

# San Luis Obispo County

## Department of Public Works & Transportation



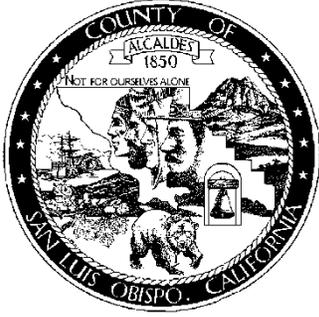
## **AUGUST DRAFT**

# **2014 Public Improvement Standards**

*[This draft does not necessarily reflect all minor edits or formatting changes.]*

Available Online at:

<http://www.slocounty.ca.gov/PW/DevServ/PublicImprovementStandards.htm>



**San Luis Obispo County**  
**Department of Public Works & Transportation**  
Paavo Ogren, Director

**2014 Public Improvement Standards**

**Adopted by the Board of Supervisors:**

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Resolution No. 20114-  
~~September 20, 2011~~ September 23, 2014

**Approved:**

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David J. Flynn, PE  
Deputy Director of Public Works



**Recommended for Approval:**

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Development Services Engineer



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**COUNTY OF SAN LUIS OBISPO**  
**MISSION STATEMENT**

**The County's elected representatives and employees are committed to serve the community with pride to enhance the economic, environmental and social quality of life in San Luis Obispo County.**

**DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION**  
**MISSION STATEMENT**

**Provides public facilities and services that ensure health and safety and enhance quality of life for the community.**

*The Department provides public services related to the safe and efficient movement of traffic on over 1300 miles of County maintained roadways; engineering and surveying review of proposed land development; administration and operation of various water and waste water wholesale and retail facilities, including the Nacimiento Water Supply and Los Osos Waste Water projects; long term master water planning; and franchise administration for the unincorporated areas.*

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## Introduction

The purpose of establishing these Public Improvement Standards is to help provide public facilities and services that ensure health and safety and enhance quality of life for the community~~uniform and functional facilities that ensure promote health and safety, and enhance the quality of life for the communities of San Luis Obispo County.~~

These standards are not intended to be a substitute for engineering knowledge, experience, or judgment. It is incumbent on the users of these standards to exercise good judgment and where needed seek guidance from the appropriate professional. Where deviation from these standards is prudent, the user shall follow the Design Exception process; which is also contained herein.

The Public Improvement Standards consist of three major components: (1) Design Standards, (2) Construction Specifications, and (3) Standard Construction Drawings. The Design Standards and Construction Specifications are presented together in each of the following Sections:

### SECTION DESCRIPTION

1. Improvement Plans
2. Site Preparation & Earthwork
3. Roadways
4. Road Edges
5. Storm Drainage
6. Water Supply
7. Wastewater Disposal
8. Utilities
9. Traffic Control
10. Project Completion

The Standard Construction Drawings provide additional graphic detail to these standards and are included at the end of the document. While not a part of these standards, an appendix is also included for convenience and ready reference.

The Public Improvement Standards establish the minimum requirements for the design and construction of any public improvement in the County of San Luis Obispo. In many cases prudent design may indicate exceeding the minimum requirements.

Public improvements are those which will be accepted for use and operation of the public and for maintenance by the County of San Luis Obispo, any County-operated Special District, any independent Special District which does not have its own requirements in these areas, or for any subdivision or land use permit where the improvement is determined to be of sufficient public benefit that compliance with these standards is required by the conditions of approval.

Additionally, these Public Improvement Standards establish requirements for grading on private property when associated with a subdivision. Chapter 2 provides more information on grading requirements.

Final authority for County approval of improvement plans, or acceptance of constructed improvements, rests with the Director of Public Works and his or her designee.

## A. Applicability of the Standard and Related Publications

This document is supported by various publications which comprise the standard references for this type of work. In the event of any conflict or discrepancy between these Public Improvement Standards, and any of the related publications listed below, these Public Improvement Standards shall take precedence.

The following are considered Design Standards by the Public Works Department and follow a hierarchy in which the local standard governs. If the local standard does not address the issue then the appropriate State Standard would govern. In cases where the Local and State Standards do not discuss the design issue then the appropriate Federal Standard governs.

NEW CONSTRUCTION (See below for Federal Aid Projects; Pavement Focused (2R) Projects; and Resurfacing, Restoration, and Rehabilitation (3R) Maintenance Projects)

### Local Standards.

- San Luis Obispo County Public Improvement Standards

### State Standards

- California Manual on Uniform Traffic Control Devices (~~CA-MUTCD~~)
- ~~Caltrans Design Information Bulletin 79-03 (3R and 2R Standards)~~
- ~~Caltrans Local Assistance Procedures Manual (LAPM); Chapter 11 Design Exhibit 11 A~~
- Caltrans Highway Design Manual
- State Standard Plans
- State Standard Specifications
- CalDAG (California Disabled Accessibility Guidebook)
- Caltrans DIB 82-05 Pedestrian Accessibility Guidelines for Highway Projects
- Caltrans Traffic Manual – Chapter 7 – Traffic Safety Systems
- 

### Federal Standards

- AASHTO: A Policy on Geometric Design of Highways and Streets
- ~~Manual on Uniform Traffic Control Devices (MUTCD)~~
- ADAG (Americans with Disabilities Act Guidelines)
- PROWAG (Pedestrian Right-of-Way Accessibility Guidelines)

MAINTENANCE AND REPAIR PROJECTS – (Pavement Focused (2R) Projects and Resurfacing, Restoration, and Rehabilitation (3R) Maintenance Projects on existing roadways)

Maintenance and repair projects restore the public facility to a state of good repair so as to minimize maintenance expenditures. Typically these projects do not expand or upgrade existing facilities except to address known safety issues, to remedy reoccurring maintenance issues or to conform to ADA standards. Unless otherwise directed by the Public Works Deputy Director, the following standards shall apply to federal aid projects:

### State Standards

- Caltrans Design Information Bulletin 79-03 (3R and 2R Standards)
- California Manual on Uniform Traffic Control Devices (MUTCD)
- Caltrans Highway Design Manual
- Caltrans Traffic Manual – Chapter 7 – Traffic Safety Systems

- State Standard Plans
- State Standard Specifications
- Caltrans Local Assistance Procedures Manual (LAPM); Chapter 11 Design
- Policy on High and Low Risk Underground Facilities Within Highway Rights of Way (Project Development Procedures Manual; APPENDIX LL – Utilities)

#### Federal Standards

- AASHTO: A Policy on Geometric Design of Highways and Streets
- ADAG (Americans with Disabilities Act Guidelines)

#### FEDERAL AID PROJECTS:

In addition to these standards, federal aid projects may have additional requirements to maintain eligibility for federal funding. Unless otherwise directed by the Public Works Deputy Director, the following standards shall also apply to federal aid projects:

#### Local Standards.

- San Luis Obispo County Public Improvement Standards

#### State Standards

- Caltrans Local Assistance Procedures Manual (LAPM); Chapter 11 Design
- California Manual on Uniform Traffic Control Devices (MUTCD)
- State Standard Plans
- State Standard Specifications
- Caltrans DIB 82-05 Pedestrian Accessibility Guidelines for Highway Projects

#### Federal Standards

- AASHTO: A Policy on Geometric Design of Highways and Streets

The most-recent versions of each of the following are considered incorporated by reference into this document: (Web links to these documents can be found on the Public Works website.)

- San Luis Obispo County General Plan
- Circulation Element (in Framework for Planning and in Land Use Element Area Plans)

#### San Luis Obispo County Code

- Title 8, Health and Sanitation
- Title 13, Roads & Bridges, Streets & Sidewalks
- Title 15, Vehicles and Traffic
- Title 19, Building and Construction Ordinance
- Title 21, Real Property Division Ordinance
- Title 22, Land Use Ordinance – Inland (LUO)
- Title 23, Coastal Zone Land Use Ordinance (CZLUO)

#### Other County Publications

- Americans with Disabilities Act (ADA) Transition Plan
- Area Plans, Design Plans and Specific Plans
- County Bikeways Plan
- Road Pavement Condition Report
- Speed Surveys
- Traffic Volumes

#### Circulation Studies:

- Avila Area
- Los Osos Area

- Nacimiento Corridor Study
- North Coast Area (Cambria, San Simeon)
- San Miguel Area
- South County Area (Nipomo, Nipomo Mesa)
- Templeton Area

Corridor and Community Plans:

- West Tefft Street Corridor Plan
- Old Towne Nipomo Plan
- Los Osos Community Plan
- San Miguel Community Plan
- Santa Margarita Design Plan

Community Drainage Studies:

- <http://www.slocountydrainagestudies.org/>
- Cambria
- Cayucos
- Los Osos
- Nipomo
- Oceano
- San Miguel
- San Luis Obispo Creek Watershed Drainage Design Manual
- Santa Margarita
- Templeton (Pending)

California Government Code

- Subdivision Map Act

California Business & Professions Code

- Professional Engineers' Act
- Professional Land Surveyors' Act

California Code of Regulations

- Cal-OSHA Construction Safety Orders
- General Industry Safety Orders

The references below are included as supporting documents. ~~They shall never and do not~~ supersede ~~an~~ the above standards.

California Department of Transportation (Caltrans)

- Bridge Computer Manual
- Bridge Design Aids
- Bridge Design Details
- Bridge Design Practice
- Bridge Design Specifications
- Bridge Memo To Designers
- Bridge Standard Detail Sheets (XS Sheets)
- Bridge Structure Manual
- Caltrans Traffic Manual Chapter 7
- Construction Manual
- Element Inspection
- Manual of Tests
- Reference Sheets

- Seismic Design Criteria
- Service Directory
- Structural Detailing Standards

Office of the State Architect

- California Building Code (CBC)

Cal Fire

- San Luis Obispo County Fire Department – [Developers' Guide Standards and Regulations](#)
- 

American Association of State Highway and Transportation Officials (AASHTO)

- Low-Volume Road Design
- Roadside Design Guide

Institute of Transportation Engineers (ITE)

- Residential Street Design and Traffic Control
- Residential Streets
- Traffic Calming – State of the Practice

American Public Works Association (APWA)

American Water Works Association (AWWA)

American Society for Testing and Materials (ASTM)

Additional Highway References from the CFR

- AASHTO LRFD Bridge Design Specifications, First Edition, AASHTO 1994 (U.S. Units)
- Bridge Welding Code, ANSI/AASHTO/AWS D1.5–95, AASHTO
- Standard Specifications for Highway Bridges, Fifteenth Edition, AASHTO 1992
- Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, AASHTO 1994
- Standard Specifications for Transportation Materials and Methods of Sampling and Testing, parts I and II, AASHTO 1995
- Structural Welding Code—Reinforcing Steel, ANSI/AWS D1.4–92, 1992.

Other publications may need to be referenced as appropriate.

## **B. Definitions in the State Specifications**

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

**Contractor.** Any person or persons, firm, partnership, corporation or combination thereof, who has/have entered into a contract with any person, persons, corporation, company, special district, or the County of San Luis Obispo as party or parties of the second part, or his/her/their legal representatives, for the construction of any public improvement or portion of any public improvement within the County of San Luis Obispo.

**Department.** The County of San Luis Obispo acting by and through its Department of Public Works and Transportation, including the Director and his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

**Director.** The Director of the Department of Public Works and Transportation of San Luis Obispo County, acting directly or through his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

**Engineer.** (1) Where the duties described indicate the acceptance or approval of the project or the plans therefore, or any other duties and functions of the Department or Director as described in these Public Improvement Standards, Engineer shall mean the Deputy Director of the Department of Public Works, Engineering Services, of San Luis Obispo County, acting directly or through his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her. (2) Where the duties described indicate the functions and responsibilities for the preparations of the plans for the project and the other duties assigned to the Project Engineer in these Public Improvement Standards for the construction, inspection, and certification of the project, Engineer shall mean the Project Engineer as defined below. (3) Where the duties described indicate authorization of payment for the construction of the improvements for the project, Engineer shall mean as follows: (a) for County-funded projects it shall mean the County of San Luis Obispo acting through the lead agency for the project; (b) for all other projects it shall mean the Developer as defined below – the County of San Luis Obispo shall be a third party and the agreement between the Developer and the Contractor shall control.

**Laboratory.** Any testing agency or testing firm, which has been licensed by the State of California to act in such capacity, and meeting the requirements of the Director.

**State.** When the State Specifications are applicable, the word “State” as used in the State Specifications shall mean the State of California and its political subdivision, San Luis Obispo County.

### **C. Definitions in These Public Improvement Standards**

In these Public Improvement Standards, the intent and meaning of the terms that are used shall be as defined below.

**Contractor.** Any person or persons, firm, partnership, corporation or combination thereof, who has/have entered into a contract with any person, persons, corporation, company, special district, or the County of San Luis Obispo as party or parties of the second part, or his/her/their legal representatives, for the construction of any public improvement or portion of any public improvement within the County of San Luis Obispo.

**County.** The County of San Luis Obispo, California.

**Department.** The County of San Luis Obispo acting by and through its Department of Public Works and Transportation, including the Director and his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

**Developer.** The owner of land where any public improvement is proposed to be constructed or his/her designated representative.

**Director.** The Director of the Department of Public Works and Transportation of San Luis Obispo County, acting directly or through his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

Encroachment Permit. Authorization by the Department to conduct work, reconstruct or place improvement in established County rights-of-way. No work or improvement shall be conducted outside the limits of the permit. Encroachment permits are required pursuant to Chapter 13.08 of the San Luis Obispo County Code and Chapter 5.5 (commencing with Section 1450) of Division 2 of the California Streets and [Highways](#) Code.

Engineer of Record. Is the Engineer of Work.

Engineer of Work. The ~~Project~~-Engineer designated by the Developer as being responsible in charge of civil engineering work as defined in the *Professional Engineers Act* (Business and Professions Code §6700-6799). The Engineer of Work shall be legally authorized to practice Civil Engineering in the State of California.

Laboratory. Any testing agency or testing firm, which has been licensed by the State of California to act in such capacity, and meeting the requirements of the Department.

~~Project Engineer. Is the Engineer of Work. 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 County of San Luis Obispo (see also Engineer of Work).~~

Public Improvement. Public improvements are those which will be accepted for operation and maintenance by the County of San Luis Obispo, any County-operated Special District, any independent Special District which does not have its own requirements in these areas, or for any subdivision or land use permit where the improvement is determined to be of sufficient public benefit that compliance with these standards is required by the conditions of approval.

Public Improvement Standards. The Design Standards, Construction Specifications and Standard Construction Drawings which comprise this volume, along with all other standard references incorporated herein.

Right-of-Way. The full width of land owned (fee) or controlled (easement) by the County, upon which the traveled way is constructed, and which usually extends considerably beyond the edge of pavement (or traveled way) to the boundaries of the adjacent private properties.

State Standard Specifications. The latest edition of the Standard Specifications, and of the associated Standard Plans, of the State of California, Department of Transportation (Caltrans).

#### **D. Other Regulatory Agencies**

Regulatory permits and/or agreements may be required by other State and Federal agencies, including but not limited to the California Regional Water Quality Control Board, the California Department of Fish & ~~Game~~-Wildlife (CalWild) and the U.S. Army Corps of Engineers. Approval of any improvement plans or construction activity by the County does not exempt the project owner from the requirement to comply with the regulations of any of these agencies. Prior to construction of public improvements, the Developer shall provide copies of all such permits to the Department, or document that such permits are not required.

# 1. Improvement Plans

Complete plans and specifications for all proposed public improvements, as defined herein, which are not initiated by County Public Works, shall conform to the requirements of this chapter. These plans and specifications shall be submitted to the Department for approval, and must receive the required approval prior to the beginning of construction of any such improvements.

## 1.1 Preparation of Plans

### 1.1.1 Plan Review Procedure

- A. Plan Check Intake. For the first submittal of plans, the Project Engineer must schedule an “intake” appointment, at which time the Department will determine whether all required information has been provided. More information about this process is available from the Department. The first submittal must include a transmittal, three sets of plans, soils report (where required) and drainage calculations. Other items may be required by the Department, as determined necessary at the intake appointment. One copy of the plans and other items, showing necessary revisions, will be returned to the Project Engineer. All subsequent submittals require only two sets of plans and other items, unless specified otherwise by the Department. A drawing of the site plan or subdivision layout shall be included with each set of subdivision improvement plans submitted. Plans not conforming to the normal standards of quality and neatness may be rejected.

Plans that require review by other entities, including but not limited to:

- i. Public Works – Utilities, Transportation and Roads Divisions
- ii. Planning and Building Department – Project Planner for condition compliance
- iii. General Services – Parks Division
- iv. Public Health – Environmental Health Division

It may be the responsibility of the Project Engineer to submit directly to those entities. Some may require a copy of both the final map and improvement plans with the submittal.

- B. Plan Approval. When all corrections have been made to the satisfaction of the Department, the Project Engineer may submit original signed, sealed and dated drawings for approval. ~~No construction will be authorized, or plan~~ Plans are not approved, until such time as the Department signifies approval by signature ~~and seal on the title sheet of the original drawings of the title sheet.~~ Construction is not authorized until the plans are approved and an encroachment permit has been issued by the Department.
- C. Bonding Estimate. Once improvement plans are approved by the Department, a bonding estimate may be submitted for review and approval, where applicable. Bonds may be submitted to the Department following approval of the bonding estimate. More information about this procedure, along with standard forms to be used for this purpose, may be obtained from the Department.
- D. Plan Revisions. There shall be no revisions made to an approved set of plans, unless such revisions are submitted to the Department for approval prior to being constructed.

Excepted from approval are any features of the plans that are contrary to, in conflict with, or do not conform to any Federal or State law, County Ordinance or Resolution, or generally accepted engineering practice, in keeping with the standards of the profession, even though such errors, omissions or conflicts may have been overlooked in the review of the plans.

- E. Phased Improvements. Where the improvement plans submitted cover only a portion of the ultimate development, the plans submitted must be accompanied by the approved overall tentative plan or a study if there is no approved overall tentative plan, showing topographic features of the ultimate development at an adequate scale to clearly show the proposed improvements.

### 1.1.2 Plans Layout

All plans shall be prepared on mylar, vellum or bond, or approved equal, measuring 24" x 36".

- A. Earthwork. If any grading is proposed outside the roadway prism, a grading plan shall be submitted with the other required improvement plans. Finished grading shall be depicted by contour lines, spot elevations, or by "top/toe" indications, as determined appropriate by the Department. The grading plan shall include a reference to the project soils report (if applicable), including its title, date and author.
- B. Retaining Walls. For any proposed retaining walls, a separate sheet shall be provided which depicts the elevation view and typical section for each wall.
- C. Roadway Improvements. Roadway plan and profile sheets shall be of appropriate scale to clearly show the proposed plan layout, along with existing and proposed profiles of all roadways. The boundaries of lots fronting on the roadway, drainage easements, utility easements, slope easements, section lines and corners, land grant lines and temporary construction easements shall be shown on all roadway improvement sheets, with proper dimensions.

#### Appropriate scales

Horizontal: 1-inch=20-feet

Vertical: 1-inch=2-feet <or> 1-inch=4-feet

Horizontal: 1-inch=30-feet

Vertical: 1-inch=6-feet

The scale may be varied in rough terrain. Each roadway plan and profile sheet shall include the typical roadway section.

- D. Cross Sections. Cross sections shall be provided for all designs involving widening existing roads. The spacing of cross sections shall be based on the characteristics of the project, as determined necessary by the Department.

The following items of work may be depicted together with the roadway improvement plans. However, the Department may require that they be separated from the roadway improvement plans if necessary for clarity.

- E. Storm Drainage. Plans for minor drainage facilities may be shown on roadway plans, if appropriate. Plans for major drainage facilities shall conform to the sheet size and scale shown above for roadway improvements. Profiles of all culverts and drainage structures shall be provided, along with the hydraulic grade line.
- F. Water Supply. Plans for water system layout and improvements shall be submitted on the same plans as the roadways. Improvements outside the roadway prism shall be drawn on separate sheets and to an appropriate scale.

- G. Wastewater Disposal. Plans for wastewater disposal systems shall be prepared on standard sheets as defined above for roadway improvements. Scales are to be as follows, except in unusually rough terrain where the scales may be varied.

Appropriate scales

Horizontal: 1-inch=20-feet

Vertical: 1-inch=2-feet <or> 1-inch=4-feet

Horizontal: 1-inch=30-feet

Vertical: 1-inch=6-feet

- H. Utilities. A layout for all utilities including water, sewer, electric, telephone, cable television and gas system improvements shall be submitted on a composite utility plan in an appropriate scale, unless approved otherwise by the Department. Roadway plans shall show placement of utilities in the typical section.

H. The depth and precise location of High Risk utilities shall be shown on the improvement plans in accordance with the Policy on High and Low Risk Underground Facilities. (See Appendix.)

- I. Traffic Control. Plans for work zone traffic control, and for installation of new permanent traffic control devices, shall be drawn on sheets and to an appropriate scale. Work zone traffic control must reference the *Manual on Uniform Traffic Control Devices* (~~MUTCD~~); (CA-MUTCD). The standard traffic control notes shall be placed on the same sheet, see Appendix A3. If new permanent traffic control devices include traffic signals or lighting, the necessary electrical details shall be incorporated into these sheets.

- J. Erosion Control. Temporary and permanent erosion control measures are to be shown. The standard erosion control notes shall be placed on the same sheet, see Appendix A2.

K. Landscape Plans. Landscape plans shall demonstrate that the landscaping, irrigation, and other features within the right-of-way comply with these standards including sight distance adequacy, lateral clearance from the roadway, and lateral clearance from sidewalks and other improvements within the right-of-way.

K.L. Details. The plans shall include one or more sheets entitled "Details," which shall show the following as applicable:

- Copy of all County Standard Drawings which are referenced in the design
- Detail of all concrete structures
- Details of any element of the plans required for clarity
- Miscellaneous details
- Other agencies' standard details which are referenced in the design
- Temporary and permanent erosion control standards/details referenced in the design

### 1.1.3 Plans Format

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

- A. Title Sheet. On improvement plans exceeding two sheets in the set, a title sheet shall be prepared. The title sheet shall also include an index of sheets, and a signature block for all other agencies involved such as utility companies, fire agency, community services district and any other applicable agencies.
- B. Vicinity Map. The title sheet shall include a vicinity map depicting the following:
1. Boundaries of the site, and any Special Districts or City Limits nearby
  2. Location of the project within the County, depicting a minimum 1.5-mile radius around the project location
  3. North arrow and scale reference

4. Section and/or Grant lines and corners
  5. Street names
- C. **Title Block.** Each sheet of the set of drawings, including the title sheet, shall have an approved title block showing:
1. Date
  2. Name and/or number of the project
  3. Project Engineer's name, professional registration number, seal and signature, as required by the Professional Engineers' Act
  4. Scale of the drawing
  5. Sheet number and total number of sheets
  6. Sheet title
  7. Signature blocks for Department approval
- D. **Right-of-Way.** Right-of-way lines, the boundaries of lots fronting on the roadway, drainage easements, utility easements, slope easements, and temporary construction easements (existing and proposed) shall be shown on the plans. All right-of-way and easement lines shall be properly dimensioned.
- E. **Survey Monuments.** Pursuant to Section 8771(b) of the *California Business and Professions Code*, existing survey monuments that control the location of subdivisions, tracts, boundaries, roads, streets or highways, or provide survey control, that are within or adjacent to the area of work, shall be located and referenced by or under the direction of a licensed land surveyor or registered civil engineer. This shall occur prior to the time when any streets, highways, other rights-of-way, or easements are improved, constructed, reconstructed, maintained, resurfaced or relocated. In the event that any existing survey monument is disturbed in any way by the improvement work, as determined by a licensed land surveyor or registered civil engineer, it shall be reset accordingly and an appropriate document shall be filed with the County Surveyor, prior to the final acceptance of the work by the Department.
- F. **Topography.** All pertinent topographic features which may affect the design, construction and operation of the improvements shall be shown on the plans, including, but not limited to, the following:
- Curbs, sidewalks, shoulders
  - Existing structures, fences, trees and other foliage
  - Existing utility lines and facilities
  - High water and frequent inundation limits
  - Roadway lines
  - Storm drains, drainage ditches
  - Wastewater Disposal systems
  - Water lines, fire hydrants
- Full topography shall be provided for a minimum of 50-feet in all directions of a development site, to evaluate drainage conditions.
- G. **Profiles.** The plans shall clearly show the existing and proposed profiles of all roadways, drainage ditches, storm drains, water lines, sanitary sewers, and clearances at structures and power lines, including elevations at 25-foot minimum intervals for warped surfaces.

**H. Design Basis.** The plans shall include the basis for design as follows:

- Road Plans: Design Speed (V), Design Volume (ADT), and Traffic Index (TI)
- Culverts: Slope (S), Design Flow and Storm Interval (Q<sub>x</sub>)
- Storm Drains: Hydraulic Grade Line (HGL), Slope (S), Design Flow and Storm Interval (Q<sub>x</sub>)

- Drainage Structures: The numerical quantities for the Rational Method formula ( $Q=CIA$ ) for the Primary Design Storm
- Drainage Basins: Design Volume, Design Inflow ( $Q_{IN}$ ), Design Outflow ( $Q_{OUT}$ ), Tributary Area ( $A$ ), and Design Infiltration Rate, as appropriate.

H.I. Stationing and Orientation. The stationing on plan and profile sheets shall read from left to right. Insofar as practical, the plans shall be arranged so that the north arrow is either pointed toward the top or to the right edge of the sheet. Wherever possible, stationing shall conform to existing stationing provided by the Department.

H.J. Benchmark. The plans shall reference a published *National Geodetic Survey* (NGS) benchmark on datum ~~NGVD 29~~ or NAVD 88. Include a description of the benchmark and the datum for its reference elevation. The plans shall indicate a durable local benchmark that will be utilized for the construction of the improvements and shall include an indication of its location on the Vicinity Map or the plans.

H.K. Basis of Bearings. The plans shall indicate the basis of bearings that will be utilized for construction of the improvements. The plans shall include a description of the points that form the basis of bearings, along with the appropriate reference information.

H.L. Units of Measurement. The units of measurement on plans submitted to the Department shall be English Units (*United States Standard Measures*). If an improvement plan includes facilities which are under the jurisdiction of another agency which requires the use of Metric Units, then Metric Units may be used on the plans for County improvements as well, if approved by the Department.

H.M. Notes. The title sheet of the plans shall include the required County General Notes, as shown in Appendix A1 thru A4. The Plans shall also include, in appropriate locations:

1. Utility plan shall include the note in 8.1.1 B 4.
2. Signal and Lighting plans shall include the note in 9.1.2 B 8.
3. Any special notes, unique to the project design, shall be shown on the relevant sheet of the plans, as much as possible.

N. Text: The minimum text size on full size plans shall be 3/32" (or 0.1").

## 1.2 Design Exceptions

~~Requests for exceptions to the requirements of the Design Standards, Standard Specifications or Standard Drawings, such as substitution of methods or materials differing from those set forth herein, may be proposed in writing by the Engineer of Work following the prescribed format. The Engineer of Work must submit a completed, signed and sealed Design Exception Application to the Department (see Appendix A7). The Department will provide written response to such requests for exception, either approving or denying the request.~~

From time to time, unusual site conditions may indicate warrant a deviation from these standards. Where such situations occur, the Engineer of Work may request a design exception. The Engineer of Work shall demonstrate that the proposed deviation adequately addresses public health and safety, long term maintenance, environmental impacts, and orderly community development. Avoiding or reducing project costs is not normally adequate reason for approving a design exception. As these assessments require professional engineering judgment, all proposals for a design exception must be prepared by a registered professional engineer and be approved by the Department.

Requests for a design exception shall be proposed in writing by the Engineer of Work following the prescribed format (see Appendix A7). The Engineer of Work must also sign and seal the Design Exception Application to the Department. The Department will provide written response to design exception requests by either approving or denying the request.

A. Geometric Control Criteria. Design exceptions to the following geometric control criteria shall be approved by the Deputy Director of Public Works: (LAPM Chap. 11)

- Design speed
- Cross slope
- Lane and shoulder width
- Superelevation
- Horizontal and vertical alignment
- Horizontal and vertical clearance
- Stopping sight distance
- Bridge width
- Grades
- Standards otherwise indicated to be approved by the Deputy Director Works including:
  - Guardrail layout and materials
  - Driveway sight distance

B. Other Requirements. Unless otherwise indicated, all other requests for a design exception shall be approved by the Design Division Manager, the Transportation Division Manager, the Utilities Division Manager, or the Development Services Division Manager as appropriate.

C. Emergency Substitutions. The Department will also consider requests for emergency substitutions involving materials which suddenly become unavailable, provided requests for such emergency substitutions, including all data to show substitutions comply with specifications, are received at least fifteen calendar days before date of use.

~~Design exceptions may be approved by the Department where the proposed alternative provides the same level of service, approximately the same estimated maintenance costs, and is not adverse to public health, safety and welfare.~~

~~The provision for design exception is intended to provide for some flexibility in designing streets with bikeways, pedestrian and equestrian paths; to facilitate the protection of trees or other resources; when an area Specific Plan has been adopted showing an alternate to the standard drawings, or where appropriate in order to provide compatibility with adjacent areas.~~

### 1.3 Americans with Disability Act Requirements

~~The Americans with Disability Act (ADA) was signed into Federal law in 1990. ADA seeks to provide equal access to public facilities for all Americans regardless of age or physical ability. Following the Federal law, Title 24 of the California State Standards has also been enacted to further promote equal access to public facilities. These laws have been revised. It has been revised and updated from time to time at both the State and Federal level. Many of these revisions were devised to better address transportation facilities within the right-of-way.~~

~~Since the ADA requirements are contained within the Federal and State law, the users of these standards are also expected to fully comply with the law. The information included in these standards are provided to assist the user and to help ensure County facilities are also in compliance.~~

A. Design Requirements: The design and placement of ADA facilities within the public right-of-way including curb ramps and designated parking spaces shall conform to the following (See Appendix also):

- Caltrans Design Information Bulletin; DIB 82-05 Pedestrian Accessibility Guidelines for Highway Projects
- Caltrans Standard Drawing A88A – Curb Ramp Details
- Caltrans Standard Drawing A88B – Curb Ramp and Island Passageway Details
- Caltrans Standard Drawings A90A and A90B – Accessible Parking

B. Design Aids. The following are useful design aids for understanding and implementing ADA:

- CalDAG (California Disabled Accessibility Guidebook)
- ADAG (Americans with Disabilities Act Guidelines)
- PROWAG (Pedestrian Right-of-Way Accessibility Guidelines)

~~— Design Aids. The following are useful design aids for understanding and implementing ADA:~~

- ~~— Caltrans DIB 82-05 Pedestrian Accessibility Guidelines for Highway Projects~~
- ~~— CalDAG (California Disabled Accessibility Guidebook)~~
- ~~— ADAG (Americans with Disabilities Act Guidelines)~~
- ~~— PROWAG (Pedestrian Right-of-Way Accessibility Guidelines)~~

Grievance Procedure: .....

C. Design Exceptions: Design exceptions to ADA requirements for transportation facilities within the County maintained right-of-way shall be approved by the Public Works ADA Design Coordinator. Federal regulations allow the use of other accessibility standards if they provide substantially equivalent or greater access as the minimum Federal accessibility standards. Similarly, the California Building Code allows the enforcing agency to make design judgments as to equivalent designs.

Requests for an ADA design exception shall be proposed in writing by the Engineer of Work following the prescribed format (see Appendix A8). The Engineer of Work must also sign and seal the Design Exception Application to the Department. The Department will provide written response to design exception requests by either approving or denying the request.

## 2. Site Preparation & Grading

### 2.1 Design Standards

#### 2.1.1 Site Preparation

This section provides standards for all work that is required to prepare a site for construction of any public improvements, as defined in these Public Improvement Standards.

A. Verification of Underground Utilities. The location of underground utilities shall be verified prior to excavation for all work that is covered by these standards and that also includes excavation or other risk to underground utilities.

1. The person(s) performing the excavation shall verify the exact location and depth of all utilities including those not shown on the plan prior to start of work.
2. Contact Underground Service Alert at (800) 422-4133 at least 48 hours before but not more than 10 days before the excavation.
3. The contractor shall mark the proposed area of excavation in accordance with the DigAlert Delineation Guide. (See <http://www.digalert.org/premark.html>).
4. High risk utilities shall be positively located during the design phase and delineated on the design plans. (See the Caltrans procedure on High Risk Utilities.)  
—Potholing for locating utilities, for placing sign posts, or for placing fence posts shall also be considered as excavation for the purposes of this section.

A-D. Clearing and Grubbing. Clearing and grubbing activities shall conform to Section 16 of the *State Standards*. Additional requirements shall apply if determined necessary by the project soils and geological report.

B-E. Tree Removal. All trees to be removed or impacted shall be depicted on the improvement plans, and shall be consistent with the environmental determination which was prepared for the project. Required tree removal and/or replacement shall allow for ~~clear zone~~lateral clearance requirements, as defined in Section 4.1.7 A and B of this document. No stumps or other vegetative material shall remain or be placed in any fill area which will support any structure or roadway. See Appendix E1 for the County policy on trees.

C-F. Removal of Hot Mix Asphalt (HMA) and Concrete. Where existing HMA or concrete pavement will be removed as part of the work, the removal shall conform to Section 15-2.02A of the *State Standards*.

D-G. Grinding Hot Mix Asphalt (HMA). Grinding of existing HMA pavement, to prepare for overlay, shall conform to Section 42-2 of the *State Standards*.

E-H. Disposal of Removed Materials. Debris from removal of any materials from the work area shall be disposed of in a manner which complies with Chapter 22.52 (Inland) or Chapter 23.05 (Coastal) of the County Code.

F-I. Abandonment of Existing Facilities. Certain existing facilities may be abandoned in place, if approved by the Department, according to the following requirements:

1. Wells. Existing wells which will no longer remain in service shall either be demolished and removed, or abandoned, as determined by the County Department of Public Health, Division of Environmental Health Services.
2. Septic Systems. Existing septic systems which will no longer remain in service shall either be removed or abandoned, as determined by the County Department

of Planning & Building. A permit from the Department of Planning & Building shall be required for this work.

3. Culverts. Existing drainage culverts which will no longer remain in service shall either be removed or abandoned, as determined by the Department. If a culvert is removed, the area shall be re-compacted to the requirements of Section 3.2.2 and 3.2.3 of this document, and of the project soils and geological report. If a culvert is abandoned, it shall conform to the requirements of Section 15-2.05A of the *State Standards Specifications*.

~~G.J.~~ Demolition of Structures. Any existing structure on a project site, which is proposed to be demolished, shall require a demolition permit from the Department of Planning & Building.

### 2.1.2 Grading Design

Where applicable, grading constructed for projects regulated by these County Standards shall conform to the provisions of the following references:

- ~~Sections 4 through 22 of the *State Standard Specifications*~~
- ~~The latest edition of the *California Building Code*~~

~~As well as the applicable portions of the San Luis Obispo County Code:~~

- Title 19, Building and Construction Ordinance, ~~which includes **Appendix Chapter 33 of the 1997 Uniform Building Code**, in accordance with (See Sections 19.02.050 and 19.03.010 (a))~~
- Title 22, Land Use Ordinance (Inland LUO)
- Title 23, Coastal Zone Land Use Ordinance (CZLUO)
- Sections 4 through 22 of the *State Standard Specifications*
- The latest edition of the *California Building Code (CBC)*
- 

In addition, grading activity reviewed by the Department will be subject to the requirements listed below.

A. Grading Plan Submittals. All grading plans reviewed by the Department shall address the following requirements in their submittals:

1. Soils and Geological Report. The Department may require a foundation and soils investigation and/or an engineering geologic report to substantiate road designs. For any grading which may or will involve a structure (building pads, retaining wall foundations, etc.) the Department will (a) require that a foundation and soils investigation and/or engineering geologic report be submitted with the plans, or (b) documentation that a foundation and soils investigation and/or engineering geologic report is not required, in accordance with CBC Chapter 18, Section 1802. If a foundation and soils investigation and/or engineering geologic report are required, the preparer of the investigation and/or the report shall provide, prior to plan approval, a letter to the Department stating that the plans were reviewed by him/her and that the plans conform to the investigation and/or the report.
2. Grading Quantities. The Project Engineer shall enumerate the quantity of cut and of fill on the face of the grading plans. When the project site is not anticipated to balance a note shall be provided on the grading plans stating that the earthwork sending/receiving site shall secure the necessary permits prior to commencing work. When requested, then engineer of work shall demonstrate that the necessary permits have been obtained prior to importing or exporting soil.

3.2. Erosion/Sedimentation Control Plan. All public improvements involving Grading shall prepare an Erosion and Sedimentation Control Plan. See Appendix B1 for plan requirements. The grading plans shall include a note identifying that proper dust control shall be maintained at all times during construction. Dust control shall conform to the provisions of Section 10 of the *State Standard Specifications*.

4.3. Area of Disturbance. The total Area of Disturbance for the project as well as the Area of Disturbance shown on the particular set of plans submitted shall be shown on the Title Sheet of the plans. All projects involving site disturbance ~~of one acre or greater~~ shall comply with the requirements of the National Pollutant Discharge Elimination System (NPDES). ~~(%%UPDATE)~~ The Developer shall submit a Notice of intent (NOI) to comply with the General Permit for Construction Activity with the Regional Water Quality Control Board (RWQCB). The Developer shall provide the County with the Waste Discharge Identification Number (WDID #) or with verification that an exemption has been granted by RWQCB.

- B. Maximum Height of Cuts/Fills. The maximum height of cut and fill slopes shall be as required by Title 19 and the ~~California Building Code~~ (CBC), unless a more restrictive limit has been established by the conditions of approval or by the foundation and soils investigation and the engineering geologic report for the project. The design shall incorporate the provision of “benches”, terracing, interceptor drains, and setbacks whenever the slope height requires them, as indicated by Title 19 the CBC.
- C. Maximum Slope outside the County Right-of-Way. The maximum slope of cut and fill slopes shall be as required by Title 19 and the CBC, unless a more restrictive limit has been established by the conditions of approval, or by the foundation and soils investigation and the engineering geologic report for the project, or by other provisions of these Standards.
- D. Grading Site Boundaries. Each lot line within a proposed new subdivision shall be considered a “grading site boundary” for purposes of implementing grading setbacks as required by the CBC.
- E. Foundation Elevations. All grading designs shall depict on the plans the “point of discharge” which satisfies the requirements of the CBC, Section 1805.3.4.
- F. Elevation Standards. In Commercial Retail, Commercial Service, Office/Professional and Industrial land use categories, or other sites where determined necessary by the Department, architectural plans for building construction shall use the same benchmark elevation as the street improvement plans (whether prepared by the Department or by the Project Engineer). The following requirements for the relationship between street improvements and building elevations shall also apply to the architectural plans for building construction:
1. The plans shall depict the finish floor elevation at all building entrances fronting a current or future public street.
  2. The plans shall depict the back-of-sidewalk elevations at the locations of all building entrances referenced in #1, based on a typical sidewalk cross-slope of 1.5%.
  3. The plans shall demonstrate compliance with ADA and CBC requirements for pedestrian access to all building entrances.
- G. Drainage Systems on Slopes. Drainage systems on slopes shall be designed as required by Title 19 and the ~~CBC 1997 Uniform Building Code (UBC), Appendix Chapter 33.~~
- H. Slope Easements Required. Slope maintenance easements shall be required for any ~~grading which occurs outside the overall project site boundary, for any~~ excavation or embankment

slopes which are steeper than 5:1 (horizontal: vertical) that extend outside the right-of-way. All such easements shall provide for access and working space rights.

- I. Retaining Walls. Prior approval is required for the construction of any reinforced concrete, ~~or~~ reinforced concrete masonry unit (CMU), or mortarless element retaining wall which would require a construction permit as defined in Section 19.02.020 (c) (4) of the San Luis Obispo County Code (Modifications of Appendix Chapter 1 of the *California Building Code*). If a proposed wall is below the threshold where a construction permit would be required, it shall be shown in the grading plan in order to evaluate its relationship to site drainage. Retaining walls shall be constructed based on an approved design. Examples of approved designs include:

- ~~• County Design Tables (available from Planning & Building)~~
- Design Tables from the *State Standard Plans*
- Design Tables from an approved alternate reference
- ~~• [e.g., *Standard Plans for Public Works Construction, APWA*]~~
- Designs prepared, signed and sealed by a registered civil ~~or structural~~ engineer

In addition, the following requirements shall apply to any retaining walls proposed as part of any public improvements, as defined in these Public Improvement Standards:

1. Designs for any retaining wall shall include the location in plan view, a typical cross-section, and an elevation view of the full length of the proposed wall. The Project Engineer shall also provide all design calculations, signed and sealed, to the Department for review, along with any applicable foundation and soils investigation or engineering geologic reports.

2. Wood retaining walls shall be no greater than 2-feet in exposed height, and shall be considered appropriate for landscaping purposes only. Wood retaining walls shall not be located within the right-of-way.

~~2.~~

3. Any wall greater than 30-inches in exposed height ~~may require~~shall include a guard (pedestrian railing) as defined in CBC Chapter 10, Section 1013 “Guards,” or maintenance worker fence as defined by Cal-OSHA and shown in the *State Standard Plans*.

~~4. Retaining walls shall not be permitted within the right-of-way as part of the design of roads for any public improvements (see 3.1.2-M).~~ The Engineer of Work shall demonstrate that wall designs are appropriate for the soil and loading conditions.

~~4.~~

- J. Preservation of Trees. Existing trees within the area of any grading shall be preserved as required by the conditions of approval for the subdivision or land use permit. All trees to be removed or impacted shall be depicted on the grading plan. The Department may require additional trees to be removed for reasons of safety or maintenance. All trees to be removed must have a CEQA determination prior to removal.

- K. Stockpile Requirements. If a project will be stockpiling material from either on-site or off-site sources the following design criteria applies:

1. All stockpile location/s shall be shown on the grading plan and erosion control plan as well as the SWPPP, if a SWPPP is required. Stockpiles ~~must~~shall be located a minimum of 50-feet away from drainage structures and water bodies such as creeks, rivers and drainage courses. Stockpiles shall not be located in environmentally sensitive areas.

2. Stockpiles may not be located on slopes greater than 20%.
3. No stockpile shall remain longer than six (6) months without prior written approval from the Department.
4. All stockpiles shall be shaped, not left in an “end dump condition”. Stockpiles shall have a slope of 3:1 or flatter with the top surface sloped downhill at minimum of 0.5% and a maximum of 5%.
5. Maximum height of any one stock pile shall be 20 feet.
6. No one stockpile shall exceed 5,000-cubic yards. Adjacent stock piles shall not be located closer than 50-feet to each other. Measured from edge to edge.
7. All stockpiles regardless of time of year shall have silt fence installed immediately around the perimeter of the stockpile at the toe of slope. This silt fence shall be maintained until stockpile is removed.
8. Between April 15<sup>th</sup> and October 15<sup>th</sup> stockpiles remaining in-active for longer than one (1) week shall be covered with plastic and secured to control dust.
9. Between October 15<sup>th</sup> and April 15<sup>th</sup> (rainy season) stockpiles shall be stripped of plastic coverings and appropriate Best Management Practices that reduce erosion potential and stabilize the slopes i.e. hydro-seeding, straw, straw wattles etc. be implemented.
10. Once a stockpile is removed, the area below shall be returned to the original contours or final project finished grades with established vegetation. This shall be done prior to acceptance of improvements.

### 2.1.3 Special Requirements for On-Site Grading

For subdivisions accepted for processing before May 2010 the LUO Section 22.52.050 (B) (1) (a) (6) states that grading activity is exempt from the provisions of that Title, when associated with improvement plans for final subdivision maps and consistent with the standards, guidelines and provisions of that Chapter. CZLUO Section 23.05.026 (c) provides for the same exemption in the Coastal Zone, when the subdivision map is accompanied by an approved coastal development permit. Therefore, on-site grading within subdivisions may be included in the improvement plans reviewed by the Department without obtaining a separate Grading Permit, but will be subject to the same design and construction requirements as those imposed by the Department of Planning and Building. This activity will be referred to as a “Grading Exemption,” and the special requirements that will apply to the Department’s review are discussed in this section. The Department of Public Works will act as a deputy to the Building Official for all Subdivision Grading Permit Exceptions.

Note that grading which is associated with a subdivision, but which occurs outside its boundaries, (such as borrow or disposal sites), may require a separate Grading Permit under the provisions of Title 22 or 23 listed above.

The Grading Exemption provides the designer an option to submit non-public improvement plans to the Public Works Department for grading permits, rather than submit a separate permit through the Department of Planning & Building.

Grading Exemption submittals processed through Public Works shall be routed through Planning & Building to ensure consistency with the following requirements:

- Accessibility: Americans with Disabilities Act (ADA)

- Code: *California Building Code (CBC)*
- Ordinance: landscaping, zoning, parking, setbacks, conditions of approval

All requirements of Section 2.1.2, Grading Design, shall apply to projects processed under Grading Exemptions. In addition, the following design requirements also apply. The designer should use the following information as a “checklist” when preparing a plan submittal under these provisions.

A. Subdivision Grading Permit Exceptions. See Appendix A6: Requirements for Subdivision Grading Permit Exceptions for additional information regarding the requirements in the CBC.

B. Scope of Work. A written Scope of Work shall be included on the Title Sheet which lists all of the items of work included on any set of plans which include Grading Exemption construction.

C. Demolition Plan.

1. Plans shall clearly show all trees proposed for removal and protection. Each tree shall be identified by type, trunk diameter and status. A summary table of all trees to be removed shall be provided on the plan.
2. Plans shall clearly show and label all existing site infrastructure proposed for removal and protection.
3. Public Works does not have the authority to permit demolition of certain facilities, including wells, septic systems and structures. A separate Demolition Permit may be required from the Department of Planning & Building, or the Environmental Health Services Division of the Public Health Department. A note to that effect shall be clearly labeled on the plans reviewed by Public Works.

D. Drainage.

1. Drainage requirements shall be per County Ordinance, these Public Improvement Standards and the project conditions of approval.
2. Storm drains and subsurface basins shall be located such that future maintenance (including removal and replacement) of the facility shall not affect the structural stability of adjacent buildings.
3. Any private drainage facilities that accept public storm water (runoff from public streets or roads) shall provide a Public Storm Water Drainage Easement which shall be shown and labeled on the plans and recorded on the Final Map or Parcel Map.
4. Drainage easements shall be shown and labeled on the plans, and recorded on the Final Map or Parcel Map, where any drainage infrastructure (basins, pipes, swales, channels, etc.) crosses onto or across adjacent lots within the subdivision. Blanket drainage easements may be proposed where appropriate.

E. Easements.

1. All proposed easements shall be shown and labeled on the plans, and recorded on the Final Map or Parcel Map.
2. Structures such as buildings, walls, trash enclosures, etc. shall not encroach within the proposed drainage or utility easements.

3. Minimum widths of all drainage easements shall be in accordance with these Public Improvement Standards.

F. Parking Lots.

1. Parking shall conform to the ~~meet the design~~ requirements of LUO Chapter 22.18 or CZLUO Section 23.04.16x.
2. No more than two vehicles may back out onto a public street or road from a parking lot.
3. Site access driveway location and design shall be in conformance with these Public Improvement Standards.

~~4. Parking requirement calculations (if applicable) shall be summarized on the Title Sheet.~~

~~5. Walks, as defined in the CBC and ADA, adjacent to perpendicular and/or angled parking spaces shall be wide enough to provide a minimum 4-foot clear area within the walk which is beyond the anticipated vehicle overhang limits. The overhang limits shall be shown and labeled on the plans as extending from the face of curb or tire stop.~~

~~6. Parking spaces should not be located closer than 2 to 3 car lengths from site access driveways, to minimize conflicts between vehicles utilizing the parking spaces and vehicles utilizing the driveways.~~

~~4.~~

~~7.5.~~ Accessible Path of Travel shall be clearly shown and labeled on plans.

~~8.6.~~ Accessible parking spaces, including the adjacent “No Parking” access aisle, shall not have a slope exceeding 2% in any direction. Spot elevations and slopes shall be provided on the plans at each accessible space.

~~9.7.~~ Regular Standard parking spaces shall have a slope between 1.5% and 5% in any direction.

~~10. Sight distance requirements provided in these Public Improvement Standards shall be addressed. The designer shall show and label sight distance triangles around all buildings, signs and other proposed above-grade obstacles.~~

~~8. Plans shall clearly show all slopes, spot elevations, existing and proposed contours (with labeled elevations), construction callouts and all construction details.~~

~~9. Parallel parking pavement markings shall provide 24-foot spacing, or 20-foot spacing when adjacent to a driveway, and be setback 20-feet from intersection curb returns.~~

~~11.10.~~

G. Site.

1. All site walks shall meet the minimum width and slope requirements in accordance with the ADA.
2. All site accessibility ramps shall meet the minimum width, slope, landing and railing requirements in accordance with the ADA. All details shall be provided on the plans.
3. Details shall be provided on the plans for all proposed surface improvements including curbs, gutters, flatwork, drainage facilities, lighting, striping and other surface improvements.

4. Outlines for all above-grade features shall be shown and labeled on the plans, including buildings, building doors, trash enclosures, signs, above-ground utilities and other above-grade features.
  5. No site access stairs or ramps shall begin within 2-feet from the back of a public sidewalk – maintain a 2-foot level area behind back of public sidewalk.
- H. On-Site Grading Review. Elements of on-site grading, as described above, will be reviewed by the Department as follows:
1. Subdivision Grading. Any elements of grading and/or drainage design which will serve more than one lot shall be considered part of the “subdivision” improvements, will be bonded for if not completed prior to map recordation, and will be shown on the Improvement Plans and the Record Drawings.
  2. Non-subdivision Grading. All other lot grading may be shown on a separate plan set if desired. It does not need to be shown on the Improvement Plans and the Record Drawings. A bond for the proposed non-subdivision grading may be required to ensure that the work, if not completed in accordance with the approved plans, will be corrected to eliminate hazardous conditions ~~(1997 UBC, Appendix Chapter 33, Section 3311)~~. If this lot grading requires substantial change during construction, it will be treated as a plan revision. At the completion of project construction, the Project Engineer will certify to the Department that the (non-subdivision) lot grading “substantially conforms to the plans approved on \_\_\_(date)\_\_\_ including any approved revisions.”

## 2.2 Construction Specifications

### 2.2.1 Materials

- A. Deleterious Materials. No vegetative matter, nor any other deleterious materials, shall be permitted within any area which will support any structure or roadway. No organic material shall be permitted in structural fills. If fill is specified to be a non-structural land reclamation, erosion control, or agricultural fill, organic material may be allowed.
- B. Retaining Walls.
1. Reinforced concrete retaining walls – Shall conform to CBC Chapters 18 “Soils and Foundations” and 19 “Concrete.”
  2. Reinforced CMU retaining walls – Shall conform to CBC Chapters 18 “Soils and Foundations” and 21 “Masonry.”
  3. ~~Segmented~~ Segmented block retaining walls – Shall conform to CBC Chapters 18 “Soils and Foundations” and the manufacturer’s recommendations.
  - 3.4. \_\_\_\_\_ Railings – Shall be in conformance with *State Standard Specification* for “Pipe Handrailing,” Section 83-1.02A and CBC Chapter 10, Section 1013 “Guards.”
  - 4.5. \_\_\_\_\_ See Appendix C for additional requirements.

### 2.2.2 Construction

- A. Compaction Standards. The Project Engineer shall collect compaction data throughout construction, as required by the CBC. Following completion of the work, the Project Engineer shall provide compaction reports to the Department, certifying compliance with these requirements, for all the following areas:

1. Each graded lot pad
  2. All roadways (Compaction tests in these areas shall comply with the *State Standards*)
  3. All roadway shoulders (Compaction tests in these areas shall comply with the *State Standards*)
  4. All sidewalk areas, where applicable (Compaction tests in these areas shall comply with the *State Standards*)
  5. See Appendix A6 for additional requirements.
- B. Elevation Certification. The Project Engineer shall collect elevation data for all graded lot pads. Following completion of the work, the Project Engineer shall provide elevation certifications to the Department prior to project completion, or building foundation pour, whichever occurs first.
- C. Inspections.
1. The Developer shall be responsible for ensuring that all required inspections are requested and performed; the Project Engineer shall be responsible for the competency of all required inspections.
  2. Special Inspections: The Project Engineer shall either: (a) document that no Special Inspections are required, or (b) prepare a Statement of Special Inspections in accordance with CBC Chapter 17, Section 1704. See Appendix A6 for the information required.
  3. In Commercial Retail, Commercial Service, Office/Professional and Industrial land use categories, or other sites where determined necessary by the Department, an inspection shall be required prior to building foundation pour, to verify the relationship between building floor elevations and back-of-sidewalk elevations. If the street improvement design was prepared by the Department, this inspection shall be conducted by the Department. If the street improvement design was prepared by the Project Engineer, the inspection shall be conducted by the Department and the Project Engineer.
- D. Grading in Open Space Areas. No grading shall occur in any Open Space area before the pertinent Open Space Agreement is recorded.
- E. Erosion Control During Construction. Follow-up applications of hydro-seeding shall be made as needed to cover weak spots, and to maintain adequate soil protection. These applications shall avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation. After any rainfall event, the Developer is responsible for maintaining all slopes to prevent erosion.
- F. Retaining Walls Inspection. Inspections are required at several phases of wall construction.
1. Footings (prior to pour)
  2. Walls:
    - i. Masonry: Pre-grout/reinforcement steel (prior to grouting)
    - ii. Reinforced concrete: Forms and reinforcement steel (prior to pouring)
  3. Backfill/drainage (prior to backfill)
  4. Final

### 3. Roadways

#### 3.1 Design Standards

##### 3.1.1 Definitions

A. Gravel Road. A Gravel road is one which serves Residential Rural, Rural Lands and Agricultural land use categories, as those categories are shown by the Land Use Element of the General Plan. The Gravel Road standard may be utilized for new or expanded roads when the following criteria are met:

- number of lots to be ultimately served by the road is 20 or less
- when the projected Average Daily Traffic (ADT) will be 100 or less
- the roadway will not be needed for area wide circulation
- the roadway will be offered for dedication to the public
- a property owners' association is formed for the maintenance of the roadway

Gravel Roads shall be designed to the requirements of Standard Drawing A-1(j), ~~unless specified otherwise by project conditions of approval.~~

B. Rural Road. A Rural road is one which serves all properties outside Urban Reserve Lines, as defined in the Land Use Element of the General Plan. In addition, a road is considered Rural when it provides access to Residential Suburban, Residential Rural, Rural Lands and Agricultural land use categories inside Urban Reserve Lines. Rural roads shall be designed to the requirements of Standard Drawing series A-1, ~~unless specified otherwise by project conditions of approval.~~

C. Complete Street: A complete street is a street designed and built to accommodate all users of the roadway including pedestrians, bicyclists, transit riders, as well as commercial and general motorists. A complete street is user friendly for all users regardless of age or ability. The County views all transportation improvements as opportunities to improve safety, access, and mobility for all travelers in California and recognizes bicycle, pedestrian, and transit modes as integral elements of the transportation system.

~~C.D.~~ Urban Street. An Urban street is one which serves Residential Single Family and Residential Multiple Family land use categories inside Urban Reserve Lines, as well as Open Space and Recreational categories adjacent to those categories as shown in the Land Use Element of the General Plan. Urban streets shall be designed to the requirements of Standard Drawing series A-2, unless specified otherwise by project conditions of approval.

~~D.E.~~ Commercial/Industrial Road or Street. A Commercial/Industrial road or street is one which serves Commercial Retail, Commercial Service, Office/Professional and Industrial land use categories within Urban Reserve Lines, as those categories are shown by the Land Use Element of the General Plan. Commercial/Industrial roads or streets shall be designed to the requirements of Standard Drawing series A-3, ~~unless specified otherwise by project conditions of approval.~~

~~E.F.~~ Arterial Road or Street. An Arterial road or street is one which is primarily for the purpose of carrying traffic between State Highways and population centers, or which is needed to serve large volumes of traffic within an urban area. As used in these Standards, the term "Arterial" includes all those roads or streets designated Principal Arterial or Arterial in the Circulation Element of the General Plan.

~~F.G.~~ Collector Road or Street. A Collector road or street is one which is or will be used primarily to enable traffic to move to and from Local roads or streets and Arterial roads

or streets. As used in these Standards, the term “Collector” includes all those roads or streets designated Collector in the Circulation Element of the General Plan.

G-H. Local Road or Street. A Local road or street is one which is or will be used primarily for access to abutting property. As used in these Standards, the term “Local” includes all other roads not considered Arterial or Collector.

I. Prevailing Speed: Prevailing speed on existing County roads shall be determined by measuring the 85<sup>th</sup> percentile speed

J. Speed: Speed for County roads shall be defined as follows:

- Average Speed shall be the summation of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed.
- Design Speed shall be used to determine the various geometric design features of a roadway. Design speed shall be selected in accordance with these standards or as determined by the Department.
- 85th-Percentile Speed is based upon measured field data and is the speed at or below which 85 percent of the motor vehicles travel.
- Operating Speed is the speed at which a typical vehicle or the overall traffic operates. Operating speed might be defined with speed values such as the average, pace, or 85th-percentile speeds.
- Pace is the 10 mph speed range representing the speeds of the largest percentage of vehicles in the traffic stream.
- Posted Speed is the speed determined following an engineering and traffic survey (CVC 627) and established by County ordinance.
- Prevailing Speed is the 85<sup>th</sup> percentile speed.
- Running Speed is the average operating speed over a selected road segment. On a straight level road segment, the running speed will typically equal the prevailing speed throughout the road segment. On road segments with varying conditions such as a curving mountain road, the operating speed may vary at different points along the segment. The running speed is typically determined by the measuring average time to travel the full segment.

H-K. Roadway Structural Section Factor of Safety. High volume roadways with projected Average Daily Traffic (ADT) of 56000 or greater shall be designed to include the Caltrans safety factors of 0.20-foot and 0.10-foot, for flexible pavement with a base layer and for full depth asphalt, respectively. The Empirical Method for calculation of the structural section is discussed in Topic 633 of the *Highway Design Manual*.

### 3.1.2 Design Criteria

In order to maintain consistency with the County General Plan, the design of roadway public improvements shall take into account the Street Design Considerations from Framework for Planning. A copy of these guidelines is included in Appendix D1.

A. Design Speed: The selection of the design speed for a County road can have a dramatic on the design, the cost, and the maintenance of that road as well as the quality of life for the road users. The design speed shall be selected as follows:

- For spot improvements fronting existing County roads such as driveways, sidewalks, trails and other similar improvements the design speed shall be the prevailing speed.
- For new roads where speed data cannot be measured or significantly altered roads where measured speeds are not relevant, the design speed shall be per Standard Drawing A-1, A-2 or A-3 as applicable.
- For road segments with varying geometry the design speed shall be based upon the prevailing running speed.
- Other design speeds may be selected if approved by the Department per the design exception process.

A.B. Longitudinal Grade. The grade along the profile or flowline of any new roads or streets shall conform to the following:

- The minimum longitudinal grade along the profile or flowline of new roads or streets constructed of Hot Mix Asphalt shall be 0.50 percent.
- The minimum grade along the profile or flowline of new roads or streets constructed of portland cement concrete shall be 0.30 percent.
- ~~The maximum longitudinal grade along any new road or street shall conform to Standard Drawings A-1, A-1j, A-2 and A-3.~~
- Vertical curves shall be used at grade breaks greater than 1%.
- A minimum 50-foot tangent shall be required between sag-sag or crest-crest adjacent vertical curves.

B.C. Horizontal Alignment. Compound curves shall be avoided whenever possible. There shall be a minimum 50-foot separation between horizontal curves.

C.D. Cross Slope. The slope transverse to the profile or flowline of roads or streets shall conform to the following:

- The standard cross-slope to be used for all new construction shall be 2.0 percent.
- The minimum cross slope for widening any roads or streets shall be 1.0 percent, except for superelevated sections or approaches to cross gutters.
- The maximum cross slope for widening any roads or streets shall be 5.0 percent, except for superelevated sections.
- The cross slope on gravel roads and shoulders shall be between 4% and 5%.
- Grade breaks in the cross slope shall be minimized where possible and shall in no case be greater than 1.0 percent (algebraic difference) within the traveled lanes nor more than 3.0 percent (algebraic difference) within the paved shoulders.

D.E. Intersecting Streets or Roads.

- When two streets or roads intersect, neither 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 or

road to the beginning of the first vertical curve, except in unusually rough terrain, where the Department may allow up to a maximum of 5.0 percent.

- Road or street intersections, or driveway approaches, shall be designed to conform to the sight distance requirements established in the A-5 series Standard Drawings.
- Intersecting streets or roads shall meet at an angle of 90 degrees where possible. ~~Design Exceptions may be approved based on site conditions, but in~~ no case shall this angle be less than ~~75~~80 degrees.

E.F. Bikeways. Bikeways shall be incorporated into the design of any public improvements whenever a street or road that is to be improved is recommended for bikeway improvements by the *County Bikeways Plan*.

Where Class I or Class II bikeways are ~~required~~specified, those bikeway improvements shall be added to the street or road cross-section as otherwise determined above.

Where Class I bikeways are to be constructed within County-maintained road rights-of-way, they shall be constructed of Portland Cement Concrete if they are to be maintained by the Department. If a Homeowners' Association or other mechanism is proposed for maintenance, other materials may be considered.

Where Class III bikeways are ~~specified~~required, ~~in no case shall the~~ roadway travel lanes shall be at least less than 12-feet in width.

The design of bikeways shall conform to Chapter 1000 of the *Highway Design Manual*, and the recommendations of the *County Bikeways Plan*.

F.G. Cross Gutters. No cross gutters will be allowed across any road or street with a twenty (20) year forecast traffic volume greater than 3,000 ADT.

G.H. Curve Data. The computed curve data for all centerline curves shall be shown on the plans. The minimum radius of the property line on the exterior corner of all corner lots shall be 20-feet. The minimum radius of curb returns shall be 30-feet. Larger radii may be required when specified in project conditions of approval, or as required by the Department.

H.I. Obstructions at Public Road Intersections and Knuckles. No signs, hedges, shrubbery, vegetation, fence or other sight distance obstruction shall be placed within the restricted area at the corner of any public road intersection, or inside curve of any knuckle. An obstruction shall be considered any such item which is higher than 2.5-feet above either the nearest pavement surface or the nearest traveled way (where there is no pavement). The dimensions of the restricted area are provided in the Standard Drawings.

I.J. Right-of-Way. Right-of-way easement shall be offered for dedication to the public, as necessary to contain all elements of the roadway prism, as depicted in the Standard Drawings.

J.K. Street and Road Profiles. Certain streets or roads are required to be extended to the boundary of a site proposed for development, to comply with the Real Property Division Ordinance or project conditions of approval. In such cases, the design shall include an extension of the street or road profile for a minimum distance of 200-feet beyond the project limits, depicting both existing grade and a potential design grade which will comply with the required design speed.

L. Mid-Block Tapers. Tapers shall be provided at each end of a segment of road widening within a block, and shall be located beyond the end of the development site. Tapers which affect the width or lateral placement of travel lanes shall be designed as follows:

- For roads having a prevailing speed of 45 mph or greater, the formula:  $L = WS$  shall be used to compute the transition taper length.
- For road having a prevailing speed less than 45 mph, the formula:  $L = WS^2/60$  shall be used to compute the taper length.

Where:

$L$  = the taper length in feet,

$W$  = the width of the offset distance in feet, and

$S$  = the prevailing speed.

~~K. based on the design speed provided by the Department, using the methods found in the Highway Design Manual.~~ All other tapers including shoulders, parking lands, and bike lanes shall be designed at a minimum ratio of 5 (longitudinal): 1 (lateral).

L.M. Intersection Tapers. When new public road intersections are constructed, intersection tapers shall be provided according to the following table:

**Table 3-1: Intersection Taper Requirements**

Urban/Rural	Main Road	Intersecting with	Taper Requirement
Rural	Arterial	Arterial	<i>Highway Design Manual (HDM) Figure 405.7*</i>
	Arterial	Collector	HDM 405.7*
	Arterial	Local	HDM 405.7*
	Collector	Collector	HDM 405.7*
	Collector	Local	30 ft. radius return
	Local	Local	30 ft. radius return
Urban	Arterial	Arterial	30 ft. radius curb return
	Arterial	Collector	30 ft. radius curb return
	Arterial	Local	30 ft. radius curb return
	Collector	Collector	30 ft. radius curb return
	Collector	Local	30 ft. radius curb return
	Local	Local	30 ft. radius curb return

\*Design vehicle: Bus

Increased taper requirements (corner radius, length of approach widening) may be required to achieve adequate turning room where bike lanes, parking lanes, or shoulders are not provided. See also “Turning Design Requirements”. Increased requirements may also be applied in the permit conditions of approval, depending on project operational requirements.

N. Turning Design: Road and driveway intersections shall be designed to accommodate the minimum turning radius of commonly anticipated vehicles.

<u>ROAD TYPE</u>	<u>TURNING REQUIREMENT</u>
<u>ARTERIALS</u>	<u>California Legal Vehicle 50-foot radius PER HDM Figure 404.5C</u>
<u>COLLECTORS</u>	
<u>COMMERCIAL ZONE</u>	
<u>INDUSTRIAL ZONE</u>	
<u>RURAL ROADS</u>	<u>California Legal Vehicle 50 foot radius per HDM Figure 404.5C (Vehicle turning path may include the opposing lane on roads with ADT less than 1,000)</u>
<u>RESIDENTIAL (URBAN)</u>	<u>40-Foot Bus Design Vehicle radius per HDM Figure 404.5E (Vehicle turning path may include the opposing lane on roads with ADT less than 1,000)</u>

~~M. Retaining Walls. Retaining walls shall not be permitted within the right-of-way as part of the design of roads for any public improvements unless an exception is granted by the Department, but in no case shall wood retaining walls be allowed.~~

O. Cut and Fill Slopes within the County Right of Way. Side slopes along the roadway that are laid back (flatter slopes) tend to provide an improved appearance, reduced erosion and maintenance, increased safety and overall better public usability. Therefore, where practical slopes should be 5:1 or flatter within the right-of-way. Where flatter side slopes are not practical the following minimums shall apply:

- 4:1 minimum for a minimum distance of 15 feet from the edge of traveled on roads with an estimated ADT of 5,000 or greater at build out.
- 3:1 minimum on sandy soils on roads with an estimated ADT of 5,000 or less at build out.
- 2:1 minimum on roads with an estimated ADT of 5,000 or less at build out.
- The Department may approve (via the design exception process) steeper slopes when the following conditions are demonstrated:

~~N. Cut and fill slopes within the County right of way shall be 2:1 minimum (3:1 in sandy soils) for roadways under 5,000 ADT and 4:1 minimum for roadways over 5,000 ADT. The Department may approve steeper slopes when the following conditions are demonstrated:~~

- ~~• Proposed slopes have been determined to be geotechnically stable~~
- ~~• The clear recovery zone is lateral clearances are maintained~~
- ~~• Adequate erosion control can be established~~
- ~~• Adequate access for maintenance can be provided.~~

- Adequate sight distance is provided.
- Adequate setback is provided from adjoining properties or adjoining facilities.

P. Barricades. Where improvements only cover a portion of the ultimate improvement and where an improved street is proposed to be extended in the future, the improvements shall include a barricade at the end of surfacing of such a street to serve as a warning to the public. The barricade shall be constructed, erected, painted and signed as depicted in Standard Drawing M-2. The barricade shown in Standard Drawing M-2a may be used if the road is to be extended in less than five years.

Q. Raised Medians. Raised medians shall not be provided on County maintained roads without prior approval from the Department. Where raised medians are provided, the medians shall conform to the following requirements:

1. Design. The raised median design shall follow the *Highway Design Manual*.
2. Width. No portion of the median shall be less than 4-feet in width. Any portion of the median less than 8-feet in width shall be surfaced with stamped concrete. No vegetation shall be permitted in these areas. A 2-foot paved shoulder shall be provided on the roadway surface adjacent to the median curb and the traveled way.
3. Lighting. Overhead lighting which conforms to the requirements of the electric utility service shall be provided at each end of a segment of raised median. Lighting shall be designed to provide a minimum illumination on the street or road surface of:
  - i. XXX? foot-candles at the centerline intersection of the street/road with the median and the intersecting street/road or driveway, and
  - ii. 0.6 foot-candles within the entire area which comprises the intersection.
4. Landscaping. A landscaping plan shall be provided to the Department for review and approval. Proposed landscaping shall provide for intersection and driveway sight distance requirements as required by the *Highway Design Manual* and these Standards. Landscaping shall be installed under an Encroachment Permit issued by the Department. The permit shall identify a specific entity which will be responsible, in perpetuity, for maintenance of the landscaping and lighting, and removal of the median landscaping if necessary in the future. Where landscaping maintenance cannot be ensured, the median shall contain stamped concrete.
5. Maintenance. Maintenance of all landscaped medians shall be the responsibility of the Developer who is required to install the median, unless the maintenance responsibility is assumed by a public entity or property owners' association. Maintenance responsibility must be established prior to approval of improvement plans. Maintenance activities shall be performed under an Encroachment Permit issued by the Department.

R. Knuckles. A knuckle may be used, in lieu of the appropriate horizontal curve, in the design of Urban streets with an ADT less than 500 and design speed of 25 mph or less, or on Commercial/Industrial streets whenever required to make a 90-degree bend. Knuckle designs shall conform to the requirements of Standard Drawing A-6b. The use of knuckles in rural areas is discouraged. Subdivisions in these land use categories should use horizontal curves appropriate for the required design speed as determined by Standard Drawing A-1.

S. Left-Turn Channelization. The need for provision of left-turn channelization shall be determined by use of NCHRP graphs or AASHTO warrant table. (XXX provide graph in the apx.XXX) The length of the channelization shall be the minimum storage plus deceleration length as determined from Highway Design Manual section 405.2, unless a greater length is

warranted. A 20 mph speed reduction may be used in determining the required length of deceleration, when first approved by the County Traffic Engineer.

B. Right-Turn Channelization. Right-turn channelization shall be provided wherever forecast right-turning traffic volume will be 300 vehicles per hour, as determined by the Department. The layout of the channelization shall be based on Highway Design Manual section 405.3, with deceleration length included, unless a greater length is warranted. A 20 mph speed reduction may be used in determining the required length of deceleration, when first approved by the County Traffic Engineer.

C. Rumble Strips: Rumble Strips are pavement groves that alert drivers that they are drifting out of the travel lane. They have proven effective in shoulders for reducing the number of run off road collisions as well as on centerlines for reduction of head-on collisions. While it is believed rumble strips are particularly effective in alerting drowsy or fatigued drivers, research suggest that rumble strips are effective in alerting other types of driver behavior as well.

1. Evaluation of Roadways for Rumble Strip Placement: The use of rumble strips shall be where directed by the Transportation Division Manager based on specific location, road type and collision history. Rumble strips may be considered in the following situations:

i. On rural roads where the prevailing speed is 45 MPH or greater

ii. Where shoulder widths accommodate bicycle traffic

iii. On new roads or overlay projects for roads with an ADT above 1,000 vpd

iv. As potential spot safety improvements on roadways with a history of high collision rates

v. Centerline rumble strip may be considered for roads with marked centerlines, with patterns of head-on collisions, or alignments which suggest higher incidence of head-on collisions.

2. Design of Rumble Strips - Right Edge: Rumble Strips should be designed in accordance with the most recent details of the State Standard Plans (sheet A40B). However, in limited shoulder conditions, rumble strips with six inch width on or adjacent to an edge line may be allowed.

Rumble Strips shall not be installed though intersections, within 50 feet of an intersection, high volume driveway, agricultural driveway or commercial driveway. Rumble strips shall be installed with a detail 27B or 39 edgeline but shall not be installed next to a striping detail 27C or 39A edgeline or where there is a break in the edgeline.

A minimum of four feet of paved shoulder shall be provided beyond the rumble strip on designated bike routes and a minimum of two feet shall be provided on all other roads.

3. Design of Rumble Strips - Left Edge (centerline or median): Rumble Strips shall be designed in accordance with the most recent details of the State Standard Plans (sheet A40B).

Rumble strips shall be installed with a striping detail 22, 25A or 29 edge line but shall not be used with two-way left turn lanes. Rumble Strips shall not be installed though intersections or where there is a break in the edge line due to high volume driveway.

## 3.2 Construction Specifications

*(This section moved to 3.1 Design)*

### ~~3.2.1 Facilities~~

- ~~A. **Barricades.** Where improvements only cover a portion of the ultimate improvement and where an improved street is proposed to be extended in the future, the improvements shall include a barricade at the end of surfacing of such a street to serve as a warning to the public. The barricade shall be constructed, erected, painted and signed as depicted in Standard Drawing M-2. The barricade shown in Standard Drawing M-2a may be used if the road is to be extended in less than five years.~~
- ~~B. **Raised Medians.** Where the construction of raised medians is required by project conditions of approval, they shall conform to the requirements of the *Highway Design Manual*. In addition, the following requirements shall apply:~~
- ~~1. **Width.** No portion of the median shall be less than 4-foot in width. Any portion of the median less than 8-foot in width shall be surfaced with stamped concrete. No vegetation shall be permitted in these areas. A 2-foot paved shoulder shall be provided on the roadway surface adjacent to the median curb and the traveled way.~~
  - ~~2. **Lighting.** Overhead lighting which conforms to the requirements of the electric utility service shall be provided at each end of a segment of raised median. Lighting shall be designed to provide a minimum illumination on the street or road surface of:
    - ~~i. foot-candles at the centerline intersection of the street/road with the median and the intersecting street/road or driveway, and~~
    - ~~ii. 0.6 foot-candles within the entire area which comprises the intersection.~~~~
- 
- ~~3. **Landscaping.** A landscaping plan shall be provided to the Department for review and approval. Proposed landscaping shall provide for intersection and driveway sight distance requirements as required by the *Highway Design Manual* and these Standards. Landscaping shall be installed under an Encroachment Permit issued by the Department. The permit shall identify a specific entity which will be responsible, in perpetuity, for maintenance of the landscaping and lighting, and removal of the median landscaping if necessary in the future.~~
- ~~4. **Maintenance.** Maintenance of all landscaped medians shall be the responsibility of the Developer who is required to install the median, unless the maintenance responsibility is assumed by a public entity or property owners' association. Maintenance responsibility must be established prior to approval of improvement plans. Maintenance activities shall be performed under an Encroachment Permit issued by the Department.~~
- ~~C. **Knuckles.** A knuckle may be used, in lieu of the appropriate horizontal curve, in the design of Urban streets with an ADT less than 500 and design speed of 25 mph or less, or on Commercial/Industrial streets whenever required to make a 90-degree bend. Knuckle designs shall conform to the requirements of Standard Drawing A-6b. The use of knuckles in rural areas is discouraged. Subdivisions in these land use categories should use horizontal curves appropriate for the required design speed as determined by Standard Drawing A-1.~~
- ~~D. **Left-Turn Channelization.** The need for provision of left-turn channelization shall be determined by use of NCHRP graphs or AASHTO warrant table. The length of the channelization shall be the minimum storage plus deceleration length as determined from *Highway Design Manual* section 405.2, unless a greater length is required by project~~

~~conditions of approval. A 20 mph speed reduction may be used in determining the required length of deceleration, if approved by the County Traffic Engineer.~~

~~E. Right Turn Channelization. Right turn channelization shall be provided wherever forecast right turning traffic volume will be 300 vehicles per hour, as determined by the Department. The layout of the channelization shall be based on *Highway Design Manual* section 405.3, with deceleration length included, unless a greater length is required by project conditions of approval. A 20 mph speed reduction may be used in determining the required length of deceleration, if approved by the County Traffic Engineer.~~

### 3.2.2 Construction and Materials

Roadway work shall conform to the applicable provisions in Sections 24 through 29, and 37 through 42, of the *State Standard Specifications* and these Standards.

The roadway shall be prepared and constructed in accordance with the applicable portions of the State Specifications, unless otherwise modified in the following or approved by the Department. The construction shall incorporate the minimum Traffic Index as provided by the Department.

The roadway structural section shall be determined based on a forecast traffic volume and Traffic Index (TI), provided by the Department, and the R-value of the subgrade, which shall be provided by the Project Engineer. In no case shall it be less than 2-inches (2") Hot Mix Asphalt over 6-inches (6") Class II aggregate base.

A. Class 2 Aggregate Base. ~~All aggregate base shall be Class 2 base, and~~ shall conform to the provisions of Section 26, "Aggregate Bases," of the *State Standard Specifications*. No additional testing, other than that specified in Section 26 (Gradation Limits, R-Value, Sand Equivalent and Durability Index), shall be required. The following additional requirements apply to the placement of all aggregate bases:

1. The Department shall be notified no less than 24 hours prior to placement of aggregate base materials (whether new or recycled).
2. The Department shall reject any improvements based on materials not in compliance with these Specifications. If rejected, this ~~shall~~ may require the removal and replacement of the material just installed.
3. The Department may require the installation of a top layer of crushed redrock to aid in protecting aggregate base shoulders from erosion.

B. Alternate Base. Alternate base such as Class 3 base, decomposed granite (DG), red-rock, recycled or similar materials shall be approved by the Department prior to use.

B-C. Recycled Aggregate Base. The County encourages the use of recycled or reclaimed materials for new construction projects, provided they comply with these Specifications. The following items apply to the use of recycled or reclaimed aggregate base:

1. The restriction in Section 26 of the *State Standard Specifications*, that the amount of recycled/reclaimed material included in Class 2 aggregate base not exceed 50 percent of the total volume of the aggregate used, shall not apply.
2. The testing requirements of Section 26 of the *State Standard Specifications* require recycled/reclaimed material to be tested at the source and at the job site.
3. The Project Engineer, Developer and Contractor shall show due diligence to ensure that recycled/reclaimed aggregate base material meets the quality requirements of Section 26

and be free of organic, metal and other deleterious materials prior to placement. The Department shall be notified prior to any use of recycled base.

G-D. Hot Mix Asphalt. Shall conform to the requirements for Hot Mix Asphalt (HMA) Type A as specified in Section 39 of the State Specifications utilizing the ¾-inch maximum aggregate on new roads with a 20-year projected ADT of 1,500 or greater, and ½-inch maximum aggregate on all other roads. Asphalt binder shall conform to PG 64-10 as specified in Section 92 of the *State Standard Specifications*.

E. Chip Seal. When Chip Seal is required by the Department it shall conform to the following requirements:

1. Chip Seal shall consist of a fine seal coat followed by a fog seal in accordance with the provisions of Section 37 of the State Standard Specifications. The Department may require the pre-coating of screenings with emulsion. The Department may also permit the elimination of a fog seal.
2. Asphaltic emulsion used for seal coat shall be PMCRS2 conforming to the provisions of Section 94, "Asphaltic Emulsions", of the State Standard Specifications. The Department may require the use of PMCRS2H "hard-setting" emulsion, or the use of an alternative rejuvenating agent, such as PASS® or Styraflex®.
3. Asphaltic emulsion used for fog seal shall be CSS1h, and conform to the provisions of Section 94, "Asphaltic Emulsions," of the State Standard Specifications.
4. The rates of application for screenings and asphaltic emulsions shall conform to the provisions of Section 37 "Applying Asphaltic Emulsion" and Section 37 "Spreading Screenings" of the State Standard Specifications. In order to minimize raveling, the following application rates are recommended:

Aggregate screening spread rate = 21 - 22 lbs./sq yd

Chip seal emulsion application rate = 0.29 gal/sq yd

Fog seal application rate = 0.22 gal/sq yd

Proposed screenings and emulsion application rates shall be reviewed and approved by the Department prior to construction.

5. The approximate rate of application of the asphaltic emulsion shall be as directed by the Project Engineer and approved by the Department. The temperature at the time of application shall not be less than that which is necessary for proper operation of the oil distribution system.
6. Material Quality – Screenings shall meet the cleanliness requirements of Section 37 of the State Standard Specifications. Out of Specification Aggregates may be rejected by the Department.
7. Sweeping shall be required in the event the surface oil application (CSS-1h) is not placed within a suitable time after the screenings have been placed and traffic has disrupted their original distribution. Sweeping shall be repeated two days after the application and again as required by the Department.
8. The contractor shall have a standby vehicle containing rock chip screenings available at all times for repairing the surface of the seal coat at locations where it is damaged by traffic before it sets up, and/or at locations where full width coverage of the existing roadway surface has not been obtained to the satisfaction of the Project Engineer.

9. In addition to the requirements of Section 37-1.04, "Preparation for Seal Coat", of the *State Standard Specifications*, the contractor shall temporarily cover any existing utility manhole covers, valve box covers survey monument vault covers and other existing highway facilities to prevent the adherence of any seal coat materials.

10. The contractor, pursuant to Section 22651-M of the California Vehicle Code, shall be responsible for notifying and making arrangements with owners of vehicles parked within the work area, for removal of those vehicles. Notification and posting of signs shall be made a minimum of 24 hours in advance of doing the work. The contractor shall be responsible for posting and marking on the signs the day the work is scheduled.

11. All excess chips shall be removed within four (4) days, in accordance with the provisions of Section 37-1.07 of the *State Standard Specifications*. If the contractor does not remove the excess chips to the satisfaction of the Department within the allotted time, no further construction will be permitted on the subject public improvements until said removal operations are completed and accepted by the Department.

D.F. Survey Monuments. Survey monuments shall be provided at the following locations within a public improvement:

1. In making a survey, the surveyor shall set permanent monuments at all angle points and curve points on the exterior boundaries of the parcel or tract map, and at all parcel corners. Permanent monuments shall be set at angle and curve points on the centerline of on-site streets so that each monument will be intervisible with at least two other monuments and shall be set at the point of intersection of all on-site streets, and at their intersections with existing streets. In the Rural Lands and Agriculture land use categories, centerline street monuments at curve points may be omitted, provided right-of-way monuments are installed at curve points.
2. Any monument as required by Title 21 of the County Code, which is disturbed or destroyed before acceptance of all improvements shall be replaced by the Developer and a corner record shall be filed with the County Surveyor-
3. All monuments shall be subject to the inspections and approval of the County Surveyor before approval of any related subdivision map. In case the street improvement work in the subdivision is proposed to be installed subsequent to the recordation of the map, the County Surveyor may enter into a Monumentation Agreement with the subdivider and authorize posting of security in accordance with the *Subdivision Map Act*, to assure installation of the monuments required by this section which cannot be permanently placed until completion of the improvement work.
4. Monuments located in streets or roads shall be installed in conformance with the requirements of Standard Drawings M-1 and M-1a.

E.G. Planting Cut and Fill Slopes. Cut and fill slopes shall be planted as required by the Department. An erosion control plan shall be submitted when improvement plans are required. The erosion control plan shall include the County's standard erosion control notes and be approved by the Department prior to any earthwork.

Erosion control planting shall consist of hydroseeding all disturbed areas other than paved or graveled surfaces, utilizing an appropriate seed mix as approved by the Department. The planting shall be designed to achieve 90% coverage prior to project completion.

F.H. Sawcutting of Pavement. All sawcuts and resulting seam locations shall be subject to approval by the Department, and shall comply with the following requirements:

1. In all cases where an Encroachment Permit allows for the widening, connection, trenching or removal and replacement of existing street or road, the existing pavement shall be sawcut along a clean line a minimum of 1-foot inside the existing edge. A greater area of existing pavement may be required to be sawcut and removed to ensure the new pavement seams are properly located (See R-1) or so that any new paving joins to competent pavement Hot Mix Asphalt. ~~All sawcuts and resulting seams shall be either parallel with or transverse to the direction of travel and in accordance with the R-series drawings.~~
2. Cut edges shall be vertical, with square corners, and shall be straight and neat in appearance.
3. Rotomilling/grinding may be utilized in place of sawcut when approved in advance of the work by the Department.
4. The initial sawcut for pavement removal and structural excavation shall follow the alignment of the facility to be installed therein. After the structure backfill has been completed and temporary paving (if any) is placed, the finished surface shall be re-sawcut a minimum of 1-foot into the existing pavement, or to competent pavement, in accordance with the requirements in Note F.1 above. The structural section applicable to the re-paving area (as determined by these Standards, the project plans and any Encroachment Permit issued pursuant to those plans) shall then be placed.

I. Temporary Steel Plate Bridging. When backfilling operations of an excavation in the roadway including bike lanes and parking lanes, whether transverse or longitudinal, cannot be properly completed within a work day, steel plate bridging with a non-skid surface and shoring may be required to preserve unobstructed traffic flow. In such cases, the following conditions shall apply:

- Steel plates used for bridging must extend a minimum of 12-inches beyond the edges of the trench.
  - Steel plate bridging shall be installed to operate with minimum noise.
  - The trench shall be adequately shored to support the bridging and traffic loads.
  - Temporary paving with cold asphalt concrete shall be used to feather the edges of the plates, if plate installation by Method (2) described below, is used.
  - Bridging shall be secured against displacement by using adjustable cleats, shims, or other devices.
1. Placement Method 1 for prevailing speeds above 40 MPH: The pavement shall be cold planed to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate.  
Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and drilled 2-inches into the pavement. Subsequent plates are to be butted and tack welded to each other.
  2. Placement Method 2 for prevailing speeds less than 45 MPH: Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and drilled 2-in into the pavement. Subsequent plates are to be butted and tack welded to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 percent with a minimum 12-inch taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry, epoxy or as directed by the Department.

The contractor shall maintain the steel plates, shoring, asphalt concrete ramps, and ensure compliance with these minimum specifications.

The following table shows the advisory minimal thickness of steel plate bridging required for a given trench width (A-36 grade steel, designed for HS20-44 truck loading per Caltrans Bridge Design Specifications Manual).

<u>Trench Width</u>	<u>Minimum Plate Thickness</u>
<u>10-in</u>	<u>1/2-in</u>
<u>1-ft-11-in</u>	<u>3/4-in</u>
<u>2-ft-7-in</u>	<u>7/8-in</u>
<u>3-ft-5-in</u>	<u>1-in</u>
<u>5-ft-3-in</u>	<u>1 3/4-in</u>
<u>Over 5-ft-3-in</u>	<u>Special Design Required</u>

3. Steel plates subject to vehicle or pedestrian travel shall be nonskid and shall have a surface that was manufactured with a nominal coefficient of friction (COF) of 0.35 as determined by California Test Method 342.

4. A Rough Road sign (W8-8) with black lettering on an orange background may be required by the Department.

~~A. Sloped (Safety) Edge. Sloped Edge Requirement for County rural roads with a design speed greater than 40-mph except where the pavement edge includes a curb, dike, metal beam guardrail, driveway or where directed by the Department (see Standard Drawing A-1i).~~

~~— The edge of the pavement at the outside pavement edge, including medians, must have a Sloped Edge. A Sloped Edge must be placed monolithically with the adjacent lane or shoulder and shaped and compacted with a device attached to the paver. The device must be capable of shaping and compacting the HMA to the required cross section as in the detail. Compaction must be by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of automatic transition to cross roads, driveways and obstructions.~~

~~— When a Sloped Edge is required on an overlay placed on a cold planed pavement, the area adjacent to the pavement must be graded to the same plane and elevation of the cold planed pavement prior to placing the Sloped Edge. The width of the grading should be at least the planned width of the Sloped Edge plus 0.25-feet to allow the paver end gate ski to ride on the surface being paved.~~

~~— The finished Sloped Edge shall be thirty (30) degrees ( $\pm 5^0$ ) measured from the plane of the adjacent finished pavement surface. The surface of the Sloped Edge shall be free of loose material. The compaction of the Sloped Edge need not to be measured.~~

~~—When paving is done in multiple lifts, the Sloped Edge may be placed with each lift, or with the final lift. Short sections of hand work for transitions, turnouts, and other areas authorized by the Department are allowed.~~

### 3.2.3 Testing

- A. Basement Soil. Resistance factor “R” (State Stabilometer method) tests shall be made by the Project Engineer as required by the Department. The location of the tests within the area shall be selected so that an average “R” value may be determined for the entire development area. If the average “R” value is rejected by the Department then use of the lowest “R” value may be required.

“R” value tests may be required prior to approval of construction plans in cases where a road is anticipated to have very high forecast traffic volumes and traffic index, and/or known poor quality basement soil.

Relative compaction tests shall be made by an appropriately licensed professional on subgrade material, and material placed within the street areas of the development, as required by the Department of Public Works. Said tests will be made prior to placing the next layer of material.

- B. Aggregate Base. Tests for aggregate bases shall be made by the Developer as required by the Department on a minimum of two representative samples taken at the source from which material will be imported. The sample shall be taken within 15 days prior to placing of either base or subbase. Test results submitted shall indicate clearly the location of the source of material. Base material shall also be subject to testing as it is delivered to the job site in accordance with *State Standards*.
- C. Hot Mix Asphalt. Compaction testing of in-place Hot Mix Asphalt (HMA) shall be done using nuclear source equipment, and in accordance with California Test Method No. 375. Relative density shall be 95% or greater, based on average maximum density from the source, or from a sample taken at the project site at the time of placement.

The following information shall be collected by the Project Engineer at the time of placement of HMA paving:

- asphalt content (for all projects with total tonnage >500 tons)
- compaction of HMA
- temperature of HMA at time of placement
- thickness of HMA and aggregate base

## 4. Road Edges

### 4.1 Design Standards

#### 4.1.1 Sight Distance

- A. Public Road Intersections. Sight distance at all public road intersections shall comply with the “intersection” requirements of Standard Drawings A-5a and A-5b.
- B. Driveways. Sight distance at all driveways entering onto public roads shall comply with the “driveway” requirements of Standard Drawings A-5a and A-5b.

#### 4.1.2 Sidewalks

Concrete curbs, gutters and sidewalks shall be installed within urban areas as required by the Land Use Ordinance or Coastal Zone Land Use Ordinance. They may also be required in other areas if established as a condition of approval of a subdivision or land use permit.

~~A. Accessibility and Usability of Sidewalks, Curbs and Related Facilities within the Public right-of-way by Persons with Disabilities. In accordance with Government Code Section 4450 et seq., and Health and Safety Code Section 19955 et seq., all items along the Accessible Route of Travel shall be constructed in accordance with the requirements of:~~

- ~~1. California Building Code (CBC);~~
- ~~2. Accessibility Guidelines prepared by the federal Access Board, as adopted by the United States Department of Justice, to implement the Americans with Disabilities Act of 1990; and~~
- ~~3. these Design Standards, the State Standard Specifications and State Standard Drawings.~~

~~These requirements will be strictly construed. All new construction, within the public right-of-way, not in conformance therewith will be rejected and shall be removed and replaced.~~

B-A. Curb Ramps Required. Any installation of concrete curbs, gutters and sidewalks fronting a property at a public road intersection, shall include the installation of curb ramps which comply with the current Caltrans Standard Plans. Curb ramps shall be required on each corner of an intersection, as indicated in Standard Drawing C-5, at the time of curb, gutter and sidewalk improvements on that property. Existing curb ramps fronting the property that do not meet current ADA standards shall be repaired or replaced as needed. No curb ramps shall be constructed of Hot Mix Asphalt.

C-B. Attached and Detached Sidewalks. Where sidewalk is to be constructed, it may be attached (i.e., integral with the curb) or detached (separated from the curb by a landscaped parkway), as ~~required by the conditions of approval, Planning Area Standard, or Specific Plan warranted~~. Where no requirements have been established, the sidewalk may be attached or detached at the option of the Developer, in accordance with these standards using widths based on the land use category. Dimensions for attached and detached sidewalks, based on land use categories, are provided in the Standard Drawings.

C. Bulb-Outs. With Department approval bulb-outs conforming to the HDM may be provided at intersections in urban area where curb, gutter and sidewalks are also provided.

D. Repair and Replacement of Sidewalk. Existing sidewalk fronting the property shall be repaired and/or replaced as determined by the following criteria:

1. ADA maximum allowable sidewalk vertical displacement = 1/4-inch
  - i. Vertical displacement of 3/4" or less – grind panel to provide smooth transition
  - ii. Vertical displacement greater than 3/4" – remove and replace panel
  - iii. Divots deeper than 1/2" and wider than 1/2" to 3/4" – use appropriate patch filler
2. ADA maximum allowable sidewalk horizontal displacement = 1/2-inch
  - i. Horizontal displacement of 1/2" to 3/4" – use appropriate patch filler
  - ii. Horizontal displacement greater than 3/4" – remove and replace 5-foot panel
3. Misalignment of curb face of 3/4" or greater – remove and replace section
4. Gutters subject to standing water 1/2" deep or greater and for a distance of 5-feet or more – remove and replace section

Tree maintenance shall comply with the requirements of Procedural Memorandum P-2, which is provided in Appendix E1.

#### 4.1.3 Multi-Use Paths

Multi-use paths are unpaved multipurpose facilities suitable for serving a combination of recreational hikers, pedestrians, equestrians, off-road bicyclists and other non-motorized vehicle users. Multi-use paths outside of the County right-of-way shall be designed in accordance with the requirements of the Department of General Services, Department of Planning and Building or the applicable jurisdiction. . Multi-use paths within the County right-of-way shall be designed and constructed in accordance with these standards:

~~Multi-use paths shall be installed in urban or rural areas as required by project conditions of approval. Their design and construction shall be reviewed and approved by both the Department of Public Works and the Department of General Services/Parks Division.~~

A. ADA Compliant: Multi-use paths shall meet all of the ADA requirements for pedestrian paths including those for surface, width, and grade unless a nearby ADA compliant path alternate is readily available.

B. HDM Compliant: Multi-use paths that are reasonably anticipated to convey bicycle traffic shall be designed either as a "Class I Bikeway" or as "Trail" and shall comply with Chapter 1000 of the Highway Design Manual.

A-C. Materials. Multi-use paths shall be constructed of a minimum 6-inches compacted angular decomposed granite, with a maximum aggregate size of 3/8-inch. Compacted sand may be used if it is confined either by the roadway or by an approved root barrier installed on both sides of path to a minimum depth of 24-inches.

B-D. Attached and Detached Paths. Where a multi-use path is to be constructed, it may be attached (i.e., integral with the edge of the roadway pavement) or detached (separated from

the roadway by a landscaped parkway), as ~~required by the conditions of approval, Planning Area Standard, or Specific Plan warranted. Only where not otherwise specified, the path may be attached or detached at the option of the Developer.~~ Dimensions for attached and detached paths are provided in Standard Drawings A-1a and A-2a. Detached paths must be used when the design speed for the adjacent roadway is 45 mph or greater, and shall be a minimum of 10-feet from the edge of traveled way.

**C-E. Crossing Locations.** Multi-use paths which cross public streets or roads shall cross only at intersections, ~~or other approved locations designated in the County Trails Plan.~~

#### 4.1.4 Pedestrian Crossings

As noted in the California Vehicle Code, crosswalks, either marked or unmarked, exist at all intersections of streets unless the local authority has adopted regulations to restrict the crossing of pedestrian traffic. Marking of crosswalks, however, shall be done only after an engineering study is performed and has determined if marked crosswalks are appropriate at a location that is not controlled by traffic signals, yield signs or stop signs. In addition, proper signage, warning devices, ADA compliance and lighting may need to be installed to support the marked crosswalk. The study will evaluate pedestrian demand, collision history, traffic volumes, site geometry, sight distance and visibility conditions at night.

New crosswalk marking and modification of existing crosswalk markings shall only be installed following approval by the County Traffic Engineer. The following guidelines shall be used when determining the marking of crosswalks and making intersection improvements:

**A. Installation of Marked Crosswalks on Uncontrolled Approaches of an Intersection.** Based on standards from the Caltrans Traffic Manual, the Manual of Uniform Traffic Control Devices, and Federal Highway Administration criteria, the table included in Appendix D3 shall be used to determine the appropriateness of marking crosswalks on public streets. ~~Note that~~

**A-B. High Speed Roads.** ~~Crosswalks shall not typically be marked crosswalks used~~ on roads with ~~posted prevailing~~ speeds ~~of 40 limits of 45~~ mph and above. Where approved, these crossings will require additional signage or other improvements. ~~The County Traffic Engineer shall be consulted prior to any installation.~~

~~The County Traffic Engineer may authorize the installation of a marked crosswalk that does not satisfy all the criteria in the table, if it is based on an engineering analysis of the site, or other unique circumstances warrant the installation of a marked crosswalk.~~

**B-C. Installation of Marked Crosswalks Between Intersections (Midblock).** A midblock marked crosswalk may be installed if it meets the following requirements:

1. The crossing location is greater than 600-feet from the nearest intersection on a through highway; and
2. There is a reasonable demand (40 pedestrians per hour) by pedestrians, as demonstrated by a survey of the street within the concentrated area; and
3. The crossing is more than 300-feet from the nearest signal or stop-controlled intersection; and
4. There is a high pedestrian volume generator nearby.

~~The County Traffic Engineer may authorize the installation of a marked crosswalk that does not satisfy all the criteria in this section if it is deemed that, based on the analysis, other unique circumstances warrant the installation of a marked crosswalk in a midblock location.~~

~~G.D.~~ Re-Installation of Marked Crosswalks Covered by Roadway Surfacing. The re-installation of marked crosswalks shall be evaluated as part of all roadway resurfacing projects that cover pavement markings (chip seal or overlay). All marked crosswalks that do not meet the criteria in this policy shall be removed, ~~unless there are unique circumstances which warrant re-installation of the markings, as determined by the County Traffic Engineer.~~

The California Vehicle Code, Section 21950.5, requires a public hearing 30 days prior to the removal of a crosswalk. Any crosswalk scheduled for removal shall be posted at the site ten days prior to the scheduled hearing before the Board of Supervisors. The public hearing process shall be initiated by the County Traffic Engineer.

~~D.E.~~ Marked Crosswalks at Traffic Signal Locations. Marked crosswalks shall be designated across all approaches of a signalized intersection, unless individual approaches have had pedestrian traffic prohibited. ~~In rural areas, the County Traffic Engineer may elect to delete installation of marked crosswalks due to the low volume of pedestrian traffic.~~

~~E.F.~~ School Crosswalks. School Crosswalks shall be established ~~by the County Traffic Engineer,~~ based on adopted “safe routes to school” maps developed by the Department and the individual school principal or site committee, and reviewed by the California Highway Patrol.

~~F.G.~~ In-Pavement and Sign-Mounted Warning Light Systems for Crosswalks. The installation of in-pavement and/or sign-mounted warning light systems, which incorporate flashing systems based on pedestrian demand, shall be considered only if all the following requirements are met:

1. At least 40 pedestrians regularly use the crossing during each of any two hours (not necessarily consecutive) during a 24-hour period.
2. The vehicular volume through the crossing exceeds 200 vehicles per hour in urban areas.
3. The 85<sup>th</sup> percentile approach speed is 45 mph or less.
4. The roadway has more than 2 lanes but not more than 5 lanes in both directions.
5. The crosswalk is not controlled by a traffic signal, stop or yield sign.

In certain cases the County Traffic Engineer may determine that a warning system is warranted due to the specific needs of visibility of school zone crosswalks.

The County Traffic Engineer may elect a sign-mounted warning light system without in-pavement warning lights due to approach visibility and speeds to the crossing, or when the pavement condition is not suitable for in-pavement warning lights.

~~G.H.~~ Illumination of Intersections (Crosswalks). Within urban reserve lines, all new intersections and crossings (either marked or unmarked crosswalks), on streets with buildout traffic over 5,000 ADT, shall have the level of illumination, as defined in Section 3.2.1 B2 of these Standards. Lighting standards shall conform to the style provided in the applicable Community Design Plan, or those shown in the Standard Drawings.

If the new crosswalk installation, either marked or unmarked, is created through land development, the Developer shall arrange for the installation, maintenance and operation of

the street light. Operation and maintenance shall be paid for either through an existing Lighting District, Community Services District or Homeowners' Association for the development.

~~H.I.~~ Crosswalk Dimensions and Markings. All marked crosswalks shall consist of two transverse lines, no less than 8-feet apart, or as defined under the latest State ADA requirements. Crosswalk transverse lines shall be a minimum of 12-inches wide. The County Traffic Engineer may require the use of "ladder" or "zebra" style crosswalks. The curb ramp treatments at both ends of a marked crosswalk shall be brought into compliance with current ADA requirements at the time the crosswalk is marked.

#### 4.1.5 Driveways

- A. Sight Distance. All driveways, at the point where they connect with any roadway ~~which is a public improvement, as defined in this document,~~ shall conform to the sight distance requirements of the Standard Drawings. Additional grading of slopes, or height restriction of fencing, signs or landscaping may be needed to meet this requirement.
- B. Rural Driveways. All driveways in rural areas shall conform to the requirements of the Standard Drawings, B-1 series. The specific type of driveway shall be determined by the Department at the time of issuance of an Encroachment Permit, or prior to improvement plan approval.
- ~~C.~~ Urban Driveways. All residential driveways in urban areas shall conform to the requirements of the Standard Drawings, B-2 series. All commercial drawings shall conform to the requirements of Drawing B-3 and B-3a, unless it is determined that a B-3b (High Volume Driveway) is required, as defined in (D.) below.
- ~~C.~~
- D. High Volume Driveways. A High Volume Driveway shall conform to Standard Drawing B-3b, and shall be required as determined by the criteria set forth thereon.
- E. Driveways on Collector Streets and Roads. ~~If permitted by Encroachment Permit, d~~ Driveways on collector streets and roads shall conform to the Encroachment permit provisions.
- F. Driveways on Arterial Streets and Roads. ~~If permitted by Encroachment Permit, d~~ Driveways on arterial streets and roads shall conform to the following requirements:
- ~~1.~~ 1. Driveway access to major activity centers shall be located no closer than 200-feet to the adjacent intersection, ~~and~~
  - ~~4.2.~~ 4.2. Driveways may only be served by a break in a center median when such a break is not detrimental to the traffic flow, where one is installed. ~~If driveways must be provided closer to intersections, these driveways shall not be served by breaks in a center median, and shall not be located any closer than 50 feet from an intersection.~~
  - ~~2.3.~~ 2.3. The distance between driveways along commercially developed arterial streets and roads shall not be less than 200-feet.
  - ~~3.4.~~ 3.4. Where possible, driveways shall be located on cross streets or roads, rather than on arterial streets or roads.
  - ~~4.5.~~ 4.5. In new subdivisions, residential driveways along arterial streets or roads shall not be permitted; these properties shall take access from local streets.
- G. Single Driveways Serving Multiple Units. The driveway apron width shall match the width of the interior access road.

#### 4.1.6 Angled Parking

A. Planning Elements. Angled parking may be designated on private property as provided for in the Land Use Ordinance or Coastal Zone Land Use Ordinance. Angled parking within public improvements shall be restricted to the following locations:

1. Central business district areas which qualify as a business district under the *California Vehicle Code*, Section 235. Said business district will need to have a defined boundary as established by a gateway feature, such as a monument, roadside bulbout treatments or other type of roadside element to define the downtown.
2. Significant public areas, such as a park, located off defined arterial and collector roadways.
3. Potential major traffic generators which are not located on defined arterial and collector roadways, as approved by the Department.

At no time will school zones or residential districts be authorized for angled parking on County-maintained roads.

B. Design Criteria. The following design criteria shall be adhered to in locating and designing of angled parking:

1. Stall angle layout shall be 45 degrees.
2. The right-of-way required to provide angled parking shall be a minimum of 90-feet. The minimum paved width shall be 39-feet from centerline.
3. Parking stalls shall conform to current ADA requirements (five disabled person stalls per 100 stalls).
4. The block to be considered for angled parking shall have either no driveways, or a minimum number of driveways, such that there is a distinct two-to-one advantage in placing angled parking over parallel parking.
5. All layouts at intersections, driveways and parking stalls shall accommodate a minimum stopping sight distance for 25 mph.
6. Angled parking shall not be allowed for one block, in either direction, of a signalized intersection.

C. Implementation Criteria.

1. Marked parking spaces between two intersections shall be either all angled parking spaces or all parallel spaces.
2. A defined walkway, at least 6-feet wide, must exist between the right-of-way line and the edge of the angled parking lane, to facilitate pedestrian traffic for the length of the block.
3. If a Developer is required to, or desires to, implement angled parking in front of a specific property, additional pavement widening shall be constructed to enable implementation of angled parking for the length of the entire block between two intersections. At the time of request the Developer shall provide the Department written verification from these

adjacent property owners which documents concurrence with the proposed angled parking.

#### 4.1.7 Trees Trimming and Removal within the Right-of-Way

##### A. Definitions

###### 1. Rights of Way

- a. Fee title – County owns the land on which the road is constructed.
- b. Easement – adjoining property owners own the land on which the road is constructed.

###### 2. Tree Ownership

- a. County tree – any tree partially or wholly based in a “fee title” right-of-way.
- b. Privately owned tree – any tree based in an “easement” type right-of-way.

###### 3. Hazardous Tree – any tree that contains one or more of the following conditions:

- a. Split trunk.
- b. Cracked main branches.
- c. Trunk leaning off of vertical by at least 15 degrees.
- d. Diseased or damaged trunk or main branches.
- e. Over half of main branches have been broken off leaving skeleton or unsightly tree.
- f. Any condition that threatens the safety of the public or endangers County facilities.
- g. Dead tree.

B. Preservation of Existing Trees. Existing trees within the area of any roadway public improvement should be preserved where possible. All trees within or near the lateral clearance requirements shall be shown on the improvement plans. All trees to be removed or impacted shall be depicted on the improvement plans. The Department may require trees to be removed, or guardrail to be installed to maximize safety or minimize maintenance. See Appendix E1 for information on preservation of trees.

C. Criteria for Tree Removal within County Rights-of-Way. Tree removal falls into the following categories:

1. Those that interfere with the safe operation of the road.
2. Those that are deemed a hazard or create a potential liability.
3. Those that are for the convenience of the property owner.

D. Responsibility for Trees within County Rights-of-Way

1. The Department shall maintain County trees (those within fee rights-of-way).
2. Privately owned trees shall be maintained by the property owner.
3. Where trees within the right-of-way jeopardize traffic, drainage, safety or other critical services and the risk is imminent, the Department may act to keep the road facilities operational and safe. In these situations, the property owner is responsible for all other work and liable for any damage and residue left after the County has made the roadway operational.

E. Procedures for Applying for Tree Removal within County Rights-of-Way. Privately owned trees within the right-of-way may be removed by the property owner at the property owner's expense subject to the following

1. The property owner shall obtain an Encroachment Permit from the Department setting forth the conditions to be followed in the removal. No bond will be required in such cases.

but the Encroachment Permit will state that Sections 1494 and 1495 of the Streets and Highways Code will be applicable.

2. Trees within the Coastal Zones shall also comply with Section 23.05.060 – Tree Removal of the CZLUO. (A permit from County Planning and Building may also be required.)
3. Trees outside the Coastal Zones shall also comply with Section 22.56 – Tree Preservation of the LUO. (A permit from County Planning and Building may also be required.)
4. In areas where a parkway tree planting program has been established, the permittee may be required to replace the tree outside of the right-of-way.

F. Tree Trimming. Property owners may secure an Encroachment Permit to hire a licensed, bonded and insured tree company to trim trees within the County right-of-way, at their own expense. Trees will be trimmed as approved by the Public Works Department Encroachment Permit Engineer.

#### 4.1.8 Trees and Landscaping within the Right-of-Way

##### A. Tree Placement.

1. Where possible trees shall be located outside the County maintained right-of-way.
2. Trees within the right-of-way may be approved where a maintenance program is established and funded for the landscape and sidewalk.
3. The eventual trunk size and branch height shall not impair sight distance on the roadway or driveways.
4. Trees shall be planted with adequate lateral clearance from the road traveled way and from parking.

B. Tree Selection. The type of trees planted within the right-of-way shall be subject to approval by the Department. Trees may be selected from an approved list or the tree selection shall demonstrate the following:

1. The selected tree and roots will have minimal impact on the curb, gutter, sidewalk, driveway, or other road facilities.
2. The tree leaves or debris load will have minimal impact on drainage facilities.
3. The tree type is known to be resistant to strong wind.
4. The tree type is known to have sturdy limbs that are not subject to sudden failure (i.e. widow maker).
5. The tree type is appropriate for the soil and weather at the site.
6. The tree type will not require extensive irrigation.

C. Planting. Landscape and plant selection within the right-of-way is subject to approval by the Department.

1. Plants selection shall not impair sight distance within the roadway. Typically this limits plant height near intersections to 30 inches.
2. Planting shall be located such that the full size plant will not impair pedestrian access on sidewalks and pathways. Planting shall not inhibit the use of parking in parking lanes.
3. Plant selection shall have minimal debris loading on drainage facilities.
4. Wood bark and “gorilla hair” and other floating mulch shall not be used near drainage facilities.
5. Loose gravel and rocks shall not be placed adjacent to sidewalks or road pavement.

D. Low Impact Development (LID). Landscaping that complies with these standards and which is consistent with the County’s Post Construction Requirement Handbook is encouraged.

4.1.79 Other Design Standards

A.E. Clear-Zone Lateral Clearance

1. Horizontal Clear-Zone Lateral Clearance – The minimum lateral clearance shall be provided as shown on the table below. Lateral clearance shall be measure from the edge of traveled way to the edge of an un-yielding fixed object. There shall be a clear zone of 10-feet, measured horizontally from the outside edge of the traveled way, on all urban streets with design speeds of 40 mph or greater, and on all rural roads. On urban streets with design speeds less than 40 mph a minimum clear zone of 24-inches behind HMA dike or concrete curb face may be allowed. There shall be no unyielding fixed objects within the clear zone. Examples of unyielding fixed objects include, but are not limited to: trees; utility poles, transformers or other above-ground facilities; ~~fire hydrants~~, sampling stations or other utility installations; or signs mounted on standards without “break-away” provisions. Examples of yielding fixed objects which may be permitted within the clear zone include landscaping other than trees, and signs mounted on standards with “break-away” provisions. See Standard Drawing U-1.

<u>Road Type</u>		<u>Lateral Clearance</u>
<u>Rural Road</u>	<u>35 MPH or more</u>	<u>10 Feet</u>
	<u>&lt; 30 MPH or less</u> <u>31 MPH</u>	<u>5 Feet</u>
<u>Urban Road</u>	<u>With Curbs</u>	<u>2-10 Feet</u>
	<u>Without Curbs</u>	<u>10 Feet</u>
	<u>Residential Zone</u> <u>without Curbs</u> <u>Sidewalk</u>	<u>5 Feet</u>

2. Vertical Clearance-Zone – A minimum vertical clearance-zone of not less ~~that than~~ 15-feet shall be provided above the travel way and shoulders, and 8-feet above sidewalks. Other vertical clearance requirements-zones apply for trails, sight distance and County Cal Fire. See Standard Drawings A-5A and M-5a.

~~B. Preservation of Trees. Existing trees within the area of any roadway public improvement shall be preserved as possible, and as required by the conditions of approval for the subdivision or land use permit. All trees to be removed or impacted shall be depicted on the roadway plan. The Department may require additional trees to be removed, or guardrail to be installed, for reasons of safety or maintenance. See Appendix E1 for more requirements and information on preservation of trees.~~

G.F. Railings and Barriers. Railings and barriers shall be placed as needed to address roadway safety conditions, accommodate pedestrian and bicycle traffic, and ~~compliance~~ with Americans with Disabilities Act (ADA) requirements and ~~compliance with Occupational Safety and Health Administration (OSHA)~~ requirements. The Project Engineer shall evaluate the need to install such railings and barriers based on the following criteria:

1. Guard Rails. Guard railing shall be designed in accordance with the *1996 California Traffic Manual and State Specifications*. The Project Engineer shall consider the elimination of

~~either the existing or created~~ obstacles prior to proposing installation of guard railing as an appropriate solution. ~~In those locations where guard railing is approved by the Department, the design shall incorporate reduced height of HMA dike, as required in the Caltrans standards.~~

2. Bikeways. Railings shall be installed on structures and along the pavement edge where embankment slopes drop off steeper than ~~1½:1~~ within the lateral clearance requirement, on any bikeway route identified in the County Bikeways Plan. Railings shall conform to the *Caltrans Bridge Design Specifications* Section 2.7.2 “Bicycle Railing”.
3. Pedestrian Railings. Railings shall be required when a sidewalk or multi-use path when a drop off exceeds 30-inches in height ~~above the grade below is within 5 feet~~ within 5 feet, and ~~the slope~~ the side slope exceeds ~~3:1~~ 3:1. ~~Railings shall conform to the Caltrans Bridge Design Specifications Section 2.7.3 “Pedestrian Railing”.~~ For locations along a sidewalk where the dropoff is greater than ~~46~~ 46-inches but less than 30-inches ~~and the side slope exceed 2:1~~, a 6-inch warning curb shall be installed along the edge in conformance with *CalDAG* (California Disabled Accessibility Guidebook) requirements. An HMA ramp shall be placed per standard detail C-5a at the terminal ends of sidewalks which do not adjoin either existing sidewalks or paths, a sidewalk barricade per Drawing M-3 shall be installed.
4. Maintenance Work Surfaces. In any road right-of-way with retaining walls greater than 4-feet in height, but not subject to the bikeway or pedestrian requirements listed above, a railing system shall be provided pursuant to OSHA Standard 1910.23(b) “Protection for wall opening and holes,” for the safety of maintenance workers. Railing systems shall be, at a minimum, a Cable Type railing as detailed in the *State Standard Plans*.

~~D.G.~~ Clearance Requirements for County Rights-of-Way. Clearance requirements for County road rights-of-way were established by the Board of Supervisors in Resolution 2003-412 (*Locate in APX*). It shall be the responsibility of property owners to maintain sidewalks and multi-use paths fronting their property free from all encroachments, as required in this Policy and Procedure.

~~E.H.~~ Bus Turnouts. Where construction of a bus turnout is required by project conditions of approval, it shall conform to the requirements of Standard Drawing A-6a or A-6b.

I. Community Mailboxes. Community mailboxes shall not be located closer than 100-feet to the entrance to the community they serve. If the entrance street where they will be located will carry more than 1,000 forecast ADT, a turnout shall be provided, utilizing the design standards for bus turnouts as shown in Standard Drawing A-6a.

~~F.~~

~~G.J.~~ Hot Mix Asphalt Dikes. ~~On Rural roads, only Dikes shall be used~~ where needed for proper control of roadway drainage and, ~~Hot Mix Asphalt dikes shall be utilized which~~ comply with the requirements of Standard Drawing C-3. The type and placement shall conform to the requirements of Standard Drawing Series A-1. Drainage inlets or overside drains shall be placed as needed to comply with the requirements concerning depth and spread of flow in Section 5.2.1 B. Hot Mix Asphalt ~~curbs dikes~~ shall use PG 70-10 binder, as specified in Section 92 of the *State Standard Specifications*. With Departmental approval, Type A-dikes may be used in Urban areas to delineate pedestrian paths.

~~H. Sloped Edge Requirement for High Speed Rural Roadways (>40 mph design speed). Also see 3.2.2.G. The outside pavement edge (including medians) shall have a 30-degree sloped edge. Sloped edges shall be placed monolithically with the adjacent lane or shoulder. See the Sloped Edge Standard Drawing A-1i for the shaped cross section and construction specification. Sloped edges are not required on road segments where Hot Mix Asphalt dike is to be placed.~~

## 5. Storm Drainage

### 5.1 Design Standards

These standards are intended to ~~meet-fulfill~~ the requirements of the National Flood Insurance Program and ~~other-to comply with the~~ County ordinances related to stormwater and flooding including the following:

- Chapter 8.66 – Discharge of Contaminants Into Ocean Waters of the County,
- Chapter 8.68 – Stormwater Pollution Prevention and Discharge Control,
- Chapter 22.10.155 – Stormwater Management
- Chapter 22.52 – Grading and Drainage
- Chapter 23.05.040 – Drainage
- Chapter 23.05.050 – Drainage Standards;
- Chapter 23.07.060 – Flood Hazard Area (FH);

It is recognized that our overall understanding of stormwater as a natural resource has improved over the last decade and continues to evolve. Designs and improvements subject to these standards shall continue to provide for proper flood control and for full access and travel during storm events. These designs and improvements shall also maximize opportunities for

- Groundwater recharge through stormwater infiltration.
- Improving stormwater quality by using constructed wetlands, vegetated bioswales, percolation ponds, and similar facilities
- Reducing creek and water course damage by reducing runoff in minor storms

These treatments are often referred to as Low Impact Design or Development (LID) and Hydro modification. Designers are encouraged to use the:

*“County of San Luis Obispo Post Construction Requirements Handbook”;*

to the fullest extent practical as a guide to designing improvements within the right-of-way.  
~~All projects shall meet the requirements of the County of San Luis Obispo’s Stormwater Pollution Prevention and Discharge Control Ordinance found in Title 8 of the San Luis Obispo County Code, Section 8.68.010~~

The design of proposed development sites shall handle waters generated by storms, springs, or other sources from both on-site and off-site impacts. Each improvement shall be designed so as to not alter the **peak** rate, concentration or location of historic flow patterns. There must not be damage to either the development site itself or any other land, either upstream or downstream. “Damage,” as used here, is defined as water having sufficient depth or velocity to damage improvements or to deposit or scour soil. Where it is reasonable to do so, the design shall seek to improve adverse conditions that affect the site or adjacent lands.

Provisions shall be made in the design of a drainage system to insure that the system may be extended to serve and to properly handle the entire drainage area at the time of ultimate development. This is to include the entire upstream portion and the portion of the drainage watershed outside the development site, regardless of existing conditions.

The design standards contained herein are minimal, and are intended to provide general guidance. Design details are the responsibility of the Project Engineer and must follow good engineering practice.

~~Exceptions to these standards may be allowed by the Department, when it can be determined that such exceptions are in the best interest of the public in the neighborhood of the development site. For example, an exception to allow alteration or concentration of flow onto adjacent properties may be permitted by the Department, if there are adequate downstream facilities provided to handle the total flow without adverse affect on other properties. In this event, the~~

~~Developer may be required to participate in the cost of said facilities, and/or obtain easements or other rights as needed.~~

Drainage improvement designs should incorporate recommendations from the community drainage studies referenced in the Introduction of this volume.

### 5.1.1 Hydrology

- A. Drainage Report Requirements. See Appendix F1 for detailed drainage report format.
- B. Rational Method. Hydraulic designs shall use the Rational Method, for areas not to exceed 200 acres. This method is discussed in the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 22 (2001), “Urban Drainage Design Manual.”
- C. Special Design Problems. For special design problems, or drainage areas in excess of 200 acres, the Project Engineer shall provide such reference information, as is necessary to confirm the hydraulic design being proposed. The design must conform to the Design Approach laid out at the beginning of this Chapter. An acceptable method for determining storm runoff is the National Resource Conservation Service method.
- D. Runoff Coefficients. Runoff coefficients for use in the Rational Method shall be determined using County Standard H-3 for developed areas, and H-3a for undeveloped areas.
- E. Design storms. The following information shall be used for determining the appropriate design storm:

**Table 5-1: Determination of Design Storms**

Type of Waterway	Drainage Area	Primary Design Storm <sup>1</sup>	Secondary Design Storm <sup>2</sup>
Major	>4 square miles (>2,560 acres)	100 years	N/A
Intermediate	1-4 square miles (640-2,560 acres)	50 years	100 years
Minor	<1 square mile (<640 acres)	25 years	50 years

1. All components of a drainage system must be designed to convey the runoff from the Primary Design Storm, with freeboard.
2. All components of a drainage system must be able to convey the runoff from the Secondary Design Storm without freeboard; otherwise, alternate surface routes must be identified and provided with proper erosion protection and easement status.

Note that a given waterway may be classed as minor in its upper reaches, then change to intermediate at a point where the drainage area exceeds one square mile and change again to major where the drainage area exceeds four square miles.

Drainage calculations shall show that there will be no damage to properties under either the Primary or Secondary Design Storm.

### 5.1.2 Hydraulic design standards

- A. Open Channels and Culverts. Manning’s Formula shall be used to compute capacities of all open channels and culverts. The methods presented in FHWA Hydraulic Circular No. 5, “Hydraulic Charts for the Selection of Highway Culverts,” may be used to evaluate culvert flow conditions.

The “n” values to be used in Manning’s Formula shall conform to the values provided in Appendix F2.

B. Hydraulic Grade Line. While conveying the runoff from the Primary Design Storm, the hydraulic grade line shall be a minimum of 0.50-feet below the elevation of:

1. The top of inlet grate or the bottom of curb opening of catch basins, and
2. The manhole covers of storm drain manholes.
3. The hydraulic grade line at those structures shall be calculated by adding to the hydraulic grade line in the culvert main the following:

~~4.~~ 4. The velocity head within the main culvert into which the inlet (and lateral, if any) discharges or which the manhole serves,

~~5.~~ 5. The head loss within said lateral, and

~~6.~~ 6. All the minor losses necessary to attain that velocity.

C. Downstream Constraints. Discharge leaving the site in the Primary and Secondary Design Storms shall not be greater than pre-development discharge in each case, unless it can be demonstrated that downstream facilities have adequate capacity.

D. Provide for Overland Escape. All components of drainage systems in public improvements shall be evaluated to consider the effect of failure of individual components and identify the route of overland escape. The evaluation shall identify any necessary measures to prevent erosion along this route.

~~E.~~ E. Conveyance of Drainage in Urban Areas. ~~In all subdivisions of an average lot size of 20,000 square feet or less, and in all developments within other land use categories inside Urban Reserve Lines, all surface drainage shall be conveyed in surface facilities such as bioswales, street gutters and cross-gutters to the maximum extent possible. Any flows which cannot be conveyed within the capacity of these facilities (per Section 5.1.1 E of these Standards) shall be conveyed in culverts or storm drains.~~

~~E.F.~~ E.F. Sidewalk Underdrains. No concentrated flows shall be permitted across the surface of any sidewalk. Inlets or under-sidewalk drains shall be used in such situations where needed, when approved by the Department, and shall conform to Standard Drawing series D-4.

### 5.1.3 San Luis Obispo Creek Watershed Drainage Design Manual.

The City and County of San Luis Obispo have developed the San Luis Obispo Creek Watershed Drainage Design Manual to provide criteria and planning procedures for floodplains, waterways, channels and culverts in the San Luis Obispo Creek watershed. This watershed comprises Zone 9 of the San Luis Obispo County Flood Control and Water Conservation District.

It is recommended that private property owners submitting applications for grading and building permits within the San Luis Obispo Creek watershed follow these guidelines and procedures if they wish to streamline their environmental permitting processes. The design criteria will be used by the County in drainage facility design review and the checking of design and construction of private projects. It is required that these guidelines and procedures be followed on projects which, upon completion, will be managed and maintained by the County.

Drainage facility review, as used here, includes the review of all drainage and hydraulic structures, and all supporting engineering calculations. Drainage facilities include, but are not limited to: hydraulic structures, open channels, culverts, pipes and culverts, stormwater management structures, bank stabilization and bank repair structures, and grade control and aquatic enhancement structures that may be placed in stream channels.

Guidelines for stream corridor planting and management, bank repair and stabilization structures and devices, and general erosion control and stormwater management requirements are also provided in this Manual.

It is critically important that any proposed channel modification and/or drainage improvement project preserve, protect and enhance the waterways within the San Luis Obispo Creek watershed, include stream-side or riparian vegetation and aquatic habitat and fisheries. Although specific design criteria and design procedures are presented, the Project Engineer is invited to be as creative as possible in ways that provide functional, safe and aesthetically pleasing channels or waterways, which are also compatible with the environment.

Early consultation with the Department of Public Works, and the Department of Planning & Building, and collaboration with stream geomorphologists and biologists prior to completing engineering designs that potentially impact creek resources in this watershed, is strongly encouraged.

Alternate methods of analysis and design are subject to the approval of the Department.

Copies of the San Luis Obispo Creek Watershed Drainage Design Manual are available for review or purchase from the Department. The manual is also available on-line at the following address:

<http://www.ci.san-luis-obispo.ca.us/publicworks/documents.asp#creek>

#### 5.1.43 Diversion of Drainage

- A. Maintain Historic Path. Unless an individual project requires diversion of water to conform to a comprehensive drainage plan, water shall be received and discharged in substantially the same location and velocity which existed prior to development and as nearly as possible in the manner which existed prior to development. Should diversion be required, sufficient work shall be done upstream and/or downstream to provide all affected properties at least the same level of flood protection as existed prior to the diversion.
- B. Diversion Permitted Only Within Limits of Project. The diversion of natural watercourses will be allowed only within the limits of the proposed improvement. All natural drainage must leave the improved area at its original horizontal and vertical alignment and with approximately the same discharge velocity as existed prior to development, unless a special agreement indemnifying and approved by the County has been executed with the adjoining property owners.
- C. Improvements In Natural Watercourses. Improvements in natural watercourses will not be approved unless the capacity of the improved waterway is at least that of the natural waterway.
- D. Permits. No work shall be permitted in natural watercourses without the appropriate permits from State and Federal regulatory agencies (e.g., California Department of Fish & **GameWildlife**, U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service, Regional Water Quality Control Board, and others as required.)

### 5.1.54 Alignment of Drainage Facilities

- A. Locate within Road or Public Easement. Drainage facilities accepting runoff from public roads, streets or other public areas shall be located in a public street or road, or within a public drainage easement. These easements must be offered for dedication to the public before the improvement will be approved for construction.
- B. Avoid Combining with Utility Easements. Drainage easements shall be used for drainage purposes exclusively and shall not be combined with easements required for other public utility purposes.
- C. Easement Width. Easements for culverts and drainage facilities shall provide a minimum width of 10-feet. All such easements shall also provide access and future maintenance working areas. Whenever possible, easements ~~for culverts~~ shall be along or adjacent to property lines and outside of areas where structures are planned. On pipes of 24-inch diameter or greater, or trenches exceeding 5-feet in depth, the easement shall have additional width to provide ample future maintenance working area as required by the Department.
- D. Culvert-Storm Drain Alignment. Storm drain lines are to be parallel with the centerline of streets. The design shall avoid meandering, offsetting, and unnecessary angular changes. No angular changes more than 10 degrees shall be made without a junction structure. No single change, even with a junction structure, shall exceed 90 degrees.
- E. Cross Culvert Alignment. Cross culverts shall be aligned with the natural water course and might not be perpendicular to the road way. The culvert shall be sized and mildly sloped to minimize downstream erosion.
- E.F. Adjacent Property. Where a minor improvement of a drainage facility falls on adjacent property, a recorded easement from the adjacent property owners for such construction and a copy of the approval of the adjacent owners shall be submitted to the Department prior to approval of the improvement plans. Agreements between property owners shall hold the County harmless from any damage claim arising from said agreement.

### 5.2-Construction Specifications

#### 5.1.62.4 Drainage Structures

~~The design and construction of drainage structures and special drainage items shall conform to the designs contained in these Standards (unless otherwise noted). Special care must be taken to insure that all drainage structures and pipe are designed at such a capacity that the drainage system may be extended or enlarged to serve the entire drainage area at ultimate development. The Rational Method formula ( $Q=CIA$ ), with all numerical quantities for the Primary Design Storm, shall be indicated on the improvement plans at each drainage structure.~~

- A. Manholes. Standard precast concrete manholes shall be used wherever feasible. When cases arise where special manholes or junction boxes are required, the design shall be approved by the Department. All manholes shall conform to the following requirements:
  - 1. Any pipes placed at a grade of 1% or flatter, shall have manholes provided every 200 =feet. Pipes at a grade of greater than 1% shall follow the criteria in #2 and #3 below.
  - 2. Manholes shall be located at junction points, changes in gradient and changes in pipe size. On curved pipes with radii of 200\_-feet to 400\_-feet, manholes shall be placed at the BC or EC of the curve and on 300-foot maximum intervals along the curve for pipes of 24-inches and less in diameter, and 500-foot maximum intervals along the curve for pipes

greater than 24-inches in diameter. Curves with radii less than 200-feet will be handled on an individual basis.

3. Spacing of manholes or inlets, of such size as to be enterable for maintenance, shall not exceed 500-feet along a tangent alignment for pipes 24-inches and smaller in diameter, and 600-feet along a tangent alignment for pipes greater than 24-inches in diameter, except under special approved conditions. The spacing of manholes shall be nearly equal wherever possible.
4. All manholes shall have standard 24-inch diameter manhole covers. No manholes shall be allowed in roadway gutter or flowlines. Maintenance access points in roadway gutter or flowlines shall be standard drainage inlets with bicycle-proof grates.

B. **Catch Basin.** Catch basins (~~gutter inlets~~) shall be in accordance with the types shown on Standard Drawings series D-2, or approved equivalent “precast” products, or other approved special inlets. **Catch basins without a curb opening inlet shall not be used in urban areas.** See the *State Standard Drawings* for extended curb opening inlets. Pavement drainage design approaches are presented in FHWA Hydraulic Engineering Circular No. 22. All inlets shall conform to the following requirements:

1. The capacity and spacing of drainage inlets shall be such that the spread of water in a Primary Design Storm does not inundate the traveled way (which includes all through and center turning lanes, but does not include bike lanes or right-turn-only lanes), as follows:
  - i. For roads with design speeds less than 45 mph, the spread encroachment on the traveled way shall not be greater than ½ the outside through lane width.
  - ii. For roads with design speeds greater than or equal to 45 mph, the spread shall not encroach on the traveled way at all. ~~;-a~~ **A**ny inundation shall be limited to the area outside the traveled way as defined above.
2. Where there is a potential for ponding at sag vertical curves (or other locations), pavement drainage shall be checked for a Secondary Design Storm. The spread encroachment shall comply with the requirements above.
3. Sufficient drainage capacity shall be provided within the road right-of-way and other drainage facilities to convey a 100-year storm without damage to any structures.
4. No more than 1.0 cubic feet per second (cfs) shall be allowed to “bypass” a midblock inlet. No more than 0.3 cfs shall be allowed to go around a curb return at an intersection
5. Sheet flow across a road shall not exceed 0.1 cfs.
6. All “at-grade” grates shall be adequate for State of California HS-20 traffic loading, and shall be “bicycle-proof”.
7. Storm Drain Markers. All catch basins or inlets that have been installed, replaced or modified and that convey storm water to a basin, creek, waterway or ocean shall have a storm drain marker installed per Standard Drawing M-6. Markers can be purchased from the Department.
- ~~8. Storm Drain Catch Basin Filters – When required by the County Stormwater Pollution Prevention and Discharge Control Ordinance (Title 8.6.8), filter frames with filters shall be required on storm drain catch basins, in accordance with Standard Drawing D-2.~~

- C. Junction Boxes. Junction boxes shall be constructed of reinforced Portland cement concrete which complies with the compressive strength requirements provided in Appendix C, or fabricated from reinforced concrete pipe sections where size limitations permit. All junction boxes shall conform to the following requirements:
1. Minimum wall thickness for poured-in-place reinforced concrete junction boxes shall be 6-inches; 8-inches when invert is in excess of 6-feet.
  2. The inside dimension of junction boxes shall be such as to provide a minimum of 3-inches clearance on the outside diameter of the largest outfall pipe.
  3. All manholes shall have the standard 24-inch manhole cover (Phoenix P1090, Pinkerton A640, or approved equal).
- D. Other Structures. The following requirements shall apply to other drainage structures, as noted:
1. All headwalls, wingwalls, and endwalls shall be of reinforced Portland cement concrete which complies with the compressive strength requirements found in Appendix C.
  2. All headwalls, wingwalls, and endwalls shall be considered individually and shall be ~~in general~~, designed in accordance with the *State Standards* or approved by the Department.
  3. Trash racks shall be provided where in the opinion of the Department they are necessary to prevent clogging of culverts and storm drains, or to provide safety to the general public.
  4. Guardrail or pedestrian/worker railings may be required by the Department at culverts, headwalls and box culverts and on steep side-slopes. When so required, the railing shall be installed in accordance with *State Standards and Specifications*.
  5. For reinforced concrete box culverts and structural plate arch culverts, all materials, designs and construction shall conform to the provisions of the State Specifications and the *State Standard Plans* unless approved otherwise by the Department.

#### 5.1.72.2 Flood Control Basins

~~Two-Three~~ types of drainage-flood control basins are utilized in San Luis Obispo County, as determined appropriate by site conditions and project requirements: retention basins, ~~and~~ detention basins, and subsurface infiltration basins. The Department shall determine which type of basin shall be used based on the downstream hydrology for each development site. The types of basins are further discussed below. In all cases, the Project Engineer shall provide evidence that the basin will completely drain within seven days to the satisfaction of the Department.

If a basin is determined to be required to serve a particular subdivision or land development project, which was not evaluated during the application phase of the project, then the Developer shall consult with the Department of Planning & Building to determine if any grading permit or land use permit is required for the construction of the basin. If a grading permit or land use permit is required, a copy is to be submitted to the Department of Public Works prior to approval of the plans.

- A. Retention Basin. Any drainage basin which is used as a terminal disposal facility shall be classified as a retention basin.
1. Basin Capacity. The basin capacity is to be based on the theoretical runoff from a 50-year storm, 10-hour intensity for 10-hour duration. No reduction in required capacity shall be

given for soil percolation rates. In addition, an antecedent moisture factor of 1.3 shall be required in locations where there are limited areas for overflow (i.e., a natural sump).

2. Inlet Structure. The inlet structure shall be designed to meet the requirements of Section 5.1.62.4 B, above.
  3. Percolation Test Required. A minimum of 3 percolation tests per basin shall be submitted to the Department for approval prior to construction, to determine that the basin will be able to drain within the seven-day standard noted above. Soil borings may be required by the Department, in areas where there is concern about shallow depth to groundwater.
- B. Detention Basin. Any drainage basin which has a downstream outlet designed to meter the outflow shall be classified as a detention basin. Basin capacity shall be based on receiving the runoff from a 50-year storm with the watershed in its fully-developed condition, and releasing the flow equivalent to the runoff from a 2-year storm with the project site in its pre-development condition. The outlet shall release water in a non-erosive manner. Orifice plates shall not be permitted as a metering device. ~~XXXXXX~~
- C. Deep Basins. Any retention or detention basin shall be considered a deep basin if the depth to the overflow point is greater than 2-feet. Deep basins shall be designed according to County Standard Drawing D-1.
- D. Shallow Basins. Any retention or detention basin shall be considered a shallow basin if the depth to the overflow point is 2-feet or less. Shallow basins shall be designed according to County Standard Drawing D-1a.
- E. Subsurface Infiltration Basins. ~~As an alternative, s~~Subsurface basins may be used for either retention or detention of site runoff, where ~~the Project Engineer provides information from the Soils Engineer which demonstrates to the satisfaction of the Department that~~ their application is suitable for project conditions. ~~At a minimum, use of s~~Subsurface basins shall be limited to locations where ~~it is demonstrated that~~ the depth to seasonally high groundwater is ~~no less greater~~ than 10-feet. ~~For project designs proposing the use of subsurface basins, t~~The Project Engineer must ~~demonstrate that attention has been given to address~~ the following areas of concern:
1. Design Criteria.
    - i. Distance to structures on site
    - ii. Maintenance practicality including landscape maintenance and maintenance access
    - iii. Lateral distance to wells or septic facilities
    - iv. Long term pPercolation rate
    - v. Surface (vehicle) loading characteristics
  2. Drain Rock. Drain rock shall be clean, crushed granite (or clean, angular rock of similar approved hardness) with rock size ranging from 1-1/2-inch to 3/4-inch. Rock gradation shall conform to the Specification of ASTM C-33 #4. The Project Engineer may assume a "void ratio" of 25% of the volume of the drain rock backfill in the computation of the storage volume of the subsurface basin.
  3. Materials.
    - i. The storage chamber shall be fully perforated (by the manufacturer) HDPE pipe with a minimum diameter of 18-inches and a maximum diameter of 60-inches. Larger diameter pipes may be used with approval from the Department. Storage chambers

shall meet the requirements of Section 5.2.8 of these standards as well as AASHTO Section 12 (including Load and Resistance Factor Design - LRFD - requirements).

- ii. Geotextiles. Filter fabric shall comply with the requirements of AASHTO M288, Class 2 non-woven or equivalent.

4. Operational Requirements.

- i. Water quality of inflow (both sediment and chemical loading)
- ii. Maintenance plan, including provisions for vehicular access and confined-space entry safety requirements, where applicable
- iii. Overflow path (See 5.2.3 G below), including easements as required
- iv. Freeboard (See 5.2.3 I below) – some may be included in parking areas, per the requirements of 5.2.3 L, below

F. Easement Requirements. All drainage basins accepting runoff from public roads, streets or other public areas shall be located in an easement offered for dedication to the public. Reversionary clauses shall not be permitted. ~~The offer of dedication can only be accepted when the basin is complete and in use.~~ If a fence is required it shall be located not more than 4-inches inside the drainage easement line, except where setbacks are required as part of the land use permit or by the Land Use Ordinance.

G. Overflow Path Required. The design of all drainage basins shall identify the designated route for overflow. The Project Engineer shall design the overflow path so that the flow in a 100-year storm is non-erosive and will not damage downstream improvements, including other basins. Easements will be required for concentrated flows onto private properties.

H. Fencing Requirements. All surface drainage basins shall be evaluated to determine if they require fencing, as follows:

1. All deep basins are required to be fenced according to the specifications found in the Materials section below. ~~Exceptions to the requirement for fencing may be granted for locations with no public traffic, subject to approval of the Department.~~
2. Shallow basins are not required to be fenced.

I. Freeboard Requirements. All basins shall be designed to provide “freeboard,” measured from the design water surface to the lowest-elevation (the “overflow point”) at which the basin would overflow during a greater-than-design storm. This overflow point may be a location on the basin perimeter, a point outside the basin perimeter if the location is a natural sump, or the flowline of the inlet structure for gutter flow entering the basin. An overflow path shall be identified as required in subsection G, above. The amount of freeboard to be provided under design-storm conditions is as follows:

1. Deep basins require 1-foot of freeboard above the design-storm water surface elevation.
2. Shallow basins require freeboard equal to 15% of their design depth.
3. Subsurface basins require freeboard equal to 20% of their maximum storage depth.

J. Bench Requirements. All drainage basins shall provide a bench around the perimeter to provide for maintenance, as follows:

1. Deep basins shall provide a bench 5-feet wide between the fence and the top of the basin side slope.

2. Shallow basins shall provide a bench 5-feet wide between the easement line and the top of the basin side slope.
- K. Maintenance Requirements. Perpetual maintenance of all drainage basins shall be the responsibility of the Developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association. Deep basins shall provide an access ramp for maintenance vehicles, as depicted in Standard Drawing D-1. The Department will not assume maintenance responsibility for ~~any~~-subsurface infiltration basins.
- L. Parking Areas. Parking areas may be used to store part of all of the volume required to be retained or detained, subject to the following criteria:
  1. The maximum depth of inundation in the design storm shall be 6-inches.
  2. No more than 5075% of the parking area shall be inundated in the Primary Design Storm. ADA parking shall not be inundated in the Primary design Storm.

#### 5.1.8 Bio-Retention Basins

In addition to flood control basins, bio-retention basins can be used to improve storm water quality in minor storms as well as reduce flooding impacts in major storms.

##### 1. Design Criteria.

- i. Lateral distance to vehicle travel lanes, bike lanes, and pedestrian paths
- ii. Vertical drop offs adjacent to travel lanes, bike lanes, and pedestrian paths
- iii. Long term percolation rate
- iv. Landscape establishment and irrigation, if any
- v. Maintenance practicality including landscape maintenance and maintenance access
- vi. Surface (vehicle) loading characteristics
- vii. Porosity of engineered soil (BSM)

##### 2. Materials

- i. Bio-retention Soil Media (BSM). Use a mixture of sand and compost conforming to the post construction handbook or other source approved by the Department
- ii. Filter fabric is prone to clogging and shall not normally be used within the right-of-way.
- iii. Gravel filter. In lieu of filter fabric, use gravel filter conforming to Caltrans Class 2 Permeable Material per Section 68 of the State standards or approved equal.

##### 3. Maintenance

- i. Perpetual maintenance of bio-retention basins and landscaping shall be the responsibility of the Developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association.

#### M5.1.82-3 Channels and Swales

All channel realignment or improvement shall be shown on the improvement plans and shall conform to the requirements of these Improvement Standards and Specifications. No diversion to roadside ditches will be allowed from natural drainage courses.

- A. Types. Open conduits may be natural watercourses, earthen channels or swales, or channels or swales lined with the materials such as those listed below. Channels lined with

impermeable surfaces (such as concrete, mortar or pipe-like materials) are discouraged and shall only be used where ~~vegetated swales~~ permeable linings are impractical:

- Low-growing grass, which will form a thick, dense sod. The proposed grass mixture is to be submitted to and approved by the Department.
- Temporary or permanent turf reinforcement mats/erosion control blankets.
- Rock slope protection, class and placement to be determined by the Project Engineer.
- Concreted-rock slope protection, class and placement to be determined by the Project Engineer.
- Concrete slope paving.
- Air-blown mortar, with reinforcement as determined necessary by the Project Engineer.
- Gabions – only if required by permit conditions from other regulatory agencies.
- Other natural linings approved by the Resource Conservation District, or State/Federal regulatory agencies.

Lining materials shall be selected which will be non-erosive under velocities calculated in the design storm, and which will provide for ease of ongoing maintenance, as approved by the Department. Where linings are required, they shall extend to the full height of freeboard, as defined below.

- B. Freeboard and Side Slopes Required. Realigned channels or swales may be required to be lined to an elevation of at least 1.0-foot above the design hydraulic gradient. The side slopes for realigned channels or swales shall not exceed 1:1 on the lined portion and 2:1 on the unlined portion (3:1 in sandy soil). Freeboard of at least 1-foot, or 0.2 of the specific energy (whichever is greater) shall be provided at design capacity for all channels or swales.
- C. Improvement Plans. For all intermediate or major channels, either realigned or natural, within an improvement, the following information shall be shown on improvement plans in addition to the information heretofore required:
- Typical sections.
  - Profile of the existing channel for a minimum of 500-feet each side of the development in order to establish an average profile grade through the development.
- D. Velocity Requirements. Channels or swales shall comply with the following requirements:
1. Minimum velocity for channels or swales flowing full, with freeboard, shall be 2 feet per second (2 fps).
  2. Minimum velocity in bioswales may be less than 2 feet per second but shall be as needed to for positive drainage.
  - 1-3. \_\_\_\_\_
  - 2-4. \_\_\_\_\_ The maximum velocity in constructed, unlined earth channels or swales shall not exceed that which would cause erosion; which is typically less than (maximum 4 fps).
  - 3-5. \_\_\_\_\_ The maximum velocity ~~in shotcrete or~~ concrete lined channels ~~or swales~~ shall not exceed 10 fps.
- E. Natural Waterways. For natural waterways, the design flow may be allowed in the natural overflow area if a drainage easement is provided, which will include the overflow area, and freeboard as specified above exists between the water surface and adjacent ground.
- F. Channel Side Inlets. Drainage facilities shall be so constructed and areas adjacent to channels so graded that side drainage will enter in a manner which will prevent erosion. This will often require constructed side inlets and collector ditches to carry side flow to inlets.

- G. Fencing Requirements. For all open-conduit drainage facilities, the following requirements shall apply:
1. Constructed channels or swales with side slopes five to one (5:1) or flatter do not require fencing, unless determined necessary by the Department for public safety.
  2. Natural channels need not be fenced, except where special hazards exist.
  3. For minor channels or swales with depths less than 3.0-feet and for localized areas **not** steeper than five to one (5:1) on other channels or swales, the Department may allow the fence requirement to be waived.
  4. Any required fence shall be located no more than 4-inches within the required easement lines and shall provide sufficient room for maintenance vehicles as set out, or as specified by the Department.

#### 5.1.92.4 Culverts

All culverts shall be shown on the improvement plans and shall conform to the requirements of the State Specifications and State Standard Drawings unless otherwise specified by the Department.

- A. Types. Culverts shall be ~~of either cast-in-place or~~ precast reinforced concrete pipe, corrugated steel pipe, or HDPE corrugated pipe with smooth interior walls as specified below in Section 5.2.28. PVC pipe shall not be used for culverts in public improvements. Aluminum pipe shall not be used if concrete structures such as headwalls or future storm drain inlets are ever to be constructed upon them. HDPE pipe, when used, shall be completely buried to avoid degradation from ultraviolet radiation.
- B. Minimum Diameter. Minimum pipe diameter allowable on any storm drain which will be maintained by the County shall be 18-inches **but 24-inch or larger is encouraged for easier maintenance**. A lesser size may be used for down drains on fill slopes, or for privately-maintained facilities, if approved by the Department. If smaller pipes are approved for use, they shall include cleanouts, with maximum 100-foot spacing and at all junctions, as required.
- C. Hydraulic Design Requirements. Waterways placed in culvert systems may be designed for full conduit capacity and pressure flow. The hydraulic entrance condition at a culvert minor waterway shall be such that the Primary Design Storm discharge will have the specified freeboard in the upstream channel or waterway and that the 100-year discharge will be contained within the banks of the upstream waterway or drainage easement. The entrance to the culvert conveying a minor waterway may be submerged provided that the above criteria are satisfied, and that there is no damage from backwater inundation.
- D. Velocity Requirements. Culverts shall comply with the following requirements:
1. Minimum design velocity in culverts shall be 2 fps when conduit is flowing at **the 2-year** design discharge.
  2. Maximum design velocity shall not exceed 15 fps when culvert is flowing at **the 50-year or 100-year** design discharge.
- E. Preformed Flared End Sections. On all culverts, preformed concrete, metal or plastic end sections shall be utilized, unless greater protection is required.
- F. Cover Requirements. Minimum thickness of cover shall be three (3) feet within the full width of the traveled way **and shoulder**. ~~This value may be adjusted according to Topic 856.5 of the~~

*Highway Design Manual.* At locations where the general minimum cover requirements cannot feasibly be obtained, the cover may be reduced as follows or the conduit shall be encased in concrete per Standard Drawing U-4b, ~~with prior approval by the Department.~~

<b><u>MINIMUM THICKNESS OF COVER AT ETW</u></b>			
<b><u>CMP &amp; CMPA</u></b>	<b><u>RCP Under Rigid Pavement</u></b>	<b><u>RCP Under Flexible Pavement Or Unpaved</u></b>	<b><u>HDPE</u></b>
<u>D/8 or 24" Min.</u>	<u>12" Min</u>	<u>D/8 or 24" Min.</u>	<u>D/2 or 24" Min.</u>

F.

G. Separation from Water Mains. There shall be a minimum 12-inch separation (O.D. to O.D.) between storm drains and water ~~or sewer~~ mains. Where either pipe is protected by concrete encasement, the separation shall be measured to the outside of the concrete encasement.

H. Separation from Sewer Mains. There shall be a minimum separation of four feet (O.D. to O.D.) between storm drains (and structures) and sanitary sewer mains (and structures). Where either pipe is protected by concrete encasement, the separation shall be measured to the outside of the concrete encasement. Where maintaining the four feet of separation is not practical, special designs may be approved by the department to minimize the potential for cross contamination

H.I. Subsurface Drainage. Where a road section will retain subsurface drainage within cut slopes of newly-constructed roads, the Department may require the installation of a subsurface drainage system, minimum 4-inches in diameter, with cleanouts as shown in the *State Standard Plans*.

#### 5.1.102.5 Outfalls

A. Improvement Plans. All drainage outfalls shall be shown both in plan and profile on the improvement plans until a definite “daylight” condition is established.

B. Accommodation for Future or Phased Development. When improvements have more than one unit or phase, the drainage outfall shall be designed to extend to the property boundary, and beyond if required. All outfalls, whether temporary or final, shall be shown both in plan and profile on improvement plans, and shall be designed to operate safely even if future units or phases are never completed. Necessary easements and agreements shall be provided prior to approval of improvement plans.

C. Culvert Energy Dissipaters. Energy dissipaters shall be designed in accordance with the provisions of the *State Highway Design Manual* Chapter 870, Channel and Shore Protection Erosion Control. The following items shall be determined and shown on the plans:

- Stable rock size (weight)
- Rock Slope Protection (RSP) class
- Dissipater trench dimensions
- Rock placement method
- RSP fabric type

Culvert energy dissipaters shall be designed for the flow from the Primary Design Storm. Rock slope protection gradation shall conform to Section 72 of the *State Standard Specifications*.

#### 5.1.112-6 Drainage pumps

The use of drainage pumps shall be avoided . They shall be used only with the approval of the Department.

- A. Gravity Outfall during Summer. If the use of a drainage pump is approved, the drainage system shall be so designed as to provide for gravity outfall during summer months and periods of low water stages. If a low stage gravity outfall is impossible or impracticable, a pump of smaller capacity for low stage flow may be used. Additional improvements may be required to handle adverse impacts downstream. Approval must be granted by the Department.
- B. Standby Equipment. Drainage pumps shall be equipped with standby equipment for power and pumps. Pumps shall have alternating operation characteristics.
- C. Floodgates. When specified by the Department, the outfall shall be equipped with floodgates of an approved design.
- D. Design Storm. Pumping installations shall be so designed as to accommodate a design storm as specified by the Department.
- E. Pump Design. Pumping stations shall be designed so that gravity flow does not flow through the pump pit. Each pumping installation shall receive separate approval, including all machinery, electrical system, piping system, housing installation and other miscellaneous design features.
- F. Maintenance. Maintenance of all drainage pumps shall be the responsibility of the Developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association.

#### 5.2.17 Installation requirements

- A. Backfill. Structure Backfill shall conform to the requirements of Section 19-3.06, "Structure Backfill," of the State Specifications and the following requirements:
  - 1. Inspection Required. Structure backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected and approved for backfilling as directed by the Department.
  - 2. Suitable Material Required. When the material from the structure excavation is unsuitable for use as structure backfill, it shall be disposed of as directed by the Department, and shall be replaced by suitable material approved by the Department.
- B. Sawcut and Pavement Replacement. Any installations requiring trenching or excavation into existing paved areas, shall comply with the requirements of Section 3.2.2 F of these Standards for sawcut and pavement replacement.

#### 5.2.28 Materials

All drainage items shall be of the material and construction methods required in accordance with the applicable portions of the State Specifications as herein noted, specified or modified.

- A. Pipe. Culvert pipe shall comply with the following requirements:

1. Reinforced Concrete Pipe (RCP) shall conform to the specifications of Section 65 of the State Specifications.

Excavation for RCP shall conform to Section 6.2.2 of these specifications except that where tongue and groove pipe is utilized excavation need only be to 1-inch below the outside diameter of the pipe in uniform material and 3-inches below the outside of the pipe in rocky material.

Laying of RCP shall conform to the specifications of Section 65-1.07 of the State Specifications.

Jointing of RCP shall conform to the specifications of Section 65-1.06 of the State Specifications.

~~2. Non-reinforced Concrete Pipe shall conform to the specifications of ASTM Designation C-14. The construction method shall conform to the method specified for reinforced concrete pipe.~~

~~3.2.~~ Corrugated Steel Pipe shall conform to the material and construction methods of Section 66 of the State Specifications. Wall thickness shall be specified. Attention is directed to the backfill requirements of Section 19-3 of the State Specifications and Section 5.2.8 of these Specifications, except that pea gravel or other suitable gravel material may be utilized for bedding and backfill.

~~4.3.~~ High-Density Polyethylene (plasticHDPE) smooth-inner-wall pipe shall conform to the provisions of Section 64 of the State Specifications and to AASHTO M-294-03. Installation and backfill shall conform to the requirements of Section 64-1.05 of the State Specifications.

- B. Concrete. 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.
- C. Reinforcement. Shall conform to the requirements of Section 52 of the State Specifications.
- D. Portland Cement Concrete. Shall conform to the compressive strength requirements found in Appendix C.
- E. Geotextile Lined Channels and Swales. Adequate vegetative cover shall be established throughout all geotextile channel and swale linings. The Project Engineer shall demonstrate that a proposed geotextile lining is adequate for the velocity and shear stress that will be experienced in the Primary Design Storm. Additional guidelines for selection of geotextiles can be found in Appendix B2.
- F. Concrete Lined Channels. Concrete lined channels shall be constructed of the materials and in accordance with Section 72-4 of the State Specifications.
- G. Grouted Rock Rip Rap Channels. Shall conform to the materials and methods called for in State Specifications 72-5.
- H. Weep Holes - Weep hole pipe consisting of 2.5-inch diameter galvanized iron pipe shall be placed through the grouted rock rip rap along both sides of the channel approximately 1-foot above the channel invert. Spacing of weep holes shall be such as to provide complete drainage of the foundation and filter material and shall not exceed 10-feet.

- I. Fencing. Fencing required for drainage channels or basins, as determined above, shall comply with the following requirements:
  1. Fence for drainage channel enclosure shall be 6-foot chain link as specified in Section 80-1.01 of the State Specifications, with or without extension arms and barbed wire as specified on the plans.
  2. Chain link fence shall be of the materials and construction as specified in Section 80-4 of the State Specifications.
  3. Drive gates and walk gates will be provided, complete with master keyed locks and keys, at such locations as specified by the Department for the purpose of maintenance vehicles and personnel.
  4. Other fencing materials may be considered for facilities which are not to be maintained by the County, and will require approval by the Department prior to improvement plan approval.
  
- J. Landscaping. Where landscaping is required by project conditions of approval for any constructed drainage facility, the following requirements shall apply:
  1. Plants shall be selected to be appropriate for the climate zone where they are to be installed, and shall be drought-tolerant.
  2. On the bottom and sides of drainage-flood control basins, landscaping shall be limited to grass or other ground cover. No shrubs or trees shall be permitted.
  3. The Project Engineer shall submit a landscape plan for approval. The Department of Public Works shall coordinate this approval with the Department of Planning & Building.
  4. Maintenance of all landscaping and irrigation shall be the responsibility of the Developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association.

## 6. Water Supply

Water lines and appurtenances within County-operated special districts shall be constructed in accordance with the details shown on plans and specifications approved by the Department.

Where a water system in the unincorporated area of the County is to be operated and/or maintained by any public agency other than the County, or other purveyor regulated by the State of California, the plans and specifications and construction must be approved by both the Department and by that entity. In the event of any discrepancy or conflict between these Public Improvement Standards and the requirements of said water purveyor, that entity's requirements shall take precedence.

Water mains connecting existing publicly regulated water distribution systems shall be installed to serve each lot in subdivisions containing lots of one acre or less. Any agency serving water for human consumption or for domestic uses shall hold a permit as provided by the Health and Safety Code of the State of California and shall comply with all applicable laws and regulations of the State of California and the County Department of Public Health/Environmental Health Services. Installation of water mains and all appurtenances thereto will be installed to grades, location, design and sizes approved by the Department for the public or private water and fire agencies, the governing bodies thereof and the Department as defined in this document.

When connection to an existing publicly regulated water system is not available, the Developer shall provide water service by the establishment of a public water system, or of a private water company which is subject to the regulations of the State Public Utilities Commission except as provided elsewhere for subdivisions containing lots of one acre or more.

The County Health Department is the review authority for State Small Water Systems (5-14 service connections) and Community Water Systems (15 to 199 service connections). For water systems larger than 200 service connections the State Department of Health Services is the review authority. These agencies should be contacted for technical approval prior to the submittal of detailed improvement plans to this Department.

### 6.1 Design Standards

#### 6.1.1 Quantity of Water

The quantity of water delivered to the distribution system from all sources must be sufficient to supply adequately, dependably and safely the total requirements of all customers (including fire hydrants) under maximum consumption. The distribution system must be capable of adequately delivering this water supply to all the customers. Storage facilities must be provided to care for the minimum sanitary and ~~fire fighting~~ firefighting requirements during breakdowns and repair of wells and pumps. Storage may also be required to store water during off-peak periods for use during peak demand periods. Formulas are presented below as a guide in determining the adequacy of proposed water systems in meeting the above requirements.

Prior to submittal of plans for Small Public Water Systems to the Department for review, the Project Engineer shall consult with the Department of Public Health/Environment Health Services, and with the local fire protection agency. Public Works shall require written clearance from each of these agencies, indicating their approval of design parameters including, but not limited to:

- Minimum daily flow rate (gallons per minute)
- Fire flow (gallons per minute)
- Water pressure (psi)
- Storage volume (gallons)
- Hydrant spacing (feet)
- Hydrant type

As a guide, the supply available at a given point in the system is required to be no less than 1000 gpm at a residual pressure of 20 psi. The Project Engineer shall provide calculation of the Q required in each of the scenarios described in this section. Whichever calculation shows the greatest quantity shall govern the design.

A. Number of Customers. For calculating supply and storage requirements, the number of customers shall be determined as follows:

1. In residential areas, each single family home or lot will be counted as one (1) customer. Each unit of a multi-family dwelling will be counted as one-half (½) customer.
2. In commercial and industrial areas, each acre (including storage and parking area) will be counted as a minimum five (5) customers.
3. In parks and landscaped areas, each acre of land will be counted as two (2) customers, except where specific design indicates otherwise.
4. In a mobile home subdivision, each unit or space will be counted as three-quarters (¾) customer.

B. Average Demand. To meet customer demand for water in residential and commercial areas, water supply sources must be capable of producing a minimum of 400 gallons per day per customer served. Industrial and agricultural area requirements are determined for the industries and agriculture involved and added to the residential and commercial demands. Average demand rate shall be increased to equal peak demand rate times the specified period over which peak demand is used.

$$(1) \text{ Average Demand (gallons per day)} = +600L^1 + DI$$

L = number of residential and commercial customers served by the system (excluding industrial areas)

I = industrial or agricultural areas (in acres) served by the system

D = demand (in gallons per day per acre) for the industrial or agricultural areas served by the system

C. Peak Hourly Demand. To meet customer and fire protection demand the combination of well pump capacity, well capacity, firm surface water supply and system storage must be capable of delivering five gallons per minute (5 gpm) per customer for metered systems; nine gallons per minute (9 gpm) per customer for flat rate systems; plus fire flow requirements dependent on the type of development in the area. The customer requirement is to be modified by a

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<sup>1</sup> B. Lakshman, Design of Residential Water Supply Systems to Meet Peak Hour Demand, Artesian Water Co., Newark, DE

factor of (f) varying from 2.00 to 0.33, dependent on the number of services in the system. (See Table below.) The system must be capable of delivering this flow for from two to four hours depending on the number of services in the system. Pipeline size can also be computed from the formula below by using factors for the portion of the system served by the pipeline whose size is to be determined. In doing this, the required fire flow must always be capable of being taken from any one hydrant in the system. Under certain conditions the engineer of the Fire District having jurisdiction may require a larger minimum size of pipeline in certain locations.

$$(2) \text{ Peak hourly demand (gallons/minute) } = Ncf + F + X + Y$$

N = number of residential and commercial services in the system

c = 5 gallons per minute (metered service) or 9 gallons per minute (flat rate service)

**Table 6-1: Customer Requirement Modification factor (f)**

Number of services	Value of “f”
5 or less	2.00
25	1.33
40	1.00
80	0.75
200	0.50
500	0.33

Intermediate values may be interpolated.

**Table 6-2: Fire Requirements (F)**

Fire flow requirements are determined by the adopted fire code and by the local fire protection authority.

Building Density	F = flow from hydrant (gallons per minute)
<u>Residential areas</u> The minimum flow requirement for residential development F = 1,000 gpm for a two-hour duration, at 20 to 150 psi.	
<u>Commercial areas</u> The minimum flow requirement for commercial and industrial development is based on the size and type of construction and buildings served. Flow shall not be less than F = 1,500 gpm at 20 to 150 psi.	

X = peak agricultural demand on system (gallons per minute)

Y = peak industrial demand on system (gallons per minute)

D. Master Planning. For master planning for new or expanding community water distribution systems, the following will be a guide:

- Residential: 1,500 gpm
- Commercial/Industrial\*: 2,500 gpm
- Urban downtown development/Heavy industrial: 4,500 gpm

\* Will require more fire flow for hazardous buildings.

- E. **Storage.** To meet minimum sanitary demands and the necessary quantity of water for fire protection during periods of pump breakdown, there must be the following minimum quantities of water stored per acre served. However, in no case shall the storage for any new subdivision be less than 30,000 gallons. The storage requirement may be increased due to the inability of the source to produce water at the peak demand rate.

**Table 6-3: Required Storage Capacity**

Lot size (acres)	Required storage capacity (gallons per acre served)
less than ½	1,000
1	800
2	650
3	500
4	350
5	200

The above requirements are not applicable in subdivisions with lots of one acre or larger where the water supply may be from wells or some other source on individual lots.

- F. **Required Residential Supply.** In addition to meeting the above requirements, the system must also meet the following requirements in approving all water systems for adequate source and storage capacities.\
1. The peak hourly residential flow, or the sum of the minimum fire flow plus one-half (½) of the peak hourly residential flow, whichever is greater, shall be maintained for the period of time shown below:

**Table 6-4: Required Residential Supply**

Number of Services	Duration
less than 100	2 hours
100-250	3 hours
greater than 250	4 hours

With the most critical well or pump inoperative, a minimum of 2/3 of the above flow shall be maintained for the time specified. This requirement may be met by drawing from both well pumping and storage.

2. The minimum residential flow shall be equal to one-half (½) of the peak hourly residential flow and shall be maintained for a period of three days. This requirement may be met from a combined source of the wells and storage.
3. The average daily residential flow for the maximum month shall be equal to one-third (1/3) of the peak hourly residential flow and shall be maintained continuously from the well pumping only.

4. If the original source of the water is not from a well, then requirements will be developed by the Department on an individual project basis. It is the intent that the supply of water and fire protection provided be equivalent to that noted above when the original source is from a well; this may require a larger storage facility.

#### 6.1.2 Areas of conflict between water and sewer lines

In the interest of public health and to minimize the possibility of contamination of the public water supply, the construction requirements included in Standard Drawing Series U-3 shall be met at any time that the separation between water and sewer lines is less than the basic separation standards contained in State regulations. These requirements apply to construction of a water main, sewer main, sewer lateral, or any other type construction causing the separation to be less than that indicated. All special construction required herein is to be discussed thoroughly with the Department of Public Works, and the Department of Public Health/Environmental Health Services, prior to starting any work and is subject to Department of Public Works approval.

#### 6.1.3 Distribution System

- A. Operating Pressure. Water distribution system mains shall be designed to maintain normal operating pressures of not less than 25 psig at the service connection, except that during periods of hourly maximum demand as defined above, the pressure may be not less than 20 psig with the storage tank at the low end of its operating storage level, and may not be more than 150 psig. Computations shall be submitted to demonstrate that these maximum and minimum pressures will be met. Variations in pressures under normal operations shall not exceed 5.0%.
- B. Size of Water Mains. Water mains shall be not less than 8-inches inside diameter unless otherwise specified. Water mains of 6-inches shall be limited to cul-de-sacs less than 400-feet long. All dead-end mains shall be provided with a standard blow-off, hydrant or other acceptable means of flushing. Mains shall be equipped with blow-off valves at low points, and air relief valves at high points.
- C. Alignment and Layout of Mains. The distribution system, wherever possible, shall be in grid form so that pressures throughout the system tend to become equalized under varying rates and locations of drafts.
  1. Primary feeders, also known as “arterial mains,” form the skeleton of the distribution system. They shall be located so that large quantities of water can be carried from the pumping plant to and from the storage tanks and distribution system.
  2. Primary feeders shall be arranged in several interlocking loops to allow continuous service through the primary mains, even when one portion is shut down temporarily. Looping will also allow supply from two directions for large fire flows. The primary mains shall not be further than 3,000-feet apart.
  3. Secondary feeders carry water from the primary feeders to points in the system. They should form smaller loops within the loops of the primary mains, by running from one primary feeder to another. Secondary feeders shall be placed only a few blocks apart.
- D. Dual Mains. Dual mains (one pipeline on each side of the street) shall be installed in streets with 20-year forecast Average Daily Traffic (ADT) 16,000 or greater, if required by the Department. In those streets classified for dual mains, the minimum size shall be 8-inches. The distribution system shall be grid-ironed as necessary to provide the flows and pressures specified in Section 6.1.1.

- E. Valves. The distribution 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 in high-value districts or greater than 800-feet in other sections. In no case shall valves be so located that any section of main can be shut down without going to more than three locations to close valves. Valves shall not be located in gutters, spandrels or cross-gutters. Existing valves shall be relocated insofar as practical.
- F. Hydrants. Fire hydrants shall be placed at street intersections whenever possible, and shall be located to minimize the hazard of damage by traffic. In addition, hydrant spacing shall conform with the following requirements:
1. Residential areas: Maximum spacing 500-feet, except on dead-end streets it shall be no more than 400-feet. The maximum distance from any point on the street or road frontage to a hydrant shall be 250-feet.
  2. Commercial/industrial areas: Maximum spacing 250-feet or less when required by the fire official. Hydrants or tie-ins for future hydrants maybe required by the fire official and shall typically limit the distance from any point on ~~be within 150-feet of~~ the exterior of any building to 150 feet.
- G. Service Lines. Service lines from the water main to the property line shall normally be installed at the time the main is constructed, to avoid frequent cutting of the street. Single and double service lines shall be 3/4-inch and 1-inch, respectively, in inside diameter.
- H. Thrust Blocks. Concrete thrust blocks shall be installed to properly restrain and protect pipeline, as shown in the Standard Drawings. Thrust blocks shall conform with the compressive strength requirements found in Appendix C, and shall be cast in place at all bends of 22 ½ degrees or more, at the end of plugged mains, behind each tee, or each cross which is valved in such a manner that they can act as a tee, and at the back of fire hydrants. The thrust block shall extend from the fitting to undisturbed soil, and shall be of such bearing area as to assure adequate resistance to the force to be encountered. Prior to pouring concrete, all fittings shall be wrapped in minimum 8-mil polyethylene plastic sheet to protect bolts from being covered with concrete. In lieu of the above, movement may be prevented by the use of restraining joints, where thrust blocks are not feasible due to limited space or other reasons, subject to the prior approval of the Department.
- I. Valve Anchors. Concrete valve anchors shall be provided at all in-line valves and shall be installed in accordance with Standard Drawing W-3. Prior to pouring concrete, all fittings shall be wrapped in plastic to protect bolts from being covered with concrete.
- J. Air and Vacuum Release Valves. Air and vacuum release valves shall be installed in the water system at all points where it is indicated that air pockets may form. The design shall be such as to insure the release of air automatically from the water main. These valves may also insure the entrance of air into the water main when the pressure inside the line is below atmospheric pressure. All valves shall be designed for a minimum of 150 psi operating pressure. The inlet to each valve shall be provided with a gate valve or corporation stop to provide a positive closure between the main pipeline and the air and vacuum release valve, and the air and vacuum release vent outlet shall be installed above ground in such a manner as to preclude backflow. They shall be located ~~outside the "Clear Zone"~~ to provide the minimum lateral clearance as defined in Chapter 4 of these Standards.
- K. Blowoffs. A blowoff or fire hydrant shall be installed in the water system at all dead-ends and low points.

- L. Sampling Stations. Sampling stations shall be installed according to the requirements established by the water purveyor. At a minimum, they shall comply with the following requirements:
1. There shall be at least one sampling station for each pressure zone in a system.
  2. Sampling stations shall be located at least 100-feet from a fire hydrant.
  3. Sampling stations shall not be placed past the last service connection on a dead-end main.
  4. If a system has more than one service loop, there shall be at least one sampling station in each service loop.
  5. For each water source, there shall be one sampling station located where raw (untreated) water from the source can be sampled.

#### 6.1.4 Cross Connections

- A. Backflow Prevention Required. Backflow prevention devices shall be installed on all service connections that pose a potential threat to health and safety of the community. At a minimum, the following service connections shall require backflow prevention:
1. Landscape irrigation
  2. Medical and health care facilities
  3. Areas served by private wells
  4. Restaurants and other food-preparation facilities
  5. Private fire-protection lines, including fire sprinkler systems
  6. Laboratories
  7. Commercial and industrial facilities that use water for other than domestic purposes
- B. Backflow Prevention Devices. The type of backflow prevention device shall be in accordance with the California Department of Health Services regulations relating to cross-connections (California Code of Regulations, Section 7604). The type of device and the method of installation shall also be subject to review and approval of the County Department of Public Health/Environmental Health Services, and where such devices are proposed to be installed on lines and appurtenances within its jurisdiction, the County Department of Public Works as well.
- C. Location of Backflow Prevention Devices. Backflow prevention devices shall be located as close as practical to the point of connection. In addition, backflow devices shall be located in accordance with Section 7603 of the California Code of Regulations.
- D. Ownership and Maintenance. The property owner where any service connection requiring a backflow prevention device is located, shall be responsible for operation and maintenance of said device. The County shall not be responsible for operation and maintenance of these devices.

### 6.1.5 Water Well Metering

Water well meters shall be designed and installed in accordance “Appendix G3 Well Water Metering Standards and Installation Guidelines” whenever metering of a water well is required by San Luis Obispo County or San Luis Obispo County Flood Control and Water Conservation District. This includes but is not limited to the requirements associated with the following:

- 1) County of San Luis Obispo Ordinance No. 3246,
- 2) Nacimiento lakeside water users,
- 3) County of San Luis Obispo Ordinance No. 2343,
- 4) All others

## 6.2 Construction Specifications

### 6.2.1 Materials

- A. Pipe. Pipe used in construction of water distribution systems shall be ductile iron, steel pipe, or plastic pipe (PVC) and shall meet the standards of the American Water Works Association (AWWA) where applicable. The use of steel pipe shall be limited to those areas where an engineering evaluation indicates that galvanic (or soil) corrosion is not a problem, or provision is made for suitable cathodic protection. The Department may specify which types shall be used in any instance. The supplier shall furnish a certificate, stating that all pipes, valves, fittings, protective coatings and all other materials comply with the specifications of this manual.
1. Ductile Iron Pipe. Ductile iron pipe shall be centrifugally cast, ductile iron pipe, with ends joined by a method approved by the Department which employs a single elongated rubber gasket to effect the joint, such as “Tyton Joint” or an approved equal. The pipe shall be minimum pressure Class 150 with bituminous coating of coal tar 1 mil thick outside, and lined inside with seal-coated cement lining of 1.6 mm minimum thickness, all conforming to applicable ASA and AWWA Specifications. Ductile iron pipe shall be encased in polyethylene material. Above-ground piping shall have flanged joints, be factory-applied epoxy-coated and blue in color.
  2. Steel Pipe. Shall conform to and meet the requirements of AWWA Specifications C200, with cement mortar lining and coating in accordance with AWWA Specification C205. The method used for coupling the ends of the pipe, whether mechanically couple welded, bell-and-spigot ends with rubber gasket or any other type, shall be approved by the Department prior to any use of the pipe.
  3. Plastic (PVC) Pipe. Shall be unplasticized Poly Vinyl Chloride (PVC) plastic class water pipe with integral bell and spigot joints or plain-end designed for joint assembly using elastomeric-gasket standard PVC couplings. The pipe shall meet the requirements of AWWA C900 “Poly Vinyl Chloride” (PVC) Pipe, and shall be furnished in cast iron (CI) equivalent outside diameters (OD). All Class 150 pipe shall meet the requirements of DR 18, and all Class 200 pipe shall meet the requirements of DR 14. All pipe shall be suitable for use as pressure conduit. Provision must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of ASTM D-1869 and E-477. The bell section shall be designed to be at least as strong as the pipe wall. Sizes and dimensions shall be as shown in this specification. Standard laying lengths shall be 20-feet for all sizes. Random lengths shall not be less than 10-feet in length. At least 85% of the pipe used shall be standard laying length. Each standard length and random length of pipe shall be factory-tested to four (4) times the class pressure of the pipe for a minimum of five (5) seconds. The integral bell shall be tested with the pipe.

B. Fittings. Bends, elbows, tees, crosses and special fittings for water mains shall be cast iron or ductile iron conforming to AWWA C-110, C-153 or approved equal.

1. Reducers. When changes in pipe size are required, eccentric reducers shall be used where appropriate to minimize air pockets.

4.

2. Inside Lining. Fittings shall be cement-mortar lined in accordance with AWWA C-104. Fittings lined in the field will not be considered as conforming to AWWA C-104 and will not be accepted.

3. Outside Coating. The outside of cast iron or ductile iron fittings shall have a bituminous coating of coal tar approximately 1 mil thick, unless specified otherwise. The finishing coat shall be continuous and smooth. It shall be neither brittle when cold nor sticky when exposed to the sun, and shall adhere strongly to the pipe.

C. Valves and Valve Boxes.

1. Valves. Valves shall open in counter-clockwise direction and shall meet the requirements of AWWA Specification C500 for gate valves and AWWA Specification C504 for butterfly valves. All valves shall be epoxy coated inside and out. The butterfly valve standard is not intended to cover valves for installation where service conditions exceed the shutoff pressures and line velocities stated in Table L of AWWA Specification C504. Gate valves shall be resilient-seated.

2. Air and Vacuum Release Valves. Valves shall meet or exceed the latest revision of ANSI/AWWA C512 Standard for Air Release, Air/Vacuum, and Combination Air Valves for waterworks service. All 2-inch valves shall incorporate stainless steel internal components and National Pipe Threaded (NPT) inlet. All 4-inch and 6-inch valves shall incorporate stainless steel internal components and flanged inlet. Floats, seats, and trim materials shall be inherently corrosion-resistant and have physical properties suitable for the application. The valve manufacturer shall provide a certification stating that the valve conforms to these Standards. Air and vacuum release valves shall be as follows:

**Table 6-5: Air/Vacuum Release Valves**

Pipe Diameter	Air/Vacuum Release Valve
6-12 inches	2-inch
16-20 inches	4-inch
24-36 inches	6-inch

All air and vacuum release valves shall be a minimum outlet size of two (2) inches.

3. Check Valves. All check valves shall seat readily and completely to assure water tightness. The face of the closure element and valve seat shall be bronze, composition, or other non-corrodible material which will seat tightly under all prevailing conditions of field use. Slow-closing check valves shall be used where excessive pressures or water hammer may occur, and the static operating pressure is within 20% of the pressure class or rating of the pipe. All check valves, 4-inch and larger in size, for use of distribution mains, shall be designed for a minimum of 175 psi working pressure.

4. Valve Boxes. Valve boxes shall be as shown on Standard Drawing No. W-3. The cover shall be marked "WATER" and shall have a loose fit in the box.

D. **Hydrants.** Fire hydrants shall be wet or dry barrel type, 30-inch bury, and shall meet the requirements of AWWA Specifications C502 and C503. They shall also meet the requirements set forth by the Fire District in which the improvement is located or by the Department in the absence of a Fire District. They shall also conform with the following requirements:

1. **Outlets.** In single-family residential areas, fire hydrants shall have not less than two 2.5-inch (2½”) outlets which National Standard fire thread. In business, industrial, institutional, school and multifamily dwelling areas, fire hydrants shall have two 2.5-inch (2 ½”) outlets with National Standard fire thread and one 4-inch (4”) suction outlet with National Standard fire thread. An approved fire hydrant is the CLOW F-2060.
2. **Painting Hydrants.** All hydrant exteriors are to be painted chrome yellow. The tops and outlet nozzle caps are to be painted as follows, based on the results of fire flow testing specified in Section 6.2.3 C:

**Table 6-6: Painting Fire Hydrants Tops and Nozzle Caps**

Hydrant Class	Color
AA (>1,500 gpm)	light blue
A (1,000-1,499 gpm)	green
B (500-999 gpm)	orange
C (<500 gpm)	red

Within private property, hydrant marking is to be at the discretion of the owner, as approved by the local fire protection agency.

All ferrous metal parts of the hydrant shall be thoroughly cleaned, and all surfaces inside and outside shall be coated with two coats of paint. Paint used on the interior shall be compatible with potable water and shall at a minimum conform to the requirements of Federal Specification TT-C-494b. Paint used on the exterior top section shall at a minimum conform to the requirements of Federal Specification TT-P-664.

3. **Installation.** Break-away bolts shall be used to join the hydrant body to the buried section. The bolts shall conform to ASTM A307, Grade B, and shall have a tensile strength less than the shear force required to break the hydrant body. Bolts shall be filled with silicon. When installing hydrants on PVC mains, the hydrant lateral shall be made of the same material as the main. This will help protect the main from damage if the hydrant is hit during a collision and the break-away bolts do not function properly. If dry-barrel type hydrants are installed, they shall have plugs pulled and leach rock installed.

E. **Blowoffs.** All blowoffs shall be a minimum outlet size of 2-inches and shall be designed for a minimum operating pressure of 150 psi.

F. **Water Service Connections.**

1. **Materials.** The following materials are acceptable for ¾" and 1" service connections:
  - i. Polyvinyl Chloride, Schedule 40, ASTM D-1785-68
  - ii. Polyethylene tubing, ASTM D-2239-67 P.E. 3306 - Type II - Grade 3 (Flarable)

The following materials are acceptable for 1 ½” and larger service connections:

- iii. All of the materials listed above for ¾" and 1" services
- iv. Brass Pipe - shall be seamless red brass conforming to

v. ASTM B-43-58

2. Sizes. Single service connections shall be minimum 3/4" inside diameter. Double service connections shall be minimum 1-inch inside diameter. (Note that Polyethylene tubing is normally specified in outside diameter.)
3. Corporation Stops. All corporation stops shall be bronze, round, with iron pipe standard (I.P.S.) thread for steel pipe, and outlet for the type of service pipe used.
4. Meter Stops. All 3/4-inch and 1-inch (curb) meter stops shall be bronze, with inlet for the type of service pipe used, and outlet for the type of service pipe or meter coupling used.

For 1 1/2-inch and 2-inch service, a bronze curb stop valve, straight ground key curb stop, or bronze gate valve (minimum of 200 psi rated working pressure) may be used. Both inlet and outlet shall be appropriate for the type of service pipe or meter flange used. All valves shall be factory hydro-tested to 300 psi or air-tested to 100 psi under water.

5. Bronze Gate Valve. All 1 1/2-inch through 3-inch gate valves shall be all bronze and comply with AWWA Standard C500.
  6. Standard Service Clamps. All service clamps and straps shall be in accordance with AWWA Standards and the pipe manufacturer's recommendations.
  7. Repair Service Clamps. Where no service clamp is required, and the corporation stop does not seal properly, a repair service clamp shall be used.
- G. Concrete Thrust Blocks. Portland cement concrete, conforming to the compressive strength requirements found in Appendix C, for thrust blocks shall be produced from commercial-quality aggregate and cement and shall contain not less than five (5) sacks of cement per cubic yard. Hand mixing of this concrete shall not be permitted. Plastic wrap shall be used to protect fitting connections.
- H. Storage Facilities and Pumps.

1. Storage. All steel tanks, standpipes, reservoirs and elevated tanks for water storage shall comply with AWWA Standard D100 and also meet all foundation and seismic requirements of the Building Code. Safety systems including roof railings and anti-fall equipment for ladders shall be installed as required by Cal OSHA. Where limited service life is satisfactory for a particular situation, the Department may approve steel tanks meeting the standards of the American Petroleum Institute (A.P.I.). All inspection, repairing, painting and repainting of steel tanks, standpipes, reservoirs and elevated tanks for water storage shall comply with AWWA Specification D102.
2. Water Production or Pumping Facilities. All special potable water production or pumping facilities, such as groundwater wells/pump stations (including booster pump stations), along with their associated treatment and disinfection systems, and their associated electrical switchgear, supplies and communications equipment shall require special considerations and approval by the Department. The design shall meet all requirements of the Regional Water Quality Control Board, State and County Health Departments, Cal Fire/County Fire and the Department of Public Works. Adequate source capacity shall be demonstrated as required by the Department. The design of all such facilities and structures shall provide for access by maintenance vehicles.

## 6.2.2 Installation

- A. Lines and Grades. 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. No deflections shall be made at the pipe joints. When curved alignment is shown on the plans, the minimum radius of curvature and the maximum deflection at any joint shall not exceed the manufacturer's recommendation and shall be approved by the Department.
- B. Trench Widths. The minimum trench width shall be the nominal diameter of the pipe plus 12-inches, for all pipes 36-inches in diameter or less. All pipes greater than 36-inches diameter need special consideration and approval by the Department. The maximum trench width shall be the nominal pipe diameter plus 16-inches. However, in any case the width shall be ample to permit the proper installation of the pipe and appurtenances. Refer to Standard Drawing Series U-4 for trenching and backfill requirements.

### C. Excavation.

1. Depth. Water mains shall be installed at a depth which will provide a minimum cover of 36-inches over the top of the pipe measured from the finished grade.
2. Excavation. Unless otherwise specified, the excavation for water mains shall be an open trench, excavated to 6-inches below the bottom of the pipe. The excavations for bells, collars, valves and fittings shall be performed by hand and the bedding material shall be hand-shaped so that the bottom segment of the pipe is firmly supported. It is the intent of these requirements to provide firm, uniform bearing for the pipe. Where the trench is in granular or sandy material, the pipe may be bedded in the native material in lieu of importing bedding material, providing it complies with the specification for bedding material. The Department shall determine the suitability of the native material.

If soft, spongy, unstable or similar other material is encountered upon which the bedding material or pipe is to be placed, additional material shall be removed below the normal trench bottom to a minimum depth of 1-foot, or as directed by the Department. The resulting sub-trench shall be backfilled with sand bedding material suitably densified, and be true to the designed line and grade.

Upon approval of the Department, horizontal boring or tunneling for short distances under roads, sidewalks, other utilities, etc., will be permitted.

3. Preparation of Pavement. When the trench is in an existing paved area, refer to Section **3.2.2** for sawcut and pavement reconstruction requirements.
4. De-Watering. When water is encountered, the trench shall be kept free of water until the laying and jointing of the pipe, and placing of the bedding material has been completed, inspected, and approved. No concrete footings, foundations, anchors or thrust blocks shall be laid in water, nor shall water be allowed to rise over them until the concrete has set at least 12 hours. All water accumulating in the trench from any source whatsoever shall be removed. Waste water shall be disposed of in such a manner as will not cause any damage to public or private property and will not be a menace or inconvenience to the public. The manner employed to dispose of water pumped from an excavation shall be subject to the approval of the Department.
5. Excavated Material. 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 and lighted.

6. Other Pertinent Regulations. 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.
7. Bracing and Shoring. Trench walls shall be vertical, unless permitted otherwise by the Department in writing. Adequate shoring, as required by the Division of Industrial Safety of the State of California, to protect personnel, adjacent property and roadway areas shall be installed through unstable material to limit trench width to the amount specified in these Standards. If any damage does result to such improvements, the necessary repairs or reconstruction required shall be made, as directed by the Department.

The sheeting, shoring and bracing shall be so arranged as not to place any stress on portions of the completed work until the general construction thereof has proceeded far enough to provide ample strength. Any damage to structures occurring through settlement, water or earth pressure, slides, caves or other causes due to failure or lack of sheeting or bracing or improper bracing, or through negligence or fault in any other manner shall be repaired immediately to the approval of the Department.

Where timber sheeting extends below the invert of a pipe, it shall be cut off at the top of the pipe and the upper portion removed without harming the support conditions. This requirement will not be necessary where steel sheeting is used for shoring below the invert of the pipe.

Care shall be exercised in the drawing or removing of sheeting, shoring, bracing, and timbering to prevent the caving or collapsing of the excavation faces which are being supported.

- D. Laying Pipe. Pipe shall be laid in accordance with the manufacturer's specifications. All PVC pipe and fittings for water mains shall be installed in accordance with AWWA C-900. The following sequence shall be used:
  1. Each section of pipe and each fitting shall be thoroughly cleaned before it is installed. All pipe, fittings, valves, etc., shall be carefully lowered into the trench by suitable tools or equipment, in such manner as to prevent damage to the pipe, lining, coating, fitting, or other appurtenances. Under no circumstances shall pipe or accessories be dropped into the trench.
  2. 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.
  3. Gate valves shall be set plumb, supported on a concrete base in accordance with Standard Drawing W-3, and properly fitted to the adjacent sections of main. A valve box shall be installed over each valve.
  4. Fire hydrants shall stand plumb, with the steamer nozzle, if any, facing the street and in accordance with Standard Drawing W-2.
  5. Ductile Iron Pipe. All ductile iron pipe shall meet the requirements of AWWA Standard C151. Any defective, damaged, or unsound pipe shall be rejected. Each section of ductile iron pipe shall be lowered into the trench by means of approved slings, and the pipeline assembled piece by piece. Where necessary to properly locate valves and fittings, the pipe shall be neatly and squarely cut to length. Field repair of cement-mortar lining shall be required. After the pipe or fitting has been lowered into the trench, all foreign matter shall be completely brushed from the bell and spigot end before assembly.

- E. **Bedding Material.** Bedding material shall be approved by the Department and meet the minimum standards for sand equivalent and gradation listed below:

Sand Equivalent = 20

**Table 6-7: Gradation Requirements for Bedding Material**

Sieve Size	Percentage Passing Sieve
1"	100
No. 4	80-100
No. 200	0-15

The sand equivalent of 20 shall also be required outside of the roadway. Imported sand bedding shall be used the full length of the buried pipe.

Bedding material shall be placed and compacted to 90% relative compaction on the sides and to the minimum of six (6) inches above the pipe. Water consolidation by flooding or jetting shall only be used by written permission of the Department. Hand tamping may be supplemented by the use of vibratory or other compaction equipment, provided that the equipment used is approved by the Department and does not strike, move or damage the pipe while in the process of compacting.

- F. **Trench Backfill.** Trench backfill shall comply with the following requirements:
1. **Tracer Wire.** Fourteen (14) gauge insulated copper tracer wire shall be laid in the trench above the pipe and branched to all water service laterals, fire hydrants, and air relief valves. The tracer wire shall be brought to finish grade through all meter boxes and valve access boxes. At fire hydrants, the tracer wire shall be brought to six inches above finish grade and secured to the hydrant bolt flange.
  2. **Warning Tape.** In addition to the tracer wire, non-detectable warning tape shall be placed above the pipe and tracer wire to alert workers to the presence of the pipe and/or tracer wire during future trenching operations. The tape shall be three-inch (3") wide polyethylene, APWA uniform color coded blue, permanently printed "CAUTION BURIED WATER LINE BELOW."
  3. **Placement.** The tracer wire and warning tape shall be located as shown on Drawings series U-4, or as directed by the Department. Tracer wire and/or warning tape shall be replaced if damaged by any subsequent trenching operation.
  4. **Minimum Cover for Water Lines.** For lines 8-inches diameter or less, the minimum soil cover over the pipe shall be 36-inches. For lines greater than 8-inches in diameter the minimum soil cover over the pipe shall be 48-inches. All trenches shall be backfilled for the full width of the trench, including joints, after pipe, fittings, appurtenances and bedding material have been installed, and before the required pressure and leakage tests are performed.
  5. **Other Requirements.** Trench backfill for water line installation shall also comply with the requirements of Section 5.2.7 of these Public Improvement Standards.
- G. **Connection to Existing Mains.** Existing mains shall not be shut down after 10:00 a.m. for the purpose of tie-ins. No tie-ins shall be performed on standard holidays. Prior to any shutdown for a tie-in the following must be performed.

1. All Encroachment Permits and rights-of-entry shall be obtained.
2. Three (3) working days' prior notice shall be given to the water service agency and affected customers.
3. All necessary materials shall be on site and fully assembled.
4. The point of the tie-in shall be fully exposed.

Direct connection to the existing water system shall not be permitted until the newly-installed portion has passed bacteriological testing. Separation may be achieved by the installation of a blind flange or “pancake” inserted between the new and existing piping, per Standard Drawing W-8.

- H. Service Lines. The water main shall be tapped at the service location shown on the approved plans, and a service line extended to the property line. Each service line shall be equipped with a corporation stop at the main and curb stop at the property line. The service line may be either laid in open cut or placed by boring or jacking. If installed by the open cut method, the trench shall be in accordance with these Standards and shall be completely backfilled with sand. The water service line shall be considered as part of the main for the purpose of the hydrostatic test as specified below. When a new water main is being installed, all new water services shall be installed at that time.

### 6.2.3 Testing

Pressure and leak tests shall be performed at the same time. Pressure testing against valves shall not be allowed. Separation may be achieved by the installation of a blind flange or “pancake” inserted between the new and existing piping per Standard Drawing W-8. The contractor shall give the Department two (2) working days' notice prior to testing.

- A. Pressure and Leak Testing. After the pipeline has been laid, it shall be filled with water for a minimum of 24 hours and then subjected to a hydrostatic pressure test. Unless otherwise specified, the test pressure shall be 200 psi, or 50 psi greater than the rated pressure of the pipe (measured at the lowest elevation of the system), whichever is greater. The pressure test will be conducted after backfilling has been completed, but before placement of permanent paving. A test shall be conducted only after all backfilling has been completed, and at least 36 hours after the last concrete thrust block or reaction backing has been cast with high-early-strength concrete, or at least seven days after the last concrete thrust block or reaction backing has been cast with standard concrete. The duration of the test shall be two (2) hours unless otherwise directed by the Department. All pressure gauges shall be approved by the Department.

During the filling of the pipe and before the application of the specified test pressure, all air shall be expelled from the pipeline – if necessary, by means of taps at points of highest elevation, and, after completion of the test, the taps shall be tightly plugged, unless otherwise specified. During the test, all exposed pipe, fittings, valves, hydrants, and PVC couplings shall be carefully examined. Any joint at which the accumulated leakage exceeds the allowable rate specified in the table below shall be rejected. All cracked or defective elements shall be removed and replaced immediately. The test shall then be repeated until the results are satisfactory to the Department.

**Table 6-8: Allowable Leakage per 1,000 feet or 50 joints (U.S. Gallons per hour)**

Nominal Pipe Size (inches)	Average Test Pressure (psi)		
	150	200	250
6	0.50	0.57	0.64
8	0.66	0.76	0.85
10	0.83	0.96	1.07
12	0.99	1.15	1.28

No pipe installation shall be accepted until or unless the leakage for the section of the line being tested is less than the rate specified in the table. In calculating the leakage, the Project Engineer will allow for the number of joints added to the pipeline, owing to the use of pipe lengths smaller than 20-feet, for which the data in the table applies. If the test leakage in any section is greater than that permitted, the defective joints shall be located and repaired until the leakage is within the permitted allowance.

- B. Flushing and Disinfecting. After the pressure test, the system should be thoroughly flushed out and disinfected in accordance with AWWA Standard C651 and the requirements of the Public Works Department Procedural Memorandum O-3, a copy of which is in Appendix G1.

Direct connection to the existing water system shall not be permitted until the newly-installed portion has passed bacteriological testing. Separation may be achieved by the installation of a blind flange or “pancake” temporary blocking device inserted between the new and existing piping, per Standard Drawing W-8.

A disinfection plan shall be submitted to the Department for approval. Alterations or modifications of the sterilization procedures set forth herein shall be approved in writing by the County Water Quality Manager before they are implemented.

All flushing water shall be disposed of outside of the County right-of-way, or as approved by the Department, in conformance with Public Works Department Procedural Memorandum O-3.

- C. Fire Flow Testing. Fire flow testing shall be conducted by the Project Engineer, in coordination with the applicable fire protection agency.

#### 6.2.4 Replacement of Road Surfaces

- A. Timing of Pavement Replacement. Paving replacement shall not proceed until the full requirements of Installation and Testing, above, have been met to the satisfaction of the Department, but in no less than ten (10) days after backfilling has been completed.
- B. Pavement Replacement Requirements. The replacement of all pavement and shoulder surfaces shall be in conformance with Section ~~3.2.2~~ of these Public Improvement Standards, as to materials and methods of construction.

## 7. Wastewater Disposal

Sanitary sewer lines and appurtenances within County-operated special districts shall be constructed in accordance with the details shown on plans and specifications approved by the Department.

Where a sewer system in the unincorporated area of the County is to be operated and/or maintained by any public agency other than the County, or other purveyor regulated by the State of California, the plans and specifications and construction must be approved by both the Department and by that entity. In the event of any discrepancy or conflict between these Public Improvement Standards and the requirements of said wastewater service purveyor, that entity's requirements shall take precedence.

### 7.1 Design Standards

#### 7.1.1 Quantity of Flow

- A. Average Flow Rate. An average flow of 100 gallons per person per day shall be used for design purposes, with the peak flow double the average flow. Pipes shall be sized to handle peak flows with the pipe flowing half full for sewers up to 15-inches in diameter. Larger sanitary sewers shall be designed to flow three-quarters full.
- B. Number of Persons Served. Accurate population estimates will be required to determine the quantity of flow. Multiply the future population by the average per capita wastewater flow, given in (A) above. Estimates of the number of visitors associated with recreational uses, which experience high seasonal fluctuation, can be converted to equivalent full-time residents by multiplying the number of visitors by the appropriate multiplier below:

Day-use visitor	0.1-0.2
Seasonal visitor	0.5-0.8

The number of persons shall be determined for a 50-year period, which is the length of time that the capacity of the sanitary sewer will be adequate. Day-use visitors are those who do not stay overnight (for example, boating or picnicking), and seasonal visitors are those who stay for short multi-day stays during peak recreational seasons (for example, camping or cabins).

#### 7.1.2 Collection System

- A. Minimum Velocity. Sanitary sewer grades shall be designed to provide a minimum velocity of 2 fps when flowing at peak discharge as determined in section 7.1.1 A, above. The minimum velocity requirement is necessary to prevent the deposition of solids. The following table indicates the slopes which will provide that velocity, and these shall be used as the minimum standard for design.

**Table 7-1: Minimum Slope for Sanitary Sewer**

Diameter	Slope in Feet/Foot
6 inch	0.0050
8 inch	0.0035
10 inch	0.0025
12 inch	0.0020
15 inch	0.0015
18 inch	0.0012
House service line	0.02

Sewers larger than 18 inches diameter shall be designed to the approval of the Department.

- B. Change in Pipe Size or Angle Point. 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 pipe, whichever is greater.
- C. Maximum Velocity. Unless special provisions for erosion protection have been provided, and approved by the Department, design velocities for sanitary sewers shall not exceed 10 fps at peak flow. 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.
- D. General Location. Sewer lines shall be installed in accordance with Standard Drawing U-1 where possible. See Standard Drawing series U-3 for special construction requirements when sewer lines are to be placed in close proximity with water lines.
- E. Locate Sewers Within Streets and Roads. All sanitary sewers designed for the collection and conveyance of domestic sewage and/or industrial wastes shall be constructed and installed within rights-of-way dedicated for public streets or roads, unless such construction or installation is determined to be impractical by the Department. The location of the sanitary sewers installed in any street or road not having frontage roads shall normally be 6-feet southerly or easterly of the centerline of the street.
- F. Sewer Lines Within Easements. Where sewer lines are located within easements, the easements shall be offered for dedication to the public. The minimum width of any easement for sanitary sewer purposes shall be 10-feet. In special cases of terrain, depth of sewer line, etc., the required easement width shall be increased. All easements shall include right of ingress and egress over adjoining property for maintenance, replacement and operation.
- G. Alignment. Sewerage systems shall be designed so as to have a minimum of curvature, both horizontal and vertical. Whenever possible, sewer lines shall be laid out in a straight line between structures. Curved sewer lines will be allowed only under the following conditions:
- All curve data shall be shown on the plans.
  - Minimum radius of curvature shall be as recommended by the pipe manufacturer and approved by the Department.
  - No deflections shall be made at the pipe joints.
- H. Depth. The normal design depth of a sanitary sewer system shall be such as to obtain a cover of 36-inches above the top of pipe for the house service lateral at the property line. Sewer

mains shall be placed with 48-inch minimum cover and shall be located deeper than any nearby potable or reclaimed water mains.

- I. Size. The normal minimum sewer main size shall be 8-inches inside diameter.

### 7.1.3 Areas of Conflict Between Water and Sewer Lines

In the interest of public health and to minimize the possibility of contamination of the public water supply, the construction requirements included in Standard Drawing Series U-3 shall be met at any time that the separation between water and sewer lines is less than the basic separation standards contained in State regulations. These requirements apply to construction of a water main, sewer main, sewer lateral, or any other type construction causing the separation to be less than that indicated. All special construction required herein is to be discussed thoroughly with the Department of Public Works, and the Department of Public Health/Environmental Health Services, prior to starting any work and is subject to Department of Public Works approval.

### 7.1.34 Areas of Conflict Between Storm Drain Lines and Sewer Lines

In the interest of public health and to minimize the possibility of contamination of the drainage system and water course, at least four feet of clearance shall be maintained between parallel sewer lines and storm drains (and structures). Where either pipe is protected by concrete encasement, the separation shall be measured to the outside of the concrete encasement. Where maintaining the four feet of separation is not practical, special designs may be approved by the Department (via a design exception) to minimize the potential for cross contamination.

## 7.2 Construction Specifications

### 7.2.1 Materials

All material that is to become a permanent part of any sanitary sewer or appurtenant structure, shall conform to the requirements for the particular material as set forth in these specifications. The Contractor shall supply any and all certificates of compliance, certified test results or shall perform tests as required to assure the Department that the material being incorporated into the work has met the requirements as specified. Approval of the Department shall be required for use of material not listed in these standards.

- A. Pipe. All sanitary sewer lines shall be ductile iron pipe, plastic PVC pipe or approved by the Department. All pipe shall be of the size, material and strength as shown on the plans. All pipe and fittings shall be marked or stamped with the trade brand name of the manufacturer, and strength or class of pipe. All pipe shall be designed to withstand all internal or external loads applied. Supporting strength of conduits as installed to safely carry imposed gravity loads and superimposed loads (including a suitable factor of safety) shall be determined by use of the Marston formula. Additionally the following requirements apply for specific kinds of pipe:
1. Ductile Iron Pipe. All ductile iron pipe and fittings for main sewers shall conform to AWWA Standards C151 and C153. Joints shall be approved type mechanical joints. No lead joints will be allowed.
  2. Polyvinyl Chloride (PVC) Pipe. PVC pipe must meet at least ASTM Standard D-3034/SDR 35. Deflection tests shall be required as prescribed by the Department.

### 7.2.2 Facilities

- A. **Manholes.** Normal maximum spacing for manholes shall be 400-feet. Where the locations of two manholes are determined by intersecting lines, the distances between intervening manholes shall be approximately equal. A sewer on a curved alignment shall have manholes spaced at a maximum of 300-feet, or adjusted to fit the individual case. The maximum spacing of manholes on trunk sewer lines shall be as follows:

**Table 7-2: Maximum Spacing of Sewer Manholes**

Size of Trunk Sewer Line	Maximum Spacing
12" to 24" diameter	500-feet
27" to 36" diameter	600-feet

The spacing of manholes on trunk sewer lines larger than 36-inches in diameter shall be determined for each individual case.

- B. **Drop Manholes.** Whenever the vertical distance between the inverts of sewer lines coming into a manhole exceeds 30-inches, a standard drop manhole shall be constructed. Designs requiring the use of drop manholes shall be avoided, and shall require prior approval by the Department where they cannot be avoided.
- C. **Other Facilities.** Other wastewater facilities shall conform to the following requirements:
1. **Stub Lines.** A flusher branch may be used in lieu of a manhole for any stub line with a length of 200-feet or less. Any line more than 200-feet in length shall have a manhole at the end.
  2. **Extension Lines.** Lateral sewers installed to a subdivision line for future extension shall have a flusher branch at the end, if there are any house service lines attached to it, and if it is not over 200-feet in length. Lines longer than 200-feet shall terminate in a manhole with a stub for future extension.
  3. **House Service Lines.** In all new subdivision work, the house service lines from the sewer to the property line shall be installed at the time the sewer is constructed. Each house service line shall be referenced to the plan stationing. Minimum size of any sanitary lateral or side sewer to serve individual residences, commercial structures, etc., shall be nominal 4-inches inside diameter. Actual size of laterals larger than 4-inches shall be determined by fixture unit requirements as per the current edition of the Uniform Plumbing Code.
- D. **Special Facilities.** All special facilities such as lift stations, force mains and treatment plants shall meet all requirements of the State Regional Water Quality Control Board, State and County Health Department and the Department of Public Works. Special structures, such as pump stations and pressure lines, shall require special considerations and approval by the Department. The design of all such facilities and structures shall provide for access by maintenance vehicles.
1. **Lift Stations.** The minimum distance from a lift station to any residence shall be 50-feet, except with advance approval of the Department. No lift station shall be constructed with bypasses which will bypass any effluent into any stream or watercourse. An alarm system, which meets the approval of the Department, shall be provided on all sewage lift stations. In addition, all lift station controls shall be approved by Public Works' Utilities Division operations staff. All lift stations shall have emergency power connections.

- ~~2. Lift Station and Force Main. Whenever the design of a sanitary sewerage system includes the necessity of a sewage lift station and a force main, the following data shall be submitted for tentative approval before plans are submitted: Design computations for the pumps or ejectors, the type to be used, and a plot plan showing the dimensions of the site and its location with respect to homes or other structures. The maximum recommended velocity in the station discharge piping is 8 fps. The minimum discharge velocity in the force main shall be 4 fps at a designed capacity, in order to achieve cleansing velocity. The operating velocity in the station piping and the force main shall be maintained between 4.0 fps and 6.0 fps. Other operating velocities may be considered by the Department subject to the Design Exception process. (See Section 1.2).~~
- ~~2.~~
3. **Force Mains.** Pipe used in the construction of force mains shall be either ductile iron pipe or C200 (DR14 per AWWA C900) plastic pipe.

### ~~7.2.3 Installation~~ 7.2.3 Installation

- A. **Lines and Grades.** All lines and grades will be set by the Project Engineer, and the Department shall be informed 24 hours in advance of the times and places at which work is to be done, in order that lines and grades may be inspected and necessary measurements made with a minimum of inconvenience and delay. All stakes and marks, once set, shall be fully 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 in all cases by the size of the pipe to be installed therein. Refer to Standard Drawing series U-4 for trenching and backfill requirements. For pipe 36-inches in diameter or less, the trench width shall be the outside diameter of the pipe, plus 12-inches (6-inches each side of pipe). For pipe diameters greater than 36-inches, the trench width shall be the outside diameter of the pipe, plus 16-inches (8-inches each side of pipe). The sides of the trench shall be as nearly vertical as possible in the material through which it is passing. If the width of the trench at the ground surface becomes excessive, the Department may require solid sheeting and bracing.
- C. **Excavation.** Unless otherwise specified, the excavation for sewer mains shall be completed in the same manner as described for water mains in Chapter 6.
- D. **Laying Pipe.** Pipe shall be laid in accordance with the manufacturer's specifications. All PVC pipe and fittings for underground gravity sewers shall be installed in accordance with the requirements of ASTM Standard D2321 (as amended to date), Recommended Practice for Installation of Flexible Thermoplastic Sewer Pipe. The following sequence shall be used:
1. The pipe shall be laid in conformity to the prescribed line and grade, and each pipe length checked to the grade lines. 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 immediately reported to the Department. In addition, a string line shall be used in the bottom of the trench to insure proper alignment and grade.
  2. 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 will be permitted.
  3. 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 the joints.
  4. 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 stopper.

5. The Contractor's attention is called to the required use of short lengths of sewer pipe to provide curves, flexibility, and prevent cracking or shearing failures. The use of short lengths of pipe is particularly required for, but not necessarily limited to, these locations: (1) inlets and outlets to all manholes; and (2) vertical and horizontal curvilinear sewers.
- E. Pipe to be Placed by Boring or Jacking. This work consists of placing cast iron pipe or other pipe of approved material, usually in a conductor pipe, under a paved roadway or railroad to a true line and grade as shown on the plans, by means of boring or jacking operations. The equipment and method of operation shall be approved by the Department before proceeding with the work, and shall meet the following requirements:
1. The excavation for the boring operation shall be kept to a minimum, but shall be of sufficient dimensions to satisfactorily complete the work. If so required, bracing and shoring shall be provided to adequately protect the workers and the roadway or railroad.
  2. The conductor pipe shall be placed closely behind and in conjunction with the boring operation. The bored hole shall be not more than 2-inches in diameter larger than the conductor pipe. Guide rails shall be accurately set to line and grade so as to achieve close adherence to the line and grade shown on the plans.
  3. The pipe to be placed inside the conductor pipe shall have non-rigid joints and shall be installed by the use of suitable centering devices. Sand, or other approved material, shall then be pumped into the conductor pipe to completely fill the annular space around the pipe for its full length.
- F. Trench Bedding and Backfill. Trench bedding and backfill shall be placed in the same manner as described for water mains in Chapter 6, including use of tracer wire and warning tape, except as follows: The non-detectable warning tape shall be 3-inch (3") wide polyethylene, APWA uniform color coded green, permanently printed "**CAUTION BURIED SEWER LINE BELOW.**"
- G. Manholes. Manholes shall be watertight structures constructed by placing precast concrete sections on a poured concrete base. Poured-in-place manholes shall not be used unless specifically called for in the Special Provisions. The following requirements shall apply:
1. Temporary covers of 3/8" steel plate of sufficient size to adequately cover the opening shall be placed on the cone until the pavement is completed. Suitable locating ribs shall be welded to the underside of the cover to hold it in place during the grading and paving operations.
  2. When adjusting an existing manhole to grade and the total depth of the throat from the top of the frame to the bottom of the throat exceeds 24-inches, the upper portion of the manhole shall be removed to the first full-size manhole section. The upper portion shall then be reconstructed as outlined above.
  3. Manholes shall be tested for water tight integrity either jointly with testing of sewer line or as separate units, in accordance with the Testing specifications, in section 7.2.4 below. The allowable leakage for one manhole shall not exceed one (1) gallon during a two-hour test period.
- H. Connection to Existing Manholes. Connections to existing manholes shall conform to the requirements of Standard Drawing S-1, and shall be made by coring a hole 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 non-shrink grout, thoroughly compacted to form a watertight connection. The grout shall be troweled smooth and flush with the interior surface

of the manhole. A manhole adapter or water stop shall be placed on the pipe prior to placement in hole, and the pipe shall be installed as specified by the manufacturer. Channelizing of the flow through the manhole shall conform to the details shown on the Standard Drawings for new manholes. The Contractor shall notify the Department, 24 hours in advance, before any connection is made to existing structures. The Contractor shall schedule the work so that interruption of flow is held to a minimum.

- I. House Service Laterals. House service laterals shall be constructed as shown on the Standard Drawing S-3 and S-3a, and shall conform to the following requirements:
  1. If it becomes necessary to locate a house service lateral less than 100-feet from a well, it shall be constructed of a suitable material approved by the Public Works Department and the Public Health Department/ Environmental Health Services. Approved construction materials for sewer lines in critical zones are listed in Section 7.1.3 above.
  2. Whenever house service laterals are to be installed as part of the contract for the construction of the lateral sewer, the use of wye or tee saddles will not be permitted.
  3. That portion of any house service lateral to be placed under an existing curb and gutter and/or sidewalk shall be done by tunneling. Cutting of the existing curb and gutter and/or sidewalk will not be permitted.
  4. All house service laterals shall be considered as part of the lateral sewers for purposes of the hydrostatic test as set forth in Testing, below.
  5. The location of house service laterals shall be permanently indicated by embedding the letter "S" in the curb directly above the line. In new subdivisions when the house service laterals are installed, before the curb is constructed, it shall be the sewer contractor's responsibility to place the "S" in the curb after it is poured. When house service laterals are constructed in existing easements or streets where curbing does not exist, a 2-inches by 2-inches by 36-inches maximum (2"x2"x36") construction grade redwood stake shall be driven in the ground to within two inches of the surface, directly above the service line at the property line and an "S" stamped in the top. Every house service lateral shall be so marked before final acceptance will be given of any job.

#### 7.2.4 Testing

Prior to final approval, all sewer lines shall be cleaned and tested for leakage by standard hydrostatic or low pressure air test, for deflection by mandrel test, and for standing water/other debris by TV inspection. All cleaning and testing shall take place after all utilities are installed, and up to, but not including the final paving is completed. Any damage to the system during final paving and cleanup shall be corrected prior to final approval.

- A. Cleaning. Prior to acceptance of any sewer line by the Department, the sewer line shall be cleaned with a Wayne-type sewer cleaning ball under hydrostatic pressure. Any stoppage, dirt or foreign matter shall be removed from the lines. All materials and debris removed shall be collected and vacuumed out of the system at a manhole selected by the Department, and no debris shall be washed or otherwise deposited into the system.
- B. Hydrostatic Test Procedure. A section of sewer line shall be prepared for testing by plugging the upper side of the downstream manhole and all openings in the upstream manhole except the downstream opening. Where grades are slight, two or more sections between manholes may be tested at once. Where grades are steep, and excessive test heads would result by testing from one manhole to another, test tees the full size of the main shall be installed at

intermediate points so the maximum head on any section under test will not exceed 12-feet. The following sequence shall be used:

1. The section of sewer line prepared as above shall be tested by filling with water to an elevation 5-feet above the top of pipe at the upstream end of the test section, or 5-feet above the existing ground water elevation, whichever is greater. The water should be introduced into the test section four hours in advance of the official test period to allow the pipe and joint material to become saturated. The pipe shall then be refilled to the original water level.
  2. At the beginning of the test, the elevation of the water in the upper manhole shall be carefully measured from a point on the manhole rim. After a period of four hours, or less with the approval of the Department, the water elevation shall be measured from the same point on the manhole rim and the loss of water during the test period calculated. If this calculation is difficult, enough water shall be measured into the upper manhole to restore the water to the level existing at the beginning of the test, and the amount added taken as the total leakage.
  3. Should an initial test show excess leakage in a section of line, it is permissible to draw the water off and test the manholes that contained water. This test shall be made by plugging all the openings in the manholes and filling with water to the same elevation as existed during the test. The leakage from the manhole may be deducted from the total leakage of the test section in arriving at the test leakage. After the testing is complete, the manhole shall be waterproofed by grouting. Other approved waterproofing methods may be used if satisfactory to the Department.
  4. The allowable leakage in the test section shall not exceed 500 gallons per mile, per 24 hours, per inch diameter of pipe tested at the 5-foot test head.
  5. If it is necessary or desirable to increase the test head above 5-feet, the allowable leakage will be increased at the rate of 80 gallons for each foot of increase in head.
  6. Test sections showing leakage in excess of that allowed shall be repaired or reconstructed as necessary to reduce the leakage to that specified above, and the line retested, after a minimum period of 24 hours during which no additional water shall be introduced into the line.
- C. Air Test Procedure. Each section of sanitary sewer between two successive manholes shall be tested by plugging all pipe outlets with suitable test plugs. Air shall be slowly added until the internal pressure is raised to 4.0 pounds per square inch gauge (psig). The compressor used to add air to the pipe shall have a blowoff valve set at 5 psig to assure that at no time the internal pressure exceeds 5 psig. The internal pressure of 4 psig shall be maintained for at least two minutes to allow the air temperature to stabilize, after which the air supply shall be disconnected and the pressure allowed to decrease to 3.5 psig. The time in minutes that is required for the internal pressure to drop from 3.5 psig to 2.5 psig shall be measured and the results compared with the values tabulated below.

**Table 7-3: Air Test Procedure**

Pipe Diameter (inches)	Test Time (minutes)	Minimum Distance Between Manholes (feet)
8	4	340
10	5	260
12	6	230
15	7	170
18	9	150
21	10	120
24	11	110
27	13	100
30	14	90
33	16	80
36	17	70
39	18	60
42	19	50

The above tabulated values shall be used for the respective diameter pipes except where the distance between successive manholes is less than the above tabulated values, or the pipe diameter is less than 8-inches, in which case the following formula will be used to determine the test time:

$$(1) T = 0.000183 d^2 L$$

T = test time (minutes)

d = inside diameter of pipe (inches)

L = distance between successive manholes (feet)

If the pressure drop from 3.5 psig to 2.5 psig occurs in less time than the above tabulated or calculated values, the pipe shall be repaired and, if necessary, replaced and [relaidre-laid](#) at the Contractor's expense until the joints and pipe shall hold satisfactorily under this test. The Contractor shall furnish all labor, air test equipment, and all other materials for making the required air test at his or her own expense. After the sewer lines have been properly backfilled to a depth where additional backfilling will not disturb the position of the pipe, all or any sections that the Department may select may be tested. In no case shall the required minimum backfill be less than 4-feet above the top of the pipe before subjecting the line to the test. The Contractor shall supply all equipment, material and perform all tests as required prior to final approval.

- D. **Deflection Test.** Following the placement and densification of backfill, and prior to the placing of permanent pavement, all pipe shall be cleaned and then mandrel measured for obstructions (deflections, joint offsets, and lateral pipe intrusions). A rigid mandrel, with a circular cross-section having a diameter of at least 95% of the specified average inside diameter, shall be pulled through the pipe by hand. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Unless otherwise permitted by the Department, any over-deflected pipe shall be uncovered and, if not damaged, reinstalled.

Damaged pipe lengths shall not be reinstalled, but shall be removed from the work site. Any pipe subjected to any method or process other than removal, which attempts – even successfully – to reduce or cure any deflection, shall be uncovered, removed from the work site, and replaced with new pipe.

The mandrel used shall be:

- effective length not less than its nominal diameter
- fabricated of steel
- fitted with pulling rings at each end
- furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel
- rigid, nonadjustable, with an odd number of legs (9 legs minimum)
- stamped or engraved, on some segment other than a runner, indicating the pipe material specification, nominal size, and mandrel OD

- E. TV Inspection. For wastewater collection systems operated by the County, a TV inspection and report shall be required prior to acceptance.
- F. Force Mains. Each section of pipe to be tested shall be slowly filled with water and all air expelled from the pipe. After the pipe has been filled, it shall be allowed to set for a period of not less than 24 hours. The pipe shall then be refilled to the original water level and subjected to a pressure of not less than 150 pounds per square inch, or the service pressure plus 50 pounds, whichever is greater, for a period of two hours. All exposed joints, bends, angles, and fittings shall be closely examined during the test. Any part of the line which proves to be defective shall be replaced and the line retested. The maximum allowable leakage shall not exceed 100 gallons per mile, per 24 hours, per inch of nominal diameter.

#### 7.2.5 Replacement of Road Surfaces

- A. Timing of Pavement Replacement. Paving replacement shall not proceed until the full requirements of Installation and Testing, above, have been met to the satisfaction of the Department, but in no less than ten (10) days after backfilling has been completed.
- B. Pavement Replacement Requirements. The replacement of all pavement and shoulder surfaces shall be in conformance with Section ~~3.2.2~~ of these Public Improvement Standards, as to materials and methods of construction.

## 8. Utilities

### 8.1 Design Standards

#### 8.1.1 General Provisions

A. Improvements Required. In accordance with Section 21.03.010 (h) of the San Luis Obispo County Code, subdivision improvements shall include electrical, telephone, gas and cable television (where applicable). Other public improvements, as defined in this document, shall include utility improvements where required by conditions of approval or as determined necessary by the Department for reasons of public safety. Utility improvement requirements shall be based on the ultimate density determined from the general plan.

B. Plan Requirements. The intent of these requirements is that sufficient utility detail be shown to permit the Department, or other appropriate agency, to locate all utilities when maintenance to the roads and other utilities in the public right-of-way or easements becomes necessary. The plans shall show the following utility information as a minimum:

1. Show all utilities in detail on the typical street sections. Include trench dimensions, depth, number of lines, and description of lines (line material, size, etc.)
2. Show complete utility layout. Include line location, road crossings, junction boxes, manholes, service connections or stubouts, etc.
3. The typical section shall be in accordance with Standard Drawing U-1.
4. The following note shall be placed on utility improvement plans in an appropriate location relative to the utility improvements:

*“All wire and gas utility connections, distribution lines, and service locations shown on these plans are for information only and should not be considered final design. Utility purveyors may need to alter their design from what is depicted herein based upon future design modifications or during construction. This may result in additional redesign costs or charges to the owner for this work.*

*No revisions to what is depicted herein shall be constructed without the prior approval of County Public Works. No above-ground facilities shall be located where they block the accessible path of travel or intersection or driveway sight distance.*

*Prior to final project acceptance it will be the owner’s responsibility to verify final utility alignments and ensure that adequate easements for such facilities are provided.”*

C. Underground Installation Required. Section 21.03.010 (h) requires that all public utilities, including cable television systems, shall be placed underground for all parcel maps and tract maps located within urban and village areas (as defined in the land use element of the county general plan). The requirement to place utilities underground shall apply to all new facilities, as well as all existing facilities interior to the property being developed. ~~Existing facilities on the perimeter of a development site shall be placed underground, as determined feasible by the Department.~~

- D. Sawcut and Pavement Replacement. Any installations requiring trenching or excavation into existing paved areas, shall comply with the requirements of Section 3.~~2.2~~**F** of these Standards for sawcut and pavement replacement.
  
- E. Service Extensions Required. All utilities shall be installed with service laterals to serve all new lots being created in any subdivision project.
  
- F. Acceptance by Utility. Utility improvements shall not be accepted as complete by the County, until written correspondence has been received from each utility providing service to the subdivision or land use permit project, indicating that their respective facilities are completed to their satisfaction and “ready for service,” or that sufficient financial arrangements have been made to assure same.

## 9. Traffic Control

### 9.1 Design Standards

#### 9.1.1 Work Zone Traffic Control

Work or other activity performed within the County maintained right-of-way or work that may affect traffic flow within the County maintained right-of-way shall only be authorized by one of the following:

- Encroachment Permit issued to a Contractor for each public improvement construction project.
- Encroachment Permit issued for a special event such as a parade, farmers market, commercial filming or similar activity.
- A construction contract awarded by the County.
- A work order issued to County road maintenance crews

~~The requirements which follow shall be implemented by the Encroachment Permit which is issued to the Contractor for each public improvement construction project within existing County road rights-of-way. The intent is to have the requirements clearly depicted on the improvement plans before the work begins.~~

A. Temporary Traffic Control Plan Requirements. ~~Each improvement plan which involves any A Temporary Traffic Control (TTC) Plan shall be prepared for all activity within existing County road rights-of-way. Unless otherwise required by the Department, the TTC plan shall be as follows shall indicate a proposed traffic control plan, consisting of the following items:~~

1. TTC for work performed within the right-of-way but is at least five feet from the edge of traveled way shall follow TA-3 in the CAMUTCD.
2. TTC for work performed within the road shoulder or having a minor encroachment into the traveled way (two feet or less) shall follow TA-6 in the CAMUTCD.
3. TTC for work performed within the roadway on local roads where prevailing speeds are less than 35 MPH and where at least 20 feet remains available for two-way traffic shall follow TA-6 in the CAMUTCD.
4. TTC for work or activities within the right-of-way that require a bike lane closure, a traveled lane closure, or a closure to pedestrian travel shall require a TTC plan prepared by registered civil engineer competent in traffic engineering or other appropriately licensed expert. The TTC plan shall be reviewed and approved by the Department prior to implementation. At a minimum the TTC plan should include:
  - i. The name, signature, and date of the responsible person preparing the TTC plan.
  - ~~1-ii. The plan shall include a~~ A ~~schematic diagram indicating the proposed placement of all construction zone signs and flaggers, including required distances for proper placement of each sign. See Appendix E3 for a summary of construction zone sign designations.~~
  - ~~2-iii. The plan shall r~~References to a standard work zone traffic control plan from the latest edition of the CAMUTCD California Manual on Uniform Traffic Control Devices (MUTCD).

iv. Identify interface locations with a sudden speed transition of 20 mph or greater.

v. Identify locations with unusual sight distance considerations

vi. Identify transit stops, bicycle lanes or sidewalks that may be affected by the TTC zone or activity. Provide detours and signage as appropriate for any closures.

vii. Identify locations for “NO PARKING” signage. Provide signage at least 72 hours prior to any closures.

viii. The plan shall include the County’s standard Traffic Control Notes, see Appendix A3 (and A4).

ix. On road closures requiring a detour or delay, the TTC plan shall include provisions for notification of the following affected agencies and service providers at least 72 hours prior to the closure or delay:

- emergency medical service
- fire protection
- law enforcement
- postal service
- public transit
- waste collection
- school districts

~~B. Significant Work Zone Traffic Control Requirements. Any construction work that requires lane closure on arterial and collector streets within any Urban Reserve Line (as defined by the Circulation Element of the General Plan), or on any arterial road in rural areas, will require the preparation of a traffic control plan, which shall provide details on all signage, delineation, flaggers and other proposed traffic control methods. This type of plan shall also be prepared, when required by the Department, in the following settings:~~

~~1. Any project affecting traffic signal operations shall have a traffic control plan which provides for temporary detection of traffic during construction. The method of temporary detection must be approved by the County Traffic Engineer.~~

~~2. Urban settings with a high concentration of side streets and driveways, such as a Central Business District as defined in the Land Use Element of the County General Plan.~~

~~3. Urban/rural interface locations with a sudden speed transition of 20 mph or greater.~~

~~4. Locations with unusual sight distance considerations.~~

~~5. Any road closure requiring a detour. The plan shall include provisions for notification of the following affected agencies and service providers:~~

- ~~• emergency medical service~~
- ~~• fire protection~~
- ~~• law enforcement~~
- ~~• postal service~~
- ~~• public transit~~
- ~~• waste collection~~

~~Other notifications shall be provided as determined necessary by the Department.~~

~~6. Any situation that does not match the standard layouts in the California MUTCD.~~

~~7. Complex project phasing.~~

~~8. Transit stops, bicycle lanes or sidewalks which are proposed to be closed or relocated during construction.~~

~~C.B.~~ Lane Closure Restrictions. No lane closures are permitted on the roads and between the times listed in the Appendix E3. No lane closure shall be permitted on Friday afternoon before weekends with Federal legal holidays, on the roads listed in the Appendix E3.

#### 9.1.2 Permanent Traffic Control Devices

~~A. Permanent traffic control devices include signs, signals, lighting, roadway striping, and any other devices which are installed by the Developer and which will remain in place following the construction phase. The following requirements apply to all permanent traffic controls which are required in conjunction with any public improvement, as defined in this document.~~

~~B. No change in existing traffic control devices on County maintained roads is authorized unless a work order is issued by the Transportation Division or is specified on a set of plans approved by the Department.~~

~~C. The installation of permanent traffic control devices on County maintained roads shall conform to the current State Standards found in the California Manual of Uniform Traffic Control Devices (CaMUTCD) unless otherwise defined or established by this County standard or by the Department.~~

~~The CaMUTCD makes use of text headings to indicate the importance of various statements and standards.~~

~~1. Standard: The term “Standard”, when used in the CaMUTCD, shall be considered as a requirement for all County maintained roads. The term “shall” in the text of the MUTCD shall be interpreted to mean a Standard.~~

~~2. Guidance: The term “Guidance”, when used in the CaMUTCD shall also be considered as a requirement for all County maintained roads. Exceptions to these requirements may be granted by the Transportation Division Manager when deemed to be in the best interest of the public. The term “should” in the text of the MUTCD shall be interpreted to mean Guidance.~~

~~D. Signage and Striping Plans. A signage and striping plan shall be prepared by a registered civil engineer competent in traffic engineering. The plan shall be approved by the Transportation Division Manager or his designee. Whenever any road widening design anticipates work involves the present or a future need to modify existing lane striping, two striping plans shall be prepared, as follows:~~

~~1. An ultimate striping plan shall assume completion of widening fronting all properties on both sides, for the full length of a block between major intersections, as determined by the Department. This plan shall be used to determine placement of the curb line and any other roadway appurtenances. Passing zones shall be established based on road design speeds.~~

~~2. An interim striping plan shall assume only the completion of the project, and no other improvements in the block. This plan shall be used to determine the transitions that will be required as a function of constructing the project before other work occurs.~~

~~A. Design Criteria. All permanent traffic control devices shall conform to the requirements of the Manual on Uniform Traffic Control Devices, including the California Supplement, State Traffic Manual and State Standard Plans, including the latest editions of the California Manual on Uniform Traffic Control Devices (MUTCD) and State Standard Plans.~~

B.E. Signals and Lighting. Improvement plans for installation or modification of any traffic signal or lighting systems ~~shall conform to the latest requirements of the California Manual on Uniform Traffic Control Devices (MUTCD). These plans~~ shall be reviewed by the County Traffic Engineer, in addition to the standard review by the Development Services Division. Additionally, the following requirements shall apply:

1. Signal installations and modifications shall be fully compliant with the pedestrian access requirements of the Americans with Disabilities Act (ADA) at all corners of the intersection, including audible pedestrian signals and tactile/vibratory pedestrian push buttons.
2. Signal controllers shall be Type 170E, using software specified by the County Traffic Engineer.
3. Signal heads shall be 12-inch LED. Pedestrian signals shall be LED and when designated by the Department, include a countdown function.
4. Street name signs shall be LED illuminated around the sign perimeter and mounted onto the mast arm directly.
5. All signal installations shall have a battery backup system installed. No backup batteries shall be placed in the controller cabinet.
6. All conduits shall be a minimum 3-inch diameter, except for DLC which shall be 1½-inch.
7. Signal standard coatings shall be hot-dipped galvanized. When designated in a community design plan to have the standards a particular color, the standards shall be powder coated.
8. Signal and lighting plans shall include the following note:

*“Special Inspection shall be required by a Certified Traffic Signal Inspector for all phases of the signal and lighting installation. A Schedule of Inspections shall be provided to the Department prior to commencing work. The Inspector’s daily reports shall be provided to the Department prior to acceptance of the work and scheduling a turn-on of the new signal and lighting facility.”*

~~C. Striping Modifications. Whenever the change of position of any existing pavement striping will be greater than 2-feet, the existing striping shall be completely obscured by use of a Chip Seal. This work shall be depicted on the improvement plans. The Chip Seal shall extend the full width of the roadway.~~

## F. PAVEMENT DELINEATION

### 1. Pavement Markings-

- “Stop Bars” and “STOP” pavement markings should be placed on the approaches of minor streets with ADT over 500.
- Pavement markings for parking shall be ADA compliant and should only be installed in the following locations:

- A Central Business District, or
- Near schools or in residential districts when determined necessary by the Transportation Division Manager.

2. Raised Pavement Markers- Raised Pavement Markers should be considered for centerlines in the following locations:

- Arterials and collectors within urban areas,
- Rural roads with ADT greater than 3,000,
- Rural roads where edgelines are also placed, and
- Where the Transportation Division Manager has determined the placement is appropriate and beneficial.

3. Delineation Materials- Thermoplastic should be used in the following locations:

- For pavement markings in the path of travel on roads with over 2000 ADT.
- For centerline markings on roads with over 5000 ADT
- Where directed by the Transportation Division Manager

G. TRAFFIC SIGNS

1. Sign installations: Traffic sign layout shall follow the FHWA Standard Highway Signs Book and the California Coded Sign Specifications.

2. Traffic Signs in Alleys: The vehicle code limits speeds in alleys to 15 MPH and requires all vehicles leaving an alley to yield to all traffic. Therefore, STOP signs and other warning signs are not typically needed within alleys. However, traffic signs may be installed when the Transportation Division Manager has determined that the placement of the signage is appropriate and beneficial. If the needed sign is a regulatory sign, it must also be adopted by County ordinance.

3. Livestock Crossing Signs: Livestock crossing signs (W11-4 (Cow) or (Sheep)) should be placed in areas where appropriate to warn against the danger of livestock on the roadway.

- Place W11-4 and supplemental sign ("Next . Miles") signs at the beginning of the livestock crossing area.
- Place W11-4 signs in each travel direction at intersecting roads.
- Place W11-4 signs in each travel direction at cattle guards.
- Existing "Open Range" signs may remain in place until replacement is needed. These should be replaced with current W11-4 signs as appropriate.

4. Street Name Signs-

- Street name signs for County maintained roads shall be installed per County Standard M-4 and maintained by County Road Crews.
- Street name signs for roads not within the County maintained system shall not be installed or maintained by the County. These signs shall be manufactured by a competent commercial sign maker in accordance with County Public Improvement Standards and shall be installed and maintained under an encroachment permit.
- Street name signs should be installed on one corner at each intersection. Preference should be given to the approach side of the road with higher ADT.
- Street names signs should be reviewed and evaluated for upgrade or replacement on County maintained roads as a part of a pavement overlay or upgrade project.

- Street name signs may be installed on State Highways in those instances for which the intersecting road is County maintained and has an approved name. The sign blade for the highway will designate the appropriate street name for that section of road as well as the State Highway route number in a shield outline.
5. Special Signs: Special signs are signs within the right-of-way that are intended to provide directional guidance to the roadway user and which are not covered elsewhere in this improvement standard.
- All special signs shall be approved by the Transportation Division Manager before installation. It is intended that special signs will be placed in accordance with State and Local standards.
  - Special signs shall be only for displaying traffic guidance information and shall not be used for promoting for a particular business.
  - Road signs that are confusing or misleading to the public shall be removed.
  - Signs placed at the request of the Department shall be installed and maintained by the Roads Crew.
  - Signs placed at the request from outside the Department require an encroachment permit completed by the applicant. These signs shall be either installed and maintained by the Roads Crew or inspected by the Department staff. All costs associated with the installation, maintenance, and inspection by the Department shall be reimbursed by the encroachment permit holder. Examples of these signs include “CAMPING”, “WINERY”, and special event signs.
  - Existing special signs previously installed without an encroachment permit may remain in place until maintenance or replacement is required. At that time the sign shall be removed until a new encroachment permit approved.

#### H. OBJECT MARKERS

1. Type P markers should be placed at the following locations:
  - Corners of all bridge railings on rural roads.
  - At cattle guards.
2. Type L markers should be placed at the following locations:
  - To mark fixed objects (such as trees and railings) or road hazards (such as drop-offs) within two feet of the traveled way on roadways that have over 750 ADT.
3. Type K markers should be placed at the following locations:
  - To mark medians and corners of raised islands.
4. Non retro-reflective markers should be placed to mark the locations of culvert ends to aid in locating culverts in storm conditions. These markers shall be placed no closer than four feet from the traveled way or edge of pavement and shall not interfere with other traffic signs or markings.

## I. DELINEATORS

### 1. Type E delineators should be used at the following locations on roads with ADT greater than 1000:

- At the beginning of dikes or curbs in rural areas that are within eight feet of the traveled way.
- At the nose of metal beam guard railing flares, the end of the flare, and at 25' increments along guardrail.
- Along the outside of curves in and in other locations where the Transportation Division Manager has determined that the placement of delineators is appropriate and beneficial.

## 9.2 Construction Specifications

### 9.2.1 Materials

- A. Signs. All signs, signals, flares, barricades, or other warning devices necessary for the protection and convenience of the public during the construction phase and for permanent installation shall be furnished, installed, and maintained by the Contractor, until final acceptance by the County or other maintenance entity. ~~Signs and other traffic warning devices must be in accordance with the latest edition of the California Manual on Uniform Traffic Control Devices (MUTCD). If approved by the Department, County signs and other equipment for warning traffic may be loaned to the Contractor.~~
- B. Pavement Markings. Pavement markings and delineation shall be two (2) component traffic paint with retroreflective glass beads, the material shall be listed on the Caltrans Authorized Product List for traffic paint, and shall conform to the layouts shown in the *State Standard Plans*. ~~All pavement markings shall be installed by the Developer. Pavement markings and delineation may be thermoplastic, only with prior approval by the Department.~~ The following link contains the current Caltrans authorized product list:

[http://www.dot.ca.gov/hq/esc/approved\\_products\\_list/](http://www.dot.ca.gov/hq/esc/approved_products_list/)

### 9.2.2 Installation

- ~~A. Standard Traffic Control Requirements. The requirements contained in the Standard Traffic Control Notes, as found in Appendix A3, shall apply to the construction of all public improvements. These notes shall be placed in an appropriate location on the plans.~~
- B. Maintenance of Traffic Control Devices. All existing County signs, or other traffic control devices, which will be disturbed by the work shall be removed, stored in an appropriate position, and reset; or maintained in place by the Contractor; as directed by the Department. Any damage to such signs or other devices as a result of the work shall be paid for or replaced at the Contractor's expense.
- C. Signs. Signs shall be connected to 4x4 wooden posts, or 2-inch diameter metal posts, by use of a "through bolt." When a metal post is used, a "sign saddle bracket" shall be used, and no "U-bolts" shall be permitted. Refer to Standard Drawing M-4.
- D. Striping Modifications. Whenever the change of position of any existing pavement striping will be greater than 2-feet, the existing striping shall be completely obscured by use of a Chip Seal or other approved surface treatment. This work shall be depicted on the improvement plans. The surface treatment shall extend the full width of the roadway.

E. Work Zone Inspection: Inspection of the temporary traffic control shall be performed by:

- The Engineer of Work when the work is performed as a part of a private development project within the County maintained right-of-way.
- The section supervisor or designated leadworker when the work is performed by County road crews
- The Contractor's foreman or project representative when the work is performed under County contract: County road construction contracts shall specify that the contractor ensure that the appropriate road construction signage is placed in conformance with this procedure. While inspection is performed by the contractor, contract compliance may be verified by the Resident Engineer.

*(Move the following to 3.2.2)*

~~C. Chip Seal. When Chip Seal is required by the Department (as per 9.1.2D) it shall conform to the following requirements:~~

- ~~1. Chip Seal shall consist of a fine seal coat followed by a fog seal in accordance with the provisions of Section 37-1 of the *State Standard Specifications*. The Department may require the pre-coating of screenings with emulsion. The Department may also permit the elimination of a fog seal.~~
- ~~2. Asphaltic emulsion used for seal coat shall be PMCRS2 conforming to the provisions of Section 94, "Asphaltic Emulsions", of the *State Standard Specifications*. The Department may require the use of PMCRS2H "hard-setting" emulsion, or the use of an alternative rejuvenating agent, such as PASS<sup>®</sup> or Styraflex<sup>®</sup>.~~
- ~~3. Asphaltic emulsion used for fog seal shall be CSS1h, and conform to the provisions of Section 94, "Asphaltic Emulsions," of the *State Standard Specifications*.~~
- ~~4. The rates of application for screenings and asphaltic emulsions shall conform to the provisions of Section 37-1.05, "Applying Asphaltic Emulsion" and Section 37-1.06, "Spreading Screenings" of the *State Standard Specifications*. In order to minimize raveling, the following application rates are recommended:~~

~~Aggregate screening spread rate = 21 – 22 lbs./sqyd~~

~~Chip seal emulsion application rate = 0.29 gal/sqyd~~

~~Fog seal application rate = 0.22 gal/sqyd~~

~~Proposed screenings and emulsion application rates shall be reviewed and approved by the Department prior to construction.~~

- ~~5. The approximate rate of application of the asphaltic emulsion shall be as directed by the Project Engineer and approved by the Department. The temperature at the time of application shall not be less than that which is necessary for proper operation of the oil distribution system.~~
- ~~6. Material Quality – Out of Specification Aggregates shall require a credit to the Department as described in Section 37-1.02 of the *State Standard Specifications*.~~
- ~~7. Brooming shall be required in the event the surface oil application (CSS-1h) is not placed within a suitable time after the screenings have been placed and traffic has disrupted their original distribution.~~

- ~~8. The contractor shall have a standby vehicle containing rock chip screenings available at all times for repairing the surface of the seal coat at locations where it is damaged by traffic before it sets up, and/or at locations where full width coverage of the existing roadway surface has not been obtained to the satisfaction of the Project Engineer.~~
- ~~9. In addition to the requirements of Section 37-1.04, "Preparation for Seal Coat", of the *State Standard Specifications*, the contractor shall temporarily cover any existing utility manhole covers, valve box covers survey monument vault covers and other existing highway facilities to prevent the adherence of any seal coat materials.~~
- ~~10. The contractor, pursuant to Section 22651-M of the California Vehicle Code, shall be responsible for notifying and making arrangements with owners of vehicles parked within the work area, for removal of those vehicles. Notification and posting of signs shall be made a minimum of 24 hours in advance of doing the work. The contractor shall be responsible for posting and marking on the signs the day the work is scheduled.~~
- ~~11. Traffic Control shall conform to the provisions of Section 37-1.03, "Maintaining Traffic", of the *State Standard Specifications*. The Encroachment Permit may have additional specific requirements.~~
- ~~12. All excess chips shall be removed within four (4) days, in accordance with the provisions of Section 37-1.07 of the *State Standard Specifications*. If the contractor does not remove the excess chips to the satisfaction of the Department within the allotted time, no further construction will be permitted on the subject public improvements until said removal operations are completed and accepted by the Department.~~

## 10. Construction of Private Development Projects Completion

### 10.1 Construction Phase

The section generally describes the requirements and responsibilities for all construction and maintenance projects that occur within the County right-of-way. However, the following particular format and procedure are unique to improvements associated with private development projects within the County right-of-way.

#### 10.1.1 Before Construction

A. Pre-Construction Conference. A Pre-Construction Conference is required prior to commencing the work shown on the approved improvement plans. The **Project Engineer of Record** shall arrange this, and notify the Department.

The conference agenda will typically review the following items, as appropriate:

- Construction Schedule,
- Potential Utility conflicts,
- Typical and Special Inspection requirements,
- Unique project safety requirements including
  - trench safety
  - confined space safety,
  - Work Zone Safety,
- Traffic Control and accessibility,
- Environmental site constraints,
- Regulatory permit requirements
- Storm water control and requirements
- Accommodation and coordination with project neighbors, and
- Contact information

The conference shall include the following attendees, as appropriate:

- the Developer,
- the **Project Engineer of Record**,
- the Contractor,
- the Soils Engineer,
- representatives of all affected utility providers,
- representatives of the permitting agencies, and the Department.
- Representatives of other County agencies, such as General Services, Parks, Environmental Health, CalFire or Public Works/Utilities, (where there has been significant involvement by those agencies, ~~depending on the characteristics of the project~~),
- and/or a representative of Cal OSHA (where elements of the project involve construction activities regulated by that agency), and
- the Department
- ~~shall also be invited to the Pre-Construction Conference by the Project Engineer.~~

A. At least ~~one~~ two working day advance notice of the time and location of the conference shall be provided to the Department.

B. Contractor's Requirements. Contractors and subcontractors performing the work under these Standards shall possess a valid State license to perform such work. The Contractor or his/her 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, the work shall be stopped at the direction of the Department.~~

- C. Trench Safety. All work shall be performed in accordance with the requirements of the State of California Department of Industrial Relations. The Contractor shall conform to the permit requirements of the Division of Industrial Safety and shall obtain any necessary trenching permit directly from the Department of Industrial Relations. The Contractor's attention is directed to the provisions of Section 6705 of the Labor Code concerning trench excavation safety plans. Excavation for any trench 5-feet or more in depth shall not begin until the Contractor has obtained a trenching permit from the *California Department of Industrial Relations*.
- D. Temporary Improvements. The installation of temporary improvements for a winter shutdown, in order to make building sites accessible, shall be approved by the Department on an individual basis. In such cases, it shall be expressly understood that such improvements are of a temporary nature only, and that they will be removed and replaced with permanent improvements during the construction season immediately following the season in which the temporary installation was made. It shall be further understood that the approval of the installation of temporary improvements in no way obligates the County for any maintenance of such improvements. These understandings shall be documented, in writing, and signed by the Developer and a representative of the Department.

E. Agency Permits. All needed regulatory permits shall be obtained by the developer prior to starting any work covered by or impacted by those permit(s). The developer shall ensure these permits shall be kept current. Copies of the permit documentation shall be kept on site for review by the Department. Issuance of an encroachment permit or other permits by the County does not relieve the developer from obtaining these permits.

F. Encroachment Permit. After approval of the improvement plans and prior to starting any work within the County right-of-way, the Developer shall obtain an encroachment permit from the Department. Copies of the encroachment permit shall be kept on site for review by the Department or other agency representatives.

#### 10.4.2 During Construction

- A. Inspection by Project Engineer. The Project Engineer shall have the primary responsibility for inspection during the construction of all improvements which are regulated by these Standards. The Project Engineer, at a minimum, shall inspect the following milestones during construction, and provide a written inspection report to the Department:
- Concrete form work
  - Hot Mix Asphalt paving operations
  - Initiating the placement of the roadway base course
  - Substantial completion of roadway base placement and compaction
  - Substantial completion of roadway subgrade excavation/fill placement
  - Trench bedding and compaction

Other required inspections may be determined necessary by the Department, and will be listed during the Pre-Construction Conference.

If the Project Engineer's place of business is not within the boundaries of San Luis Obispo County, or northern Santa Barbara County, he or she shall provide local contact information for someone that can be immediately available to respond to any problems that arise during construction.

#### B. Workplace (and field) Conduct

1. Discriminatory Harassment. In keeping consistent with the San Luis Obispo County Policy Against Discriminatory Harassment, it is expected that developers and their contractors will promote a businesslike workplace (including work sites) that assures courteous treatment for workers, fellow contractors, County employees, and the general public. Harassment or discrimination on the basis of race, religion, national origin, marital status, disability, age, sex or sexual orientation is not to be tolerated.
2. Neighborhood Relations. It is expected that the developer and contractors will promote good relations with the neighbors and public affected by a project. This typically requires regulating construction activity so as to minimize impacts to the neighborhood caused by noise, dust, construction debris, and traffic disruption. Where access or traffic will be delayed, advanced notification must be provided to the affected neighbors as well as to local emergency responders.
3. Work Site Safety. It is incumbent on the contractor to control the work site and provide a safe working environment. Contractor shall require employees to wear appropriate personal protective equipment while on the work site.
4. Work Site Control. It is incumbent on the contractor to control the work site and ensure all erosion control measures, traffic control devices are in place and properly maintained. The work site shall also be kept in a clean and orderly manner.

B.C. Inspection by Department. In addition, each phase of improvements must first be inspected and approved by the Department prior to the Contractor's proceeding with subsequent phases. Each phase shall be inspected as the Department considers necessary, but in any case the Department shall make an inspection within two working days after receiving a request for inspection from the Project Engineer.

The Department may inspect, as considered necessary, any public improvements as defined in this document. Any improvements constructed without approval as provided above, or constructed contrary to the approved plans, will be deemed as not complying with these Standards and will not be accepted.

C.D. Bond Reduction. Under the provisions of the *Subdivision Map Act* it is possible to request a reduction of a subdivision Performance Bond following completion of a substantial portion of the work. However, no reduction may be made of the subdivision Payment & Materials Bond, nor of the Guarantee Bond. The Department is not required to support bond reduction requests and may only grant such requests based on special circumstances which prohibit timely project completion. More information about bond reduction procedure is available from the Department.

D.E. 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. Spillage resulting from hauling operations along or across existing streets or roads shall be removed immediately by the Contractor. All gutters and roadside ditches shall be kept clean and free from obstructions. Any deviation from this practice shall have prior approval from the Department.

### 10.4.3 Project Completion

Once the work on the project site is complete, including site cleanup, dressing and hydroseeding graded slopes, completion of all utility and drainage facilities and removal of temporary traffic control devices from public roads, the Project Engineer may initiate the final processing of the improvements.

A. Clean Up. 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 or her, remove all

surplus construction materials and rubbish of all kinds from the grounds which he or she has occupied and leave them in a neat condition.

- B. Request for Final Processing. The Project Engineer shall make a Request for Final Processing, in writing to the Department. This request shall include the following components:
- “Ready-to-Serve” letters from all utility providers
  - Core sample, R-value, structural section and compaction reports
  - Manufacturers’ certificates of compliance for HMA, base, concrete and other materials as needed
  - Project Engineer’s certification (required format available from the Department)
  - Record Drawings which show all changes which were made during construction

If the Request for Final Processing does not include all the information listed above, it shall be returned to the Project Engineer and will not be reviewed by the Department.

- C. Preliminary Inspection. The Department shall conduct a Preliminary Inspection within five (5) business days of receiving a complete Request for Final Processing. A list will be generated of any defects or deficiencies which need to be remedied. If it appears during this inspection that substantial items of work are incomplete, the Department will terminate the inspection and no further review will be conducted.

- D. Final Inspection. The Project Engineer works with the Developer to correct the items on the list from the Preliminary Inspection. When all items have been addressed, the Project Engineer shall request a Final Inspection. The Department shall conduct a Final Inspection within two (2) business days of receiving this request.

- E. Record Drawings. During the progress of the work, the Project Engineer shall maintain one set of prints of the improvement plans showing all as-built changes. Each as-built change shall be approved by the Department before being made. This set shall be available on the job for inspection by the Department at any time. Upon completion of the work, the Project Engineer shall make as-built changes on the original plans, and return them to the Department prior to the County’s acceptance of the project.

- F. Improvements to be Accepted for County Maintenance. For any public improvement which is to be accepted for County maintenance, the Project Engineer shall submit records of the improvements to be accepted, in Microsoft Excel® format, along with AutoCAD® files of all construction drawings. Each new street shall have postmile control established, beginning at zero, based on increasing from west to east or from south to north. Existing streets shall be based on current postmile data provided by the Department. All intersections, culverts, bridges and drainage inlets shall be referenced to the postmiles. The required data format is included in Appendix A5.

- F.G. Aged Improvements to be Accepted for County Maintenance. Roads offered for acceptance that have aged at least five years or have a pavement condition index (PCI) less than 90 may require further improvement before being accepted into the County maintained system. Typically the road may require a chip seal, micorseal, or other surface treatment. Likewise other facilities with significant wear or age when offered for acceptance to the County may require improvement or reconditioning prior to acceptance.

- G.H. Timing of grading certifications. Certification of pad elevation and compaction shall be provided to the Department prior to foundations being poured. Certification of non-subdivision grading and drainage, as defined in Section 2.1.3 G of these Standards, will be required prior to the Department determining final completion of the project improvements. If building activity continues beyond the time of this non-subdivision grading and drainage certification, the Department will perform one final review of the site prior to releasing its hold on occupancy of any new structures.

H.I. Relationship with Building Permits. Public improvements required as conditions of approval for subdivisions or land use permits shall either be completed or bonded for, prior to issuance of permits for construction of any new structures.

All public improvements shall be completed prior to occupancy of any new structures.