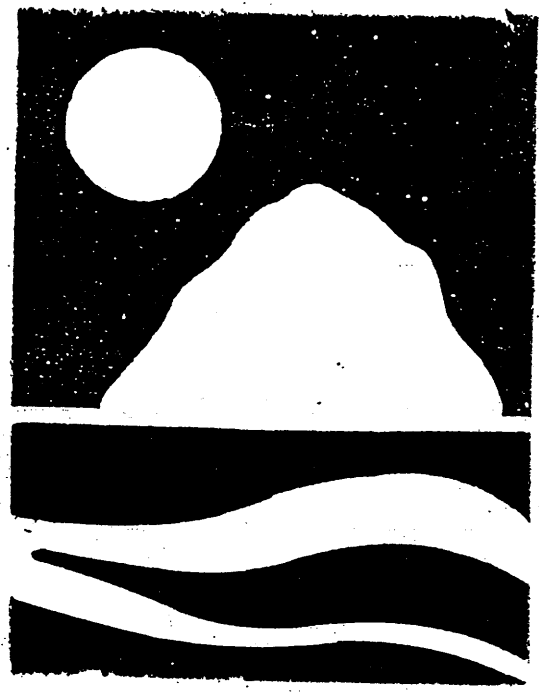


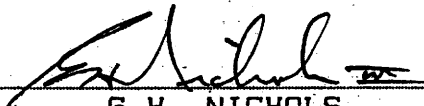
CITY OF MORRO BAY
DEPARTMENT OF PUBLIC WORKS



STANDARD DRAWINGS
and
SPECIFICATIONS

STANDARDS AND SPECIFICATIONS
OF
THE CITY OF MORRO BAY

Department of Public Works
695 Harbor Street
Morro Bay 93442
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G.H. NICHOLS
Director of Public Works

DATE: 10-5-87

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1. GENERAL REQUIREMENTS

1.01 PURPOSE:

The purpose of these Standards and Specifications is to provide minimum standards for the design, methods of construction, kinds and uses of materials, and the preparation of plans for construction, repair or alteration of streets, roadways, concrete structures, drainage, sewerage, and water supply facilities within the public right-of-way of the City of Morro Bay. Any items which are not included in these Standards or Specifications shall be constructed in accordance with the State Specifications as defined below or, if not covered in the State Specifications, as approved by the City of Morro Bay Department of Public Works.

1.02 DEFINITIONS

In these Standards and Specifications or the State Specifications the intent and meaning of the terms that are used shall be as defined in Section 1 of the State Specifications except as herein below specifically noted, revised or added.

1. Contractor - Shall mean any person or persons, firm, partnership, corporation or combination thereof who has/have entered into a contract with any person, corporation, company, or the City of Morro Bay, for the construction of any improvement or portion of any improvement within the public right-of-way of the City of Morro Bay.

2. Developer - Shall mean the owner or his representative.

3. Consultant - Shall mean any person or persons, firm, partnership or corporation legally authorized to practice civil engineering in the State of California who prepares or submits improvement plans and specifications on behalf of a developer to the City of Morro Bay.

4. City - Shall mean the City of Morro Bay.

5. Department - Shall mean the City of Morro Bay Department of Public Works.

6. Engineer - Shall mean the City Engineer of the City of Morro Bay acting either directly or through his authorized representatives.

7. State - When State Specifications are applicable, the word "State" as used in the State Specifications, shall mean City of Morro Bay.

8. State Specifications - Shall mean the latest edition of Standard Specifications of the State of California, Department of

Transportation.

1.05 SAFETY

All work shall be performed in accordance with the requirements of "Title 8" of the State of California Division of Industrial Safety.

Excavation for any trench five (5) feet or more in depth shall not begin until the Contractor has received approval from the Engineer of the Contractor's detailed plan for worker protection. Such plans shall be submitted at least 5 days before the Contractor intends to begin excavation for the trench and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection. No such plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety. If such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.

The Contractor's attention is directed to the provisions of Section 6705 of the Labor Code concerning trench safety plans.

All signs, signals, flares, barricades, flagmen, or other warning devices necessary for the protection and convenience of the public during the construction phase shall be furnished, installed, and maintained by the Contractor in accordance with the latest edition of the State of California "Manual of Traffic Control. Signs and other traffic warning devices must be in accordance with the latest edition of the State of California "Manual of Warning Signs, Lights, and Devices For Use in Performance of Work Upon Highways.

Excavated material shall be piled in such a manner that it will not endanger the work and will offer minimum obstruction to traffic. Open trenches and waste piles shall be adequately barricaded. Trenches in or adjacent to roadways shall be backfilled at the close of each working day

1.04 PERMITS AND LICENSES

Any Contractor and/or property owner wishing to do work under these standards and specifications shall obtain a permit from the Department of Public Works prior to the start of construction. If such permit has not been obtained, the work shall be stopped at the direction of the Engineer, who may cause the work already completed to be removed and the site restored to its original condition.

Any Contractor doing excavations of five (5) feet or more in depth shall possess a current CAL/OSHA permit. A copy of such permit shall be presented to the Department of Public Works.

Any Contractor performing work under these specifications shall possess a valid state license to perform such work. The Contractor or his duly authorized representative must be

available on the job site during the time when any work is in progress. If such is not the case, work shall be stopped at the direction of the Engineer.

A City of Morro Bay business license must also be obtained by any Contractor or subcontractor performing work within the City of Morro Bay.

2. PREPARATION OF PLANS

2.01 GENERAL

Complete plans and specifications for all proposed streets, drainage facilities, sewerage, water distribution systems, industrial and commercial development and subdivisions, including any necessary dedications and easements, shall be submitted to the Engineer for approval and must receive the required approval prior to the beginning of construction of any such improvements. Where improvements are required as a condition of City approval of any development, including those where City acceptance of the public ways in said development is not intended nor imminent, improvement plans acceptable to the Engineer shall be submitted to assure the Department of Public Works that proper construction standards will be used, together with Performance Bonds and Labor and Materials Bonds as necessary to assure compliance.

Three sets of plans, specifications and special provisions, together with two copies of all computations, estimates, test data, cross sections, and such other items as may be requested by the Engineer, shall be submitted to the Engineer for approval. One copy of the plans showing desired revisions will be returned. At such time as necessary revisions are made, the original drawings will be submitted for approval. No construction will be authorized or plan approved until such time as the Engineer signifies his approval by his signature on the original drawings.

2.02 STANDARD SHEET SIZES & SCALES

A. Residential Subdivisions and Commercial or Industrial Streets - These plans shall be prepared on vellum or approved equal, 24" x 36", Standard Federal Aid Plan/Profile Sheet. Desirable scales: Horizontal of 1" = 40', vertical of 1" = 2' or 1" = 4'; or horizontal of 1" = 50' with vertical of 1" = 5'. However, scale may be varied in steep terrains.

B. Storm Drainage - Plans for minor drainage facilities may be shown on street plans, if appropriate. Plans for major drainage facilities shall conform to the sheet size and scale mentioned for street plans.

Attention is directed to Section 2.01 of these Specifications which requires the submittal of computations at the time plans are submitted for approval.

C. Sanitary Sewerage - Plans for sanitary sewer improvements shall be prepared on standard sheets as defined in paragraph A. Scales are to be as follows except in unusually steep terrain where the scales may be varied.

Horizontal of 1" = 50'
Vertical of 1" = 4' or 1" = 5'

D. Water - Plans for water system layout and improvements shall be drawn on the same plans as the streets, and to the same scale as sanitary sewerage plans. Off-street improvements shall be drawn on sheets and to a scale approved by the Engineer.

E. Utilities - Plans for electric, telephone, cable T.U., and gas system improvements shall be submitted on the same plans as the streets.

F. Grading - If any grading is proposed, a grading plan shall be submitted with the other required improvement plans. Grading shall be in accordance with Chapter 70 of the Uniform Building Code, current adopted edition.

2.03 PLAN DETAILS

The following details are to be shown on plans submitted for approval:

A. Index Sheet - On improvement plans exceeding two sheets in the set, a separate index sheet shall be prepared. The index sheet shall include a vicinity map, an index of drawings; the consultant's name, Professional Registration number and signature; the date; and the block for the necessary approval of the Engineer.

B. Title Blocks - Each sheet of the set of drawings shall have an approved title block showing the sheet title, sheet number, total number of sheets, date, scale, and the consultant's name, signature, and Professional Registration number; and the name or number of the Subdivision if appropriate.

C. Right-of-Way - The boundaries of lots fronting on the street, right-of-way lines, drainage easements, utility easements, section lines and corners, land grant lines, and temporary construction easements both existing and proposed shall be on the plans. All right-of-way and easement lines shall be properly dimensioned.

D. Topography - All pertinent topographic features which may affect the design, construction, and operation of the improvement shall be shown on the plans, included but not limited to the following: street lines, sidewalks, curbs, shoulders, location and size of storm and sanitary sewer systems, high water and frequent inundation levels, water and gas lines, existing structures, fences, houses, trees, and other foliage, drainage ditches, utility poles, fire hydrants, and all other features of the area which may affect the design requirements.

E. Profiles - The plan shall clearly show the existing and proposed profiles of all roadways, drainage ditches, storm drains, and sanitary sewers.

F. Stationing and Orientation - The stationing on plan and profile shall read from left to right. Insofar as practical, the plans shall be so arranged that the north arrow is either pointed toward the top or to the right edge of the sheet.

G. Special Notes - Special notes shall be clearly indicated. The following note shall be conspicuously placed on the first sheet of the plans:

"All construction work and installations shall conform to the City of Morro Bay Standards and Specifications and all work shall be subject to the approval of the City Engineer."

H. Typical Sections - The plans shall include one sheet entitled "Typical Sections", which shall show the following:

1. Typical streets and roads
2. Typical Sections of drainage, sewer, or water trench connections

I. Details - The plans shall include detail sheets which shall show the following:

1. Details of all typical concrete structures
2. Miscellaneous typical details - street signs, monuments, etc.

J. Cross Sections - Cross sectional drawings shall be shown for all culvert and drainage structure locations, and street construction or reconstruction, including curb and gutter installations.

K. Record Drawings - During the progress of the work the Consultant or Contractor shall maintain one set of prints of the improvement plans showing all constructed changes from the original design. Each change shall be approved by the Engineer before being made. Upon completion of the work, the Developer shall obtain the original tracings from the office of the Engineer and make the recorded changes thereon and return the original drawings to the Engineer prior to the City's acceptance of the project.

3. INSPECTION

3.01 INSPECTION DURING CONSTRUCTION

Each phase of any and all improvements constructed to these specifications must first be inspected and approved by the Engineer prior to the Contractor's proceeding with subsequent phases. Each phase shall be inspected as the Engineer considers necessary but in any case the Engineer shall make an inspection within two working days after receiving a request for inspection from the Contractor.

3.02 FINAL INSPECTION

Upon completion of any improvements which are constructed under and in accordance with these standards and specifications, and prior to requesting a final inspection, the area shall be thoroughly cleaned of all rubbish, excess material and equipment, and all portions of the work shall be left in a neat and orderly condition satisfactory to the Engineer.

Within 5 days after receiving the request for final inspection, the Engineer shall inspect the work. The Developer or Contractor will be notified in writing within 5 days as to any particular defects or deficiencies to be remedied. The Developer or Contractor shall proceed to correct such defects or deficiencies at the earliest possible date. At such time as the work has been completed a second inspection shall be made by the Engineer within two working days of notification that reinspection is desired.

4. ROADS AND STREETS

4.01 GEOMETRICS AND PROFILES

The following standards shall be used for the design of road and street improvements unless otherwise directed by the City Engineer.

A. Minimum and Maximum Grades-

1. Minimum grade along any line on new streets shall be 0.30 percent.

2. Minimum grade of concrete curb and gutter section constructed on existing street shall be 0.30 percent.

3. Maximum grade on new street shall be 15.0 percent.

B. Cross Slopes/Crowns-

1. Minimum cross section slope on streets shall be 1.0 percent; maximum cross section slope shall be 6.0 percent.

2. When two streets intersect, neither street shall have a grade greater than 3.0 percent for a minimum distance of 40 feet measured from the curb line of the intersected street, except in unusually steep terrain.

3. The minimum vertical curve length allowable at the intersection of two grades shall be 50 feet. However, vertical curves may be eliminated where the algebraic difference in grades does not exceed 2.0 percent.

C. Minimum Sight Distance - The minimum sight distance over any segment of the roadway shall be 200 feet unless approved by the Engineer.

D. Roadbed - The roadbed shall be prepared and constructed in accordance with the applicable portions of the State Specifications.

1. Class II Base - Shall conform to the requirements for Class II aggregate base as specified in Section 26 of the State Specifications.

2. Asphalt Concrete - Shall conform to the requirements for Type B Asphalt Concrete as specified in Section 39 of the State Specifications utilizing 1/2 inch maximum aggregate and AR 8000 viscosity. AR 16000 shall be used for parking lots or areas with standing loads. The completed surface shall be sealed with a fog seal in accordance with Section 37-1 of the State Specifications.

5. CURB & GUTTER, SIDEWALKS, DRIVEWAY APPROACHES

5.01 GENERAL

Concrete shall conform to the requirements for Portland Cement Concrete as specified in Section 90 of the State Specifications.

Wheelchair ramps shall be installed in accordance with Standard Drawing B-4 at all intersections where sidewalks exist or are to be built in the future. Where ramps are to be installed in an existing curb return, the entirety of the curb return and the spandrel, if one exists, shall be sawcut and removed.

All sidewalks shall be a full 4 inches thick.

Where new driveways or sidewalks are to be installed in existing concrete sidewalks, the existing concrete shall be sawcut. Eighteen inch (18") greased dowels shall be placed in accordance with Standard Drawings B-1, B-5, and B-6.

6. DRAINAGE

6.01 GENERAL

These standards are designed to provide general and some detailed design criteria. Most design details are left to the responsibility of the Developer and may be handled by following good engineering practices.

6.02 ALIGNMENT

1. Storm drainage lines are to be parallel to the center of the street unless otherwise approved by the Engineer.

2. Junctions shall be provided between converging lines in such a manner as will minimize losses and utilize available velocity head.

3. The vertical alignment shall be designed to eliminate any ponding within the drainage system.

6.03 EASEMENTS

Drainage facilities shall be located in a public street or road or within a public drainage easement. Drainage easements shall be used for drainage purposes exclusively and shall not be combined with easements required for other public utilities, unless it can be proved to the Engineer that dual use of said easement will not be conflicting.

Easements for closed conduits shall meet the following requirements:

1. Minimum width of 10 feet with pipe at quarter point, on north or west. Whenever possible, easements for closed conduits shall be along or adjacent to property lines and outside of areas where structures are planned.

2. On pipes of 24-inch diameter and greater, or trenches exceeding 5 feet in depth, the easement shall have additional width to provide ample working space as required by the Engineer.

3. Provide access and working space rights.

6.04 DESIGN COMPUTATIONS

The design computation for drainage shall include the following information:

1. Drainage area in acres, time of concentration, rainfall intensity, and runoff coefficient.

2. Design flow to each structure.

3. Design flow to each pipe.

4. Flow line elevation of each pipe and structure.

5. Top of structure elevation.

6. Water surface elevation at each structure.

7. Hydraulic gradient.
8. Pipe, size, length, and gradient.

Minimum pipe diameter allowable on any storm drain shall be 12 inches. A lesser size may be used for culverts of not over 20 feet in length, and if used for down-drains on fill slopes if approved by the Engineer. The minimum design velocity in closed conduits shall be 2 f.p.s. when conduit is flowing to capacity and should not exceed 15 f.p.s.

6.05 DRAINAGE STRUCTURES

The design and construction of drainage structures and special drainage items shall conform to the designs contained in these Standards and Specifications (unless otherwise noted). Special care shall be taken to insure that all drainage structures and pipes are designed at such a capacity that the drainage system may be extended or enlarged to serve the entire drainage basin at ultimate development.

A. Inlets - Gutter inlets shall be in accordance with the types shown on Standard Drawings C-1 and C-3. The inlets shall be spaced so that gutter flow does not exceed a depth of 6 inches at the face of a curb for a 10-year storm and so that a 100-year storm will not cause any damage and can be contained within the public right-of-way. Grates and frames shall be in accordance with Standard Drawings C-4 and C-5.

B. Junction Boxes - All junction boxes shall have standard 24-inch diameter manhole covers in accordance with Standard Drawing C-9. Manholes in the gutter line may use the standard grated manhole cover and serve also as an inlet manhole. Spacing of junction boxes for maintenance shall not exceed 500 feet for drains 24 inches and smaller in diameter, and 600 feet for pipes greater than 24 inches in diameter.

When cases arise where special junction boxes are required, the design shall be approved by the Engineer.

C. Materials - All drainage items shall be of the material and construction method as required in accordance with the applicable portions of the State Specifications and the Standard Drawings.

1. Concrete pipe shall conform to the specifications of ASTM Designation C-76-Latest Revision. Laying of concrete pipe shall conform to Section 65-1.07 of the State Specifications. Jointing shall conform to Section 65-1.06 of the State Specifications.

2. Asbestos-Cement pipe is not allowed.

3. PVC pipe shall conform to ASTM Designation D2729 for sewer pipe and shall be used only in gravity flow systems.

4. Concrete structures shall be in accordance with these Standards and Specifications and in addition they shall conform to the requirements of Section 51 of the State Specifications.

5. Reinforcement shall be in accordance with the Standard Drawings and shall conform to the requirements of Section 52 of the State Specifications.

6. Portland Cement concrete shall be as specified in the Standard Drawings and conform to the requirements of Section 90 of the State Specifications.

7. Drainage pumps - The use of drainage pumps shall be avoided whenever possible. They shall be used only with the approval of the Engineer.

8. Cross culverts - Cross culverts may be of reinforced concrete pipe or corrugated metal pipe meeting the requirements of these Standards and Specifications. Cross culvert design shall be determined on the basis of a 10-year storm with no head.

6.06 BACKFILL REQUIREMENTS

Backfilling operations shall be in accordance with Standard Drawing W-6 and these Specifications. Material intended for use as structure backfill shall have a sand equivalent value of not less than 20. No structure backfill material shall be placed until the structure or facility has been inspected by the Engineer and approved for backfill.

Backfill material shall be placed in uniform horizontal layers not exceeding 0.67 foot in thickness before compaction, and shall be brought up uniformly on all sides of the structure or facility. Every layer of backfill shall be compacted to a relative compaction of not less than 90 percent, except that the upper 2 feet shall be compacted to 95 percent.

When the material from excavation is unsuitable for backfill, it shall become the property of the Contractor and shall be disposed of as approved by the Engineer.

Compaction of structure backfill by jetting will be permitted only when the Engineer determines the backfill material and the native soil conditions are of such character that it will be self-draining when compacted, that foundation material will not soften or be damaged by the application of water, and no damage from hydrostatic pressure will result to the structure or facility. When jetting is permitted, material for use as backfill shall be placed and compacted in layers not exceeding 4 feet thickness. Jetting shall be supplemented by the use of other compaction.

PVC pipe backfill shall be in accordance with the requirements of the Handbook of PVC Pipe. PVC lines shall be mandrell tested for roundness after backfill has been completed.

Settling of backfilled trenches which may occur during a one-year period after completion shall be repaired by the Contractor without expense to the City, including the complete repair of all damaged property.

7. MONUMENTS AND BARRIERS

7.01 MONUMENTS

Monuments shall be installed in accordance with Standard Drawing M-1, these Specifications, and Section 81 of the State Specifications.

A. Street Monuments shall be set to reference street centerlines at intersections, curves, and along the tract boundary as required by the Engineer.

Monuments shall be set no further apart than 500 feet along centerlines and shall be shown on the final subdivision map.

B. Boundary Monuments shall be set at all angle points marking the extremities of the subdivision and shall be set no further than 500 feet apart along boundary lines.

Boundary monuments shall be of iron pipe, no smaller than 1-1/2 inches in diameter, no shorter than 30 inches in length, capped and stamped with the land surveyor's or registered engineer's number, and indicated by a marker stake extending above the ground surface.

C. Lot Stakes shall be constructed of 1/2-inch iron pipe at least 12 inches in length or a 2-inch by 2-inch wooden hub at least 12 inches in length, painted white and tagged, or a No. 4 rebar 18" long with plastic cap marked with the surveyor's number.

The Contractor is responsible for the protection or proper resetting of all existing monuments and survey markers. Any survey monuments destroyed or damaged by the Contractor shall be replaced at the Contractor's expense.

7.02 BARRICADES

Barricades shall be installed in accordance with Standard Drawings M-2 and M-3, and Section 83 of the State Specifications.

7.03 CHAIN LINK FENCES

Chain link fences shall be installed in accordance with Standard Drawings M-4 and M-5, and Section 80 of the State Specifications.

8. SEWERAGE

8.01 GENERAL

Sanitary sewer lines and appurtenances within City jurisdiction shall be constructed in accordance with the details shown on plans and specifications approved by the Engineer, these Standards and Specifications, and State Specifications where applicable.

8.02 DESIGN FLOW AND GRADIENT

An average flow of 100 gallons per person per day shall be used for hydraulic design purposes, with the peak flow double the average flow. Pipes shall be sized to handle peak flows with pipes flowing three-quarters (3/4) full.

Sanitary sewer grades shall be designed to provide a minimum velocity of 2 feet per second when flowing full. The following table indicates the slopes which will provide that velocity, and these shall be used as the minimum standard for design.

Diameter	Slope in Feet/Foot Min. Acceptable
6"	.0050
8"	.0035
10"	.0025
12"	.0020
15"	.0015
18"	.0012
House Lateral	.02

Whenever a change in the size of the pipe, or an angle of 20 degrees or greater in alignment occurs, the flowline of the pipe flowing into the manhole shall be a minimum of 0.17 foot above the flowline of the pipe flowing from the manhole, or an amount necessary to match the inside crowns of the pipes, whichever is greater.

Design velocities for sanitary sewers shall not exceed 10 feet per second, unless approved by the Engineer. The maximum design discharge shall not exceed the flow at critical slope and velocity. Sanitary sewers should not be designed for flow conditions at critical slope and velocity.

8.03 LOCATION AND ALIGNMENT

All sanitary sewers shall be constructed and installed within City right-of-way. Location of sewer lines in easements shall be kept to a minimum. Width and location of easements are subject to the approval of the Engineer. (See also Section 6.03)

Sewerage systems shall be designed so as to have a minimum curvature both horizontal and vertical. Whenever possible sewer

lines shall be laid out in a straight line between structures.

8.04 DEPTH AND SIZE

The normal design depth of a sanitary sewer system shall be such as to obtain a minimum cover of 36 inches for the house lateral at the property line. Sewer mains and laterals shall be designed so as to be usable by each lot without the need for an ejector pump. Exceptions may be granted by the Engineer on a case-by-case basis.

The minimum sewer main size shall be 6 inches.

8.05 MANHOLES

Manholes shall be installed in accordance with Standard Drawings S-3 and S-4, and these Specifications.

Manholes shall be watertight structures constructed by placing precast concrete sections on a poured concrete base. Eccentric cones shall be used with openings over the upstream side of the manhole. Steps shall not be permitted in manholes.

Whenever the inverts of sewer lines enter a manhole at different elevations, a standard drop manhole shall be constructed.

Normal maximum spacing for manholes shall be 400 feet. The maximum spacing of manholes on trunk sewer lines shall be as follows:

- 12" to 24" diameter - 400 feet
- 24" to 36" diameter - 500 feet.

Cleanouts at the end of a line shall not be further than 400 feet from the nearest manhole. Cleanouts shall be installed in accordance with Standard Drawing S-2.

Brick or block manholes shall not be allowed except under special circumstances where it is not feasible to construct pre-cast manholes.

8.06 HOUSE SERVICE LINES

When a new sewer line is constructed, house service lines from the sewer to the property line or existing house service lines shall be installed at the same time. Whenever house service laterals are installed as a part of the construction of the sewer line, the use of wye or tee saddles shall not be permitted. Laterals shall not enter the main at an angle greater than 45 degrees.

Each house service line shall be referenced to the plan stationing. Location of the service lines shall be marked at the curb with an "S". Where curbs are not present laterals shall be marked with a brass tag stamped "S" on an iron pipe or 2" x 2" hub. The minimum size of any sanitary lateral shall be 4 inches.

For sewer laterals installed after construction of the main line, the main shall be cut and a precast wye installed in accordance with Standard Drawing S-1.

Laterals shall have approved backflow preventers installed wherever the top of the lowest fixture is lower than the rim elevation of the upstream manhole.

Cast iron shall be used for laterals under driveways when there is less than 3'-0" of cover.

Excavation for laterals shall be in accordance with Section 8.09C of these Specifications.

8.07 PIPE

All sanitary sewer lines shall be clay pipe, PVC pipe, or cast iron pipe, or approved by the Engineer. All pipe and pipe fittings shall be marked or stamped with the trade brand name of the manufacturer, and strength or class of pipe. All pipe, fittings, and joints shall conform to ASTM Standards.

Abestos-cement pipe shall not be used for sewers.

Bituminous fiber pipe shall not be permitted for mains or laterals.

PVC pipe may only be used for gravity sewers. However, the Engineer may approve PVC for installation under low head pressure where surge forces are minimal.

8.08 CASTINGS

All castings for manhole rings and covers, flushing branch frames and covers, or other purposes, shall be cast iron meeting the requirements of ASTM Designation A48, Class 25.

8.09 INSTALLATION OF SEWERS

A. Lines and Grade - All lines and grades shall be given by the Consultant and established in the field by the Consultant or Contractor. All stakes and marks shall be protected and preserved. Flow-line elevations shall be established at all changes in grade and at 50 foot intervals.

B. Trench Widths - The maximum width of trench measured at the top of pipe shall be governed by the size of the pipe to be installed in accordance with these Standards and Specifications.

C. Excavation for Sewers - Unless otherwise specified, the excavation for sewer pipe shall be an open trench in accordance with Standard Drawing W-6, excavated to three inches below the outside diameter of the bell. This undercutting shall be refilled with suitable bedding material as specified in the section on backfill, and thoroughly compacted into place.

When the trench is in an existing paved area, the pavement shall be sawcut and broken ahead of the trenching operations. The pavement shall be cut accurately in neat and parallel lines at

the width required for the trench, except when in the opinion of the Engineer the remaining pavement has been damaged.

Trenches shall not be left open farther than 100 feet in advance of pipe laying operations or 50 feet to the rear thereof, unless approved by the Engineer. No trenches shall be left open overnight.

When water is encountered, the trench shall be kept dewatered until the laying and jointing of the pipe, and placing of the bedding material has been completed, inspected, and approved. The Contractor shall place not less than 6 inches of 2-1/2 inch maximum size rock below the required bedding material, or otherwise de-water the trench in a manner which has been approved by the Engineer.

All safety orders, rules, or recommendations of the Occupational Safety and Health Administration (OSHA) and the Division of Industrial Safety of the Department of Industrial Relations of the State of California applicable to this work shall be obeyed and enforced.

D. Bracing and Shoring - As required by the "Trench Construction Safety Orders" of the California State Industrial Accident Commission, sufficient bracing and shoring shall be installed in trenches to insure the safety of workmen, and to protect and facilitate the work. Where practicable all such bracing and shoring shall be removed from the trench as the backfilling proceeds.

E. Tunneling shall not be permitted unless approved by the Engineer. If approved, tunneling shall be in accordance with Section 71-1.03 of the State Specifications.

F. Laying Sewer Pipe - The pipe shall be laid in conformity to the prescribed line and grade, and each pipe length checked to the grade line. Three consecutive points shown on the same rate of slope shall be used in common, in order to detect any variation from a straight grade. In case any such discrepancy exists, the work shall be stopped and the discrepancy directly reported to the Engineer. In addition, a string line or laser shall be used in the bottom of the trench to insure proper alignment and grade.

Pipe shall be laid continuously upgrade, with the bell of the pipe forward. Each length of pipe shall be laid on a firm bed and shall have a true bearing for the entire length. No wedging or blocking up of the pipe shall be permitted.

Connections to existing manholes shall be made by carefully breaking an opening in the wall of the manhole, inserting the end of the pipe through the opening flush with the inside wall, and packing the opening around the pipe with a stiff mix of cement mortar, thoroughly compacted to form a watertight connection. The mortar shall be trowelled smooth and flush with the inside wall of the manhole. Channeling of the flow through the manhole shall conform to the details shown on the Standard Drawings for new manholes. The contractor shall notify the Engineer 24 hours in advance before his connection is made to existing structures. The work shall be scheduled so that the interruption of flow is kept

to a minimum.

When the pipe is to be laid through a new manhole the top half of the pipe shall be sawcut and removed after the base is poured. Pipe elbows or bends shall be used when there is a change in direction.

Both bell and spigot shall be clean before the joint is made, and care shall be taken that nothing but the joint-making material enters joints. Cement joints, hot pour joints, and rubber rings shall not be permitted. Rubber coupler joints such as "Band Seal" may be used.

When for any reason pipe laying is discontinued for an hour or more the open end of each line shall be closed with a close-fitting stop.

G. Trench Backfill shall be per Section 6.06 of these specifications.

H. Testing of Sewer Lines - Prior to final approval, all sewer lines shall be tested for leakage by standard hydrostatic or low pressure air test as specified by the Engineer. Manholes shall be tested for watertight integrity either jointly with testing of sewer line or as separate units. All laterals shall be considered as part of the sewer for testing purposes.

PVC lines shall also be mandrel tested for roundness after completion of backfill.

I. CLEANING - Prior to the acceptance of any sewer line the Contractor shall clean all lines with a sewer cleaning ball under hydrostatic pressure. Any stoppage, dirt, or foreign matter shall be removed from the lines. All cleaning and testing of sewer lines shall take place after all construction is completed, up to but not including the final paving. The system will be inspected after final paving is completed and any damage to the system during final paving and cleanup will be corrected before approval.

8.10 SPECIAL CONSTRUCTION

Special construction in areas of conflict between water and sewer lines shall be in accordance with the State of California Department of Health Services, Sanitary Engineering Branch, "Criteria for the Separation of Water Mains and Sanitary Sewers" dated April 5, 1983.

8.11 REPLACEMENT OF ROAD SURFACES

Permanent paving replacement, in accordance with Standard Drawing W-6, shall not take place until other requirements have been met, but no less than 10 days after backfill has taken place. The replacement of all pavement and shoulder surfaces shall be in accordance with the Standard Drawings. Maintenance of permanent paving which may be required during a one-year period

after completion shall be provided by the Contractor at no expense to the City, including the complete restoration of all damaged property.

8.12 TEMPORARY PAVEMENT

In any case a trench is cut across a thoroughfare a temporary coldpatch shall be placed immediately after backfill has been completed, and removed just prior to placing the permanent base and surfacing material. The temporary pavement shall be maintained smooth under traffic at all times.

8.13 CLEAN UP

During the progress of the work, the Contractor shall keep the entire job site in a clean and orderly condition. Excess or unsuitable backfill material, broken pipe, or other waste material shall be removed from the job site. All gutters and roadside ditches shall be kept clean and free from obstructions.

Before final acceptance of the work, the Contractor shall carefully clean up the work and premises, remove all temporary structures built by or for him, remove all surplus construction materials and rubbish of all kinds from the grounds which he has occupied and leave them in a neat condition.

9. WATER

9.01 GENERAL

Installation of water mains and appurtenances shall be in accordance with these Standards and Specifications and shall be installed to grades, location, design, and sizes approved by the Engineer.

9.02 BASIC DESIGN REQUIREMENTS

A. The minimum water main size shall not be less than 6 inches inside diameter.

B. The system shall be equipped with a sufficient number of valves so that no single shutdown will result in shutting down a transmission main, or necessitate the removal from service of a length of pipe greater than 500 feet, and in no case should be so located that any section of main can be shut down without going to more than 3 locations to close valves.

C. Fire hydrants shall be placed at street intersections whenever possible, and located as to minimize the hazard to damage by traffic. They shall have a maximum normal spacing of 500 feet in residential areas and 300 feet in commercial areas, unless otherwise specified by the City of Morro Bay Fire Department.

D. Minimum cover over water mains shall be 30 inches.

9.03 MATERIALS

A. PIPE - Only ductile iron and PVC water mains will be acceptable. All water main pipe shall meet AWWA standards.

1. Cast iron pipe shall not be less than Class 150, caulked, bell and spigot, mechanical joint pipe, or a bell-and-spigot type which employs a single gasket to effect the push-on joint seal, and shall fulfill the requirements of AWWA Specification C106 or C108. Mechanical joints and the push-on joints shall meet the requirements of AWWA Specifications C111.

2. PVC pipe shall not be less than Class 150 and shall fulfill the requirements of AWWA Standard C900-75 and its revisions.

B. FITTINGS - Bends, elbows, tees, crosses, and special fittings for cast iron and PVC pipe shall be cast iron and shall meet the requirements of AWWA Standard C110. The weight of cast iron and metallic fittings shall not be carried by PVC pipe. Cast iron fitting weight shall be supported by a concrete cradle. PVC fittings may be supported with properly compacted bedding.

C. VALVES AND VALVE BOXES - Valves shall open in a counter-clockwise direction and shall meet the requirements of AWWA Standard C500 for gate valves and AWWA Standard C504 for butterfly valves. Valve boxes and covers shall be as shown in the Standard Drawings.

D. FIRE HYDRANTS - Fire hydrants shall be installed in accordance with Standard Drawing W-1, and shall meet the requirements of AWWA Standards C502 and C503.

E. AIR AND VACUUM RELEASE VALVES - Air and vacuum release valves shall be installed in accordance with Standard Drawing W-5. All valves shall be designed for a minimum 150 psi operating pressure.

F. BLOWOFFS shall be installed in accordance with Standard Drawing W-4, and shall be designed for a minimum operating pressure of 150 psi. Blowoffs or fire hydrants shall be installed at the terminus of all dead-end water mains or non-circulating flow mains.

9.04 WATER SERVICE CONNECTIONS

Service connections shall be installed in accordance with Standard Drawing W-3. The service line may either be laid in open cut or be placed by boring or jacking. If installed by the open cut method, the trench shall be completely backfilled with sand in areas of clay or adobe soil.

9.05 CROSS CONNECTIONS

Reference is made to Title 17, Chapter 17, Sections 7583-7622 inclusive of the California Administrative Code, regulating the construction of cross connections between drinking water systems and other sources of water. All construction shall be in strict compliance with said regulations.

9.06 WATER MAIN INSTALLATION

A. Excavation - All of the requirements set forth in "Excavation for Sewers" and "Bracing and Shoring", sections 8.09C and 8.09D of these specifications shall apply.

B. Laying Pipe - Each section of pipe and each fitting shall be thoroughly cleaned before it is installed. The pipe shall be laid true to line, with no visible change in alignment at any joint, unless curved alignment is shown on the plans.

Thrust blocks shall be installed as shown on the Standard Drawings. The thrust block shall extend from the fitting to the undisturbed soil, shall be kept clear of the joints, and shall be of such bearing area as to assure adequate resistance to the force to be encountered.

Whenever pipe laying is discontinued for short periods, or when work is stopped at the end of the day, the open ends of all mains shall be closed with water-tight plugs or bulkheads. The

plug or bulkhead shall not be removed unless or until the trench is dry.

Gate valves shall be set plumb, supported on a concrete base or 2 inch by 8 inch by 12 inch redwood block, and properly fitted to the adjacent sections of main. A valve box shall be installed over each valve.

C. Connection to Existing Mains - The Engineer shall be given not less than 24 hours notice before any connection is to be made to any existing main. Connections shall be made only after complete and satisfactory preparation has been made for such work in order to minimize shutdown.

D. Trench Backfill shall be per Section 6.06 of these Specifications.

E. Testing - Backfill and compaction shall be completed prior to the final test. Testing shall be according to Section 306-1.4.5 of "Standard Specifications for Public Works Construction.

F. Flushing and Disinfecting - After the pressure test, the system shall be thoroughly flushed out and disinfected in accordance with the requirements of the State of California Department of Health Services.

9.07 SPECIAL CONSTRUCTION

Special construction in areas of conflict between water and sewer lines shall be in strict conformance with the State of California Department of Health Service, Sanitary Engineering Branch, "Criteria for the Separation of Water Mains and Sanitary Sewers" dated April 5, 1983.

9.07 REPLACEMENT OF ROAD SURFACES

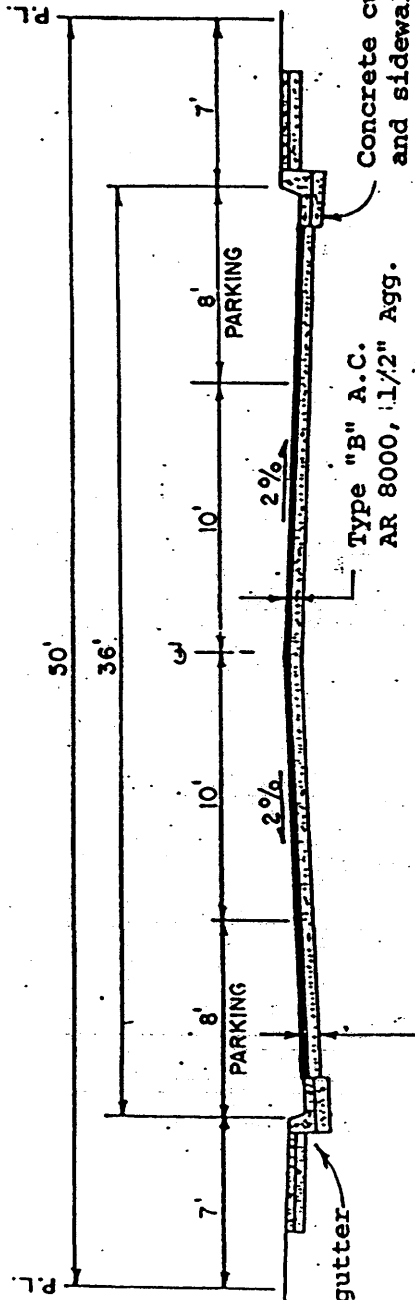
All the requirements of Section 8.11 shall apply.

9.08 TEMPORARY PAVEMENT

All the requirements of Section 8.12 shall apply.

9.09 CLEAN UP

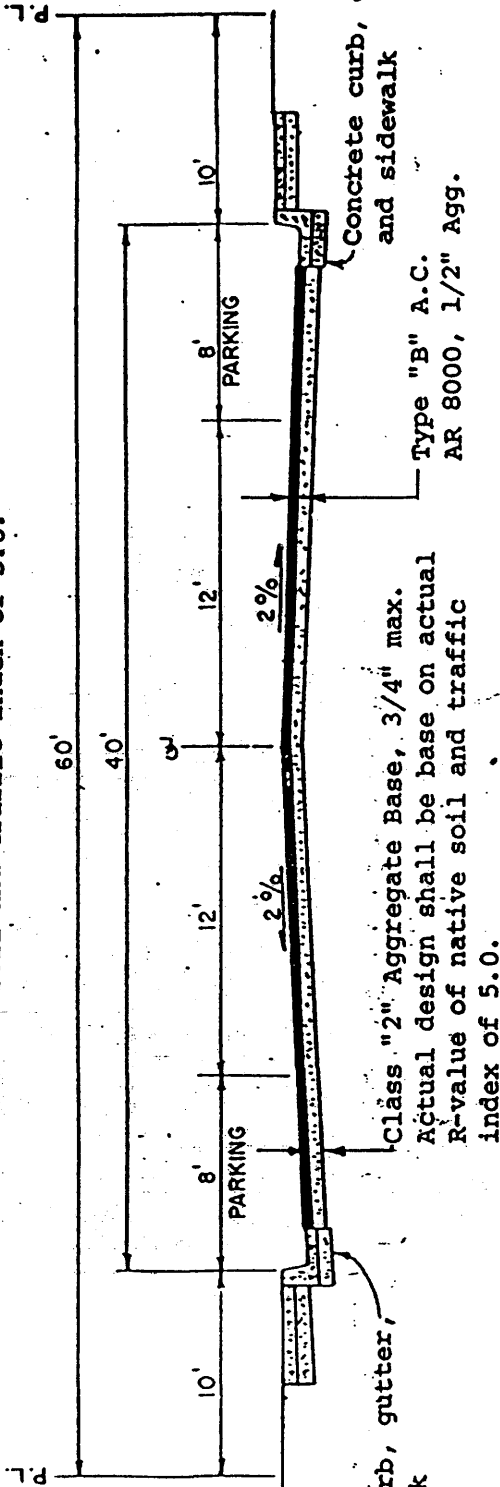
All the requirements of Section 8.13 shall apply.



Concrete curb, gutter, and sidewalk

Type "B" A.C. AR 8000, 1 1/2" Agg.

Class "2" Aggregate Base, 3/4" max. Actual design shall be based on R-value of native soil and traffic index of 5.0.



Concrete curb, gutter, and sidewalk

Type "B" A.C. AR 8000, 1 1/2" Agg.

Class "2" Aggregate Base, 3/4" max. Actual design shall be based on actual R-value of native soil and traffic index of 5.0.

Concrete curb, gutter, and sidewalk

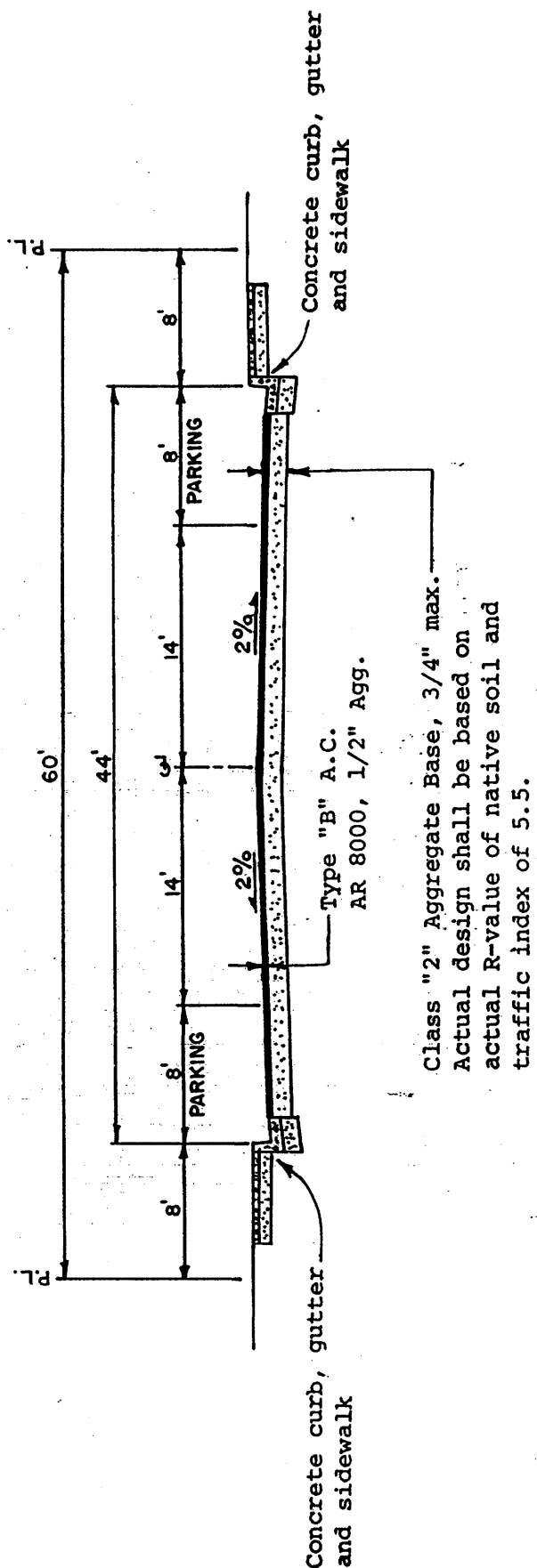
NOTES FOR LOCAL STREETS:

1. Function - directly serves residential uses. Channels traffic to collector and arterial streets. Handles only limited traffic.
2. Thickness of pavement section shall be determined by laboratory and field tests of subgrade.
3. See sheet B-1 for curb and gutter details.
4. See sheet B-5 for sidewalk details.
5. Minimum allowable cross-slope shall be 1.0%; maximum 6.0%.

APPROVED CITY ENGINEER		DATE	
<i>[Signature]</i>		10-5-87	
REVISIONS	BY	APP	DATE

CITY OF MORRO BAY
DEPARTMENT OF PUBLIC WORKS

LOCAL STREET
SCALE: NONE **A-1**



Class "2" Aggregate Base, 3/4" max.
 Actual design shall be based on
 actual R-value of native soil and
 traffic index of 5.5.

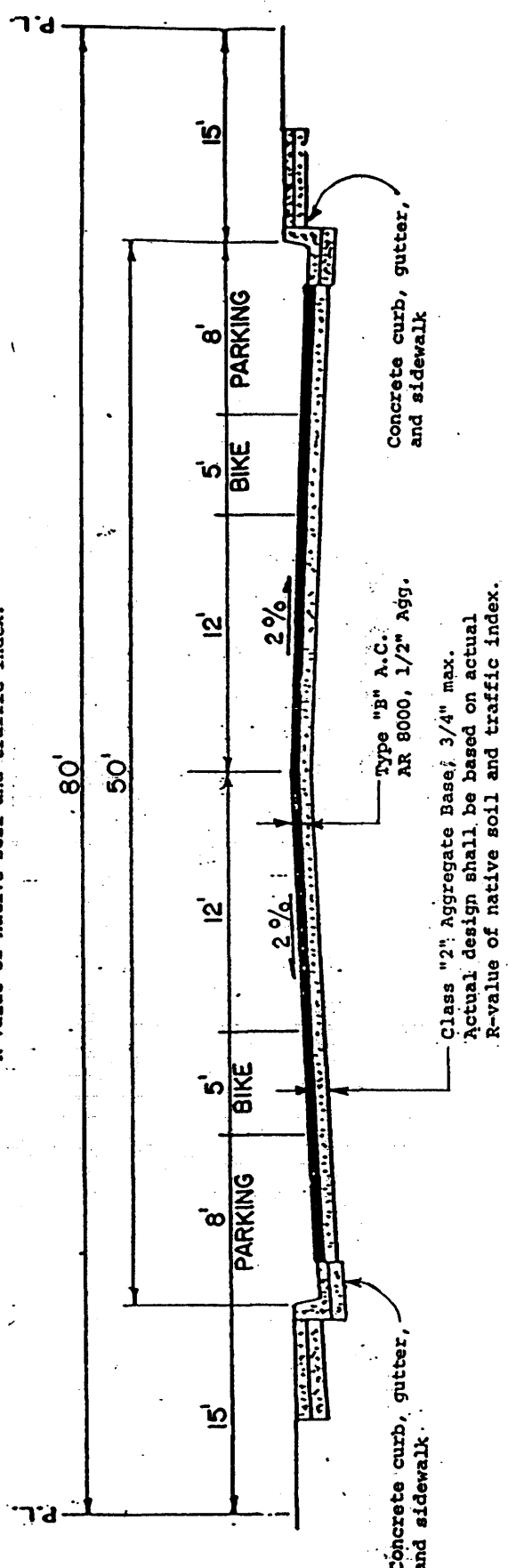
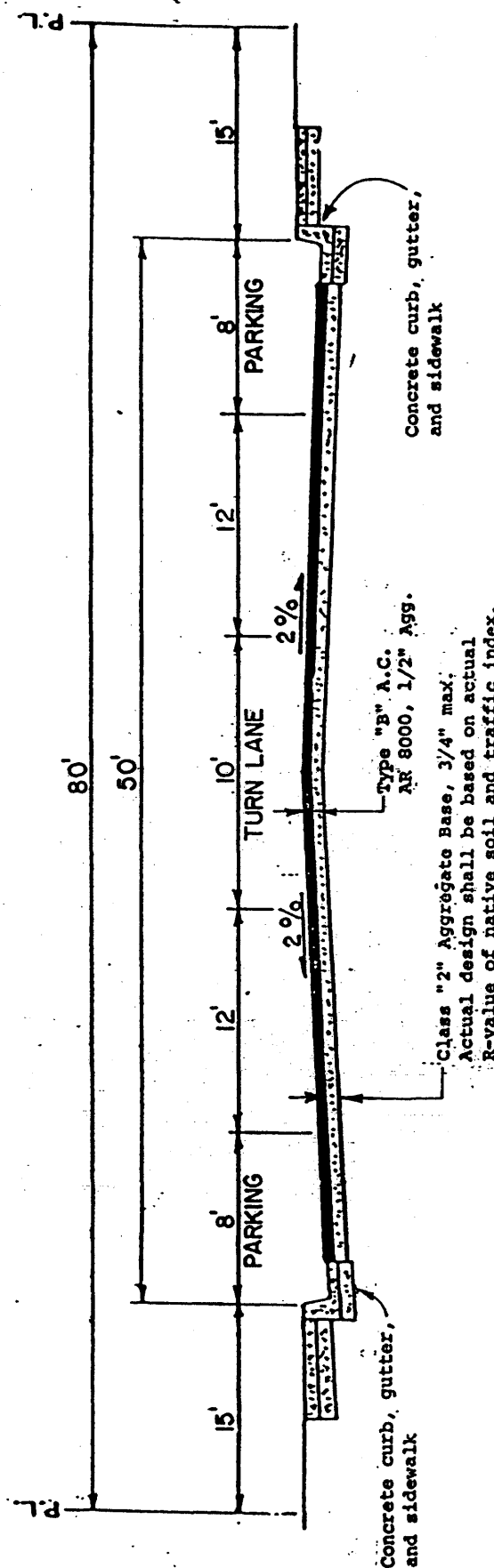
NOTES FOR COLLECTOR STREETS:

1. Function - collects traffic from local streets and channels it to arterial streets.
2. Thickness of pavement section shall be determined by laboratory and field tests of subgrade.
3. See sheet B-1 for curb and gutter details.
4. See sheet B-5 for sidewalk details.
5. Sidewalks required in commercial zones in all cases.
6. Minimum allowable cross-slope shall be 1.0%; maximum 6.0%.

APPROVED - CITY ENGINEER		DATE	
<i>[Signature]</i>		10-5-87	
REVISIONS	BY	APP	DATE

CITY OF MORRO BAY
 DEPARTMENT OF PUBLIC WORKS

COLLECTOR STREET
 SCALE: NONE **A-2**



NOTES FOR ARTERIAL STREETS:

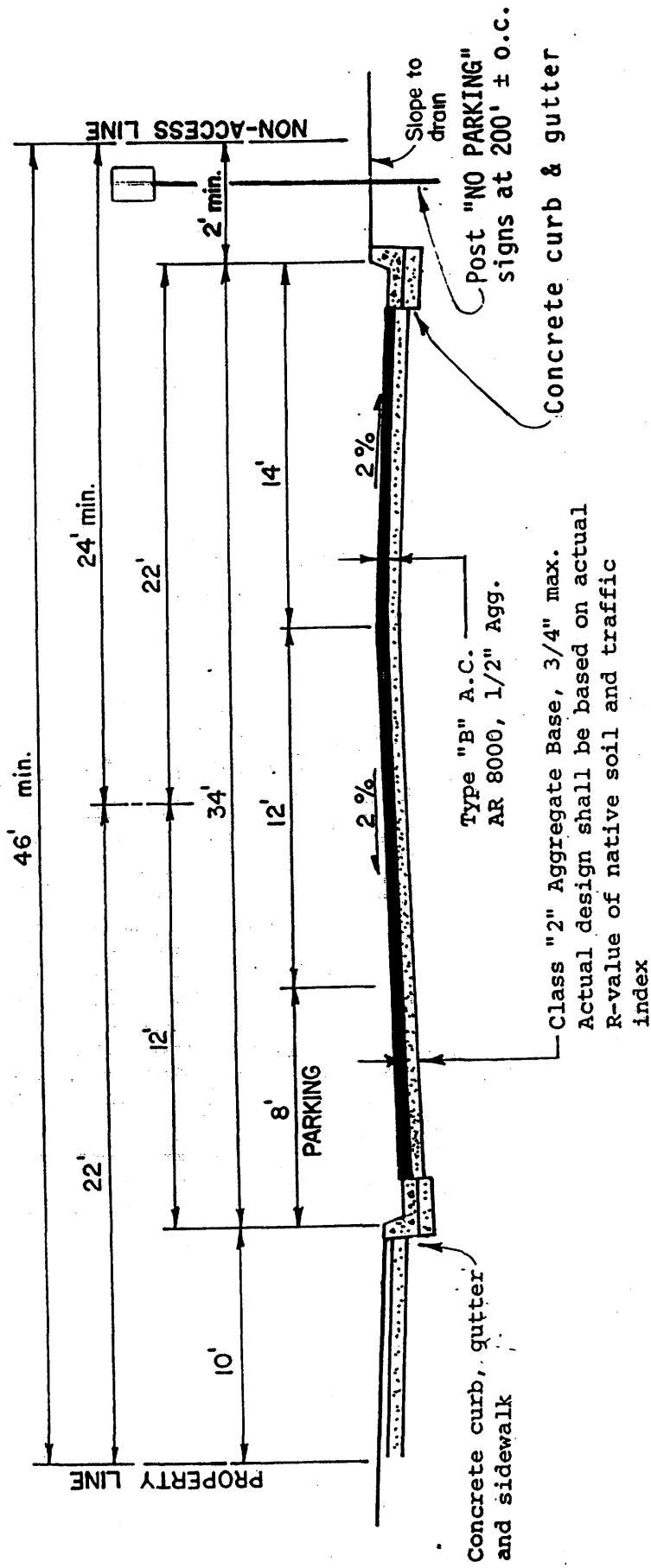
1. Thickness of pavement section to be determined by laboratory and field tests of subgrade material, and using a traffic index furnished by City Engineer.
2. See sheet B-1 for curb and gutter details.
3. See sheet B-5 for sidewalk details.
4. Sidewalks required in commercial zones in all cases.
5. Minimum allowable cross-slope shall be 1.0%; maximum 6.0%.

APPROVED-CITY ENGINEER		DATE	
<i>[Signature]</i>		10-5-87	
REVISIONS-	BY	APP	DATE

CITY OF MORRO BAY
DEPARTMENT OF PUBLIC WORKS

ARTERIAL STREET

SCALE: NONE **A-3**



NOTES FOR FRONTAGE ROADS:

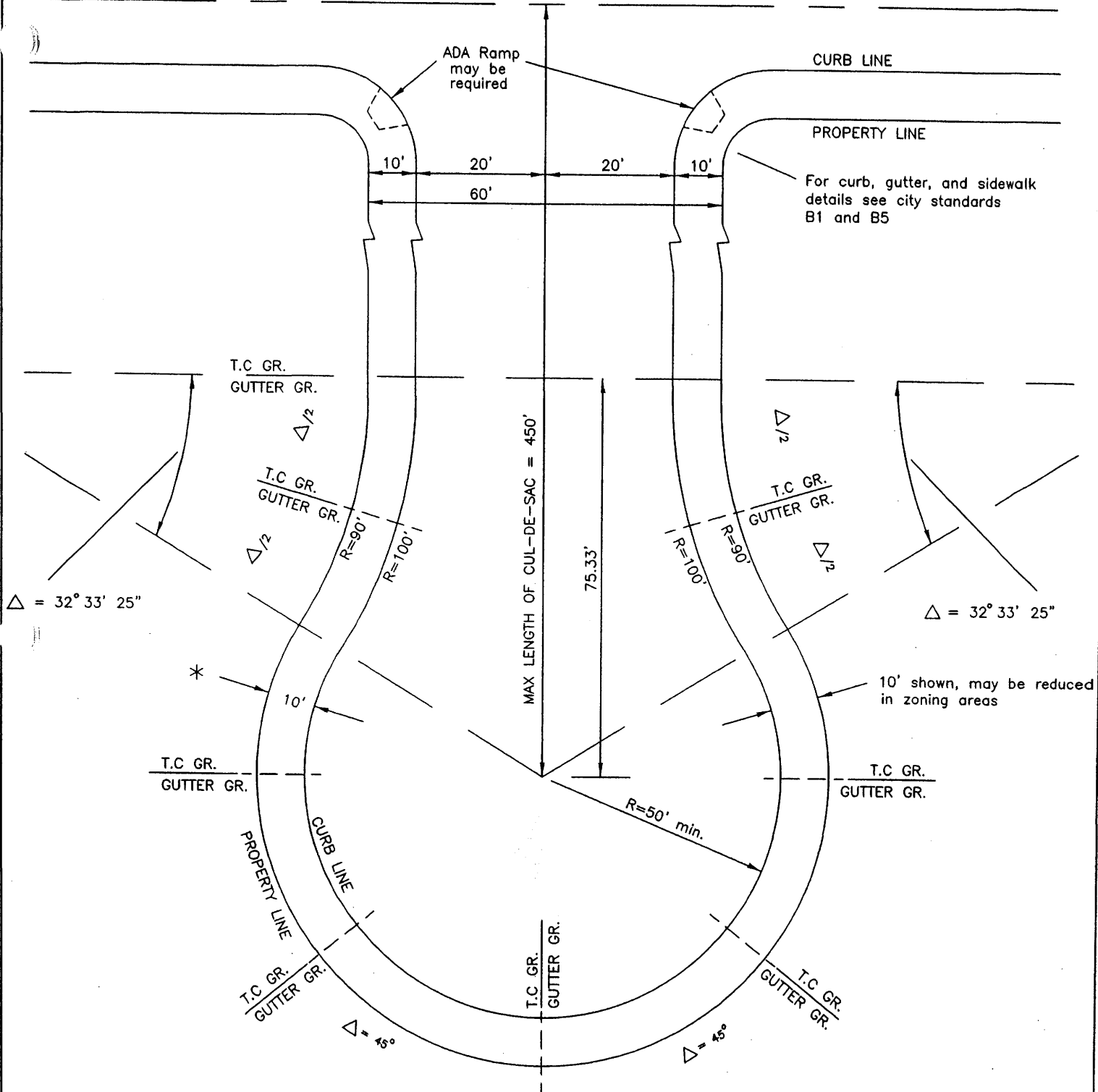
1. Thickness of pavement section to be determined by laboratory and field tests of subgrade material, and using a traffic index furnished by the City Engineer.
2. See sheet B-1 for curb and gutter details.
3. See sheet B-5 for sidewalk details.
4. Sidewalks required in commercial zones in all cases.
5. Minimum allowable cross-slope shall be 1.0%; maximum 6.0%.

APPROVED - CITY ENGINEER		DATE
<i>[Signature]</i>		10-5-87
REVISIONS	BY	APP DATE

CITY OF MORRO BAY
DEPARTMENT OF PUBLIC WORKS

FRONTAGE ROAD
SCALE: NONE **A-4**

LOCAL STREET

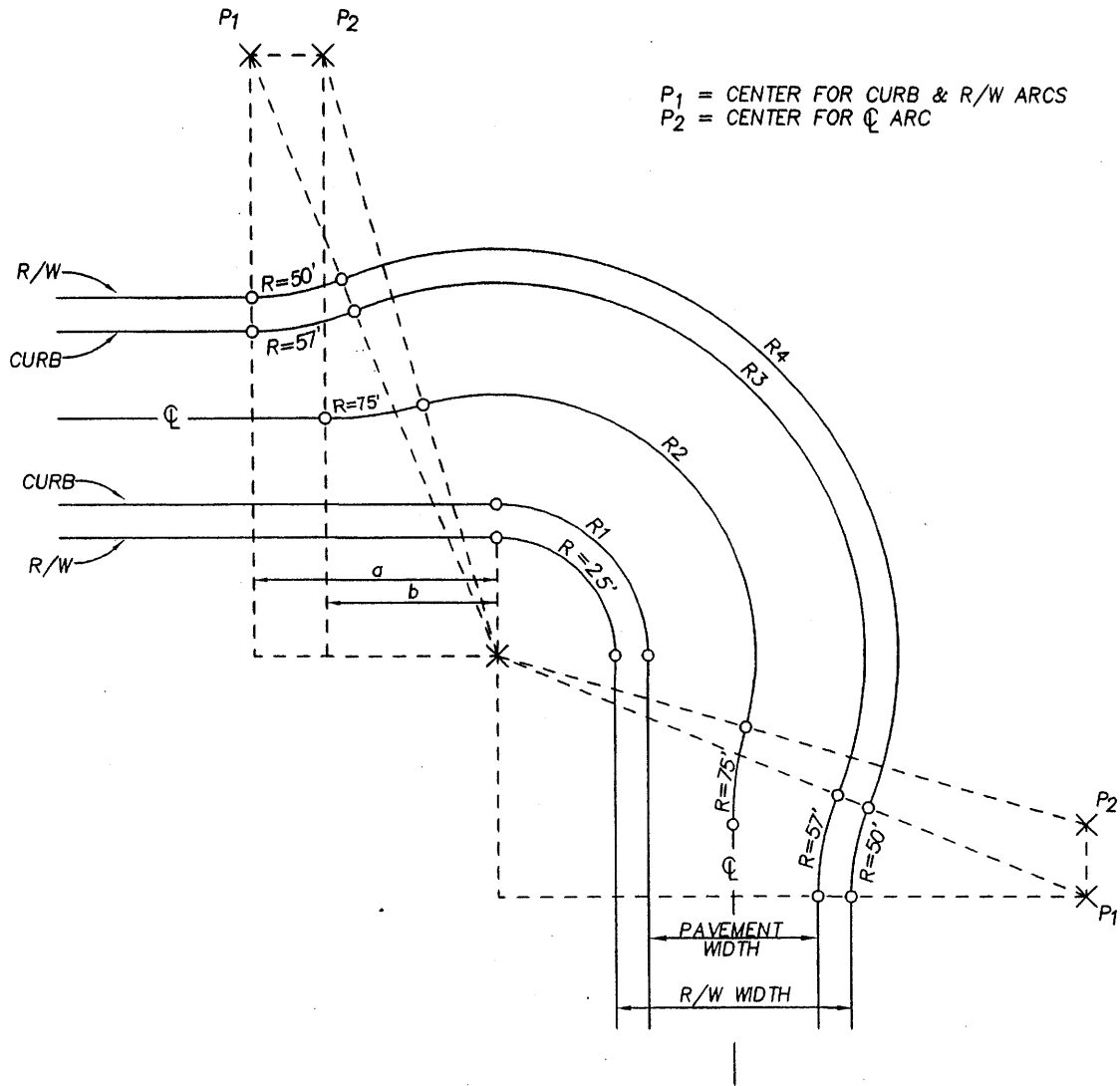


* Community path or sidewalk as per the City Engineer/zoning.

APPROVED - CITY ENGINEER <i>Frank Cunningham</i>	DATE 3/7/07
DRAWN BY: ZLJ	DATE: 03/07
REVISIONS	BY APP DATE

CITY OF MORRO BAY
DEPARTMENT OF PUBLIC SERVICES

TYPICAL CUL-DE-SAC
SCALE: NONE **A-5**



R/W WIDTH	PAVEMENT WIDTH	R1 (CURB)	R2 (C)	R3 (CURB)	R4 (R/W)
50'	36'	32'	55'	78'	85'
60'	40'	35'	60'	85'	95'
64'	44'	35'	62'	89'	99'

R/W WIDTH	a	b	P1 to P2
50'	50.97'	35.73'	15.24'
60'	52.91'	37.10'	15.81'
64'	53.68'	37.64'	16.05'

APPROVED -
CITY ENGINEER *Frank Cunningham* DATE 3/7/07

DRAWN BY: ZLJ

DATE: 03/07

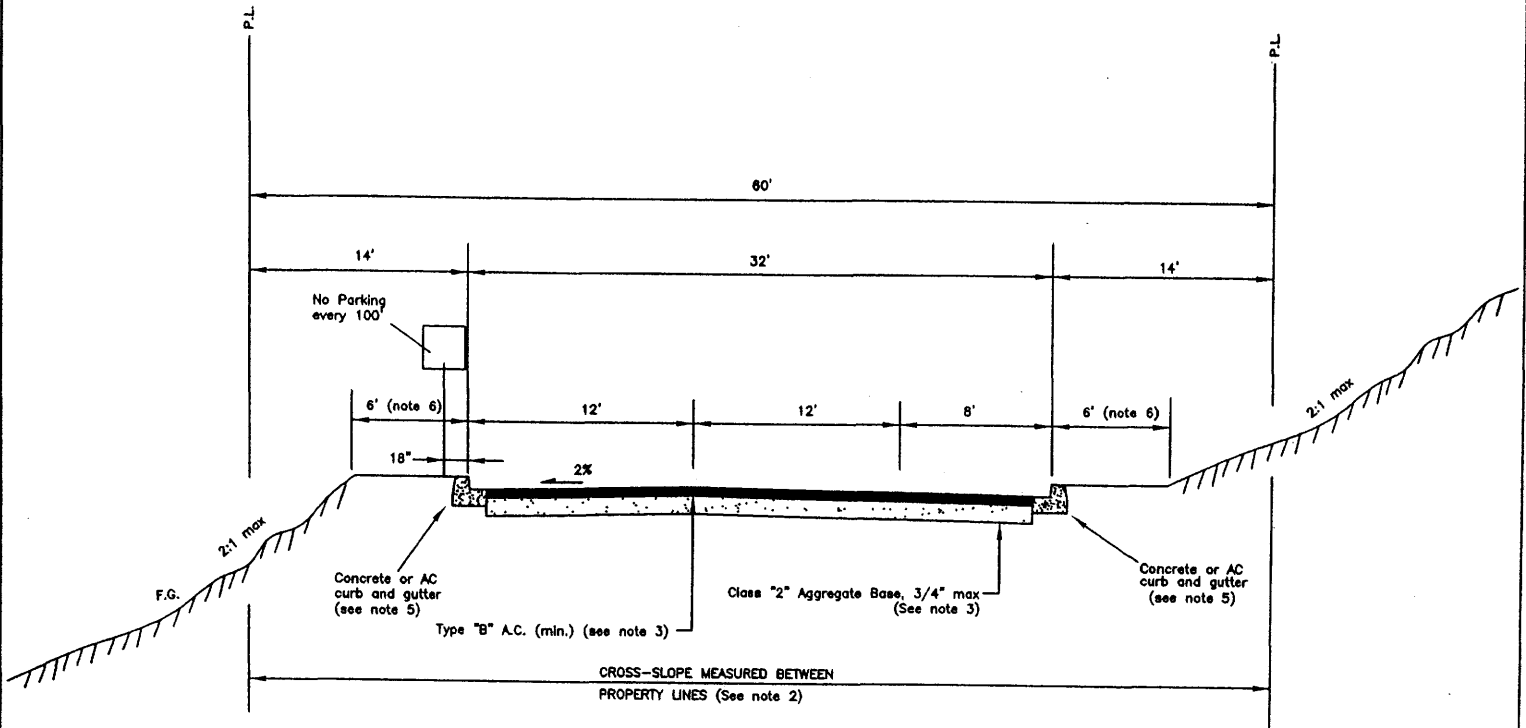
REVISIONS BY APP DATE

CITY OF MORRO BAY
DEPARTMENT OF PUBLIC SERVICES

TYPICAL KNUCKLE

SCALE: NONE

A-6



One side of hillside street shall be designated "NO PARKING."
Appropriate signs shall be installed every 100'.

NOTES FOR HILLSIDE STREETS

1. For use where average cross-slope exceeds 20%.
2. Cross-slope to be determined by average of cross-slopes measured at 50' stations between x-streets.
3. Thickness of pavement section to be determined by laboratory and field tests of subgrade, and a traffic index furnished by City Engineer.
4. Minimum allowable cross-slope shall be 1.0%; maximum 6.0%.
5. See Detail B-1 for curb and gutter details.
6. R1/R2 Zoning - Community path (pedestrian friendly) Flat, walkable surface as approved by City Engineer.

PROVED -
CITY ENGINEER

Frank P. ...
DATE: 3/7/07

DRAWN BY: ZLJ

DATE: 03/07

REVISIONS

BY	APP	DATE

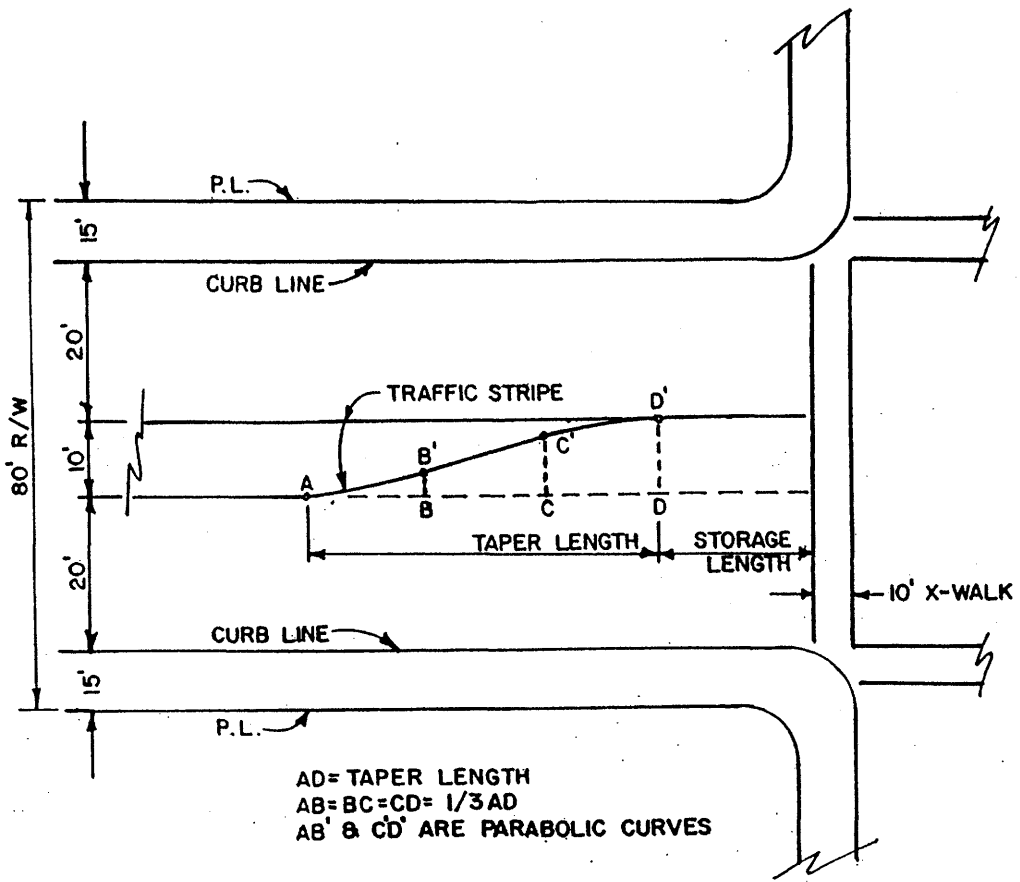
**CITY OF
MORRO BAY**

DEPARTMENT OF
PUBLIC SERVICES

**HILLSIDE
STREET**

SCALE: NONE

A-7



LENGTH OF TAPER - FEET			OFFSET DISTANCE		
60	90	120	DD'=10'	DD'=11'	DD'=12'
DISTANCE FROM POINT "A"					
-	-	-	0	0	0
5	7.5	10	0.16	0.17	0.19
10	15	20	0.62	0.69	0.75
15	22.5	30	1.41	1.55	1.69
20	30	40	2.50	2.75	3.00
30	45	60	5.00	5.50	6.00
40	60	80	7.50	8.25	9.00
45	67.5	90	8.59	9.45	10.31
50	75	100	9.38	10.31	11.25
55	82.5	110	9.84	10.83	11.81
60	90	120	10.0	11.00	12.0

NOTES:

1. The table gives offsets from a base-line parallel to the edge of pavement measured from point "A".
2. Where edge of pavement is a curve, neither base line nor taper between B' and C' will be a tangent. Use proportional offsets from B to C.
3. Speed change lanes required for left turn movements when design hourly volume is 25 vehicles or more.
4. Storage length shall be provided on the basis of 25 feet per vehicle. Minimum storage = 50 feet.

APPROVED-CITY ENGINEER DATE

[Signature] 10-5-87

REVISIONS BY APP DATE

CITY OF MORRO BAY
 DEPARTMENT OF PUBLIC WORKS

TURN POCKET

SCALE: NONE A-8