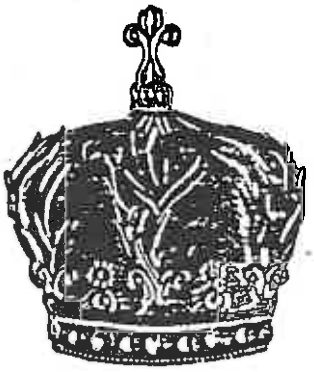


CITY OF KING

DEPARTMENT OF PUBLIC WORKS

DESIGN STANDARDS AND STANDARD SPECIFICATIONS

1995

PART I STANDARD SPECIFICATIONS

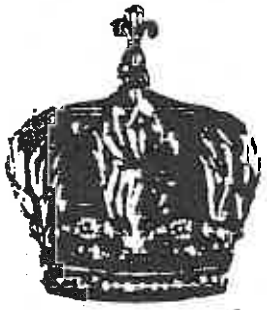
PART II DESIGN STANDARDS

PART III STANDARD PLANS

JANUARY 1987

REVISED

MAY 1991
MAY 1995



ISSUED BY

CITY OF KING, CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

COPIES OF THIS BOOK MAY BE PURCHASED FOR $15.00 EACH

SEND ORDER AND REMITTANCE TO:

CITY OF KING

DEPARTMENT OF PUBLIC WORKS

212 SO. VANDERHURST

KING CITY, CA 93930

TABLE OF CONTENTS

PART III

STANDARD PLANS

TABLE OF CONTENTS - Continued

PART I

STANDARD SPECIFICATIONS

PART I

STANDARD SPECIFICATIONS

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

SURFACINGS AND PAVEMENTS

STRUCTURES

DRAINAGE AND SEWER FACILITIES

RIGHT OF WAY AND TRAFFIC CONTROL FACILITIES

MATERIALS

PART II

DESIGN STANDARDS

PART III

STANDARD PLANS

CITY OF KING
DEPARTMENT OF PUBLIC WORKS
STANDARD SPECIFICATIONS

These Standard Specifications shall be used in conjunction with the State of California, Department of Transportation, Standard Specifications July 1984 Edition, which shall be referred to as State Standard Specifications. In case of conflict between the State Standard Specifications and the City of King Standard Specifications, the City of King City Standard Specifications shall apply.

Sections 2 and 9 and portions of all other sections pertaining to payment shall be applicable only to work contracted for by the City of King City.

SECTION 1

DEFINITIONS AND TERMS

Definitions and terms shall be as defined in Section 1 of the State Standard Specifications except as herein modified.

Department of Transportation, Department, Director of Transportation, State of California, State or Division of Highways, when referred to in the State Standard Specifications shall mean the City of King City.

1-1.10 Contractor - The person or persons, firms, partnership, corporation, or combination thereof, private or municipal, who have either entered into a contract with the City of King, as party or parties of the second part of his or their representatives, or who are permittees authorized or given permission to perform work in, under or about City of King streets, alleys or easements.

1-1.18 Engineer - Shall mean the Engineer duly and officially appointed by the City to supervise and direct the work of construction acting personally or through agents or assistants duly authorized by him, such agents or assistants acting within the scope of the particular duties entrusted to them.

1-1.19 Engineer's Estimate - The list of estimated quantities of work to be performed as contained in the "Notice to Bidders" and/or contract "Proposal" form.

1-1.25 Laboratory - Shall mean the designated laboratory authorized by the City of King to test the materials and work involved in a contract.

1-1.255 Legal Holidays - Those designated as State holidays in the Government Code and by the City of King City Council.

1-1.37 Special Provisions - The special provisions are specified clauses setting forth conditions or requirements peculiar to the work and supplementary to these Standard Specifications. The State Department of Transportations's publications entitled Equipment Rental Rates and General Prevailing Wage Rates are to be interpreted to mean the list of rental rates approved by the City Engineer and on file in the office of the City Engineer, and the list of prevailing wage rates as adopted by the City of and on file in the office of the City Engineer, and shall be considered as a part of the special provisions.

1-1.49 Right of Way - That area delineated on the plans or defined in the special provisions which is available to the contractor.

1-1.50 Attorney General - The person or persons, firm, partnership, or combination thereof duly and officially appointed by the City to act as its legal Counsel.

1-1.51 State Highway Engineer - Shall be the Engineer as defined above.

1-1.52 City of King or City - Shall mean the City of King , Monterey County, California, acting through the City Council or any board, body, official or officials, which or to whom the power belonging to the Council shall by virtue of any act or acts hereafter passed to be held to appertain.

Where the State Standard Specifications refer to "these specifications" or to sections within the State Standard Specifications, the reference shall be interpreted as referring to the City of King , Department of Public Works, Standard Specifications, 1987 or to sections therein.

Where the State Standard Specifications refer to "Notice to Contractors" it shall be understood to be "Notice to Bidders".

SECTION 2

PROPOSAL REQUIREMENTS AND CONDITIONS

Proposal requirements and conditions shall be as specified in Section 2 of the State Standard Specifications, except as herein modified.

2-1.01 Contents of Proposal Forms - Prospective bidders will be furnished with proposal forms which will state the official designation for the job and will show the estimate of the various

quantities and kinds of work to be performed, or materials to be furnished, as a schedule of items for which bid prices are asked.

2-1.03 Examination of Plans, Specifications, Contract, and Site of Work - Records of investigations as may have been made by the City of King, pertaining to test borings, contour maps and subsurface conditions may be inspected at the office of the City Engineer, City Hall, King City, California.

2-1.05 Proposal Forms - All proposal forms shall be obtained from the Public Works Department of the City of King, City Hall, King City, California.

2-1.07 Proposal Guaranty - The proposal guaranty shall be in the form of a certified check or a bidder's bond executed by an admitted surety insurer made payable to the City of King.

2-1.08 Withdrawal of Proposals - Any bid may be withdrawn at any time prior to the time fixed in the public notice for the opening of bids only by a written request for the withdrawal of the bid filed with the City Clerk of the City of King.

2-1.11 (Blank)

2-1.12 Material Guaranty - Unless otherwise specified in the Special Provisions, all work shall be required to carry a guaranty against defective material or defective workmanship for a period of one year from the date of acceptance. The signing of the contract shall be considered as the same as the signing of the guaranty. Upon completion of the contract and upon the expiration of thirty-five (35) days after acceptance of the work, the amounts of the Faithful Performance Bond required in Section 3 may at the Contractor's option be reduced to an amount equal to ten percent of the total amount of the contract bid price.

If within one year after the date of acceptance any of the work is found to be defective or not in accordance with the contract documents, the Contractor shall correct it promptly after receipt of a written notice from the City to do so unless the City has previously given the Contractor a written acceptance of such condition.

Should the Contractor neglect to carry out the work in accordance with the contract documents, the City may, after seven days written notice to the Contractor and without prejudice to any other remedy he may have, make good such deficiencies, and the Contractor shall pay all costs involved including the cost of any necessary engineering expenses.

SECTION 3

AWARD AND EXECUTION OF CONTRACT

Award and execution of contracts shall be as specified in Section 3 of the State Standard Specifications, except as herein modified.

3-1.02 Contract Bonds - In lieu of Section 3 - 1.02 of the State Standard Specifications the contractor shall furnish two good and sufficient bonds, each of the said bonds to be executed in a sum equal to at least one-half the contract price. One of the said bonds shall guarantee the faithful performance of the said contract by the Contractor and the other said bond shall be furnished as required by the Government Code.

All alterations, extensions of time, extra and additional work and other changes authorized by these Specifications or any part of the contract may be made without securing the consent of the surety or sureties on the contract bonds.

SECTION 4

SCOPE OF WORK

Scope of work shall be as specified in Section 4 of the State Standard Specifications.

SECTION 5

CONTROL OF WORK

Control of work shall be as specified in Section 5 of the State Standard Specifications, except as herein modified.

5-1.08 Inspection - Projects financed in whole or in part with federal funds, state funds, or county funds, shall be subject to inspection at all times by the agency involved.

SECTION 6

CONTROL OF MATERIALS

Control of materials shall be as specified in Section 6 of the State Standard Specifications.

6-3.02 Statistical Testing - Statistical testing shall not be considered a part of these specifications. In all cases not otherwise modified, where reference is made to statistical testing, the acceptable value for a single test is as specified for the acceptable value for the moving average.

SECTION 7

LEGAL RELATIONS AND RESPONSIBILITY

Legal Relations and responsibility shall be as specified in Section 7 of the State Standard Specifications, except as herein modified.

7-1.01C Contractor's Licensing Laws - The successful bidder and all the subcontractors listed by the successful bidder shall obtain a business license for taxing purposes from the City of King prior to starting work.

7-1.08 Public Convenience - All items listed under this Section and the payment therefor shall be considered as included in the prices for the various contract items of work and no additional compensation will be allowed therefor. If the Special Provisions call for the erection, within or adjacent to the limits of the contract, of warning and directional signs or information signs furnished by the City, and no bid item is included for such erection and return of said signs to the storage location, then the work shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

7-1.09 Public Safety - All items listed under this Section and the payment therefor shall be considered as included in the prices for the various contract items of work and no additional compensation will be allowed therefor. If the Special Provisions call for the erection within or adjacent to the limits of the contract, of warning and directional signs or information signs furnished by the City, and no bid item is included for such erection and return of said signs to the storage location, then the work shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

Whenever immediate action is required to prevent impending injury, death, or property damage, and precautions which are the Contractor's responsibility have not been taken and are not expected to be taken, the City may, after reasonable attempts to notify the Contractor, cause such precautions to be taken and shall charge the cost thereof against the Contractor, or may deduct such cost from any amount due or becoming due from the City. City action or inaction under such circumstances shall not be construed as relieving the Contractor or his surety from liability.

7-1.092A Street Closures - The Contractor shall comply with all applicable State, County and City requirements for closure of streets. No street closure shall be allowed without an approved

plan showing barricading, signing and necessary detour signing in accordance with the latest edition of the "Manual of Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways" as published by the California Department of Transportation.

At least 48 hours in advance of closing or of reopening any street, alley or other public thoroughfare, the Contractor shall notify the Police, Fire, News Media, Traffic and Engineering Departments or jurisdictional agencies involved.

The Contractor shall also be responsible for compliance with additional public safety requirements which may arise during construction. He shall furnish, install, and maintain, and upon completion of the work, promptly remove all signs and warning devices. All costs shall be absorbed in the Contractor's bid.

7-1.098 Flagging Costs - The cost of furnishing all flagmen and guards under the provisions in Section 7 - 1.08, "Public Convenience", and 7 - 1.09, "Public Safety", will be borne by the Contractor.

7-1.12 Responsibility for Damage - Section 7 - 1.12 of the State Standard Specifications shall apply, except that retention of money due the Contractor under and by virtue of the contract will be made by the City of King pending disposition of suits or claims for damages brought against the City.

The Contractor shall indemnify and save harmless the City of King and all officers and employees thereof connected with the work, including but not limited to the City Engineer, from all claims, suits or actions of every name, kind and description, brought for, or on account of, injuries to or death of any person or damage to property resulting from the construction of the work or by or in consequence of any negligence guarding the work; use of improper materials in construction of the work; or by or on account of any act or omission by the Contractor or his agents during the progress of the work or at any time before its completion and final acceptance.

The duty of the Contractor to indemnify and save harmless, as set forth herein, shall include the duty to defend, as set forth in Section 2778 of the Civil Code, provided, however, that nothing herein shall be construed to require the Contractor to indemnify the City against any responsibility or liability in contravention of Section 2782 of the Civil Code, including any loss from a design defect which is the sole negligence of the City.

The Contractor shall, at his own expense, procure and at all times during the prosecution of the work and until final completion thereof, maintain in full force and effect Workmens' Compensation Insurance, public liability insurance, and property damage insurance conforming with Section 7 - 1.12 of the State Standard Speci-

fications with the following provisions:

(1) A policy covering the full liability of the Contractor to any and all persons employed by him directly or indirectly in or upon the work or their dependents in accordance with the provisions of the Labor Code of the State of California relating to Workmen's Compensation Insurance.

(2) A policy of public liability and property damage insurance having limits of not less than the limits specified in the State Standard Specifications.

The policies mentioned in this section shall be issued by an insurance carrier satisfactory to the City and shall be delivered to the City at the time of the delivery of such contract. In lieu of actual delivery of such policies, a certificate issued by the insurance carrier showing such policies to be in force for the period covered by the contract will be accepted. Such policies or certificate shall be on the form included in the contract documents or approved by the City Attorney. Should any policy be cancelled before the final completion of the work herein contemplated and the Contractor should fail to immediately procure other insurance as herein required, then the City may procure such insurance and deduct the cost thereof from the amount due the Contractor. The policies shall include as additional insured the City of King, its officers, agents and employees.

SECTION 8

PROSECUTION AND PROGRESS

Prosecution and progress shall be as specified in Section 8 of the State Standard Specifications, except as herein modified.

8-1.01 Subcontracting - Enclosed with his bid that the Contractor shall file with the City Engineer at his office, City Hall, King City, California, a written statement showing the work to be subcontracted giving the names of the subcontractors and the description of each portion of the work to be so subcontracted.

8-1.06 Time of Completion - Shall be as specified in Section 8-1.06 of State Standard Specification, except as herein modified.

Working days will be counted beginning on the day specified on the notice to proceed with the work.

8-1.08 Termination of Control - If at any time the City Council shall find that the Contractor has failed to supply an adequate working force or material of proper quality or has failed in any other respect to prosecute the work with diligence as specified in and by the terms of the contract, notice thereof in writ-

ing shall be served upon him, and should he neglect or refuse to provide means for satisfactory compliance with the contract as directed by the Engineer within the time specified in such notice, the City Council shall have a grounds for termination of the Contractor's control over the work and for taking over the work by the City. Upon receiving notice of such suspension, the Contractor shall discontinue said work or such parts of it as the City Council may designate. Upon such suspension, the Contractor's control shall terminate and thereupon the City Council or its duly authorized representative may take possession of the work or such designated part thereof, and may use any or all of the Contractor's plant, tools, equipment, materials or other property on the work, none of which shall be removed by the Contractor so long as they may be required for the work, and the Engineer may contract or otherwise provide the superintendents, workmen, materials, appliances and equipment necessary for the completion of and may complete the work, or such designated part thereof. The whole of the expense so incurred for the completion of the work or part thereof, together with all damages, liquidated or otherwise, sustained or to be sustained by the City, shall be deducted from the fund or appropriation set aside for the purpose of the contract and shall be charged to the Contractor as if paid to him. In case the amount of such expenses and damages shall exceed the sum which would have been payable under the contract if completed entirely by the Contractor, the amount of such excess shall be paid to the City by the Contractor and both he and his sureties shall be liable to the City therefor, and in case the amount of such expense and damages shall be less than the sum which would have been payable under the contract if completed entirely by the Contractor, he shall be entitled to the amount of the difference subject to all the terms of the contract.

The Contractor shall continue to prosecute to completion all the work from which he has not, as above provided, been ordered to desist and he shall cooperate with and in nowise hinder or interfere with the forces employed by the City or contract otherwise to do any designated part of the work as above specified.

Upon completion of all the work included under the contract, the Contractor shall be entitled to the return of all his materials which have not been used in the work, of his plant, tools, and equipment, provided however that he shall have no claim on account of usual and ordinary depreciation, loss, wear and tear.

In the determination of the question whether there has been any such noncompliance with the contract as to warrant the suspension or annulment thereof, the decision of the City Council shall be binding on all parties to the contract.

SECTION 9

MEASUREMENT AND PAYMENT

9-1.01 Measurement of Quantities - Shall be as specified in Section 9 of the State Standard Specifications except as herein modified. In lieu of the portion of Section 9 - 1.01 of the State Standard Specifications which provides that roadway material, except imported borrow and imported topsoil, shall have the weight of the water deducted from the weight of the material delivered to the work, the complete weight of the material shall be the measurement upon which payment will be based, provided, however, that the moisture content does not exceed the optimum moisture for compaction of the material.

9-1.03A (1b) Labor Surcharge - Unless otherwise specified in the special provisions the labor surcharge shall be the rate as specified in Department of Transportation publication entitled Labor Surcharge and Equipment Rental Rates, which is in effect on the date upon which the work is accomplished.

9-1.07B Final Payment and Claims - In lieu of the portions of Section 9 - 1.07 of the State Standard Specifications, which provide thirty days for the Contractor to submit written approval to the Engineer or the proposed final estimate or thirty days to file a claim, ten days time shall be permitted in these specifications.

On the Contractor's approval or if he files no claim within said period of ten days, the Engineer will issue a final estimate in writing in accordance with the proposed final estimates submitted to the Contractor and within thirty-five (35) days thereafter, the City will pay the entire sum so found to be due.

Such final estimate and payment thereon shall be conclusive and binding against both parties to the contract and all questions relating to the amount of work done and any compensation payable therefor.

If the Contractor within said period of ten days files claims, the Engineer will issue a semifinal estimate in accordance with the proposed final estimates submitted to the Contractor and within thirty-five days thereafter, the City will pay the sum so found to be due. Such semifinal estimate and payment thereon shall be conclusive and binding against both parties to the contract as they relate to the amount of work done and the compensation payable therefor except items affected by the claims filed within the time and the manner required hereunder.

9-1.08 Adjustment of Overhead Costs - The State Standard Specifications shall not apply to this Section 1.08.

SECTION 10

DUST CONTROL

Dust control shall be as specified in Section 10 of the State Standard Specifications, except as herein modified.

10-1.03 Cleanup - Throughout all phases of construction including suspension of work, and until final acceptance of the project, the Contractor shall keep the work site clean and free from rubbish and debris. The Contractor shall also abate dust nuisance by cleaning, sweeping, and sprinkling with water, or other means as necessary. The use of water resulting in mud on public streets will not be permitted as a substitute for sweeping or other methods.

Failure of the Contractor to comply with the Engineer's clean up orders may result in an order to suspend the work until the condition is corrected. No additional compensation will be allowed as a result of such suspension.

10-1.04 Payment - In lieu of Section 10 - 1.04 of the State Standard Specifications, full compensation for all expense involved in conforming to the above requirements for applying either water or dust palliative shall be considered as included in the unit prices paid for the other items of work and no additional compensation will be allowed therefor.

SECTION 11

MOBILIZATION

Mobilization shall be as specified in Section 11 of the State Standard Specifications.

SECTION 12
CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Construction Area Traffic Control Devices shall be as specified in Section 12 of the State Standard Specifications.

SECTION 15

EXISTING HIGHWAY FACILITIES

Existing highway facilities shall be as specified in Section 15 of the State Standard Specifications, except as herein modified.

15-2.02A Obliterating Roads and Detours - Unless otherwise specified in the special provisions, obliterating shall consist of removal of all asphalt, concrete or portland cement concrete pavement and rooting, plowing, pulverizing or scarifying to a minimum depth of 0.5 feet or to the bottom of the base material, whichever is less. The loosened material shall be shaped to provide a presentable and well drained area.

15-2.05A Frames, Covers, Grates and Manholes - Structures located in the pavement area may be constructed to final grade prior to completion of the pavement or surfacing.

Manholes that are to be lowered to a degree that the frame will be supported with existing structure on more than 50 percent of its base width at any point, may be lowered without removal of the cone as required in Section 15 - 2.05A of the State Standard Specifications.

15-2.06 Measurement - In lieu of the portion of Section 15 -2.06 of the State Standard Specifications referring to the quantities of structure excavation, all excavation and backfill required to remove, dispose of, salvage and reconstruct highway facilities will be considered incidental to performing the work and no separate payment will be made therefor.

15-2.07 Payment - When the contract does not include separate items for removing any of the existing highway facilities encountered within the project limits, then payment for removing such facilities shall be included in the contract prices paid for the various contract items of work.

15-3.02 Removing Concrete - Removal Methods - In addition to the specifications in Section 15-2.02 of the State Standard Specifications, existing concrete shall be cut to a true line where new concrete is to join existing concrete using a concrete saw cutting to a minimum depth of 1-1/2 inches or to a depth as shown on the plans or as specified in the special provisions.

15-3.04 Removing Concrete - Payment - In addition to the provisions of Section 15 - 3.04 of the State Standard Specifications, items of work for removing concrete will be paid for at the price per square foot or in the case of curbs or gutters per lineal foot or by any other method specified on the plans or in the special provisions in the proposal.

SECTION 16

CLEARING AND GRUBBING

Clearing and grubbing shall be as specified in Section 16 of the State Standard Specifications.

SECTION 17

WATERING

Watering shall be as specified in Section 17 of the State Standard Specifications, except as herein modified.

17-1.04 Payment - In lieu of Section 17 - 1.04 of the State Standard Specifications, full compensation for developing the water supply for all water required for the work and for furnishing and applying all water will be considered as included in the prices paid for the various contract items of work and no separate payment will be made therefor.

SECTION 18

DUST PALLIATIVE

Dust Palliative shall be as specified in Section 18 of the State Standard Specifications.

18-1.05 Payment - No additional compensation will be allowed for furnishing or applying water used with the dust palliative. Binder for dust palliative shall be paid for as extra work as provided in Section 4-1.03D when the application of dust palliative is ordered by the Engineer.

SECTION 19

EARTHWORK

Earthwork shall be as specified in Section 19 of the State Standard Specifications, except as herein modified.

19-1.03 Grade Tolerance - In lieu of the applicable provisions of Section 19 - 1.03 of the State Standard Specifications, the grading plane shall not vary more than 0.05 feet above or below the grade established by the Engineer.

19-2.01A Preparation of Subgrade - Scarifying and cultivating will be required for dry soils which are impervious to the penetration of water, for soils which may contain excessive amounts of moisture which may result in unstable foundations, for soils which are nonuniform in character which may result in nonuniform compactions and may result in differential settlements of finished surfaces, or when pavement is to be placed directly on the roadbed material.

After rough grading has been completed, when scarifying and cultivating are required, the roadbed shall be loosened to a depth of at least 6 inches. The loosened material shall then be worked to a finely divided condition and all rocks larger than 3 inches in diameter removed. The moisture content shall be brought to optimum by the addition of water, by the addition and blending of dry suitable material or by the drying of existing material. The material shall then be compacted by approved equipment to the specified relative compaction.

19-2.04 Slides and Slipouts - In lieu of the applicable provisions of Section 19-2.04 of the State Standard Specifications, the cost of pioneering work necessary to make slide or slipout areas accessible to normal excavation equipment will be paid at the contract prices for roadway excavation and will not be paid for as extra work.

19-2.06 Surplus Material - Unless otherwise shown on the plans or specified in the special provisions, surplus excavated material shall become the property of the Contractor and shall be disposed of off the site of the work in a manner approved by the Engineer.

19-2.09 Payment - Overhaul and applying water will be included in the price paid per cubic yard for roadway excavation and no additional compensation will be allowed therefor.

19-3.01 Description - The State Specifications shall not apply to culverts and pipes, rods and deadmen.

19-3.06 Structure Backfill - Shall be changed to read as follows:

Backfilling Operations shall conform to the following requirements.

Except when used at certain locations hereinafter described, material for use as structure backfill shall have a sand equivalent value of not less than 30. The percentage composition by weight as determined by laboratory sieves shall conform to the following grading:

Sieve Sizes	Percentage Passing
3"	100
No. 4	35 - 100

Structure backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling. No backfill material shall be deposited against the back of concrete abutments, concrete retaining walls, or the outside walls of cast-in-place concrete structures until the concrete has developed a strength of not less than 2,500 pounds per square inch of compressive as determined by test cylinders cured under conditions similar to those prevailing at the site and tested in accordance with Test Method No. Calif. 521.

Backfill material shall be placed in horizontal, uniform layers not exceeding 0.67 feet in thickness, before compaction, and shall be brought up uniformly on all sides of the structure or facility. Each layer of backfill shall be compacted to a relative compaction of not less than 90 percent.

Compaction equipment or methods that produce horizontal or vertical earth pressures which may cause excessive displacement or may damage structures shall not be used.

At the option of the Contractor, backfill material conforming to the requirements hereinafter specified may be used at the following locations:

(1) Footings outside of slope lines and not beneath any roadbed.
(2) Footings for slope protection, slope paving and aprons.
(3) All headwalls, endwalls, and culvert wingwalls.
(4) Retaining walls, except for portions under any roadbed.
(5) Inlets in median areas or in traffic interchange loops.

The backfill material at the above locations may consist of material from excavation, free from stones or lumps exceeding 3 inches in greatest dimension, vegetable matter, or other unsatisfactory material and shall be compacted to a relative compaction of not less than 90 percent. When the material from excavation is unsuitable for use as backfill it shall be disposed of as directed by the Engineer, and suitable material approved by the Engineer shall be furnished by the Contractor at his expense for the backfill.

Compaction of structure backfill by jetting will be permitted when, as determined by the Engineer, the backfill material is of such character that it will be self-draining when compacted and that foundation material will not soften or be otherwise damaged by the applied water and no damage from hydrostatic pressure will result to the structure. Jetting of the upper four feet below finished grade will not be permitted. When jetting is permitted, material for use as structure backfill shall be placed and compacted in layers not exceeding 4 feet in thickness. The work shall be performed without damage to the structure and embankment, and in such a manner that water will not be impounded. Jetting methods shall be supplemented with the use of vibratory or other compaction equipment when necessary to obtain the required compaction. Water used for jetting shall be furnished and applied by the Contractor at his expense.

19-3.061 Trenching in Improved Areas

19-3.061A Description - Trenching in improved areas shall be considered to be in any previously paved area, either portland cement concrete or asphaltic concrete on public property or right of way, subject to vehicular traffic.

19-3.061B Trench Excavation - Except when this requirement is specifically waived by the Engineer, the trench, at the end of the day, shall not be excavated for more than 100 feet in advance of the pipe laying, or left unfilled for more than 100 feet where the pipe has been laid. At no time shall the trench be open further than 300 feet in advance of the pipe laying or 200 feet to the rear thereof, without specific approval of the Engineer. This restriction does not apply to cast-in-place pipe.

Trenches shall be dug in such a manner so as to assure that the bottom of the trench shall be true to line and grade, and be free of rocks, organic material and any other deleterious substance. The trench walls shall be cut in such a manner as to provide the proper clearance, in accordance with Standard Plan 13, and shall be cut, shored, or protected in accordance with the most recent issue of the State of California Construction Safety Orders.

When excavating for pipes, conduits, ducts, or lines of any kind, and solid rock or other unyielding material is encountered, additional material shall be removed below the normal trench bottom to a minimum depth of six inches, or as directed by the Engineeer. The resulting subtrench shall be backfilled with pipe bedding material and shall be compacted, by mechanical means, to a relative compaction of 90 per cent and shall be true to the designed line and grade for the normal trench bottom.

When excavating for pipes, conduits, ducts, or lines of any kind and a firm foundation is not encountered due to soft, spongy or other unsuitable material, additional material shall be removed below the normal trench bottom to a minimum depth of one foot, or as directed by the Engineer. The resulting subtrench shall be backfilled with 1-1/2 to 2-1/2 inch rock, the size of which is to be selected by the Engineer and shall be true to the designed line and grade.

Any additional bedding material ordered over the amount required by the plans or specifications will be paid for as provided in the Special Provisions, or in accordance with Section 4-1.03D. If the necessity for such additional bedding material has been caused by an act or failure to act on the part of the contractor, or is required for the control of ground water, the contractor shall bear the expense of the additional excavation and bedding material.

19-3.061C Trench Backfill - After the pipe, conduit, duct or line, hereinafter called pipe, except for cast-in-place concrete pipe, has been properly laid, bedded, and approved, material meeting the following specifications for initial backfill shall be deposited by hand to the springline of the pipe, and in such a manner as to prevent disturbing the pipe or altering its line or grade. Said initial backfill material shall be thoroughly compacted by mechanical means or jetting to obtain a density of 95 percent relative compaction. This backfill material shall be

placed in horizontal uniform layers and shall be brought up uniformly on all sides of the pipe.

Initial backfill material shall then be placed in uniform layers on all sides of the pipe to a level at least one foot above the top of the pipe. Said initial backfill material shall be compacted by mechanical means or jetting to a relative compaction of 95 percent.

The trench, from a depth of one foot over the top of the pipe to the bottom of the structural section of the pavement, as shown on Standard Plan 13, shall be backfilled with material conforming to the following specification for intermediate backfill. Initial backfill material may be used in lieu of intermediate backfill.

Intermediate backfill shall be placed in such a manner as to prevent disturbing the pipe or altering its line or grade and shall be thoroughly compacted to a relative compaction of 95 per cent.

When heavy machine tamping of backfill material is employed, uniform layer thickness of backfill material shall be as stipulated by the manufacturer of such equipment to produce the relative compaction specified.

Jetting of intermediate backfill will be allowed unless otherwise specified in the Special Provisions or shown on the plans. Horizontal layers shall not exceed four feet in depth and no jetting will be allowed of the final three feet of trench.

Jetting shall be accomplished only by inserting the water pipe, equipped with an approved jetting head, to the lowest portion of the fill to be compacted, and continuously running water until the water rises to the surface. Insertion of jet pipes shall be at four feet maximum intervals.

Trenches too narrow for mechanical compaction shall be completely jetted for compaction.

19-3.06C(1) Backfill Material - Backfill material shall be clean and free from decomposed materials, vegetable matter and other deleterious substances. Bedding material, initial backfill, and intermediate backfill shall consist of material which conforms to the following grading requirements:

Backfill Grading Requirements

Percentage Passing

Sieve Sizes	Bedding Material	Initial Backfill	Intermediate Backfill
3"	--------	--------	100
2-1/2"	--------	--------	90 - 100
1-1/2"	--------	--------	
1"	100		
3/4"	65 - 90	100	--------
1/2"	30 - 45	90 - 100	--------
3/8"	5 - 25		
#4	0 - 10	35 - 100	35 - 100
#200		0 - 10	0 - 10

Initial and Intermediate backfill material shall have a sand equivalent of not less than 30 as determined by test method Calif. 217.

19-3.061C(2) Slurry Cement Backfill - Slurry cement backfill shall be as specified in Section 19-3.062 of the State Standard Specifications and as herein modified.

Slurry cement backfill may be used in lieu of the requirements of Sections 19-3.061C and 19-3.061C(1) of these specifications upon approval of the Engineer.

Aggregate shall be commercial quality concrete sand.

19-3.061C(3) Backfill for Cast-In-Place Concrete Pipe - Initial backfill material shall be placed to one foot over the top of the pipe. Depth of backfill over the top of pipe shall not exceed six inches until concrete compressive strength has reached 700 psi and pipe has been in place 24 hours. Backfill may be completed when concrete strength reaches 1000 psi and pipe has been in place 48 hours. No backfill other than an initial six inch layer may be placed until the specified compressive strength is attained and the permission in writing has been obtained from the Engineer. All other backfill methods and materials and requirements shall be as specified above.

19-3.061D Trench Resurfacing - Unless permanent pavement is placed immediately, temporary bituminous surfacing two inches thick shall be placed and maintained at locations determined by the Engineer wherever excavation is made through pavement, sidewalk or driveways.

19-3.062 Trenches In Unimproved Areas

19-3.062A Description - Trenches in unimproved areas shall be considered any trench in an area not considered an improved area under Section 19-3.061A, or any area as defined in Section 19-3.063 Subdivisions and Unimproved Streets.

19-3.062B Trench Excavation - In all areas used for farming purposes or when designed on the plans or in the special provisions, the top soil shall be removed to a depth of two feet, for the entire width of the excavated area, and stockpiled for subsequent replacement. The removed top soil shall be protected and preserved from mixture with other soils and deleterious substances until it is replaced to its former location. All other conditions shall be as specified in Section 19-3.061B.

19-3.062C Trench Backfill - After the pipe, conduit, duct or line hereinafter called pipe, except for cast-in-place concrete pipe, has been properly laid and approved, material meeting the specification for bedding material, as shown in Standard Plan No. 13 , shall be deposited by hand as shown on Standard Plan No. 13. Initial backfill material shall be thoroughly compacted by mechanical means or jetting to obtain a density of 95 percent relative compaction. Initial backfill material shall then be placed in uniform layers on all sides of the pipe to a level at least one foot above the top of the pipe. Said initial backfill material shall be compacted by mechanical means or jetting to a relative compaction of 95 percent.

The trench, from one foot over the top of the pipe to an even plane two feet below final finished grade, may be backfilled with native material from excavation, free from stones or lumps exceeding three inches in greatest diameter, vegetable matter or other unsatisfactory material, and shall be compacted to a relative compaction of 85 percent or to a density equal to that of surrounding soils, whichever is lesser.

Compaction of trench backfill by jetting will be permitted to a point 24 inches below finished grade except when, as determined by the Engineer, the backfill material is of such character that it will not be self-draining when compacted. No ponding will be permitted.

Top soil shall be wheel rolled for compaction.

When jetting is permitted, material for use as trench backfill shall be placed and compacted in layers not exceeding four feet in thickness. The work shall be performed without damage to the pipe and embankment and in such manner that water will not be impounded. Jetting methods shall be supplemented by the use of other compaction equipment when necessary to obtain the required compaction. Water used for jetting shall be furnished and applied at the contractor's expense.

Jetting shall be accomplished only by inserting the water pipe, equipped with an approved jetting head, to the lowest portion of the fill to be compacted, and continuously running water until the water rises to the surface. Insertion of jet pipes shall be at four feet maximum intervals.

When heavy machine tamping of backfill material is employed, layer thickness of backfill material may be modified to depths stipulated by the manufacturer of such equipment to produce the relative compaction specified. Such equipment shall be equipped with impact regulator valves which will permit the rams to strike more gentle blows against the first course of material and as otherwise required.

19-3.062C(1) Backfill for Cast-In-Place Concrete Pipe - Initial backfill material in accordance with Standard Plan No. 13 shall be placed by hand to a depth of one foot over the top of the pipe.

Said initial backfill material shall be thoroughly compacted by tamping or jetting to obtain a density of 95 per cent relative compaction. Intermediate backfill material may consist of native material from excavation, free from stones or lumps exceeding three inches in greatest diameter, vegetable matter or other unsatisfactory material. In accordance with the curing procedures specified in Section 63 a six-inch uniform layer of moist, loose initial backfill material may be placed on the pipe, by hand, as soon after pipe placement as is possible without damage to the pipe.

Depth of backfill over the top of pipe shall not exceed six inches until concrete compressive strength reaches 700 psi and pipe has been in place 24 hours. Backfill may be completed when concrete strength reaches 1000 psi and pipe has been in place 48 hours. No backfill other than the six inch layer permitted for curing purposes shall be placed until the tests designated have been made and the permission in writing has been obtained from the Engineer.

Backfill material shall be compacted to a density equal to that of the surrounding soils or to a relative compaction of 85 percent whichever is lesser except in improved areas.

19-3.063 Subdivisions and Unimproved Streets

19-3.063A Description - Trenching in subdivisions and unimproved streets shall be considered any area which when accepted by the city will become part of the public property or right of way.

19-3.063B Trench Excavation - Shall be as specified in Section 19-3.061B of these specifications.

19-3.063C Trench Backfill - Shall be as specified in Section 19-3.062C of these specifications except as herein modified.

The trench from one foot over the top of the pipe to the bottom of the structural section may be filled with native material from the excavation, free from stones or lumps exceeding three inches in diameter, vegetable matter or other unsatisfactory material, and shall be compacted to a relative compaction of 95 percent.

19-3.065 Pervious Backfill Material - Shall be in accordance with the State Standard Specifications.

19-3.08 Payment - Payment for structure excavation and backfill and trench excavation and backfill are considered to be included in the payment for the structure and/or pipe and no additional compensation will be allowed therefor.

A proposal item may be included for removal of unsuitable material and imported select material to be paid for on a cubic yardage basis. Such payment shall include the necessary excavation and select material in place and the city shall have the right to increase or decrease the proposal quantity by more than 25 percent with no adjustment of the contract unit price.

SECTION 20

LANDSCAPE AND IRRIGATION

Landscaping, functional planting and irrigation shall be as specified herein in lieu of the State Standard Specifications.

20-1 General - This section shall govern the preparation, planting and irrigation system construction for landscaping areas required by the plans or Special Provisions.

Existing utilities and improvements not designated for removal shall be protected in place. Removals shall be performed in accordance with applicable provisions of Section 8 of the State Standard Specifications.

Unless otherwise provided, walls, curbs, planter boxes, walks, irrigation system and similar improvements required by the plans or Special Provisions shall be constructed following rough grading and before landscaping.

20-2 Landscape and Irrigation Materials

20-2.1 Landscape Materials

20-2.1.1 Topsoil - Topsoil shall be designated as Class A (imported), Class B (selected) or Class C (unclassified) as specified herein. The Engineer shall determine the suitability of topsoil prior to use. Topsoil shall be transported from the source to its final position unless stockpiling is specified.

(a) Class A Topsoil. Class A topsoil shall be from a source outside the limits of the project selected by the Contractor and in compliance with the requirements specified herein. The Engineer may make such inspections and perform such tests as deemed necessary to determine that the material meets the requirements.

At least fifteen days before scheduled use, the proposed source of topsoil must be submitted to the Engineer for approval. The Contractor shall submit a written request for approval which shall be accompanied by a written report of a testing agency registered by the State for agricultural soil evaluation which states that the proposed source complies with these specifications. Class A topsoil shall have the same relative composition and structure, a friable sandy loam character, and be free of roots, clods and stones larger than 1" in greatest dimension, pockets of coarse sand, noxious weeds, sticks, brush and other litter. It shall not be infested with nematodes or other undesirable insects and plant disease organisms. Class A topsoil shall meet the following additional requirements:

(1) Gradation Limits. Sand, 50-80%, clay, 20% maximum, and silt, 30% maximum. The sand, clay and silt gradation limits shall be as defined in ASTM D-422.

(2) Permeability Rate. Not less than 0.5" per hour nor more than 2" per hour when tested in accordance with ASTM D-2434 or other approved methods.

(3) Agricultural Suitability. The topsoil shall suitable to sustain the growth of the plants specified.

(b) Class B Topsoil. Class B topsoil is defined as material which is obtained from sources and in the quantities designated on the plans or in the Special Provisions and which requires transport to the designated landscape areas. Such designated sources of the Class B topsoil may be within or outside the project limits. The cost of stripping the surface of vegetation and debris at the designated locations and processing of the material to a finely divided state, before it is spread, shall be included in the price bid for hauling and placing.

(c) Class C Topsoil: Class C topsoil is defined as soil found in place in the designated landscape area, including soil compacted in place as part of the earthwork specified for the project.

20 - 2.1.2 Soil Fertilizing and Conditioning Materials

(a) General. Fertilizing materials shall comply with the applicable requirements of the State Agricultural Code. All fertilizing materials shall be packaged, first grade, commercial quality products identified as to source, type of material, weight and manufacturer's guaranteed analysis. Fertilizing material shall not contain toxic ingredients or fillers in quantities harmful to human life, animals or plants.

When required by the Engineer, the Contractor shall furnish a Certificate of Compliance stating that the material substantially meets the specifications.

(b) Manure. Manure shall be the product of yardfed cattle, free of weed seed, straw or other inert material, and aged at least 3 months. The manure shall have been processed by grinding and screening and shall be of a consistency that will readily spread with a mechanical spreader.
Manure may be supplied in bulk if the source is approved in advance by the Engineer.

(c) Commercial Fertilizer. Commercial fertilizer shall be a pelletized or granular product having a chemical analysis as specified on the plans or in the Special Provisions. Commercial fertilizer shall be free-flowing material delivered in unopened sacks. Material which becomes caked or otherwise damaged shall not be used.

(d) Organic Soil Amendment. Organic soil amendment shall be selected from Type 1, 2 or 3 products as described herein.

Type 1 organic soil amendment shall be a ground or processed wood product derived from redwood, fir or cedar sawdust, or from the bark of fir or pine, treated with a non-toxic agent to absorb water quickly, and shall comply with the following requirements:

Gradation: Sieve Size		Percent Passing
1/4"	-	95% minimum
#8	-	80% minimum
#35	-	30% minimum

Nitrogen Content (%, dry weight)

Redwood	0.4 - 0.6%
Fir	0.56 - 0.84%
Cedar	0.56 - 0.84%
Fir bark	0.8 - 1.2%
Pine bark	0.8 - 1.2%

Salinity

Maximum saturation extract conductivity: 2.5 milliohms/centimeter at 25° C.

Wettability

When one teaspoon of tap water is applied to 4 cubic inches of the air-dry product, the material shall become completely damp in a period not exceeding 2 minutes. Any wetting agent added shall be guaranteed non-phyto-toxic at the rate used.

Type 2 organic soil amendment shall be a relatively dry friable organic compost derived from sewage sludge processed for agricultural use. It shall contain at least 1% nitrogen by dry weight and comply substantially with the gradation for Type 1 soil amendment.

(e) Mulch. Mulch shall be designated by Type in accordance with the requirements herein. Mulch shall be packaged in bales or bags unless the engineer approves a bulk source in advance of delivery to the site of the work.

Type 1 mulch (ground wood product), shall comply with the requirements for type 1 organic soil amendment.

Type 2 mulch (sewage sludge product), shall comply with the requirements for type 2 organic soil amendment.

Type 3 mulch (mushroom compost), shall comply with the requirements for Type 3 organic soil amendment.

Type 4 mulch (peat), shall be brown compressed sphagnum or hypnum.

Type 5 mulch (fir bark chips), shall be fir bark chips in the gradation specified.

Type 6 mulch (straw), shall be either threshed new straw or stable bedding material derived from rice, oats or barley. Straw in an advanced state of decomposition will not be acceptable.

20-2.1.3 Seed - Seed shall be fresh, clean, new crop seed, mechanically premixed to specified proportions.

Seed shall be delivered to the site in original unopened containers bearing the dealer's guaranteed analysis and germination percentage, and a certificate or stamp or release by a County Agriculture Commissioner. Any seed tagged "warning, hold for inspection" shall be inspected and released by the Agriculture Commissioner of the County within which the seeds are to be planted.

20-2.1.4 Plants

(a) General. Plants may be inspected and approved at the nursery by the Engineer prior to shipment to the planting site. All plants shall be inspected at the planting site prior to planting by the Engineer.

All plants shall have a growth habit normal to the species and shall be sound, healthy, vigorous, and free from insect pest, plant diseases, sun scalds, fresh bark abrasions, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and well "hardened off". All plants shall have normal well-developed branch systems, and vigorous and fibrous root systems which are neither root nor pot-bound and are free of kinked or girdling roots.

Other than the normal side pruning during the growth period, no pruning shall be done prior to inspection at the nursery.

(b) Trees. All trees shall be of the specified height and diameter. The height shall be measured from the root crown to the last division of the terminal leader and the diameter shall be measured 6 inches above the crown roots. The height of palm trees shall be measured from the ground line to the base of the growing bud. The tree shall stand reasonably erect without support.

(c) Shrubs. Shrubs shall be of the specified type and size, selected from high quality well-shaped nursery stock.

(d) Flatted Plants. Ground cover plants and other flatted plants shall be grown and remain in the flats until transplanted at the site. The soil and spacing of the plants in the flat shall insure the minimum disturbance of the root system at time of transplanting.

(e) Sod and Stolons (turf grass). Turf grass stolons shall be fresh clean living sections of runners of hybrid bermuda grass or hybrid bent grass as designated in the contract documents. They shall be free of turf disease, insects or weeds, and capable of healthy vigorous growth.

For mechanical or hand spreading, bermuda grass stolons shall be 1 to 4 inches long and bent grass 4 to 8 inches long. Stolons to be planted in a slurry mixture as described in Section 20-3.4.8 shall be supplied in shorter sections as required.

(f) Cuttings. Cuttings shall be fresh stock cut with a sharp hand tool from the stems of healthy vigorous plants of the species specified. If not otherwise specified, the length of cuttings shall be in accordance with the best horticultural practice.

20 - 2.1.5 Headers, Stakes and Ties

(a) General. Lumber for landscape work shall be construction heart rough redwood in the size specified. Galvanized steel pipe shall be as specified in Section 20-2.2.1-(a). Nails, lag screws and miscellaneous hardware shall be galvanized commercial quality material. Miscellaneous fabricated metal items shall be made from steel conforming to ASTM A-36.

(b) Headers and Stakes. Headers shall be 2 x 4 inch except that two 1 x 4 inch boards shall be supplied for laminations on turns and curves. Header stock shall be supplied in lengths at least 10 feet. Stakes for headers shall be pointed 2 x 4 inch, at least 18 inches long. Joint splicing lumber shall be 1 x 4 inch, 2 feet long.

(c) Tree Stakes. The type of tree stake shall be as designated in the Special Provisions. The length of tree support stakes shall be 10 feet.

Guy wire shall be No. 12 AWG zinc-coated iron. Plastic ribbon tie material shall be one inch wide with a minimum tensile strength of 500 pounds.

Deadman stakes shall be either 2 x 4 inch redwood or 3/4 inch diameter steel pipe 3 feet long.

Covers for wire shall be barden hose, 1/2 inch minimum diameter.

20-2.2 Irrigation System Materials

20-2-2.1 Pipe and Fittings - The type of pipe materials and fittings shall be as designated on the plans or in the Special Provisions and shall comply with the following:

(a) Steel Pipe. Steel pipe shall be galvanized, standard weight (Schedule 40) complying with the requirements of ADTM A-120. Steel pipe shall be jointed with galvanized, threaded, standard weight malleable iron fittings and couplings.

(b) Plastic Pipe for Use with Solvent Weld Socket or Threaded Fittings. Plastic pipe shall be rigid unplasticized polyvinyl chloride PVC 1220.(Type 1, Grade 2), conforming to ASTM D-1785. Plastic pipe marked with product standard PS-21-70 conforms to the ASTM requirements. The minimum pressure rating shall not be less than the working pressures indicated therein for the schedule and sizes listed.

Schedule 40 pipe shall be used for installation on the discharge side of control valves and Schedule 80 pipe shall be used for continuously pressurized pipe on the supply side of control valves. Schedule 80, pipe only, shall be supplied when threaded joints are specified or otherwise permitted by the Engineer.

Fittings and couplings for plastic pipe shall be threaded or slip-fitting tapered socket solvent weld type. Threaded adapters shall be provided with socket pipe for connections to threaded pipe. Plastic pipe fittings and couplings shall be PVC I or PVC I/II material supplied in the same schedule size specified for the pipe. The type of plastic material and schedule size shall be indicated on each fitting or coupling. Fittings and couplings shall comply with the following specifications:

Socket Fittings

Schedule 40	ASTM-D-2466
Schedule 80	ASTM-D-2464

Threaded Fittings

Schedule 80	ASTM-D-2464

(c) Plastic Pipe for Use with Rubber Ring Gaskets. Plastic pipe for use with rubber ring gaskets shall be rigid unplasticized polyvinyl chloride PVC (Type 1, Grade 1), manufactured in accordance with ASTM D-2241. Plastic pipe market with product standard PS 22-70 conforms to the ASTM requirements.

Pipe shall be supplied with plain ends or with an integral thickened expanded bell with rubber ring groove. Couplings for plain end pipe shall be of the single rubber ring type with solvent weld socket on one end or shall be of the double rubber ring type.

Rubber ring gaskets shall be of a synthetic rubber supplied in accordance with the requirements of ASTM D-1869.

Pipe shall be furnished in the following Standard Dimension Ratios (SDR) and Pressure Ratings:

160 psi	SDR 26
200 psi	SDR 21

(d) Copper Pipe. Copper pipe shall be Type K in accordance with ASTM B-98. Copper pipe shall be jointed with the appropriate solder type wrought copper fittings for 2-1/2" and smaller sizes. Cast brass fittings shall be used for sizes over 2-1/2".

(e) Asbestos Cement Pipe and Fittings. Asbestos cement pipe and fittings shall comply with Section 64, Asbestos Cement Pressure Pipe. Couplings shall be asbestos-cement with rubber ring sealing components.

20-2.2.2 Valves and Valve Boxes

(a) General. Valves shall be of the size, type and capacity designated on the plan or in the Special Provisions and shall comply with the requirements specified herein.

All valves except garden valves shall be capable of satisfactory performance at a working pressure of 200 psi. Valves shall be designed to permit disassembly to replace sealing components without removal of the valve body from the pipeline.

(b) Gate Valves. Gate valves in sizes 2 inches and smaller shall be bronze double disc wedge type with integral taper seats and non-rising stem. Sizes 2-1/2 inches and larger shall be body brass trimmed with other features the same as for 2 inch.

(c) Manual Control Valves. Manual control valves shall be brass or bronze, and shall be straight or angle pattern globe valves, full opening, key operated with replaceable compression disc and ground joint union on the discharge end.

(d) Remote Control Valves. Remote control valves shall be electrically or hydraulically operated. They shall be brass or bronze with accurately machined valve seat surfaces, equipped with flow control adjustment and capability for manual operation. They shall be readily disassembled for servicing.

(e) Garden Valves. Garden valves shall be brass or bronze except for the handle. They shall have a replaceable compression disc, and shall be 3/4 inch straight-nosed, key operated and pressure rated for operation at 150 psi.

(f) Quick-Coupling Valves and Assemblies. Quick-coupling valves shall be brass or bronze with built-in flow control and self-closing valve and supplied in 3/4 inch size unless otherwise required. When a quick-coupler assembly is specified, it shall consist of the valve, quick coupler connection and hose swivel.

(g) Valve Boxes. Valve boxes and covers shall be precast portland cement concrete.

20-2.2.3 Backflow Preventer Assembly - The backflow preventer assembly shall consist of a backflow preventer unit and related components conforming to the governing code requirements.

20-2.2.4 Sprinkler Equipment - Sprinkler heads, bubbler heads and spray nozzles shall be of the types and sizes shown on the plans. Such equipment shall be brass, bronze and stainless steel except for minor components. Equipment of one type and flow characteristic shall be from the same manufacturer and all equipment shall bear the manufactuer's name and identification code in a position where they can be identified in the installed position.

Fixed head sprinklers shall have a one-piece housing with provision for interior parts replacement. Pop-up sprinklers shall be designed to rise at least one inch during operation. Full or part circle sprinklers shall be interchangeable in the same housing.

Shrubbery and bubbler heads shall be adjustable from full flow to shut off.

20-2.3 Electrical Materials

20-2.3.1 General - The Contractor shall furnish and install all electrical equipment and materials required for a complete electrical system.

All equipment and materials shall comply with the requirements of the governing code and the serving utility and shall be approved and identified by Underwriters Laboratories, Inc. (UL).

20-2.3.2. Conduit and Conductors

(a) Conduit. Conduit shall be as specified in Special Provisions.

(b) Conductors. Line voltage conductors shall be supplied in the sizes and types shown on the plan and shall be THW, 600-volt insulation rating, conforming to the applicable provisions to ASTM D-734.

Low voltage control conductors shall be Type UF and supplied in the sizes shown on the plans or in accordance with the control equipment manufacturer's recommendation, and shall be UL approved for direct burial installation.

20-2.3.3. Controller Unit - The type of control unit shall be as called for on the plans. It shall be fully automatic, with provisions for manual operation, sized to accommodate the number of stations or control valves included in the system. Outdoor models shall be housed in a vandal-proof and weatherproof enclosure with locking cover.

20-3 Landscaping and Irrigation Installation

20-3.1 General - The Contractor shall construct the complete landscape and irrigation work specified.

All work on the irrigation system, including hydrostatic and coverage tests, preliminary operations tests of the automatic control system, and the backfill and densification of trenches and other excavations shall be performed after topsoil work and before planting.

20-3.2 Earthwork and Topsoil Placement

20-3.2.1 General - Earthwork and topsoil placement shall include excavation and backfill for the irrigation system and the preparation for and the spreading, densification, cultivation and raking of topsoil, including fertilization and conditioning.

Planting holes and backfill shall be accomplished in accordance with Section 20-3.4, Planting.

Preliminary rough grading and related work to prepare areas for landscaping work to within one-tenth of a foot of finish grade, or to subgrade for Class A or Class B topsoil, shall be completed in accordance with Section 19, Earthwork.

20-3.2.2 Trench Excavation and Backfill - Trenches and other excavations shall be sized to accommodate the irrigation system components, conduit, and other required facilities. Additional space shall be provided to assure proper installation and access for inspection. Unless otherwise specified, the minimum depth to cover over pipelines and conduits shall be as follows:

(a) Electrical conduit - 24 inches (36 inches under roadways).

(b) Water lines continuously pressurized - 24 inches (36 inches under roadways).

(c) Lateral sprinkler lines - 12 inches.

The bottom of trenches shall be true to grade and free of protruding stones, roots or other matter which would prevent proper bedding of pipe or other facilities.

Trenches and excavations shall be backfilled so that the specified thickness of topsoil is restored to the upper part of the trench.

20-3.2.3 Topsoil Preparation and Conditioning

(a) General. The type and thickness of topsoil shall be as shown on the plans, or if not shown, shall be Class A, 6 inches thick. Planting areas shall be free of weeds and other extraneous materials to a depth of 12 inches below finished grade before topsoil is spread.

Soil shall not be worked when it is so wet or so dry as to cause excessive compaction or the forming of hard clods or dust.

The existing soil below subgrade for Class A topsoil shall be scarified to a depth of 6 inches prior to spreading topsoil.

Class C topsoil shall be scarified and cultivated to a finely divided condition to a depth of 8 inches minimum below finsihed grade. During this operation, all stones over one inch in greatest dimension shall be removed.

(b) Fertilizing and Conditioning Procedures. The planting area shall be brought to finished grade before spreading the fertilizers or conditioning materials specified.

Fertilizing and conditioning materials shall be mechanically spread at a uniform rate. The quantities of materials necessary for the planting area shall be at the site and shall be verified by delivery tickets furnished to the Engineer before spreading.

After spreading, the fertilizing and conditioning materials shall be uniformly cultivated into the upper 6 inches of soil by suitable equipment operated in at least two directions approximately at right angles. The resulting soil shall be in a friable condition.

20-3.2.4 Finished Grading - The finished grade shall be smooth, uniform, and free of abrupt grade changes and depressions to insure surface drainage.

The finished grade below adjacent paving, curbs or headers shall be one inch in lawn areas and two inches in shrub or ground cover areas.

After fertilizing and conditioning, the soil shall be watered and allowed to settle to provide a stable surface, not overly densified to the extent that it will prevent aeration and water infiltration. After the soil has dried out to a workable condition, the planting areas shall be regraded, raked, and smoothed to the required grades and contours. Finished surfaces shall be clean and suitable for planting.

20-3.3 Header Installation - Headers shall be installed at the locations and grades shown on the plan prior to planting.

Stakes shall be located at splices, corners, and at intervals not to exceed five feet and driven slightly below the top of the header. Splice plates shall be used at butt joints. Headers shall be nailed to stakes with two nails, clinched one-half inch. Splice plates shall be centered on the joint and nailed to each header with four 10d box nails.

20-3.4 Planting

20-3.4.1 General - The types, sizes and quantities of plant materials shall be as called for in the contract documents.

All plants will be inspected prior to planting, including plants previously approved at the nursery. The Contractor shall be responsible for the condition of all plants, planted or otherwise, until acceptance.

Planting shall be performed with materials, equipment, and procedures favorable to the optimum growth of the plants and in compliance with these procedures.

Except as noted for specimen planting, all planting shall follow the completion of the irrigation system.

20-3.4.2 Protection and Storage - The Contractor shall keep all plant material delivered to the site in a healthy condition for planting. Plants shal not be allowed to dry out. Bare root stock shall be separated and "heeled in" in moist earth or other suitable material. Balled and burlapped plants shall have the root ball covered with moist sawdust, wood chips, or other approved material.

20-3.4.3 Layout and Plant Location - Planting areas will be staked by the Engineer. Detailed layout within the planting areas shall be performed by the Contractor and approved by the Engineer prior to planting. Parkway trees will be located in the field by the Engineer before planting.

The first row of plants in areas designated for center to center spacing of plants shall be located at one-half of designated spacing from the edge of the area.

20-3.4.4 Specimen Planting - Plants in boxes twenty-four inches and larger shall be planted before installation of lateral irrigation lines.

Irrigation lines conflicting with specimen plant locations shall be rerouted to clear the root ball.

20-3.4.5 Tree and Shrub Planting - Planting holes shall be approximately square with vertical sides twice the depth and width of the plant container or ball, and shall be larger if necessary to permit handling and planting without injury or breakage of the root ball or root system. Any plant with a broken or cracked root ball before or during planting shall not be planted.

Containers shall be opened and removed in such a manner that the plant root is not injured. Balled plant wrapings shall be loosened or cut back after plant is positioned in the planting hole.

The native soil at the bottom of planting holes shall be scarified to a depth of 6 inches.

All planting holes shall be backfilled with a prepared soil mix. Soil shall consist of 50% of the specified topsoil and 50% Type 1, 2 or 3 organic soil amendment.

After planting, the plant shall be plumb, with the root crown at its natural growing depth with respect to finished grade. Planting shall be governed by the following requirements:

(a) A layer of prepared soil mix shall be deposited in the planting hole.

(b) The plant shall be set approximately at the center of the hole.

(c) Prepared soil mix shall be deposited in the remainder of the hole to finished grade.

(d) The backfill shall be thoroughly water-settled and additional prepared soil mix added to fill any remaining void below finished grade.

(e) A circular watering basin slightly larger than the planting hole, 4 inches high for trees and 2 inches high for shrubs, shall be left around the plant.

The bottom of the basin shall be at approximate finished grade or slightly lower. Type 1, 2, 3 or 4 mulch shall be spread at least 2 inches thick in the basin.

(f) The plant shall be guyed and staked as specified in Section 20 - 3.4.6.

(g) The area around plants shall be regraded to finished grade. The excess soil shall be disposed of by the Contractor.

20-3.4.6 Plant Staking and Guying - Plant staking and guying shall be installed as follows:

(a) Trees shall be staked with two 2x2x8 foot Redwood Stakes. Ties shall be zinc coated iron wire #12 AWG covered with garden hose or other approved tie. Spacing of the ties shall be as shown on the plans. The alignment of tree and stakes shall parallel the street centerline and placed on the south side of tree.

(b) Guying. Trees and other plants, except specimen plants, to be guyed shall be designated in the contract documents.

Guying shall be done immediately after planting. Three guys per plant shall be installed in accordance with the following:

(1) Each guy shall be secured to the appropriate main branch by a twisted loop of No. 12 AWG zinc-coated iron wire covered with garden hose.

(2) Each guy shall be anchored to a driven stake located at a horizontal distance from the tree equal to the vertical distance from ground to the connection of guy wire on the tree branch.

(3) Each guy shall be covered with highly visible garden hose or plastic tubing to a height of 6 feet above grade.

(4) Slack in each guy shall be removed by hand so as not to bend or twist the plant.

20-3.4.7 Ground Cover and Vine Planting - Soil preparation and fine grading shall be completed prior to ground cover planting.

Ground cover and vines shall be planted in moist soil and spaced as indicated on the plans.

Each plant shall be planted with its proportionate amount of flat soil to minimize root disturbance. Soil moisture shall be such that the soil does not crumble when removing plants.

Following planting, ground cover and vine areas shall be regraded to restore smooth finished grade and to insure proper surface drainage. A one-inch layer of Type 1, 2, 3 or 4 mulch shall be spread over the planted areas. Watering shall begin immediately following mulching.

When necessary to prevent plant damage from pedestrian traffic during the initial growing stage, the Contractor shall erect temporary protective fencing to be removed at the end of the plant establishment period.

Vines shall be tied to walls, fences, etc. in the manner prescribed on the plans. Temporary staking shall be removed at the end of the plant establishment period.

20-3.4.8 Lawn Planting - Before planting lawn, all specified soil preparation and fine grading shall be completed.

(a) Seed Lawn Planting. Seed lawn planting may be accomplished by Method A (dry method) or Method B (hydraulic method). Seeding shall not be performed when the wind velocity exceeds five miles per hour, or is detrimental to the uniform distribution of the seed.

Method A Seed Lawn Planting:

The area to be seeded shall be lightly raked to provide a seed bed.

The required seed mixture shall be sown uniformly at the specified rate. Seeding shall be done in two operations with the spreader set to sow one-half the specified amount in each operation. The second sowing shall be at right angles to the first. After sowing, the area shall be evenly covered to a depth of 1/4 to 1/2 inch with an approved mulch.

The lawn area shall be watered in a manner so as not to cause surface erosion.

Newly seeded surfaces shall be kept moist continuously throughout the germination period.

Method B Seed Lawn Planting:

The seed, fertilizer, fiber and other materials in the slurry mixture shall be as specified. All materials shall be of such character that they will disperse into a uniform slurry when mixed with water. The mixture shall be such that an absorbent porous mat will be formed.

All materials must be available for inspection prior to application. Weights and contents of containers shall be clearly identified. A green coloring additive shall be used in the slurry for visual inspection purposes.

The slurry shall be applied under pressure at the specified rates.

Areas to be planted by this method shall be moistened to a depth of 6 inches but shall not be surface wet at the time of application.

The slurry planted areas shall be kept moist during the germination period, but puddling shall be avoided.

(b) Sod Lawn Planting. The type and thickness of sod and the areas to be sodded shall be in accordance with the Special Provisions.

Subgrade for sod shall be the specified thickness of the sod below finished grades. Soil conditioning and fine grading shall be completed before sodding. No heavy equipment shall operate over the subgrade after grading is completed.

The subgrade shall be moist but not wet when sod is laid. Sod shall be laid with closely fitted joints, and the ends of the strips shall be staggered. Openings shall be plugged with sod or topsoil.

Within two hours after installing sod and before rolling, the sod shall be lightly irrigated. All seams and joints shall then be rolled until the sod is well bonded to the subgrade.

The area shall then be watered thoroughly to penetrate the subsoil at least eight inches. Watering shall be repeated as necessary to keep the sod moist until rooted into the subgrade. Sodded areas shall be protected against foot traffic until the sod is well established.

(c) Stolon Planting. Topsoil preparation and conditioning and finished grading shall be completed in accordance with Sections 20-3.2.3 and 20-3.2.4 before stolen planting.

The area to be planted in stolons shall be thoroughly irrigated to a depth of at least eight inches. As soon as the soil can be worked, the specified commercial fertilizer shall be worked into the top one inch of soil.

At the time of planting, the top two inches of soil shall be friable and contain enough moisture to prevent stolons from drying out during the planting operation. The stolons shall be worked into the soil to a depth of 1/2 to 1-1/2 inches by a mechanical or hand planter, or broadcast by hand and covered with 1/4 inch of mulch.

When the area to be planted exceeds 10,000 square feet, a mechanical spreader shall be used; when less than 10,000 square feet and more than 2,000 square feet, the use of a hand planter or mechanical planter is optional; and when less than 2,000 square feet, hand planting or braodcasting with mulch is optional.

The planted stolons shall not be allowed to dry out. Watering shall begin immediately after planting and the stolons kept moist at all times until the plants are well established.

When overseeding is required, the seed shall be spread in accordance with Section 20-3.4.8(a), Method A, immediately after planting stolons.

20-3.4.9 Erosion Control Planting - Erosion control planting shall be for slope protection. Topsoil grading and conditioning shall be in accordance with Section 20-3.2.

(a) Straw Stabilization. When straw stabilization is specified, Type 6 mulch shall be incorporated into the slope topsoil either by discing or with a steel plate studded roller. The steel plate studs shall be at least 6 inches long, not more than 6 inches wide, and approximately one-inch thick with rounded edges. The roller shall be capable of forcing the straw into the soil a sufficient depth to tie down the surface soils.

(b) Sprigging. Sprigging shall consist of planting turf grasses, cut stems of plants, and plants with attached root system but without adhering soil.

Sprigs shall normally be harvested and planted within a 24 hour period. Ice plant sprigs shall be harvested between 48 and 96 hours before planting so that a thin callous is formed over the cut surface of each sprig. Sprigs shall be shaded during callousing, but shall not be moistened.

Turf grasses shall be planted in accordance with Section 20-3.4.8(c).

Ice plant sprigs shall be planted in moist soil in holes or furrows 4 inches deep and the hole or furrow refilled with soil and made firm around the plant in such a manner that the plant is not damaged.

Sprigs shall be planted individually at specified spacing. When row sprigging is specified, planting shall be in furrows cut along the contour of the slope.

If mulching of sprigged areas is required, it shall immediately follow planting.

(d) Watering. All seeded and planted areas shall be kept moist during the establishment period.

Areas containing ice plants shall be maintained in a barely moist condition to a depth of one inch below the planted root depth.

When a permanent irrigation system is not available, the Contractor shall provide whatever temporary system is necessary to provide adequate watering during the establishment period without erosion detrimental to the planting.

20-3.5 Irrigation System Installation

20-3.5.1 General - The Contractor shall furnish all necessary materials, labor and equipment required to complete the work of installing the irrigation system in accordance with the contract documents.

Large specimen plants shall be planted before installing the irrigation system, as required by Section 20-3.4.4.

Unless otherwise provided, irrigation system layout shown on the plan shall be considered schematic. With the Engineer's approval, the Contractor may make adjustments where necessary to conform to actual field conditions. The irrigation system shall be operational, with uniform and adequate coverage of the areas to be irrigated, prior to planting.

Utility connections shall be as shown on the plan or designated by the utility company. The Contractor shall include in his bid all costs for such utility connections shown on the plans or designated by the utility company.

Trenches through paved areas shall be resurfaced in accordance with Section 19-3.061.

After completing the irrigation system, the Contractor shall submit as-built drawings showing the location of pipe, valves, tubing, wiring, controllers, and electrical services.

20-3.5.2 Irrigation Pipeline Installation

(a) General. Trench excavation and backfill including the depth of cover over the pipeline shall be in accordance with requirements of Section 20-3.2.2.

Pipe fitting shall be installed in accordance with the manufacturer's recommendations and these specifications. When requested by the Engineer, the Contractor shall furnish the manufacturer's printed installation instructions before pipe installation.

When two or more pipelines are installed in the same trench, they shall be separated by a minimum horizontal clear distance of 6 inches and they shall be installed so that each pipeline, valve, or other pipeline component may be serviced or replaced without disturbing the other.

All assemblies shall be assembled as specified and in accordance with the manufacturer's directions.

During installation of pipe, fittings, valves, and other pipeline components, foreign matter shall be prevented from entering the system. All open ends shall be temporarily capped or plugged during cessation of installation operations.

Changes in pipeline size shall be accomplished with reducer fittings.

(b) Steel Pipeline. Ends of pipe shall be cut square and reamed to full size with a long taper reamer.

Threads shall be cut with clean sharp dies and shall conform to American Standard Association Specification B2.

Joints shall be made with a non-toxic non-hardening joint compound applied to the male threads only.

When wrapped pipe is specified, joints and any remaining unwrapped portion of the pipeline shall be similarly wrapped after pressure testing.

(c) Plastic Pipeline. Plastic pipe shall be jointed by socket type solvent welded fittings, threaded fittings, rubber ring fittings or by other means specified. When plastic pipe is jointed to steel pipe, the steel pipe shall be installed first.

Plastic pipe shall be cut square, externally chamfered approximately 10-15 degrees, and all burrs and fins removed.

Solvent welded joints shall be made in accordance with ASTM D-2855. The solvent recommended by the manufacturer shall be used.

Plastic pipe installation shall be in accordance with ASTM D-2774 and the requirements herein.

Care shall be exercised in assembling a pipeline with solvent welded joints so that stress on previously made joints is avoided. Handling of the pipe following jointing, such as lowering the assembled pipeline into the trench, shall not occur prior to the set times specified in ASTM D-2855.

Solvent shall be applied to pipe ends in such a manner that no material is deposited on the interior surface of the pipe or extruded into the interior of the pipe during jointing. Excess cement on the exterior of the joint shall be wiped clean immediately after assembly.

Threads for plastic pipe shall be as specified in (b) above. A plug shall be installed in the bore of the pipe to prevent distortion prior to threading.

Threaded pipe joints shall be made using teflon tape or other approved jointing material. Solvent shall not be used with threaded joints.

Pipe shall be protected from tool damage during assembly. Vices shall have padded jaws and strap wrenches shall be used for installation of fittings and nipples.

Plastic pipe which has been nicked, scarred or otherwise damaged shall be removed and replaced.

Plastic pipe shall be snaked from side to side in the trench to allow one foot of expansion and contraction per 100 feet of straight run.

The pipeline shall not be exposed to water for 24 hours after the last solvent welded joint is made.

(d) Copper Pipeline. Copper pipeline shall be made with sweated solder joints.

Before jointing, the end of the pipe for the depth of the fitting, and the interior of the fitting shall be buffed to a bright finish and coated with solder flux.

The assembled joint shall be made with a 50-50 tin-lead solder. A continuous solder bead shall show around the joint circumference after soldering.

Copper pipe shall be jointed to steel or cast iron pipe with a dielectric union.

(e) Asbestos Cement Pipeline. Asbestos cement pipe when required by City Engineer shall be assembled with flexible rubber ring asbestos cement couplings, utilizing asbestos or cast iron fittings, in accordance with the manufacturer's printed instructions and these specifications.

The pipe barrel shall be supported for its full length, except that the trench bottom shall be belled at couplings to prevent the couplings from bearing on the trench bottom. The deflection of the pipe at the couplings shall be less than 4°.

A coupling shall be installed not more than 4 feet from each valve or caulked cast iron fitting.

Concrete thrust blocks, with sufficient bearing area to resist the thrust of water, shall be constructed against undisturbed earth at all changes of direction exceeding 45°. Portland cement concrete for thrust blocks shall be produced from commercial quality aggregates and cement and shall contain not less than 470 pounds of cement per cubic yard. Hand mixing of this concrete will be permitted.

20-3.5.3 Installation of Valves, Valve Boxes, and Special Equipment - Valves, backflow preventers, pressure regulators and related accessories shall be furnished and installed as specified.

All valves and other equipment shall be installed in a normal upright position unless otherwise recommended by the manufacturer, and shall be readily accessible for operation, maintenance and replacement. Sectional control valves shall not be located within range of sprinklers they control.

Valves shall be the same size as the pipeline in which they are installed.

Gate valves and sectional control valves shall be installed below ground. Gate valves shall be housed in a covered concrete box that will permit access for servicing. Sectional control valves shall be equipped with a sleeve and cap centered on the valve stem.

Quick-coupler valves and garden valves projecting above grade shall be installed 3 feet from the curbs, pavement and walks. In

lawn areas, such equipment shall be installed in a covered concrete box set to finished grade. In ground cover and shrubbery areas, quick-coupler valves shall be set 6 inches above finished grade, and garden valves shall be set between 12 and 15 inches above finished grade. Quick-coupler valves and garden valves shall be installed on a double swing joint riser assembly as described in Section 20-3.5.4(b) and secured to a driven stake (No. 4 reinforcing steel) as described in Section 20-3.5.4(c).

All valve boxes, pipe sleeves, and caps shall be set to finished grade, and valves shall be set at sufficient depth to provide clearance between the cover and the cap, valve handle, or key when the valve is in the fully open position.

Backflow preventers shall be provided with pipe supports and the accessories necessary to properly secure the assembly. All backflow preventers shall be assembled with pipe and fittings of galvanized steel.

20-3.5.4 Sprinkler Head Installation and Adjustment - In accordance with the requirements of Section 20-3.5.6, all mains and laterals, including risers, shall be flushed and pressure tested before installing sprinkler heads, after which a water coverage test shall be performed.

(a) Location, Elevation and Spacing. Sprinkler head spacing shall not exceed the maximum shown on the drawings or recommended by the manufacturer.

In new lawn areas, sprinkler heads shall be installed 3 inches above grade and then reset flush with the finished surface just prior to the first mowing. Lawn sprinklers shall be installed 2 inches clear of adjacent walks, curbs, paving, headers and similar improvements.

Sprinkler heads shall be installed 4 inches from adjacent vertical elements projecting above grade such as walls, planter boxes, curbs and fences.

Shrub heads, bubbler heads and oscillating sprinklers shall be installed 6 inches above finished grade.

Nozzle lines shall be installed at least 12 inches above finished grade. Sprinkler heads projecting above finished grade shall be at least 12 inches from adjacent curbs, walk, paving and similar improvements.

(b) Riser and Nozzle Line Installation. To obtain optimum coverage of the area, risers shall be oriented perpendicular to finished grade.

Risers for oscillating sprinklers and nozzle lines shall be galvanized steel pipe. All other risers may be galvanized steel or Schedule 80 PVC. All pipe between the connection to the lateral or main and the sprinkler head shall be threaded.

Sprinkler head riser assemblies shall be top outlet, single swing joint, or double swing joint as specified herein.

Sprinkler head risers and nozzle risers installed above grade within 24 inches of roadway paving, curbs, walks and similar improvements shall be of the double swing joint type.

A top outlet riser assembly shall consist of a pipe riser threaded into a top outlet ell or tee installed in the lateral supply line.

Double-swing joint and single-swing joint riser assemblies shall utilize a horizontal 6 inch pipe nipple threaded into a side outlet ell or tee installed in the lateral supply line. For a double-swing joint, 3 ells shall be used in the remaining assembly ahead of the vertical riser pipe. For a single-swing joint, one ell shall be used.

Risers for nozzle lines, oscillating sprinklers, and other sprinkler heads installed above grade within 24 inches of curbs, walks, roadways and similar improvements shall be supported by a No. 4 reinforcing steel rod driven into the ground, secured with two stainless steel clamps. The upper end of the rod shall be at finished grade and be of such length that it extends 24 inches below the lateral supply line.

Where nozzle lines cannot be supported on adjacent fences, guardrails and the like, they shall be supported on driven 1/2 inch pipe stakes four feet long at 8 foot centers. The nozzle line shall be secured to the top of the stake with 3/8 inch anchor rings 12 inches long.

(c) Sprinkler Head Adjustment. When all sprinkler heads are installed and the irrigation system is operating, each section or unit shall be adjusted and balanced, with all section control valves fully open to obtain uniform and adequate coverage.

Sprinkler heads having adjustable pin nozzles or orifices shall have the pins adjusted to provide adequate distribution of water over the coverage pattern. The

Contractor shall substitute larger or smaller nozzle cores in nonadjustable sprinkler heads as necessary.

20-3.5.5 Automatic Control System Installation - The Contractor shall install a complete automatic irrigation control system including the automatic controller, remote control valves and wiring, and all necessary accessories and utility service connection.

The automatic controller shall be installed outside of the coverage pattern of the irrigation system at the location designated in the plan. The foundation for the controller shall be concrete of the size shown on the plan or recommended by the manufacturer. The control components in the controller shall be fused and the chassis shall be grounded.

Remote control valves shall be compatible with the automatic controller. When the valve is to be housed in a concrete box, it shall be installed with at least a 6 inch clearance below the concrete cover. The box shall be set to finished grade on a 12 inch layer of one inch crushed rock.

All service wiring shall be installed at the minimum depth specified in Section 20 - 3.2.2 in galvanized steel conduit from the service point to the controller. A separate disconnect switch or combination meter socket, as required, shall be installed between the source of power and the controller. The minimum service wire shall be No. 12 AWG copper 600 volt type TW, TWH or TWHH or larger as required by the contract documents or controller manufacturer. Wire splices shall be located only in specified pull boxes and shall be made with a packaged kit approved for underground use or as specified in the Special Provisions. Pull boxes shall be concrete, set to grade on a 12 inch layer of one inch crushed rock.

Control wiring or hydraulic control tubing shall be housed in conduit between the controller and a concrete pull box installed at least one foot outside the limits of the controller foundation, or the structure foundation where the controller is housed. All other wiring and hydraulic control tubing issuing from the pull box shall be direct burial installed in main or lateral water line trenches wherever practicable. The wiring or tubing shall be bundled and secured to the lower quadrant of the irrigation pipeline at ten foot intervals with plastic electrical tape. Sufficient slack shall be left in the wiring or tubing to provide for expansion and contraction. When the control wiring or tubing cannot be installed in a pipe trench, it shall be installed a minimum of 18 inches below finished grade and a bright colored plastic ribbon with suitable markings shall be installed in the trench 6 inches below grade directly over the wire or tubing.

Control wiring shall be suitably color coded as necessary for identification. All common wire shall be the same color. Unless otherwise required, all control wiring shall be direct burial Type

UF, No. 14 AWG copper. Splices in control wire shall be made in accordance with the requirements for service wire. At least 2 feet of slack shall be left at each splice and point of connection in pull boxes and valve boxes.

All wiring shall be tested for continuity, open circuits, and unintentional grounds prior to connecting to equipment. When tested for a period of four hours, the hydraulic control system shall maintain a constant test pattern of 125 psi.

Upon completion of the work, the control system shall be in operating condition with an operational chart mounted within the controller cabinet.

20-3.5.6 Flushing and Testing. After completion and prior to the installation of any terminal fittings, the entire pipeline system shall be thoroughly flushed to remove dirt, scale, or other material. After flushing, the following tests shall be conducted in the sequence listed below. All equipment, materials, and labor necessary to perform the tests shall be furnished by the Contractor and all tests shall be conducted in the presence of the Engineer.

(a) Pipeline Pressure Test. A water pressure test shall be performed on all pressure mains and laterals before any couplings, fittings, valves and the like are concealed. All open ends shall be capped after the water is turned into the line in such a manner that all air will be expelled. Pressure mains shall be tested with all control valves to lateral lines closed. After the pressure main test, all valves shall be opened to test lateral lines. The constant test pressure and the duration of the test are as follows:

Mains	6 hours	at	125 psi
Laterals	2 hours	at	100 psi

(b) Sprinkler Coverage Test. The coverage test shall be performed after sprinkler heads have been installed and shall demonstrate that each section or unit in the irrigation system is balanced to provide uniform and adequate coverage of the areas serviced. The Contractor shall correct any deficiencies in the system in accordance with the requirements of Section 20-3.5.4(c).

(c) Operational Test. The performance of all components of the automatic control system shall be evaluated for manual and automatic operation.

During the maintenance period and at least 15 days prior to final inspection, the Contractor shall set the controller on automatic operation and the system shall operate satisfactorily during such period. All neces-

sary repairs, replacements and adjustments shall be made until all equipment, electrical work controls and instrumentation are functioning in accordance with the contract documents.

20-4 Plant Establishment Work - Plant establishment work shall consist of caring for the highway planting as specified in this Section 20-4 and in the special provisions.

The Engineer will notify the Contractor in writing of the start of the following plant establishment periods and will furnish statements regarding days credited to the plant establishment work after said notification:

1. Type 1 plant establishment period shall be the number of working days specified for plant establishment in the special provisions and shall begin after all work has been completed, except the application of commercial fertilizer.

2. Type 2 plant establishment period shall be the time between completion of all planting work (except the application of commercial fertilizer) and acceptance of the contract, provided however, that the contract will not be accepted unless the plant establishment work has been satisfactorily performed for at least the number of working days specified for plant establishment in the special provisions.

   If relief from maintenance and responsibility is granted for a completed portion of the work, as provided in Section 7-1.15, "Relief from Maintenance and Responsibility", Type 2 plant establishment period for said completed portion shall be the time between completion of all planting work (except the application of commercial fertilizer) and the granting of relief from maintenance and responsibility, provided however, that said relief will not be granted unless the plant establishment work in the completed portion of the work has been satisfactorily performed for at least the number of working days specified for plant establishment in the special provisions.

The time required for plant establishment work shall be considered as included in the total time limit specified for the contract.

The Contractor will be required to adequately water plants, replace unsuitable plants, do weed, rodent and other pest control and other work, as determined necessary by the Engineer, every calendar day before acceptance of the contract.

Working days upon which no work will be required, as determined by the Engineer, will be credited as one of the plant establishment working days, regardless of whether or not the Contractor performs plant establishment work.

Working days when the Contractor fails to adequately perform plant establishment work including but not limited to watering plants, replacing unsuitable plants, do weed, rodent and other pest control, determined to be necessary by the Engineer, will not be credited as plant establishment working days.

Commercial fertilizer shall be applied to trees, shrubs, vines and ground cover areas as specified in the special provisions.

Plants shall be kept watered as provided in Section 20-3.4.9(d), "Watering"; basins and basin walls shall be kept well formed; and weeds shall be kept removed from within the basins, including the basin walls, and from within header boards.

Vines next to fences shall be kept tied to the fences as provided in Section 20-3.4.7, "Ground Cover and Vine Planting".

Weeds which appear in asphalt concrete or rock sealed areas shall be killed before they exceed 2 inches in height by spraying with a chemical weed killer which will not stain the surfacing.

All planted areas shall be kept free of debris and shall be weeded and cultivated at intervals not to exceed 10 days or as specified in the special provisions. The first mowing of lawn areas shall be performed when the grass is 2-1/2 inches high and shall be repeated as often as is necessary to maintain the lawn at a height of 2 inches. In no case shall the lawn be cut lower than 1-1/2 inches in height.

Any required pruning of plants will be designated by the Engineer at the start of the plant establishment period and the Contractor shall perform the pruning as part of the plant establishment work.

Where chemical weed control is permitted by the special provisions or the Engineer, weeds shall be killed before they exceed 2 inches in height.

Where weeds are to be mowed as specified in the special provisions, they shall be mowed as close to the ground as possible before they exceed 6 inches in height.

Where weeds are to be pulled by hand as specified in the special provisions, they shall be pulled before they exceed 4 inches in height.

SECTION 25

AGGREGATE SUBBASES

Aggregate subbases shall be as specified in Section 25 of the State Standard Specifications except as herein modified.

25-1.02D Class 6, Class 7 and Class 8 Aggregate Subbases - Aggregate for Class 6, Class 7 and Class 8 aggregate subbases shall be clean and free from vegetable matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm stable base.

The percentage composition by weight of Class 6, Class 7 and Class 8 aggregate subbases shall conform to the grading shown in the following table for the class specified when determined by Test Method No. Calif. 202:

PERCENTAGE PASSING

Sieve Sizes	Class 6	Class 7	Class 8
4"	95 - 100	-------	-------
3"	90 - 100	-------	-------
2-1/2"	--------	100	100
No. 4	35 - 90	35 - 70	35 - 70
No. 200	0 - 20	5 - 20	5 - 20

Class 6, Class 7 and Class 8 aggregate subbases shall also conform to the quality requirements shown in the following table for the class specified.

TESTS	TEST METHOD NO. CALIF.	REQUIREMENT Class 6	Class 7	Class 8
Sand Equivalent	217	55	30	25
Resistance (R Value)	301	70	70	30

All values listed are minimum values acceptable.

25-1.06 Measurement - Quantities of aggregate subbase are computed from the areas on which subbase material is to be placed as shown on the Contract Drawings. The quantity as set forth in the proposal shall be considered as final unless the Engineer modifies the typical sections or limits of work as shown on the Contract Drawings. Excepting that the Contractor may, at his own ex-

pense, have the material weighed by a Public Weightmaster on scales inspected and sealed by the State of California Bureau of Weights and Measures, in which event a unit wet density of 150 pounds per compacted cubic foot of material will be used to convert the tonnage to cubic yards of material in place as evidence by weight tickets furnished to the Engineer.

25-1.07 Payment - Aggregate subbase will be paid for as specified in the State Standard Specifications except that the cost of furnishing and applying water will be considered as included in other items and no additional compensation will be allowed therefor.

SECTION 26

AGGREGATE BASES

Aggregate bases shall conform to Section 26 of the State Standard Specifications, except as herein modified.

26-1.01 Description - Aggregate bases are designated herein as Class 1, Class 2, Class 3 and Class 4. The class of aggregate base will be shown on the plans or specified in the special provisions.

26-1.02 Materials - Class 1, Class 2 or Class 3 aggregate bases shall be as specified in Section 26-1.02C of the State Standard Specifications. Class 4 aggregate base - aggregate furnished for Class 4 aggregate base - shall be free from vegetable matter and other deleterious substances and shall be of such nature that it can be compacted readily under watering and rolling to form a firm stable base.

The aggregate shall consist of any one or a mixture of the following materials:

1. Broken stone or crushed gravel.
2. Natural material having essentially the same qualities of angularity or surface irregularity and roughness as broken stone.
3. Natural rough surface gravel.

The percentage composition by weight of Class 4 aggregate base shall conform to the following grading when determined by Test Method No. Calif. 202:

Sieve Sizes	Percentage Passing Sieves
2"	100
1-1/2"	90 - 100
3/4"	50 - 90
No. 4	25 - 50
No. 200	3 - 15

The Class 4 aggregate base shall conform to the following quality requirements:

Test	Test Method No. Calif.	Requirements
Loss in Wet Shot Rattler	210	55% Max.
Loss in Los Angeles Rattler (after 500 revolutions)	211	50% Max.
Resistance (R-value)	301	75 Min.
Sand Equivalent	217	26 Min.
Plasticity Index	202	6 Min.

26-1.04 Spreading - The provisions of the State Standard Specifications shall be modified as follows:

Water shall be introduced into the aggregate base, except for Class 4, prior to spreading in sufficient quantity to prevent segregation and nonuniform thickness of spread.

The use of bottom dump trucks is not precluded if the desired final results can be satisfactorily obtained. New and approved spreading equipment which will produce the desired results may be used. If methods can be developed whereby material can be successfully spread working from wind rows, this is satisfactory.

Class 4 aggregate base shall be spread as specified in the State Standard Specifications, except that it may be spread with the use of a motor grader or other equipment that will provide the uniform layer conforming to the planned section both transversely and longitudinally within the thickness tolerance specified hereafter, without causing segregation of the material.

26-1.07 Payment - Payment for furnishing and applying water after weighing shall be considered to be included in the price paid for other items and no aditional compensation will be allowed therefor.

SECTION 27
CEMENT TREATED BASES

Cement Treated Bases shall be as specified in Section 12 of the State Standard Specifications.

SECTION 28

LEAN CONCRETE BASE

Lean Concrete Base shall be as specified in Section 28 of the State Standard Specifications.

SECTION 36

PENETRATION TREATMENT

Penetration treatment shall be as specified in Section 36 of the State Standard Specifications, except as herein modified.

36-1.07 Payment - Cost for sand cover used to cover excess asphalt for public convenience or because of failure to penetrate the surface will be considered as included in other items of work and no additional compensation will be allowed therefor.

SECTION 37

BITUMINOUS SEALS

Bituminous seal shall be a specified in Section 37 of the State Standard Specifications, except as herein modified.

37-1.09 Payment - The cost of traffic control and flagmen and the cost of salvaging the stockpiling excess screenings will be considered as included in the price paid for other items and no additional compensation will be allowed therefor.

SECTION 39

ASPHALT CONCRETE

Asphalt concrete shall be as specified in Section 39 of the State Standard Specifications, except as herein modified.

39-6.01 Compacting - Compacting shall be in accordance with the State Standard Specifications except that payment for any and all water used shall be considered as part of the other items of work and no additional compensation will be made.

SECTION 40

PORTLAND CEMENT CONCRETE PAVEMENT

Portland cement concrete pavement shall be as specified in Section 40 of the State Standard Specifications.

SECTION 41

PAVEMENT SUBSEALING

Pavement subsealing shall be as specified in Section 41 of the State Standard Specifications.

SECTION 42

GROOVE AND GRIND PAVEMENT

Groove and grind pavement shall be as specified in Section 42 of the State Standard Specifications.

SECTION 49

PILING

Piling shall be as specified in Section 49 of the State Standard Specifications.

SECTION 50

PRESTRESSING CONCRETE

Prestressed concrete members shall be as specified in Section 50 of the State Standard Specifications.

SECTION 51

CONCRETE STRUCTURES

Concrete structures shall be as specified in Section 51 of the State Standard Specifications, except as herein modified:

Minor Structures - In lieu of the provisions of Section 51-1.02, 51-1.05, 51-1.22, and 51-1.23 of the State Standard Specifications, such pipe headwalls, drop inlets, catch basins and such other miscellaneous concrete structures that are identified on the plans or in the special provisions as minor structures and are listed in the proposal as separate items will be paid for at the contract price for each structure so listed, which price shall include full compensation for all excavation, backfill, reinforcing steel, stops, metal frames, covers, grates, unused pipe stubs, and pipe connections into the structures as provided for in the special provisions or as shown on the plans. Minor structures, at the option of the Contractor, may be furnished and installed as precast units provided the structures in place are equal in all respects to cast in place construction as specified herein.

51-1.12C Premolded Expansion Joint Fillers - Unless otherwise provided in the special provisions, premolded joint fillers shall have a minimum content of thirty-five percent and a maximum of fifty percent air-blown asphalt by weight. The thickness shall be 3/8 inch. The basic material shall be cane fiber.

SECTION 52

REINFORCEMENT

Reinforcement shall be as specified in Section 52 of the State Standard Specifications.

SECTION 53

AIR-BLOWN MORTAR

Air-blown mortar shall be as specified in Section 53 of the State Standard Specifications.

SECTION 54

WATERPROOFING

Waterproofing shall be as specified in Section 54 of the State Standard Specifications.

SECTION 55

STEEL STRUCTURES

Steel structures shall be as specified in Section 55 of the State Standard Specifications.

SECTION 56

SIGNS

Sign structures shall be as specified in Section 56 of the State Standard Specifications.

SECTION 57

TIMBER STRUCTURES

Timber structures shall be as specified in Section 57 of the State Standard Specifications.

SECTION 58

PRESERVATIVE TREATMENT OF LUMBER, TIMBER AND PILING

Preservative treatment of lumber, timber, and piling shall be as specified in Section 58 of the State Standard Specifications.

SECTION 59

PAINTING

Painting shall be as specified in Section 59 of the State Standard Specifications.

SECTION 61

CULVERT AND DRAINAGE PIPE JOINTS

Culvert and drainage pipe joints shall be as specified in Section 61 of State Standard Specifications.

SECTION 62

ALTERNATIVE PIPE AND PIPE ARCH CULVERTS

Alternative pipe and pipe arch culverts shall be as specified in Section 62 of the State Standard Specifications.

SECTION 63

CAST-IN-PLACE CONCRETE PIPE

Cast-In-Place concrete pipe shall be as specified in Section 63 of the State Standard Specifications and these Standard Specifications.

63-1.05 Construction - An approved method or device shall be used when placing invert concrete to insure that thickness is maintained at not less than minimum wall thickness at any point. Approval of this method or device must be obtained from the Engineer prior to commencement of work. Flow line elevation must not vary more than 0.05 feet from the design grade line.

A starter section shall be used at the beginning of each run of cast-in-place concrete pipe unless indicated otherwise on the plans or approved by the Engineer.

A closing section shall be used where indicated on the plans or as directed by the Engineer, where it is not possible to complete a run of cast-in-place concrete pipe because of lack of clearance ahead in the trench.

If construction of the pipe stops short of a manhole, or for a period of time exceeding 20 minutes, the resulting construction joint must be reinforced with a concrete collar which may be either precast or cast-in-place. This collar must extend one foot either side of the joint, and must be of a minimum thickness equal to that of the pipe.

When using a total periphery, metal form process, care shall be exercised to keep the machine vertical. A deflection of more than five degrees from vertical will not be allowed.

When metal slip forms are used to form the invert of the pipe, the invert shall be hand troweled to a smooth and even finish immediately after placement.

Variations in the internal diameter shall not exceed 1/32 inch per diameter inch. Offsets at form laps shall not exceed the limits specified in the following:

Pipe Diameter	Maximum Offset
24"	3/8"
30"	3/8"
36"	1/2"
42"	1/2"
48"	5/8"
54"	5/8"
60"	5/8"
72"	7/8"

Forms shall be strong enough to withstand the vibrating of the concrete and to permit workmen to place the concrete without causing distortion at any point, and form support systems shall be constructed so that previously placed concrete shall not be damaged.

Form structure bearing plate indentations shall not exceed 1/8 inch and the remaining interior surface of the pipe shall be equivalent to a steel screeded finish. All extraneous concrete shall be removed from the interior surfaces as soon as possible after placing.

Care shall be taken when removing the forms to prevent damage to the pipe. After removal of the forms, the inside of the pipe shall be inspected and any repairs made promptly. If obvious segregation or honeycombing, or inadequate wall thickness are encountered during inspection, the pipe may be rejected by the Engineer.

63-1.06 Curing - Immediately after the exposed exterior surfaces are finished, the exposed surface will be covered with a polyethylene film, at least .002 inch in thickness, or other approved waterproof mat for curing purposes. The sole use of a liquid sealing or curing compound will not be allowed. As soon as it is possible, without causing damage to the fresh concrete pipe, a loose, moist layer of initial backfill material, six inches in thickness, may be hand placed on the concrete in accordance with Section 19-3 of these specifications.

Unrestricted traffic may be permitted over the pipe when concrete strength reaches 1500 psi and pipe has been in place 72 hours. In all cases, the Contractor shall be responsible for correcting any damage to cast-in-place concrete pipe caused by premature or excessive loading prior to the end of a seven day curing period.

All openings into the pipe shall be kept tightly closed at all times during construction, except where work is in progress, and for a minimum time of seven days after placement.

63-2.02 Reinforced Cast-In-Place Pipe - The specification for cast-in-place concrete pipe shall apply in full force for the construction of reinforced cast-in-place concrete pipe except that the minimum thickness of walls shall not be less than four inches. Reinforcement must equal or exceed ASTM Designation: C-76 and must be lapped 10 inches where spliced.

Any obvious segregation, honeycombing, cracks, inadequate wall thickness or any other indications of failure or inadequacy that are observed may be considered as cause for rejection of any portion or all of the pipe.

Prior to final acceptance, small diameter pipe may be checked by viewing with television equipment.

Pressure tests will be required on any section of cast-in-place concrete pipe designed to operate under head.

63-1.08 Measurement - The length of pipe to be paid for will be the slope length measured between centers of manholes or other end of the pipe in other structures. Pipe placed in excess of the length designated will not be paid for.

Structure excavation and backfill, trench excavation and backfill, all material, including concrete and reinforcing steel, pavement cutting and replacement, and all other items of work required to install the pipe complete in place will be considered as part of the item for cast-in-place pipe and no additional payment will be made therefor.

63-1.09 Payment - Items of work measured as specified above will be paid for at the contract price per linear foot for the various sizes of cast-in-place pipe as described in these specifications.

The contract price paid per linear foot for cast-in-place pipe shall include full compensation for all labor, materials, tools, equipment and incidentals and for doing all the work involved in installing the pipe, complete in place as shown on the plans and as specified in these specifications and the Special Provisions.

SECTION 64

ASBESTOS CEMENT PIPE

Asbestos cement pipe shall be as specified in Section 64 of the State Standard Specifications and used when designated by City engineer.

SECTION 65

REINFORCED CONCRETE PIPE

Reinforced concrete pipe shall be as specified in Section 65 of the State Standard Specifications; except as herein modified.

65-1.10 Payment - In lieu of the portions of this section pertaining to structure excavation and structure backfill, those items will be considered as included in the price paid for other items, as well as pavement cutting and replacement, and no additional compensation will be allowed therefor.

SECTION 66

CORRUGATED METAL PIPE

Corrugated metal pipe shall be as specified in Section 66 of the State Standard Specifications.

SECTION 67

STRUCTURAL STEEL PLATE PIPE

Structural metal plate pipe shall be as specified in Section 67 of the State Standard Specifications.

SECTION 68

SUBSURFACE DRAINS

Subsurface drains shall be as specified in Section 68 of the State Standard Specifications.

SECTION 69

OVERSIDE DRAINS

Overside drains shall be as specified in Section 69 of the State Standard Specifications.

SECTION 70

MISCELLANEOUS FACILITIES

Miscellaneous facilities shall be as specified in Section 70 of the State Standard Specifications.

SECTION 71

SEWERS

Sewers shall be as specified in Section 71 of the State Standard Specifications, except as herein modified. (SEE REVISION IN PART II)

71-1.01 Description - This work shall consist of constructing sewers, manholes and appurtenances as shown on the plans and in accordance with these specifications, the special provisions, and as directed by the Engineer, including all necessary street cutting excavation, laying of pipe, backfilling and repaving, to provide a complete sewer of the size and type and to the line and grade shown on the plans.

The type of sewer pipe and manhole will be designated in the contract item.

71-1.02A Reinforced Concrete Sewer Pipe - Reinforced Concrete Sewer Pipe shall conform to the specifications of the American Society for Testing Materials for Reinforced Concrete low-head

internal pressure sewer pipe (ASTM C362 - 57T), hereinafter referred to as ASTM C362 - 57T. It shall be manufacturered by the spin-cast method.

71-1.02B Non-Reinforced Concrete Sewer Pipe -Non-reinforced concrete pipe is prohibited.

71-1.02C Clay Sewer Pipe - Clay sewer pipe shall conform to the specification for extra-strength pipe of the current revision of ASTM C-700-71T and ASTM C-301-72, except that plain end pipe otherwise complying in all respects with said specifications may be used.

Compression couplings for plain end clay pipe shall conform to ASTM C-594-73 and ASTM A-167-70. Shear rings shall be required on all sewer mains.

The ends of the pipe shall be so formed that, when the pipes are laid together and jointed, the pipe will form a continuous line with a smooth interior surface.

Caps shall be furnished with branch pipes or at the ends of pipes that are to be left unconnected. Caps shall consist of disks of the same material as the pipe, or approved plastic 0.06 foot thick, and shall snugly fit the bell or coupling of the branch pipe and shall be secured in place with pipe joint material.

Vitrified Clay Pipe shall be shipped and handled in such a manner as to prevent impact, shocks and free fall, and shall be kept clean at all times. Cracked or broken pipe shall be permanently removed from the work.

Vitrified Clay Pipe shall be of first quality, durable, sound, well-burned throughout its entire thickness, and shall give a clear metallic ring when struck with a hammer. It shall be unglazed.

Vitrified Clay Pipe shall have factory fabricated compression joints, or an approved equal. Joints shall meet the minimum requirements of the Specifications for Vitrified Clay Pipe Joints, using materials having resilient properties in accordance with the current revision of ASTM Serial Designation C425. With approval by the Engineer, individual joints with special conditions may be joined with concrete mortar or hot pour material.

When installing clay pipe with compression joints, the mating surfacing shall be wiped clean of dirt, foreign matter, and an approved lubricant shall be applied to the joint surfaces.

Plain End Vitrified Clay Pipe and Fittings shall conform to the requirements specified above for bell and spigot type of clay pipe.

The ends of the pipe shall not be scored, but each end of every length of pipe shall be marked to indicate the depth of insertion into the coupling.

The joints of pipe shall be coupled with preformed rubber gaskets, which will cushion the abutting ends of pipe or fittings, clamped with corrosion resisting metal compression bands.

71-1.02E Asbestos Cement Sewer Pipe - When designated by City Engineer Asbestos Cement Sewer Pipe shall conform to the requirements of ASTM Specifications C428-59T, for nonpressure service and, unless otherwise indicated on the drawings, in the special provisions, or in the proposal, shall be Class 1500.

The lengths of pipe shall be jointed with sleeve couplers containing rubber gaskets or sealing rings.

The coupler shall meet the same crushing strength requirements as required for the pipe.

71-1.02F Bituminous Lined Corrugated Metal Pipe - Bituminous Lined Corrugated Metal Pipe shall conform to the provisions in Section 66 of the State Standard Specifications.

71-1.02G Cast Iron Pipe and Fittings - Cast Iron Pipe and Fittings shall conform to the specifications of ASTM Designation: A74.

When joints are caulked with lead and packing, the lead shall be pig lead containing not less than 99-1/2 percent metallic lead.

Packing shall consist of "Sealite" yarn or equal and kept clean and free of contamination.

In preparing the pipe for caulking, the pipes shall be seated and butted and the packing driven tightly to the base of the socket so as to entirely encircle the pipe for one-quarter the depth of order to prevent joint compound flowing through into the pipe.

71-1.02M Miscellaneous Iron and Steel - Miscellaneous iron and steel shall conform to the provisions of Section 75.

All steel items shall be galvanized. All cast iron items shall be painted or dipped in commercial quality, asphaltum paint furnished by the Contractor. Galvanizing shall be performed after fabrication.

Frames and covers shall be matchmarked in pairs before delivery to the work and the covers shall fit into their frames without rocking. The faces and seats of manhole covers shall be machined.

71-1.04 Existing Manholes - Shall be adjusted to grade, remodeled or abandoned as shown on the plans in accordance with the provisions of Section 15.

71-1.05 Pipe Laying - Pipe shall be protected during handling against impact shocks and free fall.

When the new facilities interfere with the existing flow of sewage, the Contractor shall provide satisfactory bypass facilities at his expense.

The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe, unless otherwise permitted by the Engineer.

Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bedding material. All adjustments to line and grade shall be made by scraping away or filling in with rock under the barrel of the pipe, and not by wedging or blocking.

Unless otherwise indicated on the drawings or permitted by the Engineer, excavation for sewers shall be by open cut.

All joints shall be cleaned and lubricated immediately prior to installation. All joints shall be mechanical joints, using premolded gaskets, attached to the pipes at the factory, except where other type joints are specifically approved by the Engineer or required in the special provisions. All joints shall be watertight against leakage and infiltration under all conditions of expansion, contraction and settlement.

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

Whenever existing pipes are to be cut and abandoned, the open ends of said pipes shall be securely closed by a tight fitting plug or wall of Class A concrete not less than 0.5 foot thick, or by a tight brick wall 0.67 foot thick with cement mortar joints.

When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Engineer shall be given the opportunity to inspect the existing pipe before connection is made.

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

Contractor shall furnish, install and operate all necessary machinery, appliances and equipment to keep excavations 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 a nuisance 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 operations of all pumping equipment. During placement of concrete, and until concrete has set, the excavation shall be kept free of water.

71-1.06 Pipe Reinforcement and Cradles - Shall be as specified in Section 71-1.06 of the State Standard Specifications.

71-1.07 Sewer Structures - New manholes shall conform with Section 71-1.07 of the State Standard Specifications, except that steps shall not be installed in manholes, and pipe may be laid through the manhole and be used as the channel.

71-1.07A Flushing Inlets - Flushing inlets shall be constructed of the same material as the rest of the sewer, in the manner shown on the standard plans and on the plans. The frame shall be securely set in concrete supports with the top flush with the established finished grade.

71-1.08 Testing of Sewers - Unless specifically waived by the Engineer, before the tests are performed, the pipe installation shall be cleaned in the following manner:

The Contractor shall furnish an inflatable rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be used without a tag line, or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in the last cleanout or manhole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the force of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris, or a damaged pipe shall stop the ball, the Contractor shall remove the obstruction.

AIR TEST: The Contractor shall furnish all materials, equipment and labor for making an air pressure test. Air test equipment shall be approved by the Engineer unless otherwise provided on the plans or in the special provisions.

At his option the Contractor may conduct an initial air test of the sewer lines prior to backfilling the trenches and such tests will be considered to be for the Contractor's convenience only and shall not be construed to be an acceptance

test. The initial tests need not be performed in the presence of the Engineer. The acceptance test shall be conducted under the supervision of the Engineer at the time designated by him in the following manner:

Immediately following the pipe cleaning described, the pipe installation shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reached 4.0 pounds per square inch. At least two minutes shall be allowed for temperature stabilization before proceeding further.

The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch.

The requirements of this specification shall be considered satisfied if the time required in seconds for the pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe is not less than that computed by either of the following equations. The equation which gives the shorter time shall govern:

$t_Q = 0.011\ d_1^2L_1 + 0.011\ d_2^2L_2 + \ldots + 0.011\ d_n^2L_n$

= total K, where $K = 0.011\ d^2L$

tq= total K divided by total C, where $C = 0.0003882\ dL$, and total $C = 0.0003882\ d_1L_1 + 0.0003882\ d_2l_2 + \ldots + 0.0003882\ d_nL_n$

If the time lapse is less than that shown in the table, the Contractor shall determine at his own expense the source or sources of the leakage, and he shall repair or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of this test.

TELEVISION INSPECTION: The Contractor shall hire an independent firm or furnish a closed circuit television camera inspection of the sewer mains. The firm selected shall submit to the City proof of past satisfactory performance in the conduct of closed circuit television camera inspections. The television camera check of the sewer mains shall be made after air tests have been performed and prior to placing of street asphalt paving. Any broken pipe, separation of joints, or any pipe exceeding the permitted tolerances for line and grade shall be replaced or repaired. Any pipe repaired or replaced as a result of camera inspection shall be retested for leakage and deflection. The Engineer shall be present during all television inspection operations. One complete set of video tapes with voice comment made

NCPI AIR TEST TABLES

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

PIPE DIAMETER

LENGTH OF LINE IN FEET

	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"
25	4	10	18	28	40	62	89	121	158	200	248	299	356	418
50	9	20	35	55	79	124	178	241	317	401	495	599	713	837
75	13	30	51	83	119	186	267	364	475	601	743	898	1070	1255
100	18	40	70	110	158	248	356	485	614	765	851	935		
125	22	50	88	138	198	309	446	595	680					
150	26	59	106	165	218	371	510							
175	31	69	121	193	277	425								
200	35	79	141	220	317									
225	40	89	158	248	340									
250	44	99	176	275										
275	48	109	194	283										
300	53	119	211											
350	62	139	227											
400	70	158												
450	79	170												
500	88													
550	97													
600	106													
650	113	170	227	283	340	425	510	595	680	765	851	935	1020	1105

NOTE: TO BE USED WHEN TESTING ONE DIAMETER ONLY

LENGTH OF MAIN LINE IN FEET — 6" DIAMETER

LENGTH OF LATERAL IN FEET — 4" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	14	24	34	44	54	64	74	84	94	103	113	123	163	168
50	19	29	39	48	58	68	78	88	98	108	118	128	166	167
75	23	33	43	53	63	73	83	92	102	112	122	132	164	165
100	28	37	47	57	67	77	87	97	107	117	127	136	162	163
125	32	42	52	62	72	81	91	101	111	121	131	141	160	162
150	36	46	56	66	76	86	96	106	116	125	135	145	159	161
175	41	51	61	70	80	90	100	110	120	130	140	150	157	159
200	45	55	65	75	85	95	105	114	124	134	144	153	156	158
225	50	59	69	79	89	99	109	119	129	139	149	151	154	157
250	54	64	74	84	94	103	113	123	133	143	149	150	153	156
275	58	68	78	88	98	108	118	128	138	146	147	149	152	155
300	63	73	83	92	102	112	122	132	142	145	146	147	151	154
350	72	81	91	101	111	121	131	140	141	143	144	145	149	152
400	80	90	100	110	120	130	136	138	139	141	142	143	147	150
450	89	99	109	119	129	132	134	136	138	139	141	142	145	149
500	98	108	118	126	129	131	133	135	136	138	139	140	144	147

LENGTH OF MAIN LINE IN FEET — 8" DIAMETER

LENGTH OF LATERAL IN FEET — 4" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	22	40	57	75	92	110	128	145	163	180	198	216	223	224
50	26	44	62	79	97	114	132	150	167	185	202	218	220	221
75	31	48	66	84	101	119	136	154	172	189	207	214	217	219
100	35	53	70	88	106	123	141	158	176	194	209	211	214	216
125	40	57	75	92	110	128	145	163	180	198	206	207	211	214
150	44	62	79	97	114	132	150	167	185	201	202	204	209	212
175	48	66	84	101	119	136	154	172	189	197	199	201	206	210
200	53	70	88	106	123	141	158	176	192	194	197	199	204	208
225	57	75	92	110	128	145	163	180	189	192	194	196	202	206
250	62	79	97	114	132	150	167	183	186	189	191	193	200	204
275	66	84	101	119	136	154	172	181	184	187	189	191	198	202
300	70	88	106	123	141	158	174	178	181	184	187	189	196	200
350	79	97	114	132	150	166	170	174	177	180	183	185	192	197
400	88	106	123	141	157	162	166	170	174	176	179	181	189	194
450	97	114	132	148	154	159	163	167	170	173	176	178	186	191
500	106	123	140	146	151	156	160	164	167	170	173	175	183	189

LENGTH OF MAIN IN FEET — 8" DIAMETER

LENGTH OF LATERAL IN FEET 6" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	28	45	63	80	98	116	133	151	168	186	204	221	224	225
50	37	55	73	90	108	126	143	161	178	196	214	220	222	223
75	47	65	83	100	118	135	153	171	188	206	217	217	220	221
100	57	75	93	110	128	145	163	181	198	214	214	215	218	220
125	67	85	102	120	138	155	173	190	208	211	212	213	216	218
150	77	95	112	130	148	165	182	200	207	209	210	211	214	217
175	87	105	122	140	157	175	192	204	206	207	208	209	213	215
200	97	114	132	150	167	185	201	202	204	205	206	207	211	214
225	107	124	142	160	177	195	199	201	203	204	205	206	210	213
250	117	134	152	169	187	195	198	199	201	202	203	204	209	212
275	127	144	162	179	192	194	196	198	200	201	202	204	208	210
300	136	154	172	187	190	192	195	196	198	200	201	202	207	209
350	156	174	181	185	187	190	193	194	196	198	199	200	205	208
400	173	178	181	184	186	189	191	192	194	196	197	198	203	206
450	173	177	180	183	185	187	189	190	192	194	195	196	201	204
500	173	177	180	182	184	186	188	189	191	192	193	194	200	203

LENGTH OF MAIN LINE IN FEET — 10" DIAMETER

LENGTH OF LATERAL IN FEET 4" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	32	59	87	114	142	169	197	224	252	277	277	278	279	280
50	36	64	91	119	146	174	201	229	256	271	272	273	275	277
75	41	68	96	123	151	178	206	233	261	265	267	268	272	274
100	45	73	100	128	155	183	210	238	258	260	262	264	268	271
125	50	77	105	132	160	187	214	242	253	255	257	259	264	268
150	54	81	109	136	164	191	219	244	248	251	253	255	261	265
175	58	86	113	141	168	196	223	239	243	246	249	251	258	262
200	63	90	118	145	173	200	228	235	239	242	245	248	255	260
225	67	95	122	150	177	205	226	231	235	239	242	244	252	257
250	72	99	127	154	182	209	222	227	231	235	238	241	249	255
275	76	103	131	158	186	211	218	223	228	231	235	238	247	253
300	80	108	135	163	190	208	214	220	224	228	232	235	244	250
350	89	117	144	172	194	201	208	213	218	222	226	229	239	246
400	98	125	153	179	188	196	202	208	213	217	221	224	235	242
450	107	134	162	174	183	191	197	203	208	212	216	220	230	238
500	116	143	160	170	179	186	193	198	203	208	212	215	226	235

LENGTH OF MAIN LINE IN FEET — 10" DIAMETER

LENGTH OF LATERAL IN FEET 6" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	37	65	92	120	147	175	202	230	257	277	278	278	279	280
50	47	75	102	130	157	185	212	240	267	271	272	273	276	277
75	57	85	112	140	167	195	222	250	265	266	267	269	272	274
100	67	95	122	150	177	205	232	257	260	262	263	265	269	271
125	77	105	132	160	187	215	242	253	255	257	259	261	266	269
150	87	114	142	169	197	224	245	248	251	254	256	257	263	266
175	97	124	152	179	207	234	241	245	248	250	252	254	260	264
200	107	134	162	189	217	233	237	241	244	247	249	251	258	262
225	117	144	172	199	225	230	234	238	241	244	246	248	255	260
250	127	154	182	209	222	227	231	235	238	241	243	246	253	258
275	136	164	191	213	219	224	229	232	236	238	241	243	251	256
300	146	174	201	211	217	222	226	230	233	236	239	241	249	254
350	166	192	200	207	212	217	222	226	229	232	235	237	245	250
400	181	190	197	203	209	214	218	222	225	228	231	233	241	247
450	180	188	195	201	206	211	215	218	222	225	227	230	238	244
500	179	186	193	198	203	208	212	215	219	222	224	227	235	241

LENGTH OF MAIN LINE IN FEET — 10" DIAMETER

LENGTH OF LATERAL IN FEET — 8" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	45	73	100	128	155	183	210	238	265	279	280	280	281	281
50	63	90	118	145	173	200	228	255	275	275	276	277	278	279
75	80	108	135	163	190	218	245	270	272	272	273	274	276	277
100	98	125	153	180	208	235	263	267	268	269	270	271	274	275
125	116	143	171	198	226	253	263	265	266	267	268	269	272	274
150	133	161	188	216	243	258	260	262	264	265	266	267	270	272
175	151	178	206	233	254	256	258	260	262	263	264	265	268	271
200	168	196	223	249	252	254	256	258	260	261	262	263	267	269
225	186	213	241	247	250	253	255	257	258	259	261	262	265	268
250	204	231	242	246	249	251	253	255	256	258	259	260	264	267
275	221	237	241	244	247	250	252	254	255	256	258	259	263	266
300	232	237	240	243	246	249	251	253	254	255	256	258	262	265
350	232	235	239	242	244	247	249	251	252	253	254	256	260	263
400	231	234	238	240	243	245	247	249	250	251	253	254	258	261
450	230	234	237	239	241	243	245	247	248	250	251	252	256	259
500	230	233	236	238	240	242	244	246	247	249	250	251	255	258

LENGTH OF MAIN LINE IN FEET — 12" DIAMETER

LENGTH OF LATERAL IN FEET — 4" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	44	84	123	163	202	242	282	321	332	333	334	334	336	336
50	48	88	128	167	207	246	286	323	324	326	327	328	331	333
75	53	92	132	172	211	251	290	316	317	319	321	323	327	329
100	57	97	136	176	216	255	295	308	311	313	316	317	323	326
125	62	101	141	180	220	260	297	301	304	308	310	312	319	323
150	66	106	145	185	224	264	290	295	299	302	305	308	315	319
175	70	110	150	189	229	268	283	289	293	297	300	303	311	316
200	75	114	154	194	233	271	277	283	288	292	296	299	308	313
225	79	119	158	198	238	265	272	278	283	288	291	295	304	310
250	84	123	163	202	242	259	267	273	278	283	287	291	301	308
275	88	128	167	207	244	254	262	269	274	279	283	287	298	305
300	92	132	172	211	239	249	257	264	270	275	279	283	295	302
350	101	141	180	218	231	241	249	256	262	268	272	276	289	297
400	110	150	189	210	223	233	242	249	255	261	266	270	283	292
450	119	158	189	204	216	227	235	243	249	255	260	264	278	288
500	128	166	184	198	210	221	229	237	243	249	254	259	273	283

LENGTH OF MAIN LINE IN FEET — 12" DIAMETER

LENGTH OF LATERAL IN FEET — 6" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	50	89	129	168	208	248	287	327	331	332	333	333	335	336
50	59	99	139	178	218	257	297	321	323	325	326	327	330	332
75	69	109	149	188	228	267	307	314	316	318	320	321	326	328
100	79	119	158	198	238	277	302	306	309	312	314	316	321	325
125	89	129	168	208	248	287	295	300	303	306	309	311	317	321
150	99	139	178	218	257	284	289	294	298	301	304	306	314	318
175	109	149	188	228	267	278	284	289	293	296	299	302	310	315
200	119	158	198	238	265	272	278	284	288	292	295	298	306	312
225	129	168	208	248	260	268	274	279	284	288	291	294	303	309
250	139	178	218	246	255	263	269	275	280	284	287	290	300	306
275	149	188	228	242	251	259	266	271	276	280	284	287	297	304
300	158	198	227	238	248	255	262	268	272	277	281	284	294	301
350	178	208	221	232	241	249	255	261	266	271	274	278	289	296
400	189	204	217	227	236	243	250	256	261	265	269	273	284	292
450	187	201	213	223	231	239	245	251	256	260	264	268	279	288
500	186	199	210	219	227	234	240	246	251	256	260	263	275	284

LENGTH OF MAIN LINE IN FEET — 12" DIAMETER

LENGTH OF LATERAL IN FEET 8" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	57	97	136	176	216	255	295	331	332	333	334	334	336	336
50	75	114	154	194	233	273	312	324	325	327	328	329	331	333
75	92	132	172	211	251	290	315	317	319	321	323	324	327	330
100	110	150	189	229	268	306	309	312	314	316	318	319	324	327
125	128	167	207	246	286	300	303	306	309	311	314	315	320	324
150	145	185	224	264	290	295	299	302	305	307	310	311	317	321
175	163	202	242	279	285	290	294	298	301	304	306	308	314	318
200	180	220	260	275	281	287	291	294	297	300	303	305	312	316
225	198	238	265	272	278	283	287	291	294	297	300	302	309	314
250	216	253	262	269	275	280	284	288	291	294	297	299	306	311
275	233	251	260	266	272	277	282	285	289	292	294	297	304	309
300	240	249	258	264	270	275	279	283	286	289	292	294	302	307
350	238	247	254	260	266	271	275	279	282	285	288	290	298	304
400	237	245	252	257	263	267	271	275	278	281	284	286	294	300
450	236	243	249	255	260	264	268	272	275	278	281	283	291	297
500	235	242	248	253	257	262	265	269	272	275	278	280	288	295

LENGTH OF MAIN LINE IN FEET — 15" DIAMETER

LENGTH OF LATERAL IN FEET 4" DIAMETER

-	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	66	128	190	252	314	376	414	415	416	417	418	418	420	421
50	71	133	194	256	318	380	403	406	408	409	411	412	415	417
75	75	137	199	261	323	385	393	397	400	402	404	406	410	413
100	80	141	203	265	327	378	384	388	392	395	397	400	406	409
125	84	146	208	270	331	369	375	380	385	388	391	394	401	406
150	88	150	212	274	336	360	367	373	378	382	385	388	397	402
175	93	155	216	278	340	351	359	366	371	376	380	383	392	398
200	97	159	221	283	332	343	352	359	365	370	374	378	388	395
225	102	163	225	287	324	336	345	353	359	365	369	373	384	392
250	106	168	230	292	317	329	339	347	353	359	364	368	380	388
275	110	172	234	293	310	323	333	341	348	354	359	364	377	385
300	115	177	238	287	303	316	327	336	343	349	354	359	373	382
350	124	185	247	275	292	305	316	325	333	340	346	351	366	376
400	132	194	242	264	281	295	306	316	324	332	338	343	359	370
450	141	203	233	255	272	286	298	308	316	324	330	336	353	365
500	150	199	225	247	264	278	290	300	309	316	323	329	347	359

LENGTH OF MAIN LINE IN FEET — 15" DIAMETER

LENGTH OF LATERAL IN FEET 6" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	72	134	196	257	319	381	411	413	414	416	416	417	419	420
50	82	144	205	267	329	391	399	402	404	406	408	409	413	415
75	92	154	215	277	339	383	388	392	395	398	400	402	408	411
100	102	163	225	287	349	372	378	383	387	390	393	395	402	406
125	111	173	235	297	352	362	369	374	379	383	386	389	397	402
150	121	183	245	307	342	352	360	367	372	376	380	383	392	398
175	131	193	255	317	334	344	353	360	365	370	374	377	387	394
200	141	203	265	312	326	337	346	353	359	364	368	372	383	390
225	151	213	275	304	319	330	339	346	353	358	363	367	379	387
250	161	223	279	298	312	323	333	341	347	353	358	362	374	383
275	171	233	273	292	306	317	327	335	342	348	353	357	370	379
300	181	243	268	286	300	312	322	330	337	343	349	353	367	376
350	201	237	259	277	291	302	312	321	328	334	339	344	359	370
400	204	231	252	268	282	294	304	312	320	326	332	337	353	364
450	201	226	245	261	275	286	296	305	312	319	325	330	346	358
500	199	221	240	255	269	280	290	298	306	312	318	324	341	353

LENGTH OF MAIN LINE IN FEET — 15" DIAMETER

LENGTH OF LATERAL IN FEET 8" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	80	141	203	265	327	389	411	413	414	418	416	417	419	420
50	97	159	221	283	345	395	399	402	404	408	407	409	413	415
75	115	177	238	300	362	383	388	392	395	400	400	402	407	410
100	132	194	256	318	366	373	378	383	387	392	393	395	402	406
125	150	212	274	336	356	364	370	375	379	385	386	389	397	402
150	168	229	291	337	348	356	362	368	373	379	380	383	392	398
175	185	247	309	329	340	349	355	362	366	373	374	378	387	394
200	203	265	309	323	334	342	349	356	361	367	369	373	383	390
225	220	282	303	317	328	337	344	350	356	362	364	368	379	386
250	238	281	298	311	322	331	339	345	351	357	360	364	375	383
275	256	277	293	307	318	327	334	341	346	353	356	359	372	380
300	254	274	290	303	313	322	330	336	342	349	352	356	368	377
350	250	269	283	296	306	315	322	329	335	341	344	349	362	371
400	248	264	278	290	300	308	316	322	328	335	338	342	356	366
450	246	261	274	285	294	303	310	316	322	329	332	337	351	361
500	244	258	270	281	290	298	305	311	317	323	327	331	346	356

LENGTH OF MAIN LINE IN FEET — 18" DIAMETER

LENGTH OF LATERAL IN FEET 4" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	94	183	272	361	450	496	498	499	501	502	502	503	505	506
50	98	187	276	365	454	483	487	489	492	493	495	496	499	502
75	102	191	281	370	459	470	476	480	483	485	488	489	494	497
100	107	196	285	374	450	459	465	470	475	478	481	483	489	493
125	111	200	289	378	438	448	456	462	467	470	474	477	484	489
150	116	205	294	383	427	438	446	453	459	463	467	471	480	485
175	120	209	298	387	416	428	438	445	452	457	461	465	475	481
200	124	213	303	388	406	419	430	438	445	450	455	459	470	478
225	129	218	307	378	397	410	422	431	438	444	449	453	466	474
250	133	222	311	369	388	402	414	424	431	438	443	448	462	470
275	138	227	316	360	380	395	407	417	425	432	438	443	457	467
300	142	231	320	352	372	387	400	411	419	426	433	438	453	463
350	151	240	308	337	358	374	388	399	408	416	422	428	445	457
400	160	249	295	323	345	362	376	388	397	406	413	419	438	450
450	168	246	283	312	333	351	365	378	388	396	404	411	430	444
500	177	237	273	301	323	341	355	368	379	388	396	403	423	438

LENGTH OF MAIN LINE IN FEET — 18" DIAMETER

LENGTH OF LATERAL IN FEET 5" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	99	188	277	366	455	492	495	497	498	499	500	501	503	505
50	109	198	287	376	465	476	481	484	487	489	491	493	497	499
75	119	208	297	386	453	462	468	473	477	480	482	484	490	494
100	129	218	307	396	439	449	456	462	467	470	474	476	484	489
125	139	228	317	406	425	437	445	452	457	462	466	469	478	484
150	149	238	327	397	413	426	435	443	449	454	458	462	473	480
175	158	248	337	385	402	415	426	434	441	446	451	455	467	475
200	168	257	347	375	392	406	417	426	433	439	444	449	462	470
225	178	267	340	365	383	397	409	418	426	432	438	443	457	466
250	188	277	331	356	374	389	401	411	419	426	431	437	452	462
275	198	287	323	348	367	382	394	404	412	419	426	431	447	458
300	208	284	316	341	359	375	387	397	406	414	420	426	443	454
350	228	272	303	328	346	362	375	385	395	403	409	415	434	446
400	224	263	293	316	335	351	364	375	384	392	400	406	426	439
450	219	255	284	307	325	341	354	365	375	383	391	397	418	432
500	215	246	276	298	316	332	345	356	366	375	382	389	411	426

LENGTH OF MAIN LINE IN FEET — 18" DIAMETER

LENGTH OF LATERAL IN FEET — 8" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	107	196	285	374	463	490	493	495	497	498	499	500	503	504
50	124	213	303	392	468	473	478	482	485	487	489	491	495	498
75	142	231	320	409	451	458	465	469	474	477	479	482	488	492
100	160	249	338	423	436	445	452	458	463	467	470	473	482	487
125	177	266	355	409	423	433	442	448	454	458	462	466	475	482
150	195	284	373	397	411	422	432	439	445	450	454	458	469	477
175	212	301	366	386	401	413	422	430	437	442	447	451	464	472
200	230	319	356	377	391	404	414	422	429	435	440	445	458	467
225	248	321	348	368	384	396	406	415	422	429	434	439	453	463
250	265	315	341	361	376	389	399	408	416	423	428	433	448	458
275	275	309	334	354	369	382	393	402	410	417	422	428	443	454
300	271	304	328	348	363	376	387	396	404	411	417	422	439	450
350	266	296	319	337	352	365	376	386	394	401	407	413	430	443
400	262	289	311	329	343	356	367	376	384	392	398	404	422	436
450	258	284	304	321	335	348	359	368	376	384	390	396	415	429
500	255	279	298	315	328	340	351	361	369	376	383	389	409	423

LENGTH OF MAIN LINE IN FEET — 21" DIAMETER

LENGTH OF LATERAL IN FEET — 4" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	126	247	368	490	577	581	582	584	585	586	587	588	590	591
50	130	251	373	494	561	567	570	573	576	578	579	581	584	586
75	135	256	377	498	545	553	559	563	567	569	571	574	579	582
100	139	260	381	503	531	541	548	553	558	561	564	567	573	578
125	143	265	386	503	518	529	537	544	549	553	557	560	568	573
150	148	269	390	488	505	518	527	535	541	546	550	553	563	569
175	152	273	395	475	493	507	518	526	533	538	543	547	558	565
200	157	278	399	462	482	497	509	518	526	531	536	541	553	561
225	161	282	403	450	472	488	500	510	518	524	530	535	548	557
250	165	287	408	439	462	479	492	502	511	518	524	529	544	553
275	170	291	397	429	452	470	484	495	504	511	518	523	539	549
300	174	295	387	420	443	462	476	488	498	505	512	518	535	546
350	183	304	368	402	427	446	462	474	485	493	501	507	526	538
400	192	304	352	386	412	432	448	462	473	482	490	497	518	531
450	201	291	338	372	398	419	436	450	462	472	480	488	510	524
500	209	279	325	360	386	407	425	439	452	462	471	479	502	518

LENGTH OF MAIN LINE IN FEET — 21" DIAMETER

LENGTH OF LATERAL IN FEET — 6" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	131	253	374	495	572	576	579	581	582	584	585	586	588	589
50	141	262	384	505	552	559	563	567	570	573	574	576	581	584
75	151	272	394	515	533	543	549	554	559	562	565	567	574	578
100	161	282	403	501	516	528	536	542	548	552	555	559	567	572
125	171	292	413	483	501	514	524	531	537	542	547	550	561	567
150	181	302	423	468	487	501	512	521	528	533	538	543	554	562
175	191	312	425	454	474	490	501	511	518	525	530	535	548	557
200	201	322	412	441	462	479	491	501	510	517	522	528	542	552
225	210	332	399	429	451	468	482	492	501	509	515	521	537	547
250	220	342	388	418	441	459	473	484	493	501	508	514	531	542
275	230	336	378	409	432	450	464	476	486	494	501	508	526	538
300	240	327	369	399	423	441	456	468	479	487	495	501	521	533
350	255	312	353	383	407	426	441	454	465	474	482	490	511	525
400	246	300	339	369	393	412	428	441	453	462	471	479	501	517
450	239	290	327	357	380	400	416	429	441	451	460	468	492	509
500	234	281	317	346	369	389	405	419	431	441	450	459	484	501

LENGTH OF MAIN LINE IN FEET — 21" DIAMETER

LENGTH OF LATERAL IN FEET — 8" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	139	260	381	503	569	573	576	578	580	582	583	584	587	588
50	157	278	399	520	546	554	559	563	566	569	571	573	579	582
75	174	295	417	513	526	536	543	549	554	557	560	563	571	575
100	192	313	434	493	508	520	529	536	542	546	550	554	563	569
125	209	331	452	476	493	506	516	524	531	536	540	545	556	563
150	227	348	436	461	479	493	504	513	520	526	531	536	549	557
175	245	366	422	447	466	481	493	502	511	517	523	528	542	552
200	262	375	409	435	455	470	483	493	502	509	515	520	536	546
225	280	364	398	424	444	461	473	484	493	501	507	513	530	541
250	297	355	389	415	435	451	465	476	485	493	500	506	524	536
275	298	347	380	406	426	443	456	468	478	486	493	499	518	531
300	293	340	372	398	418	435	449	460	470	479	486	493	513	526
350	285	328	359	384	404	421	435	447	458	466	474	481	503	517
400	279	319	348	372	392	409	423	435	446	455	463	471	493	509
450	274	311	338	362	381	398	413	425	435	445	453	461	484	501
500	270	304	330	353	372	389	403	415	426	436	444	452	476	493

LENGTH OF MAIN LINE IN FEET — 24" DIAMETER

LENGTH OF LATERAL IN FEET — 4" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	163	321	480	638	662	665	667	669	670	671	672	673	674	676
50	167	326	484	637	645	650	654	658	660	662	664	665	669	671
75	172	330	488	617	629	636	642	647	650	653	656	658	663	666
100	176	334	493	599	613	623	631	637	641	645	648	650	658	662
125	180	339	497	582	599	611	620	627	632	637	640	643	652	658
150	185	343	502	567	585	599	609	617	623	629	633	636	647	653
175	189	348	506	552	573	588	599	608	615	621	626	630	642	649
200	194	352	506	538	560	577	589	599	607	613	619	623	637	645
225	198	356	492	525	549	566	580	591	599	606	612	617	632	641
250	202	361	478	513	538	556	571	582	591	599	605	611	627	637
275	207	365	465	501	528	547	562	574	584	592	599	605	622	633
300	211	370	454	491	518	538	554	567	577	585	593	599	617	629
350	220	375	432	471	499	521	538	552	563	573	581	588	608	621
400	229	356	413	453	482	505	523	538	550	560	569	577	599	613
450	238	340	397	436	467	491	509	525	538	549	558	566	590	606
500	244	326	382	422	453	477	497	513	526	538	548	556	582	599

LENGTH OF MAIN LINE IN FEET — 24" DIAMETER

LENGTH OF LATERAL IN FEET — 6" DIAMETER

	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	168	327	485	644	656	660	663	665	667	668	669	670	673	674
50	178	337	495	624	634	641	646	651	654	656	658	660	665	668
75	188	347	505	600	614	624	631	637	641	645	648	650	658	662
100	198	356	515	579	596	608	617	624	630	634	638	641	650	656
125	208	366	525	559	579	593	603	612	618	624	629	632	644	651
150	218	376	511	542	563	579	591	600	608	614	619	624	637	645
175	228	386	493	526	548	566	579	589	598	605	611	616	630	640
200	238	396	477	511	535	553	567	579	588	596	602	608	624	634
225	248	406	462	497	522	542	557	569	579	587	594	600	618	629
250	257	397	449	485	511	531	547	559	570	579	586	593	612	624
275	267	385	437	473	500	521	537	550	561	571	579	586	606	619
300	277	374	426	462	490	511	528	542	553	563	571	579	600	614
350	283	356	406	443	471	493	511	526	538	549	558	566	589	605
400	272	340	389	426	454	477	495	511	524	535	545	553	579	596
450	263	327	375	411	439	462	481	497	511	523	533	542	569	587
500	255	316	362	398	426	449	468	485	499	511	521	531	559	579

LENGTH OF MAIN LINE IN FEET — 24" DIAMETER

LENGTH OF LATERAL IN FEET 8" DIAMETER	25	50	75	100	125	150	175	200	225	250	275	300	400	500
25	176	334	493	645	652	656	659	662	664	666	667	668	671	673
50	194	352	510	615	627	635	641	645	649	652	654	656	662	666
75	211	370	528	589	604	615	623	630	635	639	642	645	653	659
100	229	387	541	566	584	597	607	615	622	427	631	635	645	652
125	246	405	519	546	566	581	592	602	609	615	620	625	637	645
150	264	422	499	528	550	566	579	589	597	604	610	615	630	639
175	282	436	482	512	535	553	566	577	586	594	600	606	622	633
200	299	421	467	498	522	540	554	566	576	584	591	597	615	627
225	317	408	453	485	509	528	543	556	566	575	583	589	608	621
250	331	396	441	473	498	517	533	546	557	566	574	581	602	615
275	324	386	430	462	487	507	523	537	548	558	566	573	595	610
300	317	377	421	452	478	498	514	528	540	550	559	566	589	604
350	307	362	404	435	460	481	498	513	525	535	544	553	577	594
400	298	350	390	420	445	466	483	498	511	522	532	540	566	584
450	292	340	378	407	432	453	470	485	498	510	520	529	556	575
500	286	331	367	396	421	441	459	474	487	498	509	518	547	567

HYDRO LEAKAGE TEST

Leakage test shall be made after pressure test has been satisfactorily completed and all backfilling and compaction is completed to top of trench. The Contractor shall furnish the necessary apparatus, and assistance to conduct the test.

To pass the leakage test, the leakage from the pipeline shall not exceed the leakage allowed by the following formula:

$$L = N \times D \times (P)^{1/2} \times (3700)^{-1}$$

in which L = allowable leakage in gallons per hour.

N = number of joints in the pipeline being tested, this "N" being the standard length of the pipe furnished divided into the length being tested, with no allowance for joints at branches, blowoff, and fittings.

D = nominal diameter of pipe in inches.

P = average observed test pressure of the pipe being tested, equal to at least 100 percent of the class rating of pipe being tested, in pounds per square inch gauge, based on the elevation of the lowest point in the line or section under test and corrected to the elevation of the test gauge.

Should the test on any section of the pipeline show leakage greater than specified above, the Contractor shall locate and repair the defective pipe, fittings, or joint until the leakage is within the specified allowance of two-hour duration. All repairs and retests, if required, shall be made without additional cost to the Owner.

Connections to the existing pipelines or existing valves shall not be made until after that section of the new construction has satisfactorily passed the hydrostatic tests.

during the television inspection shall be supplied to the City at the completion of the inspection. The Contractor shall be responsible for all costs associated with furnishing television inspection and making final repairs to the sewer mains.

71-1.09 Trench Resurfacing - Trenches shall be resurfaced as shown on Standard Plan 13.

The Contractor shall proceed immediately to resurface with temporary pavement any part of any excavation subject to heavy traffic upon notice from the Engineer without waiting for completion of the full length of the sewer.

71-1.10 Measurement - Sewer work performed under Section 71, "Sewers", will be designated by size, type, quality or whatever information is necessary for identifying sewer work. The length of sewer pipe to be paid for will be the slope length designated by the Engineer. Pipe placed in excess of the length designated will not be paid for. Measurement will be to the center of the manhole, or inner edge of other structures to which the sewer is connected.

Pipe bends, tees, wyes and other branches will be measured and paid for by the linear foot for the sizes of pipes involved. Bends will be measured along the center line to the point of intersection.

Quantities of drop manholes, offset manholes, other manholes and flushing inlets will be determined as units from actual count. New frames and covers shall be considered as included in the price paid for manholes and flushing inlets.

The quantity of concrete for pipe reinforcement to be paid for shall be the actual volume placed, except that the maximum width used for computing pay quantities shall be considered as two feet greater than the outside diameter of the pipe.

Trench resurfacing shall be considered as included in other items, and no additional compensation will be paid therefor.

Reinforcement will be considered as included in the price paid for other items, and no additional compensation will be allowed therefor.

Excavation and backfill shall be considered as included in the price paid for other items of work, and no additional compensation will be allowed therefor.

71-1.11 Payment - Items of work, measured as specified above, will be paid for at the contract price per linear foot for the

different sizes and types of sewer pipe; the contract unit price for manholes and flushing inlets; the contract price per cubic yard for Class B concrete (pipe reinforcement); all other items of work such as reinforcing steel, excavation and backfill, trench paving, frames and covers, and equipment and materials used for testing, including the water used for cleaning, will be considered as included in the price paid for other items.

Full compensation for all tunneling and jacking of pipe, capping open end of pipe, joining of pipe to other pipe or structure, utility support and protective work operations required to accommodate or safeguard public traffic, testing the sewer line, and all other incidental work and material required to construct the sewer system shall be considered as included in the prices paid for the various contract items of sewer work and no separate payment will be made therefor.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved for constructing sewers, complete in place, as shown on the plans, and specified in these specifications and the special provisions, and as directed by the Engineer.

SECTION 72

SLOPE PROTECTION

Slope protection shall be as specified in Section 72 of the State Standard Specifications.

SECTION 73

CONCRETE CURBS AND SIDEWALKS

73-1.01 Description - This work shall consist of constructing curbs, gutters, sidewalks, island paving, and driveways of the form and dimensions shown on the plans, on the City of Salinas Standard Plans, or as specified in these specifications and the special provisions. They shall be constructed of Class B concrete conforming to the provisions in Section 90 with a maximum slump of four inches as determined by the slump cone method, and reinforcement conforming to the provisions of Section 52, "Reinforcement".

73-1.02 Subgrade Preparation - The subgrade shall be constructed true to grade and cross section, as shown on the plans or directed by the Engineer. It shall be watered and thoroughly compacted by mechanical means before placing the concrete. All soft and spongy material shall be removed to a depth of not less than 0.5 foot below subgrade elevation for curbs, island paving and driveways and 0.25 foot below for sidewalks, and the resulting

space filled with earth, sand or gravel of a quality that when moistened and compacted will form a stable foundation. The subgrade for commercial driveways shall be compacted to a relative compaction of not less than 90 percent.

Base material as called for in the City of Salinas Standard Plans shall be installed, compacted, wetted and tested for grade and cross section by means of a template supported on the side forms. The base material and forms shall be wet immediately in advance of placing concrete.

73-1.03 Existing Curbs, Gutters, Driveways and Sidewalks - Where the plans provide for the reconstruction of a portion of an existing curb, gutter, driveway or sidewalk, the existing section shall be cut to a minimum depth of 1 1/2 inches with an abraisve type saw at the location shown on the plans or designated by the engineer. The entire section to be reconstructed shall be removed. The new curb, gutter, driveway or sidewalk shall join the old work at this line. No sawing is necessary along an existing construction joint where an area designated for removal abuts such a joint.

73-1.04 Forms - Forms shall be true and shall have a smooth straight upper edge.

Timber forms shall be surfaced on the side placed next to the concrete and shall have a true surfaced upper edge and shall not be less than 1 1/2" thick after being surfaced, except on curves.

All forms shall be thoroughly cleaned and coated with form oil to prevent the concrete from adhering to them.

Nominal dimension back forms may be used for Type "B" and Type "C" and roll type curb. All face of gutter forms shall be full dimension.

Forms shall be carefully set to alignment and grade and shall conform to the required dimensions. Forms shall be held rigidly in place by iron or wooden stakes placed at intervals not to exceed four feet. Clamps, spreaders, and braces shall be used where required to insure rigidity in the forms.

Benders or thin plank forms may be used on curves, grade changes, or for curb returns. Back forms for curb returns may be made of 1/2 inch thick benders cleated together for the full depth of the curb.

The form on the front of curbs shall not be removed while the concrete is sufficiently plastic to slump. Side forms for sidewalks, island paving and curbs, except for the face, shall not be removed in less than 12 hours after the finishing has been completed.

73-1.05 Curb Construction - In constructing curbs, entrances shall be provided for driveways as shown on the plans or designated by the Engineer.

Concrete curbs to be constructed over an existing pavement shall be anchored to the pavement by means of steel dowels firmly grouted with 1:1 Portland cement and sand grout in holes drilled in the pavement except as provided in Section 73-1.06 "Extruded Curb Construction". Dowels shall conform to the provisions for bar reinforcing steel in Section 52 and shall be spaced and shall be of the sizes shown on the plans, or on the City of King Standard Plans. Approved anchor bolts may be used in lieu of dowels at the option of the contractor.

Expansion joints 3/8 inch wide shall be constructed in curbs at 20 foot intervals except for extruded curb which shall be at 60 foot intervals and at the ends of curb returns, except that expansion joints shall not be constructed within 20 feet of an island nose. Expansion joints shall be filled with premolded joint filler conforming to the provisions of Section 51. Expansion joint filler shall be shaped to the cross section of the curb. Joints shall be constructed at right angles to the curb line. Weakened plane joints shall be constructed at 20 foot intervals.

Concrete shall be placed and compacted in forms without segregation.

Immediately after removing the front curb forms, the face of the curb shall be troweled smooth to a depth of not less than 0.17 feet below the flow line or to the flow line of integral curb and gutter, and then finished with a steel trowel. The top shall be finished and the front and back edges rounded as shown on the plans and on the City of King Standard Plans. Concrete placed next to expansion joints shall be finished with an edger tool.

After the face of the curb has been troweled smooth, it shall be given a final fine brush finish with brush strokes parallel to the line of the curb.

The top and face of the finished curb shall be true and straight, and the top surface of curbs shall be of uniform width, free from humps, sags, or other irregularities. When a straight edge 10 feet long is laid on top of face of the curb or on the surface of gutters, the surface shall not vary more than 0.02 foot from the edge of the straight edge, except at grade changes or curves. The top of finished curb shall not vary more than 0.02 foot above or below the grade established by the Engineer.

Exposed surfaces of curbs shall be cured by the pigmented curing compound method as provided in Section 90-7.07, except that the

curbs may be sprinkled with water as soon after finishing as possible without pitting the surface and shall in that case be kept moist in this manner for a period of seven days between the hours of sunrise and sunset.

When required by the Engineer, curbs and gutters shall be water tested for flow line characteristics.

The Contractor shall clean at his expense all discolored concrete. The concrete may be cleaned by abrasive blast cleaning.

Repairs shall be made by removing and replacing the entire unit between scoring lines or joints.

73-1.06 Extruded Curb Construction - Shall be as specified in Section 73-1.06 of the State Standard Specifications, except that cleaning of the existing pavement shall be understood to include the removal of any existing striping.

73-1.06A Drainage Outlets Through Curb - The Contractor will be required to provide suitable outlets through new curb for all existing building drains along the line of the work. He shall place similar outlets opposite any low area on adjacent property, the drainage of which will be affected by the new work. Where sidewalk will be higher than adjacent property, the Contractor shall provide curb drains per Standard Plan 15.

73-1.06B Sidewalk, Gutter Depression, Island Paving, and Driveway Construction - Fresh concrete shall be struck off and compacted until a layer of mortar has been brought to the surface. The surface shall be finished to grade and cross section with a float, troweled smooth and finished with a broom. Brooming shall be transverse to the line of traffic and if water is necessary, it shall be applied to the surface immediately in advance of brooming.

The surface of sidewalks shall be marked into rectangles of not more than 16 square feet in area for sidewalks four feet in width, or more than 15 square feet for sidewalks five feet in width, unless otherwise directed by the Engineer. A scoring tool shall be used which will leave the edges rounded.

On straight work, the scoring lines shall be perpendicular to the line of the work; at curves, the scoring lines shall be radial to the curb; when longitudinal scoring lines are required, they shall be parallel to, or concentric with the line of the work. When sidewalk is constructed adjacent to the curbs, the score marks will also correspond with the weakened plain joints in the curb.

Expansion joints 3/8 inch wide shall be constructed at all returns and opposite expansion joints in adjacent curb. Where curb is not adjacent, expansion joints shall be constructed at intervals of 20 feet. Expansion joints shall be filled with premolded joint filler conforming to the provisions of Section 51 of these specifications. Expansion joint filler shall be shaped to fit the concrete that is being placed, with the edge placed 1/8 inch below the top of the finished concrete surface. Concrete placed next to an expansion joint shall be finished with an edger tool.

The surface shall not vary more than 0.02 feet from a 10 foot straightedge, except at grade changes, and the finished surface shall be free from blemishes.

Concrete sidewalks, island paving, driveways, and gutters, shall be cured as provided in Section 90 of these specifications. If the pigmented curing compound method is used, the manual operation of an unshielded spray nozzle will be permitted.

73-1.07 Measurement - Quantities of curbs, sidewalks, gutter depressions, island paving, gutters, and driveways will be measured by the linear foot or square foot as indicated in the proposal.

All base material, reinforcing steel, expansion joint material, shall be considered as included in the unit price paid for other items, except as noted below.

73-1.08 Payment - Quantities of curbs, gutters, sidewalks, gutter depressions, island paving, and driveways will be paid for at the contract price per linear foot or square foot as indicated in the proposal, which prices shall include full compensation for any necessary excavation and backfill and for furnishing and applying water, curb dowels, reinforcing steel, base material and expansion material, and no separate payment will be made therefor, unless specified otherwise in the special provisions or shown on the plans.

Payment for curb, or curb and gutter, constructed as part of a catch basin, as shown on the Standard Plans, shall be included in the contract price for the catch basin and no other compensation shall be made.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing curbs, gutters, sidewalks, island paving and driveways, complete in place, as shown on the plans, and as specified in these specifications and special provisions and as directed by the Engineer. Payment for depressed curbs at driveways or pedestrian access ramps shall be at the contract unit price for type of curbs specified and no additional compensation will be allowed therefor.

SECTION 74

PUMPING PLANT EQUIPMENT

Pumping plant equipment shall be as specified in Section 74 of the State Standard Specifications.

SECTION 75

MISCELLANEOUS METAL

Miscellaneous metal shall be as specified in Section 75 of the State Standard Specifications.

SECTION 80

FENCES

Fences shall be as specified in Section 80 of the State Standard Specifications.

SECTION 81

MONUMENTS

Monuments shall be as specified in the State Standard Specifications, except as herein modified.

81-1.01 Description - This work shall consist of furnishing and installing Portland cement concrete survey monuments at the locations shown on the plans or as directed by the Engineer, and as specified in the specifications and the special provisions.

81-1.02 Materials - The concrete portion of the monuments shall be constructed in accordance with the provisions in Sections 51 and 90.

Concrete shall be Class A or B using 3/4 inch maximum size aggregate.

Bronze plates punched with the precise monument location point (minimum depth 3/32") and the registration number of the licensed surveyor or registered civil engineer setting the point shall be as shown on the standard plans.

The upper portion of the survey monuments shall consist of a cast steel valve box top, constructed and marked as shown on the standard plans.

81-1.03 Construction - The concrete portion of the monuments shall be cast-in-place using the adjacent earth for exterior forms. The holes forming such monuments shall be neat and true according to the standard plans.

The bronze marker shall be placed in survey monuments before the concrete block has acquired its initial set, and shall be firmly bedded in the concrete. When the plate is inserted, the reference point shall fall within 1" diameter circle in the center of the plate, and the plate shall fall within a 3" diameter circle in the center of the concrete block.

81-1.04 Installation - Survey monument shall be installed as shown on the Standard Plans. The top of the steel valve box cap shall be flush with the finished pavement grade.

81-1.05 Measurement - The quantity of monuments furnished and installed will be paid for as units determined from actual count.

81-1.06 Payment - The unit price paid for survey monuments shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and installing the monuments complete in place, including necessary excavation and backfill as shown on the plans and specified in these specifications and the special provisions and as directed and located by the Engineer.

SECTION 82

MARKERS AND DELINEATORS

Markers shall be as specified in Section 82 of the State Standard Specifications.

SECTION 83

RAILINGS AND BARRIERS

Guard railings and barriers shall be as specified in Section 83 of the State Standard Specifications.

SECTION 84

TRAFFIC STRIPES AND PAVEMENT MARKINGS

Traffic stripes and pavement markings shall be as specified in Section 84 of the State Standard Specification and Standard Plans 39 and 40, except as modified herein.

84-3 Painted Traffic Stripes and Pavement Markings 84-3.02 Materials - Paint and glass beads shall be as specified in the Special Provisions and shall be furnished by the Contractor.

84-3.07 Payment - The contract unit prices for painted traffic stripes and pavement markings shall also include full compensation for furnishing paint and glass beads.

SECTION 85

PAVEMENT MARKERS

Pavement markers shall be as specified in Section 85 of the State Standard Specifications and Standard Plan No. 39.

SECTION 86

SIGNALS AND LIGHTING

Signals and lighting shall be as specified in Section 86 of the State Standard Specifications.

SECTION 88

ENGINEERING FABRICS

Engineering fabrics shall be as specified in Section 88 of the State Standard Specifications.

SECTION 89

LIGHTWEIGHT PORTLAND CEMENT CONCRETE

Lightweight Portland cement concrete shall be as specified in Section 89 of the State Standard Specifications.

SECTION 90

PORTLAND CEMENT CONCRETE

Portland cement concrete shall be as specified in Section 90 of the State Standard Specifications, except that Portland cement may be either Type I or Type II.

SECTION 91

PAINT

Paint shall be as specified in Section 91 of the State Standard Specifications.

SECTION 92

ASPHALTS

Asphalts shall be as specified in Section 92 of the State Standard Specifications.

SECTION 93

LIQUID ASPHALTS

Liquid asphalts shall be as specified in Section 93 of the State Standard Specifications.

SECTION 94

ASPHALTIC EMULSIONS

Asphaltic Emulsions shall be as specified in Section 94 of the State Standard Specifications.

SECTION 95

EPOXY

Epoxy shall be as specified in Section 95 of the State Standard Specifications.

PART II

DESIGN STANDARDS

D E S I G N S T A N D A R D S

C I T Y O F K I N G

1987

I. IMPROVEMENT POLICY FOR SUBDIVISIONS & UNIMPROVED STREETS

A. GENERAL

It is the City's policy to require all developers and subdividers to construct the public improvements within and adjacent to their property to City Standards. Unless specified otherwise, such improvements shall have appearance characteristics compatible with those of the neighborhood in which they are installed.

All public improvements shall be designed and constructed according to these Design Standards and the Standard Plans and Specifications adopted by the City Council of the City of King, unless specific modifications to such standards are approved by the City Engineer.

B. ROADWAY PAVING

Design procedures for rigid and flexible roadway pavements shall be in accordance with Section 7 of the California State Design Manual, City Standard Plan No. 3 and these following requirements.

Basement soil "R" value tests will be required for roadway pavement designs by qualified laboratories in accordance with testing procedures of Caltrans. Soil samples for R-Value tests shall be of sufficient number and at appropriate intervals to reflect R-Values representative of the entire development. Pavement structural section designs shall be governed by the lowest of obtained R-Values, with a minimum section of 2½-inches of

8"

Asphalt Concrete over 6-inches of Baserock. Off Right-of-Way parking areas shall be paved in accordance with R-Value tests with minimum 2-inch asphalt concrete over 6-inches of baserock.

C. CURBS

Unless permitted otherwise, concrete vertical curbs with integral gutters shall be constructed throughout the City. In blocks where streets have already been improved with roll-type curbs, policies adopted separately from this document shall apply.

D. SIDEWALKS

Concrete sidewalks shall be constructed in all residential, industrial and commercial developments, unless designated otherwise by separate agreement. Sidewalks in commercial areas shall extend from the curb to a line not more than one foot from the property line. Residential sidewalks shall be minimum four feet in width and shall be located one foot from the property line, except where permitted per Standard Plan No.2 and when the property line is under nine feet, in which case, the sidewalk shall be increased to 5.5 feet wide, and located adjacent to the curb. Sidewalks fronting schools, churches and similar locations within residential areas with high pedestrian traffic may be constructed to either residential or commercial standards. Unless otherwise approved by the City Engineer, 5.5 foot sidewalks adjacent to the curb shall be installed in industrial areas.

Handicapped access ramps shall be constructed within sidewalk areas at curb returns and other locations per City requirements.

E. DRIVEWAYS

Driveways shall be constructed only at locations where access from private property is required. The design of driveways shall be as detailed on Design Standard Plan No. 5 and in conformance with the City Resolution, which establishes driveway regulations.

Commercial type driveways with heavy duty curbs shall be constructed for all commercial, industrial applications, and multiple residential developments of three or more units.

F. STREET LIGHTING

A street lighting system shall be required of new developments, with service design and connections coordinated with the Utility Company. Street lighting designs including fixture wattage, pole locations and spacing, and conduit shall be subject to review and approval of the Public Works Department.

Electroliers and appurtenances shall be in accordance with City Standard Plans unless otherwise approved by the City Engineer. These installations shall be City-owned upon completion of the development.

G. MONUMENTS

Standard street monuments shall be constructed on the centerlines of streets at the following locations:

1. All intersections of street centerlines.
2. All beginnings and ends of curves,

Lot corners and subdivision corners shall be as specified in the Subdivision Ordinance.

Section 8771 of the Land Surveyors Act requires that all existing monumentation shall be referred and reestablished when disturbed by new construction.

H. STREET SIGNS

Street name signs shall be constructed at each intersection. Roadways of 4 or more travel lanes shall be furnished with a minimum of 2 street name signs. Traffic signs together with appropriate pavement markings, striping and/or raised pavement markers shall be installed as directed by the Transportation Engineer.

I. STORM DRAIN

Storm drains shall be designed and constructed to serve the development including any areas which will ultimately drain through the development with the cost of oversizing to be shared per current City policy. All intersections requiring drainage improvements shall be served with underground pipes and appropriate drainage facilities. "T" intersections with

low traffic volumes may use cross-gutters on the leg of the "T". Siphons are not acceptable, except as a temporary measure.

J. SEWERS

Sanitary sewer mains and laterals shall be constructed to serve each lot. Laterals shall lead directly to the sewer main in the street. Except on a temporary basis during construction, sewer laterals shall not pass through lots other than the one served. Joint use of laterals is not permitted.

Sanitary sewer mains/trunklines shall be designed to accommodate the development including affected portions of sewage service areas as applicable, in accordance with the City Master Sewer Plan. Sewer main oversizing costs to be shared per current City policy.

K. FIRE PROTECTION

If required by local fire protection regulations, the development shall include fire protection systems including all necessary fire hydrants, valves, mains, and appurtenances, together with fire access lanes and equipment turn-arounds as applicable. Materials, equipment, and installation shall conform to the requirements of local water companies, City, State and Federal agencies.

L. RIGHTS-OF-WAY AND EASEMENTS

As a condition for development, street rights-of-way and/or

easements for publicly owned and maintained facilities shall be conveyed to the City in accordance with current policy. All plats and deed descriptions necessary for recordation of such conveyances shall be prepared/submitted by the developer in accordance with current City policies and procedures.

M. PARKING AND TRAFFIC CIRCULATION

Access roadways, on-site parking and interior vehicular circulation designs shall be in accordance with current City policies.

Entrances/driveways to developments shall be located and designed with appropriate signing, striping and markings, divider strips, signalization and other traffic control devices as necessary to minimize conflicts with or disruptions to through traffic.

Parking layouts, stall and aisle dimensions shall be in accordance with Section 17.52.060 of the City of King Municipal Code. For high-turnover rate parking, recommended stall dimensions are minimum 9-feet in width and 19-feet in length as measured along the angle of parking.

All parking areas shall be graded and paved to drain and delineated by painted lines and/or raised markers. Individual

stalls adjacent to buildings, pedestrian walks or other similar structures shall be separated by raised curbs, sidewalks, planters or other type barriers. Where parking spaces abut pedestrian or landscape planters, the walkways and planters shall be of adequate width to provide for 3-foot vehicle overhang where such improvements are used for wheel stops, allowing for minimum 4-foot clearance for pedestrian traffic as applicable. Planted areas adjacent to paved parking or roadway areas shall be separated by vertical type curbs (epoxied Type A,Type B, or Type C).

Provisions for handicapped parking stalls, with ramps as applicable, shall be included in parking designs, in accordance with latest State Standards.

On-site vehicular roadways shall include provisions for emergency vehicle corridors and turn-arounds in accordance to Fire Department regulations. Such corridors shall be adequately marked and/or signed to prohibit unauthorized parking.

II. STORM DRAIN DESIGN

A. GENERAL

The determination of storm runoff shall be as outlined herein.

B. HYDROLOGY - SURFACE RUNOFF

The "Rational Method" shall be used for the determination of storm runoff in the City of King.

The "Rational Method" approach is represented by the formula:

$$Q = CiA$$

Q - Storm runoff in cubic feet per second

C - Coefficient of runoff, representing the ratio of runoff to rainfall.

i - Average rainfall intensity expressed in inches per hour for a duration equal to the time of concentration.*

A - Size of the tributary drainage area in acres.

*The time of concentration is considered as the time required for water to flow overland to reach established surface drainage channels such as street gutters, and channel flow time required for water to flow through established drainage channels to the point of inlet. A minimum inlet time of fifteen minutes is used. Subsequent time of concentration in the drainage system is determined by the time of flow in the conduit.

Rainfall intensity curves for the City of King as shown herein (Figure 1) shall be used for runoff computations.

MODIFIED INTENSITY CURVES FOR DESIGN

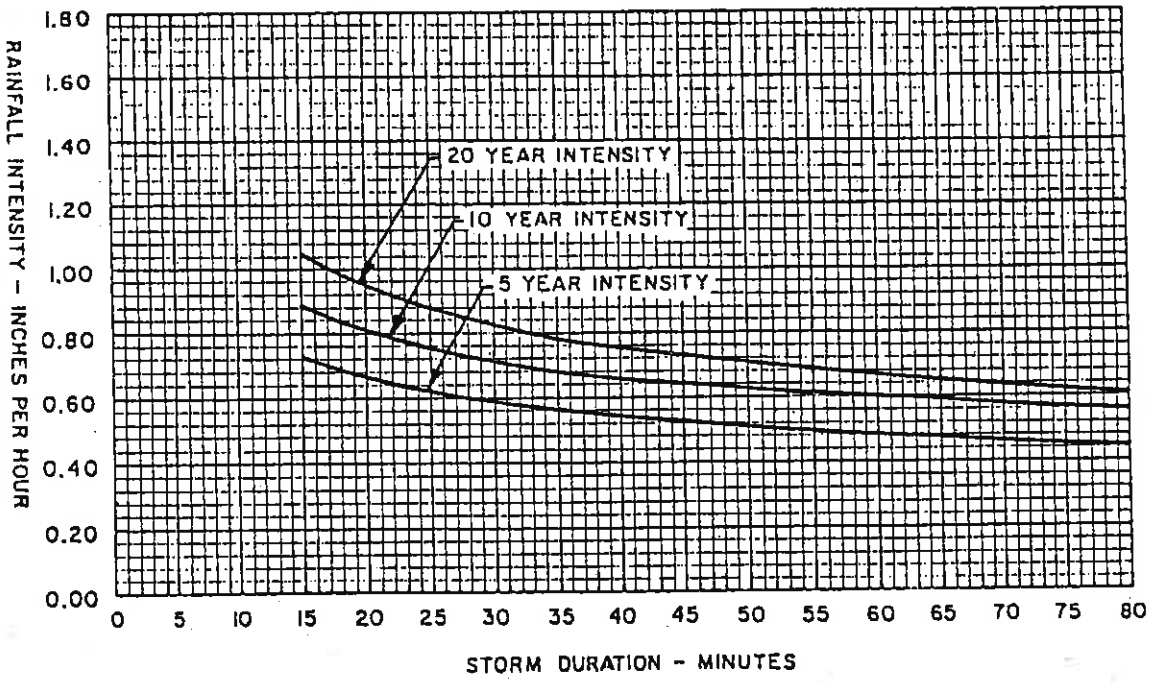


FIGURE I

A 20-year average return intensity is to be used for design of conduits and inlets in commercial and industrial areas and for main trunklines. A ten-year average return intensity is to be used for design in residential and local drainage facilities. Depth of water in streets shall not exceed curb heights for these intensities.

Minimum runoff coefficients shall be as follows:

LAND USE	PERCENT IMPERVIOUS	RUNOFF COEFFICIENT
Single Family, Residential	30-50	0.40
One & Two Family Residential	50-60	0.45
Garden Apartment Residential	60-80	0.60
All Commercial Uses	90-100	0.75
Light Industry and Research	70-80	0.60
General Industrial	90-100	0.75
Parks and Recreation	10-20	0.20
Schools	40-60	0.40

C. HYDRAULIC CONSIDERATIONS

Drainage inlet type and spacing shall be governed by the capacity of the drainage channel/gutter as well as the capacity of the inlet itself. Generally, channel flow lengths between inlets should be less than 1,000 feet, with a flowline grade of not less than 0.30 percent.

In designing a structure, the inlet capacity of the pipe draining the inlet structure shall be considered.

Gradients of the pipes shall be sufficient to provide a velocity not less than 2.0 feet per second nor more than 8 feet per second when flowing full. A minimum pipe size of 15" diameter is required for all mains, but 12" diameter may be used for catch basin laterals, provided it has adequate capacity.

Manning's formula for gravity flow in pipes should be used in computing the capacity. The roughness coefficient (n) shall be as follows:

	n
P V C	0.010
R C P	0.015

Where grades permit, 0.1 feet drop in manholes should be included where there is appreciable change in direction.

Special consideration shall be given to the design criteria for major trunklines and outfalls, pumping stations and areas historically subject to flooding. Design criteria for flood prone lands shall be in accordance with these specifications and the standards of the Monterey County Flood Control and Water Conservation District. Storm water retention basins/areas may be required. For the protection of properties under flooding conditions, flood relief structures, channels or other drainage facilities shall be constructed to accommodate flood water depths exceeding 9 inches above gutter flowlines.

Manholes or structures providing access to the pipe should be constructed at all changes in pipe size and angle points. Manhole spacings should not exceed 500 feet.

Manholes are required at lateral pipe junctions with new and existing mains, unless the main pipeline is three times or more greater in diameter than the joining pipe.

Pipelines may be laid on curves by using beveled pipe sections and/or by deflections of straight pipe in accordance with pipe manufacturers recommendations.

III. SANITARY SEWER DESIGN

A. DESIGN

Sanitary sewers shall be designed to discharge the expected peak flow when pipe is running full. Grades shall be sufficient to provide a velocity of at least 2.00 feet per second when running full, and 1.75 feet per second, at average rate of flow. Maximum velocity shall be limited to 8 feet per second. Friction factor (n) shall be taken as 0.013 for Vitrified Clay Pipe and .010 for P.V.C. Pipe. Mannings Formula Nomograph or other method of solution which relates pipe diameter, slope, discharge, and velocity, may be used. Unless approved by the City Engineer, no sewer mains less than 8 inch diameter shall be used. Six inch mains may be approved for lines with ultimate maximum of twenty single-family units or less.

Design and sizing of sewer mains and major laterals shall be based upon the anticipated sewage discharge in accordance with the following critera. On the basis of an average flow of 100 gallons per capita per day, the average flow rates (cfs/acre) shall be based upon allowable land use densities (units per acre) and an average occupancy figure of 3.5 persons per household, per data furnished by the Community Development Department charts and the following:

Peak flows shall be in accordance with the following table:

Service Population	Ratio of Peak to Average Flow
1,000	2.5
3,000	2.5
10,000	2.5

Infiltration and storm water inflow shall be at 500 gallons per acre per day for new sewer mains.

Sewers shall be designed parallel and offset from street centerline as practicable. Spacing of manholes shall not exceed 500 feet on lines under 12" diameter. All grades for sewer pipe shall be given in feet/foot to 4 decimal places and preferably shall be divisible by four. In manholes where outlet pipe has a greater diameter than the inlets, the crowns or the 0.8 diameter lines should be matched. Where grades permit, 0.20 feet drop should be allowed at 90° alignment change in manholes, to insure sufficient fall. Drop manholes shall be constructed where the inlet/outlet differential is 2 feet or greater.

B. DEPTH OF SEWERS

Sewer mains and laterals shall be deep enough to insure adequate drainage of lowest sanitary fitting connected thereto and to accommodate any future building extensions in the area. Sewer lateral connections to mains in Public Street right-of-way shall be a minimum 5-foot depth to top

of pipe at property line.

C. CONNECTIONS TO SEWERS

All lateral connections to sewer mains shall be made by means of wye branches, saddles or manholes, with connections in accordance with Standard Plans 24, 30, and 33 in the upper half of the sewer main. Lateral connections shall be vitrified clay pipe (VCP) or poly vinyl chloride pipe (PVC) not less than 4" diameter and shall be laid to a minimum grade of 1% between sewer main and property line. A lateral cleanout shall be installed at property line. Additional wye branches shall be installed in the sewer mains for future anticipated services.

No roof drains or storm water inlets shall be connected to sanitary sewers, nor shall sanitary sewers be connected to storm drains.

Upon completion of sewer main installations of 6 inch and larger diameter within public easements and right-of-way, all sections of pipe shall be checked with television equipment and air tested in accordance with current requirements of the Public Works Department.

Subject to prior approvals, swimming pools may be drained into storm drains; however, backwash must be discharged to the sanitary sewer system.

IV. DEVELOPMENT PLANS

A. GENERAL

Project development plans shall contain sufficient detailed drawings of required public improvements including streets, drainage and sewer facilities, street lighting systems, utilities and related street improvements.
Construction details shall include: typical roadway structural sections, curve data; locations, invert elevations, slopes, type and sizes of storm and sanitary sewer mains, laterals, manholes and appurtenant facilities; locations and depths of new and existing utilities; electrical and street lighting service points with light pole and conduit locations and conductor schedule; easements; curbs and gutters, sidewalks, driveways and other street improvements.

Plan and Profile drawings shall be furnished on standard 24-inch by 36-inch sheets with originals of legible, reproducible quality. Review plans shall be prepared and submitted in accordance with the current policies. Where filing of plans is required for public record, the completed, signed originals or reproducible mylar sheets shall be furnished to the Public Works Department.

Profiles of curbs and gutters, storm and sanitary sewers, and/or street centerlines as applicable, shall be included in the plans. Where practicable, such profiles shall be shown

directly above or below the plan views and of equivalent scale.

Typical dimensioned design sections shall be furnished for roadways, special sewer and drainage structures and shall contain details of thickness and type of materials, special bedding or reinforcement and relative locations and depths of utilities or other underground facilities requiring special consideration.

A site grading plan shall also be furnished, together with the development plans for review. Site grading shall be in accordance with the requirements of City of King Building Dept. (NCS) "Standards to Control Excavations, Cuts, Fills, Clearing, Grading, Erosion and Sediment."

Standard construction details may be referenced by note to specific City Standard Plans.

SECTION 71
SANITARY SEWERS

Sewers shall be as specified in Section 71 of the City of Salinas Standard Specifications, except as herein modified.

71-1.02 Materials - Pipe, fittings, miscellaneous materials and the most common joint materials are described in this Section 71-1.02.

Portland cement used in the production of concrete products set forth in this Section 71-1.02 shall be Type II Modified cement conforming to the provisions in Section 90, "Portland Cement Concrete."

71-1.02A Reinforced Concrete Sewer Pipe - Reinforced concrete pipe shall conform to A.S.T.M. Designation C-76 for the size and classes indicated on the plans.

71-1.02A(1) Plastic Lining - The full three hundred and sixty degrees (360°) of the interior circumference of all reinforced concrete pipe shall be sealed and protected with a polyvinyl chloride resin lining. Copolymer resins will not be permitted.

The plastic liner shall be impermeable to sewage gases and liquids and shall be non-conducive to bacterial or fungus growth. The lining shall be impact resistant, flexible, and shall have an elongation sufficient to bridge up to 1/8" settling cracks which may take place in the pipe or in the joint after installation without damage to the lining.

The lining shall be of a type that is permanently and physically embedded into the concrete pipe wall by the T-lock mechanism and shall not rely on an adhesive bond between the lining and pipe wall.

The lining at all pipe joints, and at all joints between individual sheets or sections of lines shall be continuously heat welded by the use of welding strips of the same kind and equivalent thickness of the material as the lines.

The contractor shall submit for the Engineer's consideration written information as to the type, size, workmanship and other specifications for the plastic liner he proposes to use on any installation. Approval of this submission by the Engineer shall be obtained prior to any material being delivered to the job site.

71-1.02D Acrylonitrile-Butadiene - Styrene (ABS) Sewer Pipe- Pipe sizes four (4) and six (6) inch diameter shall conform to ASTM D2751-80 with minimum wall thickness determined by SDR 35.

Pipe sizes eight (8) through fifteen (15) inch diameter shall conform to ASTM D2680-80 with Type OR or Type SC joints.

71-1.02E Asbestos Cement Pipe - Asbestos Cement pipe shall not be used.

71-1.02F Bituminous Lined Corrugated Metal Pipe - Bituminous lined corrugated metal pipe shall not be used.

71-1.02K Rubber Gasketed Joints - Rubber gasketed joints shall conform to the provisions in Section 65-1.06B, "Rubber Gasketed Joints".

71-1.02L Polyvinyl Chloride PVC Sewer Pipe - All solid wall pipe and fittings in 4" through 15" in diameters shall conform to either ASTM D3034, SDR 35 minimum wall thickness or ASTM F789.

71-1.03 Excavation and Back-fill - Excavation and back-fill shall conform to the provisions shown on City Standard Plans No. 13.

Trenches shall not be left open farther than 100 feet in advance of pipe laying operations or 100 feet to the rear thereof, unless otherwise permitted by the Engineer.

71-1.05B Pipe Joints

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

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

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

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

Polyvinyl chloride joints may be used on curves, provided that the radius of curvature is not less than shown in the following table, unless beveled pipe or shorter lengths are provided:

Pipe size Inches	Maximum Pipe Length Feet	Minimum Radius of Curvature	Maximum Deflection
6	5	100	2°00'
8	5	100	2°00'
8	6	115	2°00'
10	5	185	1°33'
10	6	220	1°33'
12	5	215	1°20'
12	6	260	1°20'
15	5	275	1°03'
15	6	330	1°03'

Polyurethane joints may be permitted for use on curves, provided that the radius of curvature is not less than shown in the following table, unless beveled pipe or shorter lengths are provided:

Pipe size Inches	Maximum Pipe Length Feet	Minimum Radius of Curvature	Maximum Deflection
6	5	100	2°00'
8	5	100	2°00'
8	6	115	2°00'
10	5	170	1°41'
10	6	205	1°41'
12	5	150	1°54'
12	6	180	1°54'
15	5	190	1°32'
15	6	225	1°32'
18	5	225	1°16'
18	6	275	1°16'
21	5	265	1°06'
21	6	315	1°06'
24	5	240	1°12'
24	6	290	1°12'
27	5	270	1°04'
27	6	325	1°04'
30	5	300	0°58'
30	6	360	0°58'
33	5	275	1°03'
33	6	330	1°03'
36	5	295	0°59'
36	6	355	0°59'
39	5	325	0°54'
39	6	385	0°54'
42	5	345	0°50'
42	6	415	0°50'

b. Reinforced Concrete Pipe - All reinforced concrete sanitary sewer pipe shall be joined with rubber gasketed joints.

Rubber gasketed joints shall conform to the requirements of ASTM Designation: C443 and shall be flexible and able to withstand expansion, contraction and settlement.

All rubber gaskets shall be stored in as cool a place as practicable, preferably at 70° or less, and in no case shall the rubber gaskets be exposed to the direct rays of the sun for more than 72 hours.

Rubber gaskets, of the type requiring lubrication, shall be lubricated with the lubricant recommended and supplied by the manufacturer of the pipe.

The ends of the pipe shall be so formed that when the pipes are laid together and joined, they shall make a continuous and uniform line of pipe with a smooth and regular surface.

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

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

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

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

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

c. Cast Iron or Ductile Iron Pipe- Cast and ductile iron pipe joints shall comply with the following requirements for the types specified on the plans or in the Special Provisions:

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

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

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

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

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

d. ABS Sewer Pipe

1. Pipe lengths and fittings shall be joined by utilizing elastomeric gaskets as referenced in ASTM D-2680 and D-2751 and meeting the requirements of ASTM D-3212 "Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals," or solvent weld joints.

Solvent weld joint or usage shall conform to ASTM F-402 "Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe and Fittings," and the following requirements:

a. All ABS pipe joints, fittings and surfaces to be joined by solvent welding shall be connected with adhesive cement conforming to ASTM D-2680 for ABS composite sewer pipe or to ASTM D-2751 for 4-inch and 6-inch ABS solid wall pipe. (Solid wall ABS limited to 4-inch and 6-inch pipe with 35 SDR maximum).

b. Prior to joining ABS pipe joints, fittings and surfaces, dirt, mud or any other foreign material shall be thoroughly removed and cleaned from the joints, fittings and surfaces to be joined.

c. A coat of adhesive cement shall be liberally and thoroughly applied to the joints, fittings and surfaces to be joined. After application of the adhesive cement, the pipe joints, fittings, and surfaces to be joined shall be immediately fitted and joined without interruption.

For bell and spigot connections, the spigot end of each pipe shall be fitted to the full depth of the bell socket.

d. When the temperature is below 40 degrees F., a primer shall be applied to the pipe surface to be cemented and joined.

2. Reducing Wyes:

a. Reducing wyes for service laterals shall be either saddle type wyes or in-line bell and spigot type wye fittings. All reducing wyes shall be premolded and factory fabricated.

b. Saddle Fittings:

1. In addition to the solvent welding of the saddle to the main pipeline, the saddle type wye shall be attached to the main pipeline with a stainless steel clamp.

2. Tapping hole for saddle fittings shall be cut with a cutting instrument. The hole shall be of the same size and shape of the lateral pipe and shall provide a smooth and continuous interior pipe surface.

3 . Exposed Pipe Cross-Sections:

Exposed cross-sections of the ABS composite sewer pipe shall be coated with adhesive cement prior to connection of pipe joints, fittings and surfaces.

4. Manhole Connections:

At manhole connections, a manhole water stop shall be attached to the ABS pipe with a stainless steel clamp. The water stop shall be centered to the manhole wall with gasket fingers pointed to the outside of the wall.

e. PVC Sewer Pipe -

1. All joints shall be integral wall bell and spigot configuration, factory formed. All rubber rings shall conform to ASTM F-477.

2. Reducing wyes for service laterals shall be in line bell and spigot type, factory molded.

3. Assembly of all joints shall conform to ASTM P-3212.

4. Saddle fittings for lateral connection will be permitted; solvent welded.

5. Manhole connections shall be by rubber ring water stop installed on pipe and cast in center of manhole wall or four (4) inches from outside face of manhole base. Pipe section on water-stop at manhole shall have bell flush with outside of manhole or no more than ten (10) inch outside manhole.

71-1.04 Existing Manholes - Unless otherwise specified on the plans, all existing manholes, lampholes and terminal cleanout frames and covers that are removed become the property of the City.

71-1.07 Sewer Structures - Manhole frames shall be secured to the manhole cover or riser barrels with full mortar bed or full circle concrete collar that will effectively secure the frame to the manhole structure and provide a uniform bearing for the frame.

71-1.07A Coating Manholes

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

Material - The coating shall be a high build, two-component, 100% solids, non-solvented, hybrid polyurethane material. the flash point of the individual components and the fluid mixture shall be a minimum of 415 degrees F (COC). Application shall be 125 mils in thickness.

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

The coating shall be resistant to attach from the following: Oxidizing agents such as bleaches, sulfuric, acetic, hydrochloric, phosphoric, nitric, chromic, oleic, and stearic acids; sodium and calcium hydroxides, ammonium, sodium, calcium, magnesium, and ferric chlorides; ferric sulfate, petroleum oils and greases, vegetable and animal oils, fats, greases, soaps and detergents. The coating shall be impermeable to sewage gases and liquids and shall be non-conducive to bacterial or fungus growth.

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

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

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

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

71-1.08A Deflection Test for ABS and PVC Sewer Pipe - The contractor shall furnish all equipment needed to complete this test. The cost for the deflection test shall be included in the unit price bid for the sanitary sewer pipe. Deflection test shall be conducted after the placement and densification of backfill.

For PVC Pipe - see table.

For ABS Pipe - All mainline pipe shall be cleaned and then mandrelled to measure for obstructions (deflection, joint offsets, lateral intrusions, etc.). A rigid mandrel with a circular cross-section having a diameter at least 96 percent of the specified average inside diameter shall be pulled through the pipe. The method of measuring the deflection shall be approved by the City Engineer. Any pipe through which the mandrel will not pass shall be said to have failed and will be repaired by the contractor at his expense.

At his option the Engineer may require a sample of ten percent (10%) of the laterals randomly selected by the inspectors shall also be tested for deflection. If difficulty is encountered in passing the mandrel test, the inspector may direct that a larger sample of laterals be tested up to including one-hundred percent (100%) of all laterals.

Contractor shall furnish properly sized mandrels for size and type of pipe installed. Certification of proper mandrel size shall be required and mandrel identified in a manner to identify with certification.

The following tables list minimum pipe I.D. deflections; i.e. O.D. of mandrel:

Table of Allowable Deflections for PVC

Pipe Size & Type	Base I.D.	Min. Allowable I.D.
4" PVC	3.966	3.66
6" PVC	5.742	5.36
8" PVC	7.665	7.18
10" PVC	9.563	8.98
12" PVC	11.361	10.69
15" PVC	13.898	13.08

At the contractor's expense, all locations with deflection greater than allowable shall be excavated, repaired or replaced, back-filled and re-tested.

SECTION 76

DOMESTIC WATER FACILITIES

The water purveyor in King City is:

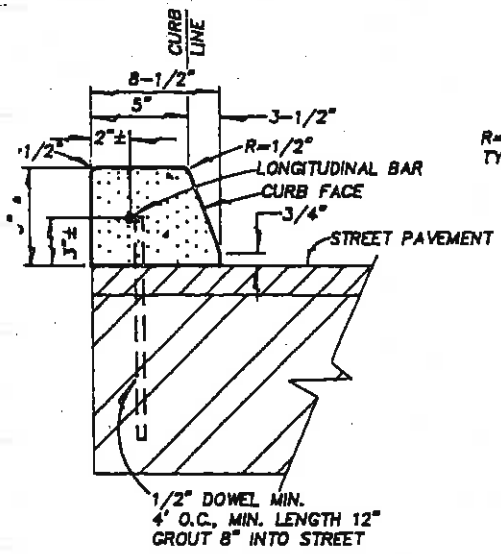
California Water Service Company
301 Broadway
King City, CA. 93930

Any development project requiring water service should contact the Branch Manager at the earliest possible date in the project planning process.

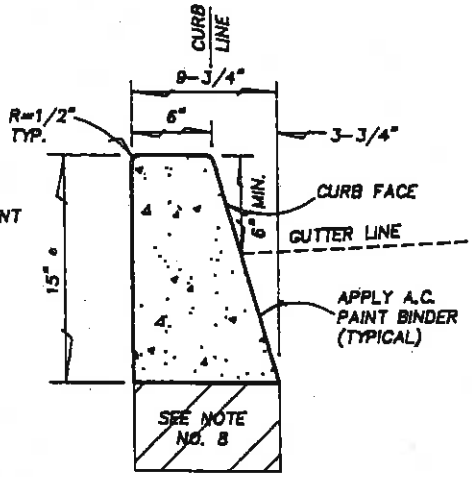
All water systems to be installed in new subdivisions shall be PVC (AWWA C-900) pipe unless otherwise designated by the City Engineer.

PART III

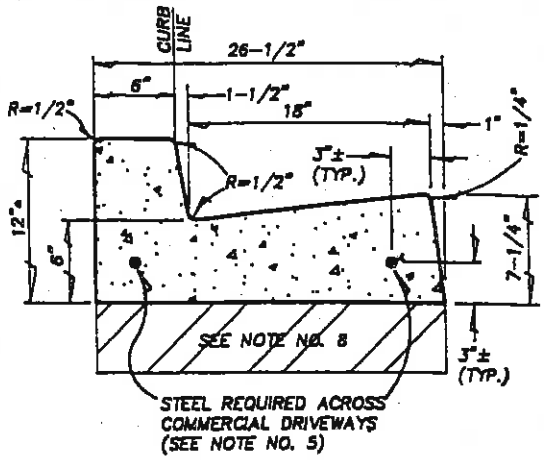
STANDARD PLANS



TYPE A



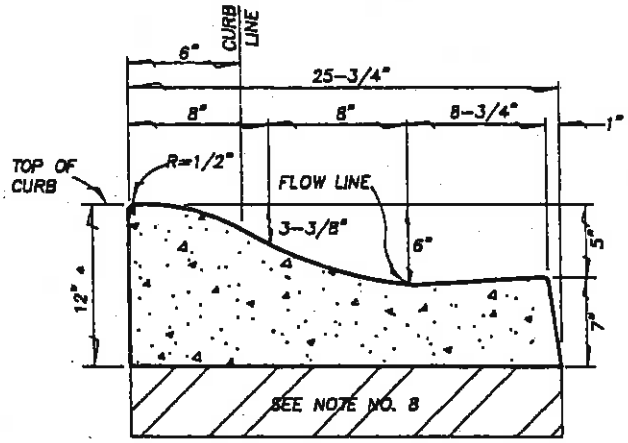
TYPE B



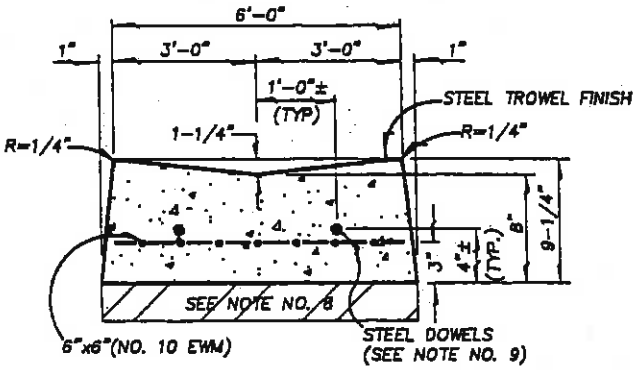
TYPE C

INTEGRAL CURB & GUTTER

* NOMINAL DIMENSION BACK-FORM MAY BE USED.



STANDARD ROLL CURB

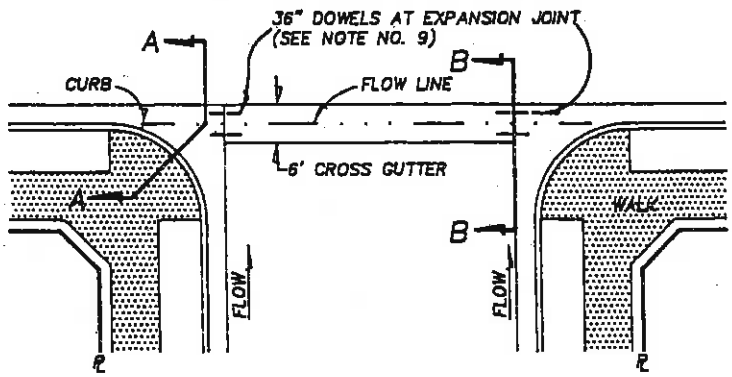


CROSS GUTTER

SECTION B-B

NOTE:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH SECTION 73 OF THE STANDARD SPECIFICATIONS.
2. EXPANSION JOINTS SHALL BE SLIP DOWELED AT CURB RETURNS. (SEE STANDARD PLAN 2).
3. TOP AND FRONT OF ALL CURBS SHALL BE FINE BROOM FINISHED.
4. CURB RETURNS SHALL BE TYPE "C" EXCEPT ADJACENT TO CROSS GUTTERS, WHERE MODIFIED TYPE C CURB AND APRON SHALL BE USED.
5. CURB AND GUTTER AT COMMERCIAL DRIVEWAYS SHALL HAVE 2-#4 BARS INSTALLED FOR THE WIDTH OF THE DRIVEWAY (HEAVY DUTY TYPE "C")
6. INSTALL 3/8" EXPANSION JOINTS AT 20 FOOT INTERVALS MAX. ON TYPE "C" CURB. PROVIDE WEAKENED PLANE JOINTS AT 20 FOOT INTERVALS WITH EXPANSION AT 60 FOOT INTERVALS ON EXTRUDED CURB. (SEE STANDARD PLAN 2)
7. CLASS A OR B CONCRETE SHALL BE USED.
8. 4" MINIMUM OF CLASS 4 A.B. OR HIGHER TYPE BASE MATERIALS.
9. CROSS GUTTERS SHALL HAVE 2-#4 x 36" LONG STEEL DOWELS AT MID DEPTH CENTERED AT EXPANSION JOINT, FOR SLIP DOWEL DETAIL SEE STANDARD PLAN 2.
10. AN APPROVED ADHESIVE MAY BE USED IN LIEU OF DOWELS IN TYPE "A" EXTRUDED CURB FOR PLACEMENT ON EXISTING PAVEMENT. OMIT HORIZONTAL STEEL IN EXTRUDED CURB.



SECTION A-A

Department of Public Works — City of King, California

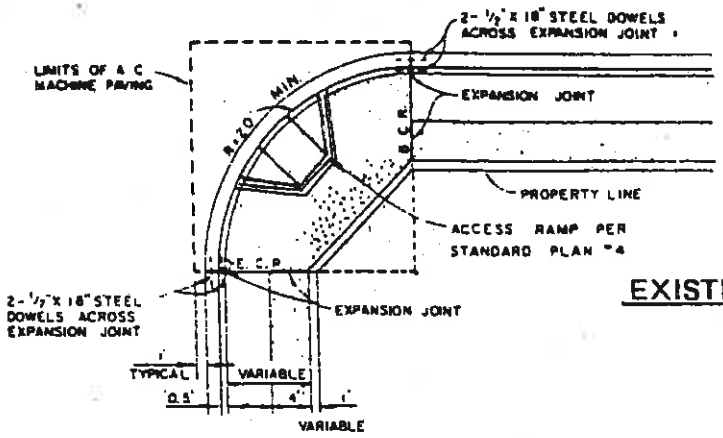
Curb and Gutter

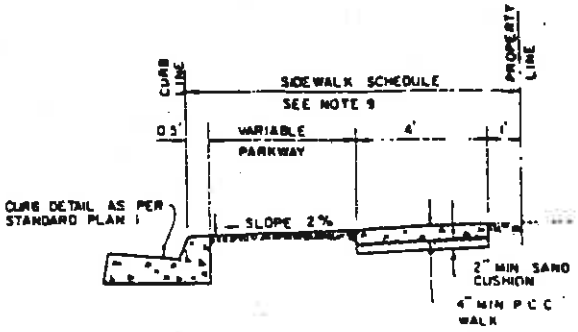
Standard Detail 1

City Engineer R.C.E. 17,186 (expires: 6/30/97)

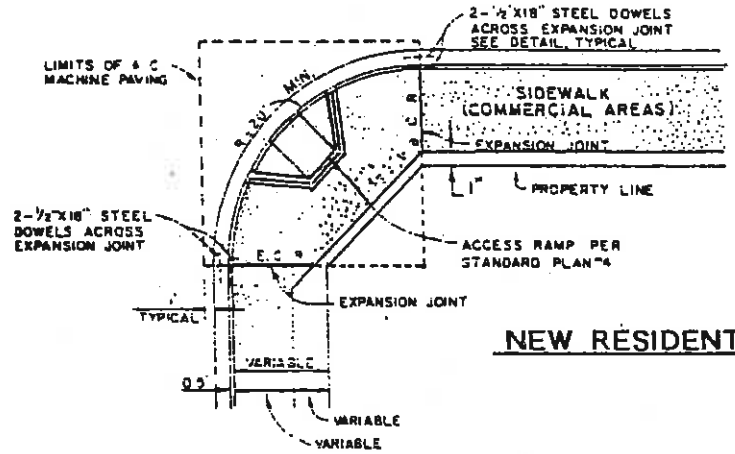
Approved: _____

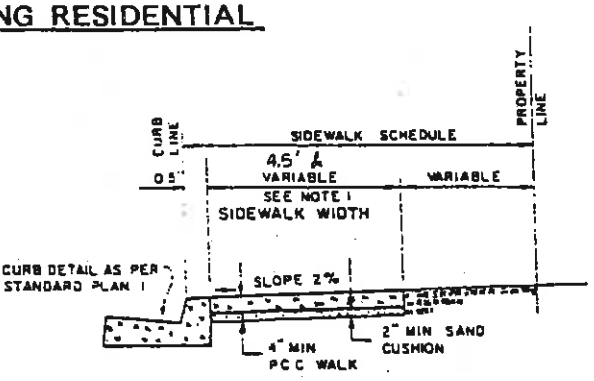
Date: 7-20-94



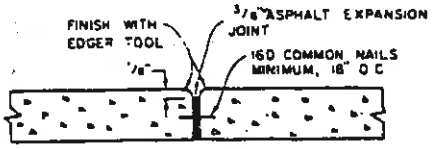


EXISTING RESIDENTIAL

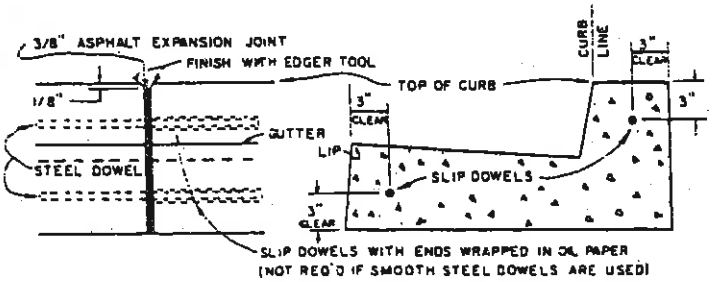




NEW RESIDENTIAL-INDUSTRIAL-COMMERCIAL



TYPICAL SIDEWALK EXPANSION JOINT



TYPICAL DOWEL DETAIL AT CURB RETURNS

NOTES:

1. CONCRETE SIDEWALK SHALL BE 8.5 FEET MINIMUM IN COMMERCIAL AREAS AND 5.5 FEET MINIMUM FOR INDUSTRIAL AREAS. A 5.5 FEET SIDEWALK CAN BE USED IN COMMERCIAL AREAS UPON APPROVAL OF THE CITY ENGINEER SEE "SIDEWALK" PER CITY OF SALINAS DESIGN STANDARDS
2. ALL SIDEWALK IS TO BE ONE COURSE, CLASS B P.C.C. AND FINE BROOM FINISHED
3. ASPHALT EXPANSION JOINTS SHALL BE PLACED WITH MAXIMUM SPACING OF 60 FEET AND WHEREVER SIDEWALK ADJOINS EXISTING BUILDING OR SIDEWALK
4. ASPHALT EXPANSION JOINT SHALL BE COMPOSED OF ASPHALT, FIBER, AND MINERAL FILLER PREMOLDED INTO SHEETS WITH ASHALT IMPREGNATED LINERS ON BOTH SIDES AND SHALL CONFORM WITH ASTM D-994-53 AND AASHTO M-33-48 SPECIFICATIONS
5. SLIP DOWELS PER DETAIL AT E.C.R. AND E.C.R.
6. CONTRACTOR SHALL STAMP HIS NAME AND MONTH AND YEAR OF CONSTRUCTION ON SIDEWALK A MINIMUM OF ONCE PER CONSTRUCTION AND ONCE PER EACH 500 SQUARE FEET. MONTH AND YEAR MAY BE STAMPED IN NUMBERS
7. ALL DIMENSIONS AS SHOWN UNLESS OTHERWISE SPECIFIED ON PLANS
8. ACCESS RAMP PER STANDARD PLAN "4
9. 5.5 FOOT WIDE SIDEWALKS, LOCATED ADJACENT TO CURB, PERMITTED ON RESIDENTIAL (MINOR & CUL-DE-SAC) STREETS, ON STREETS HAVING SIDEWALK SCHEDULES OF 2 FEET OR LESS, AND ON STREETS ADJOINING PORTIONS OF SUBDIVISIONS WHERE AT LEAST 50% OF THE LOTS HAVE AN AREA OF 9,000 S.F. OR LESS

Department of Public Works — *City of King, California*

Sidewalk

Standard Detail 2

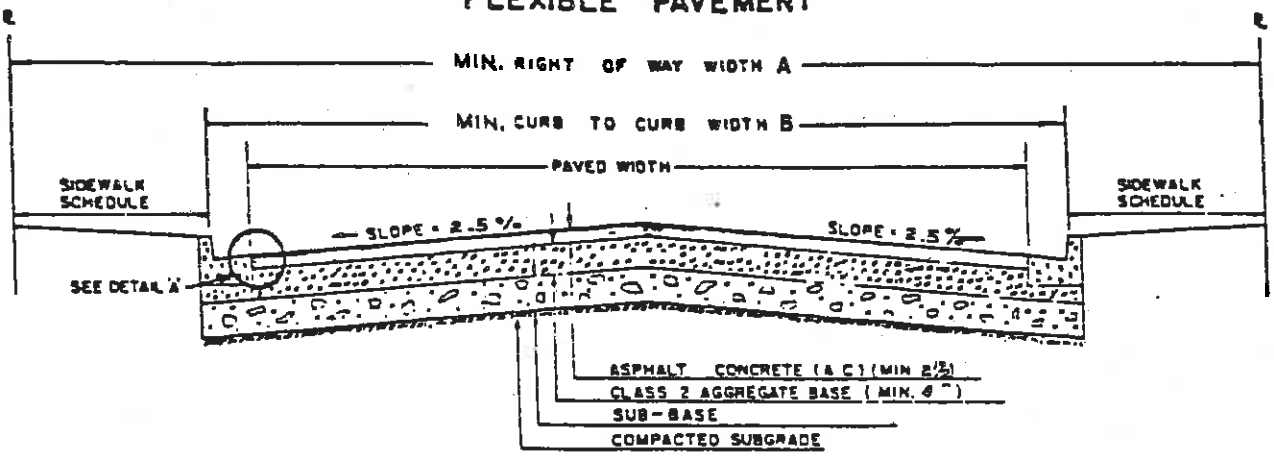
City Engineer R.C.E. 17,186 (expires: 6/30/97)

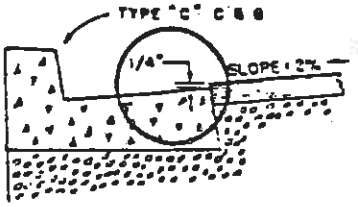
Approved: _____

Date: 7-20-94

TYPICAL CROSS SECTION

FLEXIBLE PAVEMENT





DETAIL 'A'

MINIMUM STREET WIDTH

		A	B
	INDUSTRIAL	68	48
	COMMERCIAL	68	48
*	RESIDENTIAL	60	40

* UNLESS OTHERWISE DETERMINED BY THE CITY ENGINEER

NOTES

STREET RIGHT-OF-WAY WIDTHS AND SIDEWALK SCHEDULES SHALL BE BASED UPON CURRENT CITY STANDARDS FOR DESIGNATION OF STREET CLASSIFICATIONS.

PAVEMENT STRUCTURAL SECTIONS SHALL BE DETERMINED BY THE CALTRANS FLEXIBLE PAVEMENT DESIGN METHODS, BASED UPON THE R-VALUES OF SUBGRADE MATERIALS AND THE TRAFFIC INDEX. IN NO CASE SHALL FLEXIBLE PAVEMENT SECTIONS BE LESS THAN 2½ INCHES OF ASPHALT CONCRETE OVER 6 INCHES OF AGGREGATE BASE.

R-VALUE TESTS ON SUBGRADE MATERIALS SHALL BE PERFORMED BY THE DEVELOPER'S SOIL ENGINEER.

TRAFFIC INDEX (TI) VALUES FOR COLLECTOR, INDUSTRIAL, AND ARTERIAL STREETS SHALL BE BASED UPON PROJECTED 20 YEAR VOLUMES AND SHALL BE NO LESS THAN THE MINIMUM VALUES SET BY THE CITY ENGINEER FOR THE VARIOUS STREET CLASSIFICATIONS.

MINIMUM TRAFFIC INDEX FOR TYPICAL RESIDENTIAL STREETS SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

CUL-DE-SACS OR OTHER SINGLE ENTRANCE STREETS WHICH PROVIDE ACCESS TO A MAXIMUM 18 DWELLING UNITS (AT FULL DEVELOPMENT) SHALL BE ASSIGNED A MINIMUM TRAFFIC INDEX OF 4.5

MINOR RESIDENTIAL STREETS WHICH PROVIDE ACCESS TO A MAXIMUM OF 100 UNITS SHALL BE ASSIGNED A TRAFFIC INDEX OF 5 OR MORE.

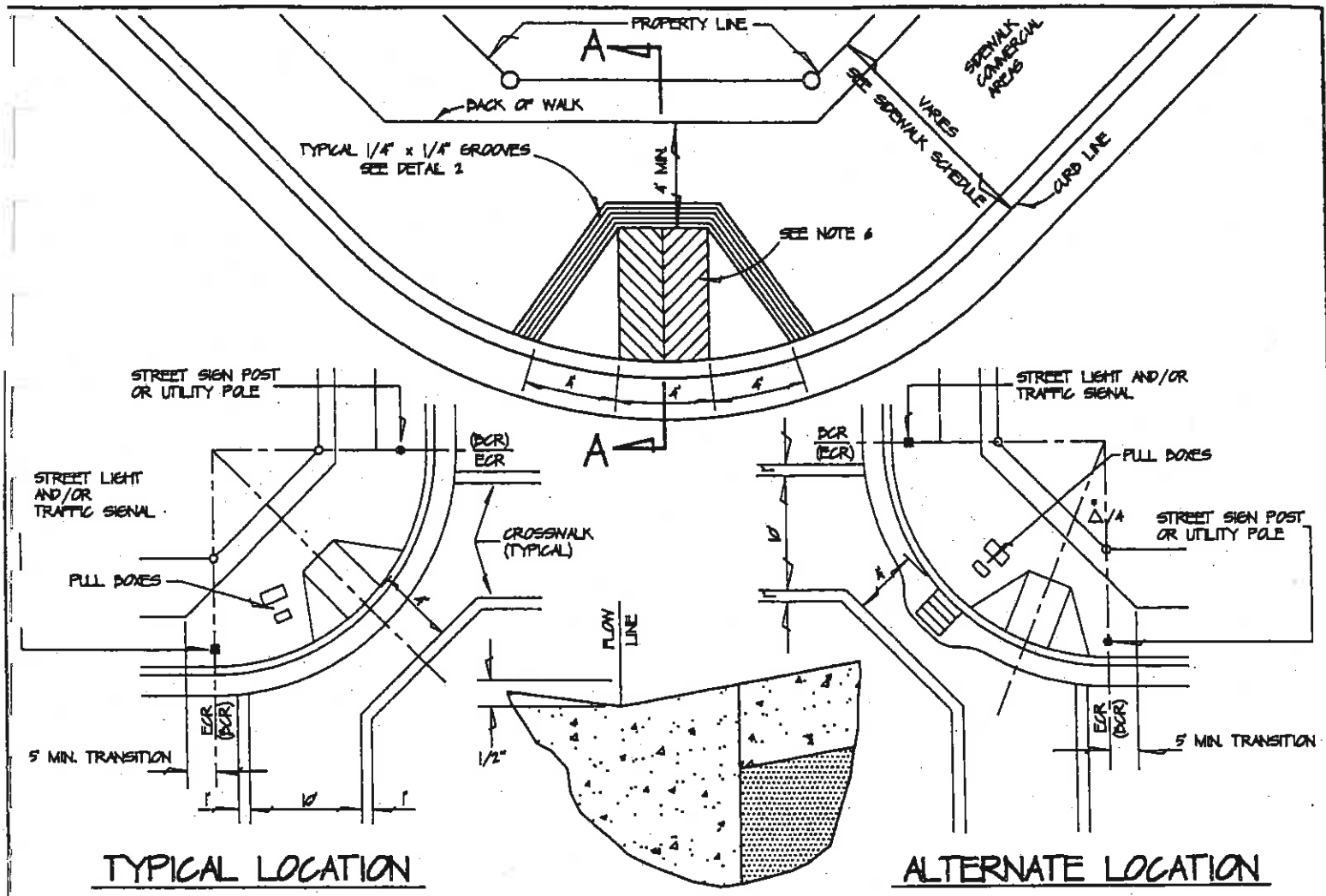
A MINIMUM TRAFFIC INDEX OF 5.5 SHALL BE ASSIGNED TO OTHER RESIDENTIAL STREETS WITH 2 OR MORE ENTRANCES AND WHICH SERVES AS A COLLECTOR OF TRAFFIC OF ADJACENT STREETS WITHIN THE SAME SUBDIVISION.

OTHER RESIDENTIAL STREETS WHICH SERVES AS A COLLECTOR FOR THROUGH TRAFFIC FROM ADJACENT SUBDIVISIONS, MAJOR TRAFFIC GENERATORS, AND/OR JOINS OTHER COLLECTOR OR ARTERIAL STREETS SHALL BE ASSIGNED TRAFFIC INDEX VALUES BY THE CITY ENGINEER.

FLEXIBLE PAVEMENT DESIGNS WITH ALTERNATIVE MATERIALS AND THICKNESS OR RIGID PAVEMENT DESIGNS MAY BE SUBMITTED FOR APPROVAL OF THE CITY ENGINEER.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION — CITY OF KING

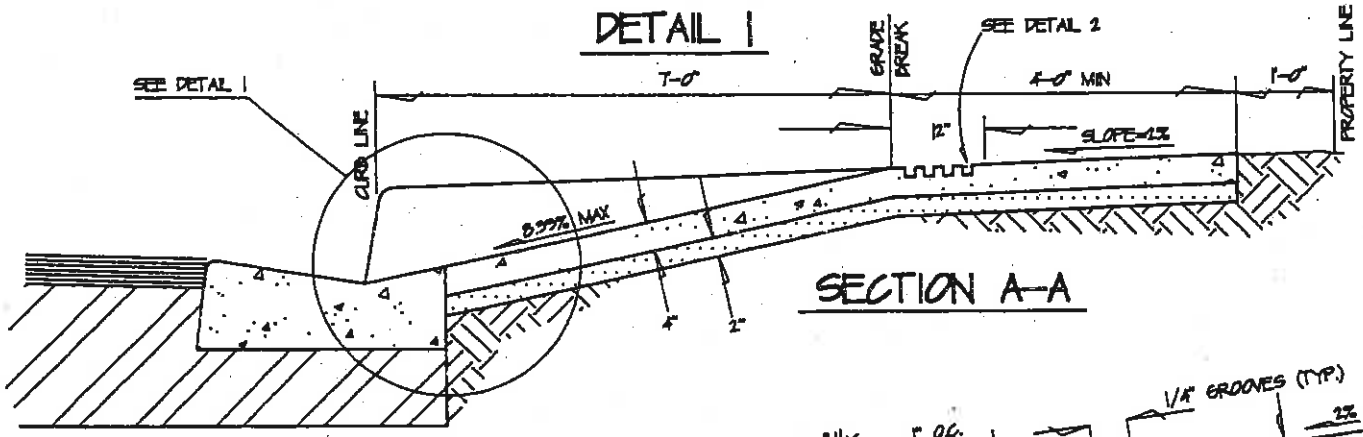
TITLE: STREET STRUCTURAL SECTIONS		STANDARD PLAN
DESIGNED BY: STAFF	APPROVED	DATE
DRAWN BY: R. HARTSOCK	CITY ENGINEER: Donald Burnett RCE 17,186	5-26-87
CHECKED BY:	REVISED 5/15/91	3



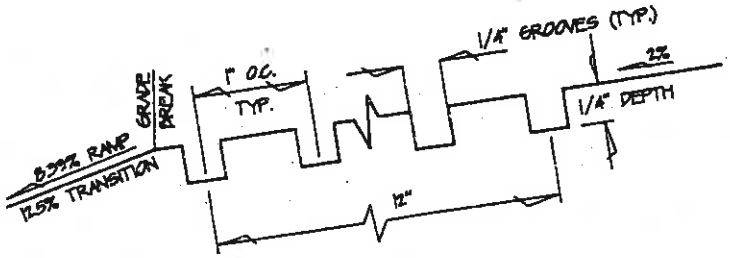
TYPICAL LOCATION

ALTERNATE LOCATION

DETAIL 1



SECTION A-A



GROOVING DETAIL 2

NOTES:

1. ACCESS RAMP SHALL BE MONOLITHIC, CLASS B P.C.C., 4" THICK WITH 2" SAND CUSHION, AND WITH A COARSE BROOM FINISH.
2. WIDTH OF SIDEWALK AND RADIUS OF CURB RETURN SHALL BE PER CONSTRUCTION DRAWINGS.
3. CURB AND GUTTER SHALL BE PER STANDARD PLAN NO. 1.
4. SIDEWALK SHALL BE PER STANDARD PLAN NO. 2.
5. * ALTERNATIVE LOCATIONS/CONFIGURATIONS ARE SUBJECT TO PRIOR APPROVAL BY THE CITY ENGINEER.
6. PROVIDE GROOVES (2" O.C.) ON SLOPING PORTION OF RAMP WHEN LOCATED WITHIN CURB RETURN W/ALIGNMENTS PARALLEL TO CROSSWALK STRIPING.

Department of Public Works — City of King, California

ACCESS RAMP

Standard Detail

4

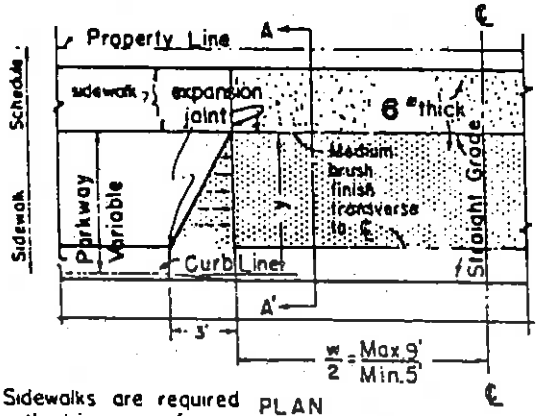
Gerald R. Burnett

City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

Date: 7-20-94

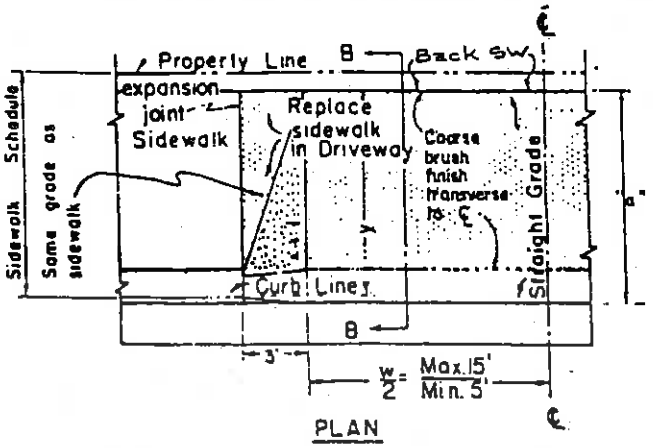
EXIST DRIVEWAY APPROACH



Sidewalks are required with driveways if no sidewalks exist.

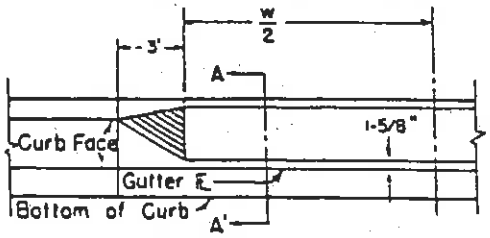
PLAN

NEW RESIDENTIAL INDUSTRIAL-COMMERCIAL ⚠1

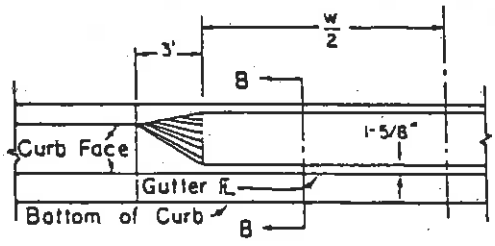


PLAN

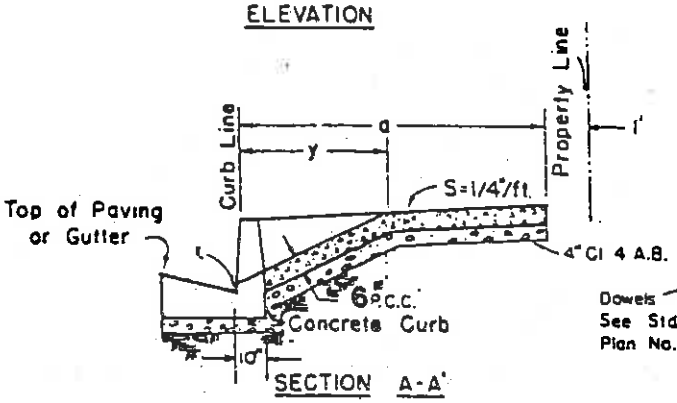
DRIVEWAY APPROACH PAYMENT LIMITS



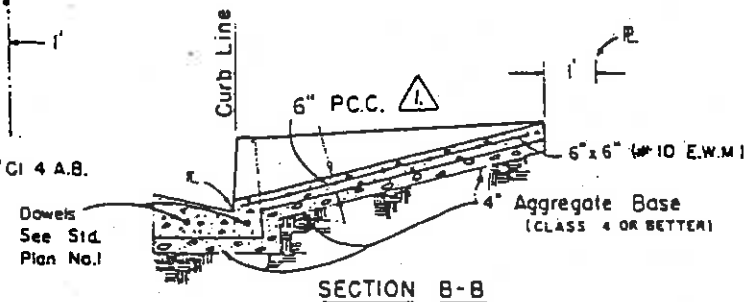
ELEVATION



ELEVATION



SECTION A-A'



SECTION B-B

1. ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST ADOPTED STANDARD SPECIFICATIONS.
2. THE AREA INCLUDED WITHIN THE "X" AND "Y" SLOPES SHALL BE MEDIUM BRUSH FINISHED. THE BALANCE OF THE DRIVEWAY SHALL BE FINE BROOM FINISHED TO MATCH THE ADJOINING SIDEWALK. SCORING LINES SHALL BE SPACED TO EVENLY DIVIDE THE AREA INTO BLOCKS OF NOT LESS THAN 3 FEET NOR MORE THAN 4 FEET, OR TO MATCH THE EXISTING.
3. ON COMMERCIAL DRIVEWAYS, "Y" SHALL BE EQUAL TO "a" FOR RESIDENTIAL DRIVEWAYS, "Y" SHALL EXTEND TO THE FRONT EDGE OF THE SIDEWALK BUT SHALL NOT BE LESS THAN 4 FEET UNLESS OTHERWISE SPECIFIED.
4. RESIDENTIAL DRIVEWAYS SHALL HAVE 6 INCH MINIMUM CLASS 4 A.B.(OR BETTER) COMMERCIAL DRIVEWAYS SHALL HAVE 6 INCH MINIMUM CLASS 4 A.B., AND 6"x6" x1/4" (#10 E.W.M.) PLACED AT MID-DEPTH. ⚠1
5. CONCRETE SHALL BE CLASS "B" PER STANDARD SPECIFICATIONS
6. ON RESIDENTIAL DRIVEWAY CONSTRUCTION ONLY CONTRACTOR MAY REMOVE VERTICAL CURB AND CONSTRUCT DRIVEWAY AGAINST REMAINING GUTTER AN APPROVED BONDING AGENT OR EPOXY SHALL BE APPLIED TO JOIN CONCRETE SURFACES
7. CURB HEIGHT HIGHER THAN 6-1/2" SHALL BE APPROVED BY THE CITY ENGINEER

Department of Public Works · City of King, California

Driveway Approach

Standard Detail

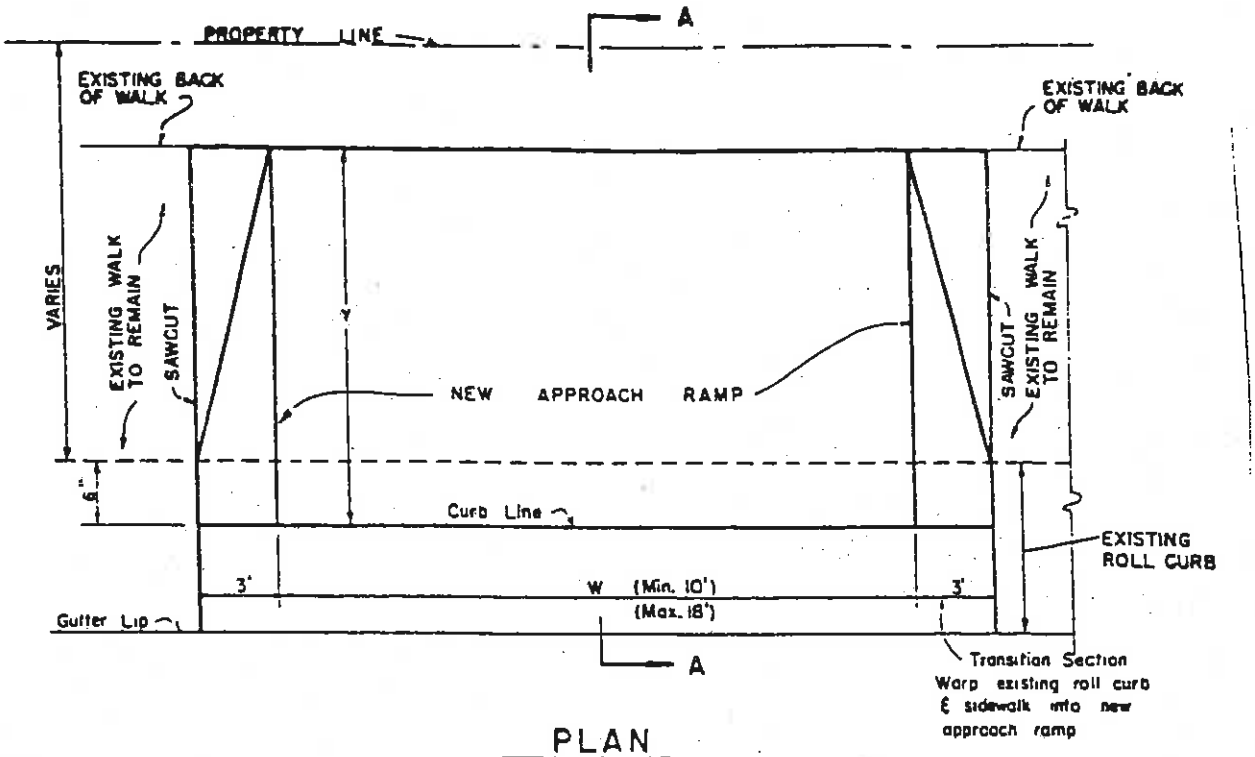
5

Gerald M. Burnett

City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

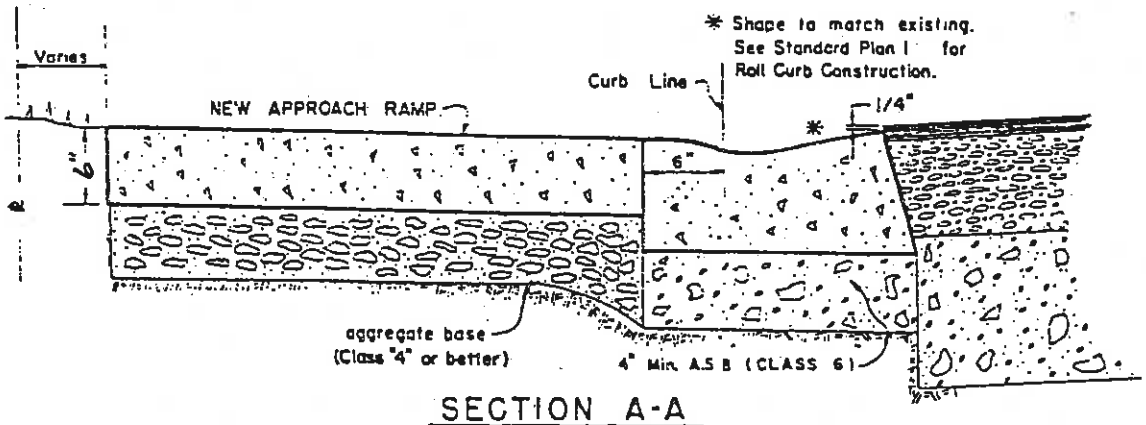
Date: 7-20-94



PLAN

NOTES:

1. "Y" SHALL EXTEND TO THE FRONT EDGE OF THE SIDEWALK BUT SHALL NOT BE LESS THAN 4 FEET UNLESS OTHERWISE SPECIFIED.
2. IF SIDEWALK IS ADJACENT TO CURB "Y" SHALL EXTEND TO BACK OF WALK.
3. AFTER REMOVING EXISTING SECTIONS AND CLEANING UP OF DEBRIS, WET, ROUGHEN WITH WIRE BRUSH, AND APPLY BRUSH COAT OF NEAT CEMENT ON ALL JOIN SURFACES BEFORE REPOURING SECTION PER PLAN.
4. CONCRETE SHALL BE CLASS "B" PER STANDARD SPECIFICATIONS.



SECTION A-A

NOTE: ROLLED TYPE CURB ONLY TO BE USED WITH WRITTEN APPROVAL OF CITY ENGINEER & P.W.D. ⚠

Department of Public Works — City of King, California

Driveway Approach for Roll Type Curb

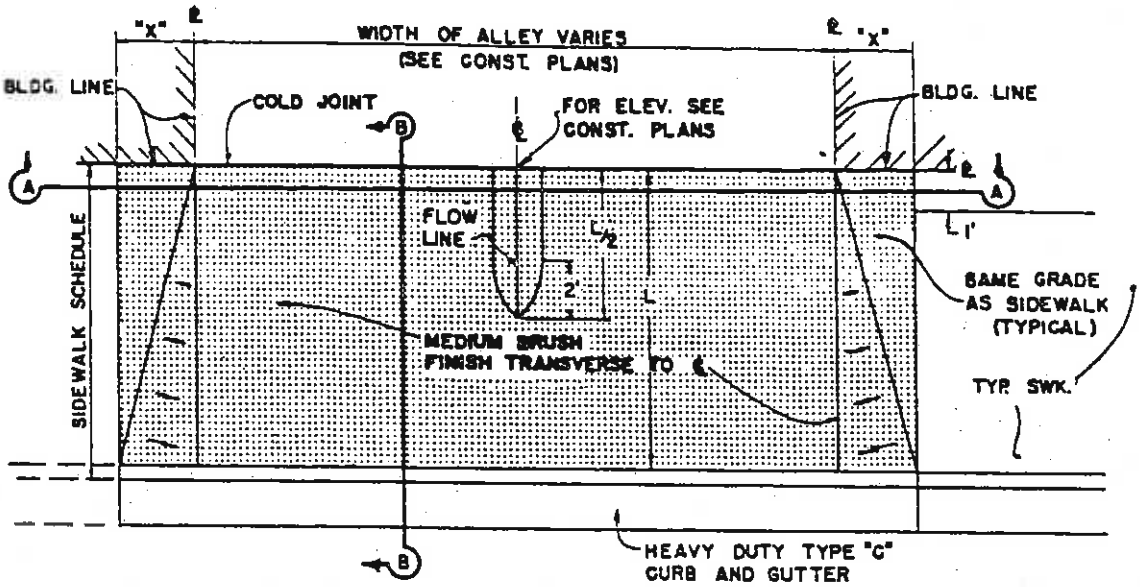
Standard Detail

6

City Engineer R.C.E. 17,186 (expires: 6/30/97)

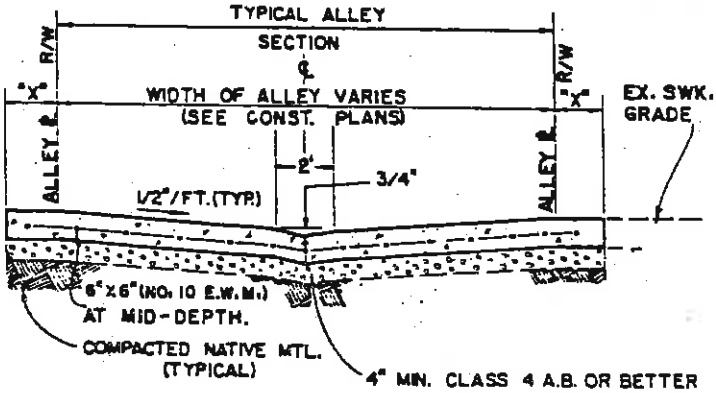
Approved: _____

Date: 7-20-94

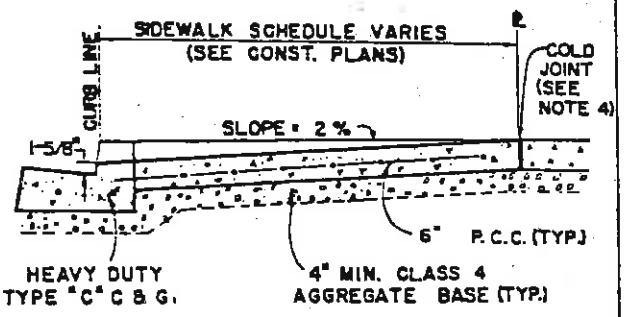


PLAN

ALLEY APPROACH PAYMENT LIMITS



SECTION A–A
(ALLEY APPROACH & ALLEY)



SECTION B–B

NOTES:

1. ALL WORK AND MATERIALS SHALL CONFORM TO SECTION 73 OF THE STANDARD SPECIFICATIONS "DRIVEWAY CONSTRUCTION".
2. SEE STANDARD PLAN NO. 1 FOR CURB AND GUTTER CONSTRUCTION.
3. THE "X" DIMENSION SHALL BE 3 FT. UNLESS OTHERWISE INDICATED ON PLANS.
4. PROVIDE COLD JOINT AT BACK OF ALLEY APPROACH (OMIT STEEL ACROSS THIS JOINT).
5. ALL CONCRETE SHALL BE CLASS "B" PER STANDARD SPECIFICATIONS.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

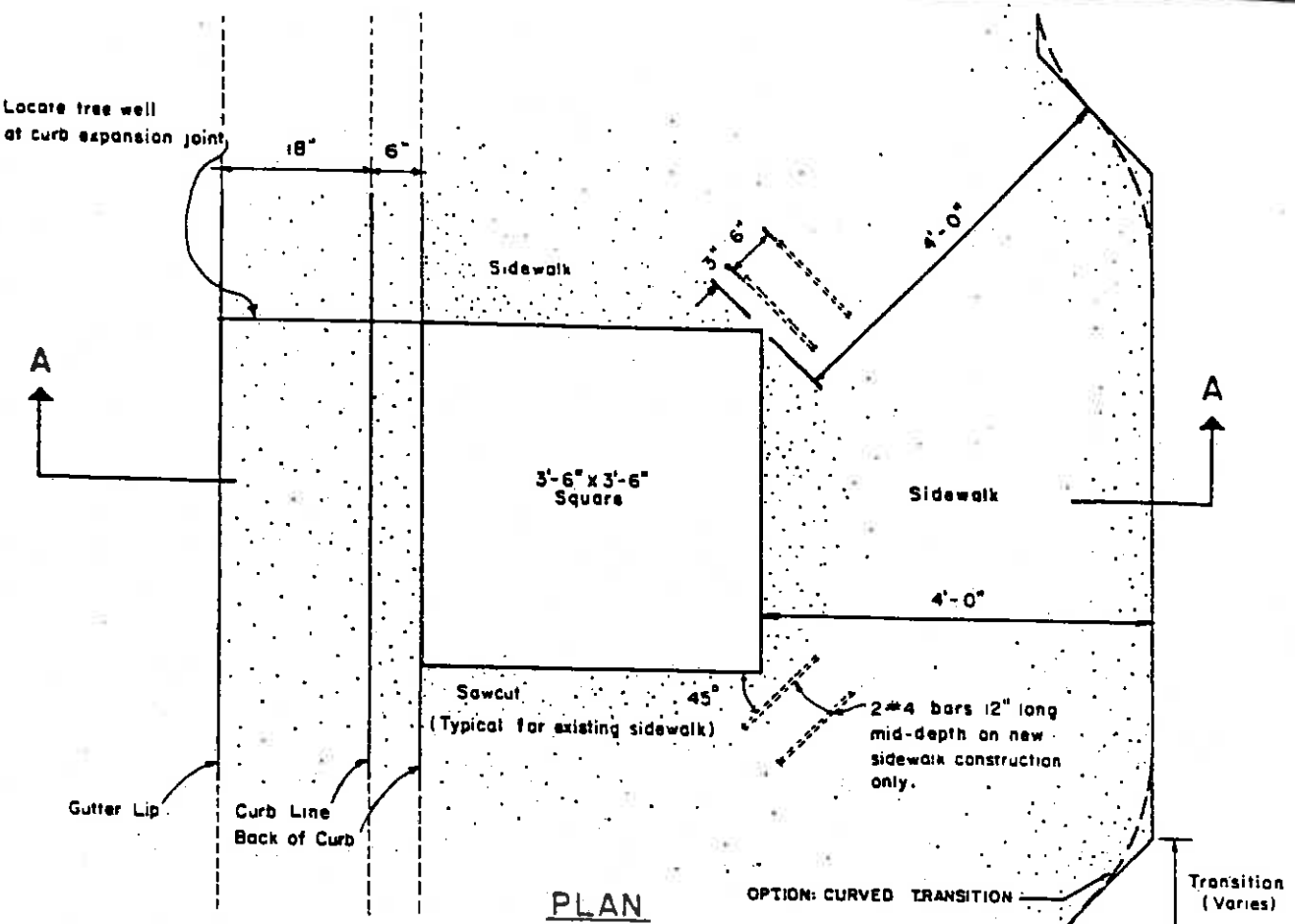
TITLE ALLEY APPROACH AND SECTION

STANDARD PLAN

7

DESIGNED BY J.D.E.
DRAWN BY K.L.C.
CHECKED BY

APPROVED
CITY ENGINEER
DATE 5-26-87

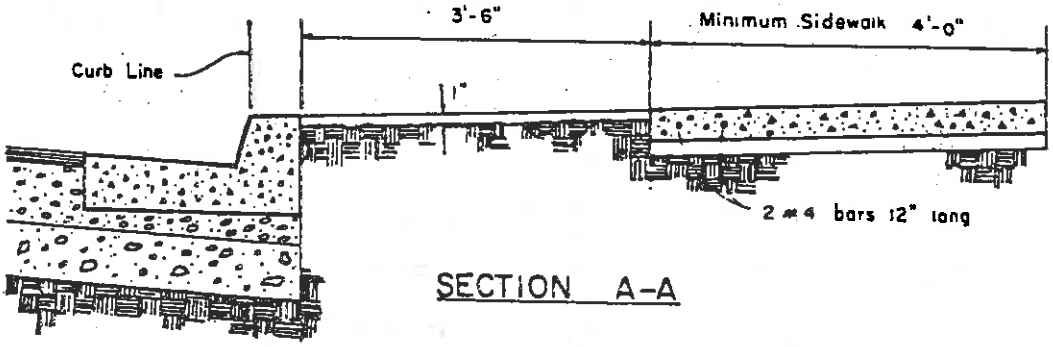


PLAN

NOTES:

Unless otherwise specified in the plans placement of Tree Wells shall be as follows.

1. Minimum of 10' clear from sanitary sewer lateral
2. Minimum of 5' clear from water service.
3. Minimum of 15' from driveways.
4. Minimum of 25' from Curb Returns
5. Minimum spacing of 50 to 60', or 1 per each lot.
6. Minimum of 10' clear of Fire Hydrants.



SECTION A-A

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE: TREE WELL

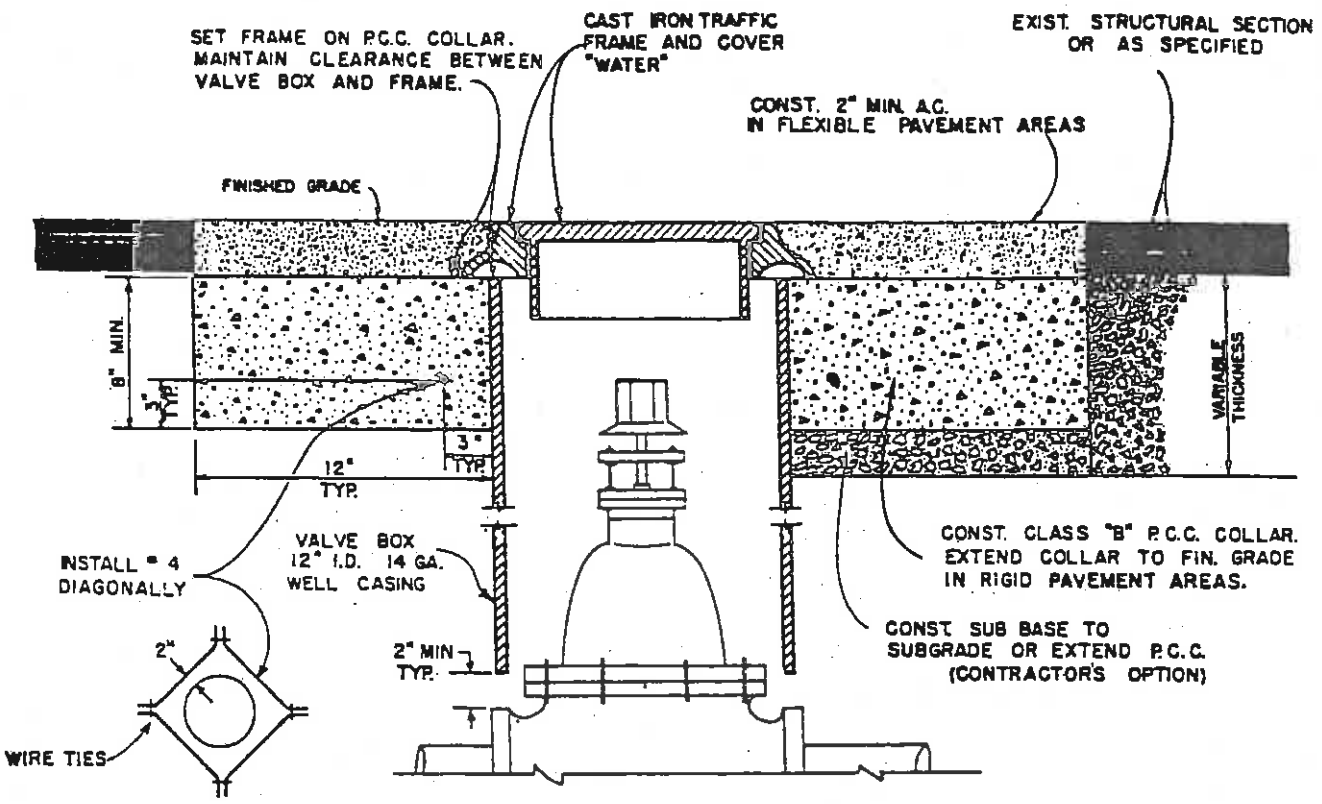
STANDARD PLAN 8

DESIGNED BY A.A ADLAWAN
DRAWN BY V.A.
CHECKED BY

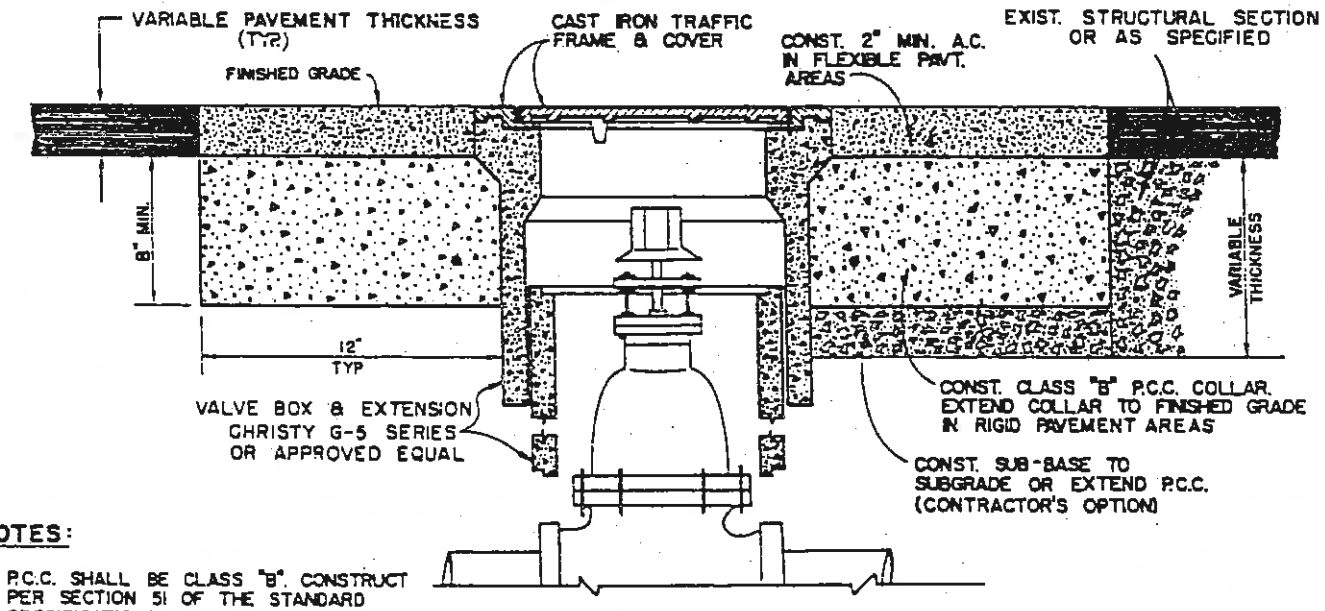
APPROVED

DATE

CITY ENGINEER Arnold Burnett 5-26-87



STEEL VALVE BOX DETAIL



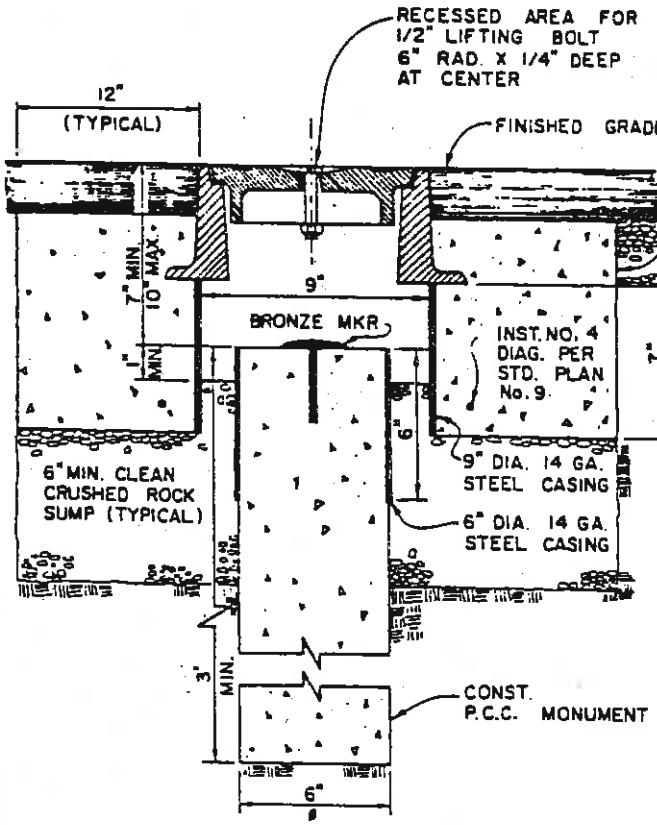
CONC. VALVE BOX DETAIL

NOTES:

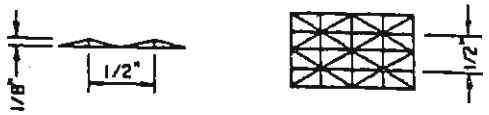
1. P.C.C. SHALL BE CLASS "B". CONSTRUCT PER SECTION 51 OF THE STANDARD SPECIFICATIONS.
2. ALL CASTINGS SHALL BE GRAY CAST IRON CONFORMING TO ASTM A-48, CLASS 30 FREE FROM CRACKS, HOLES, SWELLS & OTHER DEFECTS. ALL BEARING SURFACES SHALL BE MACHINED.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION — CITY OF KING

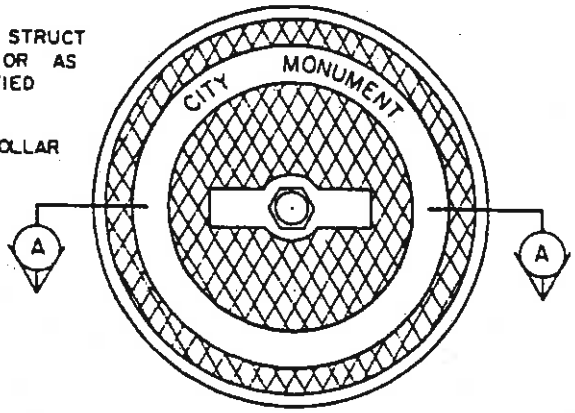
TITLE: VALVE BOX INSTALLATION		STANDARD PLAN
DESIGNED BY J.D EDWARDS	APPROVED	DATE
DRAWN BY K.L. CLEMENT	CITY ENGINEER Arnold Kunath	5-16-87
CHECKED BY		9



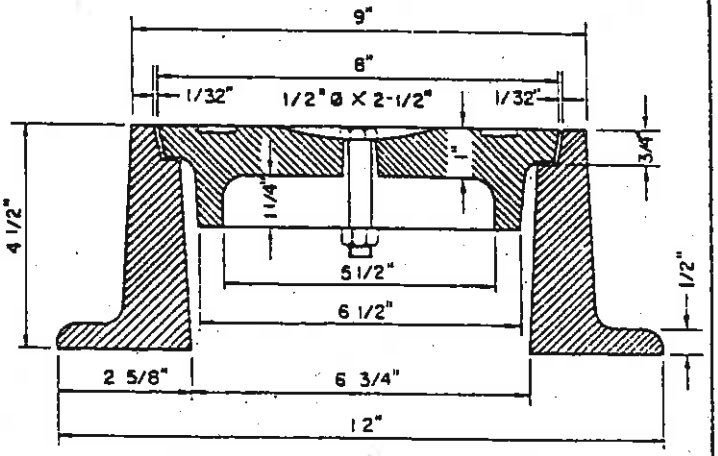
SECTION A-A



CHECKERED PATTERN DETAIL



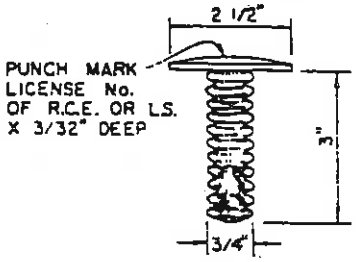
PLAN



FRAME & COVER SECTION

GENERAL NOTES:

1. MONUMENT FRAME AND COVER SHALL BE GRAY CAST IRON, FREE OF BLISTERS, BLOW-HOLES, WARPAGE, AND COLD SHUTS.
2. MONUMENT SHALL BE FURNISHED & INSTALLED AS PER PLANS AND SECTION 81 OF THE STANDARD SPECIFICATIONS, COMPLETE W/MARKER.
3. BEARING SURFACES OF FRAME AND COVER SHALL FIT WITH POSITIVE PRESSURE ON ALL SURFACES AND SHALL BE NON-ROCKING.
4. ALL CONCRETE SHALL BE CONSTRUCTED IN ACCORDANCE WITH CLASS "B" OF THE STANDARD SPECIFICATIONS.
5. FRAME AND COVER SHALL BE AMERICAN BRASS & FOUNDRY 5020-21 OR APPROVED EQUAL.
6. CONTRACTOR MUST PROVIDE SURVEY OF CENTERLINE CONTROL & FINAL PUNCH MARK PER DETAIL AT RIGHT.
7. FOR CENTERLINE CONTROLS PERFORMED BY CITY SURVEYORS, THE MARKERS AND FINAL PUNCH MARK WILL BE FURNISHED BY THE CITY.



BRONZE MARKER DETAIL

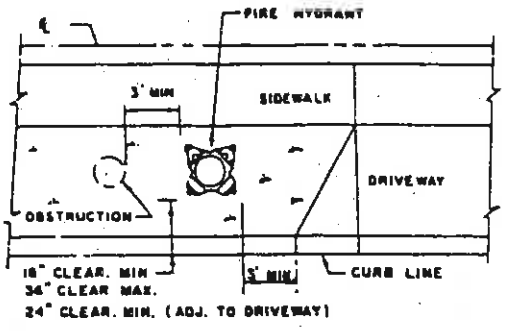
DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION — CITY OF KING

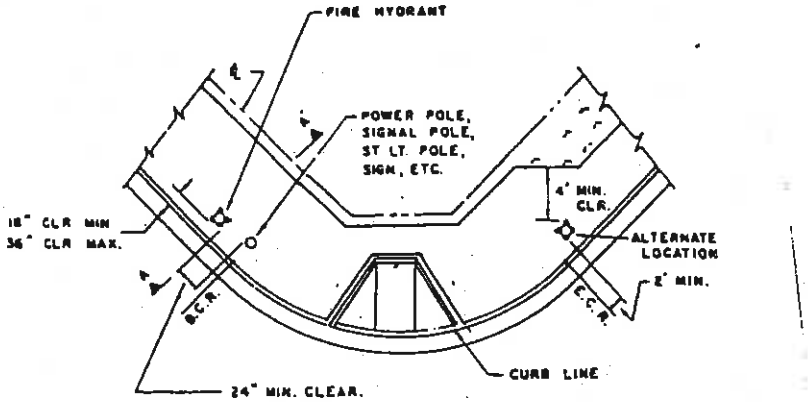
TITLE: CITY MONUMENT

STANDARD PLAN 10

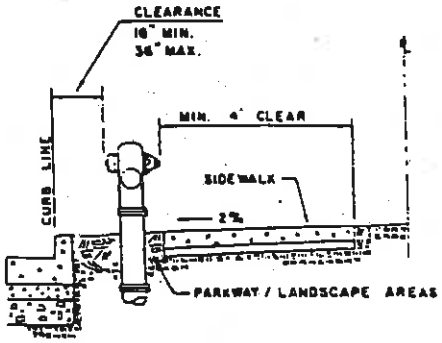
DESIGNED BY	APPROVED	DATE
J.D EDWARDS		
DRAWN BY STAFF	CITY ENGINEER Arnold Lucietti	5-26-87
CHECKED BY		



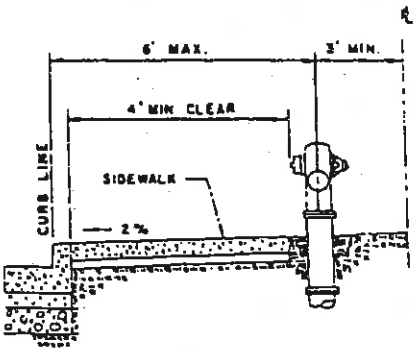
CASE A: IN PARKWAY STRIP



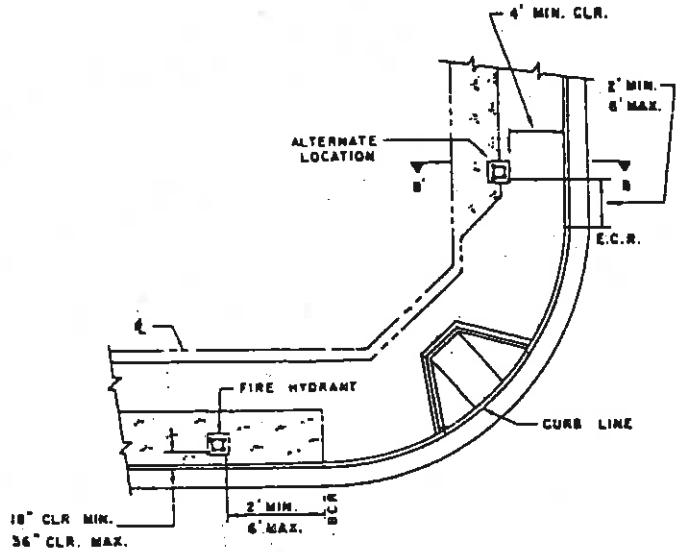
CASE B: IN SIDEWALK AT CURB RETURN



SECTION A-A'



SECTION B-B'



CASE C: IN PARKWAY/PLANTER AT CURB RETURN

NOTES:

1. SIDEWALKS ADJACENT TO FIRE HYDRANT LOCATIONS SHALL BE A MINIMUM 4' WIDE (CLEARANCE) FOR PEDESTRIAN TRAFFIC.
2. DETAILS SHOW PREFERRED HYDRANT LOCATIONS. NO DIMENSIONS OR DETAIL HEREON SHALL PRECLUDE THE FINAL LOCATION OF FIRE HYDRANT IN THE FIELD BY THE SALINAS FIRE DEPARTMENT.
3. SEE STANDARD PLAN 12 FOR FIRE HYDRANT CONSTRUCTION.

Department of Public Works — City of King, California

Fire Hydrant Location

Standard Detail

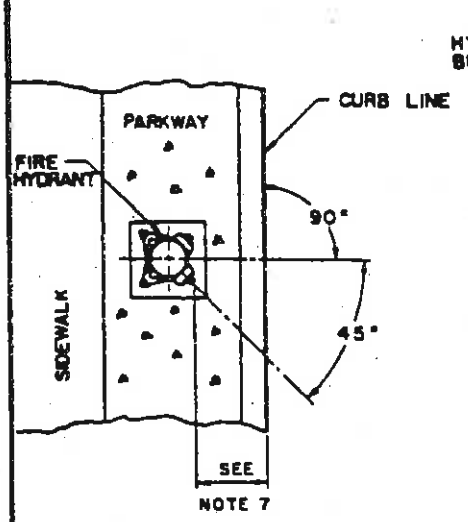
11

Edward R. Burnett

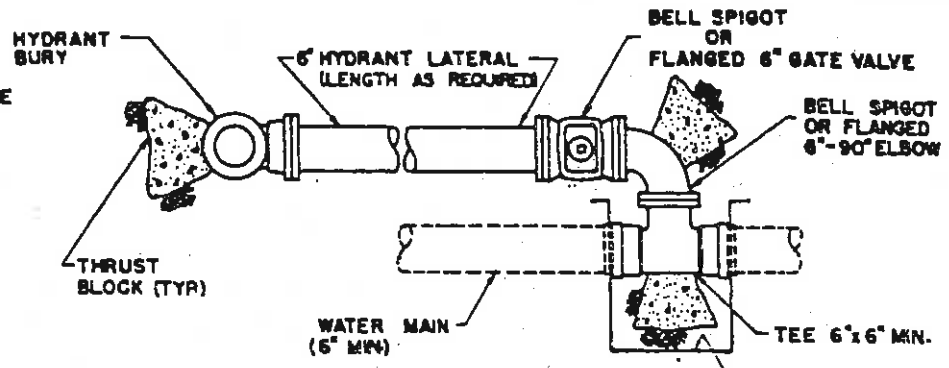
City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

Date: 7-20-94



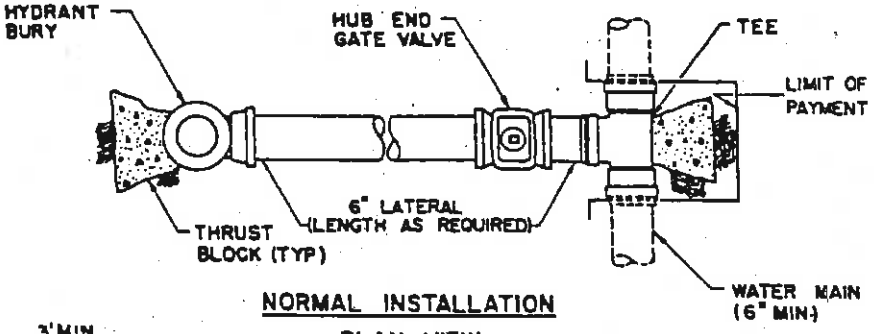
PLAN VIEW



MODIFIED INSTALLATION

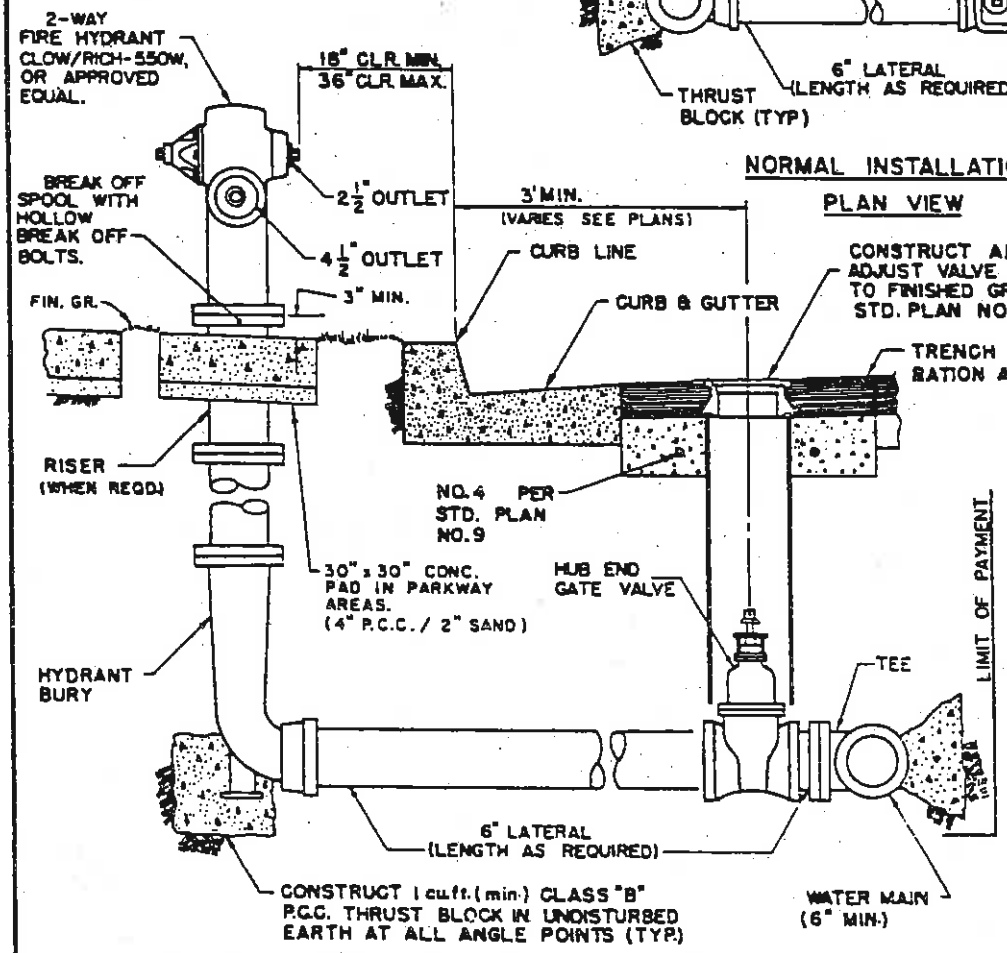
(AT APPROVED LOCATIONS ONLY)

PLAN VIEW



NORMAL INSTALLATION

PLAN VIEW



FIRE HYDRANT INSTALLATION

SECTION

NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH REQUIREMENTS OF THE APPROVED ENCROACHMENT PERMIT & STANDARD SPECIFICATIONS.
2. CAST IRON PIPE SHALL CONFORM TO THE AWWA SPECIFICATION C106, CLASS 150.
3. CAST IRON FITTINGS SHALL CONFORM TO THE AWWA SPECIFICATION C110 71.
4. ASBESTOS CEMENT PIPE SHALL CONFORM TO THE AWWA SPECIFICATION C400 73, CLASS 150.
5. NO OTHER SERVICE CONNECTIONS SHALL BE MADE TO THE FIRE HYDRANT LATERAL.
6. DETAILS SHOW NORMAL FIRE HYDRANT INSTALLATION. ALTERNATE CONSTRUCTION METHODS MAY BE USED SUBJECT TO APPROVAL OF THE SALINAS FIRE DEPARTMENT.
7. SEE PUBLIC WORKS STANDARD PLAN NO. 11 FOR FIRE HYDRANT LOCATION.
8. FINAL INSPECTION BY THE CITY ENGINEER WILL BE REQUIRED PRIOR TO BACKFILL.

DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION — CITY OF KING

TITLE: FIRE HYDRANT CONSTRUCTION

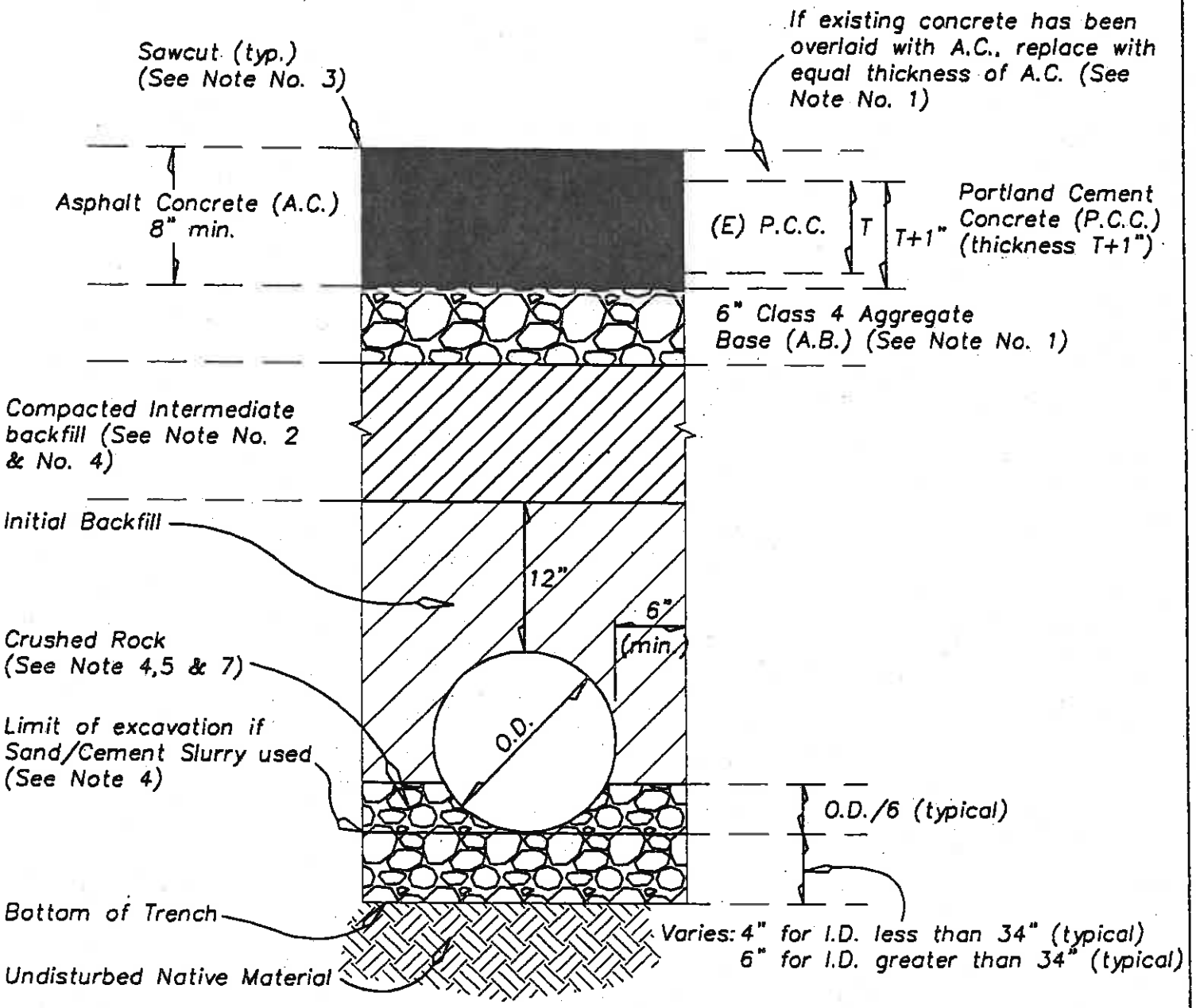
STANDARD PLAN

12

DESIGNED BY J.O.E.	APPROVED	DATE
DRAWN BY STAFF	CITY ENGINEER Donald Burnett	5-26-87
CHECKED BY	CITY FIRE CHIEF	

NOTES:
Structural pavement replacement as follows:

1. On improved street the thickness of the A.C., A.B., and A.S.B. shall be equivalent to the existing. On A.C. pavement, a minimum of 2" A.C. over 6" A.B. is required.
2. For backfill materials and compaction methods see Section 19-3 of the Standard Specifications. Intermediate backfill shall be compacted to 95% relative compaction in improved areas and 85% relative compaction in unimproved areas.
3. All street cuts shall neatly sawcut on true line to 1-1/2" minimum depth.
4. Slurry Cement Backfill shall be used as intermediate backfill if ditch is less than 18" wide or in patch areas less than 100 square feet.
5. Crushed Rock Bedding shall conform with aggregate gradations of section 19-3.06 C (1) of the Standard Specifications.
6. Structural Section requirements shall not apply to unimproved areas.
7. Crushed rock may be replaced with initial backfill material for all pipe installations other than Storm Drain lines and Sanitary Sewer lines provided note 4 does not apply.
8. Crushed rock or Slurry Cement Backfill will not be required if monolithic concrete pipe is installed.
9. Initial and intermediate backfill materials shall be minimum S.E.=30.
10. New subdivisions may use native material for intermediate backfill with approval of the City Inspector.



A.C. & P.C.C. IMPROVED AREAS

Department of Public Works — City of King, California

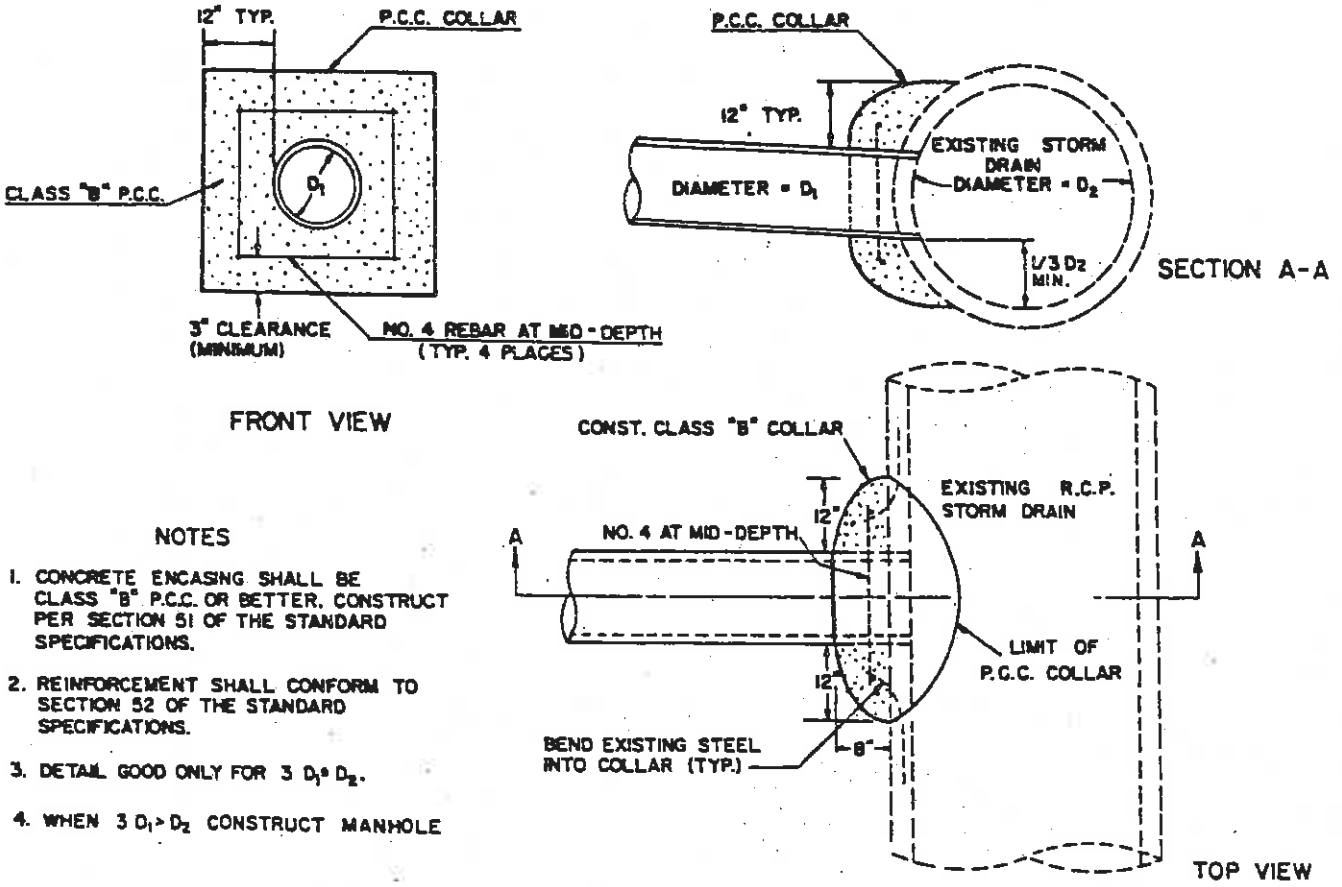
Trench Backfill & Surface Restoration

Standard Detail 13

City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

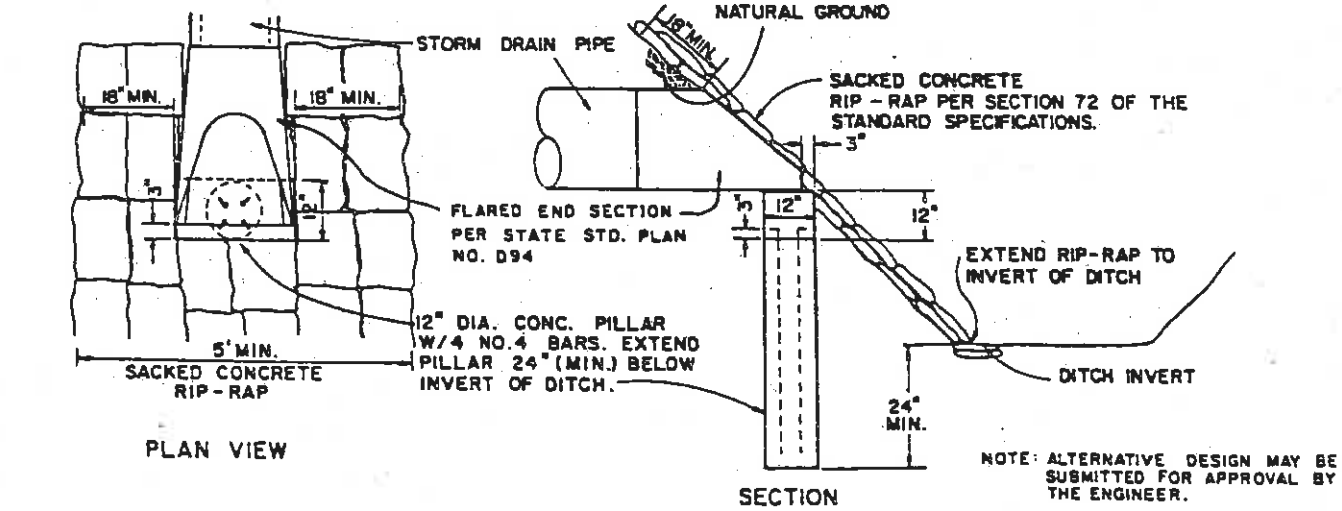
Date: _____



NOTES

1. CONCRETE ENCASING SHALL BE CLASS "B" P.C.C. OR BETTER. CONSTRUCT PER SECTION 51 OF THE STANDARD SPECIFICATIONS.
2. REINFORCEMENT SHALL CONFORM TO SECTION 52 OF THE STANDARD SPECIFICATIONS.
3. DETAIL GOOD ONLY FOR 3 $D_1 \leq D_2$.
4. WHEN 3 $D_1 > D_2$ CONSTRUCT MANHOLE

STORM DRAIN LATERAL CONNECTION DETAIL (P.C.C. COLLAR)



NOTE: ALTERNATIVE DESIGN MAY BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

PIPE OUTLET DETAIL AT DITCH

ENGINEERING DIVISION

DEPARTMENT OF PUBLIC WORKS

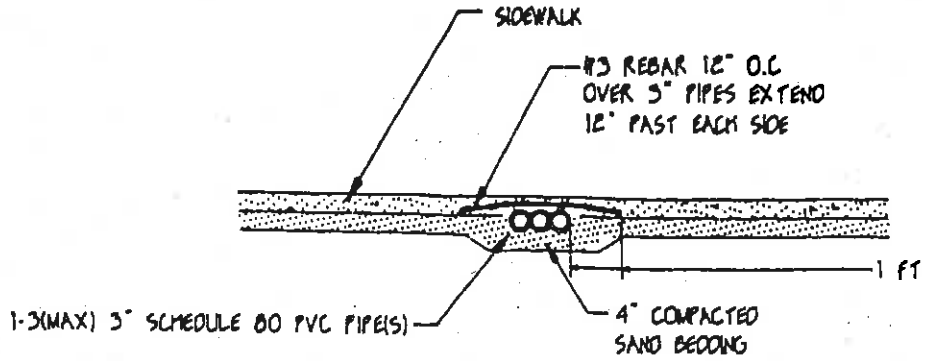
CITY OF KING

TITLE : MISCELLANEOUS STORM DRAIN DETAILS

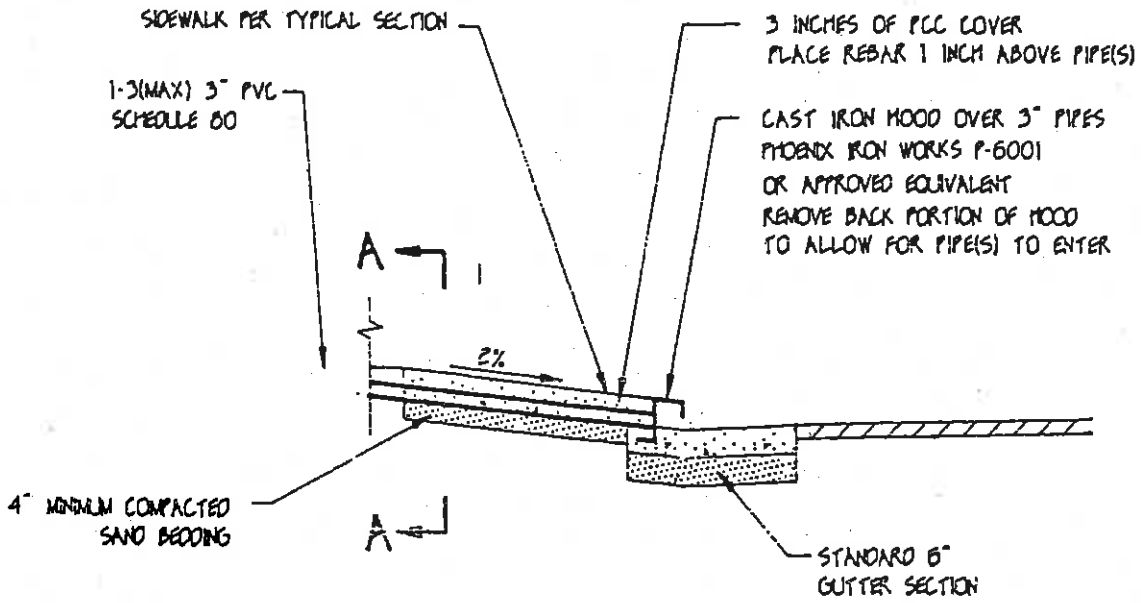
STANDARD PLAN

14

DESIGNED BY	APPROVED	DATE
A. ADLAWAN	CITY ENGINEER	5-26-87
DRAWN BY: E. PANGANIBAN		
CHECKED BY		



SECTION A - A



NOTES:

1. P.V.C. PIPE SHALL BE SHEDULE 80
2. EXISTING SIDEWALK FOR DRAIN INSTALLATION SHALL BE REMOVED AND REPLACED TO THE NEAREST JOINT
3. ALTERNATE DESIGN/MATERIALS REQUIRE WRITTEN APPROVAL FROM CITY ENGINEER
4. PLACE #3 REBAR 12" BEYOND END OF PIPE(S) 1 FT ON CENTER LAYING 1 INCH OBOVE PIPE(S)
5. PIPE(S) SHALL HAVE 3 INCHES OF P.C.C. COVER

Department of Public Works — City of King, California

Curb Drain

Standard Detail

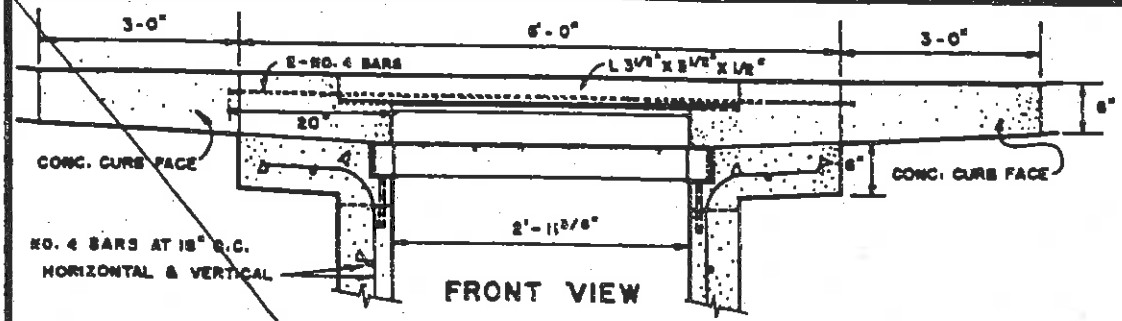
15

Signature

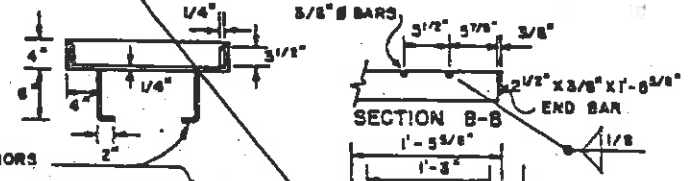
City Engineer R.C.E. 17,186 (expires: 6/30/97)

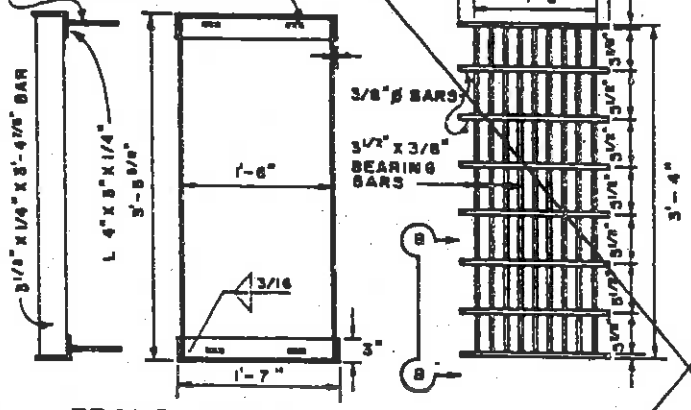
Approved: _____

Date: 7-20-94



FRONT VIEW





FRAME DETAIL

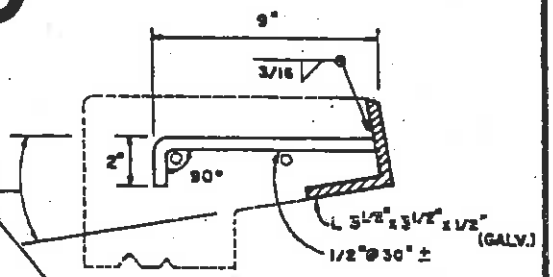
GRATE DETAIL

TYPE 18-9X (GALV. WELDED STEEL

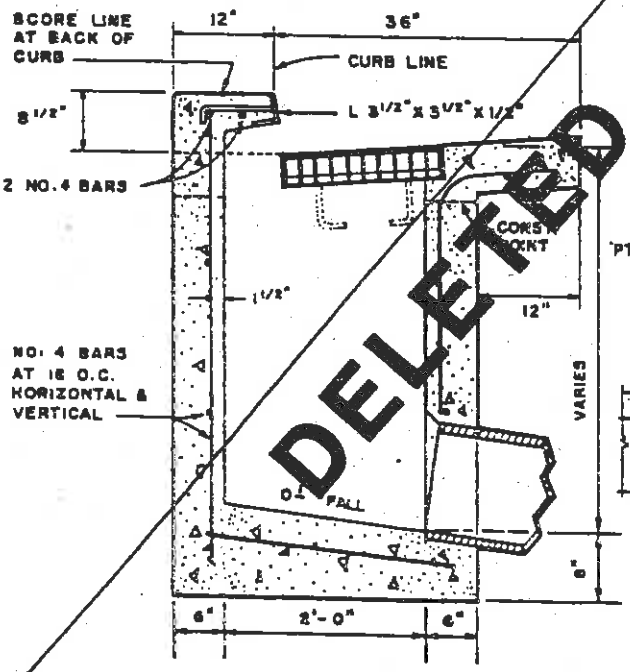
NOTES:

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH SECTION 51 OF THE STANDARD SPECIFICATIONS.
2. ALL CONCRETE SHALL BE CLASS A P.C.C.
3. FRAME AND GRATE SHALL CONFORM TO CALTRANS TYPE 18-9X GALVANIZED WELDED STEEL FRAME AND GRATE AND RATED FOR H-20 LOADING.
4. CURB AND GUTTER FROM PT. A TO PT. B SHALL BE INCLUDED IN THE CATCH BASIN FOR PAYMENT PURPOSES.
5. CONTRACTOR MAY SUBSTITUTE APPROVED PRECAST CATCH BASIN FOR THE CAST-IN-PLACE AS SHOWN.

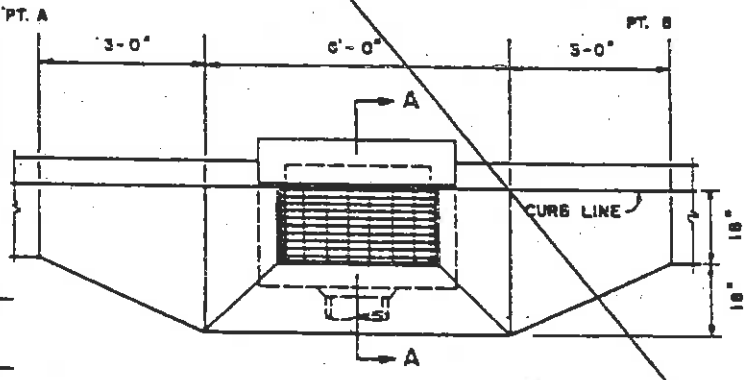
DELETED 5-15-91



FACE ANGLE ANCHOR DETAIL



SECTION A-A



PLAN VIEW

ENGINEERING DIVISION

DEPARTMENT OF PUBLIC WORKS

CITY OF KING

TITLE: TYPE "A" CATCH BASIN

STANDARD PLAN

16

DESIGNED BY SCOTT GREEN

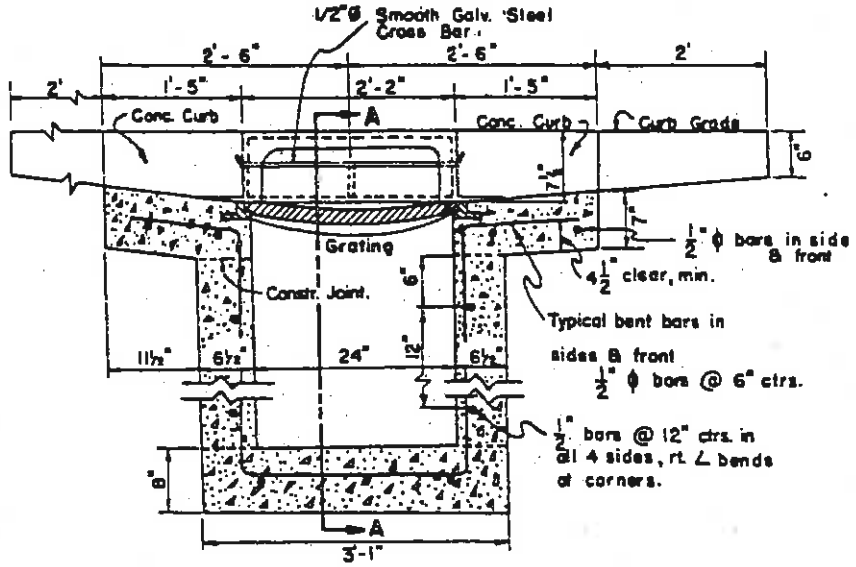
DRAWN BY JO EVANS V.A.

CHECKED BY

APPROVED

CITY ENGINEER Harold Burnett

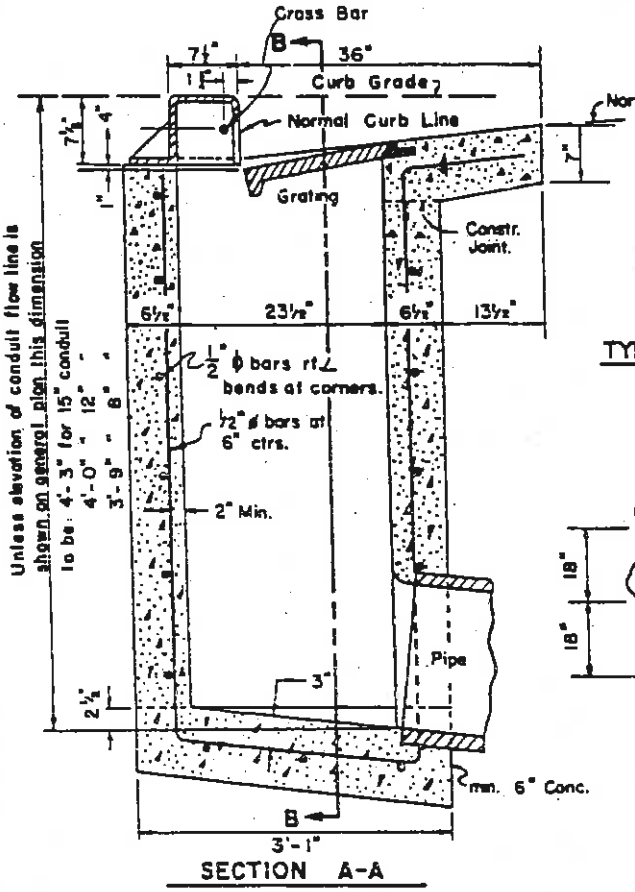
DATE 5-26-87



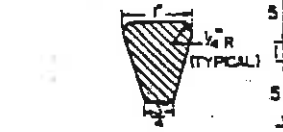
SECTION B-B

NOTES:

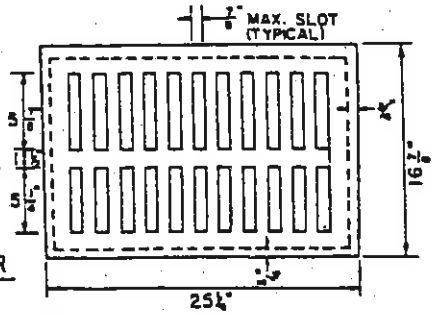
1. All work and materials shall be in accordance with Section 51 of the Standard Specifications.
2. All concrete shall be constructed in accordance with Class A of the Standard Specifications.
3. Frame and grate shall be Phoenix Iron Works model P-6001 or approved equal.
4. Castings for catch basin frames & grates shall be of tough gray iron free from cracks, holes, swells, & cold shuts.
5. Dimensions may be adjusted to fit any similar grate.
6. Curb from Pt. A to Pt. B to be considered a part of the catch basin for payment purposes.



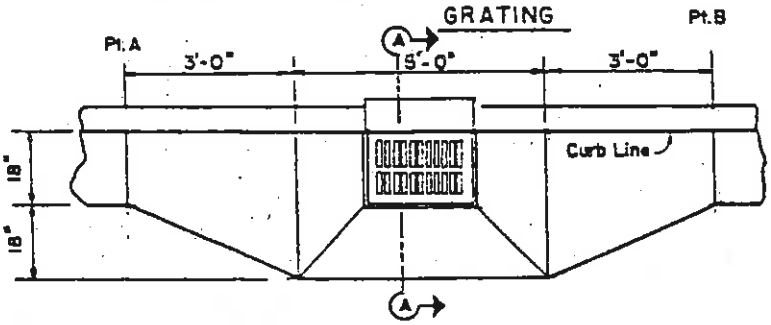
SECTION A-A



TYPICAL GRATING BAR



GRATING



PLAN
N.T.S.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

CITY OF KING

TITLE: TYPE "B" CATCH BASIN

STANDARD PLAN

17

DESIGNED BY STAFF

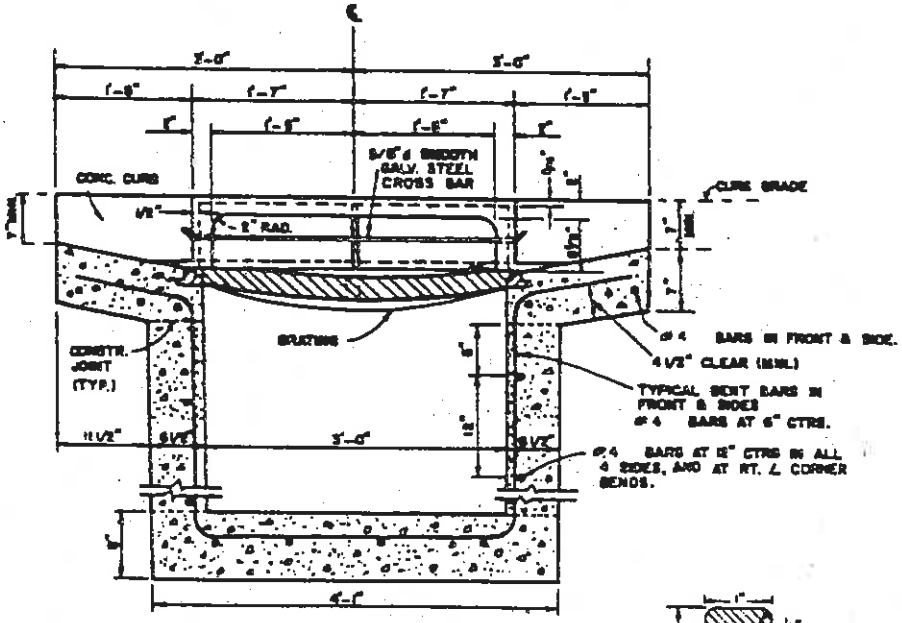
DRAWN BY STAFF

CHECKED BY

APPROVED

DATE

CITY ENGINEER Arnold Bennetti 5-26-87



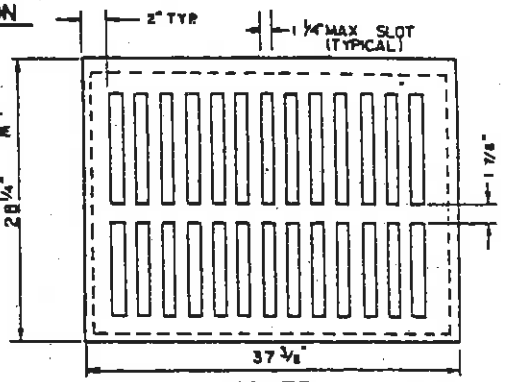
SECTION B-B

TYPICAL GRATE BAR SECTION

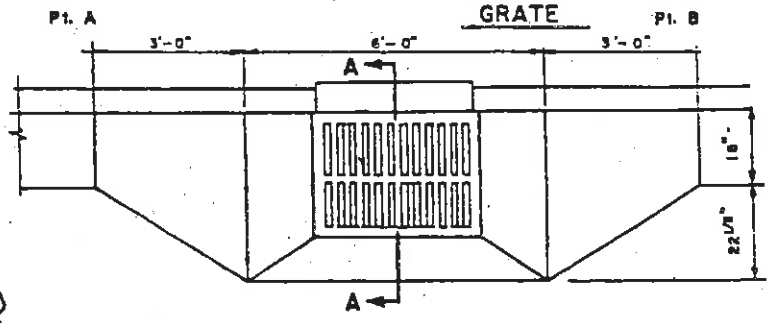
NOTES:

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH SECTION 51 OF THE STANDARD SPECIFICATIONS.
2. ALL CONCRETE SHALL BE CONSTRUCTED IN ACCORDANCE WITH CLASS A OF THE STANDARD SPECIFICATIONS.
3. FRAME AND GRATE SHALL BE PHOENIX IRON WORKS MODEL P-6002 OR APPROVED EQUAL.
4. CASTINGS FOR CATCH BASIN FRAMES & GRATES SHALL BE OF TOUGH GRAY IRON FREE FROM CRACKS, HOLES, SWELLS, & COLD SHUTS.
5. DIMENSIONS MAY BE ADJUSTED TO FIT ANY SIMILAR GRATE.
6. CURB FROM PT. A TO PT. B TO BE CONSIDERED A PART OF THE CATCH BASIN FOR PAYMENT PURPOSES.

SECTION A-A



GRATE



PLAN

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

CITY OF KING

TITLE: TYPE "C" CATCH BASIN

STANDARD PLAN

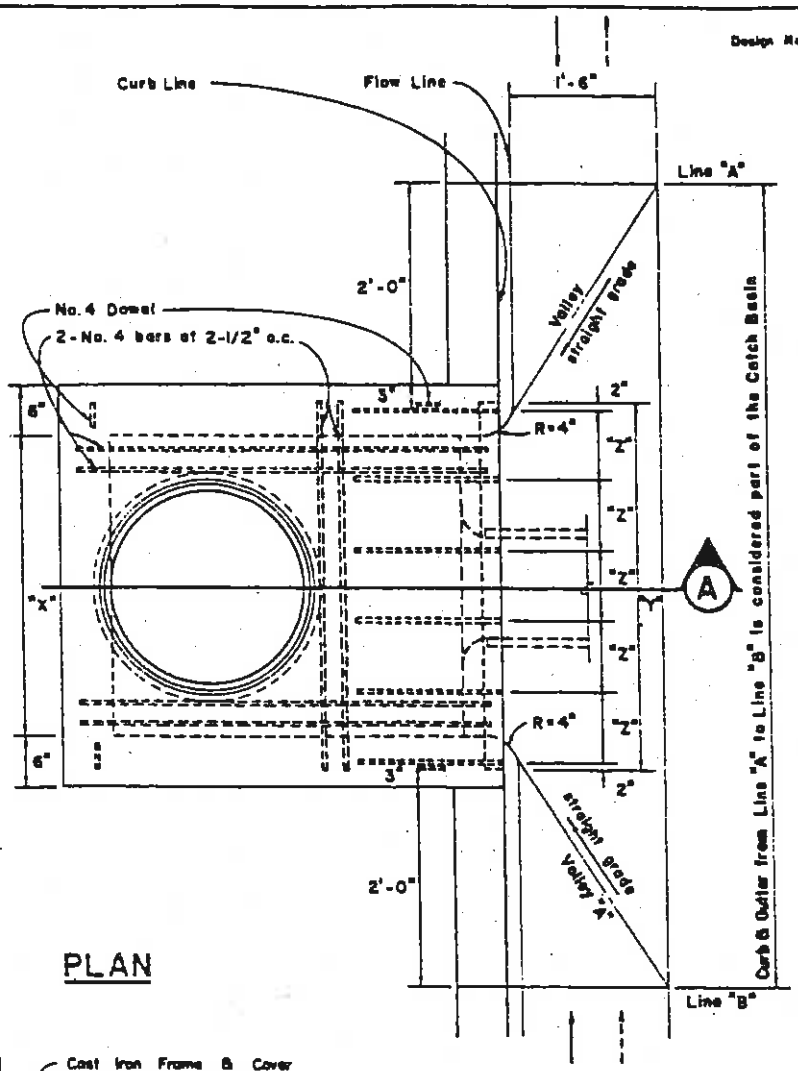
18

DESIGNED BY STAFF
DRAWN BY STAFF
CHECKED BY

APPROVED

CITY ENGINEER Arnold Emmett

DATE 5-26-87



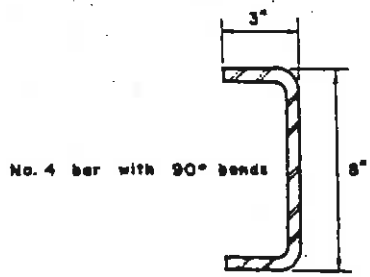
PLAN

Design Note: Gutter Depression
Use solid lines for grade sag
Use dashed lines and Valley "X" for flow in one direction only.

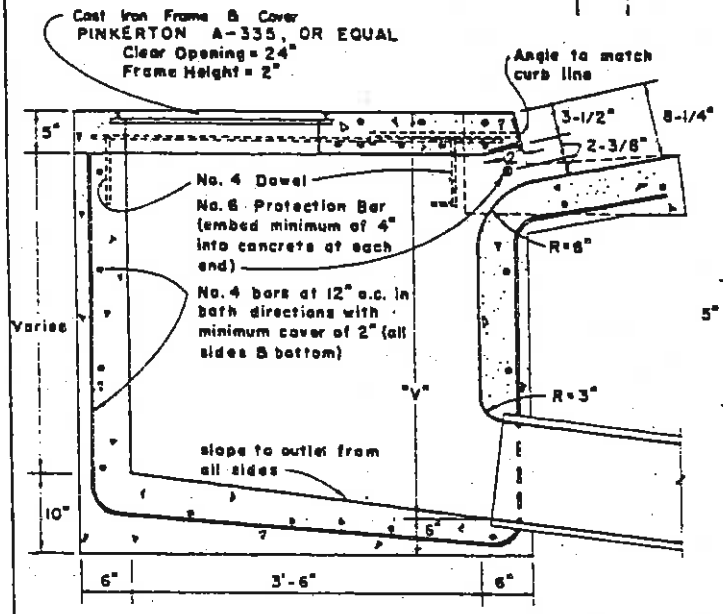
DIMENSION SCHEDULE				
Model	"X"	"Y"	"Z"	No. & Size of rebar
A	2'-6"	3'-4"	8"	5 - #4
B	3'-3"	4'-1"	8"	6 - #4
C	3'-6"	4'-4"	8"	7 - #4
D	4'-2"	5'-0"	8"	8 - #4

GENERAL NOTES:

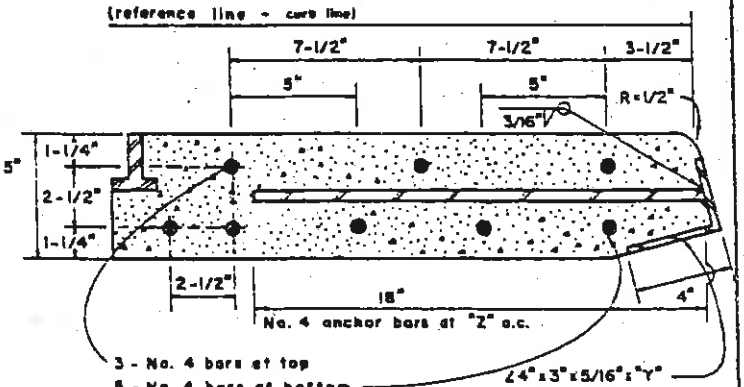
1. Connection pipes may be placed at any point around the catch basin, provided they flow in the proper direction, and the placement is otherwise consistent with the improvement plan.
2. Curvatures at all openings of the catch basin shall be formed with curved forms, and shall not be made by plastering.
3. Outlet pipe shall be trimmed to final length and shape before concrete is poured.
4. All reinforcing steel shall be adequately supported to maintain correct position during concrete pour.
5. Concrete shall be Class A P.C.C.
6. Steel reinforcing bars shall be No. 4 bar Grade 60 conforming to ASTM A615 (minimum cover of 1"L
7. Anchor bars at angle shall be shop welded and shall be hot-dip galvanized after fabrication.
8. "Y"=3'-0" plus O.D. of pipe unless otherwise specified.



DETAIL of DOWEL



SECTION A



DETAIL of REINFORCEMENT

DEPARTMENT of PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE TYPE "D" SIDE OPENING CATCH BASIN

STANDARD PLAN

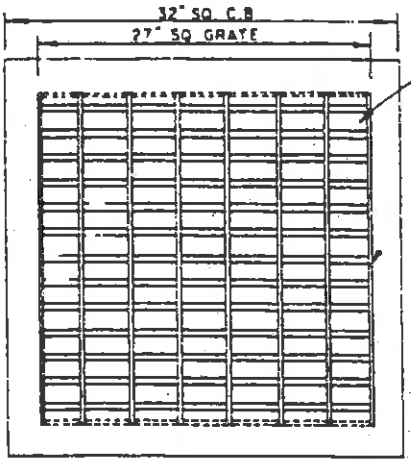
DESIGNED BY A. A. ADLAWAN
DRAWN BY R. C. AYARS
CHECKED BY

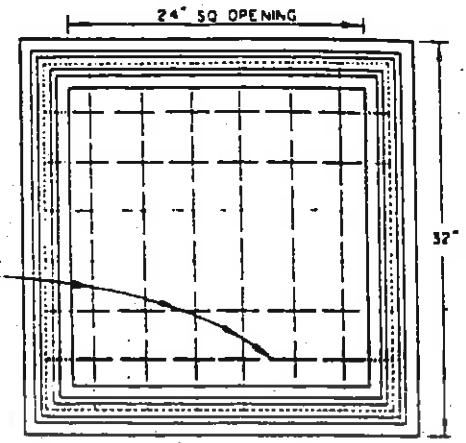
APPROVED

CITY ENGINEER Arnold Kennett

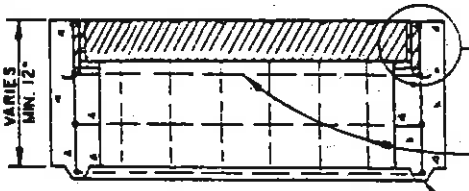
DATE 5-26-87

19

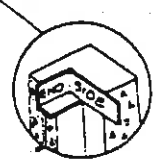




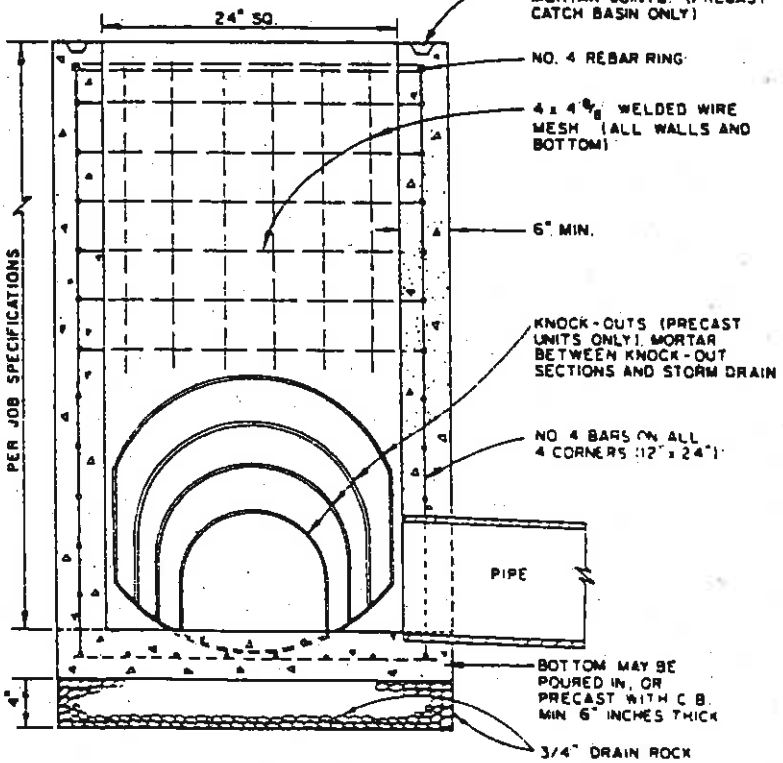
PLAN VIEW



PRECAST OR CAST IN PLACE GRADE RING



CAST-IN-PLACE CATCH BASIN
POUR CONCRETE COLLAR AND INSTALL FRAME TO FINISHED GRADE.
GRATE FRAME SHALL BE MINIMUM 4"x3"x3/16" GALVANIZED ANGLE IRON WITH ANCHOR BOLTS EMBEDDED IN CONCRETE.
PRECAST CATCH BASIN SHALL BE FURNISHED WITH CAST-IN GALVANIZED FRAME.



TYPICAL SIDE SECTION

NOTES.

1. ALL CONCRETE SHALL BE CLASS A P.C.C. IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
2. CONTRACTOR MAY USE EITHER PRECAST OR CAST-IN-PLACE CONCRETE CATCH BASINS CONFORMING TO ALL THE REQUIREMENTS SHOWN HEREIN
3. FRAME AND GRATE SHALL BE GALVANIZED IN ACCORDANCE WITH A.S.T.M. SPECIFICATION A123-59. GRATE SHALL BE HEAVY DUTY AND RATED FOR H-20 LOADING AND BICYCLE PROOF.
4. ALL CATCH BASIN WALLS AND BASE SHALL HAVE 4 x 4 8/8 WELDED WIRE MESH. WIRE MESH SHALL BE CONTINUOUS AND LAP A MINIMUM OF 12" AT CORNERS.
5. CATCH BASINS LESS THAN 4' DEEP SHALL BE CONTINUOUS WITH NO GRADE RINGS.
6. CONTRACTOR SHALL MINIMIZE NUMBER OF GRADE RINGS REQUIRED
7. PRECAST CATCH BASINS MAY BE ORDERED WITH OR WITHOUT BOTTOM
8. APPROVED PRECAST CATCH BASINS INCLUDE CHRISTY U-21 WITH 71R GALVANIZED GRATE, SANTA ROSA K2 WITH HEAVY TYPE GRATE, OR APPROVED EQUAL.

DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION

CITY OF KING

TITLE: TYPE "E" TOP OPENING CATCH BASIN

STANDARD PLAN

20

DESIGNED BY S GREEN

DRAWN BY E PANGANIBAN

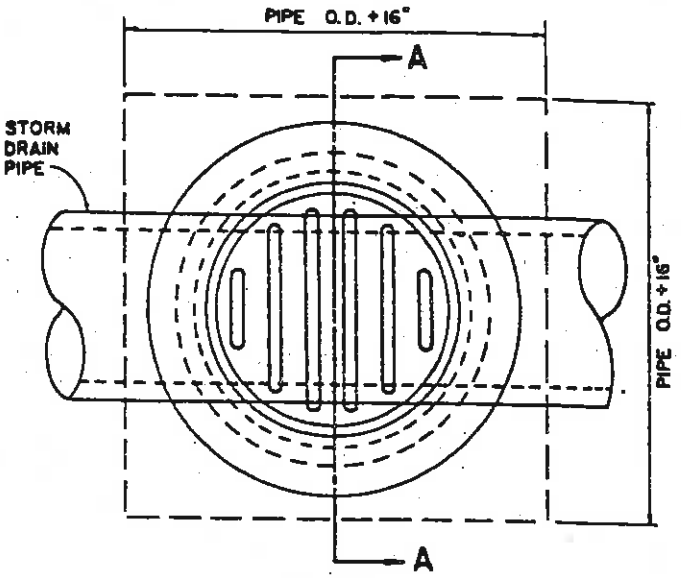
CHECKED BY

APPROVED

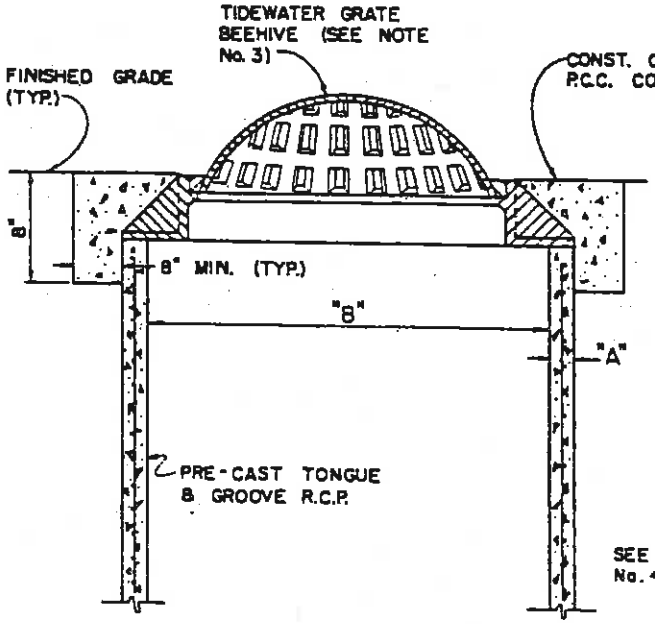
CITY ENGINEER Donald Kenneth

DATE 5-26-87

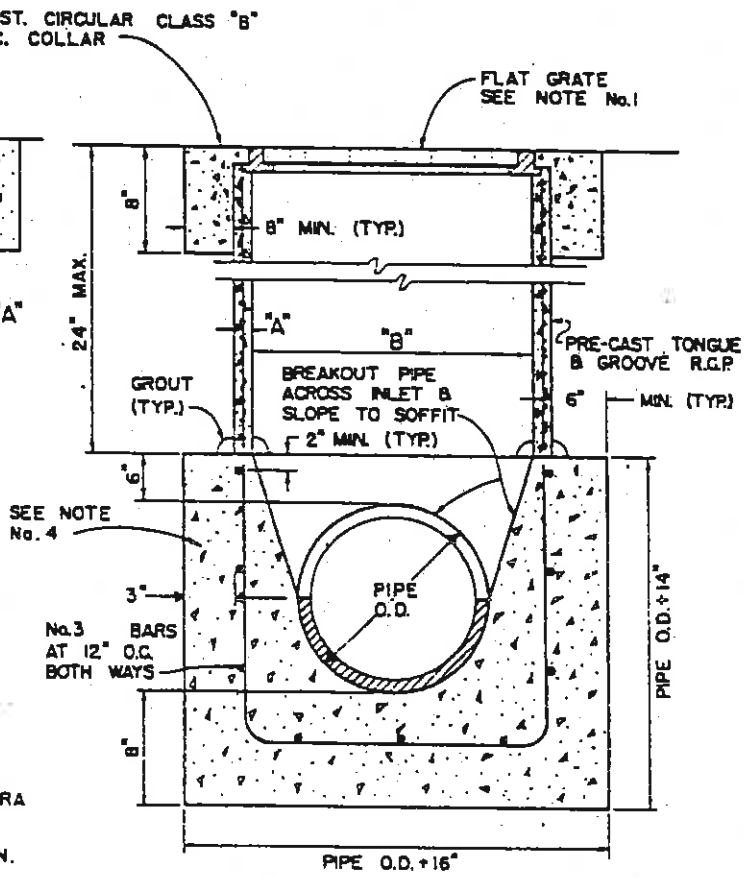
DIMENSION TABLE		
DIM.	FLAT GRATE	TIDEWATER GRATE
"A"	2-1/2"	2-3/4" FOR 30" R.C.P.
		2-5/8" FOR 27" R.C.P.
"B"	24" I.D. R.C.P.	27" OR 30" I.D. R.C.P.



PLAN



TIDEWATER GRATE SECTION



SECTION A-A
N.T.S.

NOTES:

1. TRAFFIC FRAME & SOLID COVER ALHAMBRA A-1210 (OR EQUAL).
2. ALL FRAME & GRATE SHALL BE CAST IRON.
3. TIDEWATER GRATE ALHAMBRA A-1215.
4. P.C.C. SHALL BE CLASS "A". CONSTRUCT PER SECTION 51 OF THE STANDARD SPECIFICATIONS.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE: TYPE "F" R.C.P. CATCH BASIN

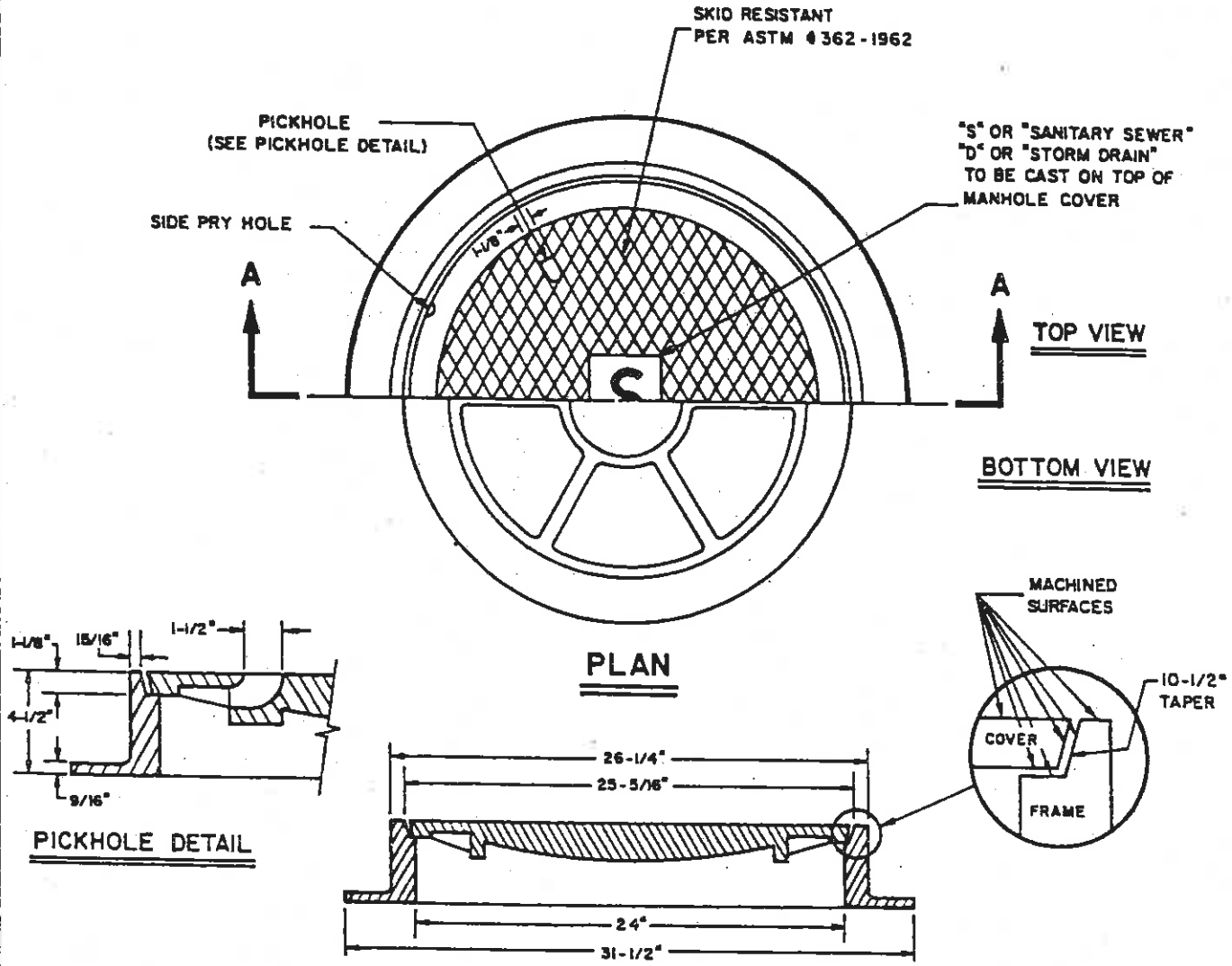
STANDARD PLAN

21

DESIGNED BY J. W.
DRAWN BY STAFF
CHECKED BY

APPROVED

CITY ENGINEER Lonnie Burnett DATE 5-26-87



NOTES:

1. BEARING SURFACES OF FRAME AND COVER SHALL BE MACHINED TO FIT WITH POSITIVE PRESSURE ON ALL SURFACES.
2. MINIMUM WEIGHT FOR RING AND COVER SHALL BE 265 POUNDS.
3. MANHOLE NOT APPLICABLE TO UTILITIES.
4. ALL MATERIALS USED IN MANUFACTURING FRAME AND COVER SHALL CONFORM TO ASTM A-48-70T-G3000 OR U.S. GOVERNMENT SPECIFICATION QQ I-653.
5. ENTIRE FRAME AND COVER ASSEMBLY SHALL BE CAPABLE OF SUPPORTING H-20 HIGHWAY LOADING.

ENGINEERING DIVISION

DEPARTMENT OF PUBLIC WORKS

CITY OF KING

TITLE **MANHOLE FRAME AND COVER**

STANDARD PLAN

22

DESIGNED BY A. A. ADLAWAN

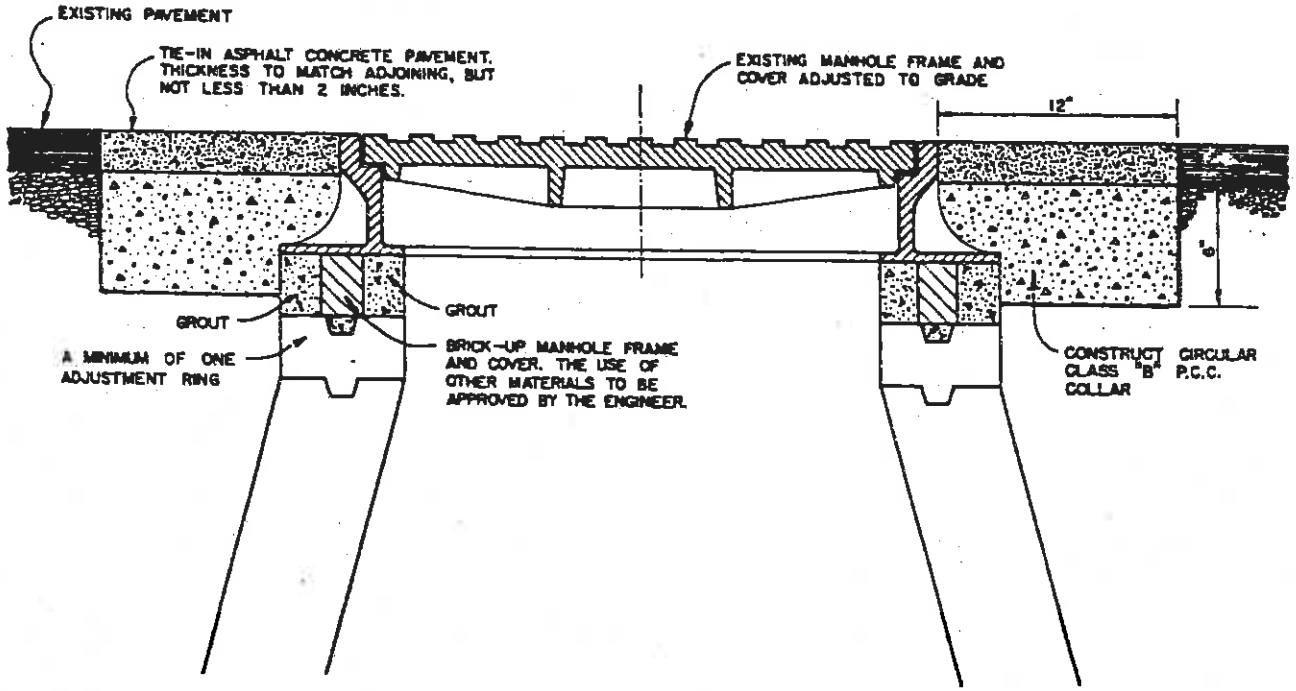
DRAWN BY JO EVANS

CHECKED BY

APPROVED

CITY ENGINEER Ernest Burnett

DATE 5-26-87



NOTES:

1. P.C.C. SHALL BE CLASS "B". CONSTRUCT PER SECTION 51 OF THE STANDARD SPECIFICATIONS.
2. A.C. SHALL BE TYPE "B" PER SECTION 39 OF THE STANDARD SPECIFICATIONS.
3. COLD MIXED A.C. SHALL BE USED FOR TEMPORARY TIE-IN PAVEMENT AND THE TIE-IN A.C. SHALL BE PLACED NOT LATER THAN 15 CALENDAR DAYS AFTER CONCRETE COLLAR IS IN PLACE.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

CITY OF KING

TITLE: MANHOLE FRAME & COVER ADJUSTMENT

STANDARD PLAN

23

DESIGNED BY STAFF

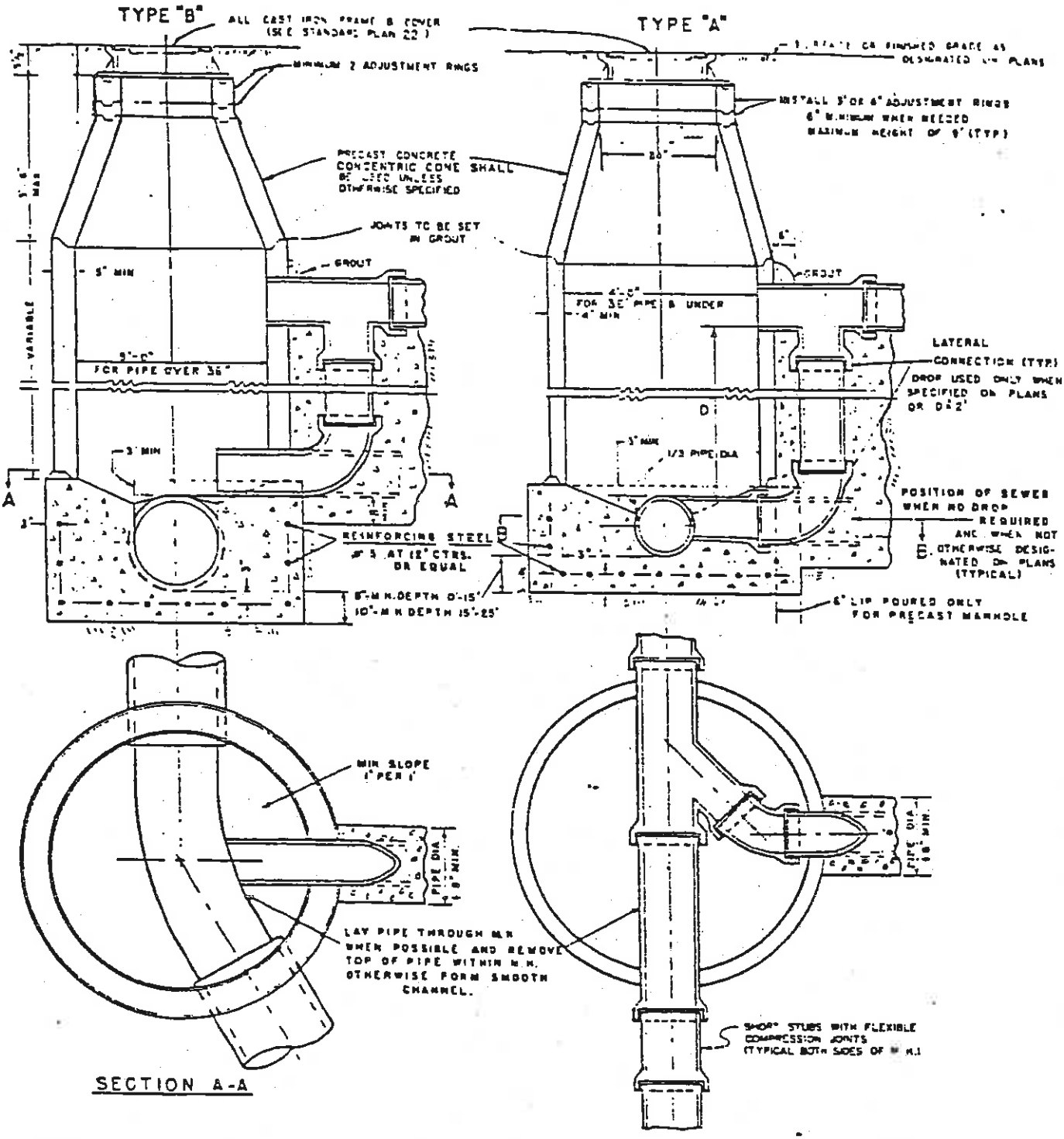
DRAWN BY STAFF

CHECKED BY

APPROVED

CITY ENGINEER Kenneth Burnett

DATE 5-16-87



SECTION A-A

SECTION B-B

NOTES:

1. P.C.C. SHALL BE CLASS "A". CONSTRUCT PER SECTION 51 OF STANDARD SPECIFICATIONS

Department of Public Works

City of King, California

Manholes — Type "A" & "B"

Standard Detail

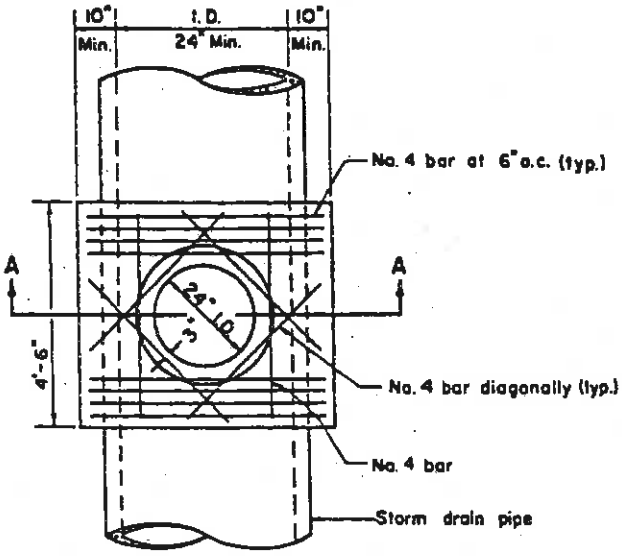
24

Gerald R. Burnett

City Engineer R.C.E. 17,186 (expires: 6/30/97)

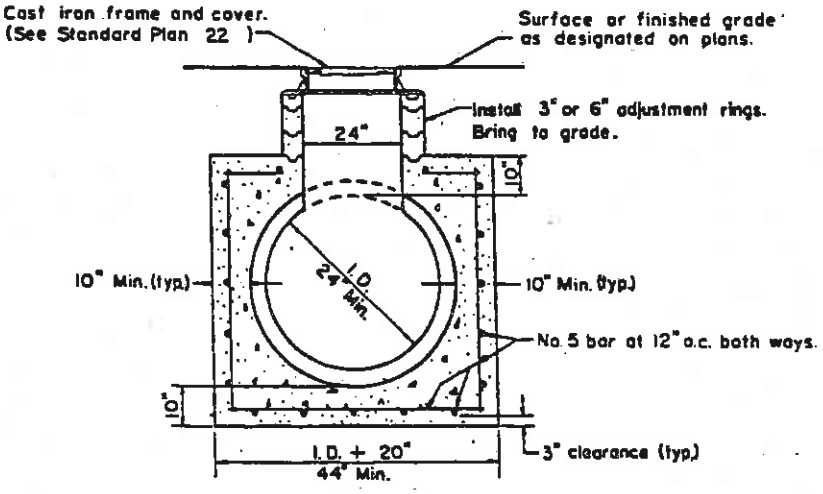
Approved: _____

Date: 7-20-94



PLAN

(Cover not shown)



SECTION A–A

NOTES:

1. This manhole to be used in locations when cover is less than 30 inches.
2. P.C.C. shall be Class "A" constructed per Section 81 of the Std. Specs.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

CITY OF KING

TITLE: MANHOLE – TYPE "C"

STANDARD PLAN

25

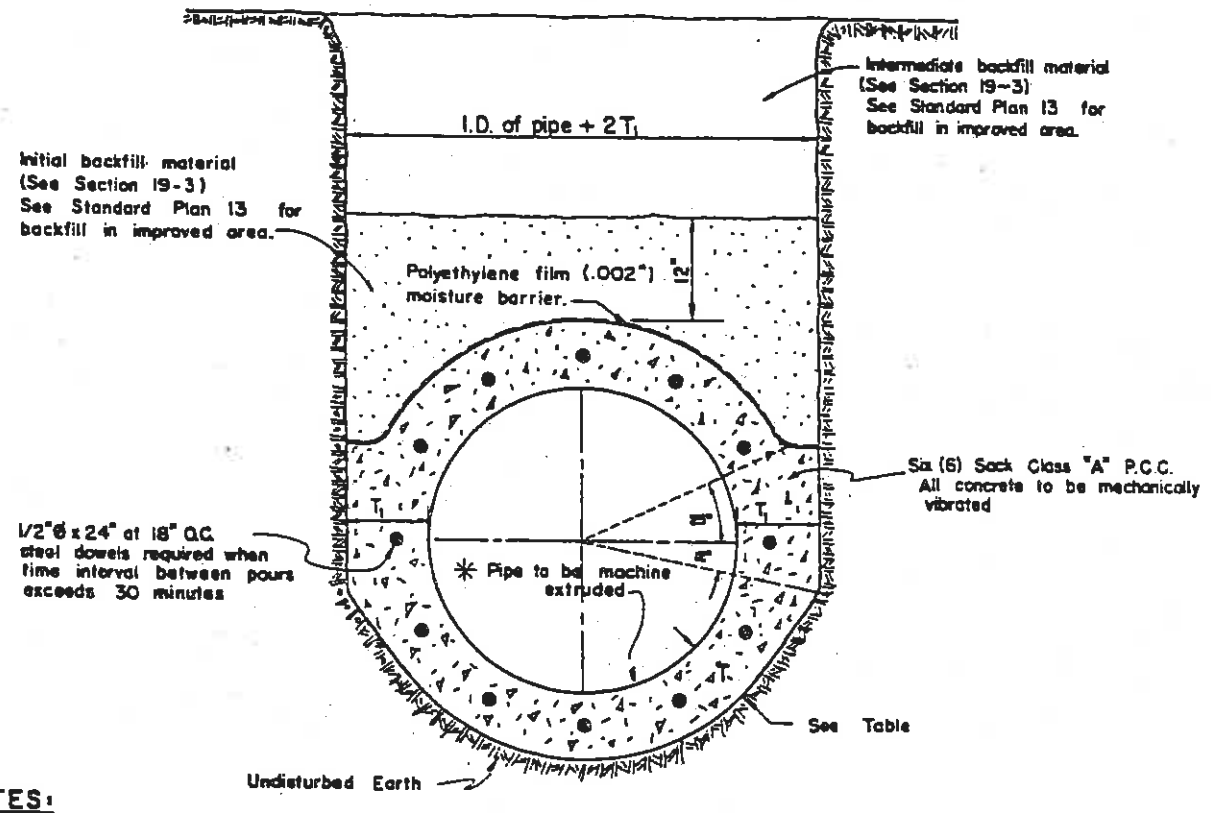
DESIGNED BY STAFF
DRAWN BY STAFF
CHECKED BY

APPROVED

CITY ENGINEER Arnold Bennett DATE 5-26-87

TABLE OF INTERNAL DIAMETER AND WALL THICKNESS

NOMINAL INTERNAL DIAMETER IN INCHES	MINIMUM WALL THICKNESS, T IN INCHES	T_1 INCHES
24 to 30	3	3-3/4
33 or 36	3-1/2	4-1/4
42	4	4-3/4
48	5	6-1/2
54	5-1/2	7-1/2
60	6	9
66	6-1/2	9
72	7	9
84	8	9
96	9	10-1/2



NOTES:

1. Cast-in-place pipe shall conform with Section 63 of Standard Specifications.
2. P.C.C. shall be Class "A". Construct per Section 51 of the Standard Specifications.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE: **CAST-IN-PLACE CONCRETE PIPE**

STANDARD PLAN

26

DESIGNED BY J.W.	APPROVED	DATE
DRAWN BY STAFF	CITY ENGINEER Ismael Burnett	5-26-87
CHECKED BY		

BLANK

DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION CITY OF KING

TITLE

DESIGNED BY

DRAWN BY

CHECKED BY

APPROVED

DATE

CITY ENGINEER _____ _____

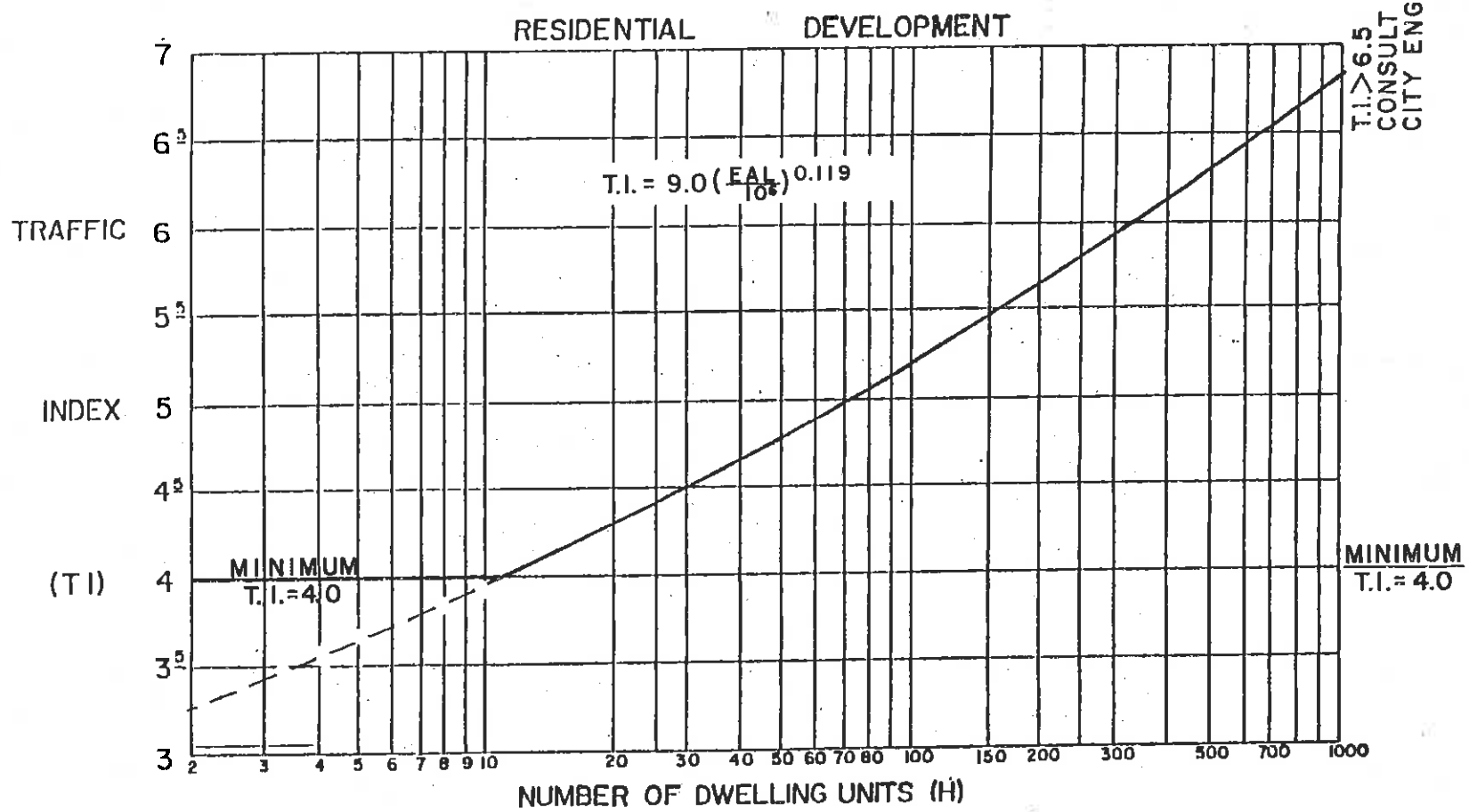
STANDARD PLAN

27-28

NOTE: The traffic index used for design of the streets having traffic loads from industrial or commercial use, shall be based on the EAL generated by trucks from such use in addition to the residential truck traffic. EAL constants shall be in accordance with the State Planning Manual-Part 7, Design For County Roads.

$$\text{Traffic Index} = 9.0\left(\frac{EAL^{*}}{10^{6}}\right)^{.119}$$

* For residential development use 100 X number of dwelling units for truck traffic loads.



DEPT. OF PUBLIC WORKS — CITY OF KING

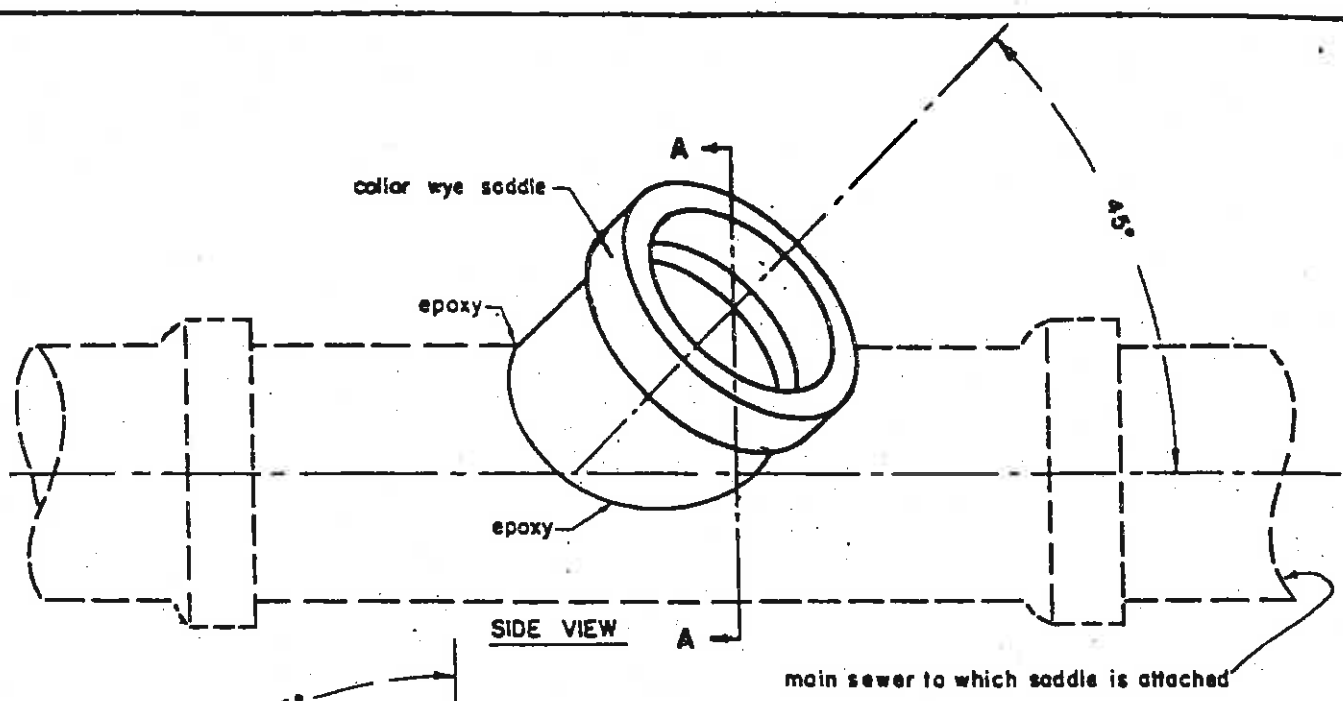
STANDARD DETAILS

RESIDENTIAL TRAFFIC INDEX CHART

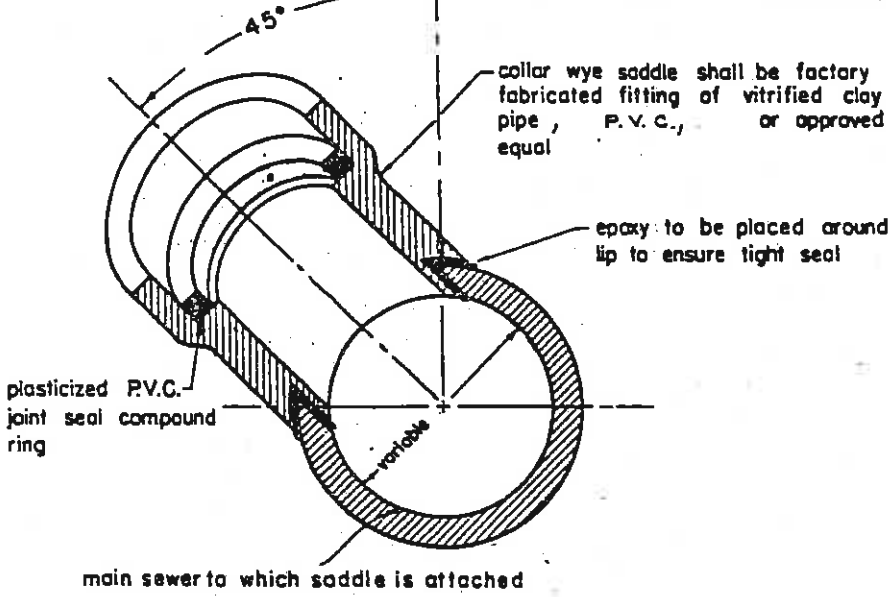
APPROVED [signature] DATE 5-25-87

REVISED | DATE

PLATE NO 29



SIDE VIEW



SECTION A-A

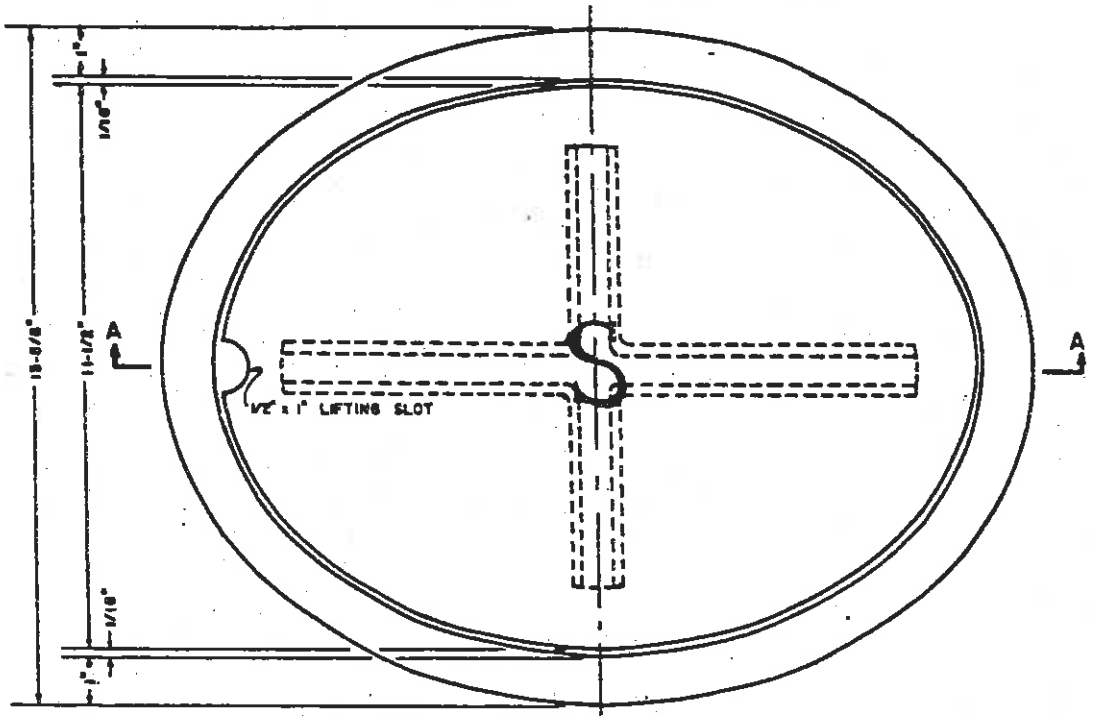
NOTES:

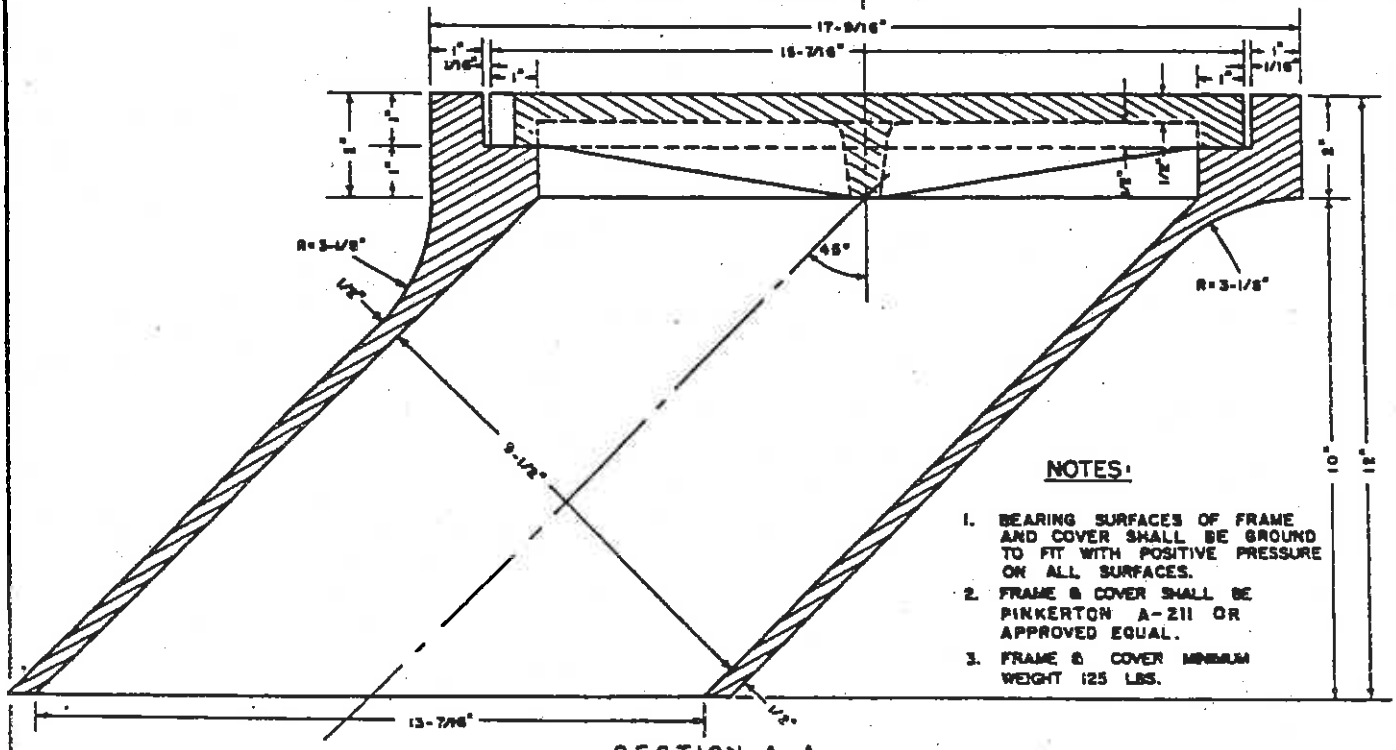
1. Main sewer shall not be saddled when the difference in diameter between the main and the lateral is less than 4 inches.
2. No sewer shall be saddled unless the cut into the main is made with a core drill which cuts a round hole, and a collared wye is fastened to pipe with epoxy.
3. No sewer shall be saddled without prior approval of the Engineer.
4. All saddles shall be approved by the Engineer before backfilling.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE: SEWER SADDLE CONNECTION		STANDARD PLAN
DESIGNED BY J.W.	APPROVED	
DRAWN BY STAFF	CITY ENGINEER [signature]	DATE 5-26-87
CHECKED BY		30

PLAN OF COVER & FRAME





NOTES:

1. BEARING SURFACES OF FRAME AND COVER SHALL BE GROUND TO FIT WITH POSITIVE PRESSURE ON ALL SURFACES.
2. FRAME & COVER SHALL BE PINKERTON A-211 OR APPROVED EQUAL.
3. FRAME & COVER MINIMUM WEIGHT 125 LBS.

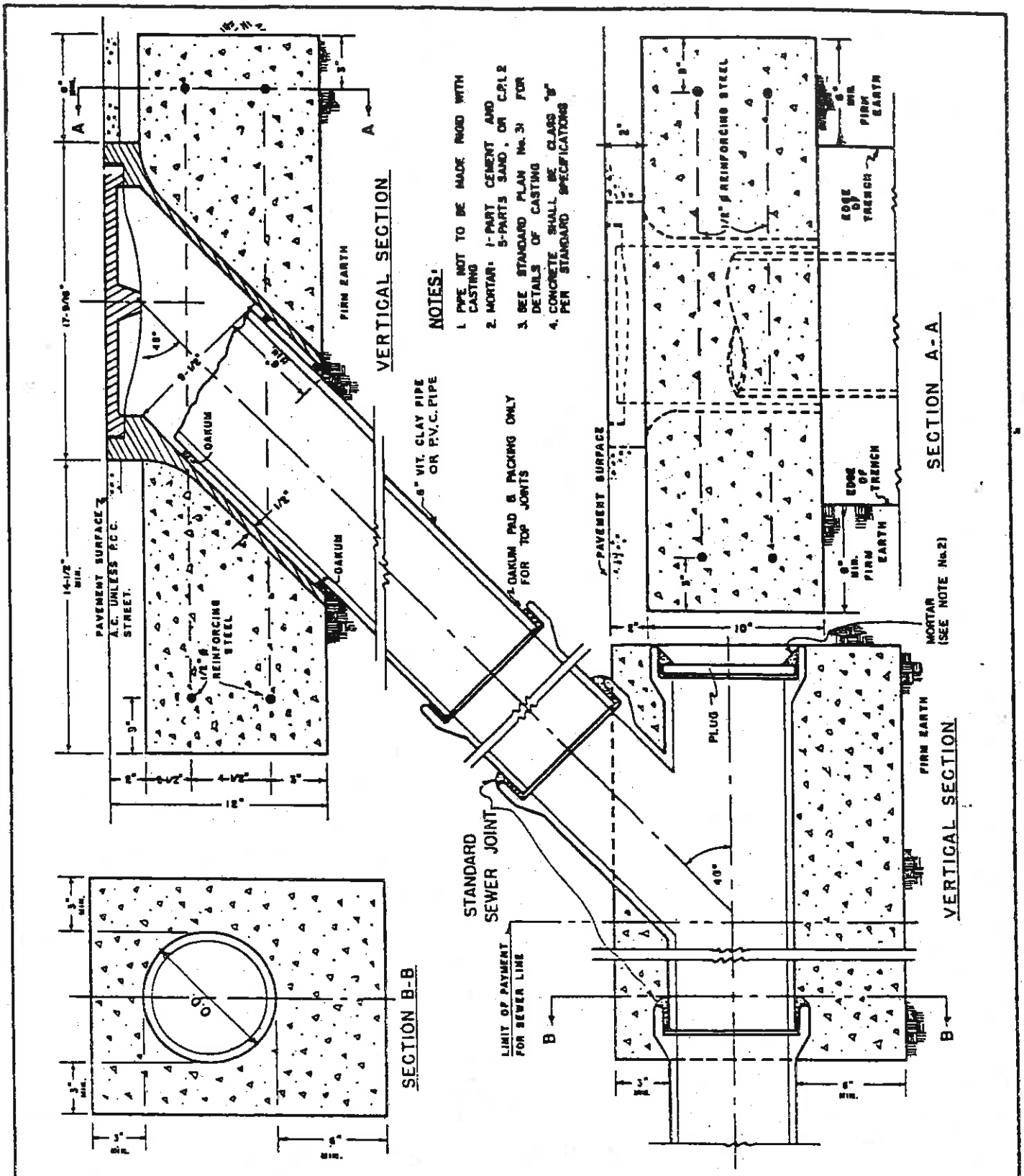
SECTION A-A

RISER, FRAME & COVER

DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION — CITY OF KING

TITLE: FLUSHING INLET FRAME & COVER		STANDARD PLAN
DESIGNED BY: STAFF DRAWN BY: STAFF CHECKED	APPROVED: CITY ENGINEER Donald Burnett	DATE: 5-26-87
		31



DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE

FLUSHING INLET

STANDARD PLAN

32

DESIGNED STAFF

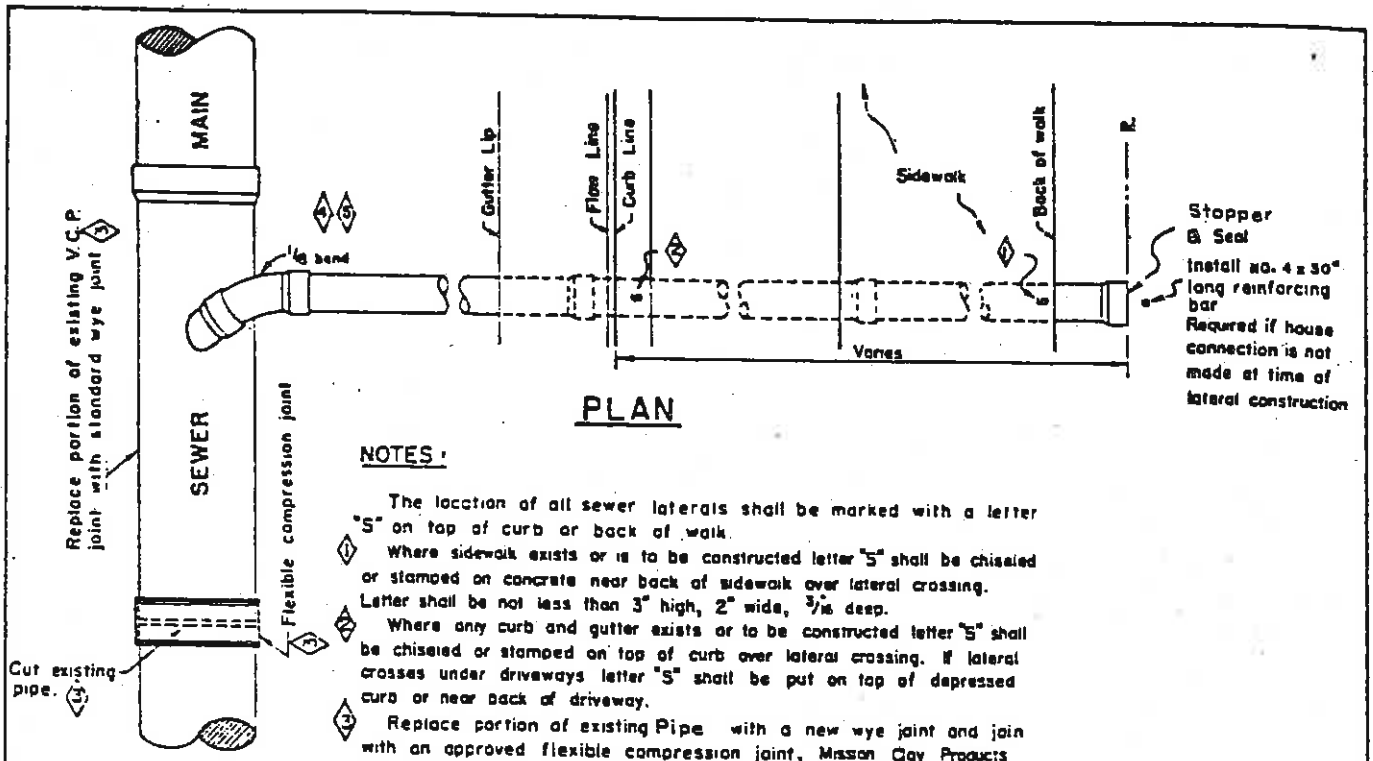
DRAWN BY: STAFF

CHECKED

APPROVED:

CITY ENGINEER Arnold Burnett

DATE: 5-26-87



PLAN

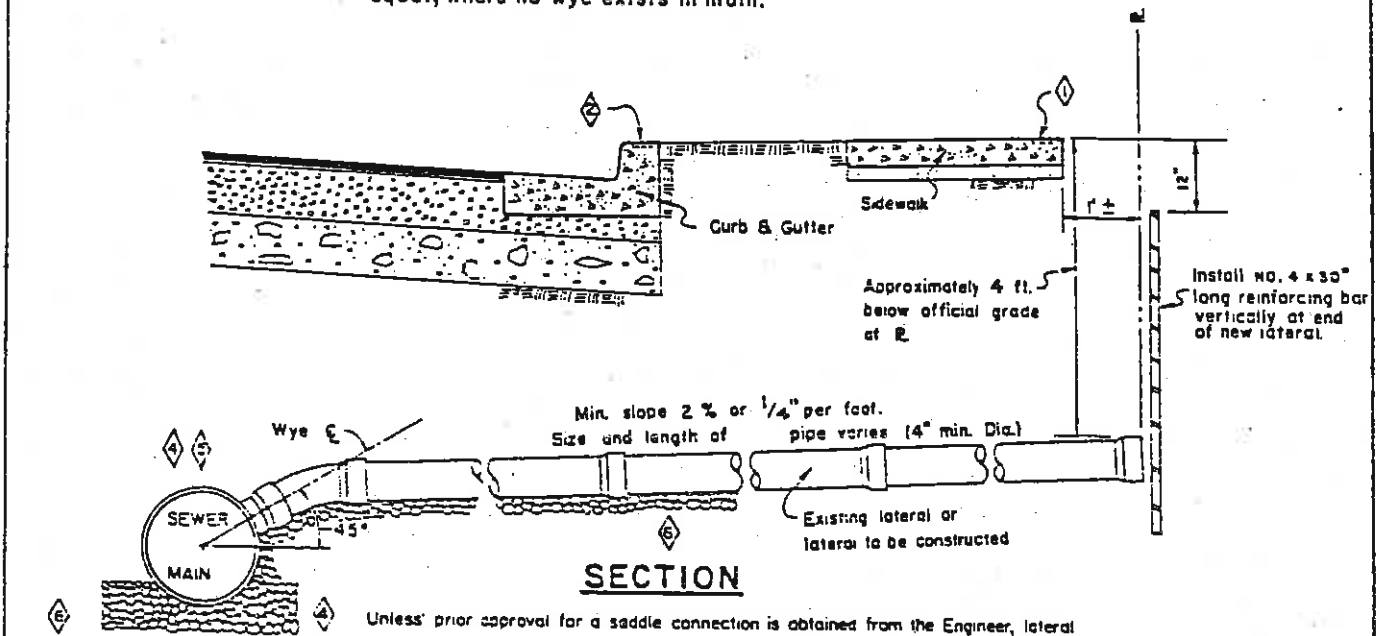
NOTES:

The location of all sewer laterals shall be marked with a letter "S" on top of curb or back of walk.

(1) Where sidewalk exists or is to be constructed letter "S" shall be chiseled or stamped on concrete near back of sidewalk over lateral crossing. Letter shall be not less than 3" high, 2" wide, 3/16 deep.

(2) Where any curb and gutter exists or to be constructed letter "S" shall be chiseled or stamped on top of curb over lateral crossing. If lateral crosses under driveways letter "S" shall be put on top of depressed curb or near back of driveway.

(3) Replace portion of existing Pipe with a new wye joint and join with an approved flexible compression joint, Mission Clay Products Corp. Band-Seal or Pacific Clay Products Wedge-Lock, or approved equal, where no wye exists in main.



SECTION

(4) Unless prior approval for a saddle connection is obtained from the Engineer, lateral connection into main sewer shall be made at a wye fitting as detailed above. See Standard Plan No. 30.

(5) Manhole is required at the junction of an existing sewer main and a new lateral if the lateral is 8" or larger, or if the difference in diameter is less than 4".

(6) Pipe bedding per Standard Plan No. 13.

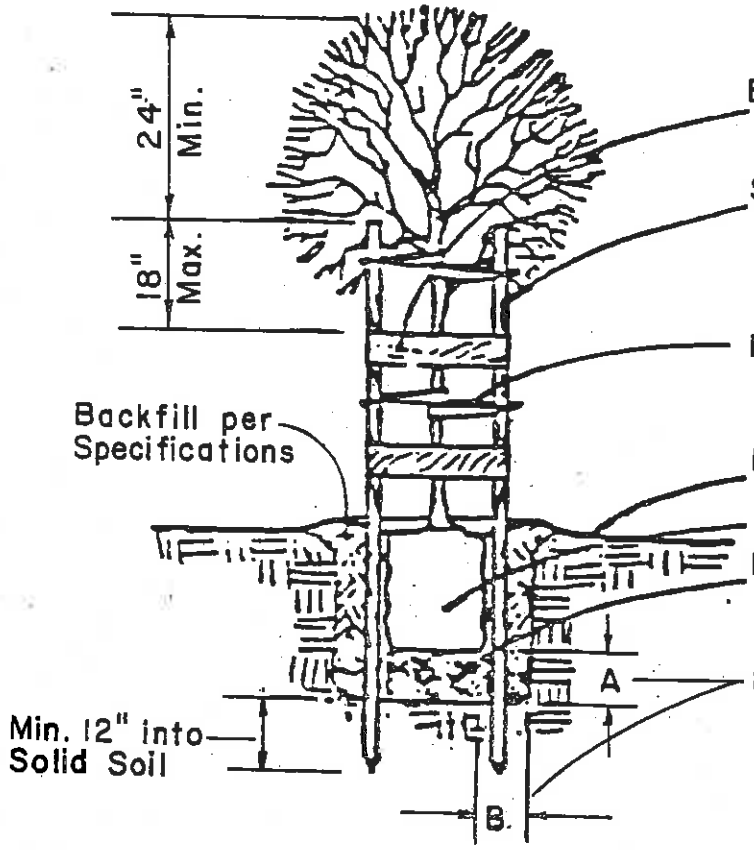
SEWER LATERAL

DEPARTMENT OF PUBLIC WORKS
CITY OF KING

CALIFORNIA

APPROVED: Arnold Smith DATE 5-26-87
CITY ENGINEER R.C.E. 17,166
(EXP. 6-30-89)

STANDARD DETAIL
33



SEE PLAN FOR ANY OVERSIZED PITS REQUIRED

TREE STAKING DETAIL

Not to Scale

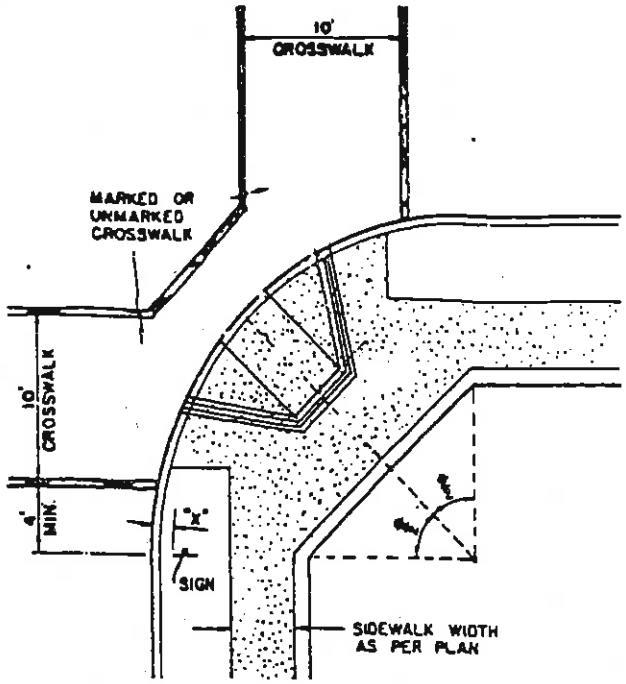
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION CITY OF KING

TITLE	STANDARD PLAN
DESIGNED BY	APPROVED DATE
DRAWN BY	CITY ENGINEER _____ _____
CHECKED BY	34

BLANK

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION CITY OF KING

TITLE		STANDARD PLAN
DESIGNED BY	APPROVED	DATE
DRAWN BY	CITY ENGINEER _____	_____
CHECKED BY		35-36



NOTES:

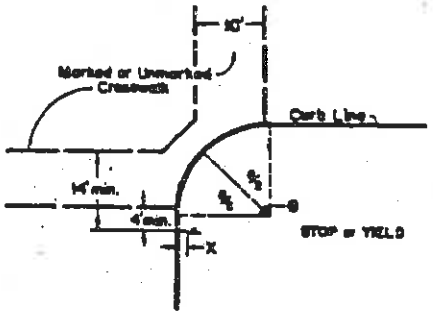
1. STREET NAME SIGNS SHALL BE EXTRUDED ALUMINUM BLADE.
2. SIGN FINISH SHALL BE ENGINEER GRADE INTERSTATE GREEN BACKGROUND WITH WHITE LETTERS.
3. STREET BLOCK NUMBER AS SPECIFIED ON PLANS OR PROVIDED BY CITY ENGINEER.
4. DIMENSION "X" SHALL BE SUCH THAT THE MINIMUM CLEARANCE BETWEEN CURB LINE AND THE FURTHEST PROTRUSION OF THE SIGNS TOWARD THE STREET SHALL BE NOT LESS THAN 12 INCHES.
5. STREET NAME LETTERS SHALL BE 4" UPPER CASE, 3" LOWER CASE. ABBREVIATIONS SHALL BE 2" UPPER CASE, 1½" LOWER CASE.
6. THE ARROW SHALL POINT IN THE DIRECTION OF INCREASING NUMBERS.

SECTION

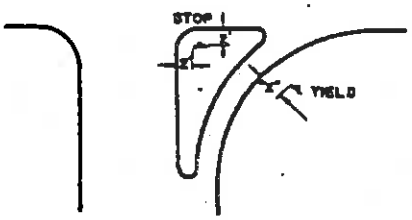
NOTE:
Check with Public Works Director for correct street name and for manufacturer of City Std. Street Sign.

Department of Public Works	*City of King, California*
Street Name Signs	*Standard Detail* 37
City Engineer R.C.E. 17,186 (expires: 6/30/97)	*Approved:* _____ *Date:* _____

TYPICAL LOCATIONS

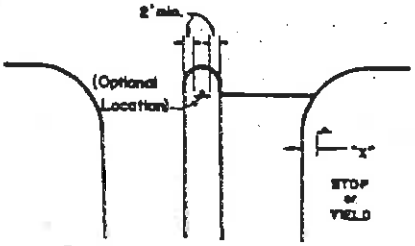


URBAN INTERSECTION



CHANNELIZED INTERSECTION

WIDE THROAT INTERSECTION

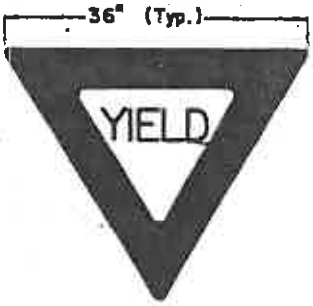


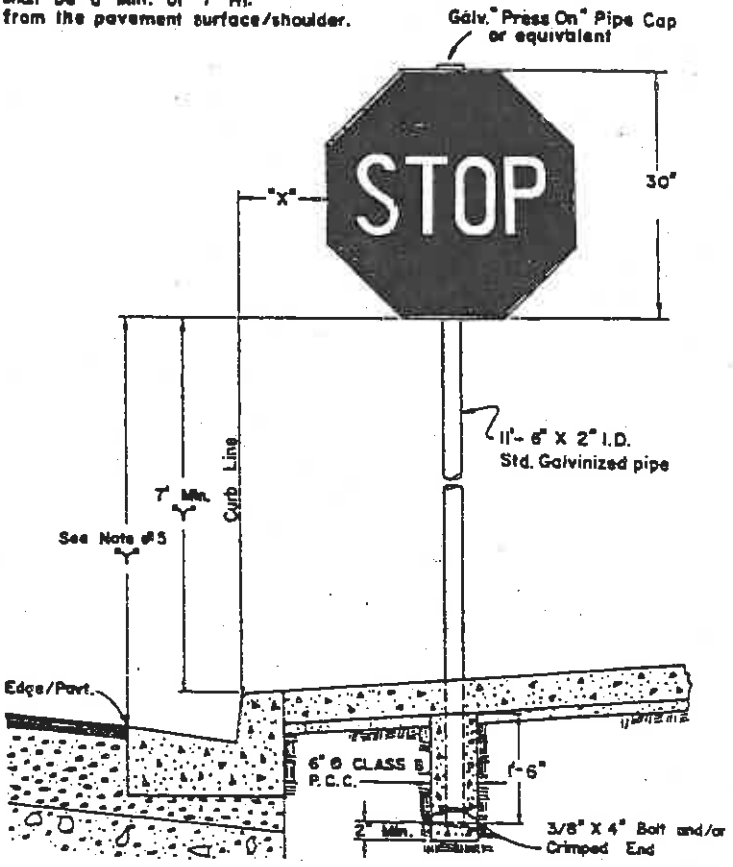
DIVISIONAL ISLAND

NOTES:

1. Stop signs shall be minimum 30" reflective type as per Calif. State Specifications.
2. Yield signs shall be 36" reflective type as per Calif. State Specifications.

   Mounting details as per manufacturer's recommendations.
3. Signs shall always be erected at the point where the vehicle is to stop or as near thereto as possible. In no case shall either sign be placed in excess of 50' from the intersected road.
4. Dimension "X" shall have 1' Min. and 2' Max. clearance. For rural applications 6' and 12' shall be the limiting dimensions.
5. For unimproved areas "Y" shall be a Min. of 7' Ht. from the pavement surface/shoulder.





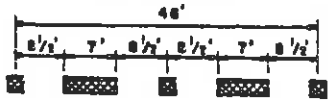
SIGN INSTALLATION DETAIL

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION — CITY OF KING

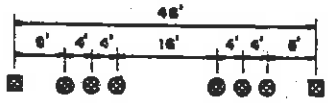
TITLE	TRAFFIC SIGNS (STOP - YIELD)	STANDARD PLAN
DESIGNED BY R.N.M.	APPROVED	DATE
DRAWN BY R.N.M.	CITY ENGINEER Lloyd Smith	5-26-87
CHECKED BY		38

CENTERLINES

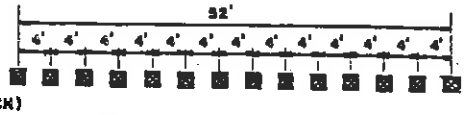
DETAIL A (W/STRIPING)



DETAIL B (W/O STRIPING)

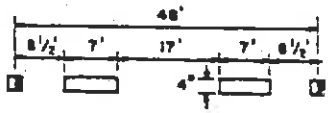


DETAIL C (STOP APPROACH)

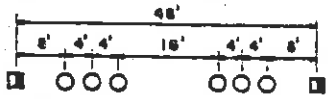


LANELINES

DETAIL D (W/STRIPING)

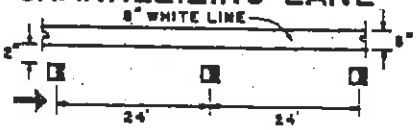


DETAIL E (W/O STRIPING)



CHANNELIZING LANE

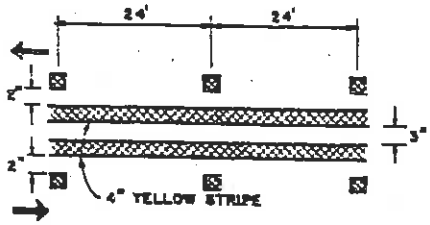
DETAIL F



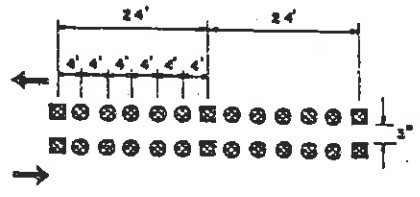
NO PASSING ZONES (TWO DIRECTION)

DETAIL G

DETAIL H

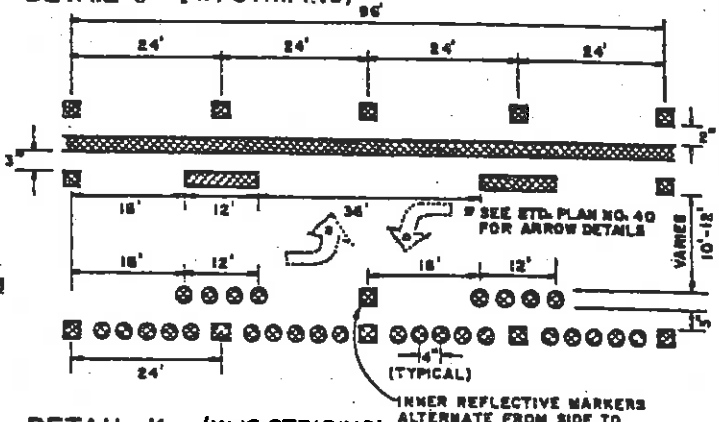


DETAIL I



TWO WAY LEFT TURN LANES

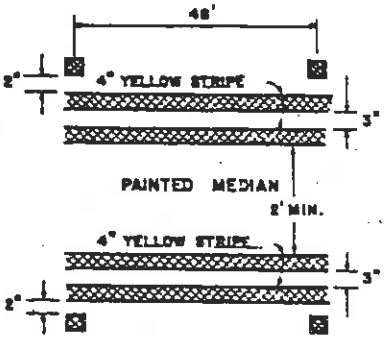
DETAIL J (W/STRIPING)



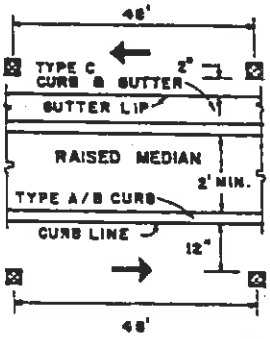
DETAIL K (W/O STRIPING)

MEDIAN ISLANDS

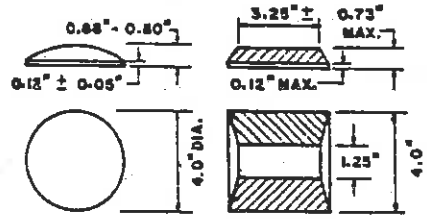
DETAIL L



DETAIL M



RAISED MARKER DETAILS



LEGEND

- TYPE A (WHITE) NON-REFLECTIVE
- TYPE AY (YELLOW) NON-REFLECTIVE
- TYPE D: TWO WAY YELLOW REFLECTIVE (HIGH INTENSITY)
- TYPE G: ONE WAY CLEAR REFLECTIVE (HIGH INTENSITY)
- TYPE H: ONE WAY YELLOW REFLECTIVE (HIGH INTENSITY)
- DIRECTION OF TRAVEL

NOTES

1. PAVEMENT MARKERS SHALL BE STIMSONITE OR APPROVED EQUAL.
2. PAINTING SHALL BE PER STATE SPECIFICATIONS 8010-12F-04 AND STANDARD PLAN NO. 40.
3. LOCATION/PLACEMENT OF CONTROL POINTS AND PRELIMINARY MARKINGS SHALL BE SUBJECT TO APPROVALS OF THE ENGINEER.

ENGINEERING DIVISION

DEPARTMENT OF PUBLIC WORKS

CITY OF KING

TITLE: RAISED PAVEMENT MARKERS AND STRIPING

STANDARD PLAN

39

DESIGNED BY A.A.ADLAWAN

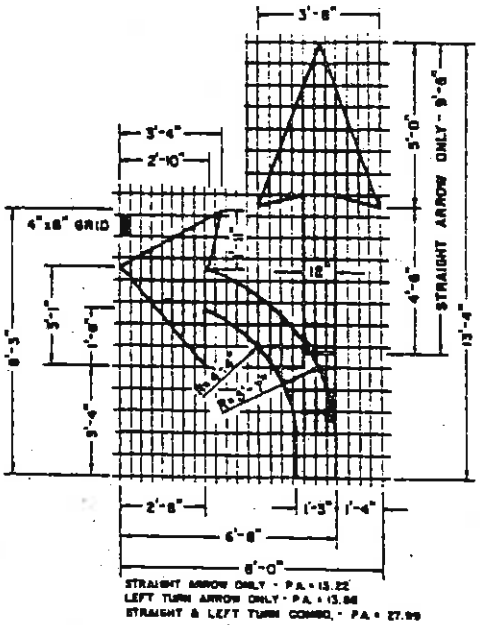
DRAWN BY V.A.

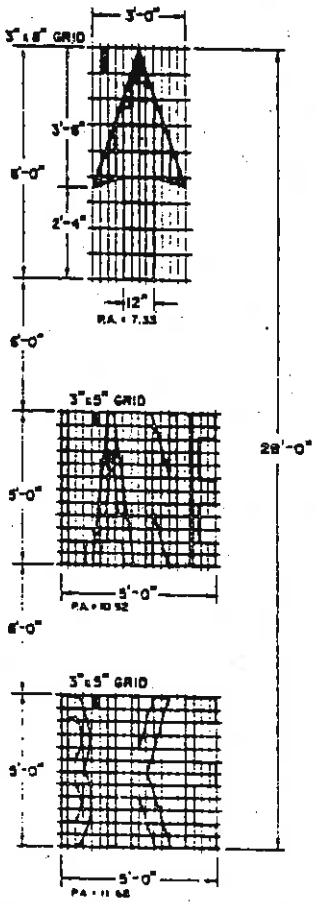
CHECKED BY

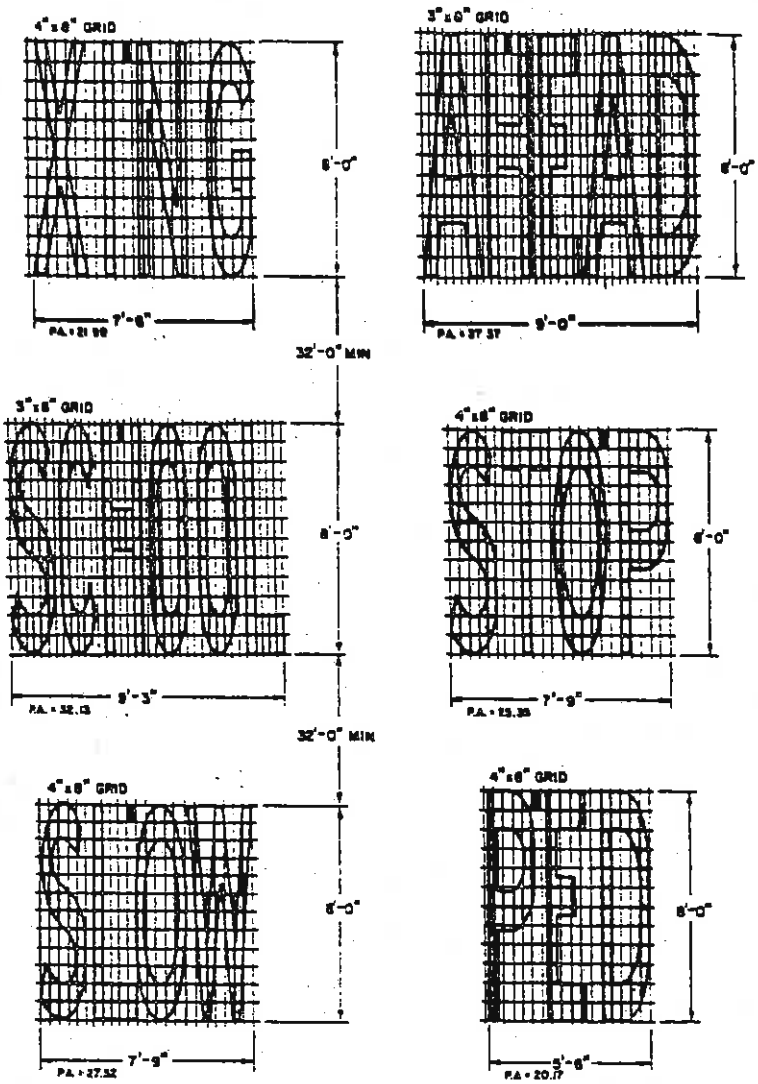
APPROVED

CITY ENGINEER

DATE 5-26-87







NOTES

1. PAVEMENT MARKINGS AND STRIPING SHALL BE IN ACCORDANCE WITH STATE SPECIFICATION 8010-12F-02,04,05.
2. EACH COAT SHALL BE APPLIED AT THE RATE OF MIN. 1 GALLON PER 107 SQ. FT.
3. REFLECTORIZATION (GLASS SPHERES) SHALL BE TYPE II PER STATE SPECIFICATION 8010-7IL-22, APPLIED AT 5 POUNDS PER GALLON FOR EACH COAT.
4. LOCATION AND PLACEMENT OF CONTROL POINTS AND PRELIMINARY MARKINGS ARE SUBJECT TO APPROVAL BY THE ENGINEER.
5. P.A. INDICATES PAINTED AREA IN SQUARE FEET.
6. SLOW-SCHOOL-XING LEGEND AND SCHOOL CROSSWALKS SHALL BE YELLOW. UNLESS DESIGINATED OTHERWISE, ALL OTHER PAVEMENT MARKINGS SHALL BE WHITE

ENGINEERING DIVISION

DEPARTMENT OF PUBLIC WORKS

CITY OF KING

TITLE : PAVEMENT MARKINGS

STANDARD PLAN

40

DESIGNED BY A.A ADLAWAN

DRAWN BY R.A EASTMAN

CHECKED BY

APPROVED

CITY ENGINEER Richard Kuntz

DATE 5-26-07

BLANK

DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION CITY OF KING

TITLE

DESIGNED BY

DRAWN BY

CHECKED BY

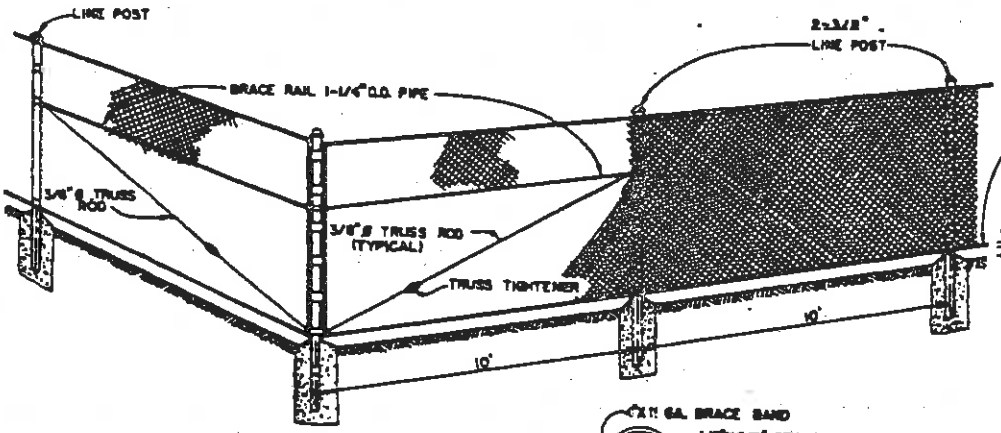
APPROVED

DATE

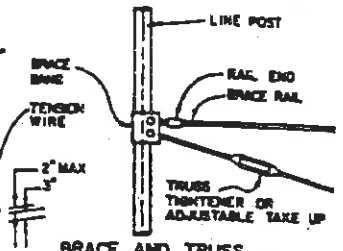
CITY ENGINEER _____ _____

STANDARD PLAN

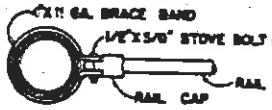
41



END, CORNER POST

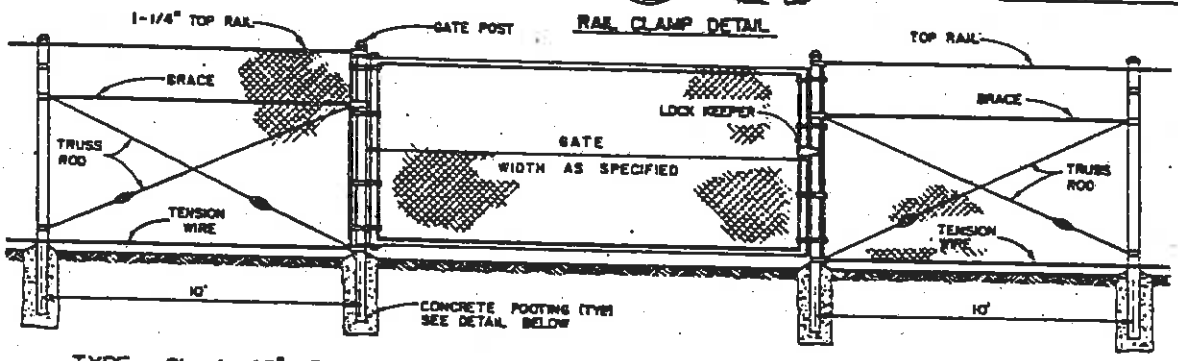


BRACE AND TRUSS CONNECTION

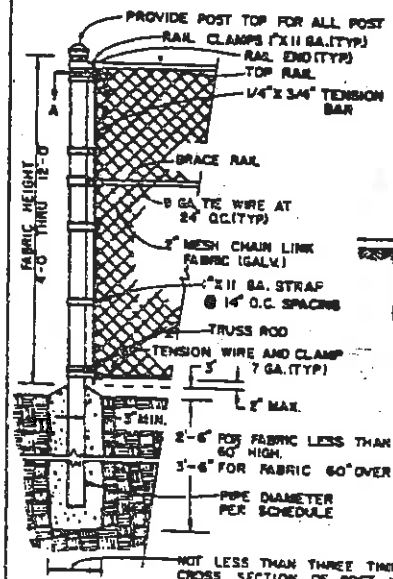


RAIL CLAMP DETAIL

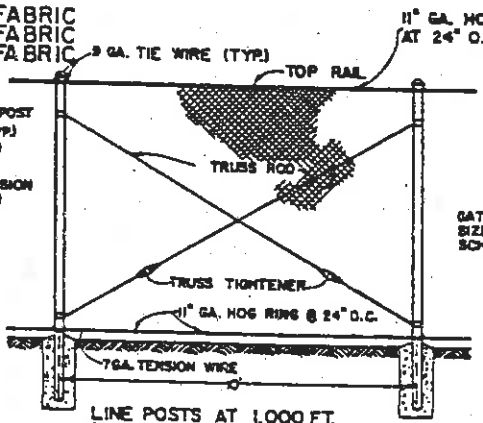
FABRIC AND LINE POST CONNECTION



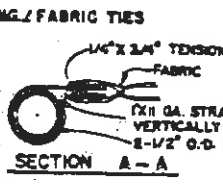
TYPE CL-4 = 48" FABRIC
TYPE CL-6 = 72" FABRIC
TYPE CL-8 = 96" FABRIC



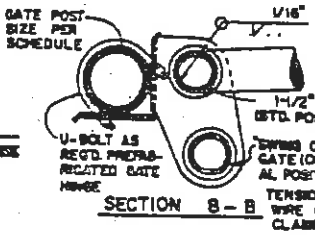
END AND CORNER POST ASSEMBLY



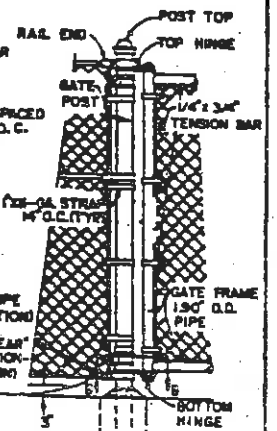
LINE POSTS AT 1,000 FT. MAXIMUM INTERVALS TRUSSED IN BOTH DIRECTIONS



SECTION A – A



SECTION B – B



GATE DETAIL

GENERAL NOTES:

1. CHAIN LINK FABRIC SHALL BE 11-GAUGE FOR ALL FENCES 84 INCHES OR LESS IN HEIGHT AND SHALL BE 9-GAUGE FOR ALL FENCES OVER 84 INCHES IN HEIGHT.
2. IN BALL PARK AREA, CHAIN LINK FABRIC SHALL BE 9-GAUGE FOR ALL HEIGHTS UNLESS OTHERWISE SPECIFIED.
3. TRUSS RODS SHALL HAVE TRUSS TIGHTENERS OR ADJUSTABLE TAKE-UP APPROVED BY THE ENGINEER.
4. GATE SHALL BE PROVIDED WITH LOCK KEEPER.
5. IF BEAM TYPE POST IS TO BE USED, TYPE AND SIZES SHALL BE APPROVED BY THE ENGINEER BEFORE CONSTRUCTION
6. ALL CONCRETE SHALL BE CLASS "A" PER STANDARD SPECIFICATIONS.
7. ALL PIPE SHALL BE SCH. 40 GALV. STEEL.
8. TOP RAIL SHALL BE 1 1/4" O.D. PIPE.

GATE POSTS SCHEDULE

HEIGHT	GATE WIDTH	SIZE O.D.
6 FEET AND LESS	UP TO 6'	2-7/8"
	7' TO 13'	4"
	14' TO 18'	6-5/8"
	OVER 18'	8-5/8"
OVER 6 FEET	UP TO 6'	3-1/2"
	7' TO 13'	4-1/2"
	14' TO 18'	6-5/8"
	OVER 18'	8-5/8"

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE CHAIN LINK FENCE

DESIGNED BY: A.A. ADLAWAN
DRAWN BY: STAFF
CHECKED BY:

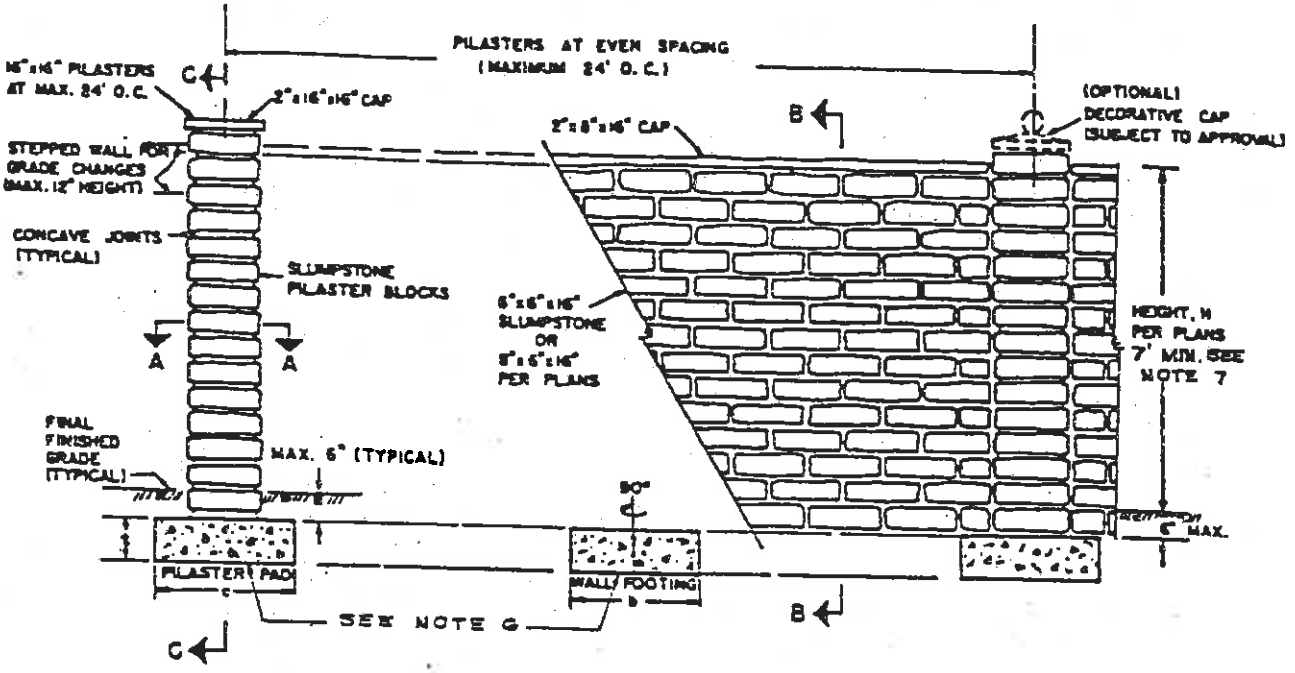
APPROVED

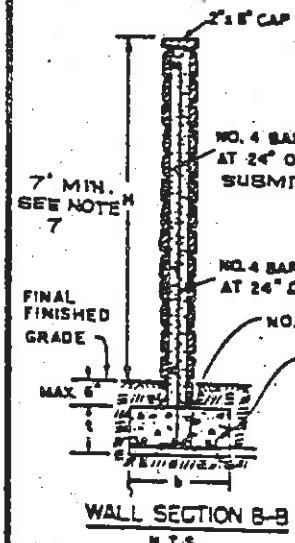
DATE

CITY ENGINEER Donald Kenneth 5-26-87

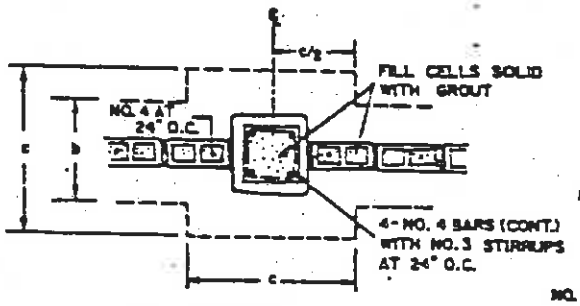
STANDARD PLAN

42

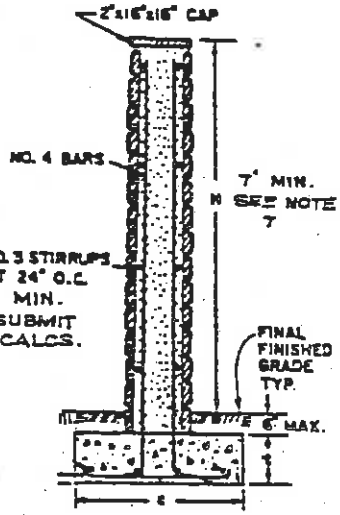




WALL SECTION B-B
N.T.S.



SECTION A-A
N.T.S.



PILASTER SECTION C-C
N.T.S.

NOTES

1. SLUMPED BLOCK UNITS SHALL BE GRADE S PER ASTM SPECIFICATION C90.
2. CONCRETE FOOTINGS SHALL BE CLASS "A" P.C.C. PER SECTION 90 OF THE TIE STANDARD SPECIFICATIONS
3. REINFORCEMENT SHALL BE IN ACCORDANCE WITH SECTION 52 OF THE STANDARD SPECIFICATIONS
4. PAINTING SHALL BE IN ACCORDANCE WITH SECTION 59-4 OF THE STANDARD SPECIFICATIONS. ALL SURFACES OF WALL AND PILASTERS TO BE FINISHED WITH VINYL LATEX PAINT PER MANUFACTURER'S RECOMMENDATIONS.
5. EXACT LOCATION OF SCREEN WALL WITH RESPECT TO PROPERTY LINES SHALL BE IN ACCORDANCE WITH THE PLANS.
6. FOOTING DESIGNS SHALL BE SUBMITTED TO THE CITY OF KING BUILDING DEPARTMENT COMPLETE WITH CALCULATIONS AND DETAILED DRAWINGS FOR APPROVAL. SOIL BEARING PRESSURE SHALL BE BASED ON A SOILS REPORT PREPARED BY A REGISTERED SOILS ENGINEER.
7. WALL MINIMUM HEIGHT SHALL BE 7 FEET - WALL MAYBE 6' IF CONSTRUCTED ON A 1 FOOT HIGH BERM. FOOTINGS MUST BE BASED ON ENGINEERED FILL MINIMUM OF 24" BELOW TOP OF BERM FINISHED GRADE. SEE NOTE 6a.
8. PRE CAST CONCRETE WALLS WILL BE ALLOWED AS ALTERNATES. IF PRE-CAST WALLS ARE USED DETAIL DRAWINGS COMPLETE WITH CALCULATIONS SHALL BE SUBMITTED TO THE CITY OF KING BUILDING DEPARTMENT FOR APPROVAL. DETAIL DRAWINGS AND CALCULATIONS SHALL BE SITE SPECIFIC.

ENGINEERING DIVISION

DEPARTMENT OF PUBLIC WORKS

CITY OF KING

TITLE : MASONRY NON - ACCESS WALL

STANDARD PLAN

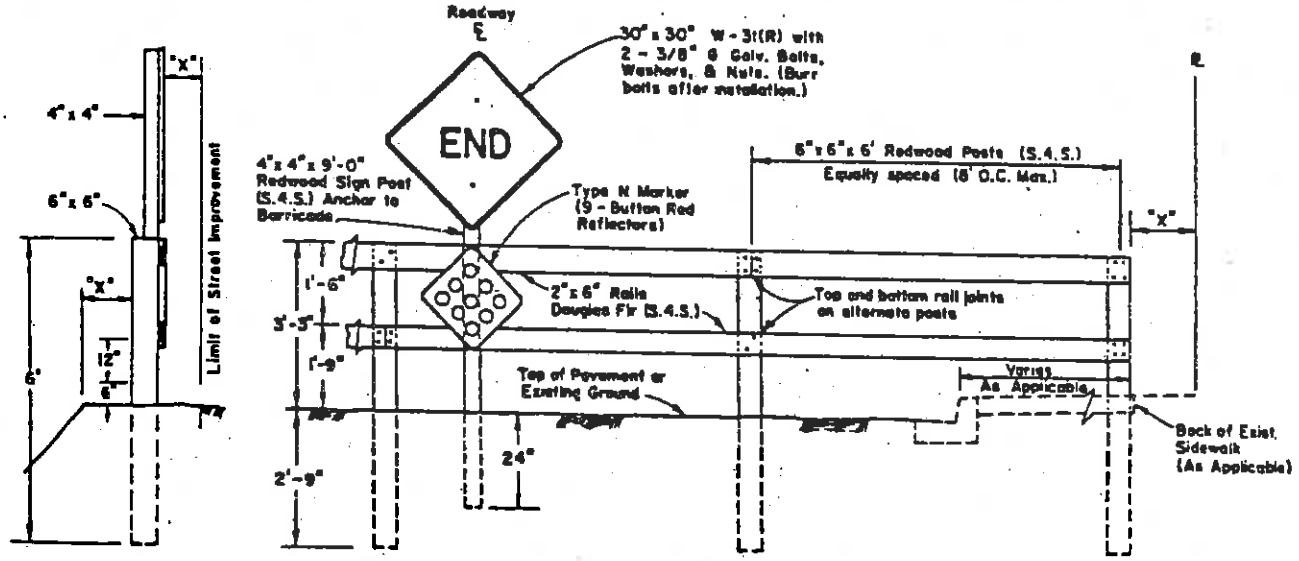
43

DESIGNED BY	A. A. ADLAWAN
DRAWN BY	R RUSSELL
CHECKED BY	

APPROVED

CITY ENGINEER Harold Lundt DATE 5-26-87

REVISED 5/15/91



WOODEN RAIL BARRICADE

Maximum spacing of posts shall be 8' C. to C.
All dimensions are nominal lumber dimensions.
Breakaway holes required unless designated otherwise.
Completed barricade shall be painted with 2 coats, approved traffic yellow paint per Section 59.
Portions of post below grade shall be asphalt dipped.
Nails shall be hot - dipped Galv. 30D. Minimum 4 required at rail splices and end posts.
Nominal width of barricade: As measured to center of end posts.
X = 1 Ft. unless otherwise specified on special plan.

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE **WOODEN BARRICADE**

STANDARD PLAN

44

DESIGNED BY R. MIYOKO
DRAWN BY E. PANGANIBAN
CHECKED BY

APPROVED

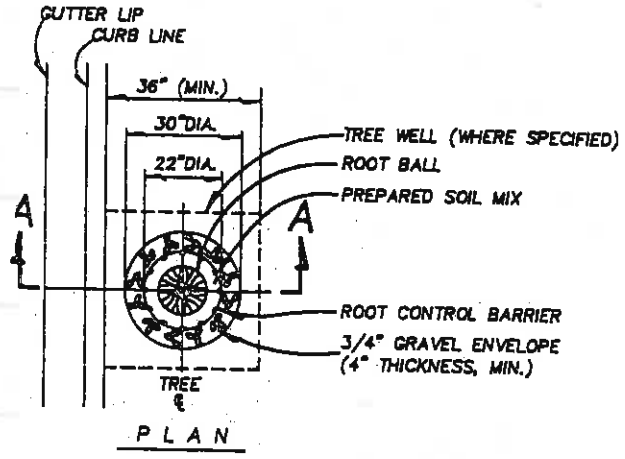
CITY ENGINEER [signature] DATE 5-26-87

BLANK

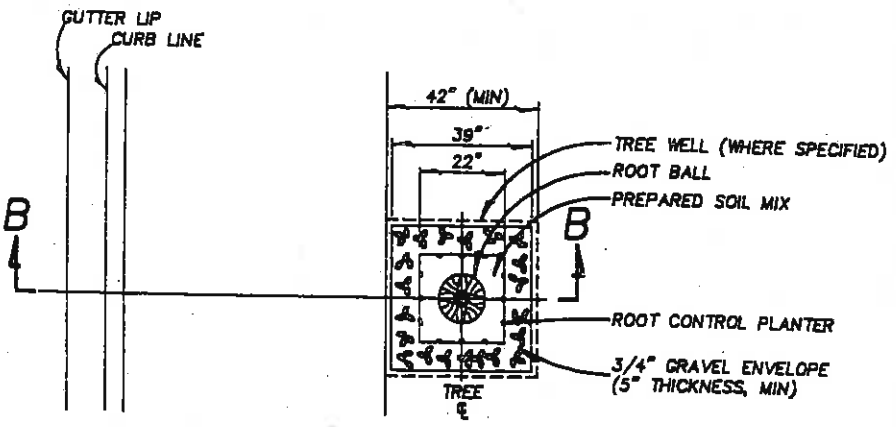
DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION CITY OF KING

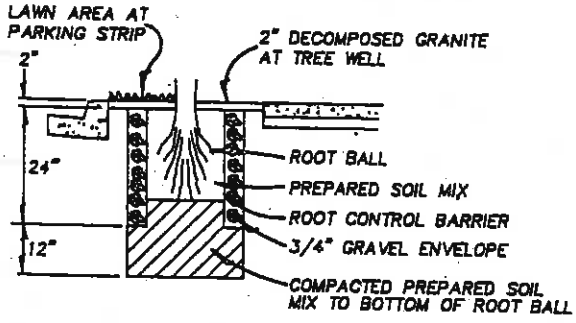
TITLE		STANDARD PLAN
DESIGNED BY	APPROVED DATE	45
DRAWN BY	CITY ENGINEER _____ _____	
CHECKED BY		



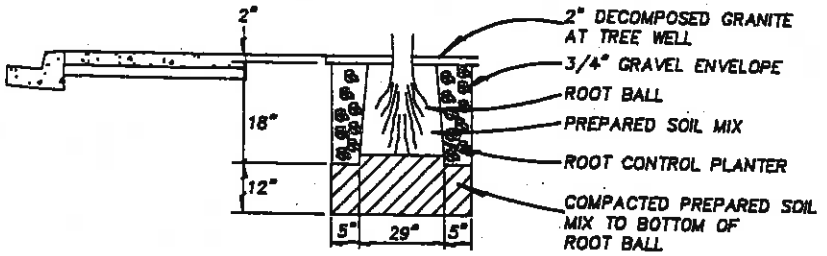
PLAN



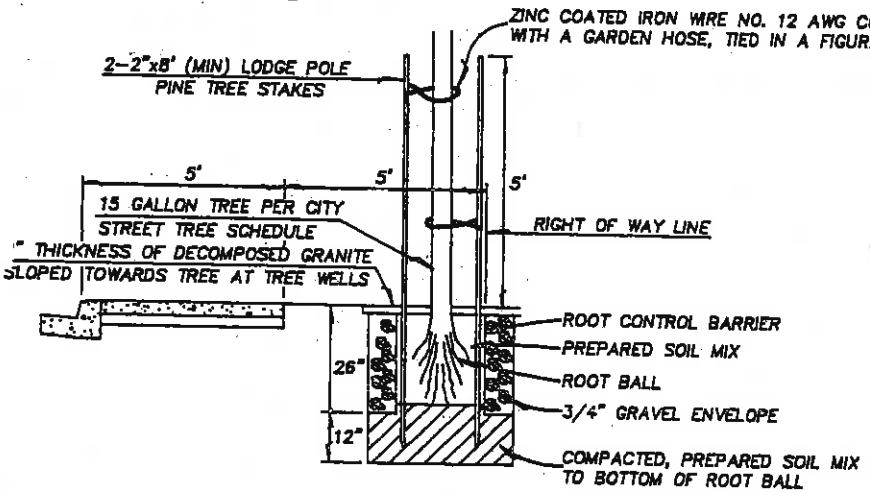
PLAN



SECTION A – A
EXISTING RESIDENTIAL



SECTION B – B
NEW RESIDENTIAL–INDUSTRIAL–COMMERCIAL



STAKING DETAIL

NOTE: CONTACT PLANNING DIRECTOR FOR A LIST OF TREES THAT MAY BE PLANTED IN THE PUBLIC RIGHT OF WAY AS PER SECTION 12.20 OF THE SOLEDAD MUNICIPAL CODE AND APPROVED STANDARD SPECIFICATION FOR PUBLIC IMPROVEMENTS.

LANTING NOTES:

PREPARED SOIL MIX SHALL CONSIST OF 1/4 NITROHUMUS, 1/4 SHAVINGS, 1/2 EXISTING SOIL AND 20–10–5 FORMULA FERTILIZER TABLETS WEIGHING 21 GRAMS (3 TABLETS PER 15 GALLON (CONTAINER SIZE) TREE).

2 ROOT DEFLECTOR SHALL BE DEEP ROOT STANDARD PLANTER NO. 22–29–18–P, DEEP ROOT CONTROL BARRIER NO. UB24–2, OR APPROVED EQUAL. DEEP ROOT CONTROL PRODUCTS ARE AVAILABLE FROM EWING IRRIGATION PRODUCTS, 125 LEE ROAD, WATSONVILLE, CA., 95076

THE LOWER 12" OF THE EXCAVATION SHALL BE BACKFILLED AND COMPACTED WITH PREPARED SOIL MIX PRIOR TO PLACING THE ROOT DEFLECTOR. BACKFILL 3/4" GRAVEL ENVELOPE AROUND DEFLECTOR AFTER TREE PLANTING.

4 PREPARED SOIL MIX SHALL BE PLACED IN THE PLANTING HOLE AND COMPACTED TO BOTTOM OF ROOT BALL ELEVATION. PLANT TREE IN PLANTER, BACKFILL WITH PREPARED SOIL MIX AND COMPACT. COVER WITH LAWN OR DECOMPOSED GRANITE, AS SPECIFIED.

AFTER PLANTING, TREE SHALL BE WATERED WITH 20 GALLONS OF WATER. REPEAT WATERING TWICE IN THE NEXT 7 DAYS, NOT CLOSER THAN AT 48 HOURS INTERVALS.

STREET TREE PLANTING SHALL INCLUDE TREE PLANTING IN TREE WELLS OR WITHIN PARKING STRIPS. PAYMENT FOR TREE PLANTING SHALL INCLUDE EXCAVATION, SOIL PREPARATION, ROOT DEFLECTOR AND INSTALLATION, BACKFILL, TREE, AND THE ITEMS DESCRIBED ON THIS PLAN.

7 UPON APPROVAL OF THE CITY ENGINEER, ROOT DEFLECTOR MAY BE DELETED DUE TO SPECIAL CIRCUMSTANCES WHICH MAKE THE DEFLECTOR UNUSABLE OR UNNECESSARY.

Department of Public Works — City of King, California

STREET TREE PLANTING

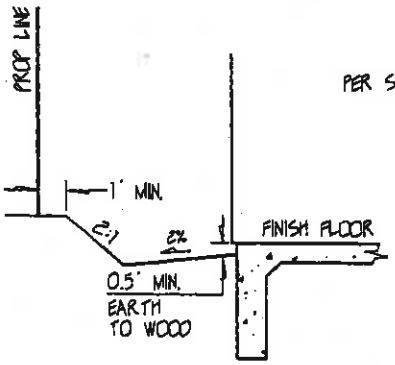
Standard Detail

46

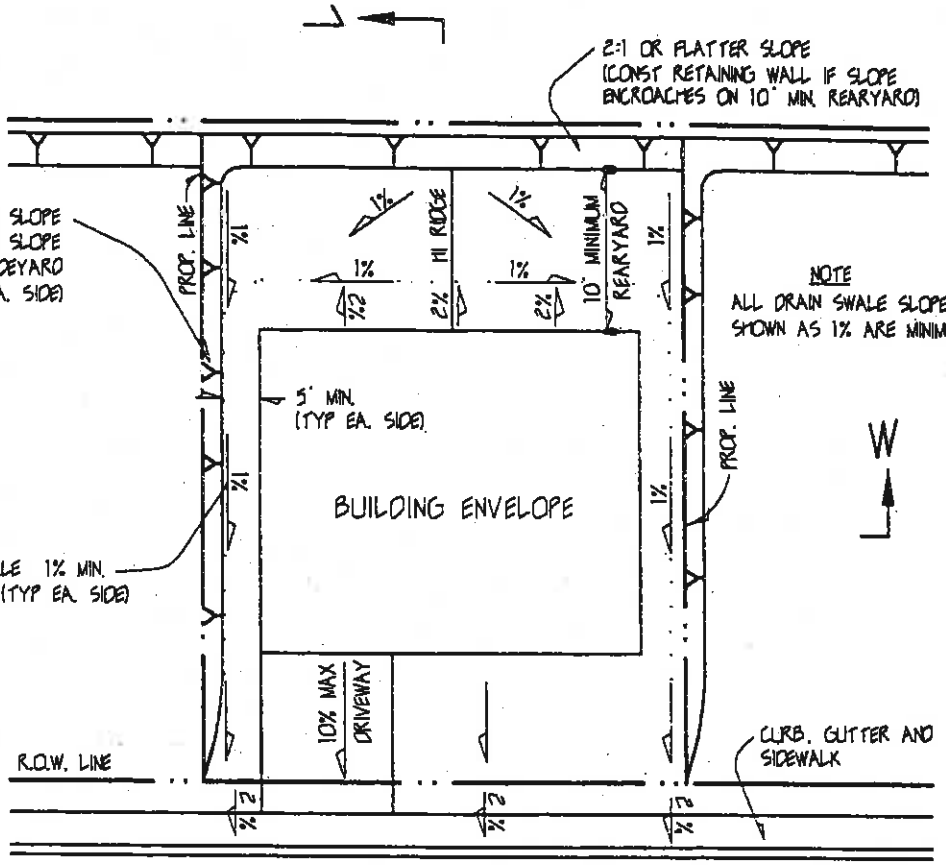
ity Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

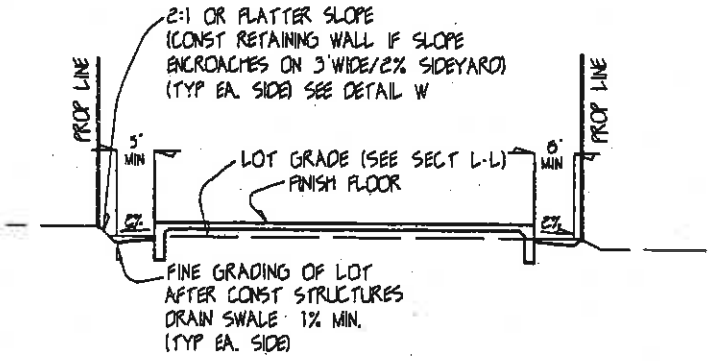
Date: 7-20-94



DETAIL W



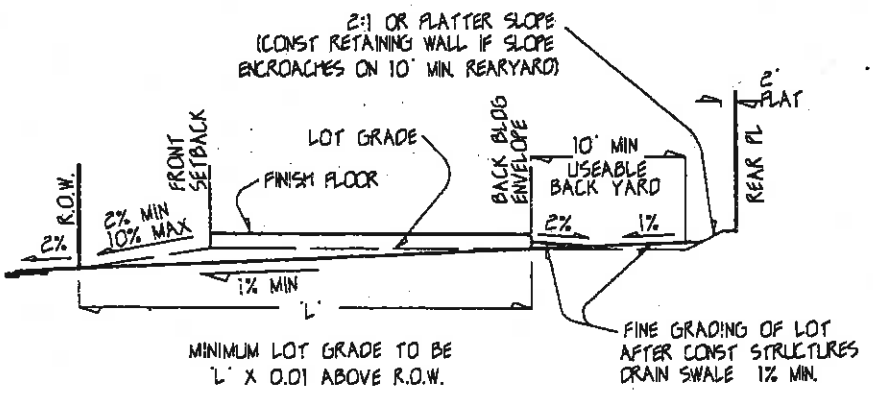
TYPICAL FINE GRADING PLAN



TYPICAL SECTION W - W

NOTE

VARIATIONS OF THIS LOT GRADING PLAN ARE ACCEPTABLE IF 1. ACTUAL FOUNDATIONS OF STRUCTURES ARE KNOWN- AND
2. 1% MINIMUM DRAINAGE SWALES CAN BE SHOWN - AND
3. CITY (OR COUNTY IF NOT IN CITY) ENGINEER. AND DESIGN ENGINEER APPROVE.



TYPICAL SECTION L - L

Department of Public Works — City of King, California

Typical Lot Grading

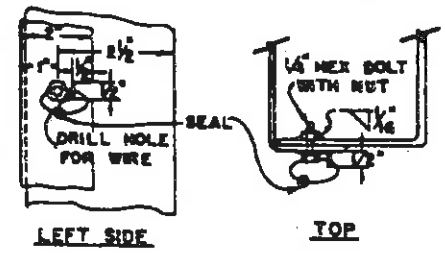
Standard Detail

47

City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

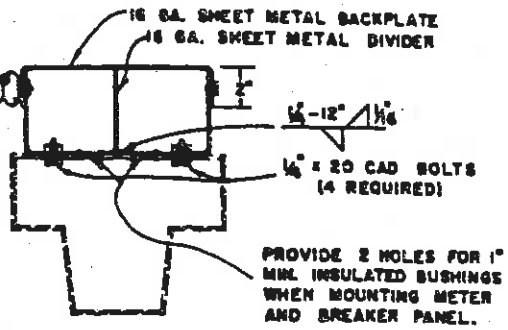
Date: _____



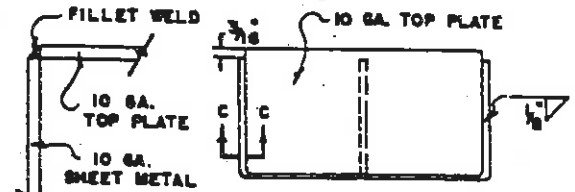
LEFT SIDE

TOP

SEALABLE BOLT DETAIL

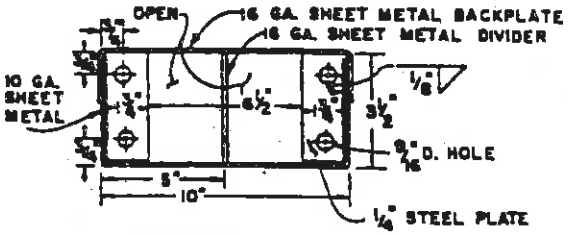


SECTION A-A



SECTION C-C

TOP

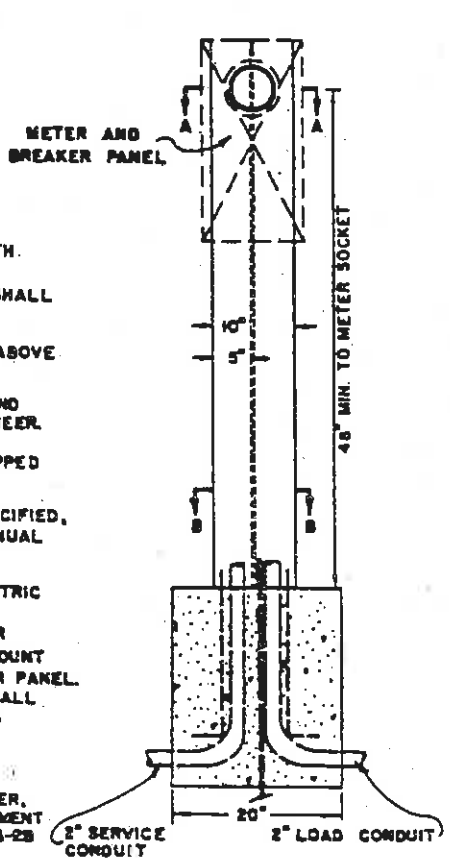


SECTION B-B

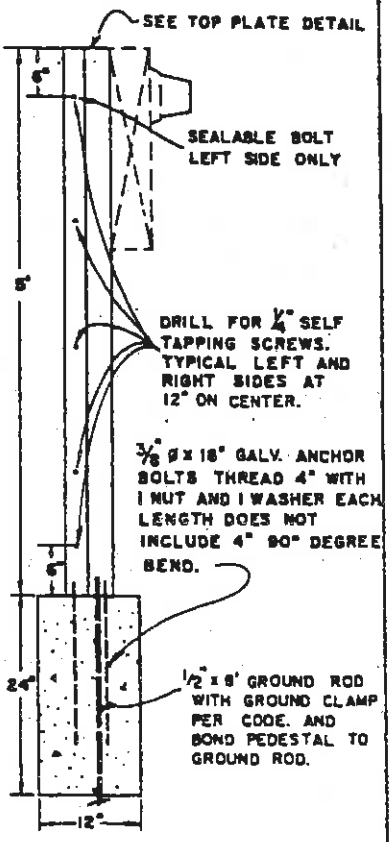
TOP PLATE DETAIL

GENERAL NOTES

1. TOP OF FOUNDATION SHALL BE FLUSH WITH SIDEWALK IN SIDEWALK AREAS, OUTSIDE SIDEWALK AREAS, TOP OF FOUNDATION SHALL BE 6" ABOVE GRADE.
2. CONDUITS SHALL EXTEND AT LEAST 2" ABOVE TOP OF FOUNDATION.
3. INSTALL AND ORIENT SERVICE PEDESTAL AND SERVICE EQUIPMENT AS DIRECTED BY ENGINEER.
4. FABRICATED PEDESTAL SHALL BE HOT DIPPED GALVANIZED OR #304 STAINLESS STEEL.
5. WHEN METER AND BREAKER PANEL IS SPECIFIED, IT SHALL BE A SINGLE UNIT WITH MANUAL CIRCUIT CLOSING DEVICES INCLUDED.
6. WHEN FLASHING BEACON OR PHOTOELECTRIC CONTROL IS SPECIFIED, A NEMA 3R ENCLOSURE SHALL BE FURNISHED PER DIMENSIONS IN SPECIAL PROVISIONS. MOUNT ENCLOSURE BELOW METER AND BREAKER PANEL. FLASHERS, SUPPRESSORS, OR RELAYS SHALL BE INSTALLED PER SPECIAL PROVISIONS.
7. ALL CONCRETE SHALL BE CLASS "B" PER STANDARD SPECIFICATIONS.
8. SUBJECT TO APPROVAL BY THE CITY ENGINEER, ALTERNATIVE STATE TYPE II SERVICE EQUIPMENT ENCLOSURES PER STATE STANDARD PLAN ES-2B (JULY 1984) MAY BE SUBSTITUTED.



FRONT



LEFT SIDE

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CITY OF KING

TITLE	UTILITY SERVICE PEDESTAL	STANDARD PLAN
DESIGNED BY J.W.	APPROVED	DATE
DRAWN BY K.L.C.	CITY ENGINEER [signature]	5-26-87
CHECKED BY		48

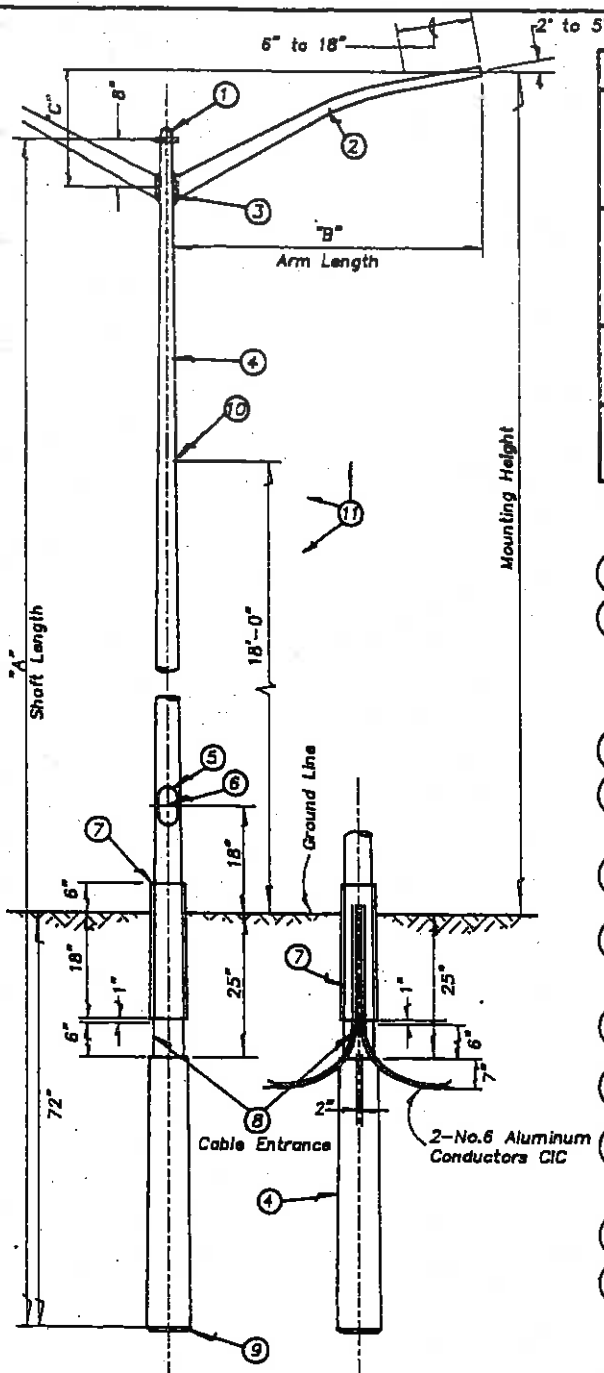


FIG. 1 FIG. 1A

CABLE ENTRANCE DETAIL

Typical installation for LS-1C schedule with High Pressure Sodium Vapor Lamps.

Pole shall be "A"= 37'-0" with "B"= 8'-0" unless otherwise noted.

EMBEDDED STEEL POLES

DIMENSIONS					CODE		
"A" Shaft Length	Pole Diameter		"B" Arm Length	"C" Rise	Single Arm	Double Arm	Mounting Height
	At Top	At Bottom					
32'-6"	3.6"to3.8"	8.1"to8.4"	4'-0"	1'-6"	35-7231		27'-6"
			6'-0"	2'-0"	35-7232	35-7236	28'-6"
			8'-0"	2'-0"	35-7274	35-7273	28"-6"
37'-0"	3.6"to3.8"	8.7"to9.0"	6'-0"	2'-0"	35-7233	35-7237	32'-6"
			8'-0"	2'-0"	35-7234	35-7238	
39'-6"	3.3"to3.9"	8.8"to9.5"	6'-0"	2'-0"	35-7235	35-7239	35'-6"
			8'-0"	2'-0"		35-7240	

Pole and Arm to be per PG&E Standards

General Specifications

(1) Cast Iron or Steel Cap: Furnish with set screws.

(2) Arm: 11 gauge (or better) steel and make with a yield strength of at least 33,000 psi. Cylindrical with a taper of C.14 inch per foot, O.D. at the small end is 2.37 inches. "Ovalize" the large end so the cross-section becomes about 2-1/2" in the horizontal dimension.

(3) Simplex Attachments: Make them as described by Sheet 9.

(4) Pole: 11 gauge (or better) steel with a yield strength of at least 33,000 psi. Cylindrical with a taper of about 0.14 inch per foot.

(5) Handhole: 4" x 6-1/2" and weld a reinforcing frame around it. Furnish a cover and mounting hardware.

(6) Weldnut: Weld a 1/2" square grounding nut or nut holder inside the pole, directly opposite the handhole. For alternate location,, see Detail "A", Sheet 7.

(7) Ground-line Sleeve: Use 11 gauge (or better) steel and continuously seal-weld it (top and bottom) to the pole.

(8) Cable Entrance: Make oval slot 2" x 6" and 180° with luminaire bracket. (See Fig. 1 and 1A.)

(9) Butt Plate: Cut it from plate or angle steel 1/4" thick and 4" to 6" wide and 12" long. Attach it to the bottom of the pole with continuous seal-welds at both ends.

(10) Festoon Outlet: For ordering information, see Sheet 10.

(11) Finish: Coat all parts:
- -Galvanize the arm(s) per ASTM A123 after forming and welding.
- -Galvanize all removable parts per ASTM 153.
- -Galvanize the pole per ASTM A123 after the holes are cut in it and the sleeve, weldnut(holder) arm fixture(s) and butt plate are welded to it.

Shipping Instructions: Ship the loose parts for one pole in one package.

(12) Bottom of pole holes shall always be well tamped before installing pole. Judgement, basedon experience and local soil conditions, should be used to determine if "keying" and "rocking-in" the steel pole are required.

(13) For CIC installations, pull conduits to handhole. For DB cable installations, use salvaged lengths of CIC conduits of sufficient length to provide cable protection.

(14) Developer installs pole, arm, wire from head to hand hole and backfill for City.

DEPARTMENT OF ENGINEERING
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

PG & E Drawing No. 015136 change 13

Department of Public Works — City of King, California

Street Lighting Poles (embedded steel poles)

Standard Detail 49

David N. Brents
City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____
Date: 7-20-94

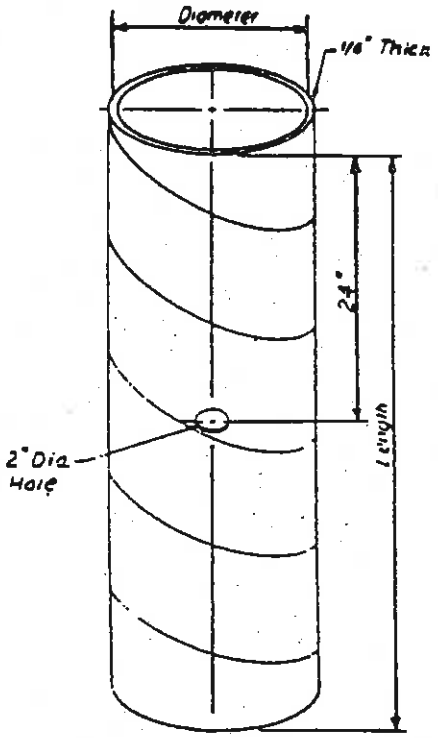


FIG. 3

TABLE 4 CIRCULAR TUBES FOR STREET LIGHT INSTALLATIONS

Fig. No.	Dimensions in.		MANUFACTURER AND CATALOG NO.		CODE
	Dia.	Length			
3	18	48	Armorcast Products Co.	JM-1848	12-8077
	24			JM-2448	12-8081
	30			JM-3048	12-8083

Application:

These tubes are to be used in those instances where future street light poles are to be installed and it is doubtful whether the space will be clear of other facilities when it comes time to auger the hole. Place the tube in the ground at the proposed pole location, set it to approximately finished grade and fill with native backfill. Fill the inside first. Auger down thru it when setting the pole, and abandon tube in place.

The street light conductor should be installed on the outside of the tube and on the same side as the entrance hole that is located 24" below the top edge.

NOTE: PG&E INSTALLS & BILLS DEVELOPER

PROTECTIVE TUBES

STREET LIGHTING POLES

DEPARTMENT OF ENGINEERING
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

PG&E DRAWING NUMBER 015136 REV. 16

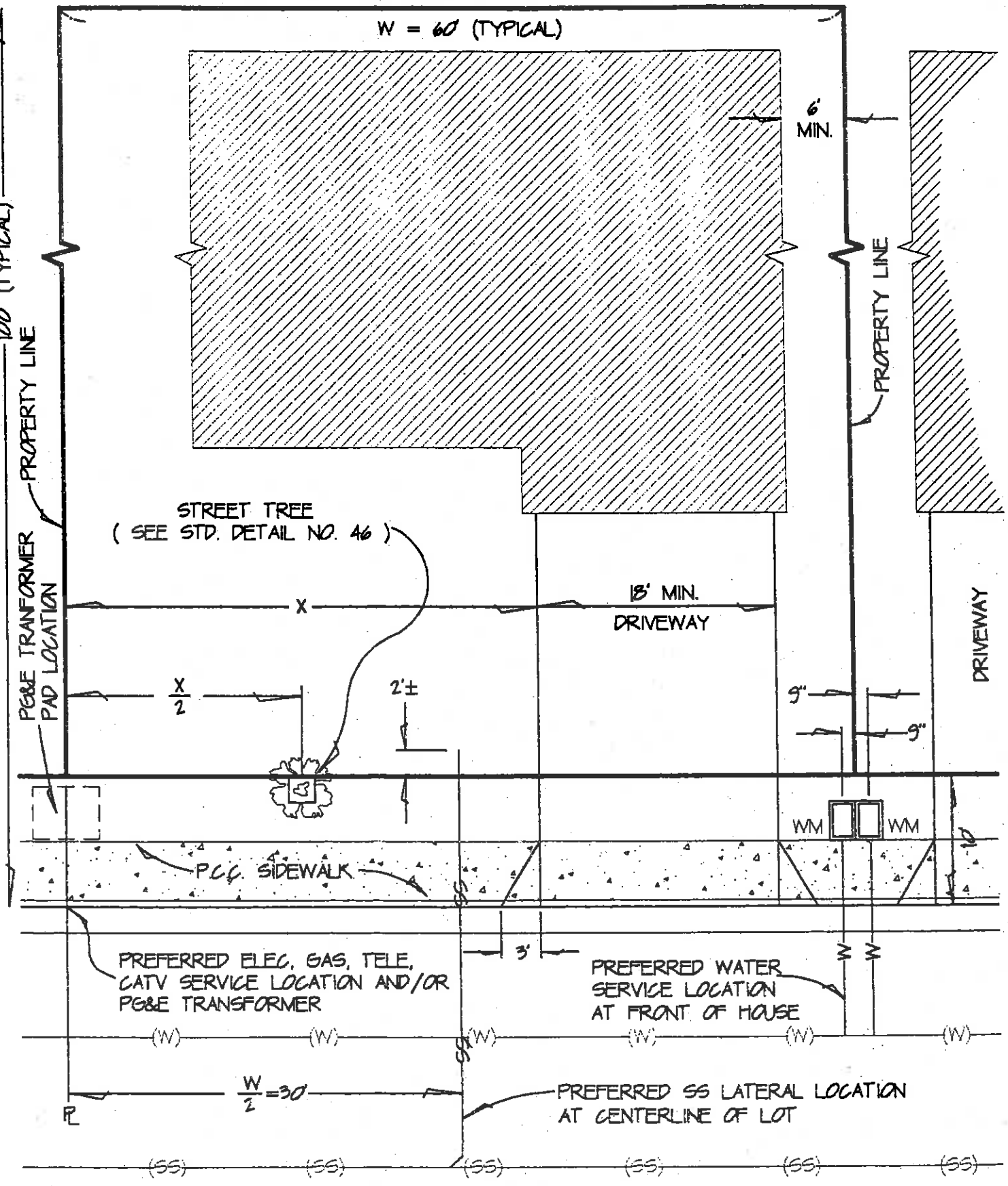
Department of Public Works — City of King, California

Protective Tubes

Standard Detail 50

Signature
City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved:
Date: 7-20-94



Department of Public Works — City of King, California

UTILITY LOCATIONS (TYPICAL)

Standard Detail

51

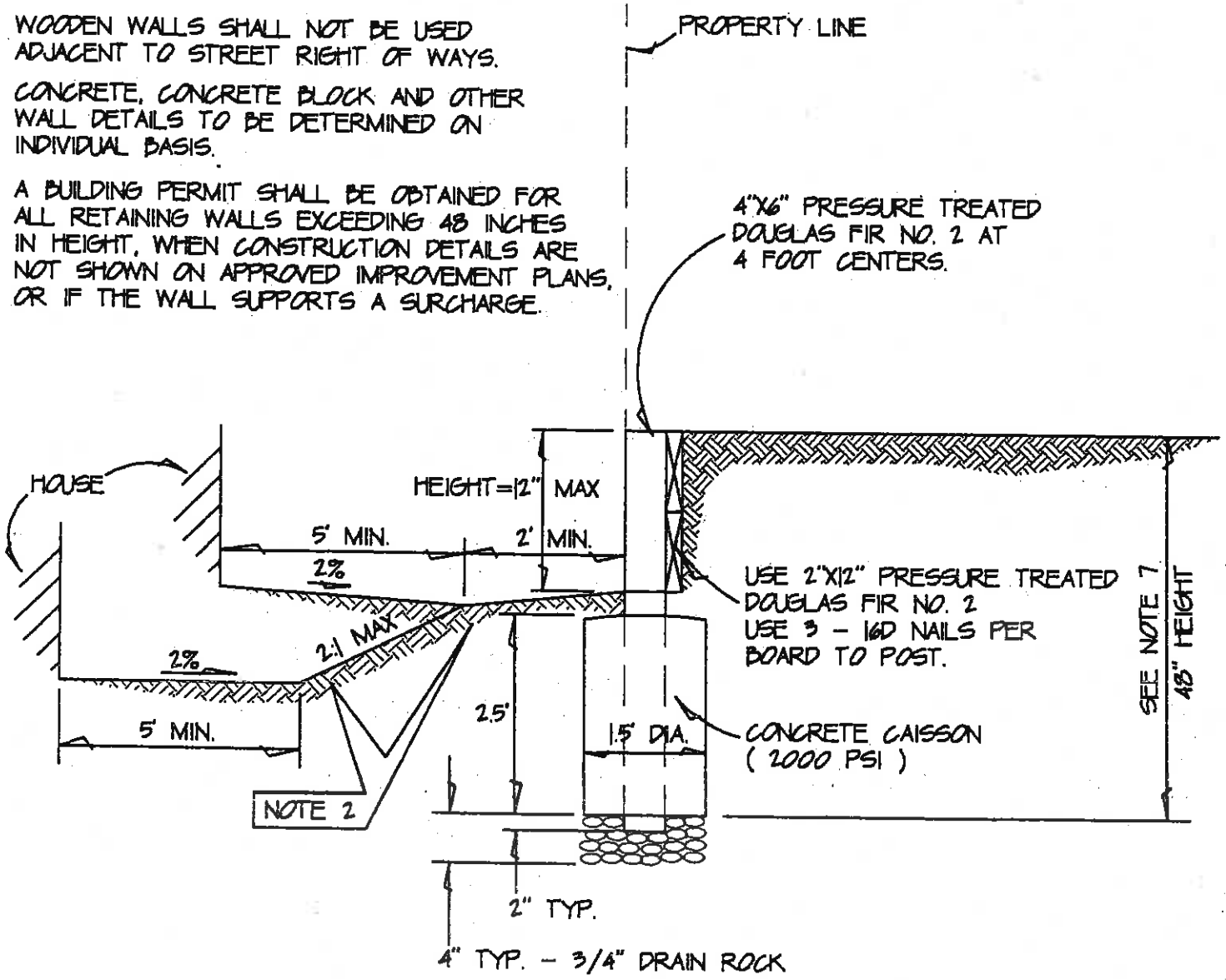
ity Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

Date: _____

NOTES:

1. STRUCTURAL CALCULATIONS SHALL BE REQUIRED IF FENCE IS ATTACHED TO WOOD RETAINING WALL AND SHALL BE SIGNED BY REGISTERED CIVIL ENGINEER.
2. ALL SOIL SURROUNDING POSTS SHALL BE NATIVE SOIL, COMPACTED ENGINEERING FILL OR AS SPECIFIED BY GEOTECHNICAL ENGINEER.
3. ALL WOOD MATERIALS SHALL BE TAGGED BY CERTIFIED INSPECTION AGENCY CITY INSPECTOR SHALL REMOVE TAG.
4. ALL WOODEN MATERIALS SHALL BE GRADE NO. 2 OR BETTER WITH NO OPEN GRAIN MATERIAL ALLOWED AND SHALL MEET THE REQUIREMENTS OF AWPB STANDARD LP - 22.40 FOR GROUND CONTACT.
5. WOODEN WALLS SHALL NOT BE USED ADJACENT TO STREET RIGHT OF WAYS.
6. CONCRETE, CONCRETE BLOCK AND OTHER WALL DETAILS TO BE DETERMINED ON INDIVIDUAL BASIS.
7. A BUILDING PERMIT SHALL BE OBTAINED FOR ALL RETAINING WALLS EXCEEDING 48 INCHES IN HEIGHT, WHEN CONSTRUCTION DETAILS ARE NOT SHOWN ON APPROVED IMPROVEMENT PLANS, OR IF THE WALL SUPPORTS A SURCHARGE.



DATED: 9-23-92

Department of Public Works — City of King, California

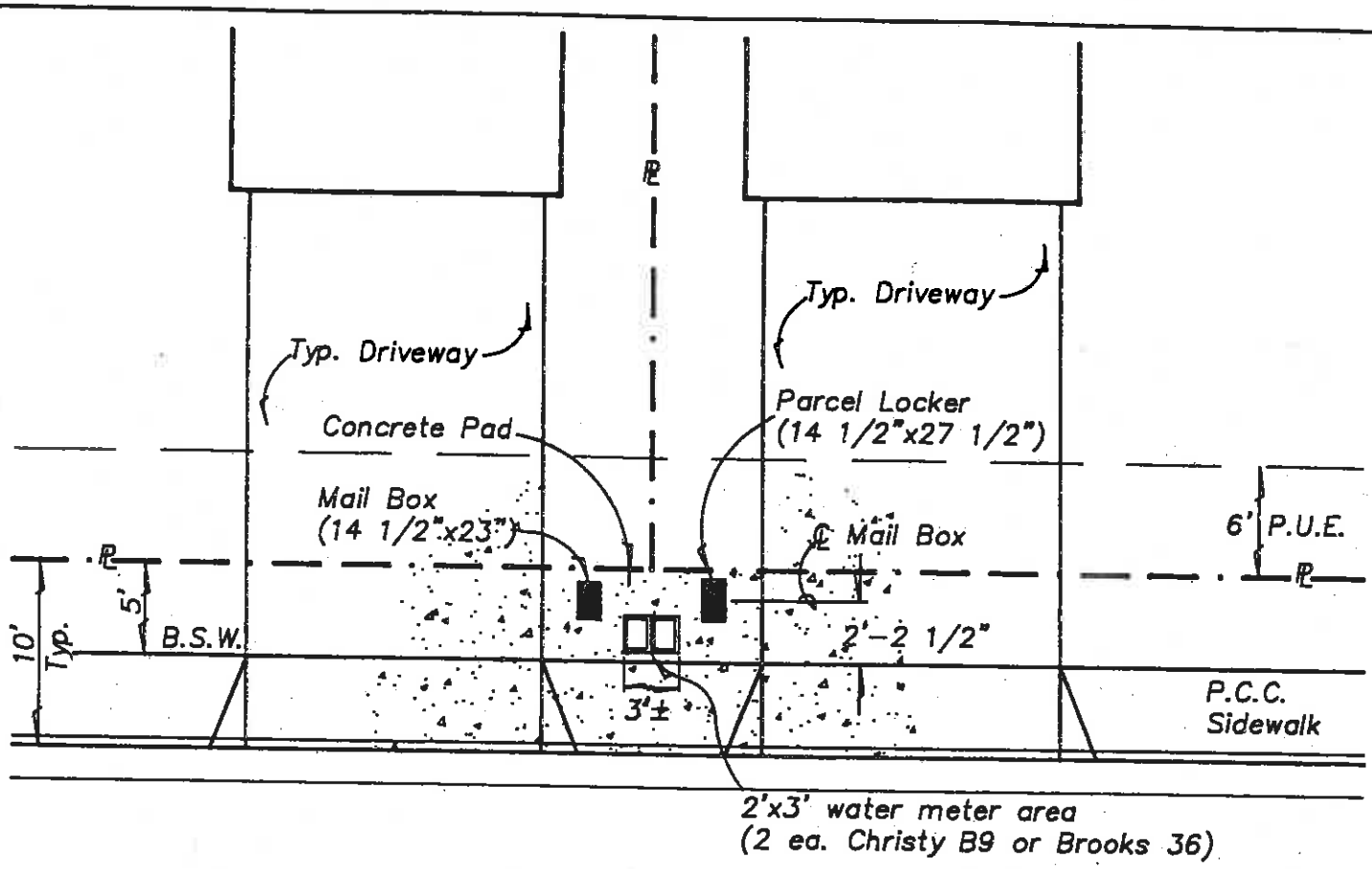
WOOD RETAINING WALL (12" MAX.)

Standard Detail 52

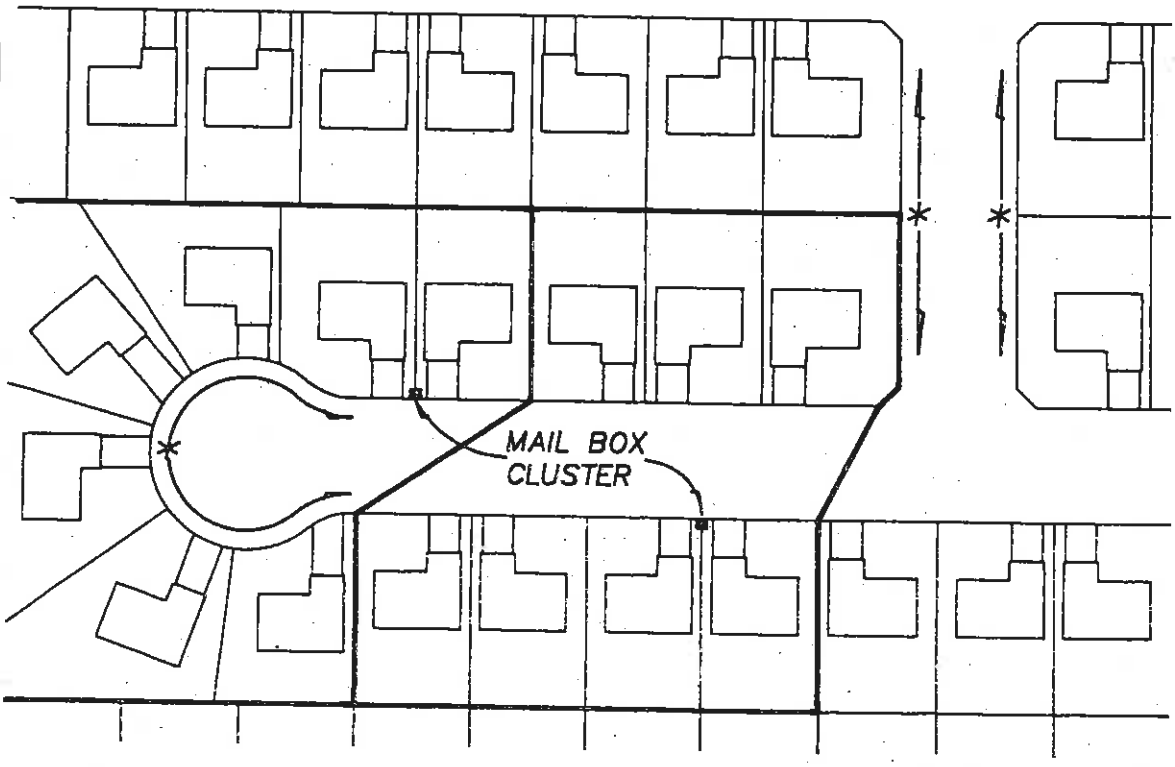
City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

Date: _____



Mail Box cluster location to avoid water meter boxes & water services.



Type II & III mail box clusters not desirable in multi family residential developments only.

* Undesirable locations – space & traffic restrictions.

Department of Public Works

City of King, California

Mail Box Cluster (U.S.P.O. Type I)

Standard Detail

53

City Engineer R.C.E. 17,186 (expires: 6/30/97)

Approved: _____

Date: 7-20-94