



City of
Los Banos
At the Crossroads of California

IMPROVEMENT STANDARDS AND SPECIFICATIONS



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CITY OF LOS BANOS

**IMPROVEMENT STANDARDS
AND SPECIFICATIONS**

Approved by
Council Resolution No. 4539
October 6, 2004

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DEPARTMENT OF PUBLIC WORKS
411 Madison Avenue
Los Banos, California 93635
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A. GENERAL

The Improvement Standards have been prepared by the City of Los Banos to aid all persons engaged in the construction of public works within the City limits of Los Banos. (Portions of these standards also apply to private work within the city limits.)

The data contained herein is not intended for use as Contract Documents for contracts between the City and a Contractor, or for Contracts between a subdivider or private person and a Contractor. Rather, separate Contract Documents must be prepared for each project, with each such contract containing a Special Provisions section applicable to that particular project. Design Engineers and Construction Contractors working in the City of Los Banos should be familiar with both the written specifications and Standard Detail Drawings contained in these Improvement Standards. All Plans and Specifications for construction of improvements to be accepted by the City shall be prepared and constructed in accordance with the applicable Improvement Standards.

The Improvement Standards do not cover all the work which may require acceptance by the City. Work which is not covered by these Improvement Standards shall be designed in accordance with generally accepted engineering principles. It is recommended that the criteria for work which is to be accepted by the City and which is not covered by these Improvement Standards be reviewed with the City Engineer prior to the actual design to establish the acceptable design criteria. Design criteria will be based on current codes and regulations applicable to the work and the latest accepted principles of engineering. The Design Engineer may be required to submit applicable engineering calculations to verify that the proposed work meets the design criteria set forth by the City Engineer.

Nothing in these Improvement Standards is intended to reduce or modify applicable Federal, State or local laws, nor to create a standard to be applied retroactively to existing improvements except where specifically noted.

The Improvement Standards are divided into three parts, each of which is briefly described in the paragraphs below.

B. IMPROVEMENT STANDARDS

1. PART II, DESIGN STANDARDS, are the Engineering Design Standards which shall be followed in the design of all Public Works and are arranged in sections covering various phases of the work as listed below:

Section 1	Streets
Section 2	Lighting
Section 3	Drainage Facilities
Section 4	Sanitary Sewers
Section 5	Water Service
Section 6	Landscaping
Section 7	Miscellaneous

2. PART III, CONSTRUCTION STANDARD SPECIFICATIONS, covers City Construction Standards. These standards shall be followed in any work constructed for City acceptance and shall be included by reference in any construction contract when the work is to be accepted by the City of Los Banos. The Construction Standard Specifications are arranged in divisions covering various phases of the work as listed below:

Division 1	General Conditions and Construction Requirements
Division 2	Sitework
Division 3	Concrete and Masonry
Division 4	Metals
Division 5	Pipelines
Division 6	Mechanical
Division 7	Electrical

3. PART IV, STANDARD DETAILS, is a set of Standard Details to be used in conjunction with the Construction Standard Specifications and shall be incorporated, where applicable, in any construction plans involving work for acceptance by the City.

C. DEFINITIONS AND TERMS

The definitions and terms listed in Section 1 of the California State Department of Transportation Standard Specifications shall apply with the following additions and exceptions:

CITY - shall mean the City of Los Banos or any persons to whom the power of the City has been delegated.

CITY ENGINEER - shall mean the City Engineer of the City of Los Banos acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

CONTRACTOR - shall mean an individual, firm, corporation, partnership or association duly licensed by the State of California who does work for City acceptance.

DESIGN ENGINEER - shall be the registered engineer licensed by the State of California responsible for the preparation of plans, specifications and general supervision of the construction of the improvement work.

DIRECTED, DESIGNATED, PERMITTED, REQUIRED, SPECIFIED, ACCEPTED - and words of like import, wherever and in whatever manner used, with or without reference to the City, mean as directed, designated, permitted, required, specified and accepted by the City.

DIRECTOR - shall mean the Director of Public Works for the City of Los Banos, or his properly authorized agent.

IMPROVEMENT PLANS - shall be plans of proposed improvements prepared by the Design Engineer, subject to approval by the City Engineer.

IMPROVEMENT STANDARDS - shall mean the Improvement Standards of the City of Los Banos and shall include the Design Standards, Construction Standard Specifications and Standard Details.

MINIMUM, MAXIMUM - wherever and in whatever manner used, with or without reference to the City, means proper and acceptable under normal conditions. Exceptions for unusual conditions may be made as approved by the Engineer.

PRODUCT DATA - An illustration, standard schematics, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, project or system for some portion of the work.

SHOP DRAWING - All drawings, diagrams, schedules and other data which are specifically prepared for the work by the Contractor, a subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the work shall be fabricated or installed.

SUFFICIENT, NECESSARY OR PROPER, ACCEPTABLE, SATISFACTORY, DESIRABLE - and words of like import, wherever and in whatever manner used, with or without reference to the City, means sufficient, necessary, proper, acceptable, satisfactory and desirable in the judgment of the City of Los Banos.

STATE STANDARD SPECIFICATIONS - the latest edition of the State of California, Department of Transportation Standard Specifications.

D. IMPROVEMENT PLAN APPROVAL

Improvement plans and supplemental information shall be approved by the City Engineer for all projects that are subject to the approval of the Department of Public Works prior to the issuance of permits allowing construction to begin. The improvement plans and supplemental information described herein shall be prepared by an engineer legally authorized to practice Civil Engineering in the State of California.

E. IMPROVEMENT PLAN INFORMATION REQUIREMENTS

Final plan submittals shall consist of the original drawings duly stamped and signed by the design engineer. Prints or sheets submitted for preliminary review need not be signed and stamped, but should be complete and shall be submitted with supporting design calculations. The following details and supplemental information shall be shown on plans submitted for approval:

1. GENERAL REQUIREMENTS

- a. Improvement plans shall show all existing facilities and all improvements to be constructed. The plans shall be original drawings, film positives or mylar composites. Paper sepias will not be allowed.
- b. Size: The size of the improvement plan sheets shall be 24"x 36" or 22" x 34".
- c. Scale: The scales selected shall be sufficient to clearly show all required details when reproduced on blueline. Preferred vertical scales are 1" = 4' in flat areas.
- d. Title Block: Each sheet within the set shall have a title block showing the project's name, City project number, sheet title, date of drawing and revisions, scale of drawings, page number, and the Design Engineer's name, registration number, expiration date of registration, and signature.
- e. Vertical Control: All elevations indicated in the improvement plans shall be based on Los Banos datum. Benchmark location, number, and elevation shall be shown on the drawings.
- f. Orientation and Stationing: Insofar as practical, the plans shall be arranged so that the North shall be at the top or right edge of the sheet. The stationing on the plan and profile sheet shall read from left to right or from bottom to top.

2. TITLE SHEET

- a. Title sheets shall be prepared for improvement plans exceeding two sheets per set, and shall show the following:
 - The entire project, drawn at a suitable engineering scale, including existing and proposed street names and lot numbers. Surrounding lot lines shall be shown within a minimum distance of 50 feet of the project.
 - Vicinity map and north arrow.
 - Index of sheets.
 - Legend of symbols.
 - Location, description and elevation of the reference Los Banos Benchmark as well as any temporary benchmark used for the project.

- Name, address, telephone number and designated agent, of any agency whose facilities will be installed, utilized, interfered with, or crossed as part of the improvements, as well as a signature block for their approval. Where construction requires encroachment permits by other agencies, copies of signed encroachment permits together with evidence of any required insurance shall be submitted.
- Name, address and telephone number of the developer or his authorized representative.
- Signature block for approval by the City Engineer as follows:

APPROVED BY THE CITY ENGINEER, CITY OF LOS BANOS REVIEWED FOR CONFORMANCE WITH CITY OF LOS BANOS REQUIREMENTS ONLY. SINCE PLANS WERE PREPARED BY OTHERS, NO RESPONSIBILITY FOR THE ADEQUACY OF THE DESIGN IS EXPRESSED.

BY _____ DATE _____

b. The following notes shall be placed on the title sheet:

- This set of improvement plans is valid for construction purposes only after being signed by the City Engineer and upon issuance of permits.
- All Contractors and Subcontractors involved in the construction of this project shall attend a pre-construction conference arranged by the Developer at the Department of Public Works for construction and inspection coordination prior to commencement of any on-site construction activities.
- The current Los Banos Department of Public Works Improvement Standards and Specifications that have been referenced in these plans shall be considered as part of these plans.

c. The following shall **not** be included in the title sheet:

- Quantities List.

3. TOPOGRAPHY SHEET

A topographical survey sheet shall be included in the improvement plan set and shall show spot elevations at an appropriate interval, fences, structures, pipelines, ditches, utility poles, trees, driveways, roads, pavement, wells, rights-of-way, easements, etc., and their disposition. Disposition of existing facilities may be

indicated on the topographical survey sheet by reference to appropriate sheets within the Improvement Plans.

4. GRADING AND DRAINAGE SHEET

A grading and drainage sheet shall be included in the improvement plans set and shall show the following:

- a. A typical lot grading detail. (Specific lots may be required to provide and independent grading plan.)
- b. Proposed lot corner elevations as well as any elevation differential between the project boundaries and the adjoining properties.
- c. Gutter or ditch flow arrows, slopes, and grade break elevations.
- d. Storm drainage pipes, manholes, valley gutters, and catch basins. (Submit supporting design calculations.)
- e. Detention basin location and details. (Submit supporting design calculations.)
- f. Location and height of any retaining walls or retaining fences. Concrete or masonry retaining walls shall be provided where the difference in grade at property line exceeds 18 inches. Where the grade differential is 6 inches to 18 inches, the use of retaining fences is allowed. For grade differentials less than 12 inches, a grading strip with a 6 horizontal:1 vertical slope may be utilized. Grading strips requiring slope easements are not allowed.

5. UTILITIES SHEET

A utilities sheet shall be included in the improvement plans set and shall show street lights, fire hydrants, water lines, valves, blowoffs, sanitary sewer lines, manholes and clean outs, sewer and water service locations, water wells, power lines, gas lines, TV cable lines, street light conduit, utility boxes, mail boxes, telephone lines, PUE's, driveways, centerline monuments, street signs, etc. Some of the above utilities may not be finalized prior to improvement plan approval. In this case, these utilities shall be shown on the required Record Plans prior to acceptance of improvements. Utility company Record Plans may be accepted in lieu of required Record Plans provided sufficient detail is provided to coordinate the electrical, gas, telephone and TV cable line locations with other utilities as determined by the Director of Public Works.

6. PLAN AND PROFILE SHEET

A plan and profile sheet shall be included in the set of improvement plans showing the existing and proposed profiles of all roadways and other improvements in public rights-of-way. This sheet shall show elevations, grade breaks, vertical curves, slope, road stationing, storm drainage lines, water lines, sewer lines, irrigation lines and any areas of possible conflict between underground utilities. Indicate length and type of all sewer and storm drain pipes and catch basins. Show elevations of pipe inverts in manholes and catch basins. Indicate length and type of all water system pipes and locations of valve junctions.

7. DETAIL SHEET

A detail sheet shall be included in the set of improvement plans showing typical construction details. Construction details included in the Improvement Standards and Specifications, that are applicable to the work, shall be reproduced and included on the detail sheet(s).

8. COMBINING REQUIRED SHEETS

Sheets may be combined or omitted depending on the complexity of the project.

F. SUPPLEMENTAL INFORMATION

The following supplemental information shall be submitted to the City Engineer prior to the improvement plans being approved:

1. SOILS REPORT

The required soils report shall be prepared by a Civil or Geotechnical Engineer legally authorized to practice in the State of California. Three (3) copies shall be submitted. The soils report shall include:

- a. The results of "R" value tests taken in the project site and a recommendation by the Civil or Geotechnical Engineer for design "R" values for road pavement sections.
- b. Depths to groundwater measurement or other records of depth to groundwater. Civil or geotechnical engineer's recommendations for elevations of roads above groundwater.

All portions of the soils report may be waived by the City Engineer if the soil conditions can be adequately determined from an existing soils report for an adjacent project.

2. MISCELLANEOUS CALCULATIONS

Submit calculations for pavement structural section determination plus any calculations used in the design of any retaining walls or other miscellaneous items not covered in these standards, such as domestic water flow, fire flow, sewage flow, and storm drainage calculations.

3. QUANTITIES LIST AND ENGINEER'S ESTIMATE

Quantities list and engineer's estimate shall show estimated costs, descriptions and total costs of each item of work. Engineer's estimate shall be separated into items that deal with storm drainage, domestic water systems, sanitary sewers, etc. and shall include a separate 10% contingency for the total value of work to be done.

4. PRODUCT SPECIFICATIONS

When a product is mentioned in the improvement plans such as pumps, motors, street lights, etc., the Design Engineer shall submit the manufacturer's specifications upon request.

G. DEPARTMENTAL REVIEW

The Design Engineer shall submit for review to the Permit Coordinator the number of blue-line sets of improvement plans requested, together with the other required items. When corrections are required, one set will be returned to the Design Engineer with comments. The Design Engineer shall then resubmit the revised improvement plans for review, along with the redlined set. The number of sets resubmitted will be determined by the Permit Coordinator. In order to reduce the man-hours required in checking resubmittals of plans, the Design Engineer shall address all comments through annotations on the plans, a letter format or a combination of both. The City will make a reasonable effort to provide all pertinent comments and identify all necessary corrections during the first improvement plan review. However, the Design Engineer's changes in response to the comments may themselves require further comments and corrections, and may necessitate changes in other areas of the design. Thus, the Design Engineer is cautioned not to assume all the changes have been identified during the first submittal review cycle.

H. PRODUCT DATA, SHOP DRAWINGS, AND SUBMITTALS

The Contractor shall provide the Design Engineer with Product Data, Shop Drawings or other submittals required by the Specifications or Improvement Plans or otherwise submitted for custom design work including but not limited to pumping stations, bridges and other structures. The Design Engineer shall promptly review all product data, shop drawings and submittals submitted and return reviewed items directly to the Contractor; two copies of favorably reviewed items shall be sent directly to the Director for construction monitoring.

The Contractor shall also submit to the Design Engineer for review engineering calculations and/or items as required by the Specifications or Improvement Plans or to support Shop Drawing submittals. The Design Engineer shall promptly review these items and return them directly to the Contractor; two sets of favorably reviewed items shall be sent directly to the Director.

The City Engineer may request to review Product Data or Shop Drawings for City acceptability of major components or assemblies. If such a request is made, the Design Engineer shall submit the requested Shop Drawings to the City Engineer following favorable review by the Design Engineer. The City Engineer shall promptly review the requested submittals, make a determination on acceptability and return the submittals to the Design Engineer.

The Contractor shall submit the City Engineer all proposed substitution of items in these Improvement Standards where an "or equal" option is not explicitly permitted. The City Engineer shall promptly review these proposed substitutions are acceptable and return the reviewed submittals directly to the Contractor.

I. RECORD DRAWINGS

Prior to the City's acceptance of the improvements, the Design Engineer shall compile and submit a set of Record Drawings showing final improvement details, corrected improvement elevations and locations, as well as any changes that occurred during construction. Record Drawings shall consist of film positive or mylar sepias (paper sepias will not be accepted). Original data that has been superseded shall be crossed out, but not eradicated. All utilities that could not be shown on the construction plans shall be drawn on the Record Drawings. The design Engineer shall provide final elevations of all catch basin grades, storm drainage pipe inverts, sewer flowline elevations at manholes and curb and gutter flowline. All lettering must be clear and legible. Extensive changes which cannot be shown clearly on an original sheet should be drawn on a supplemental sheet. Any supplemental sheets shall be signed by the Design Engineer and included as part of the Record Drawings. The Design Engineer shall sign the Record Drawings. The Record Drawings shall be retained by the City of Los Banos.

J. EQUIPMENT OPERATION AND MAINTENANCE SUBMITTALS

Prior to the acceptance of the improvements by the City of Los Banos, the Developer shall compile and submit information and materials related to each maintainable piece of equipment, equipment assembly, or sub-assembly provided and dedicated to the City in conjunction with his work. This requirement generally applies to such items as pumps, lift stations, irrigation systems, and similar equipment and systems. It also includes valves, fire hydrants, and similar items not specifically listed in the Improvements Standards that have been provided on an "or equal" basis, where operation and maintenance of such items differs from listed items and replacement parts and special tools are not directly interchangeable with those for listed items.

1. OPERATION AND MAINTENANCE MANUALS

An operation and maintenance manual shall be submitted for each maintainable piece of equipment, equipment assembly or sub-assembly which covers the following subjects in detail:

General

- Names, addresses, and telephone numbers of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts.

In addition, one or more of the following items of information shall be provided as applicable, to the satisfaction of the Director of Public Works:

Operating Instructions

- Safety precautions
- Operator prestart
- Startup, shutdown, and post shutdown procedures
- Normal operations
- Emergency operations
- Operator service requirements
- Environmental conditions

Preventive Maintenance

- Lubrication data
- Preventive maintenance plan and schedule

Corrective Maintenance

- Troubleshooting guides and diagnostic techniques
- Wiring diagrams and control diagrams
- Maintenance and repair procedures
- Removal and replacement instructions
- Spare parts and supply list
- Corrective maintenance man-hours

Appendices

- Parts identification
- Warranty information
- Personnel training requirements
- Testing equipment and special tool information

2. ROUTINE MAINTENANCE ITEMS AND SUPPLIES

Consumables, lubricants, gaskets, fuses, and similar routine maintenance items and supplies (not including fuel) sufficient for one (1) year operation.

3. OPERATION AND ROUTINE MAINTENANCE

Special tools required for operation and routine maintenance.

1-1 GENERAL**1-1.1 Scope**

All public streets shall be designed in accordance with acceptable engineering principles and shall conform to these Standards. Primary references for supplemental information and/or details include:

- Highway Design Manual, Fourth Edition, California Department of Transportation, State of California Department of Transportation Central Publication Distribution Unit, Sacramento, CA.
- Transportation and Traffic Engineering Handbook, Second Edition, Institute of Transportation Engineers, Prentice Hall, Inc., Englewood, N.J., 1982.
- Guidelines For Urban Major Street Design, Institute of Transportation Engineers, Washington, D.C., 1984.

Private streets and parking lots shall be designed according to applicable development approvals, City Codes and Standards, and accepted engineering principles.

1-2 DESIGN VOLUMES**1-2.1 General**

Unless otherwise designated in the General Plan or approved development plan, the design volumes shall be used to determine required street classifications and shall be approved by the City Engineer. Volumes may be estimated using these design standards in consultation with the City Engineer; however, a traffic study may be required at locations with access, capacity or other traffic problems. Larger projects and those requesting significant changes to the General Plan shall have a traffic study, as required, as part of the development approval process.

The following table relates street classification, R/W, configuration, design speed, and design volume:

<u>Street Classification</u>	<u>R/W, Curb-Curb Width (In Feet)</u>		<u>Configuration</u>	<u>Design Speed (In MPH)</u>	<u>Daily Traffic Volume Range</u>	
Private Residential	--	--	2 lanes	25	0	500
Local Residential	52	32	2 lanes with parking	30	0	4,000
Minor Collector	60	40	2 lanes with parking	35	500	4,000
Minor Collector	60	34	2 lanes and no parking	35	500	4,000
Major Collector	72	56	2 lanes with parking and LT lane/median	40	4,000	7,500
Major Collector	80	50	2 lanes with no parking and with walls at property line	40	4,000	7,500

<u>Street Classification</u>	<u>R/W, Curb-Curb Width (In Feet)</u>		<u>Configuration</u>	<u>Design Speed (In MPH)</u>	<u>Daily Traffic Volume Range</u>	
Industrial	66	48	2 lanes	40	0	14,000
Minor Arterial	84	62	4 lanes with no parking	50	7,500	--
Minor Arterial	100	62	With wall at property line and no parking	50	7,500	--
Major Arterial	106	80	4 lanes with LT lane/median and no parking	55	--	25,000
Major Arterial	122	80	4 lanes with no parking and with walls at property line	55	--	25,000

Due to specific design considerations, the foregoing minimum rights-of-way and curb-to-curb widths may be increased (i.e., turn lanes at intersections, bus turn-outs, meandering sidewalks, landscape buffers, etc.).

1-2.2 Traffic Studies

Traffic studies shall only be conducted after consultation with the City Engineer regarding scope of work, assumptions, computer programs and models to be used and other parameters.

Generation rates shall be used as approved by the City. For mixed use development projects, individual building rates shall be added. For example, in a commercial development consisting of a large retail space with detached building pads, shopping center rates may be used for the large retail space and fast food, bank or other appropriate rates used for the pads. "Pass-by" reductions in rates shall be approved by the City.

1 - 3 STREET DESIGN

1-3.1 General Design

Incorporation of moderately curved streets, cul-de-sacs, knuckles, and "T" intersections in the site plan is encouraged. Maximum length of continuous straight streets should not exceed 1,000 feet. Continuous straight streets with residential frontage, between two collector or arterial streets, is discouraged.

Blocks shall not be longer than 1,200 feet between intersecting street lines, except on industrial or arterial streets.

For multi-family, industrial and commercial projects, on-site circulation shall be designed such that exiting vehicles do not have to back out onto the street.

- **ALLEYS**

New public alleys are not allowed unless specifically approved by the City Council.

- **CUL-DE-SACS**

A cul-de-sac shall be constructed on all permanent dead-end streets. Cul-de-sacs are discouraged in commercial and industrial developments and shall be specifically approved by the Planning Commission or City Council. The maximum design volume on a cul-de-sac shall be 500 vehicles per day. The maximum length of a cul-de-sac, regardless of volume, shall be 500 feet measured from the centerline of the intersecting street to the radius point of the cul-de-sac.

Temporary cul-de-sacs on dead-end streets that are to be extended may be required for Fire Department turn-around depending on the length of the street and location of fire hydrants.

- **RESIDENTIAL**

Private and local residential streets shall be designed to discourage through traffic. Direct access to major collectors and arterials from less than minor collector streets is not permitted, except when physical conditions do not allow for other design solutions.

"Knuckles" on residential streets are to provide proper lot width at the setback line and shall conform to Standard Detail ST-4.

- **COLLECTORS AND ARTERIALS**

Left-hand turn lanes shall be provided for access from collectors and arterials into high traffic commercial areas.

Spacing of access points shall be such as to minimize the disruption of traffic flow in collectors and arterials.

Direct vehicular access to major collectors and arterial streets from residential lots is not allowed.

- **INDUSTRIAL**

Industrial streets shall not intersect residential streets.

MISCELLANEOUS

Streets shall be fully improved within tract boundaries.

Where new streets are provided at the periphery of a project, minimum construction shall consist of full half-width construction on the side nearest the project, plus a minimum of one lane of travel in the opposite direction. Full construction in both directions may be required, if necessary, to meet traffic demands.

1-3.2 Cross Section

Cross sections for standard street classifications are shown on Standard Detail ST-1. Sections may be modified by the City Engineer based on specific plans, traffic study requirements for project access lanes or other development approvals.

The standard cross slope of the street shall be 2.5%. Where necessary to match existing facilities, the cross slope on new streets may vary between 1% and 5%. Replacement of existing travel lanes in order to meet cross slope criteria may be required. Intersection, cul-de-sac and knuckle cross slopes should be 2% maximum, 1% minimum.

Upon approval of the City Engineer, the cross slope in shoulder areas may be increased to 8% for overlays or other special circumstances. Grinding is normally required to minimize the effects of overlay and may include double passes, the first 6 feet wide adjacent to the gutter at constant depth, with a second, tapered transition pass next to the first.

1-3.3 Intersection/Driveway Sight Distance

Minimum requirements for intersection and commercial/industrial driveway sight distances are shown in the "Sight Distance Requirements" table and are based on stopping sight distances for traffic on the major (through) street and stop control on the intersection/driveway. Preferred distances are from Transportation and Traffic Engineering Handbook, Table 19-8 "Suggested Corner Sight Distances at Intersections", which are intended to allow opposing traffic to cross the major street without requiring approach traffic to reduce speed. These longer distances will normally be required for new streets and may be required in other circumstances depending on available setback or other considerations.

Planned intersection controls shall be considered in determining the appropriate sight distance. For example, where a traffic signal is planned, and the intersection will be initially controlled with a two-way stop, the minimum sight distance may be provided at the "stop" legs of the intersection.

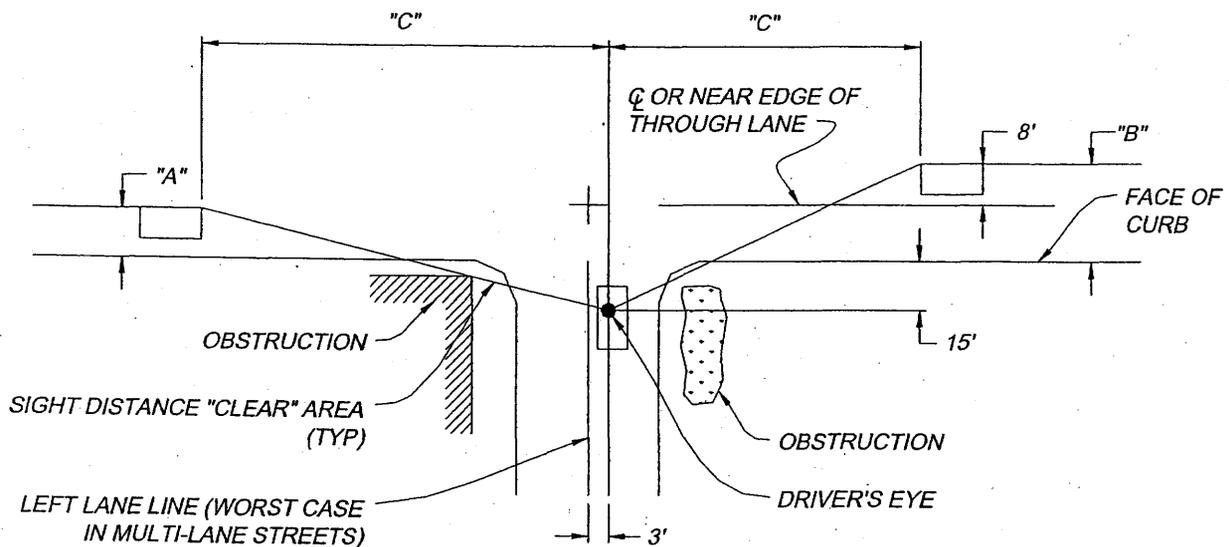
Sight distances shall also be provided at median openings as appropriate.

Right-of-way or sight easements shall be provided at new reverse frontage fences, signs or other obstructions as appropriate. The "clear" area shall not contain shrubbery, mounds,

signs or other obstructions over 30" high. Poles and trees shall be spaced far enough apart to provide adequate sight and tree limbs shall be at least 7 feet above the ground. (This section is not intended to pre-empt the zoning code with regard to front yard fences in residential areas.)

SIGHT DISTANCE REQUIREMENTS

Major St. Classification	Design Speed	"A" (ft.)	"B" (ft.)	"C" (ft.)
Private Residential	25	14	26	250
Local Residential	30	16	26	300
Minor Collector	35	15	28	350
Major Collector	40	16	33	400
Industrial	40	20	32	400
Minor Arterial	50	16	39	600
Major Arterial	55	16	55	660



1-3.4 Vertical Alignment

- **VERTICAL CURVES**

Vertical curves are rarely required in Los Banos due to the flat terrain. Thus the following standards are brief and only describe minimum requirements. The design engineer is referred to the "Caltrans Highway Design Manual" for additional design criteria where compound curves are needed such as at canal or railroad crossings.

Where the algebraic difference in longitudinal slope exceeds 1%, a parabolic vertical curve shall be used. The minimum length of vertical curve shall be per the following:

$$L = KA$$

Where:

L = length of vertical curve, ft.

K = constant per table below

A = algebraic difference in grades, %

VERTICAL CURVE K VALUES

<u>Design Speed</u>	<u>Crest Curve</u>	<u>Sag Curve</u>
25	20	30
30	30	35
35	50	50
40	80	70
50	170	110
55	220	130
60	320	155

The minimum length of vertical curve shall be 200 ft. for design speeds below 30 mph and 400 ft. for design speeds of 40 mph and above. Where the calculated length is below the minimum, the curve may be approximated by an intermediate straight segment(s).

- **TOP OF CURB AND FLOWLINE GRADES**

Flowline grades shall not be less than 0.20% and not greater than 4%. A normal design minimum of 0.30% is recommended to minimize birdbaths.

Grades on opposite sides of the street shall be the same wherever practical.

- **GRADES ON CURVES**

On cul-de-sacs, knuckles and other curves (except curb returns) where the curb radius is less than 100 feet, the flowline grade shall be 0.30% minimum.

▪ **CURB RETURN GRADES**

Top of curb fall (in feet) around returns shall be per the following table:

<u>Radius</u>	<u>Retrofit Minimum</u>	<u>New Construction</u>	
		<u>Minimum</u>	<u>Maximum</u>
15	0.12	0.20	0.50
20	0.16	0.20	0.60
25	*	0.25	0.80
30	*	0.30	0.90
35	*	0.35	1.00
40	*	0.40	1.10
45	*	0.45	1.20
50	*	0.50	1.30

* Special Determination

At returns where the curb type changes, differences in curb height shall be taken into account in the design so as not to reduce the flowline fall.

▪ **MEDIAN GRADES**

Median grades shall follow street grades. Minor variation in top of median curb grades on opposite sides of the median is permitted depending on the width and nature of landscaping. For aesthetic reasons, the maximum variation at noses or other medians less than 6 feet wide should be 0.15± feet. Median noses and other areas with solid fill in between curbs shall be sloped to drain.

1-3.5 Horizontal Alignment

▪ **STREET CURVATURE**

Design of curved arterial and collector streets shall be based on criteria in the Caltrans Highway Design Manual. The minimum radius of curvature of centerline for all streets shall be per the following table:

MINIMUM HORIZONTAL CURVE RADIUS

<u>Street Classification</u>	<u>Design Speed</u>	<u>Radius (feet)</u>
Private Residential	25	230
Local Residential	30	350
Minor Collector	35	500
Major Collector, Industrial	40	650
Minor Arterial	50	1100
Major Arterial	55	1400

Use of these minimum radii assumes no sight obstructions. On major collector, industrial and arterial streets, "Stopping Sight Distance on Horizontal Curves" of the Caltrans Design Manual, should be reviewed when walls or other obstructions are planned within 20 feet of the right-of-way.

There shall be a tangent between reversing curves of at least 150 feet on arterial, collector and industrial streets, and 50 feet on residential streets.

There shall be a minimum tangent length of 50 feet at intersections measured from the projected curb lines of the intersecting street to the beginning of curve in any leg of the intersection.

▪ **TRANSITIONS**

Length of pavement transitions affecting travel lanes shall be designed per applicable Caltrans Standards (Topic 206 of the Design Manual). At ends of curb and gutter, the minimum transition length shall be based on a 45 degree pavement transition. Longer distances will be required where a driveway is located at the end of the curb and gutter.

▪ **INTERSECTION ANGLE**

Streets shall intersect at right angles (± 5 degrees). Curved residential streets shall have at least 50 feet of centerline perpendicular (± 5 degrees) to the projected curb line of the intersecting street. Collector and arterial streets will require a minimum of 150 feet.

▪ **CURB RETURNS**

Minimum curb return radii in feet for various street intersections are as follows:

	<u>Private Residential</u>	<u>Local Residential</u>	<u>Minor Collector</u>	<u>Major Collector</u>	<u>Industrial</u>	<u>Arterial</u>
Private Residential	20	---	---	---	---	---
Local Residential	20	25	---	---	---	---
Minor Collector	20	25	25	---	---	---
Major Collector	20	25	25	35	---	---
Industrial	---	---	---	35	40	---
Arterial	25*	25*	30	40	40	50

* For Retrofit

- **ANGLE POINTS**

Angle points of 5 degrees or less are allowed on residential street centerlines with approval of the City Engineer. In such cases, the curb face shall be designed with a 100 foot radius curve.

- **OPPOSING STREETS**

All streets entering upon opposite sides of any given street shall have their centerlines directly opposite to each other or separated by at least 150 feet. Greater distances may be required on collector and higher classification streets based on anticipated turning volumes.

When offset intersections are used on major streets they should be located to avoid conflicting left turns.

Intersections that are to be signalized shall be four-way.

1 - 4 DRIVEWAYS

1-4.1 General Requirements

The following driveway standards are not applicable to State Highway or controlled access streets where access is limited by deed or map restrictions or other development restrictions. If driveways are approved at such locations, the applicable design requirements shall be used.

The number, location and width of commercial driveways are regulated by the Planning Department and shall be based on the demonstrated needs of the parcel being served. They shall not be excessively detrimental to the abutting street capacity, safety, and/or efficiency.

The City Engineer may modify any of the following standards in order to provide better traffic movements or because of special or unusual conditions. The ITE publication "Guidelines for Driveway Design & Location" contains additional design guidelines.

"Commercial" driveways shall be used on all driveways servicing four or more parking stalls and other locations where trucks, including garbage trucks, are anticipated. Where land use changes affect existing driveways proposed for reuse, the City Engineer may require upgrading of the driveway to commercial standards.

"Common" driveways straddling a property line to serve two or more parcels, are permitted provided applicable width and clearances are met, and Reciprocal Access Easements over traveled areas receiving "common" use are recorded to run with the land.

1-4.2 Special Commercial Driveways

Special commercial driveways are those with a depressed back of driveway at the property line and a radius instead of a curb transition and are used to provide improved access at high volume driveways and minimize capacity reduction on collectors and arterials. Design geometrics are shown on Standard Detail ST-12.

Special commercial driveways shall be used when the driveway peak hour volume exceeds 300 vehicles per hour and may be utilized at lower volume driveways where allowed by the City Engineer.

1-4.3 Width(s)

For residential driveways the maximum width shall not exceed 30 feet. In addition, the maximum driveway approach width shall not exceed 50% of the lot frontage measured at the curb line or 34 feet, whichever is less. For residential lots with more than one driveway approach, total combined driveway approach width shall not exceed those previously mentioned. The minimum width of driveways shall be the driveway apron width; the maximum width shall be the apron width plus 4 feet. Driveways shall align with the approach and shall not be less than the approach width for a minimum distance of 20 feet as measured from the back of sidewalk.

For commercial driveways, the maximum width shall not exceed 35 feet. The maximum driveway approach width shall not exceed the greater of 43 feet or 50% of the lot frontage measured at the curb line. (Width of a raised median separating entrance and exit traffic is not included in these widths.)

Special commercial driveway widths shall not exceed 56 feet.

Minimum driveway widths shall be 15 feet for a single driveway and 24 feet for a driveway serving a parking lot with a two-way aisle. Additional driveway width may be required on collectors and arterial streets particularly where there is no parking and a travel lane is adjacent to the curb.

1-4.4 Distances from Curb Returns

Commercial, industrial or other high volume driveways on arterials and major collectors shall be located as far as practical from the nearest curb return and may be prohibited within 200 feet where the intersection is signalized, is planned for signalization, or is recommended by the Traffic Committee. (This 200-foot distance may be increased based on traffic flow conditions particular to a specific site or intersection geometry.) At other locations, the top of the driveway transition shall be a minimum of 10 feet from the nearest curb return provided the return meets current standards for radius and location. At streets to be widened or improved, the above distances shall be measured from the ultimate location of the curb return.

At alleys, the driveway transition shall be permitted no closer than 10 feet from the alley curb taper.

1-4.5 Distances From Utility or Safety Devices

Driveway transitions shall clear all public facilities such as street light and traffic signal standards, utility poles, fire hydrants, and street trees located behind sidewalks by a minimum of 5 feet. (If public facilities are located within parkways or sidewalk areas, this distance shall be increased to a minimum of 8 feet.) Greater distances from fire hydrants is recommended. Any relocation of public facilities required to maintain such clearance shall be at the expense of the party requesting the driveway.

1-4.6 Distance Between Driveways

A minimum of 6 feet of full curb height shall be maintained between the top of transitions of adjoining driveways. On cul-de-sacs and knuckle curves, this minimum width may be reduced to 2 feet. Where practical, the total space between driveway transitions shall be in multiples of 22 feet plus 4 feet. (Spacing = $22X + 4$)

1-4.7 Distances From Property Line

A minimum of 3 feet of full curb height shall be maintained between the property line and the top of the driveway transition except, where common use driveways have been permitted. On cul-de-sacs and knuckle curves, this minimum length may be reduced to 1-foot.

1-4.8 Removal

Any abandoned driveway shall be completely removed and replaced with standard curb, gutter and sidewalk. Driveways are considered abandoned when on-site development, fencing or other use demonstrates that the driveway is no longer needed.

1-4.9 Driveway Slope

Driveways shall be designed to minimize vehicles scraping the pavement in front of the driveway or high-centering at the back of the driveway.

In new work, residential driveway grades shall not exceed 8 percent when measured from the back of the sidewalk grade to the beginning of the building set back line. Change in grade beyond the building set back line shall not exceed 12 percent within any 10 foot distance. The maximum grade change at the crest shall not exceed 8 percent within any 10 foot distance.

In designing overlays or driveway replacements, the deflection angle at the flowline determined by a point on the pavement 4 feet out from the flowline and a point on the driveway 10 feet behind the flowline should not exceed 9.75 degrees.

1 - 5 CURB, GUTTER AND SIDEWALK**1-5.1 General Requirements**

Curb, gutter and sidewalk shall be installed in all new developments unless specifically deferred or otherwise waived. Curb and gutter may be required to be extended across adjacent parcels for drainage purposes.

1-5.2 Curb and Gutter Type

Curb and gutter with a vertical "barrier" type curb shall be installed along all street frontages except where driveway locations are proposed.

Various designs of curb and gutter have been used in the City. For minor repairs of existing improvements, the type of curb and gutter shall match existing. In replacing curb returns or curb and gutter one-half the length of a block, vertical curb and gutter per Standard Detail ST-5 shall be used. Existing curb & gutter should be considered for replacement where ponding extends into the pavement. In replacement projects, curb height may be varied to match existing improvements.

Four foot transitions with weakened plane joints at each end shall be used to separate different curb & gutter types.

1-5.3 Sidewalk

The minimum width of sidewalk shall be 4 feet for separated curb and sidewalk on residential streets, 5 feet for attached curb and sidewalk on residential streets, 6 feet on industrial streets, and 10 feet in the central business district and neighborhood commercial areas. Other commercial areas shall have a sidewalk width as determined during project approval.

Widths shall be increased by at least one foot where fences, walls or other similar clearance obstacles to pedestrians are constructed.

Where poles, trees and other small structures are located within the sidewalk, the minimum clear sidewalk width provided shall be 4 feet. Upon specific approval by the City Engineer, the minimum width may be reduced to 3 feet in extreme cases. The "obstacle course" effect of closely spaced poles and other street hardware on opposite sides of the sidewalk shall be avoided.

New poles or other devices placed in the sidewalk on the curb side shall have a minimum distance from the face of curb of one foot.

Back of walk transitions necessary to accomplish the above clearances shall have smooth reversing curves or angle points with deflection angles not exceeding 30 degrees.

1-5.4 Wheelchair Ramps

Wheelchair ramps shall be installed in all new curb returns per Standard Details ST-15. When it is not feasible to relocate existing obstacles, Standard Detail ST-16 may be used when approved by the City Engineer. Ramps may also be required at "T" intersections or knuckles at a lot line on the side opposite the curb return.

Wheelchair ramps shall be retrofitted at curb returns where the adjacent street pavement is being reconstructed or new buildings are being constructed on corner lots.

Handicapped access shall be included at appropriate locations in medians, parking lots, and other improvements.

1-5.5 Area Between Curb and Sidewalk

Improvement of the space between the curb and sidewalk shall be consistent with the proposed land use. Where this space is landscaped, maintenance is the responsibility of the fronting owner/developer or the appropriate landscape lighting district as applicable.

1 - 6 STRUCTURAL SECTION

The structural section shall be asphalt concrete (AC) pavement with aggregate base designed in accordance with the procedures contained in the "Flexible Pavement Structural Section Design Guide for California Cities and Counties" and these Standards. The T.I. shall be based on a 10 year design life.

The minimum T.I. used to determine the structural section, shall be as follows:

<u>STREET CLASSIFICATION</u>	<u>T.I.</u>
Residential Cul-de-Sacs	4.0
Private and Local Residential	5.0
Collectors	6.0
Industrial	7.5
Arterial	8.0

The Design Engineer shall be responsible for providing soil R-value test results on all streets for determining structural sections. A minimum of one R-value test shall be made for all developments with an additional R-value test required for every 4 acres of development. R-value tests shall be taken at approximately equal intervals along the proposed street alignments.

The R-value test shall be taken approximately 1 foot below the finished grade of the proposed street at the test locations.

New development may be required to remove and replace existing pavement as necessary to provide a high quality connection between existing and new improvements. Examples include:

- raveled edges of existing pavement
- additional pavement to meet cross slope standards
- ends of streets being extended
- flares at shoulders
- transitions

2-1 GENERAL

All lighting systems shall be in accordance with the following requirements and shall be designed to best serve the area and to minimize the length of service runs from the point of connection to the street lights. The location of all street lights to be installed, power sources, conduit runs and sizes shall be shown on the Improvement Plans.

Electroliers utilized for a project shall be either standard or decorative.

2-2 LIGHT LOCATIONS

The spacing and location of 25 foot poles with their respective luminaires are shown on the Standard Detail No. SL-1. Spacing and location of 30 foot poles is shown on Standard Detail No. SL-2.

For decorative electrolier, spacing and location shall be as determined by the Design Engineer and as approved by the City Engineer.

Additional lights may be required at railroad crossings or special commercial driveways.

3 - 1 GENERAL

All drainage design shall be in accordance with the following requirements and shall provide a positive means of providing drainage to the discharge point designated by the City. All drainage calculations shall be submitted to the City Engineer for review. Drainage calculations shall cover all drainage facilities required to deliver run-off to a certain location and hydraulic grade line elevation as determined by the City Engineer.

3 - 2 SUBMITTALS

Prior to submittal of improvement plans for the first phase of construction, a storm drainage master plan for the entire development shall be submitted, reviewed and approved by the City Engineer. The plan shall include the following:

- A plan with a scale of 1" to 100' showing the proposed system, preliminary pipe sizes, tributary sub-areas and existing and future tributary areas outside the project area.
- Hydraulic calculations.
- Detention basin design calculations and conceptual drawings of the basin inlet/outlet structures and access road. The drawings shall include approximate groundwater elevation, basin inverts, maximum water surface elevations and hydraulic grade line control elevations.
- A description and preliminary sketch of any pump stations. This information shall include number and size of pumps, sump volumes and pump operating levels.

3 - 3 FLOW RATES

Flow rates shall be determined by using the Soil Conservation Technical Release 55 (TR55) entitled, "Urban Hydrology for Small Watersheds."

Roof to gutter time shall be assumed to be 0.3 hours.

3 - 4 PIPE DESIGN**3-4.1 General**

Storm drainage piping shall be designed to handle a storm with a minimum return period of five years. The minimum size of any storm drainage pipe shall be 15-inches in diameter except for pipes terminated in cul-de-sacs and catch basin laterals which shall be a minimum of 12-inches in diameter.

Manning's formula shall be used to calculate design flow, velocity, slope and pipe diameter. Manning's roughness coefficient "n" varies with the type of pipe used according to the following table:

<u>PIPE MATERIAL</u>	<u>n</u>
PLASTIC	0.012
NON-REINFORCED CONCRETE	0.014
REINFORCED CONCRETE	0.013
ASBESTOS CEMENT	0.012
CAST-IN-PLACE CONCRETE	0.015

Normally due to the hydraulic grade line determined by the trunk or downstream basin, storm drains are surcharged.

3-4.2 Slope

Minimum slopes are as follows:

<u>DIAMETER (Inches)</u>	<u>MINIMUM SLOPE (ft/ft)</u>
12	0.0019
15	0.0014
18	0.0011
21	0.0009
24	0.0008
30	0.0006
36	0.0006
42	0.0005
48	0.0004

The above slopes are intended to provide velocities of not less than 2.0 feet per second when flowing half full regardless of the slope of the hydraulic grade line. (Where the City's system is surcharged, velocities based on the design hydraulic grade line are well below 2 feet per second except in truck lines.)

If it is impractical to meet these velocity standards, the minimum slopes can be waived by the City Engineer.

The slope of storm drains between manholes shall be constant.

Catch basin lateral shall have a minimum fall of 0.10 feet between the catch basin and the manhole. Desired fall is 0.30 feet or more.

Siphons are not permitted.

3-4.3 Vertical Alignment

The minimum cover for storm drains shall be 2 feet 6-inches. When crossing a water main, the storm drain line should be installed below the water main with a minimum clearance of 12-inches. At points of convergence of pipes, the invert of the inflowing pipe shall be a minimum of 0.1 foot higher than the invert of the outflowing pipe. (This 0.1 foot of elevation difference does not apply for laying of pipe through a manhole.)

3-4.4 Horizontal Alignment

Drainage pipes shall be placed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline whenever possible.

Permanent easements shall be provided for all mains not located in public rights-of-way. The minimum easement width shall be 15 feet. Wider easements may be required by the Director for any lines over 18-inches in width or with an invert elevation 5 feet or greater below ground line. The line shall be located in the center of the easement unless otherwise required by the Director.

A minimum horizontal clearance of 10 feet shall be maintained between drain lines and water mains, unless otherwise approved by the City Engineer. If the 10 foot separation is waived, the requirements of the California State Department of Health Services for separation between water mains and sanitary sewers shall be adhered to.

3 - 5 SERVICES

3-5.1 General

In general, only one storm drain service is to be provided per parcel served. Additional services may be approved by the City Engineer depending on the on-site layout, available mains and land use/monitoring requirements.

Storm drain services are provided to improve public health and safety and minimize inconvenience created by on-site drainage running over the sidewalk into the gutter. Services carrying process, wash or other wastewater shall be specifically approved by the City Engineer in conformance with the Los Banos Municipal Code.

Parcels over 1 acre (net) shall have an on-site collection system connected to the public system. Where it is impractical to connect to the public system, this requirement may be waived by the City Engineer.

Industrial and commercial parcels under 1 acre shall utilize on-site drains or through-the-curb drains to minimize drainage over the sidewalk.

It is recommended that roof drains of large buildings (carrying **only** drainage) be piped through-the-curb or connected to an underground system at the property line downstream of any required monitoring device or trap.

Underground services shall connect to the public system at a manhole or catch basin.

3-5.2 On-Site Design Requirements

For industrial land use and commercial uses involving potential water quality hazards (including, but not limited to: automotive service, gas stations, and car washes) the following requirements shall apply:

All storm drainage shall be picked up in an on-site drainage system unless approved otherwise.

- The on-site drainage system shall be tied to the City's storm drain system, either at the back of a City catch basin or at a storm drain manhole on the City's system.
- An approved sand and oil trap shall be required on new storm drain discharge lines and on existing storm drainage discharge lines serving facilities being upgraded. Exceptions are automotive service facilities where all work is performed within a building and gas stations that have employee(s) present whenever fuel is being dispersed. (These exceptions do not apply if other potential water quality hazards exist at the site.)
- All sand and oil traps shall be readily accessible and on the street side of all fences and gates and not in the sidewalk area.
- No storm drainage will be allowed to flow over the curb, gutter, and sidewalk into the street. Roof drainage may be tied directly to a "curb drain" per Standard Detail No. SD-5. Exceptions are driveway approaches and landscaped areas adjacent to sidewalks.
- With approval from the City Engineer, smaller industrial parcels may be allowed to drain through the curb face. This approval shall depend upon existing street conditions, the location of City storm drain facilities, and the size and use of the parcel. On-site drainage may be required to flow through a sand and oil trap.

3 - 6 DRAIN INLETS

All inlets shall be Type A as shown on Standard Detail SD-4. Inlets shall be designed and placed to intercept the required flow.

Inlet capacity shall be determined using rating curves, empirical equations, or graphic methods.

The width of flow in the gutter shall not exceed 8 feet or the width of the shoulder, whichever is less, for a five year storm.

The energy gradients in the catch basin laterals shall be a minimum of 0.25 feet below the gutter flow line.

3 - 7 MANHOLES

Manholes shall be located on storm drain trunk and lateral pipelines. Manholes shall be placed at all storm drain intersections, at sections where changes in slope, pipe size and pipe alignment occur, and at the upstream ends of all storm drains.

Manholes shall have a maximum spacing of 450 feet.

Invert elevation drop across each manhole shall equal the difference in pipe diameter where there is a change in pipe size and a minimum of 0.1 foot at all bends.

3 - 8 DETENTION BASINS

Each detention basin shall be a minimum of 5 acres in area and be utilized as a multipurpose water storage/minor and major community park facility. In addition, it shall be designed with the following criteria:

- Capacity shall be large enough to hold the total run-off from a 50 year frequency, 24 hour duration storm if pump discharge is used. For gravity discharge, the capacity at the basin shall be large enough to hold the run-off from the 10 year frequency, 24 hour event. (Run-off volume shall be calculated based upon the equation $Q = (P-0.25)^2/(P+0.8S)$ where Q = runoff (inches), P = rainfall (inches), S = potential maximum retention after runoff begins in inches.)
- The maximum water surface of the basin shall be 1 foot below the elevation of the top of the curb at the lowest catch basin inlet within the tributary area.
- Hydraulic grade line control elevation, if not established, shall be the elevation at which 50% of the design containment occurs.
- Maximum sideslope shall be 6 horizontal: 1 vertical.
- The basin bottom shall slope to an outfall structure at a minimum slope of 0.5%.
- The bottom of the basin shall be a minimum of 5 feet above the underlying groundwater level.
- For pump discharge basins, a pump station shall be provided to drain the facilities. The pump station will be provided with a minimum of 2 pumps. For two pump installations, each pump shall be capable of draining the basin within 48 hours. Where more than two pumps are provided, the pumps which remain in service with

the largest pump on standby shall be capable of draining the basin within 48 hours. Pumps provided solely to accommodate nuisance flows shall not be considered.

- For gravity discharge basins, the discharge facilities shall be capable of draining the basin within 48 hours.

3 - 9 PUMPING STATIONS

3-9.1 General

Pumping stations shall be designed to efficiently handle the calculated runoff from a storm with a ten year return period unless utilized in conjunction with a detention basin. Pumping stations utilized in conjunction with basins shall be capable of draining 100% of the basin's storage capacity within 48 hours.

Pump stations shall be classified according to the maximum flowrate and shall be designed in conformance with the following categories:

- Small Stations
- Medium Stations
- Large Stations

3-9.2 Small Stations

The design flowrate for small stations shall be up to 600 gallons per minute. The station design shall meet the following criteria:

- Duplex pump station with non-clog submersible FLYGT sewer pumps and slide rail systems. Each pump shall be capable of pumping 100% of the design flowrate. A spare submersible pump and motor with slide rail attachment shall be provided and delivered to the City.
- Reinforced concrete pump sump. (Circular is acceptable.)
- Minimum pump cycle time of 10 minutes.
- Access frame and cover.
- Debris separator to separate settleable solids and floatable solids from the drainage stream prior to pumping.
- Pole mounted yard light or electrolier with an alarm light mounted on top of the pole. Alarm light shall be Edwards Signaling Products, AdaptaBeacon, Cat No. 104STR-N5.

If the pump station is used in conjunction with a detention basin, a reinforced concrete inlet structure shall be provided between the pumping station and the basin, and a manually

cleaned trashrack, as specified in Section 3-9.6, installed at the inlet structure. In addition, a slide gate or gate valve shall be installed between the pumping station and the basin.

3-9.3 Medium Stations

The design flow for medium stations shall be between 600 gallons per minute and 1,500 gallons per minute. The station will be designed with the following criteria:

- Duplex pump station with non-clog submersible FLYGT sewer pumps and slide rail systems. Each pump shall be capable of pumping 100% of the design flowrate. A spare submersible pump and motor with slide rail attachment shall be provided and delivered to the City.
- Reinforced concrete pump sump of a hydraulic design that meets the recommendations of the pump manufacturer and the City.
- Minimum pump cycle time of 15 minutes.
- Access frame and cover
- Debris separator to separate settleable solids and floatable solids from the drainage stream prior to pumping.
- Pole mounted yard light or electrolier with an alarm light mounted on top of the pole. Alarm light shall be Edwards Signaling Products, AdaptaBeacon, Cat No. 104STR-N5.

If the pump station is used in conjunction with a detention basin, a reinforced concrete inlet structure shall be provided between the pumping station and the basin, and a manually cleaned trashrack as specified in Section 3-8.7 installed at the inlet structure. In addition, a slide gate or gate valve shall be installed between the pumping station and the basin.

If the design flow of the smallest pump exceeds 1,000 gallons per minutes, a nuisance flow pump shall be installed. The nuisance flow pump shall be a non-clog submersible sewer pump designed to discharge between 300 gallons per minute and 500 gallons per minute.

3-9.4 Large Stations

The design flow rates for large stations shall exceed 1,500 gallons per minute. The station shall be designed using the criteria listed in Section 3-9.3 and the following:

- A minimum of two propeller type, high volume, low head belt driven pumping units with a maximum speed of 600 rpm shall be utilized. Capacities shall be selected so that with the largest pump out of service the others can handle the design flow.

3-9.5 Controls

Controls shall be mounted in a deadfront free standing self-contained NEMA 3R steel enclosure with a padlockable door. The control center and all electrical components shall bear the Underwriters Laboratory (UL) label.

An interior dead front aluminum door shall be provided with a continuous aircraft type hinge, shall contain cutouts for mounted equipment, and provide protection of personnel from live internal wiring. A breaker handle shall be provided on the main breaker and cutouts shall be provided on all other breakers to allow operation of breakers without entering the compartment. All control switches, indicator pilot lights, elapsed time meters, controller and other operational devices shall be mounted on the external surface of this door.

All circuit breakers shall be heavy-duty thermal magnetic or motor circuit protectors similar and equal to Square D type FAL. Each motor breaker shall be adequately sized to meet the pump motor operating characteristics and shall have a minimum interrupting capacity of 10,000 amps at 230 vac. Heavy-duty breakers shall individually control the control circuit and the duplex receptacle.

Circuit breakers shall be indicating type, providing "on-off-trip" positions of the operating handle. When the breaker is tripped automatically, the handle shall assume a middle position indicating "trip".

Thermal magnetic breakers shall be quick-make and quick-break on manual and automatic operation and have inverse time characteristics secured through the use of bimetallic tripping elements supplemented by a magnetic trip.

Breakers shall be designed so that an overload on one pole automatically trips and opens all legs.

A main circuit breaker sized for all pumps operating shall be installed in the enclosure.

Each pump shall be provided with the following:

- A motor starter that is NEMA rated sized for the pump horsepower per NEC. The overload heater shall be melting alloy type with protection provided in each power phase. The starter coil shall be replaceable from the front without removal of the starter from its installed position. Overload heaters shall be sized for the full amp draw of the pump motor.
- A three position H-O-A switch. The switch shall be NEMA 4X rated with 10 amp contacts. A position indicating legend plate shall be provided.
- A green run pilot indicator light.

- A run time meter. The meter shall operate on 120 vac, shall indicate in hours (6 digits) and tenths and shall be non-resettable.

A three phase power monitor that will protect the system from over and under voltage conditions shall be installed. The unit shall provide protection for reversed phasing and loss of a phase in addition to the over voltage and under voltage conditions.

The control center shall also have a thermostatic controlled condensation heater and a 120 volt, 15 amp, GFI receptacle.

A manual power transfer switch with a receptacle and closing plug shall be provided to allow connection of an emergency power generator. For 3 phase 240 volt service, the receptacle shall be a Hubbel Model 4100 B9W. For 3 phase 480 volt service, the receptacle shall be a CROUSE HINDS Model AR 2042 S22 M80 receptacle.

The controller shall be a Motor Protection Electronics, Model SC 2000. The water level sensor for pump control shall be as specified by the Director.

3-9.6 Discharge Piping

Discharge piping shall be ductile iron or steel. Plastic piping may be allowed below ground, where approved by the City Engineer.

The design velocity in the discharge piping shall not exceed 8 feet per second. All internal piping in the pumping station should be properly anchored and restrained. Expansion joints and flanged connections shall be provided to facilitate dismantling and maintenance of the equipment.

Valving, couplings, and additional flanges as required for proper operation and maintenance of the pumping facilities shall be readily accessible.

3-9.7 Trashracks

Trashracks shall be constructed of flat steel bars a minimum of 2-inches deep and 0.25-inches wide. Centerline to centerline spacing of the bars shall be 2-inches.

Bars shall be held in a parallel, equal spaced position by a flat toe plate welded across their lower ends and by horizontal spacing bars welded to the rack's downstream side. These horizontal spacing bars shall not interfere with raking the screen.

The maximum design velocity through the screen (low water level) shall not exceed 2 feet per second.

The rack shall be inclined 30 degrees to 45 degrees from the horizontal. It shall extend from the floor to the top of the inlet structure. A walkway, platform, or other suitable level surface a minimum of 4 feet in width shall be provided at the top of all trashracks to allow for maintenance operations. Guardrails or safety chains meeting the industrial safety orders

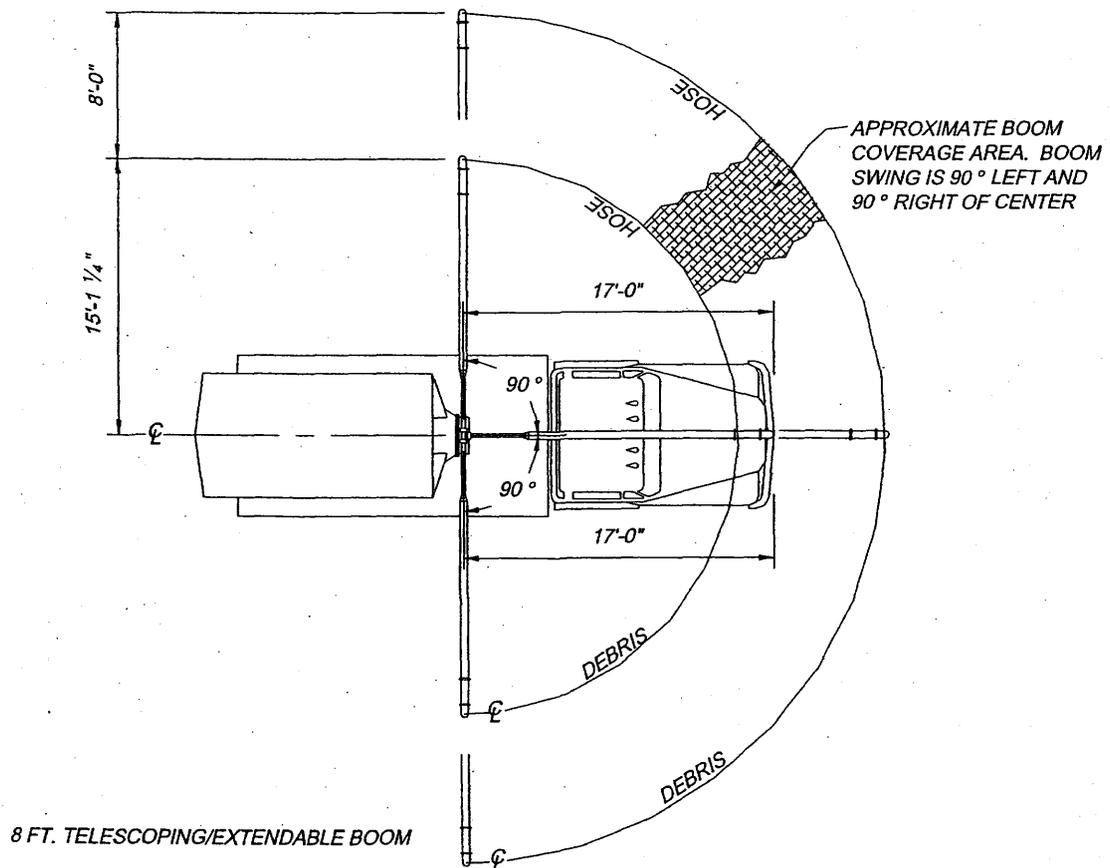
requirements shall be provided. Sufficient clearance shall be provided between trashracks and surrounding fences or any other obstacles to permit handling of cleaning rakes.

3-9.8 Access

Access roads to pump stations shall be paved as required by the Director.

Pump station layout shall allow for proper access of maintenance vehicles. Vehicular access route from the adjacent public travelway, throughout the site, and back onto the public travelway shall be shown on the site plan. Minimum outer and maximum inner turning radii of 42 feet and 24 feet, respectively, are required.

When pump station layout does not allow for vehicular circulation within the site, access to pumps and wet wells shall allow for cleaning boom trucks to operate from on-street parking area without disruption of traffic flow, or shall be such that cleaning and other maintenance vehicles will not encroach on the public right-of-way during maintenance operations. Cleaning vehicle configuration and dimensions are shown on the following diagram:



4 - 1 GENERAL

These standards apply to all public sanitary sewer facilities designed for installation within a public right-of-way (ROW) or public utility easement (PUE) in the City. Except where specifically noted in these Standards or as required as part of project approval, all sanitary sewer facilities installed on private property for private use and ownership shall be designed and constructed in accordance with the provisions of the Uniform Plumbing Code, as adopted by the City.

Sanitary sewer lines shall be designed in accordance with acceptable engineering principles, California OSHA Standards and State of California Title 22 requirements, and shall conform to City Standards. Storm water collection facilities shall not be connected to a sanitary sewer line.

4 - 2 DESIGN SUBMITTALS

The Subdivider's Statement on the Tentative Map shall include the following anticipated project sewage demands:

- average daily flow in gpd
- peak flow in gpm

Prior to submittal of improvement plans for the first stage of construction, a master sanitary sewer plan for the entire development shall be submitted, reviewed and approved by the City Engineer. The plan shall include the following:

- A plan with a scale of 1" to 100' showing the proposed system, preliminary pipe sizes, tributary sub-areas and existing and future tributary areas outside the project area.
- Design flow at major junction points.
- A description and preliminary sketch of any pump stations. This information shall include number and size of pumps, wet well volumes and operating levels.

4 - 3 FLOWRATE

Unless specific sanitary sewer discharges are required or approved by the City, the following sewage discharges shall be used for design of residential developments:

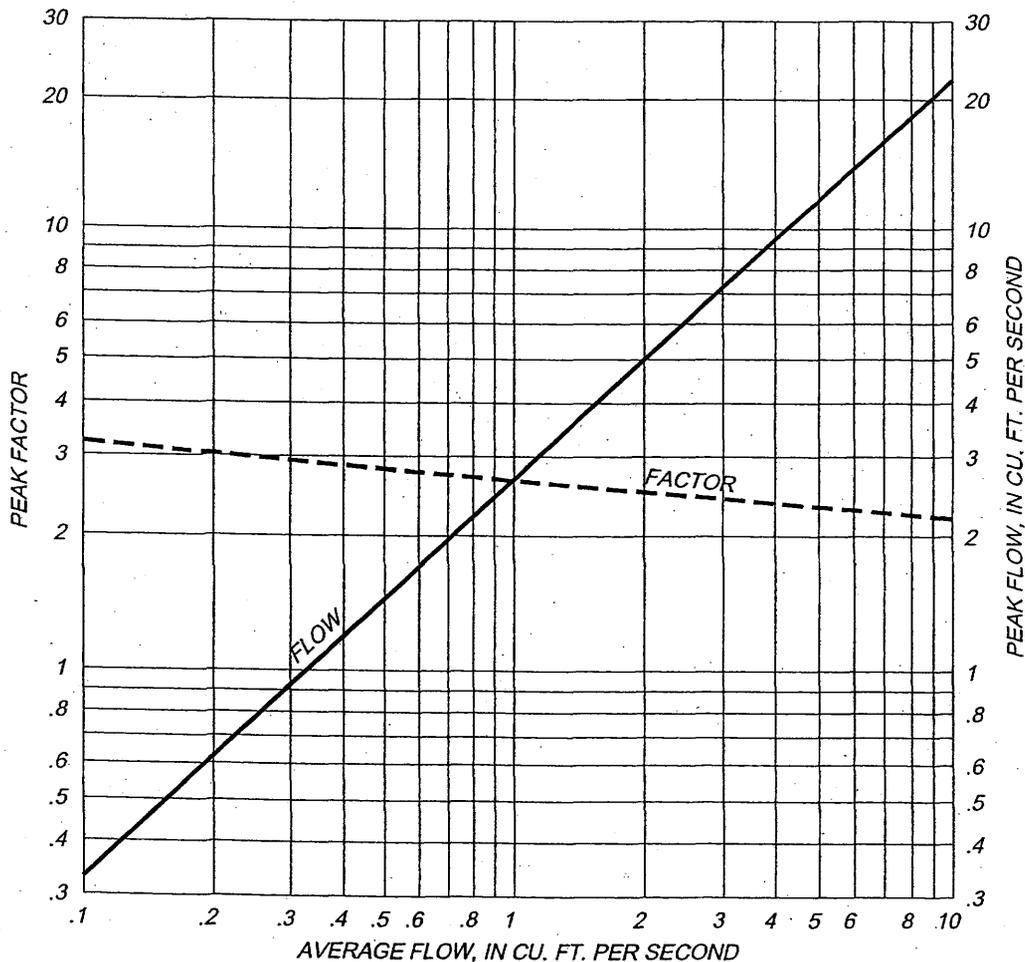
<u>RESIDENTIAL DEVELOPMENT</u>	<u>AVERAGE FLOW</u>
Single Family - Detached	300 gpud
Single Family - Attached	300 gpud
Multi Family - 2-4 Units	250 gpud
Multi Family - 5 Units or More	200 gpud

gpud = gallons per unit per day

For commercial, industrial and other types of development, anticipated sewage discharges shall be determined using typical discharge information from similar facilities.

Peak flow shall be obtained by multiplying the average flow by the peaking factor. The peaking factor is 3.0 for commercial flows and 2.0 for industrial flows.

Peaking factors for residential flow shall be selected from the following figure based upon total upstream average flow.



Sanitary sewer calculations shall be submitted to the City Engineer for review.

4 - 4 **PIPE DESIGN**

4-4.1 Minimum Size

The minimum size pipe used for gravity sanitary sewer mains shall be 6-inches in diameter.

4-4.2 Slope

Minimum slopes are as follows:

<u>Diameter (inches)</u>	<u>Minimum Slope (ft/ft)</u>
6	.0049
8	.0034
10	.0025
12	.0019
15	.0014
18	.0011
21	.0009
24	.0008

The above slopes are intended to provide velocities of not less than 2.0 feet per second when flowing full based on Manning's equation utilizing an "n" value of 0.013.

If it is impractical to meet these velocity standards, the minimum slopes can be waived by the City Engineer.

Maximum velocity shall not exceed 10 feet per second. The slope of sewer lines between manholes shall be constant.

4-4.3 Vertical Alignment

The minimum cover for sanitary sewer lines, unless otherwise approved by the City Engineer, shall be 3 feet 6-inches from the existing or planned final grade, whichever is lower, to the top of the sewer pipe. Where the preceding minimum cover cannot be provided, the City Engineer may require submittal of pipe load calculations and structural design.

When crossing a water main, it is desirable that the sewer line be installed below the water main with a minimum clearance of 12-inches. If the desired clearance cannot be maintained, the sewer line shall be designed in accordance with the requirements of the

California Department of Health Services for separation between water mains and sanitary sewers. A minimum vertical clearance of at least 3-inches shall be maintained between a sewer line and a storm drain.

At points of convergence of sewer pipes of the same size, the invert of the incoming pipe shall be a minimum of 0.1 feet higher than the outflowing pipe. (This 0.1 foot of elevation difference does not apply for laying of pipe through a manhole.) Under no circumstances shall the crown of the incoming pipe be below the crown of the outflowing pipe.

4-4.4 Horizontal Alignment

Sanitary sewer pipes shall be placed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline whenever possible.

Permanent easements shall be provided for all mains not located in public rights-of-way. The minimum easement width shall be 15 feet. Wider easements may be required by the Director for any lines over 12-inches in width or with an invert elevation 5 feet or greater below ground line. The line shall be located in the center of the easement unless otherwise required by the Director.

A minimum horizontal clearance of 10 feet shall be maintained between sewer lines and water mains, unless otherwise approved by the City Engineer. If the 10 foot separation is waived, the requirements of the California State Department of Health Services for separation between water mains and sanitary sewers shall be adhered to.

4-4.5 Pipes

The following standard pipe materials shall be used for gravity sewer construction and shall conform to the latest edition of American Society of Testing Materials standards.

<u>Pipe Material</u>	<u>Standard</u>
PVC (Std. Wall)	ASTM D3034
PVC Large Diameter	ASTM F679
PVC Large Diameter Ribbed	ASTM F794
Vitrified Clay	ASTM C700

4 - 5 SERVICES**4-5.1 General**

In general, only one sanitary service is allowed per parcel served. Additional services may be approved by the City Engineer in order to eliminate the need for on-site lift stations or monitoring requirements.

The minimum diameter for services (sewer laterals) shall be 4-inches.

A sewer lateral installed concurrently with a main sewer shall be of the same type and class of pipe material as the sewer main except where cover or water main separation require otherwise.

4-5.2 Monitoring Facilities

Flow monitoring facilities and/or sampling facilities shall be installed where required by the Director.

4-5.3 Grease Traps and Waste Interceptors

Traps and interceptors shall be installed where required by the Director and/or Health Department. Design calculations shall be submitted for review.

4 - 6 MANHOLES

Manholes shall be placed at the intersections of all sewer mains and/or laterals 6-inches in diameter or larger and at sections where changes in slope, pipe size, or pipe alignment occur. In addition, manholes shall be installed at the upstream ends of all mains. (Cleanouts may be substituted for manholes at the upstream ends of mains if approved by the City Engineer.)

Manholes shall have a maximum spacing of 350 feet on 6-inch and 8-inch mains and 450 feet on mains 10-inches and larger.

Manholes shall have an inside diameter of 4 feet when the largest pipe entering or exiting the manhole is less than 24-inches in diameter. Where the nominal pipe diameter is 24-inches or larger, the inside diameter of the manhole shall be 5 feet.

Drop manholes shall be provided wherever the invert of the incoming pipe is higher than 2 feet above the invert of the outflowing pipe.

4-7 LIFT STATIONS

Lift stations shall be specifically approved by the City Engineer. The lift station shall be of the wet well - dry well arrangement and shall be provided with fencing, paved access and potable water.

The following criteria shall be used for design:

- Wet well capacity shall be adequate to provide a minimum pump cycle time of 10 minutes.
- Wet wells shall be reinforced concrete with a plastic liner mechanically locked into the pipe at the time of manufacturing.
- A stainless steel debris basket with a stainless steel slide rail system shall be provided on the wet well influent pipe.
- Aluminum access frames and covers shall be provided for the wet well.
- Dry well shall be Smith and Loveless Custom Services or approved equal with a steel shell. Minimum diameter of the dry well shall be 9 feet.
- Dry wells shall be protected from corrosion through usage of an anode current cathodic protection system designed by a corrosion specialist certified by the National Association of Corrosion Engineers (N.A.C.E.). Minimum anode life shall be 20 years.
- Two non-clog sewer pumps, each capable of pumping 100% of the design flowrate, shall be provided.
- Controls shall be in accordance with Section 3-9.5 of these standards.
- Provide a pole mounted yard light or electrolier with an alarm light mounted on top of the pole. Alarm light shall be Edwards Signaling Products, AdaptaBeacon, Cat No. 104STRN5.

Access to the lift station shall be in accordance with Section 3-9.8 of these standards.

4-8 FORCE MAINS

Force main piping shall be sized to provide a minimum velocity of 2 feet per second at the design flowrate of the lift station.

The following standard pipe materials shall be used for force main construction and shall conform to the latest edition of applicable American Water Works Association standards:

<u>Pipe Materials</u>	<u>Standard</u>
Ductile Iron	AWWA C151
w/Cement Mortar Lining & Seal (std thickness)	AWWA C104
Polyethylene Encasement	AWWA C105
PVC (iron pipe O.D.)	AWWA C900, DR 18 (Class 150) minimum

There are no slope requirements for force mains. However, inverts and pipe slopes shall be shown on the profile sheet of the improvement plans.

Force mains shall enter the gravity sewer system through a manhole. The invert of the force main shall be 1 foot above the flow line of the outflow pipe. Cleanouts on automatic air release valves as required by the City Engineer shall be provided.

Horizontal alignment of force mains shall be in accordance with Section 4-4.4 of these standards.

5 - 1 GENERAL

These standards apply to all public water facilities designed for installation within a public right-of-way (ROW) or public utility easement (PUE) in the City and are limited to mains and services 12-inches or less in diameter. Standards and requirements for larger sizes will be determined by the City Engineer. In all developments, on-site mains and hydrants for fire protection shall be public. Other on-site facilities, unless specifically noted in these Standards or as required as part of project approval, shall be private and shall be designed and constructed in accordance with the provisions of the Uniform Plumbing Code, as adopted by the City.

Water lines shall be designed in accordance with acceptable engineering principles, California OSHA Standards, and California Department of Health Service Regulations, Title 22, Chapter 16, California Waterworks Standards, and shall conform to City Standards.

5 - 2 DESIGN SUBMITTALS

The Subdivider's Statement on the Tentative Map shall include the following anticipated project water demands:

- average daily demand in gpd
- peak hourly demand in gpm
- maximum daily demand plus fire flow in gpm

Prior to submittal of improvement plans for the first phase of construction, a master water plan for the entire development shall be submitted, reviewed and approved by the City Engineer. The plan shall include water flow and pressure calculations.

5 - 3 DESIGN FLOW

Unless other water usage figures are required or approved by the City, the following water demands shall be used for design calculations:

<u>Residential Development</u>	<u>Average Daily Demand</u>	<u>Peaking Factors</u>	
		<u>Max. Day</u>	<u>Max. Hour</u>
Single Family Detached	600 gpud	2.0	4.00
Single Family Attached	600 gpud	2.0	4.00
Multi Family, 2-4 Units	500 gpud	2.0	4.00
Multi Family, 5 Units or More	400 gpud	2.0	4.00
Commercial, Industrial & Others	*	2.0	4.00

gpud = gallons per unit per day
* = To be determined on a case by case basis.

Design fire flows shall be as follows unless otherwise approved by the City Fire Chief:

<u>Land Use</u>	<u>Fire Flow</u>
Low Density Residential	2000 gpm
Medium & High Density Residential	2000 gpm
Commercial & Industrial	3500 gpm

5 - 4 PIPE DESIGN

5-4.1 Minimum Size

The minimum size pipe used for new water mains shall be 8-inches. Larger water lines may be required based on required fire flow, service demand or planned extension of the City's distribution system.

Permanent dead-end runs shall be no longer than 500 feet unless specifically approved by the City Engineer. Reasonable looping of water mains will be required; the maximum loop independent length of a main shall be 1,300 feet.

5-4.2 Design Pressure

The system shall be designed to maintain a minimum residual pressure of 20 psi at the service point or fire hydrant under the following demand conditions:

- maximum day flow plus fire flow, or;
- peak hour flow.

The Hazen-Williams formula shall be used to calculate design flow, pressure loss, velocity and pipe diameter relationships. The coefficient of friction, "C", shall be 120 for 8-inch and 10-inch, and 130 for 12-inch and larger pipes unless loss at fittings is calculated separately using equivalent length or other approved methods. In such cases, a "C" of 130 may be used.

5-4.3 Slope

There are no slope requirements for water mains. However, inverts and pipe slopes shall be shown on the profile sheets of the improvement plans.

All high points within the system shall be located at fire hydrants or air release valves.

5-4.4 Vertical Alignment

The minimum cover over water mains shall be 2 feet 6-inches in paved street sections and 3 feet in unpaved areas. The maximum cover over water lines should not exceed 5 feet.

When crossing a wastewater or storm line, it is desirable that the water main be installed above the other pipeline with a clearance of 12-inches. If the desired clearance cannot be maintained, the water main shall be designed in accordance with the requirements of the California Department of Health Services for separation between water mains and sanitary sewers.

5-4.5 Horizontal Alignment

Water mains shall be installed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline wherever possible.

Permanent easements shall be provided on all mains not located in public rights-of-way. The minimum easement width shall be 15 feet. The main shall be located in the center of the easement unless otherwise required by the Director.

Water mains shall not be placed in easements across low density or medium density residential lots.

A minimum horizontal clearance of 10 feet shall be maintained between water mains and wastewater or storm drain lines, unless otherwise approved by the City Engineer. If the 10 foot separation is waived, the requirements of the California Department of Health Services for separation between water mains and sanitary sewers shall be adhered to.

Curved water mains are allowed; however, joint deflection or pipe curvature shall not exceed the pipe manufacturer's recommendations.

5-4.6 Pipe

The following standard pipe materials shall be used for water main construction and shall conform to the latest edition of appropriate American Water Works Association standards:

<u>Pipe Materials</u>	<u>Standard</u>
Ductile Iron	AWWA C151
w/Cement Mortar Lining & Seal (std. thickness)	AWWA C104
Polyethylene Encasement	AWWA C105
PVC (iron pipe O.D.)	AWWA C900, DR 18 (Class 150) minimum

5 - 5 SERVICES**5-5.1 General**

Each parcel shall have individual water service. In general, only one service is to be provided per parcel served. Four exceptions are as follows:

- For residential developments with on-site public mains, one standard service per dwelling unit may be provided.
- In parcels with separate buildings, one standard service per building may be provided (individual shut-offs per unit are required).
- In non-residential developments, separate water service(s) shall be provided for landscaped areas.
- In multi-family residential developments of 5 units or more, separate water service(s) shall be provided for landscape areas.

Due to the variety of building and main configurations and backflow requirements, the above requirements/exceptions are not specific. Details of each project shall be specifically approved by the City Engineer.

All water services shall be metered.

5-5.2 Domestic Service

Size of service is to be determined by the design engineer for the parcel being served. (Minimum service size is 3/4-inch.)

A minimum horizontal clearance of 5 feet shall be maintained between water services and wastewater services, unless otherwise approved by the City Engineer.

5-5.3 Backflow Prevention Devices

Backflow prevention devices shall be installed on all water services where an actual or potential cross connection exists between the City's water system and any source or system containing used, reclaimed, recycled or unapproved water, industrial fluid, gas or other substance that is not or cannot be approved as safe, wholesome and suitable for human consumption.

Types of backflow devices that may be required (listed in an increasing level of protection) include:

DOUBLE CHECK VALVE ASSEMBLY - (DC)
REDUCED PRESSURE PRINCIPLE ASSEMBLY - (RP)
AIR GAP SEPARATION - (AG)

Points, facilities or situations which are not included in the following list shall be evaluated on a case by case basis by the Director for determination of the type of protection required.

The required minimum level of service connection protection at specific plants and facilities shall include the following:

- | | | |
|----|-----------------------------|----|
| 1. | Aircraft and Missile Plants | RP |
| 2. | Automotive Plants | RP |
| 3. | Autopsy Facilities | RP |
| 4. | Auxiliary Water Systems | RP |

Defined as any water supply on, or available to, a Customer's premises other than an approved public water system.

- | | | |
|----|---|----|
| 5. | Beverage Bottling Plants | RP |
| 6. | Breweries | RP |
| 7. | Buildings | |
| | (a) Hotels, apartment houses, public and private buildings, or other structures, where sewage pumps and/or sewage ejectors have been installed. | RP |
| | (b) Any commercial structure in which specific business activity cannot be ascertained. | RP |
| | (c) Multi-storied buildings that use booster pumps or elevated storage tanks to distribute potable water within the premises. | RP |
| | (d) Any building that exceeds forty (40) feet in height as measured from the service connection to the highest water outlet. | DC |

- | | | |
|----|---|----|
| 8. | Canneries, Packing Houses and Reduction Plans | RP |
|----|---|----|

- | | | |
|----|-----------------|----|
| 9. | Chemical Plants | RP |
|----|-----------------|----|

Any premises, served from a public water supply, where there is a facility requiring the use of water in the industrial process of manufacturing, storing, compounding or processing chemicals. This will also include facilities where chemicals are used as additives to the water supply or in the processing of products.

10. Chemically Contaminated Water Systems RP
Any premises, served from a public water supply, where chemicals are used as additives to the water supply, or where the water supply is used for transmission or distribution of chemicals, or where chemicals are used with water in the compounding or processing of products.
11. Cold Storage Plants RP
12. Convalescent Homes RP
13. Dairy Processing Plants RP
14. Dental Clinics RP
15. Dry Cleaning Facilities RP
16. Dye Work RP
17. Film Processing Facilities/Film Manufacturing Plants RP
18. Fire Protection Systems that are supplied from a public water system:
- (a) Low-Hazard Fire Protection Systems:
- i. Premises where the fire system is directly supplied from a public water system and there is an unapproved auxiliary water supply on or to the premises (not inter-connected.) DC
- ii. Premises where the fire system is supplied from a public water system and where either elevated storage tanks or fire pumps which take suction from private reservoirs or tanks are used. (*if not metered) DC
*RP-DA
- iii. Premises where the fire system is directly supplied from a public water system and interconnected with another public water service. DC-DA

- (b) High-Hazard Fire Protection Systems:
- i. Fire protection system is supplied from a public water system and inter-connected with an unapproved auxiliary water supply. RP
 - ii. Fire protection system is supplied from a public water system and contains any hazardous substance. RP
19. Hospitals RP
20. Ice Manufacturing Plants RP
21. Irrigation Systems:
- (a) Premises or locations where facilities have been installed for pumping, injecting or spreading fertilizers, pesticides or other hazardous substances. RP
 - (b) Premises or locations having a separate service connection for irrigation purposes. RP
22. Laboratories RP
Including, but not limited to, teaching institutions, biological and analytical facilities.
23. Laundries (Commercial) RP
24. Medical Buildings and Clinics RP
25. Metal Manufacturing, Cleaning, Processing, or Fabricating Plants RP
26. Morgues RP
27. Mortuaries RP
28. Multi-Storied Buildings: See Buildings

29. Multiple Services: Includes two or more inter-connected services provided by one or more water purveyors to a single consumer complex.
- Minimum Backflow Protection Required at each Service Connection RP
30. Nursing Homes RP
31. Oil/Gas Production, Storage or Transmission Premises RP
32. Paper and Paper Products Manufacturing Plants RP
33. Plastic Manufacturing, Extruding and Injection Molding: RP
34. Plating Plants RP
35. Portable Spray or Cleaning Equipment which can be connected to a public water system AG
36. Radioactive Materials or Substances Plants or Facilities that process, handle or store radioactive materials or substances RP
37. Reclaimed Water Distribution Systems:
- (a) Premises where the public water system is used to supplement the reclaimed water system. AG
- (b) Premises where reclaimed water is used and there is no inter-connection with the potable water system. RP
38. Restricted, Classified or Other Closed Facilities RP
39. Rubber Manufacturing Plants (Natural or Synthetic) RP
40. Sand and Gravel Plants RP
41. Sanitariums RP
42. Schools, Colleges and Universities *RP
(*If actual or potential health hazard exists on premises)
43. Solar Heating Systems:
- (a) Solar collector system which contains any hazardous substance and where there is a direct make-up connection to the public water system. RP

- (b) Service connection protection is not required for "once through" solar heating systems including, but not limited to, domestic hot water systems.

- | | | |
|-----|---|----|
| 44. | Tank Trucks:
See Portable Spray and Cleaning Equipment | AG |
| 45. | Vehicle Washing Facilities | RP |
| 46. | Veterinary Clinics | RP |

Backflow devices shall be sized and located in accordance with the following:

- Backflow prevention devices shall have at least the same cross sectional area of the water meter. Where two or more devices are installed in parallel, the sum of the cross section area shall be at least equivalent to the cross-sectional area of the water service.
- If a continuous supply of water is required, two or more backflow prevention devices shall be installed in parallel.
- Backflow prevention devices shall be located as close to the water meter as possible, commensurate with physical protection, protection of the integrity of the service line between the meter and the device, and site layout considerations. Backflow prevention device location shall be approved by the Director.
- Multiple buildings served from the same service shall be equally protected. Such protection shall be based upon the highest level of existing or potential hazard on the premises or lots in question.

5 - 6 VALVES, FIRE HYDRANTS AND MISCELLANEOUS APPURTENANCES

5-6.1 Valves

Valves on mains shall be spaced and located in conformance with the following criteria:

- Water mains shall be valved on each side of railroad, highway and canal right-of-way crossings. (These valves shall be located outside of the right-of-way being crossed unless otherwise approved by the City Engineer.)
- At "tees", valves are required as follows:
 - 2 valves where one leg is less than 10-inches, with one of the valves installed on the smaller leg.
 - 3 valves where all legs are 10-inches or larger.

- At "crosses", valves are required as follows:
 - 3 valves where one or more legs is less than 10-inches with valves on each of the smaller legs.
 - 4 valves where all legs are 10-inches or larger.
- At ends of mains or on stubs such that future extensions will not interrupt service.
- At all fire hydrant assemblies.

The valving requirements mentioned above are minimum. Additional valves may be required.

5-6.2 Fire Hydrants

Fire hydrants shall be spaced and located in accordance with the following criteria:

- At approximately 400 foot spacing in residential areas along one side of the street. Hydrants shall normally be placed at street intersections.
- At approximately 250 foot spacing in industrial areas.
- On streets classified as arterial or greater, the above spacing shall apply to both sides of the street. If buildings are separated from the street by a 6 foot or higher restrictive wall, hydrants shall be placed only at street intersections.
- At the ends of cul-de-sacs and permanent dead-end mains.
- Within 10 feet of a street light unless otherwise approved by the City Engineer.
- In commercial developments locations and spacing shall be determined on a project by project basis by the City Fire Chief and City Engineer.

5-6.3 Blow-Offs

Fire hydrants shall be located at the ends of temporary dead-end mains for blow-off purposes.

7-1 MONUMENTATION**7-1.1 General**

All survey monuments shall be visibly marked or tagged with the certificate number of the surveyor or civil engineer setting them, according to Section 8772 of the Professional Land Surveyors Act.

Permanent survey monuments set in paved areas shall conform to Standard Detail M-1. Monuments found in a perishable condition shall be rehabilitated with a permanent monument according to Section 8773.3 of the Professional Land Surveyors Act. The instructions as set forth in the 1973 "Manual of Instructions for the Survey of Public Lands of the United States," published by the Bureau of Land Management, Department of the Interior, Washington, D.C., shall be followed for the restoration of lost or obliterated corners for those corners that were established based on the Public Lands Surveying System.

7-1.2 Lot Lines

Survey monuments shall be set at all lot corners, angle points, and point of curvature. Monuments shall be 1-inch O.D. (3/4-inch I.D.) galvanized iron pipe, 24-inches in length, set 6-inches below finish grade.

7-1.3 Subdivision Boundaries

Subdivision boundary monuments, except those in street pavement, shall be 1½-inches O.D. (1¼-inch I.D.) galvanized iron pipe, 24-inches in length, set 12-inches below finish grade, marked per Section 7-1.1. Subdivision boundary monuments in street pavement shall conform to Standard Detail M-1.

7-1.4 Street Centerlines

Survey monuments shall be set at all street centerline intersections, angle points and points of curvature. Number and location of monuments within a subdivision is subject to the approval of the City Engineer. Centerline and street intersection monuments shall conform to Standard Detail M-1.

7-1.5 Section and Quarter Corners

Permanent survey monuments shall be placed at all section and quarter corners within the subdivision. Monuments shall be constructed and marked according to the 1973 "Manual Of Instructions." Monuments located within street sections shall utilize a monument box conforming to Standard Detail M-1.

7-2 PARKING LOTS**7-2.1 General Requirements**

Parking lots shall be provided for commercial, industrial facilities and multi-family dwelling units containing more than four dwelling units located within the City. The minimum number of parking spaces for each use shall conform to the standards set forth in the Los Banos Municipal Code. Commercial and industrial parking lot areas shall be paved with Portland cement concrete or asphalt concrete over aggregate base material. All parking stalls shall be marked so as to clearly delineate the parking spaces. A minimum of 4 percent of the gross parking area shall be dedicated to landscaping.

7-2.2 Parking Space Dimensions

Standard parking spaces shall be a minimum of 9 feet in width and 19 feet in length. Length of spaces may be reduced by 2 feet provided the resulting reduction area is used to augment a planter or walkway. When length of spaces is reduced to 17 feet, the landscaping area created by the 2-foot overhang shall be in addition to the 4 percent of gross parking area dedicated to landscaping.

Compact parking spaces may be utilized in lots containing a minimum of 20 parking stalls. Compact stalls shall be a minimum of 8 feet in width and 15 feet in length. The number of compact stalls shall not exceed 20 percent of the total number of spaces provided. Compact stalls shall be separated from the standard stalls with landscape planters or hardscaping.

End stalls and stalls adjacent to raised curbing shall be a minimum of one foot wider than the normal stall width.

7-2.3 Layout

Parking lot driveways shall be designed so as to preclude the use of abutting public streets for vehicular circulation solely related to the parking lot. Off street parking in commercial, industrial and multi-family areas shall be designed so that vehicles are not required to back out onto public right-of-way.

No perpendicular parking stalls shall be permitted within 10 feet of alleys or street right-of-way lines for stalls accessed directly from the driveway approach aisle.

Parking and vehicle circulation areas within parking lots shall not extend onto the public right-of-way. All parking areas shall have sufficient accessibility and internal circulation as determined by the Planning Director.

Parking lot layouts requiring a cul-de-sac or similar type of turning facility necessary to allow vehicles to reverse direction of travel and exit the parking area are discouraged.

Dead end parking lots, where allowed, shall be provided with an end stall maneuvering space, a minimum of 25 feet wide by 7 feet centered on the drive aisle.

End stalls shall be protected from the turning movement of other vehicles through the use of raised curbing and landscaping. The raised islands shall extend a maximum of 13 feet past the parking base line.

All areas not utilized for parking and vehicular circulation shall be landscaped. Landscaping shall be provided between paved areas and building structures, fences, and property lines, unless otherwise approved by the Planning Department. Landscaped and paved areas shall be separated by 6-inch high concrete curbs. Concrete curbing shall be used as wheel stops wherever possible.

Additional information for standard parking stall dimensions and parking lot layout is shown on Standard Detail M-3.

Site plan approval of the parking lot layout by the Planning Director is required.

7-2.4 Handicapped Parking

Handicapped parking spaces shall be a minimum of 19 feet in length, 9 feet in width, plus an additional 5-foot side access zone as required under Title 24 of the California Administrative Code. When more than one space is required, two spaces can be provide within a 23-foot wide area marked to provide a 9-foot wide parking space on each side of a 5-foot wide access area. One in every eight accessible spaces, but not less than one, shall be served by an access aisle 8 feet wide and shall be designated as van accessible.

Handicapped parking spaces shall be located as near as practical to a primary entrance such that the disabled person does not need to wheel or walk behind parked cars other than his/her own. Accessible paths shall be provided from each parking space to the establishments served by the parking facilities. Raised curbs or wheel stops are required in the parking area to prevent cars from encroaching over the required widths of paths and walkways. Where vehicle overhang encroaches upon an adjoining sidewalk, the required sidewalk width shall be provided in addition to the overhang dimensions.

When parking lot elevation differs from walk elevation, curb ramps shall be provided in accordance with applicable state and federal recommendations and requirements. Ramps shall not encroach into any parking space or access aisle.

Surface slope of handicapped parking spaces shall not exceed $\frac{1}{4}$ -inch per foot in any direction.

Each handicapped parking space is required to be identified by a permanent, reflectorized sign with the International Symbol of Accessibility. The sign shall be equal to a porcelain on steel sign with beaded text, with a minimum size of 70 square inches, and shall be either 80 inches from the bottom of the sign to the surface of the parking space if mounted on a

pole, or 36 inches above the surface of the parking space, finish grade, ground, or sidewalk, if mounted on a wall. The sign shall be centered at the interior end of the parking space.

An additional sign shall be posted in a conspicuous place at each entrance to off-street parking facilities, or immediately adjacent to and visible from each space. The sign shall not be smaller than 17-inches by 22-inches in size, with lettering not smaller than 1-inch in height, and shall state the following: *Unauthorized vehicles parked in designated handicapped spaces not displaying distinguishing placards or license plates issued for physically disabled persons may be towed away at owner's expense. Towed vehicles may be reclaimed at 945-5th Street, Los Banos, or by telephoning (209) 827-7070.*"

The surface of each handicapped parking space is required to have a 3 foot square International Symbol of Accessibility stenciled in blue paint.

The number of handicapped spaces provided shall be in accordance with the following:

REQUIRED NUMBER OF HANDICAPPED PARKING SPACES

<u>Total Number of Parking Spaces</u>	<u>Required Number of Handicapped Spaces</u>
1 - 25	1
26 - 50	2
51 - 75	3
76 - 100	4
101 - 150	5
151 - 200	6
201 - 300	7
301 - 400	8
401 - 500	9
501 - 1,00	2 percent of total
1,001 and over	20 plus 1 for each 100 or fraction thereof over 1,001

7-2.5 Pavement

All parking stalls and drive aisles shall be paved with either asphalt concrete or Portland cement concrete.

▪ **Asphalt Concrete**

Minimum slope for asphalt concrete shall be 1.5 percent. This slope requirement may be reduced to 1 percent by the City Engineer if it can be shown that meeting the 1.5 percent requirement is not practical.

▪ **Portland Cement Concrete**

Unreinforced and reinforced Portland cement concrete pavement shall be designed and constructed in accordance with the recommendations of the American Concrete Institute set forth in ACE 330R-87, "Guide For Design And Construction Of Concrete Parking Lots." Design calculations meeting the criteria set forth in the above ACI guide shall be submitted to the City Engineer for review and approval.

Minimum finished grade slope shall be 1.0 percent. If it can be shown that meeting the 1.0 percent requirement is not practical, the slope may be reduced to 0.75 percent with the approval of the City Engineer.

7-2.6 Storm Drainage

Design of storm drainage piping for parking lots shall be based on predicted run-off from a 5 year storm using the Rational Formula $Q = CIA$. Where Q equals the predicted run-off in cubic feet per second; C the coefficient of run-off; I the intensity of the rainfall in inches per hour; and A the drainage area tributary to the parking lot in acres. Run-off coefficients and intensity of rainfall shall be determined from Standard Detail SD-2.

Roof to parking lot time shall be assumed to be 10 minutes. Manning's equation shall be used for pipe flow design. When using smooth walled plastic pipe, the roughness coefficient, "n" value, shall be 0.010. Local entrance and exit losses shall be included in the calculation of head loss. Local loss coefficients (K) shall be as follows:

LOCAL LOSS COEFFICIENTS	
<u>Local Loss</u>	<u>K</u>
Re-entrant Inlets	1.0
Square Edge and Beveled Inlets	0.5
All Exits	1.0
90° Elbow	0.3
45° Elbow	0.2
Line Flow Tee	0.2
Branch Flow Tee	1.0

If curb drains are used (see Standard Detail No. SD-5), all grate elevations shall be a minimum of 0.6 feet above the invert of the discharge pipe at the curb (exit).

If drain basin lines discharge into the City's storm drain system at the back of a City catch basin the grate elevations in the parking lot shall be a minimum of 0.3 feet above the City's catch basin grate.

7-2.7 Lighting

Luminary units shall be installed within landscape areas or on raised islands in such a manner as not to obstruct vehicular circulation and parking. Raised concrete bases (higher than 6-inches) for light poles shall be avoided. Where necessary, they shall be provided with exposed aggregate or other decorative treatment.

The minimum lighting level shall be 1.0 foot candles with a uniformity ratio of less than 6:1.

Mounting height and spacing shall be such as to distribute the desired lighting intensity throughout the entire parking lot.

Appropriate light fixtures shall be utilized (i.e., no industrial security lights in residential areas). Lighting shall be located as to prevent excessive light spillover into adjacent areas and public streets.

An interior lighting plan with fixture details and light contours shall be submitted to the Planning Department for approval.

**7-3 ACCESS GATE STANDARD AND AUTOMATED CONTROLLER
SYSTEMS FOR PUBLIC SAFETY****7-3.1 General**

All electrical vehicular gates shall be provided with access control using a Radio Transceiver and Knox Key Switch for Public Safety and authorized users. This transceiver will allow emergency vehicles to open the gate from a mobile or portable radio or by using the Fire Department Knox Key. The Los Banos Police and Fire Departments currently use the "Click2Enter" and "Knox Company" to provide these devices.

Gate activation shall not be altered or placed out of service without prior notification to the Fire Department and Police Dispatch.

If there are two or more electric gates in any single development, all gates must be operated in the same fashion.

The maintenance and upkeep of all gates, including the power to operate the gates, is the responsibility of the property owner, homeowners' association, or occupants of a gated community. All gates must be serviced on a bi-annual basis.

7-3.2 Material and Installation

The radio transceiver system shall be the type manufactured by Click 2 Enter, Inc. of Sonoma California 95476. The mobile/portable radio system shall meet or exceed the following specifications:

The equipment shall be the state-of-the-art electronics using modern scanner radio technology for public safety including law enforcement, fire, ambulance/rescue or any other authorized users.

The equipment shall provide a quick, safe, reliable and stealthy means to activate gates and security control mechanisms using portable or mobile radios.

The equipment shall be compatible with existing mobile or portable radio transmitters and shall respond only to the frequencies and sub-audible private line codes programmed into its memory.

The Knox Key Switch must be purchased through the Knox Company. An application to order this equipment must be obtained through the Los Banos Fire Department.

A Knox key activating switch or padlock shall be installed to allow emergency personnel access through vehicular gates.

An approved Knox key padlock system shall be installed to allow emergency personnel access through all pedestrian gates.

All electrical vehicular gates must be provided with a fail-open device to open it during power failures. These devices usually restore the gate(s) to the closed position after the power is restored.

For residential gated communities, the gate layout shall consist of one 20-foot min. opening or two separate 12-foot min. openings.

For commercial occupancies, the gate layout shall consist of one 20-foot opening.

The guest entry key pad & Knox key switch shall be set back a minimum of 10-foot from the front of the gate face.

The key pad & Knox Key Switch minimum set back from the City Right of Way is 30-feet.

7-3.3 Equipment

The receiver scanner/radio shall meet the following specifications:

- a. Shall be variable activation range via programming.
- b. Two radio transmission "Clicks" for activation.
- c. 20 channel capacity.
- d. Mutual aid compatible.
- e. Bright activation LED and power LED.
- f. Time/day/agency memory recall.
- g. CTCSS, PL/DPL private line (PL) Programming capacity.
- h. Auto detect and load of private line codes.
- i. Compatible with analog or digital radio transmitters using private line sub-audible transmissions.
- j. Will operate with carrier only for use with digital radio systems.
- k. Able to use talk around carriers (car to car) of trunk line radio systems.
- l. Able to receive radio transmissions to include 900MHz bands.
- m. Able to use aircraft AM band frequencies for airport access control operations.
- n. Latch open and close features.
- o. Programmable latch open variable 0 to 60 minute reset delay on each channel (0=pulse ON only).
- p. Ability to handle high power mobile transmitters and lower power hand held portable transmitters.

7-3.4 Radio Transceiver System Shall Meet Or Exceed The Following General Programming And Power Capabilities.

- a. Proprietary programming software built into each unit.
- b. Field programmable using Windows CE PDA or laptop computer.
- c. Programmable via RS-232 interface.
- d. User selected PIN for security of programmed frequencies.
- e. Factory override PIN, via software.
- f. Able to capture and exhibit activation data log, via software.
- g. Computer software programmable using standard terminal emulation software (Windows Hyper-terminal) and null modem adapter.
- h. Ability to adapt and use 12V to 24V DC or 12V to 24V AC..
- i. Lightning surge current protected (current/surge limiting circuit).
- j. Reflective logo for night identification.
- k. Unit enclosed in a NEMA Type 4 box, with security screens supplied.
- l. Relay or dry contact ready.
- m. Extra set of relay contacts to activate a multitude of devices.
- n. Separate device available to perform external test.
- o. Five year manganese dioxide lithium battery for memory backup.
- p. Retrofit kits available for operation beyond temperature range specifications.
- q. Unit shall be programmed to automatically open the gate upon power failure.

110 - 1 **STANDARD SPECIFICATIONS**

Whenever standard specifications are referenced, they shall be the latest edition and shall be considered to be a part of these standards insofar as they apply. Standard specifications from the following sources are referred to herein:

- AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS (AASHO)
- AMERICAN CONCRETE INSTITUTE (ACI)
- AMERICAN GAS ASSOCIATION (AGA)
- AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
- AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
- AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
- AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS (ASHRAE)
- AMERICAN WATER WORKS ASSOCIATION (AWWA)
- AMERICAN WELDING SOCIETY (AWS)
- FEDERAL SPECIFICATIONS (FED. SPEC.)
- INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
- NATIONAL LUMBER MANUFACTURERS ASSOCIATION (NLMA)
- STANDARD SPECIFICATIONS, STATE OF CALIFORNIA, BUSINESS AND TRANSPORTATION AGENCY, DEPARTMENT OF TRANSPORTATION (STATE STANDARD SPECIFICATIONS)
- UNIFORM BUILDING CODE (UBC) WITH STATE OF CALIFORNIA AMENDMENTS

110 - 2 **EXISTING FACILITIES**

The contractor shall maintain all water and sewer lines, lighting, power, telephone and TV conduits, structures, house connection lines, and other surface and subsurface structures of any nature that may be affected by the work. Should it be necessary in the performance of the work to disconnect or reroute any underground utility, or should any such utility be damaged during construction, all expenses of whatever nature arising from such disconnection, rerouting, damage or replacement shall be borne by the Contractor. The City reserves the right, if requested by the utility owner, to permit moving or maintaining any such conflicting utility at the Contractor's expense.

To locate Pacific Gas and Electric Company facilities, Pacific Telephone, TCI Cable, and City utilities, contact Underground Service Alert Center (U.S.A.) forty-eight hours prior to the start of actual work operations, between 3:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays. Phone number 800-642-2444.

The right is reserved by the City, State, County and by owners of public utilities and franchises, to enter upon any street, road, right-of-way, or easement for the purpose of maintaining their property and for making necessary repairs or changes caused by the work.

110 - 3 **DUST CONTROL**

Reasonable measures shall be provided to prevent a nuisance from occurring due to dust from areas under construction.

Such measures may include watering and sweeping, light oiling of the affected surfaces or other remedies considered appropriate by the City.

110 - 4 **STORM WATER DISPOSAL**

Construction projects involving soil disturbance of 1 acre or greater, or less than 1 acre if part of a common plan of development or sale, are subject to National Pollutant Discharge Elimination System (NPDES) requirements. Prior to starting any construction, the project's owner or developer shall either obtain an individual NPDES permit or submit a Notice of Intent to the State Water Resources Control Board to operate under the state's permit.

In addition, the project owner or developer shall submit a copy of their individual permit or SWPPP to the Director prior to starting any construction activity.

110 - 5 **WORK WITHIN RAILROAD AND HIGHWAY RIGHT-OF-WAY**

Construction within the Railroad and the State Highway rights-of-way shall be subject to Utility Encroachment Permits provided by the railroad company and/or the Department of Transportation.

110 - 6 **WORK IN EASEMENTS**

Before the construction commences within an easement, the City shall be furnished an executed copy of the deed of easement. Should an area greater than that described in the easement be required for construction purposes, the developer shall be responsible for obtaining the additional work area from the property owner. Fences, structures, and landscaping which are removed or damaged by the Contractor shall be restored to their equivalent original condition. All damage to

private and public property during execution of the work shall be the Contractor's responsibility.

110 - 7 **PRODUCT DATA AND SHOP DRAWINGS**

During execution of the work, Product Data or Shop Drawings may be necessary for proper execution of the work or required by the Improvement Standards. Where Product Data or Shop Drawings are necessary or required, they shall be submitted and reviewed in accordance with Part 1 of these Improvement Standards. Portions of the work requiring Product Data or Shop Drawings shall not begin until the submittals have been favorably reviewed and submitted to the Director.

110 - 8 **OPERATION OF EXISTING FACILITIES**

Existing public works facilities shall be maintained in service at all time. The Contractor shall devise acceptable methods of maintaining continuity of service equal to that which existed prior to construction. Any construction involving existing facilities shall be coordinated with the Public Works Department.

Existing sewer manholes to be abandoned shall be filled with sand and their frames and covers shall be salvaged by the Contractor. These City-owned frames and covers shall be delivered by the Contractor to a location designated by the City.

The Contractor shall notify the City in writing at least seven days in advance of the connection of a new pipeline to an existing pipeline.

Extreme care shall be taken by the Contractor to avoid contamination of the existing water distribution facilities. New water lines shall not be connected without permission of the Director of Public Works, and only after the new line has been shown to be bacteriologically safe.

110 - 9 **CONSTRUCTION WITHIN CITY RIGHT-OF-WAY**

Construction within the City right-of-way shall be in accordance with plans and specifications approved by the City, and shall pertain to all construction including that of public and private utilities. In addition, all work in the City right-of-way shall be governed by Chapter 2 of Title 7, the Municipal Code entitled, Public Works.

210 - 1GENERAL

Public and private construction sites shall be cleared of all brush, debris, and other objectionable material as directed by the City, as indicated on the Plans and as recommended in the Soils Report for the project. The native subbase under all structure foundations shall be cleared of all stumps, roots, and other objectionable organic matter. Any such material which may affect the quality of the work shall be considered objectionable material.

All cleared and grubbed material shall become the property of the Contractor and shall be removed from the site of the work before the date of completion, or otherwise disposed of as approved by the City.

220 - 1 GENERAL

Earthwork consists of all work necessary to excavate, fill, trench, backfill and grade for the construction of engineered fill, parking lots, streets, structures and underground utilities. For work where a Soils Report is required or available, earthwork operations shall be in accordance with the requirements and recommendations set forth therein. The Soils Engineer shall be retained to properly control the work to assure and to certify that the completed earthwork meets the requirements and recommendations set forth in the Soils Report and these Improvement Standards.

When a Soils Report is not available for the site of proposed work, earthwork shall be in accordance with applicable sections of Chapter 33 of the Uniform Building Code, latest edition, including State of California amendments; and these Improvement Standards.

220 - 2 GENERAL REQUIREMENTS

220 - 2.1 Control of Water

The Contractor shall furnish, install and operate all necessary machinery, appliances, and equipment required to keep excavated areas reasonably free from water during construction, and shall dispose of the water in a manner that causes no injury to public or private property, or becomes a nuisance or a menace to the public. Disposal of groundwater through existing City facilities shall be approved by the Director. The Contractor shall, at all times, have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, and shall have available at all times competent mechanics for the operation of all pumping equipment.

The control of groundwater shall be such that softening of the bottom of excavations or the formation of "quick" conditions or "boils" shall be prevented. All dewatering systems shall be designed to prevent removal of the natural soils.

During excavation, installation of pipe, placing of trench backfill and the placing and setting of concrete, the excavation shall be kept reasonably free of water. The static water level shall be drawn down below the bottom of the excavation to maintain the undisturbed state of the natural soil and to allow the placement of backfill to the required density. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that it would damage or endanger adjacent structures or property.

Water from dewatering systems shall be disposed of in such a manner as to prevent nuisance conditions. Where a construction project is of a size to require a construction stormwater runoff management plan, disposal of water from dewatering systems shall be in compliance with said plan.

The release of groundwater to its static level shall be performed in a manner that maintains the undisturbed state of the natural foundation soil, prevents disturbance of compacted backfill and prevents flotation or movement of the structures and/or pipelines.

220 - 2.2 Excavated Material

Excess material and unsuitable material shall become the property of the Contractor. Arrangements for disposing of excess excavated material and unsuitable material shall be made by the Contractor. Excavated material suitable for backfill shall be stored temporarily in such a manner as will facilitate the work and prevent nuisance conditions.

220 - 2.3 Shoring, Sheeting and Bracing

Where sheet piling, shoring, sheeting, bracing, or other supports are necessary, they shall be furnished, placed, maintained and removed by the Contractor. At all times, the rules of the Construction Safety Orders of the Division of Industrial Safety, with respect to excavation and construction, shall be strictly observed. Sheet piling and other support shall be withdrawn in such a manner as to prevent subsequent settlement of the pipe, transfer of additional backfill loads onto sewer lines which might cause overloading, or other damage to the pipelines.

The design, planning, installation and removal of all shoring, sheeting and bracing shall be accomplished in a manner that maintains the undisturbed state of the soil adjacent to the trench and below the excavation bottom.

220 - 2.4 Removal of Obstructions

The Contractor shall remove all trees, including stumps, fences and all other structures where the proper construction and completion of the work require their removal as determined by the City. The contractor shall also remove all rock, stones, debris, and all obstructions of whatever kind or character, whether natural or artificial, encountered in the construction of the work which, in the opinion of the City, will downgrade the quality of the work. Any wells or septic systems which are to be abandoned shall be abandoned in accordance with the current requirements of Merced County Department of Public Health.

Material that is removed and is not to be incorporated in the improvement being constructed shall become the property of the Contractor who shall properly dispose of the material.

220 - 3EXCAVATION AND BACKFILL FOR STRUCTURES**220 - 3.1 Excavation**

The site shall be cleared of all natural obstructions, pavement, utilities and other items which will interfere with construction. Unless otherwise specified, any method of excavation may be employed which, in the opinion of the Contractor, is considered best.

The sidewalls of the excavation shall be adequately sloped or braced in accordance with the Construction Safety Orders of the Division of Industrial Safety. Should the excavation be carried below the design lines and grades because of the Contractor's operations, the Contractor shall refill such excavated space to the proper elevation in accordance with the procedure specified for compacted backfill, or, if under footings, the space shall be filled with concrete as directed by the City.

Where, in the opinion of the City, the undisturbed condition of the natural soil is not adequate to support the structure, the City shall direct the Contractor to over-excavate to adequate supporting soil and refill the over-excavated space as directed by the City. The quantity and placement of such material shall be as ordered by the City.

Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms, installation of services, and for inspection, except where concrete is authorized to be deposited directly against excavated surfaces or against existing concrete surfaces.

220 - 3.2 Backfilling

After completion of foundation footings and walls and completion of other construction below the elevation of the final grade, all forms shall be removed and the excavation shall be cleaned of all debris. Substructure surfaces shall be waterproofed if required and as specified. Sheet piling shall not be removed until backfilling operations are completed.

220 - 3.3 Excavation In Stable Ground

Where the excavation is located in stable ground, backfill shall be composed of clean natural material or imported material acceptable to the City. If the material is cohesionless, compaction may be obtained by uniformly wetting each 8-inch layer in place and tamping or rolling. Ponding or jetting of water that results in free standing water in the excavation shall not be permitted.

If the excavated or imported material is cohesive, backfill shall be placed in layers not exceeding 6 inches in loose depth and compacted by moistening, tamping and rolling.

Compaction tests shall be performed at the option of the City. For cohesive materials, the laboratory standard maximum soil density (dry) will be determined in accordance with ASTM Designation D-1557. For cohesionless materials, the relative density will be determined in accordance with ASTM Designation D-2049.

AGGREGATE SUBBASE AND BASE

230 - 1 GENERAL

The Contractor shall furnish, spread and compact the aggregate subbase and aggregate base to the grades, depths and neat lines as shown on the approved plans.

230 - 2 MATERIAL

230 - 2.1 Aggregate Subbase

Aggregate subbase shall be Class 2 and shall conform to Section 25, "Aggregate Subbases", of the State of California, Department of Transportation Standard Specifications.

230 - 2.2 Aggregate Base

Aggregate base shall be Class 2, ¾-inch maximum size and shall conform to Section 26, "Aggregate Bases", of the State of California, Department of Transportation Standard Specifications.

230 - 3 SUBBASE PREPARATION

Following excavation of the earthwork, the subbase shall be graded and the top 6 inches of native material compacted to not less than 90% of the maximum density as determined by ASTM Designation D-1557. The finished surface of the grading plane shall not be more than 0.05 feet above the grade shown on the approved plans at any point.

To assist the Director in review of the grading plane, line and grade stakes for curb and gutter shall be provided along both sides of the street. Spacing between adjacent stakes shall not exceed 50 feet.

230 - 4 SPREADING AND COMPACTION

Spreading and compaction of aggregate subbase and aggregate base shall be in accordance with Sections 25 and 26 of the State Standard Specifications respectively, except as specified herein.

Water may be introduced into the aggregate material prior to spreading in sufficient quantities to prevent segregation and non-uniform thickness of spread.

The use of dump trucks is not precluded if the desired final results can be satisfactorily obtained. Other approved spreading equipment which will produce the desired results may be used.

The surface of the finished aggregate base at any point shall not vary more than 0.02 feet above or 0.05 feet below the design grade.

PAVING AND RESURFACING

240 - 1 GENERAL

Paving consists of all work necessary to construct a layer of asphalt concrete over aggregate base or over an existing layer of asphalt concrete.

Resurfacing consists of replacement of concrete or bituminous pavement areas which are broken, removed or damaged by the Contractor's operation.

240 - 2 PAVING

240 - 2.1 **Materials**

Asphalt concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt mixed at a central mixing plant and spread and compacted to form a uniform layer. The viscosity grade of the asphalt shall be AR-8000, unless otherwise approved by the Director. Asphalt concrete surfacing shall be Type B, 3/4-inch maximum size conforming to Section 39 of the State of California, Department of Transportation Standard Specifications, except that the amount of asphalt shall be a minimum of 5% by weight of the dry aggregates. A favorably reviewed mixed design shall be submitted to the Director prior to paving.

Paint binder shall be RS-2 furnished and applied in accordance with the provisions in Section 94, "Asphaltic Emulsions" of the State Standard Specifications.

240 - 2.2 **Spreading and Compacting**

Spreading and compacting of the asphalt surfacing shall be in accordance with Section 39 of the State Standard Specifications except that a pneumatic-tired roller is required as one of the rollers. Alternative compaction equipment or substitution of a vibratory steel roller for the pneumatic-tired roller will not be permitted.

Prior to placing asphalt paving, paint binder shall be applied to all vertical surfaces against which paving material is to be placed, including existing pavement, curbs, gutters, construction joints, and any other surfaces designated by the Director. Paint binder shall be applied in one application at a rate of between 0.05 and 0.10 gallons per square yard of surface covered. The exact rate shall be as directed by the Director. Immediately in advance of placing asphalt concrete, additional paint binder shall be applied as directed by the Director to areas which may have been damaged.

Paving shall be completed in the number of passes approved by the Director, starting from the curb and paving toward the centerline. Pass width and spacing shall be arranged such that longitudinal joints between adjacent passes are excluded from the traveled way of traffic lanes. Where such joints are necessary, they shall be provided only at the edges of lanes or at the road centerline.

In instances where areas to be paved are less than 8 feet in width, measure less than 9,000 square feet exclusive of feathered area, or the total quantity of material to be placed is 100 tons or less, the material may be deposited and spread by mechanical means other than those specified in Section 39-5.01 of the State Standard Specifications. Motor graders are not considered acceptable for this work. The above restrictions of area and quantity shall not apply to leveling courses.

Minimum compacted density of the asphalt concrete shall not be less than 92% of the maximum theoretical density as determined by AASHTO Test Method T-209.

240 - 2.3 Finishing Roadways

Finishing roadways shall be as specified in Section 22, "Finishing Roadways" of the State Standard Specifications.

240 - 2.4 Fog Seal

A fog seal shall be applied over the areas paved with asphalt concrete in accordance with Section 37, "Bituminous Seals", of the State Standard Specifications. The mixture shall consist of 50% asphaltic emulsion and 50% water. The mixture shall be applied utilizing a conventional bar spraying truck. The application rate of the mixture shall be 0.1 gallon per square yard of surface covered.

240 - 3

RESURFACING

240 - 3.1 General

All concrete or bituminous paved surfaces that are broken, removed or damaged by the Contractor shall be restored at least to the condition existing prior to the beginning of work. All work shall be subject to the requirements of the entity having jurisdiction over the affected areas.

240 - 3.2 Concrete Surfaces

Reconstruction of concrete curbs, gutters, driveways and sidewalks shall be in accordance with Section 320 of these Standards. Dimensions of the reconstructed improvements shall match those of the adjacent improvements. In the case of concrete slabs, the minimum thickness shall be 4 inches. Repairs shall be made by removing and replacing the entire portions between joints or scores. (Reconstruction of damaged portions only are not allowed.) The outline of all areas to be removed shall be cut to a minimum depth of 2 inches with an abrasive-type saw prior to removal. Cuts shall be neat and true along the score lines, with no shatter outside the removal areas. The finish of reconstructed portions shall match the finish of the existing improvements remaining.

240 - 3.3 Bituminous Surfaces

After all backfill material has been placed and compacted, asphalt concrete surfacing shall be applied to a minimum depth of 2 inches but in no case less than the thickness of the existing pavement. Materials shall conform to Section 240-2.1 of these Standards, except surfacing shall be Type B, ½ inch maximum size, and minimum asphalt content shall be as approved by the ENGINEER. Spreading and compacting of the asphalt surfacing shall conform to Section 240-2.2 of these Standards, except that a self-propelled mechanical spreading and finishing machine need not be used, and a pneumatic-tired roller is not required.

Immediately prior to placing the asphalt surfacing, the outline of the areas to be replaced shall be neatly cut to a minimum depth of 2 inches with an abrasive type saw and the balance of the asphalt concrete to be replaced shall be removed.

STRUCTURAL CONCRETE

310 - 1 GENERAL

Structural concrete as specified in this section shall be used in the construction of all structures. The Contractor shall furnish all work and materials, including cement, fine and coarse aggregate, water, admixtures, curing, reinforcement, form work, and other materials that may form an integral part of the concrete construction.

310 - 2 STRUCTURAL CONCRETE MATERIALS

310 - 2.1 Cement

All cement shall be Portland cement, Type 2, containing less than 0.60% alkalis, and shall conform to ASTM Designation C-150. The cement shall be free of lumps and properly aged.

310 - 2.2 Concrete Aggregates

Concrete aggregates shall conform to ASTM Designation C-33. The coarse aggregate shall be graded to Size Number 467, 57 or 67, as shown in Table 2 of ASTM Designation C-33 for concrete in structures. The City Engineer reserves the right to reduce the maximum size of coarse aggregate whenever, in his judgment, the quality of the work would be improved.

310 - 2.3 Water

Water shall be clean and free from oils, acids, salts or other injurious substances.

310 - 2.4 Air Entraining Agent

The Contractor shall use an air entraining agent conforming to the requirements of ASTM Designation C-260 in all concrete. Air entraining agents or other admixtures containing chlorides will not be permitted.

310 - 3 PROPORTIONING STRUCTURAL CONCRETE

The Contractor shall furnish concrete which will develop a minimum 28-day compressive strength of 3,500 psi, unless otherwise shown on the Approved Plans, and shall conform to the basic requirements set forth in these Standards. The net water-cement ratio of the concrete (exclusive of water within or absorbed by the aggregates) shall not exceed 0.45 by weight. A minimum of 6 sacks of cement to each cubic yard of concrete shall be used. The slump shall not exceed 3-inches for slabs that are horizontal or nearly horizontal and 4-inches for all other concrete work. The City Engineer reserves the right to alter the required slump whenever, in his judgment, the quality of the work would be improved.

The amount of air entraining agent shall be such as will effect the entrainment of 5% to 6% of air, by volume, of the concrete at the time of discharge from the mixer. All tests for concrete and concrete materials and associated procedures therefore will be made by the City and such tests shall conform to the latest ASTM Designation.

310 - 4**MIXING STRUCTURAL CONCRETE**

Concrete shall conform to the Standard Specifications for Ready-Mixed Concrete, ASTM Designation C-94. The total volume of materials mixed per batch shall not exceed the rated capacity of the mixer as determined by the standard requirements of the Associated General Contractors of America. All concrete shall be in place within 1½ hours after the cement is added to the aggregate.

The mixing shall be increased if the charging and mixing operations fail to produce a concrete in which the ingredients are consistent and uniform throughout. Water shall be added prior to, during, and following the mixer-charging operation. Excessive over mixing, requiring additional water to preserve the concrete consistency, will not be permitted. Any mixer that at any time produces unsatisfactory results shall be repaired or replaced.

310 - 5**HANDLING AND PLACING STRUCTURAL CONCRETE**

In preparation for the placing of concrete, all water, sawdust, chips and other construction debris and extraneous matter shall be removed from the interior of the forms. Concrete shall not be deposited around any metal reinforcement until the City has approved the reinforcement placed in the forms. The concrete in each integral part of the structure shall be placed continuously and the Contractor will not be allowed to commence work on any such part unless the inspected and approved materials on hand are sufficient to complete the part without interruption in the placing of the concrete. The concrete shall be placed as nearly as possible to its final position in even horizontal lifts not in excess of 18 inches deep per lift. The Contractor shall submit for approval his proposed plan for transporting concrete from mixing source to the point of placement. The use of vibrators for the extensive shifting of the mass of fresh concrete will not be permitted. Fresh concrete shall not be permitted to fall from a height greater than 6 feet without the use of adjustable length pipes, elephant trunks or double belting. All concrete during and immediately after placing shall be compacted by means of high frequency internal vibrators of a type, size and number approved by the City. The locations, manner and duration of the application of the vibrators shall be such as to secure maximum consolidation of the concrete.

The vibrators shall not be attached to or held against the forms or the reinforcing steel. The surface of construction joints shall be clean and damp when covered with mortar.

STRUCTURAL CONCRETE

Cleaning shall consist of the removal of all laitance, loose or defective concrete, coating, sand and other foreign material from the surface of the joint and exposed reinforcing steel. Mortar for bonding of construction joints shall be the same as that in the concrete with the coarse aggregate omitted. The mortar bond shall be approximately one-quarter to three-eighths inch thick and well worked into the joint surface.

The Contractor shall furnish the City with one copy of the concrete batch ticket at the time each batch of concrete is placed.

310 - 6 **FINISHING STRUCTURAL CONCRETE**

All horizontal surfaces shall have a steel trowel finish, unless otherwise specified.

310 - 7 **CURING CONCRETE**

Concrete shall be cured by membrane curing. Membrane curing shall be by application of a white sealing compound, which shall be Hunt's Process, Burke-Cure, or equivalent. Sealing compound shall be applied to the concrete surfaces by spraying on one coat to provide a continuous, uniform membrane over all areas. In weather during which the temperature drops below 32° Fahrenheit, the concrete shall be protected against freezing for three days after placing.

310 - 8 **FORMS FOR STRUCTURAL CONCRETE**

Forms shall conform to the shape, line, grade, and dimensions of structures as shown on the Approved Plans. Forms shall be plywood and have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall be maintained rigidly in position. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. All edges and corners of permanently exposed concrete surfaces shall be chamfered or beveled approximately 1 inch. Embedded wire ties for holding forms will not be permitted. Bolts, snap ties, and rods used for form ties shall be so arranged that when the forms are removed no metal shall be within 1-inch of any surface. Forms shall be removed as soon as feasible after the concrete is placed, but not until the concrete has attained the necessary strength to support all live and dead loads during the construction period. Forms shall be removed in such a manner as to prevent injury to the concrete.

Immediately after the forms are removed, all defects in the concrete and the rod holes shall be repaired as specified herein and the total exposed area coated with white sealing compound.

Plywood reused in forms shall be cleaned, repaired, and plugged. All nails shall be withdrawn prior to reuse. Before the concrete is placed, the forms shall be coated with a nonstaining commercial form oil.

310 - 9 **TOLERANCES**

Permissible tolerances shall be as follows:

Elevations of pipe inverts and structures	± 0.10 foot
Elevations of the tops of structures	± 0.10 foot
Elevations of the bottoms of structures	± 0.10 foot
Variation from level or specified grades	0.50 inch in a 10-foot section
Variation from the alignment of walls	0.50 inch in a 10-foot section
Variation from plumb in vertical members	0.50 inch in a 10-foot section
Variation in cross-sectional dimensions	-0.25 inch to +0.50 inch
Variations from level, grade, alignment, or plumb for members less than 10 feet in length	0.50 inch

The tolerances for particular items shall have precedence over less restrictive general requirements.

310 - 10 **REPAIR OF CONCRETE**

Concrete shall be repaired in accordance with this paragraph and the Bureau of Reclamation, "Concrete Manual, Eighth Edition". All repairs shall be made with concrete, dry pack, or mortar (Portland cement mortar), at the option of the Contractor, or with epoxy-bonded mortar, where and as applicable for the type of repair involved, as provided in the Concrete Manual mentioned above. Use of water reducing, set-controlling admixture in concrete or epoxy-bonded concrete will not be required. White sealing compound shall be applied to repair patches.

310 - 11 **REINFORCEMENT****310 - 11.1** **Materials**

Reinforcing steel shall conform to ASTM Designation A-615 Grade 60 billet steel bars for concrete reinforcement, unless otherwise shown on the Approved Plans. Welded wire fabric shall conform to ASTM Designation A-185.

310 - 11.2 **Shop Drawings**

Favorably reviewed Shop Drawings consisting of bar placing diagrams, bar lists and bar bending diagrams shall be furnished to the Director prior to placing any reinforcing steel.

310 - 11.3 Placing Reinforcement

Before the reinforcing bars are placed, the surfaces of the bars shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease or other foreign substances that would reduce or destroy the bond.

Fabrication of reinforcing steel shall conform accurately to the dimensions shown on the Approved Plans. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks or improper bends shall not be used.

Reinforcing bars shall be firmly and securely held in place by wiring at intersection with No. 14 or No. 16 gage wire. Mortar blocks of sufficient strength to resist crushing under full load shall be used to provide the proper clearance. Metal supports which extend to the surface of the concrete shall not be used. Reinforcing bars shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete. Special care shall be exercised to prevent any disturbance of the reinforcing bars in concrete that has already been placed.

After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete.

CONCRETE IMPROVEMENTS

320 - 1 GENERAL

Portland cement concrete curb, gutter, sidewalk, driveway approaches, valley gutters, thrust blocks and other similar concrete improvements shall be constructed complete and in place in accordance with Section 73 of the State Standard Specifications and these Standards.

320 - 2 CONCRETE IMPROVEMENT MATERIALS

Materials for concrete improvements shall be in accordance with Section 310-2 of these Standards.

320 - 3 SUBGRADE PREPARATION

Subgrade shall be prepared in accordance with Section 73-1.02 of the State Standard Specifications except that the top 6 inches of the subgrade shall be compacted as shown on the applicable Standard Details. All subgrade must be approved by the City prior to placement of aggregate base or concrete. Areas which do not meet the above compaction requirements shall be scarified, uniformly moistened and recompactd to obtain the required density.

320 - 4 PROPORTIONING CONCRETE FOR CONCRETE IMPROVEMENTS

The proportioning of concrete for concrete improvements shall be in accordance with Section 310-3 of these Standards except that the maximum slump shall be 4 inches in all cases and the concrete shall contain a minimum of five sacks of cement for each cubic yard.

320 - 5 MIXING CONCRETE FOR CONCRETE IMPROVEMENTS

Mixing of concrete for concrete improvements shall be in accordance with Section 310-4 of these Standards.

320 - 6 HANDLING AND PLACING CONCRETE FOR CONCRETE IMPROVEMENTS

Handling and placing shall be in accordance with Section 310-5 of these Standards.

320 - 7 CURB CONSTRUCTION

Curb construction shall be in accordance with Section 73-1.05 of the State Standard Specifications except that the weakened plane joints shall be 1½ inches deep. The weakened plane joints shall be constructed on 10 foot centers. Expansion joints shall not be required.

Extruded curb construction shall be in accordance with Section 73-1.05B of the State Standard Specifications except that expansion joints shall not be required and 1½-inch weakened plane joints shall be provided at 10 foot centers.

320 - 8**SIDEWALK, GUTTER AND SIDEWALK DEPRESSIONS, AND DRIVEWAY CONSTRUCTION**

The sidewalk, gutter and sidewalk depressions, and driveway construction shall be in accordance with Section 73-1.06 of the State Standard Specifications utilizing fixed form construction, except that expansion joints shall not be provided and weakened plane joints shall be provided in sidewalks on five foot centers.

320 - 9**FINISH**

All concrete shall be finished in accordance with the applicable section of Section 73 of the State Standard Specifications.

320 - 10**CURING**

Curing shall be in accordance with Section 310-7, "Curing Structural Concrete", of these Standards except, a clear curing compound shall be used in lieu of white.

320 - 11**MORTAR**

Cement mortar shall consist of a mixture of Portland cement, sand and water. Cement and sand shall first be combined in the proper proportions and then thoroughly mixed with the required amount of water. Cement mortar shall be one part cement and one part sand. The quantity of water to be used in the preparation of mortar shall be only that required to produce a mixture sufficiently workable for the purpose intended. Mortar shall be used as soon as possible after mixing and shall show no visible signs of setting prior to use. Retempering of mortar will not be permitted.

320 - 12**PRECAST CONCRETE MANHOLES**

Manholes shall be precast concrete and shall conform to the details shown on the standard drawings. Materials shall conform to ASTM Designation C-478.

Joints in precast manhole shafts shall be made by buttering with mortar the joint space previously laid. After placing the next section, excess mortar squeezed from the joint shall be removed and the joint area troweled smooth. Special precautions shall be taken to see that the entire joint space is filled with mortar.

PIPELINES, GENERAL

510 - 1 GENERAL

The Contractor shall furnish and install all pipe, fittings and all other appurtenant apparatus required to complete the pipelines in an operating, watertight condition. No damaged or imperfect pipe will be permitted.

The Contractor shall furnish all supports, bracing, other materials, and all work required for pipe hauling, unloading, distributing, trenching, placing, backfilling and testing of the pipelines.

Before purchasing pipe, the Contractor shall submit to the City for review, complete sets of data covering the pipe and pipe joints that he proposes to furnish including, details and calculations of the pipe joints showing that pipe joints conform to applicable specifications for the pipe being furnished.

510 - 2 UNDERGROUND PIPELINES

510 - 2.1 **General**

The Contractor shall, prior to beginning construction, obtain from the Division of Industrial Safety the permit required by California Labor Code, Section 6500, and pay any fee charged for such permit. In addition thereto, whenever the work under the Contract involves trench excavation 5 feet or more in depth, the Contractor shall submit for approval to a registered civil or structural engineer representing the City, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer. Nothing in this section shall be deemed to allow the use of shoring, sloping or other protective system less effective than that required by the Construction Safety Orders. Nothing in this section shall be construed to impose tort liability on the City, City Engineer, or any of their officers, agents or employees.

The pipe trench shall be dug with side walls sloped or otherwise supported in a safe manner in accordance with the Department of Industrial Relations, Division of Occupational Safety and Health Administration regulations pertaining to trenching.

Excavated material shall be placed on only one side of the trench unless otherwise directed. Separation distance between piles of excavated material and trench shall be consistent with the Construction Safety Orders.

510 - 2.2 Grade And Alignment

The alignment and grade for the bottom of the trench shall be properly established before the trench is excavated and shall be approved by the City before the pipe is laid. Trenches shall be true to line and grade, and the bottom shall be even and free from all objectionable material.

510 - 2.3 Trench Width For Rigid Wall Pipe

The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe, exclusive of bells and collars, plus 24 inches, and such maximum width shall be inclusive of all trench timbers. A minimum of 6 inches shall be maintained between pipe and trench wall. Whenever the maximum allowable trench width is exceeded for any reason, the Contractor shall demonstrate, to the satisfaction of the City, that the pipe is structurally capable of supporting expected loads with a reasonable factor of safety.

510 - 2.4 Water In Trench

When water is encountered in the trench, it shall be removed by draining or by pumping. Should water get into the trench before the pipe is laid, the laying of pipe shall be postponed until the trench has dried sufficiently to provide a firm foundation for the pipe or else, the mud or softer material shall be removed and grade re-established by backfilling and compacting with suitable material as determined by the City.

510 - 2.5 Laying And Jointing Of Pipe

Laying and jointing of pipe shall be in accordance with the manufacturer's recommendations and as approved by the City. Joint deflections shall not exceed 80% of the maximum recommendations of the manufacturer.

Where rubber gaskets are used for jointing pipe, a feeler gauge shall be used to check the position of the rubber gasket upon each closure. The interior of the pipe shall be cleared of all debris, and exposed pipe ends shall be closed by a suitable pipe plug when pipe laying is not in progress.

The pipe shall be laid on a trench bottom shaped to provide adequate support of the pipe except at coupling or bell holes. The use of prepared mounds to facilitate laying of the pipe is not approved.

Where pipe is to be encased or have concrete bedding, suitable concrete blocks shall be used to support the pipe in the proper location while placing concrete.

510 - 2.6 Curves And Bends

As shown on the Improvement Plans, changes in the alignment and grade shall be made with fabricated bends; otherwise, changes in alignment and grade may be made by pulling the pipe joints, by using manufactured beveled end pipe, if available, or by using a combination of pulling pipe joints and beveled end pipe. The deflection angle in beveled pipe joints shall not exceed 5°. Where pipe joints are pulled, mitered, or beveled, a full laying length of pipe shall be used on each side of the joint. The allowable pull at each pipe joint shall not exceed 80% of the manufacturer's recommendation.

510 - 2.7 Fittings

The Contractor shall furnish and install all air vents, fabricated bends, elbows, tees, and reducers as shown on the Improvement Plans for the applicable type of pipe. Unless otherwise specified, all materials, methods, and operations required to complete the fittings in an operating watertight condition shall conform to the provisions of the specification pertaining to the type of pipe in which the fitting is installed. Fabricated bends shall include bends, thrust blocks, and encasements as required. The deflection angles between adjacent sections in any particular fabricated bend shall be equal.

Prior to fabrication of any fittings, the Contractor shall submit to the City for review Shop Standards detailing the pipe fitting proposed.

Miscellaneous components not specified, but required to complete the fittings shall be furnished and installed by the Contractor. These materials shall be first-class components or materials and shall meet the applicable ASTM, ASA or AWWA Standard.

510 - 2.8 Backfill Of Pipe

Backfill shall not be dropped directly on the pipe. Backfill placed within 6-inches of the pipe shall be free from heavy gravel, or stones greater than 3-inches in maximum dimension, or both. The Contractor shall segregate material greater than 3-inches in maximum dimension.

The pipe shall not be displaced from alignment during the backfilling operation. Backfill shall be placed at approximately the same elevation on both sides of the pipe. Material used for backfill and compaction requirements shall be as shown on the Standards.

DRAINAGE PIPELINES

511 - 1 GENERAL

The type and size of pipe to be used shall be as shown on the approved improvement plans.

511 - 2 CLEANING AND FLUSHING

After all backfilling is completed and manhole frames and covers set, but prior to placement of paving material, the Contractor shall clean and flush all lines.

Disposal of cleaning and flushing water through existing City facilities shall be approved by the Director.

To clean and flush gravity drainage pipes 12 inches or less in diameter, the Contractor shall furnish and use a heavy rubber ball manufactured for this purpose and approved by the Director. When inflated with air it should have an outside diameter equal to the interior diameter of the pipe to be cleaned. The ball shall be placed in the uppermost structure of the line to be cleaned and then water shall be introduced into the structure in back of the ball. The ball shall pass through the pipe with only the pressure of the water behind it. The rate at which the ball is allowed to pass through the pipe shall be controlled by a rope attached to the ball at all times.

This procedure shall be utilized on each section of pipe installed. Care shall be exercised to feed the ball slow enough to allow debris to be removed in a manner acceptable to the Director.

Drainage pipes over 12 inches in diameter may be cleaned by means other than the above described ball method, with the approval of the Director.

511 - 3 TESTING OF STORM DRAINAGE PIPE

511 - 3.1 General

All testing shall be performed upon completion of the backfill operation and after compaction test results have been obtained. If the pipe is installed underneath street sections, tests shall be performed after placement and compaction of the base but prior to paving.

511 - 3.2 Deflection Testing

Flexible walled drainage pipe shall be tested after cleaning and flushing using a mandrel or other approved testing device. Maximum deflection shall not exceed 5% of the average inside diameter of the pipe.

511 - 4 CLOSED CIRCUIT TV INSPECTION

Prior to placing the final street surfacing, the City, at the developer's request and expense, will inspect all new drainage systems with a closed circuit television system. This will be done after the pipe has been installed true to the prescribed lines and grades, the trench backfilled and compacted, the manhole and cleanout covers set to proper grade, the roadway subgrade compacted, aggregate subbases and bases placed and compacted, and the drainage system cleaned of all debris. The Developer shall make the necessary repairs or corrections at his sole expense so that the work is acceptable to the Director. After the tests are completed to the satisfaction of the Director, the Contractor may commence paving. The drainage system may also be inspected with said television system any time within the twelve month warranty period after filing the Notice of Completion.

512 - 1 **GENERAL**

The type and size of pipe to be used shall be as shown on the approved improvement plans.

512 - 2 **LATERAL CONNECTIONS TO SANITARY SEWERS****512 - 2.1** **New Construction**

Where 4-inch laterals are constructed concurrently with main sewers 15 inches in diameter and less, connections shall be made with a regularly manufactured wye branch. Connection to mains, 18 inches in diameter or larger, shall be at manholes only, unless otherwise approved by the Director. If approval is granted, a City approved wye or tee saddle shall be used. Saddles shall have a skirt to prevent the saddle from entering the sewer main beyond the inside surface of the main, and shall be located so the invert of the saddle branch is at the same elevation as the crown of the main sewer. A neat opening shall then be cut in the main sewer which shall form a snug fit with the spigot of the saddle. The saddle shall then be installed and secured in accordance with the manufacturer's recommendations and, in addition, shall be attached to the main with a minimum of two stainless steel banding straps. The ends of the lateral shall be securely stopped with plugs or caps which can easily be removed without damage to the pipe end. The end of the lateral shall be marked by imprinting an "S" on the curb face over the sewer lateral. All laterals shall be installed prior to air testing.

512 - 2.2 **Lateral Connection To Existing Main Sewer**

Lateral connections to existing sewers shall be made at a manhole or wye branch. Where, in the opinion of the Director, it is impractical to connect or to install a manhole or wye branch, the connection shall be made by the use of a tee saddle as described in Section 512-2.1.

512 - 3 **CLEANING AND FLUSHING**

After all backfilling is completed and manhole frames and covers set, but prior to placement of paving material, the Contractor shall clean and flush all sanitary sewer mains.

Disposal of cleaning and flushing water through existing City facilities shall be approved by the Director.

To clean and flush sewer pipes 12 inches or less in diameter, the Contractor shall furnish and use a heavy rubber ball manufactured for this purpose and approved by the Director. When inflated with air it should have an outside diameter equal to the interior diameter of the pipe to be cleaned. The ball shall be placed in the uppermost structure of the line to be cleaned and then water shall be introduced into

the structure in back of the ball. The ball shall pass through the pipe with only the pressure of the water behind it. The rate at which the ball is allowed to pass through the pipe shall be controlled by a rope attached to the ball at all times. This procedure shall be utilized on each section of pipe installed. Care shall be exercised to feed the ball slow enough to allow debris to be removed in a manner acceptable to the Director. The work shall be done in such a manner as to prevent flooding of adjacent properties due to sewage back-up.

Sewer pipes over 12 inches in diameter may be cleaned by means other than the above described ball method, with the approval of the Director.

512 - 4**TESTING OF SANITARY SEWER PIPE****512 - 4.1 General**

All testing shall be performed upon completion of the backfill operation and after compaction test results have been obtained. If the pipe is installed underneath street sections, tests shall be performed after placement and compaction of the base, but prior to paving.

512 - 4.2 Deflection Testing

Flexible walled sewer pipe shall be tested after cleaning and flushing using a mandrel or other approved testing device.

512 - 4.3 Air Pressure Test

Sanitary sewer pipelines shall be pressure tested, if required, utilizing a low pressure air test. Any section of sewer failing the air test shall be repaired and retested until leakage is reduced to acceptable limits.

512 - 7**CLOSED CIRCUIT TV INSPECTION**

Prior to placing the final street surfacing, the City, at the developers request and expense, will inspect all new sewer systems with a closed circuit television system. This will be done after the pipe has been installed true to the prescribed lines and grades, the trench backfilled and compacted, the manhole and cleanout covers set to proper grade, the roadway subgrade compacted, aggregate subbases and bases placed and compacted, and the sewer system cleaned of all debris. The Developer shall make the necessary repairs or corrections at his sole expense so that the work is acceptable to the Director. After the tests are completed to the satisfaction of the Engineer, the Contractor may commence paving. The sewer system may also be inspected with said television system any time within the twelve month warranty period after filing the Notice of Completion.

WATER SERVICE PIPELINES

513 - 1 GENERAL

The type and size of pipe to be used shall be as shown on the approved improvement plans. All buried water mains shall have a copper tracer wire installed in the trench with them. Tracer wire shall also be installed along service laterals that are not perpendicular to the main.

513 - 2 APPURTENANCES

513 - 2.1 Gate Valves

Gate valves shall conform to the requirement of AWWA C-509 or C-515. Valves shall be resilient seat, non-rising stem, with stuffing box stem seals. Stems shall turn counter clockwise to open and shall be furnished with a 2-inch square operating nut.

513 - 2.2 Fire Hydrants

Hydrants shall meet the requirements of AWWA C-502 for dry barrel hydrants with the drain outlet omitted and shall have two 2½-inch nozzles and one 4½-inch pumper nozzle. Outlet nozzle threads shall have standard fire hose coupling screw threads. The main valve body shall have a diameter of at least 5¼-inches. The hydrants shall be a "traffic" type with a replaceable breakaway unit immediately above the ground line. The main hydrant valve shall close with water pressure when the hydrant is severed.

Hydrants shall be furnished with caps with rubber gaskets and chains. The contractor shall adjust the "bury length" of the hydrant to provide proper installation. The pumper nozzle shall be rotated to face the street after installation.

Hydrants shall be American AVK 2700 or Watrous Pacer.

513 - 2.3 Thrust Blocks

Thrust blocks shall be concrete, non-reinforced and shall be poured against undisturbed trench sidewalls. Contact with fittings shall be made on the body of the fitting only and not on the bell ends. Thrust blocks shall be placed at all elbows, tees, crosses and plugs.

Wrap fittings with 6-mil plastic when concrete will be placed for thrust restraint.

Thrust blocks shall not be utilized on fittings requiring vertical restraint.

513 - 2.4 Tracer Wire

Tracer wire shall be #12 AWG, single strand, soft drawn, uninsulated copper wire. The wire shall be laid along the bottom of the trench adjacent to the pipe. All tracer wire shall be continuous between valve boxes.

Tracer wire shall be insulated adjacent to valves or fittings. Splicing of tracer wires shall be accomplished by wrapping the bare ends of the wire together, soldering the connection and wrapping the soldered connection with electrical tape.

513 - 3**CONNECTIONS TO EXISTING CITY WATER MAINS**

The Contractor shall not make any connections to the existing City water mains until written approval for the connection is obtained from the Director. (Signed Improvement Plans, Issuance of Permits, or Issuance of Encroachment Permits do not constitute such approval.)

Any connections on existing in-service mains shall be made by a "Director Approved" contractor or by the "Public Works". If the connection is made by "Public Works", it shall be at the expense of the applicant.

513 - 4**PRESSURE TESTS**

All water mains shall be pressure tested prior to placement of permanent surfacing. When leakage exceeds the amount allowed by these Standards, the Contractor shall locate the leaks and make the necessary repairs, as approved by the City, to reduce the leakage to within the specified limits. Any detectable leaks shall be repaired regardless of the results of the tests.

513 - 5**DISINFECTION**

All water lines shall be disinfected in accordance with AWWA C-651. Points of flushing, flushing rates, and application methods shall be approved by the Director. At least three water samples shall be collected for bacteriological tests over a 24-hour period. For mains 12-inches in diameter and larger, sample points shall be taken at each end of the main and near the center of the main, and two samples shall be taken from each point over a 24-hour period.

513 - 6**BACKFLOW PREVENTION DEVICES****513 - 6.1 General**

Only backflow prevention devices that are approved by the State Department of Health Services shall be utilized to protect public water supply. (This requirement does not apply to backflow prevention devices required by the City for use in protection of the occupants of users within a facility.) Only complete assemblies,

WATER SERVICE PIPELINES

including shut-off valves and test cocks supplied by the manufacturer are approved. Substitution of valves or assembly of devices from individual components is prohibited.

No outlets, tees, taps or other connection(s) shall be made between the water meter and the required backflow prevention device.

Prior to activating service, all backflow prevention devices shall be tested and certified by a certified backflow prevention assembly tester.

513 - 6.2 Double Check Valve Assembly

Double check valve assemblies shall be installed as shown on Standard Detail W-4 unless otherwise approved by the Director.

513 - 6.3 Reduced Pressure Principle Assembly

Reduced pressure principle backflow prevention devices shall be installed in a horizontal and level position as shown on Standard Detail W-5.

Reduced pressure devices shall be installed such that the discharge port is a minimum of 12 inches above the floor, ground surface, or any level subject to flooding. Under no circumstances shall the device be installed in a pit or vault.

520 - 1 GENERAL

CIPP shall conform to ACI 346-81, except as otherwise noted herein. The Contractor shall be required to furnish evidence of successful installations made with the equipment he proposes to use.

The acceptability of the pipe shall be determined by the results of the tests herein specified and by inspection to determine conformance to these Standards.

520 - 2 EXCAVATION

The trench shall be excavated to lines and grades shown on the Standards. The trench shall be shaped to form the bottom outside of the pipe and shall be graded and prepared to provide full, firm, and uniform support by undisturbed earth, rock, or compacted fill over a minimum of the bottom 210° of the outside of the pipe, hereinafter referred to as the "trench form". When the soil around the trench form must be over-excavated and then backfilled and compacted, trenching shall be performed to produce the above mentioned stable trench form. All unstable strata or lenses of loose sand, silt, cohesive or noncohesive soils, below the contact line of the concrete pipe and trench form, shall be over-excavated to such depths and widths as required, refilled with selected cohesive soils, and compacted to not less than 85% of maximum dry density in accordance with ASTM Designation D-1557.

520 - 3 WETTING

At the time of concrete placement, all soil adjacent to the pipe shall be sufficiently wet so that it does not absorb water from the concrete nor expand upon additional wetting. The trench shall be stable and completely free of protrusions, mud, debris, and standing water.

520 - 4 GRADE AND ALIGNMENT TOLERANCES

Departure from and return to established grade shall not exceed 1-inch per 10 linear feet and the maximum departure shall be limited to 1½ inches. Departure from and return to established alignment shall not exceed 2 inches per 10 linear feet and the maximum departure shall be limited to 4 inches.

520 - 5 MATERIALS

520 - 5.1 **Cement**

Cement shall be Portland cement, Type II, containing less than 0.6% alkali, and shall conform to ASTM Designation C-150. The cement shall be free of lumps and properly aged.

CAST-IN-PLACE PIPE (CIPP)

520 - 5.2 Concrete Aggregates

Concrete aggregate shall be in accordance with Section 310-2.2 of these Standards, except the normal maximum coarse aggregate size shall be not more than 1/3 of minimum wall thickness nor greater than 1½-inches.

520 - 5.3 Water

Water shall be in accordance with Section 310-2.3 of these Standards.

520 - 5.4 Air Entraining Agent

Air entraining agents shall conform to Section 310-2.4 of these Standards.

520 - 5.5 Pozzolan

The Contractor may use pozzolan conforming to the requirements of ASTM Designation C-618 or a liquid admixture with pozzolan characteristics in accordance with ASTM Designation C-494.

520 - 5.6 Bonding Mortar

Bonding mortar shall consist of two or more parts of cement to three parts of sand by volume.

520 - 6 PROPORTIONING

Proportioning of concrete for CIPP purposes shall be in accordance with Section 310-3 of these Standards, except the slump shall be the minimum required for satisfactory placement of the concrete by the equipment used by the Contractor, but in no case shall it exceed 2½ inches. The minimum 28-day compressive strength shall be 3,000 psi. A minimum of 5½ sacks of cement to each cubic yard of concrete shall be used.

520 - 7 MIXING

Mixing of concrete shall be in accordance with Section 310-4 of these Standards.

520 - 8 PLACEMENT

520 - 8.1 Method Of Placement

The pipe shall be constructed in one placement, by the one stage method utilizing metal forms to support the upper portion of the pipe.

520 - 8.2 Construction Joints

When work is stopped at the end of a placement or for any period that would permit initial set to take place, a construction joint shall be formed. The ends of the pipe that are to be in butt contact shall be left in rough condition with a slope of approximately 45°. Before resuming, an excavation shall be made along the sides and bottom of the joint to permit casting of a concrete collar around the outside of the joint. This collar shall have a minimum thickness of 1¼ times the wall thickness of the pipe and shall lap the entire joint by at least two times the wall thickness. Immediately before resuming concrete placement, the surfaces to be bonded shall be cleaned of all laitance, coatings, foreign material, and loose or defective concrete, thoroughly wetted, and coated with a layer of bonding mortar approximately ¼ inch thick. In lieu of the bonding mortar, neat cement paste may be thoroughly scrubbed onto the wet surface of the previously placed concrete.

For a joint that may be used for connections to another pipe or structure, a joint shall be made by squaring off the end of the pipe. An excavation shall be made along the sides and bottom of the cast-in-place pipe, for any diameter, to permit casting of a concrete collar as described above.

The outside top of all joints shall be capped for the entire width of the pipe that is exposed, that is, between the earth walls of the excavated trench. This cap shall have a minimum thickness equal to the wall thickness of the pipe and shall lap the joint, both upstream and downstream from the joint by at least twice the wall thickness of the pipe. A cap as described is required regardless of pipe size.

520 - 8.3 Temperature

The temperature of concrete when it is being discharged from the mixer shall be not more than 90°F (32°C) and not less than 40°F (4°C) in moderate weather, or 50°F (10°C) in weather during which the mean daily temperature drops below 40°F (4°C). Whenever the mean daily temperature in the vicinity of the work site falls below 40°F (4°C) for more than 1 day, the concrete shall be maintained at a temperature not lower than 50°F (10°C) for at least 48 hours after it is placed. Concrete shall be protected against freezing temperatures for an additional 48 hours immediately following the 48 hours of protection at 50°F (10°C). Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. The Contractor shall employ effective means, such as precooling of aggregates and mixing water or placing at night, as necessary to maintain the placing temperature of the concrete below 90°F (32°C).

520 - 8.4 Finish

Except for the form offsets, the interior surface of the pipe shall be equivalent to or better than a wood float finish. All extraneous concrete shall be removed from the interior surface.

CAST-IN-PLACE PIPE (CIPP)

520 - 9

CURING AND BACKFILL

Polyethylene film complying with ASTM Designation C-171, nominal thickness 0.0015-inches (0.038 mm), shall be placed on the exposed top surface of the pipe immediately after the pipe is cast. The film shall be anchored in place with loose soil to assure continuous, adequate curing. After placement of film, 6 inches of loose soil shall be carefully placed over the entire pipe. The trench shall be completely backfilled as soon as the pipe attains suitable strength. Care should be exercised in placement of the film and earth to ensure that no air pockets are left between the pipe and earth, and that no damage or contamination of the concrete occurs.

Circulation of air through completed sections of pipe shall be prevented at all times by bulkheading open ends and all openings left for pipe appurtenances.

Sufficient water shall be placed in each completed section to provide a minimum water depth of 12 inches in the pipeline interior not more than 72 hours after the first placement of concrete. Water used for this purpose and for testing shall be 50°F or warmer. Water shall remain in the pipeline for a minimum of 14 days. Sandbagging or other temporary dams shall be used to maintain the water depths in the sloping pipeline. Such dams shall be removed by the Contractor upon completion of the 14 day curing period.

520 - 10

PIPE DIMENSIONS AND TOLERANCES

520 - 10.1 Wall Thickness

The minimum wall thickness of the cast-in-place pipe at any point shall not be less than 1/12 the pipe nominal diameter plus 1 inch.

520 - 10.2 Pipe Diameter Tolerances

The internal diameter of the pipe at any point shall not be less than 95% of the nominal diameter, and the average of any four measurements of the internal diameter made at 45° intervals shall not be less than the nominal diameter.

520 - 10.3 Offsets

Offsets at form laps and horizontal edges shall not exceed ½ inch for pipe having inside diameter not greater than 42 inches; ¾ inch for pipe having inside diameter greater than 42 inches but not greater than 72 inches; and 1 inch (25 mm) for pipe having inside diameter greater than 72 inches.

520 - 11TESTING

Routine testing of materials, of proposed mix proportions, and of resulting concrete for compliance with technical requirements of these specifications shall be the responsibility of the Contractor. Other testing required because of changes in materials or proportions of the mix requested by the Contractor, as well as any coring, load testing, or other extra testing of concrete or other materials occasioned by their failure to meet these Standards, shall also be at the Contractor's expense. (Core and load tests shall be in accordance with Sections 9.3 and 9.4 of ACI 346).

Concrete strengths shall be considered satisfactory if the average of any five consecutive sets of strength tests of the laboratory cured specimens is equal to or greater than the specified strength, and if not more than 20% of the strength tests have values less than the specified strength. The pipe represented by unsatisfactory strength tests on cylinders shall be further tested either by coring or by load testing at the Contractor's option as specified herein. Any pipe failing these tests shall be replaced at the Contractor's expense.

Concrete samples shall be taken by an independent test laboratory approved by the City. At least one sample will be taken for each 50 cubic yards of concrete used, but not less than one sample for each days work, nor less than one sample for each section of pipe placed in a continuous operation.

Samples shall be taken in accordance with ASTM Designation C-172. Two cylinders shall be molded and cured for each sample taken in accordance with ASTM Designation C-31. The two specimens taken shall be tested at the end of the 28-day of curing. The 28-day test results shall be the average of the strengths of the two specimens.

The Contractor, in the presence of the City, shall measure the thickness of the pipe at least every 200 linear feet (60 m) with individual measurements staggered at points designated by the City. Where thickness is not determined by probes through the fresh concrete, small holes shall be drilled for this purpose. The Contractor shall patch all core holes in a manner that will be permanent, and will not leak.

NON-REINFORCED CONCRETE PIPE

521 - 1 GENERAL

The Contractor shall construct non-reinforced concrete pipelines with rubber gasket joints at all locations shown on the approved plans.

521 - 2 MATERIALS

Pre-cast non-reinforced concrete pipe shall conform to ASTM Designation C-505, 'Non-Reinforced Concrete Irrigation Pipe With Rubber Gasket Joints'.

522 - 1

GENERAL

The Contractor shall construct reinforced concrete pipelines with rubber gasket joints at all locations shown on the approved plans.

522 - 2

MATERIALS

Reinforced concrete pipe shall be the minimum class required to serve the purpose intended, but in no case shall be less than Class III conforming to the specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, ASTM Designation C-76. The pipe shall be manufactured using the packer head method or shall be centrifugally spun. The pipe shall utilize a Bureau of Reclamation Type R-4 bell and spigot. Use of elliptical reinforcement in the pipe is not allowed.

Fittings shall be fabricated of steel cylinders with cement mortar lining and coating and shall be equal in strength to the abutting pipe sections. Design of all fittings shall be in accordance with AWWA C-302. Fabrication details of all fittings shall be submitted to the City for approval.

STEEL PIPE

530 - 1 GENERAL

530 - 2 MATERIALS

Pipe 6 inches in diameter and larger shall conform to AWWA C-200 and be fabricated per ASTM A-53. Unless otherwise noted, the minimum wall thickness shall be 0.25 inches. Fittings shall be in accordance with AWWA C-208.

Steel pipe smaller than 6 inches in diameter shall be Schedule 40, in accordance with ASTM A-120. Pipe shall be galvanized unless otherwise noted.

530 - 3 MORTAR LINING AND COATING

Mortar lining and coating shall be in accordance with AWWA C-205.

530 - 4 FUSION EPOXY LINING AND COATING

Fusion epoxy lining and coating shall be in accordance with AWWA C-213.

DUCTILE IRON PIPE (DIP)

531 - 1 GENERAL

Ductile iron pipe for water and other liquids shall be furnished in the sizes, classes, or nominal thickness' and joint types as shown on the approved plans.

531 - 2 MATERIALS

Ductile iron pipe shall comply with AWWA C-151 for pipe utilizing mechanical or push-on joints and AWWA C-115 for flanged joints.

Unless otherwise specified, the internal surfaces of the pipe and fittings shall be lined with a uniform thickness of cement mortar and subsequently sealed with a bituminous coating in accordance with AWWA C-104. The outside surfaces of the pipe and fittings for general use shall be coated with a bituminous coating a minimum of one mil thick in accordance with AWWA C-151.

The manufacturer shall furnish a certified statement that the pipe conforms to these requirements.

531 - 3 JOINTS

Ductile iron pipe joints shall comply with the following requirements for the joint type specified on the plans and shall meet the applicable specifications shown in the table below:

<u>Type Of Joint</u>	<u>Specification</u>
Rubber Gasket Push-On Joint	AWWA C-111
Mechanical Joint	AWWA C-111
Flanged Joint	AWWA C-110

531 - 4 FITTINGS

Fittings shall be ductile iron conforming to AWWA C-153.

531 - 5 INSTALLATION

Ductile iron pipe shall be installed in accordance with AWWA C-600 and the Standard Details.

All ductile iron pipe and fittings shall be encased with an 8 mil minimum thick polyethylene encasement. Installation shall be performed in accordance with Section 4 of AWWA C105 utilizing Method "A".

531 - 6**TESTING OF WATER DISTRIBUTION AND TRANSMISSION PIPING**

All buried pipelines shall be tested after backfilling of the pipe, but prior to placement of any permanent surfacing. The Contractor shall make arrangements with the City for temporary connection to the water supply prior to starting the test.

The hydrostatic test pressure shall be the greater of 150 psi or 1.5 times the working pressure. The test pressure shall be maintained for two (2) hours by pumping water from a measuring tank into the line. At the end of 2 hours, the volume of water pumped into the line will be measured and recorded as the leakage. During the test, the test pressure shall be maintained within 5 psi of the required test pressure.

No pipe installation will be considered acceptable if the leakage is greater than that determined by the formula:

$$L = \frac{SD\sqrt{P}}{133,200}$$

L = Allowable leakage in gallons per hour.

S = Length of pipe tested in feet.

D = Nominal diameter of the pipe in inches.

P = Average test pressure in pounds per square inch.

POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

560 - 1 GENERAL

The Contractor shall construct pressure PVC pipelines with rubber gasket joints at all locations shown on the approved plans.

560 - 2 MATERIALS

PVC pipe shall be one of the following:

- A. PVC pressure pipe manufactured in accordance with AWWA C-900 for cast iron pipe equivalent O.D.'s with elastomeric joints.
- B. PVC pressure pipe manufactured in accordance with AWWA C-905 for cast iron pipe equivalent O.D.'s with elastomeric joints.

560 - 3 FITTINGS

Fittings shall be ductile iron conforming to AWWA C-153. Fittings shall be furnished with a joint type suitable for attaching to valves or other pressure pipe. Adapter gaskets are not acceptable.

560 - 4 TESTING OF WATER DISTRIBUTION AND TRANSMISSION PIPING

All buried pipelines shall be pressure tested after backfilling of the pipe, but prior to placement of any permanent surfacing. The Contractor shall make arrangements with the City for temporary connection to the water supply prior to starting the tests.

The hydrostatic pressure shall be 150 psi. The test pressure shall be maintained for two (2) hours by pumping water from a measuring tank into the line. At the end of 2 hours, the volume of water pumped into the line will be measured and recorded as the leakage. During the test, the test pressure shall not drop below 140 psi.

No pipe installation will be considered acceptable if the leakage is greater than that determined by the formula:

$$L = \frac{ND\sqrt{P}}{7400}$$

- L = Allowable leakage in gallons per hour.
- N = Number of joints in length of pipeline.
- D = Nominal diameter of the pipe in inches.
- P = Average test pressure in pounds per square inch.

POLYVINYL CHLORIDE (PVC) NON-PRESSURE PIPE

561 - 1 GENERAL

The Contractor shall construct non-pressure PVC pipelines with rubber gasket joints at all locations shown on the Drawings.

561 - 2 MATERIALS

Gravity PVC pipe shall be one of the following:

- A. PVC sewer pipe in accordance with ASTM Designation D-3034, SDR 35. Rubber gaskets shall be factory installed and conform to ASTM Designation D-3212.
- B. PVC large diameter plastic gravity sewer pipe in accordance with ASTM Designation F-679. Rubber gaskets shall be factory installed and conform to ASTM Designation F-477.
- C. PVC large diameter ribbed gravity sewer pipe in accordance with ASTM Designation F-794, Series 46. Rubber gasket joints shall be factory installed and conform to ASTM Designation F-477. Fittings shall be manufactured in accordance with ASTM Designation D-2855.

561 - 3 INSTALLATION

PVC sewer pipe shall be installed in accordance with ASTM Designation D-2321 using Class I or II embedment materials and the Standard Details. Jetting or flooding of backfill is not permitted.

Unstable trench wall conditions exist if any of the following conditions occur:

- The excavation for the trench is below or within 3 feet of groundwater.
- The soil moisture content of the trench sidewall is 4% or more above optimum moisture content at the time of excavation.
- The relative compaction of the trench wall, in undisturbed material, is 75% or less of "Maximum Dry Density" in accordance with ASTM Designation D-1557.

561 - 4 DEFLECTION TEST

PVC sewer pipe shall be tested after cleaning and flushing using a mandrel or other approved testing device. Maximum deflection shall not exceed 5% of the average inside diameter of the pipe.

For all pipes less than 24-inches (I.D.), a mandrel shall be pulled through the pipe by hand. Prior to use, the mandrel shall be approved by the Director. (Use of any unapproved mandrel will invalidate the test.) If the mandrel fails to pass, the pipe will be deemed to be overdeflected.

Any overdeflected pipe shall be re-laid. (The use of rerounding devices is not acceptable.)

Mandrels shall be rigid, nonadjustable, odd-numbering-leg (9 legs minimum), having an effective length not less than its nominal diameter. The minimum diameter of the mandrel at any point along its full length shall be as follows:

<u>Pipe Material</u>	<u>Nominal Size (Inches)</u>	<u>Minimal Mandrel Diameter (Inches)</u>
PVC - ASTM D-3034 (SDR 35)	6	5.455
	8	7.282
	10	9.085
	12	10.793
	15	13.203
PVC - ASTM F-679 (T-1 Wall)	18	16.748
	21	19.744
	24	22.212
	27	25.033
PVC - ASTM F-794	18	16.768
	21	19.713
	24	22.325
	27	25.175
	30	28.025

Mandrels shall be fabricated from steel, fitted with pulling rings at each end, and stamped or engraved on some segment, other than the runner, with the pipe material, specifications, nominal size, and mandrel O.D.

For pipes with a nominal diameter of 24-inches or larger, deflections shall be determined by a method submitted to and approved by the Director. If a mandrel is selected, the minimum diameter, length, and other requirements shall conform to the dimensions and requirements previously stated.

561 - 5

AIR PRESSURE TEST

All PVC sanitary sewer pipelines shall be pressure tested. Each section of pipe shall be pressure tested by a low pressure air test in accordance with UNI-B-6. Any section of sewer failing the air test shall be repaired and retested until leakage is reduced to acceptable limits.

VITRIFIED CLAY PIPE

571 - 1 **GENERAL**

The Contractor shall construct vitrified clay pipelines with polyurethane compression joints at all locations shown on the approved plans.

571 - 2 **MATERIALS**

Extra strength vitrified clay sewer pipe conforming to ASTM C-700 shall be used. Bell and spigot ends of all clay pipe materials shall be fitted with factory installed resilient joint materials conforming to ASTM C-425.

571 - 3 **FITTINGS**

Fittings shall be fabricated of the same materials of the pipe and shall be equal in strength to the abutting pipe sections. Nominal dimension of all fittings shall conform to the recommendation of the "Western Region of the National Clay Pipe Institute".

571 - 4 **AIR PRESSURE TEST**

All VCP sanitary sewer pipelines shall be pressure tested. Each section of pipe shall be pressure tested by a low pressure air test in accordance with ASTM C-828. Any section of sewer failing the air test shall be repaired and retested until leakage is reduced to acceptable limits.

STREET LIGHTING

710 - 1 GENERAL

Street lighting materials including poles, luminaire arms, luminaires, lamps, controls, wiring, pull boxes, and conduit shall be supplied complete and in working condition in accordance with these specifications and standards.

710 - 2 STREET LIGHT POLE AND LUMINAIRE ARM

The street light pole and luminaire arm shall be in accordance with Standard Detail SL-3 except where decorative street lighting is required.

Poles shall not be installed until the foundation has cured a minimum of 5 days. The pole shall be plumbed by adjusting the leveling nuts; usage of leveling shims is not allowed.

When installed in locations shown on Standard Details SL-1 and SL-2, the luminaire arm shall be 6 feet in length. Where the pole is located at the back of the sidewalk, the length of the luminaire arm shall be 10 feet.

Poles and luminaire arms shall be designed to withstand dead loads and theoretical dynamic loads developed by 100 MPH winds with a 1.3 gust factor.

710 - 3 LUMINAIRE

The luminaires shall be high pressure sodium vapor lamps with 120 volt built-in high power factor regulating type ballast, a twist lock receptacle wired for 120 volt operation, and a built-in receptacle for photoelectric cells. The luminaires shall be as follows or approved equal:

<u>Wattage</u>	<u>I.E.S. Distribution Pattern</u>	<u>Luminaire</u>
200	Type III	G.E. M2RR200S1H2GMS3 American Electric 113-062J3
150	Type II	G.E. M2RR150S1H2GMS2 American Electric 113-56262
150	Type III	G.E. M2RR150S1H2GMS3 American Electric 113-56263
100	Type II	G.E. M2RR100S1H2GMS2 American Electric 113-56212
100	Type III	G.E. M2RR100S1H2GMS3 American Electric 113-56213

STREET LIGHTING

710 - 4 PHOTOELECTRIC CELLS

Photoelectric cells shall be adjustable, compatible with related equipment and properly sized for the load. They shall be General Electric No. PEC1TL, Fisher Pierce No. 6690B, Precision 8690 or approved equal.

710 - 5 REGULATIONS AND CODES

Regulations and codes shall conform to Section 86-1.02 of the State Standard Specifications.

710 - 6 EXCAVATION AND BACKFILL

Excavation and backfill shall be in accordance with Section 86-2.01 of the State Standard Specifications.

710 - 7 CONDUIT

All conductors shall be installed in conduit except inside poles. Conduit shall be in accordance with applicable sections of Section 86-2.05 of the State Standard Specifications and shall be sized in accordance with the National Electrical Code; however, in no case shall the conduit be smaller than that indicated in Section 86-2.05b of the State Standard Specifications. Conduit shall be installed in accordance with the applicable sections of Section 86-2.05c of the State Standard Specifications. All risers shall be rigid steel.

710 - 8 PULL BOXES

Pull boxes shall be in accordance with Section 86-2.06 of the State Standard Specifications, except that all pull boxes shall be concrete. Pull boxes shall be located where shown on the plans or where required by regulations or codes. Pull boxes shall be Christy N16 with N16J lids or equivalent if located outside of vehicular travel areas. Where located inside vehicular travel areas, lids shall be Christy N16-61J or equivalent. All pull box covers shall be marked "Street Lighting", and installed at finished grade. Pull boxes shall be placed on a bed of pea gravel of 12-inch minimum thickness to allow drainage. Sufficient extensions shall be used to provide connection of conduits without offsets. A fused splice connector shall be used to connect the street light to the line in accordance with Section 86-2.095 of the State Standard Specifications.

STREET LIGHTING

710 - 9 FOUNDATIONS

Foundations for standards shall conform to Standard Detail SL-4. Foundations shall be placed monolithically to within 4-inches of the sidewalk grade. After the pole is set, a 30-inch square cap shall be installed to bring the foundation to sidewalk grade.

710 - 10 ANCHOR BOLTS

Anchor bolts shall be 1-inch in diameter, 36-inches long with a 4-inch "L" bend at the bottom end. Anchor bolts shall conform to ASTM Designation A-307.

710 - 11 CONDUCTORS

Conductors shall conform to Section 86-2.08 of the State Standard Specifications.

710 - 12 WIRING

Wiring shall be in accordance with Section 86-2.09 of the State Standard Specifications. In addition, the Contractor shall pull through a test mandrel to remove any foreign matter that may damage the insulation before pulling the conductor. No conductors shall be pulled until the conduit run is complete. Extreme care shall be exercised when pulling conductors and cable into conduits to avoid kinking, twisting, nicking or scratching of the conductors and insulation, or the placement of extreme stress on the conductors or cable.

710 - 13 TESTING

Testing shall be in accordance with the applicable portions of Section 86-2.14B, Field Testing, and Section 86-2.14C, Functional Testing, of the State Standard Specifications.



STREET IMPROVEMENTS

ST-1	TYPICAL STREET SECTION
ST-2	SYMMETRICAL CUL-DE-SACS
ST-3	SYMMETRICAL CUL-DE-SACS
ST-4	UNSYMMETRICAL CUL-DE-SAC & KNUCKLE INTERSECTION
ST-5	STANDARD CURB & GUTTER SECTION
ST-6	SIDEWALK CURB & GUTTER SECTION
ST-7	SIDEWALK CONSTRUCTION
ST-8	VALLEY CROSS GUTTER
ST-9	RESIDENTIAL DRIVEWAY
ST-10	COMMERCIAL / INDUSTRIAL DRIVEWAY
ST-11	SPECIAL COMMERCIAL DRIVEWAY
ST-12	ALLEY APPROACH DETAILS
ST-13	ALLEY GUTTER AND PAVEMENT SECTION
ST-14	WHEELCHAIR RAMP DETAIL
ST-15	STREET SIGNS
ST-16	STREET NAME SIGN
ST-17	STREET BARRICADES

STREET LIGHTING

-2-

- SL-1 LOCATIONS OF 25' POLES
- SL-2 LOCATIONS OF 30' POLES
- SL-3 STREET LIGHT INSTALLATION
- SL-4 STREET LIGHT FOUNDATION

STORM DRAINAGE

- SD-1 STORM DESIGN SHEET
- SD-2 RAINFALL INTENSITY CURVES
- SD-3 GUTTER CAPACITY
- SD-4 TYPE 'A' CATCH BASIN
- SD-5 CURB DRAIN
- SD-6 C.I.P.P. STORM DRAIN & TRENCH
- SD-7 STORM DRAIN M.H. FOR 30" - 48" C.I.P.P.
- SD-8 STORM DRAIN M.H. FOR 54" - 96" C.I.P.P.
- SD-9 STORM DRAIN M.H.'S PLAN VIEW (C.I.P.P.)
- SD-10 STORM DRAIN MANHOLE
- SD-11 CAST IRON MANHOLE FRAME & COVER

SANITARY SEWER

- SS-1 TYPICAL MANHOLE
- SS-2 DROP MANHOLE
- SS-3 CAST IRON MANHOLE FRAME & COVER
- SS-4 CLEANOUT
- SS-5 4-INCH SEWER SERVICE
- SS-6 4-INCH SEWER CLEANOUT ATTACHED SIDEWALK
- SS-7 4-INCH SEWER CLEANOUT SEPARATED SIDEWALK
- SS-8 WASTE SUMP

WATER IMPROVEMENTS

-3-

- W-1 1" TO 2" WATER SERVICE
- W-2 FIRE HYDRANT INSTALLATION
- W-3 VALVE BOX DETAIL
- W-4 DOUBLE CHECK VALVE BACKFLOW PREVENTOR
- W-5 REDUCED PRESSURE BACKFLOW PREVENTOR

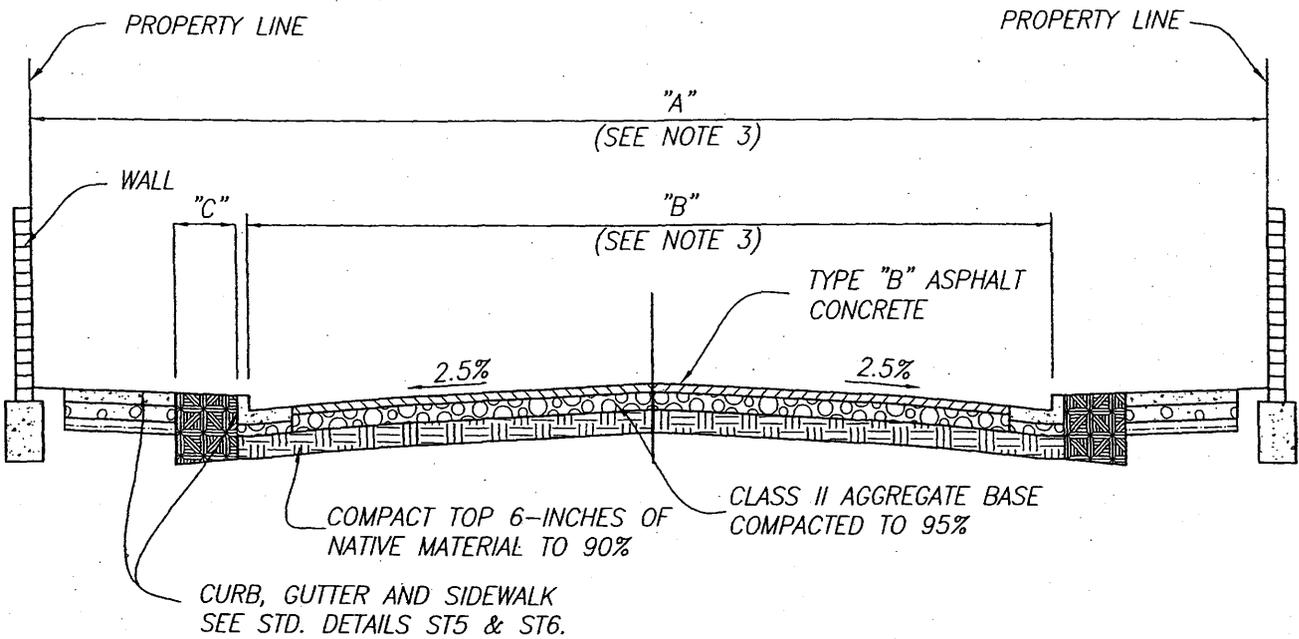
BACKFILL AND BEDDING

- BF-1 FLEXIBLE WALLED PIPE BACKFILL
- BF-2 RIGID WALLED PIPE BACKFILL
- BF-3 EXCAVATION & BACKFILL IN EXISTING STREETS

MISCELLANEOUS

- M-1 PERMANENT MONUMENTS
- M-2 TYPICAL RESIDENTIAL LOT GRADING
- M-3 PARKING STANDARDS
- M-4 DOUBLE GATE – CLICK TO ENTER
- M-5 SINGLE GATE – CLICK TO ENTER

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TYPICAL SECTION

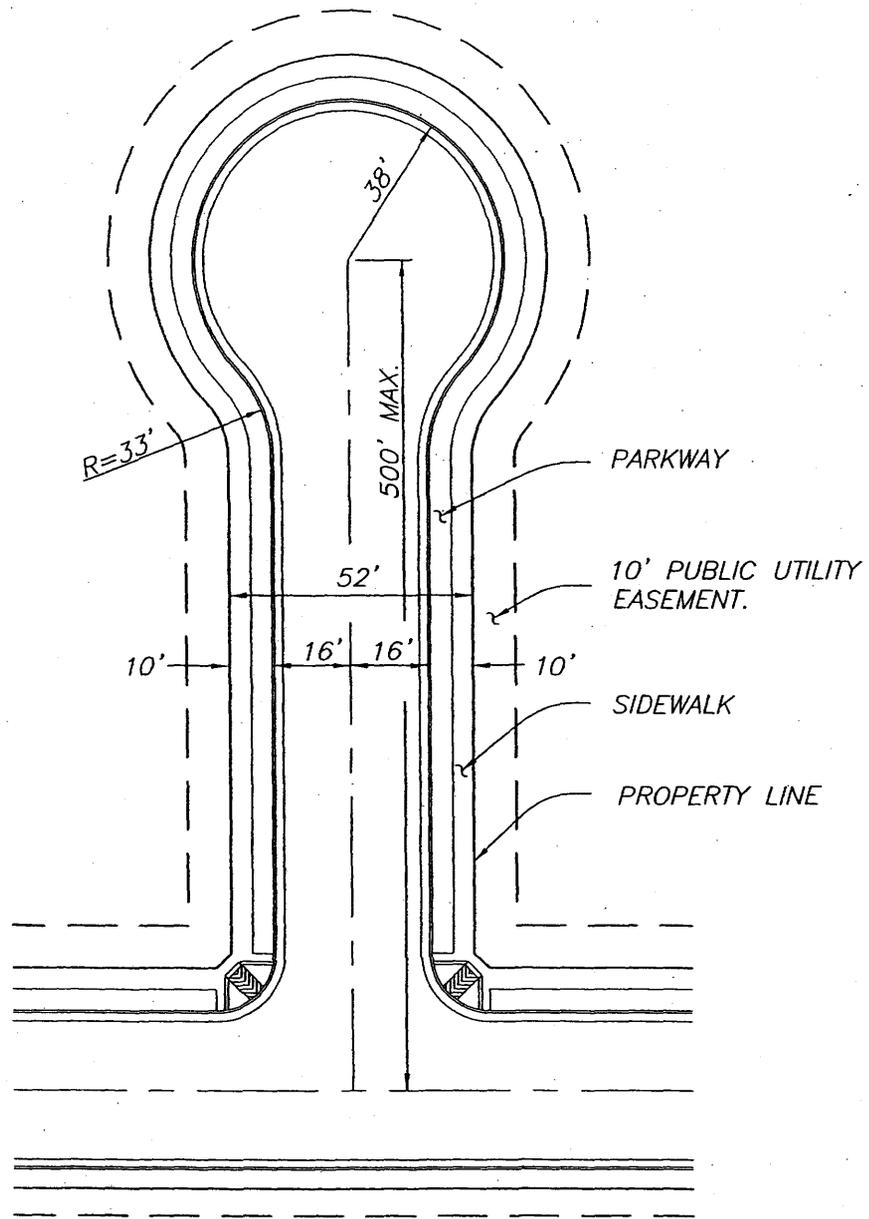
STREET CLASSIFICATION	"A" IN FEET	"B" IN FEET	"C" IN FEET
PRIVATE RESIDENTIAL	--	--	--
LOCAL RESIDENTIAL WITH PARKING	52	32	5'-6"
MINOR COLLECTOR WITH NO PARKING	60	34	VARIES
MINOR COLLECTOR WITH PARKING	60	40	5'-6"
MAJOR COLLECTOR WITH PARKING AND NO WALLS AT PROPERTY LINES	72	56	VARIES
MAJOR COLLECTOR WITH WALLS AT PROPERTY LINES AND NO PARKING	80	50	VARIES
INDUSTRIAL	66	48	VARIES
MINOR ARTERIAL WITHOUT WALLS AT PROPERTY LINES AND NO PARKING	90	62	VARIES
MINOR ARTERIAL WITH WALLS AT PROPERTY LINES AND NO PARKING	100	62	VARIES
MAJOR ARTERIAL WITHOUT WALLS AT PROPERTY LINES AND NO PARKING	106	80	VARIES
MAJOR ARTERIAL WITH WALLS AT PROPERTY LINES AND NO PARKING	122	80	VARIES

NOTE:

1. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM DESIGNATION D1557.
2. APPLY FOG SEAL TO PAVEMENT AFTER PAVING.
3. DUE TO SPECIFIC DESIGN CONSIDERATIONS THE ABOVE MINIMUM RIGHTS-OF-WAY AND CURB TO CURB WIDTHS MAY BE INCREASED.

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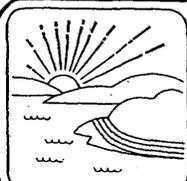
	DATE APPROVED: 10-06-04	STREET IMPROVEMENTS	STANDARD DETAIL
	APPROVED BY:		
	DRAWN: D. MORENO	DATE: 02/25/04	CITY OF LOS BANOS



NOTES:

1. RADII SHOWN ARE FOR RESIDENTIAL CUL-DE-SACS. FOR COMMERCIAL OR INDUSTRIAL CUL-DE-SACS RADII SHALL BE APPROVED BY THE ENGINEER.
2. CUL-DE-SAC SHOWN IS FOR PIE SHAPED LOTS LOCATED AT THE CUL-DE-SAC BULB.

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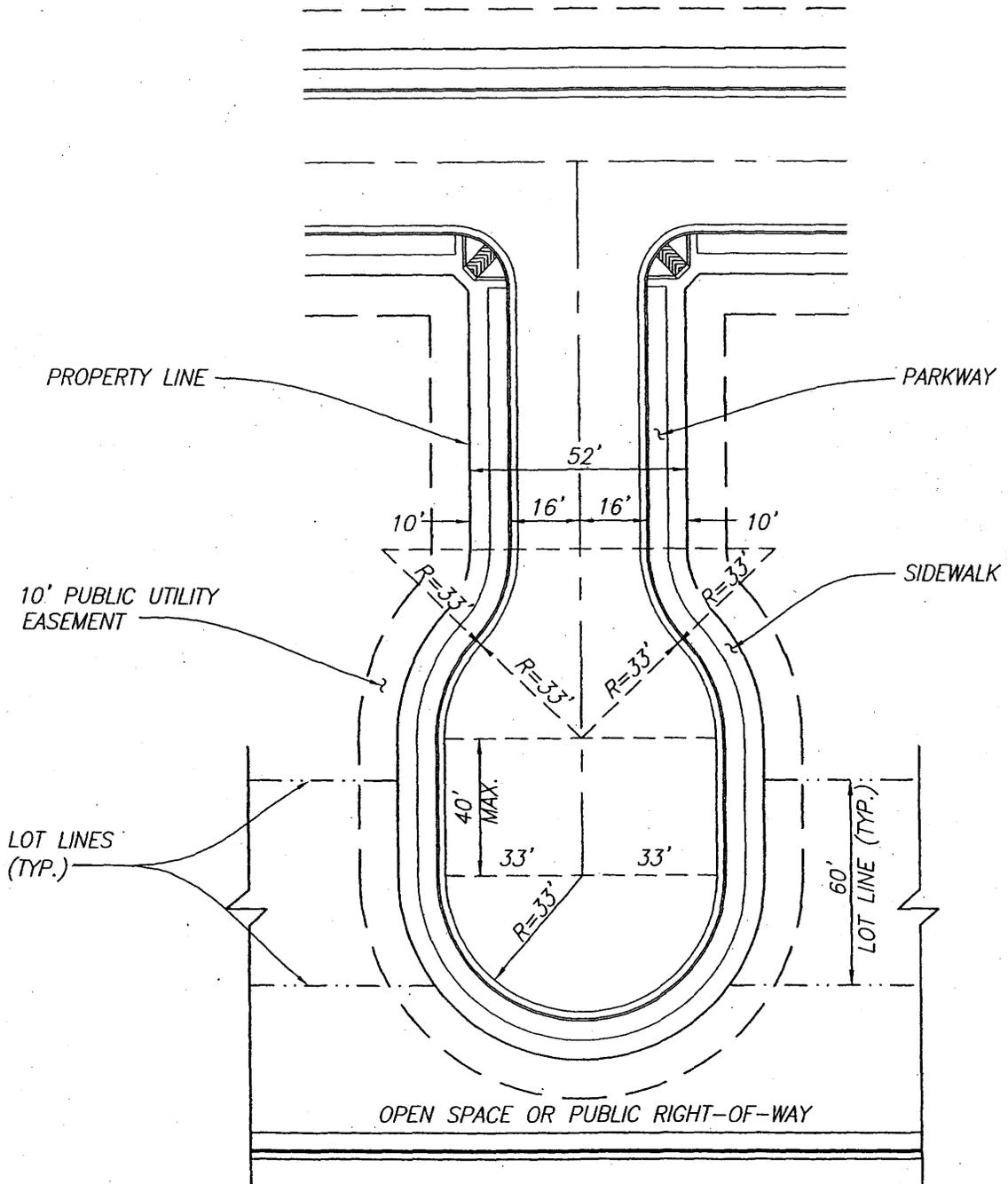


DATE APPROVED: 10-06-04
 APPROVED BY: *[Signature]*
 DRAWN: D. MORENO DATE: 02/25/04

STREET IMPROVEMENTS
 SYMMETRICAL
 CUL-DE-SACS
 CITY OF LOS BANOS

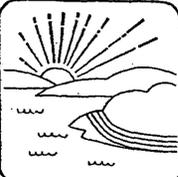
STANDARD DETAIL
 ST-2

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NOTES:

1. RADII SHOWN ARE FOR RESIDENTIAL CUL-DE-SACS. FOR COMERCIAL OR INDUSTRIAL CUL-DE-SACS RADII SHALL BE APPROVED BY THE ENGINEER.
2. LOT LINES FOR THE CUL-DE-SAC SHOWN SHALL BE PERPENDICULAR TO THE CENTERLINE OF THE CUL-DE-SAC.



DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: D. MORENO DATE: 02/25/04

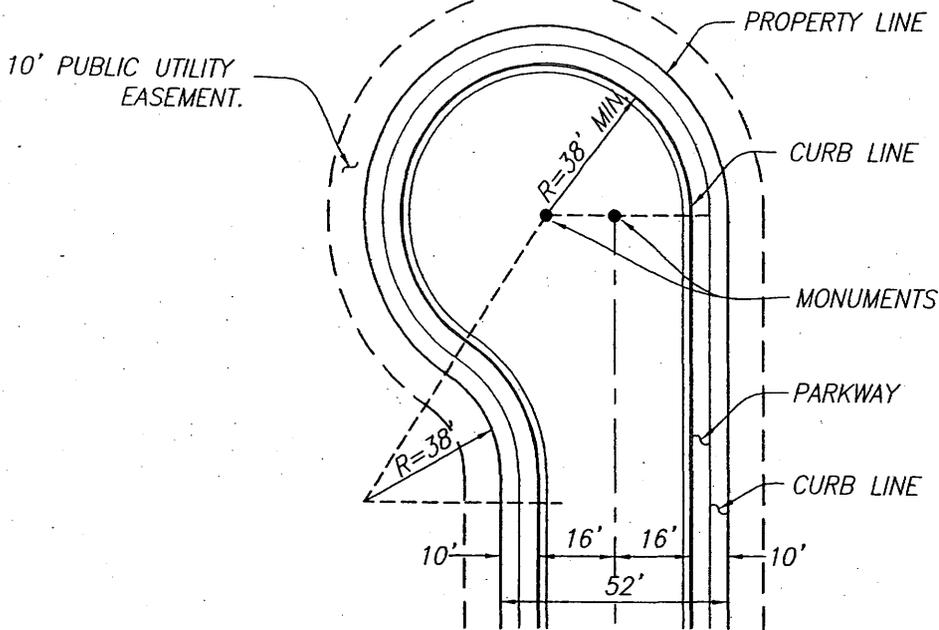
STREET IMPROVEMENTS

SYMMETRICAL CUL-DE-SACS

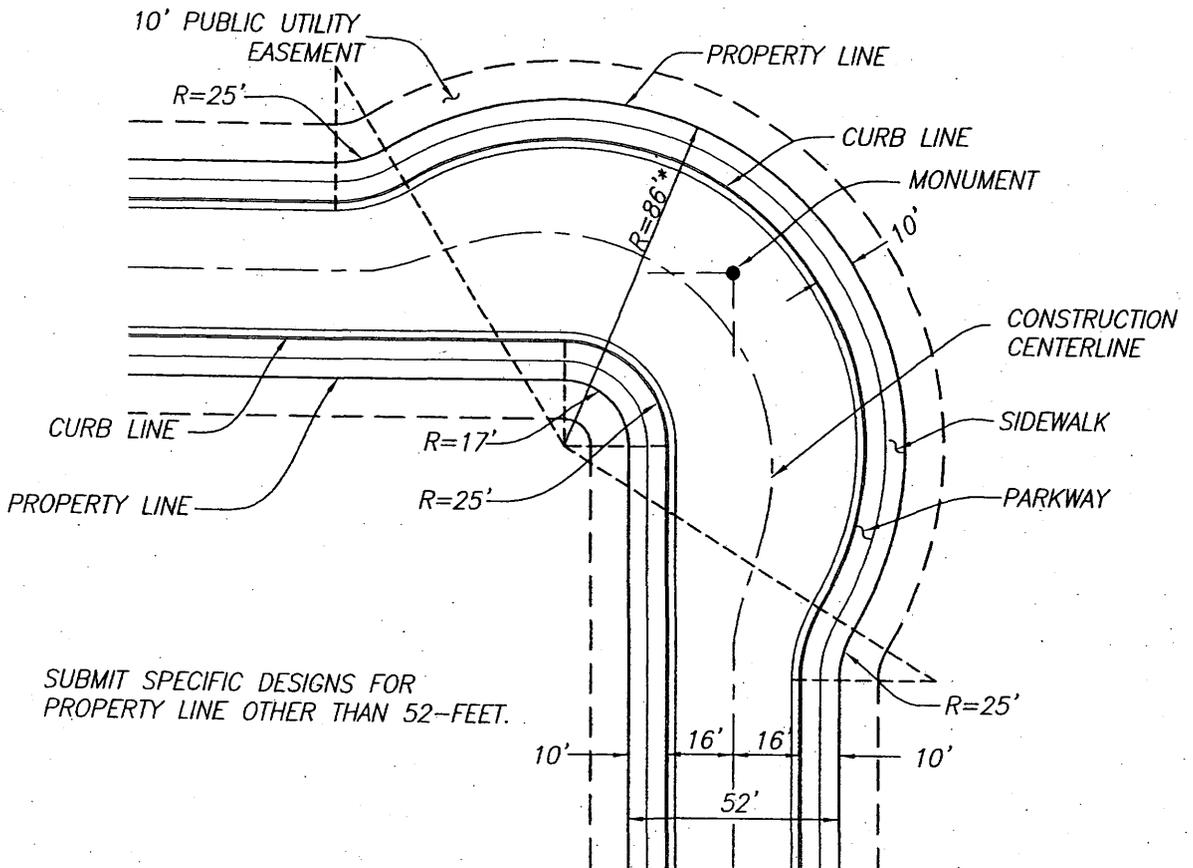
CITY OF LOS BANOS

STANDARD DETAIL

ST-3



UNSYMMETRICAL CUL-DE-SAC

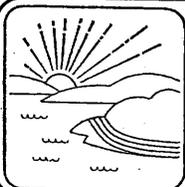


SUBMIT SPECIFIC DESIGNS FOR
PROPERTY LINE OTHER THAN 52- FEET.

KNUCKLE INTERSECTION

* OTHER RADII MAY BE
SUBMITTED FOR CITY APPROVAL

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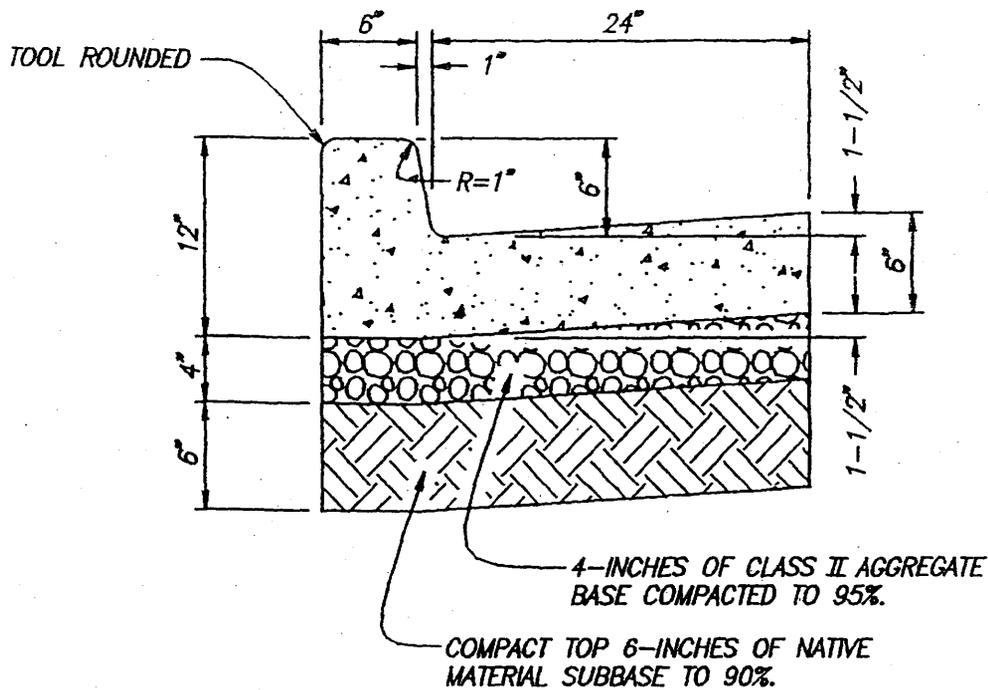
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DRAWN: D. MORENO DATE: 02/25/04

STREET IMPROVEMENTS
UNSYMMETRICAL CUL-DE-SAC &
KNUCKLE INTERSECTION

CITY OF LOS BANOS

STANDARD DETAIL
ST-4



STANDARD CURB AND GUTTER SECTION

NOTES:

1. CITY SHALL APPROVE SUBGRADE & BASEROCK PREPARATION PRIOR TO PLACEMENT OF CONCRETE.
2. ON CURB AND GUTTER REPLACEMENT, 6-INCHES OF CLASS II AGGREGATE BASE COMPACTED TO 95% OVER UNDISTURBED NATIVE MATERIAL SUBBASE MAY BE USED IN LIEU OF 4-INCHES OF CLASS II AGGREGATE BASE (95% COMPACTION) OVER 6-INCHES OF NATIVE MATERIAL SUBBASE (90% COMPACTION).
3. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.
4. CURB HEIGHT SHALL BE 6-INCHES UNLESS OTHERWISE SPECIFIED.



DATE APPROVED: 1-19-94

APPROVED BY:

Gerald L. Hema

DRAWN: ALEX BUENROSTRO DATE: 7/01/93

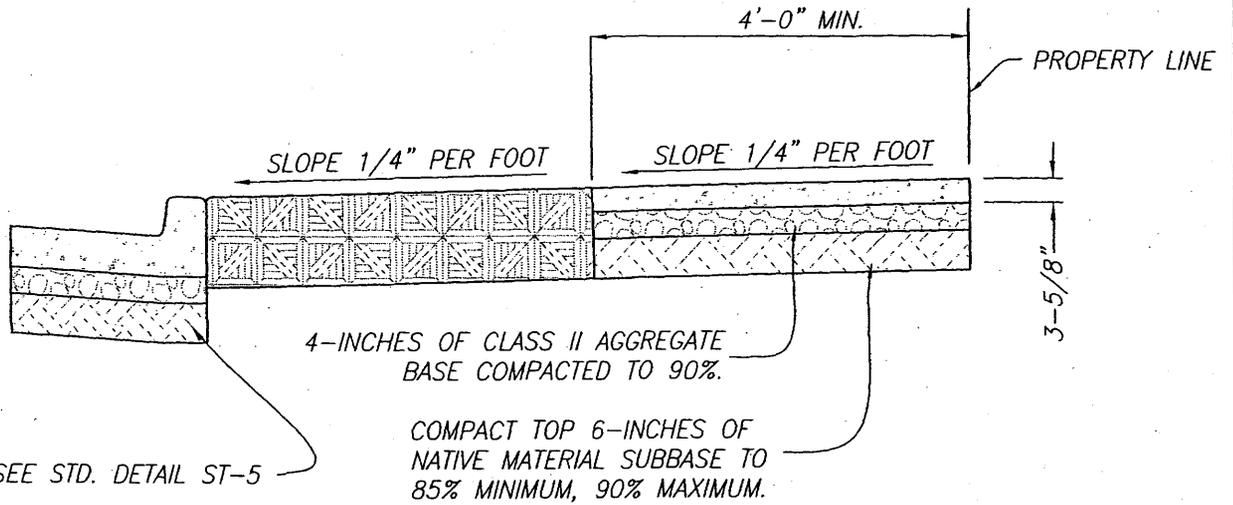
STREET IMPROVEMENTS

STANDARD
CURB & GUTTER SECTION

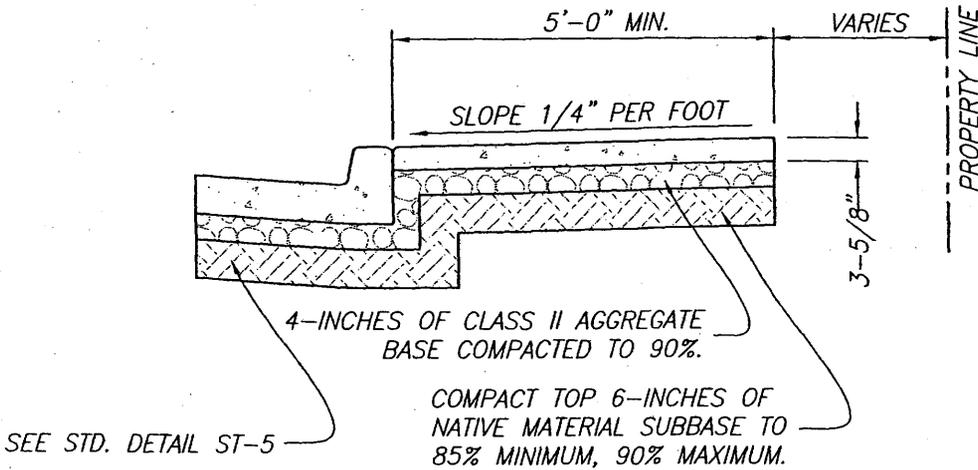
CITY OF LOS BANOS

STANDARD DETAIL

ST-5



SIDEWALK WITH PARKWAY

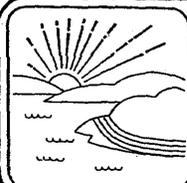


INTEGRAL SIDEWALK, CURB AND GUTTER

NOTES:

1. CITY SHALL APPROVE SUBGRADE AND BASEROCK PREPARATION PRIOR TO PLACEMENT OF CONCRETE.
2. ON SIDEWALK, CURB AND GUTTER REPLACEMENT, 6-INCHES OF CLASS II AGGREGATE BASE COMPACTED TO 90% OVER UNDISTURBED NATIVE MATERIAL SUBBASE, MAY BE USED IN LIEU OF 4-INCHES OF CLASS II AGGREGATE BASE (90% COMPACTION) OVER 6-INCHES OF COMPACTED NATIVE MATERIAL SUBBASE.
3. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.
4. IMMEDIATELY PRIOR TO PLACEMENT OF CONCRETE, THE GEOTECHNICAL ENGINEER SHALL CERTIFY THE MOISTURE CONTENT OF THE NATIVE MATERIAL SUBBASE HAS A MOISTURE CONTENT OF NOT LESS THAN 3% ABOVE OPTIMUM TO A DEPTH OF 18 INCHES. IN ADDITION, AGGREGATE BASE SHALL HAVE A MOISTURE CONTENT AS SPECIFIED BY THE DIRECTOR.

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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: D. MORENO DATE: 02/25/04

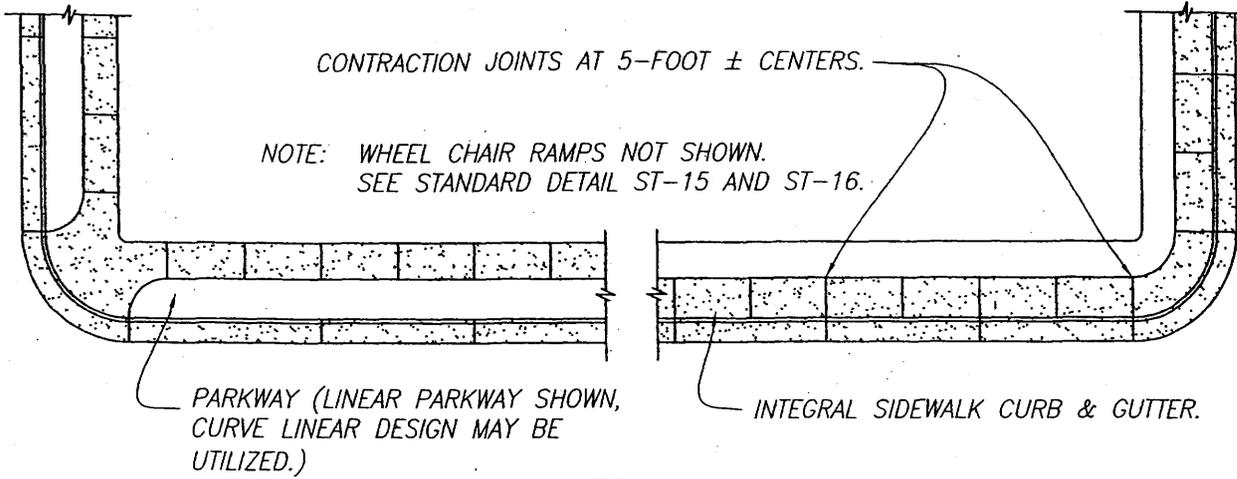
STREET IMPROVEMENTS

SIDEWALK
CURB & GUTTER SECTION

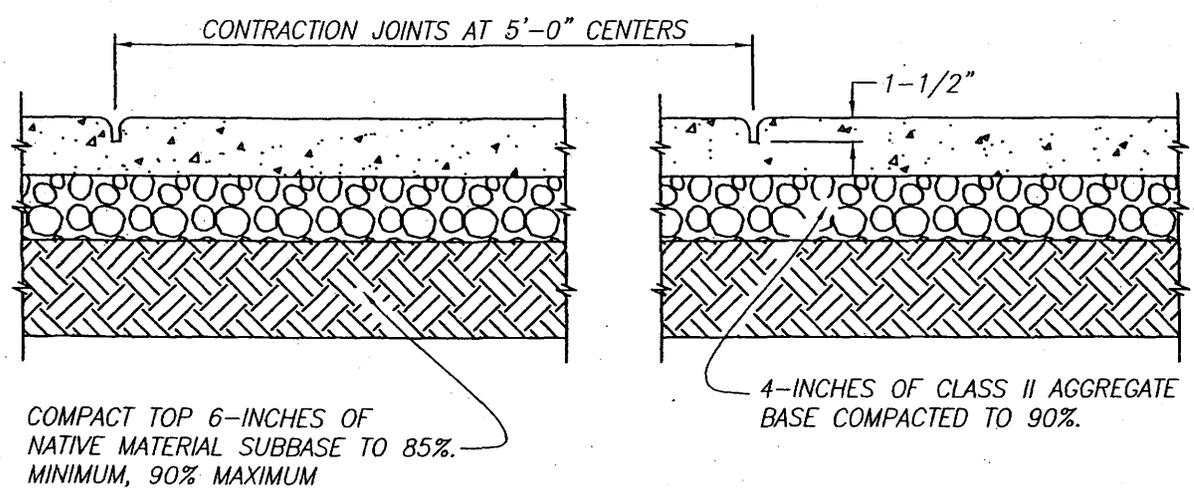
CITY OF LOS BANOS

STANDARD DETAIL

ST-6



**PLAN
TYPICAL CITY BLOCK**



LONGITUDINAL SECTIONS

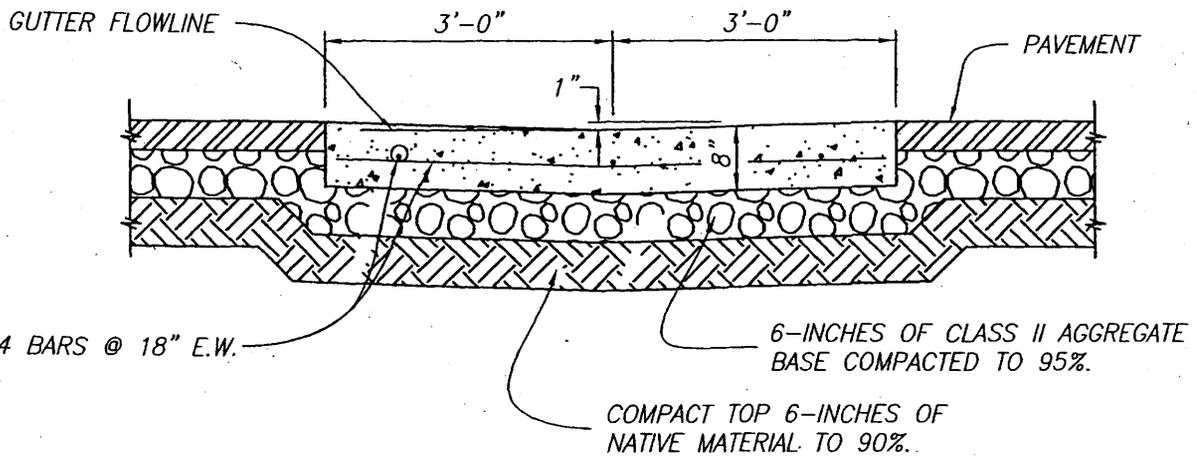
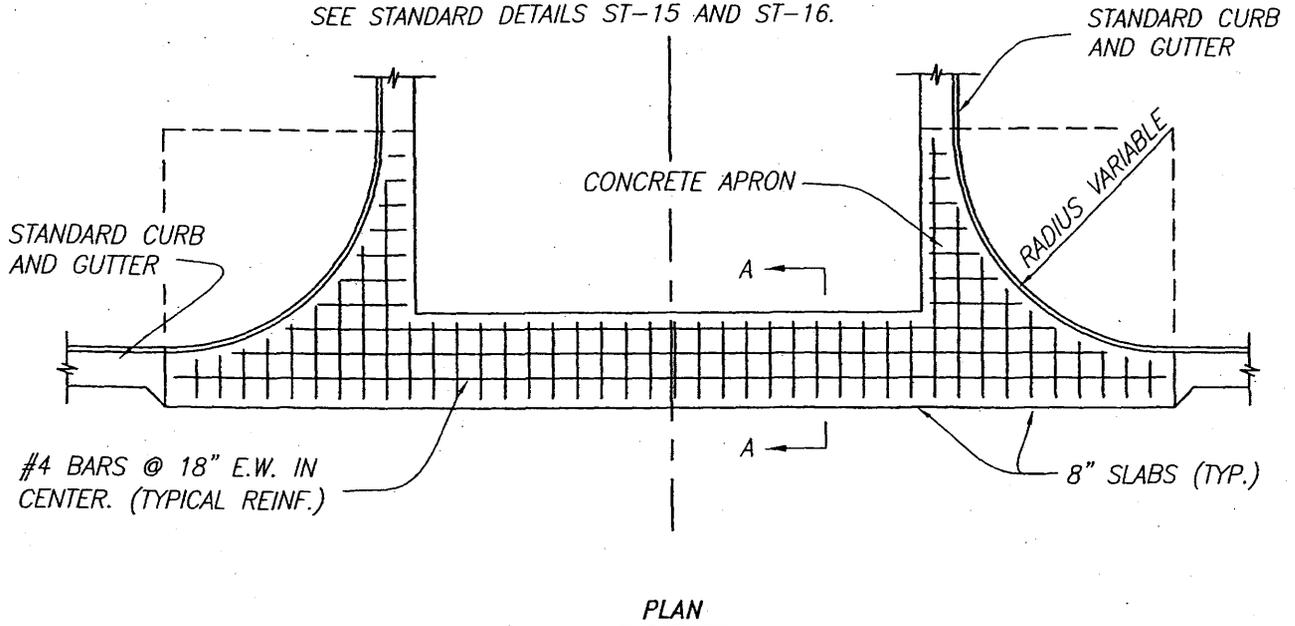
NOTES:

1. EDGES TO HAVE 3/4-INCH RADIUS.
2. CONTRACTION JOINTS MAY BE SAWED.
3. WHEN BREAKING OUT SIDEWALK, CONCRETE SHALL BE REMOVED TO THE NEAREST CONTRACTION JOINT.
4. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.
5. CITY SHALL APPROVE SUBGRADE AND BASEROCK PREPARATION PRIOR TO PLACEMENT OF CONCRETE.
6. SEE STANDARD DETAIL ST-6 FOR SUBGRADE AND BASE MOISTURE REQUIREMENTS.

\\Server_1\Library\Details\City of Los Banos\Street Improvements\st-07.dwg

	DATE APPROVED: 10-06-04	STREET IMPROVEMENTS	STANDARD DETAIL
	APPROVED BY:	SIDEWALK CONSTRUCTION	ST-7
	DRAWN: MARK ARRIETA DATE: 02/25/04	CITY OF LOS BANOS	

NOTE: WHEEL CHAIR RAMPS NOT SHOWN
SEE STANDARD DETAILS ST-15 AND ST-16.

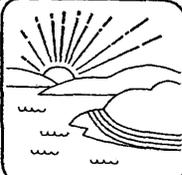


SECTION A-A

NOTES:

1. MINIMUM DIFFERENCE IN ELEVATION ACROSS GUTTER TO BE 0.30 FEET.
2. BOTH APRONS AND GUTTER SHALL BE PLACED OVER 6-INCHES OF CLASS II AGGREGATE BASE COMPACTED TO 95%.
3. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.

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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: MARK ARRIETA DATE: 02/25/04

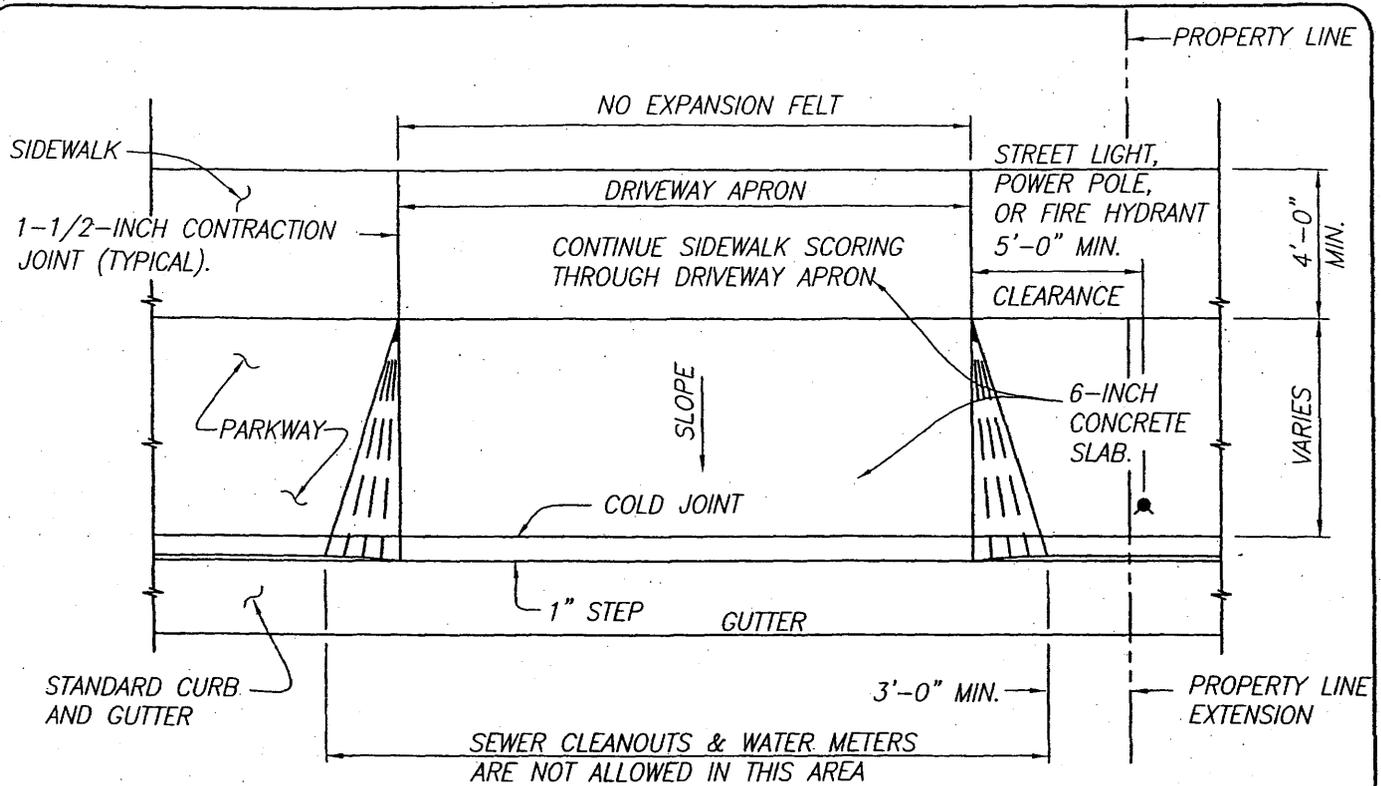
STREET IMPROVEMENTS

VALLEY CROSS GUTTER

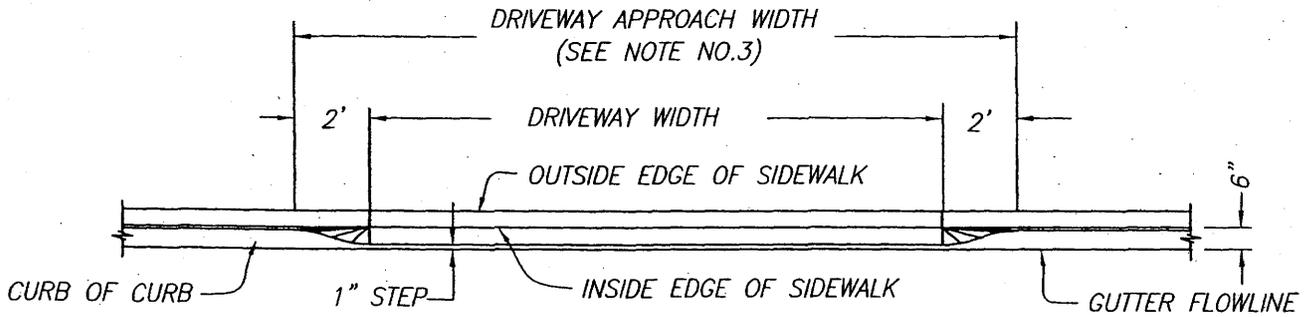
CITY OF LOS BANOS

STANDARD DETAIL

ST-8



PLAN

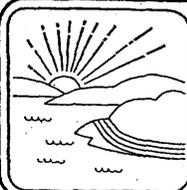


ELEVATION

NOTES:

1. DRIVEWAY APPROACHES SHALL BE INSTALLED OVER 4-INCHES OF CLASS II AGGREGATE BASE COMPACTED TO 90%, OVER 6-INCHES OF NATIVE MATERIAL SUBBASE COMPACTED TO 85% MINIMUM, 90% MAXIMUM.
2. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.
3. THE MAXIMUM DRIVEWAY APPROACH WIDTH SHALL CONFORM TO PART II, SECTION 1, PARAGRAPH 1-4.3 OF THESE STANDARDS.
4. WHEN INSTALLING A NEW DRIVEWAY IN EXISTING CURB, GUTTER AND SIDEWALK, SAWCUT TOP AND FACE OF CURB, GUTTER AND SIDEWALK TO A MINIMUM DEPTH OF 2 INCHES PRIOR TO REMOVAL. CHIP CONCRETE TO A VERTICAL PLANE BELOW SAWCUT.

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DATE APPROVED: 10-06-04

APPROVED BY:

DRAWN: E. MORENO DATE: 02/25/04

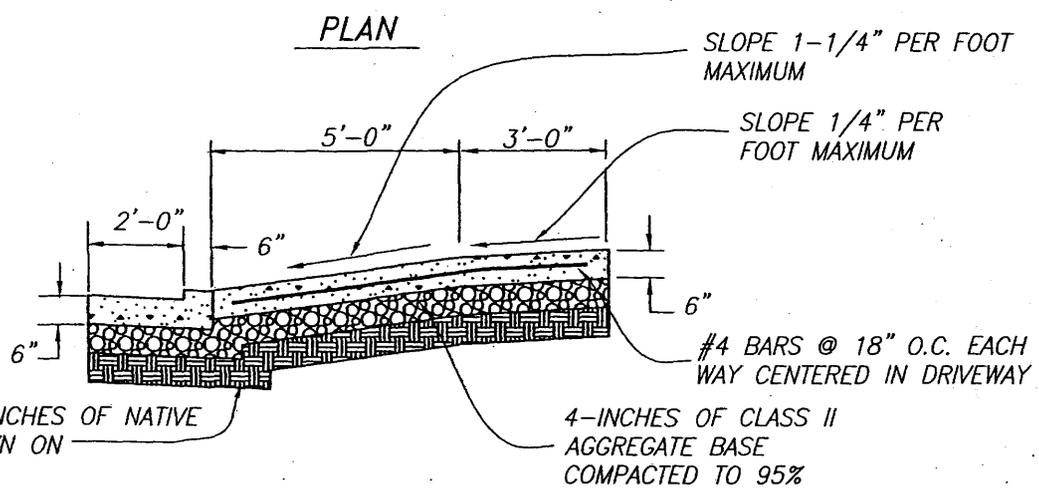
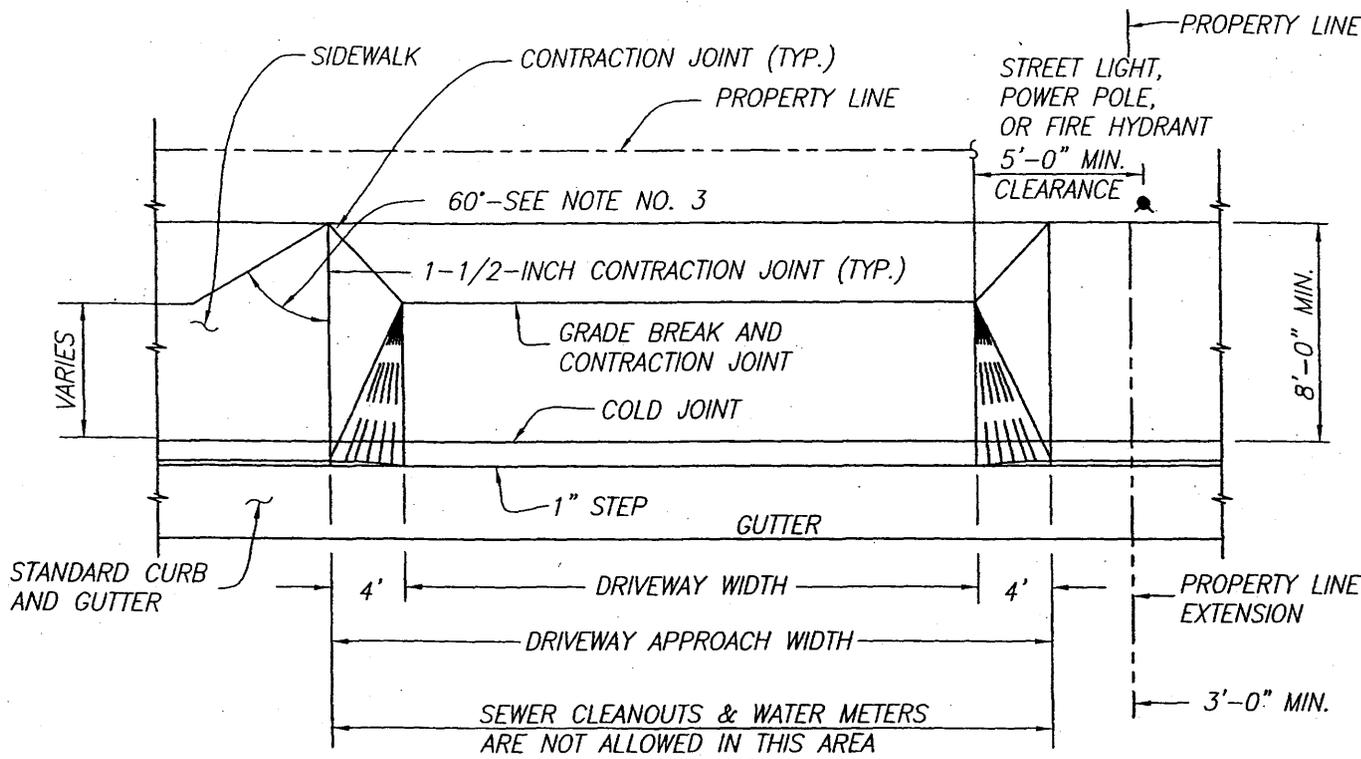
STREET IMPROVEMENTS

RESIDENTIAL DRIVEWAY

CITY OF LOS BANOS

STANDARD DETAIL

ST-9



COMPACT TOP 6-INCHES OF NATIVE MATERIAL AS SHOWN ON STD. DETAIL ST-6

ELEVATION

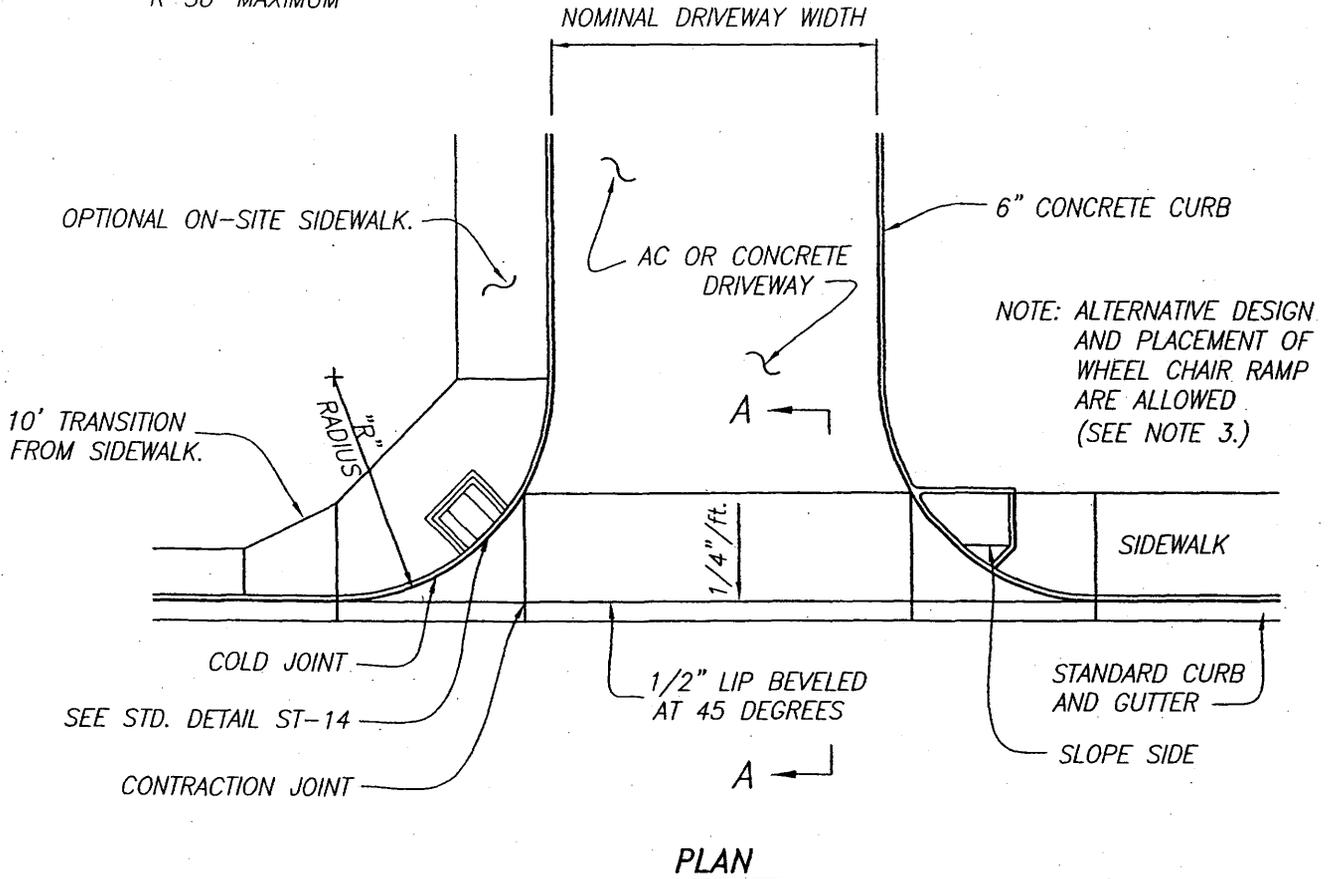
NOTES:

1. SHOWN FOR INTEGRAL SIDEWALK CURB AND GUTTER. FOR DRIVEWAY WITH PARKWAY, PLAN AND ELEVATION SIMILAR TO ST-9. EXTEND REINFORCING STEEL THROUGH DRIVEWAY APRON.
2. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.
3. PROVIDE TRANSITION TO SIDEWALKS THAT ARE LESS THAN 8- FEET IN WIDTH.
4. THE MAXIMUM DRIVEWAY APPROACH WIDTH SHALL CONFORM TO PART II, SECTION 1, PARAGRAPH 1-4.3 OF THESE STANDARDS.
5. WHEN INSTALLING A NEW DRIVEWAY IN EXISTING CURB, GUTTER, AND SIDEWALK, SAWCUT TOP AND FACE OF CURB, GUTTER AND SIDEWALK TO A MINIMUM DEPTH OF 2 INCHES PRIOR TO REMOVAL. CHIP CONCRETE TO A VERTICAL PLANE BELOW SAWCUT.

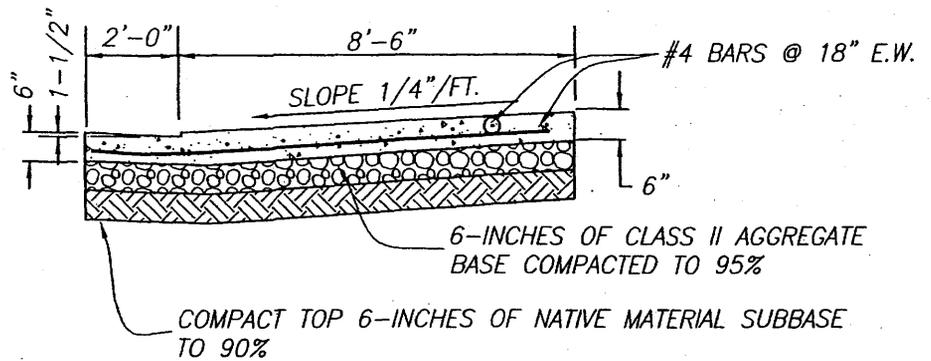
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	DATE APPROVED: 10-06-04	STREET IMPROVEMENTS	STANDARD DETAIL
	APPROVED BY:	COMMERCIAL/INDUSTRIAL DRIVEWAY	
	DRAWN: B. MORENO DATE: 10/18/00	CITY OF LOS BANOS	

NOTE: R-10' MINIMUM
R-30' MAXIMUM



PLAN

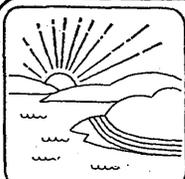


SECTION A-A

NOTES:

1. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.
2. PROVIDE TYPE "A" CATCH BASIN ON UPSTREAM SIDE OF DRIVEWAY APPROACH IF DEPTH OF FLOW IN GUTTER EXCEEDS 3-INCHES.
3. WHEEL CHAIR RAMP TYPE USED SHALL BE DETERMINED BASED ON DIMENSIONS OF CROSSWALK AND CURB RETURN RADIUS AND SHALL MEET THE STATE HANDICAPPED ACCESSIBILITY STANDARDS.

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DATE APPROVED: 10-06-04

APPROVED BY:

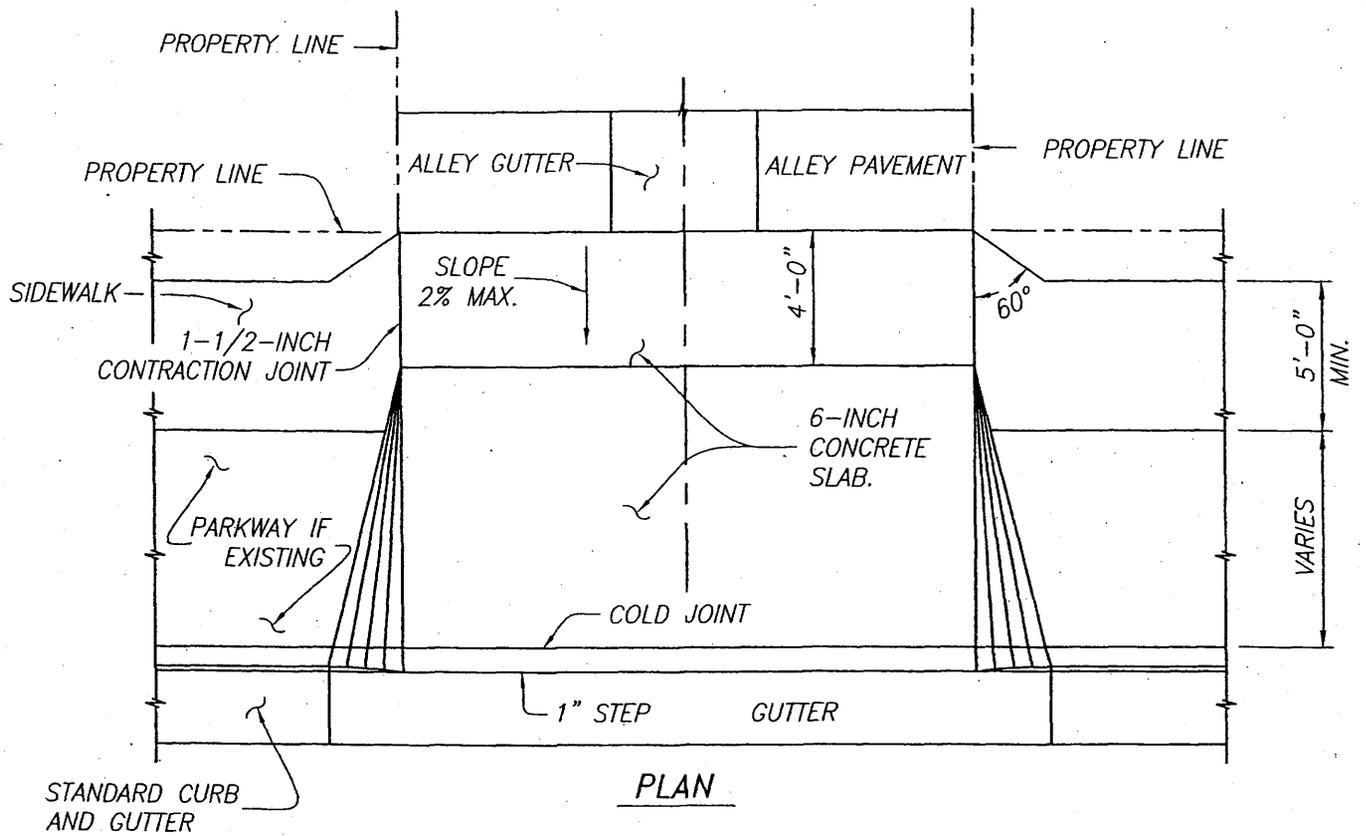
DRAWN: ALEX BUENROSTRO DATE: 7/01/93

STREET IMPROVEMENTS
SPECIAL
COMMERCIAL DRIVEWAY

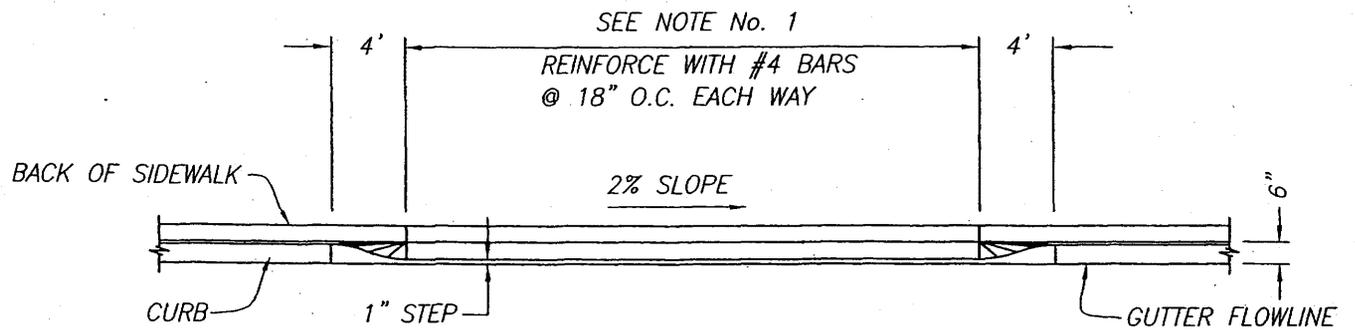
CITY OF LOS BANOS

STANDARD DETAIL

ST-11



PLAN

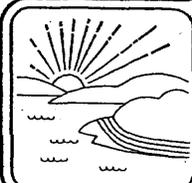


ELEVATION

NOTES:

1. MINIMUM ALLEY WIDTH FOR RESIDENTIAL DEVELOPMENTS SHALL BE 26 FEET. FOR COMMERCIAL ALLEY, THE MINIMUM WIDTH SHALL BE 30 FEET.
2. ALLEY APPROACHES SHALL BE INSTALLED OVER 6-INCHES OF CLASS II AGGREGATE BASE COMPACTED TO 95%, OVER 6-INCHES OF NATIVE MATERIAL SUBBASE COMPACTED TO 90%.
3. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.
4. ALLEY SHALL BE SYMMETRICAL ABOUT CENTERLINE.

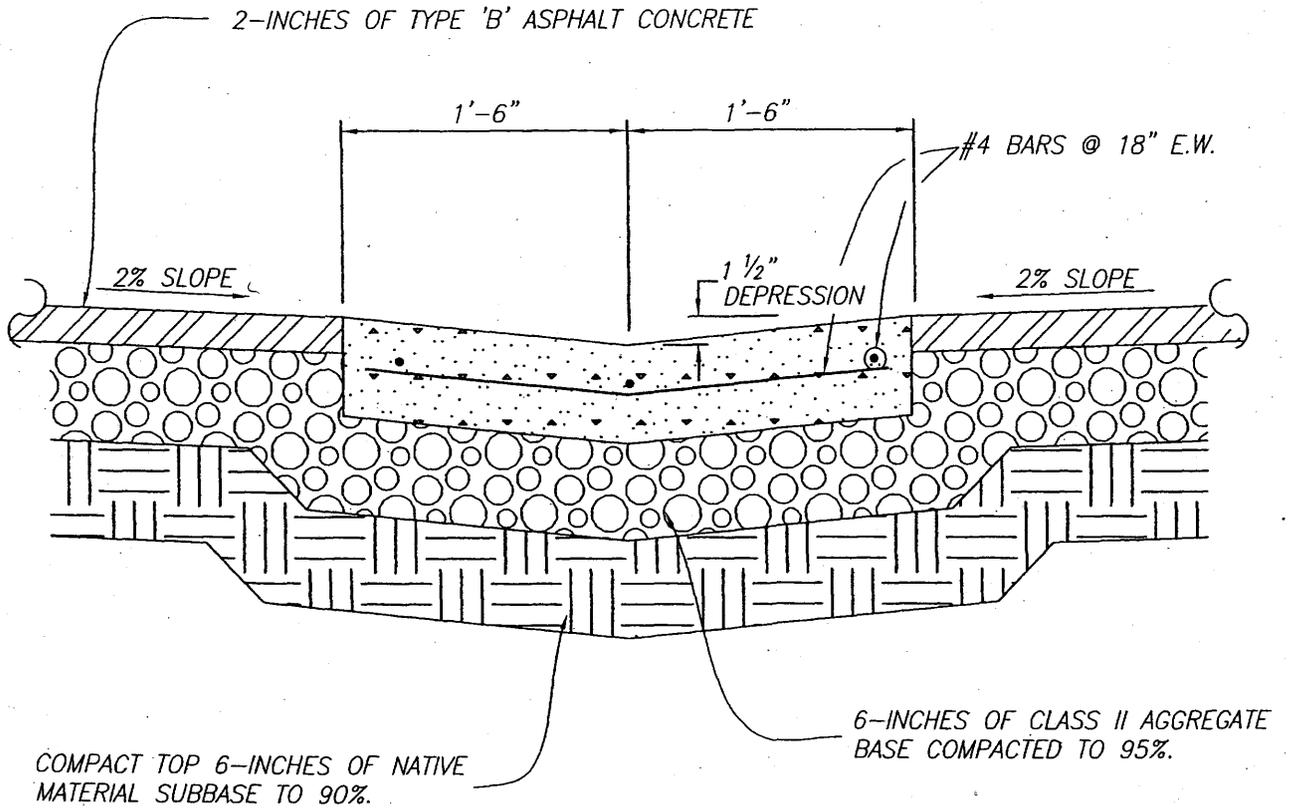
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DATE APPROVED: 10-06-04
 APPROVED BY: *[Signature]*
 DRAWN: MARK ARRIETA DATE: 02/27/04

STREET IMPROVEMENTS
 ALLEY APPROACH DETAILS
 CITY OF LOS BANOS

STANDARD DETAIL
 ST-12

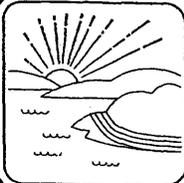


SECTION

NOTES:

1. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557.

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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: MARK ARRIETA DATE: 02/27/04

STREET IMPROVEMENTS

ALLEY GUTTER AND PAVEMENT SECTION

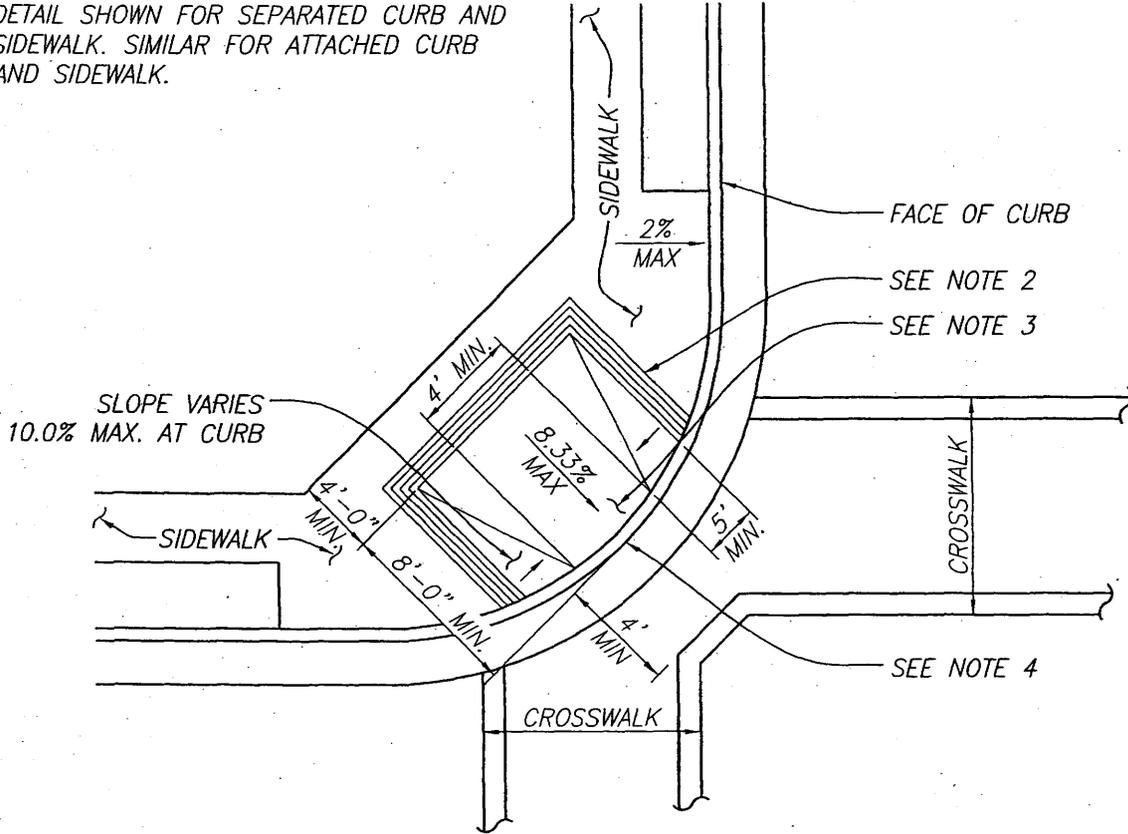
CITY OF LOS BANOS

STANDARD DETAIL

ST-13

NOTES:

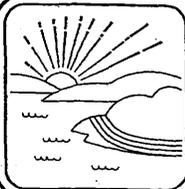
DETAIL SHOWN FOR SEPARATED CURB AND SIDEWALK. SIMILAR FOR ATTACHED CURB AND SIDEWALK.



NOTES:

1. SIDEWALK AND WHEEL CHAIR RAMP IN RETURN AREA SHALL BE 5 1/2 INCHES THICK MINIMUM.
2. THE RAMP SHALL HAVE A 12-INCH WIDE BORDER WITH 1/4 INCH BY 1/4 INCH GROOVES APPROXIMATELY 3/4 INCH ON CENTERS. THE SURFACE OF THE RAMP SHALL HAVE A TRANSVERSE BROOMED TEXTURE ROUGHER THAN THE SURROUNDING SIDEWALK. BORDER SHALL BE ON SIDEWALK PORTION.
3. A DETECTABLE WARNING (RAISED TRUNCATED DOMES) SHALL BE INSTALLED THE FULL WIDTH AND DEPTH OF THE CURB RAMP INSIDE THE GROOVED BORDER WHEN THE RAMP SLOPE IS LESS THAN 6.7%. DETECTABLE WARNINGS SHALL CONTRAST VISUALLY WITH THE ADJOINING SURFACE. THE MATERIAL USED SHALL BE AN INTEGRAL PART OF THE WALKING SURFACE.
4. TOP OF CURB SHALL BE FLUSH WITH GUTTER FLOWLINE AT RAMP.

Oct 26, 2004 - 11:28am
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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: MARK ARRIETA DATE: 02/27/04

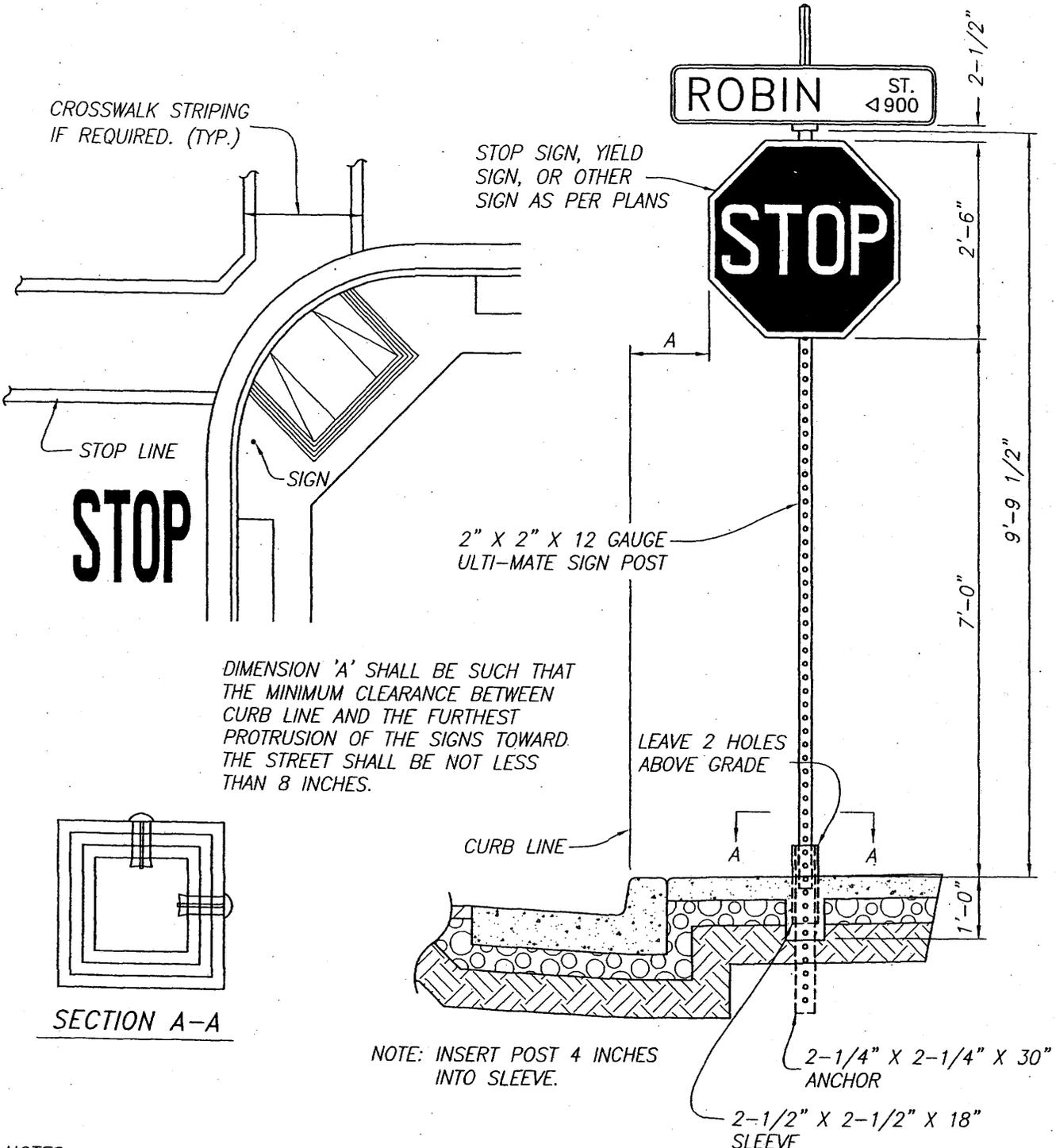
STREET IMPROVEMENTS

**WHEEL CHAIR RAMP
DETAIL**

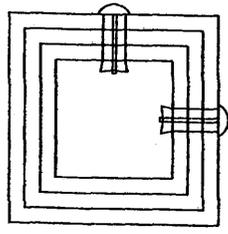
CITY OF LOS BANOS

STANDARD DETAIL

ST-14



DIMENSION 'A' 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 8 INCHES.



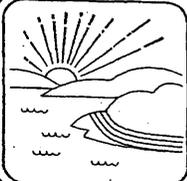
SECTION A-A

NOTE: INSERT POST 4 INCHES INTO SLEEVE.

NOTES:

1. SEE STANDARD DETAIL ST-16 FOR ADDITIONAL INFORMATION ON STREET NAME SIGN ASSEMBLY.
2. STOP SIGNS SHALL BE REFLECTIVE TYPE: 3M ENGINEER GRADE REFLECTIVE MATERIAL OR EQUAL.
3. "STOP" PAVEMENT MARKING STOP LINE AND CROSS WALK STRIPINGS SHALL BE OF THERMOPLASTIC MATERIAL IN ACCORDANCE WITH SECTION 84-2, OF THE STATE STANDARD SPECIFICATIONS.
4. LOCATE POLE IN CONCRETE AREA UNLESS SHOWN OTHERWISE ON PLANS.

May 27, 2004 - Jim
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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: B. MORENO DATE: 05/27/04

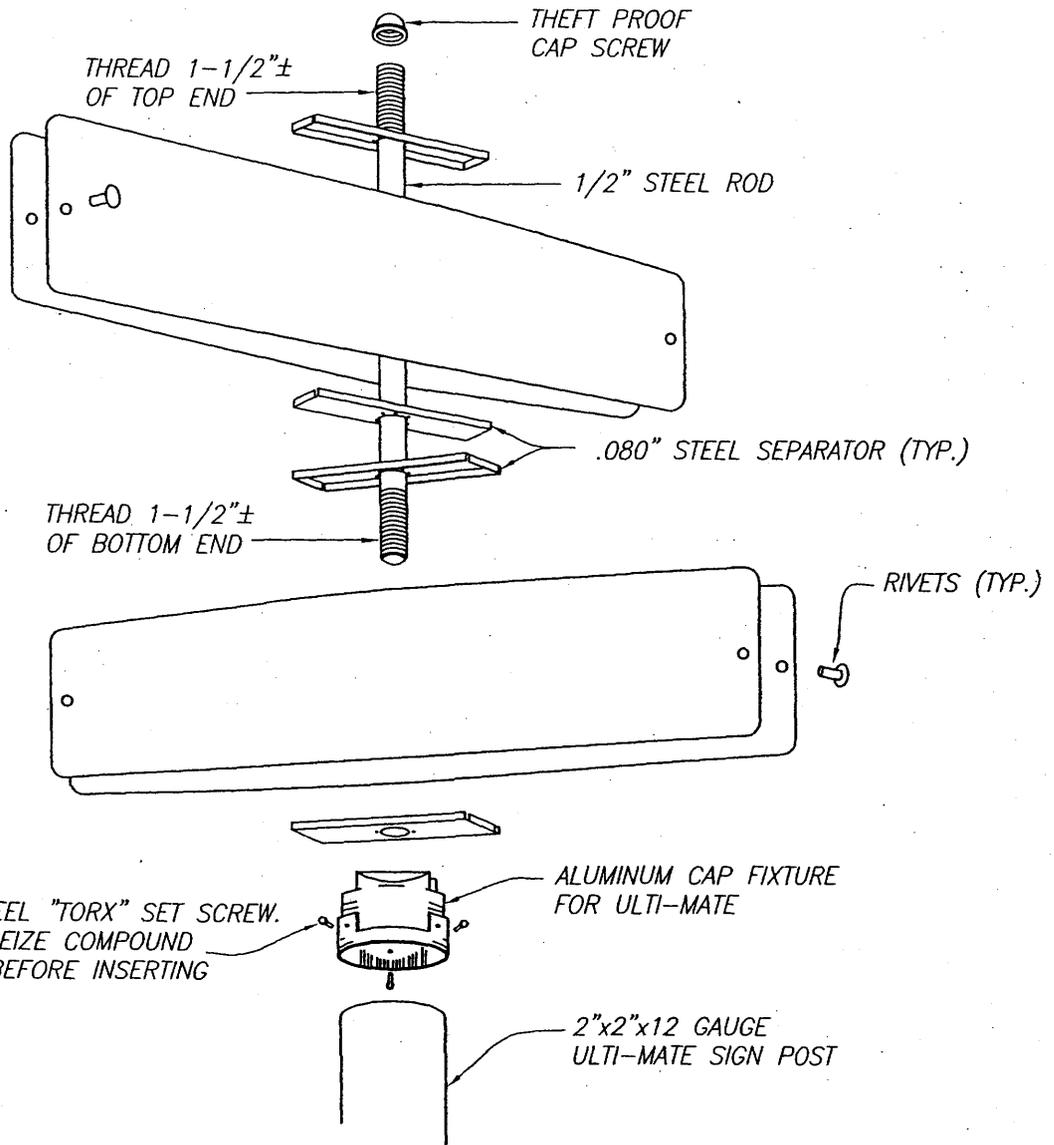
STREET IMPROVEMENTS

STREET SIGNS

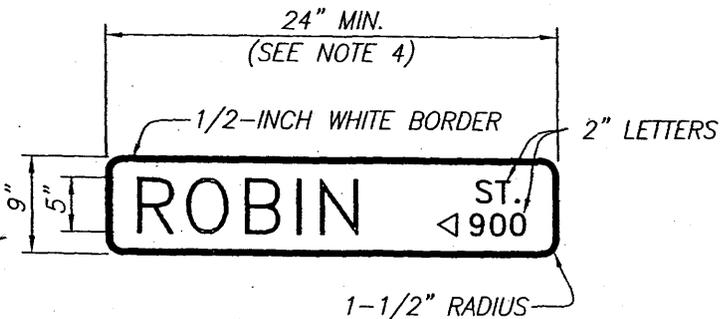
CITY OF LOS BANOS

STANDARD DETAIL

ST-15



STREET NAME SIGN HARDWARE

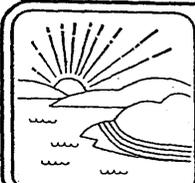


STREET SIGN

NOTES:

1. STREET NAME SIGN TO BE PLACED 7'-6" MINIMUM ABOVE GROUND.
2. SEE STANDARD DETAIL ST-15 FOR MOUNTING LOCATIONS AND INSTALLATION DETAILS.
3. STREET NAME SIGN SHALL BE REFLECTORIZED, AND SHALL HAVE A WHITE BORDER ON A GREEN BACKGROUND.
4. LENGTH OF 30" AND 36" MAY BE USED TO ACCOMMODATE LONGER STREET NAMES.

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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: MARK ARRIETA DATE: 02/27/04

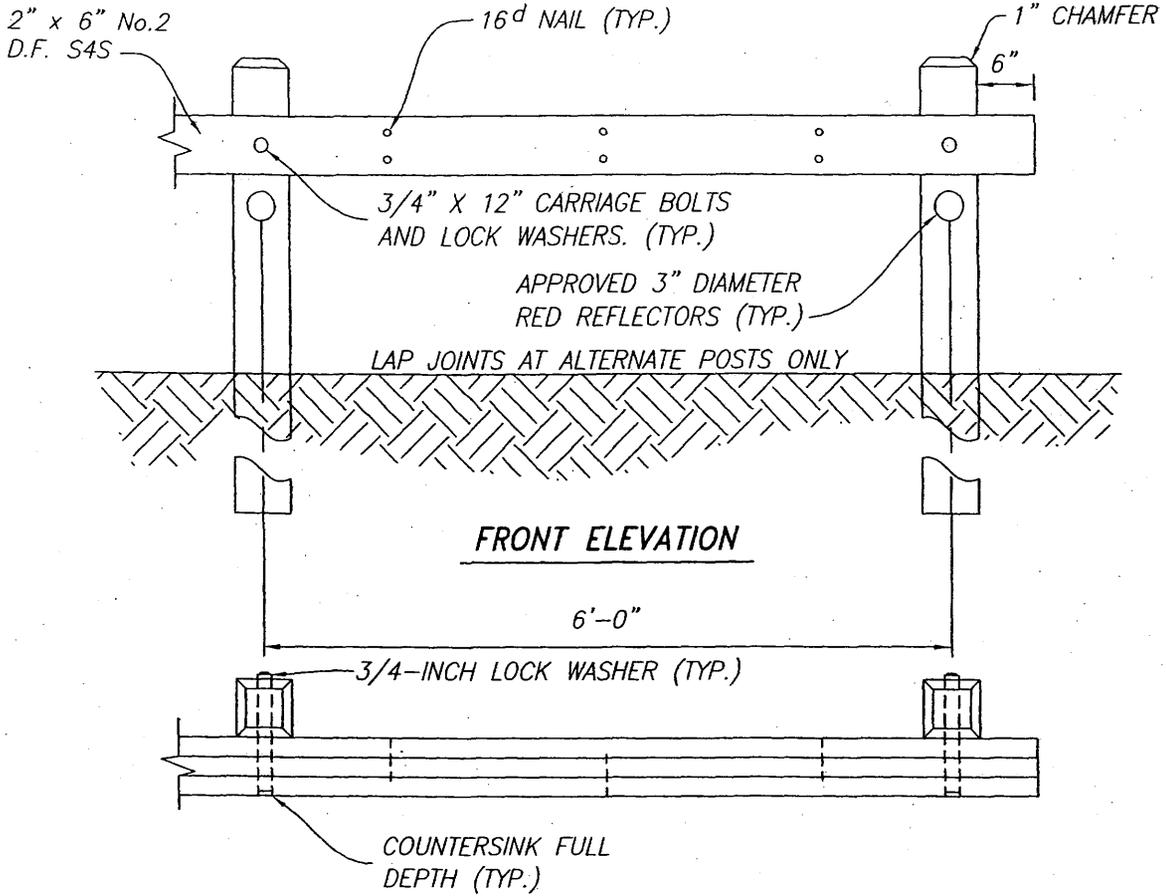
STREET IMPROVEMENTS

STREET NAME SIGN

CITY OF LOS BANOS

STANDARD DETAIL

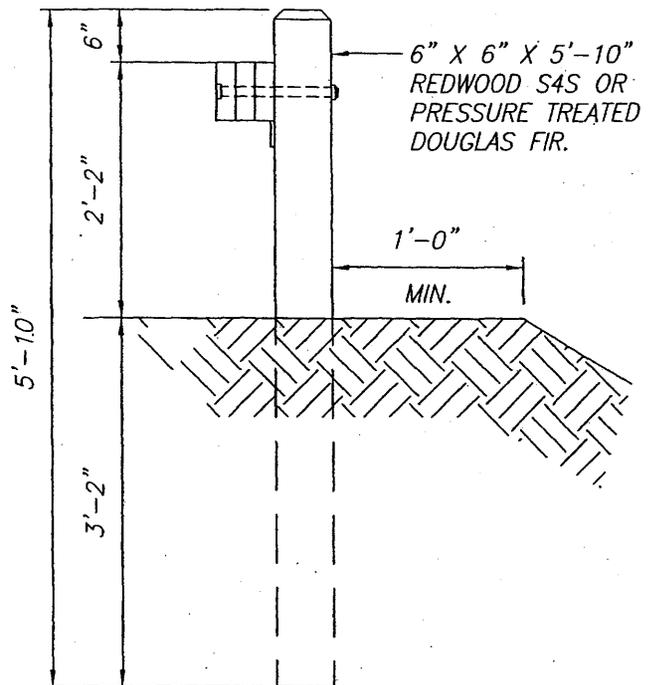
ST-16



PLAN VIEW

NOTES:

1. ALL EXPOSED WOOD SURFACES SHALL HAVE TWO (2) COATS OF WHITE LATEX PAINT CONFORMING TO SECTION 91-3.02 OF THE STATE STANDARD SPECIFICATIONS OVER ONE (1) COAT OF PRIMER CONFORMING TO SECTION 91-3.01.
2. FINAL COAT OF PAINT SHALL BE APPLIED AFTER FABRICATION AND INSTALLATION OF BARRICADE.
3. BARRICADES SHALL EXTEND ACROSS CURBS AND SIDEWALKS.
4. EROSION CONTROL, IF REQUIRED BY THE CITY, SHALL BE INSTALLED AT BARRICADES.



SIDE ELEVATION

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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: MARK ARRIETA DATE: 03/01/04

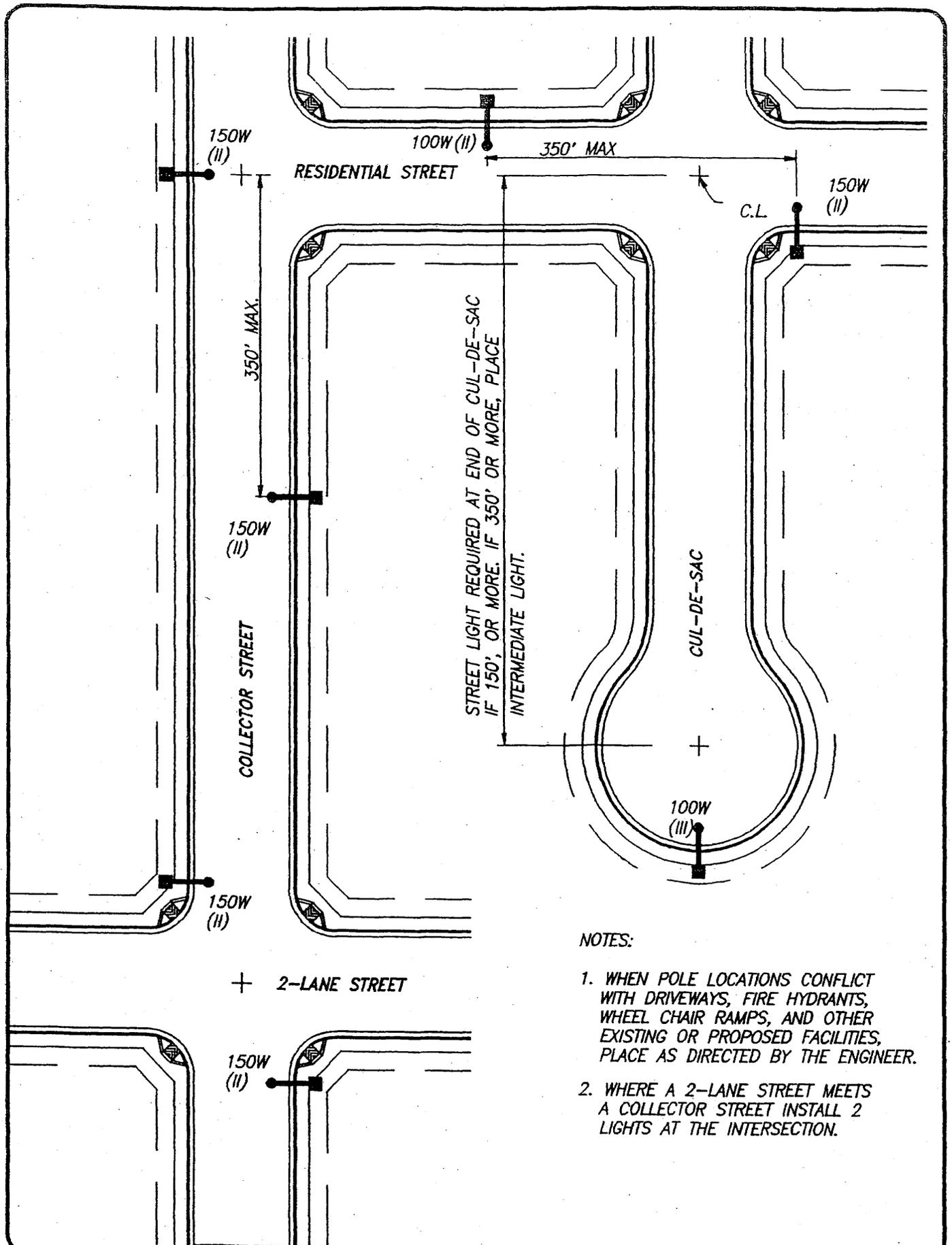
STREET IMPROVEMENTS

STREET BARRICADES

CITY OF LOS BANOS

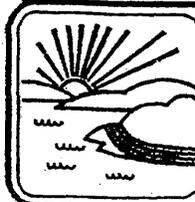
STANDARD DETAIL

ST-17



NOTES:

1. WHEN POLE LOCATIONS CONFLICT WITH DRIVEWAYS, FIRE HYDRANTS, WHEEL CHAIR RAMPS, AND OTHER EXISTING OR PROPOSED FACILITIES, PLACE AS DIRECTED BY THE ENGINEER.
2. WHERE A 2-LANE STREET MEETS A COLLECTOR STREET INSTALL 2 LIGHTS AT THE INTERSECTION.



DATE APPROVED: 1-19-94

APPROVED BY: *Gerald L. Herman*

DRAWN: ALEX BUENROSTRO DATE: 12/4/92

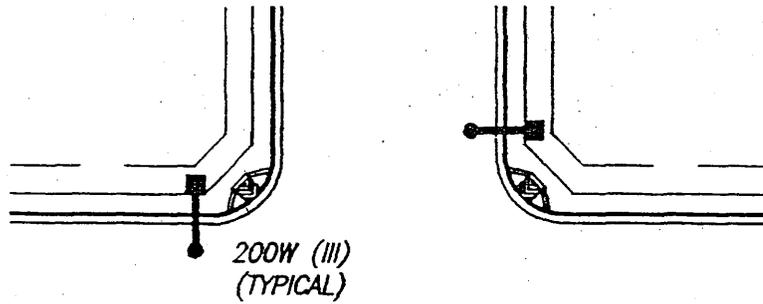
STREET LIGHTING

LOCATIONS OF 25' POLES

CITY OF LOS BANOS

STANDARD DETAIL

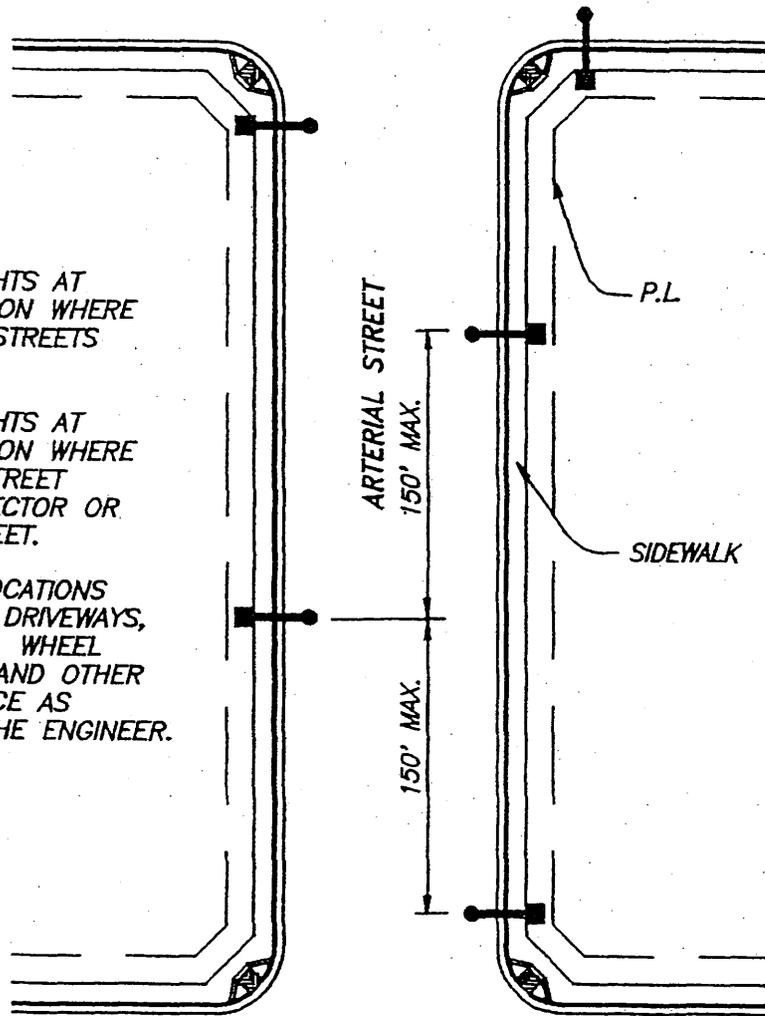
SL-1



ARTERIAL STREET

NOTES:

1. INSTALL 4-LIGHTS AT THE INTERSECTION WHERE TWO ARTERIAL STREETS MEET.
2. INSTALL 2-LIGHTS AT THE INTERSECTION WHERE AN ARTERIAL STREET MEETS A COLLECTOR OR A 2-LANE STREET.
3. WHEN POLE LOCATIONS CONFLICT WITH DRIVEWAYS, FIRE HYDRANTS, WHEEL CHAIR RAMPS, AND OTHER FACILITIES, PLACE AS DIRECTED BY THE ENGINEER.



COLLECTOR OR 2-LANE STREET



DATE APPROVED: 1-19-94

APPROVED BY:

David L. Herman

DRAWN: ALEX BUENROSTRO

DATE: 7/01/93

STREET LIGHTING

LOCATIONS OF
30' POLES

CITY OF LOS BANOS

STANDARD DETAIL

SL-2

6'-0" OR 10'-0" - PER SECTION
710 OF THESE IMPROVEMENT STANDARDS

LUMINAIRES

25'-0" OR 30'-0"

3" X 5" INSPECTION PLATE

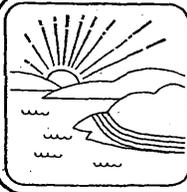
SIDEWALK GRADE

FOR FOUNDATION DETAIL
SEE STANDARD DETAIL SL-4

NOTES:

1. POLES SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF EEI-NEMA STANDARD FOR STREET LIGHTING POLES, EEI PUBLICATION NO. TDJ-135.
2. ALL STEEL & ALUMINUM POLES TO HAVE 1/2" SQUARE GROUNDING OR NUT HOLDER IN THE POLE DIRECTLY OPPOSITE THE HANDHOLE.
3. ALL STEEL POLES, LUMINAIRE ARMS AND ANCHOR BOLTS SHALL BE HOT DIP GALVANIZED PER ASTM DESIGNATION A 153.
4. ALL STEEL AND ALUMINUM POLES TO BE FURNISHED WITH HANDHOLES AND HANDHOLE COVERS.
5. POLES TO BE FURNISHED WITH CAST ALUMINUM POLE BASE COVERS.
6. POLE CENTERLINE SHALL BE 1'-3" BEHIND BACK OF SIDEWALK FOR ADJACENT CURB AND SIDEWALK. FOR SEPARATED CURB AND SIDEWALK, POLE SHALL BE 1'-3" BEHIND BACK OF CURB.
7. POLE SHALL BE VALMONT DS32 OR EQUAL.
8. LUMINAIRE ARMS SHALL BE OF THE TAPERED TUBULAR DESIGN.

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DATE APPROVED:

APPROVED BY: *Mark Arrieta*

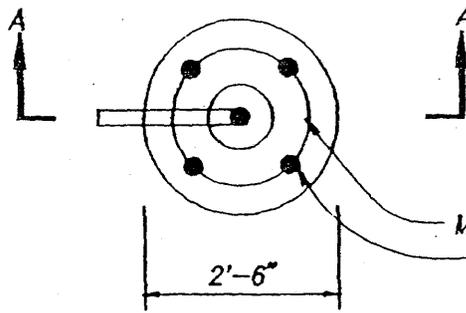
DRAWN: MARK ARRIETA DATE: 2/27/04

STREET LIGHTING
STREET LIGHT
INSTALLATION

CITY OF LOS BANOS

STANDARD DETAIL

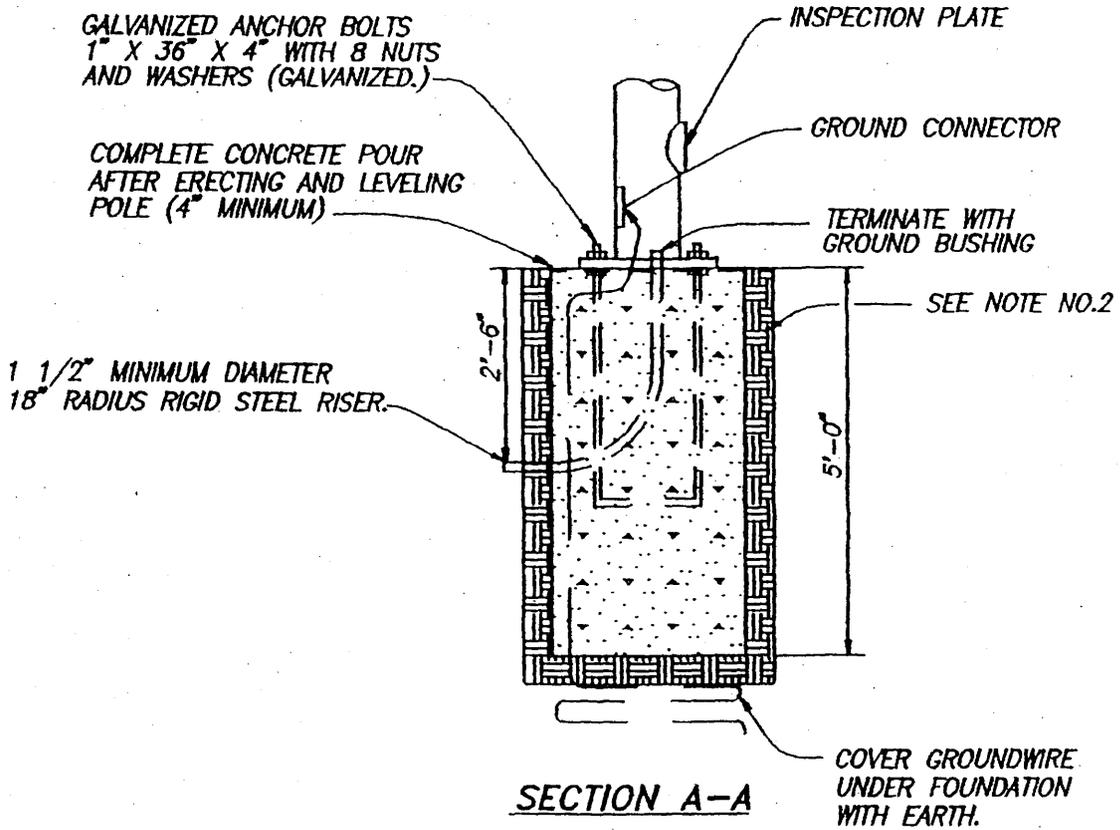
SL-3



NOTE: 30-INCH SQUARE CAP NOT SHOWN.

MATCH POLE BOLT CIRCLE.
ANCHOR BOLTS (TYP)

PLAN



GALVANIZED ANCHOR BOLTS
1" X 36" X 4" WITH 8 NUTS
AND WASHERS (GALVANIZED.)

COMPLETE CONCRETE POUR
AFTER ERECTING AND LEVELING
POLE (4" MINIMUM)

1 1/2" MINIMUM DIAMETER
18" RADIUS RIGID STEEL RISER.

INSPECTION PLATE

GROUND CONNECTOR

TERMINATE WITH
GROUND BUSHING

SEE NOTE NO.2

5'-0"

SECTION A-A

COVER GROUNDWIRE
UNDER FOUNDATION
WITH EARTH.

NOTES:

1. GROUND WIRE SHALL BE 15- FEET OF NO.6 BARE COPPER WIRE. LEAVE 2-FOOT PROTRUDING ABOVE TOP OF FOUNDATION TO ALLOW CONNECTION TO THE STREET LIGHT.
2. IF UNABLE TO POUR FOUNDATION AGAINST UNDISTURBED EARTH, COMPACT TO 90% OF OPTIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557.
3. CONCRETE STRENGTH SHALL BE 4000 PSI MINIMUM.
4. PRECAST FOUNDATIONS MAY BE USED WITH CITY ENGINEER APPROVAL.



DATE APPROVED: 1-19-94

APPROVED BY:
Dwight L. Herman

DRAWN: ALEX BUENROSTRO DATE: 7/01/93

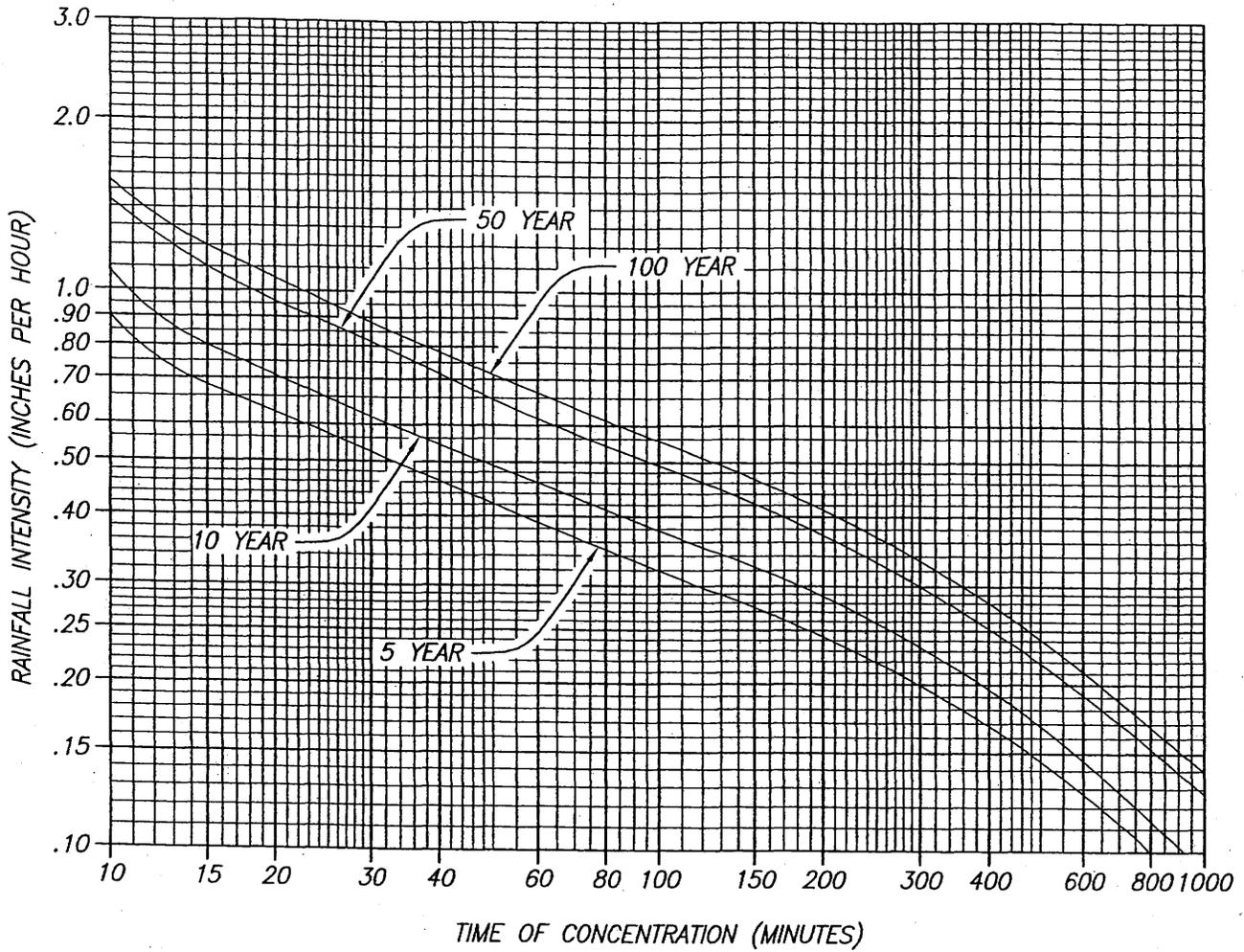
STREET LIGHTING

STREET LIGHT
FOUNDATION

CITY OF LOS BANOS

STANDARD DETAIL

SL-4



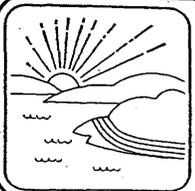
NOTES:

1. ALL STORM DRAINAGE PIPING SHALL BE DESIGNED TO HANDLE A STORM WITH A MINIMUM RETURN INTERVAL OF 5 YEARS.
2. ROOF TO GUTTER TIME SHALL BE ASSUMED TO BE 20 MINUTES.
3. THE 10 YEAR-24 HOUR RAINFALL IS 1.88-INCHES.
4. THE 50 YEAR-24 HOUR RAINFALL IS 2.49-INCHES.
5. THIS STANDARD DETAIL IS FOR USE WHEN RATIONAL METHOD IS ALLOWED BY CITY ENGINEER FOR RUN-OFF CALCULATIONS.

RUNOFF COEFFICIENTS

<u>ZONING</u>	<u>"C"</u>
R1, R2	0.30
R3	0.50
COMMERCIAL	0.80
INDUSTRIAL	0.70

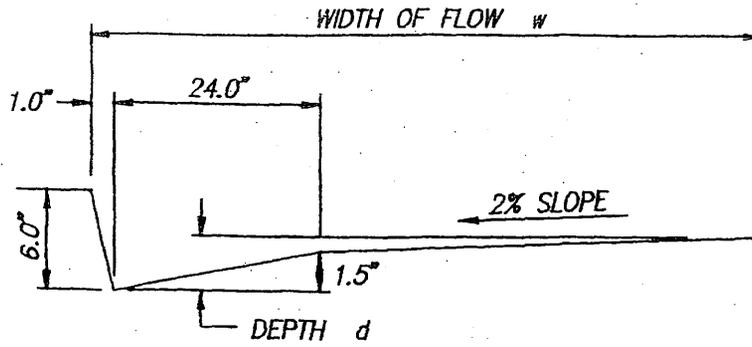
\\Server_1\Library\Details\City of Los Banos\Storm Drain\Std-02.dwg



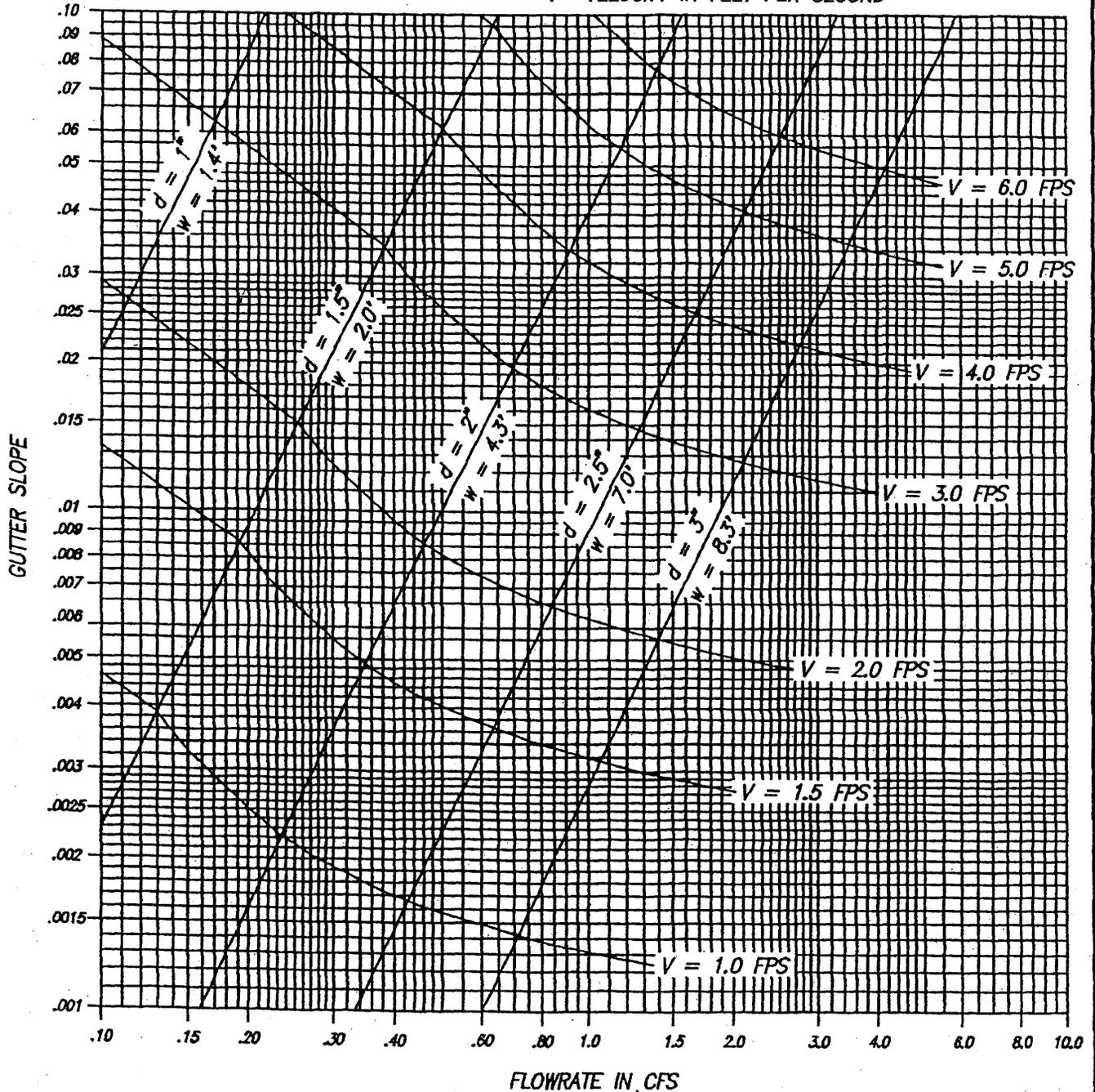
DATE APPROVED: 10-06-04
 APPROVED BY: *[Signature]*
 DRAWN: ALEX BUENROSTRO DATE: 7/01/93

STORM DRAINAGE
 RAINFALL INTENSITY
 CURVES
 CITY OF LOS BANOS

STANDARD DETAIL
 SD-2



V = VELOCITY IN FEET PER SECOND



DATE APPROVED: 1-19-94

APPROVED BY:

Derald J. Weira

DRAWN: ALEX BUENROSTRO DATE: 7/01/93

STORM DRAINAGE

GUTTER CAPACITY

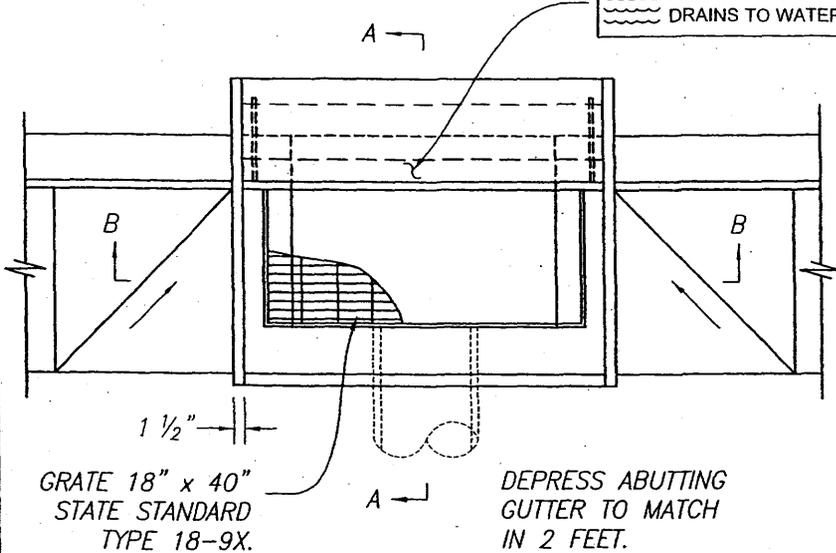
CITY OF LOS BANOS

STANDARD DETAIL

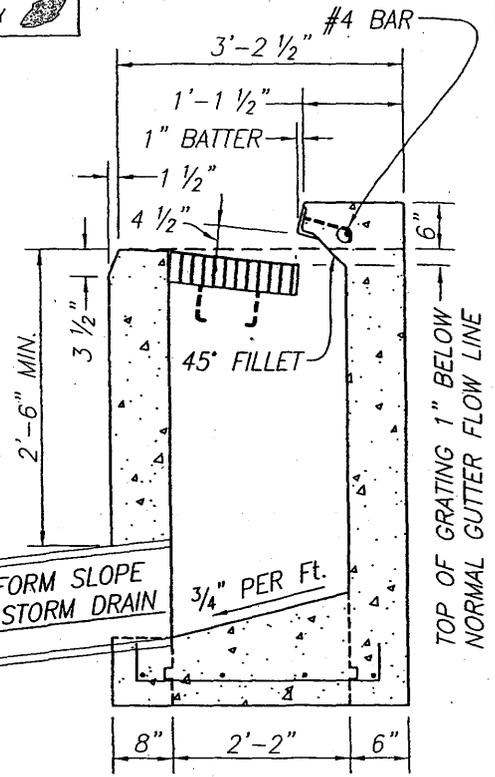
SD-3

SEE NOTE NO. 3

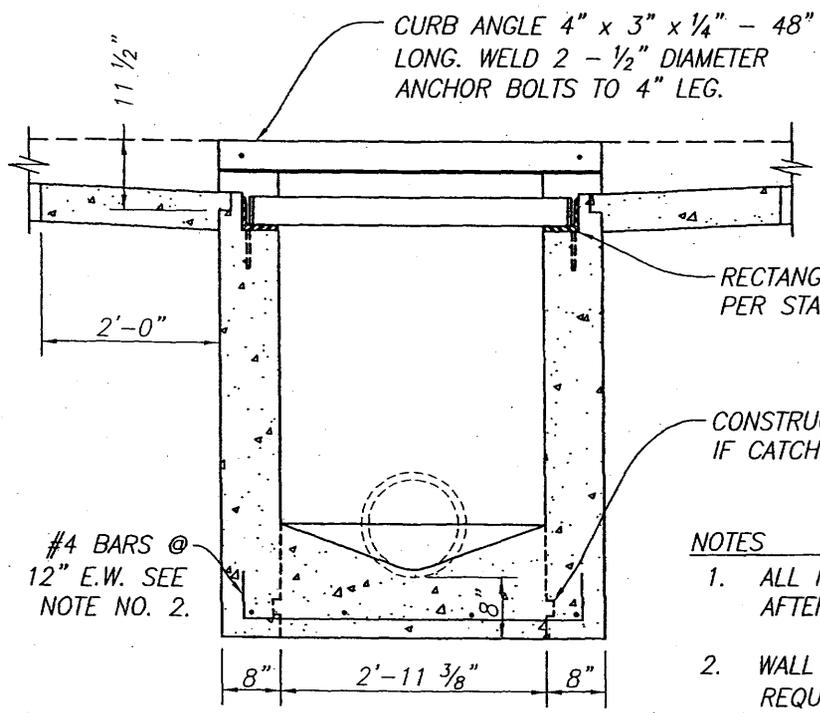
NO DUMPING!
DRAINS TO WATERWAY



PLAN



SECTION A-A

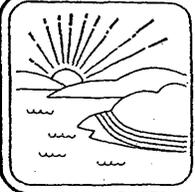


SECTION B-B

NOTES

1. ALL METAL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
2. WALL AND FLOOR REINFORCING NOT REQUIRED IF INVERT LESS THAN 8' DEEP, OTHERWISE USE No. 4 BARS AT 12" EACH WAY, CENTER IN WALLS.
3. PREFORMED THERMOPLASTIC STORMDRAIN MARKING BY PREMARK. (5"x29" WHITE BACKGROUND WITH BLUE LETTERING.) INSTALL ON TOP OF CURB CENTERED ON CATCH BASIN.

Apr 21, 2004 - 3:11:17 PM Server_1\Library\Details\City of Los Banos\Storm Drain\SD-04.dwg



DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: B. MORENO DATE: 03/26/04

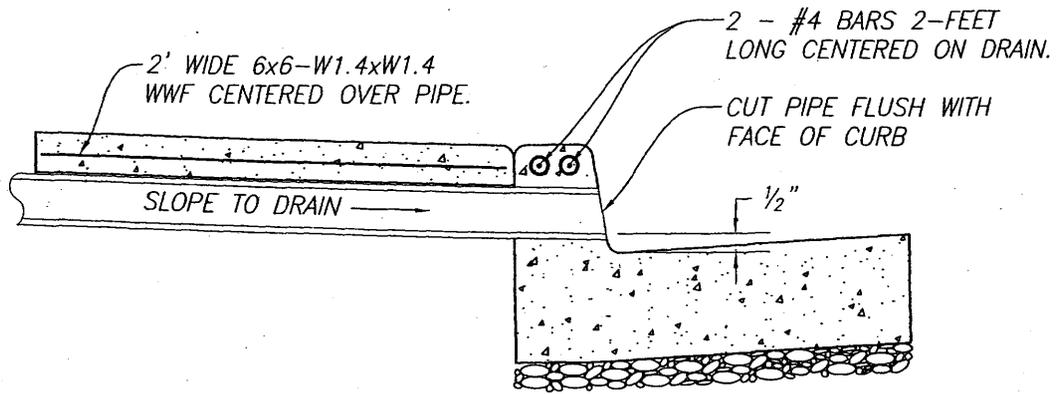
STORM DRAINAGE

TYPE 'A' CATCH BASIN

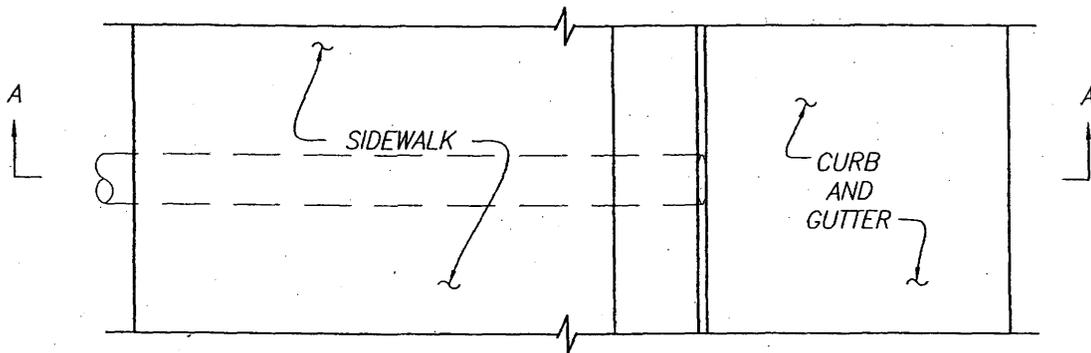
CITY OF LOS BANOS

STANDARD DETAIL

SD-4



SECTION A-A

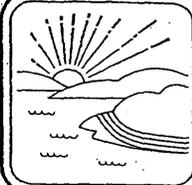


PLAN

NOTES:

1. PIPING SHALL BE SCHEDULE 40 GALVANIZED STEEL, OR CLASS 51 DUCTILE IRON, WITHIN THE PUBLIC RIGHT-OF-WAY.
3. PIPE SHALL BE 3-INCHES IN DIAMETER (MAXIMUM) FOR 6-INCH HIGH CURBS AND 6-INCHES IN DIAMETER FOR 9-INCH HIGH CURBS.
3. IF MULTIPLE PIES ARE USED AT ONE LOCATION, MAINTAIN A MINIMUM CLEAR DISTANCE OF 2-INCHES BETWEEN THEM. NO MORE THAN THREE PIPES MAY BE UTILIZED.
3. WHERE INSTALLING DRAINS THROUGH AN EXISTING CURB, SAWCUT AND REMOVE THE EXISTING CURB AND GUTTER A MINIMUM OF 2-FOOT ON EITHER SIDE OF THE PIPE(S).
4. WHERE INSTALLING DRAINS THROUGH AN EXISTING SIDEWALK, SAWCUT AND REMOVE THE EXISTING SIDEWALK TO THE NEAREST JOINT LINES LOCATED A MINIMUM OF 2-FEET FROM THE PIPES.
5. WHEN ROOF DOWNSPOUT OR PARKING LOT DRAIN IS WITHIN 50-FEET OF AN EXISTING OR PROPOSED CATCH BASIN PIPE, DRAIN SHALL BE CONNECTED TO CATCH BASIN AND NOT PLACED THROUGH CURB.

Mar 26, 2004 - 1:44 PM
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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: D. MORENO DATE: 03/26/04

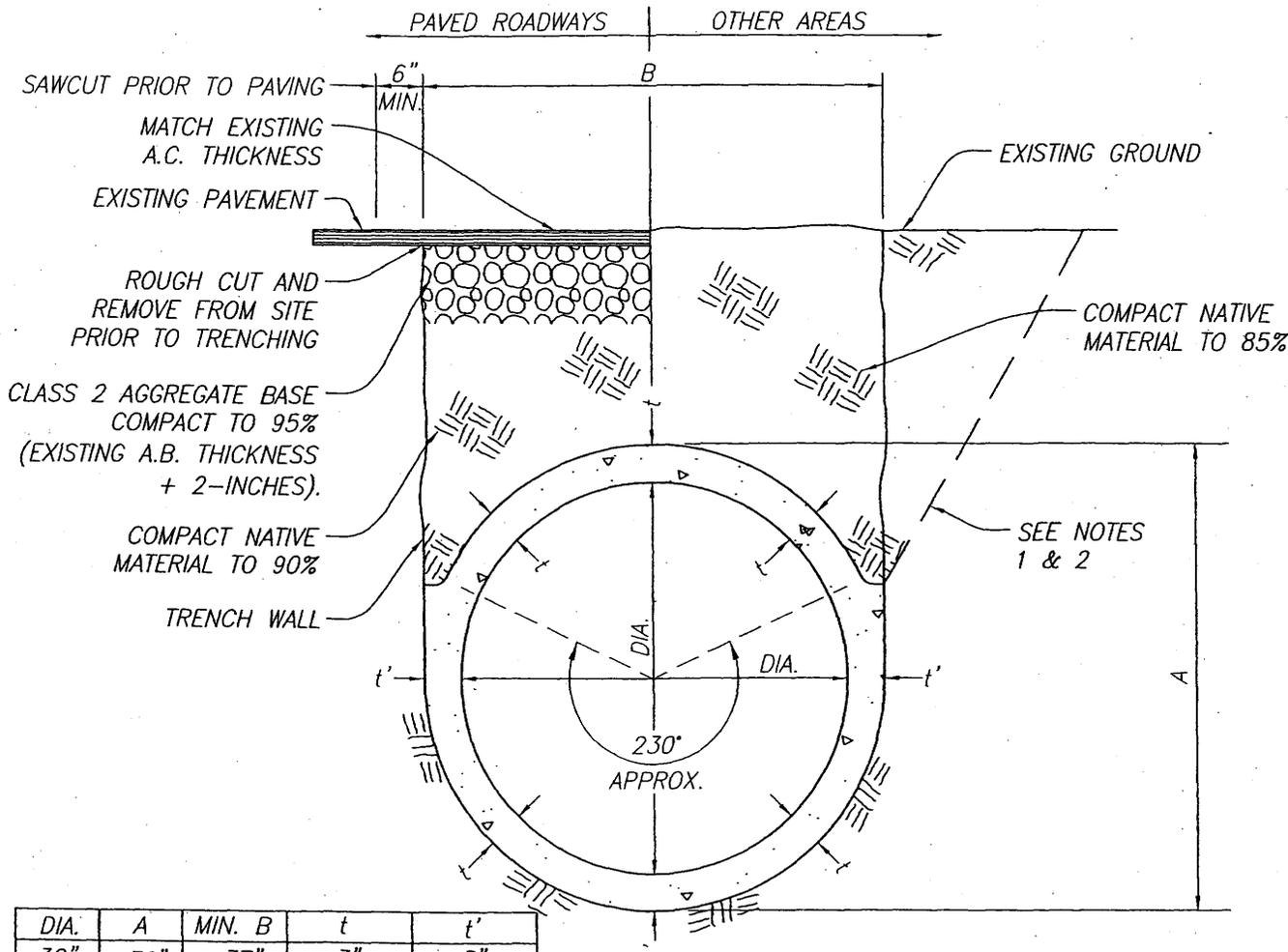
STORM DRAINAGE

CURB DRAIN

CITY OF LOS BANOS

STANDARD DETAIL

SD-5

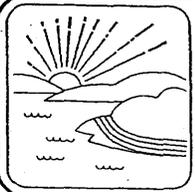


DIA.	A	MIN. B	t	t'
30"	36"	37"	3"	3"
36"	43"	44"	3 1/2"	3 1/2"
42"	50"	51"	4"	4"
48"	58"	59"	5"	5"
54"	65"	66"	5 1/2"	5 1/2"
60"	72"	73"	6"	6"
66"	79"	80"	6 1/2"	6 1/2"
72"	86"	87"	7"	7"
84"	100"	101"	8"	8"
96"	114"	115"	9"	9"

TYPICAL PIPE SECTION
30" THRU 96"

- NOTES:**
1. THE CONTRACTOR SHALL SUBMIT A DETAILED PLAN TO THE CITY ENGINEER PRIOR TO EXCAVATION, SHOWING DESIGN OF SHORING, BRACING, SLOPING OR OTHER PROVISIONS TO BE MADE FOR WORKER PROTECTION, IN ACCORDANCE WITH SECTION 6422 OF THE LABOR CODE OF CALIFORNIA.
 2. THE MINIMUM REQUIRED WORKER PROTECTION SHALL BE AS DESCRIBED IN THE CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY. VARIANCES THEREFROM SHALL BE PREPARED AND SIGNED BY A REGISTERED CIVIL ENGINEER OF THE STATE OF CALIFORNIA.
 3. TRENCHES IN EXISTING PAVED AREAS SHALL BE EXCAVATED VERTICALLY, OR TO THE MOST NARROW PRACTICAL WIDTH AS SOIL CONDITIONS WILL PERMIT.
 4. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557.

Mar 29, 2004 - 6:00 am
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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

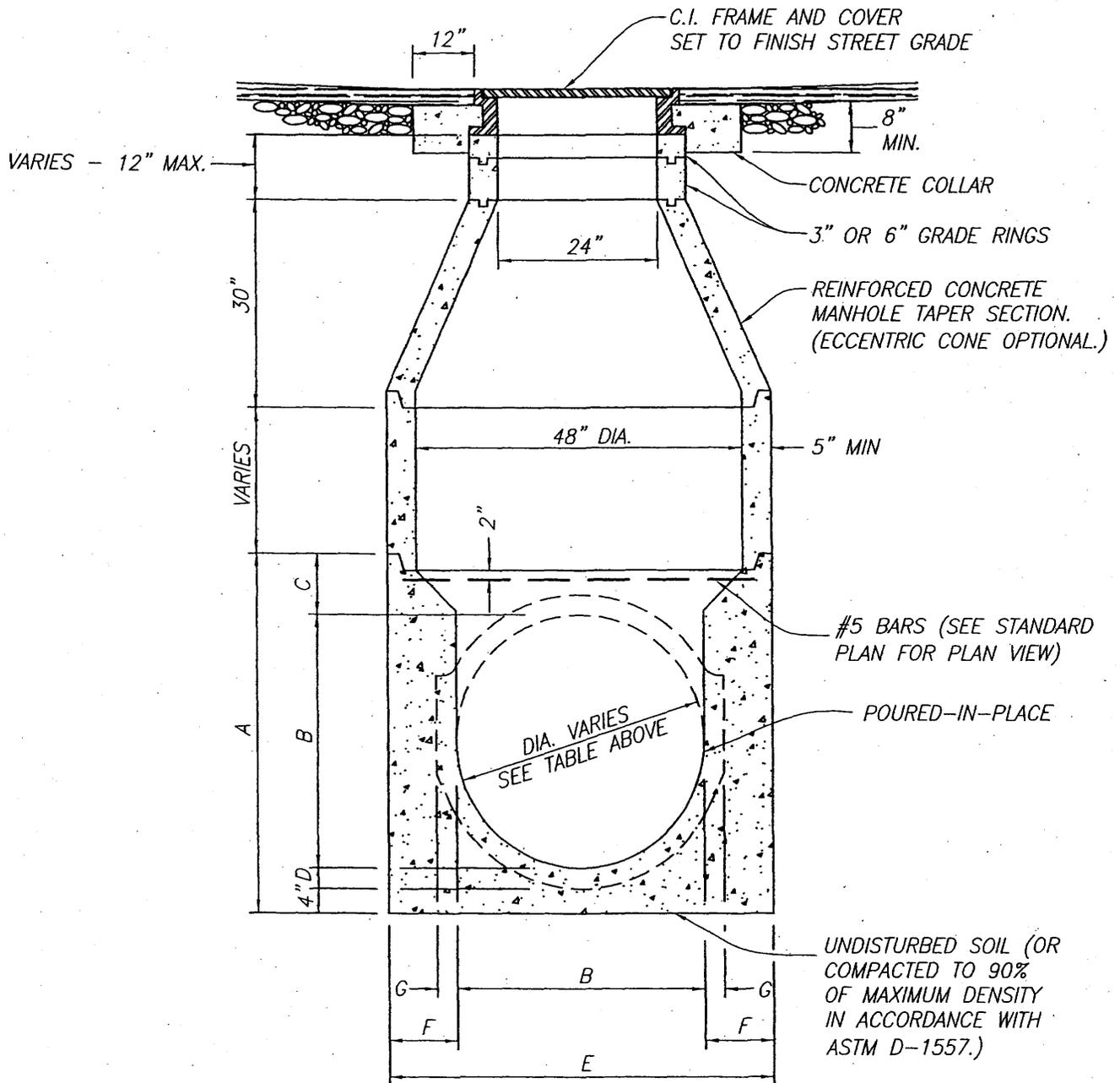
DRAWN: D. MORENO DATE: 03/29/04

STORM DRAINAGE
C.I.P.P. STORM DRAIN
AND TRENCH

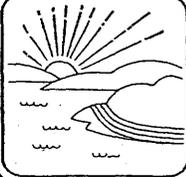
CITY OF LOS BANOS

STANDARD DETAIL
SD-6

DIA.	A	B	C	D	E	F	MIN. G
30"	46"	30"	9"	3"	56"	13"	3"
36"	53"	36"	9 1/2"	3 1/2"	56"	10"	3 1/2"
42"	60"	42"	10"	4"	60"	9"	4"
48"	68"	48"	11"	5"	66"	9"	5"



Mar 26, 2004
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DATE APPROVED: 10-06-04

APPROVED BY:

[Signature]

DRAWN: D. MORENO DATE: 03/26/04

STORM DRAINAGE

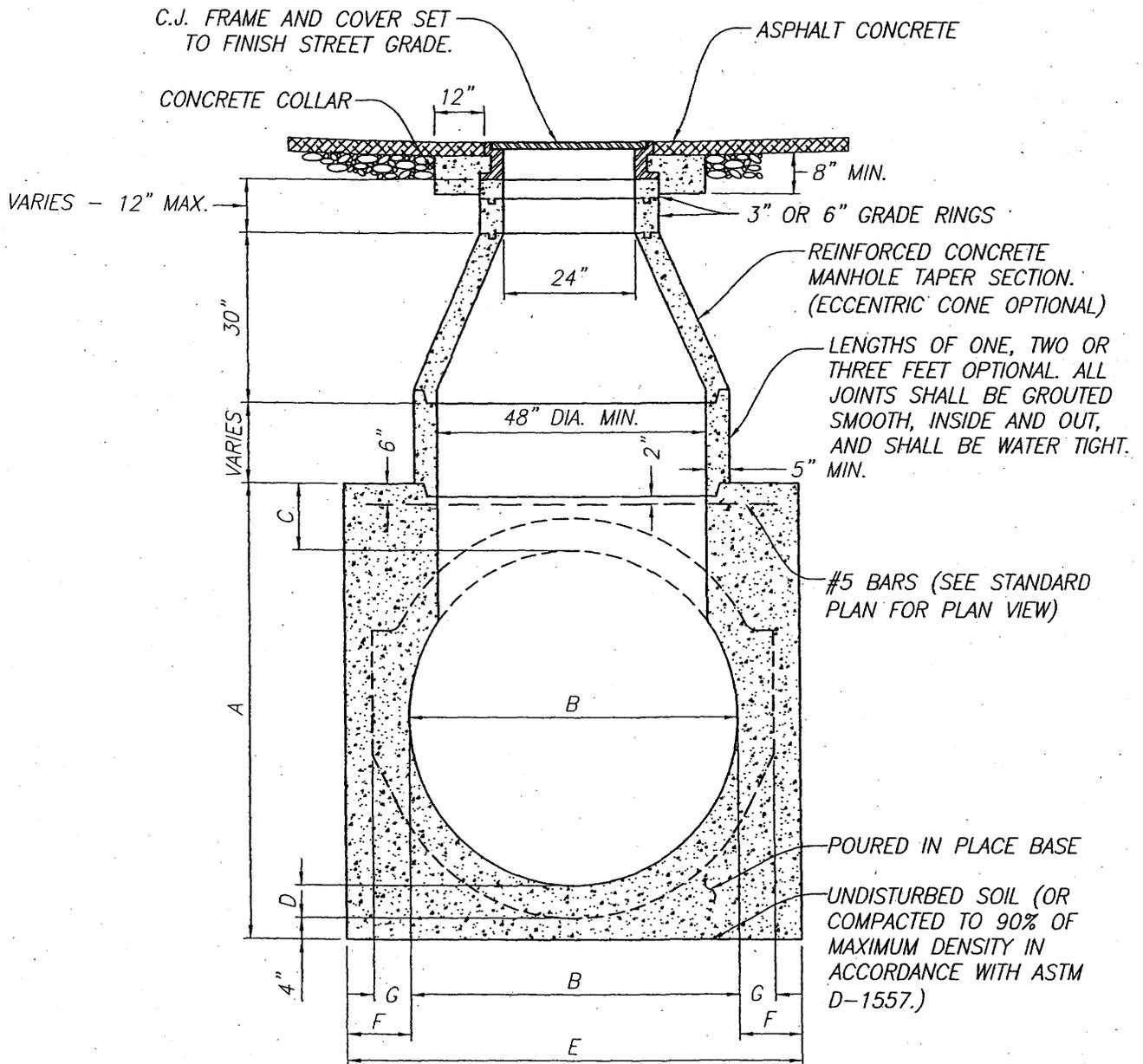
STORM DRAIN M.H.
FOR 30"-48" C.I.P.P.

CITY OF LOS BANOS

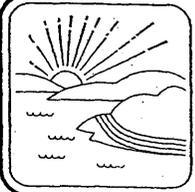
STANDARD DETAIL

SD-7

DIA.	A	B	C	D	E	F	MIN. G
54"	75"	54"	11 1/2"	5 1/2"	75"	10 1/2"	5 1/2"
60"	82"	60"	12"	6"	82"	11"	6"
66"	89"	66"	12 1/2"	6 1/2"	89"	11 1/2"	6 1/2"
72"	96"	72"	13"	7"	96"	12"	7"
84"	110"	84"	14"	8"	110"	13"	8"
96"	124"	96"	15"	9"	124"	14"	9"



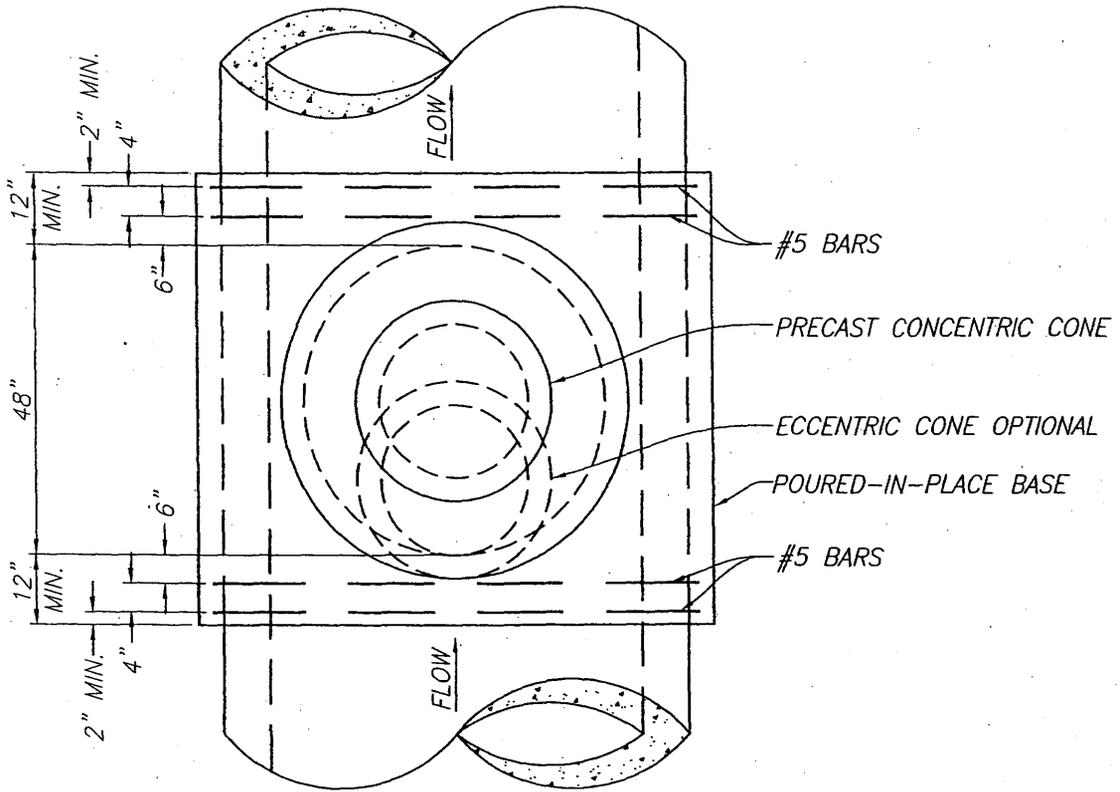
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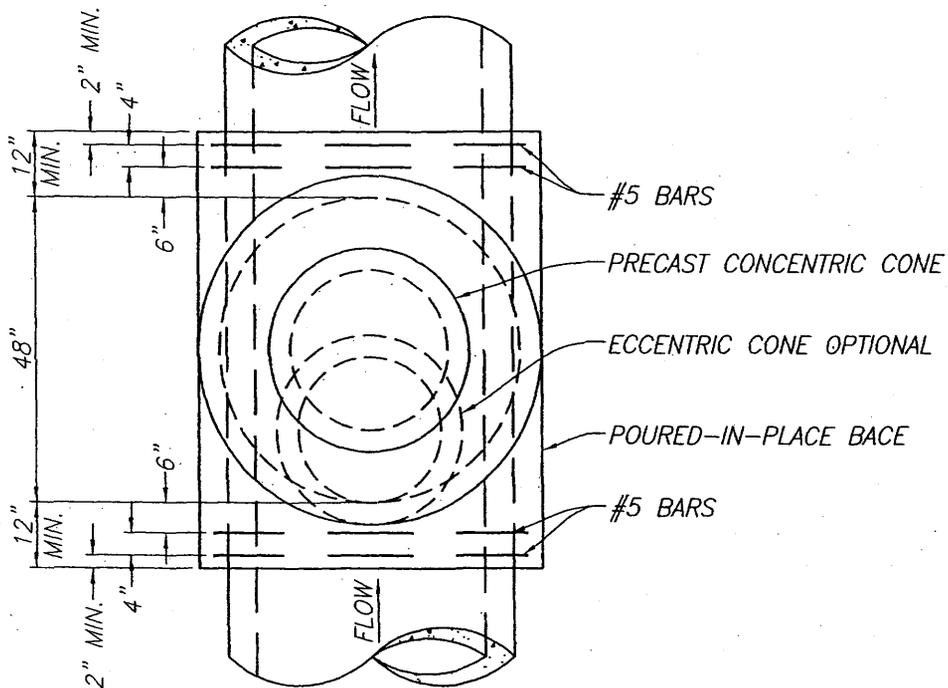
DATE APPROVED: 10-06-04
 APPROVED BY: *[Signature]*
 DRAWN: D. MORENO DATE: 03/26/04

STORM DRAINAGE
 STORM DRAIN M.H.
 FOR 54"-96" C.I.P.P.
 CITY OF LOS BANOS

STANDARD DETAIL
 SD-8

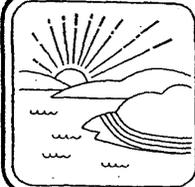


MANHOLE FOR 54"-96" C.I.P.P.



MANHOLE FOR 30"-48" C.I.P.P.

Mar 29, 2004 - 6:00am
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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: D. MORENO DATE: 03/26/04

STORM DRAINAGE

STORM DRAIN M.H.'s
 PLAN VIEW (C.I.P.P.)

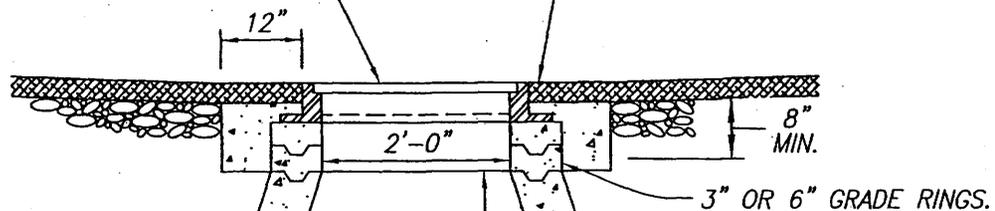
CITY OF LOS BANOS

STANDARD DETAIL

SD-9

C.I. FRAME AND COVER.
SET TO FINISH STREET GRADE.

CONCRETE COLLAR



3" OR 6" GRADE RINGS.
REINFORCED CONCRETE
MANHOLE TAPER SECTION.
(ECCENTRIC CONE OPTIONAL.)

VARIES

5" MIN.

5" MIN.

4'-0"

POURED IN PLACE CONCRETE
SET MANHOLE BARREL IN
CONCRETE DURING PLACEMENT
OF BASE. HANDFORM
INTERIOR OF MANHOLE AND
WOOD FLOAT FINISH.

MIN. SLOPE .05

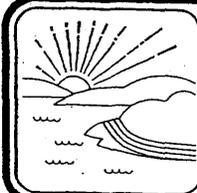
VARIES

4" MIN. OVER
ALL PIPES

#4 BARS @ 12" E.W.

6" OF 1-1/2" DRAIN ROCK
IF GROUNDWATER PRESENT.

6'-0" MIN. BASE DIA.



DATE APPROVED: 10-06-04

APPROVED BY:

DRAWN: D. MORENO DATE: 05/27/04

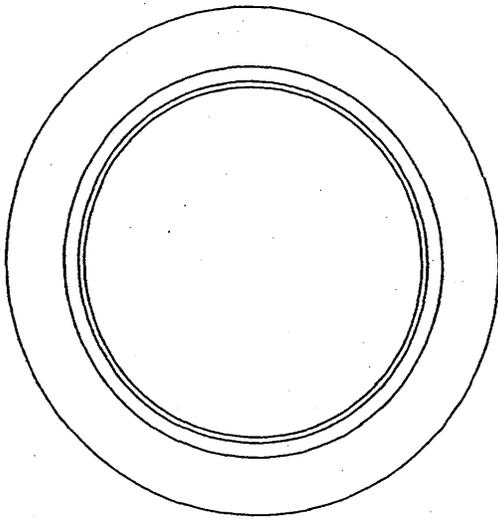
STORM DRAINAGE

STORM DRAIN MANHOLE

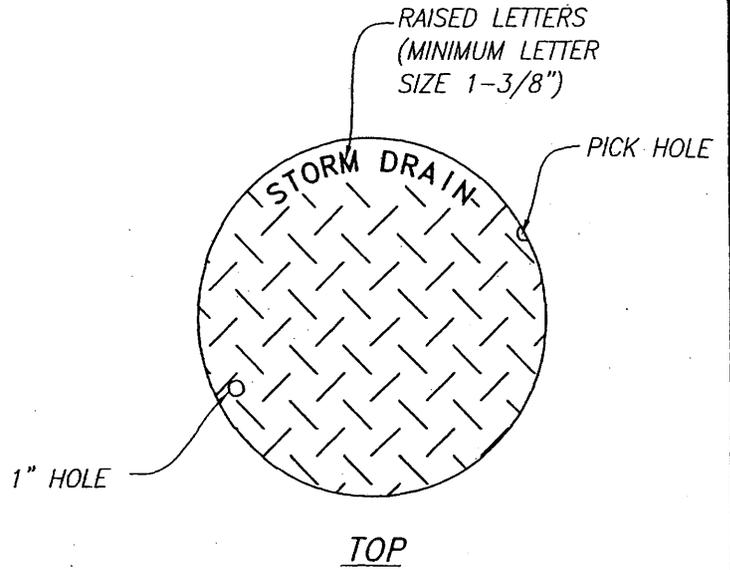
CITY OF LOS BANOS

STANDARD DETAIL

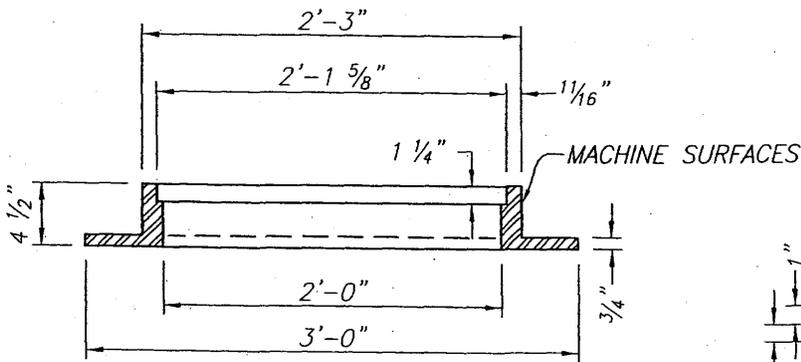
SD-10



PLAN

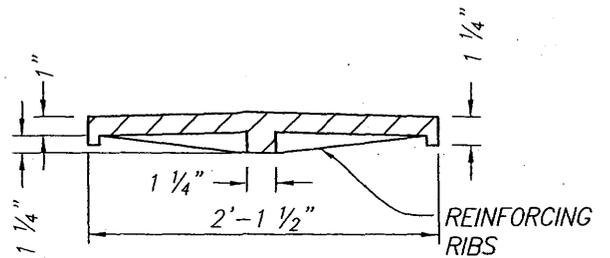


TOP



SECTION

MANHOLE FRAME DETAIL

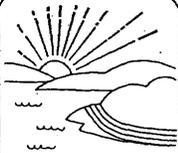


SECTION

MINIMUM WEIGHT OF FRAME AND COVER: 280 lbs.

MANHOLE COVER DETAIL

Mar 29, 2004 - 9:11:00 AM
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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

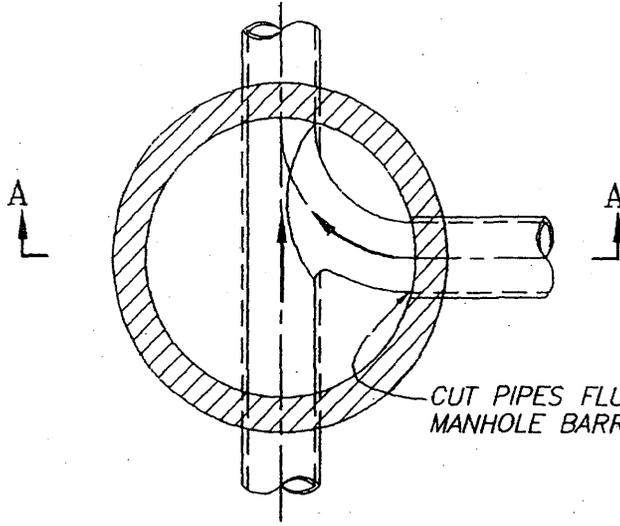
DRAWN: MARK ARRIETA DATE: 03/17/04

STORM DRAINAGE
 CAST IRON MANHOLE
 FRAME AND COVER

CITY OF LOS BANOS

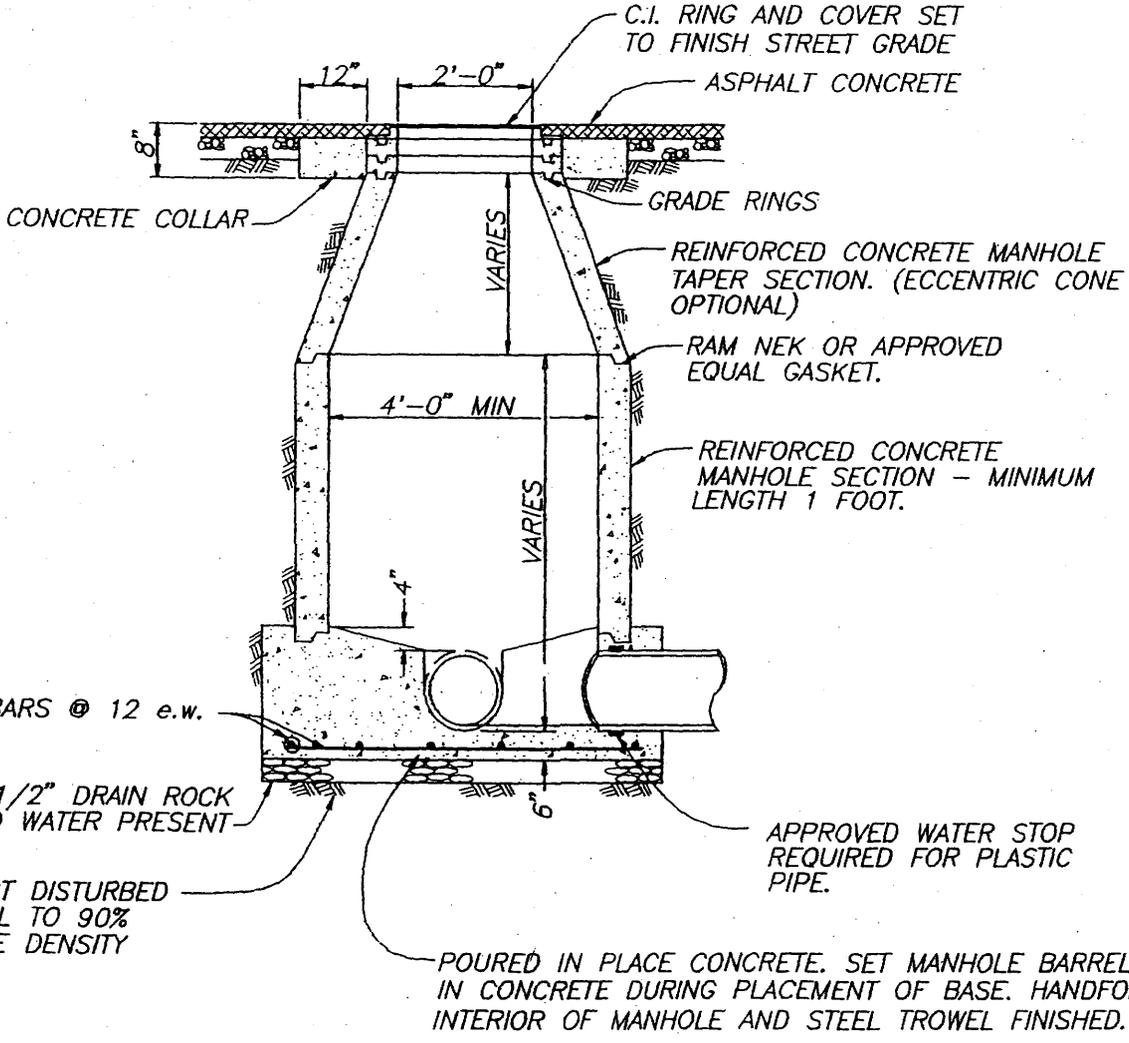
STANDARD DETAIL

SD-11

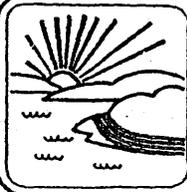


CUT PIPES FLUSH WITH
MANHOLE BARREL SECTION

PLAN



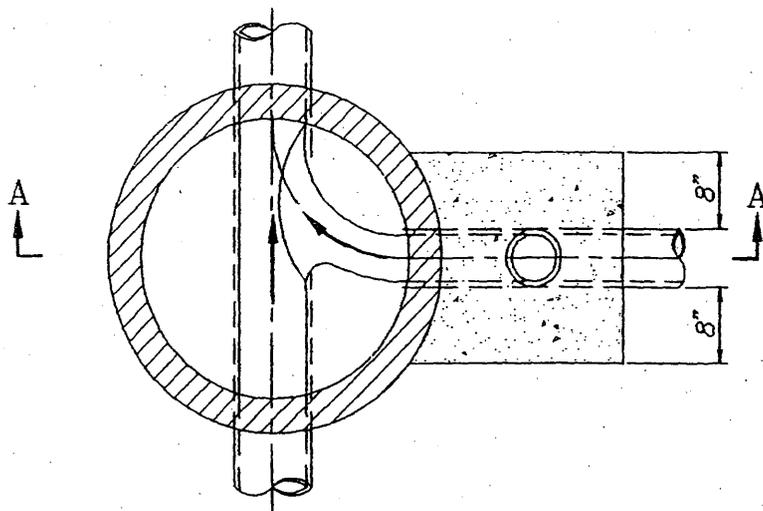
SECTION "A-A"



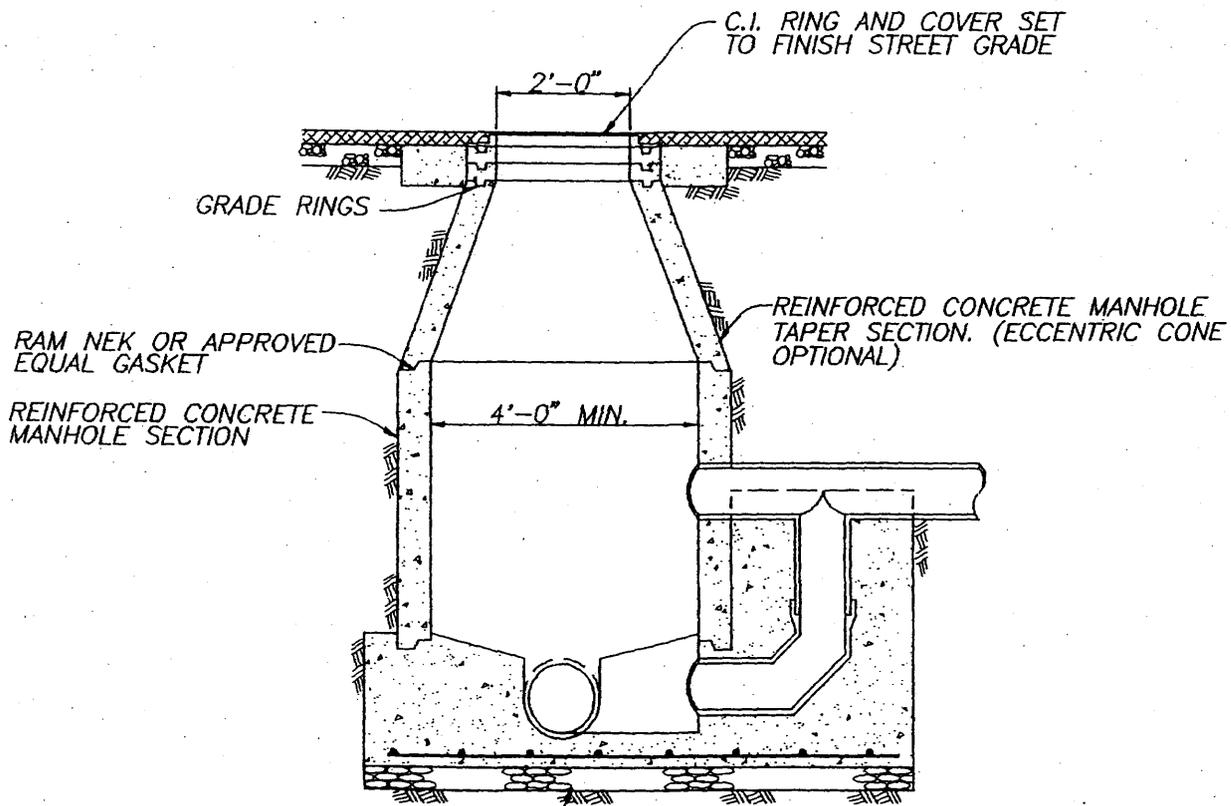
DATE APPROVED: 6-15-94
 APPROVED BY: *Darold L. Herman*
 DRAWN: R.D. HILL II DATE: 02/04/94

SANITARY SEWER
 TYPICAL MANHOLE
 CITY OF LOS RANOS

STANDARD DETAIL
 SS-1



PLAN



6" OF 1-1/2" DRAIN ROCK
IF GROUND WATER PRESENT

SEE STANDARD DETAIL
SS-1 FOR ADDITIONAL
INFORMATION.

SECTION "A-A"



DATE APPROVED: 6-15-94

APPROVED BY:
Darold L. Varma

DRAWN: R.D. HILL II DATE: 02/07/94

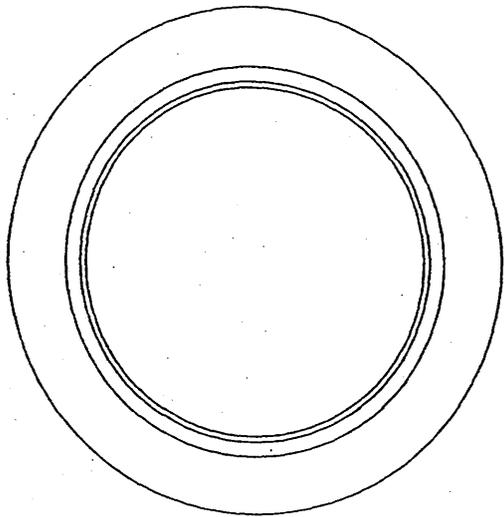
SANITARY SEWER

DROP MANHOLE

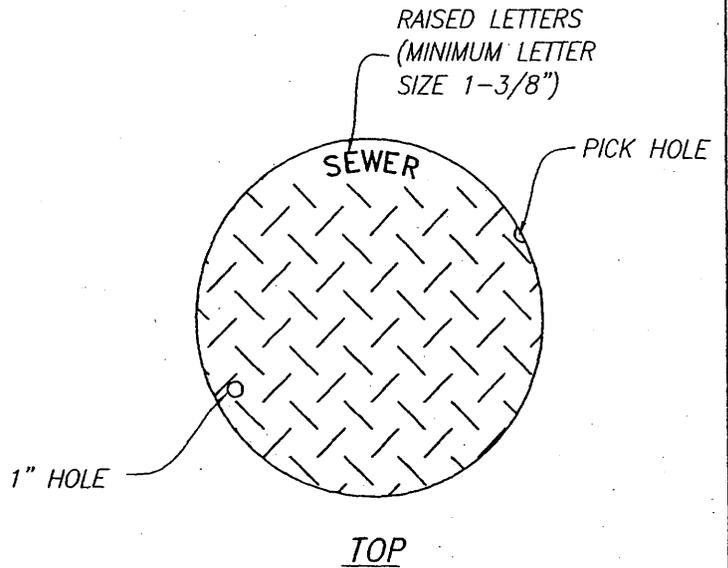
CITY OF LOS BANOS

STANDARD DETAIL

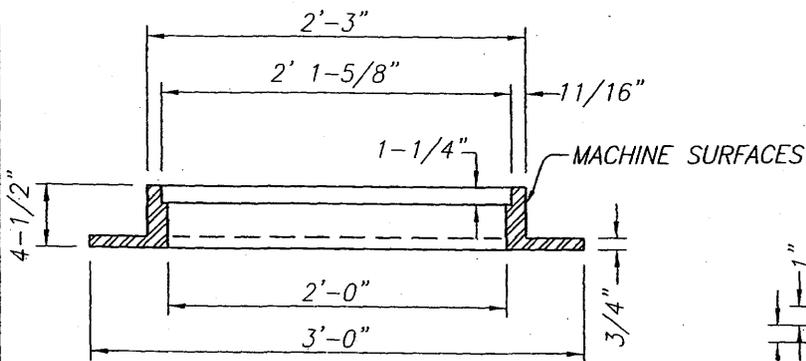
SS-2



PLAN

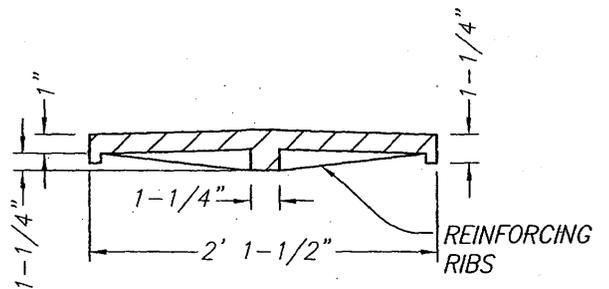


TOP



SECTION

MANHOLE FRAME DETAIL



SECTION

MINIMUM WEIGHT OF FRAME AND COVER: 280 lbs.

MANHOLE COVER DETAIL

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DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: MARK ARRIETA DATE: 03/17/04

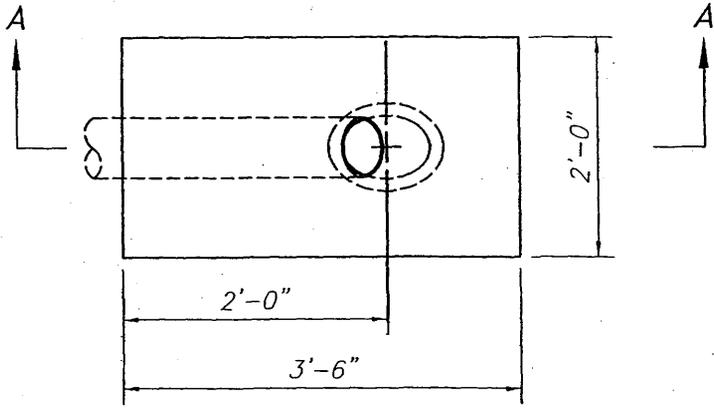
SANITARY SEWER

CAST IRON MANHOLE FRAME AND COVER

CITY OF LOS BANOS

STANDARD DETAIL

SS-3

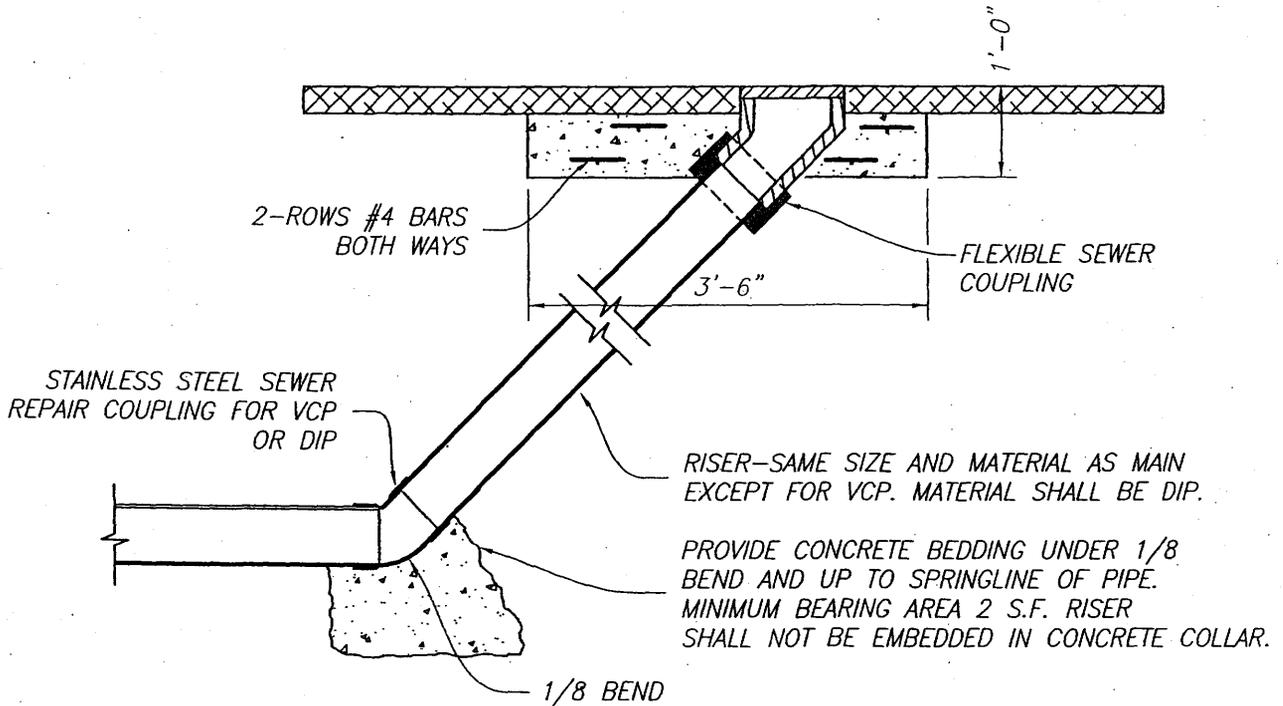


CASTING FRAME AND COVER

6" SOUTH BAY FOUNDRY
NO. SBF 1248 OR EQUAL.

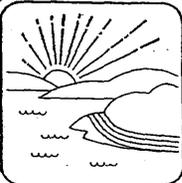
8" SOUTH BAY FOUNDRY
NO. SBF 1247 OR EQUAL.

PLAN



SECTION A-A

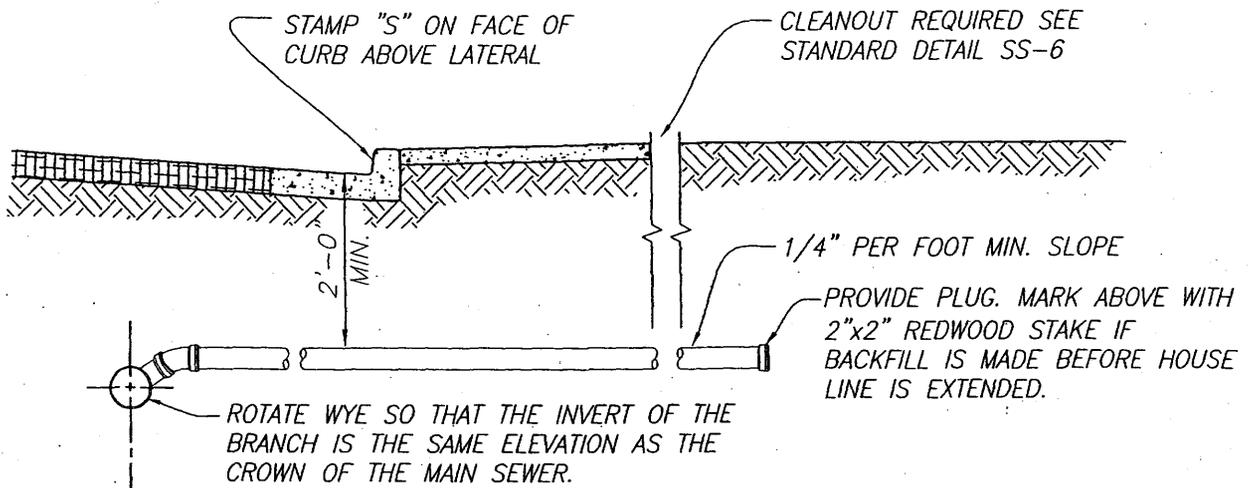
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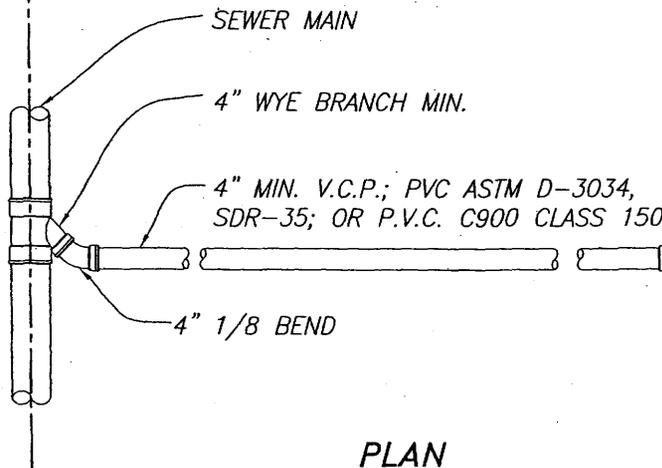
DATE APPROVED: 10-06-04
 APPROVED BY: *[Signature]*
 DRAWN: D. MORENO DATE: 03/29/04

SANITARY SEWER
 CLEANOUT
 CITY OF LOS BANOS

STANDARD DETAIL
 SS-4



PROFILE

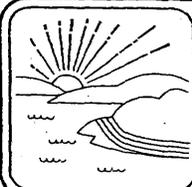


PLAN

NOTES:

1. LATERALS SHALL HAVE SAME BEDDING & BACKFILL AS SEWER MAIN. TRENCH WIDTH FOR 4" OR SMALLER LINES SHALL BE SUFFICIENT TO ALLOW MECHANICAL COMPACTION OF BACKFILL AROUND CONDUIT.
2. SEWER SERVICE SHALL HAVE A MINIMUM OF 2' COVER AT PROPERTY LINE WHENEVER LATERAL DEPTH AND SERVICE SLOPE OF 1/4" PER FOOT (MIN.) PERMIT. SERVICE MUST BE DEEP ENOUGH TO SERVE ADJACENT PROPERTY.
3. WHEN THE LATERAL SEWER DEPTH IS SUCH THAT 2' COVER AT PROPERTY LINE CANNOT BE MET, THE LATERAL MUST BE ENCASED IN CONCRETE IN THE TRAVELED RIGHT OF WAY OR PVC PIPE MEETING THE REQUIREMENTS OF AWWA C900 CLASS 150 MUST BE USED.

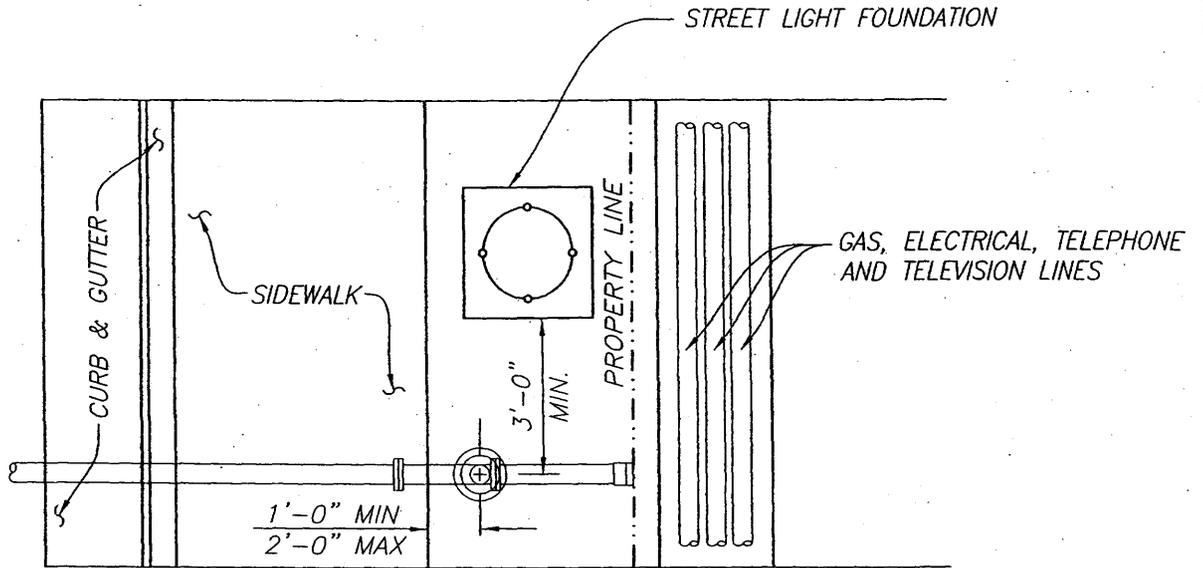
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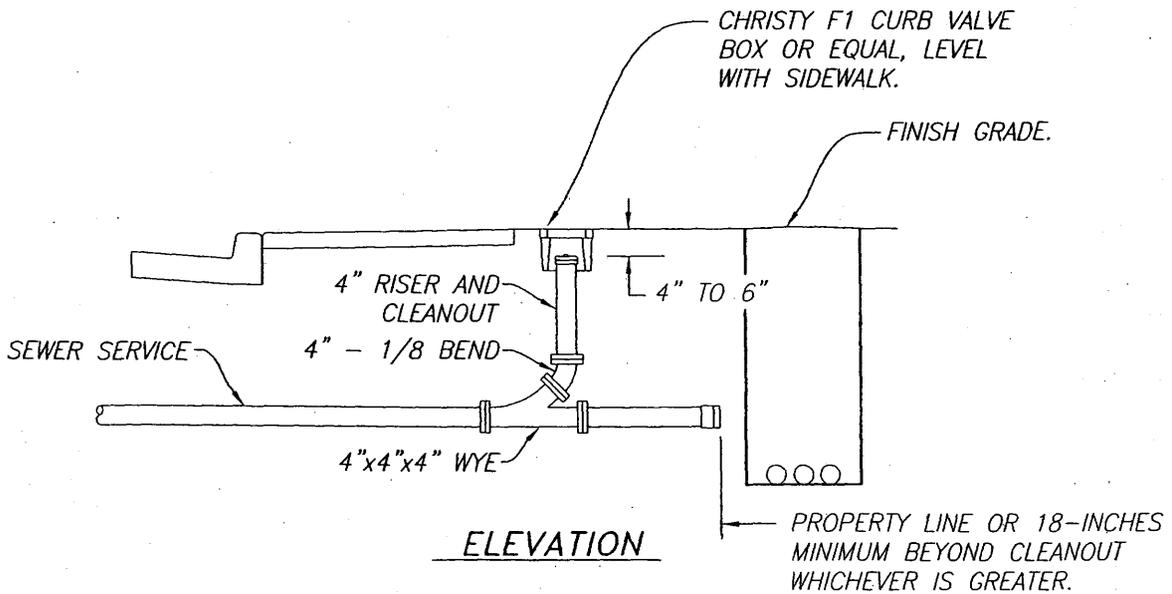
DATE APPROVED: 10-06-04
 APPROVED BY: *[Signature]*
 DRAWN: R.D.HILL II DATE: 01/04/94

SANITARY SEWER
 4-INCH SEWER SERVICE
 CITY OF LOS BANOS

STANDARD DETAIL
 SS-5



PLAN

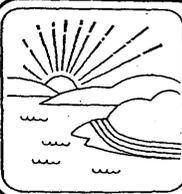


ELEVATION

NOTES:

1. THE RISER SHALL BE TERMINATED APPROXIMATELY 6-INCHES BELOW GRADE WITH A SOLVENT WELD CAP. THE CLEANOUT CAP, PLUG AND CURB VALVE BOX SHALL BE INSTALLED WHEN CONNECTION TO THE SEWER SERVICE IS MADE.

May 28, 2004 - 1
 \\Server_1\1\Library\...ails\City of Los Banos\Sewer\SS-6.dwg



DATE APPROVED: 10-06-04

APPROVED BY:

DRAWN: MARK ARRIETA DATE: 03/19/04

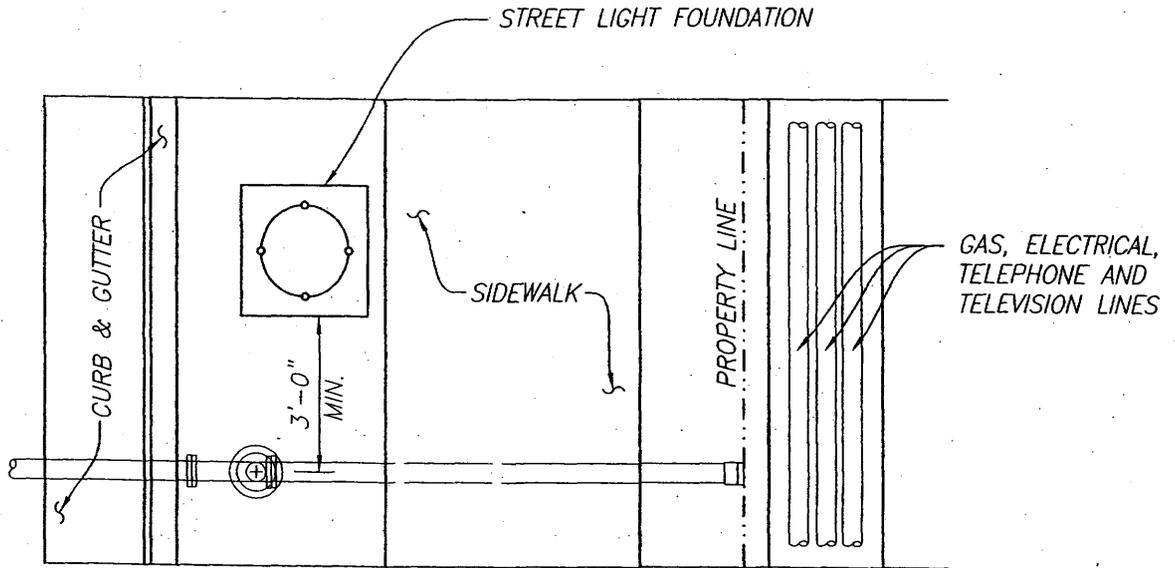
SANITARY SEWER

4-INCH SEWER CLEANOUT
ATTACHED SIDEWALK

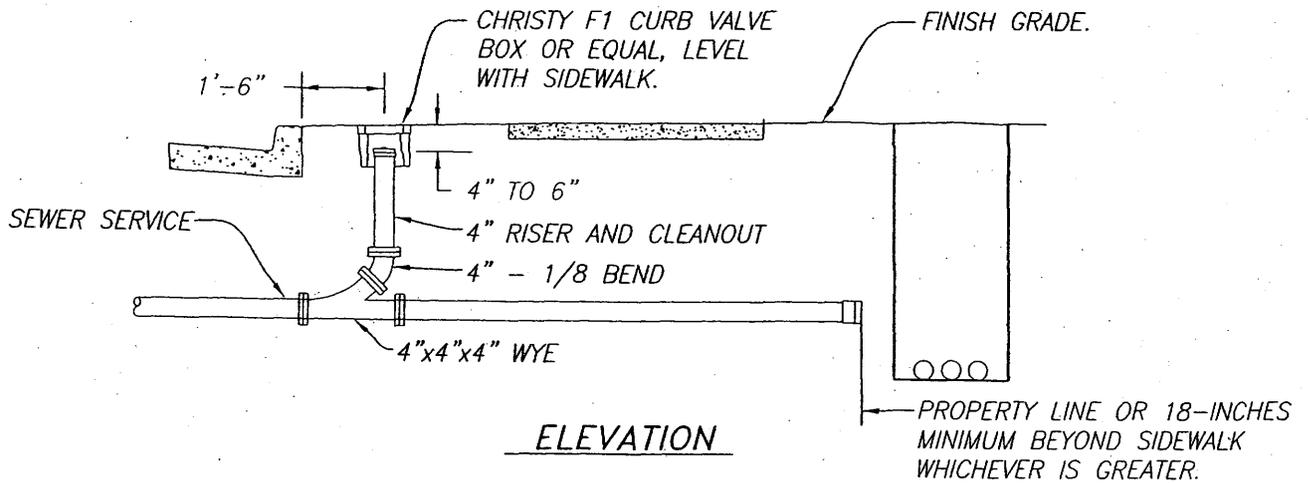
CITY OF LOS BANOS

STANDARD DETAIL

SS-6



PLAN

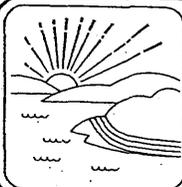


ELEVATION

NOTES:

1. THE RISER SHALL BE TERMINATED APPROXIMATELY 6-INCHES BELOW GRADE WITH A SOLVENT WELD CAP. THE CLEANOUT CAP, PLUG AND CURB VALVE BOX SHALL BE INSTALLED WHEN CONNECTION TO THE SEWER SERVICE IS MADE.

May 28, 2004 - 1:10 PM
 \\Server_1\0\Library\Details\City of Los Banos\Sewer\SS-7.dwg



DATE APPROVED: 10-06-04

APPROVED BY:

DRAWN: MARK ARRIETA DATE: 03/19/04

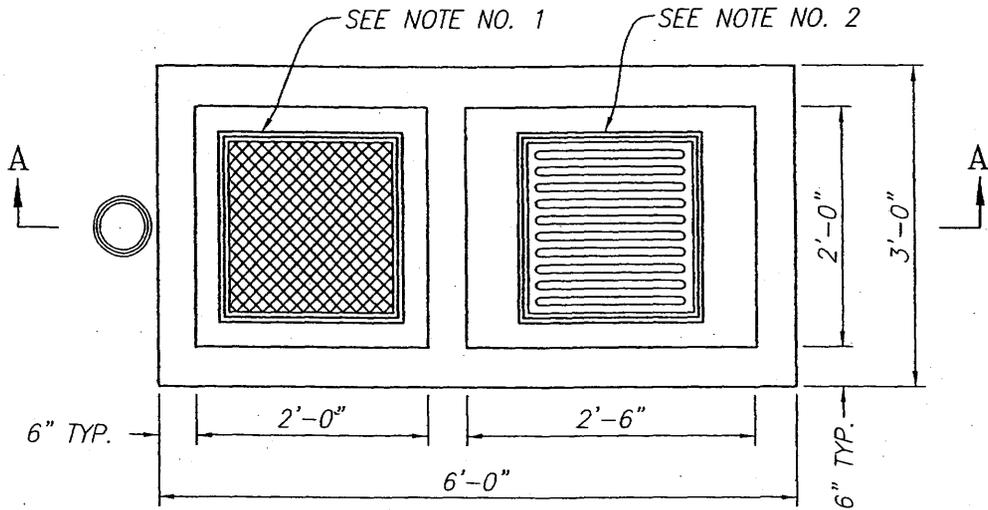
SANITARY SEWER

4-INCH SEWER CLEANOUT
SEPARATED SIDEWALK

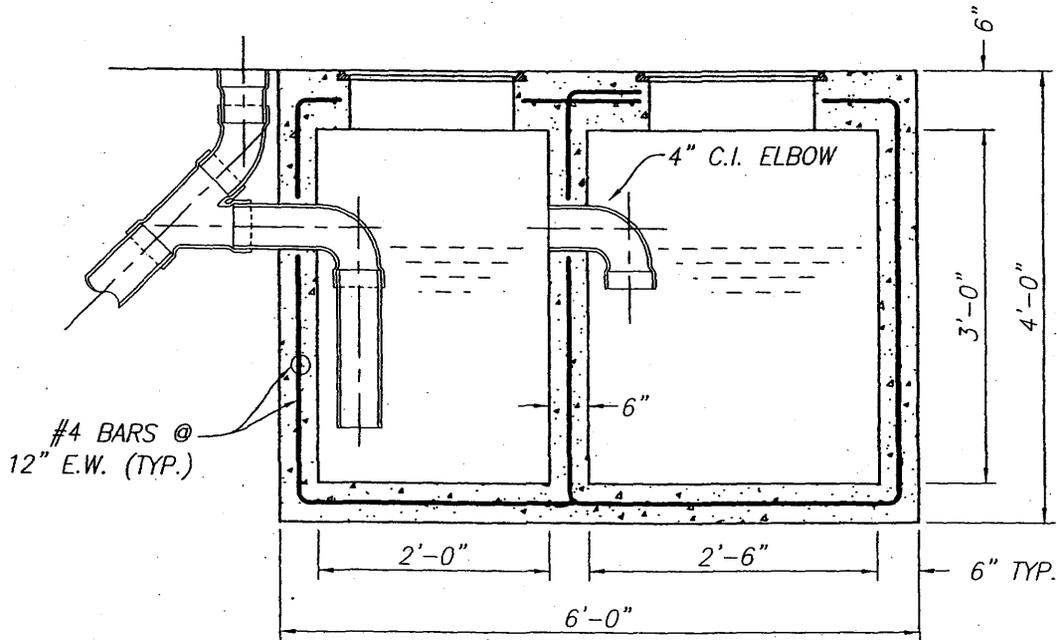
CITY OF LOS BANOS

STANDARD DETAIL

SS-7



PLAN

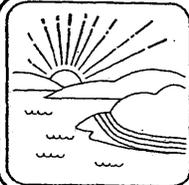


SECTION A-A

NOTES:

1. ALHAMBRA FOUNDRY COVER AND FRAME 18"x 18", NO. A 2015 (STANDARD COVER), NO. A 2017 (TRAFFIC COVER) OR EQUAL.
2. PINKERTON FOUNDRY GRATING AND FRAME 16"x 16", NO. A357 OR EQUAL.

Mar 29, 2004 - 10:00 AM
 Server_1\Library\Details\City of Los Banos\Sewer\ss-8.dwg



DATE APPROVED: 10-06-04

APPROVED BY:

DRAWN: D. MORENO DATE: 03/26/04

SANITARY SEWER

WASTE SUMP

CITY OF LOS BANOS

STANDARD DETAIL

SS-8

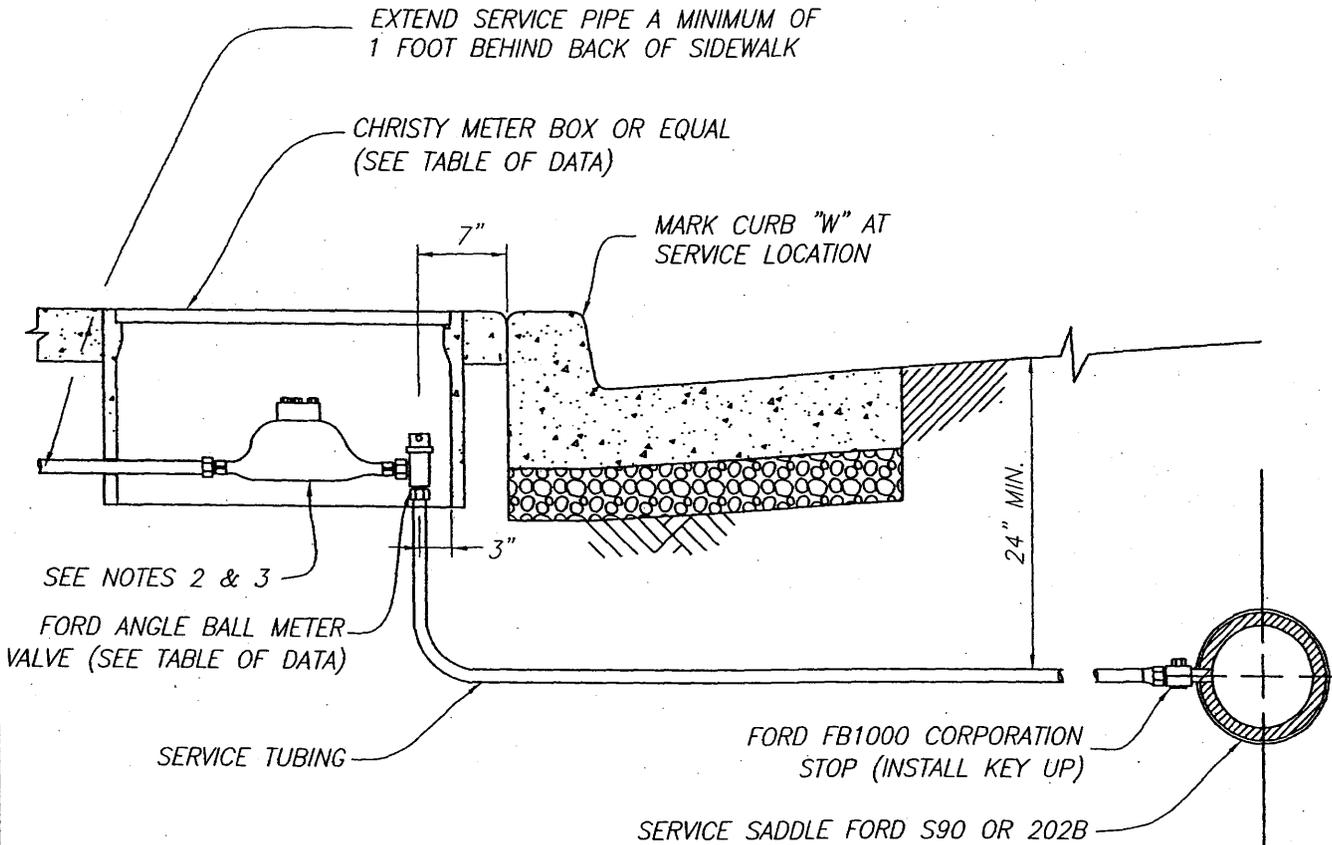


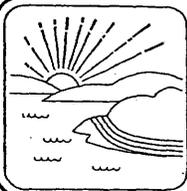
TABLE OF DATA

METER SIZE	METER VALVE	BOX NO.	LID NO.
1"	BA43-444W	B16	B16P
1-1/2"	BFA43-666W	B30	B30P
2"	BFA43-777W	B36	B36P

NOTES:

- SERVICE TUBING SHALL BE CLASS 160 POLYETHYLENE (PE3406, SDR7, PR160 PSI, CTS). NO JOINTS ARE PERMITTED BETWEEN THE CORPORATION STOP AND THE METER VALVE.
- WATER METERS SHALL BE FURNISHED AND INSTALLED BY THE CITY AT THE DEVELOPER/HOME BUILDERS EXPENSE.
- IF METER NOT INSTALLED AT TIME OF CONSTRUCTION, CONTRACTOR TO INSTALL METER SPACER/ALIGNMENT SLEEVE AS APPROVED BY THE DIRECTOR.

May 13, 2004 - 4:55
 \\Server_1\ID\Library\Details\City of Los Banos\Water\W-1.dwg



DATE APPROVED: 10-06-04

APPROVED BY: *Mark Arrieta*

DRAWN: MARK ARRIETA DATE: 2/27/04

WATER IMPROVEMENTS

1" TO 2"

WATER SERVICE

CITY OF LOS BANOS

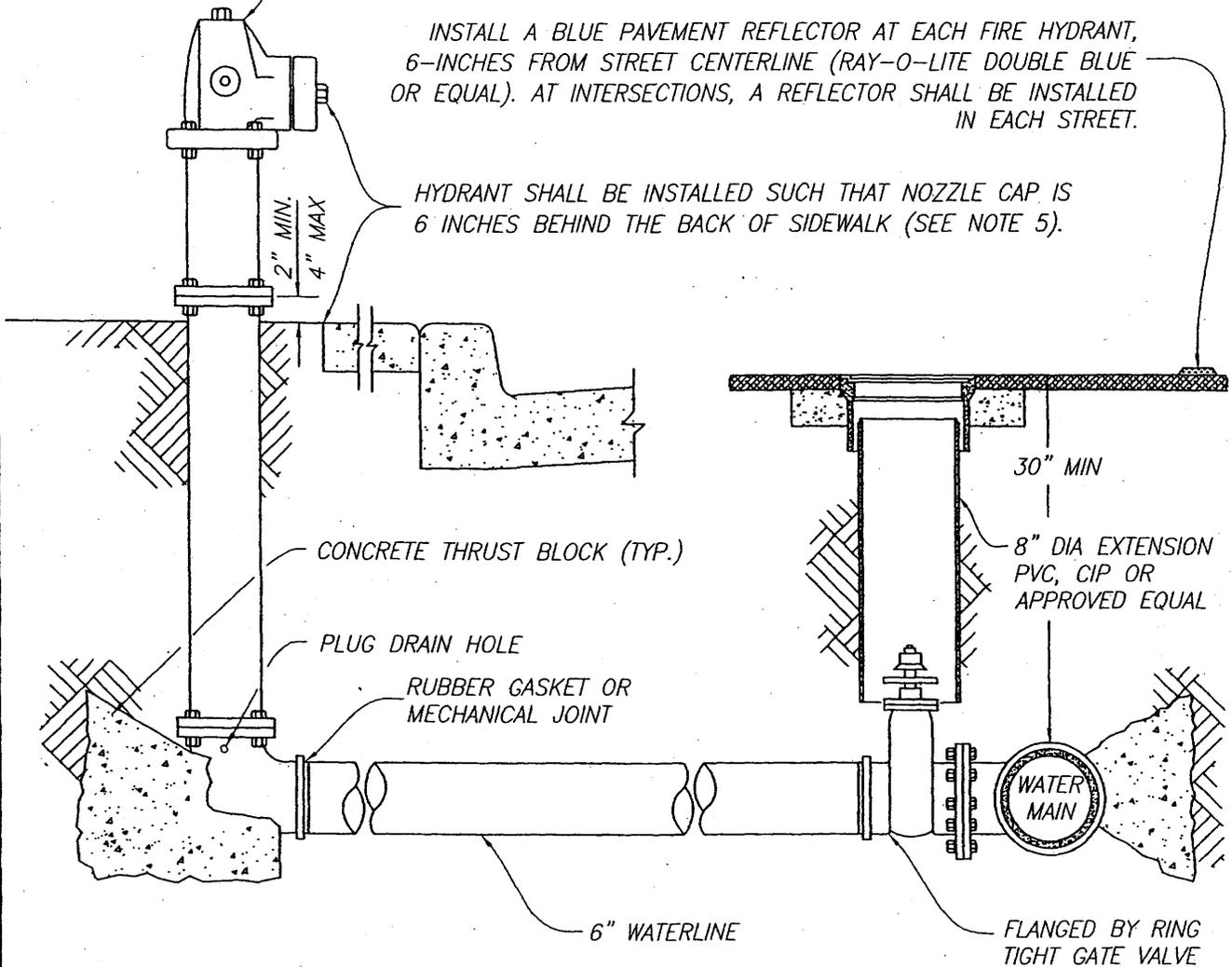
STANDARD DETAIL

W-1

HYDRANT SHALL BE FACTORY PAINTED WITH A SILVER ENAMEL FINISH COAT.

INSTALL A BLUE PAVEMENT REFLECTOR AT EACH FIRE HYDRANT, 6-INCHES FROM STREET CENTERLINE (RAY-O-LITE DOUBLE BLUE OR EQUAL). AT INTERSECTIONS, A REFLECTOR SHALL BE INSTALLED IN EACH STREET.

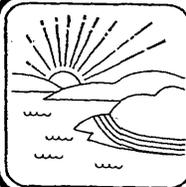
HYDRANT SHALL BE INSTALLED SUCH THAT NOZZLE CAP IS 6 INCHES BEHIND THE BACK OF SIDEWALK (SEE NOTE 5).



NOTES:

1. FIRE HYDRANTS SHALL BE INSTALLED A MINIMUM LATERAL DISTANCE OF 5-FOOT FROM DRIVEWAY APPROACHES; 10-FOET FROM SEWER LINES, ELECTRICAL VAULTS AND PULL BOXES, MANHOLES AND UNDERGROUND TRANSFORMERS; AND 20-FOET FROM POWER POLES AND TREES.
2. WRAP THE FIRE HYDRANT AND WATER MAIN FITTINGS WITH 6-MIL PLASTIC PRIOR TO POURING THRUST BLOCKS.
3. SEE STANDARD DETAIL W-3 FOR VALVE BOX DETAILS.
4. FIRE HYDRANTS SHALL BE WATROUS PACER OR AVK 2700
5. IF FIRE HYDRANTS ARE INSTALLED WITHIN PARKWAYS THE NOZZLE CAP SHALL BE 12 INCHES BEHIND THE BACK OF CURB.

Mar 26, 2004 - 1L
\\Server-1\Library\Details\City of Los Banos\Water\W-2.DWG



DATE APPROVED: 10-06-04

APPROVED BY:
[Signature]

DRAWN: MARK ARRIETA DATE: 3/01/04

WATER IMPROVEMENTS

FIRE HYDRANT
INSTALLATION

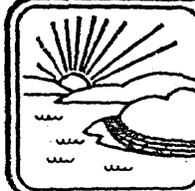
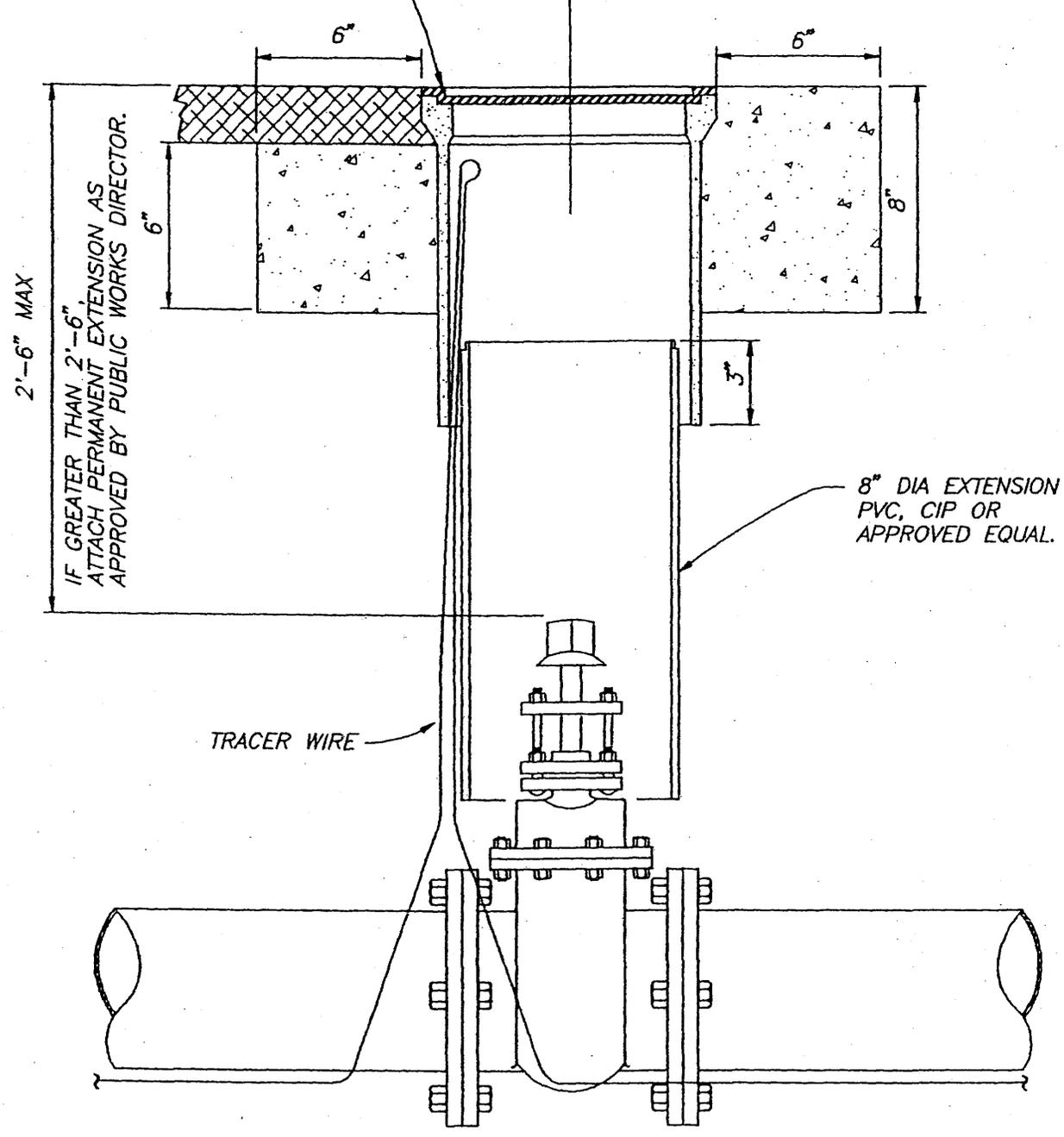
CITY OF LOS BANOS

STANDARD DETAIL

W-2

VALVE BOX WITH CAST IRON FACE AND COVER MARKED WATER (CHRISTY 6-5, BROOKS 4-TT OR EQUAL)

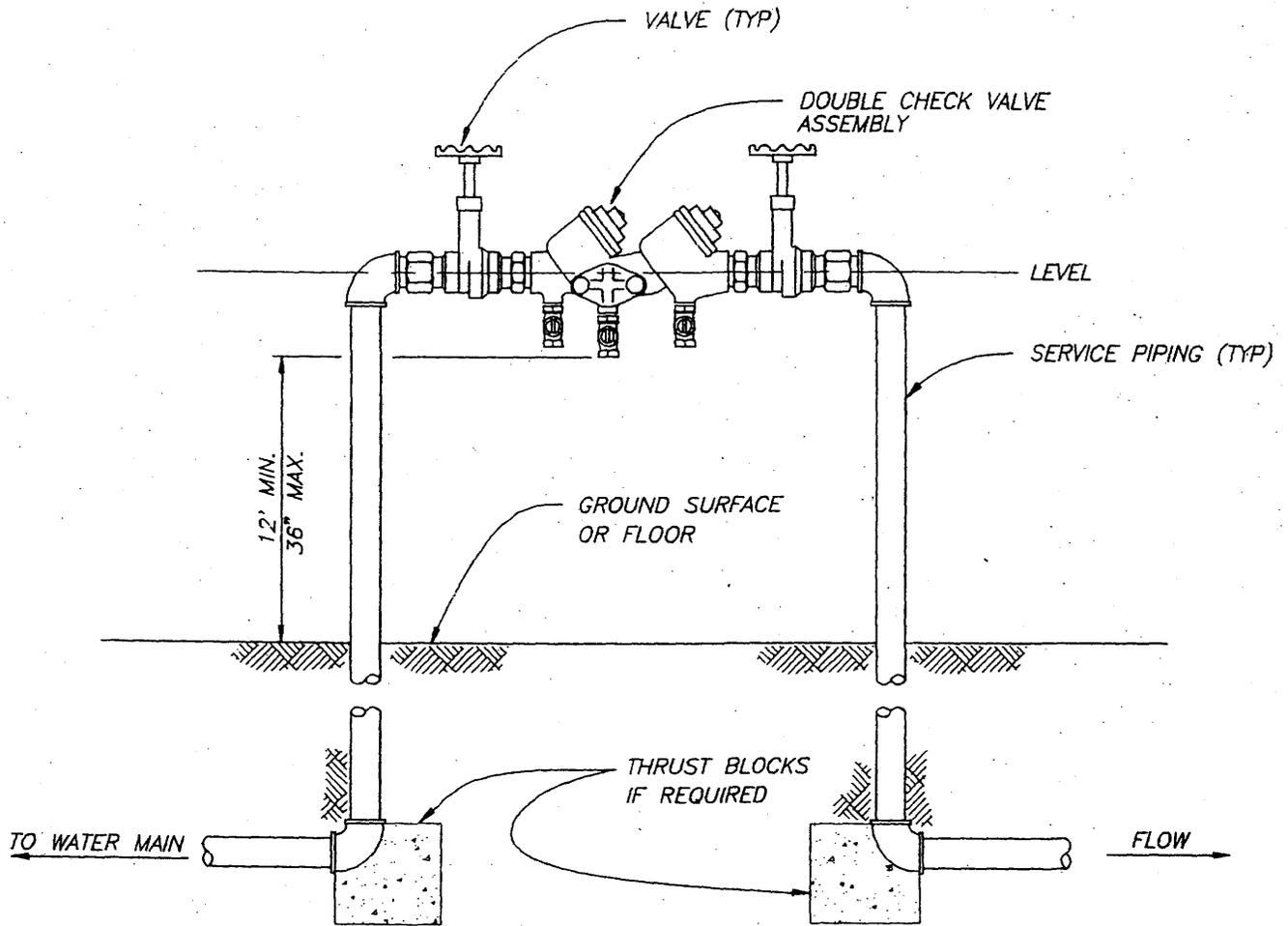
PAVED AREAS | NON PAVED AREAS



DATE APPROVED: 6-15-94
 APPROVED BY: *Gerald L. Herman*
 DRAWN: ALEX BUENROSTRO DATE: 6/23/93

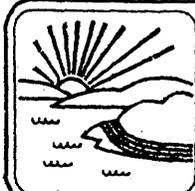
WATER IMPROVEMENTS
 VALVE BOX DETAIL
 CITY OF LOS BANOS

STANDARD DETAIL
 W-3



NOTES:

1. MANUFACTURING AND MODEL NUMBER OF BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE DIRECTOR PRIOR TO INSTALLATION.
2. ABOVE GROUND SERVICE PIPING FOR BACKFLOW PREVENTION DEVICES 2-INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER OR BRASS. SERVICE LINES 4-INCH DIAMETER AND SMALLER BUT LARGER THAN 2-INCHES IN DIAMETER SHALL BE GALVANIZED STEEL.
3. SUPPORTS WHERE PROVIDED SHALL NOT INTERFERE WITH TESTING AND MAINTENANCE.



DATE APPROVED: 6-15-94

APPROVED BY:

Ronald L. Nelson

DRAWN: RAYMOND HILL II DATE: 1/19/94

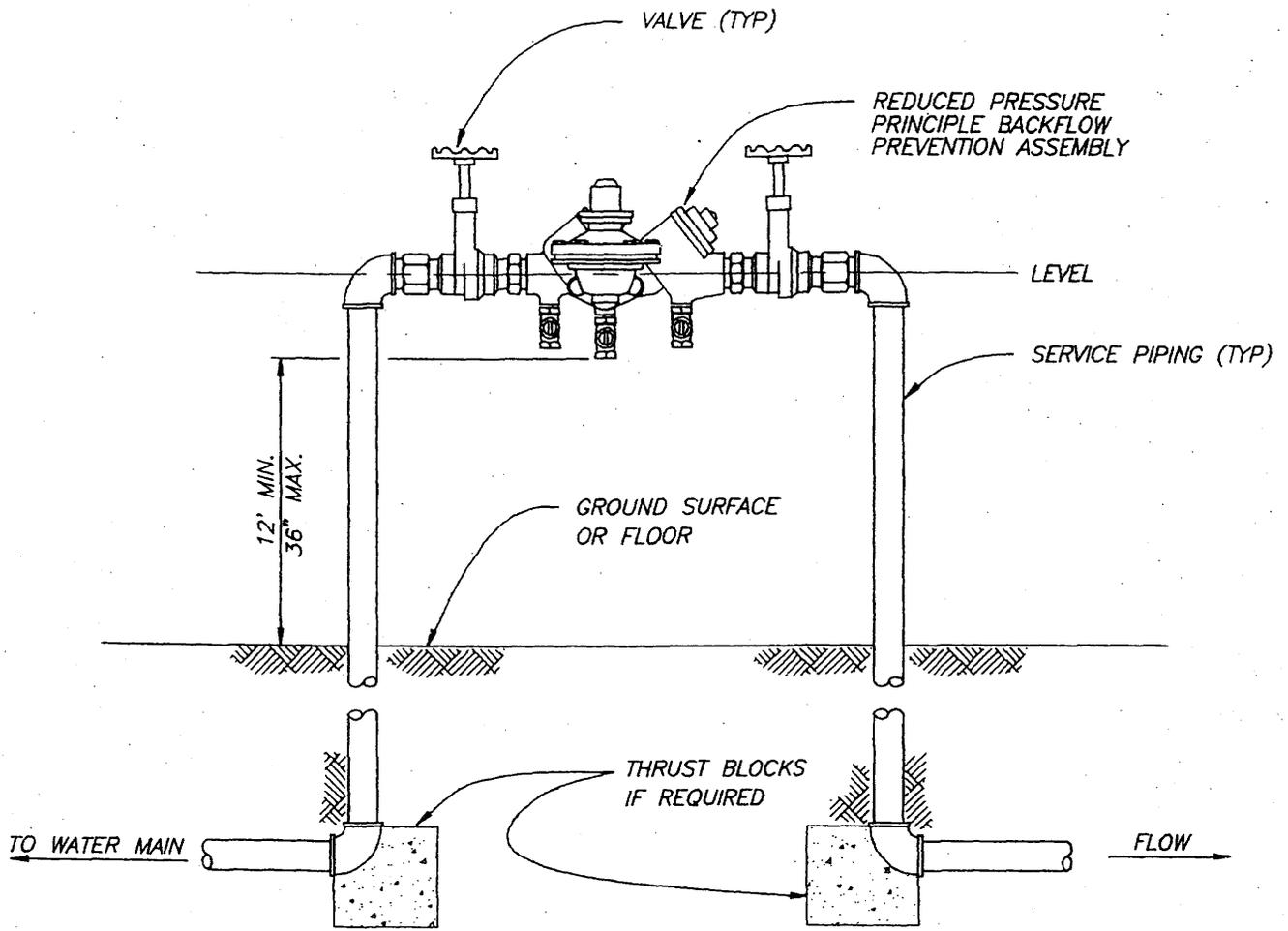
WATER IMPROVEMENTS

DOUBLE CHECK VALVE
BACKFLOW PREVENTOR

CITY OF LOS BANOS.

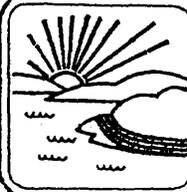
STANDARD DETAIL

W-4



NOTES:

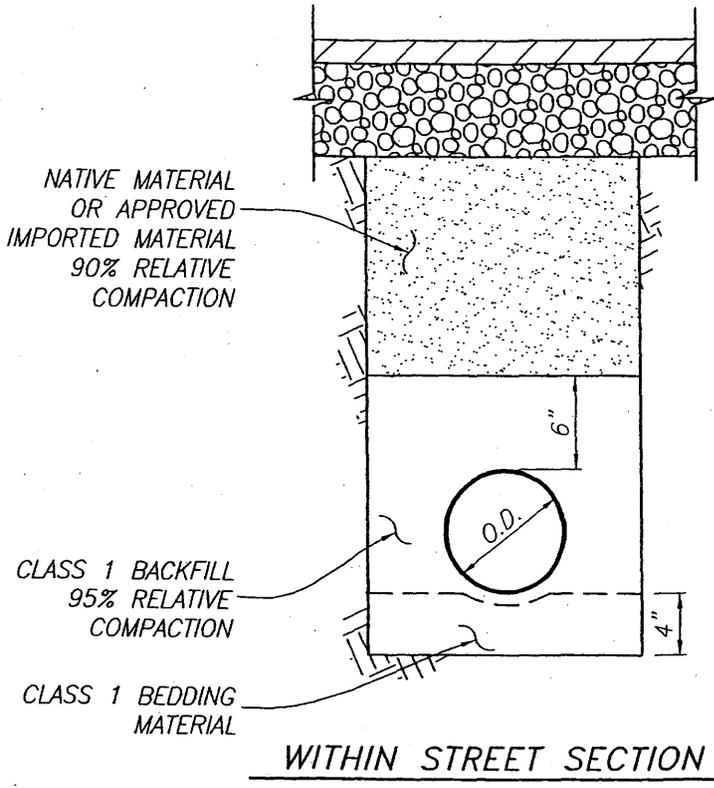
1. MANUFACTURING AND MODEL NUMBER OF BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY THE DIRECTOR PRIOR TO INSTALLATION.
2. ABOVE GROUND SERVICE PIPING FOR BACKFLOW PREVENTION DEVICES 2-INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER OR BRASS. SERVICE LINES 4-INCHES DIAMETER AND SMALLER BUT LARGER THAN 2-INCHES IN DIAMETER SHALL BE GALVANIZED STEEL.
3. SUPPORTS WHERE PROVIDED SHALL NOT INTERFERE WITH TESTING AND MAINTENANCE.



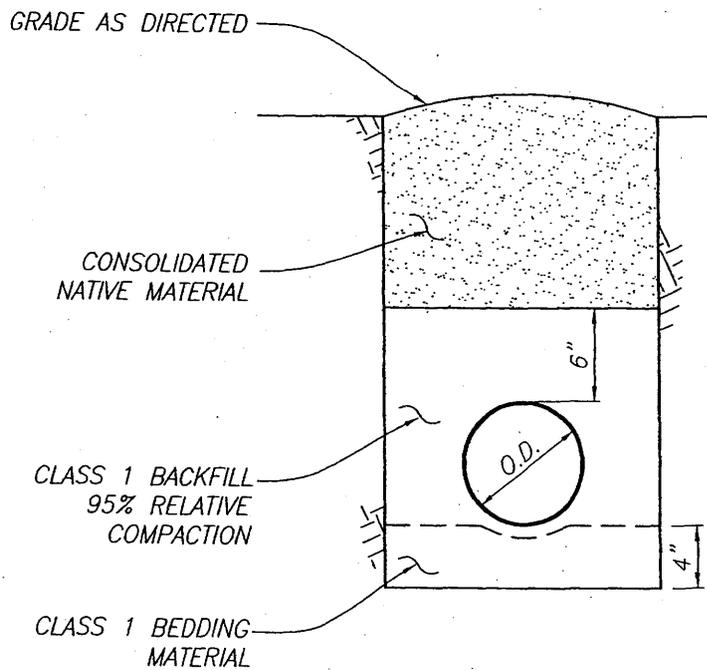
DATE APPROVED: 6-15-94
 APPROVED BY: *Gerald L. Nerma*
 DRAWN: RAYMOND HILL II DATE: 1/19/94

WATER IMPROVEMENTS
 REDUCED PRESSURE
 BACKFLOW PREVENTOR
 CITY OF LOS BANOS

STANDARD DETAIL
 W-5



WITHIN STREET SECTION

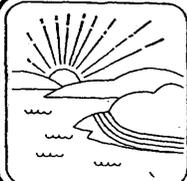


OUTSIDE STREET SECTION

NOTES:

1. MINIMUM TRENCH WIDTH SHALL BE NOT LESS THAN THE GREATER OF EITHER THE PIPE OUTSIDE DIAMETER PLUS 16 INCHES OR THE PIPE OUTSIDE DIAMETER TIMES 1.25 PLUS 12 INCHES.
2. BACKFILL CLASSIFICATION (CLASS1) IS IN ACCORDANCE WITH ASTM D2321.
3. RELATIVE COMPACTION IS EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557.
4. TRENCH WIDTH SHOWN IS FOR STABLE TRENCH WALL CONDITIONS. FOR UNSTABLE TRENCH WALL CONDITIONS, TRENCH WIDTH AND EMBEDMENT REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF A SOILS ENGINEER.
5. IF THE BOTTOM OF TRENCH IS SOFT OR UNSTABLE, IT SHALL BE OVER-EXCAVATED A MINIMUM OF 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.
6. WHERE CONSOLIDATED BACKFILL IS SHOWN, THE MATERIAL SHALL BE CONSOLIDATED TO THE DENSITY OF THE SURROUNDING GROUND.
7. SEE STANDARD DETAIL BF-2 FOR AWWA C900 OR C905 PRESSURE PIPE BACKFILL DETAILS.

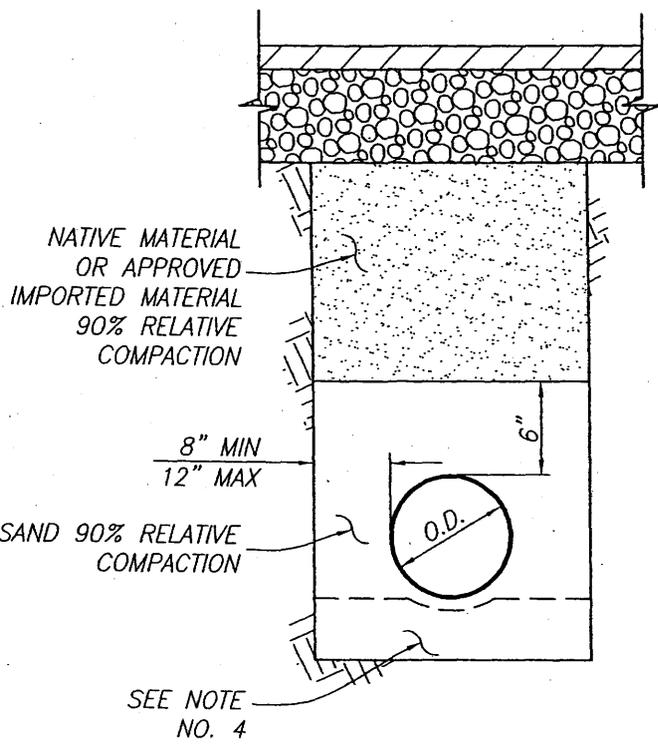
Mar 29, 2004 - 10.
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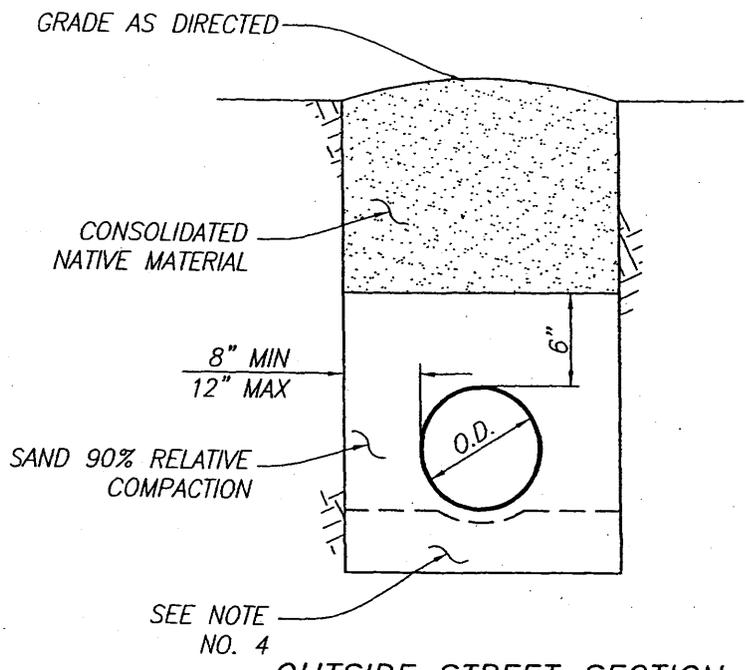
DATE APPROVED: 10-06-04
 APPROVED BY: *[Signature]*
 DRAWN: D. MORENO DATE: 03/26/04

BACKFILL AND BEDDING
FLEXIBLE WALLED PIPE
BACKFILL
 CITY OF LOS BANOS

STANDARD DETAIL
BF-1



WITHIN STREET SECTION



OUTSIDE STREET SECTION

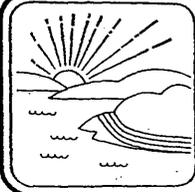
NOTES:

1. SAND SHALL CONFORM TO THE FOLLOWING GRADING REQUIREMENTS:

SIEVE SIZE	PERCENTAGE PASSING
#4	100
#16	0-70
#30	0-15
#200	0-5

- FOR PVC PRESSURE PIPE PROVIDE 4 INCHES OF SAND BEDDING MATERIAL.
- RELATIVE COMPACTION IS EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557.
- IF THE BOTTOM OF TRENCH IS SOFT OR UNSTABLE, IT SHALL BE OVER EXCAVATED A MINIMUM OF 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.
- WHERE CONSOLIDATED BACKFILL IS SHOWN, THE MATERIAL SHALL BE CONSOLIDATED TO THE DENSITY OF THE SURROUNDING GROUND.

Jul 01, 2004 - 1:14
 \\Server_1\1\Library\Details\City of Los Banos\Backfill\bf-2.dwg



DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: D. MORENO DATE: 03/26/04

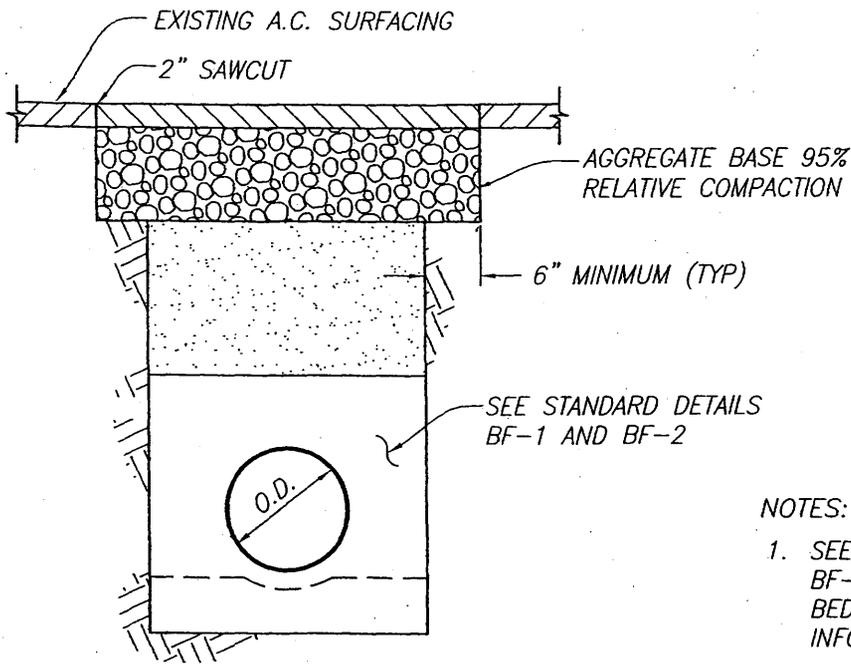
BACKFILL AND BEDDING

RIGID WALLED PIPE
BACKFILL

CITY OF LOS BANOS

STANDARD DETAIL

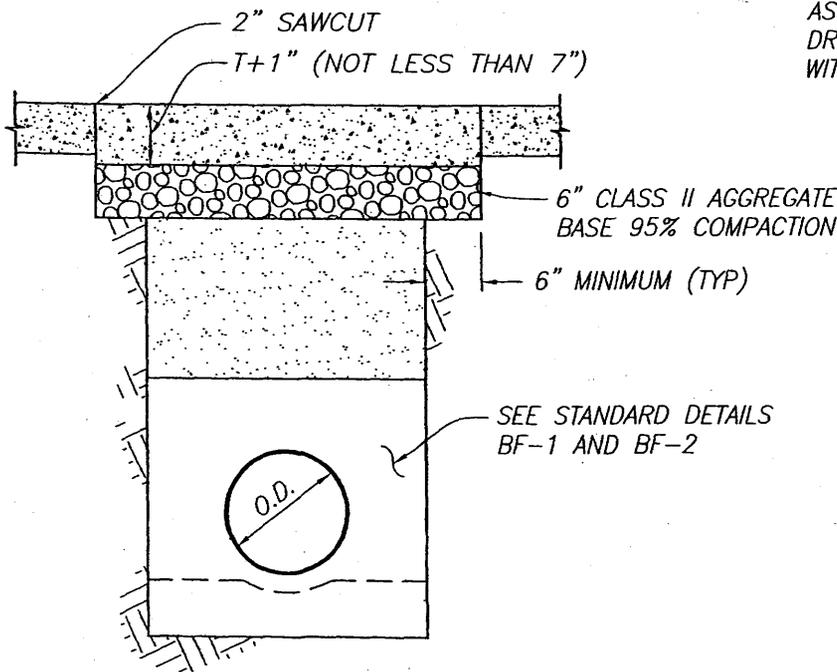
BF-2



**EXCAVATION AND BACKFILL
IN BITUMINOUS PAVEMENT**

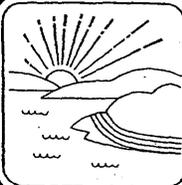
NOTES:

1. SEE STANDARD DETAIL BF-1 AND BF-2 FOR TRENCH WIDTH, PIPE BEDDING AND BACKFILL INFORMATION.
2. THE THICKNESS OF THE RESURFACING MATERIAL SHALL BE EQUIVALENT TO THE EXISTING, PLUS 2 ADDITIONAL INCHES OF AGGREGATE BASE.
3. SOIL DENSITIES ARE EXPRESSED AS A PERCENTAGE OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557.



**EXCAVATION AND BACKFILL
IN CONCRETE PAVED STREETS**

Mar 29, 2004 - 3
 \\Server_1\1\Library\Utilities\City of Los Banos\Backfill\bf-3.dwg



DATE APPROVED: 10-06-04

APPROVED BY:


DRAWN: D. MORENO DATE: 03/26/04

BACKFILL AND BEDDING

EXCAVATION AND BACKFILL
IN EXISTING STREETS

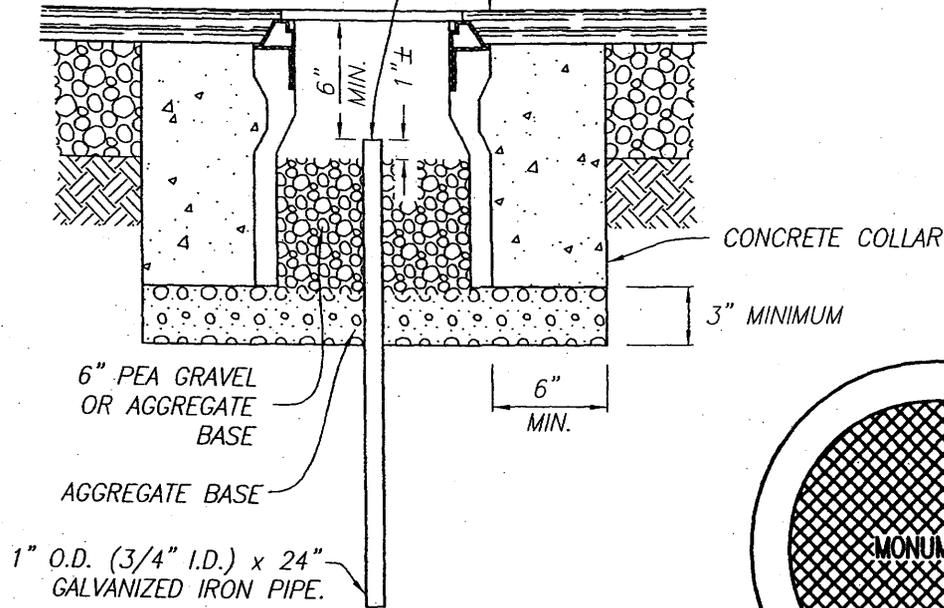
CITY OF LOS BANOS

STANDARD DETAIL

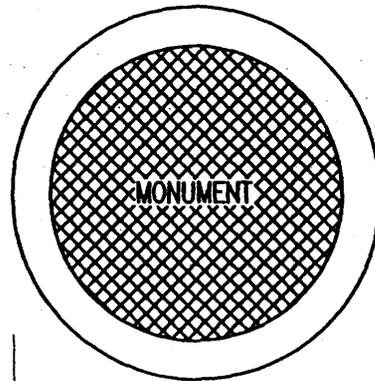
BF-3

MARKED OR TAGGED WITH
CERTIFICATE NUMBER OF
L.S. OR APPROVED R.C.E.

FINISHED GRADE



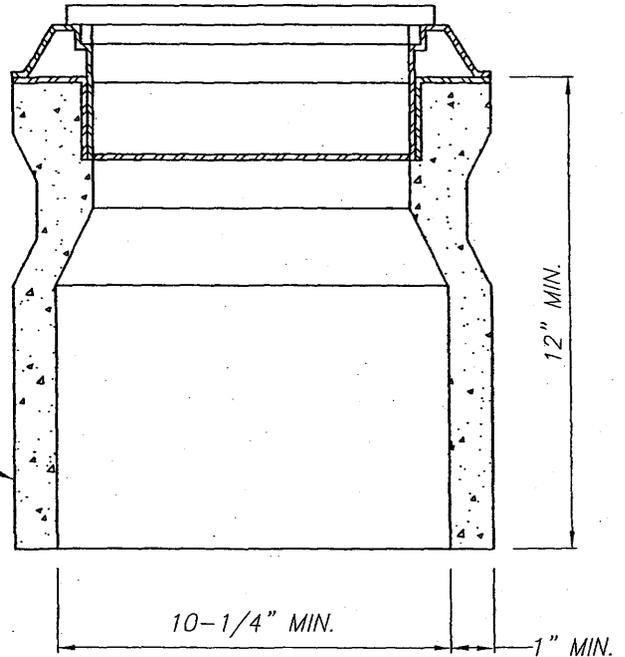
SECTION OF MONUMENT



9-5/8" MIN.

NOTE:

1. FOR INSTALLATION INSIDE STREET SECTIONS ONLY.



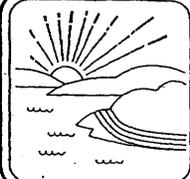
CHRISTY G5 OR BROOKS
3RT TRAFFIC BOX.

10-1/4" MIN.

12" MIN.

1" MIN.

Mar 26, 2004 - 8:11 AM Server_1\Library\Details\City of Los Banos\Miscellaneous\M-1.dwg



DATE APPROVED: 10-06-04

APPROVED BY:
[Signature]

DRAWN: MARK ARRIETA DATE: 3/19/04

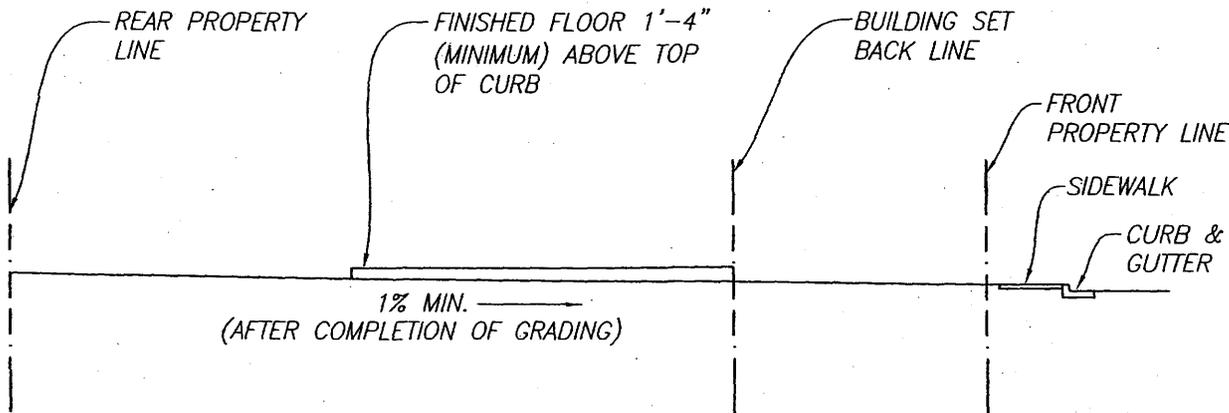
MISCELLANEOUS

PERMANENT MONUMENTS

CITY OF LOS BANOS

STANDARD DETAIL

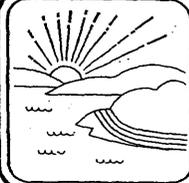
M-1



NOTES:

1. EARTHWORK SHALL BE IN ACCORDANCE WITH THE SOILS REPORT FOR THE PROJECT OR CHAPTER 70 OF THE UNIFORM BUILDING CODE, LATEST EDITION, INCLUDING STATE OF CALIFORNIA AMENDMENTS IF NO SOILS REPORT IS REQUIRED.
2. ALL EARTHWORK SHALL BE COMPLETED PRIOR TO COMMENCING ON SITE CONSTRUCTION.
3. ALL FILL SHALL BE CONSIDERED ENGINEERED FILL UNLESS DESIGNATED OTHERWISE BY THE DESIGN ENGINEER.

Mar 26, 2004 -
 \\Server_1\Library\Details\City of Los Banos\Miscellaneous\M-2.dwg



DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: D. MORENO DATE: 03/22/94

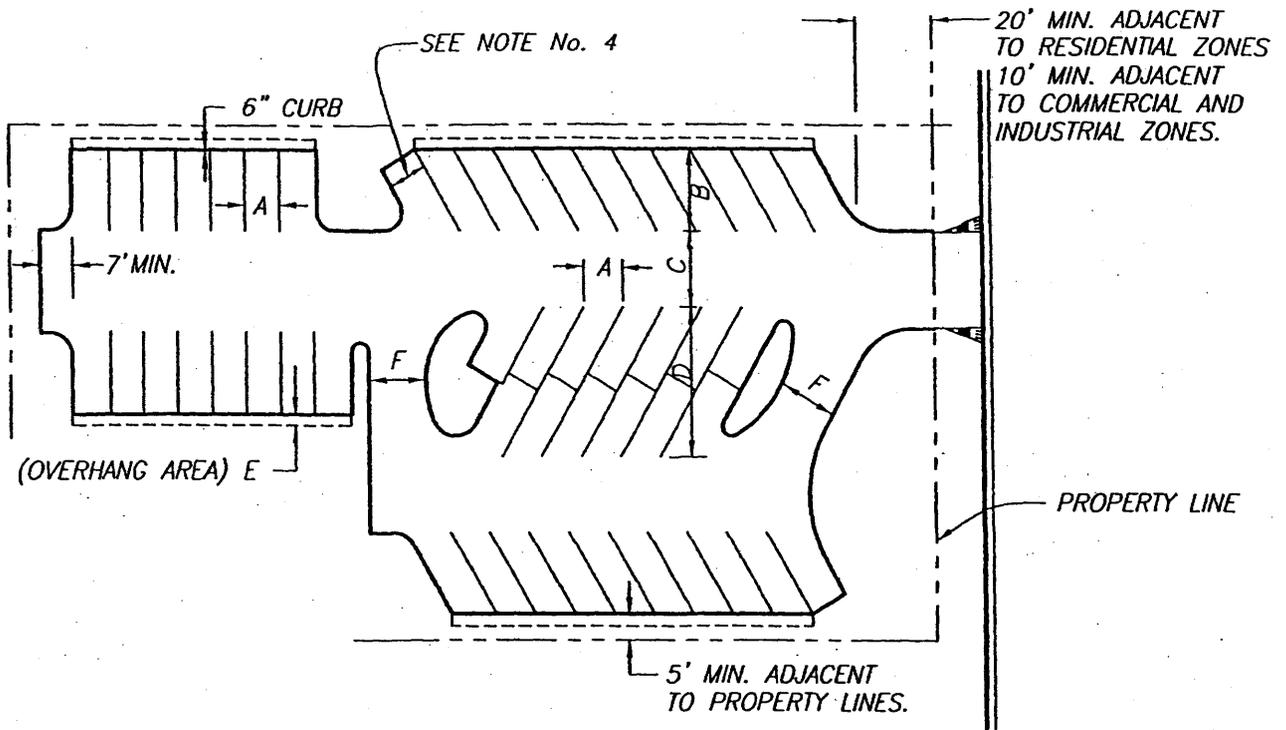
MISCELLANEOUS

TYPICAL
RESIDENTIAL LOT GRADING

CITY OF LOS BANOS

STANDARD DETAIL

M-2

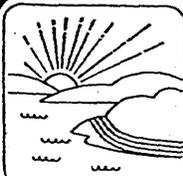


PARKING ANGLE	A	B *	C	D	E	F **
45	12.7	18.4	13	33.2	2.0	14.0
50	11.8	18.8	14	34.9	2.0	14.0
55	11.0	19.1	15	36.3	2.0	14.0
60	10.4	19.2	16	37.4	2.0	14.0
90	9.0	17.0	25	38	2.0	14.0

* PLUS OVERHANG
 ** SEE NOTE NO.3

NOTES:

1. WHERE TWO PARKING ANGLES ARE TO BE USED IN A SINGLE LOT, THEY SHALL BE LOCATED IN SEPARATE AREAS OF THE LOT (EXCEPT AS SHOWN ON LAYOUT).
2. TWO-WAY TRAFFIC AISLES SHALL BE A MINIMUM OF 25- FEET.
3. WHEN A LONG DRIVEWAY HAVING ONLY A SINGLE INGRESS IS NECESSARY WITHIN A DEVELOPMENT, PROVISIONS SHOULD BE MADE FOR THE MANEUVERING OF EMERGENCY VEHICLES AND THE ARRANGEMENT APPROVED BY CITY STAFF PRIOR TO ITS INCORPORATION INTO THE PLAN.
4. TABULATED DIMENSIONS ARE FOR 9 FOOT WIDE SPACES. END STALLS AND STALLS ADJACENT TO CURBINGS SHALL BE A MINIMUM OF 10- FEET WIDE.
5. OUTSIDE CORNERS OF CURBING SHALL BE ROUNDED WITH A MINIMUM RADIUS OF 2- FEET.
6. HANDICAP PARKING STALLS NOT SHOWN.



DATE APPROVED: 10-06-04

APPROVED BY: *[Signature]*

DRAWN: Angela M. Thomson DATE: 1/3/97

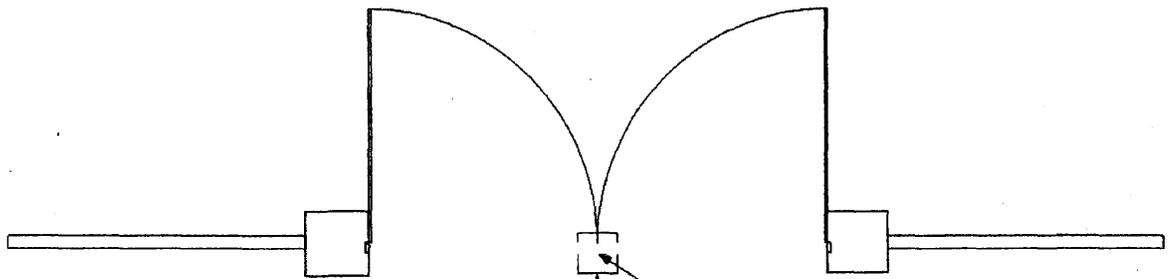
STREET IMPROVEMENTS

PARKING STANDARDS

CITY OF LOS BANOS

STANDARD DETAIL

M-3



10' MINIMUM SET BACK
FROM GATE TO KEY PAD

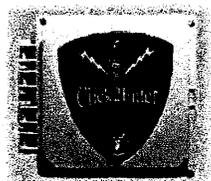
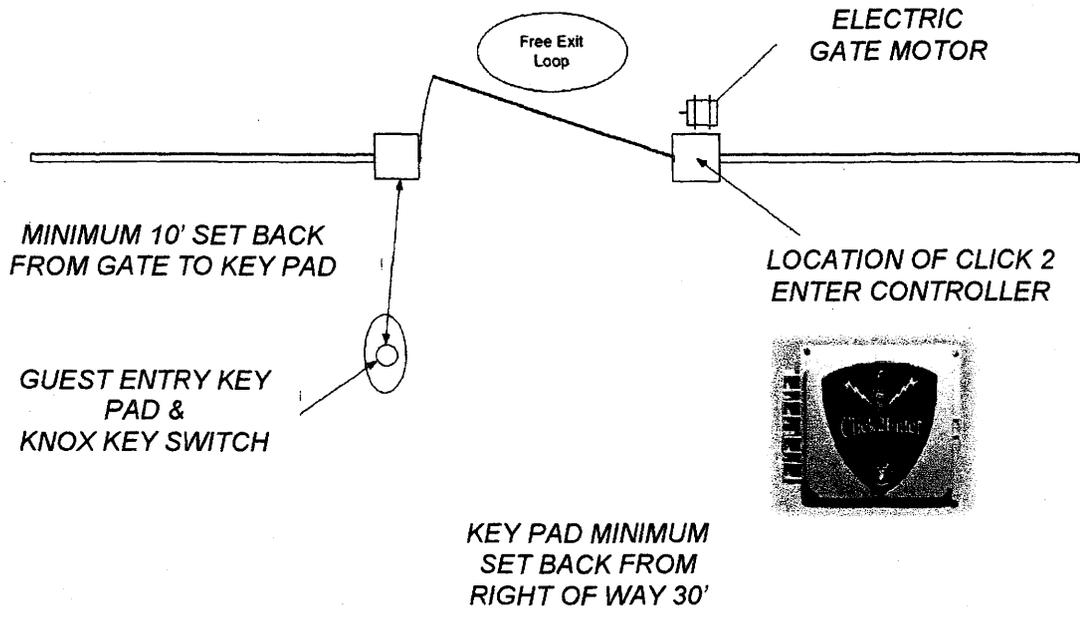
LOCATION OF CLICK 2
ENTER CONTROLLER

GUEST ENTRY KEY PAD
&
KNOX KEY SWITCH



KEY PAD MINIMUM
SET BACK FROM
RIGHT OF WAY 30'

	DATE APPROVED: 2-21-07	MISCELLANEOUS	STANDARD DETAIL
	APPROVED BY:	DOUBLE GATE - CLICK 2 ENTER	M-4
	DRAWN: G. Hutsell 2-1-07	CITY OF LOS BANOS	



DATE APPROVED: 2-21-07

APPROVED BY: *[Signature]*

DRAWN: G. Hutsell 2-1-07

MISCELLANEOUS

SINGLE GATE - CLICK 2 ENTER

CITY OF LOS BANOS

STANDARD DETAIL

M-5

RESOLUTION NO. 4840

**A RESOLUTION OF THE CITY COUNCIL OF THE
CITY OF LOS BANOS ADOPTING REVISIONS TO
CITY OF LOS BANOS STANDARDS AND
SPECIFICATIONS**

WHEREAS, the City Council of the City of Los Banos has received a request from City Staff that revisions to the City of Los Banos Standards and Specifications be adopted; and

WHEREAS, the addition of the Click 2 Enter Automatic Access Gate Controller System to the City of Los Banos Standards and Specifications will allow Mutual Aid and City Service Departments 24 hours per day access to gated communities; and

WHEREAS, the Click 2 Enter Automatic Access Gate Controller System will reduce emergency response to residences within gated communities; and

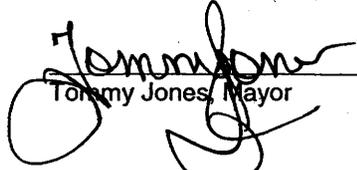
WHEREAS, the City Council of the City of Los Banos has reviewed said request and finds that the revisions of said document are in a position to be adopted by the City of Los Banos.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Los Banos that it does hereby adopt the revisions to the City of Los Banos Standards and Specifications as presented.

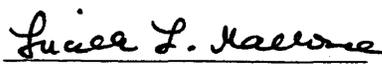
The foregoing Resolution was introduced at a regular meeting of the City Council of the City of Los Banos held on this 21st day of February 2007, by Council Member Sousa, who moved its adoption, which motion was duly seconded by Council Member Faria, and the Resolution was adopted by the following vote:

AYES: Council Members Brooks, Faria, Sousa, Villalta, Mayor Jones
NOES: None
ABSENT: None

APPROVED:


Tommy Jones, Mayor

ATTEST:


Lucille L. Mallonee, City Clerk

