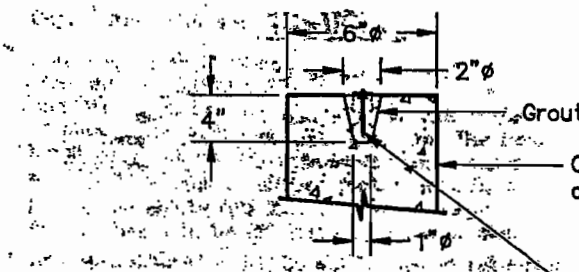
FRAME & COVER
SECTION A–A

CITY OF VALLEJO

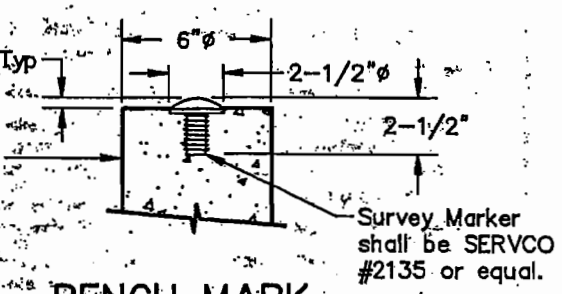
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-22	SHEET ____ OF ____
DRAWN BY EVA	FILE NO. ____
DATE 7-30-92	REF

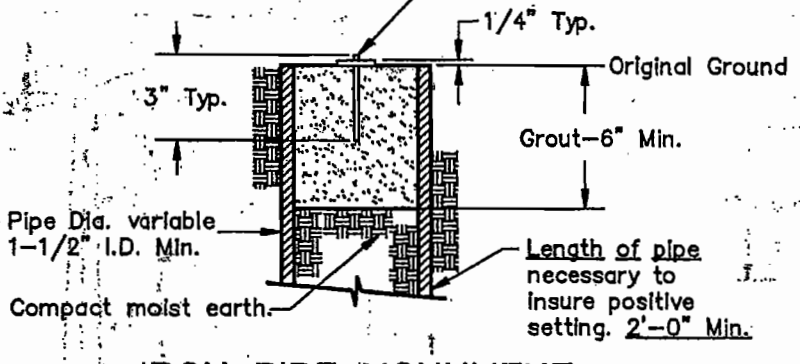
ALTERNATE CAST IRON MONUMENT CASTING



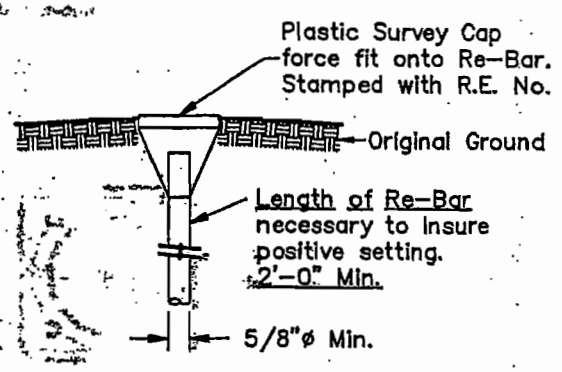
SURVEY MONUMENT



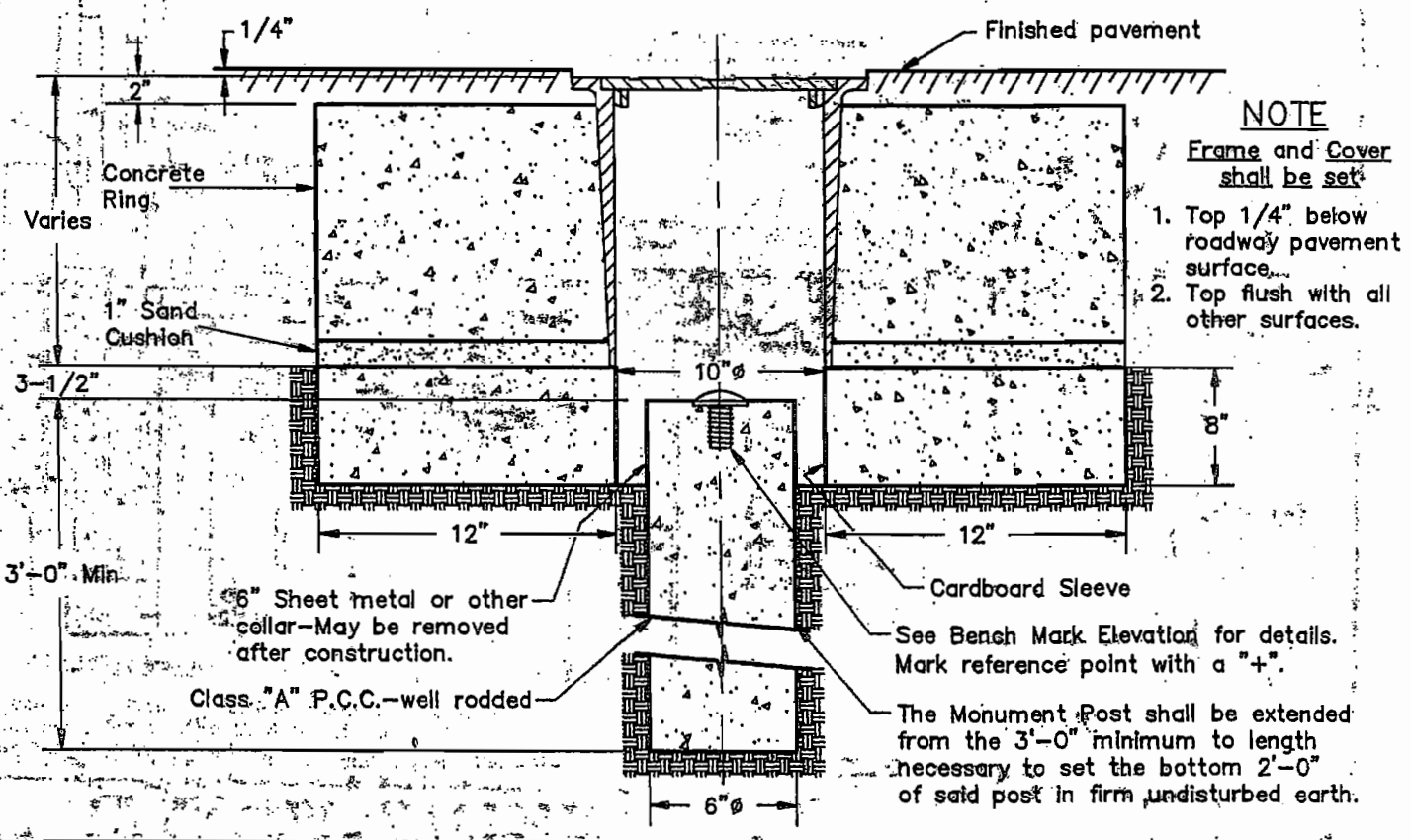
BENCH MARK ELEVATION



IRON PIPE MONUMENT



RE-BAR MONUMENT



NOTE

Frame and Cover shall be set

1. Top 1/4" below roadway pavement surface.
2. Top flush with all other surfaces.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-23	SHEET ____ OF ____
DRAWN BY GLR	FILE NO. ____
DATE 12-20-91	REF. ____
CHECKED EAH	SCALE NONE

STANDARD INSTALLATION DETAILS
CITY SURVEY MONUMENT AND BENCH MARK ELEVATION

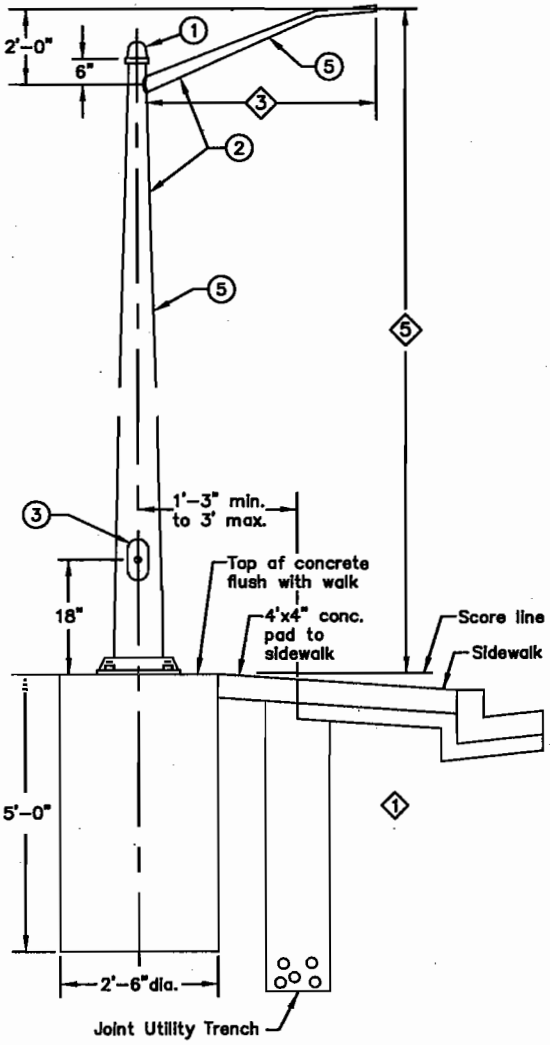
APPROVED: John D. Deane ON 8-21-92
DIRECTOR OF PUBLIC WORKS — DATE

SPECIFICATIONS

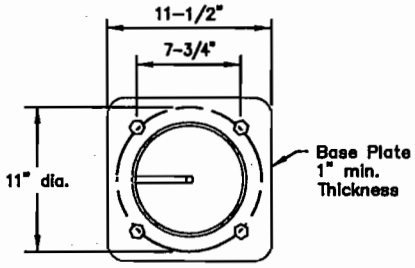
1. Cap: Steel with set screws.
2. Pole and Arm: 11 guage steel with a yield strenght of 33,000 psi. minimum. The Pole and Arm shall be cylindrical with a taper of about 0.14 inch per foot. Arm O.D. at small end to be 2.37". "Ovalize" large end to about 2.5" in the horizontal dim.
3. Handhole: 4"x6-1/2" with a welded reinforcing frame. Furnish a cover and mounting hardware.
4. Anchor Bolts: 4 each 1"x36"x4" with 6" minimum thread lenght. Furnish 2 hex nuts, and 2 round washers with each bolt.
5. Finish: Galvanize all parts after all cutting and welding. Pole and Arm per ASTM 123. Removable Parts per ASTM 153.

GENERAL NOTES

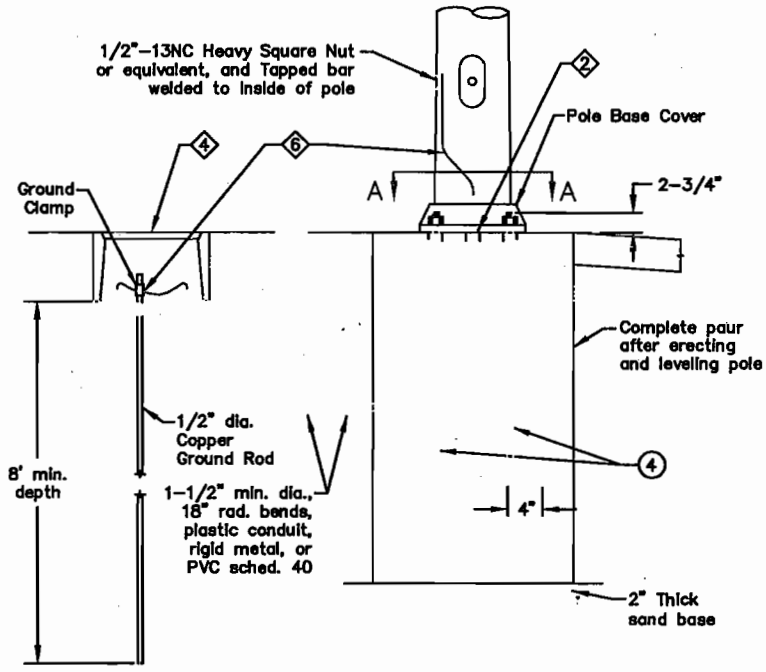
1. When setting poles in wide sidewalks (greater than 6ft. wide), set ℄ of pole 2ft. from the face of curb.
2. When setting poles provide a drainage hole under the steel plate to the center of the pole. Form hole before the concrete sets using a piece of welding rod or equivalent.
3. 8-foot mast arms for residential streets, 10-foot mast arms for major commercial streets as directed by City Engineer.
4. Install a No. 3-1/2 Pullbox per Caltrans Standard every 200ft., and at every pole location.
5. Mounting height for residential or cul-de-sac shall be 28ft. All others shall be 32.5ft.
6. Connect #6 Groundwire to service ground rod in adjocent Pullbox through conduit.



Foundation to be Class B Portland Cement Concrete (470 lbs. min.) per Section 51 & 90 of the Caltrans Standard Specifications.



SECTION A-A



CAST-IN-PLACE DRILLED HOLES
BASE & FOUNDATION DETAILS

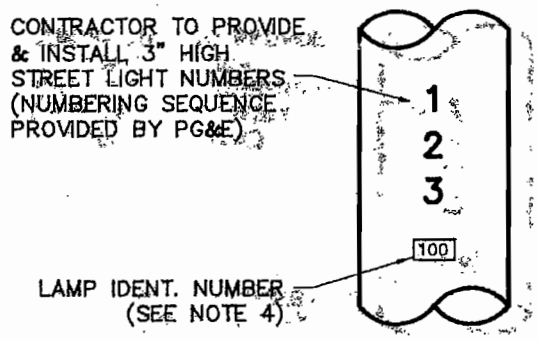
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-24	SHEET ____ OF ____
DRAWN BY EVA	FILE NO. ____
DATE 5-11-92	REF. ____
CHECKED EAH	SCALE NONE

STANDARD
STREET LIGHT POLE

APPROVED: ____ DIRECTOR OF PUBLIC WORKS ON ____ DATE



ARRANGEMENT OF NUMBERS ON THE POLE

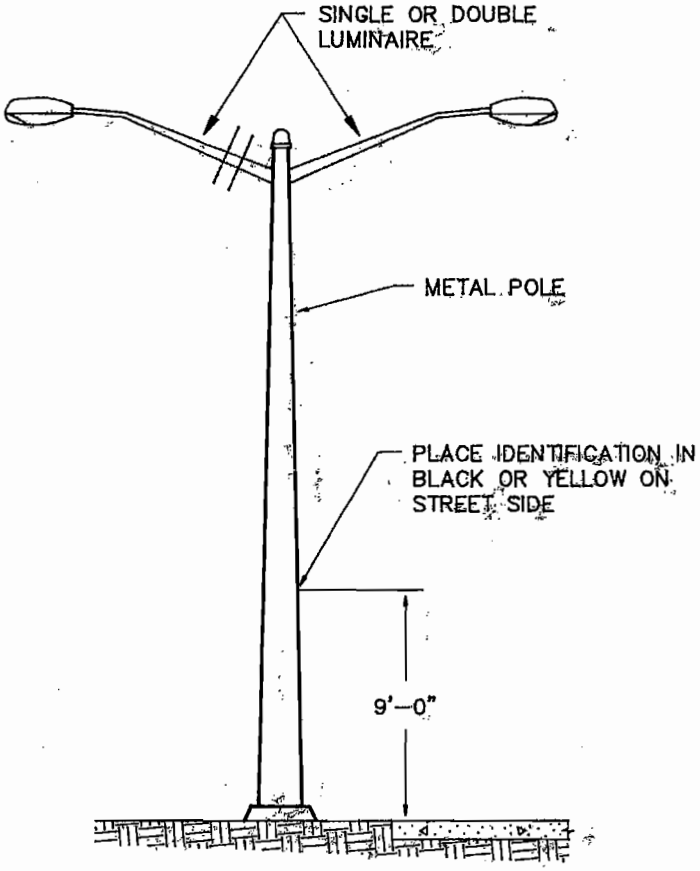


TABLE A

LAMP IDENTIFICATION TAGS HIGH PRESSURE SODIUM LAMP	
TAG MARKINGS	LAMP RATINGS, WATTS
70	70
100	100
150	150
175	175
200	200
250	250

NOTES:

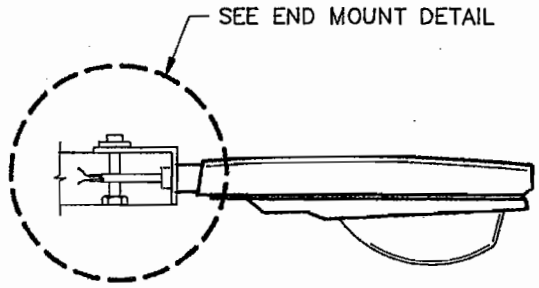
1. USE ENAMEL PAINT OR ENAMEL TRANSPARENTS FOR STREET LIGHT NUMBERS ON METAL POLES OR POSTS.
2. TWIN LUMINARIES REQUIRE TWO STREET LIGHT LOCATION NUMBER.
3. USE BLACK IDENTIFICATION NUMBERS ON LIGHT POLES. BACKGROUND COLOR SHALL BE GOLD OR SILVER.
4. USE 3/4" ENAMEL PAINT TRANSFERS OR ENAMEL TRANSPARENTS FOR LAMP IDENTIFICATION NUMBERS ON METAL.

(STREET LIGHT POLE NUMBER SEQUENCE MUST BE OBTAINED FROM PG&E)

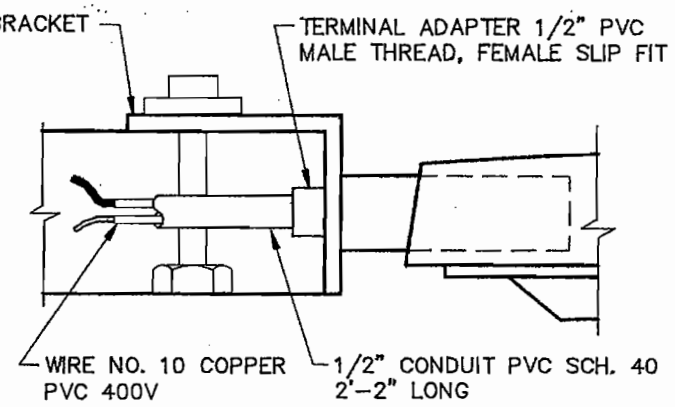
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

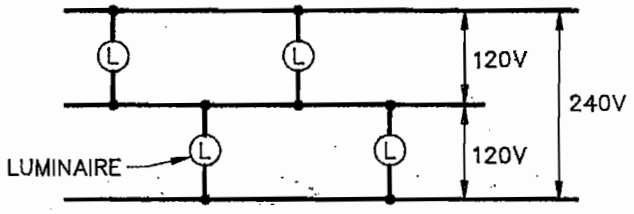
DWG. NO. 3-25	SHEET ____ OF ____	STANDARD LIGHT POLE NUMBER
DRAWN BY EVA	FILE NO.	
DATE 3-26-93	REF.	
CHECKED EAH	SCALE NONE	APPROVED [signature] DIRECTOR OF PUBLIC WORKS ON 3-26-93 DATE



MAST ARM MOUNTED LUMINAIRE



END MOUNT DETAIL



3-WIRE 1-ø SECONDARY

WIRING SCHEMATIC

NOTE: WHEN INSTALLING HIGH PRESSURE SODIUM LUMINAIRES, IT IS DESIRABLE THAT THE OPERATING VOLTAGE BE 120V. BALANCE TRANSFORMER SECONDARY LOADING BY CONNECTING LUMINAIRES AS SHOWN.

TABLE A

STREET LIGHT FUSE SIZE	
LAMP RATING WATTS	FUSE RATINGS AMPERES
70	5
100	5
150	5
175	5
200	5
250	10

1. FUSES SHALL BE INLINE TYPE.
2. FUSES SHALL BE LOCATED IN PULL BOX ADJACENT TO LIGHT POLE.
3. EACH LUMINAIRE SHALL BE FUSED SEPARATELY.

GENERAL NOTES

1. ALL LUMINAIRES SHALL BE 120V HIGH PRESSURE SODIUM VAPOR LUMINAIRES.
2. PHOTOELECTRIC CONTROL SHALL BE WEATHERPROOF DUAL VOLTAGE PHOTOELECTRIC RELAY WITH TWIST LOCK RECEPTACLE INTERGRAL WITH LUMINARIES.
3. BALLAST SHALL BE REGULATOR TYPE WITH 90% POWER FACTOR PER SECTION 86.-6.10A, CALTRANS STANDARD SPECIFICATIONS.
4. LIGHT CONTROL SHALL BE SEMI-CUTOFF. VERTICAL LIGHT DISTRIBUTION PATTERN SHALL BE MEDIUM, AND TRANSVERSE LIGHT DISTRIBUTION PATTERN SHALL BE PER PLANS.
5. ALL LUMINAIRES SHALL HAVE OPITICAL FILTER SYSTEMS.
6. CONTRACTOR TO PROVIDE CITY WITH MATERIAL SUBMITTED 10 DAYS PRIOR TO INSTALLATION FOR APPROVAL.

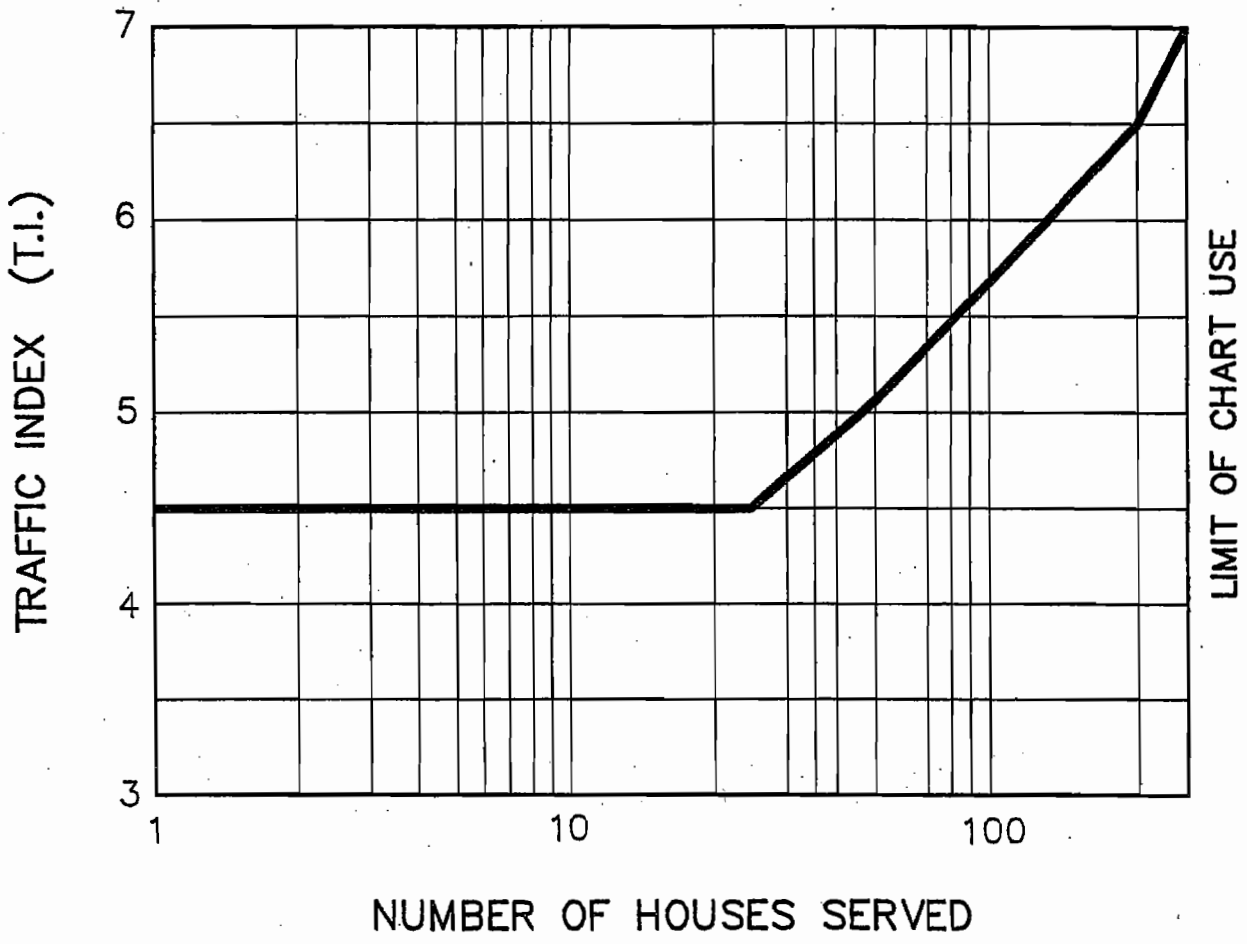
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-26	SHEET ____ OF ____
DRAWN BY EVA	FILE NO. ____
DATE 6-3-92	REF. ____
CHECKED JER	SCALE NONE

STANDARD STREET LIGHT LUMINAIRE

APPROVED: John D. Ward ON 8-21-92
DIRECTOR OF PUBLIC WORKS — DATE



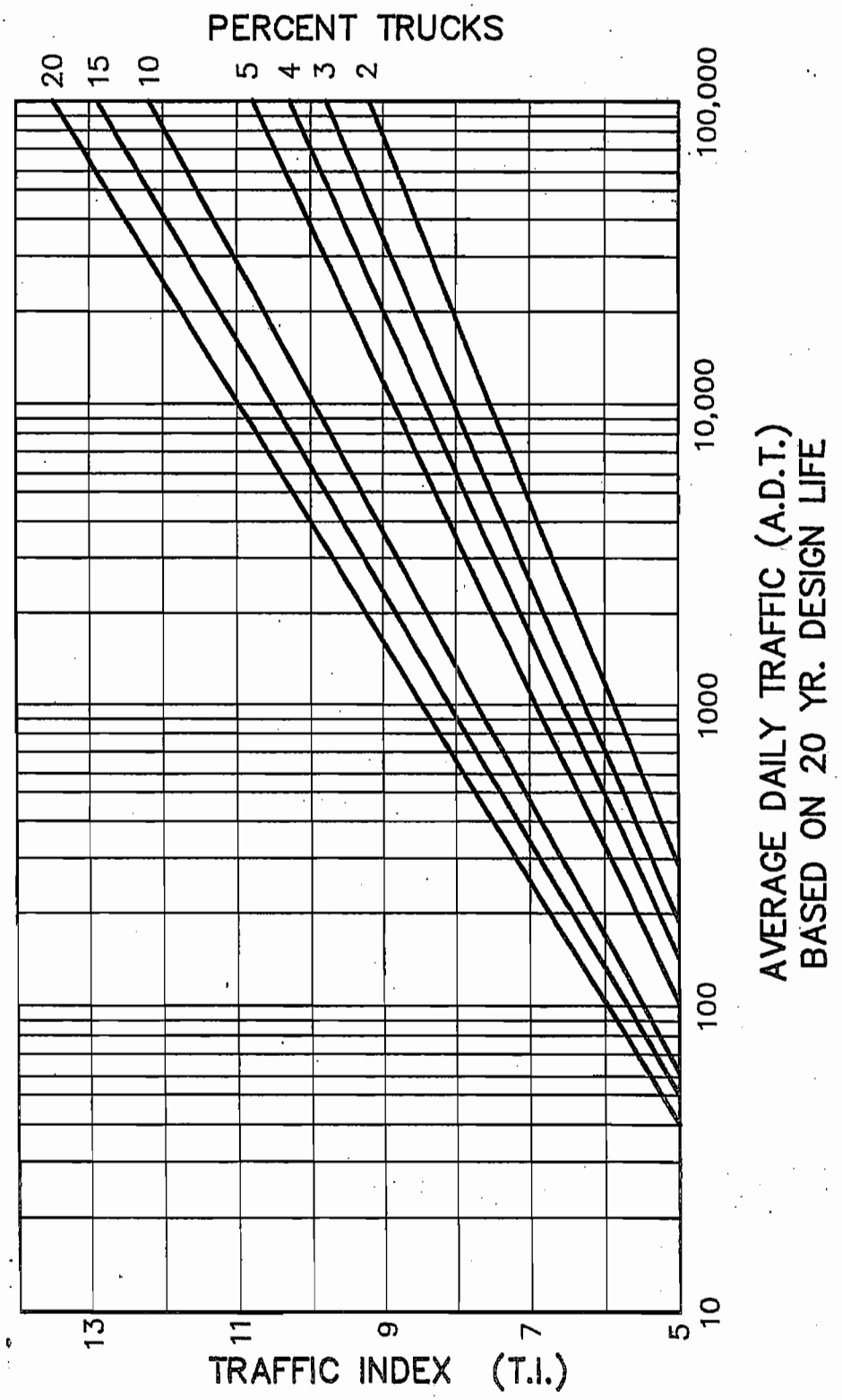
NOTES

1. FOR USE ONLY WITHIN SUBDIVISIONS FOR RESIDENTIAL AND CUL-DE-SAC STREETS.
2. CHART IS BASED ON A 20-YEAR DESIGN LIFE.
3. T.I. = 2.472 (HOUSES)$^{0.1825}$

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-27	SHEET ____ OF ____	STANDARD CHART FOR ESTIMATION OF TRAFFIC INDEX USING A HOUSING COUNT
DRAWN BY EVA	FILE NO. ____	
DATE 4-20-90	REF. ____	
CHECKED EAH	SCALE NONE	APPROVED: [signature] DATE Mar. 12, 90



CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-28
DRAWN BY EVA
DATE 4-20-90

SHEET _____ OF _____
FILE NO. _____
REF

STANDARD CONVERSION CHART

AVERAGE DAILY TRAFFIC TO TRAFFIC INDEX

NOTES

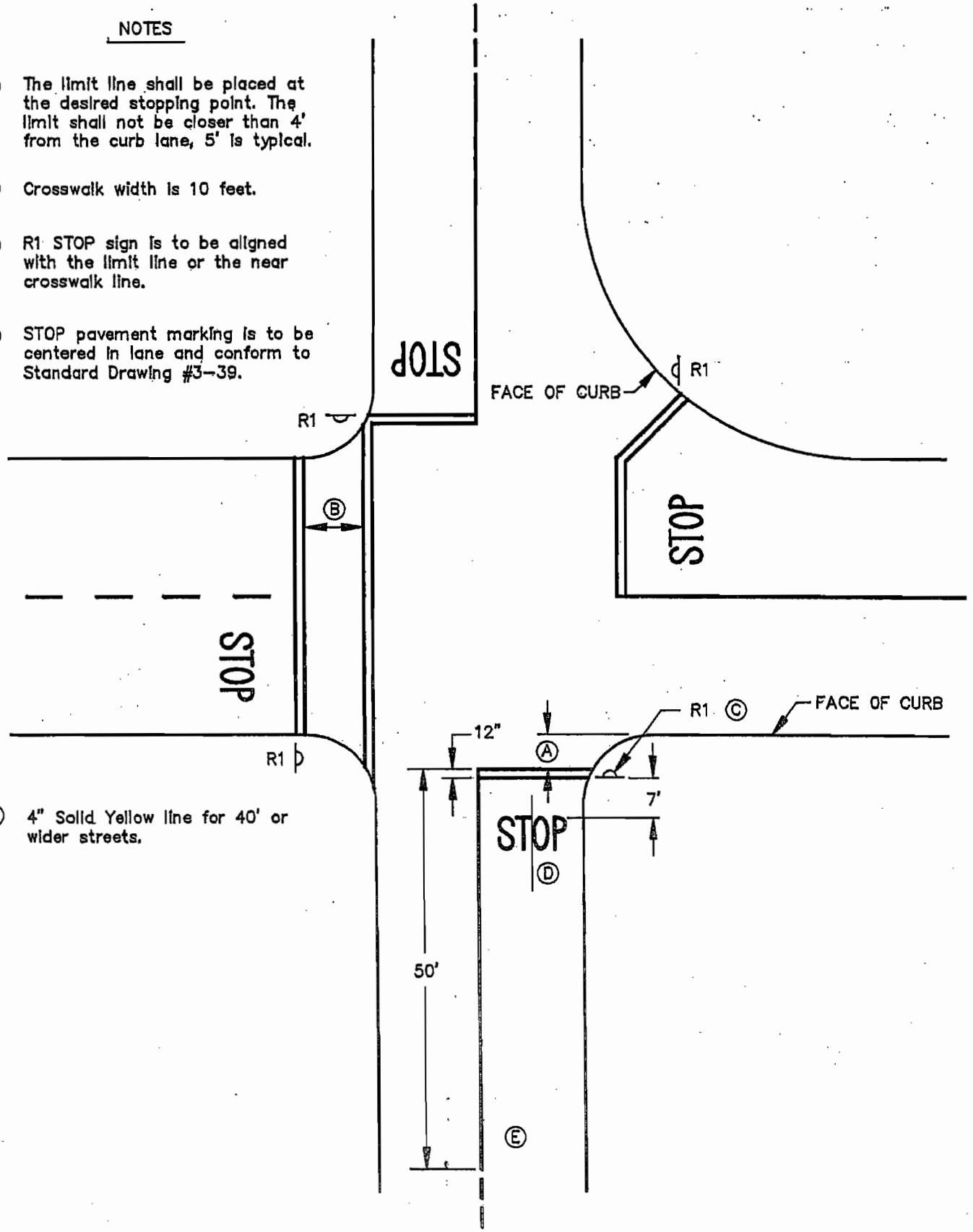
Ⓐ The limit line shall be placed at the desired stopping point. The limit shall not be closer than 4' from the curb lane, 5' is typical.

Ⓑ Crosswalk width is 10 feet.

Ⓒ R1 STOP sign is to be aligned with the limit line or the near crosswalk line.

Ⓓ STOP pavement marking is to be centered in lane and conform to Standard Drawing #3-39.

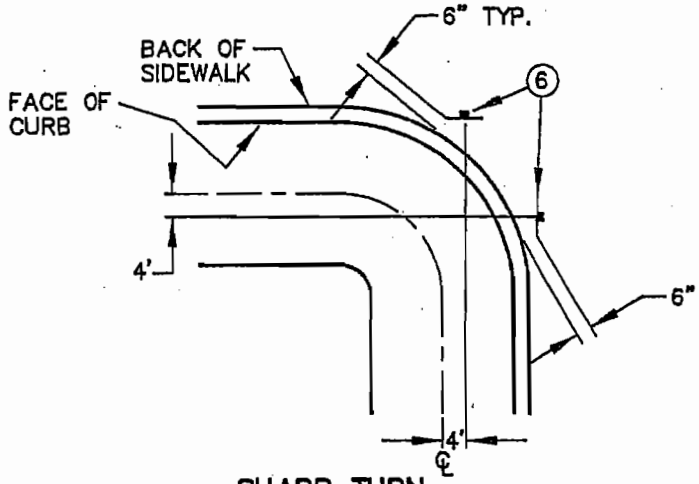
Ⓔ 4" Solid Yellow line for 40' or wider streets.



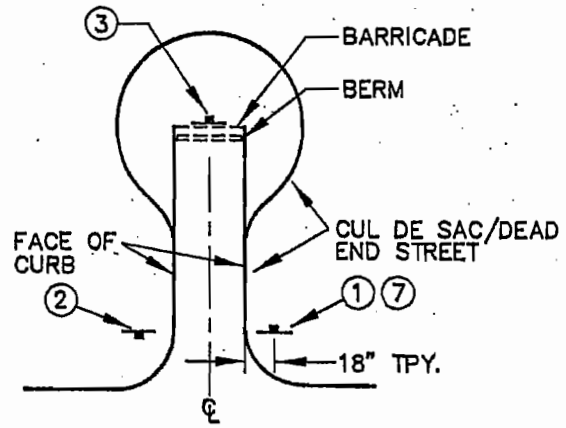
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

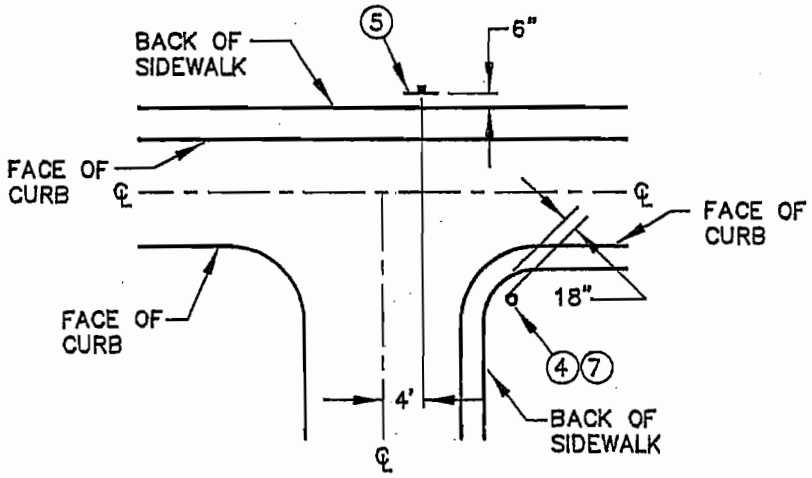
DWG. NO. 3-29	SHEET ____ OF ____	STANDARD
DRAWN BY EVA	FILE NO. ____	STOP SIGN LOCATION
DATE 4-20-90	REF. ____	



SHARP TURN



CUL DE SAC OR DEAD END STREET



"T" INTERSECTION

DETAIL NOTES:

(1) W 53 NOT A THROUGH STREET SIGN. LOCATE AT END OF CURB RETURN.

(2) R1 STOP SIGN AS REQUIRED. RI STOP SIGN IS TO BE ALIGNED WITH THE LIMIT LINE OR THE NEAR CROSS-WALK SEE DRAWING No.3-29.

(3) W31 END SIGN ATOP TYPE "N" MARKER REFLECTOR SIGN ON DEAD END STREET ONLY.

(4) STREET NAME SIGNS WHEN COMBINED WITH R1 STOP SIGN, USE STOP SIGN LOCATION, OTHERWISE USE FAR RIGHT SIDE OF MAJOR STREET. TWO (2) SIGNS REQUIRED FOR 4 LEG INTERSECTION OF "MAJOR STREET".

(5) W56 DOUBLE ARROW SIGN ATOP TYPE "N" MARKER REFLECTOR SIGN. PLACE SIGN POST 6" FROM BACK OF SIDEWALK.

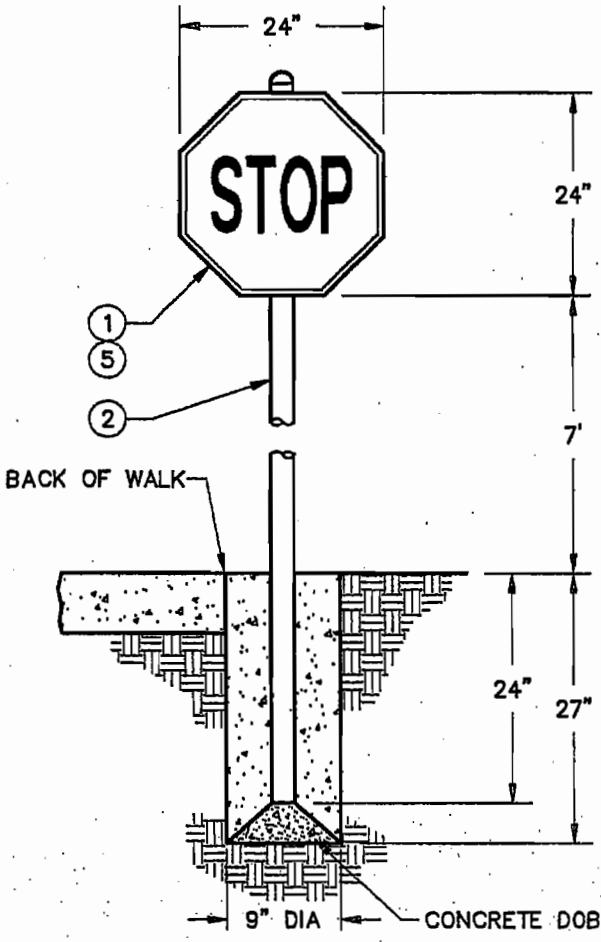
(6) W57 DIRECTIONAL ARROW SIGN ATOP TYPE "N" MARKER REFLECTOR SIGN.

(7) FOR SIDEWALKS GREATER THAN FOUR FEET (4') WIDE, THE CENTERLINE OF THE POST FOR TRAFFIC SIGNS SHALL BE EIGHTEEN INCHES (18") FROM THE FACE OF CURB. WHERE THE SIDEWALK WIDTH IS FOUR FEET OR LESS, TRAFFIC SIGNS SHALL BE INSTALLED AT THE BACK OF SIDEWALK, SEE SECTION 3.3.38.

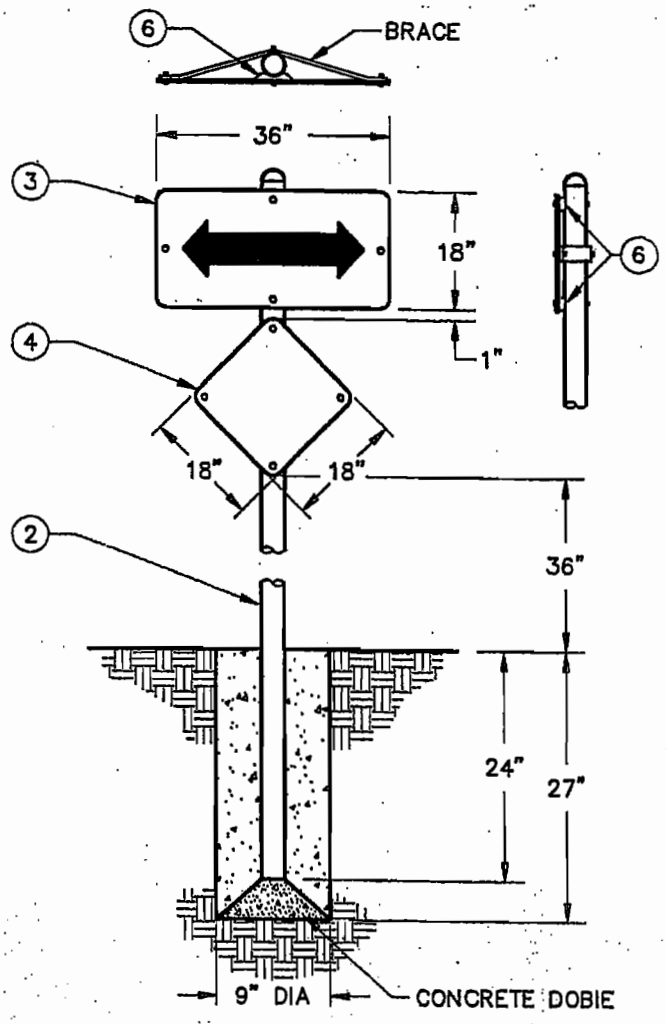
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-30	SHEET 1 OF 1	STANDARD TRAFFIC SIGN LOCATIONS
DRAWN BY JJM	FILE NO.	
DATE 8-13-92	REF.	



STOP SIGNS AND ALL OTHER TRAFFIC SIGNS



CHANGE OF DIRECTION – WARNING SIGN

SPECIFIC NOTES

1. R1 STOP SIGN/ALL OTHER TRAFFIC SIGNS.
2. 2" DIA. GALVANIZED IRON PIPE (SCH 40).
3. W56 OR W57 DIRECTION SIGNS.
4. SOLID YELLOW REFLECTOR FACE TYPE "H". SIGNS ARE TO BE MADE FROM 0.080 GAGE ALUMINUM SHEETED WITH A REFLECTOR FACE ACCORDING TO THE STATE OF CALIFORNIA DIVISION OF HIGHWAY SPECIFICATIONS.
5. ALL SIGNS REQUIRE 2 GALVANIZED STEEL SIGN SADDLES 1-1/2" x 4".
6. SIGN SADDLES.

NOTES FOR C-7 SIGN (ADVANCED STREET NAME SIGN)

1. SIGN SIZE 18" x VARIES.
2. HEIGHT 5' TO THE BOTTOM OF SIGN
3. LOCATION – IN MEDIAN, IF MEDIAN IS 4' OR GREATER, OTHERWISE BEHIND SIDEWALK.
4. FOR POST AND OTHER DETAILS, SEE CALTRANS STANDARD SPECIFICATIONS.

GENERAL NOTES

A. 1"x1"x1/8" BRACE REQUIRED FOR UNBALANCED SIGNS 30" AND GREATER IN WIDTH.

B. 30"x30" STOP SIGNS REQUIRED ON STREETS INTERSECTING STATE HIGHWAYS AND STREETS HAVING A WIDTH GREATER THAN 40'.

C. FOR SIDEWALKS GREATER THAN 4' WIDE, THE CENTERLINE OF THE POST FOR STREET NAME AND STOP SIGNS SHALL BE 18" FROM FACE OF CURB.

D. USE SAME INSTALLATION DIMENSIONS FOR ALL TRAFFIC SIGNS AS USED IN THE STOP SIGN.

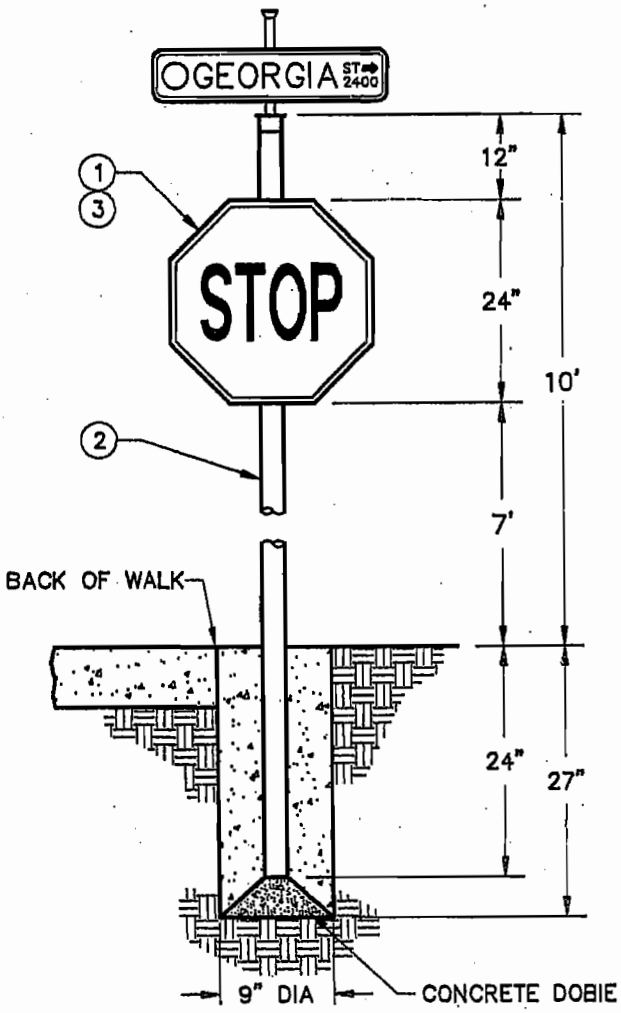
HARDWARE (TYPICAL)

2 – 5/16"x3-1/2" CARRIAGE BOLTS
2 – 5/16" LOCKWASHERS
2 – 5/16" NUTS
2 – SIGN SADDLES
1 – PIPE CAP
1 – BRACE, FOR SIGNS 30" OR GREATER, TO COVER FULL DIAMETER. (U-CLAMP TYPES OF HARDWARE ARE UNACCEPTABLE)

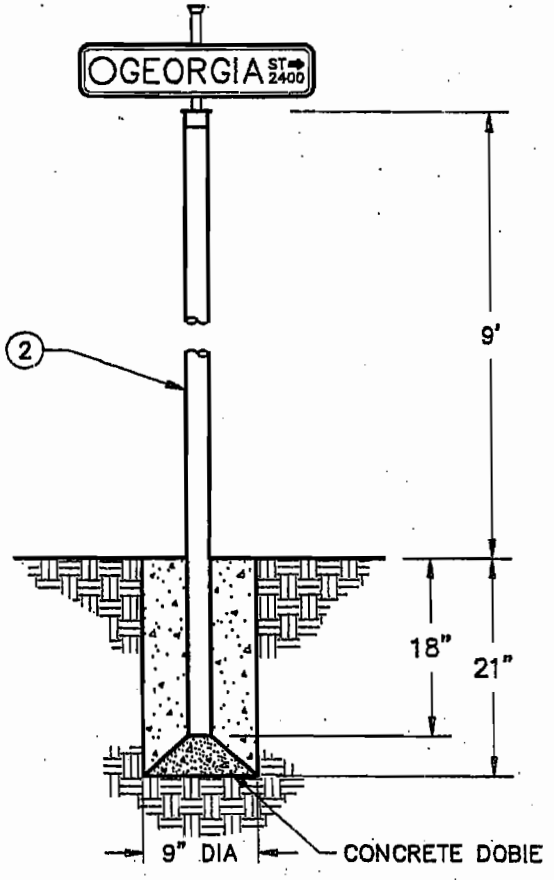
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-31	SHEET 1 OF 1	STANDARD TRAFFIC SIGNS INSTALLATION
DRAWN BY EVA	FILE NO.	
DATE 11-7-91	REF.	



COMBINED STREET NAME SIGN AND STOP SIGN



STREET NAME SIGN

(HARDWARE FOR STREET SIGNS SEE SPECIFICATIONS)

SPECIFIC NOTES

1. R1 STOP SIGN.
2. 2" DIA. GALVANIZED IRON PIPE (SCH 40).
3. ALL SIGNS REQUIRE 2 GALVANIZED STEEL SIGN SADDLES 1-1/2" x 4".

GENERAL NOTES

A. 1"x1"x1/8" BRACE REQUIRED FOR UNBALANCED SIGNS 30" AND GREATER IN WIDTH.
B. 30"x30" STOP SIGNS REQUIRED ON STREETS INTERSECTING STATE HIGHWAYS AND STREETS HAVING A WIDTH GREATER THAN 40'.
C. FOR SIDEWALKS GREATER THAN 4' WIDE, THE CENTERLINE OF THE POST FOR STREET NAME AND STOP SIGNS SHALL BE 18" FROM FACE OF CURB.

HARDWARE (TYPICAL)

2 – 5/16"x3-1/2" CARRIAGE BOLTS
2 – 5/16" LOCKWASHERS
2 – 5/16" NUTS
2 – SIGN SADDLES
1 – PIPE CAP
1 – BRACE, FOR SIGNS 30" OR GREATER, TO COVER FULL DIAMETER. (U-CLAMP TYPES OF HARDWARE ARE UNACCEPTABLE)

CITY OF VALLEJO

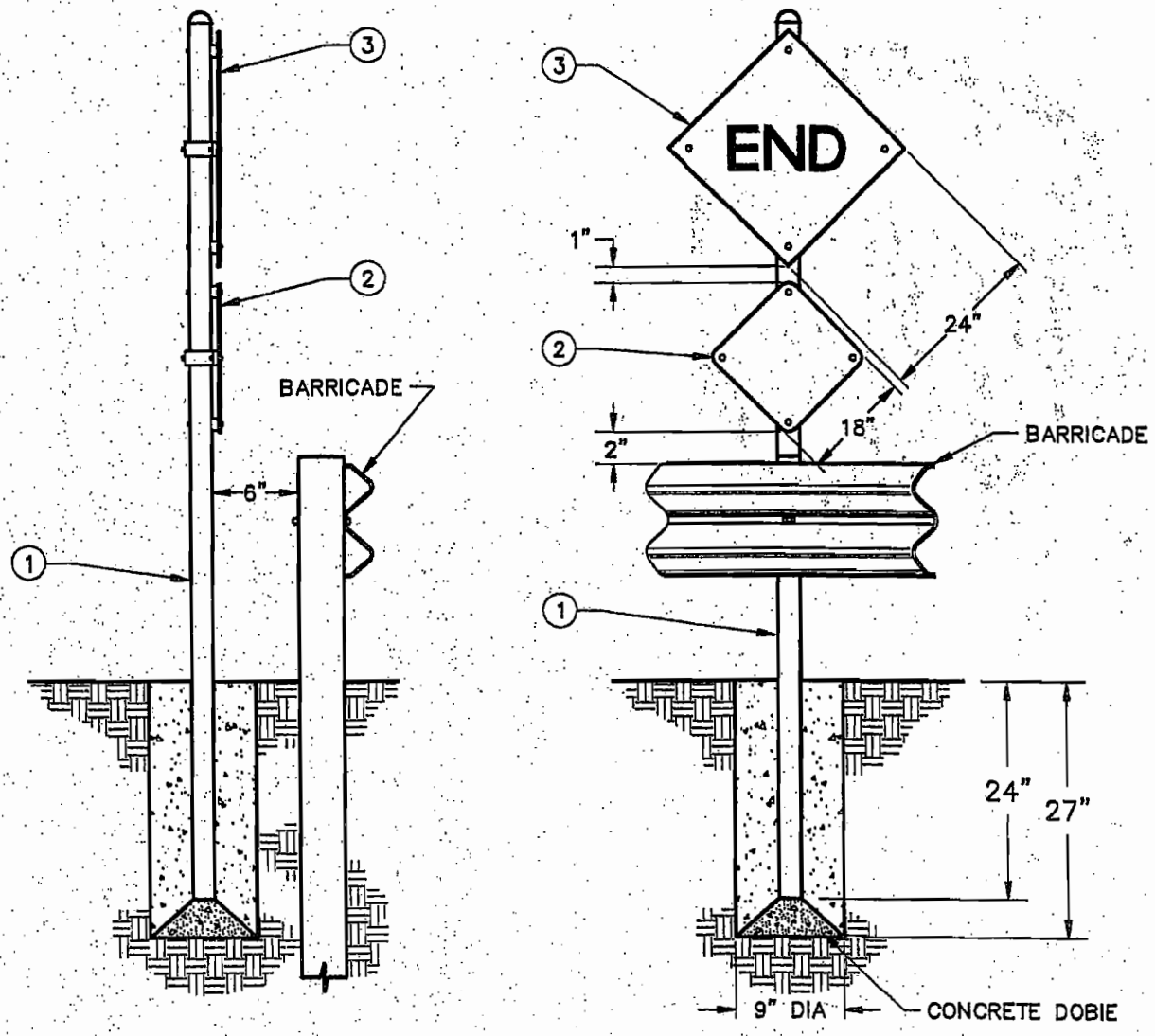
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-32
DRAWN BY EVA
DATE 11-11-91
CHECKED THA

SHEET 8 OF 8
FILE NO.
REF.
SCALE NONE

STANDARD TRAFFIC SIGNS INSTALLATION

APPROVED: [signature] DATE 8-21-97



DEAD END STREET BARRICADE WARNING SIGN

SPECIFIC NOTES

1. 2" DIA. GALVANIZED IRON PIPE (SCH 40).
2. SOLID YELLOW REFLECTOR FACE TYPE "H". SIGNS ARE TO BE MADE FROM 0.080 GAGE ALUMINUM SHEETED WITH A REFLECTOR FACE ACCORDING TO THE STATE OF CALIFORNIA DIVISION OF HIGHWAY SPECIFICATIONS.
3. W31 DEAD END SIGN.

GENERAL NOTES

A. 30"x30" STOP SIGNS REQUIRED ON STREETS INTERSECTING STATE HIGHWAYS AND STREETS HAVING A WIDTH GREATER THAN 40'.

B. FOR SIDEWALKS GREATER THAN 4' WIDE, THE CENTERLINE OF THE POST FOR STREET NAME AND STOP SIGNS SHALL BE 18" FROM FACE OF CURB.

HARDWARE (TYPICAL)

2 – 5/16" x 3-1/2" CARRIAGE BOLTS
2 – 5/16" LOCKWASHERS
2 – 5/16" NUTS
2 – SIGN SADDLES
1 – PIPE CAP
1 – BRACE, FOR SIGNS 30" OR GREATER, TO COVER FULL DIAMETER. (U-CLAMP TYPES OF HARDWARE ARE UNACCEPTABLE)

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-33
DRAWN BY EVA
DATE 11-8-91
SHEET [illegible] OF [illegible]
FILE NO.
REF.

STANDARD TRAFFIC SIGNS INSTALLATION

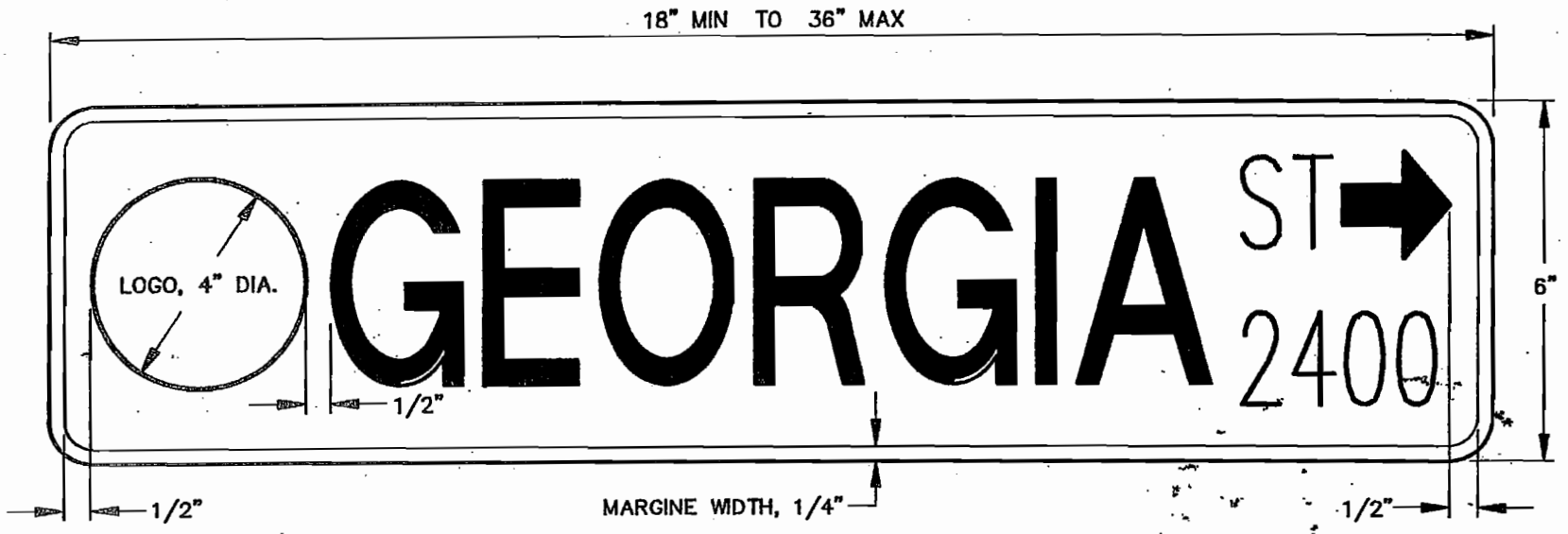
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-34
DRAWN BY EVA
DATE 10-28-91

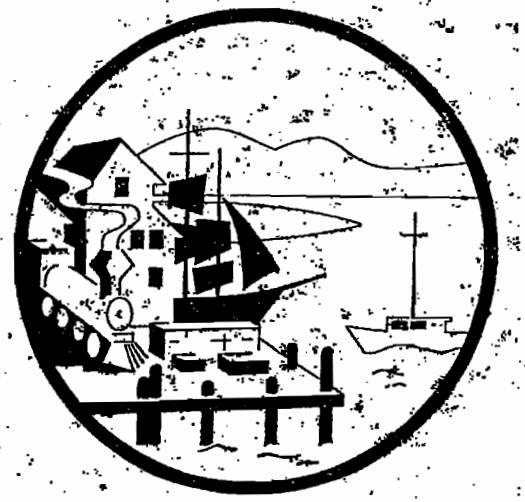
SHEET ____ OF ____
FILE NO. ____
REF. ____

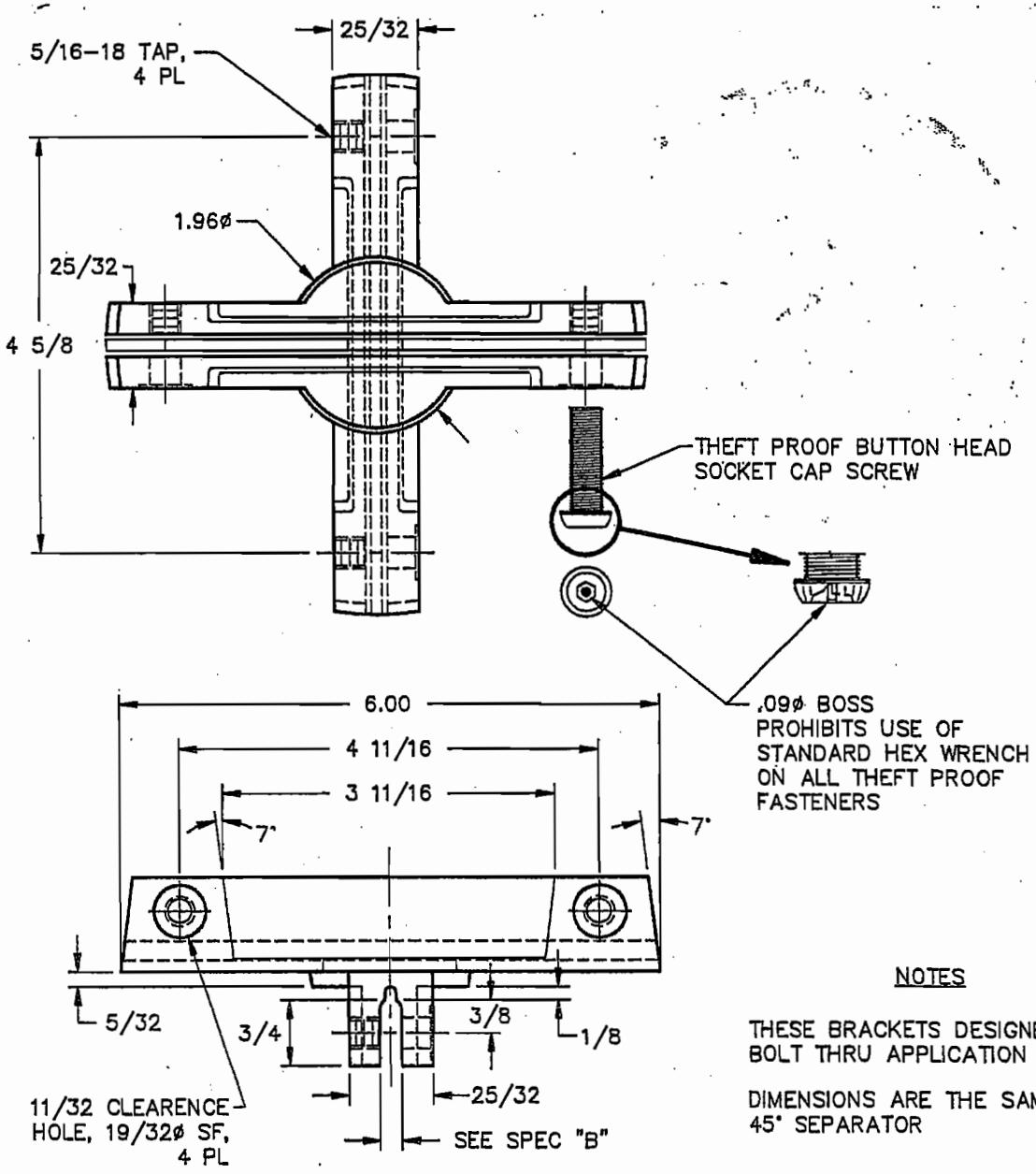
STREET NAME SIGN SPECIFICATION



NOTES

1. Street Name lettering to be 4" white reflective, Series B.
2. Block Numbers and Street Suffix lettering to be 1-1/2" white reflective, Series B.
3. Directional Arrow to be 1-3/4" x 1-3/4" white reflective.
4. City logo to be silk-screened, 4" in diameter.
5. Overall sign coloring to be blue.
6. Plates to be drilled per attached hardware specifications.
7. Plate to be flat type with a minimum thickness to be .125".
8. For logo see the cover sheet of these specifications, excluding the words "PRIDE IN SERVICE" the logo is to be 3 colors, DARK BLUE (Pantone #287C), MEDIUM BLUE (Pantone #285C), and LIGHT BLUE (Pantone #283C).





NOTES

THESE BRACKETS DESIGNED FOR BOLT THRU APPLICATION ONLY

DIMENSIONS ARE THE SAME FOR 45° SEPARATOR

SPECIFICATIONS

VANDAL–PROOF (BOLT–THUR) HARDWARE FOR STREET NAME SIGNS

A.– ALL DIMENSIONS AND SPECIFICATIONS CONTAINED IN DRAWINGS.

B.– MATERIAL. ALUMINUM HIGH STRENGTH ALLOY NO.380 OR 385 (A.S.T.M.B.–5 45T). HARDWARE SHALL BE SMOOTHLY FINISHED, PRECISION MACHINED TO FIT ALL STANDARD FLAT BLADE SECTIONS ALLOWING CLEARANCE FOR REFLECTIVE FACING ACCORDING TO REQUIREMENTS.

C.– POST TO SIGN BRACKETS. THEY SHALL ATTACH FIRMLY ON STANDARD 2" PIPE BY MEANS OF THREE 5/16" THEFT–PROOF SET SCREWS, THRU A WALL SECTION HAVING .312 MINIMUM THICKNESS. BLADE SLOT SHALL BE 6" LONG, WITH SIGN BLADES SECURED IN PLACE BY 5/16" THEFT–PROOF TRUSS HEAD SCREW.

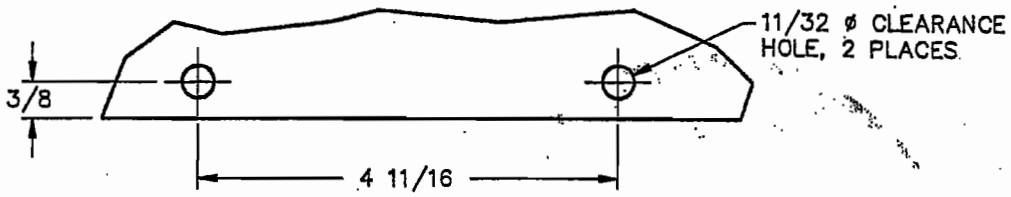
D.– SIGN TO SIGN BRACKETS. SHALL BE 90 OR 45 DEGREE TYPE WITH MINIMUM REQUIRE AS THE POST TO SIGN BRACKET.

E.– SAMPLE MUST BE SUBMITTED FOR BID ACCEPTANCE.

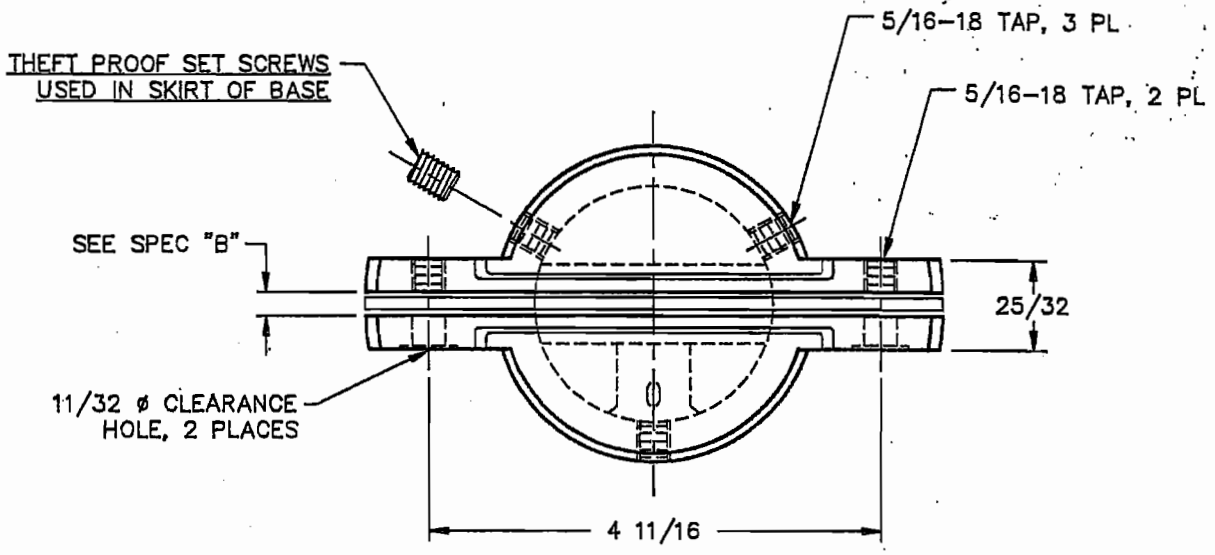
CITY OF VALLEJO

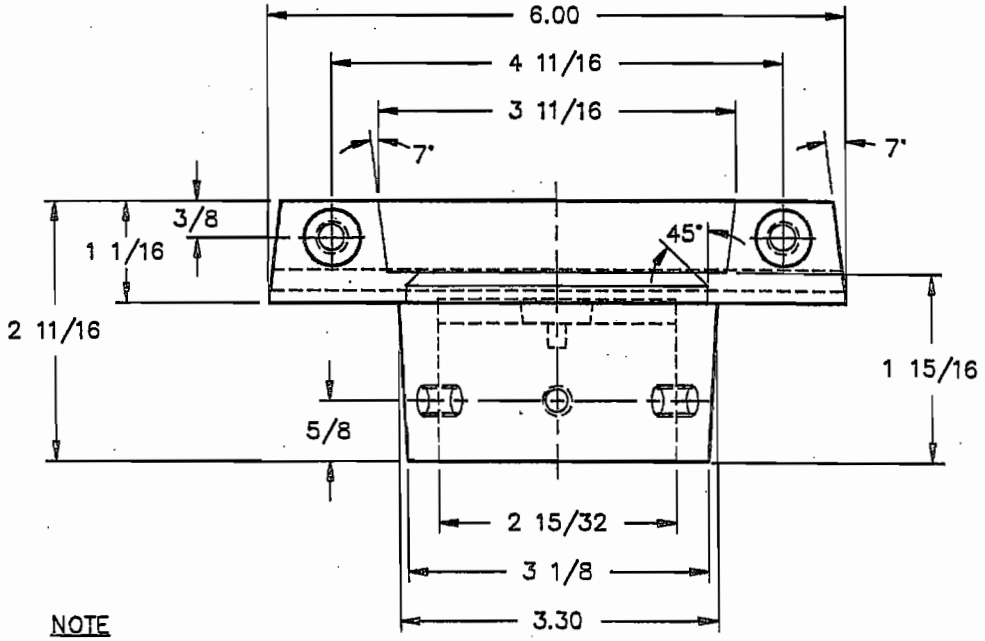
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3–35	SHEET 1 OF 2	STANDARD STREET SIGN BRACKET 90° SEPARATOR
DRAWN BY EVA	FILE NO.	
DATE 7/5/90	REF.	



SIGN BLADE MOUNTING HOLE PATTERN





NOTE

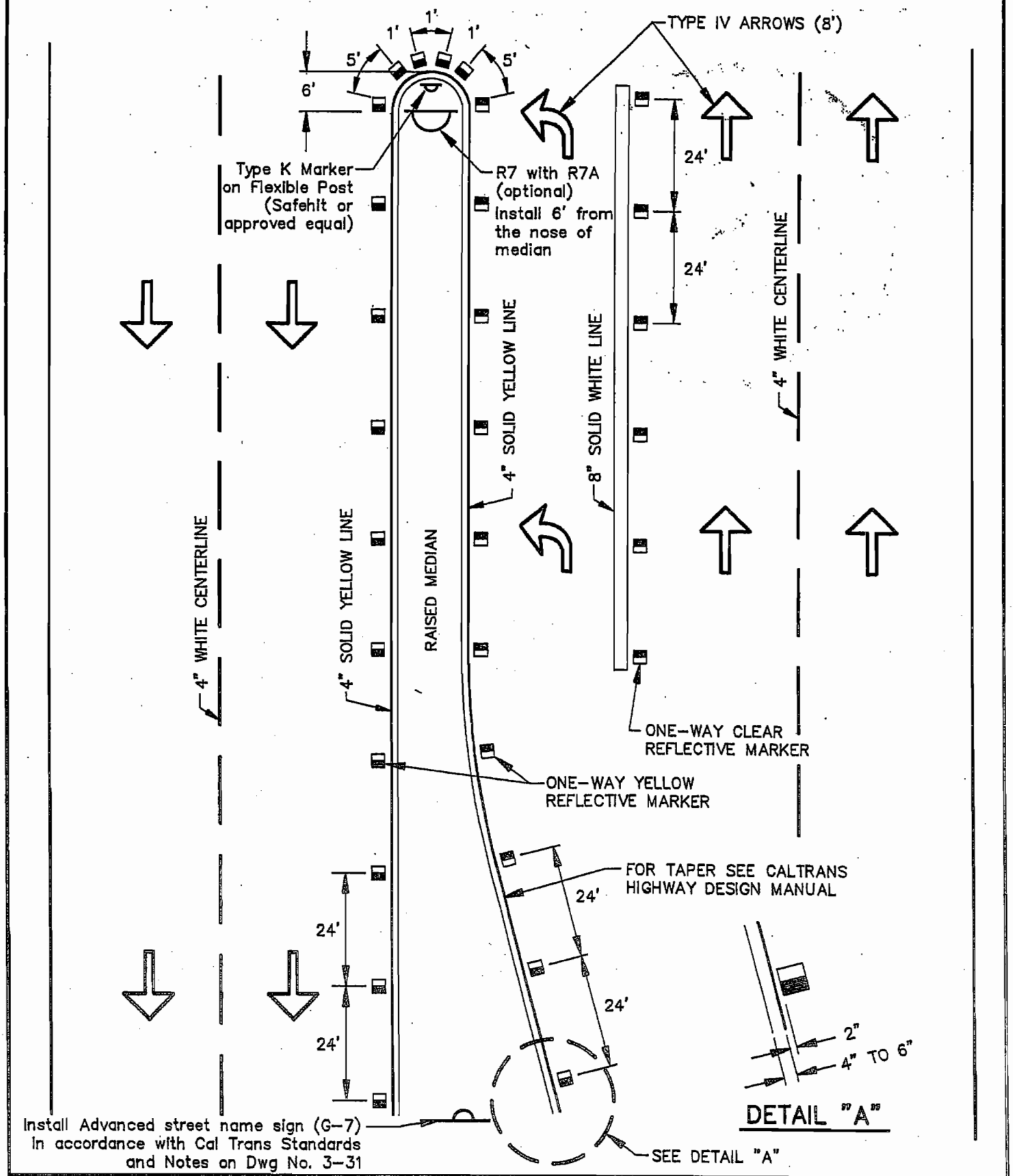
THESE BRACKETS DESIGNED FOR
BOLT THRU APPLICATION ONLY

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3–36 | SHEET 2 OF 2
DRAWN BY EVA | FILE NO.
DATE 7/5/90 | REF.

STANDARD STREET SIGN BRACKET POST CAP, & SIGN HOLE DETAIL



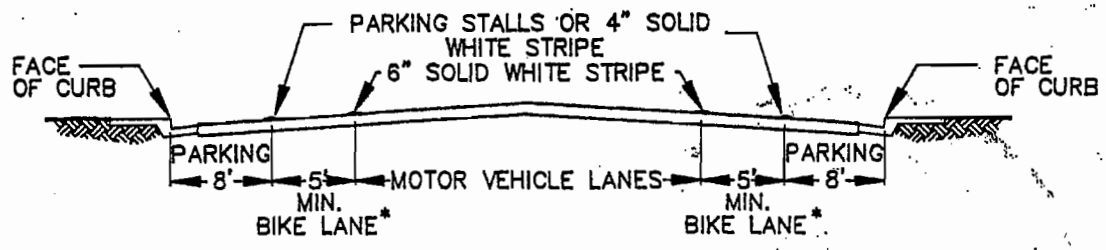
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

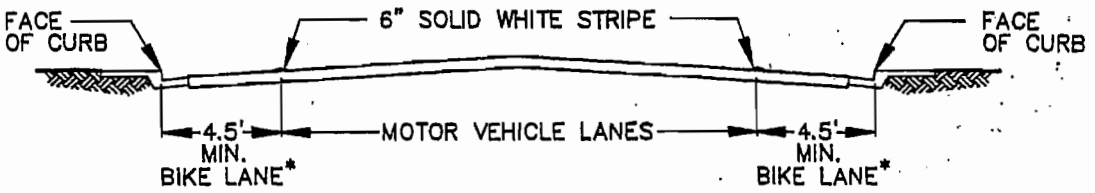
DWG. NO. 3-37
DRAWN BY EVA
DATE 7-20-90

SHEET____ OF ____
FILE NO.____
REF.____

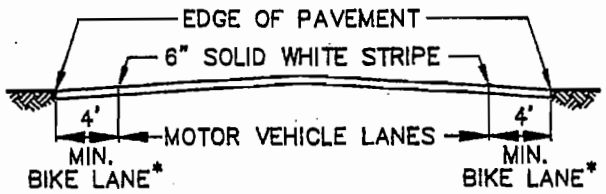
TYPICAL MEDIAN ISLANDS PAVEMENT MARKINGS AND SIGNS



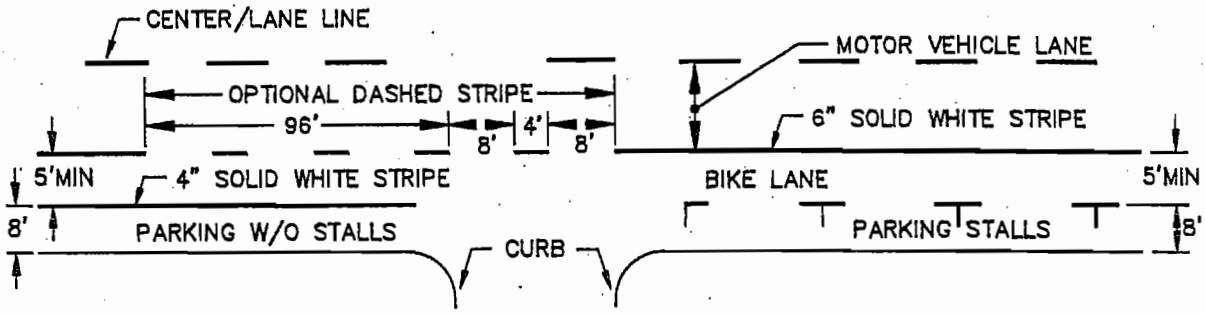
WHERE VEHICLE PARKING IS PERMITTED



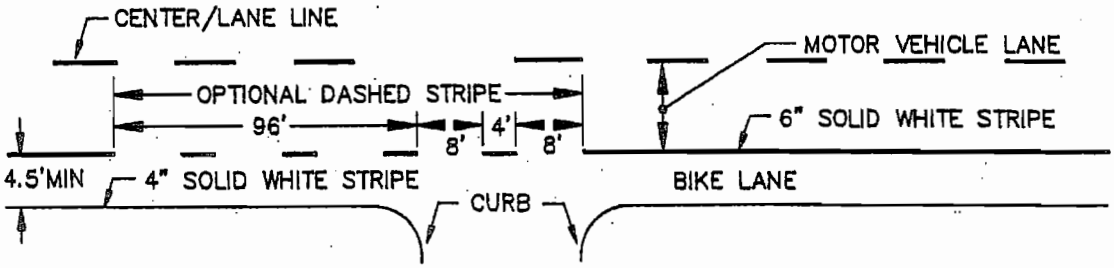
WHERE VEHICLE PARKING IS PROHIBITED



ROADWAY WITHOUT CURB



WHERE VEHICLE PARKING IS PERMITTED



WHERE VEHICLE PARKING IS PROHIBITED

NOTE:

* ALL BIKEWAY ROUTES SHALL BE POSTED WITH STATE REGULATORY AND GUIDE SIGNS AS DIRECTED.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

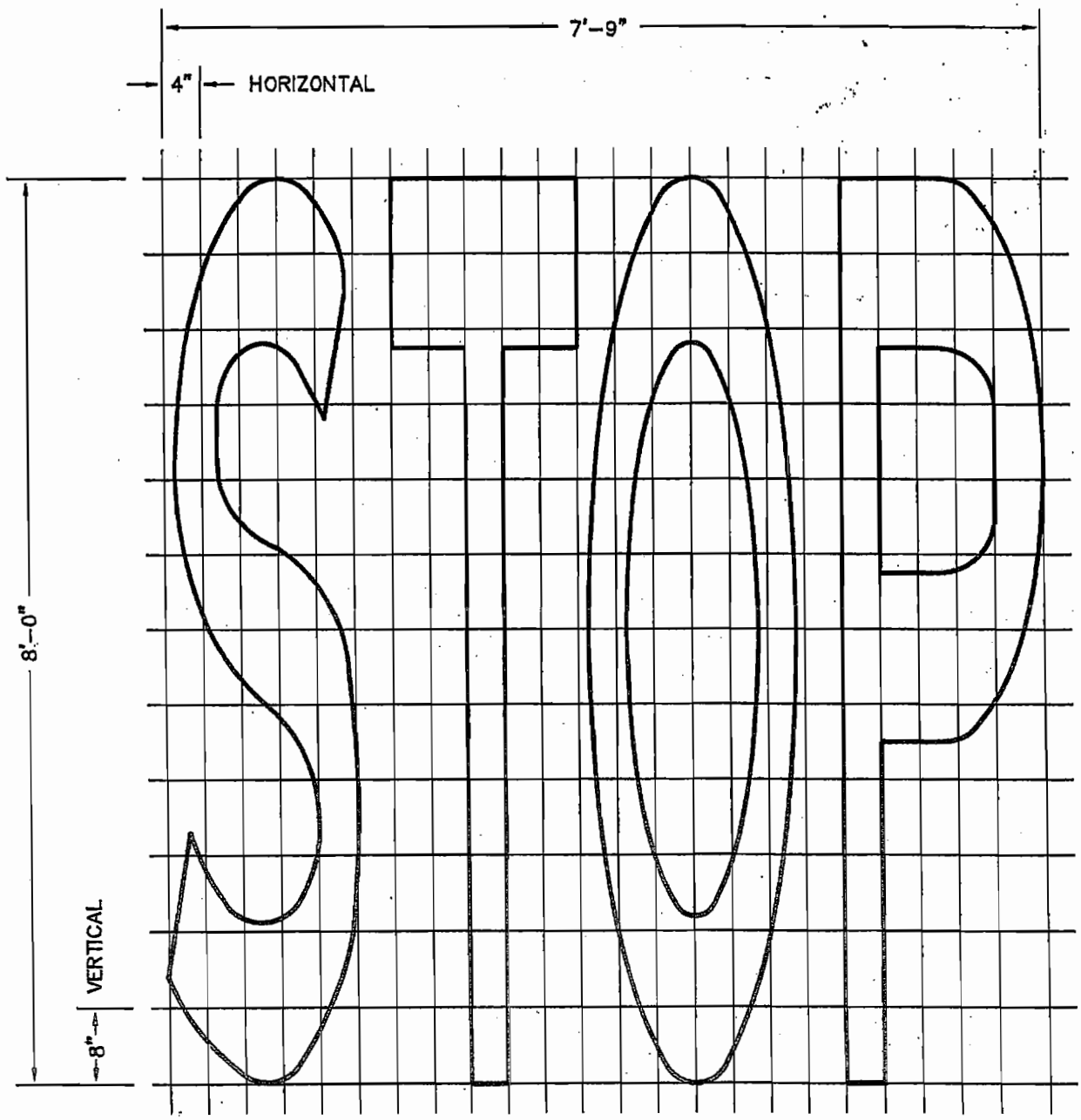
DWG. NO. 3-38
DRAWN BY JJM
DATE 7-24-92
TLA

SHEET 1 OF 1
FILE NO.
REF.
NTS

TYPICAL BIKE LANE CROSS-SECTIONS AND LANE MARKINGS

APPROVED

TYPICAL PAVEMENT MARKINGS

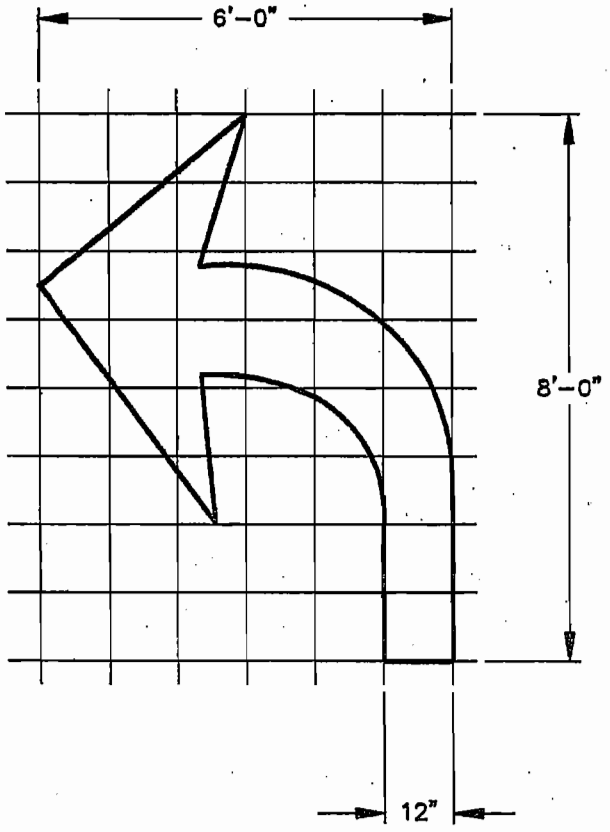


TYPICAL LAYOUT OF STOP

PAINTED AREA = 25.35 SQ. FT.

CITY OF VALLEJO	DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION	
DWG. NO. 3-39	SHEET ____ OF ____	STANDARD PAVEMENT STOP LAYOUT
DRAWN BY EVA	FILE NO. ____	
DATE 4-20-90	REF. ____	

TYPICAL PAVEMENT ARROW



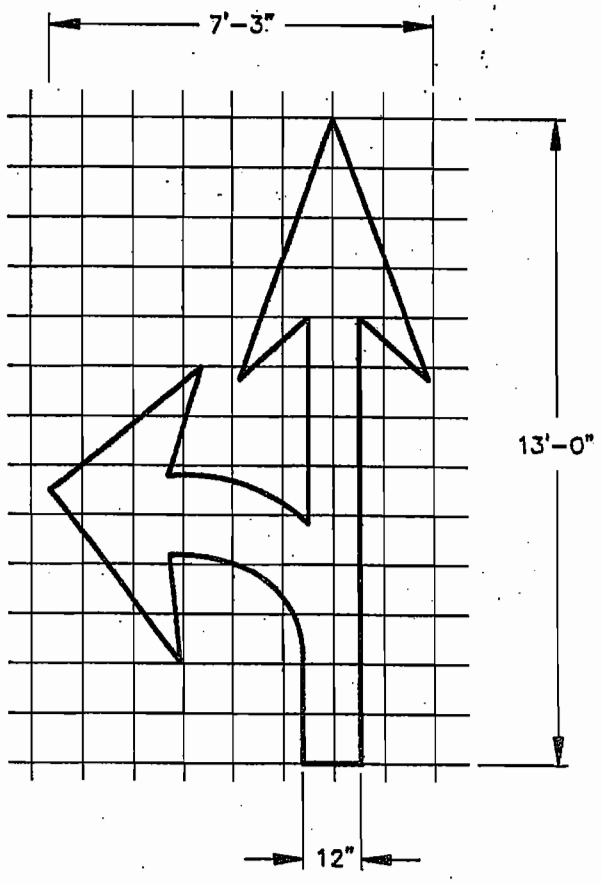
12 INCH GRID

TYPE IV (L) ARROW

A=15 SQ. FT.

(FOR TYPE IV (R) ARROW, OR (R) AND (L) DOUBLE ARROW USE MIRROR IMAGE)

FOR LANE REDUCTION ARROWS, STRAIGHT ARROWS MAY BE USED IF TURNED AT THE PROPER ANGLE TO THE CURB LINE.



12 INCH GRID

TYPE VII (L) ARROW

A=27 SQ. FT.

(FOR TYPE VII (R) WITH STRAIGHT ARROW USE MIRROR IMAGE)

FOR STRAIGHT ARROW ONLY, USE TYPE I (10) ARROW 3'-6" X 10'-0", A=14 SQ. FT.

CITY OF VALLEJO

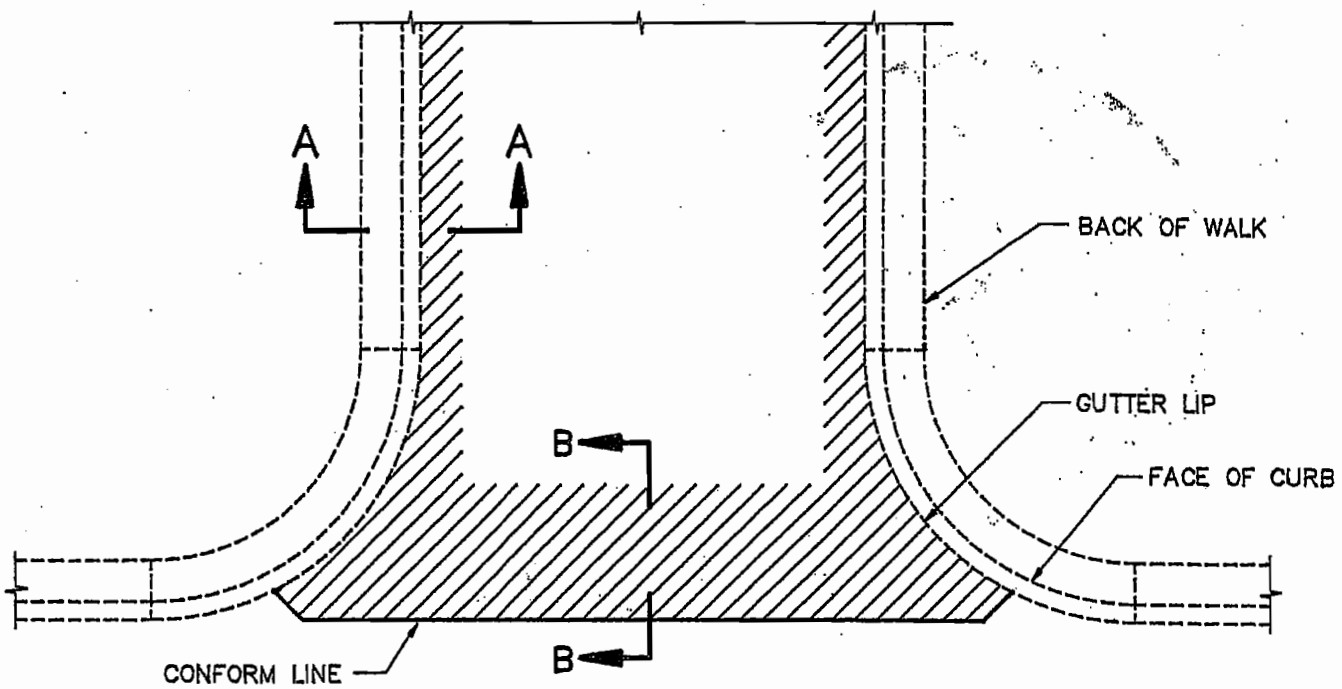
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

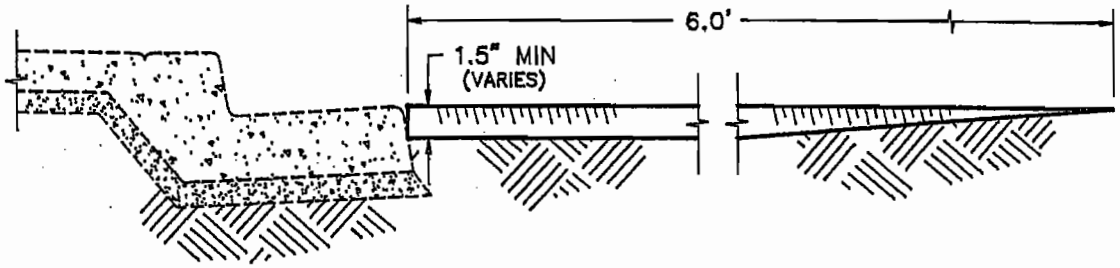
DWG. NO. 3-40
DRAWN BY EVA
DATE 10-25-91

SHEET ____ OF ____
FILE NO. ____
REF. ____

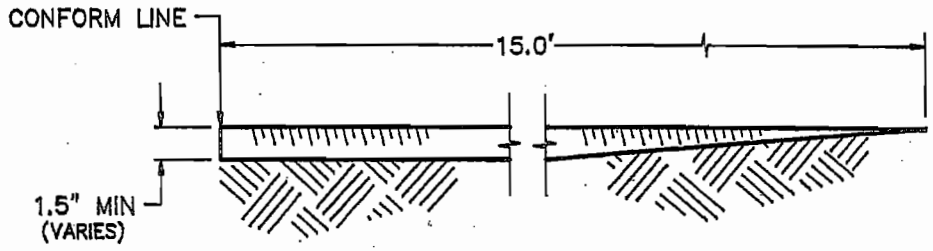
STANDARD PAVEMENT ARROW LAYOUT

APPROVED: [signature] 8-21-97





SECTION A–A



SECTION B–B

GENERAL NOTES:

1. IMMEDIATELY FOLLOWING GRINDING, THE GROUND AREAS SHALL BE SWEPT CLEAN, FREE OF LOOSE MATERIAL AND DUST PARTICLES.
2. THE GROUND SURFACE SHALL BE NEAT WITH ALL SHATTERED, BROKEN OR LOOSE MATERIAL REMOVED AND DISPOSED PROPERLY.
3. TEMPORARY ASPHALTIC CUTBACK SHALL BE PLACED IMMEDIATELY FOLLOWING GRINDING AT INTERSECTION CROSSINGS, AND SHALL BE MAINTAINED TO PROVIDE A SMOOTH TRANSITION FOR TRAFFIC UNTIL PERMANENT PAVING IS PLACED.

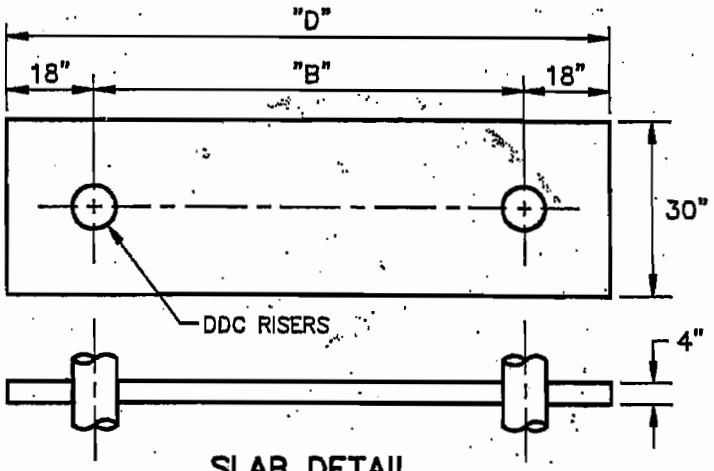
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 3-41	SHEET ____ OF ____	AC PAVEMENT KEY CUTTING DETAIL
DRAWN BY JJM	FILE NO. ____	
DATE 6-3-92	REF. ____	

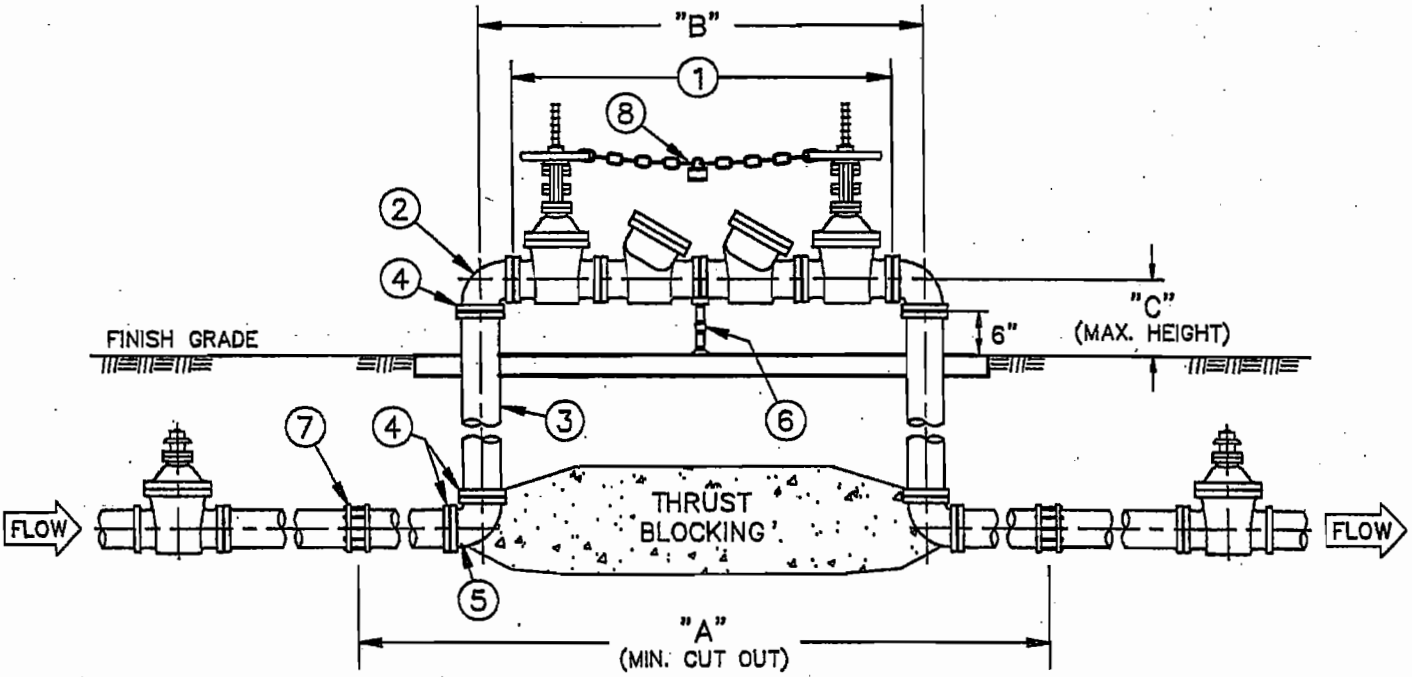
DIMENSIONS				
NOM. DIA.	A MIN. CUT OUT	B	C MAX. HEIGHT	D
4"	7'-6"	5'-3 7/16"	12 1/2"	8'-3 7/16"
6"	8'-7"	6'-3 11/16"	14"	9'-3 11/16"
8"	9'-10"	7'-3 3/16"	15"	10'-3 3/16"
10"	11'-8"	8'-10 3/16"	17"	11'-10 3/16"

MATERIALS LIST		
No.	QTY.	DESCRIPTION
①	1	DOUBLE-DETECTOR CHECK VALVE ASSY.
②	2	90° ELBOW, FLANGE x M.J.
③	2	± 5 FT. EACH, DUCTILE IRON PIPE
④	6	M.J. RESTRAINING GLANDS
⑤	2	90° ELBOW, M.J. x M.J.
⑥	1	PIPE SUPPORT
⑦	2	STD. FLEX. COUPLINGS OR M.J. SLEEVES
⑧	1	CHAIN AND LOCK, AS REQUIRED



SLAB DETAIL

CONCRETE PAD BY OWNER OR CONTRACTOR



NOTES

1. Dimensions from "Febco Model 806". Any change in dimensions are because of manufacturer change.
2. Backflow Device shall be provided and installed by the City.
3. Unless otherwise directed, the Backflow Device shall be perpendicular to the street, at the back of the sidewalk.
4. Hydrostatic testing is the responsibility of the Contractor, and shall be completed and approved by the City Inspector and the Fire Department, before the Backflow Device is installed.
5. Thrust restraint during hydrostatic testing, is the responsibility of the Contractor. Any temporary restraint, shall be removed as directed.
6. When the City has installed the Device, the City will chain the shut-off valves, as follows: Street Valve OPEN, and the Property Valve CLOSED. Unless otherwise directed by the City Fire Dept.
7. Unless otherwise directed, all pipe and fittings shall be Ductile Iron.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

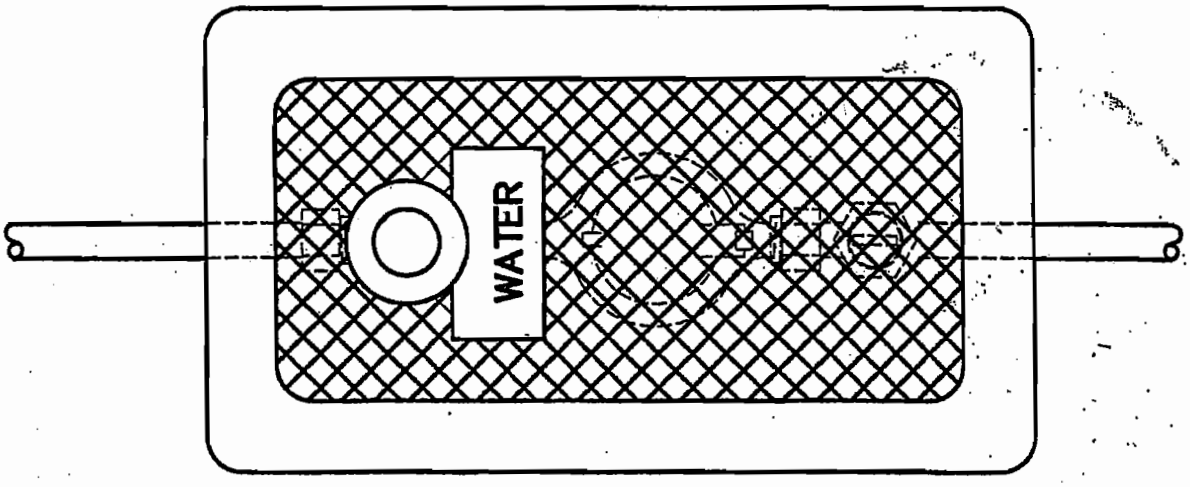
DWG. NO. 4-1
DRAWN BY EVA
DATE 1-15-92
CHECKED C HOLMES

SHEET ____ OF ____
FILE NO. ____
REF. ____
SCALE NONE

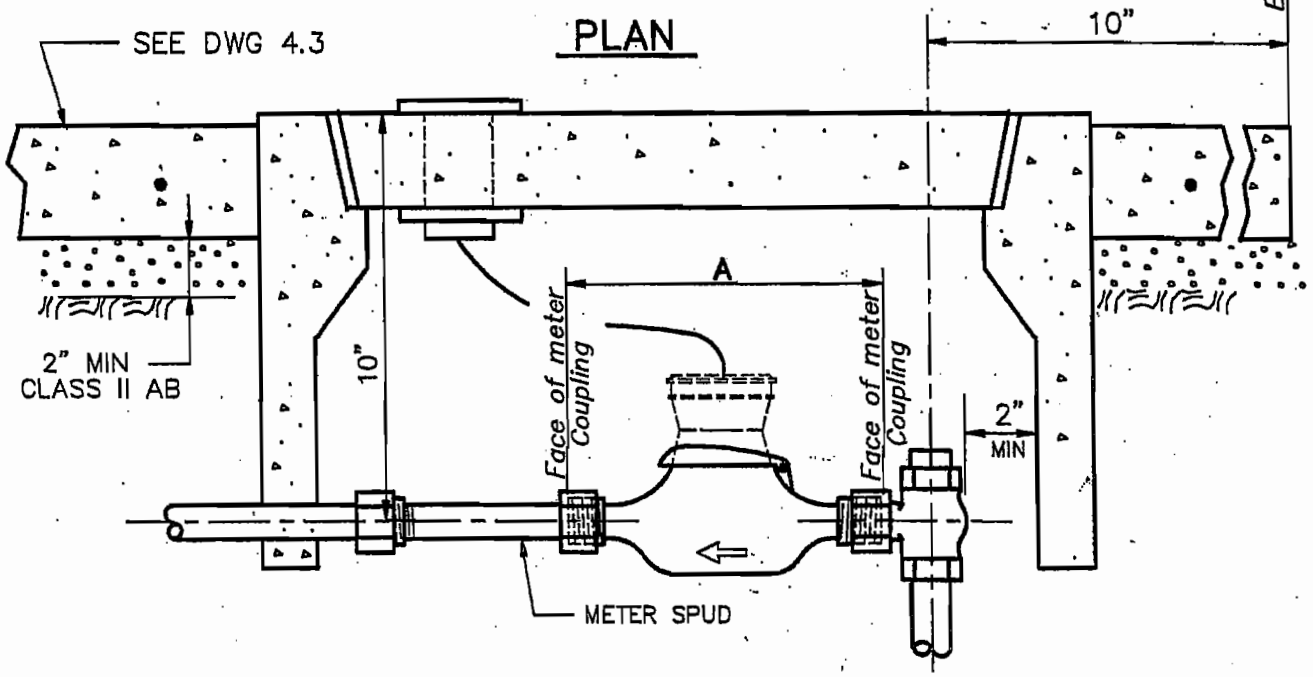
STANDARD FIRE SPRINKLER SERVICE
BACKFLOW PREVENTER INSTALLATION

FOR DOUBLE-DETECTOR CHECK VALVE ASSEMBLY WITH VALVES IN-LINE

APPROVED: Josh D. Nelson ON 8-21-92



PLAN



ELEVATION

Meter Size	A	METER BOX (SEE SPEC. SEC. 4.2.12)
3/4"x5/8"	7 1/2"	"CHRISTY" B-9
3/4"x3/4"	9"	"CHRISTY" B-9
1"	10 3/4"	"CHRISTY" B-16

NOTES:

Contractor of subdivider shall furnish and install all materials except water meter and meter spud. Meter box will be furnished by the City but will be

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
WATER DIVISION

DWG. NO. 4-02
DRAWN BY EFR
DATE 09/19/91

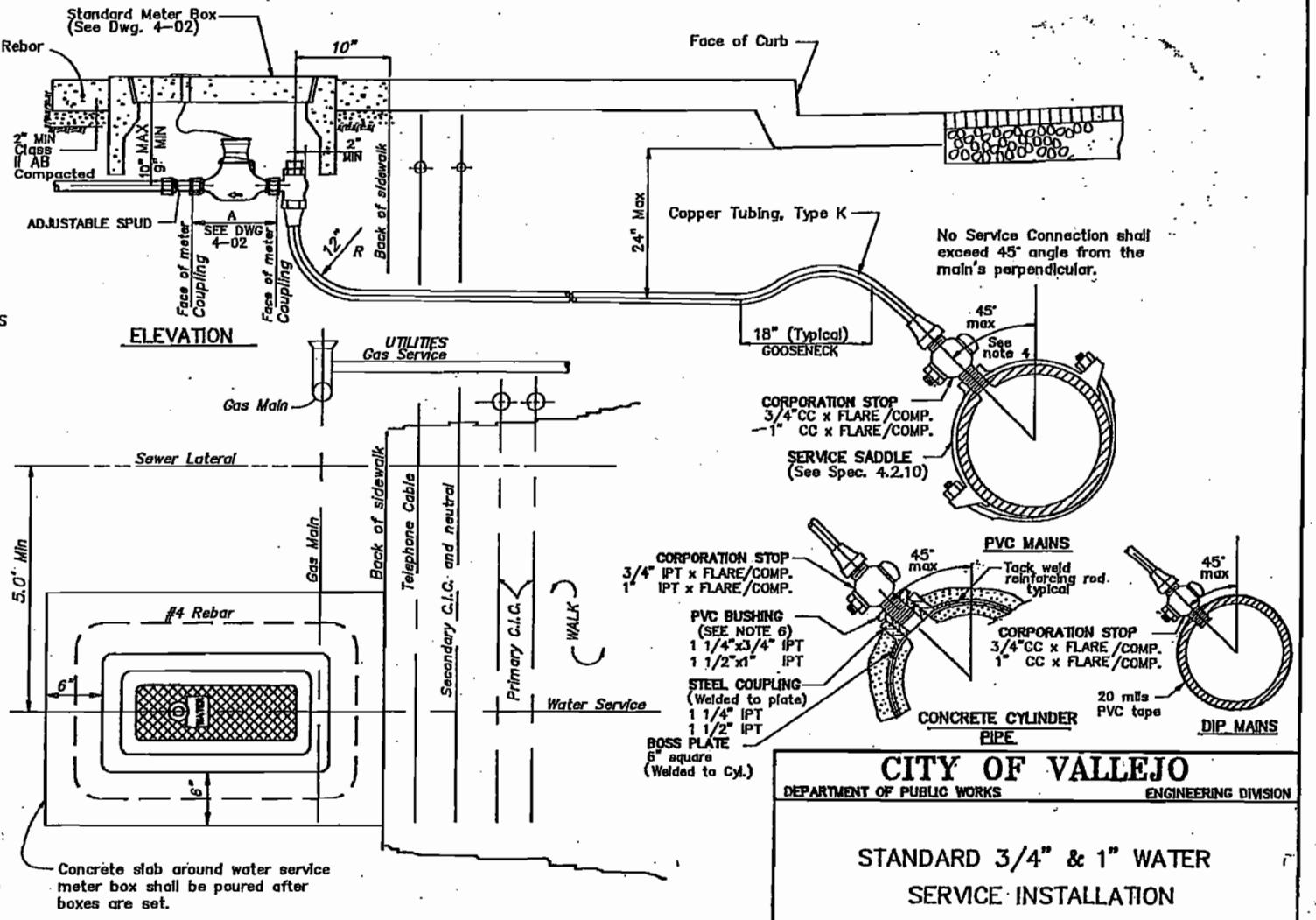
SHEET ____ OF ____
FILE NO. ____
REF. ____

STANDARD 3/4" & 1" WATER METER INSTALLATION

NOTES:

1. SERVICE SADDLES ARE NOT REQUIRED FOR 3/4" AND 1" TAPS INTO DUCTILE IRON PIPE MAINS, EXCEPT WHEN D.I.P. MAIN IS CATHODICALLY PROTECTED.
2. ALL TAPS INTO POLYETHYLENE ENCASED D.I.P., WHETHER DIRECT TAPPED OR WITH SERVICE SADDLES, SHALL BE ACCOMPLISHED BY FIRST REMOVING 6" WIDE BAND OF POLYWRAP FROM AROUND THE CIRCUMFERENCE OF THE PIPE AT THE LOCATION OF THE TAP. TAPE WRAP BARE PIPE WITH 10 MIL VINYL TAPE, HALF LAPPED TO PROVIDE MINIMUM 20 MILS OF PROTECTION. SEAL OPEN ENDS OF POLYWRAP WITH TWO WRAPS OF TAPE AT TAP LOCATION.
3. FOR DIRECT TAPS DRILL THROUGH TAPE AND INSTALL CORP STOP. AFTER INSTALLATION CAREFULLY TAPE WRAP ALL EXPOSED THREADS AT TAP LOCATION.
4. FOR CATHODICALLY PROTECTED D.I.P., PROVIDE DI-ELECTRIC C.C.THREAD NYLON BUSHING. AT SERVICE SADDLE, AND A CORPORATION STOP CONNECTION.

   FOR CATHODICALLY PROTECTED D.I.P., CAREFULLY REMOVE TAPE FROM SERVICE SADDLE GASKET LOCATION, TO PERMIT SEALING OF GASKET ON BARE PIPE. INSTALL SERVICE SADDLE WITHOUT FURTHER CUTTING OR DAMAGING VINYL TAPE. WRAP SADDLE WITH 16 MILS POLYETHYLENE SEAL ALL OPENINGS.
5. ON CONCRETE CYLINDER PIPE (C.C.P.) COAT ALL EXPOSED FERROUS METAL WITH A MINIMUM OF 1/2" OF MORTAR.
6. TAPS SHALL BE SPACED A MINIMUM OF 24" ON CENTER FROM ANOTHER TAP, BELL, SPIGOT OR ANOTHER FITTING.
7. MULTIPLE TAPS INTO PVC MAINS SHALL BE LOCATED IN DIFFERENT POSITIONS TO PREVENT CRACK PROPAGATION.
8. COPPER SERVICE PIPE SHALL BE CONTINUOUS FROM CORPORATION STOP TO CURB STOP: SPLICES ARE NOT PERMITTED EXCEPT WHEN SERVICE RUN EXCEEDS 60 LF.
9. INSULATING BUSHING SHOWN ON CONCRETE CYLINDER PIPE IS FOR CATHODICALLY PROTECTED WATERMAINS.
10. SEE SPECIFICATIONS SECTION
    4.2.8 – SERVICE PIPE
    4.2.9 – SERVICE FITTINGS
    4.2.10– SERVICE SADDLES



CITY OF VALLEJO

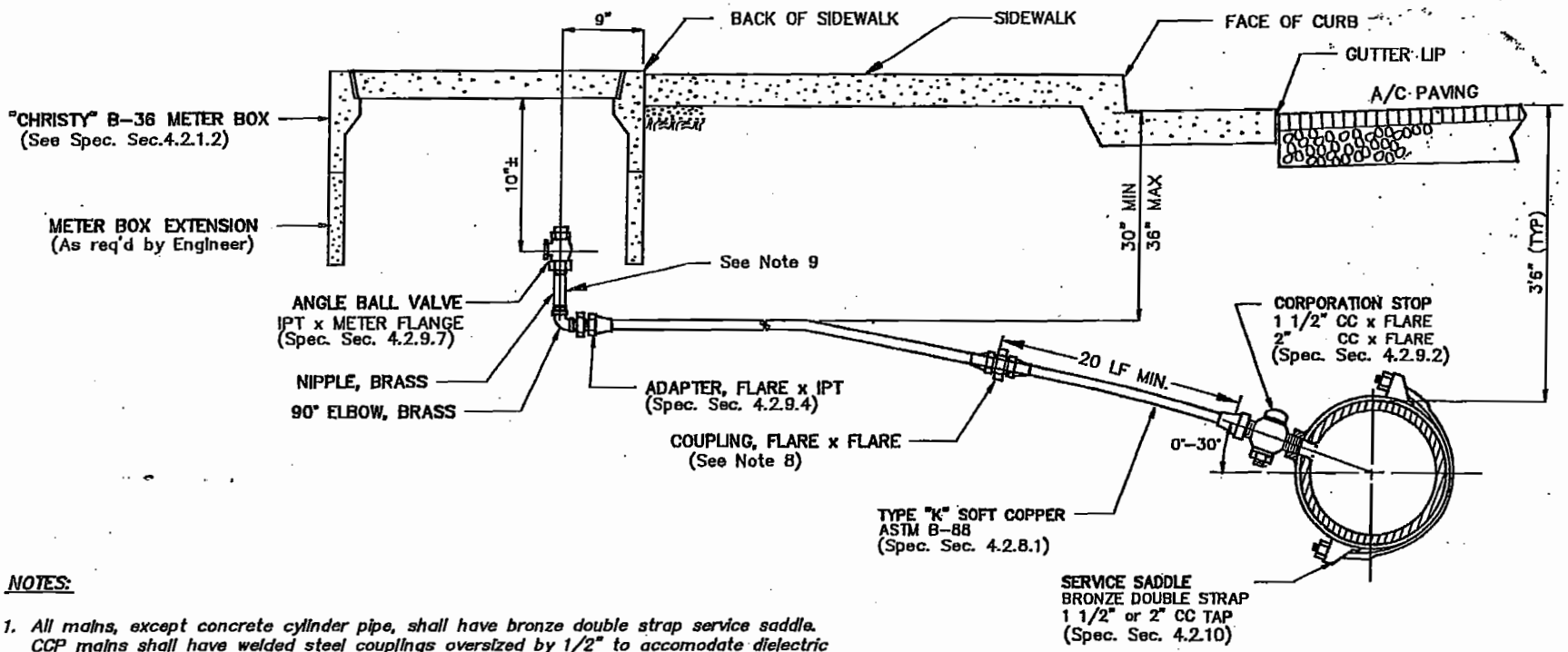
DEPARTMENT OF PUBLIC WORKS — ENGINEERING DIVISION

STANDARD 3/4" & 1" WATER SERVICE INSTALLATION

DWG. NO. 4-03	DRAWN BY EFR	SCALE NONE
JOB NO.	DATE 09/19/91	SHEET OF
REF.	CHECKED FJN/DAS	FILE NO.

APPROVED: John D. Sharp ON 8-21-92
DIRECTOR OF PUBLIC WORKS — DATE

DATE	MARK	REVISION	INIT.



NOTES:

1. *All mains, except concrete cylinder pipe, shall have bronze double strap service saddle. CCP mains shall have welded steel couplings oversized by 1/2" to accomodate dielectric bushing. Cathodically protected D.I.P. mains shall have di-electric c.c. thread nylon bushing, oversized 1/2 inch, at service saddle and corporation stop connection.*
2. *For polyethylene wrapped DIP, remove 6" of polyethylene at service tap location, make tap, tape wrap circumference of pipe, sealing open ends of polyethelene tube with half-lapped 10 mil tape. After wrapping, remove tape at service saddle gasket location, install service saddle. Wrap service saddle with 16 mils of polyethylene. Use 10 mil vinyl tape to seal all openings.*
3. *On concrete cylinder pipes (CCP), replace cement mortar coating on main and coat entire coupling with 2 inches of mortar.*
4. *The location of the tap shall be a minimum of 24" from another tap, bell, spigot or other fittings.*
5. *Do not coat PVC bushing with mastic or other solvent based coating.*
6. *Water hook-up fees include meter and meter box. Meter box shall be installed by applicant. Meter installation by City forces.*
7. *Mueller compression style fittings may be used in lieu of flare connections shown.*
8. *Couplings are not permitted on service runs that are less than 20 LF (See Spec. Sec. 4.2.9.5)*
9. *Type "K" copper may be used in lieu of brass nipple.*

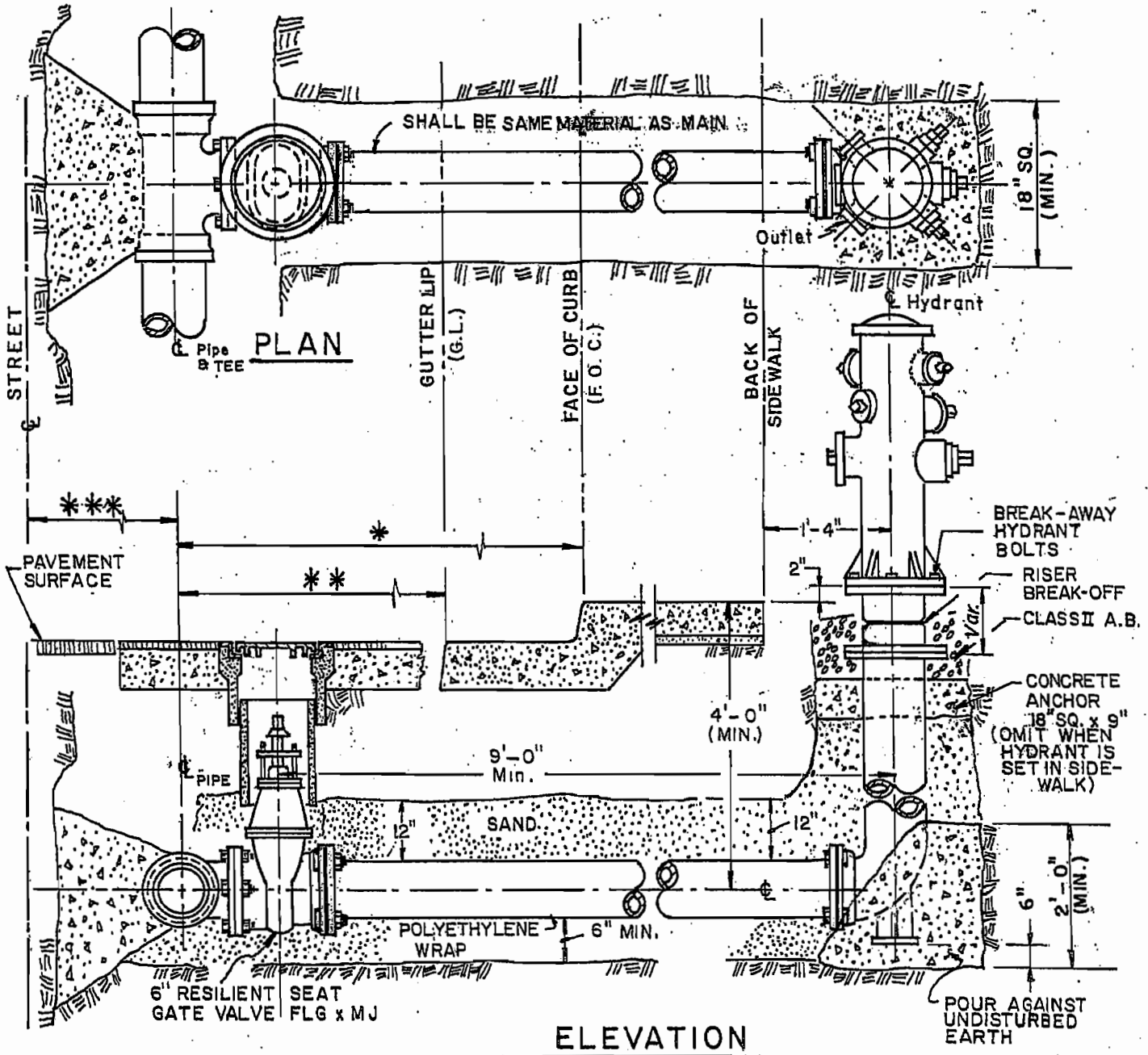
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS — WATER DIVISION

STANDARD 1 1/2" & 2" WATER SERVICE INSTALLATION

DWG. NO. 4-04	DRAWN BY EFR	SCALE NONE
JOB NO.	DATE 09/19/91	SHEET OF
REF.	CHECKED FJN/DAS	FILE NO.

APPROVED: John D. Sloane ON 8-21-92
DIRECTOR OF ENGINEERING — DATE



ELEVATION

NOTE

A blue fire hydrant marker of Stimsonite 88 or equal shall be installed in the street marking the location of each hydrant (public or private) 12" from the centerline on the hydrant side on the centerline.

Installation details will furnished by the Fire Prevention Bureau.

Wrap all metallic surfaces below ground with polyethylene 8 mils min. around pipe sections, 16 min. around fittings and valves.

WATERMAIN REPLACEMENT PROJECTS

* 7'-6" As directed by Engineer
** 1'-9" Minimum for 18" trench
** 2'-0" Minimum for 24" trench
** 2'-3" Minimum for 30" trench

NEW SUBDIVISIONS

*** 10'-0" South or East of street centerline

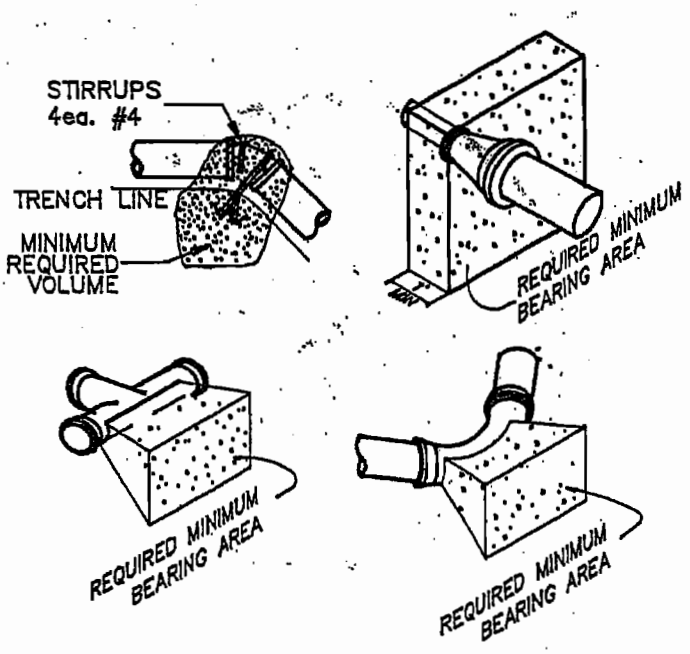
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

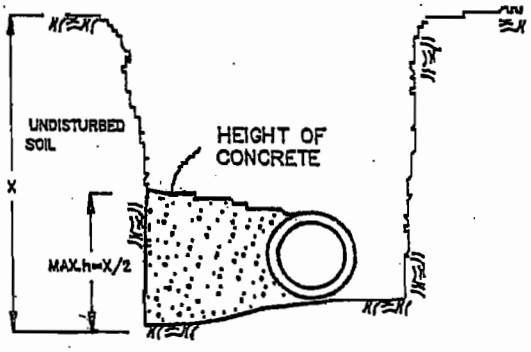
DWG. NO. 4-05
DRAWN BY EFR
DATE 09-20-91
SHEET ____ OF ____
FILE NO. ____
REF. ____

FIRE HYDRANT INSTALLATION
WATER DISTRIBUTION SYSTEM

THRUST BLOCK MINIMUM BEARING AREA REQUIRED (SQ. FT.)					ANCHOR BLOCK MIN. VOLUME
PIPE SIZE	FITTING	S.C.	M.C. OR L.G.S.	H.C. OR M.G.S.	(CU. YDS.)
4"	11 1/4° BEND	1	1	1	0.2
4"	22 1/2° BEND	2	2	2	0.3
4"	45° BEND	3	2	2	0.5
4"	90° BEND	5	3	2	0.5
4"	TEE/CROSS	4	2	2	0.5
4"	CAP/B.O.	5	3	2	0.5
4"	OFF-SET	–	–	–	0.5
6"	11 1/4° BEND	2	1	1	0.3
6"	22 1/2° BEND	3	2	2	0.5
6"	45° BEND	7	3	2	1.0
6"	90° BEND	12	4	3	1.5
6"	F.H. BURY	12	4	3	–
6"	TEE/CROSS	9	3	3	1.0
6"	CAP/B.O.	12	4	3	1.5
6"	OFF-SET	–	–	–	1.0
8"	11 1/4° BEND	3	2	1	0.5
8"	22 1/2° BEND	5	3	2	1.0
8"	45° BEND	10	4	3	2.0
8"	90° BEND	18	7	4	2.5
8"	TEE/CROSS	12	5	4	1.5
8"	CAP/B.O.	18	7	4	2.5
8"	OFF-SET	–	–	–	2.0
12"	11 1/4° BEND	6	3	2	1.0
12"	22 1/2° BEND	12	5	3	2.0
12"	45° BEND	23	9	5	4.0
12"	90° BEND	45	16	9	5.5
12"	TEE/CROSS	32	12	5	3.5
12"	CAP/B.O.	45	16	9	5.5
12"	OFF-SET	–	–	–	4.0
12x8	REDUCER	18	9	6	–
12x6	REDUCER	24	12	8	–
12x4	REDUCER	28	14	9	–
8x6	REDUCER	6	3	2	–
8x4	REDUCER	10	5	3	–
6x4	REDUCER	4	2	1	–



TYPICAL ANCHOR BLOCK–FITTING



TYPICAL SECTION
THRU THRUST BLOCK

SOIL IDENTIFICATION CHARACTERISTICS

S.C. – SOFT CLAY –MOLDED BY LIGHT FINGER PRESSURE
M.C. – MEDIUM CLAY –MOLDED BY STRONG FINGER PRESSURE
H.C. – HARD CLAY –DIFFICULT TO INDENT BY THUMB NAIL
L.G.S. – LOOSE GRANULAR SOIL –EASILY EXCAVATED WITH SHOVEL
M.G.S. – MEDIUM GRANULAR SOIL –DIFFICULT TO EXCAVATE WITH SHOVEL

NOTES:

1. THRUST BLOCKS AND ANCHOR BLOCKS SHALL BE CONSTRUCTED WITH 3000 PSI (MIN) CONCRETE AND SHALL BE POURED AGAINST UNDISTURBED SOIL. WHERE UNDISTURBED SOIL IS NOT AVAILABLE, SIZE THE THRUST BLOCK ACCORDING TO THE VOLUME OF CONCRETE AS REQUIRED FOR AN ANCHOR BLOCK
2. NO CONCRETE SHALL BE PLACED BEYOND THE FACE OF THE BELL EXCEPT ANCHOR BLOCKS.
3. POLYWRAP FITTINGS IN ACCORDANCE WITH CITY OF VALLEJO STANDARD SPECIFICATIONS.
4. THRUST BLOCK AREA REQUIRED IS BASED ON 175 PSI TEST PRESSURE.
5. ANCHOR BLOCK FITTINGS SHALL BE SECURED WITH #4 REBAR– 4@.
6. RESTRAINED JOINTS MAY BE USED WITH ANCHOR BLOCK ASSEMBLIES.
7. THRUST RESTRAINT DESIGN FOR 14"ø & LARGER SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL

CITY OF VALLEJO

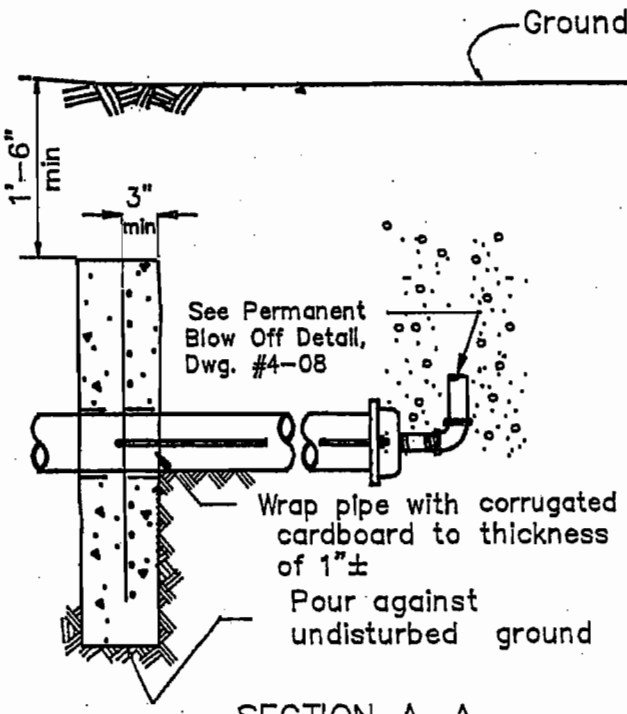
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 4–06
DRAWN BY EFR
DATE 09/19/91
CHECKED DAS/FJN

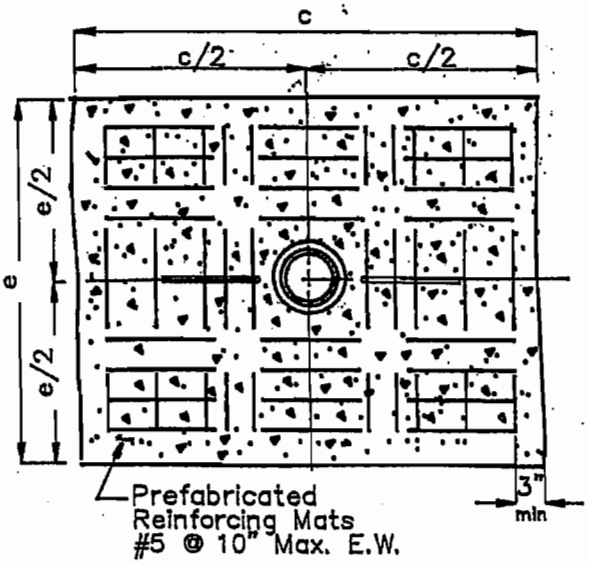
SHEET ____ OF ____
FILE NO. ____
REF. ____
SCALE NONE

THRUST BLOCK & ANCHOR BLOCK DETAILS FOR 4", 6", 8" & 12" FITTINGS

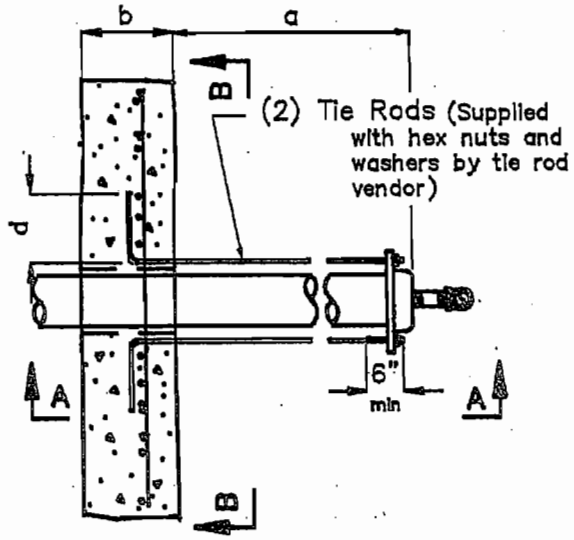
APPROVED: [signature] DIRECTOR OF PUBLIC WORKS ON 8-24-92



SECTION A-A



SECTION B-B



PLAN

Notes:

1. Working pressures shall not exceed pressures as indicated on the schedule table
2. Anchor tie rod stock shall be A-36 steel or approved equivalent, and reinforcing bars to be grade 60 steel
3. Apply mastic in accordance with City of Vallejo Specifications
4. Concrete shall have minimum compressive strength of 3000 psi at 28 days
5. Horizontal mat bars may be temporarily removed and replaced to permit pipe placement
6. 2"ø Blow off piping shall be as detailed in Drawing #4.8 "Permanent Blow Off"
7. Temporary blow-offs are required at the ends of all new lines planned for future extension. future date.

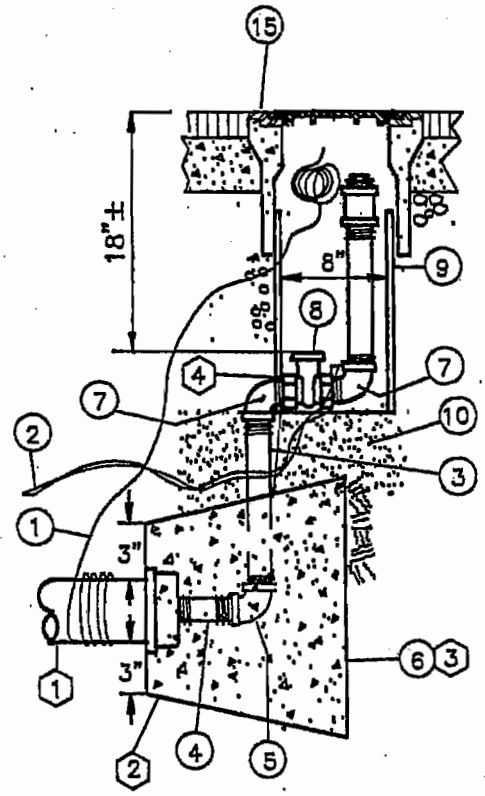
DIAMETER OF PIPE (in)	ALLOWABLE PRESS (psi)	TIE ROD Blank Dimension	DIMENSIONS				
			a	b	c	d	e
6	0-150	5/8"x6'-6"	5'-0"	1'-0"	3'-0"	6"	3'-0"
8	0-150	5/8"x7'-6"	6'-0"	1'-0"	3'-6"	6"	3'-6"
12	0-150	7/8"x10'-0"	7'-9"	1'-0"	6'-1"	1'-3"	4'-9"

CITY OF VALLEJO

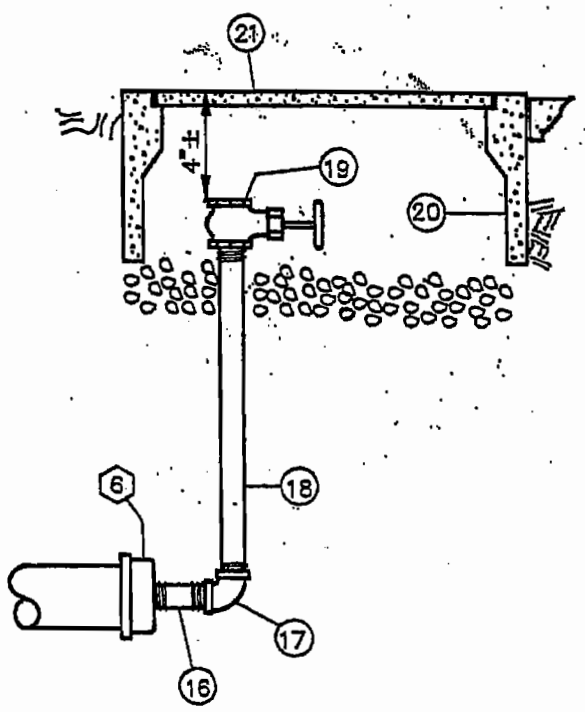
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 4-07
DRAWN BY EFR
DATE 09/19/91
SHEET ____ OF ____
FILE NO. ____
REF. ____

REVERSE ANCHOR AND TEMPORARY BLOW OFF



PERMANENT



TEST

ITEM	MATERIAL DESCRIPTION
1	#10 TRACER WIRE(ALL MAINS)
2	BLUE CAUTION TAPE, 3" WIDE
3	NIPPLE, 2"ø x VARIES, RED BRASS
4	NIPPLE, 2"ø x 3" PVC SCH 80
5	90°ELBOW, 2"ø RED BRASS
6	CONC. THRUST BLOCK (SEE DWG. 4-06)
7	90° STREET ELBOW, 2"ø RED BRASS
8	BALL VALVE W/ TEE HEAD, 2"ø IPT x IPT
9	RISER, 8"ø PVC, C900 OR CONCRETE
10	6" COMPACTED SAND
11	DELETED

ITEM	MATERIAL DESCRIPTION
12	NIPPLE, 2"ø x 6" RED BRASS
13	COUPLING, 2"ø RED BRASS
14	HEX HEAD PLUG, 2"ø PVC (HAND TIGHT)
15	VALVE BOX, CHRISTY G-5 OR EQUAL
16	NIPPLE, 2"ø x VARIES GALV. IRON
17	90° ELBOW, 2"ø GALV. IRON
18	NIPPLE, 2"ø x VARIES GALV. IRON
19	GATE VALVE, 2"ø BRASS
20	METER BOX, CHRISTY B-9 OR EQUAL
21	METAL TRAFFIC LID "B9C"
22	DELETED

NOTES:

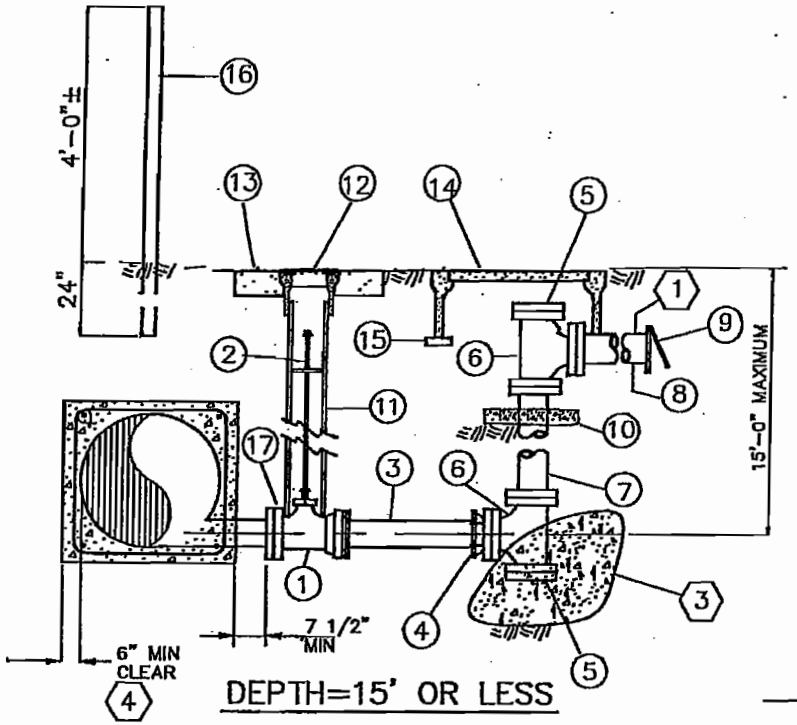
1. *Main size: 6"ø to 14"ø*
2. *Cap or plug shall have 2"ø tap.*
3. *Thrust block shall be poured against undisturbed earth. When undisturbed earth is not existing, use anchor block dimensions.*
4. *Cut slots in riser to accomodate piping.*
5. *Test blowoffs shall be installed at the ends of all new lines for use in pressure testing and bacteria sampling.*
6. *Thrust restraint for test blow-offs shall be at contractor's option.*
7. *Permanent blow-offs are required at the ends of all new lines.*

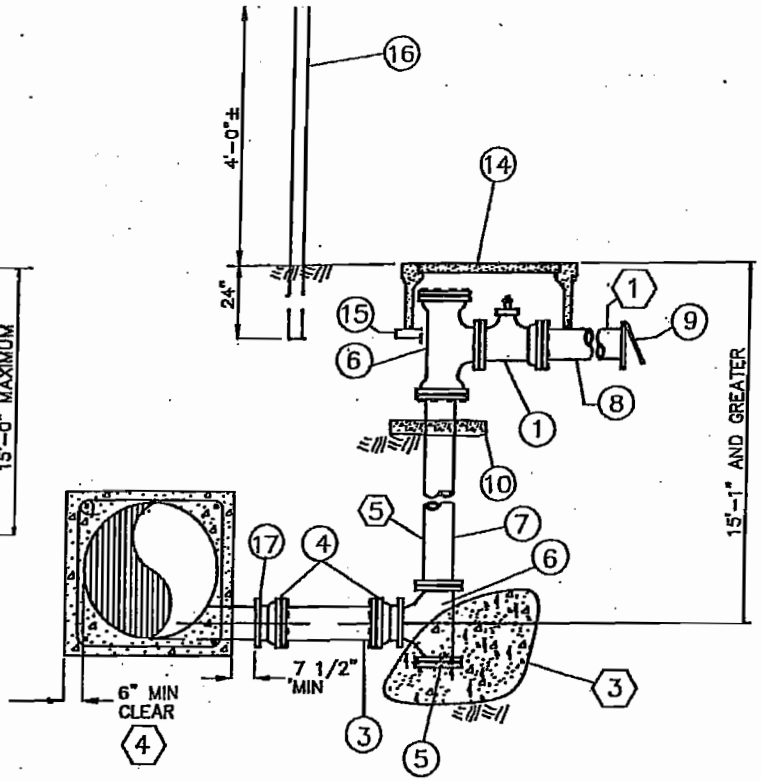
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

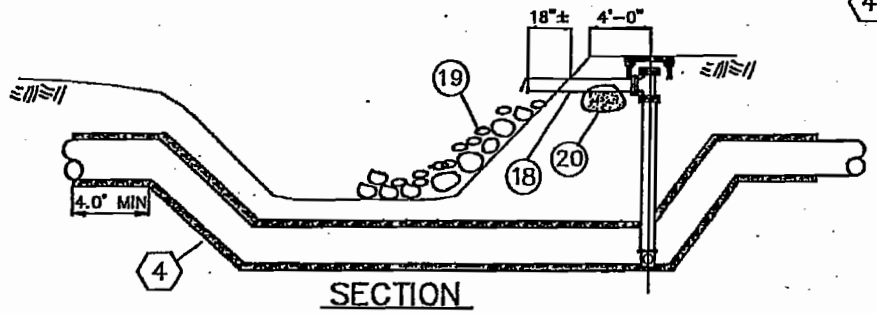
DWG. NO. 4-08 | SHEET ____ OF ____
DRAWN BY EFR | FILE NO. ____

2"ø BLOW OFF ASSEMBLY





ITEM	MATERIAL DESCRIPTION
1	6"ø RES. SEATED. G.V., FxMJ
2	VALVE NUT EXTENSION
3	6"ø DIP, PExPE
4	6"ø FLANGE COUPLING ADAPT
5	6"ø BLIND FLANGE
6	6" TEE, FxF
7	6"ø DIP, FxF
8	6"ø DIP, FxPE
9	6"ø FLAP VALVE, RESTRAINED
10	CONCRETE COLLAR, 9" THICK
11	VALVE RISER, 6"ø PVC
12	VALVE BOX, CHRISTY G-5
13	CONCRETE COLLAR, 6" THICK
14	METER BOX, CHRISTY B-36
15	BRICK, COMMON CLAY
16	4x6 TREATED DOUGLAS FIR
17	6"ø FLANGE INSULATION KIT
18	6"ø DIP, PExPE
19	LIGHT RIP-RAP, 18" THICK
20	PIPE SUPPORT, CONCRETE 2 CU.



NOTES:

1. BLOW OFF PIPE SHOWN ROTATED FOR CLARITY
2. SEE CITY OF VALLEJO STANDARD TRENCH DETAIL FOR BACKFILL REQUIREMENTS
3. SEE C.O.V. STANDARD THRUST BLOCK REQUIREMENTS
4. REINFORCING DETAILS FOR CONCRETE ENCASEMENT SHALL BE SUBMITTED FOR APPROVAL.
5. MJ COUPLING WITH "MEGAL-LUG" RESTRAINED GLANDS ARE PERMITTED WHEN APPROVED BY CONSTRUCTION INSPECTOR.

DATE	MARK	REVISION	INIT.

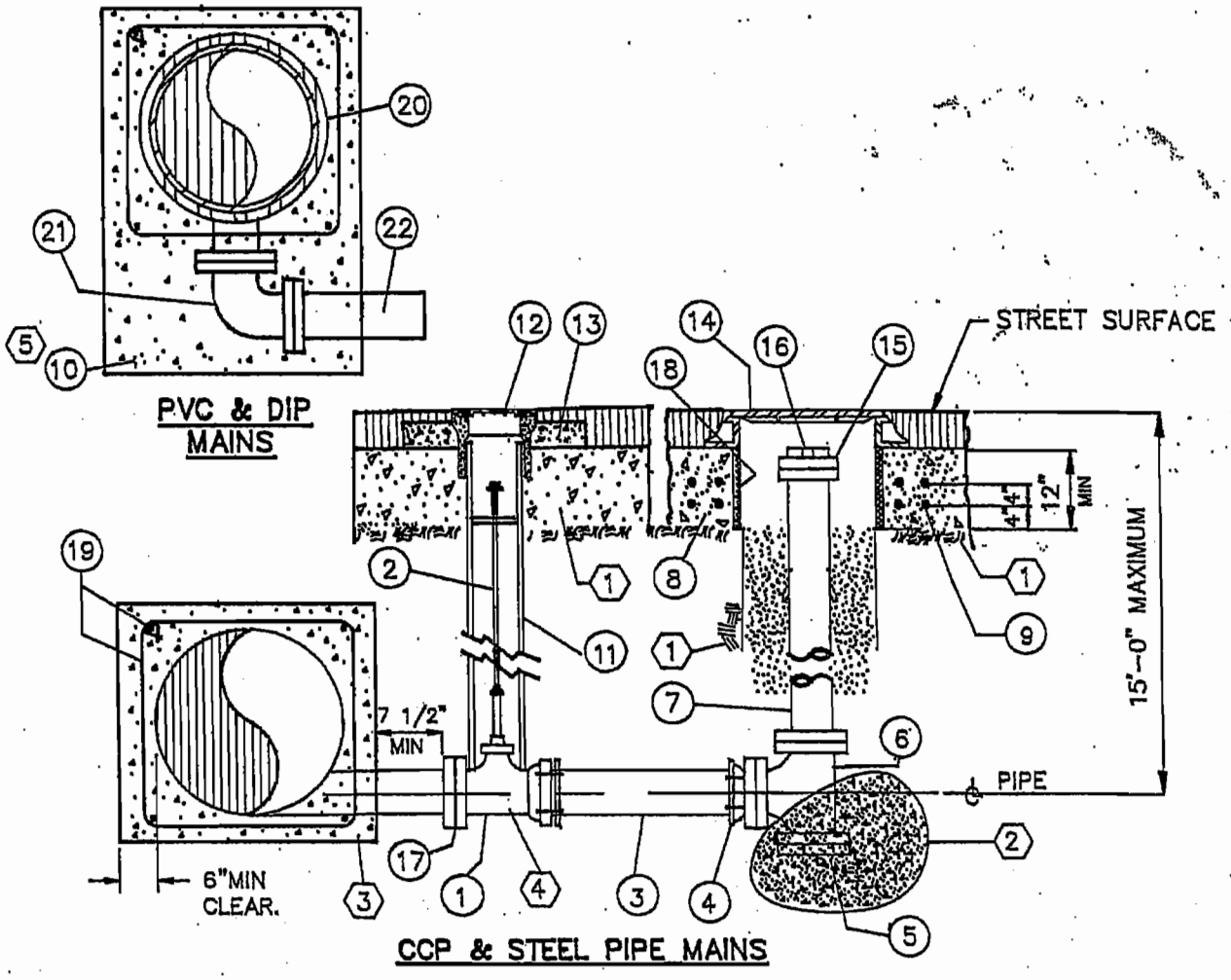
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS — ENGINEERING D

6" BLOW OFF ASSEMBLY (UNIMPROVED AREAS)

DWG. NO. 4-09	DRAWN BY EFR	SCALE NONE
JOB NO.	DATE 09/19/91	SHEET C
REF.	CHECKED FJN/DAS	FILE NO.

APPROVED: John D. Ulsane, DIRECTOR OF PUBLIC WORKS ON 8-21- DATE



ITEM	MATERIAL DESCRIPTION
1	6"ø RES.SEAT G.V., FxMJ
2	VALVE NUT EXTENSION
3	6"øDIP, PExPE
4	6"ø FLANGE COUPLING ADAPTER
5	6"ø BLIND FLANGE
6	6"ø TEE, FxF
7	6"ø DIP, FxF
8	CONCRETE COLLAR, 3'-6" SQUARE
9	REINFORCING BAR, #4x3' LONG
10	CONCRETE ENCASEMENT
11	8"ø VALVE RISER, PVC

ITEM	MATERIAL DESCRIPTION
12	VALVE BOX, CHRISTY G-5
13	**SEE DWG. 3-16**
14	MANHOLE, 24"ø
15	COMPANION FLANGE, 6"øIPT
16	6"ø TANK PLUG, IPT
17	6"ø FLANGE INSULATION KIT
18	24"ø FIBER TUBE FORM
19	REINFORCING BAR
20	TEE, BELL x FLANGE
21	90° ELBOW, 6"ø -FxF
22	6" FLANGE x PE SPOOL, 12" LG

NOTES:

(1) SEE CITY OF VALLEJO STANDARD TRENCH DETAIL FOR BACKFILL REQUIREMENTS

(2) SEE CITY OF VALLEJO STANDARD DETAIL FOR THRUST BLOCK REQUIREMENTS

(3) RE-INFORCING DETAILS FOR CONCRETE ENCASEMENT SHALL BE SUBMITTED FOR APPROVAL

(4) ON PVC & DIP MAINS, GATE VALVE SHALL BE MJ x MJ

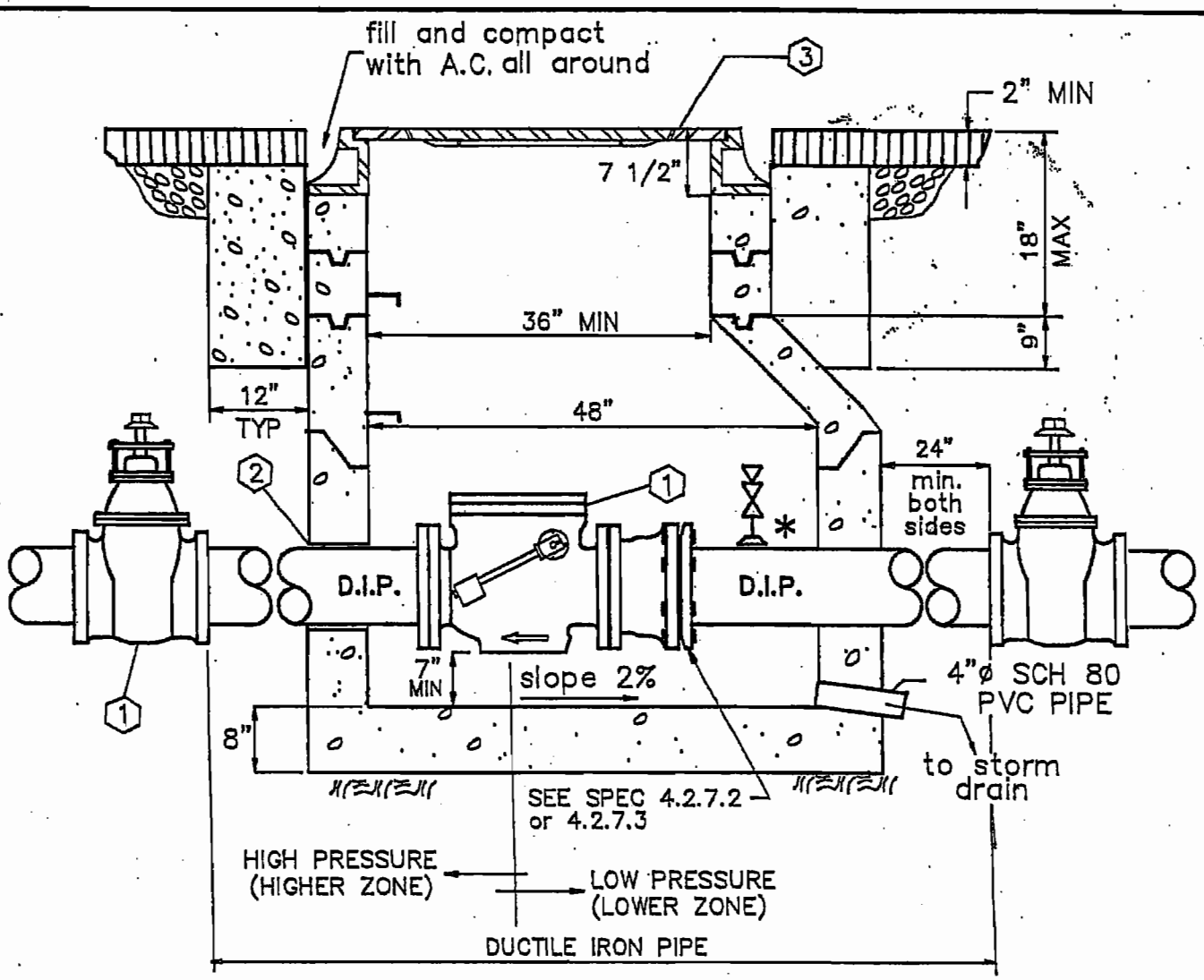
(5) CONCRETE ENCASEMENT SHALL BE AS REQUIRED BY THE ENGINEER. MINIMUM ENCASEMENT AT ELBOW SHALL BE 6".

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 4-10
DRAWN BY EFR
DATE 09/19/91
SHEET ____ OF ____
FILE NO. ____
REF. ____

6" BLOW OFF ASSEMBLY (IMPROVED AREAS)



* **LEAK TEST TAP**
3/4"x1/2" INSULATING BUSHING
1/2" BRASS NIPPLE
1/2" BRASS BALL VALVE
1/2" BRASS PLUG

GENERAL NOTES

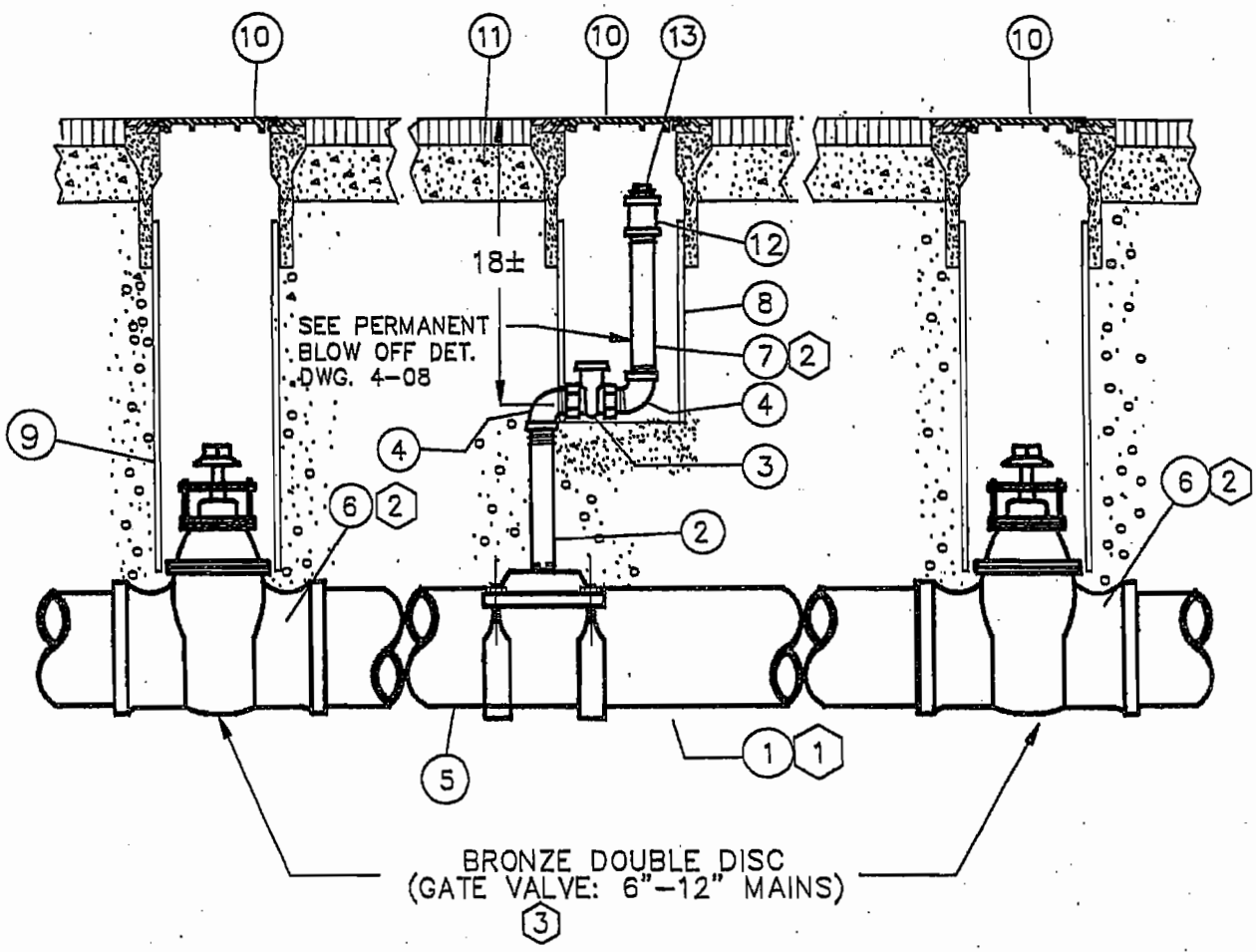
1. Check valve shall have flanged ends with ANSI B16.1 125 lb. drilling. Flange coupling adapter permitted on low-pressure side only
2. Fill annular space around main with dry packed mortar
3. For manhole cover, use 36"ø double lid labelled "WATER" (similar to VS & FCD Drawing # 27)
4. Ladder rungs shall conform to OSHA Standards. Spacing shall not exceed 12"
5. Check valve shall be lined and coated with minimum of 8 mils of Factory applied epoxy
6. Check valve shall be "APCO 6000CLW" with Buna-N disc seat and stainless steel trim, or approved equal
7. Isolation valves shall be double disc gate valves for 6" to 12" main sizes (or approved resilient seat gate valve).

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 4-11
DRAWN BY EFR
DATE 09/19/91
SHEET ____ OF ____
FILE NO. ____
REF ____

CHECK VALVE ASSEMBLY



ITEM	MATERIAL DESCRIPTION
1	DOUBLE STRAP BRONZE SADDLE W/ 2" TAP
2	NIPPLE, 2"ø x VARIES, RED BRASS (SEE DWG 4-08)
3	2"ø BALL VALVE, BRASS (SEE DWG 4.8)
4	90° STREET ELBOW, 2"ø, RED BRASS
5	SPOOL, PE x PE, 4'-0" LONG
6	DOUBLE DISC GATE VALVE (ALL MAINS) SEE NOTE 3
7	NIPPLE, 2"ø x 6", RED BRASS
8	RISER-8"ø x 1'-0", PVC, C-900 (SEE DWG. 4-08)
9	RISER-8"ø x VARIES, PVC, C-900
10	METER BOX, "CHRISTY G-5, OR EQUAL
11	CONCRETE COLLAR
12	2"ø BRASS COUPLING
13	HEX HEAD PLUG, 2"ø PVC (HAND TIGHT)

NOTES:

(1) See Standard 2" Water Service Connection Detail for corrosion protection requirements.

(2) Main line valves shall be normally closed. 2" ball valve shall be normally open

(3) Mueller resilient seat gate valves may be used in lieu of double disc gate valve

CITY OF VALLEJO

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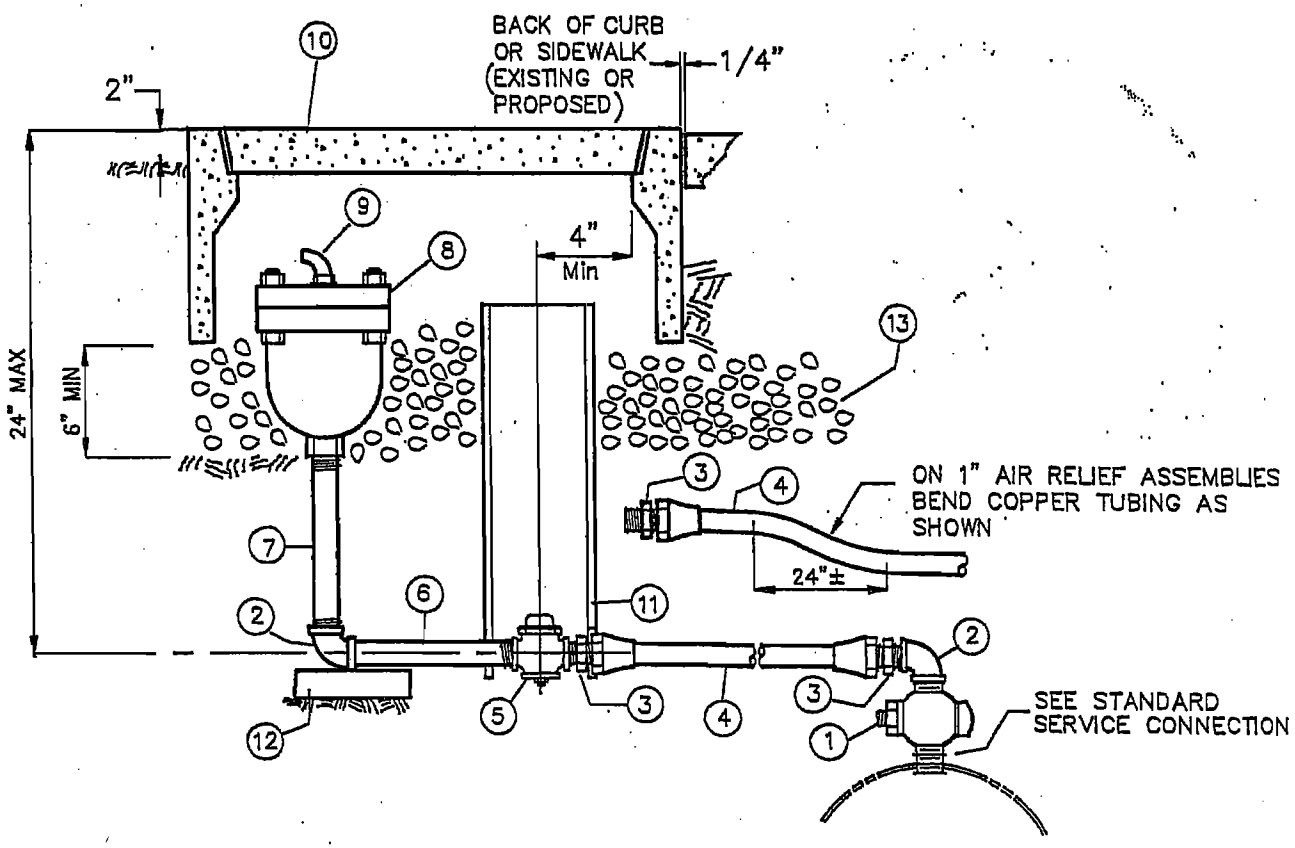
ENGINEERING DIVISION

DWG. NO. 4-12 | SHEET ____ OF ____

DRAWN BY EFR | FILE NO. ____

08/20/01

ZONE VALVE ASSEMBLY



ITEM	DESCRIPTION	SIZE	
1	Corporation Stop	1"	2"
2	90° Elbow(brass)	1"	2"
3	Adapter (IPT x Flare)	1"	2"
4	Copper tubing	1"	2"
5	Curb Stop (bronze) / Ball Valve (bronze)	1"	2"
6	4" Nipple (brass)	1"	2"
7	Nipple (PVC Sch 80)	1"	2"

ITEM	DESCRIPTION	SIZE	
8	Air Release Valve / Combination: Air/Vac	1"	2"
9	90° Elbow (PVC)	1"	2"
10	Meter Box B-16	1"	–
	Meter Box B-36	–	2"
11	6" PVC Pipe w/ slot	–	–
12	Brick	–	–
13	6" Class II AB	–	–

NOTES:

1. *Maintain an upward grade from corporation stop at main to air valve. (2% min.)*
2. *Install at location directed by the Engineer*
3. *Line and coat air valve with 8 mils (min) factory applied eopxy.*
4. *Concrete coating and lining, damaged by installation of welded couplings, shall be repaired with field applied cement mortar as applicable.*
5. *For copper tubing, use Type "K" ASTM B-88-55, soft copper.*
6. *Meter box shall be as manufactured by "Christy" or approved equal.*
7. *Air release valve shall be "APCO" Model 143C or approved equal.*

CITY OF VALLEJO

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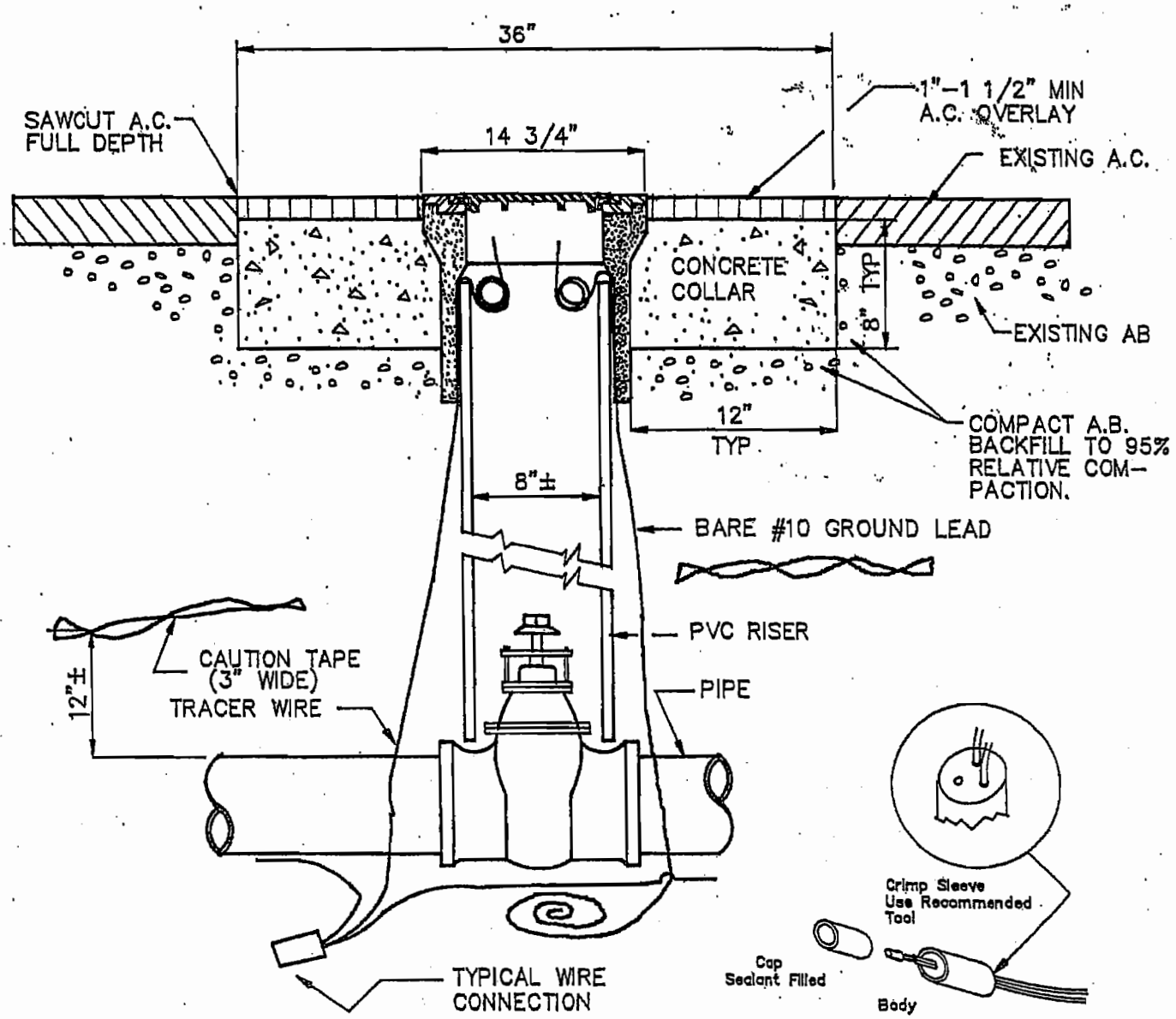
ENGINEERING DIVISION

DWG. NO. 4-13
DRAWN BY EFR
DATE 04/17/90
SHEET ____ OF ____
FILE NO. ____
REF. ____

1" & 2" AIR RELIEF VALVE

COMBINATION AIR/VACUUM
AND AIR RELEASE VALVE



TYPICAL WIRE CONNECTION

VALVE COATING

Wrap entire valve, to operating nut, with polywrap, 16 mils minimum.

TRACER WIRE

All pipes including D.I.P. shall have a tracer wire, (#10 solid copper TW or THHN), laid on the trench bottom and centered under the pipe. A contact lead shall be provided inside the valve pot. At all valve locations a bare #10 copper ground lead shall be provided as shown. Tracer wire may be looped inside valve box at in-line valves.

CAUTION TAPE

Locator tape shall be blue plastic tape, 3" wide, marked "WATER LINE BURIED BELOW". Lay tape 12" above pipe.

CITY OF VALLEJO

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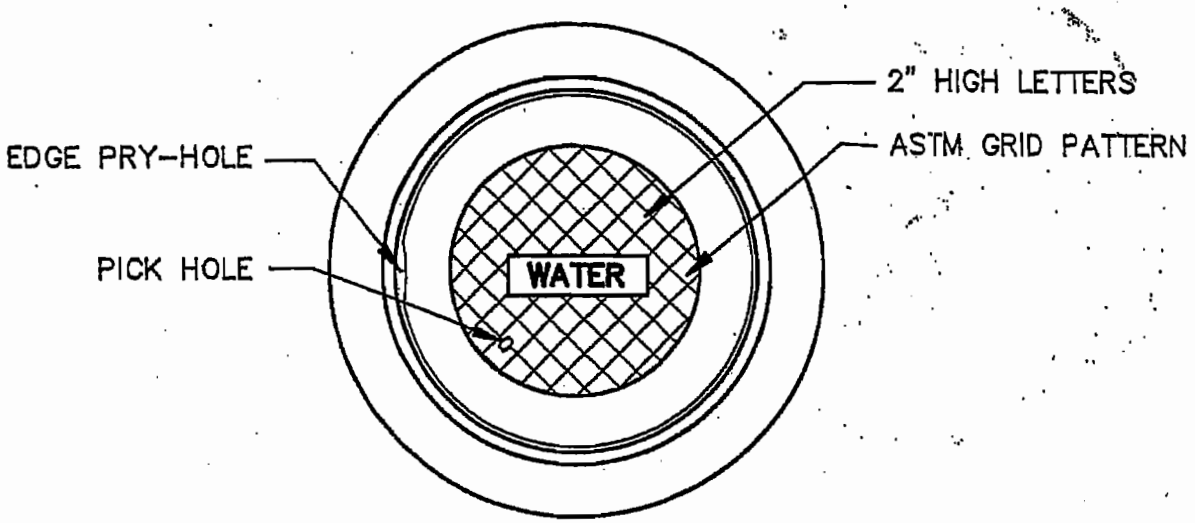
ENGINEERING DIVISION

DWG. NO. 4-14 | SHEET____ OF ____

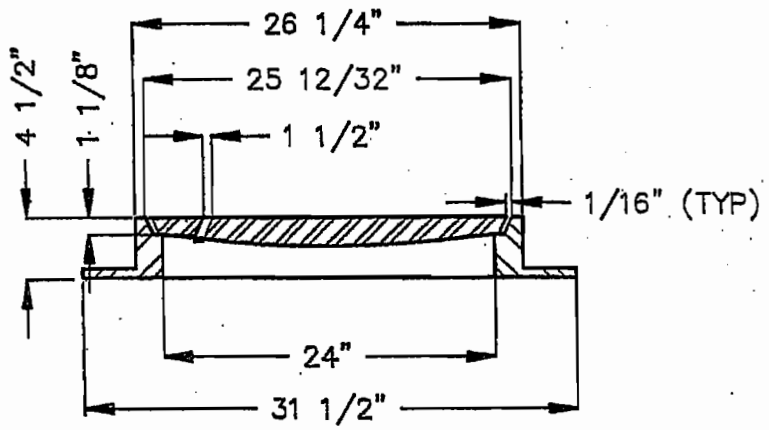
DRAWN BY EFR | FILE NO.____

DATE 09/30/21

VALVE ASSEMBLY & TRACER WIRE INSTALLATION



PLAN



SECTION

GENERAL NOTES

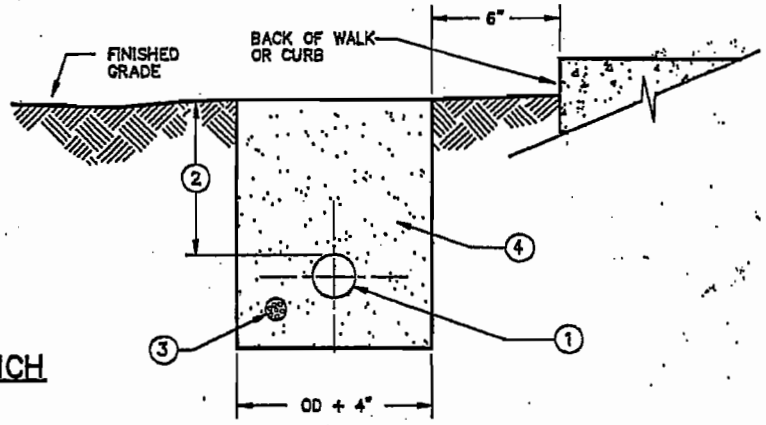
1. FRAME AND COVER SHALL BE DESIGNED FOR H-20 HIGHWAY LOADING
2. ALL MATERIALS USED IN MANUFACTURING SHALL CONFORM TO ASTM 48-30
3. FRAME AND COVER SHALL BE MACHINED ON BEARING SURFACES TO ASSURE CLOSE, QUIET FIT
4. CASTINGS SHALL BE DIPPED IN BLACK BITUMINOUS PAINT
5. FRAMES AND COVERS LARGER THAN 24" SHALL BE FULL TRAFFIC, HEAVY DUTY

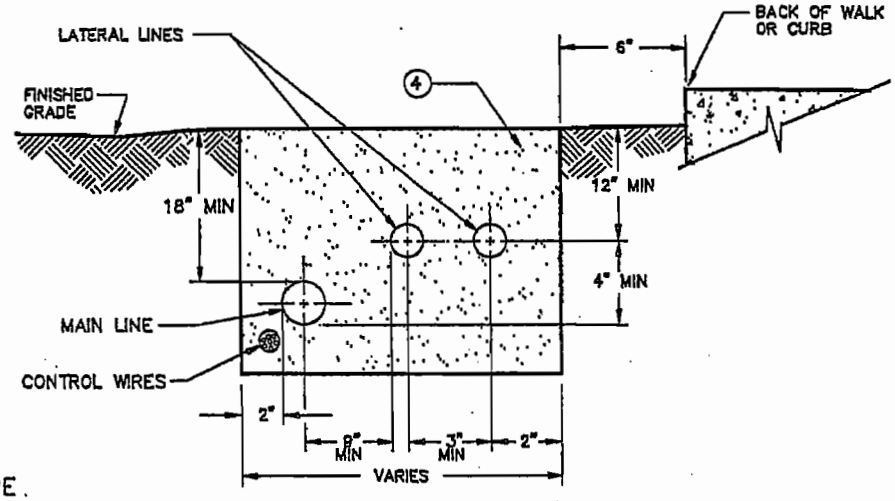
CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 4-15	SHEET ____ OF ____	MANHOLE FRAME & COVER, 24"
DRAWN BY EFR	FILE NO. ____	
DATE 03/01/90	REF. ____	

TYPICAL TRENCH





DETAIL NOTES:

(1) SCHEDULE 40 PIPE.

(2) 18" MIN FOR MAIN LINE, 12" MIN FOR LATERAL LINE.

(3) BUNDLE CONTROL WIRE ALONGSIDE MAIN LINE (TYP). TAPED AT TEN FEET INTERVALS, LOOP WIRE BUNDLE AT ALL SHARP TURNS GREATER THAN 45°.

(4) IF THE EXCAVATED NATIVE MATERIAL IS LARGER THAN 3/4" DIA, IT SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO PROVIDE SUITABLE BACKFILL MATERIAL. SUITABLILITY OF THE BACKFILL SHALL BE DETERMINED AT THE CITY'S DISCRETION. THE REPLACEMENT BACKFILL SHALL HAVE 90% RE-LATIVE COMPACTION. NATIVE MATERIAL THAT IS USED AS BACKFILL SHALL BE CLEAR OF ALL DEBRIS AND ROCKS LARGER THAN 3/4" IN DIAMETER.

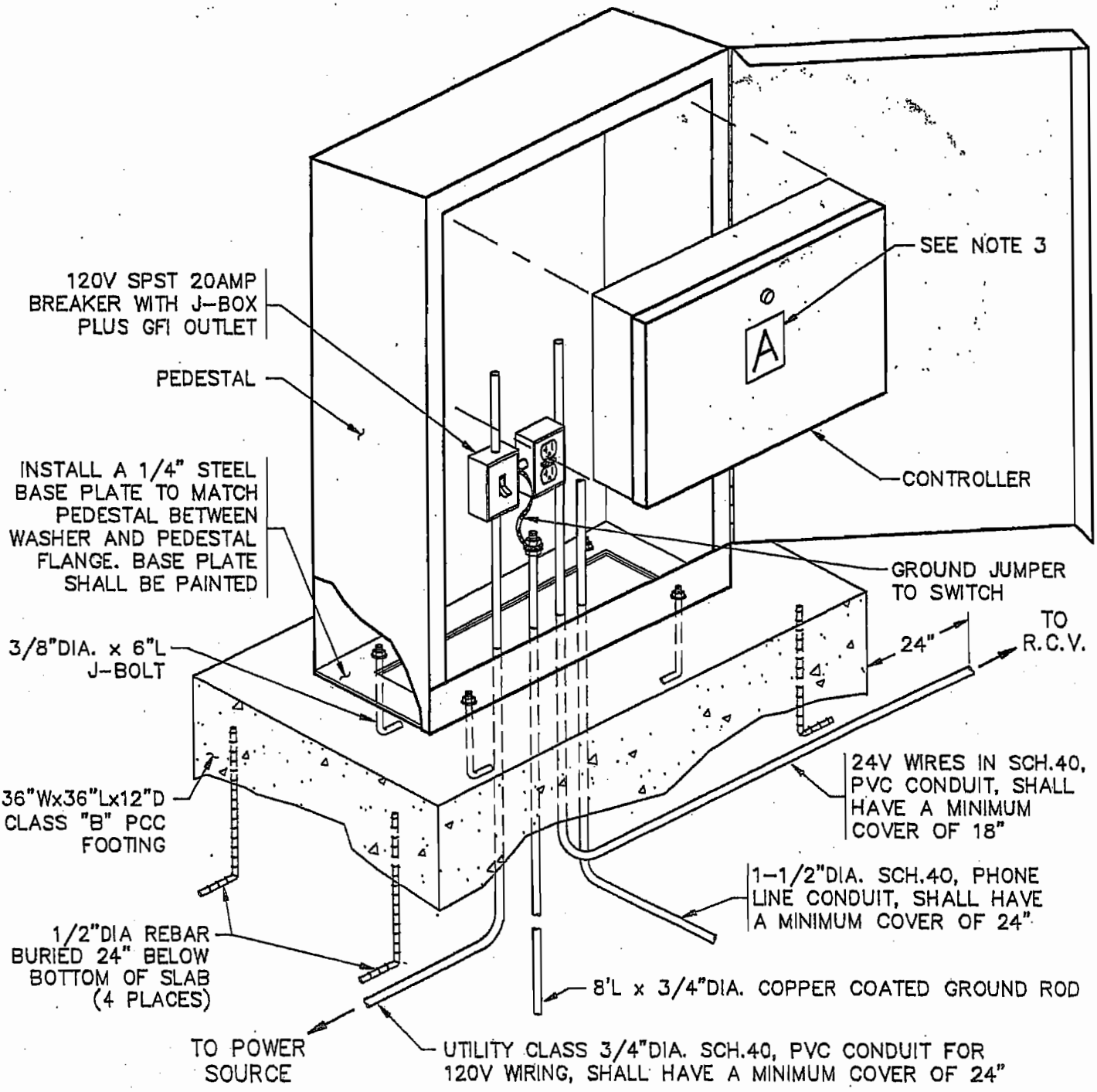
GENERAL NOTES:

1. PROVIDE 24" SEPARATION BETWEEN IRRIGATION LINES AND VARIOUS UTILITIES.
2. ROUTE TRENCH 6 FEET MIN AWAY FROM ANY TREE PLANTING AND OUTSIDE THE DRIP-LINE OF EXISTING TREES.
3. EXCAVATION FOR IRRIGATION SLEEVES UNDER PAVED IMPROVEMENTS SHALL BE DONE AS PER THE "TYPICAL TRENCH BACKFILL STANDARD DETAIL".

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 5-1	SHEET 1 OF 1	IRRIGATION LINE
DRAWN BY JJM	FILE NO.	TRENCHING DETAILS
DATE 6-30-92	REF.	



NOTES

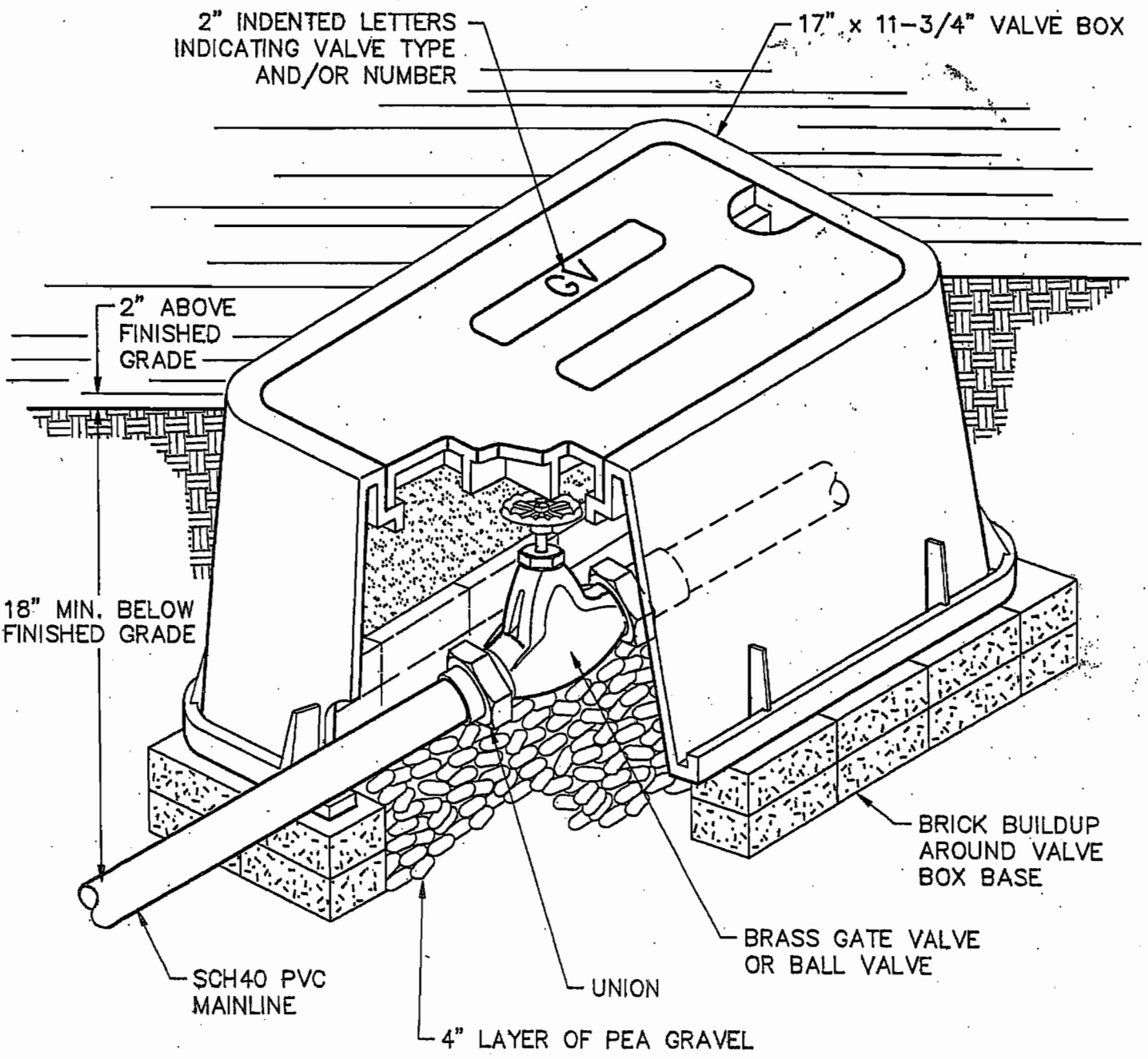
1. CONTROLLER SHALL BE RAINMASTER, IRRITROL OR EQUAL, WALL-MOUNTED INSIDE A LEMUR SECURITY BOX.
2. COLOR SHALL BE "SHERWOOD GREEN".
3. AFFIX CONTROLLER LETTER TO OUTSIDE OF THE BOX USING A SELF STICKING OR BOLT ON PLATE.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 5-2 | SHEET ____ OF ____
DRAWN BY EVA | FILE NO. ____

IRRIGATION CONTROLLER MOUNTING DETAIL



NOTES

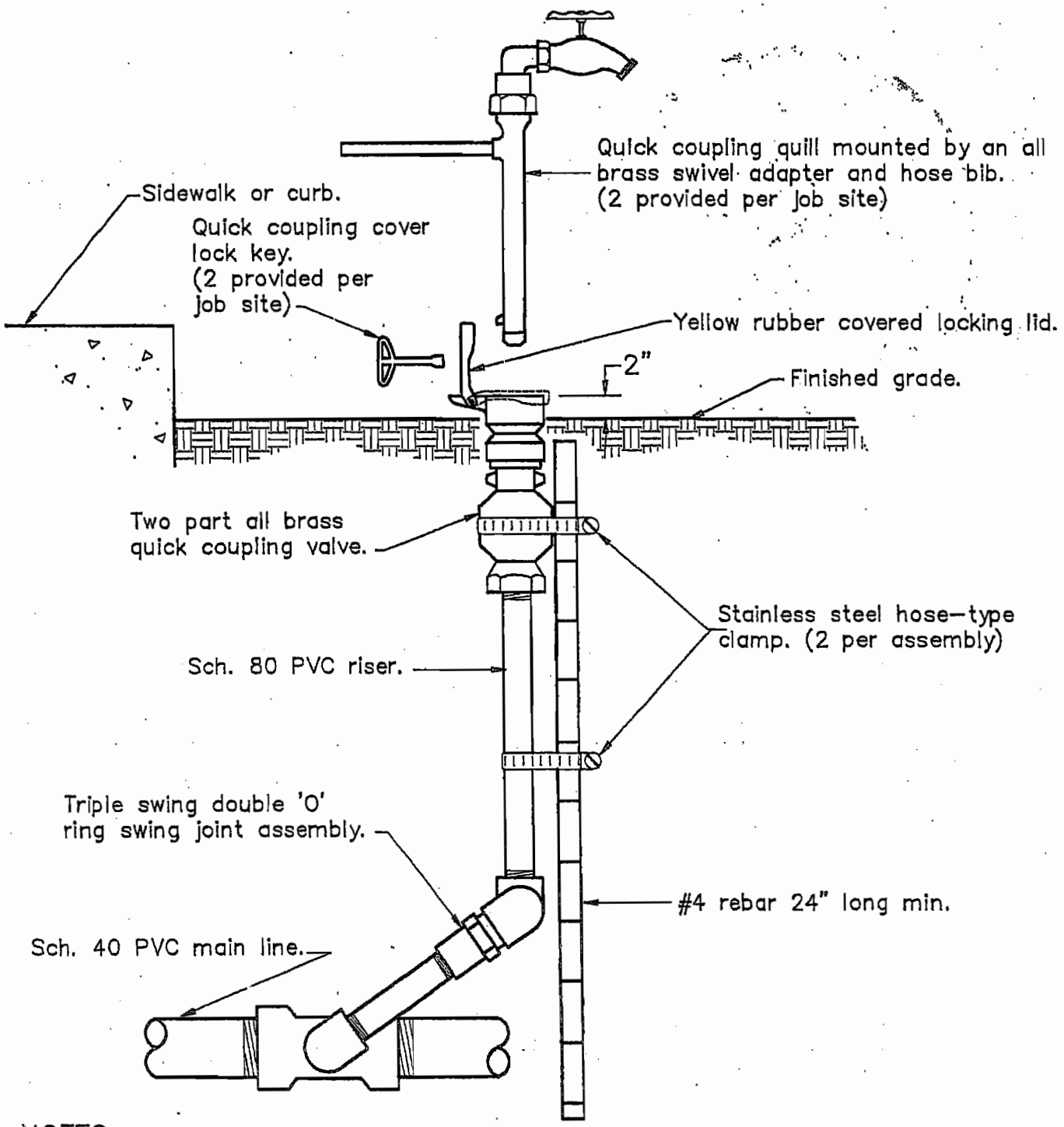
1. THE VALVE BOX SHALL BE CONSTRUCTED OF GREEN PLASTIC OR FIBERGLASS MATERIAL WITH A BOLT DOWN LID.
2. THE VALVE BOX SHALL BE INSTALLED, CENTERED AND PLUMB ABOVE THE VALVE.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 5-3	SHEET ____ OF ____
DRAWN BY EVA	FILE NO. ____
DATE 12-27-91	REF. ____

ISOLATION VALVE INSTALLATION DETAIL



NOTES

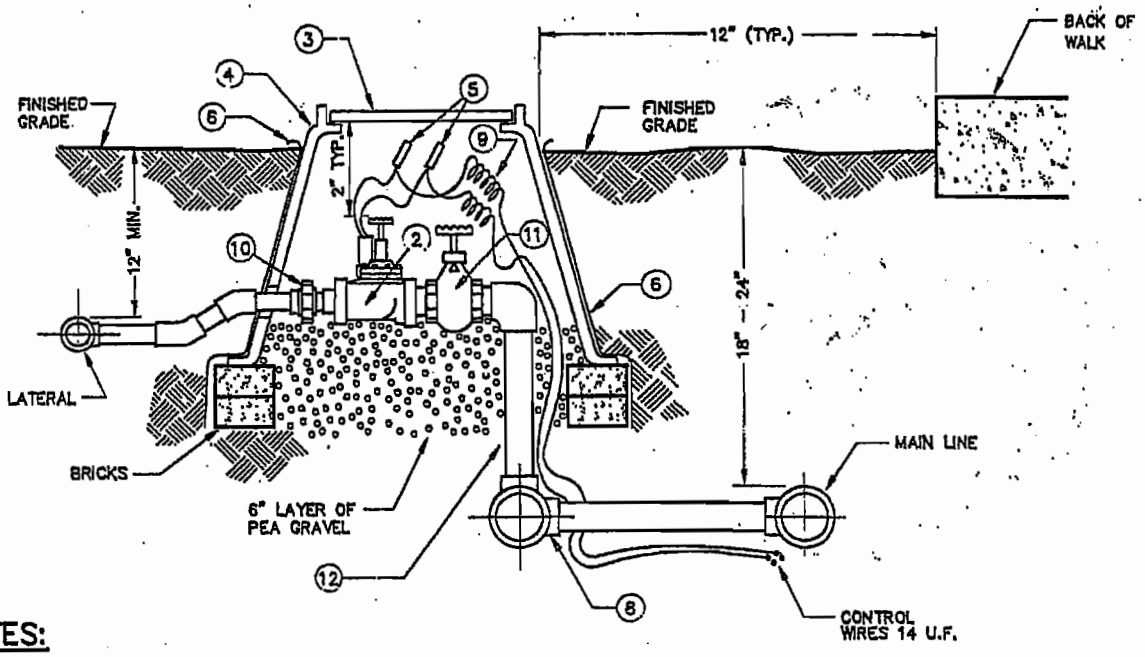
(1) All components of the swing assembly shall be sch. 80 PVC.
(2) Compact soil to 90% relative compaction.
(3) The riser component size shall match the quick coupler valve inlet size.

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 5-4 | SHEET ____ OF ____
DRAWN BY GLR | FILE NO. ____

QUICK COUPLING VALVE DETAIL



DETAIL NOTES:

1. DRIP SYSTEM STRAINER W/CHANGABLE PACK FILTER, 140–200 MESH FILTER INSIDE. FILTER UNIT TO BE POSITIONED OFF TO ONE SIDE FOR CONVENIENCE OF ACCESS.
2. BRASS, DIRTY WATER, LOWFLOW SERIES, REMOTE CONTROL VALVE. (GRISWOLD OR EQUAL)
3. 2" INDENTED LETTERS ON LID SHOWING CONTROL LETTER AND VALVE #, TO BE PERMANENTLY ENGRAVED ON LID.
4. BOX EXPOSURE TO BE 1" ABOVE FINISHED GRADE AND 4" ABOVE FINISHED GRADE IN OPEN SPACES.
5. PROVIDE WATERPROOF LOW VOLTAGE CONNECTORS OVER COPPER CRIMPS ON ALL CONNECTIONS AND SEAL WITH WATERPROOF SEALANT.
6. FOLD LANDSCAPING FABRIC AROUND BOX PERIMETER.
7. PROVIDE SPACE TO REMOVE FILTER.
8. TRIPLE SWING DOUBLE O–RING SWING JOINT ASSEMBLY.
9. 36" PIGTAIL COIL OF WIRE.
10. UNION SCHEDULE 80 PVC.
11. GATE OR BALL VALVE SIZED THE SAME AS VALVE.
12. VALVE AND PIPING NOT TO BE PLACED VERTICALLY ABOVE MAIN. PROVIDE OFFSET ARRANGEMENT TO IMPROVE FLEXIBILITY INCASE OF DOWN THRUST ON VALVE BOX.

GENERAL NOTES:

1. SET NO MORE THAN THREE BOXES IN ONE LOCATION.
2. SET NO BOX INSIDE LAWN AREA.
3. LOOP, COIL, AND SECURE 36" OF SPARE WIRE (NOT SHOWN) INSIDE EACH VALVE BOX.
4. CITY INSPECTOR TO SPOT LOCATION OF MAINLINE PRIOR TO INSTALLATION.

CITY OF VALLEJO

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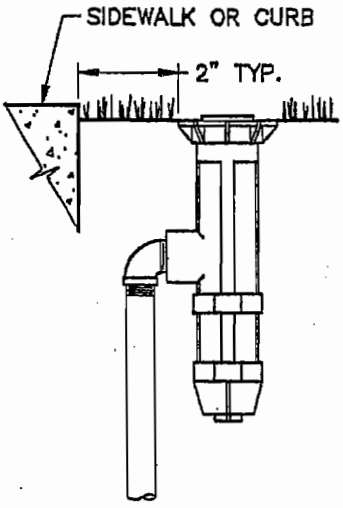
ENGINEERING DIVISION

DWG. NO. 5-5 | SHEET 1 OF 1

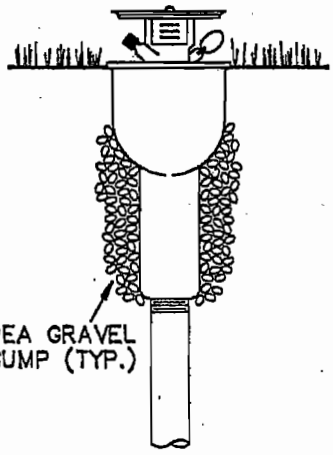
DRAWN BY JJM | FILE NO. ____

6-26-92

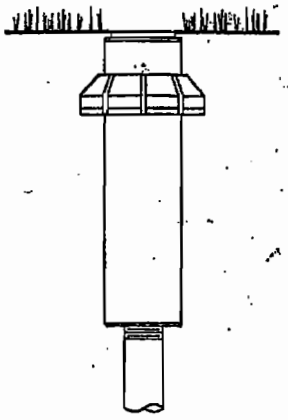
REMOTE CONTROL VALVE ASSEMBLY DETAIL



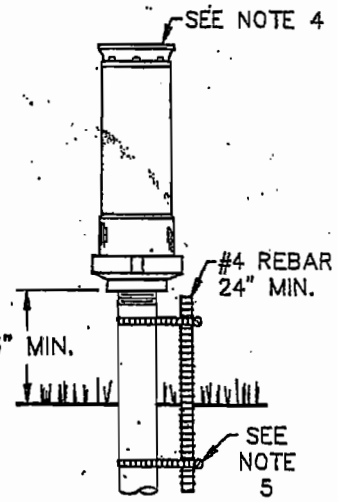
SIDE FEED POP-UP



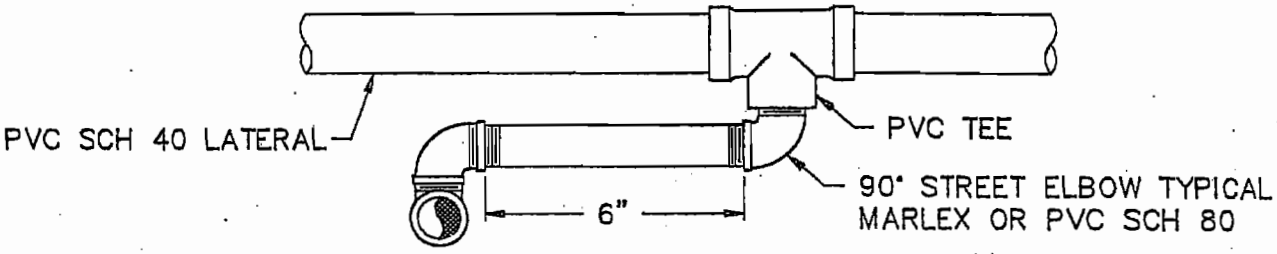
POP-IMPACT HEAD



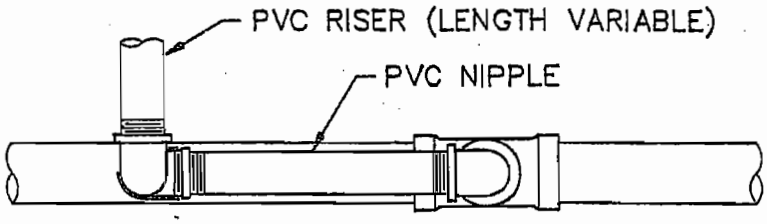
GEAR DRIVEN ROTOR HEAD (OR) POP UP



SHRUB ABOVE GROUND SPRINKLER



TOP VIEW



ELEV. VIEW

TRIPLE SWING ASSEMBLY DETAIL

NOTES

1. COMPACT SOIL TO 90% RELATIVE COMPACTION.
2. ALL COMPONENTS FOR THE SWING JOINT SHALL BE P.V.C. SCHEDULE 80 OR MARLEX 90° (STREET) ELBOWS ON LATERAL SWING ASSEMBLIES.
3. NO ABOVE GROUND SPRINKLER HEADS SHALL BE PLACED AT CURBSIDE OR OTHER AREAS OF PREDICTABLE PEDESTRIAN OR VEHICLE TRAFFIC.
4. USE STAINLESS STEEL HOSE-TYPE CLAMPS (3 PER HEAD).

CITY OF VALLEJO

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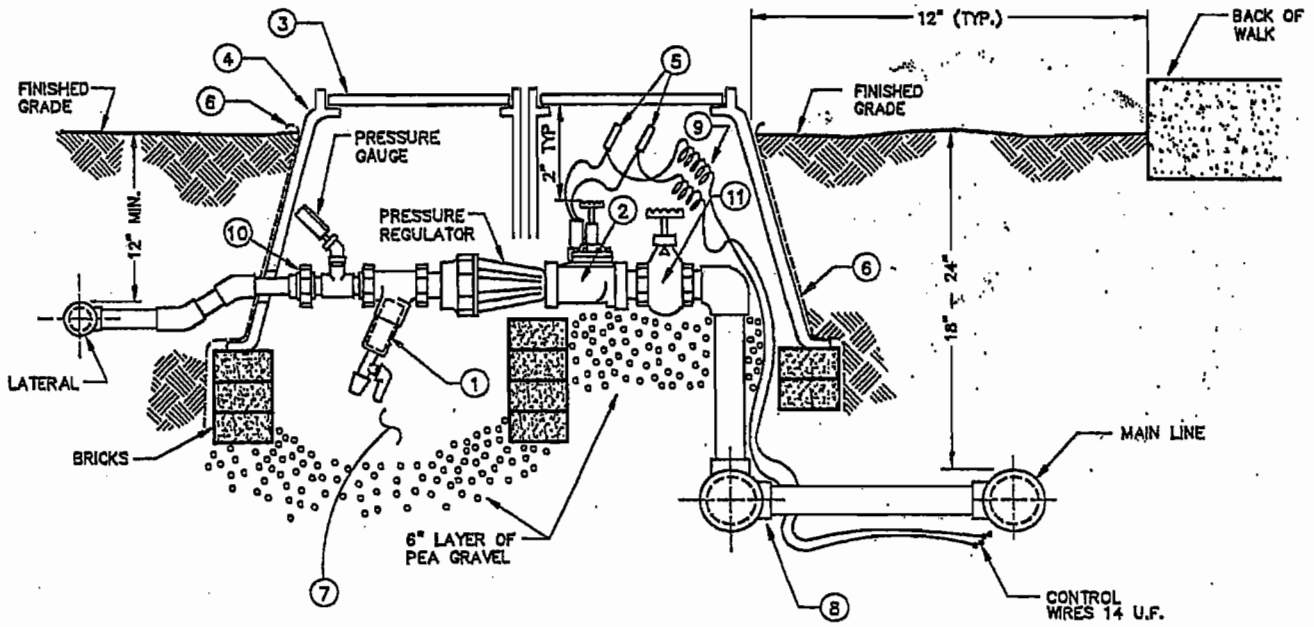
ENGINEERING DIVISION

DWG. NO. 5-6 | SHEET ____ OF ____
DRAWN BY EVA | FILE NO. ____

SWING JOINT AND SPRINKLER HEAD DETAILS



DETAIL NOTES:

(1) DRIP SYSTEM STRAINER W/CHANGABLE PACK FILTER, 140–200 MESH FILTER INSIDE. FILTER UNIT TO BE POSITIONED OFF TO ONE SIDE FOR CONVENIENCE OF ACCESS.

(2) BRASS, DIRTY WATER, LOWFLOW SERIES, REMOTE CONTROL VALVE. (GRISWOLD OR EQUAL)

(3) 2" INDENTED LETTERS ON LID SHOWING CONTROL LETTER AND VALVE #, TO BE PERMINENTLY ENGRAVED ON LID.

(4) BOX EXPOSURE TO BE 1" ABOVE FINISHED GRADE AND 4" ABOVE FINISHED GRADE IN OPEN SPACES.

(5) PROVIDE WATERPROOF LOW VOLTAGE CONNECTORS OVER COPPER CRIMPS ON ALL CONNECTIONS AND SEAL WITH WATERPROOF SEALANT.

(6) FOLD LANDSCAPING FABRIC AROUND BOX PERIMETER.

(7) PROVIDE SPACE TO REMOVE FILTER.

(8) TRIPLE SWING DOUBLE O–RING SWING JOINT ASSEMBLY.

(9) 36" PIGTAIL COIL OF WIRE.

(10) UNION SCHEDULE 80 PVC.

(11) GATE OR BALL VALVE SIZED THE SAME AS VALVE.

GENERAL NOTES:

1. SET NO MORE THAN THREE BOXES IN ONE LOCATION.
2. SET NO BOX INSIDE LAWN AREA.
3. LOOP, COIL, AND SECURE 36" OF SPARE WIRE (NOT SHOWN) INSIDE EACH VALVE BOX.
4. CITY INSPECTOR TO SPOT LOCATION OF MAINLINE PRIOR TO INSTALLATION.

CITY OF VALLEJO

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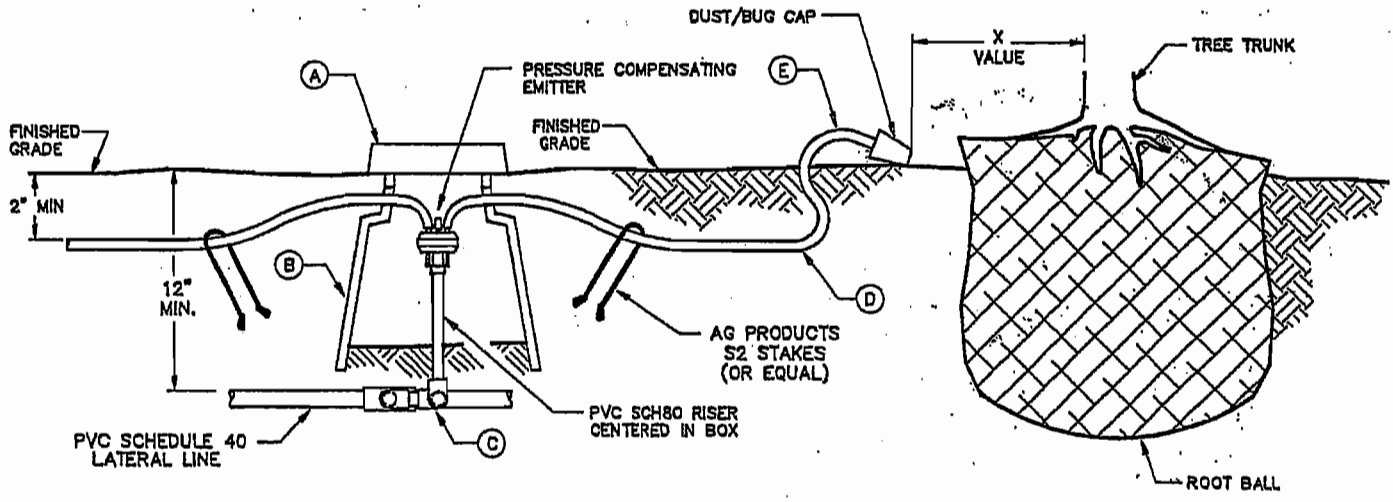
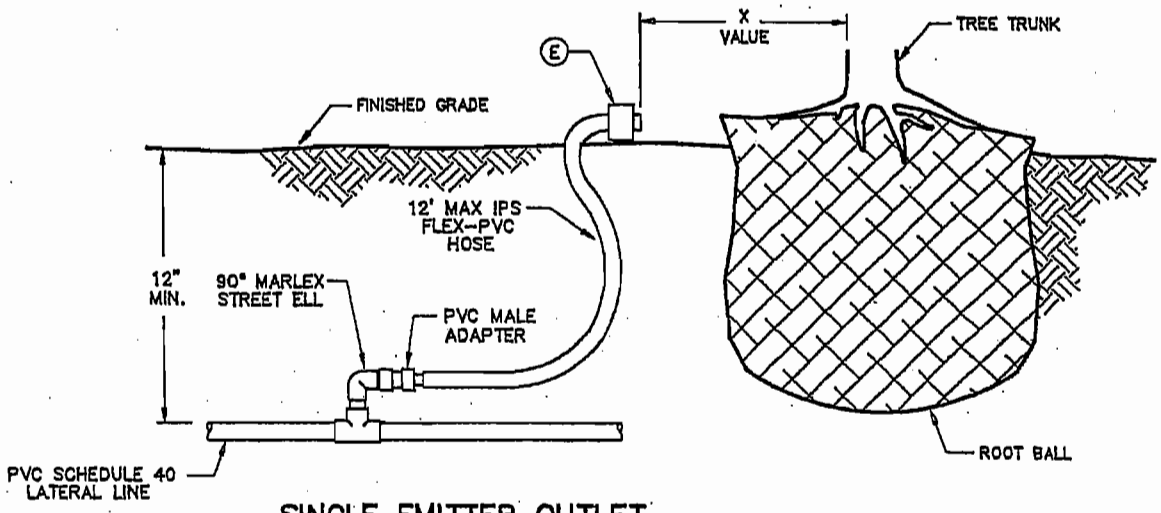
DWG. NO. 5-7 | SHEET 1 OF 1
DRAWN BY JJM | FILE NO.
DATE 1-31-92 | REF.

VALVE ASSEMBLY DETAIL FOR DRIP EMITTER SYSTEM 1" DIA. OR GREATER



MULTIPLE EMITTER OUTLET



SINGLE EMITTER OUTLET

DETAIL NOTES:

(A) SET CAP WITH LOCKING LID 2" ABOVE FINISHED GRADE.

(B) RAINBIRD 5EB-6 ACCESS SLEEVE (OR EQUAL).

(C) TURN TEE TO SIDE AND ADD SWING JOINTS (2-PVC TEFLON TAPED STREET Ls AND 1-PVC TT 90).

(D) POLYETHYLENE DISTIBUTION TUBE, MAX LENGTH IS 10 FT..

(E) REFER TO EMITTER LOCATION PLACEMENT TABLE BELOW.

GENERAL NOTES:

1. PUT ADDITIONAL EMITTER OUTLETS INTO ROOT ZONE TO SATISFY THE SPECIMEN'S WATER CONSUMPTION DEMAND AS ADJUSTED BY THE LOCAL E.T. RATE.
2. ON SLOPES, PLACE EMITTERS UPSLOPE OF PLANTS.
3. EMITTER PLACEMENT TABLE FOR DIFFERENT SIZED PLANTS: (DO NOT PUNCTURE ROOT BALL WITH EMITTER NOZZLE)

EMITTER LOCATION PLACEMENT	
X = 8" AWAY FROM	1GAL PLANT
X = 12" " "	5GAL "
X = 16" " "	15GAL "

CITY OF VALLEJO

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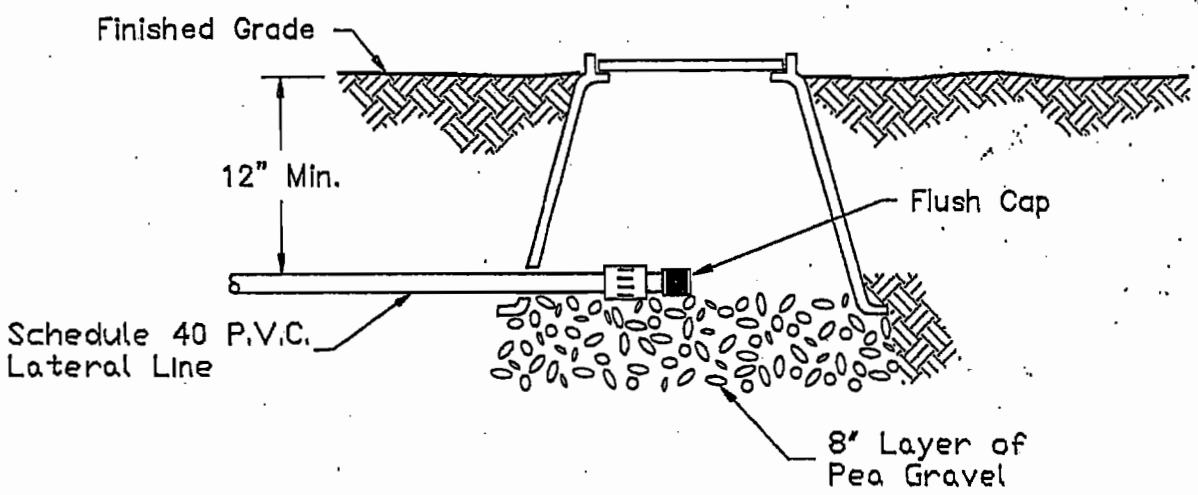
DWG. NO. 5-8 | SHEET ____ OF ____

DRAWN BY JJM | FILE NO. ____

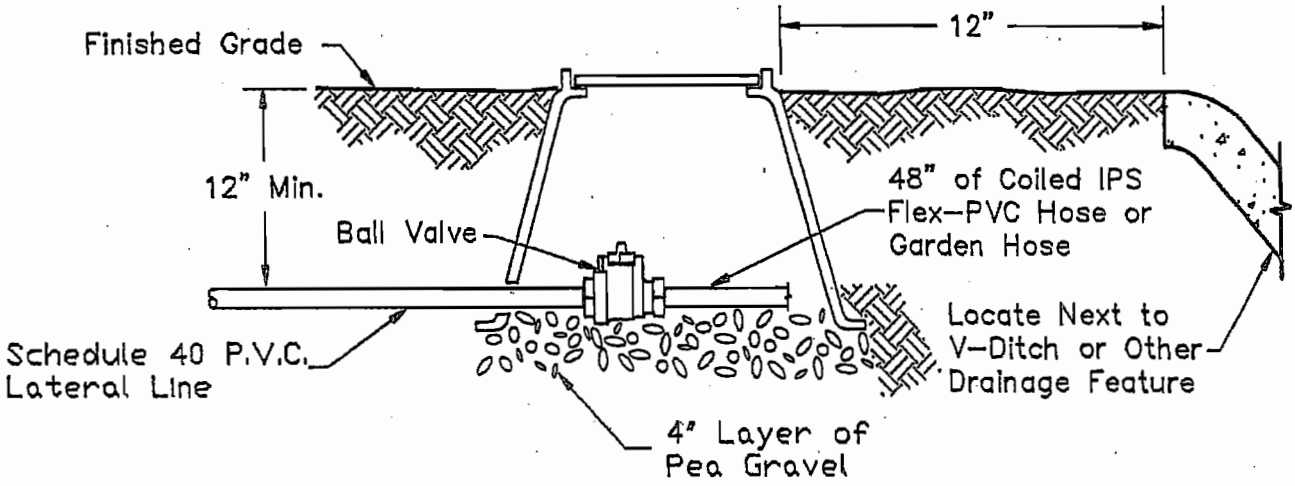
DATE 4-1-92 | REF. ____

DRIP EMITTER ASSEMBLY DETAIL

1. ASSEMBLY TO SERVICE LATERAL RUNS UNDER 60 FT.



2. ASSEMBLY TO SERVICE LATERAL RUNS 60 FT. OR OVER.



NOTES

1. Use Rectangular Plastic Irrigation Box With Bolt Down Lid.
2. Irrigation Box is to be Located on Downhill Side of Lateral Run.
3. 2" Indented Letters on Lid Showing "F.V." as well as Control Valve Number.
4. Box Exposure to be 1" Above Finished Grade.

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DWG. NO. 5-9	SHEET ____ OF ____	FLUSH VALVE DETAIL FOR
DRAWN BY GLR	FILE NO. ____	DRIP EMITTER SYSTEM

No co-dominant leaders.

Remove any nursery stakes.

Direction of prevailing wind.

Position tree so that the stronger lateral branches face into the wind. On grafted tree(s) face the bud union to the north.

2'-2" dia. lodgepole stakes on 15 gal. trees w/rubber ties (nailed, no wire). One stake only for 5 gal. tree. (See note 4 below)

Minimum 3/4" cal. on 15 gal., measured at 4' level.

(See note 6 below)

Install tree so that root flare is 1"-2" above finish grade after watering and settling.

Keep root crown free of soil mudflows.

3" water basin. Remove after 6 months.

Hand water all trees for one (1) year.

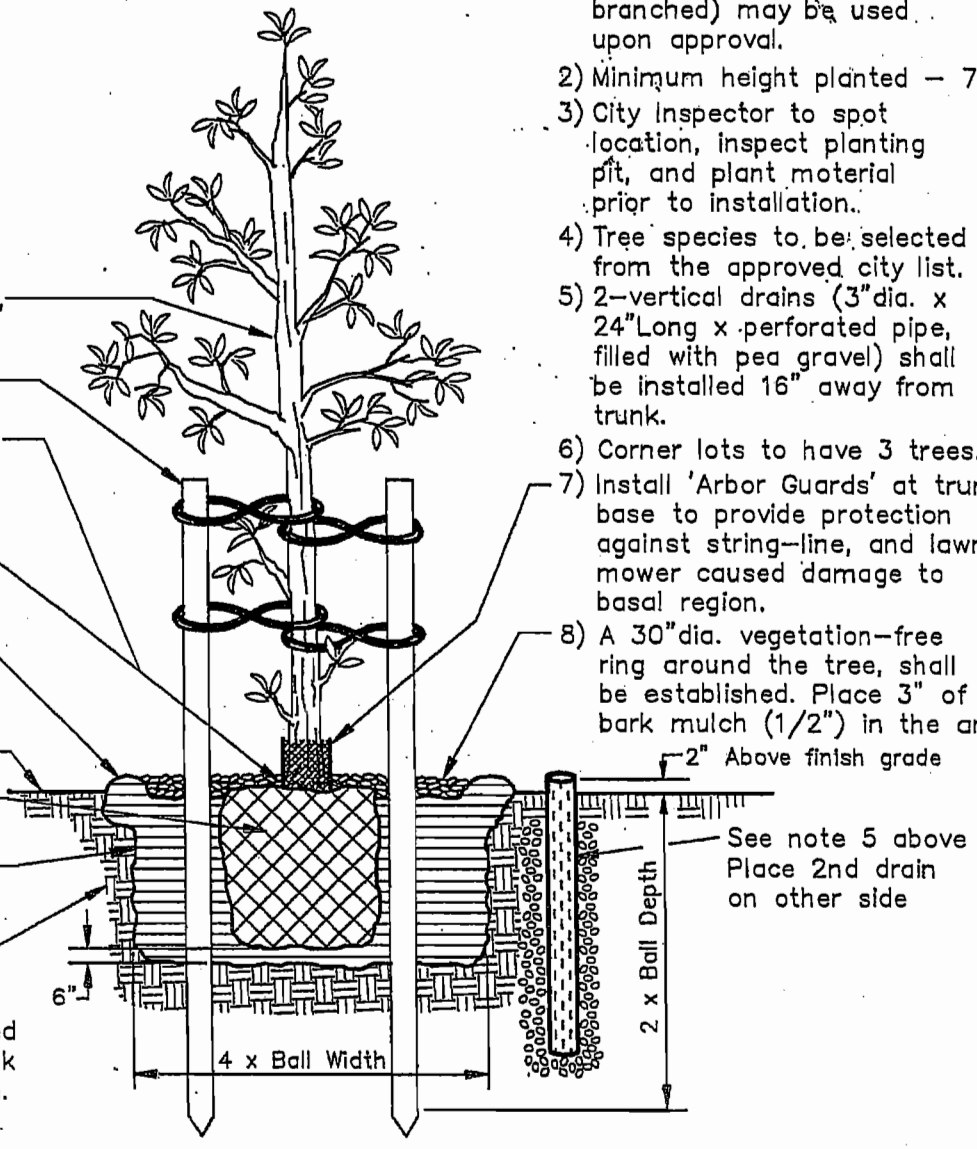
Finish grade.

Remove 1" of the root ball soil surface, sides & bottom.

Scarify sides of planting pits; eliminate compaction and/or glazing.

Backfill with native soil. (See note 1 below)

Trees should be free of kinked and circling roots in the trunk surface and center root zone.



SPECIAL STREET TREE REQUIREMENTS

1) 15 gal. container stock. Between Nov.-Feb bareroot stock (min 1-1/2" Cal., branched) may be used upon approval.
2) Minimum height planted - 7'.
3) City Inspector to spot location, inspect planting pit, and plant material prior to installation.
4) Tree species to be selected from the approved city list.
5) 2-vertical drains (3"dia. x 24"Long x perforated pipe, filled with pea gravel) shall be installed 16" away from trunk.
6) Corner lots to have 3 trees.
7) Install 'Arbor Guards' at trunk base to provide protection against string-line, and lawn mower caused damage to basal region.
8) A 30"dia. vegetation-free ring around the tree, shall be established. Place 3" of bark mulch (1/2") in the area.

NOTES:

1) Backfill planting pit with native soil unless soil tests indicate the need for soil amendments.
2) Broadcast a granulated fertilizer in a 24" band at tree dripline. Analysis and rate are as per soil test recommendation.
3) Do not plant within 6 feet of any underground utility.
4) Install stakes and ties just high enough to hold the trunk upright. Do not allow stakes to protrude up into the tree canopy. Inspector may determine that stakes are not needed for certain tree specimens.
5) Do not apply Pramitol ®, Hyvar ®, Spike ®, and/or Tordon ® chemicals within 30 feet of tree basins.
6) Remove stakes during the one (1) year maintenance period upon request by City Arborist or City Inspector.

CITY OF VALLEJO

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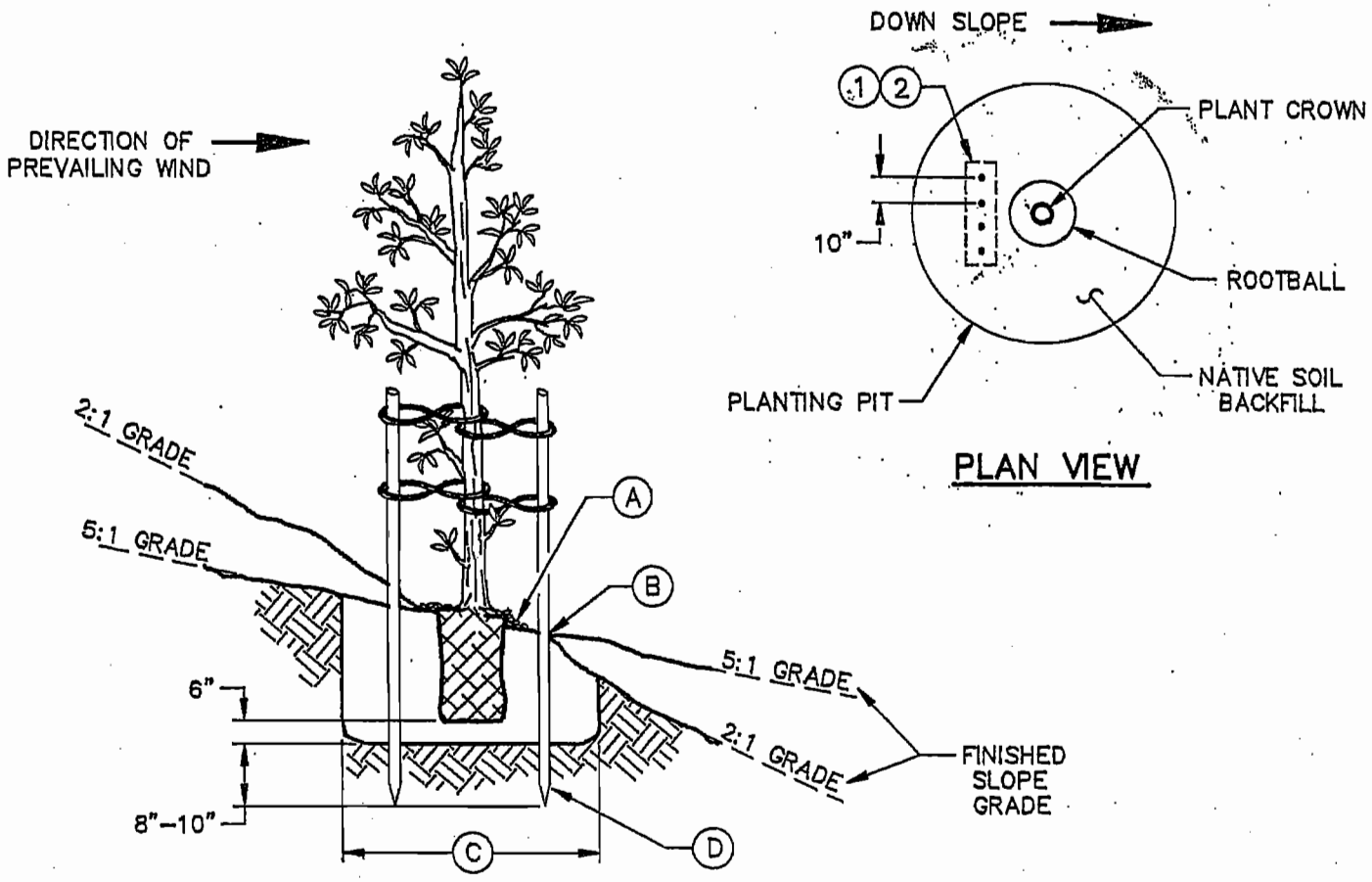
ENGINEERING DIVISION

DWG. NO. 5-10 | SHEET 1 OF 1

DRAWN BY EVA | FILE NO.

DATE 6-25-91 | REF.

TREE PLANTING DETAILS



PLAN VIEW

ELEV. VIEW

DETAIL NOTES:

(A) FOR TREES ONLY PLACE 2" LAYER OF BARK MULCH, 1/2" IN A 36" DIAMETER.

(B) NO SOIL MOUND SURROUNDING PLANTING PIT.

(C) EXCAVATE PLANTING PIT TO 4 TIMES THE DIAMETER OF THE ROOTBALL.

(D) SINK STAKE ENDS 8" TO 10" INTO COMPACTED SUBGRADE. DO NOT STAKE SHRUBS.

GENERAL NOTES:

1. ON NON–DRIP SLOPES HANDWATER TREES FOR ONE YEAR.
2. FOR DRIP EMITTER PLACEMENT: EMITTERS TO BE PLACED UP–SLOPE OF PLANT CROWN: SPACE EMITTERS 10" APART AND 12" AWAY FROM TRUNK ON 5 GAL. PLANTS, 16" AWAY FROM TRUNK ON 15 GAL. PLANTS. ONE YEAR AFTER INSTALLATION RELOCATE EMITTERS 20' AND 24" AWAY FROM TRUNK ON 5 AND 15 GAL. TREES RESPECTIVELY. (SEE TOP VIEW FOR THIS PLACEMENT)

CITY OF VALLEJO

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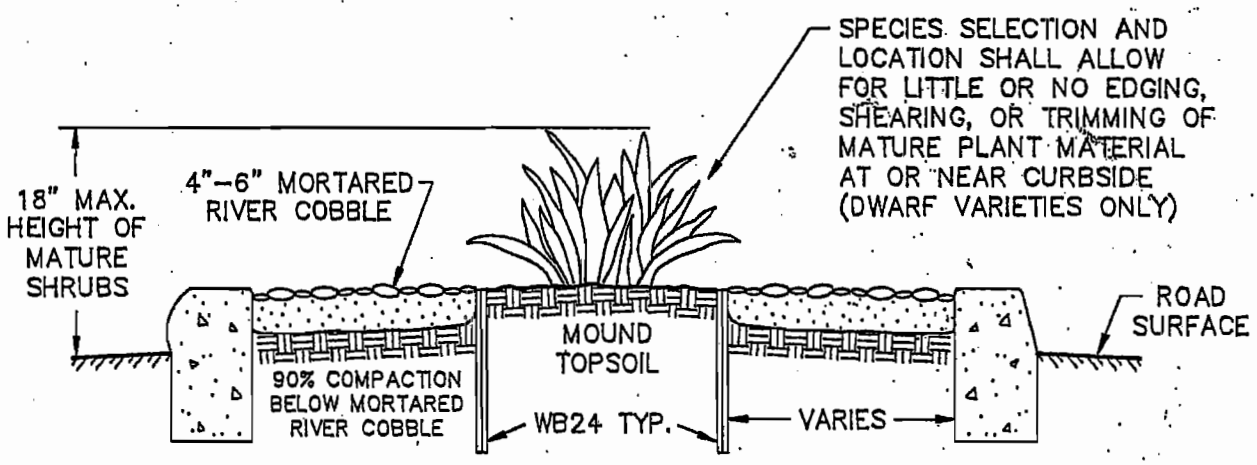
DWG. NO. 5–11	SHEET ____ OF ____
DRAWN BY JJM	FILE NO. ____

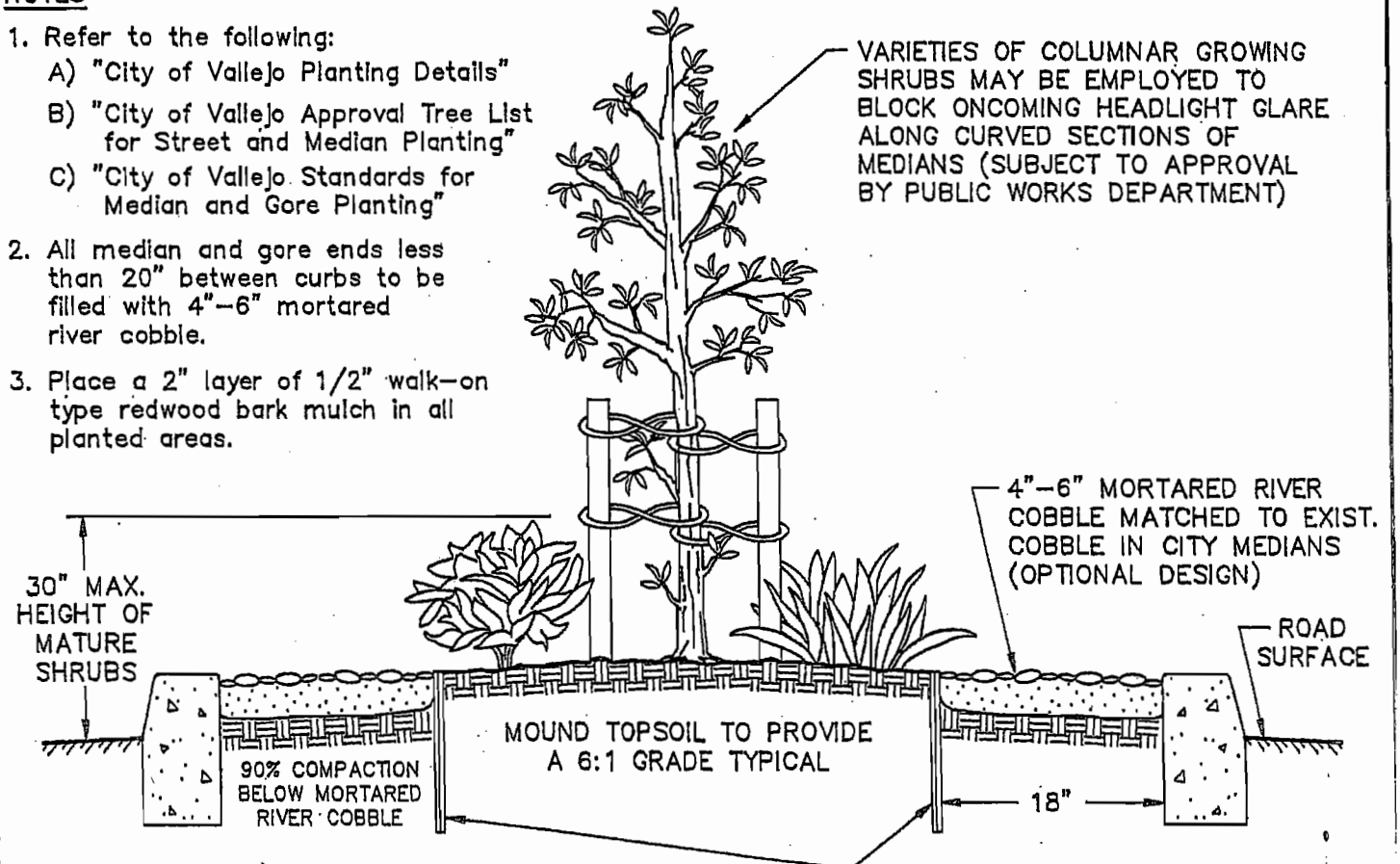
SLOPE PLANTING TREES/SHRUBS



MID GORE OR NOSE OF MEDIAN DETAIL

NOTES

1. Refer to the following:
   A) "City of Vallejo Planting Details"
   B) "City of Vallejo Approval Tree List for Street and Median Planting"
   C) "City of Vallejo Standards for Median and Gore Planting"
2. All median and gore ends less than 20" between curbs to be filled with 4"–6" mortared river cobble.
3. Place a 2" layer of 1/2" walk–on type redwood bark mulch in all planted areas.

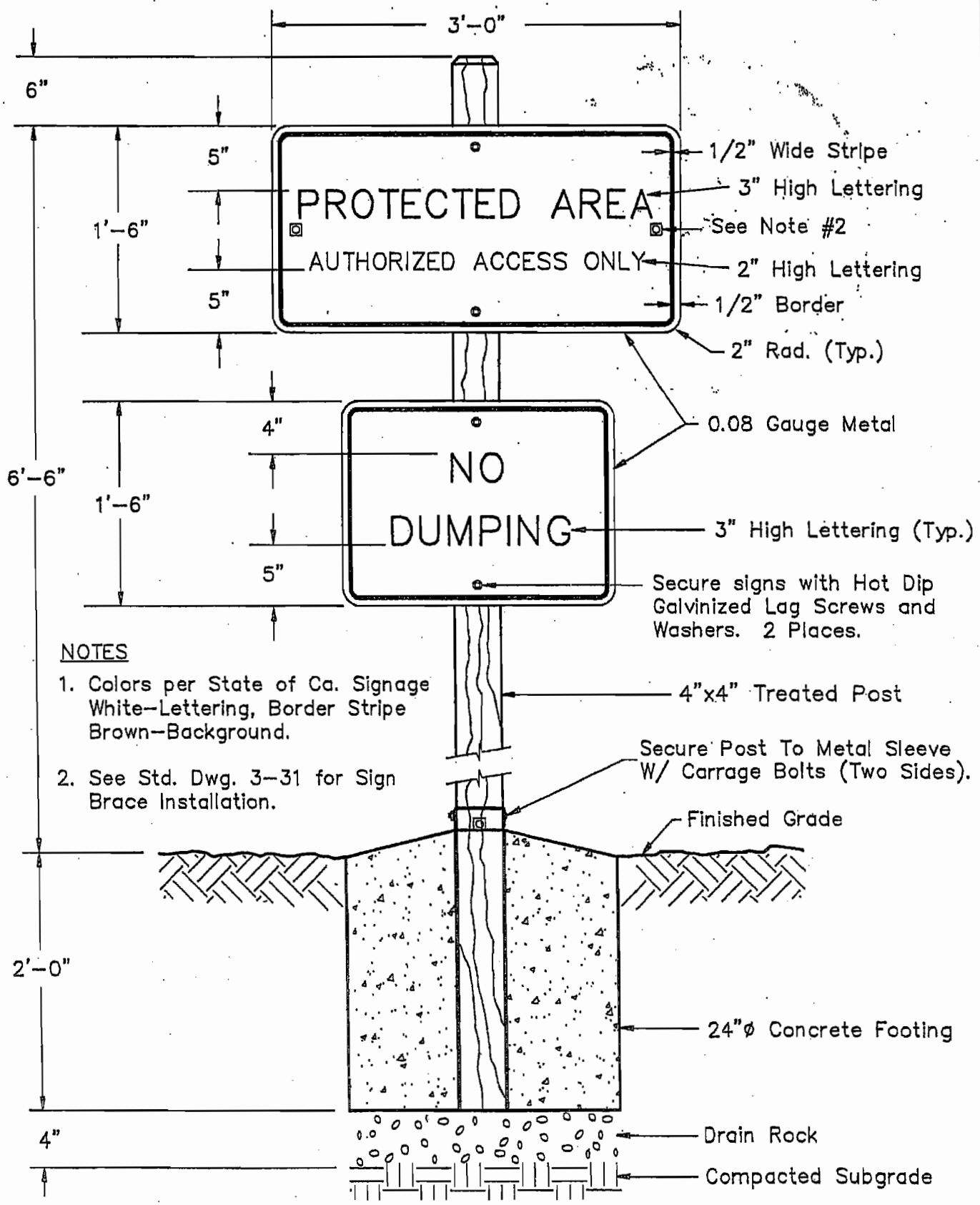


MID MEDIAN DETAIL

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 5–12	SHEET ____ OF ____	MEDIAN AND GORE PLANTING DETAIL
DRAWN BY EVA	FILE NO. ____	



NOTES

1. Colors per State of Ca. Signage White-Lettering, Border Stripe Brown-Background.
2. See Std. Dwg. 3-31 for Sign Brace Installation.

CITY OF VALLEJO

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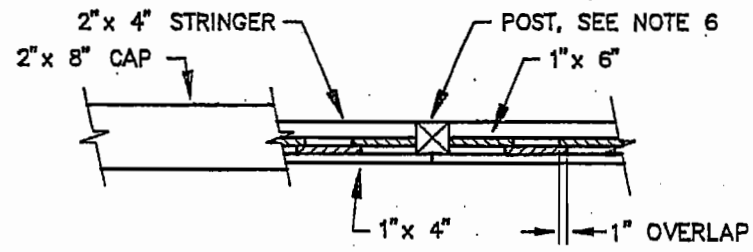
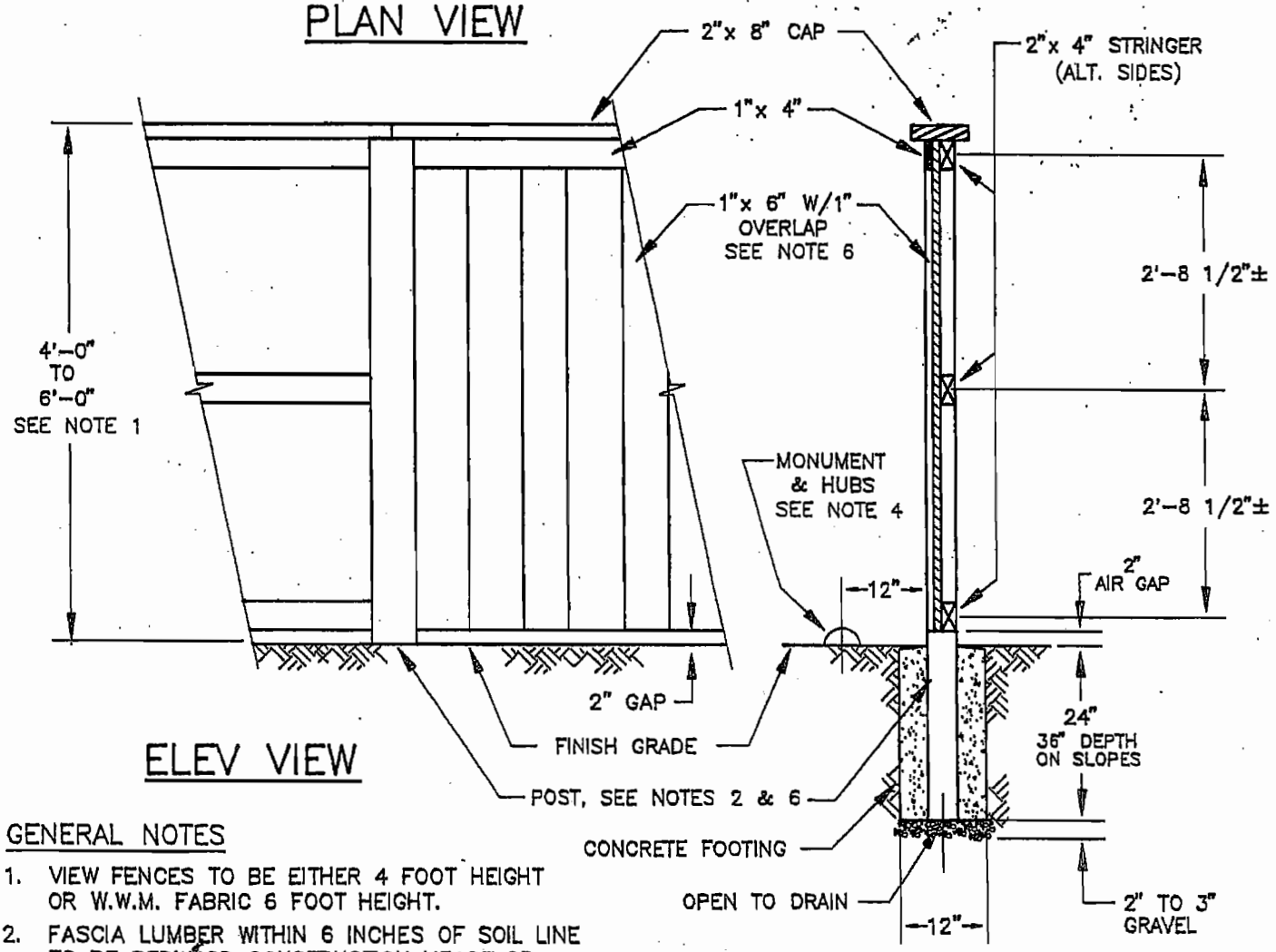
DWG. NO. 5-13 | SHEET ____ OF ____
DRAWN BY: GLR | FILE NO. ____

ENTRY POSTS FOR ENTRIES TO OPEN SPACES AND TRAIL HEADS



PLAN VIEW



ELEV VIEW

SECTION VIEW
POST DETAIL

GENERAL NOTES

1. VIEW FENCES TO BE EITHER 4 FOOT HEIGHT OR W.W.M. FABRIC 6 FOOT HEIGHT.
2. FASCIA LUMBER WITHIN 6 INCHES OF SOIL LINE TO BE REDWOOD CONSTRUCTION HEART OR PRESSURE TREATED LUMBER.
3. ALL FASTENERS TO BE HOT DIPPED, GALVANIZED.
4. FENCE CONTRACTOR SHALL PROTECT PROPERTY CORNERS AND MONUMENTS DURING CONSTRUCTION.
5. CONCRETE SHALL BE TRANSITMIX.
6. POSTS:
   * 4x4's CONST. HEART REDWOOD OR TREATED POSTS LINE POSTS
   * 4"x6's CONST. HEART REDWOOD OR TREATED POSTS AT 100'-0" O.C. AND @ CORNERS
   * 6" DIA. PEELERS LINE, 100'-0" O.C., AND CORNERS TREATED
7. THIS FENCE IS NOT FOR SOUND ATTENUATION PURPOSES.

CITY OF VALLEJO

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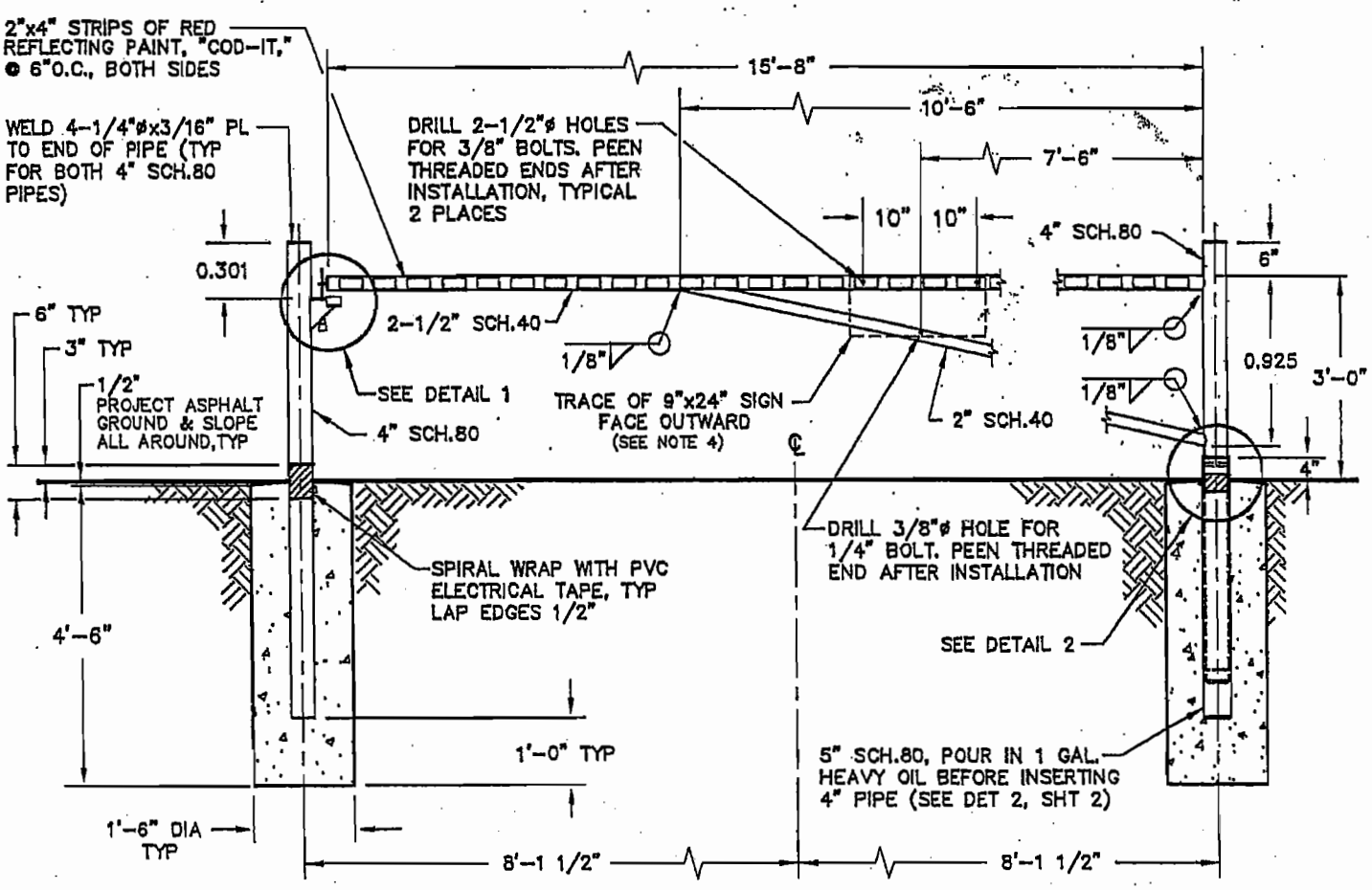
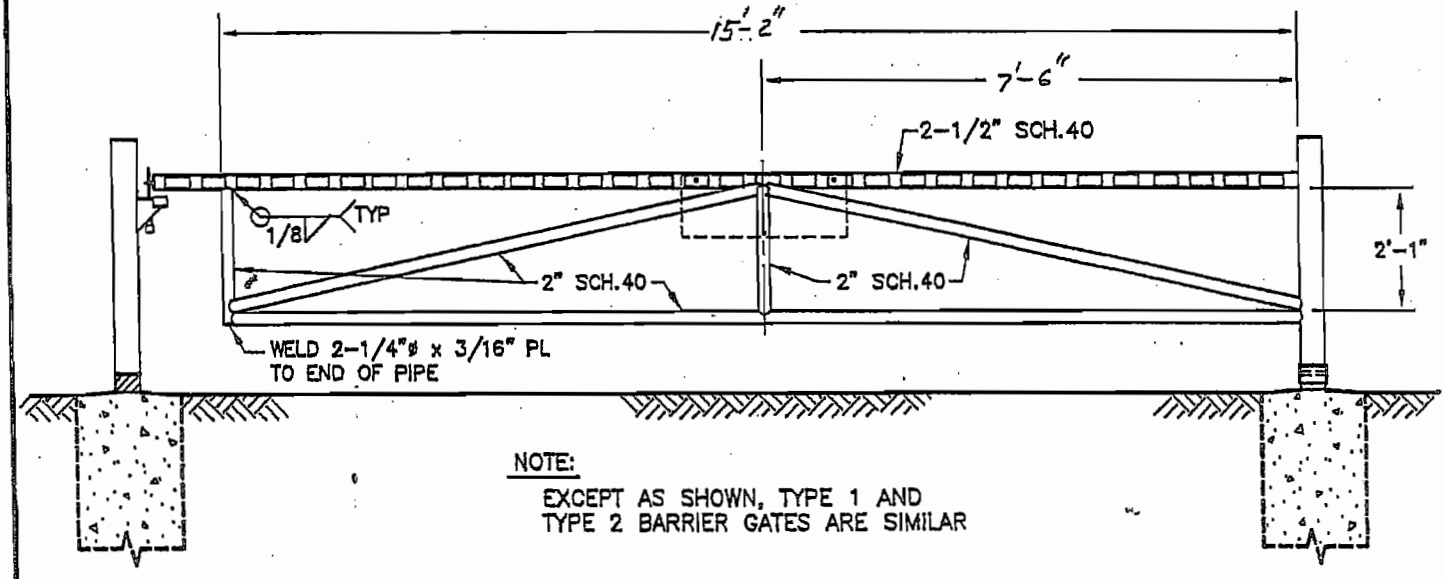
ENGINEERING DIVISION

DWG. NO. 6-1 | SHEET 1 OF 1
DRAWN BY SRT | FILE NO.

PUBLIC FENCE DETAILS



TYPE 1 INSTALLATION



NOTE:

EXCEPT AS SHOWN, TYPE 1 AND TYPE 2 BARRIER GATES ARE SIMILAR

TYPE 2 INSTALLATION

CITY OF VALLEJO

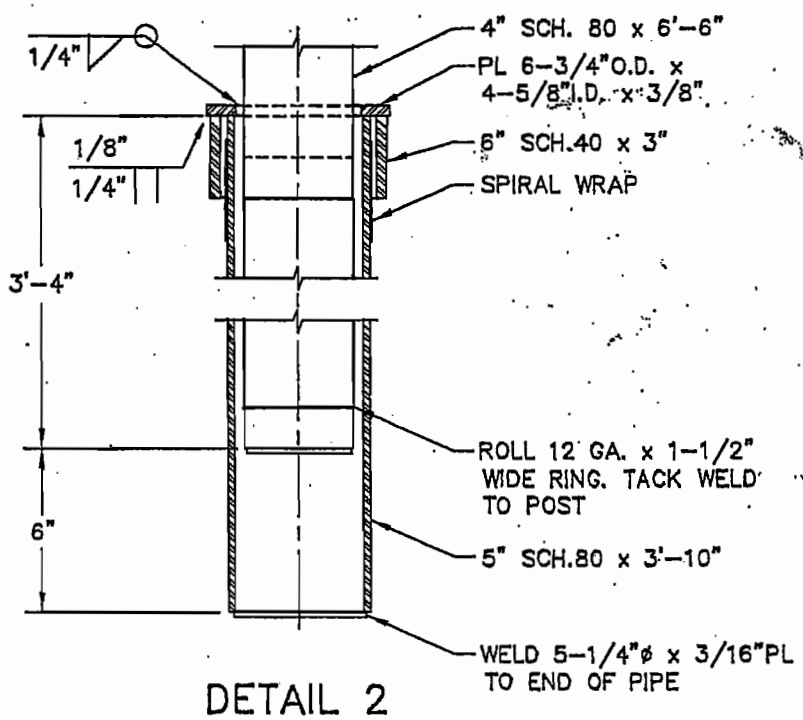
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 6-2 | SHEET 1 OF 3

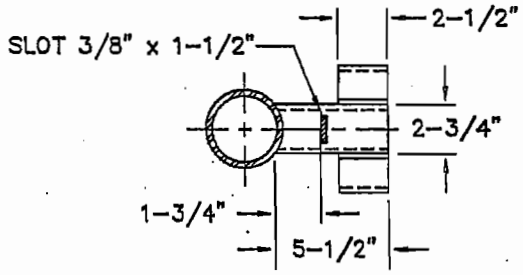
DRAWN BY SRT | FILE NO.

PIPE BARRIER GATES

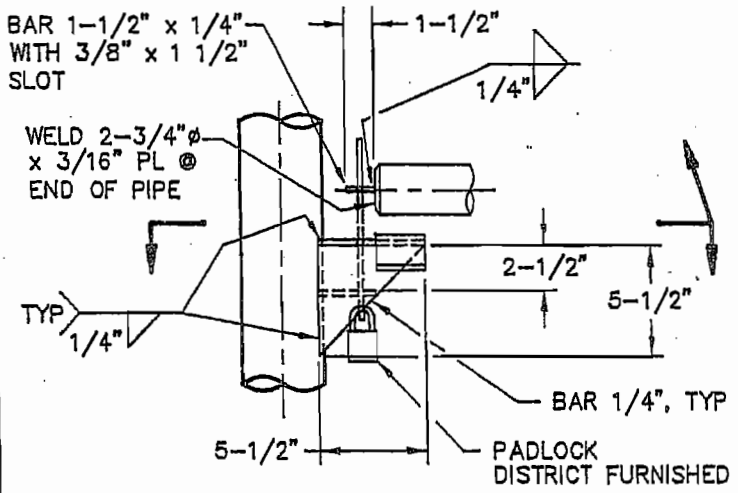
TO P.G. & E. TOWER PADS OR OPEN SPACES

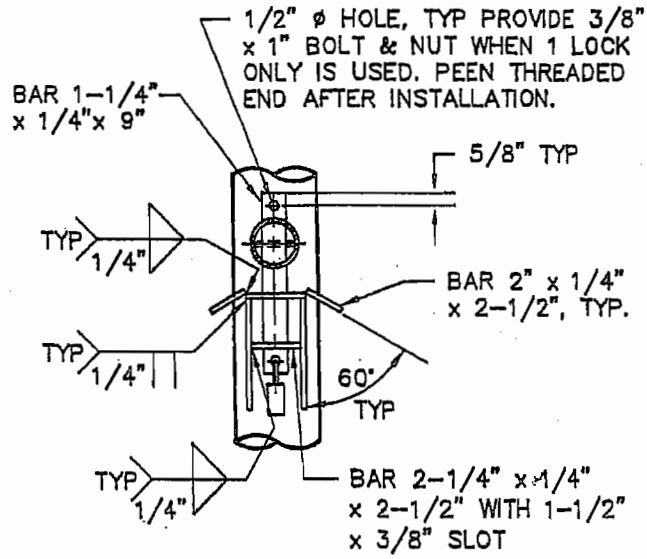


DETAIL 2
PIVOT POST



NOTE:
GATE NOT SHOWN (SEE SHT 1)





DETAIL 1
LATCH/LOCK

CITY OF VALLEJO

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DWG. NO. 6-3	SHEET 2 OF 3
DRAWN BY SRT	FILE NO.

PIPE BARRIER GATES

LIST OF MATERIALS

NO. REQ'D	DESCRIPTION
2'-10"	12 GA. x 1-1/2" SHEET STEEL, BLACK
1	BAR 1-1/4" x 1/4" x 9"
1	BAR 1-1/2" x 1/4" x 2-3/4"
2	BAR 2" x 1/4" x 2-1/2"
1	BAR 2-3/4" x 1/4" x 5-1/2"
1	BAR 5-1/2" x 1/4" x 5-1/2", CUT DIAGONALLY
1	BAR 2-1/4" x 1/4" x 2-1/2"
1	1/4" DIA. x 3-1/2" BOLT WITH NUT
2	3/8" DIA. x 3-3/4" BOLT WITH NUTS
1	3/8" DIA. x 1" BOLT WITH NUT (WHEN 1 LOCK ONLY IS USED)
1	9" x 24" SIGN, SEE G.N. 4
1	DISTRICT PADLOCK
15± C.F.	CONCRETE
AS NEC	PVC ELECTRICAL TAPE, 2" WIDE, 7 MILS MINIMUM THICKNESS
1	6-3/4" x 3/8" x 6-3/4" PLATE, CUT TO SHAPE
1	2-1/4" DIA x 3/16" PLATE (TYPE2)
1	2-3/4" DIA x 3/16" PLATE
3	4-1/4" DIA x 3/16" PLATE
1	5-1/4" DIA x 3/16" PLATE
1 GAL.	HEAVY OIL
AS NEC.	RED REFLECTING PAINT
AS NEC.	SHERWOOD GREEN PAINT
11'-2"	2" SCH.40 STEEL PIPE, BLACK (TYPE1)
34'-9"	2" SCH.40 STEEL PIPE (TYPE2)
15'-9"	2-1/2" SCH.40 STEEL PIPE, BLACK
13'-6"	4" SCH.80 STEEL PIPE, BLACK
3"	6" SCH.40 STEEL PIPE, BLACK

GENERAL NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 P.S.I. AT 28 DAYS.
2. ALL WELDS SHALL BE GROUND FLUSH AND SMOOTH.
3. HOT-DIP GALVANIZE AFTER FABRICATION.
4. SIGN SHALL BE FURNISHED BY DISTRICT. SEE SIGN DETAILS OF DRAWING NO. 5-XX.
5. GATES MUST HAVE A MINIMUM OF 14' CLEAR OPENING.

CITY OF VALLEJO

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DWG. NO. 6-4 | SHEET 3 OF 3

PIPE BARRIER GATES