

San Luis Obispo County

Department of Public Works & Transportation



2014 Public Improvement Standards

Available Online at:

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



San Luis Obispo County
Department of Public Works & Transportation
Dave Flynn, Interim Director

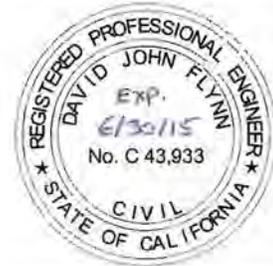
2014 Public Improvement Standards

Adopted by the Board of Supervisors:

Resolution No. 2014-
September 23, 2014

Approved:

David J. Flynn, PE
Interim Director of Public Works



Recommended for Approval:

Frank Honeycutt, PE
Development Services Engineer



Contents

Introduction	i
A. Applicability of the Standard and Publications	i
B. Definitions in the State Specifications	iii
C. Definitions in These Public Improvement Standards	iv
D. Other Regulatory Agencies	v
1 Improvement Plans	1-1
1.1 Preparation of Plans	1-1
1.1.1 Plan Review Procedure	1-1
1.1.2 Plans Layout	1-2
1.1.3 Plans Format	1-3
1.2 Design Exceptions	1-5
1.3 Americans with Disability Act Requirements	1-6
2 Site Preparation & Grading	2-1
2.1 Design Standards	2-1
2.1.1 Site Preparation	2-2
2.1.2 Grading Design	2-2
2.1.3 Special Requirements for On-Site Grading	2-5
2.2 Construction Specifications	2-8
2.2.1 Materials	2-8
2.2.2 Construction	2-8
3 Roadways	3-1
3.1 Design Standards	3-1
3.1.1 Definitions	3-2
3.1.2 Design Criteria	3-2
3.2 Construction Specifications	3-9
3.2.1 Construction and Materials	3-9
3.2.2 Testing	3-13
4 Road Edges	4-1
4.1 Design Standards	4-1
4.1.1 Sight Distance	4-1
4.1.2 Sidewalks	4-1
4.1.3 Multi-Use Paths	4-2
4.1.4 Pedestrian Crossings	4-2
4.1.5 Driveways	4-4
4.1.6 Angled Parking	4-5
4.1.7 Trees Trimming and Removal within the Right-of-Way	4-6
4.1.8 Trees and Landscaping within the Right-of-Way	4-7
4.1.9 Other Design Standards	4-9
5 Storm Drainage	5-1
5.1 Design Standards	5-1
5.1.1 Hydrology	5-2
5.1.2 Hydraulic Design Standards	5-2
5.1.3 San Luis Obispo Creek Watershed Drainage Design Manual	5-3
5.1.4 Diversion of Drainage	5-4
5.1.5 Alignment of Drainage Facilities	5-5
5.1.6 Drainage Structures	5-5
5.1.7 Flood Control Basins	5-7
5.1.8 Alignment of Drainage Facilities	5-10
5.1.9 Channels and Swales	5-10

5.1.10 Culverts	5-12
5.1.11 Outfalls	5-13
5.1.11 Drainage Pumps	5-14
5.2 Construction Specifications	5-15
5.2.1 Installation requirements	5-15
5.2.2 Materials	5-15
6 Water Supply	6-1
6.1 Design Standards	6-1
6.1.1 Quantity of Water	6-1
6.1.2 Areas of Conflict Between Water and Sewer Lines	6-5
6.1.3 Distribution System	6-5
6.1.4 Cross Connections	6-7
6.1.5 Water Well Metering	6-8
6.2 Construction Specifications	6-8
6.2.1 Materials	6-8
6.2.2 Installation	6-12
6.2.3 Testing	6-15
6.2.4 Replacement of Road Surfaces	6-16
7 Wastewater Disposal	7-1
7.1 Design Standards	7-1
7.1.1 Quantity of Flow	7-1
7.1.2 Collection System	7-1
7.1.3 Areas of Conflict Between Sewer and Water Lines	7-3
7.1.4 Areas of Conflict Between Sewer and Storm Drain Lines	7-3
7.2 Construction Specifications	7-3
7.2.1 Materials	7-3
7.2.2 Facilities	7-4
7.2.3 Installation	7-5
7.2.4 Testing	7-7
7.2.5 Replacement of Road Surfaces	7-10
8 Utilities	8-1
8.1 Design Standards	8-1
8.1.1 General Provisions	8-1
9 Traffic Control	9-1
9.1 Design Standards	9-1
9.1.1 Work Zone Traffic Control	9-1
9.1.2 Permanent Traffic Controls	9-2
9.2 Construction Specifications	9-3
9.2.1 Materials	9-5
9.2.2 Installation	9-6
10 Construction of Private Development Projects	10-1
10.1 Before Construction	10-1
10.2 During Construction	10-2
10.3 Project Completion	10-3

Appendix

Improvement Plans	A
A1: General Notes	
A2: Erosion Control Notes	
A3: Traffic Control Notes	
A4: Traffic Signal Plan Notes	
A5: Public Improvements Acceptance for County Maintenance Inventory Data Requirements	
A6: Requirements for Subdivision Grading Permit Exceptions	
A7: Design Exception Request Application	
Erosion and Sedimentation Control	B
B1: References	
B2: Geotextile Selection	
B3: Structural and Treatment Control Best Management Practices	
Concrete	C
C1: Concrete Mix Designations	
C2: Compressive Strength Testing of Concrete	
C3: Concrete Mix by Type of Construction	
Road Design	D
D1: Street Design Considerations	
D2: Clearance and Maintenance Requirements for County Rights-of-Way	
D3: Recommendations for Installing Marked Crosswalks	
Encroachment	E
E1: Policies Regarding Trees	
E2: (INCLUDE) Public Work Approved Tree Planting List	
E3: County Lane Closure Restriction List UPDATE	
E4: List of California Temporary Traffic Control Signs	
Drainage	F
F1: Drainage Report Format	
F2: “n” Values for Manning’s Formula	
Waterline	G
G1: Waterline Disinfection Procedures	

Standard Construction Drawings

(Following Appendix)

Page Intentionally Left Blank

**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.

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.

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:

<u>SECTION</u>	<u>DESCRIPTION</u>
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 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
- 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 maintenance and repair 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 and do not supersede 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 –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 Department.

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 *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.

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 & 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.

Page Intentionally Left Blank

Section 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. Planning and Building Department – Project Planner for condition compliance
- ii. General Services – Parks Division
- iii. Public Health – Environmental Health Division
- iv. Utilities – Community Services Districts, PG&E, So Cal Gas, etc.

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. Plans are not approved, until such time as the Department signifies approval by signature on the title sheet of the original drawings. 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. 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.

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 (CA-MUTCD)*. The standard traffic control notes shall be placed on the same sheet, see Appendix. 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.
- 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.
- 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:
- Date
 - Name and/or number of the project
 - Project Engineer's name, professional registration number, seal and signature, as required by the Professional Engineers' Act
 - Scale of the drawing
 - Sheet number and total number of sheets
 - Sheet title
 - 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_x)
 - Storm Drains: Hydraulic Grade Line (HGL), Slope (S), Design Flow & Storm (Q_x)
 - 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.

- 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.
- J. Benchmark. The plans shall reference a published *National Geodetic Survey* (NGS) benchmark on datum 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.
- 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.
- 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.
- 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:
 - Utility plan shall include the note in 8.1.1 B 4.
 - Signal and Lighting plans shall include the note in 9.1.2 C 8.
 - 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

From time to time, unusual site conditions may 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). 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 Director of Public Works or his designee: (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 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.

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 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):
- 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)

- 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). 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.

Page Intentionally Left Blank

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 which 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.

- B. 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.
- C. 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 lateral clearance requirements, as defined in Section 4.1.9 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.
- D. 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 15-2.02 of the *State Standards*.
- E. Grinding Hot Mix Asphalt (HMA). Grinding of existing HMA pavement, to prepare for overlay, shall conform to Section 42 of the *State Standards*.
- F. 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.
- G. 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 in place, as determined by the Department. If a culvert is removed, the area shall be re-compacted to the requirements of this document, and of the project soils and geological report. If a culvert is abandoned-in-place, it shall conform to the requirements of Section 15-2 of the *State Standards Specifications*.
- H. 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:

- Title 19, Building and Construction Ordinance.
- 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. 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*.

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 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 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.

- H. Slope Easements Required. Slope maintenance easements shall be required 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 also provide for access and working space rights.

I. Retaining Walls. Prior approval is required for the construction of any reinforced concrete, 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:

- Design Tables from the *State Standard Plans*
- Design Tables from an approved alternate reference
- Designs prepared, signed and sealed by a registered civil 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.
3. Any wall greater than 30-inches in exposed height 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. The Engineer of Work shall demonstrate that wall designs are appropriate for the soil and loading conditions.

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 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 15th and October 15th stockpiles remaining in-active for longer than one week shall be covered with plastic and secured to control dust.
9. Between October 15th and April 15th (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: 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.

1. Parking shall conform to the 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. 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.
5. Accessible Path of Travel shall be clearly shown and labeled on plans.
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.
7. Standard parking spaces shall have a slope between 1.5% and 5% in any direction.
8. 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.

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. 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 block retaining walls – Shall conform to CBC Chapters 18 “Soils and Foundations” and the manufacturer’s recommendations.”
 4. Railings – Shall be in conformance with *State Standard Specification* for “Pipe Handrailing,” Section 83-1.02A and CBC Chapter 10, Section 1013 “Guards.”
 5. See Appendix C for additional requirements.

2.2.2 Construction

- A. Compaction Standards. The Project Engineer shall collect compaction data throughout construction and 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 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

Page Intentionally Left Blank

3. Roadways

3.1 Design Standards

3.1.1 Definitions

- A. 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.
- B. 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-1f.
- C. 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.
- 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.
- 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.
- 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.
- 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.

- 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. 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 85th 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.
- J. Roadway Structural Section Factor of Safety. High volume roadways with projected Average Daily Traffic (ADT) of 6000 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

- A. 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.
- B. 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.
- 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.
 - 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.
- C. Horizontal Alignment. Compound curves shall be avoided whenever possible. There shall be a minimum 50-foot separation between horizontal curves.
- 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.
- 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. In no case shall this angle be less than 80 degrees.

- 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 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, the roadway travel lanes shall be at least 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*.

- 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.
- 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.
- 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.
- 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.
- 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 , 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 = WS²/60** 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.

All other tapers including shoulders, parking lands, and bike lanes shall be designed at a minimum ratio of 5 (longitudinal): 1 (lateral).

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.

ROAD TYPE	TURNING REQUIREMENT
ARTERIALS	California Legal Vehicle 50-foot radius PER HDM Figure 404.5C
COLLECTORS	
COMMERCIAL ZONE	
INDUSTRIAL ZONE	
RURAL ROADS	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)
RESIDENTIAL (URBAN)	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)

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 way 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 less than 5,000 at build out.
- 2:1 minimum on roads with an estimated ADT less than 5,000 at build out.
- The Department may approve (via the design exception process) steeper slopes when the following conditions are demonstrated:
 - Proposed slopes have been determined to be geotechnically stable
 - The lateral clearances are maintained
 - Adequate erosion control can be established
 - Adequate access for maintenance is 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. 1.0 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. (See Appendix) 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.
- T. 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.

U. Rumble Strips: Rumble Strips are pavement grooves 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

3.2.1 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. Class 2 base 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 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.
- 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.

- 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.
- 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.
- 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.

- 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 .
 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 inspect and 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).

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

3. Steel plates subject to bicycle, auto, 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.

3.2.2 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. 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.
- 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 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. 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 the Appendix.

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:

- 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 alternate path 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.
- 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.
- 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 warranted. 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.
- E. Crossing Locations. Multi-use paths which cross public streets or roads shall cross only at intersections.

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.
 - B. High Speed Roads. Crosswalks shall not typically be marked on roads with prevailing speeds of 40 mph and above. Where approved, these crossings will require additional signage or other improvements.
 - 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.
 - 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..
- 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.
- 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.
 - F. School Crosswalks. School Crosswalks shall be established 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.
 - 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 85th 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.

- 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 3.1.2 Q 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.

- 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 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.
- 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. Driveways on collector streets and roads shall conform to the Encroachment permit provisions.
- F. Driveways on Arterial Streets and Roads. Driveways on arterial streets and roads shall conform to the following requirements:
1. Driveway access to major activity centers shall be located no closer than 200-feet to the adjacent intersection.
 2. Driveways may only be served by a break in a center median when such a break is not detrimental to the traffic flow.

3. The distance between driveways along commercially developed arterial streets and roads shall not be less than 200-feet.
4. Where possible, driveways shall be located on cross streets or roads, rather than on arterial streets or roads.
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. With Department approval, angled parking within public improvements shall only be located in the following:
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, which are not located on defined arterial and collector roadways.
 3. Potential major traffic generators which are not located on defined arterial and collector roadways.

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.

4.1.9 Other Design Standards

A. Lateral Clearance

1. 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. Examples of unyielding fixed objects include, but are not limited to: trees; utility poles, transformers or other above-ground facilities; 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 lateral clearance include landscaping other than trees, and signs mounted on standards with “break-away” provisions. See Standard Drawing U-1.

Road Type		Lateral Clearance
Rural Road	35 MPH or more	10 Feet
	30 MPH or less	5 Feet
Urban Road	With Curbs	10 Feet
	Without Curbs	10 Feet
	Residential Zone without Curbs	5 Feet

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

- B. Preservation of Trees. Existing trees within the area of any roadway public improvement may 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 for information on preservation of trees.

- C. Railings and Barriers. Railings and barriers shall be placed as needed to address roadway safety conditions, accommodate pedestrian and bicycle traffic, and comply with ADA requirements and 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 obstacles prior to proposing installation of guard railing as an appropriate solution.
2. Bikeways. Railings shall be installed on structures and along the pavement edge where embankment slopes drop off steeper than 2:1 within the lateral clearance requirement. 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 is within 5 feet and the slope exceeds 3:1. For locations along a sidewalk where the dropoff is greater than 6-inches but less than 30-inches , a 6-inch warning curb shall be installed along the edge in conformance with *CalDAG*. 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 .

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. 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. (See Appendix). 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. 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.
- F. 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.
- G. Hot Mix Asphalt Dikes. Dikes shall be used where needed for proper control of roadway drainage and shall 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 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.

5. Storm Drainage

5.1 Design Standards

These standards are intended to fulfill the requirements of the National Flood Insurance Program and 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 peak 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.

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.

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 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 ¹	Secondary Design Storm ²
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:
 - The velocity head within the main culvert into which the inlet (and lateral, if any) discharges or which the manhole serves,
 - The head loss within said lateral, and
 - 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. Conveyance of Drainage in Urban Areas. Drainage shall be conveyed in surface facilities such as bioswales, street gutters and cross-gutters to the maximum extent possible. 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.
- 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>

5.1.4 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 & Wildlife, U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service, Regional Water Quality Control Board, and others as required.)

5.1.5 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 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. 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.
- 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.

5.1.6 Drainage Structures

- 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 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 $\frac{1}{2}$ 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. Any 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.
- 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 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.

5.1.7 Flood Control Basins

Three types of flood control basins are utilized in San Luis Obispo County, as determined appropriate by site conditions and project requirements: retention basins, 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 5.1.6 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.

- 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. Subsurface basins may be used for either retention or detention of site runoff, where their application is suitable for project conditions. Subsurface basins shall be limited to locations where the depth to seasonally high groundwater is greater than 10-feet. The Project Engineer must 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 percolation 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. 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.
 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 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 75% 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.

- A. Design Criteria. The following shall be considered and presented in the design of bio-retention basins (and swales).
1. Lateral distance to vehicle travel lanes, bike lanes, and pedestrian paths
 2. Vertical drop offs adjacent to travel lanes, bike lanes, and pedestrian paths
 3. Long term percolation rate
 4. Landscape establishment and irrigation, if any
 5. Maintenance practicality including landscape maintenance and maintenance access
 6. Surface (vehicle) loading characteristics
 7. Porosity of engineered soil (BSM)
- B. Materials
1. 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
 2. Filter fabric is prone to clogging and shall not normally be used within the right-of-way.
 3. 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.
- C. Maintenance: 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.

5.1.9 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. 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 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.
 3. The maximum velocity in constructed, unlined earth channels or swales shall not exceed that which would cause erosion; which is typically less than 4 fps.
 4. The maximum velocity concrete lined channels 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.

5.1.10 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 precast reinforced concrete pipe, corrugated steel pipe, or HDPE corrugated pipe with smooth interior walls. 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. 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.

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

- G. Separation from Water Mains. There shall be a minimum 12-inch separation (O.D. to O.D.) between storm drains and water 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
- 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*.

5.1.11 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*.

5.1.12 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 Construction Specifications

5.2.1 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.

5.2.2 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. 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.
 3. High-Density Polyethylene (HDPE) 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 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 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 (3/4) 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

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

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 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 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 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 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.
 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 3/4" 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 3/4" 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 ¾-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.
 5. For 1 ½-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.
 6. Bronze Gate Valve. All 1 ½-inch through 3-inch gate valves shall be all bronze and comply with AWWA Standard C500.
 7. Standard Service Clamps. All service clamps and straps shall be in accordance with AWWA Standards and the pipe manufacturer's recommendations.
 8. 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 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 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 Procedural Memorandum O-3. (See Appendix)

- 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 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 Sewer and Water 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.

7.1.4 Areas of Conflict between Sewer and Storm Drain 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 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).
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

- 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-inch by 2-inch by 36-inch 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 re-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 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:
“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.
- D. Sawcut and Pavement Replacement. Any installations requiring trenching or excavation into existing paved areas, shall comply with the requirements of Section 3 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.

Page Intentionally Left Blank

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
- A. Temporary Traffic Control Plan Requirements. 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 :
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.
 - ii. A schematic diagram indicating the proposed placement of all construction zone signs and flaggers, including required distances for proper placement of each.
 - iii. References to a standard work zone traffic control plan from the latest edition of the CAMUTCD.
 - 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 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. 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

Permanent traffic control devices include signs, signals, lighting, roadway striping, and any other traffic control devices which are installed to direct or guide traffic and which will remain in place following the construction phase.

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.

- A. CaMUTCD. 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.
- B. 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 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.

C. Signals and Lighting. Improvement plans for installation or modification of any traffic signal or lighting systems 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.”

D. 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

E. 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.

F. 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.

G. DELINEATORS. 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.

- 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*. The following link contains the current Caltrans authorized product list:

http://www.dot.ca.gov/hq/esc/approved_products_list/

9.2.2 Installation

- A. 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.
- B. 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.
- 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 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.
- D. 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 standard. While inspection is performed by the contractor, contract compliance may be verified by the Resident Engineer.

10. Construction of Private Development Projects

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 Before Construction

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

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

- Contact information,
- 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
- Any unique projects constraints.

The conference shall include the following attendees, as appropriate:

- The Developer,
- The Engineer of Work,
- The Contractor,
- The Soils Engineer,
- Representatives of the affected utility providers,
- Representatives of the permitting agencies,.
- Representatives of other County agencies, such as General Services, Parks, Environmental Health, CalFire or Public Works/Utilities, (where there has been involvement by those agencies),
- Representative of Cal OSHA (where elements of the project involve construction activities regulated by that agency), and
- The Department

At least 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.

- 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.

10.2 During Construction

- A. Inspection by Engineer of Work. The Engineer of Work shall have the primary responsibility for inspection during the construction of all improvements which are regulated by these Standards. The Engineer of Work, 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 Engineer of Work'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. When 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 clean and orderly.

- 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 Engineer of Work.

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, may be deemed as not complying with these Standards and may be rejected.

- 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.

- 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.

10.3 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 Engineer of Work 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
 - Engineer of Work’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 may be returned to the Engineer of Work and 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 may terminate the inspection without further review.
- D. Final Inspection. The Engineer of Work shall work with the Developer to correct the items on the list from the Preliminary Inspection. When all items have been addressed, the Engineer of Work 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 Engineer of Work 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 Engineer of Work 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 Engineer of Work 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 the Appendix.
- 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, a 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.
- 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 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.

- 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.

THIS PAGE LEFT BLANK INTENTIONALLY

THIS PAGE LEFT BLANK INTENTIONALLY

San Luis Obispo County

Department of Public Works & Transportation



2014 Standard Construction Drawings

Available Online at:

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

Standard Construction Drawings

Rural Road Standards

Rural Road Design Criteria	A-1
Typical Rural Road Section - Multiuse Path	A-1a
Typical Rural Road Section - Less than 400 Future ADT	A-1b
Typical Rural Road Section - 401 to 1000 Future ADT	A-1c
Typical Rural Road Section - 1001 to 6000 Future ADT	A-1d
Typical Rural Road Section - Over 6000 Future ADT	A-1e
Typical Rural Road Section - Gravel Road Standard	A-1f

Urban Street Standards

Urban Street Design Criteria	A-2
Typical Street Road Section - Multiuse Path	A-2a
Typical Street Road Section - Urban Residential w/o Sidewalks	A-2b
Typical Street Road Section - Less than 500 Future ADT	A-2c
Typical Street Road Section - 500 to 6000 Future ADT	A-2d
Typical Street Road Section - 6001 to 16000 Future ADT	A-2e
Typical Street Road Section - 16001 to 24000 Future ADT	A-2f

Commercial-Industrial Road Standards

Commercial - Industrial Road Design Criteria	A-3
Typical Commercial-Industrial - Rural Roads	
Less Than 5000 Future ADT	A-3a
Typical Commercial-Industrial - Urban Streets	
Less Than 5000 & 5000-16000 Future ADT	A-3b
Typical Commercial-Industrial - Urban Streets Greater Than 16000 Future ADT	A-3c

Road Design Criteria

Stopping Sight Distance on Sag Vertical Curves	A-4
Stopping Sight Distance on Crest Vertical Curves	A-4a
Super-Elevation on Horizontal Curves	A-4b

Sight Distance Design Criteria

Stopping Sight Distance on Horizontal Curves	A-5
Intersection & Driveway Sight Distance	A-5a
Site Distance Control Areas	A-5b

Road Layout Criteria

Rural Cul-de-Sac	A-6
Urban Cul-de-Sac	A-6a
Typical Knuckle	A-6b
Urban Bus Turnout & Loading Area	A-6c
Rural Bus Turnout & Loading Area	A-6c.1
Standard Bulb-Out (Angled Parking on Major Road)	A-6d
Standard Bulb-Out (Parallel Parking on Major Road)	A-6e

Driveways: Rural

Rural Driveway, Layout Standards	B-1
Rural Residential Driveway, for Edge of Pavement (No Dike)	B-1a
Rural Residential Driveway, for Type "A" HMA Dike	B-1b

Driveways: Rural (continued)

Rural Residential Driveway, for Type "D" & "E" HMA Dikes	B-1b.1
Rural Residential Driveway, for Edge of Pavement with Culvert	B-1c
Rural Residential Driveway, for Edge of Pavement w/ Retaining Wall	B-1d
Rural Driveway Approach, for use on High Speed and/or High Volume Roadways	B-1e
Rural Residential Driveway, Use of Pavers within the Right-of-Way	B-1f

Driveways: Urban

Urban Residential Driveway, Layout Standards	B-2
Urban Residential Driveway, Residential Driveway	B-2a

Driveways: Commercial-Industrial

Commercial-Industrial Driveway, Layout Standards	B-3
Commercial-Industrial Driveway, Standard Driveway	B-3a
Commercial-Industrial Driveway, High Volume Driveway	B-3b
Commercial-Industrial Driveway, Upward / Downward Driveway	B-3c

Curb, Gutter & Sidewalk

Expansion & Weakened Plane Joint Requirements	C-1
Type "A" Concrete Curb & Gutter	C-2
Type "C" Concrete Curb	C-2a
Hot Mix Asphalt (HMA) Dikes	C-3
Sidewalks	C-4
Curb Ramps	C-5
Hot Mix Asphalt Ramp Detail	C-5a

Drainage

Deep Retention Basin	D-1
Shallow Retention Basin	D-1a
Catch Basin	D-2
Rural Catch Basin - Edge of Pavement Condition	D-2a
Rural Catch Basin - Hot Mix Asphalt Dike Condition	D-2b
Road Side Infiltrator (RSI)	D-2c
Storm Drain Manhole for Pipe Diameters from 18" to 36"	D-3
Storm Drain Manhole for Pipe Diameters Greater Than 36"	D-3a
Sidewalk Underdrain, Residential	D-4
Sidewalk Underdrain, Residential Parkway (LID Alternative)	D-4a
Sidewalk Underdrain, Commercial (Zero Setback)	D-4b
Cross Gutter & Spandrel	D-5

Hydrology

Average Annual Rainfall	H-1
Time of Concentration for Watershed Less Than 200 Acres	H-2
Runoff Coefficients for Developed Areas	H-3
Runoff Coefficients for Undeveloped Areas	H-3a
Rainfall Intensity Data	H-4
Rock Slope Protection Sizing Method at Culvert Outlets	H-5

Layout

Standard County Title Blocks	L-1
Standard Abbreviations	L-2

Miscellaneous

Standard Street Monument for Paved Roads	M-1
Standard Street Monument for Gravel Roads	M-1a
Metal Beam Barricade	M-2
Temporary Wood Beam Barricade	M-2a
Sidewalk Barricade	M-3
Standard Street Sign	M-4
Tree Planting in the Right-of-Way	M-5
Tree Trimming Methods	M-5a
Tree Protection Detail	M-5b
Storm Drain Marker	M-6

Repair

Allowable Pavement Seam Locations	R-1
Rural Road Widening	R-2
Urban Street Widening	R-2a
Trench Repair, Transverse Trenches and Bore Pits	R-3
Trench Repair, Longitudinal Trenches	R-3a
Curb, Gutter & Sidewalk Repair	R-4

Sanitary Sewer

Sewer Manhole	S-1
Sewer Drop Manhole	S-1a
Sewer Main Cleanout	S-2
Sewer Lateral	S-3
Sewer Lateral for Deep Mains	S-3a

Utilities

Location of Utilities	U-1
Location of Service Laterals	U-2
Utility Separation Criteria	U-3
Utility Separation Criteria, Case 1: New Sewer Mains	U-3a
Utility Separation Criteria, Case 2: New Water Mains	U-3b
Trench Detail, Paved Surfaces	U-4
Trench Detail, Outside Roadway Prism	U-4a
Shallow Trench Detail	U-4b

Water

Thrust Block Requirements, 1 of 2	W-1
Thrust Block Requirements, 2 of 2	W-1a
Fire Hydrant Detail	W-2
Valve Anchor & Box	W-3
Water Service Connection	W-4
1-1/2" Blow-Off Assembly	W-5
2" Blow-Off Assembly	W-5a
Air and Vacuum Relief Assembly	W-6
Water Sampling Station	W-7
New Waterline Connection Details	W-8
New Waterline Flushing Detail	W-9
Waterline Cut-In Tee & Hot Tap Assembly	W-10

THIS PAGE LEFT BLANK INTENTIONALLY

THIS PAGE LEFT BLANK INTENTIONALLY

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 2	REM	NOV 07			

CRITERIA	ADT <250	ADT 250-400	ADT 401-1000	ADT 1001-3000	ADT 3001-10000
----------	-------------	----------------	-----------------	------------------	-------------------

DESIGN SPEED, MILES PER HOUR, (MINIMUM)

FLAT	40	50	50	55	55
ROLLING	30	40	40	40	45
MOUNTAINOUS	20	20	30	30	35

CURVE RADIUS, FT. (MINIMUM)

FLAT	510	830	830	1050	1050
ROLLING	275	510	510	510	670
MOUNTAINOUS	110	115	250	275	350

GRADE, PERCENT (MAXIMUM)

FLAT	7	6	6	6	6
ROLLING	9	8	8	8	8
MOUNTAINOUS	12	12	10	10	10

NOTES:

1. ADT IS BASED UPON A 20-YEAR PROJECTION.
2. ADT IN EXCESS OF 5,000 WILL REQUIRE SPECIAL DESIGN REQUIREMENTS BY THE DEPARTMENT.
3. SUPERELEVATION MAY BE REQUIRED, SEE STANDARD DRAWING A-4b.
4. THE STRUCTURAL SECTION SHALL BE BASED ON THE TRAFFIC INDEX AS PROVIDED BY THE DEPARTMENT.
5. RIGHT OF WAY SHALL BE THE MINIMUM REQUIRED BY THE DESIGN STANDARDS.
6. FOR ADT <250 GRADES MAY BE INCREASED BY 150% FOR RELATIVELY SHORT LENGTHS.

FLAT ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE LITTLE OR NO TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE AND WHICH COULD BE CONSTRUCTED WITH MINOR CUTS AND FILLS.

ROLLING ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE WHICH REQUIRE SOME MODERATE CUTS AND FILL.

MOUNTAINOUS ROADWAYS ARE THOSE SECTIONS OF ROADWAY WHICH REQUIRE MAXIMUM OR NEAR MAXIMUM GRADES AND MINIMUM CURVE RADII IN ORDER TO REDUCE THE CUTS AND FILLS TO PRACTICAL AND VISUALLY ACCEPTABLE HEIGHTS.

THE DETERMINATION OF FLAT, ROLLING, OR MOUNTAINOUS ROADWAYS SHALL BE UNIFORM OVER THE FULL LENGTH OF A ROADWAY EXCEPT WHERE THE DEPARTMENT DETERMINES THAT A SAFE TRANSITION MAY BE MADE.



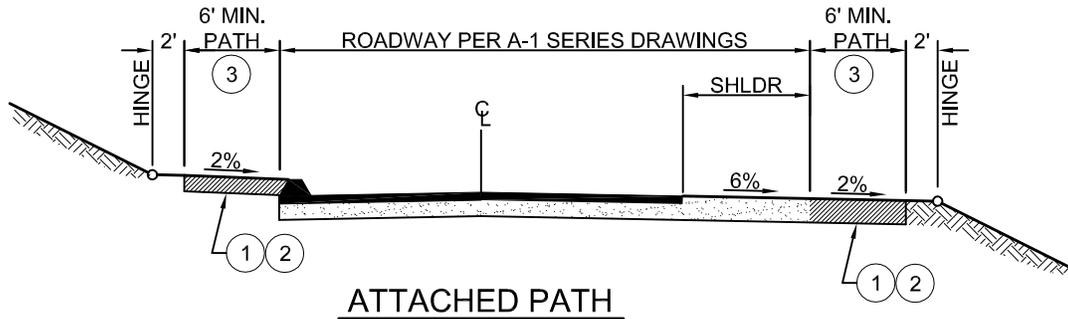
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

RURAL ROAD DESIGN CRITERIA

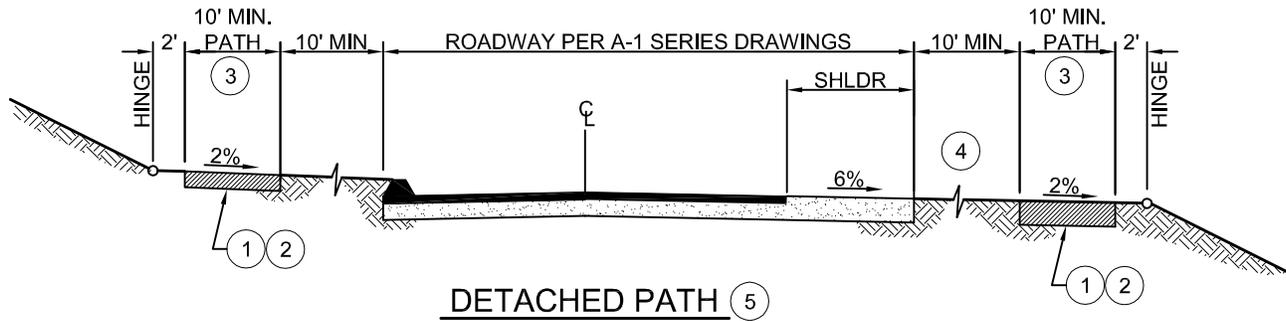
Scale:	Adopted: 2011
Drawing No:	A-1
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTES 1 & 8	GDM	JAN 11			
REVISED NOTES 3 THROUGH 7	FH	AUG 14			



ATTACHED PATH



DETACHED PATH (5)

NOTES:

1. THE LONGITUDINAL GRADE ON THE DETACHED PATH SHALL MATCH THE ADJACENT ROADWAY GRADE.
2. PATH MATERIAL SHALL BE: 6-INCHES MINIMUM DEPTH ANGULAR DECOMPOSED GRANITE WITH A MAXIMUM AGGREGATE SIZE OF 3/8-INCH OR LESS AND COMPACTED TO A MINIMUM OF 90%. NATIVE SANDY MATERIAL MAY BE USED IF IT IS CONFINED EITHER BY THE ROADWAY OR BY AN APPROVED ROOT BARRIER INSTALLED ON BOTH SIDES OF PATH, AND CONSTRUCTED TO A MINIMUM DEPTH OF OF 24-INCHES AND COMPACTED TO 90%. THE PATH SHALL BE TOLERANT TO NORMAL USE AND RESISTANT TO EROSION.
3. NO OBSTACLES OR AT-GRADE VAULTS SHALL BE LOCATED WITHIN THE LIMITS OF THE PATH. ADJACENT TO THE PATH THE FOLLOWING MINIMUM LATERAL CLEARANCES TO OBSTACLES SHALL BE MAINTAINED:
 2' MINIMUM LATERAL CLEARANCE ON EACH SIDE OF PATH.
 5' MINIMUM LATERAL CLEARANCE FROM NEW TREES, SHRUBS AND OTHER OBSTRUCTIONS.
 10' MINIMUM LATERAL CLEARANCE FROM UNFENCED DRAINAGE BASINS.
 12' MINIMUM LATERAL CLEARANCE TO OVERHEAD BRANCHES, SIGNS, AND OTHER ABOVE GRADE OBSTACLES.
4. RURAL ROADS WITH PREVAILING SPEEDS OF 45 MPH OR GREATER OR HAVE AN ADT OF 3,000 OR GREATER SHALL REQUIRE A DETACHED PATH.
5. NO PORTION OF THE PATH SHALL BE USED AS PART OF A SURFACE DRAINAGE CONVEYANCE SYSTEM.
6. IF DRAINAGE FACILITIES ARE REQUIRED THEY SHALL BE EITHER STORM DRAIN PIPES WITH A MINIMUM COVER OF 1-FOOT OVER THE PATH OR A CONCRETE DRY CROSSING (DESIGN TO BE APPROVED BY THE DEPARTMENT).
7. PATH SIGNAGE MAY BE REQUIRED AND MUST HAVE PRIOR APPROVAL FROM THE COUNTY PARKS & RECREATION.

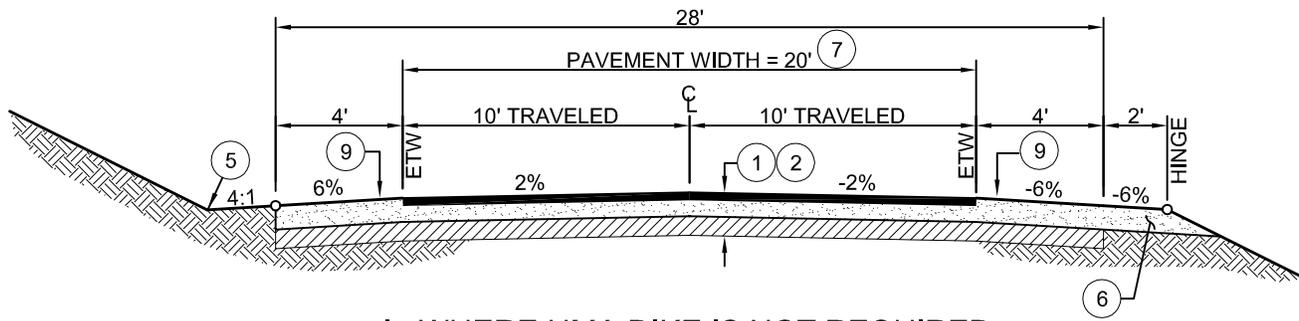


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL RURAL ROAD SECTION
 MULTIUSE PATH

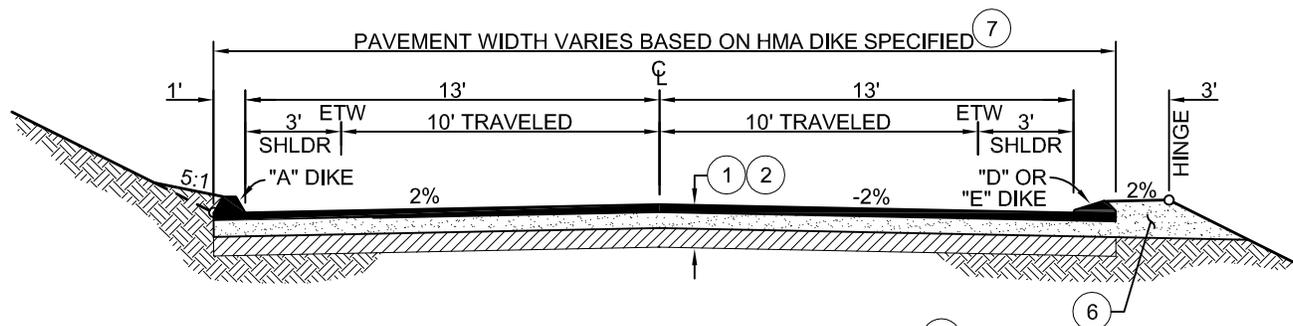
Scale: NTS	Adopted: 2014
Drawing No: A-1a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 7	REM	NOV 07	NOTE 9		MAY 14
REPLACE AC WITH HMA, NOTE 4	GDM	JAN 11	REVISE NOTES 2, 3 & 6, DELETE NOTES 7, 8 & 9		AUG 14



I: WHERE HMA DIKE IS NOT REQUIRED



II: WHERE HMA DIKE IS REQUIRED

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 ■ HOT MIX ASPHALT (HMA), OVER
 ▨ CLASS II AGGREGATE BASE, OVER
 ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
4. HMA DIKE REQUIREMENTS PER C-3.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE TURN AND/OR BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.

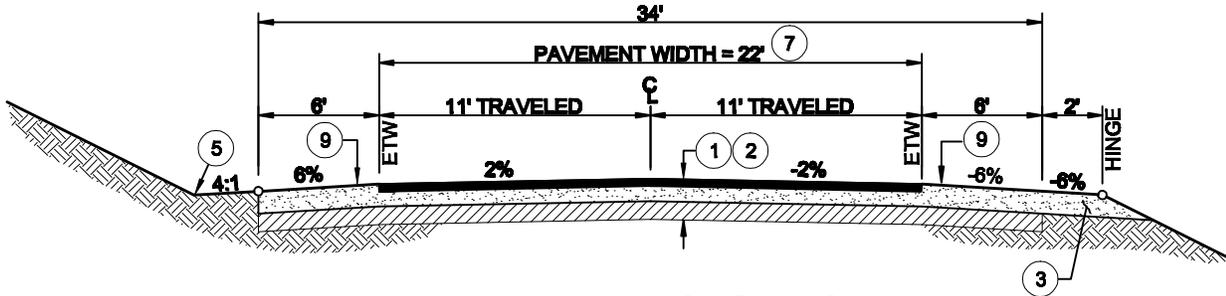


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL RURAL ROAD SECTION
 LESS THAN 400 FUTURE ADT

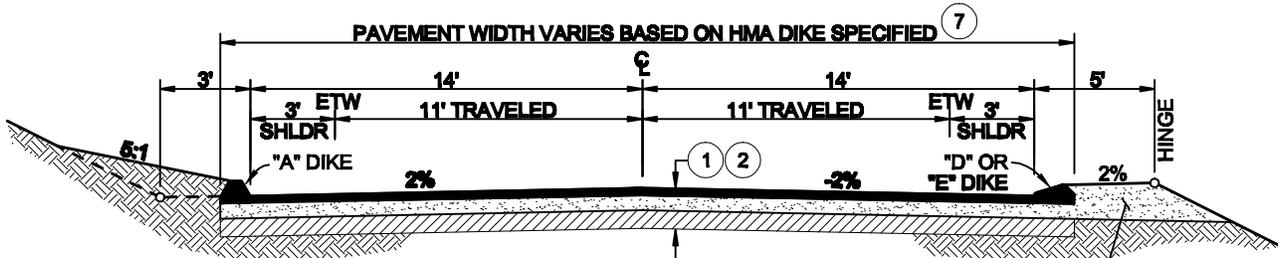
Scale: NTS	Adopted: 2014
Drawing No: A-1b	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 7	REM	NOV 07	NOTE 9		MAY 14
REPLACE AC WITH HMA, NOTE 4	GDM	JAN 11	REVISE NOTES 2, 3 & 6, DELETE NOTES 7 & 8		AUG 14



I: WHERE HMA DIKE IS NOT REQUIRED



II: WHERE HMA DIKE IS REQUIRED

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5- FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 ■■■■■ HOT MIX ASPHALT (HMA), OVER
 ■■■■■ CLASS II AGGREGATE BASE, OVER
 ■■■■■ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
4. HMA DIKE REQUIREMENTS PER C-3.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER.
6. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE TURN AND/OR BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.

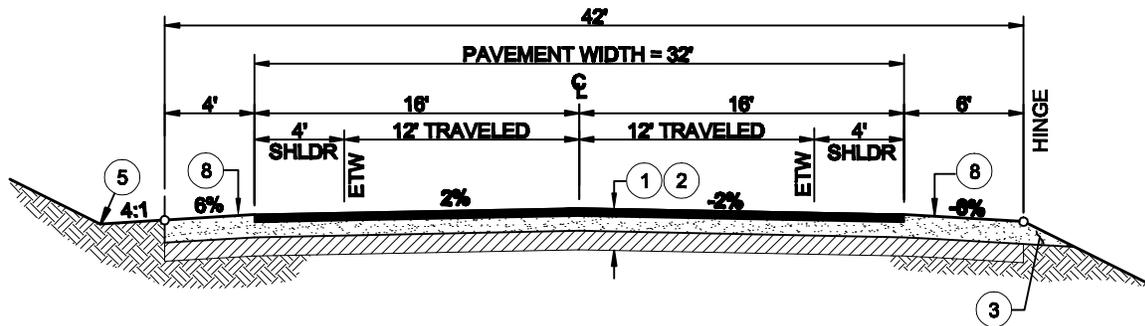


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL RURAL ROAD SECTION
401 TO 1000 FUTURE ADT**

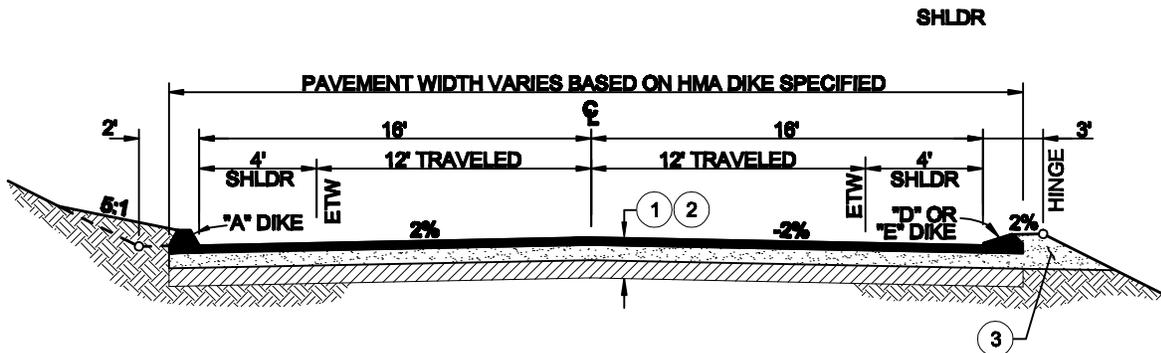
Scale: NTS	Adopted: 2014
Drawing No:	A1c
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
CHANGE 6,000 TO 5,000 FUTURE ADT	REM	NOV 07	CHANGE FUTURE ADT RANGE, NOTE 9, SHLDR DIMS		MAY 14
REPLACE AC WITH HMA, NOTE 4, 3' MIN. TO HINGE	GDM	JAN 11	REVISE NOTES 2 & 3, DELETE NOTES 6,7,& 8		AUG 14



I: WHERE HMA DIKE IS NOT REQUIRED



II: WHERE HMA DIKE IS REQUIRED

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5- FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 ■■■■ HOT MIX ASPHALT (HMA), OVER
 ■■■■ CLASS II AGGREGATE BASE, OVER
 ■■■■ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
4. HMA DIKE REQUIREMENTS PER C-3.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER.

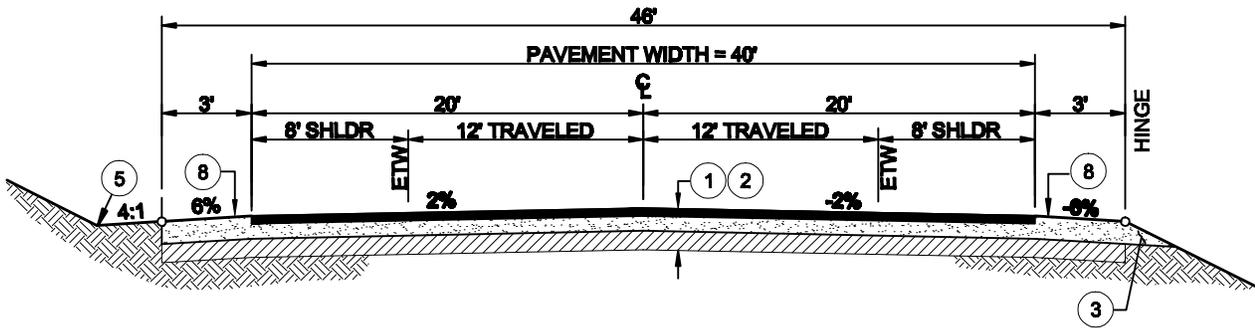


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL RURAL ROAD SECTION
1001 TO 6000 FUTURE ADT**

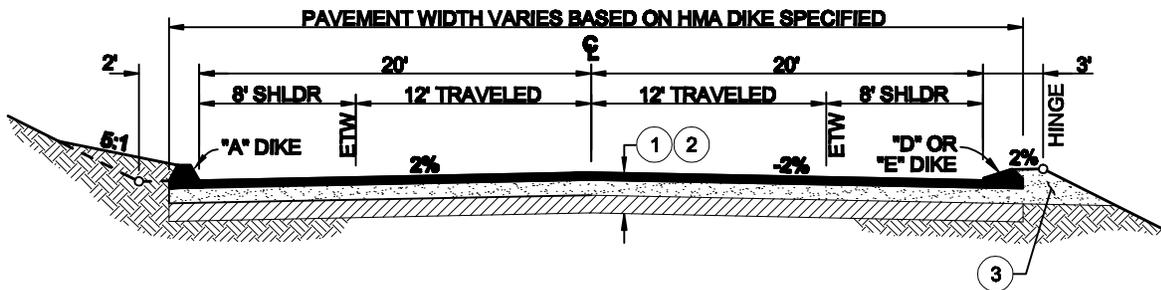
Scale: NTS	Adopted: 2014
Drawing No: A-1d	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
CHANGE 6,000 TO 5,000 FUTURE ADT	REM	NOV 07	ADT RANGE, NOTE 8		MAY 14
REPLACE AC WITH HMA, NOTE 4, 3' MIN. TO HINGE	GDM	JAN 11	REVISE NOTES 2 & 3, DELETE NOTES 6, 7 & 8		AUG 14



I: WHERE HMA DIKE IS NOT REQUIRED



II: WHERE HMA DIKE IS REQUIRED

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 ■ HOT MIX ASPHALT (HMA), OVER
 ▨ CLASS II AGGREGATE BASE, OVER
 ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
4. HMA DIKE REQUIREMENTS PER C-3.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER.

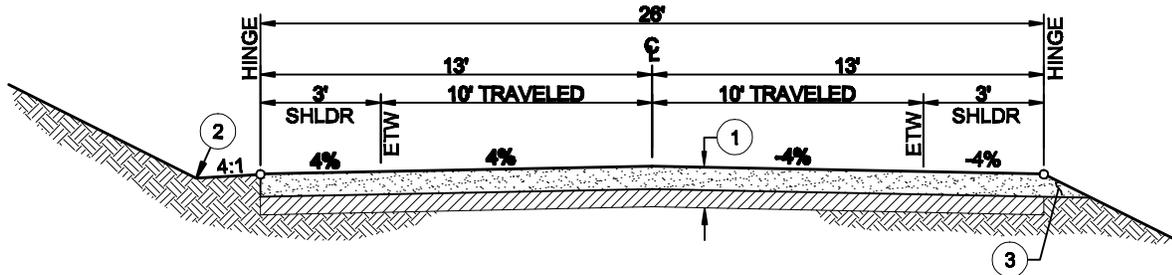


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL RURAL ROAD SECTION
 OVER 6000 FUTURE ADT

Scale: NTS	Adopted: 2014
Drawing No: A-1e	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
10' TRAVEL LANE	REM	NOV 07			
REVISE NOTES 2 AND 3	FH	AUG 14			



NOTES:

1. TYPICAL SECTION SHALL BE:

- 4" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION FOR R ≥40, OR
- 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION FOR R <40, OVER
- 12" MINIMUM SUBGRADE COMPACTED TO 95% RELATIVE COMPACTION

2. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.

3. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.

DESIGN CRITERIA

	MIN. DESIGN SPEED	MIN. CURVE RADIUS	MAX. GRADE
FLAT	30 mph	275 ft	7%
ROLLING	20 mph	130 ft	12%
MOUNTAIN	15 mph	75 ft	12%

DESIGN CRITERIA NOTES:

- 1. OPTION FOR USE IN RURAL AND AGRICULTURAL LAND USE CATEGORIES WHERE THE 20 YEAR PROJECTED ADT DOES NOT EXCEED 100.**
- 2. MINIMUM LONGITUDINAL SLOPE SHALL BE 0.50%.**
- 3. GRADES GREATER THAN 12% SHALL REQUIRE PAVED SURFACES PER DRAWING A-1b AND THE FIRE AGENCY STANDARDS.**



**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL RURAL ROAD SECTION
GRAVEL ROAD STANDARD**

Scale:	Adopted:
NTS	2014
Drawing No:	A-1f
Sheet No:	1 of 1

THIS PAGE LEFT BLANK INTENTIONALLY

THIS PAGE LEFT BLANK INTENTIONALLY

Revisions

Description	Approved	Date	Description	Approved	Date

CRITERIA	ADT <500	ADT 500-1500	ADT 1500-5000	ADT >5000
----------	-------------	-----------------	------------------	--------------

DESIGN SPEED, MILES PER HOUR, (MINIMUM)

FLAT	25	35	45	45
ROLLING	25	35	40	40
MOUNTAINOUS	20	30	35	35

CURVE RADIUS, FT. (MINIMUM)

FLAT	250	600	1100	1100
ROLLING	250	600	800	800
MOUNTAINOUS	125	400	600	600

GRADE, PERCENT (MAXIMUM)

FLAT	7	6	4	3
ROLLING	12	9	6	5
MOUNTAINOUS	15	13	8	7

NOTES:

1. ADT IS BASED UPON A 20-YEAR PROJECTION.
2. SUPERELEVATION NOT PERMITTED ON URBAN ROADS.
3. THE STRUCTURAL SECTION SHALL BE BASED ON THE TRAFFIC INDEX AS PROVIDED BY THE DEPARTMENT.
4. RIGHT OF WAY SHALL BE THE MINIMUM REQUIRED BY THE DESIGN STANDARDS.

FLAT ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE LITTLE OR NO TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE AND WHICH COULD BE CONSTRUCTED WITH MINOR CUTS AND FILLS.

ROLLING ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE WHICH REQUIRE SOME MODERATE CUTS AND FILL.

MOUNTAINOUS ROADWAYS ARE THOSE SECTIONS OF ROADWAY WHICH REQUIRE MAXIMUM OR NEAR MAXIMUM GRADES AND MINIMUM CURVE RADII IN ORDER TO REDUCE THE CUTS AND FILLS TO PRACTICAL AND VISUALLY ACCEPTABLE HEIGHTS.

THE DETERMINATION OF FLAT, ROLLING, OR MOUNTAINOUS ROADWAYS SHALL BE UNIFORM OVER THE FULL LENGTH OF A ROADWAY EXCEPT WHERE THE DEPARTMENT DETERMINES THAT A SAFE TRANSITION MAY BE MADE.

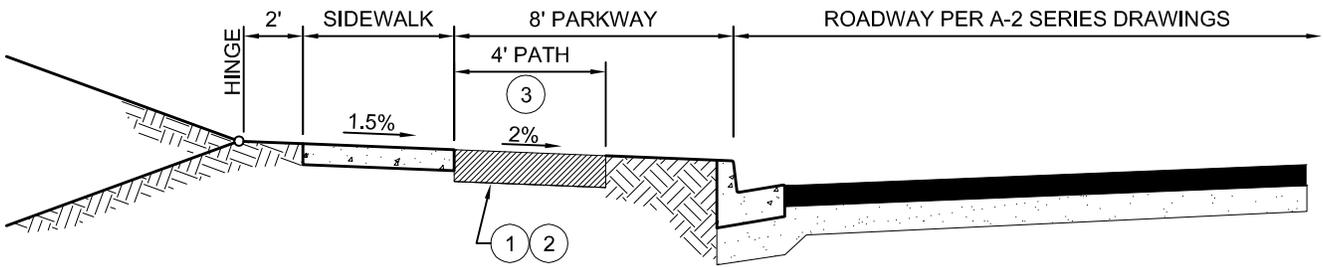


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
URBAN STREET DESIGN CRITERIA**

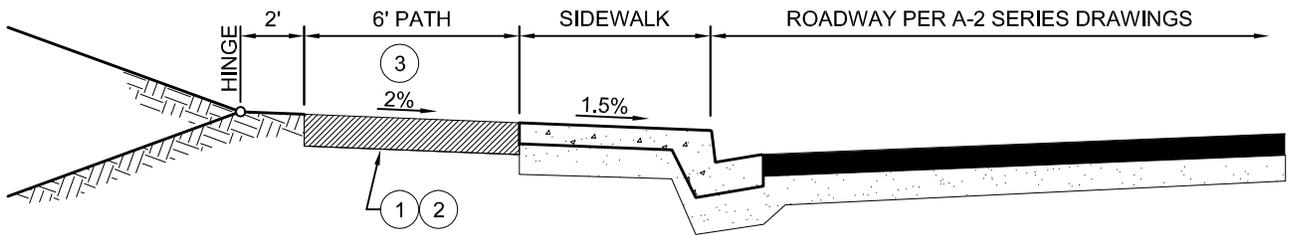
Scale:	Adopted: 2011
Drawing No:	A-2
Sheet No:	1 OF 1

Revisions

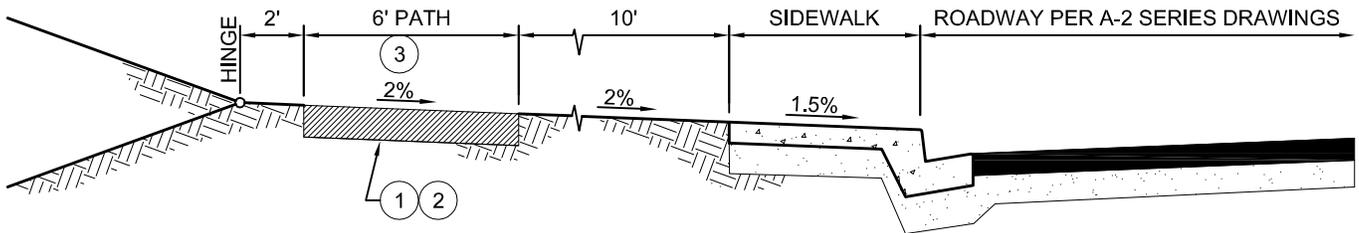
Description	Approved	Date	Description	Approved	Date
NOTES 1 & 8	GDM	JAN 11			
REVISE NOTES 4, 5, 6 AND 7	FH	AUG 14			



ATTACHED PATH



ATTACHED PATH W/O PARKWAY



DETACHED PATH - $\geq 45\text{mph}$ & 3,000 ADT ④

NOTES:

1. THE LONGITUDINAL GRADE OF THE DETACHED PATH SHALL MATCH THE ADJACENT ROADWAY GRADE.
2. PATH MATERIAL SHALL BE: 6-INCHES MINIMUM DEPTH ANGULAR DECOMPOSED GRANITE WITH A MAXIMUM AGGREGATE SIZE OF 3/8-INCH OR LESS AND COMPACTED TO A MINIMUM OF 90%. NATIVE SANDY MATERIAL MAY BE USED IF IT IS CONFINED EITHER BY THE ROADWAY OR BY AN APPROVED ROOT BARRIER INSTALLED ON BOTH SIDES OF PATH, AND CONSTRUCTED TO A MINIMUM DEPTH OF 24-INCHES AND COMPACTED TO 90%. THE PATH SHALL BE TOLERANT TO NORMAL USE AND RESISTANT TO EROSION.
3. NO OBSTACLES OR AT-GRADE VAULTS SHALL BE LOCATED WITHIN THE LIMITS OF THE PATH. ADJACENT TO THE PATH THE FOLLOWING MINIMUM CLEARANCES TO OBSTACLES SHALL BE MAINTAINED:
 MINIMUM OF 2' CLEARANCE ON EACH SIDE OF PATH.
 MINIMUM OF 5' CLEARANCE FROM NEW TREES, SHRUBS, AND OTHER OBSTRUCTIONS.
 MINIMUM OF 10' CLEARANCE FROM UNFENCED DRAINAGE BASINS.
 MINIMUM OF 12' CLEARANCE TO OVERHEAD BRANCHES, SIGNS, AND OTHER ABOVE GRADE OBSTACLES.
4. URBAN ROADS WITH PREVAILING SPEEDS OF 45 MPH OR GREATER OR HAVE AN ADT OF 3,000 OR GREATER SHALL LOCATE THE PATH 5-FEET FROM THE BACK OF SIDEWALK.
5. NO PORTION OF THE PATH SHALL BE USED AS PART OF A SURFACE DRAINAGE CONVEYANCE SYSTEM.
6. IF DRAINAGE FACILITIES ARE REQUIRED THEY SHALL BE EITHER STORM DRAIN PIPES WITH A MINIMUM COVER OF 1-FOOT OVER THE PATH OR A CONCRETE DRY CROSSING (DESIGN TO BE APPROVED BY THE DEPARTMENT).
7. PATH SIGNAGE MAY BE REQUIRED AND MUST HAVE PRIOR APPROVAL FROM THE COUNTY PARKS & RECREATION.

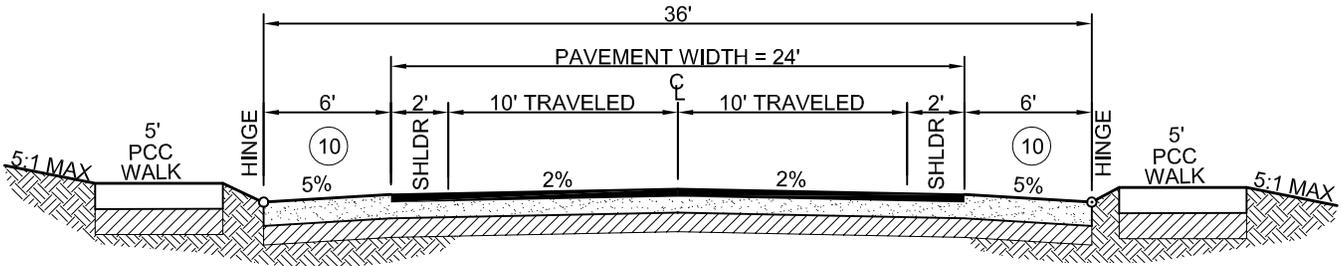


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL URBAN STREET SECTION
 MULTIUSE PATH

Scale: NTS	Adopted: 2014
Drawing No: A-2a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 7	REM	NOV 07	NOTES 3-10, FIGURE		MAY 14
REPLACE AC WITH HMA, NOTE 4	GDM	JAN 11	REVISE NOTES 2,3,,5 AND 7	FH	AUG 14



NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 - HOT MIX ASPHALT (HMA), OVER
 - ▨ CLASS II AGGREGATE BASE, OVER
 - ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE HINGE POINT.
3. CUT AND FILL SLOPES SHALL NOT EXCEED 5 HORIZONTAL:1 VERTICAL.
4. TRAVELED LANE WIDTH MAY BE INCREASED TO 12' ON ROAD SEGMENTS CLASSIFIED AS A COLLECTOR OR AS A CLASS III BIKE ROUTE
5. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE TURNING LANES AND/OR BICYCLE LANES ARE REQUIRED.
6. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
7. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
8. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
9. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.
10. ALTERNATIVE: PARKING LANE AND SHOULDER MAY BE SURFACED WITH TURF OR LANDSCAPE PAVERS WHERE PRIVATE MAINTENANCE SOURCE IS APPROVED BY DEPARTMENT.

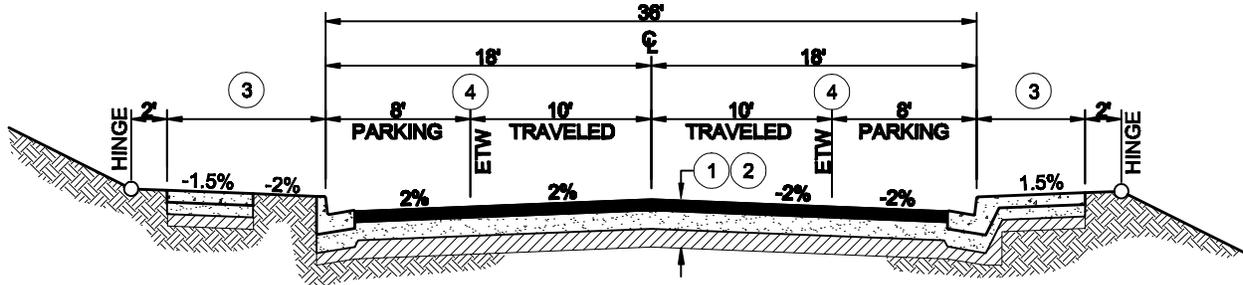


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL URBAN STREET SECTION FOR
RESIDENTIAL AREAS WITHOUT CURBS**

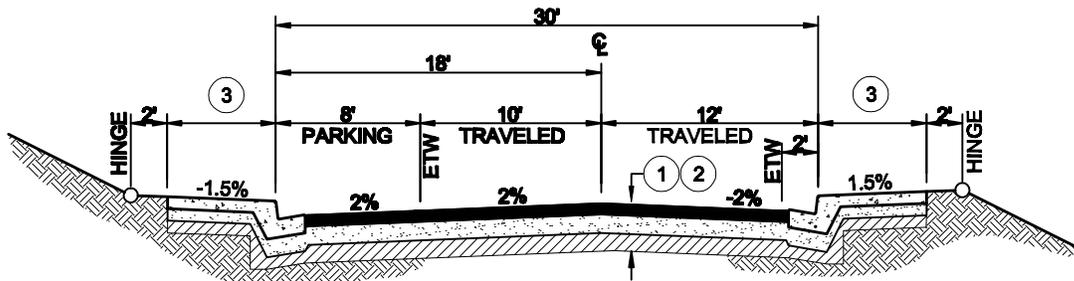
Scale: NTS	Adopted: 2014
Drawing No: A-2b	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 5	REM	NOV 07	FUTURE ADT		MAY 14
REPLACE AC WITH HMA	GDM	JAN 11	REVISE NOTES 2 - 7, DELETE NOTES 8 & 9		AUG 14



I: LESS THAN 500 FUTURE ADT-FLAT & ROLLING



II: LESS THAN 500 FUTURE ADT-MOUNTAINOUS

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 - HOT MIX ASPHALT (HMA, OVER
 - ▨ CLASS II AGGREGATE BASE, OVER
 - ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
4. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE TURN AND/OR BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
5. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
6. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
7. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.

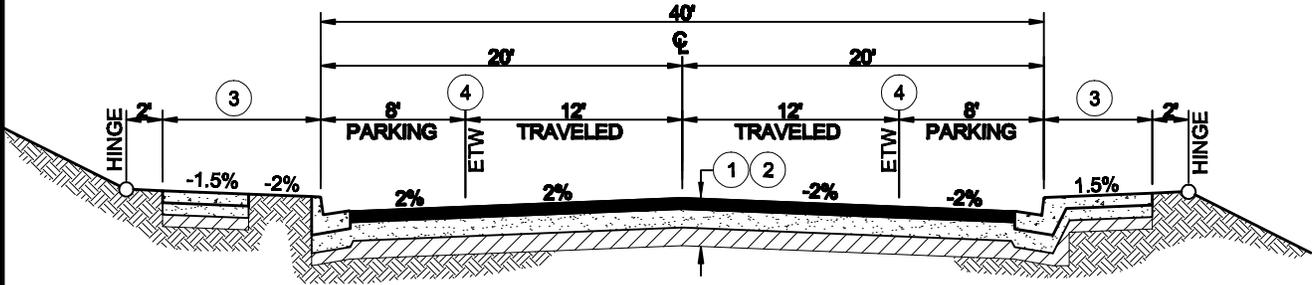


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL URBAN STREET SECTION
LESS THAN 500 FUTURE ADT**

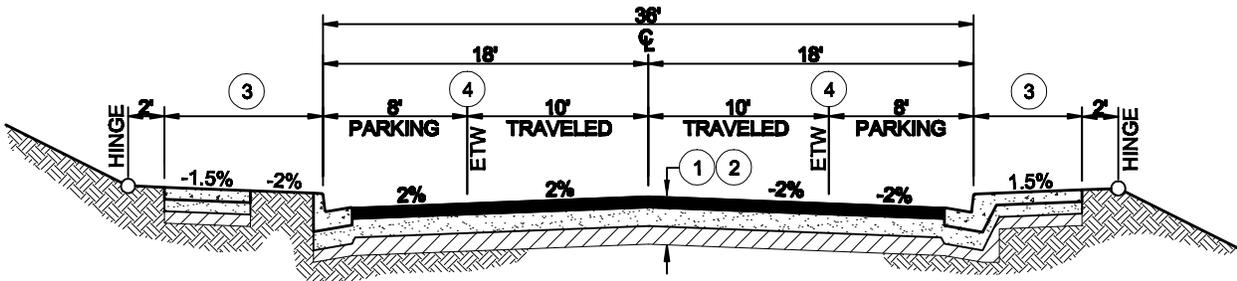
Scale: NTS	Adopted: 2014
Drawing No: A-2c	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 5	REM	NOV 07	FUTURE ADT		MAY 14
REPLACE AC WITH HMA	GDM	JAN 11	REVISE NOTES 2 - 7, DELETE NOTES 8 & 9		AUG 14



I: 500 TO 6000 FUTURE ADT-FLAT



II: 500 TO 1500 FUTURE ADT-ROLLING & MOUNTAINOUS

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 - HOT MIX ASPHALT (HMA), OVER
 - ▨ CLASS II AGGREGATE BASE, OVER
 - ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
4. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE TURN AND/OR BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
5. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
6. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
7. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.

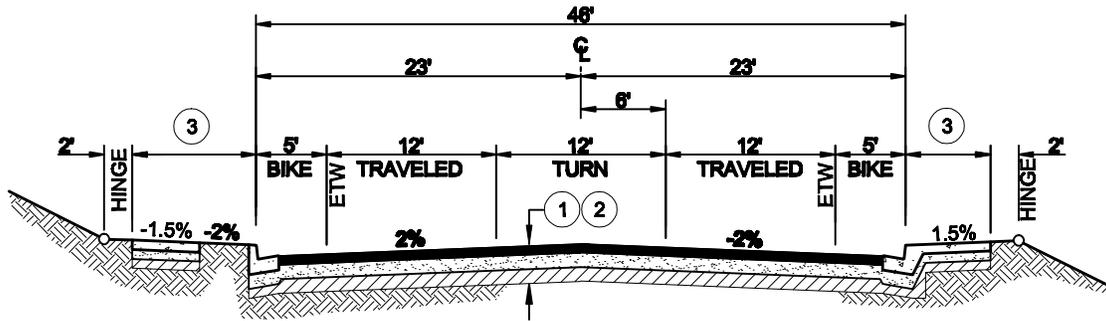


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL URBAN STREET SECTION
500 TO 6000 FUTURE ADT**

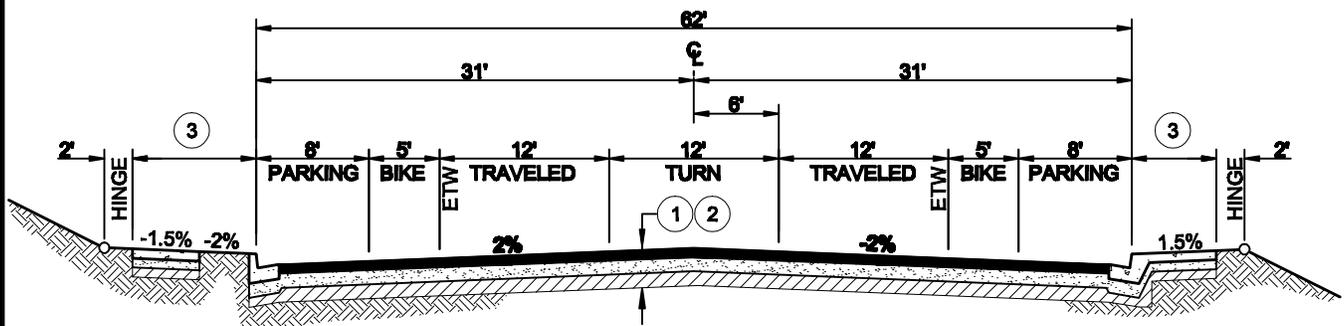
Scale: NTS	Adopted: 2014
Drawing No: A-2d	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
REPLACE AC WITH HMA, NOTE 3	GDM	JAN 11	REVISE NOTES 2 - 6, DELETE NOTES 7 & 8		AUG 14
FUTURE ADT		MAY 14			



I: 6001 TO 16000 FUTURE ADT WITHOUT PARKING



II: 6001 TO 16000 FUTURE ADT WITH PARKING

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5- FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.

2. TYPICAL SECTION SHALL BE:

■ HOT MIX ASPHALT (HMA), OVER

▨ CLASS II AGGREGATE BASE, OVER

▨ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).

3. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.

4. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.

5. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.

6. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.

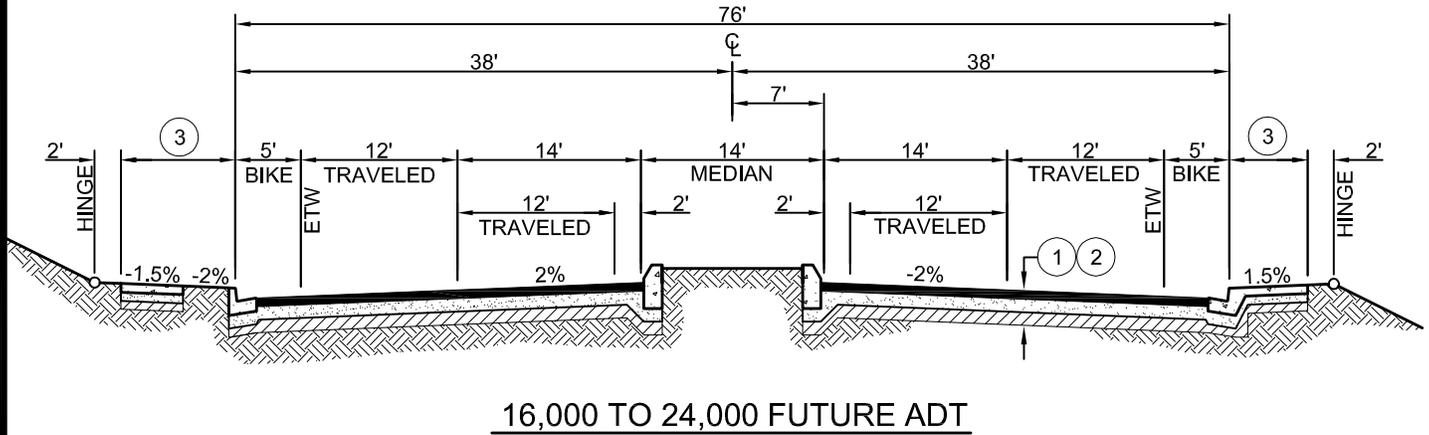


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL URBAN STREET SECTION
6,001 to 16,000 FUTURE ADT**

Scale: NTS	Adopted: 2014
Drawing No: A-2e	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
REPLACE AC WITH HMA, NOTE 3	GDM	JAN 11	REVISE NOTES 2 - 7, DELETE NOTES 8 & 9		AUG 14
DRAWING NUMBER		MAY 14			



NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 - HOT MIX ASPHALT (HMA), OVER
 - ▨ CLASS II AGGREGATE BASE, OVER
 - ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
4. WHEN STREET PARKING IS REQUIRED AN ADDITIONAL WIDTH OF 8-FEET MINIMUM SHALL BE PROVIDED.
5. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
6. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
7. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.



**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL URBAN STREET SECTION
16,000 to 24,000 FUTURE ADT**

Scale: NTS	Adopted: 2014
Drawing No: A-2f	
Sheet No: 1 OF 1	

THIS PAGE LEFT BLANK INTENTIONALLY

THIS PAGE LEFT BLANK INTENTIONALLY

Revisions

Description	Approved	Date	Description	Approved	Date

CRITERIA	ADT	ADT	ADT	ADT
	<500	500-1500	1500-5000	>5000

DESIGN SPEED, MILES PER HOUR, (MINIMUM)

FLAT	25	30	35	35
ROLLING	25	30	30	30
MOUNTAINOUS	20	25	25	25

CURVE RADIUS, FT. (MINIMUM)

FLAT	250	400	600	600
ROLLING	250	400	400	400
MOUNTAINOUS	125	250	250	250

GRADE, PERCENT (MAXIMUM)

FLAT	7	6	4	3
ROLLING	10	9	6	5
MOUNTAINOUS	10	9	8	7

NOTES:

1. ADT IS BASED UPON A 20-YEAR PROJECTION.
2. SUPERELEVATION NOT PERMITTED ON COMMERCIAL / INDUSTRIAL ROADS.
3. THE STRUCTURAL SECTION SHALL BE BASED ON THE TRAFFIC INDEX AS PROVIDED BY THE DEPARTMENT.
4. RIGHT OF WAY SHALL BE THE MINIMUM REQUIRED BY THE DESIGN STANDARDS.

FLAT ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE LITTLE OR NO TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE AND WHICH COULD BE CONSTRUCTED WITH MINOR CUTS AND FILLS.

ROLLING ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE WHICH REQUIRE SOME MODERATE CUTS AND FILL.

MOUNTAINOUS ROADWAYS ARE THOSE SECTIONS OF ROADWAY WHICH REQUIRE MAXIMUM OR NEAR MAXIMUM GRADES AND MINIMUM CURVE RADII IN ORDER TO REDUCE THE CUTS AND FILLS TO PRACTICAL AND VISUALLY ACCEPTABLE HEIGHTS.

THE DETERMINATION OF FLAT, ROLLING, OR MOUNTAINOUS ROADWAYS SHALL BE UNIFORM OVER THE FULL LENGTH OF A ROADWAY EXCEPT WHERE THE DEPARTMENT DETERMINES THAT A SAFE TRANSITION MAY BE MADE.

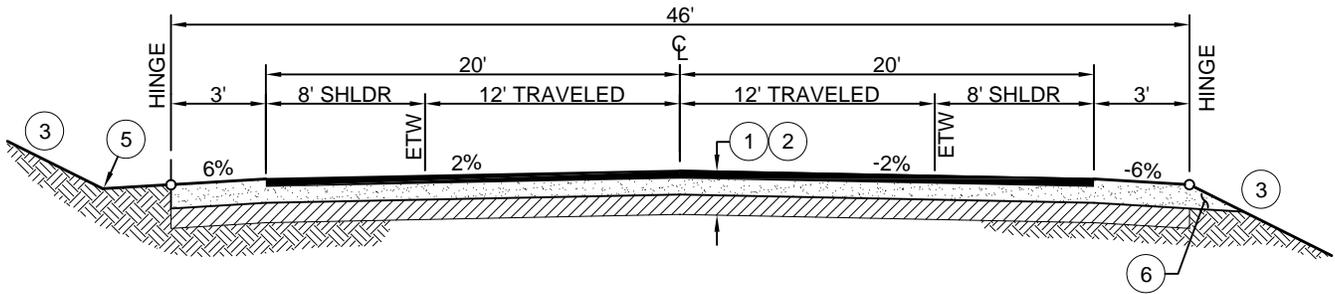


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
COMMERCIAL-INDUSTRIAL ROAD
DESIGN CRITERIA**

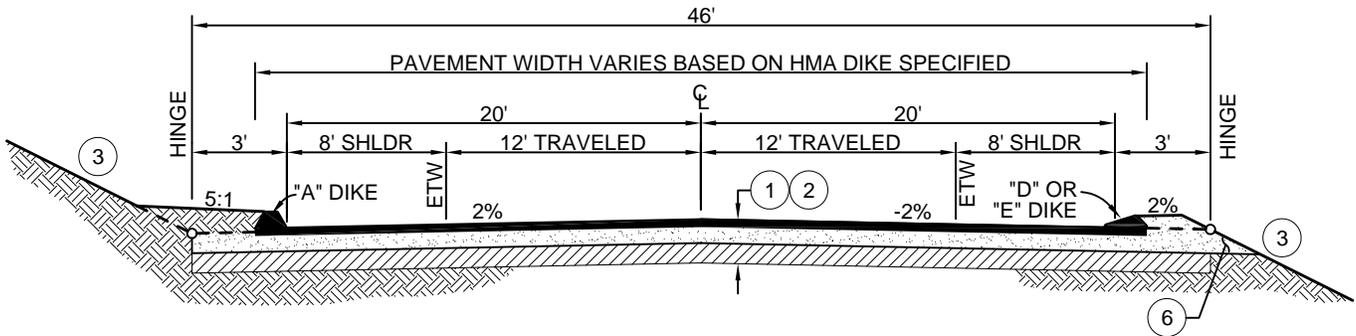
Scale:	Adopted: 2011
Drawing No:	A-3
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
REPLACE AC WITH HMA, NOTE 4	GDM	JAN 11			



I: LESS THAN 5000 FUTURE ADT WITHOUT HMA DIKE - OUTSIDE URL



II: LESS THAN 5000 FUTURE ADT WITH HMA DIKE - OUTSIDE URL

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 - HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 - ▨ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - ▧ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. HMA DIKE REQUIREMENTS PER C-3.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

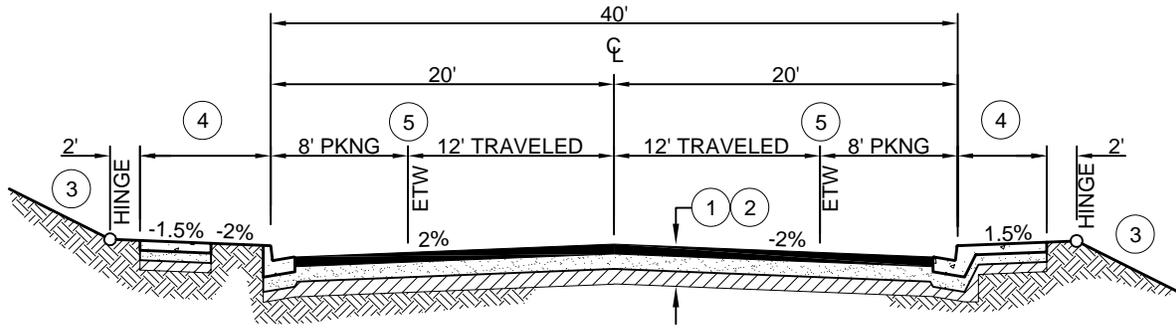


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL COMMERCIAL-INDUSTRIAL
RURAL ROADS OUTSIDE URL
LESS THAN 5,000 FUTURE ADT

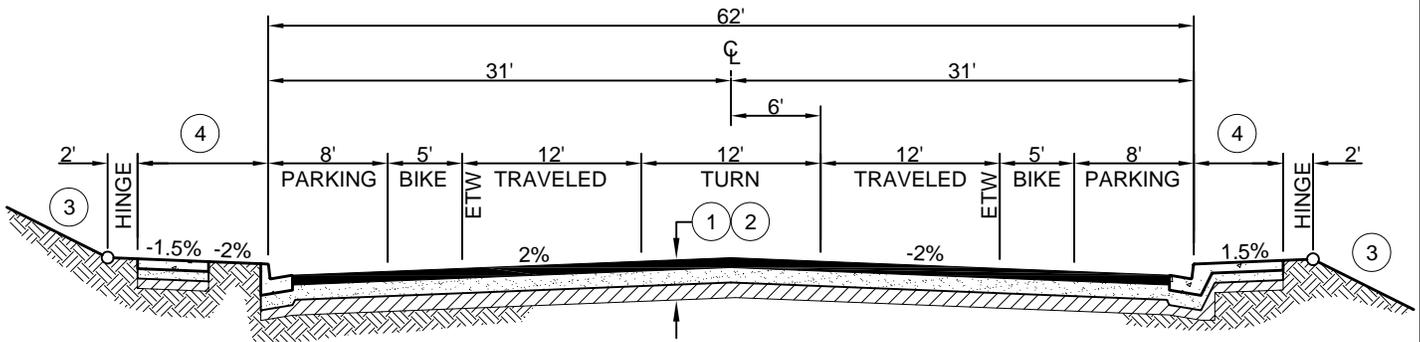
Scale: NTS	Adopted: 2011
Drawing No: A-3a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
MODIFY DRAWING TITLE	REM	NOV 07			
REPLACE AC WITH HMA, NOTE 3	GDM	JAN 11			



I: LESS THAN 5,000 FUTURE ADT - WITHIN URL



II: 5,000 TO 16,000 FUTURE ADT - WITHIN URL

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 - HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 - ▨ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 4 HORIZONTAL:1 VERTICAL WITHIN THE PUBLIC ROW WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. ADDITIONAL 5-FOOT WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
6. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
7. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
8. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
9. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

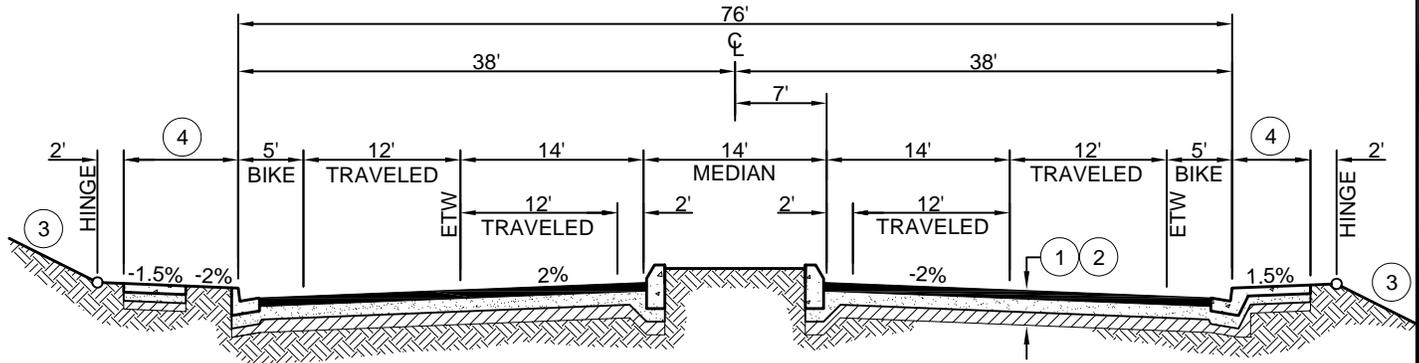


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL COMMERCIAL-INDUSTRIAL
URBAN STREETS WITHIN URL
LESS THAN 5,000 & 5,000 TO 16,000 FUTURE ADT

Scale: NTS	Adopted: 2011
Drawing No: A-3b	
Sheet No:	1 OF 1

Revisions

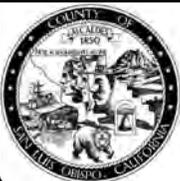
Description	Approved	Date	Description	Approved	Date
REPLACE AC WITH HMA, NOTE 3	GDM	JAN 11			



GREATER THAN 16000 FUTURE ADT - WITHIN URL

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
 - HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 - ▨ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 4 HORIZONTAL:1 VERTICAL WITHIN THE PUBLIC ROW WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
6. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
7. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

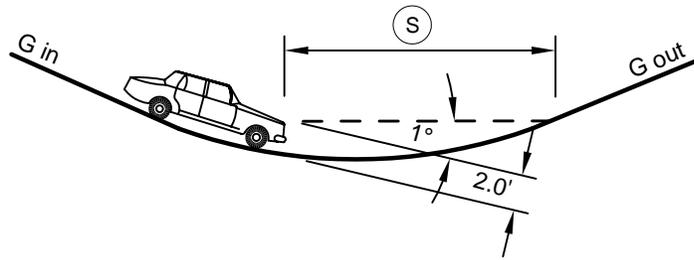


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPICAL COMMERCIAL-INDUSTRIAL
URBAN STREETS WITHIN URL
GREATER THAN 16,000 FUTURE ADT

Scale: NTS	Adopted: 2011
Drawing No: A-3c	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



REFERENCE: 1988 STATE HIGHWAY DESIGN MANUAL FIGURE 201.5

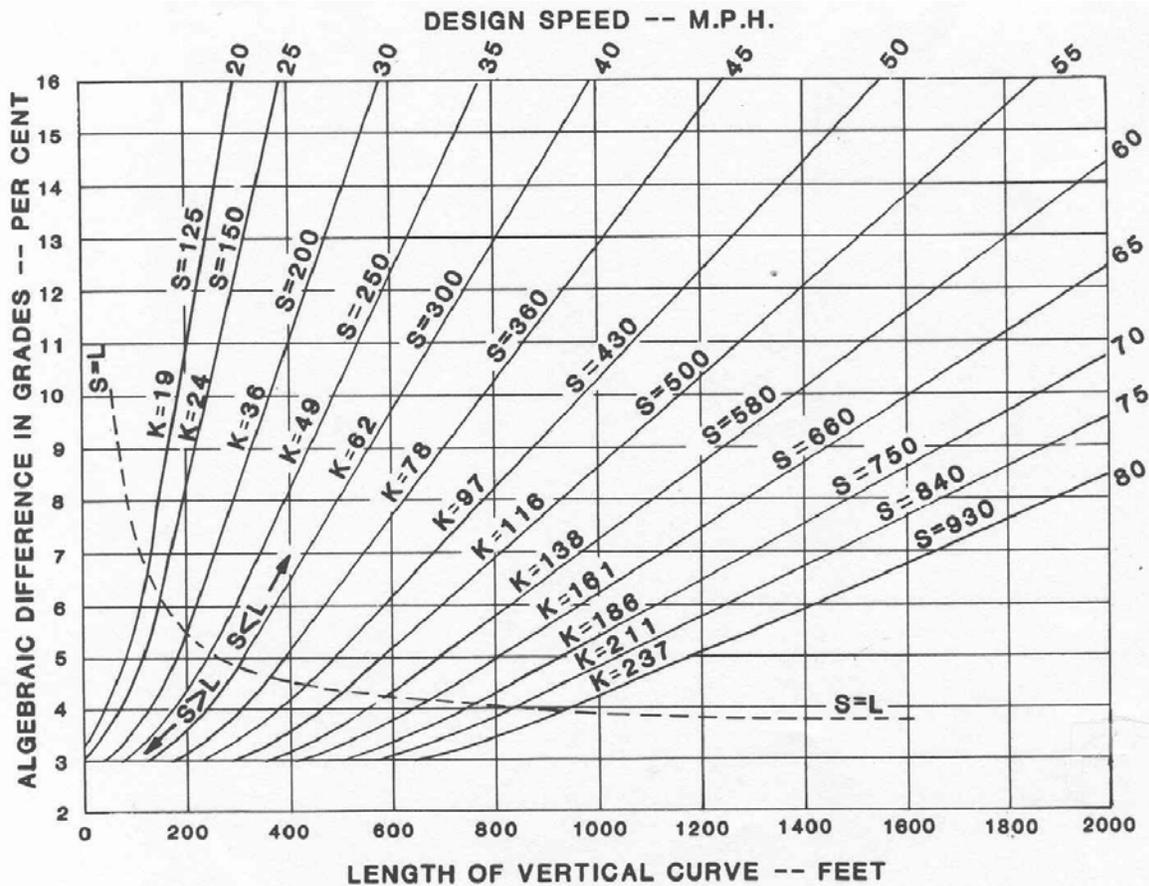
- L = CURVE LENGTH IN FEET
- A = ALGEBRAIC GRADE DIFFERENCE, $G_{out}\% - G_{in}\%$
- S = SIGHT DISTANCE IN FEET
- V = DESIGN SPEED IN M.P.H. FOR "S"
- K = DISTANCE IN FEET REQUIRED TO ACHIEVE A 1% CHANGE IN GRADE.
- K VALUE SHOWN IS VALID WHEN $S < L$

WHEN $S > L$

$$L = 2S - \frac{400 + 3.5S}{A}$$

WHEN $S < L$

$$L = \frac{AS^2}{400 + 3.5S}$$



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
**STOPPING SIGHT DISTANCE ON
 SAG VERTICAL CURVES**

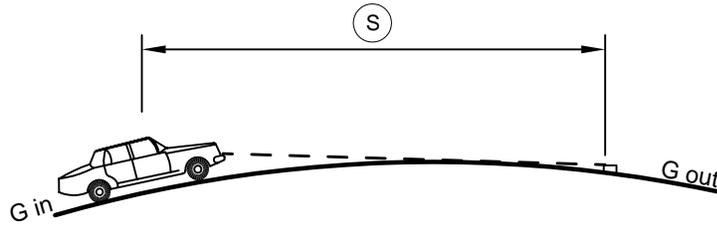
Scale:	Adopted: 2011
Drawing No:	A-4
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date

HEIGHT OF EYE - 3.5 FEET
 HEIGHT OF OBJECT - 0.50 FEET.

REFERENCE: 1988 STATE
 HIGHWAY DESIGN MANUAL
 FIGURE 201.4



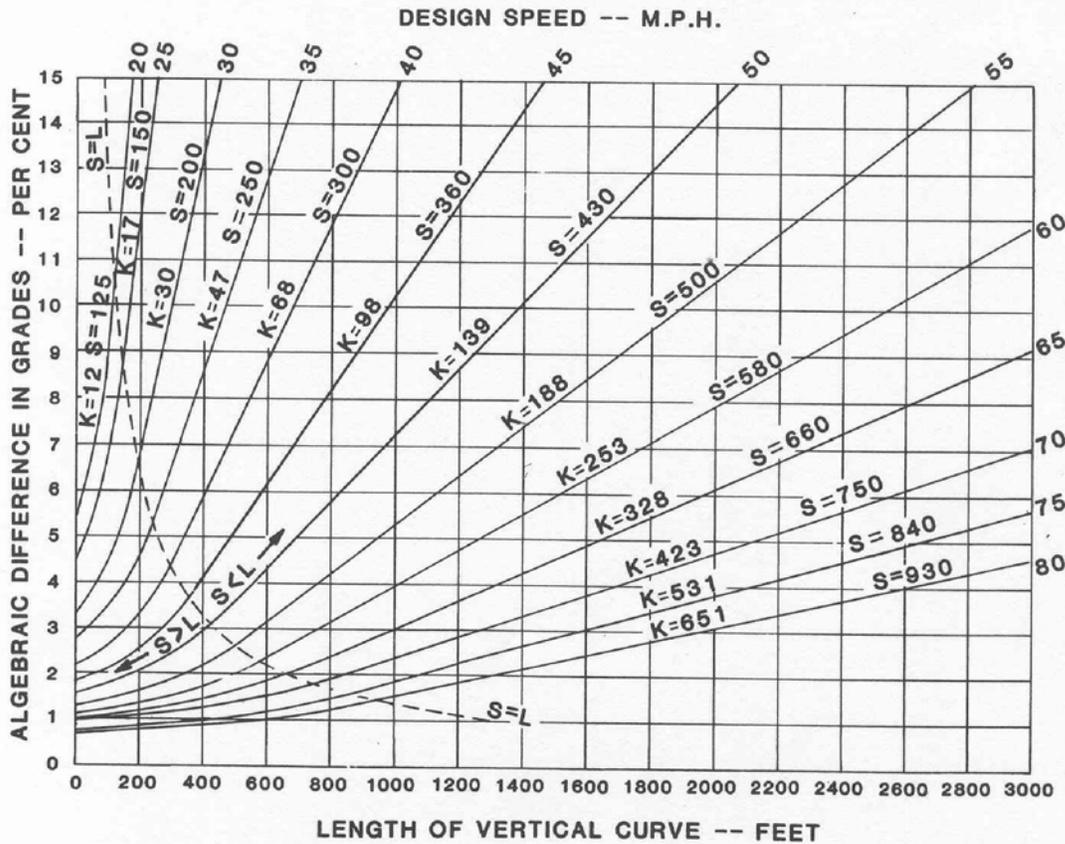
- L = CURVE LENGTH IN FEET
- A = ALGEBRAIC GRADE DIFFERENCE, $G_{out}\% - G_{in}\%$
- S = SIGHT DISTANCE IN FEET
- V = DESIGN SPEED IN M.P.H. FOR "S"
- K = DISTANCE IN FEET REQUIRED TO ACHIEVE A 1% CHANGE IN GRADE.
- K VALUE SHOWN IS VALID WHEN $S < L$

WHEN $S > L$

$$L = 2S - \frac{1329}{A}$$

WHEN $S < L$

$$L = \frac{AS^2}{1329}$$



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
**STOPPING SIGHT DISTANCE ON
 CREST VERTICAL CURVES**

Scale:	Adopted: 2011
Drawing No:	A-4a
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date

FOR RURAL ROADS - LESS THAN 35 MPH	
CURVE RADIUS - FEET	SUPER-ELEVATION - %
Under 500	+4%
500-1000	+3%
1000-5000	+2%
Over 5000	Standard crown section

FOR RURAL ROADS - 35 MPH to 45 MPH	
CURVE RADIUS - FEET	SUPER-ELEVATION - %
Under 600	+6%
600-1000	+5%
1000-1500	+4%
1500-2000	+3%
2000-7000	+2%
Over 7000	Standard crown section

FOR RURAL ROADS - OVER 45 MPH	
CURVE RADIUS - FEET	SUPER-ELEVATION - %
Under 1100	+10%
1100-1350	+9%
1350-1600	+8%
1600-1900	+7%
1900-2200	+6%
2200-2700	+5%
2700-3500	+4%
3500-4500	+3%
4500-20000	+2%
Over 20000	Standard crown section

NOTES:

1. THIS TABLE CONTAINS THE STANDARD RADII AND SPEEDS FOR THE USE OF SUPERELEVATIONS ON RURAL COUNTY ROADS. SUPER-ELEVATIONS ARE NOT ALLOWED ON URBAN COUNTY STREETS.
2. SUPERELEVATIONS GREATER THAN 10% ARE NOT ALLOWED WITHOUT THE APPROVAL OF THE DEPARTMENT.
3. WHEN USING SUPER-ELEVATIONS, THE DESIGN SHALL BE BASED ON THE CALTRANS HIGHWAY DESIGN MANUAL WHICH PROVIDES INFORMATION ON HORIZONTAL AND VERTICAL ALIGNMENTS, TRANSITIONS, THE AXIS OF ROTATION, DRAINAGE AND OTHER PERTINENT INFORMATION.
4. SUPERELEVATION DIAGRAMS SHALL BE PROVIDED ON THE APPROVED PLANS.



**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
SUPER-ELEVATION ON
HORIZONTAL CURVES**

Scale:	Adopted: 2011
Drawing No:	A-4b
Sheet No:	1 OF 1

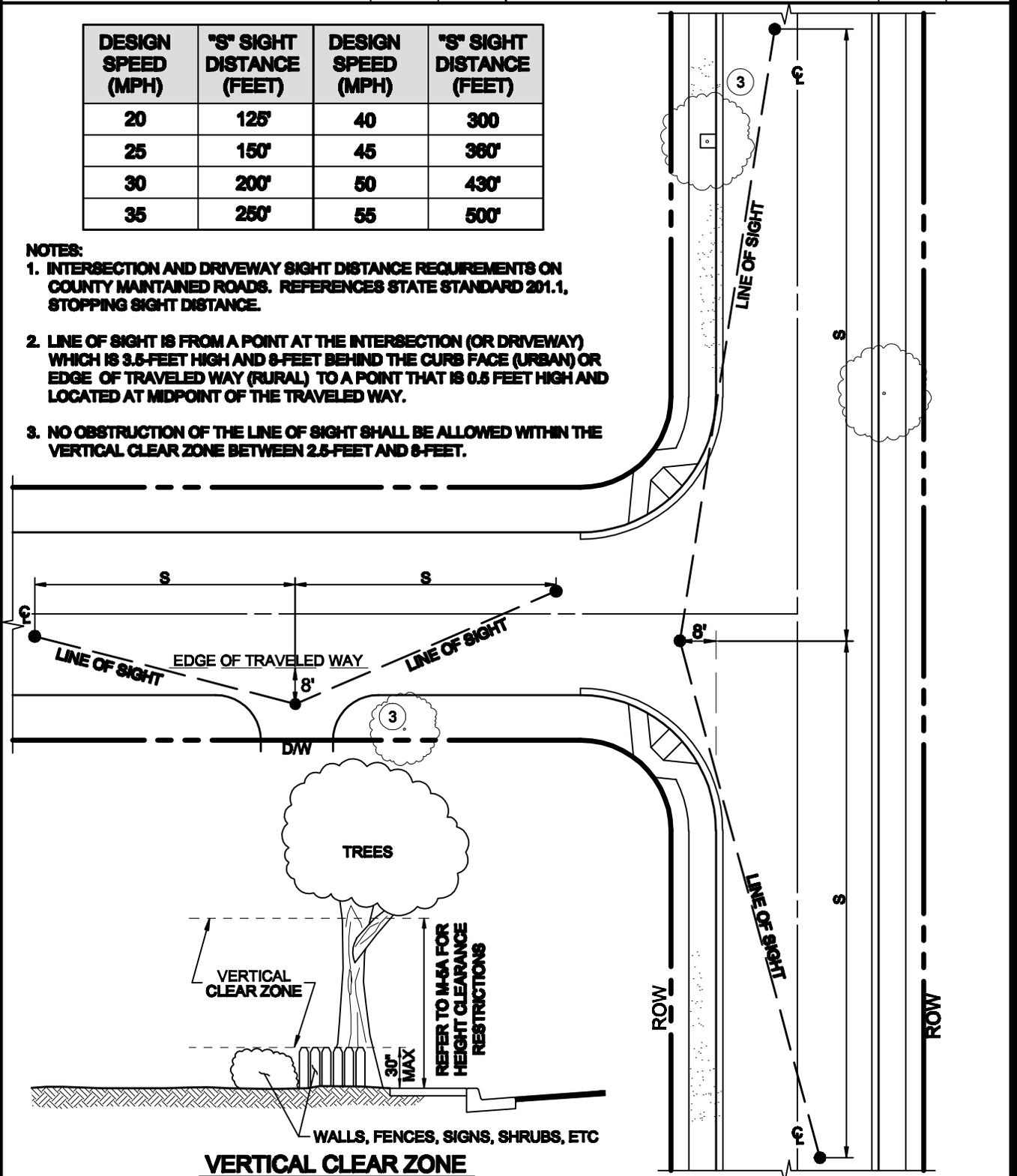
Revisions

Description	Approved	Date	Description	Approved	Date
SIGHT DISTANCE LINES	REM	NOV 07	DW SIGHT DIST. SAME AS INTERSECTION	GDM	JAN 11
SIGHT DISTANCE CHANGED TO CALTRANS STD	GDM	NOV 08	REVISED NOTE 2	FH	AUG 14

DESIGN SPEED (MPH)	"S" SIGHT DISTANCE (FEET)	DESIGN SPEED (MPH)	"S" SIGHT DISTANCE (FEET)
20	125'	40	300
25	150'	45	360'
30	200'	50	430'
35	250'	55	500'

NOTES:

1. INTERSECTION AND DRIVEWAY SIGHT DISTANCE REQUIREMENTS ON COUNTY MAINTAINED ROADS. REFERENCES STATE STANDARD 201.1, STOPPING SIGHT DISTANCE.
2. LINE OF SIGHT IS FROM A POINT AT THE INTERSECTION (OR DRIVEWAY) WHICH IS 3.5-FEET HIGH AND 8-FEET BEHIND THE CURB FACE (URBAN) OR EDGE OF TRAVELED WAY (RURAL) TO A POINT THAT IS 0.5 FEET HIGH AND LOCATED AT MIDPOINT OF THE TRAVELED WAY.
3. NO OBSTRUCTION OF THE LINE OF SIGHT SHALL BE ALLOWED WITHIN THE VERTICAL CLEAR ZONE BETWEEN 2.5- FEET AND 8- FEET.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
**INTERSECTION & DRIVEWAY
 SIGHT DISTANCE**

Scale: **1"=30'** Adopted: 2014
 Drawing No: **A-5a**
 Sheet No: **1 OF 1**

Revisions

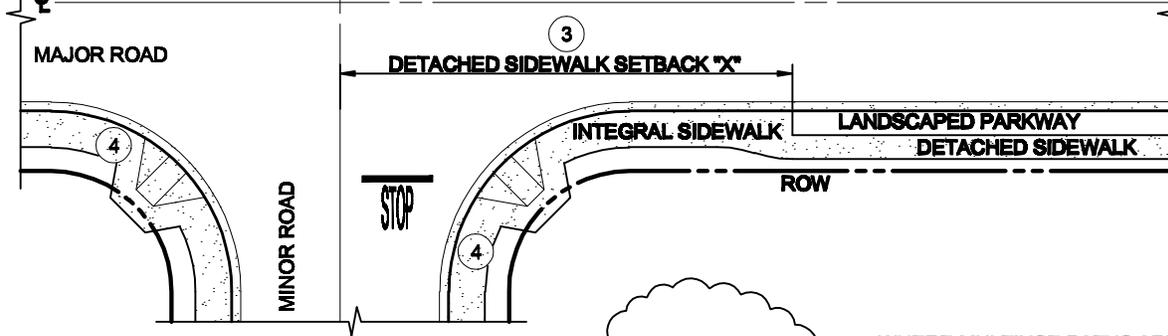
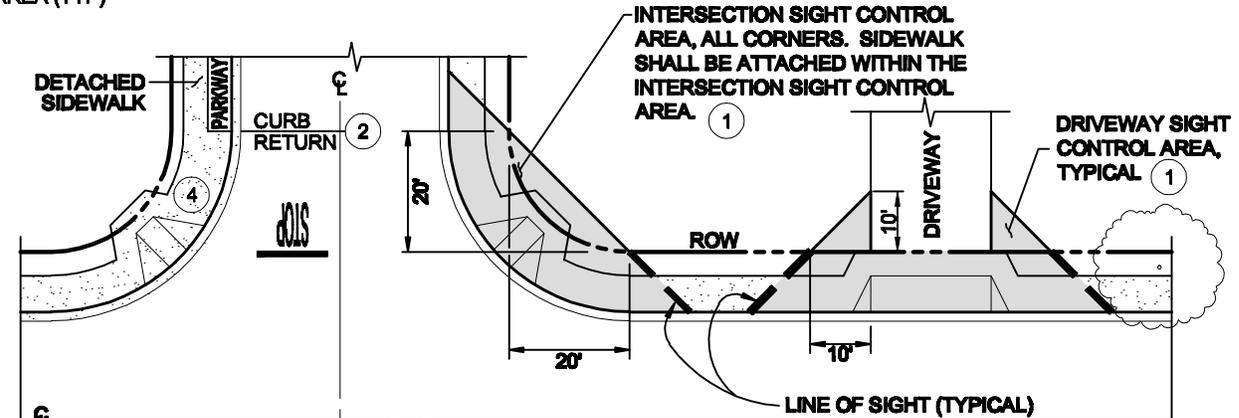
Description	Approved	Date	Description	Approved	Date
UPDATE VERTICAL CLEAR ZONE, TABLE 1	GDM	JAN 11			

NOTES:

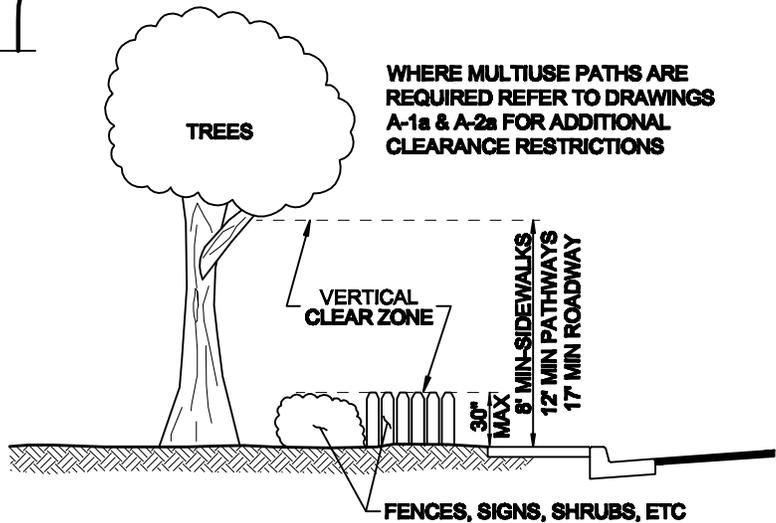
1. OBSTRUCTIONS WITHIN CONTROLLED AREA SHALL NOT EXCEED THE MAXIMUM CLEARANCES IDENTIFIED HEREON.

TO MINIMIZE VEGETATION SIGHT DISTANCE OBSTRUCTIONS AT ROAD INTERSECTIONS:

2. DETACHED SIDEWALKS ON MINOR ROADS SHALL NOT BE ALLOWED WITHIN THE INTERSECTION CURB RETURN AREA.
3. DETACHED SIDEWALKS ON MAJOR ROADS SHALL NOT BE ALLOWED WITHIN THE SETBACK AS PROVIDED IN TABLE 1.
4. WHEN REQUIRED, ONLY INTEGRAL SIDEWALKS SHALL BE ALLOWED WITHIN THE CURB RETURN AREA (TYP)



PREVAILING SPEED OF MAJOR ROAD	SETBACK "X"
20 mph	50 ft
25 mph	55 ft
30 mph	75 ft
35 mph	95 ft
40 mph	115 ft
45 mph	135 ft
50 mph	160 ft
55 mph	190 ft



VERTICAL CLEAR ZONE

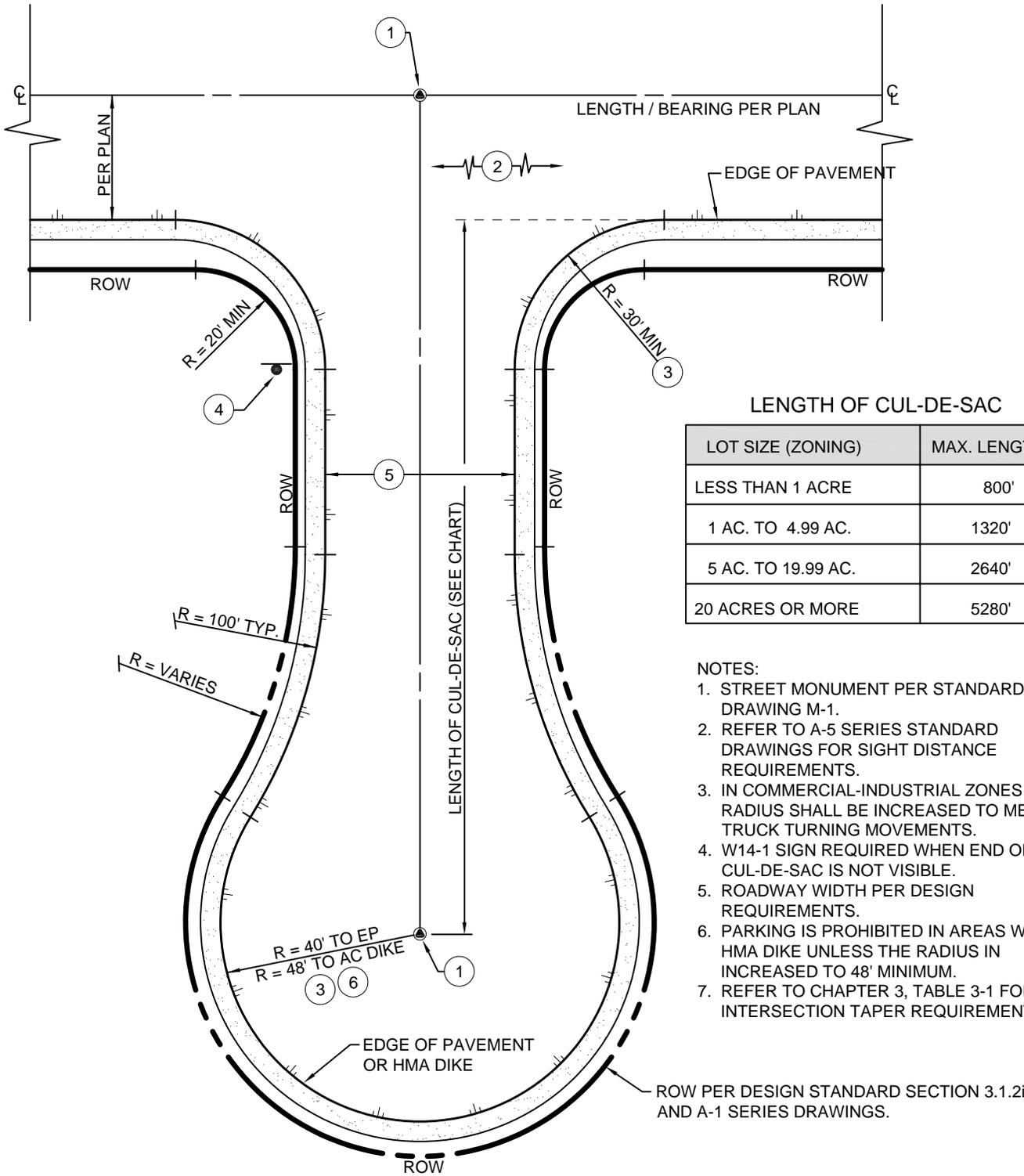


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
SIGHT DISTANCE CONTROL AREAS

Scale: 1"=30'	Adopted: 2014
Drawing No: A-5b	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
ADDED NOTE 7	GDM	NOV 08			
REPLACE AC WITH HMA	GDM	JAN 11			



LENGTH OF CUL-DE-SAC

LOT SIZE (ZONING)	MAX. LENGTH
LESS THAN 1 ACRE	800'
1 AC. TO 4.99 AC.	1320'
5 AC. TO 19.99 AC.	2640'
20 ACRES OR MORE	5280'

NOTES:

1. STREET MONUMENT PER STANDARD DRAWING M-1.
2. REFER TO A-5 SERIES STANDARD DRAWINGS FOR SIGHT DISTANCE REQUIREMENTS.
3. IN COMMERCIAL-INDUSTRIAL ZONES THE RADIUS SHALL BE INCREASED TO MEET TRUCK TURNING MOVEMENTS.
4. W14-1 SIGN REQUIRED WHEN END OF CUL-DE-SAC IS NOT VISIBLE.
5. ROADWAY WIDTH PER DESIGN REQUIREMENTS.
6. PARKING IS PROHIBITED IN AREAS WITH HMA DIKE UNLESS THE RADIUS IN INCREASED TO 48' MINIMUM.
7. REFER TO CHAPTER 3, TABLE 3-1 FOR INTERSECTION TAPER REQUIREMENTS.



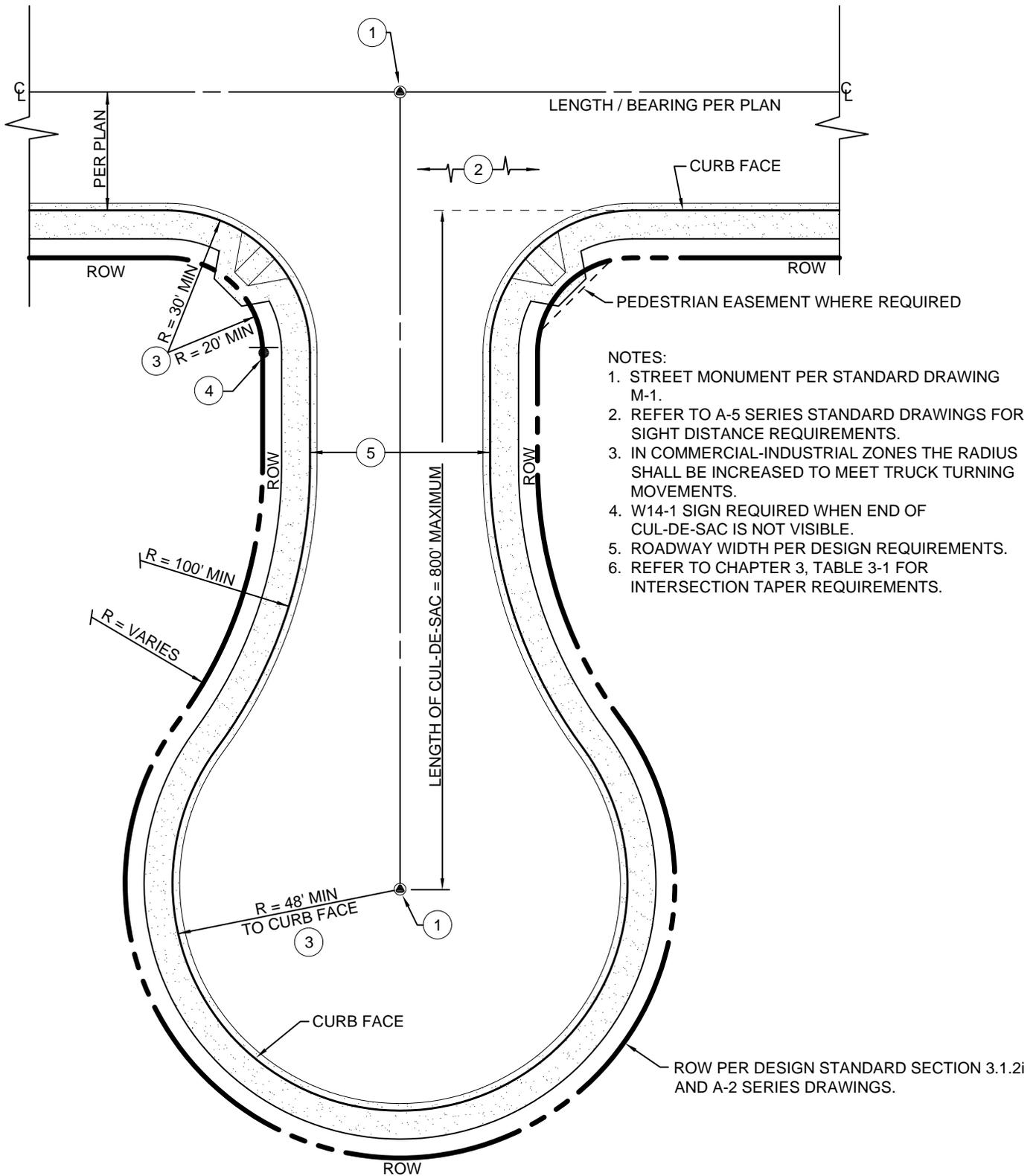
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

RURAL CUL-DE-SAC

Scale: 1"=30'	Adopted: 2011
Drawing No: A-6	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
ADDED NOTE 6. MODIFIED CDS RADIUS	GDM	NOV 08			



- NOTES:
1. STREET MONUMENT PER STANDARD DRAWING M-1.
 2. REFER TO A-5 SERIES STANDARD DRAWINGS FOR SIGHT DISTANCE REQUIREMENTS.
 3. IN COMMERCIAL-INDUSTRIAL ZONES THE RADIUS SHALL BE INCREASED TO MEET TRUCK TURNING MOVEMENTS.
 4. W14-1 SIGN REQUIRED WHEN END OF CUL-DE-SAC IS NOT VISIBLE.
 5. ROADWAY WIDTH PER DESIGN REQUIREMENTS.
 6. REFER TO CHAPTER 3, TABLE 3-1 FOR INTERSECTION TAPER REQUIREMENTS.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

URBAN CUL-DE-SAC

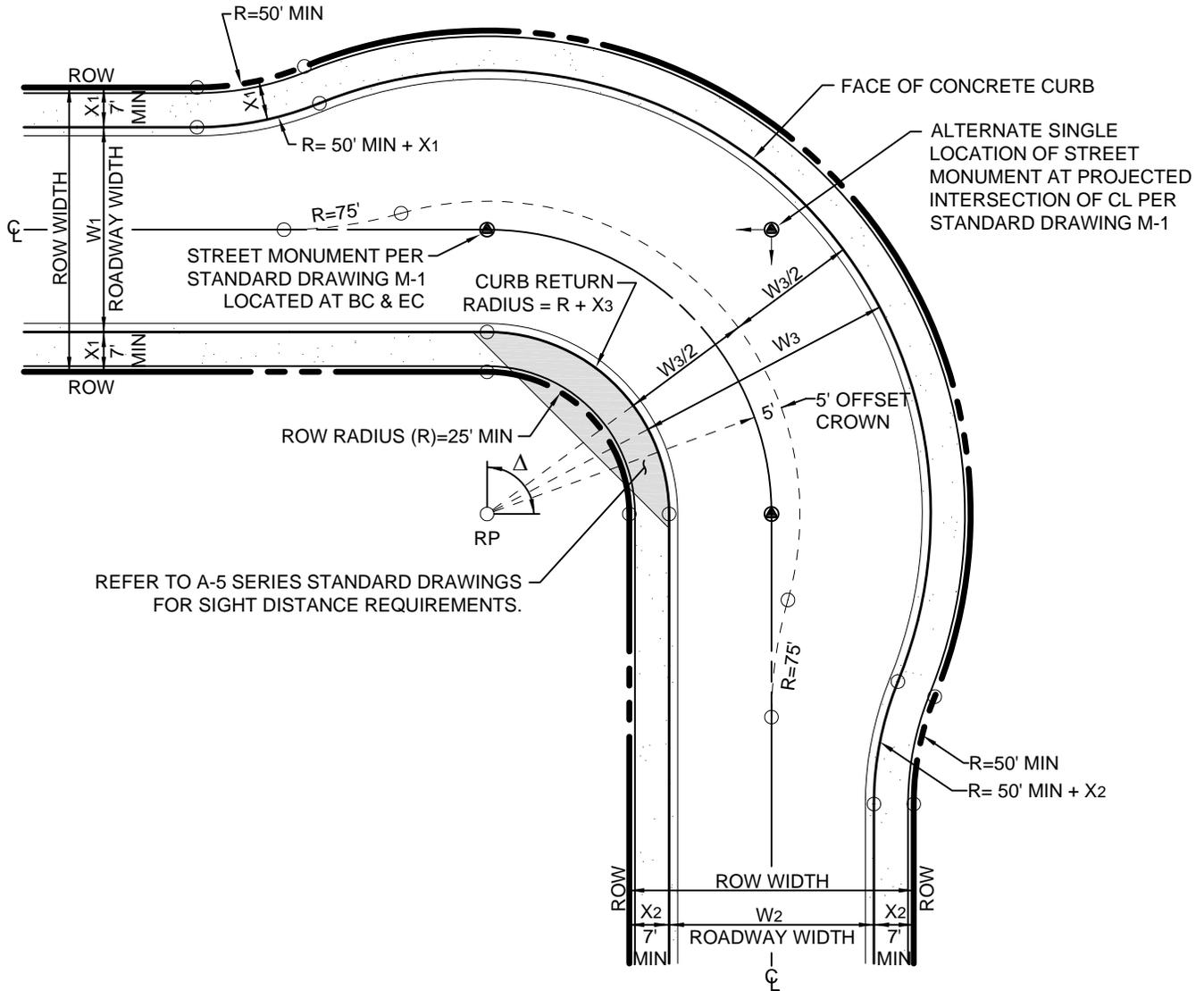
Scale: 1"=30'	Adopted: 2011
Drawing No: A-6a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
KNUCKLE CL LINETYPE, LAYOUT NOTES	REM	NOV 07			

NOTES:

1. KNUCKLES SHALL ONLY BE ALLOWED IN URBAN AREAS.
2. KNUCKLE USE IS LIMITED TO ADT < 500, DESIGN SPEEDS OF 25 MPH OR LESS, AND WITH PRIOR APPROVAL OF THE DEPARTMENT.
3. UNDER NO CIRCUMSTANCES SHALL Δ BE GREATER THAN 90°.
4. IN COMMERCIAL-INDUSTRIAL ZONES THE DEPARTMENT MAY REQUIRE THAT ALL RADII SHALL BE ADJUSTED BY THE DESIGN ENGINEER TO MEET TRUCK TURNING MOVEMENTS.



LAYOUT NOTES:

- W3 = THE GREATER OF THE ROAD WIDTHS (W1 OR W2) PLUS 10'
- X3 = THE GREATER OF THE WIDTH FROM CURB FACE TO ROW (X1 OR X2)



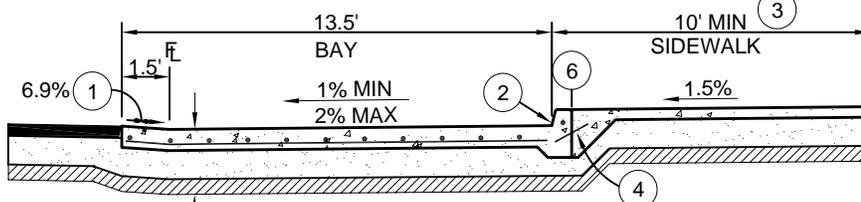
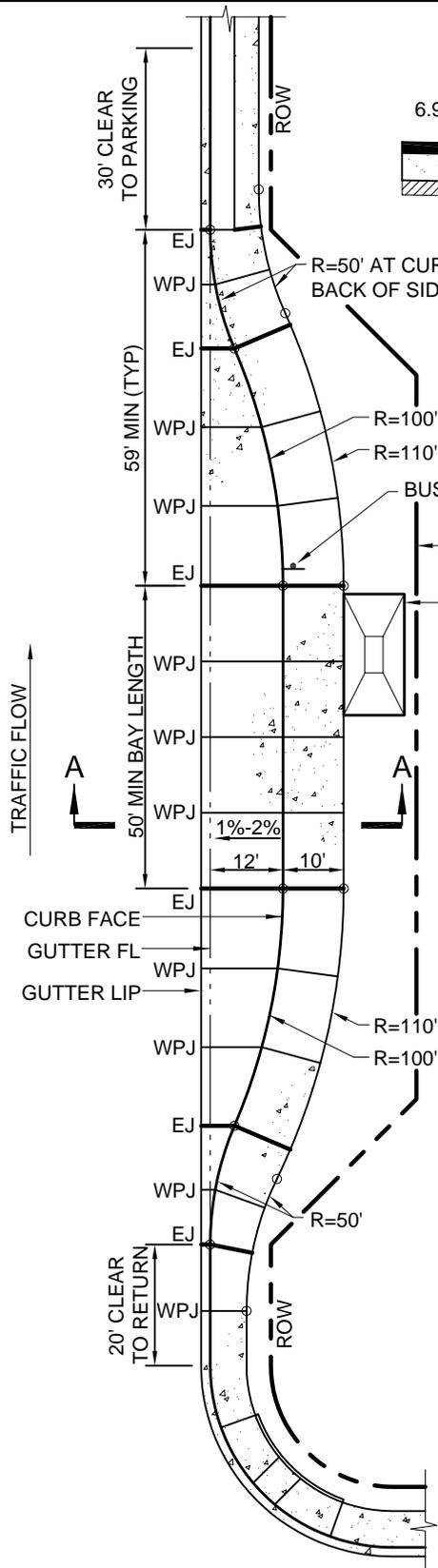
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

TYPICAL KNUCKLE

Scale: 1"=30'	Adopted: 2011
Drawing No: A-6b	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 10	REM	NOV 07			
NOTE 5	GDM	JAN 11			



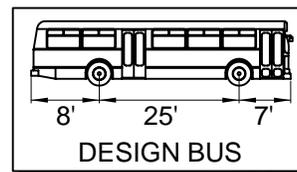
8" MINIMUM PCC WITH #4's AT 24" ON CENTER, EACH WAY, OVER CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION. ACTUAL STRUCTURAL SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE.

SECTION A-A

R=50' AT CURB & BACK OF SIDEWALK
 R=100' AT CURB
 R=110' AT BACK OF SIDEWALK
 BUS STOP & SCHEDULE INFORMATIONAL SIGN (5)
 (6) ROW OR PEDESTRIAN EASEMENT
 PREFERRED PASSENGER SHELTER LOCATION (WHEN REQUIRED)

NOTES:

- GUTTER SLOPE AT FLOWLINE (FL) SHALL BE PER STANDARD DRAWING C-2 (1-1/4" IN 18", 6.9%).
- 6" TALL MAX TYPE "C" CURB PER STANDARD DRAWING C-2a SHALL BE MONOLITHICALLY POURED WITH THE BAY.
- A MINIMUM 10' WIDE SIDEWALK PER DRAWING C-4 SHALL BE REQUIRED ADJACENT TO THE BAY. APPROACH SIDEWALK WIDTH AND TYPE DETERMINED BY THE DESIGN STANDARDS.
- SIDEWALK SHALL BE DOWELED INTO CURB PER STANDARD DRAWING C-4, OPTIONAL JOINT DETAIL.
- BUS STOP LOCATION AND SCHEDULE INFORMATION SIGN(S) TO BE APPROVED AND LOCATED BY THE REGIONAL TRANSIT AUTHORITY (RTA).
- MINIMUM RIGHT-OF-WAY SHALL BE LOCATED AT BACK OF CURB FACE WITH A PEDESTRIAN ACCESS EASEMENT PROVIDED TO INCORPORATE SIDEWALK, SHELTERS, AND OTHER REQUIRED APPURTENANCES.
- PROVIDE EXPANSION JOINTS (EJ) AND WEAKENED PLANE JOINTS (WPJ) AS SHOWN AND PER STANDARD DRAWING C-1.
- FINAL LOCATION AND DESIGN OF BUS TURNOUT AND LOADING AREA SHALL BE APPROVED BY THE DEPARTMENT AND THE RTA. STANDARD IS FOR HIGH-SPEED AND HIGH-VOLUME STREETS.
- THE PROJECT ENGINEER MAY BE REQUIRED TO PROVIDE A SIGHT DISTANCE EXHIBIT FOR DEPARTMENT APPROVAL.
- FOR RURAL BUS STOPS ASPHALT WIDENING SHALL BE REQUIRED. CONTACT PUBLIC WORKS FOR ADDITIONAL REQUIREMENTS.

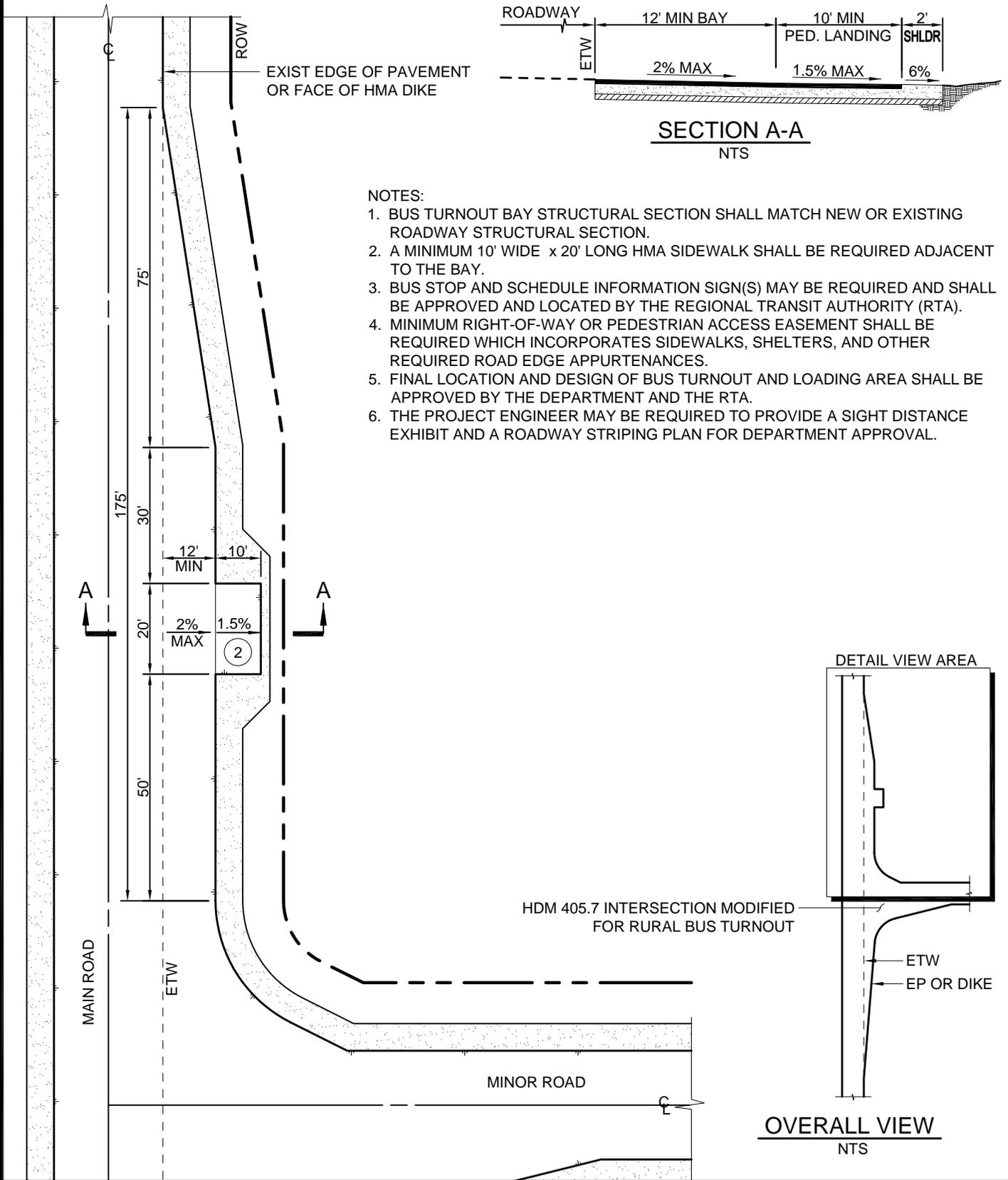


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
URBAN BUS TURNOUT & LOADING AREA

Scale: 1"=30'	Adopted: 2011
Drawing No: A-6c	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
NEW STANDARD	GDM	NOV 08			
REPLACE AC WITH HMA, NOTE 2	GDM	JAN 11			



NOTES:

1. BUS TURNOUT BAY STRUCTURAL SECTION SHALL MATCH NEW OR EXISTING ROADWAY STRUCTURAL SECTION.
2. A MINIMUM 10' WIDE x 20' LONG HMA SIDEWALK SHALL BE REQUIRED ADJACENT TO THE BAY.
3. BUS STOP AND SCHEDULE INFORMATION SIGN(S) MAY BE REQUIRED AND SHALL BE APPROVED AND LOCATED BY THE REGIONAL TRANSIT AUTHORITY (RTA).
4. MINIMUM RIGHT-OF-WAY OR PEDESTRIAN ACCESS EASEMENT SHALL BE REQUIRED WHICH INCORPORATES SIDEWALKS, SHELTERS, AND OTHER REQUIRED ROAD EDGE APPURTENANCES.
5. FINAL LOCATION AND DESIGN OF BUS TURNOUT AND LOADING AREA SHALL BE APPROVED BY THE DEPARTMENT AND THE RTA.
6. THE PROJECT ENGINEER MAY BE REQUIRED TO PROVIDE A SIGHT DISTANCE EXHIBIT AND A ROADWAY STRIPING PLAN FOR DEPARTMENT APPROVAL.

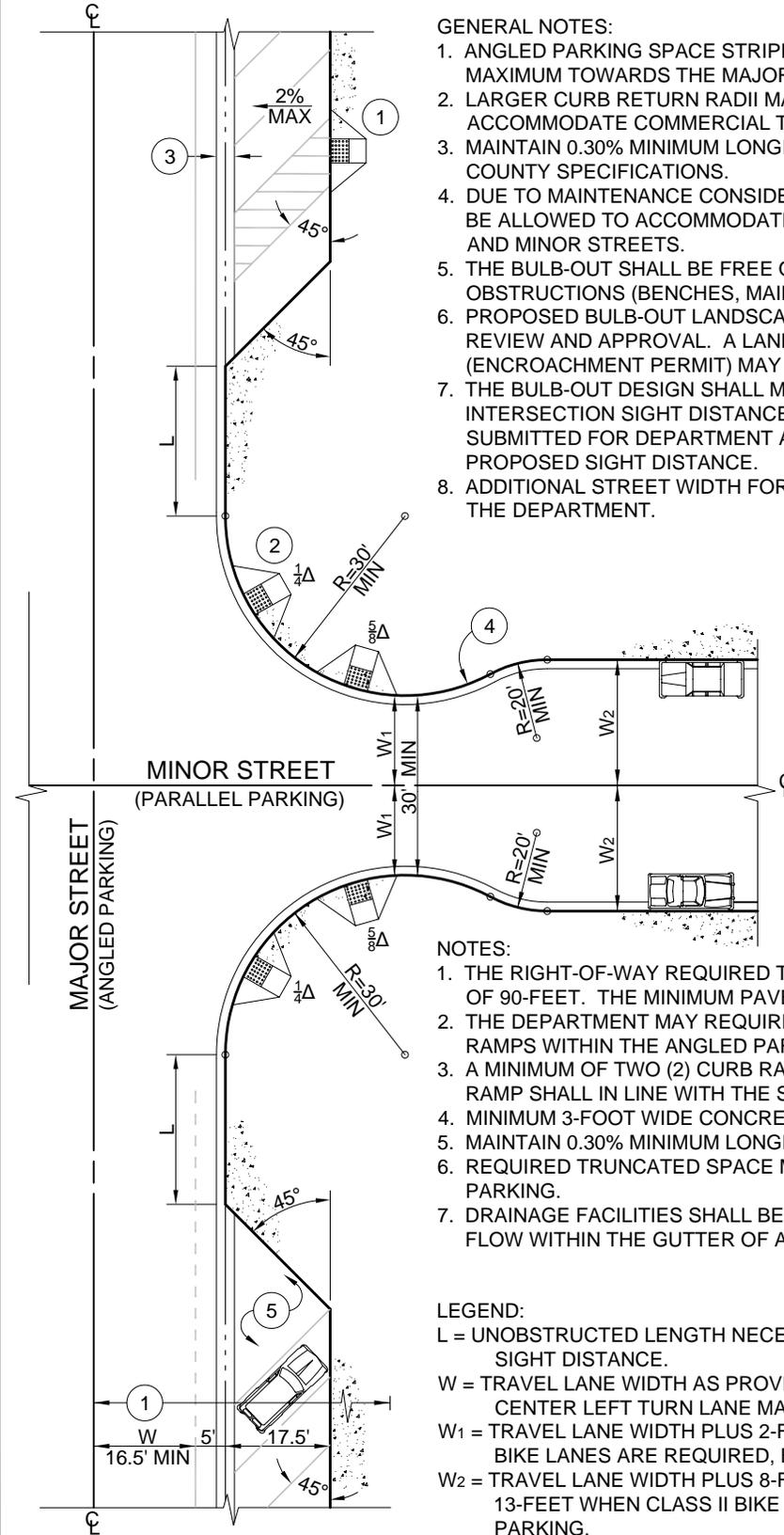


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL BUS TURNOUT & LOADING AREA

Scale: 1"=30'	Adopted: 2011
Drawing No: A-6c.1	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NEW STANDARD DRAWING	REM	NOV 07			
NOTE 1	GDM	JAN 11			



GENERAL NOTES:

1. ANGLED PARKING SPACE STRIPING SHALL BE SET AT 45°, AND SLOPED AT 2% MAXIMUM TOWARDS THE MAJOR ROAD TO ACCOMMODATE FOR DRAINAGE.
2. LARGER CURB RETURN RADII MAY BE REQUIRED BY THE DEPARTMENT TO ACCOMMODATE COMMERCIAL TRUCK MOVEMENTS.
3. MAINTAIN 0.30% MINIMUM LONGITUDINAL CURB AND GUTTER SLOPES PER COUNTY SPECIFICATIONS.
4. DUE TO MAINTENANCE CONSIDERATIONS, SIDEWALK UNDER DRAINS SHALL NOT BE ALLOWED TO ACCOMMODATE FOR BULB-OUT DRAINAGE BETWEEN MAJOR AND MINOR STREETS.
5. THE BULB-OUT SHALL BE FREE OF ALL PEDESTRIAN AND SIGHT DISTANCE OBSTRUCTIONS (BENCHES, MAILBOXES, UTILITY SERVICE CABINETS, ETC)
6. PROPOSED BULB-OUT LANDSCAPING SHALL BE SUBJECT TO DEPARTMENT REVIEW AND APPROVAL. A LANDSCAPING MAINTENANCE AGREEMENT (ENCROACHMENT PERMIT) MAY BE REQUIRED.
7. THE BULB-OUT DESIGN SHALL MEET COUNTY REQUIREMENTS FOR INTERSECTION SIGHT DISTANCE. THE CONSTRUCTION PLANS SHALL SUBMITTED FOR DEPARTMENT APPROVAL SHALL SHOW AND LABEL THE PROPOSED SIGHT DISTANCE.
8. ADDITIONAL STREET WIDTH FOR CLASS II BIKE LANES MAY BE REQUIRED BY THE DEPARTMENT.

NOTES:

1. 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.
2. THE DEPARTMENT MAY REQUIRE "PUBLIC" ADA ACCESSIBLE PARKING SPACES AND RAMPS WITHIN THE ANGLED PARKING AREA.
3. A MINIMUM OF TWO (2) CURB RAMPS SHALL BE INSTALLED IN EACH BULB-OUT. EACH RAMP SHALL IN LINE WITH THE SIDEWALK.
4. MINIMUM 3-FOOT WIDE CONCRETE RIBBON GUTTER SIMILAR TO STANDARD D-5.
5. MAINTAIN 0.30% MINIMUM LONGITUDINAL TOP OF CURB GRADES.
6. REQUIRED TRUNCATED SPACE MAY BE SIGNED AND STRIPED FOR MOTORCYCLE PARKING.
7. DRAINAGE FACILITIES SHALL BE PROVIDED SO THAT NO MORE THAN 0.3 cfs SHALL FLOW WITHIN THE GUTTER OF AN INTERSECTION CURB RETURN.

LEGEND:

- L = UNOBSTRUCTED LENGTH NECESSARY TO ACCOMMODATE FOR INTERSECTION SIGHT DISTANCE.
- W = TRAVEL LANE WIDTH AS PROVIDED BY DEPARTMENT (ADDITIONAL WIDTH FOR A CENTER LEFT TURN LANE MAY BE REQUIRED).
- W1 = TRAVEL LANE WIDTH PLUS 2- FEET, OR LANE WIDTH PLUS 5- FEET WHEN CLASS II BIKE LANES ARE REQUIRED, BUT SHALL NOT BE LESS THAN 15- FEET.
- W2 = TRAVEL LANE WIDTH PLUS 8- FEET FOR PARALLEL PARKING, OR LANE WIDTH PLUS 13- FEET WHEN CLASS II BIKE LANES ARE REQUIRED ADJACENT TO PARALLEL PARKING.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

STANDARD BULB-OUT
ANGLED PARKING ON MAJOR ROAD

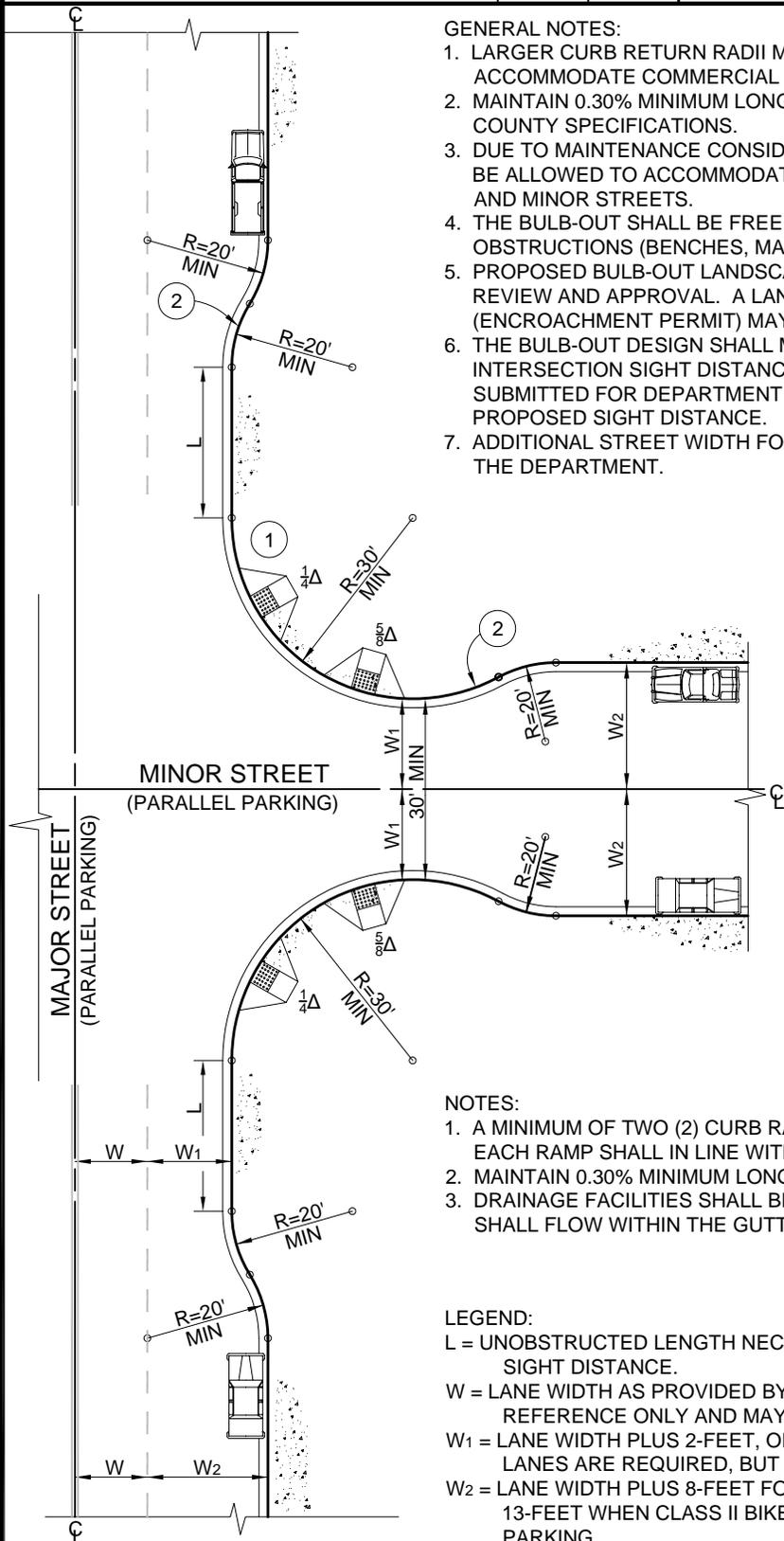
Scale: 1"=30'	Adopted: 2011
Drawing No: A-6d	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NEW STANDARD DRAWING	REM	NOV 07			

GENERAL NOTES:

1. LARGER CURB RETURN RADII MAY BE REQUIRED BY THE DEPARTMENT TO ACCOMMODATE COMMERCIAL TRUCK MOVEMENTS.
2. MAINTAIN 0.30% MINIMUM LONGITUDINAL CURB AND GUTTER SLOPES PER COUNTY SPECIFICATIONS.
3. DUE TO MAINTENANCE CONSIDERATIONS, SIDEWALK UNDER DRAINS SHALL NOT BE ALLOWED TO ACCOMMODATE FOR BULB-OUT DRAINAGE BETWEEN MAJOR AND MINOR STREETS.
4. THE BULB-OUT SHALL BE FREE OF ALL PEDESTRIAN AND SIGHT DISTANCE OBSTRUCTIONS (BENCHES, MAILBOXES, UTILITY SERVICE CABINETS, ETC)
5. PROPOSED BULB-OUT LANDSCAPING SHALL BE SUBJECT TO DEPARTMENT REVIEW AND APPROVAL. A LANDSCAPING MAINTENANCE AGREEMENT (ENCROACHMENT PERMIT) MAY BE REQUIRED.
6. THE BULB-OUT DESIGN SHALL MEET COUNTY REQUIREMENTS FOR INTERSECTION SIGHT DISTANCE. THE CONSTRUCTION PLANS SHALL SUBMITTED FOR DEPARTMENT APPROVAL SHALL SHOW AND LABEL THE PROPOSED SIGHT DISTANCE.
7. ADDITIONAL STREET WIDTH FOR CLASS II BIKE LANES MAY BE REQUIRED BY THE DEPARTMENT.



NOTES:

1. A MINIMUM OF TWO (2) CURB RAMPS SHALL BE INSTALLED IN EACH BULB-OUT. EACH RAMP SHALL IN LINE WITH THE SIDEWALK.
2. MAINTAIN 0.30% MINIMUM LONGITUDINAL TOP OF CURB GRADES.
3. DRAINAGE FACILITIES SHALL BE PROVIDED SO THAT NO MORE THAN 0.3 cfs SHALL FLOW WITHIN THE GUTTER OF AN INTERSECTION CURB RETURN.

LEGEND:

- L = UNOBSTRUCTED LENGTH NECESSARY TO ACCOMMODATE FOR INTERSECTION SIGHT DISTANCE.
- W = LANE WIDTH AS PROVIDED BY DEPARTMENT (TWO LANES ARE SHOWN FOR REFERENCE ONLY AND MAY NOT BE REQUIRED BY DEPARTMENT).
- W₁ = LANE WIDTH PLUS 2-FEET, OR LANE WIDTH PLUS 5-FEET WHEN CLASS II BIKE LANES ARE REQUIRED, BUT SHALL NOT BE LESS THAN 15-FEET.
- W₂ = LANE WIDTH PLUS 8-FEET FOR PARALLEL PARKING, OR LANE WIDTH PLUS 13-FEET WHEN CLASS II BIKE LANES ARE REQUIRED ADJACENT TO PARALLEL PARKING.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

STANDARD BULB-OUT
PARALLEL PARKING ON MAJOR ROAD

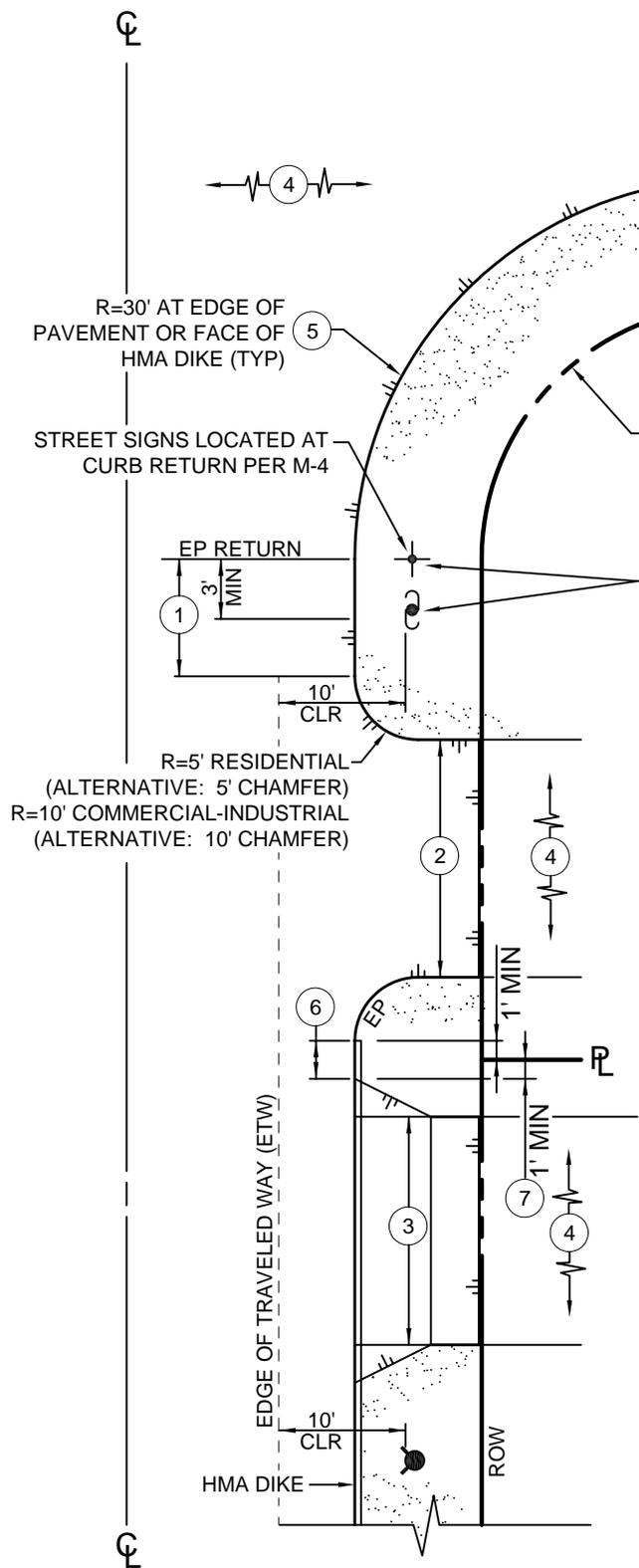
Scale: 1"=30'	Adopted: 2011
Drawing No: A-6e	
Sheet No:	1 OF 1

THIS PAGE LEFT BLANK INTENTIONALLY

THIS PAGE LEFT BLANK INTENTIONALLY

Revisions

Description	Approved	Date	Description	Approved	Date
CHANGE "ZONES" TO "USES"	GDM	NOV 08			



ROAD SIGNS, FIRE HYDRANTS, UTILITY POLES, TRAFFIC SIGNALS, LIGHT STANDARDS, ABOVE GROUND VAULTS AND ALL OTHER ROADSIDE OBSTACLES SHALL BE LOCATED TO PROVIDE A 10-FOOT CLEAR ZONE FROM THE EDGE OF TRAVELED WAY. WITH THE EXCEPTION OF TRAFFIC SIGNS, ALL OBSTACLES SHALL BE LOCATED NO CLOSER THAN 3-FEET TO A RETURN AND SHALL MEET THE SIGHT DISTANCE REQUIREMENTS OF THE A-5 SERIES DRAWINGS.

NOTES:

1. DISTANCE BETWEEN THE CURB RETURN AND THE FIRST DRIVEWAY SHALL BE 6-FEET MINIMUM FOR RURAL RESIDENTIAL, AND 50-FEET MINIMUM FOR COMMERCIAL AND INDUSTRIAL USES.
2. STANDARD DRAWING B-1a SHALL BE USED WHEN THE DRIVEWAY IS LOCATED AGAINST EDGE OF PAVEMENT.
3. STANDARD DRAWING B-1b SHALL BE USED WHEN THE DRIVEWAY IS LOCATED AGAINST HMA DIKE.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR INTERSECTION AND DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. A LARGER RETURN RADIUS MAY BE REQUIRED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL USES.
6. MAINTAIN 2-FOOT MINIMUM TO 5-FOOT MAXIMUM, OR 20-FOOT MINIMUM CLEARANCE BETWEEN ADJACENT DRIVEWAYS (SEPARATION BETWEEN 5-FEET AND 20-FEET ARE NOT ALLOWED).
7. THE DRIVEWAY WING OR RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM EACH PROPERTY LINE. THIS STANDARD MAY BE WAIVED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL USES.
8. IN RESIDENTIAL ZONES, THE TOTAL WIDTH (W) OF ALL DRIVEWAYS SERVING A SINGLE PARCEL SHALL NOT EXCEED 60-PERCENT OF THE PARCEL FRONTAGE.
9. AS A CONDITION OF ISSUANCE OF ANY DRIVEWAY ENCROACHMENT PERMIT, ALL ABANDONED DRIVEWAYS ON THE SAME FRONTAGE SHALL BE REMOVED AND THE IMPROVEMENTS RESTORED PER THE RESPECTIVE DESIGN STANDARDS.

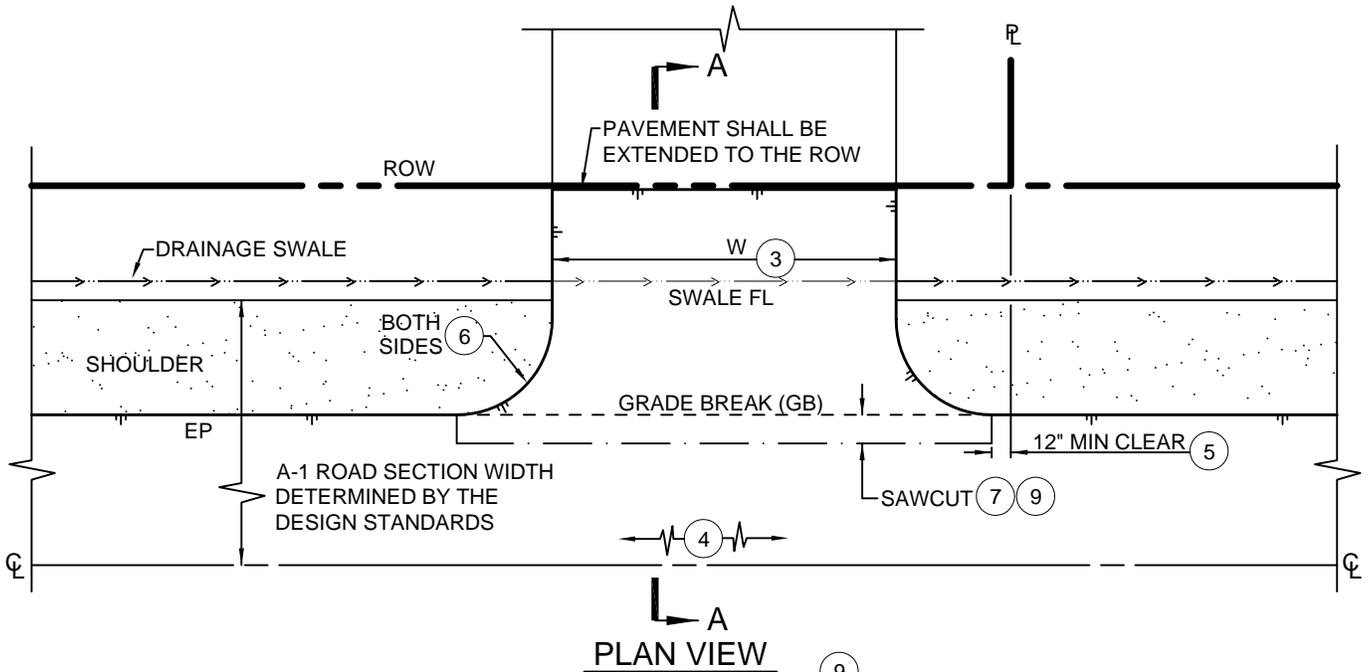


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL DRIVEWAY
 LAYOUT STANDARDS

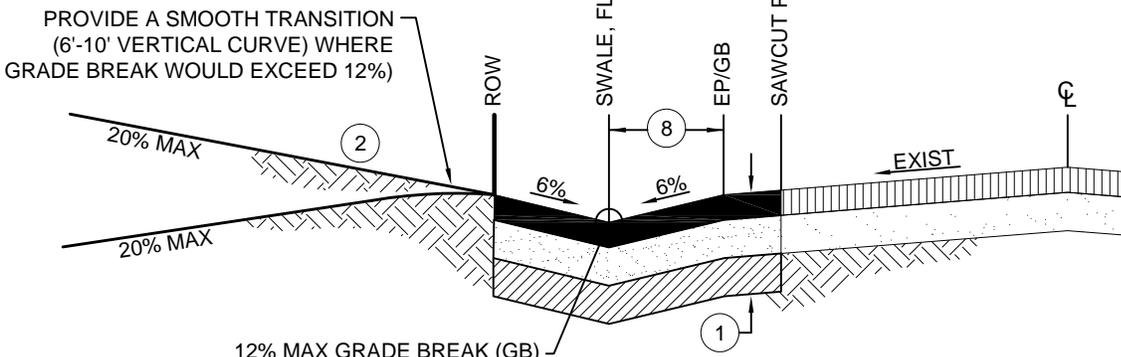
Scale: NTS	Adopted: 2011
Drawing No: B-1	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NAME CHANGE	GDM	NOV 08			
REPLACE AC WITH HMA	GDM	JAN 11			



PLAN VIEW



SECTION A-A

NOTES:

- WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
 ■ HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 ▨ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
- RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET FIRE AGENCY REGULATIONS.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- THE END OF DRIVEWAY RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
- THE DRIVEWAY RETURN SHALL HAVE A RADIUS OF 5-FEET FOR RESIDENTIAL (ALTERNATIVE: 5-FOOT CHAMFER), AND A RADIUS OF 10-FEET FOR COMMERCIAL-INDUSTRIAL (ALTERNATIVE: 10-FOOT CHAMFER).
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-2.
- DISTANCE TO MATCH ROADSIDE DRAINAGE SWALE PER SERIES A-1 DRAWING REQUIREMENTS.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL SURFACE SEAMS.

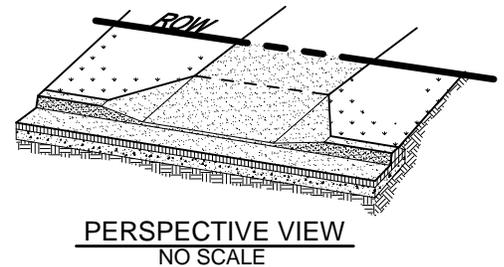
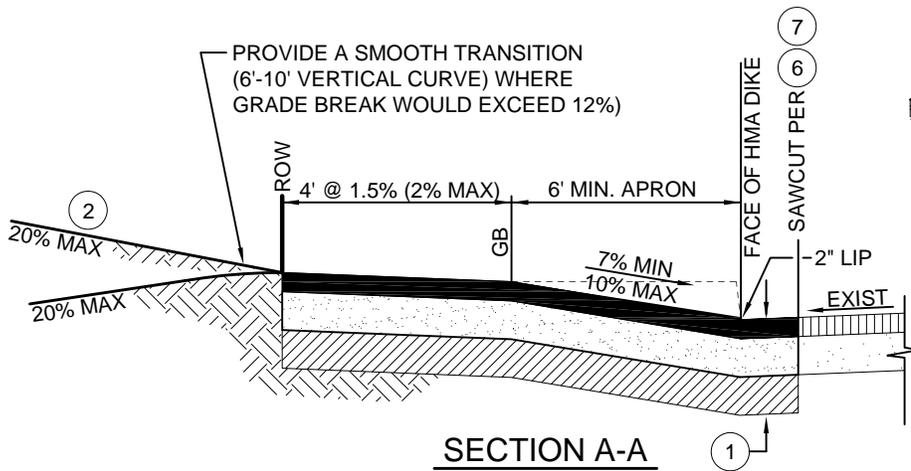
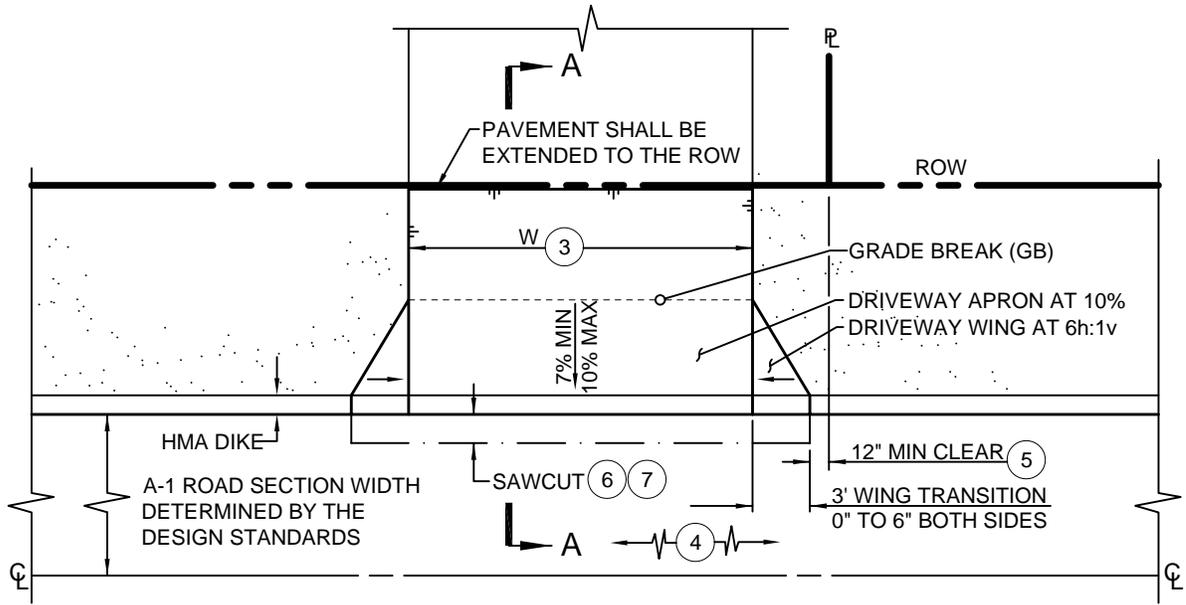


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL RESIDENTIAL DRIVEWAY
 FOR EDGE OF PAVEMENT (NO DIKE)

Scale: 1"=10'	Adopted: 2011
Drawing No: B-1a	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
ADDED 2" AC LIP AT GUTTER	REM	NOV 07	REPLACE AC WITH HMA, D/W SLOPE	GDM	JAN 11
NAME CHANGE	GDM	NOV 08			



NOTES:

- WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
 - HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
- RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET FIRE AGENCY REGULATIONS.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- THE DRIVEWAY WING SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-2.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL SURFACE SEAMS.

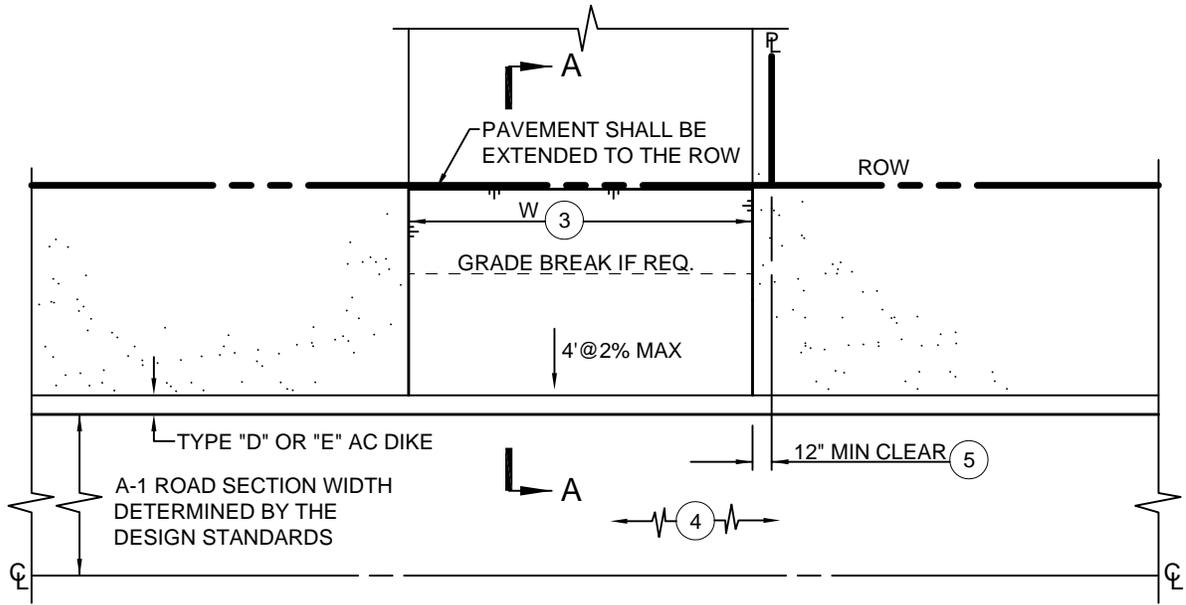


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL RESIDENTIAL DRIVEWAY
FOR TYPE "A" HMA DIKE

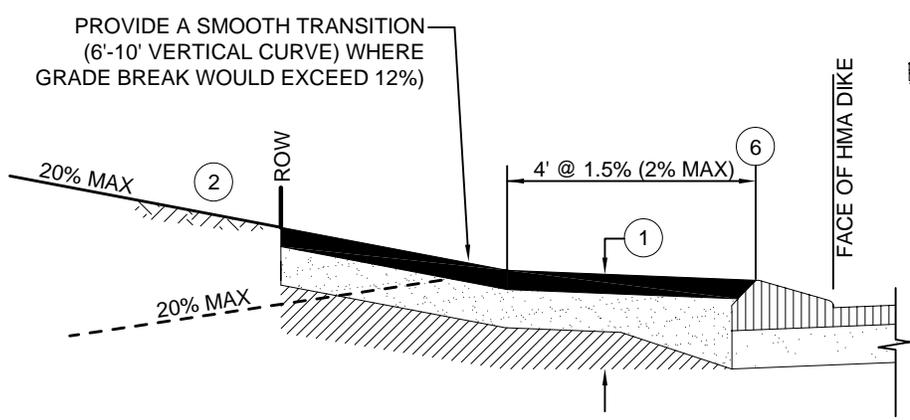
Scale: 1"=10'	Adopted: 2011
Drawing No: B-1b	
Sheet No:	1 OF 1

Revisions

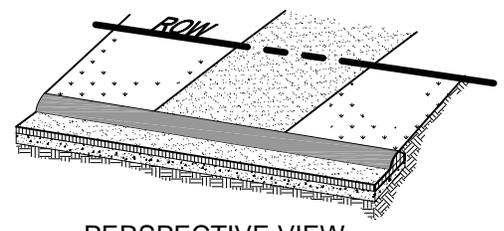
Description	Approved	Date	Description	Approved	Date
NEW STANDARD	GDM	NOV 08			
REPLACE AC WITH HMA	GDM	JAN 11			



PLAN VIEW



SECTION A-A



PERSPECTIVE VIEW
NO SCALE

NOTES:

- WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
 ■ HOT MIX ASPHALT PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 ■ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 ■ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
- RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET FIRE AGENCY REGULATIONS.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- THE EDGE OF DRIVEWAY SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
- NEW DRIVEWAY APRON SHALL CONFORM TO THE BACK OF EXISTING "D" OR "E" DIKE.
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-2.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL SURFACE SEAMS.

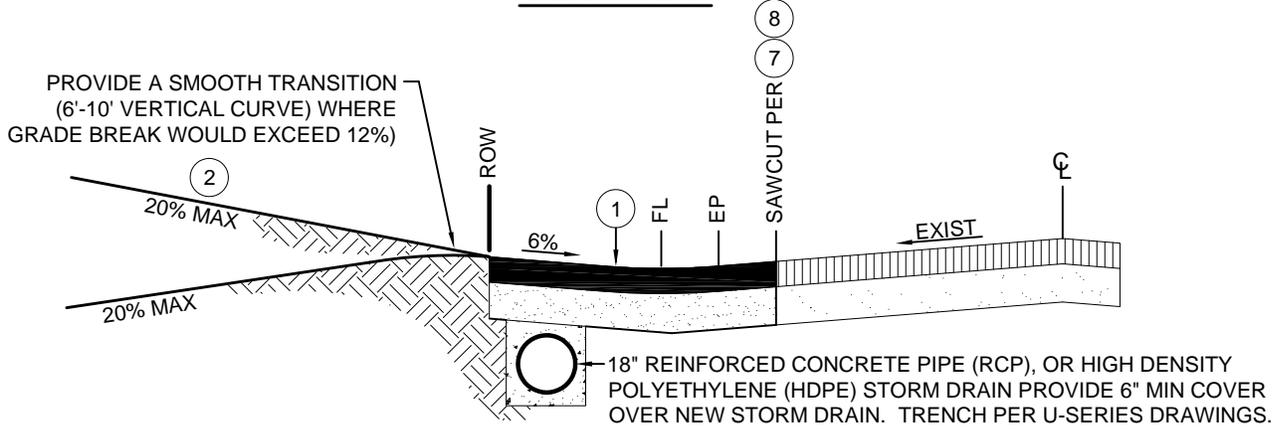
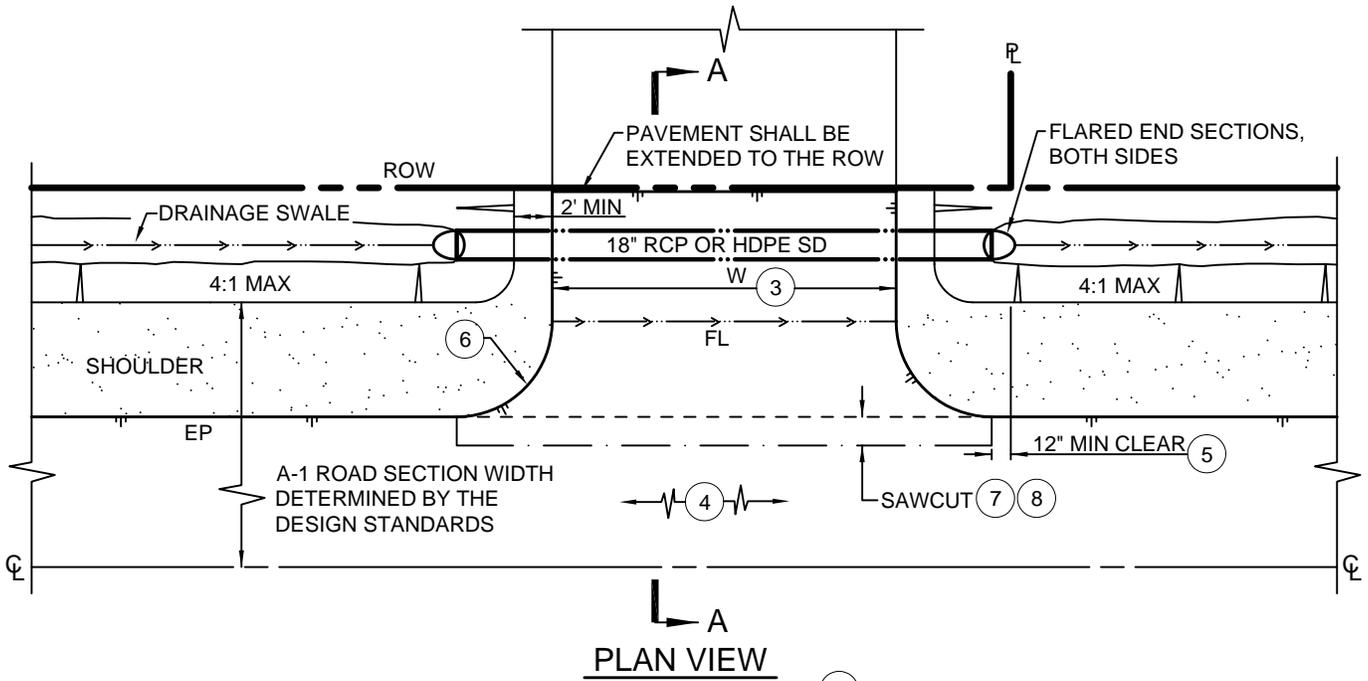


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL RESIDENTIAL DRIVEWAY
 FOR TYPE "D" & "E" HMA DIKES

Scale: NTS	Adopted: 2011
Drawing No: B-1b.1	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NAME CHANGE	GDM	NOV 08			
REPLACE AC WITH HMA	GDM	JAN 11			



SECTION A-A

NOTES:

- WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
 ■ HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 ■ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 ■ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
- RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET FIRE AGENCY REGULATIONS.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- THE END OF DRIVEWAY RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
- THE DRIVEWAY RETURN SHALL HAVE A RADIUS OF 5-FEET FOR RESIDENTIAL (ALTERNATIVE: 5-FOOT CHAMFER), AND A RADIUS OF 10-FEET FOR COMMERCIAL-INDUSTRIAL (ALTERNATIVE: 10-FOOT CHAMFER).
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-2.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL SURFACE SEAMS.

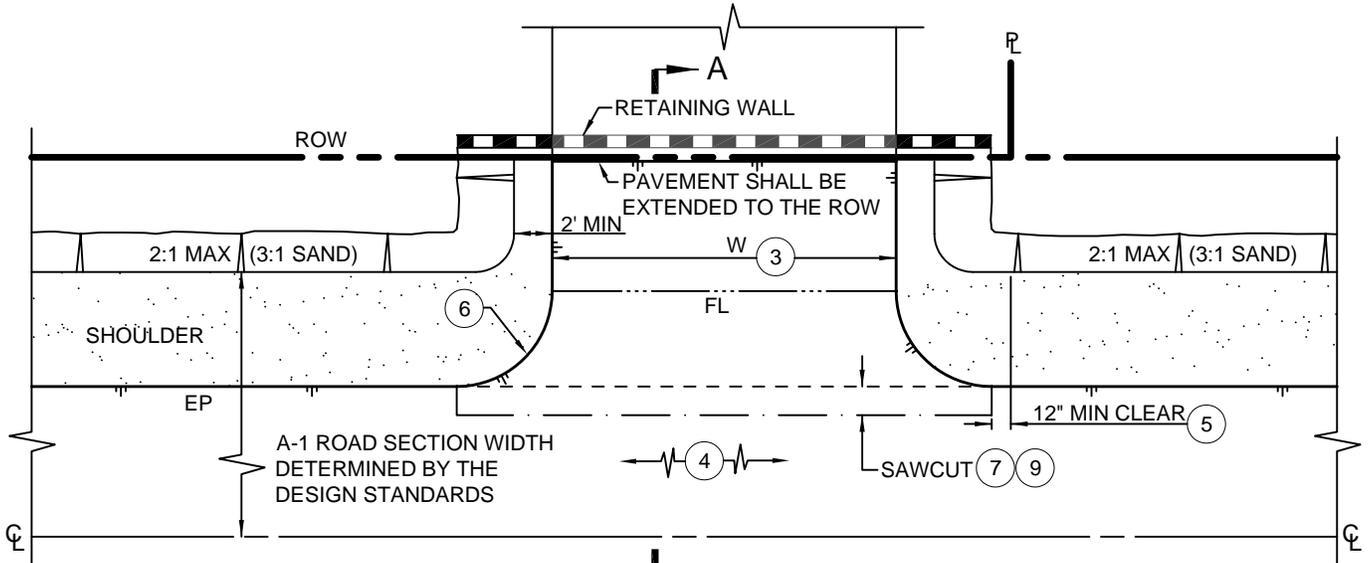


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL RESIDENTIAL DRIVEWAY
FOR EDGE OF PAVEMENT WITH CULVERT
(PRIOR DEPARTMENT APPROVAL REQUIRED)

Scale: 1"=10'	Adopted: 2011
Drawing No: B-1c	
Sheet No:	1 OF 1

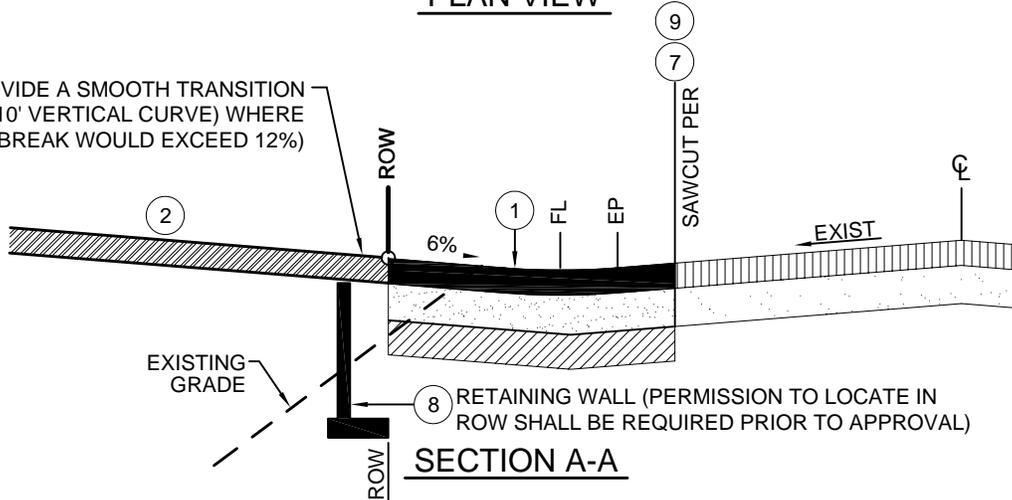
Revisions

Description	Approved	Date	Description	Approved	Date
NAME CHANGE	GDM	NOV 08			
REPLACE AC WITH HMA	GDM	JAN 11			



PLAN VIEW

PROVIDE A SMOOTH TRANSITION (6'-10' VERTICAL CURVE) WHERE GRADE BREAK WOULD EXCEED 12%



SECTION A-A

NOTES:

- WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
 - HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH FIRE AGENCY REGULATIONS.
- RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FOOT MINIMUM TO 35-FOOT MAXIMUM. ALL DRIVEWAYS SHALL MEET FIRE AGENCY REGULATIONS.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- THE END OF DRIVEWAY RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
- THE DRIVEWAY RETURN SHALL HAVE A RADIUS OF 5-FOOT FOR RESIDENTIAL (ALTERNATIVE: 5-FOOT CHAMFER), AND A RADIUS OF 10-FOOT FOR COMMERCIAL-INDUSTRIAL (ALTERNATIVE: 10-FOOT CHAMFER).
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-2.
- IF RETAINING WALL ARE REQUIRED TO BE LOCATED IN THE RIGHT-OF-WAY THE FOLLOWING SHALL APPLY:
 - PRIOR APPROVAL SHALL BE GRANTED BY THE DEPARTMENT.
 - THE RETAINING WALL SHALL BE ENGINEERED. PLANS AND CALCULATIONS SHALL BE SUBMITTED FOR DEPARTMENT APPROVAL.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL SURFACE SEAMS.

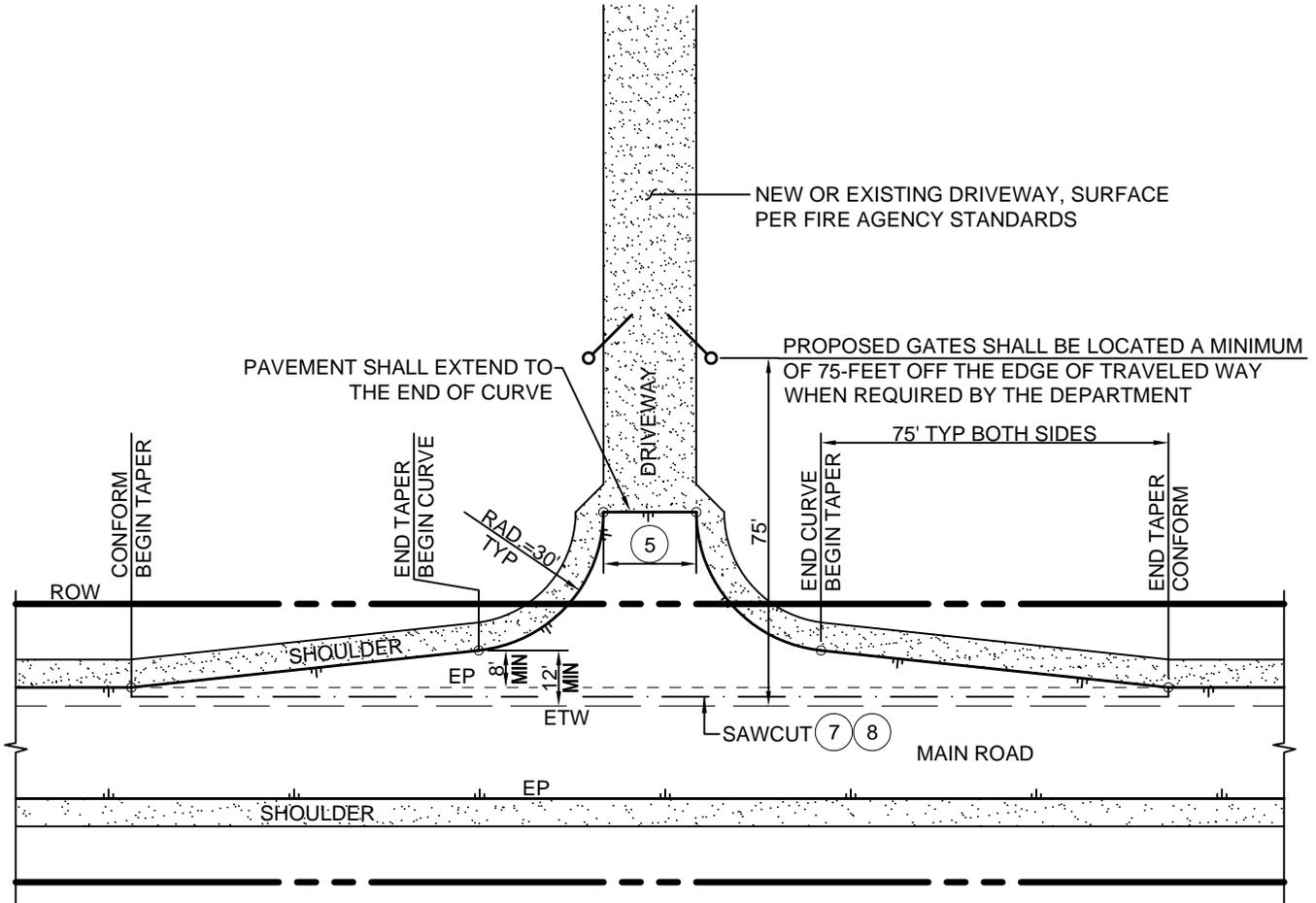


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL RESIDENTIAL DRIVEWAY
 FOR EDGE OF PAVEMENT W/ RETAINING WALL
 (PRIOR DEPARTMENT APPROVAL REQUIRED)

Scale: 1"=10'	Adopted: 2011
Drawing No: B-1d	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NEW STANDARD	GDM	NOV 08			
CHANGE AC TO HMA, UPDATE GATE NOTE	GDM	JAN 11			



NOTES:

- THE DEPARTMENT MAY REQUIRE THIS STANDARD FOR MODIFYING EXISTING DRIVEWAYS, OR PROPOSING NEW DRIVEWAYS WHICH CONNECT TO COUNTY ROADS HAVING HIGH VEHICLE VOLUMES AND/OR HIGH VEHICLE SPEEDS.
- ALL ROADSIDE DRAINAGE SHALL BE ACCOMMODATED FOR TO THE SATISFACTION OF THE DEPARTMENT. CONSTRUCTION PLANS AND/OR DRAINAGE CALCULATIONS MAY BE REQUIRED FOR DEPARTMENT APPROVAL PRIOR TO ENCROACHMENT PERMIT ISSUANCE.
- WITHIN THE PUBLIC RIGHT-OF-WAY THE DRIVEWAY SECTION SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
 -  HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 -  CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 -  12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH FIRE AGENCY REGULATIONS.
- DRIVEWAY WIDTH SHALL BE 20' MINIMUM TO 35' MAXIMUM. ALL DRIVEWAYS SHALL MEET CALFIRE/FIRE REGULATIONS.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-2.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL SURFACE SEAMS.

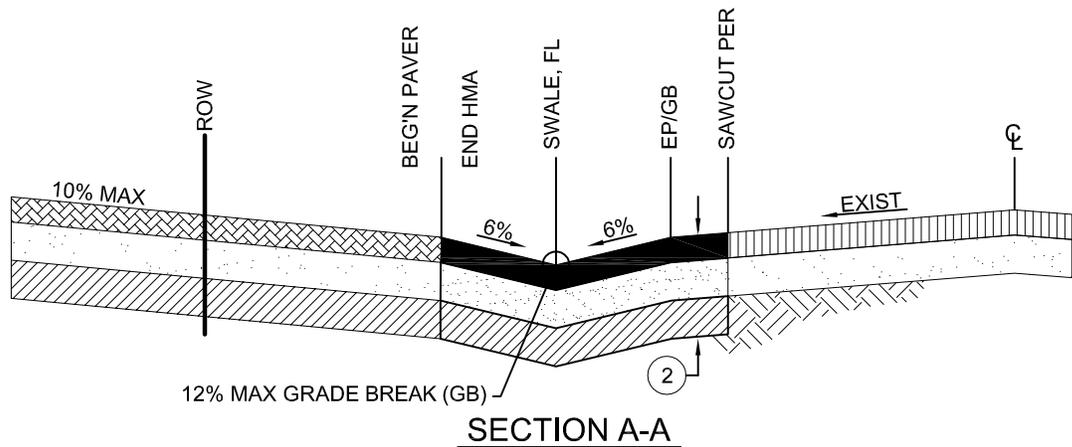
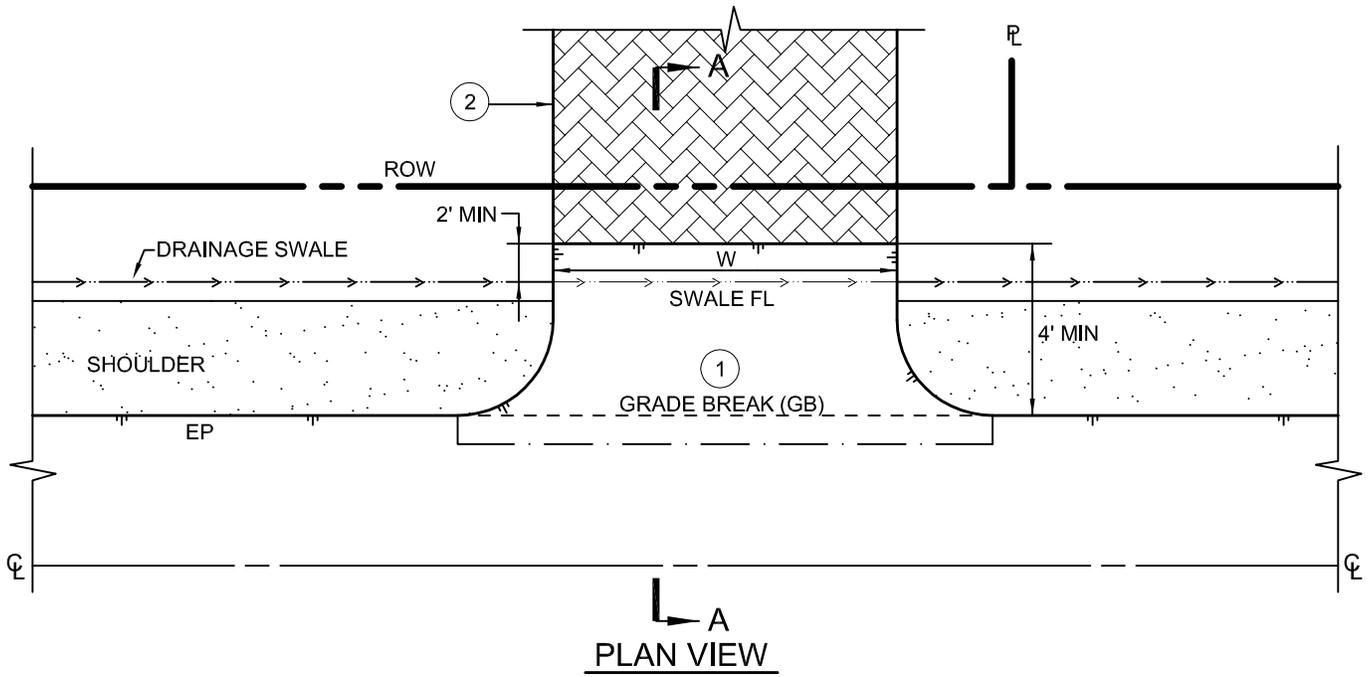


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL DRIVEWAY APPROACH
 (PRIOR DEPT. APPROVAL REQUIRED FOR USE ON
 HIGH SPEED AND/OR HIGH VOLUME ROADWAYS)

Scale: 1"=40'	Adopted: 2011
Drawing No:	B-1e
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NAME CHANGE	GDM	NOV 08			
REPLACE AC WITH HMA	GDM	JAN 11			



NOTES:

1. CONSTRUCT DRIVEWAY PER COUNTY STANDARD B-1a, B-1c, OR B-1d.
2. APPROVED ROAD SECTION SHALL MEET THE FOLLOWING REQUIREMENTS:
 - ▨ CONCRETE PAVER, OVER
 - ▨ CLASS II AGGREGATE BASE, OVER
 - ▨ SCARIFY 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
4. RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM. ALL DRIVEWAYS SHALL MEET FIRE AGENCY REGULATIONS.

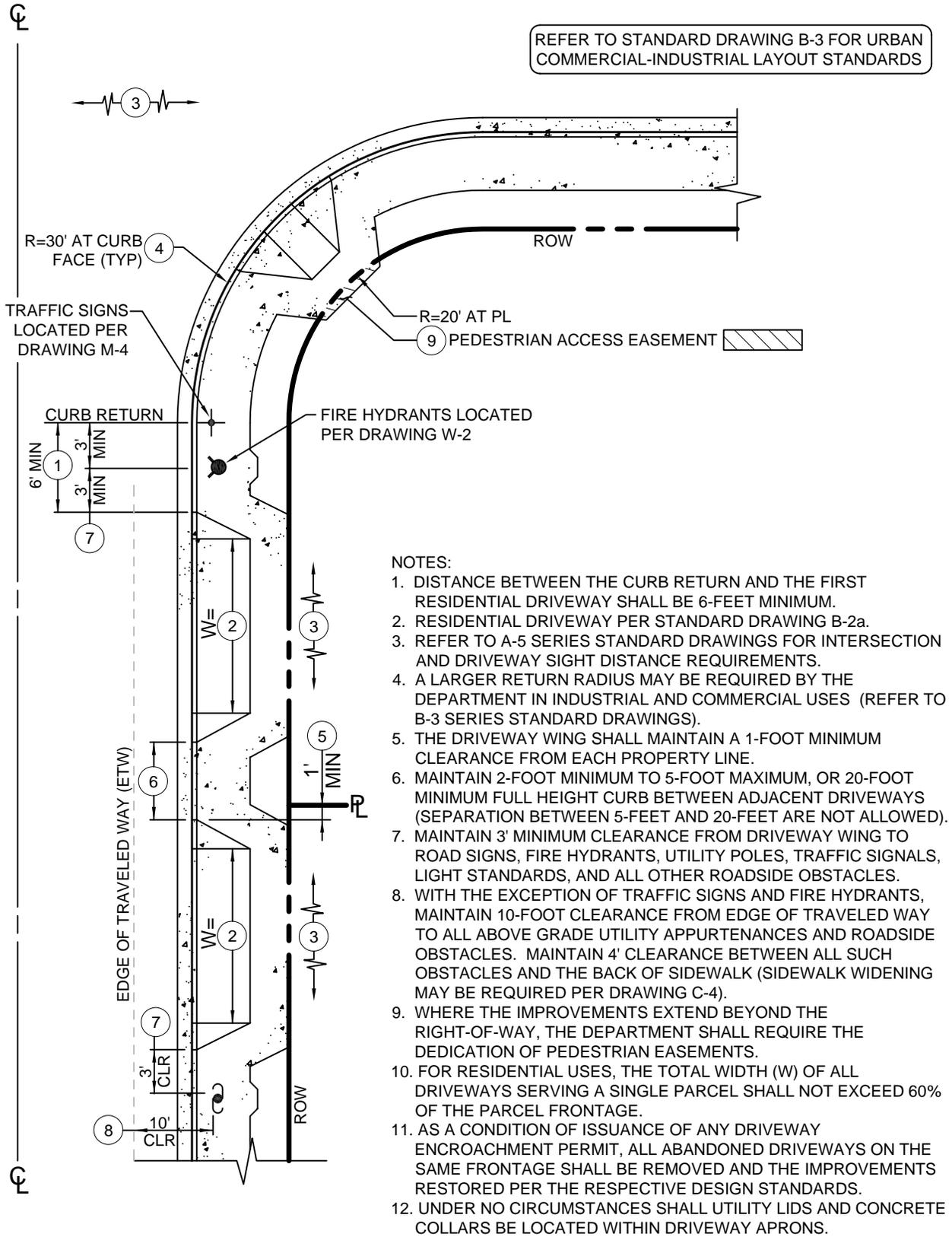


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL RESIDENTIAL DRIVEWAY
 USE OF PAVERS WITHIN THE RIGHT OF WAY

Scale: 1"=10'	Adopted: 2014
Drawing No: B-1f	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
REPLACE "ZONES" WITH "USES"	GDM	NOV 08			



NOTES:

1. DISTANCE BETWEEN THE CURB RETURN AND THE FIRST RESIDENTIAL DRIVEWAY SHALL BE 6-FOOT MINIMUM.
2. RESIDENTIAL DRIVEWAY PER STANDARD DRAWING B-2a.
3. REFER TO A-5 SERIES STANDARD DRAWINGS FOR INTERSECTION AND DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
4. A LARGER RETURN RADIUS MAY BE REQUIRED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL USES (REFER TO B-3 SERIES STANDARD DRAWINGS).
5. THE DRIVEWAY WING SHALL MAINTAIN A 1-FOOT MINIMUM CLEARANCE FROM EACH PROPERTY LINE.
6. MAINTAIN 2-FOOT MINIMUM TO 5-FOOT MAXIMUM, OR 20-FOOT MINIMUM FULL HEIGHT CURB BETWEEN ADJACENT DRIVEWAYS (SEPARATION BETWEEN 5-FEET AND 20-FEET ARE NOT ALLOWED).
7. MAINTAIN 3' MINIMUM CLEARANCE FROM DRIVEWAY WING TO ROAD SIGNS, FIRE HYDRANTS, UTILITY POLES, TRAFFIC SIGNALS, LIGHT STANDARDS, AND ALL OTHER ROADSIDE OBSTACLES.
8. WITH THE EXCEPTION OF TRAFFIC SIGNS AND FIRE HYDRANTS, MAINTAIN 10-FOOT CLEARANCE FROM EDGE OF TRAVELED WAY TO ALL ABOVE GRADE UTILITY APPURTENANCES AND ROADSIDE OBSTACLES. MAINTAIN 4' CLEARANCE BETWEEN ALL SUCH OBSTACLES AND THE BACK OF SIDEWALK (SIDEWALK WIDENING MAY BE REQUIRED PER DRAWING C-4).
9. WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, THE DEPARTMENT SHALL REQUIRE THE DEDICATION OF PEDESTRIAN EASEMENTS.
10. FOR RESIDENTIAL USES, THE TOTAL WIDTH (W) OF ALL DRIVEWAYS SERVING A SINGLE PARCEL SHALL NOT EXCEED 60% OF THE PARCEL FRONTAGE.
11. AS A CONDITION OF ISSUANCE OF ANY DRIVEWAY ENCROACHMENT PERMIT, ALL ABANDONED DRIVEWAYS ON THE SAME FRONTAGE SHALL BE REMOVED AND THE IMPROVEMENTS RESTORED PER THE RESPECTIVE DESIGN STANDARDS.
12. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.

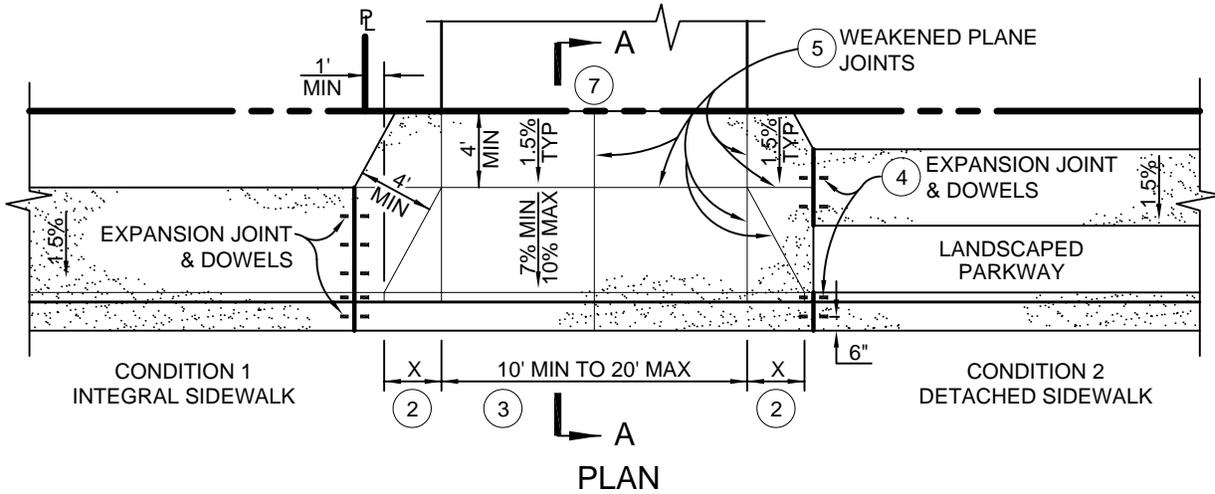


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
URBAN DRIVEWAY
 LAYOUT STANDARDS

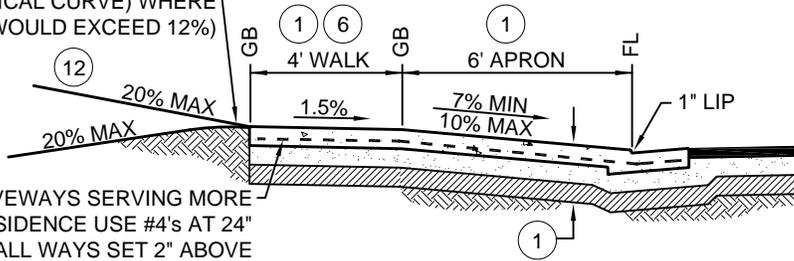
Scale: NTS	Adopted: 2011
Drawing No: B-2	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 3	REM	NOV 07			
NOTE 6 & 12, DRIVEWAY SLOPE & NOTE	GDM	JAN 11			

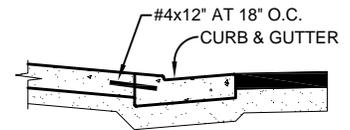


PROVIDE A SMOOTH TRANSITION (6'-10' VERTICAL CURVE) WHERE GRADE BREAK WOULD EXCEED 12%.



FOR DRIVEWAYS SERVING MORE THAN ONE RESIDENCE USE #4's AT 24" ON CENTER, ALL WAYS SET 2" ABOVE AGGREGATE BASE ON DOBIES.

SECTION A-A



WHEN CURB & GUTTER IS PLACED PRIOR TO DRIVEWAY CONSTRUCTION THEN THE NEW DRIVEWAY SHALL BE DOWELED INTO THE CURB AND GUTTER WITH #4x12" AT 18" OC

COLD JOINT DETAIL

NOTES:

- CONCRETE DRIVEWAY SHALL CONFORM TO STATE STANDARD 90-1.01, 520 LBS/CY CEMENTITIOUS MATERIAL [5-1/2 SACK]. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE. TYPICAL SECTION SHALL BE:
 - 6-INCH MIN PORTLAND CEMENT CONCRETE, OVER
 - 6" MIN CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 IF THE R-VALUE OF THE NATIVE MATERIAL IS 55 OR GREATER THEN THE 6" OF AGGREGATE BASE MAY BE SUBSTITUTED WITH COMPACTED NATIVE MATERIAL.
 A COURSE BROOM FINISH TRANSVERSE TO THE LINE OF TRAFFIC SHALL BE USED ON THE APRON AND WINGS. THE 4-FOOT WIDE SIDEWALK SHALL HAVE A LIGHT BROOM FINISH PARALLEL TO THE LINE OF TRAFFIC.
- X = 3-FEET (6h:1v) EXCEPT FOR CURB HEIGHTS OVER 8-INCHES WHERE 4h:1v SLOPES SHALL BE USED ON CURB SLOPE.
- DRIVEWAY WIDTH (W) SHALL BE 10-FEET MIN AND 20-FEET MAX FOR RESIDENTIAL ACCESS. FOR DRIVEWAYS SERVING MORE THAN ONE RESIDENCE W EQUALS THE INTERIOR ROAD WIDTH AS GOVERNED BY THE LOCAL FIRE AGENCY STANDARDS.
- EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AS SHOWN. 1/2"Øx18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
- WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED AS SHOWN AND PER STANDARD DRAWING C-1.
- THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
- WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, AN OFFER OF DEDICATION FOR PEDESTRIAN EASEMENT/S SHALL BE REQUIRED BY THE DEPARTMENT.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-3.
- THE HIGH VOLUME DRIVEWAY STANDARD B-3b SHALL BE USED AT ENTRANCES TO RESIDENTIAL DRIVEWAYS THAT EXCEED 200 VEHICLES PER PM PEAK HOUR AND EXIT ONTO A COLLECTOR OR ARTERIAL ROAD. THE DEPARTMENT RESERVES THE RIGHT TO REQUIRE THE USE OF A HIGH VOLUME DRIVEWAY BASED ON OTHER EXTENUATING CONDITIONS.
- UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.



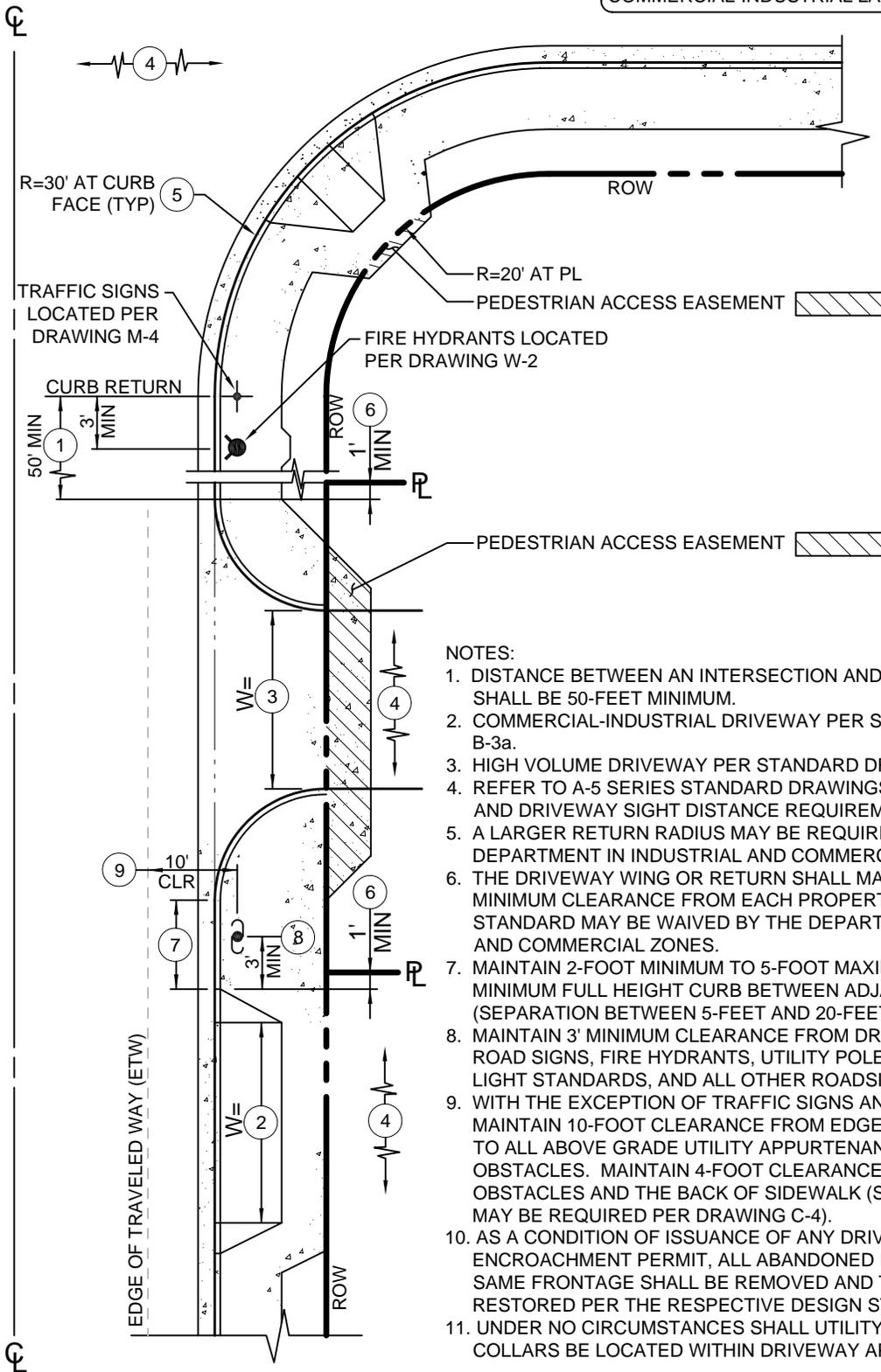
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
URBAN DRIVEWAY
 RESIDENTIAL DRIVEWAY

Scale: 1"=10'	Adopted: 2011
Drawing No: B-2a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date

REFER TO STANDARD DRAWING B-1 FOR RURAL COMMERCIAL-INDUSTRIAL LAYOUT STANDARDS



NOTES:

1. DISTANCE BETWEEN AN INTERSECTION AND THE FIRST DRIVEWAY SHALL BE 50-FOOT MINIMUM.
2. COMMERCIAL-INDUSTRIAL DRIVEWAY PER STANDARD DRAWING B-3a.
3. HIGH VOLUME DRIVEWAY PER STANDARD DRAWING B-3b.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR INTERSECTION AND DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. A LARGER RETURN RADIUS MAY BE REQUIRED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL ZONES.
6. THE DRIVEWAY WING OR RETURN SHALL MAINTAIN A 1-FOOT MINIMUM CLEARANCE FROM EACH PROPERTY LINE. THIS STANDARD MAY BE WAIVED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL ZONES.
7. MAINTAIN 2-FOOT MINIMUM TO 5-FOOT MAXIMUM, OR 20-FOOT MINIMUM FULL HEIGHT CURB BETWEEN ADJACENT DRIVEWAYS (SEPARATION BETWEEN 5-FOET AND 20-FOET ARE NOT ALLOWED).
8. MAINTAIN 3' MINIMUM CLEARANCE FROM DRIVEWAY WING TO ROAD SIGNS, FIRE HYDRANTS, UTILITY POLES, TRAFFIC SIGNALS, LIGHT STANDARDS, AND ALL OTHER ROADSIDE OBSTACLES.
9. WITH THE EXCEPTION OF TRAFFIC SIGNS AND FIRE HYDRANTS, MAINTAIN 10-FOOT CLEARANCE FROM EDGE OF TRAVELED WAY TO ALL ABOVE GRADE UTILITY APPURTENANCES AND ROADSIDE OBSTACLES. MAINTAIN 4-FOOT CLEARANCE BETWEEN ALL SUCH OBSTACLES AND THE BACK OF SIDEWALK (SIDEWALK WIDENING MAY BE REQUIRED PER DRAWING C-4).
10. AS A CONDITION OF ISSUANCE OF ANY DRIVEWAY ENCROACHMENT PERMIT, ALL ABANDONED DRIVEWAYS ON THE SAME FRONTAGE SHALL BE REMOVED AND THE IMPROVEMENTS RESTORED PER THE RESPECTIVE DESIGN STANDARDS.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.

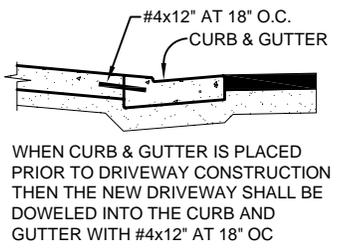
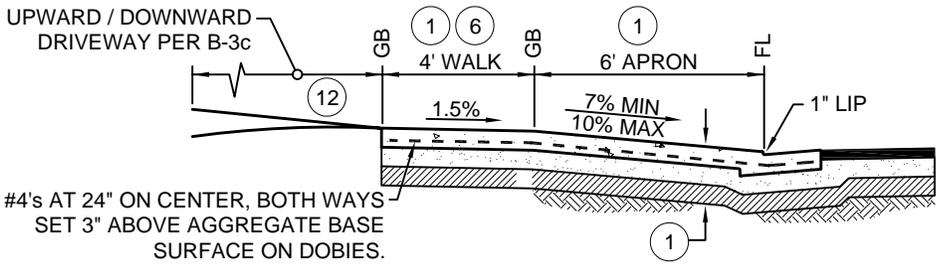
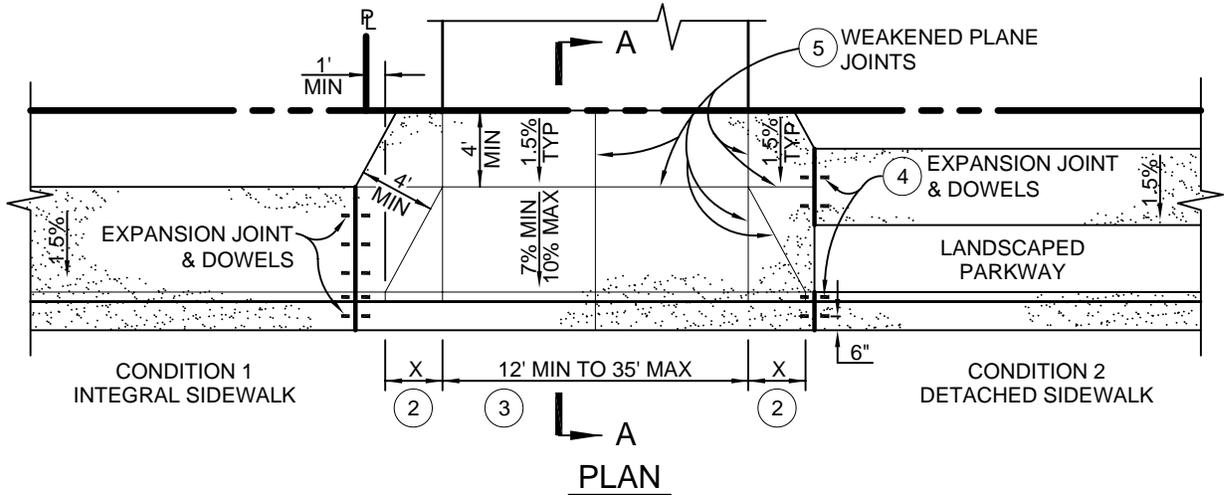


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
COMMERCIAL-INDUSTRIAL DRIVEWAY
 LAYOUT STANDARDS

Scale: NTS	Adopted: 2011
Drawing No: B-3	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



SECTION A-A

COLD JOINT DETAIL

NOTES:

- CONCRETE DRIVEWAY SHALL CONFORM TO STATE STANDARD 90-1.01, 520 LBS/CY CEMENTITIOUS MATERIAL [5-1/2 SACK]. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE. TYPICAL SECTION SHALL BE:
 - 8-INCH MINIMUM PORTLAND CEMENT CONCRETE REINFORCED WITH #4's AT 24" OC BOTH WAYS, OVER
 - 6" MIN CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 IF THE R-VALUE OF THE NATIVE MATERIAL IS 55 OR GREATER THEN THE 6-INCHES OF AGGREGATE BASE MAY BE SUBSTITUTED WITH COMPACTED NATIVE MATERIAL.
- A COURSE BROOM FINISH TRANSVERSE TO THE LINE OF TRAFFIC SHALL BE USED ON THE APRON AND WINGS. THE 4-FOOT WIDE SIDEWALK SHALL HAVE A LIGHT BROOM FINISH PARALLEL TO THE LINE OF TRAFFIC.
- X = 3- FEET (6h:1v) EXCEPT FOR CURB HEIGHTS OVER 8-INCHES WHERE 4h:1v SLOPES SHALL BE USED ON CURB SLOPE.
- W = DRIVEWAY WIDTH SHALL BE 12- FEET MINIMUM AND 35- FEET MAXIMUM FOR COMMERCIAL-INDUSTRIAL ACCESS.
- EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AS SHOWN. 1/2"Øx18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
- WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED AS SHOWN AND PER STANDARD DRAWING C-1.
- THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
- WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, THE ACQUISITION OF PEDESTRIAN EASEMENTS SHALL BE REQUIRED BY THE DEPARTMENT.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-3.
- THE HIGH VOLUME DRIVEWAY STANDARD B-3b SHALL BE USED AT ENTRANCES THAT EXCEED 200 VEHICLES PER PM PEAK HOUR AND EXIT ONTO AN ARTERIAL ROAD. THE DEPARTMENT RESERVES THE RIGHT TO REQUIRE THE USE OF A HIGH VOLUME DRIVEWAY BASED ON OTHER EXTENUATING CONDITIONS.
- UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.

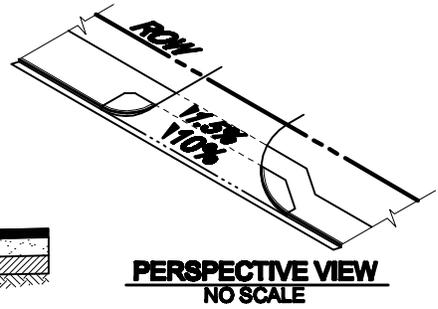
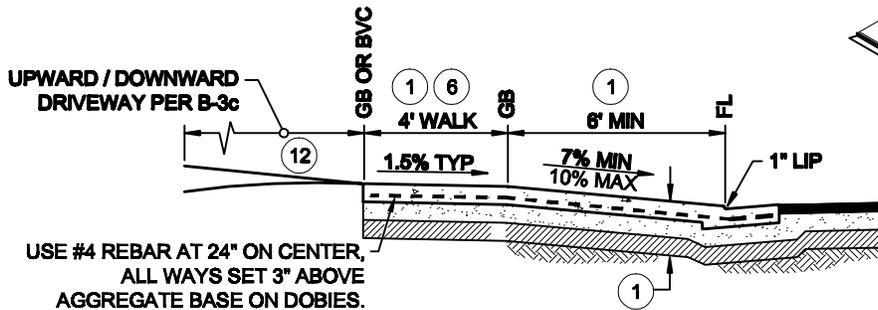
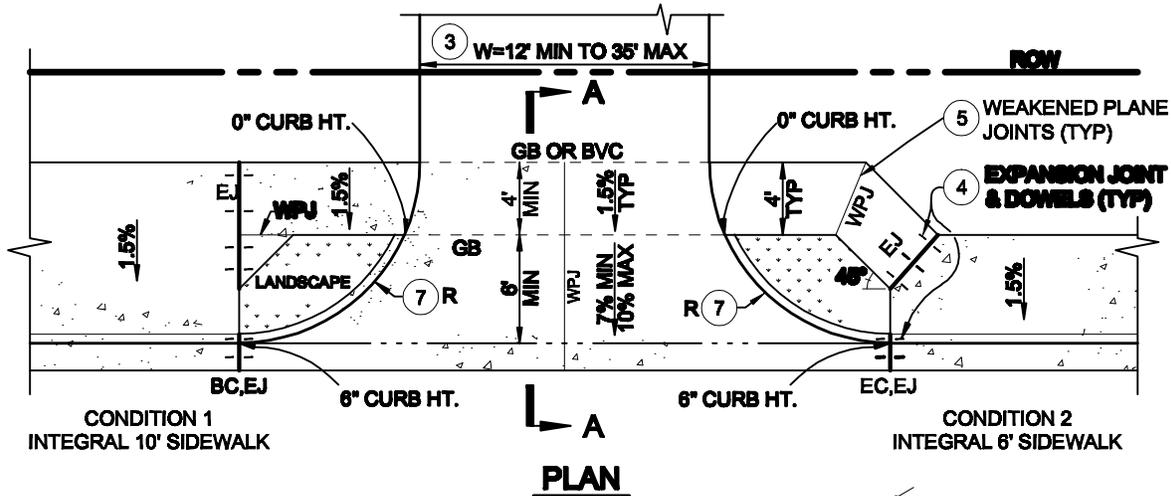


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
COMMERCIAL-INDUSTRIAL DRIVEWAY
 STANDARD DRIVEWAY

Scale: 1"=10'	Adopted: 2011
Drawing No: B-3a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 7	REM	NOV 07	REVISE NOTE 1	FH	AUG 14
NOTE 1 AND 7		MAY 14			



SECTION A-A

NOTES:

- CONCRETE DRIVEWAY SHALL CONFORM TO STATE STANDARD 90-1.01, 520 LBS/CY CEMENTITIOUS MATERIAL [5-1/2 SACK]. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE. TYPICAL SECTION SHALL BE:
 - 8-INCH MINIMUM PORTLAND CEMENT CONCRETE REINFORCED WITH #4's AT 24" OC BOTH WAYS, OVER
 - 6" MIN CLASS II AGGREGATE BASE, OVER
 - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
 A COURSE BROOM FINISH TRANSVERSE TO THE LINE OF TRAFFIC SHALL BE USED ON THE APRON AND WINGS.
- DIMENSIONS "W" & "R" AND PARKWAY WIDTH SHALL BE SHOWN ON PLANS.
- W = DRIVEWAY WIDTH SHALL BE 12-FOOT MINIMUM AND 35-FOOT MAXIMUM FOR COMMERCIAL-INDUSTRIAL ACCESS.
- EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AS SHOWN. 1/2"x18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
- WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED AS SHOWN AND PER STANDARD DRAWING C-1.
- THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
- RADIUS (R) SHALL BE 10 FEET. CURB HEIGHT VARIES FROM 0 TO 6-INCHES
- WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, THE ACQUISITION OF PEDESTRIAN EASEMENTS SHALL BE REQUIRED BY THE DEPARTMENT.
- REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
- FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 AND R-3.
- THIS HIGH VOLUME DRIVEWAY STANDARD SHALL BE USED AT ENTRANCES THAT EXCEED 200 VEHICLES PER PM PEAK HOUR AND EXIT ONTO AN ARTERIAL ROAD, OR WHERE REQUIRED BY THE DEPARTMENT.
- UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.
- OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT DESIGNER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.

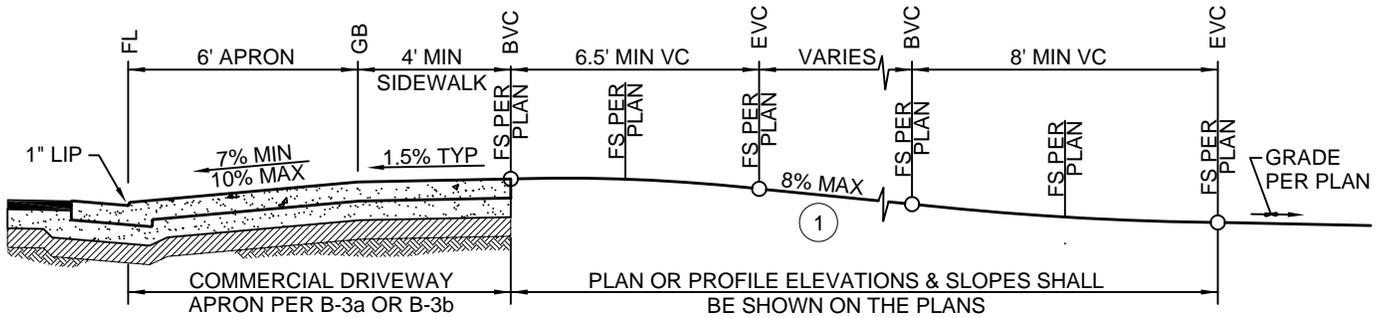


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
COMMERCIAL-INDUSTRIAL DRIVEWAY
HIGH VOLUME DRIVEWAY

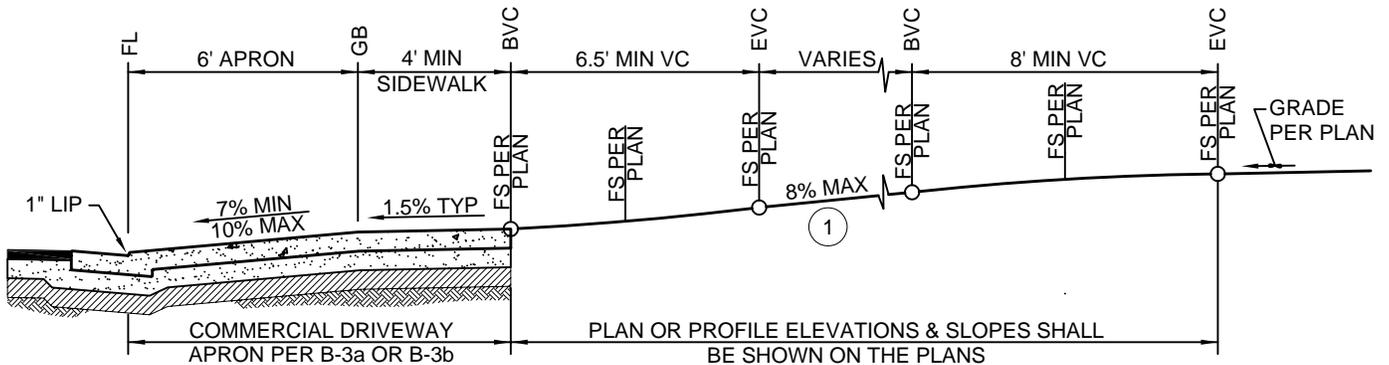
Scale: 1"=15'	Adopted: 2014
Drawing No: B-3b	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date



DOWNWARD DRIVEWAY



UPWARD DRIVEWAY

NOTES:

1. THE MAXIMUM SLOPE OF 8% SHALL NOT BE EXCEEDED ALONG ANY LONGITUDINAL PORTION OF THE NEW DRIVEWAY. THE SLOPE MAY BE INCREASED TO 12% WITH SPECIAL CONSTRUCTION TECHNIQUES AND PRIOR DEPARTMENT APPROVAL.
2. THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
3. THIS STANDARD IS INTENDED TO BE USED IN CONJUNCTION WITH STANDARD DRAWINGS B-3a AND B-3b.

ABBREVIATIONS:

- BVC BEGIN VERTICAL CURVE
- EVC END VERTICAL CURVE
- FL FLOWLINE
- FS FINISHED SURFACE (ELEVATION)
- GB GRADE BREAK
- VC VERTICAL CURVE



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
COMMERCIAL-INDUSTRIAL DRIVEWAY
 UPWARD / DOWNWARD DRIVEWAY

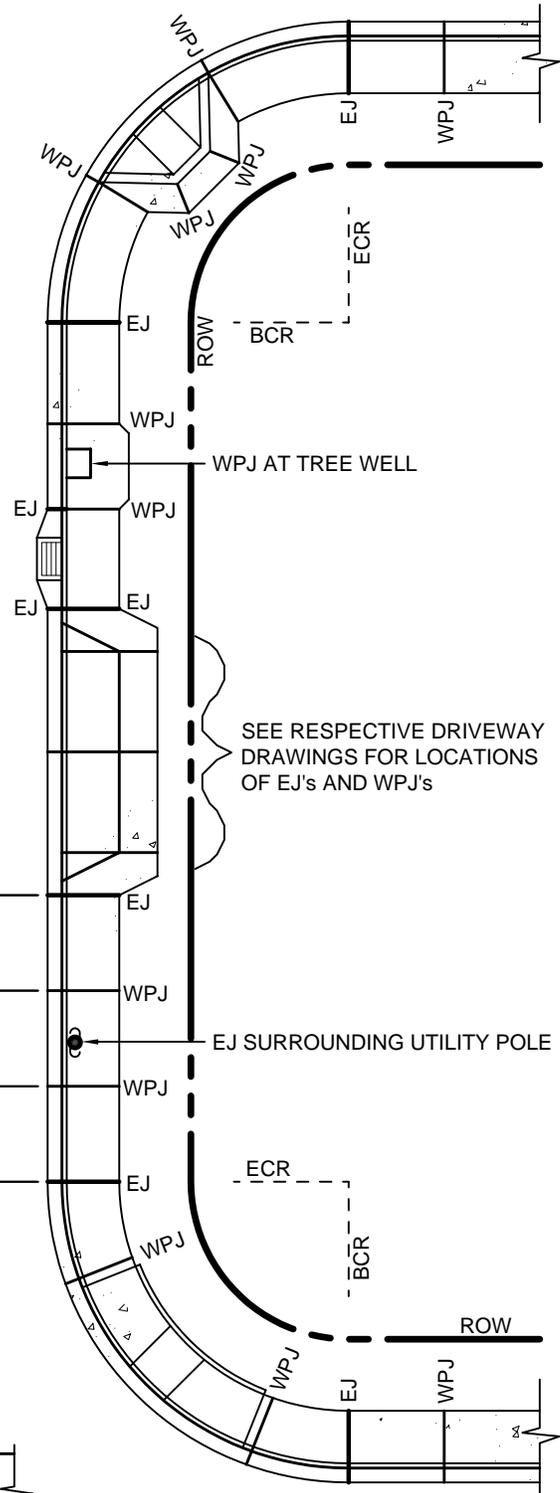
Scale: 1"=5'	Adopted: 2011
Drawing No:	B-3c
Sheet No:	1 OF 1

Revisions

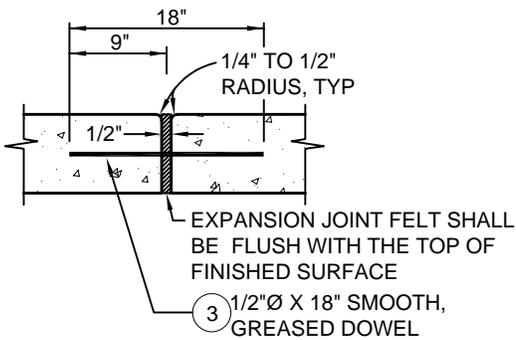
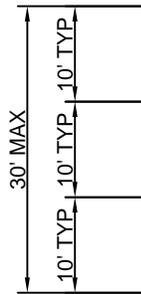
Description	Approved	Date	Description	Approved	Date

NOTES:

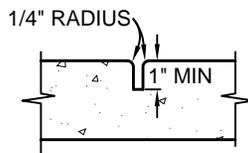
- EXPANSION JOINTS (EJ) SHALL BE PLACED AT CURB RETURNS, DRIVEWAYS, STORM DRAIN CATCH BASINS, AROUND UTILITY POLES, AT LONGITUDINAL CURB GUTTER AND SIDEWALK INTERVALS NOT TO EXCEED 30-FEET, AND AT ALL OTHER LOCATIONS AS DIRECTED BY THE DEPARTMENT. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS IN ADJACENT EXISTING IMPROVEMENTS AS APPLICABLE.
- WEAKENED PLANE JOINTS (WPJ) SHALL BE A MINIMUM 1-INCH IN DEPTH AND PLACED AT LONGITUDINAL CURB GUTTER AND SIDEWALK INTERVALS NOT EXCEEDING 10-FEET BETWEEN EXPANSION JOINTS. THE INTERVALS BETWEEN WEAKENED PLANE JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS IN ADJACENT EXISTING IMPROVEMENTS AS APPLICABLE.
- 1/2"Ø x 18" SMOOTH, GREASED DOWELS SHALL BE PLACED AT ALL EXPANSION JOINTS, ONE IN THE NEW CURB FACE, ONE IN THE NEW GUTTER, AND AT 18-INCHES ON CENTER IN NEW SIDEWALK.
- WHEN PLACED IN SIDEWALKS, BOTH EXPANSION JOINTS AND WEAKENED PLANE JOINTS SHALL EXTEND THROUGH THE ADJACENT CURB AND GUTTER.
- REFER TO RESPECTIVE IMPROVEMENT (CURB, GUTTER, SIDEWALK, RAMP, DRIVEWAY, ETC) STANDARD DRAWING FOR ADDITIONAL CONSTRUCTION INFORMATION.



REFER TO DRAWING R-3 FOR REPAIR OF EXISTING SIDEWALKS



EXPANSION JOINT ①



WEAKENED PLANE JOINT ②

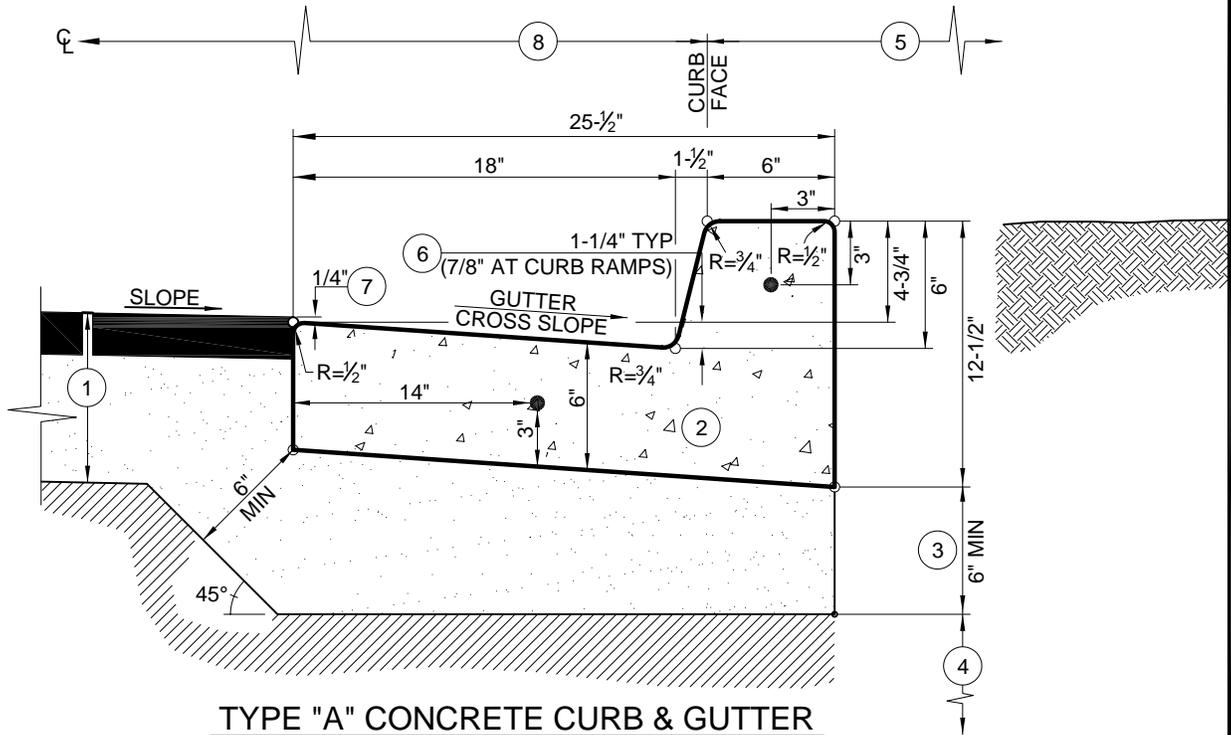


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
**EXPANSION & WEAKENED PLANE
 JOINT REQUIREMENTS**

Scale: 1"=20'	Adopted: 2011
Drawing No:	C-1
Sheet No:	1 OF 1

Revisions

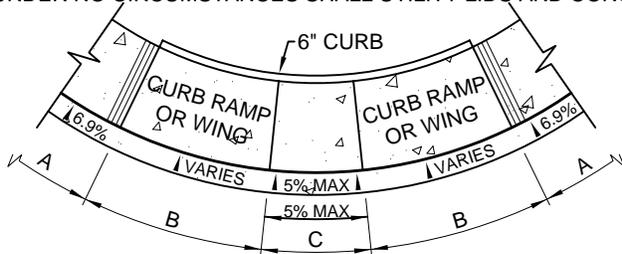
Description	Approved	Date	Description	Approved	Date
NOTE 2	REM	NOV 07			
5% SLOPE IN ROAD AT BOTTOM OF RAMP	GDM	JAN 11			



TYPE "A" CONCRETE CURB & GUTTER

NOTES:

1. ROADWAY STRUCTURAL SECTION PER PLAN OR AS EXISTING.
2. CONCRETE CURB SHALL CONFORM TO STATE STANDARD 90-1.01, 520 LBS CEMENTITIOUS MATERIAL PER CUBIC YARD [5-1/2 SACK]. EXTRUDED CURB SHALL CONFORM TO STATE STANDARD 73-1.01. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE.
3. 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION OR MATCH BASE THICKNESS REQUIREMENT FOR NEW OR EXISTING ROAD SECTION, WHICHEVER IS GREATEST.
4. 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION.
5. SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
6. GUTTER CROSS SLOPE SHALL NOT EXCEED 5% ACROSS CURB RAMPS PER DETAIL BELOW.
7. THE ROADWAY FINISHED SURFACE SHALL BE 1/4" ABOVE THE GUTTER LIP.
8. PAVEMENT WIDTH MEASURED FROM ROAD CENTERLINE TO THIS POINT.
9. 1/2"Ø x 18" LONG GREASED SMOOTH DOWELS (●) SHALL BE CONSTRUCTED AT ALL EXPANSION JOINTS AND CONSTRUCTION JOINTS, REFER TO STANDARD DRAWING C-1.
10. EXPANSION JOINTS SHALL BE CONSTRUCTED AT 30-FEET MAXIMUM INTERVALS, AT ENDS OF ALL CURB RETURNS, AND EACH SIDE OF DRIVEWAY DEPRESSIONS PER STANDARD DRAWING C-1. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS ADJACENT EXISTING IMPROVEMENTS WHEN APPLICABLE.
11. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT 10-FEET MAXIMUM INTERVALS PER STANDARD DRAWING C-1. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS ADJACENT EXISTING IMPROVEMENTS WHEN APPLICABLE.
12. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN THE CURB & GUTTER.



NOTES:

- A. GUTTER CROSS SLOPE = 1-1/4" IN 18" = 6.9%
- B. GUTTER CROSS SLOPE TRANSITION ZONE (VARIES)
- C. GUTTER CROSS SLOPE = 7/8" IN 18" = 4.9% (5% MAX)
LONGITUDINAL SLOPE = 2% MAX

TYPICAL GUTTER TRANSITION AT CURB RAMP

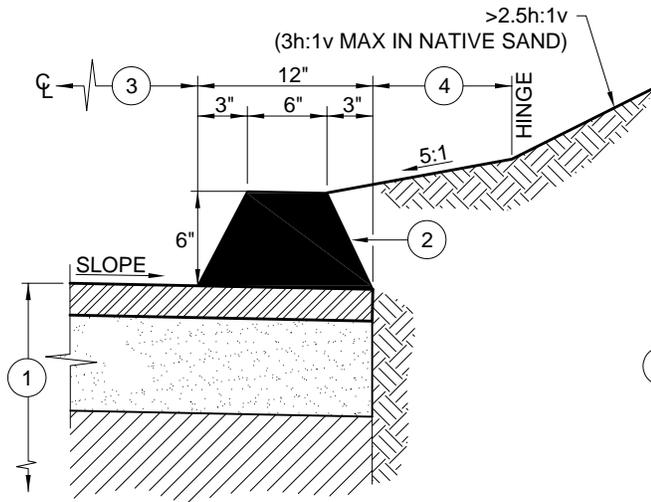


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TYPE "A" CONCRETE
CURB & GUTTER

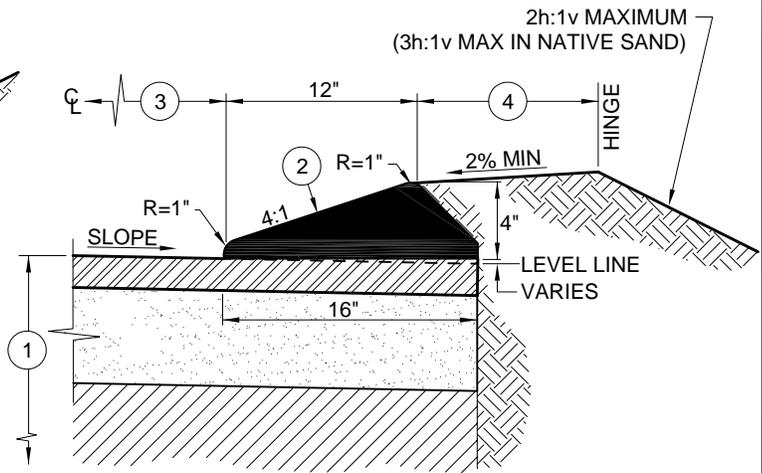
Scale: NTS	Adopted: 2011
Drawing No:	C-2
Sheet No:	1 OF 1

Revisions

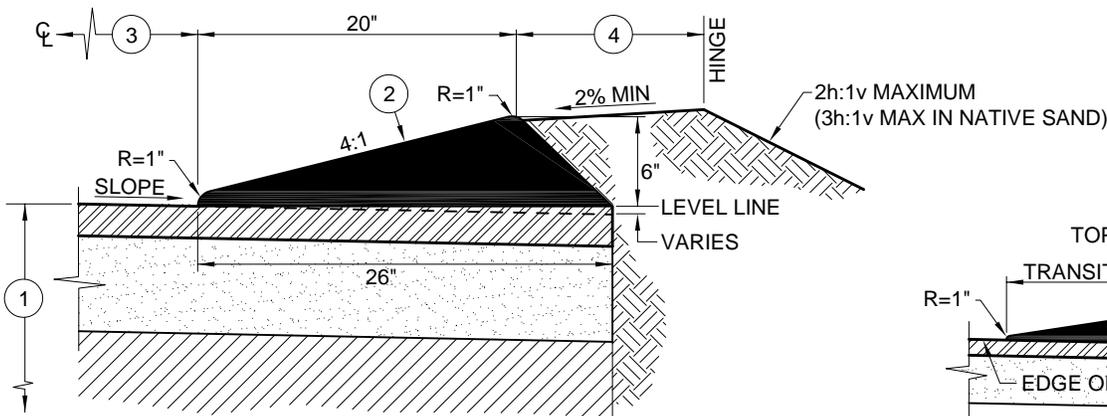
Description	Approved	Date	Description	Approved	Date
NOTE 6, REPLACE AC AND ASPHALT W/ HMA	GDM	JAN 11			



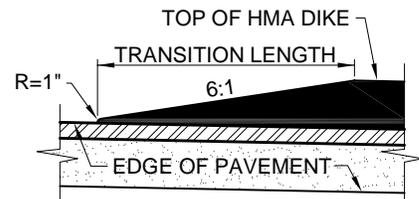
TYPE "A" HMA DIKE
FOR USE IN CUT CONDITIONS > 2.5:1



TYPE "E" MOUNTABLE HMA DIKE
FOR USE IN FLAT & FILL CONDITIONS



TYPE "D" MOUNTABLE HMA DIKE
FOR USE IN FLAT & FILL CONDITIONS (OPTIONAL)



DIKE END TRANSITION 5

NOTES:

- ROADWAY STRUCTURAL SECTION THICKNESS PER PLAN.
- HOT MIX ASPHALT (HMA) DIKE SHALL BE REQUIRED PER THE DESIGN STANDARDS (REFER TO A-1 SERIES STANDARD DRAWINGS). USE PG 70-10 ASPHALT BINDER FOR ALL HMA DIKE.
- ROADWAY TRAVEL PLUS SHOULDER WIDTH MEASURED FROM ROAD CENTERLINE TO THIS POINT.
- REFER TO A-1 SERIES STANDARD DRAWINGS FOR MINIMUM DISTANCES TO HINGE POINT.
- A 6h:1v DIKE HEIGHT TAPER SHALL BE PROVIDED AT EACH TERMINUS OF THE HMA DIKE.
- HMA DIKE MAY BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION ON ROADWAYS HAVING LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "D" OR "E" HMA DIKE SHALL NORMALLY BE USED IN ALL APPLICATIONS AND SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH THE ADJACENT GRADE. TYPE "A" HMA DIKE SHALL BE USED ADJACENT TO CUT SLOPES STEEPER THAN 2.5:1 AND WHEN THE ROADWAY IS BELOW THE ADJACENT GRADE.
- PRIOR TO PROJECT ACCEPTANCE, ALL DAMAGED HMA DIKE SHALL BE REMOVED AND REPLACED AND A FOG SEAL SHALL BE APPLIED TO BOTH THE REPLACED HMA DIKE AND TO THE REMAINING UNDAMAGED HMA DIKE TO THE LIMITS DETERMINED BY THE DEPARTMENT.



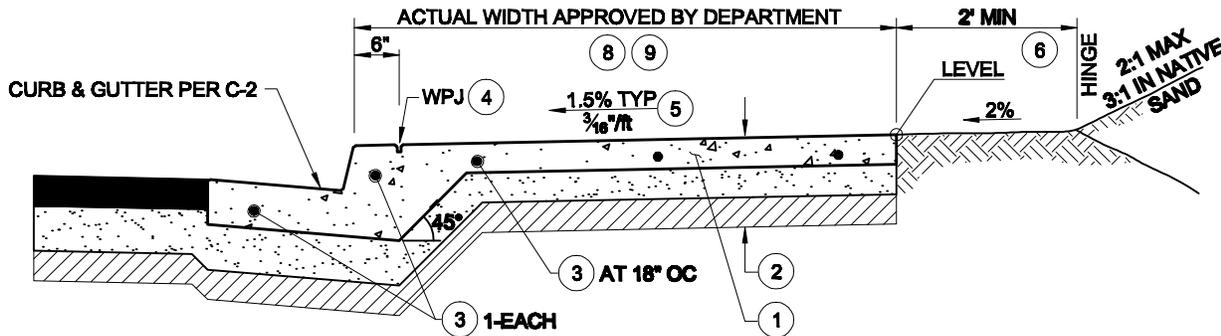
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

HOT MIX ASPHALT (HMA) DIKES

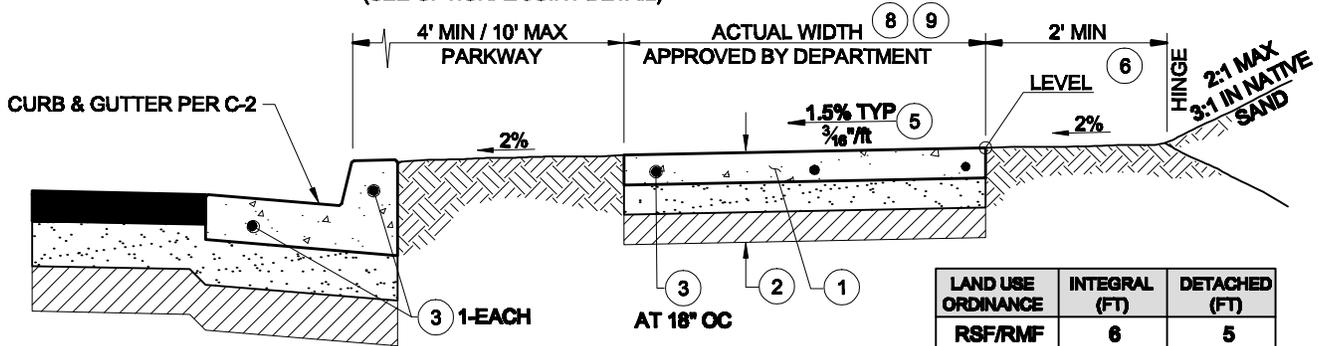
Scale: 1"=1'	Adopted: 2011
Drawing No:	C-3
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 1, ADD NOTE 11, "TYPICAL" TO JOINT DETAIL, & LABEL "PARKWAY"	REM	NOV 07	REVISE NOTE 2	FH	AUG 14
INCREASED DETACHED SIDEWALK WIDTH	GDM	JAN 11			



INTEGRAL SIDEWALK (MONOLITHIC)
(SEE OPTIONAL JOINT DETAIL)



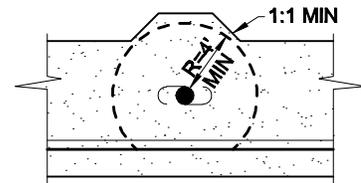
DETACHED OR MEANDERING SIDEWALK

LAND USE ORDINANCE	INTEGRAL (FT)	DETACHED (FT)
RSF/RMF	6	5
CR	10	6
CS	6	5
OP	8	5
IND	6	5

SIDEWALK WIDTH TABLE

NOTES:

- CONCRETE SIDEWALK SHALL CONFORM TO STATE STANDARD 90-1.01, MINOR (520 LBS CEMENTITIOUS MATERIAL PER CUBIC YARD [5-1/2 SACK]). CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE.
- TYPICAL SECTION SHALL BE:
 - 4-INCH MIN PCC (6-INCH OR 8-INCH WHEN WITHIN A DRIVEWAY), OVER
 - 4-INCH MIN CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - 12-INCH MIN SUBGRADE TO 95% RELATIVE COMPACTION
 IF THE R-VALUE OF THE NATIVE MATERIAL IS 55 OR GREATER THEN THE 4-INCH OF AGGREGATE BASE UNDER THE SIDEWALK ONLY MAY BE SUBSTITUTED WITH COMPACTED NATIVE MATERIAL.
- EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AT LONGITUDINAL INTERVALS NOT EXCEEDING 30-FEET. 1/2" x 18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
- WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED BETWEEN EXPANSION JOINTS AT LONGITUDINAL INTERVALS NOT EXCEEDING 10-FEET, AND AT 6-INCHES BEHIND THE CURB FACE FOR ATTACHED SIDEWALKS PER STANDARD DRAWING C-1.
- THE CROSS SLOPE OF THE SIDEWALK SHALL NOT EXCEED 2% (1/4-INCH PER 12-INCHES), 1.5% (3/16-INCH PER 12-INCHES) IS RECOMMENDED.
- THE 2-FOOT BENCH IS NOT REQUIRED FOR ADJOINING SLOPES OF 5h:1v OR FLATTER.
- ALTHOUGH THE PROJECT CONDITIONS OF APPROVAL OR THE AREA SPECIFIC PLAN MAY REQUIRE AN ALTERNATIVE SIDEWALK CONFIGURATION, THE CONSTRUCTION SPECIFICATIONS OF THIS STANDARD SHALL APPLY.
- THE SIDEWALK SHALL BE WIDENED WHERE REQUIRED TO ALLOW FOR A 4-FOOT CLEAR PASSAGE AROUND ALL ABOVE GRADE OBSTACLES LOCATED WITHIN THE SIDEWALK.
- WATER PURVEYOR METER BOXES ARE ALLOWED WITHIN THE SIDEWALK PROVIDED THAT ALL LIDS AND LIDS WITH A.M.R. SYSTEMS ARE SET FLUSH WITH THE SIDEWALK.
- ALL UTILITY VAULTS AND LIDS MUST BE LOCATED OUTSIDE OF THE SIDEWALK OR HAVE PRIOR DEPARTMENT APPROVAL FOR LOCATION WITHIN THE SIDEWALK. UTILITY LIDS WITHIN THE SIDEWALK SHALL HAVE A NON-SLIP SURFACE.
- SEE DRAWING M-5 FOR TREE PLANTING REQUIREMENTS WITHIN RIGHT-OF-WAY.



SIDEWALK SHALL BE WIDENED BEHIND ALL ABOVE GRADE OBSTACLES TO PROVIDE A 4-FOOT MINIMUM CLEARANCE.

8 SIDEWALK WIDENING DETAIL
NTS



WHEN EXTRUDED CURB & GUTTER IS USED AND SIDEWALK PORTION IS NOT PLACED WITHIN 1-HOUR THEN REBAR SHALL BE PLACED PER THIS JOINT DETAIL.

TYPICAL JOINT DETAIL
NTS



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SIDEWALKS

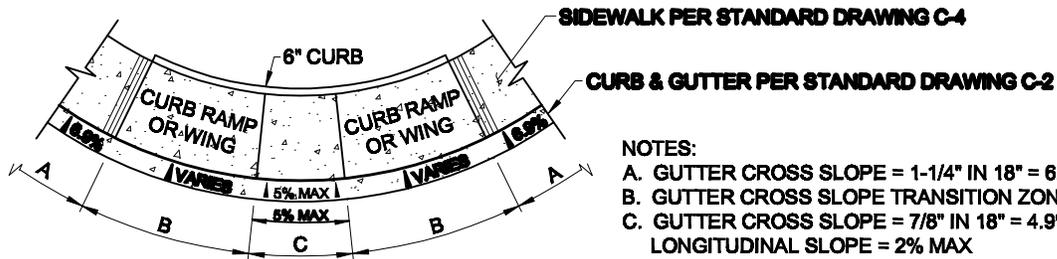
Scale:	1"=2'	Adopted:	2014
Drawing No:	C-4		
Sheet No:	1 OF 1		

Revisions

Description	Approved	Date	Description	Approved	Date
ADD NOTE 6	REM	NOV 07	ADDED NOTES 1, 2, 3, & 6; RENUMBER NOTES	GDM	JAN 11
MODIFY NOTE 1, ADD NOTE 7	GDM	NOV 08	REVISE NOTES 1 AND 6	FH	AUG 14

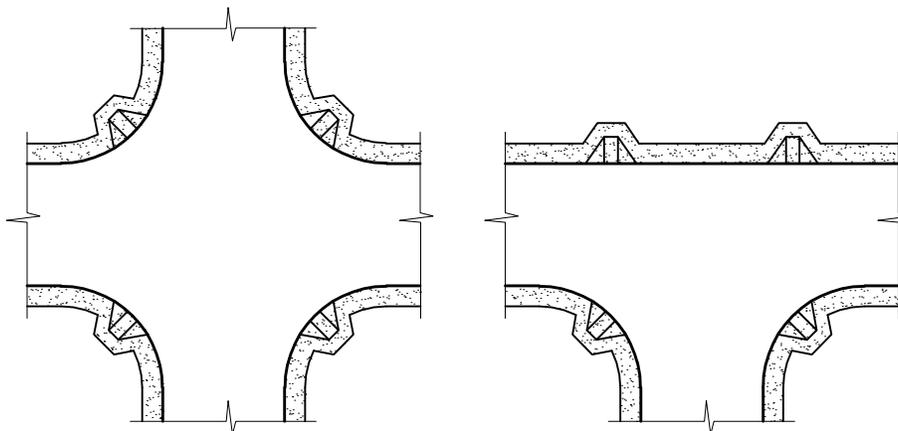
NOTES:

- ALL CURB RAMPS FOR NEW CONSTRUCTION, RETROFIT, AND REPLACEMENT SHALL CONFORM TO STATE STANDARDS A88A & A88B, CASE A, AND STATE SPECIFICATION 90-1.01, MINOR (520 LBS CEMENTITIOUS MATERIAL PER CUBIC YARD [5-1/2 SACK]). CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE.
- CURB RAMPS SHALL HAVE A DETECTABLE WARNING SURFACE THAT EXTENDS THE FULL WIDTH AND 3-FEET DEPTH OF THE RAMP PER NOTE 3 (BELOW) AND SHALL CONFORM TO THE DETAILS OF CALTRANS STANDARD A88A.
- CURB RAMP DETECTABLE WARNING SURFACES SHALL BE:
YELLOW COLOR COMPLYING WITH FEDERAL STANDARD 595B, COLOR No. 33538
PREFABRICATED
RAISED TRUNCATED DOMES
INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS
- NEW SIDEWALKS AND PATHS SHALL BE PROVIDED WITH CURB RAMPS AT ALL INTERSECTIONS.
- NO UTILITY APPURTENANCES OR LIDS SHALL BE LOCATED WITHIN THE CURB RAMP AND WINGS.
- MID-BLOCK CURB RAMPS ARE DISCOURAGED AND SHALL REQUIRE PRIOR DEPARTMENT APPROVAL.
- THE PROJECT ENGINEER SHALL DETAIL EACH CURB RAMP ON THE PLANS. MINIMUM DETAIL REQUIREMENTS SHALL INCLUDE DIMENSIONS, SLOPES, AND SPOT ELEVATIONS.
- THE DEPARTMENT MAY GRANT EXCEPTIONS TO THESE STANDARDS PER CHAPTER 1.2. THE DEPARTMENT ADA COORDINATOR SHALL REVIEW AND PROVIDE PRIOR APPROVAL OF ALL EXCEPTIONS.
- MULTIPLE RAMPS SHALL BE REQUIRED AT ALL BULB-OUTS AND SHALL BE ALIGNED WITH APPROACH SIDEWALK, REFER TO STANDARD DRAWINGS A-6e & A-6d.
- INTERNET LINKS TO CALTRANS CURB RAMP STANDARDS (A88A & A88B):
http://www.dot.ca.gov/hq/esc/oe/project_plans/highway_plans/stdplans_US-customary-units_06/viewable_pdf/aps88a.pdf
http://www.dot.ca.gov/hq/esc/oe/project_plans/highway_plans/stdplans_US-customary-units_06/viewable_pdf/a88b.pdf



- NOTES:**
- GUTTER CROSS SLOPE = 1-1/4" IN 18" = 6.9%
 - GUTTER CROSS SLOPE TRANSITION ZONE (VARIES)
 - GUTTER CROSS SLOPE = 7/8" IN 18" = 4.9% (5% MAX)
LONGITUDINAL SLOPE = 2% MAX

TYPICAL GUTTER TRANSITION AT CURB RAMP



TYPICAL CURB RAMP PLACEMENT



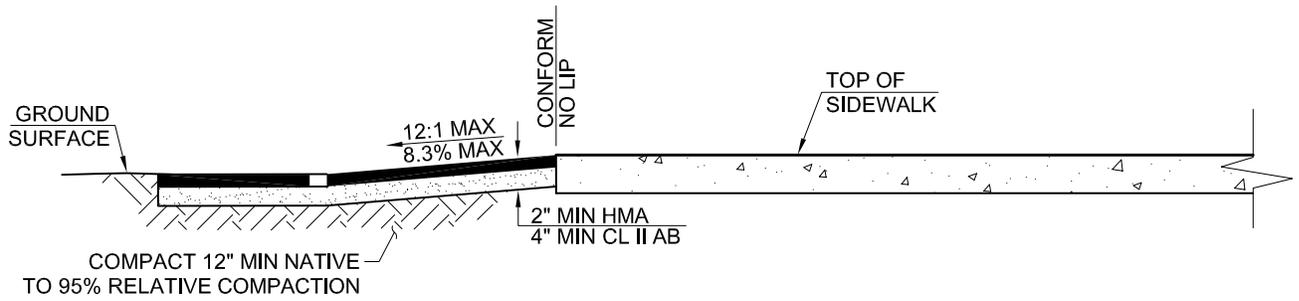
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

CURB RAMPS

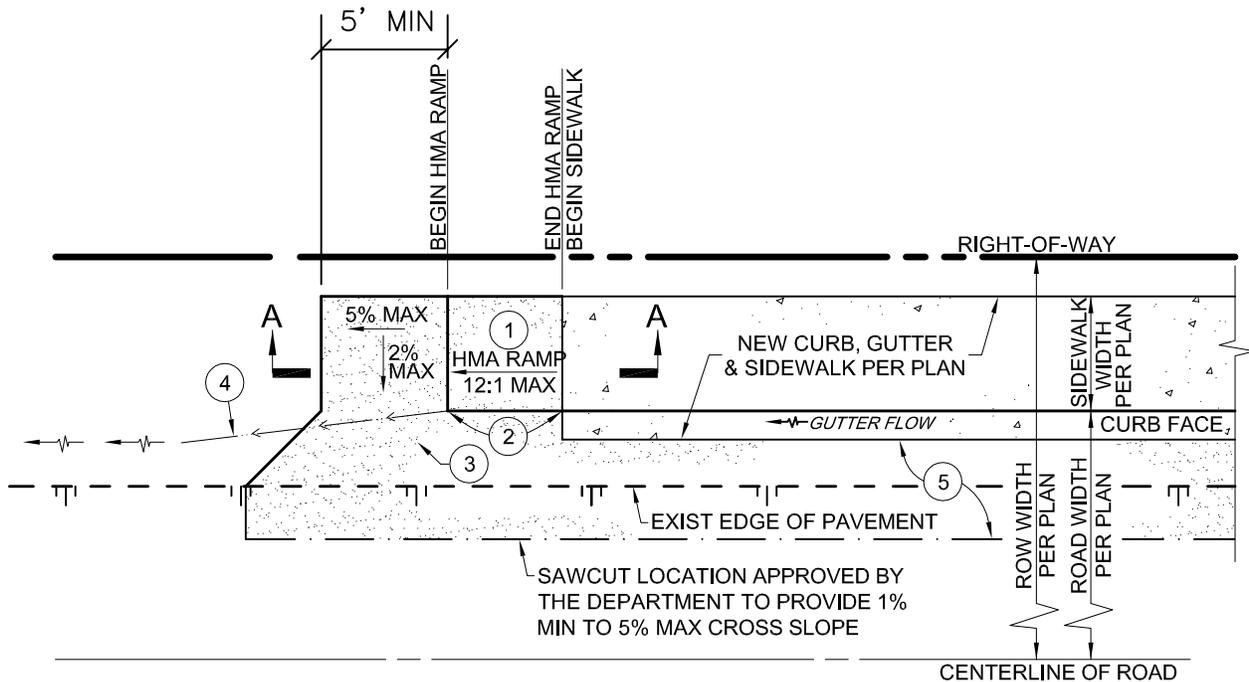
Scale:	Adopted:
NTS	2014
Drawing No:	C-5
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
ADD TRANSITION TO HMA RAMP	FH	AUG 14			



SECTION A-A: HMA RAMP



PLAN VIEW

NOTES:

FOR USE AT THE END OF NEW SIDEWALK TO PROVIDE A SMOOTH TRANSITION FROM EDGE OF NEW SIDEWALK TO EXISTING GRADE. IF A SMOOTH TRANSITION CANNOT BE ACHIEVED THEN THE DEPARTMENT MAY REQUIRE A SIDEWALK BARRICADE BE CONSTRUCTED PER DRAWING M-3.

1. CONSTRUCT NEW HOT MIX ASPHALT (HMA) RAMP. RAMP SHALL BE 2-INCHES MINIMUM HMA TO 95% RELATIVE COMPACTION, OVER 4-INCHES MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER COMPACTED NATIVE MATERIAL. SLOPE OF RAMP SHALL NOT EXCEED 12:1 (8.33%), RECOMMENDED SLOPE OF 8% MAXIMUM.
2. TYPE "A" HMA DIKE PER DRAWING C-1 TAPERED FROM 0-INCHES (FLUSH) TO 6-INCHES TALL TO MATCH EDGE OF NEW CONCRETE CURB.
3. CONSTRUCT NEW EDGE OF PAVEMENT TAPER AT 1:1 MINIMUM IN RESIDENTIAL (5:1 MINIMUM IN COMMERCIAL) AREAS TO JOIN EXISTING EDGE OF PAVEMENT (THE DEPARTMENT MAY REQUIRE A LONGER TAPER LENGTH).
4. GRADE AND RECOMPACT EXISTING SHOULDER TO PROVIDE A POSITIVE DRAINAGE CONNECTION BETWEEN NEW GUTTER FLOWLINE TO EXISTING SWALE PATH.
5. NEW ROADWAY WIDENING, STRUCTURAL SECTION PER PLANS.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

HOT MIX ASPHALT RAMP DETAIL

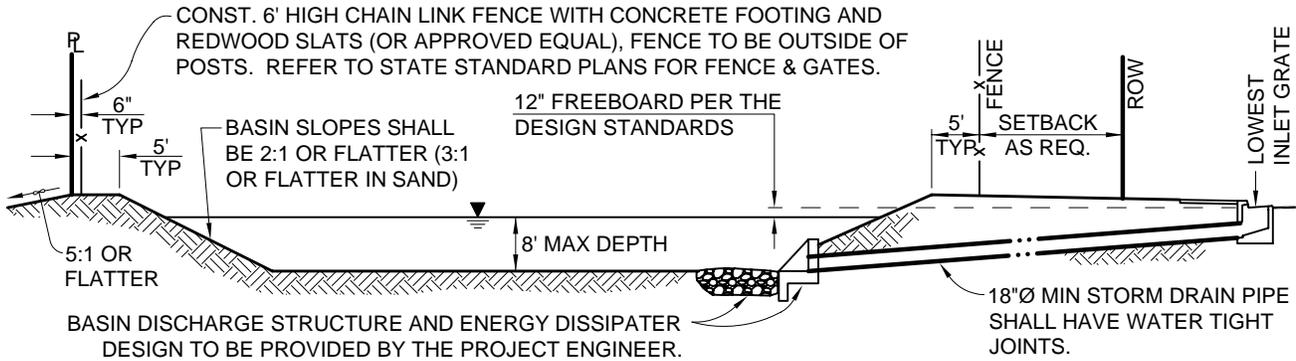
Scale: 1"=1'	Adopted: 2014
Drawing No: C-5a	
Sheet No:	1 OF 1

THIS PAGE LEFT BLANK INTENTIONALLY

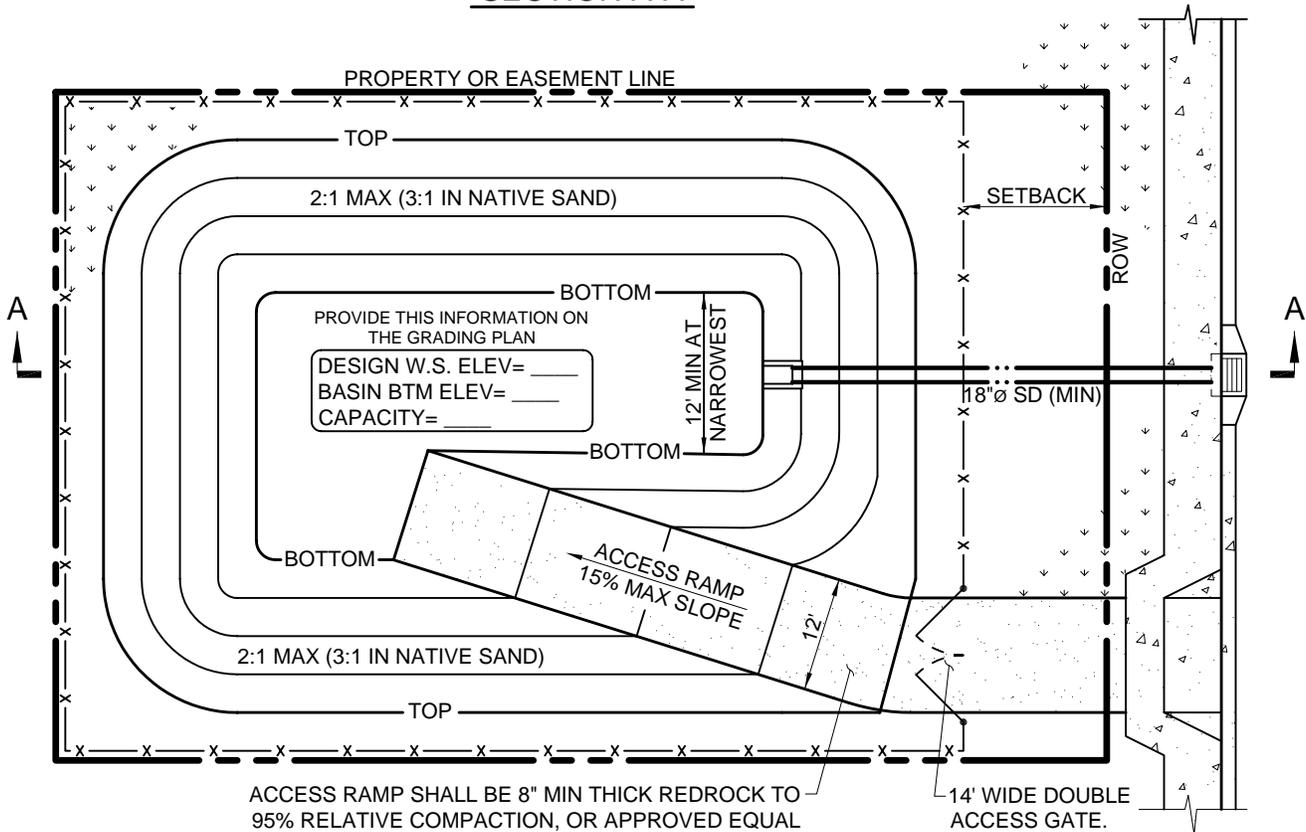
THIS PAGE LEFT BLANK INTENTIONALLY

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 1	REM	NOV 07			



SECTION A-A



PLAN VIEW

NOTES:

1. DEEP RETENTION BASIN SHOWN. WHERE DEEP DETENTION BASINS ARE PROPOSED THEY SHALL MEET THE SAME REQUIREMENTS OF THIS STANDARD.
2. BASINS MUST FULLY DRAIN WITHIN 7 DAYS OR A PERCOLATION ENHANCEMENT SYSTEM SHALL BE REQUIRED. THE DEPARTMENT MAY ALSO REQUIRE PERCOLATION TESTS AND CERTIFICATION FROM THE PROJECT ENGINEER.
3. A BASIN OVERFLOW STRUCTURE TO ACCOMMODATE UP TO A 100-YEAR STORM EVENT SHALL BE DESIGNED WHICH DISCHARGES FLOWS TO THE PUBLIC RIGHT-OF-WAY OR A DEFINED WATER COURSE IN A NON-EROSIVE MANNER.
4. THE OVERLAND ESCAPE PATH (NOTE 3) SHALL BE IDENTIFIED ON THE PLANS AND SHOWN TO PROTECT DOWNSTREAM PROPERTIES IN THE EVENT OF BASIN SPILL OR FAILURE.
5. ADDITIONAL BASIN AND BASIN LANDSCAPING REQUIREMENTS MAY BE IMPOSED AS PART OF THE DESIGN STANDARDS.
6. BASIN LANDSCAPING AND EROSION CONTROL SHALL BE SUBSTANTIALLY ESTABLISHED PRIOR TO PROJECT ACCEPTANCE.



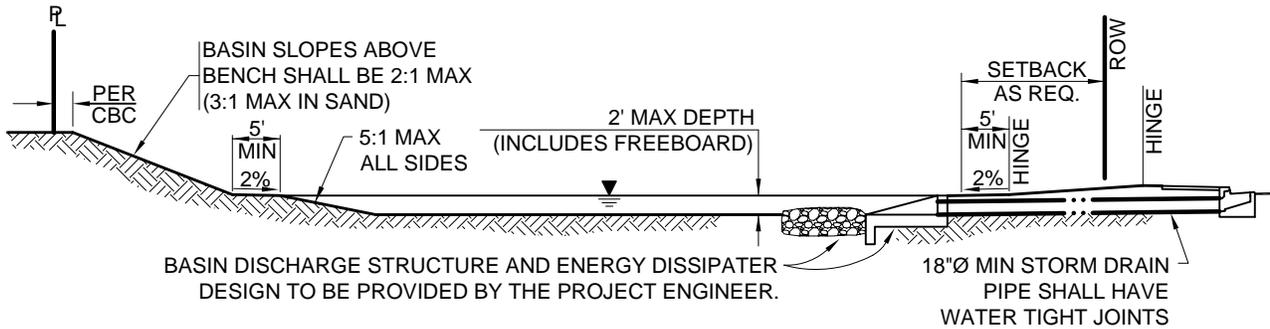
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

DEEP RETENTION BASIN

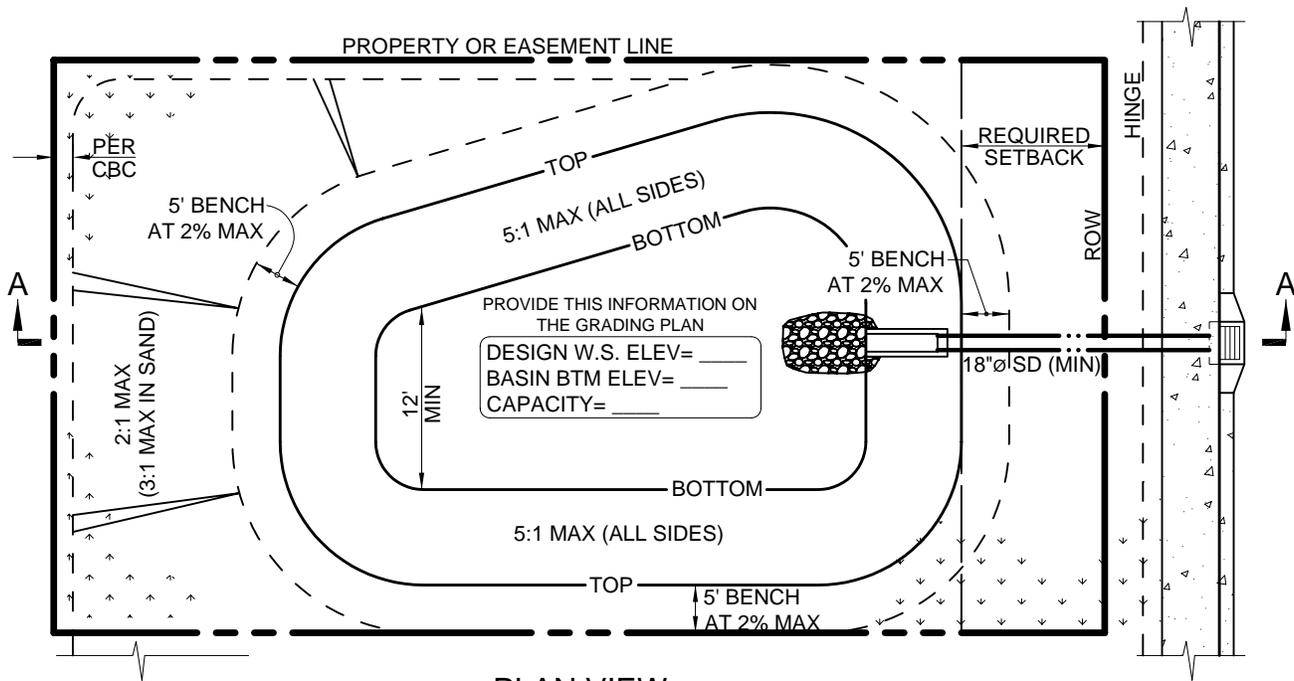
Scale: NTS	Adopted: 2011
Drawing No:	D-1
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTES 1 & 3	REM	NOV 07			



SECTION A-A



PLAN VIEW

NOTES:

1. SHALLOW RETENTION BASIN SHOWN. WHERE SHALLOW DETENTION BASINS ARE PROPOSED THEY SHALL MEET THE SAME REQUIREMENTS OF THIS STANDARD.
2. BASINS MUST FULLY DRAIN WITHIN 7 DAYS OR A PERCOLATION ENHANCEMENT SYSTEM SHALL BE REQUIRED. THE DEPARTMENT MAY ALSO REQUIRE PERCOLATION TESTS AND CERTIFICATION FROM THE PROJECT ENGINEER.
3. BASIN OVERFLOW SHALL BE DESIGNED WHICH DISCHARGES FLOWS TO THE PUBLIC RIGHT-OF-WAY OR A DEFINED WATER COURSE IN A NON-EROSIVE MANNER.
4. THE OVERLAND ESCAPE PATH SHALL BE IDENTIFIED ON THE PLANS AND SHOWN TO PROTECT DOWNSTREAM PROPERTIES IN THE EVENT OF BASIN SPILL OR FAILURE.
5. ADDITIONAL BASIN AND BASIN LANDSCAPING REQUIREMENTS MAY BE IMPOSED AS PART OF THE DESIGN STANDARDS.
6. BASIN LANDSCAPING AND EROSION CONTROL SHALL BE SUBSTANTIALLY ESTABLISHED PRIOR TO PROJECT ACCEPTANCE.



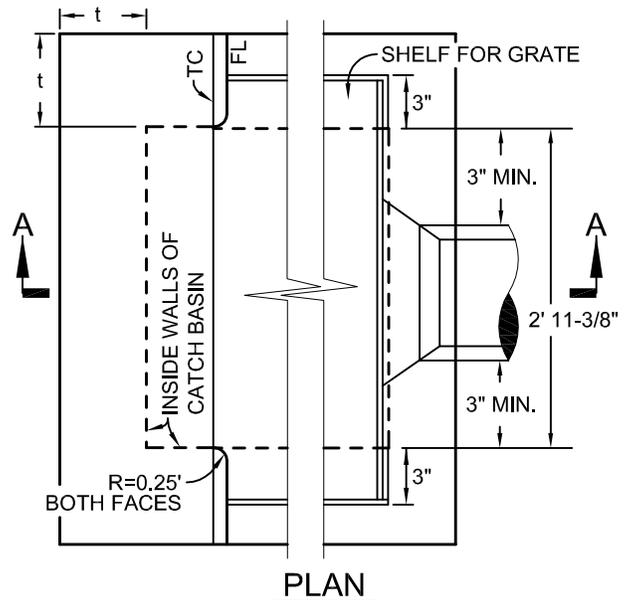
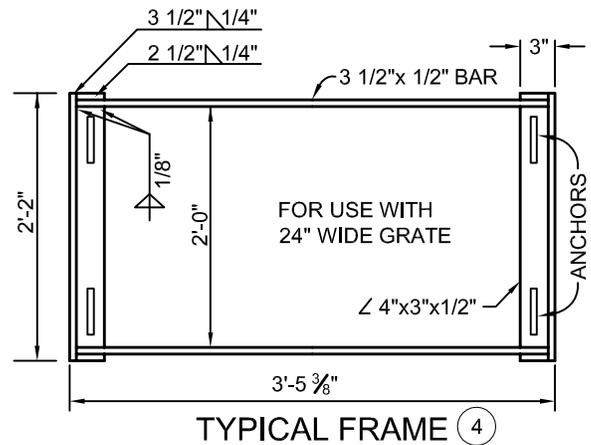
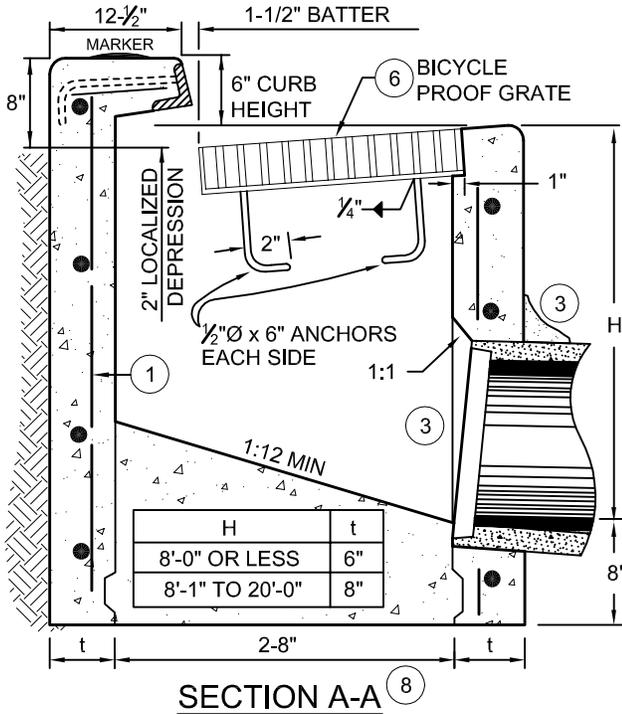
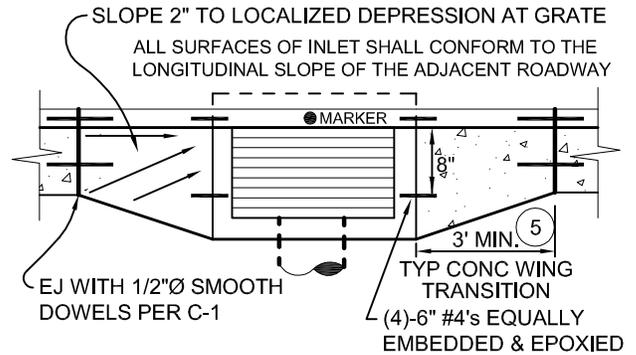
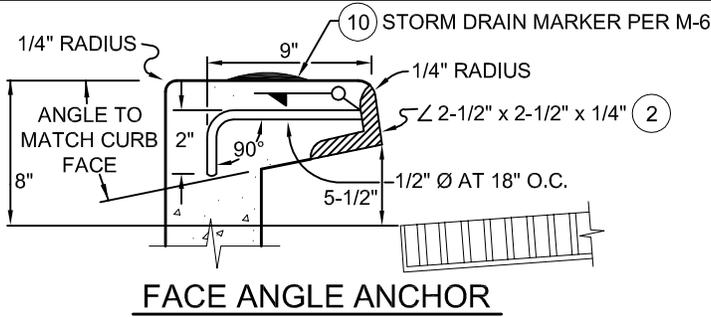
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SHALLOW RETENTION BASIN

Scale: NTS	Adopted: 2011
Drawing No: D-1a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 1	REM	NOV 07	DELETED DRAIN PAC		AUG 14
NOTES 9 & 10	GDM	NOV 08			



NOTES:

1. REINFORCING STEEL SHALL BE #4 BARS AT 18" O.C. PLACED 1-1/2" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE NOTED. BASIN FLOORS SHALL HAVE WOOD FLOAT FINISH AND A MINIMUM SLOPE OF 12h:1v FROM ALL DIRECTIONS TOWARDS OUTLET PIPE. CONCRETE SHALL BE 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK].
2. FACE ANGLE SHALL EXTEND FULL WIDTH OF BOX.
3. SMOOTH GROUT INSIDE AND OUTSIDE OF PIPE JUNCTION TO FORM A WATERTIGHT SEAL.
4. FRAME SHALL BE DIPPED IN COMMERCIAL QUALITY ASPHALTUM PAINT OR GALVANIZED.
5. IN ALL CASES 3' LONG CONCRETE WINGS SHALL BE CONSTRUCTED EITHER SIDE OF THE INLET. WHERE CATCH BASIN IS PLACED AGAINST AC DIKE A SEPARATE DETAIL SHALL BE PROVIDED ON THE PLANS SHOWING THIS TRANSITION.
6. GRATE SHALL CONFORM TO STATE STANDARD PLAN D77B AND BE BICYCLE PROOF.
7. PROJECT CONDITIONS MAY REQUIRE OIL AND/OR SEDIMENTATION CONTROL AT THE DIRECTION OF THE DEPARTMENT.
8. PRECAST INLETS MAY BE SUBSTITUTED AT THE APPROVAL OF THE DEPARTMENT. PRECAST INLETS SHALL HAVE 2" LOCALIZED DEPRESSION AT THE GRATE, 3' CONCRETE WINGS, EXPANSION JOINTS AS SHOWN, AND NO STEPS.
9. THE CATCH BASIN SHALL BE CONSTRUCTED TO MATCH THE LONGITUDINAL SLOPE OF THE ADJACENT ROADWAY.
10. INSTALL STORM DRAIN MARKER PER M-6.



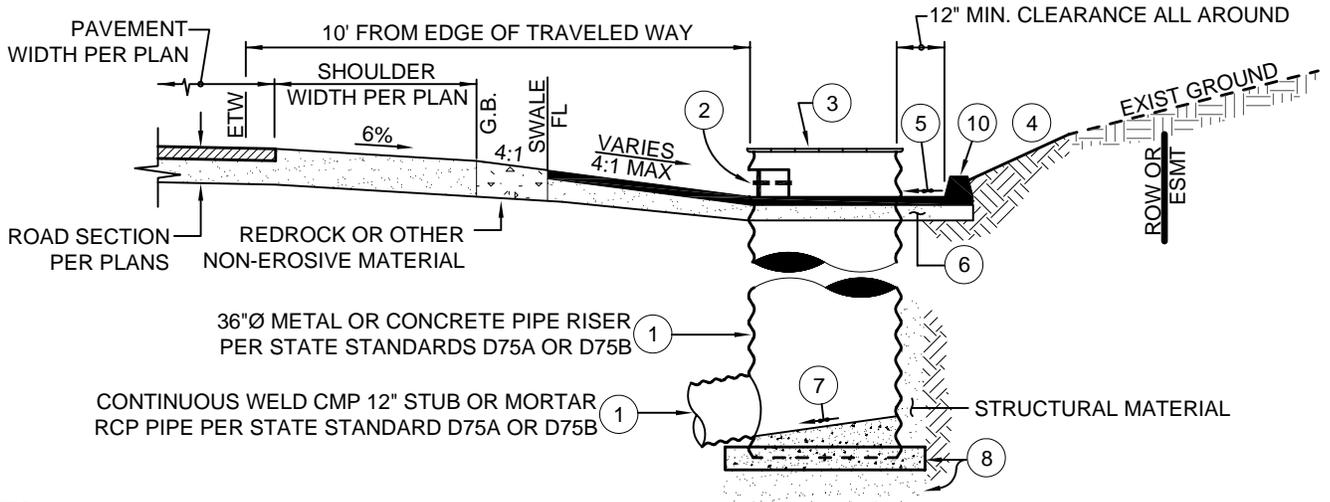
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

CATCH BASIN

Scale: NTS	Adopted: 2014
Drawing No: D-2	
Sheet No: 1 OF 1	

Revisions

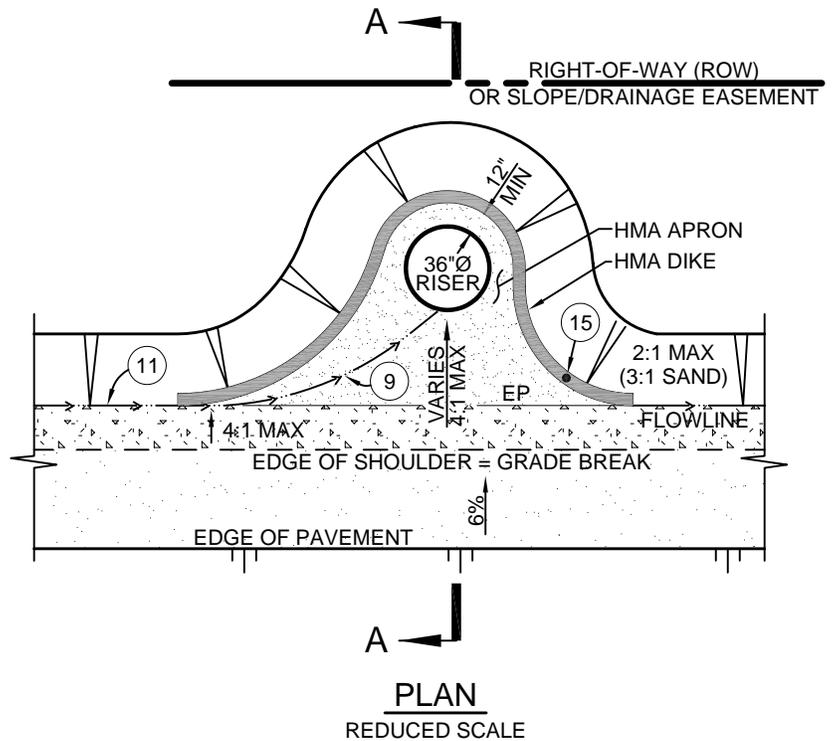
Description	Approved	Date	Description	Approved	Date
NOTE 8	REM	NOV 07	NOTE 2, REMOVE "DrainPac", REPLACE "AC" W/ "HMA"	GDM	JAN 11
NOTE 15	GDM	NOV 08			



SECTION A-A

NOTES:

- REFER TO THE 2006 STATE STANDARD PLANS D75A OR D75B FOR PIPE RISER DETAILS. THE PROJECT ENGINEER SHALL PROVIDE ALL DESIGN SPECIFICATIONS ON THE PLANS (RISER TYPE, COVER, GRATE, PIPE SIZE, ETC).
- CONSTRUCT TRASH RACK PER THE 2006 STATE STANDARD PLAN D75C IF DIRECTED BY THE DEPARTMENT.
- A COVER MAY BE USED WHEN THE RISER NOT LOCATED IN SUMP CONDITIONS, OTHERWISE USE TYPE "GMP" OR "GCP" GRATE. PROJECT ENGINEER SHALL PROVIDE HYDRAULIC CALCULATIONS.
- MINIMUM CUT SLOPE SHALL BE 2 HORIZONTAL:1 VERTICAL (3h:1v IN NATIVE SAND).
- SLOPE TO DRAIN TOWARDS RISER OPENING.
- 2-INCH MINIMUM HOT MIX ASPHALT OVER 6-INCH MINIMUM CLASS II AGGREGATE BASE COMPACTED TO 95%.
- RISER FLOOR SLOPED TO DRAIN AT 4h:1v TOWARDS OUTLET, PROVIDE WOOD FLOAT FINISH.
- CONCRETE SHALL BE 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], OVER 6-INCH MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION.
- MODIFY APPROACH GRADING AS REQUIRED TO PROVIDE SMOOTH FLOWLINE TRANSITION TOWARDS INLET.
- TYPE "A" HMA DIKE PER DRAWING C-3.
- REQUIRED ROADSIDE DRAINAGE PER A-1 SERIES DRAWINGS. PROVIDE COMPACTED REDROCK OR OTHER DEPARTMENT APPROVED MATERIAL.
- ALL EXPOSED STEEL SHALL BE COLD GALVANIZED.
- A DRAINAGE EASEMENT SHALL BE OFFERED TO THE PUBLIC WHENEVER THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY.
- MODIFY AS REQUIRED FOR SUMP CONDITIONS.
- INSTALL STORM DRAIN MARKER PER M-6.



PLAN
REDUCED SCALE

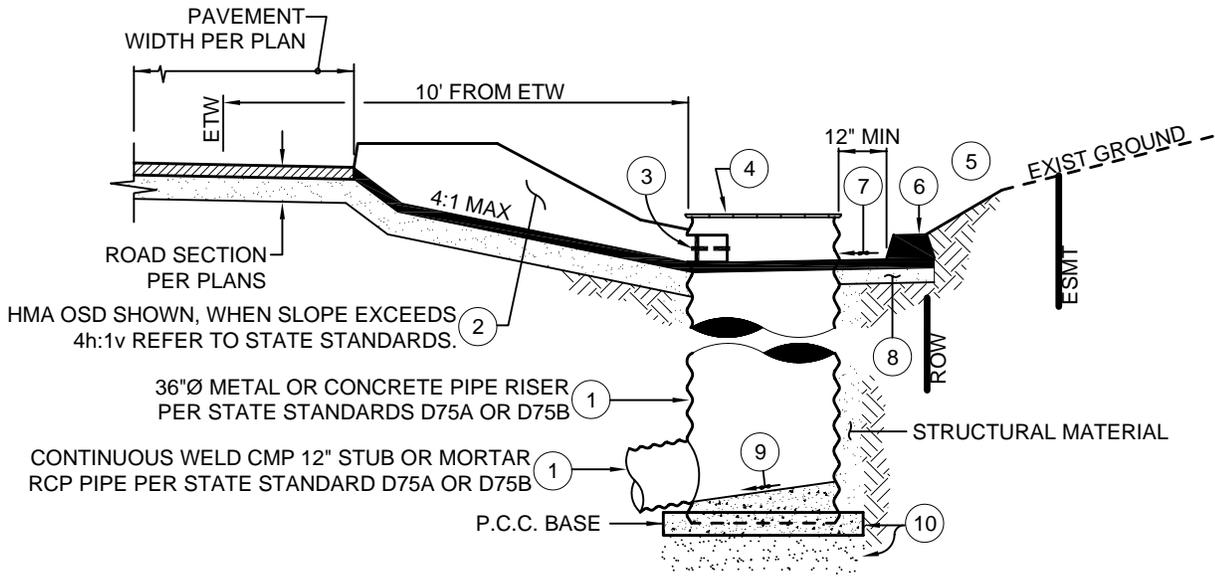


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL CATCH BASIN
EDGE OF PAVEMENT CONDITION

Scale: 1"=4'	Adopted: 2011
Drawing No: D-2a	
Sheet No: 1 OF 1	

Revisions

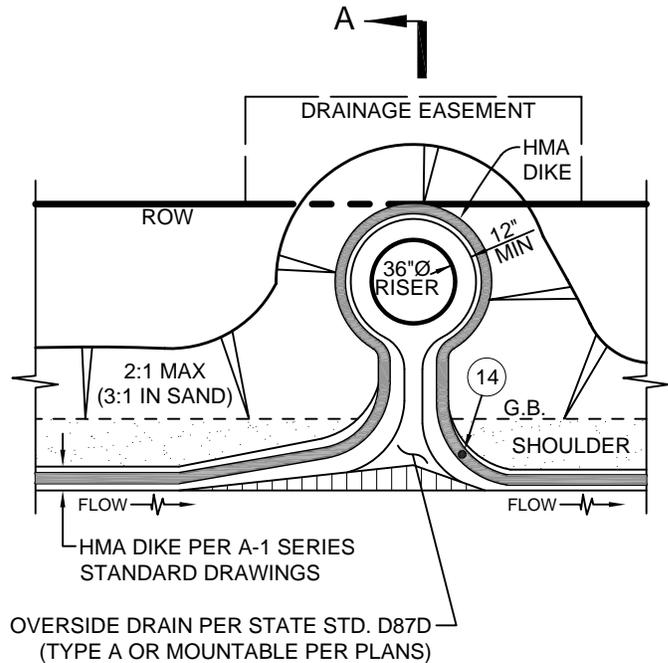
Description	Approved	Date	Description	Approved	Date
NOTE 10	REM	NOV 07	NOTE 3, REMOVE "DrainPac", REPLACE "AC" W/ "HMA"	GDM	JAN 11
NOTE 14	GDM	NOV 08			



SECTION A-A

NOTES:

- REFER TO THE 2006 STATE STANDARD PLANS D75A OR D75B FOR PIPE RISER DETAILS. THE PROJECT ENGINEER SHALL PROVIDE ALL DESIGN SPECIFICATIONS ON THE PLANS (RISER TYPE, LID, GRATE, PIPE SIZE, ETC).
- REFER TO THE 2006 STATE STANDARD D78D FOR HMA OVERSIDE DRAIN DETAILS AND SPECIFICATIONS. THE PROJECT ENGINEER SHALL PROVIDE ALL DESIGN SPECIFICATIONS ON THE PLANS.
- CONSTRUCT TRASH RACK PER THE 2006 STATE STANDARD PLAN D75C IF DIRECTED BY THE DEPARTMENT.
- A LID MAY BE USED WHEN THE RISER NOT LOCATED IN SUMP CONDITIONS, OTHERWISE USE TYPE "GMP" OR "GCP" GRATE. PROJECT ENGINEER SHALL PROVIDE HYDRAULIC CALCULATIONS.
- MINIMUM CUT SLOPE SHALL BE 2 HORIZONTAL:1 VERTICAL (3h:1v IN NATIVE SAND).
- TYPE "A" HMA DIKE PER DRAWING C-3..
- SLOPE TO DRAIN TOWARDS RISER OPENING.
- 2-INCH MINIMUM HOT MIX ASPHALT OVER 6-INCH MINIMUM COMPACTED AGGREGATE BASE.
- RISER FLOOR SLOPED TO DRAIN AT 4h:1v TOWARDS OUTLET, PROVIDE WOOD FLOAT FINISH.
- CONCRETE SHALL BE 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK]., OVER 6-INCH MINIMUM CLASS II AGGREGATE BASED TO 95% RELATIVE COMPACTION.
- ALL EXPOSED STEEL SHALL BE COLD GALVANIZED.
- A DRAINAGE EASEMENT SHALL BE OFFERED TO THE PUBLIC WHENEVER THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY.
- MODIFY AS REQUIRED FOR SUMP CONDITIONS.
- INSTALL STORM DRAIN MARKER PER M-6.



OVERSIDE DRAIN PER STATE STD. D87D (TYPE A OR MOUNTABLE PER PLANS)

PLAN
REDUCED SCALE

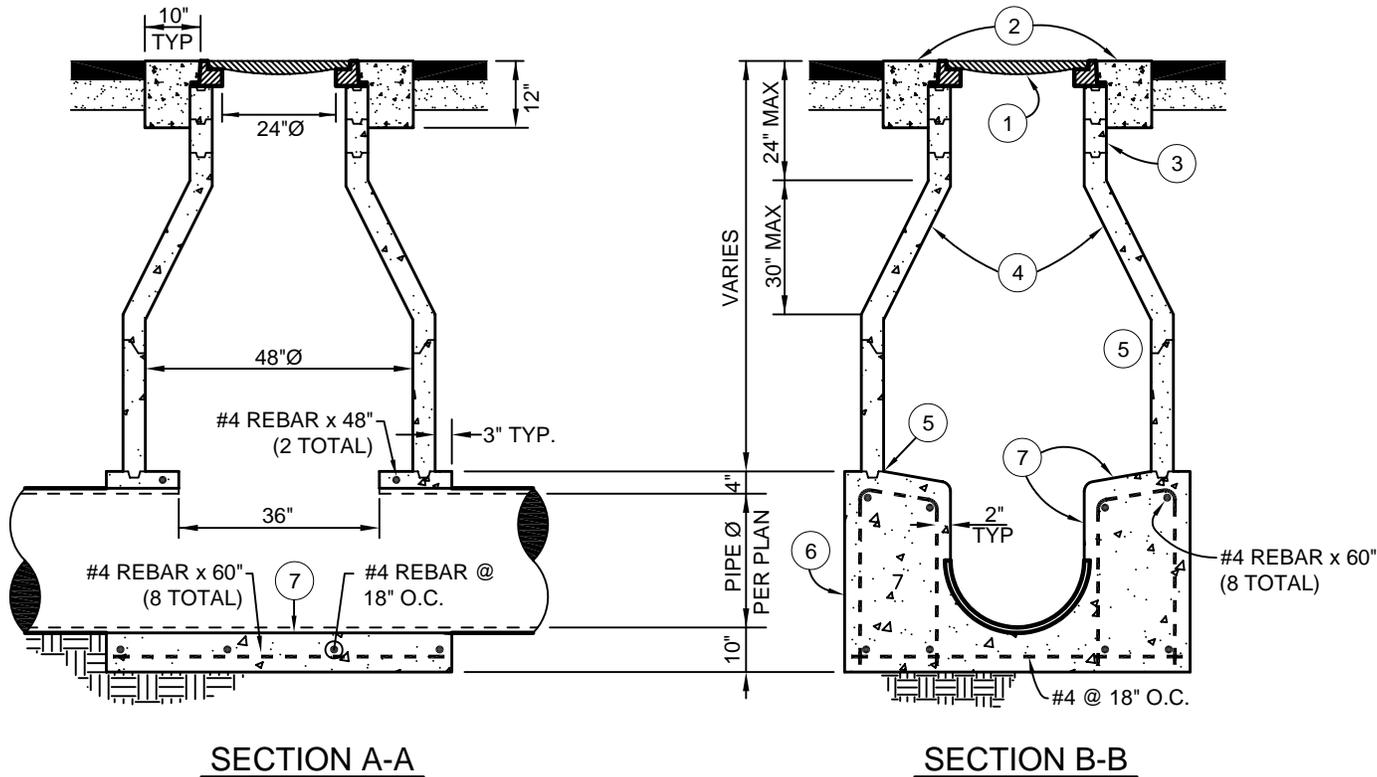


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL CATCH BASIN
HOT MIX ASPHALT DIKE CONDITION

Scale: 1"=4'	Adopted: 2011
Drawing No: D-2b	
Sheet No:	1 OF 1

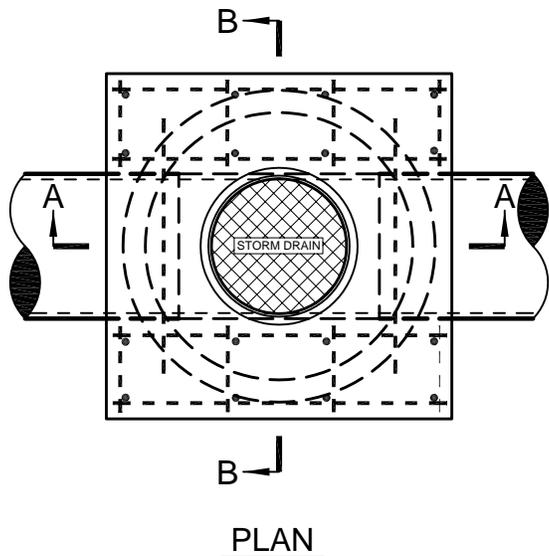
Revisions

Description	Approved	Date	Description	Approved	Date
NOTES 2,3,6 & 10	GDM	JAN 11			



SECTION A-A

SECTION B-B



PLAN

NOTES:

1. MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24"Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE AN OPEN PICKHOLE, AND BE LETTERED "STORM DRAIN".
2. COLLAR SHALL BE PORTLAND CEMENT CONCRETE, TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
3. PROVIDE ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE. PROVIDE HYDRAULIC CEMENT GROUT BETWEEN MANHOLE FRAME AND TOP RING SHALL BE PER APPENDIX C3.
4. PRECAST SHAFT(S) AND CONCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
5. JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
6. CONCRETE MANHOLE BASE SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], AND REST UPON UNDISTURBED MATERIAL. BOTTOM SHAFT SHALL BE WET-SET OR SET IN FORMED GROOVE. PRECAST BASES MAY BE USED WITH PRIOR APPROVAL OF THE DEPARTMENT AND SHALL MEET ASTM C-478 61T.
7. PIPE SHALL BE LAID THROUGH MANHOLE, AND TOP PORTION REMOVED AFTER BASE IS POURED. TROUGH SHALL HAVE STEEL-TROWEL FINISH, VERTICAL SIDES, ROUNDED CORNERS. TOP SURFACE SHALL HAVE 1-INCH PER 12-INCH SLOPE TOWARD TROUGH.
8. EQUIVALENT PRECAST BASE SHALL BE ALLOWED.
9. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.
10. LOCKING LIDS MAY BE REQUIRED BY THE DEPARTMENT.

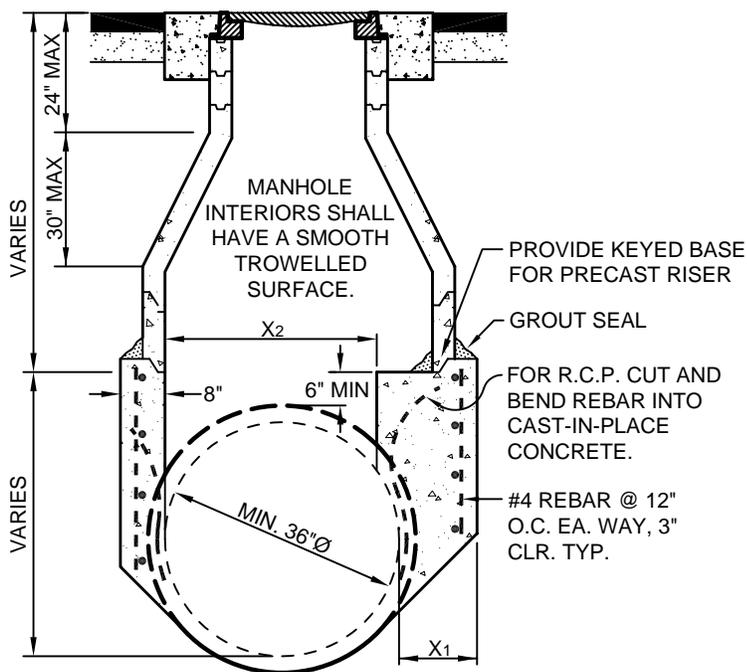


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
STORM DRAIN MANHOLE
 FOR PIPE DIAMETERS FROM 18" TO 36"

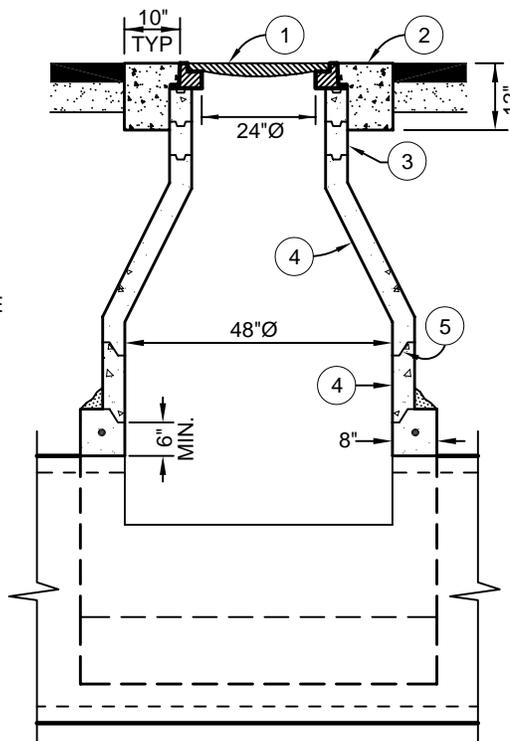
Scale: NTS	Adopted: 2011
Drawing No: D-3	
Sheet No:	1 OF 1

Revisions

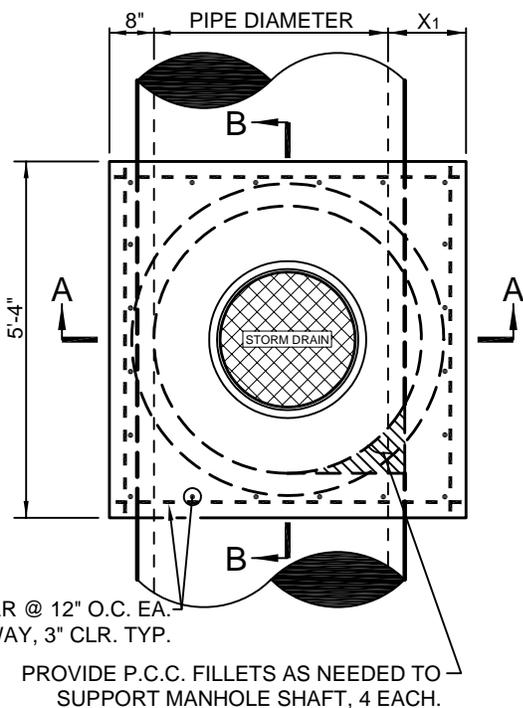
Description	Approved	Date	Description	Approved	Date
NOTES 2,3 & 7	GDM	JAN 11			



SECTION A-A



SECTION B-B



PLAN

DIMENSIONS				
PIPE Ø	36"	42"	48"	54" AND GREATER
X1	20"	14"	8"	EQUALS PIPE WALL THICKNESS
X2	32"	38"	44"	48"

NOTES:

1. MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24"Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE AN OPEN PICKHOLE, AND BE LETTERED "STORM DRAIN".
2. COLLAR SHALL BE PORTLAND CEMENT CONCRETE, TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
3. PROVIDE ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE. PROVIDE HYDRAULIC CEMENT GROUT BETWEEN MANHOLE FRAME AND TOP RING SHALL BE PER APPENDIX C3.
4. PRECAST SHAFT(S) AND CONCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
5. JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
6. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.
7. LOCKING LIDS MAY BE REQUIRED BY THE DEPARTMENT.

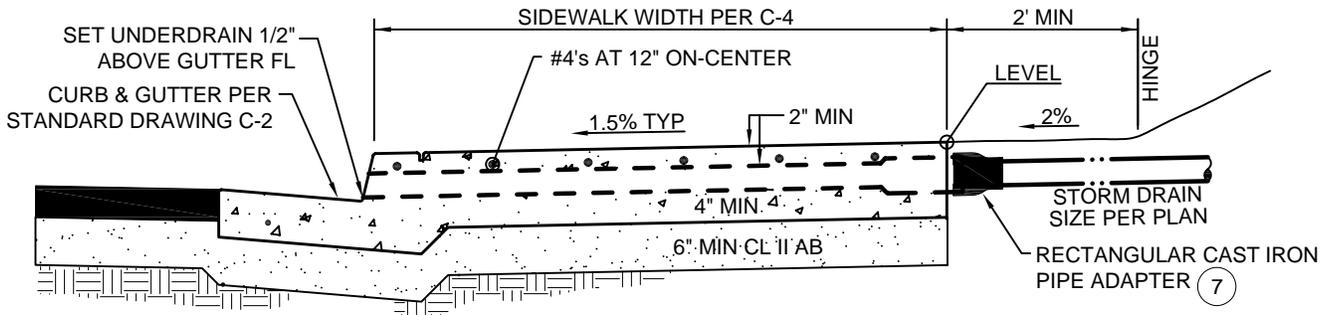


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
STORM DRAIN MANHOLE
 FOR PIPE DIAMETERS GREATER THAN 36"

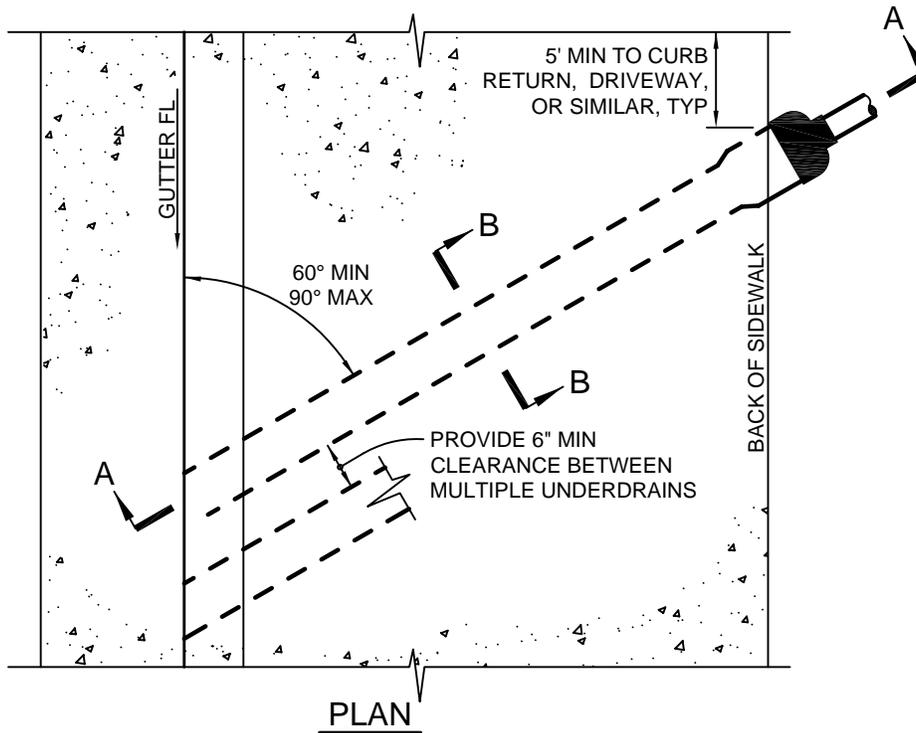
Scale: NTS	Adopted: 2011
Drawing No: D-3a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
ADD SCORE LINE NOTE TO SECTION B-B	GDM	NOV 08			
DEFINE ADAPTER	GDM	JAN 11			



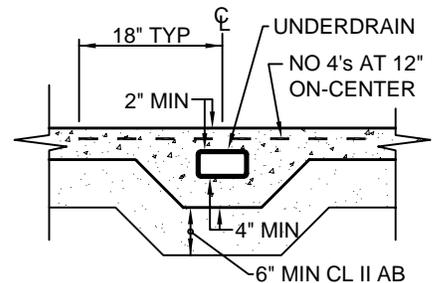
SECTION A-A
SHOWN AT 90°



PLAN

NOTES:

1. THE UNDERDRAIN SHALL BE A 3-INCH TALL BY 5-INCH WIDE (MINIMUM) RECTANGULAR CAST IRON CONDUIT, ALHAMBRA A-470 OR DEPARTMENT APPROVED EQUAL. THE DESIGN WIDTH SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHOWN ON THE PLANS.
2. THE UNDERDRAIN SHALL BE SET FLUSH WITH THE CURB FACE AND PLACED 1/2" ABOVE THE GUTTER FLOWLINE.
3. THE SLOPE OF THE UNDERDRAIN SHALL MATCH THE SIDEWALK CROSS SLOPE.
4. UNDERDRAIN SHALL NOT BE LOCATED CLOSER THAN 5-FEET TO A DRIVEWAY OR CURB RETURN.
5. MULTIPLE DRAINS SHALL HAVE 6-INCH MINIMUM CLEARANCE WITH MAXIMUM OF 3 DRAINS PER 10-FOOT OF SIDEWALK.
6. REVERSE SIDEWALK UNDERDRAINS SHALL BE SET 1-INCH BELOW THE DESIGN GUTTER FLOWLINE, AND 3-FOOT GUTTER TRANSITIONS SHALL BE PROVIDED EITHER SIDE OF THE UNDERDRAIN. THE DESIGN ENGINEER SHALL DETAIL REVERSE UNDERDRAINS ON THE PLANS.
7. RECTANGULAR CAST IRON PIPE ADAPTER SHALL BE ALHAMBRA A-480, OR APPROVED EQUAL, FOR OPTIONAL CONNECTION TO ONSITE DRAIN PIPE.



ADD SCORE LINE IN CONCRETE DIRECTLY ABOVE PIPE EDGES

SECTION B-B

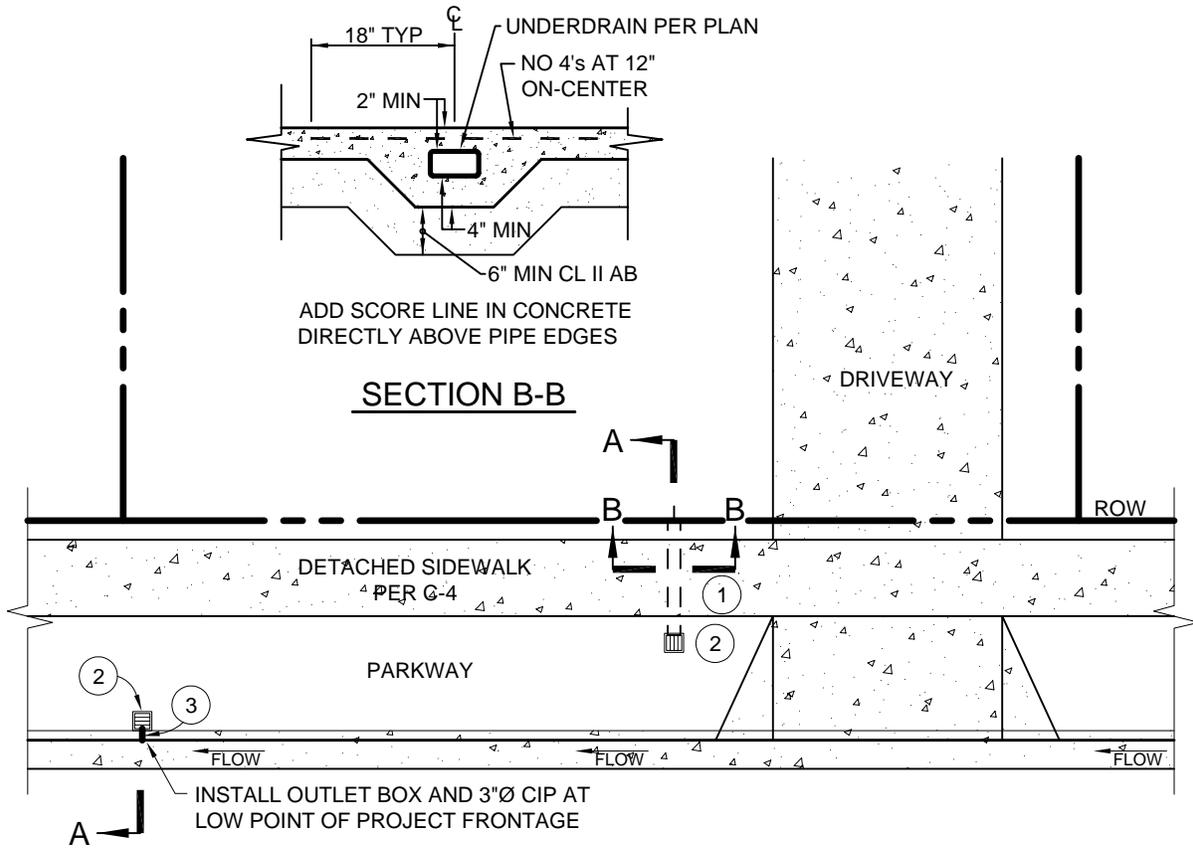


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
SIDEWALK UNDERDRAIN
RESIDENTIAL

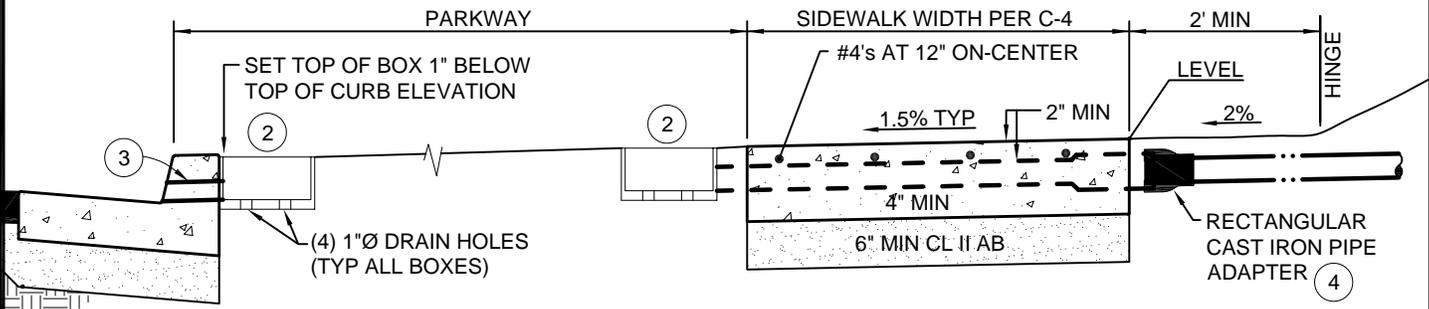
Scale: 1"=2'	Adopted: 2011
Drawing No:	D-4
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NEW STANDARD	GDM	NOV 08			
DEFINE ADAPTER	GDM	JAN 11			



PLAN



SECTION A-A
NTS

NOTES:

1. THE UNDERDRAIN SHALL BE A 3-INCH TALL BY 5-INCH WIDE (MINIMUM) RECTANGULAR CAST IRON CONDUIT, ALHAMBRA A-470 OR DEPARTMENT APPROVED EQUAL. THE DESIGN WIDTH SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHOWN ON THE PLANS. INSTALL UNDER SIDEWALK PER SECTION B-B, THIS SHEET.
2. PLASTIC STORM DRAIN BOX (NDS OR EQUAL). PROVIDE A MINIMUM OF 4 1"Ø DRAIN HOLES DRILLED THROUGH THE BOTTOM OF THE BOX.
3. INSTALL 3" CAST IRON PIPE. SET FLUSH WITH CURB FACE AND PLACE 1/2" ABOVE THE GUTTER FLOWLINE.
4. RECTANGULAR CAST IRON PIPE ADAPTER SHALL BE ALHAMBRA A-480, OR APPROVED EQUAL, FOR OPTIONAL CONNECTION TO ONSITE DRAIN PIPE.

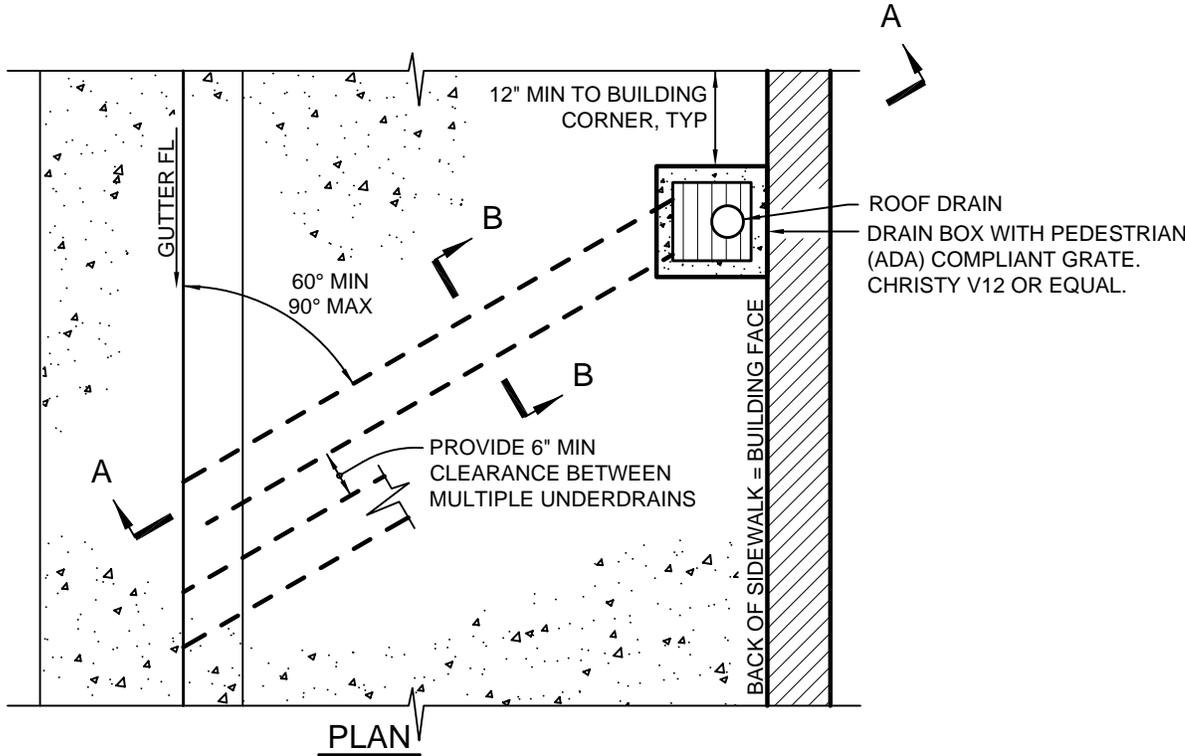
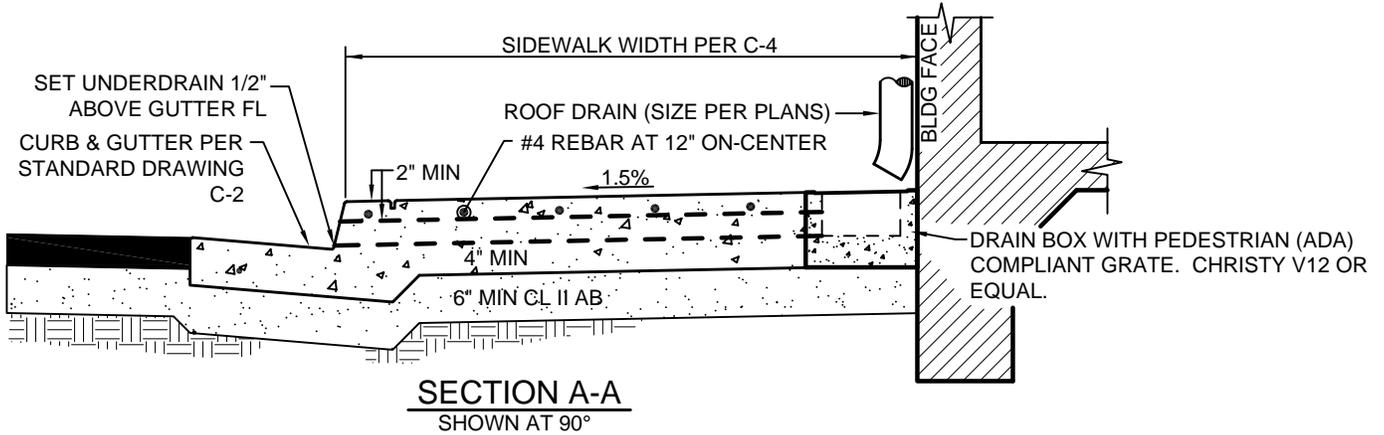


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
SIDEWALK UNDERDRAIN
 RESIDENTIAL WITH PARKWAY
 (LID ALTERNATIVE)

Scale: 1"=10'	Adopted: 2011
Drawing No: D-4a	
Sheet No:	1 OF 1

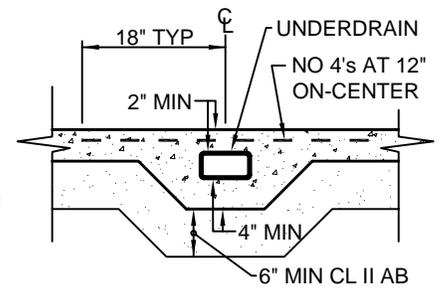
Revisions

Description	Approved	Date	Description	Approved	Date
ADD SCORE LINE NOTE TO SECT. B-B, DRAIN BOX, CHANGE DWG No	GDM	NOV 08			



NOTES:

1. THE UNDERDRAIN SHALL BE A 3-INCH TALL BY 5-INCH WIDE (MINIMUM) RECTANGULAR CAST IRON CONDUIT, ALHAMBRA A-470 OR DEPARTMENT APPROVED EQUAL. THE DESIGN WIDTH SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHOWN ON THE PLANS.
2. THE UNDERDRAIN SHALL BE SET FLUSH WITH THE CURB FACE AND PLACED 1/2-INCH ABOVE THE GUTTER FLOWLINE.
3. THE SLOPE OF THE UNDERDRAIN SHALL MATCH THE SIDEWALK CROSS SLOPE.
4. UNDERDRAIN SHALL NOT BE LOCATED CLOSER THAN 5-FEET TO A DRIVEWAY OR CURB RETURN.
5. MULTIPLE DRAINS SHALL HAVE 6-INCH MINIMUM CLEARANCE WITH MAXIMUM OF 3 DRAINS PER 10-FEET OF SIDEWALK.
6. ALL JUNCTION BOXES SHALL HAVE A PEDESTRIAN RATED GRATE OR NON-SLIP LID AND BE APPROVED BY THE DEPARTMENT.



ADD SCORE LINE IN CONCRETE DIRECTLY ABOVE PIPE EDGES

SECTION B-B

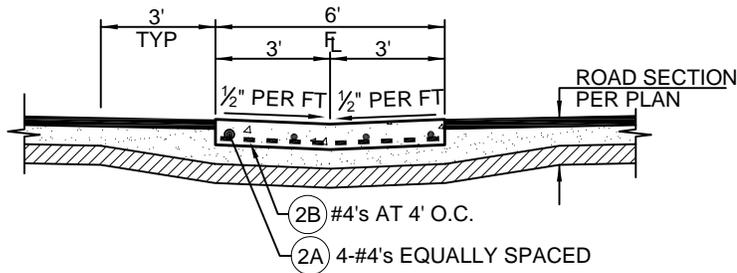
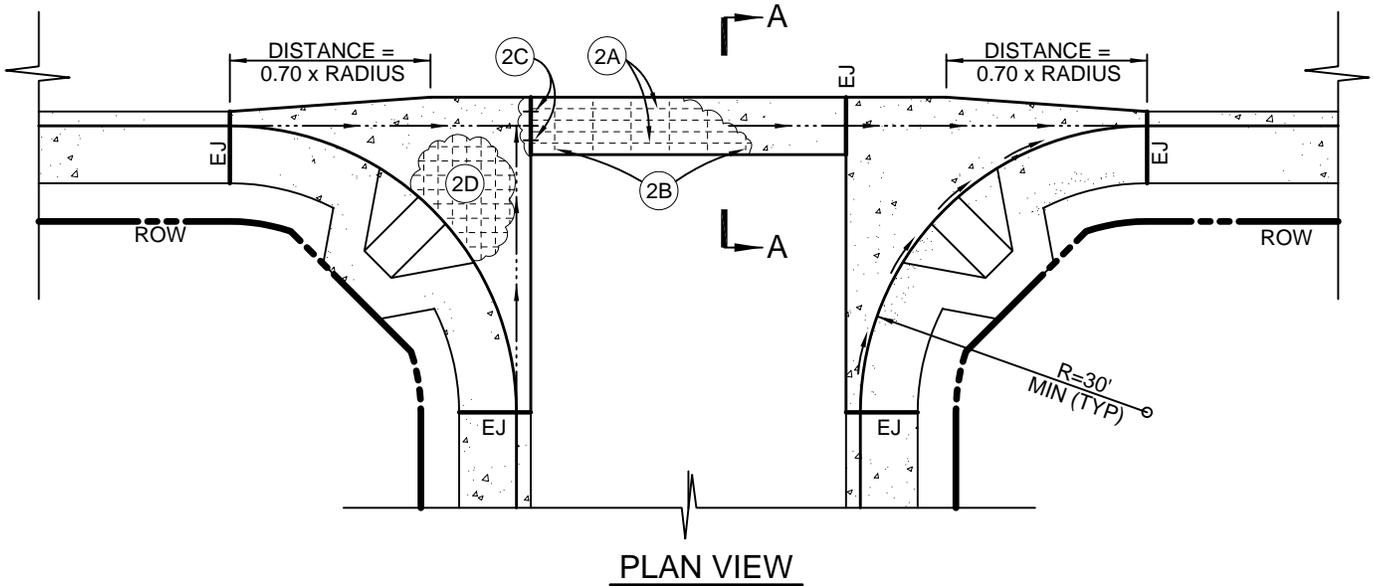


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
SIDEWALK UNDERDRAIN
 COMMERCIAL (ZERO SETBACK)

Scale: 1"=2'	Adopted: 2011
Drawing No: D-4b	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 3	REM	NOV 07			



SECTION A-A

NOTES:

- TYPICAL CROSS GUTTER & SPANDREL SECTION SHALL BE:
 - 8" MINIMUM PORTLAND CEMENT CONCRETE PER THE DESIGN STANDARDS, OVER
 - 6" MINIMUM CLASS II AGGREGATE BASE (OR MATCH ROAD SECTION) TO 95% RELATIVE COMPACTION, OVER
 - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- TYPICAL CROSS GUTTER & SPANDREL REINFORCEMENT SHALL BE:
 - 2A. (4) #4 REBAR CONTINUOUS & EQUALLY SPACED
 - 2B. #4 REBAR AT 4' ON CENTER
 - 2C. EXPANSION JOINT WITH (3) 1/2"Ø x 36" SMOOTH GREASED DOWELS (TYP BOTH SIDES)
 - 2D. #4 REBAR AT 18" ON CENTER ALL WAYS (3" CLEAR FROM ALL EDGES, TYPICAL)

IN ALL CASES, DOBIES SET 2-INCHES ABOVE FINISHED AGGREGATE BASE SHALL BE USED TO SUPPORT REINFORCEMENT.
- CONCRETE SHALL CONFORM TO STATE STANDARD 90-1.01, 520 LBS/CY CEMENTITIOUS MATERIAL [5-1/2 SACK]. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE. TYPICAL SECTION SHALL BE:
- CURB RAMPS SHALL BE INSTALLED PER STANDARD DRAWING C-5.
- UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN THE CROSS GUTTER OR SPANDREL.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

CROSS GUTTER & SPANDREL

Scale: 1"=20'	Adopted: 2011
Drawing No: D-5	
Sheet No:	1 OF 1

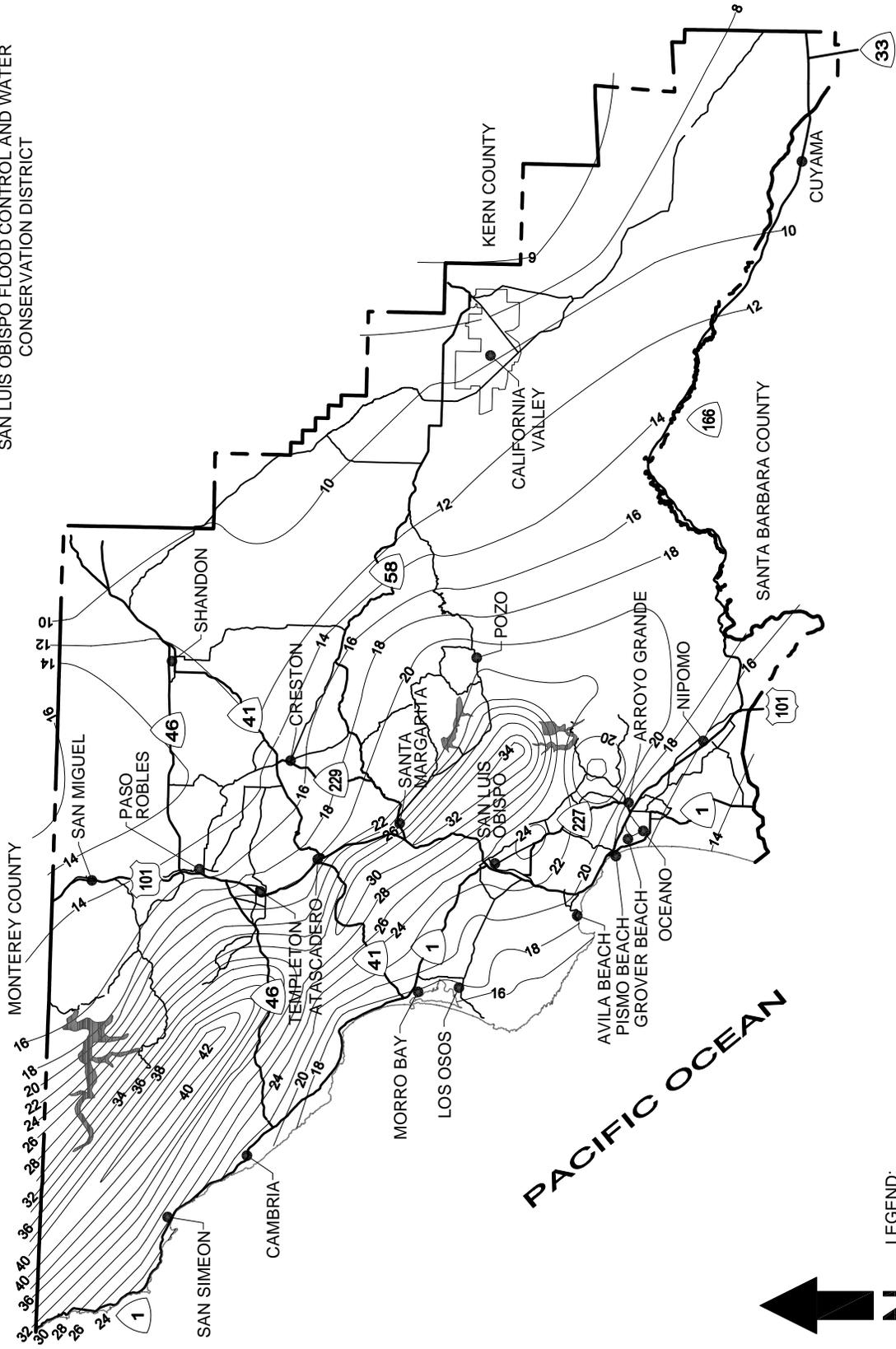
Revisions

Description	Approved	Date	Description	Approved	Date

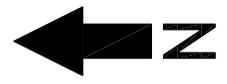
**SAN LUIS OBISPO COUNTY
AVERAGE ANNUAL PRECIPITATION**

(JULY 1 THROUGH JUNE 30) FOR 42 YEAR PERIOD
FROM 1955-56 THROUGH 1997-98)

SAN LUIS OBISPO FLOOD CONTROL AND WATER
CONSERVATION DISTRICT



LEGEND:
22 - AVERAGE ANNUAL PRECIPITATION (INCHES)

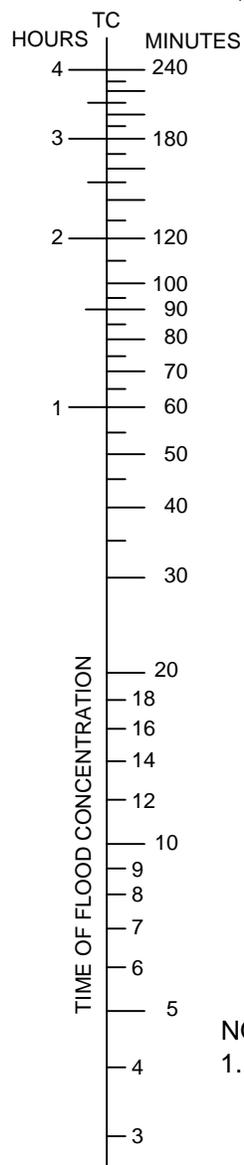
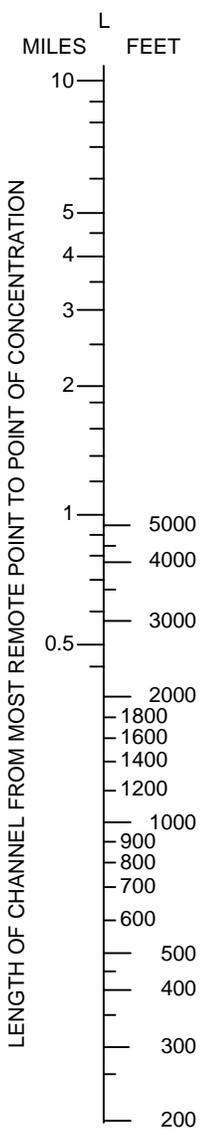
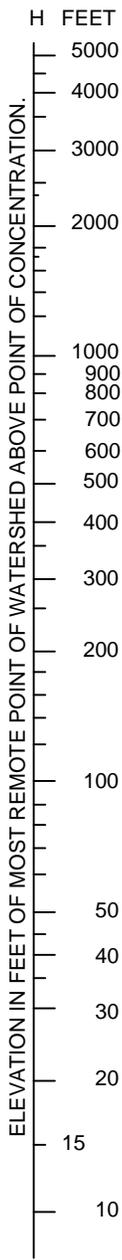
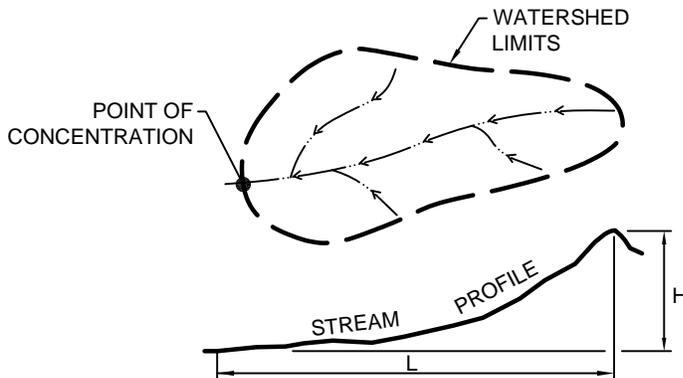


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
AVERAGE ANNUAL RAINFALL

Scale: NTS	Adopted: 2011
Drawing No:	H-1
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
ADD REF.	GDM	NOV 08			



EQUATIONS FOR ESTIMATED "TIME OF CONCENTRATION"

$$T_c = \left(\frac{11.9L^3}{H} \right)^{0.385}$$

LEGEND:
 T_c = TIME OF CONCENTRATION IN HOURS.
 L = LENGTH OF CHANNEL IN MILES.
 H = DIFFERENCE IN ELEVATION BETWEEN MOST REMOTE POINT AND THE POINT OF CONCENTRATION IN FEET.

NOTES:
 1. THIS NOMOGRAPH IS TO BE LIMITED TO WATERSHED AREAS OF 200 ACRES OR LESS. FOR LARGER WATERSHEDS REFER TO THE DESIGN STANDARDS.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TIME OF CONCENTRATION
 FOR WATERSHEDS LESS THAN 200 ACRES

Scale:	Adopted: 2011
Drawing No:	H-2
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date

TABLE 1: RATIONAL METHOD STANDARD RUNOFF COEFFICIENTS FOR DEVELOPED AREAS

TYPE OF DEVELOPMENT	SOIL TYPE	SLOPE			FOOT NOTE
		<2%	2% to 10%	>10%	
RESIDENTIAL LOTS > 20,000 SF	C	0.35	0.40	0.50	1,2
	S	0.25	0.35	0.40	1,2
RESIDENTIAL LOTS 10,000 SF TO 19,999 SF	C	0.40	0.45	0.55	1,2
"	S	0.30	0.40	0.45	1,2
RESIDENTIAL LOTS 6,000 SF TO 9,999 SF	C	0.45	0.55	0.65	1,2
"	S	0.35	0.40	0.50	1,2
PLANNED DEVELOPMENTS (PUD)	C	0.65	0.70	0.75	1,2
"	S	0.60	0.65	0.70	1,2
APARTMENTS	C	0.50	0.60	0.70	2
"	S	0.40	0.50	0.60	2
INDUSTRIAL	C	0.55	0.65	0.75	2
"	S	0.45	0.55	0.65	2
COMMERCIAL	C	0.75	0.80	0.85	2
"	S	0.70	0.75	0.80	2

FOOT NOTES:

- ESTIMATION OF COMPOSITE "C" VALUE USING ESTIMATED IMPERVIOUS AREAS AND STD. DWG. H-3a (TABLE 2) MAY BE REQUIRED BY THE DEPARTMENT. IMPERVIOUS AND PAVED AREAS SHALL USE C=0.95.
- ALL VALUES SHOWN ARE INTENDED TO BE MINIMUMS. HIGHER VALUES MAY BE REQUIRED BY THE DEPARTMENT.

LEGEND:

- C - CLAY, ADOBE, ROCK, OR IMPERVIOUS MATERIAL
- S - SAND, GRAVEL, LOAM, OR PERVIOUS MATERIAL

NOTES:

- COEFFICIENTS FOR RESIDENTIAL LOTS ASSUME TYPICAL SINGLE FAMILY RESIDENCE WITH ASSOCIATED GARAGE, DRIVEWAY, FLATWORK, AND LANDSCAPING. HIGHER DENSITY RESIDENTIAL DEVELOPMENTS MAY REQUIRE USING COMPOSITE COEFFICIENT EVALUATED BY THE DESIGN ENGINEER AND BASED ON PROPOSED DEVELOPMENT IMPERVIOUS AREAS.
- FOR ALL TYPES OF DEVELOPMENT, COEFFICIENTS ARE INCLUSIVE OF ONLY THE LOT AREA OUTSIDE THE RIGHT-OF-WAY (NET LOT AREA). PAVED SURFACES BETWEEN ROAD CENTERLINE AND RIGHT-OF-WAY SHALL BE EVALUATED SEPARATELY AND INCLUDED TO DETERMINE A COMPOSITE "C" FACTOR.
- ALL IMPERVIOUS AREAS AND PAVED AREAS SHALL USE C = 0.95.



**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RUNOFF COEFFICIENTS
FOR DEVELOPED AREAS**

Scale:	Adopted: 2011
Drawing No:	H-3
Sheet No:	1 OF 2

Revisions

Description	Approved	Date	Description	Approved	Date
CORRECT TO MATCH HWY. DES. MAN.	REM	NOV 07			

TABLE 2: RATIONAL METHOD STANDARD RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

	EXTREME	HIGH	NORMAL	LOW
RELIEF	0.28 TO 0.35 STEEP, RUGGED TERRAIN WITH AVERAGE SLOPES ABOVE 30%	0.20 TO 0.28 HILLY, WITH AVERAGE SLOPES OF 10% TO 30%	0.14 TO 0.20 ROLLING, WITH AVERAGE SLOPE OF 5% TO 10%	0.08 TO 0.14 RELATIVELY FLAT LAND, WITH AVERAGE SLOPES OF 0% TO 5%
SOIL INFILTRATION	0.12 TO 0.16 NO EFFECTIVE SOIL COVER, EITHER ROCK OR THIN MANTLE OF NEGLIGIBLE INFILTRATION CAPACITY	0.08 TO 0.12 SLOW TO TAKE UP WATER, CLAY OR SHALLOW LOAM SOILS OF LOW INFILTRATION CAPACITY, IMPERFECTLY OR POORLY DRAINED	0.06 TO 0.08 NORMAL; WELL DRAINED LIGHT OR MEDIUM TEXTURED SOILS, SANDY LOAMS, SILT AND SILT LOAMS	0.04 TO 0.06 HIGH; DEEP SAND OR OTHER SOILS THAT TAKES UP WATER READILY, VERY LIGHT WELL DRAINED SOILS
VEGETAL COVER	0.12 TO 0.16 NO EFFECTIVE PLANT COVER, BARE OR VERY SPARSE COVER	0.08 TO 0.12 POOR TO FAIR; CULTIVATION CROPS, OR POOR NATURAL COVER, LESS THAN 20% OF DRAINAGE AREA OVER GOOD COVER	0.06 TO 0.08 FAIR TO GOOD; ABOUT 50% OF AREA IN GOOD GRASSLAND OR WOODLAND, NOT MORE THAN 50% OF AREA IN CULTIVATED CROPS	0.04 TO 0.06 GOOD TO EXCELLENT; ABOUT 90% OF DRAINAGE AREA IN GOOD GRASSLAND, WOODLAND, OR EQUIVALENT COVER
SURFACE STORAGE	0.10 TO 0.12 NEGLIGIBLE SURFACE DEPRESSIONS FEW AND SHALLOW; DRAINAGE WAYS STEEP AND SMALL, NO MARSHES	0.08 TO 0.10 LOW; WELL DEFINED SYSTEM OF SMALL DRAINAGE WAYS, NO PONDS OR MARSHES	0.06 TO 0.08 NORMAL; CONSIDERABLE SURFACE STORAGE, LAKES AND POND MARSHES	0.04 TO 0.06 HIGH; SURFACE STORAGE, HIGH; DRAINAGE SYSTEM NOT SHARPLY DEFINED; LARGE FLOOD PLAIN STORAGE OR LARGE NUMBER OF PONDS OR MARSHES

(REFERENCES FIGURE 819.2A OF HIGHWAY DESIGN MANUAL)

EXAMPLE:

GIVEN: AN UNDEVELOPED WATERSHED CONSISTING OF:

1. ROLLING TERRAIN WITH AVERAGE SLOPES OF 5%
2. CLAY SOILS
3. GOOD GRASSLAND AREA
4. NORMAL SURFACE DEPRESSIONS

FIND: THE RUNOFF COEFFICIENT FOR THE ABOVE WATERSHED

SOLUTION:

1. RELIEF = 0.14
2. SOIL INFILTRATION = 0.08
3. VEGETAL COVER = 0.04
4. SURFACE STORAGE = 0.06

ANSWER: THE RUNOFF COEFFICIENT, C = 0.32



**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RUNOFF COEFFICIENTS
FOR UNDEVELOPED AREAS**

Scale:	Adopted: 2011
Drawing No:	H-3a
Sheet No:	2 OF 2

Revisions

Description	Approved	Date	Description	Approved	Date

TABLE 1: ANNUAL RAINFALL < 14":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.00	0.90	0.60	0.40	0.26	0.22	0.18	0.14
5	1.40	1.20	0.80	0.50	0.37	0.32	0.25	0.20
10	1.70	1.40	1.00	0.60	0.44	0.38	0.30	0.23
25	2.00	1.70	1.10	0.70	0.54	0.47	0.37	0.28
50	2.20	1.90	1.30	0.80	0.60	0.53	0.44	0.34
100	2.40	2.10	1.40	0.90	0.65	0.59	0.48	0.36

TABLE 2: ANNUAL RAINFALL 14" TO 17":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.30	1.10	0.80	0.50	0.35	0.30	0.23	0.18
5	1.90	1.60	1.10	0.70	0.49	0.42	0.33	0.26
10	2.30	1.90	1.30	0.80	0.60	0.51	0.40	0.30
25	2.60	2.20	1.50	1.00	0.71	0.63	0.50	0.38
50	3.00	2.50	1.70	1.10	0.81	0.74	0.60	0.47
100	3.20	2.70	1.90	1.20	0.90	0.80	0.65	0.49

TABLE 3: ANNUAL RAINFALL 18" TO 21":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.70	1.40	1.00	0.65	0.44	0.37	0.29	0.22
5	2.30	1.90	1.30	0.85	0.60	0.52	0.41	0.33
10	2.80	2.40	1.60	1.03	0.74	0.64	0.50	0.38
25	3.20	2.70	1.90	1.20	0.92	0.80	0.64	0.50
50	3.70	3.10	2.10	1.40	1.05	0.92	0.74	0.58
100	4.00	3.40	2.30	1.50	1.13	1.00	0.80	0.62

TABLE 4: ANNUAL RAINFALL 22" TO 28":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	2.10	1.80	1.20	0.77	0.55	0.47	0.36	0.28
5	2.80	2.50	1.70	1.05	0.76	0.64	0.52	0.42
10	3.60	3.00	2.10	1.30	0.92	0.81	0.64	0.48
25	3.90	3.50	2.40	1.50	1.10	0.98	0.78	0.60
50	4.50	3.90	2.60	1.70	1.28	1.15	0.94	0.72
100	5.00	4.30	2.90	1.85	1.40	1.25	0.98	0.76



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

RAINFALL INTENSITY DATA

Scale:	Adopted: 2011
Drawing No:	H-4
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
COMBINED H-5 & H-5a, ADDED FES & RSP KEY	GDM	JAN 11			
REVISE NOTE 6.	FH	AUG 14			

W50 STANDARD ROCK WEIGHT. SELECT A W50 GREATER THAN DETERMINED STABLE ROCK WEIGHT (W)	D50 FEET OF STANDARD W50	TRENCH DEPTH (Z) IN FEET, 1.5 TIMES D50 OF STANDARD W50	RSP-CLASS METHOD B PLACEMENT	RSP-FABRIC TYPE NONWOVEN OR WOVEN
25 LBS	0.86	1.0	BACKING No 2	A or B
75 LBS	0.95	1.5	BACKING No 1	A or B
200 LBS	1.32	2.0	LIGHT	B
1/4 TON	1.79	2.7	1/4 TON	B
1/2 TON	2.26	3.4	1/2 TON	B
1 TON	2.85	4.3	1 TON	B

ROCK SIZE RSP CLASS	TRENCH DEPTH RANGE (Z)	TYPE OF RSP FABRIC
BACKING No 2	10"-16"	A or B
BACKING No 1	12"-18"	A or B
LIGHT	18"-24"	B
1/4 TON	30"-36"	B
1/2 TON	36"-42"	B
1 TON	48"-60"	B

DESIGN METHOD:

1. DETERMINE ROCK SIZE BASED ON CULVERT OUTLET VELOCITY:

- a. FIRST TRIAL ROCK SIZE BY N.K. BERRY'S EQUATION (1948), SEE USBR EM-25:

$$d = 0.0120V^2$$

WHERE DIAMETER (d) FEET, VELOCITY (V) FPS, AND SG = 2.65.

- b. COMPARE TO CALTRANS BANK & SHORE EQUATION 1 WITH 1V:1.5H (IF H>1.5 SIZE WILL BE SMALL) AND SG = 2.65

$$\text{STABLE ROCK WEIGHT } W = 0.0000568V^6$$

EQUATION GIVES ROCK SIZE ON BANK USUALLY SMALLER THAN BERRY FOR BEDLOAD MOVEMENT ALONG CHANNEL BOTTOM

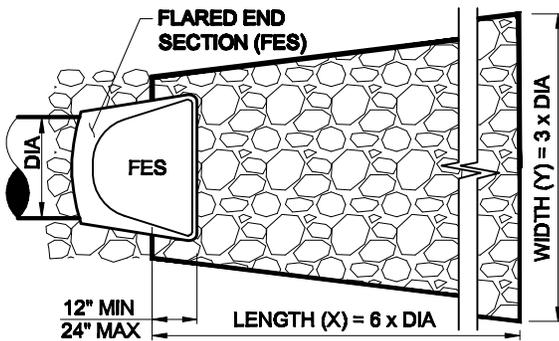
- c. ALSO COMPARE ABOVE ROCK SIZE TO HEC-14 CHART, FIGURE II-C-1, ON PAGE II-9 (1975), ORIGINALLY FROM SEARCY (1967).
- d. SELECT FINAL ROCK SIZE BASED ON ENGINEERING JUDGMENT AND FIELD EXPERIENCE. ADJUST (X) BASED ON SITE SPECIFIC CONSTRAINTS.

2. DETERMINING STABLE ROCK WEIGHT (W), STEP 1 ABOVE.

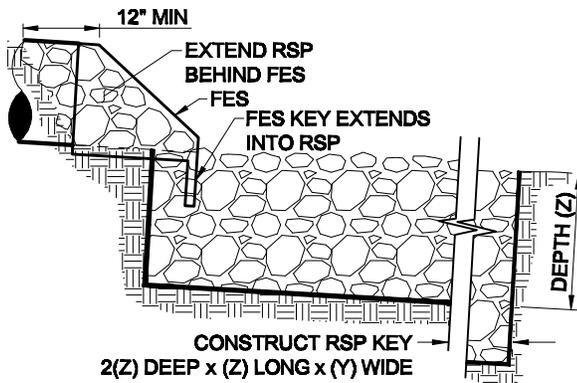
- 3. EXTEND FES 12" TO 24" INTO RSP TO PREVENT HEADCUT.
- 4. TABLE (STANDARD ROCK SIZES, D50, Z, RSP CLASS, RSP FABRIC TYPE).
- 5. RSP FABRIC PER CALTRANS SECTION 88..

CONSTRUCTION NOTES:

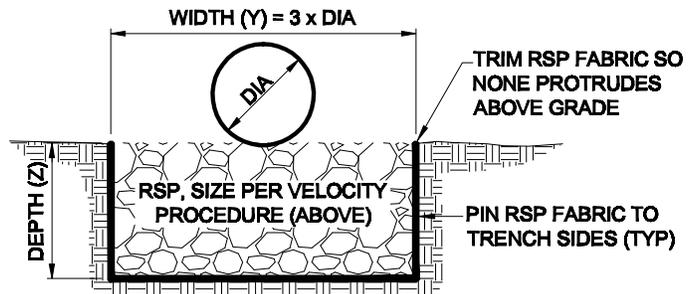
- A. EXCAVATE AND/OR FILL DISSIPATER TRENCH TO DIMENSIONS (X, Y AND Z, SHOW ON PLAN SET (SQUARED EDGES NOT REQUIRED).
- B. INSTALL FLARED END SECTION APPROPRIATELY SIZED FOR CULVERT.
- C. PLACE RSP-FABRIC LOOSELY AND PIN IT TO ALL SIDES AND BOTTOM OF TRENCH.
- D. PLACE RSP-CLASS OF DISSIPATER ROCK IN TRENCH. ROCK SHALL NOT PROTRUDE ABOVE CULVERT FLOWLINE OR ADJACENT GROUND. MATCH DISSIPATER GRADE WITH DOWNSTREAM FLOWLINE AND ADJACENT GROUND.
- E. TRIM RSP FABRIC SO THAT NONE PROTRUDES ABOVE GROUND.



PLAN VIEW



PROFILE VIEW



END VIEW



**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
ROCK SLOPE PROTECTION SIZING
METHOD AT CULVERT OUTLETS**

Scale: NTS	Adopted: 2014
Drawing No:	H-5
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
ADDED COUNTY POST MILES TO BLOCK 1	REM	NOV 07			
NOTE 2	GDM	JAN 11			

"Engineering Firm's Name, Address, & Phone Number"				
PUBLIC IMPROVEMENT PLANS FOR "Project Identification (Tract No., Parcel No., etc.)"				
"Sheet Title"				
Design/Drawn	County Plan Checker	APPROVED FOR COUNTY REQUIREMENTS		
		Development Services Engineer _____		Date _____
Job No.	County W.O. No. 201R11-XXXX	"Engineer's Name and Registration Number" _____ Date _____		
California Coordinates N XXX E XXXX		County Post Miles XXXX	County Road No. XXXX	Sheet X of XX

NOTES:

1. THE COUNTY TITLE BLOCK SHALL BE LOCATED IN THE LOWER RIGHT CORNER OF EACH SHEET WITHIN THE SET WITH EACH SHEET BEING STAMPED, SIGNED, AND DATED BY THE PROJECT ENGINEER.

BLOCK 1: COUNTY TITLE BLOCK

RECORD DRAWINGS	
"Engineer's Name & Registration No."	DATE
REVISIONS THIS SHEET:	
①	_____
②	_____
③	_____
④	_____
⑤	_____

NOTES:

1. EACH SHEET SHALL HAVE A RECORD DRAWING BLOCK AND BE SIGNED AND DATED BY THE ENGINEER OF WORK.
2. THE ENGINEER OF WORK SHALL WET STAMP AND SIGN EACH RECORD DRAWING SHEET IF THE ENGINEER OF WORK IS DIFFERENT THAN THE PROJECT ENGINEER.
3. REVISION NUMBERS SHALL BE USED ONLY ONCE WITHIN ALL SHEETS OF A SET. EACH ADDITIONAL REVISION SHALL HAVE ITS OWN UNIQUE NUMBER WITHIN THE SET.

BLOCK 2: COUNTY RECORD DRAWING BLOCK



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
STANDARD COUNTY TITLE BLOCKS

Scale:	Adopted: 2011
Drawing No:	L-1
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
OL, URL, VRL	GDM	JAN 11			

AB - AGGREGATE BASE	IRR - IRRIGATION	TW - TOP OF WALL
ABN - ABANDON	JB - JUNCTION BOX	UD - UNDER DRAIN
AC - ASPHALT CONCRETE	JP - JUNCTION POLE	UP - UTILITY POLE
ACD - ASPHALT CONCRETE DIKE	LAT - LATERAL	URL - URBAN RESERVE LINE
ADJ - ADJUST	LF - LINEAR FEET	VERT - VERTICAL
ADT - AVERAGE DAILY TRAFFIC	LP - LOW POINT	VC - VERTICAL CURVE
ANG - ANGLE	LT - LEFT	VCP - VITRIFIED CLAY PIPE
APROX - APPROXIMATE	MAX - MAXIMUM	VLT - VAULT
ASBLY - ASSEMBLY	MH - MANHOLE	VLV - VALVE
AV - AIR VACUUM	MIN - MINIMUM	VRL - VILLAGE RESERVE LINE
AVO - AVOCADO TREE	MON - MONUMENT	WL - WATER LINE
BLDG - BUILDING	NTS - NOT TO SCALE	WM - WATER METER BOX
BM - BENCHMARK	OAE - OR APPROVED EQUAL	WPJ - WEAKENED PLANE JOINT
BTM - BOTTOM	OG - ORIGINAL (EXISTING) GROUND	WS - WATER SERVICE
BVC - BEGIN VERTICAL CURVE	OHW - OVERHEAD WIRE	W.S. - WATER SURFACE
BW - BACK OF WALK (GRADE)	OL - OVERLAY (PAVEMENT)	WV - WATER VALVE
CATV - CABLE TELEVISION (LINE)	OPT - OPTION	WW - WING WALL
CB - CATCH BASIN	OS - ORIGINAL SURFACE	WWM - WELDED WIRE MESH
CIP - CAST IRON PIPE	UG - UNDERGROUND	± - APPROXIMATE
CL - CENTERLINE	PCC - PORTLAND CEMENT CONCRETE	Ø - DIAMETER
CMU - CONCRETE MASONRY UNIT	PCCL - POINT OF COMPOUND CURVE LEFT	
CNTR - CENTER	PCCR - POINT OF COMPOUND CURVE RIGHT	
CO - CLEANOUT	PCI - PAVEMENT CONDITION INDEX	
COM - COMMUNICATIONS	PI - POINT OF INTERSECTION	
CONC - CONCRETE	PL - PROPERTY LINE	
CSP - CORRUGATED STEEL PIPE	POC - POINT OF CONNECTION	
D/W - DRIVEWAY	PRC - POINT OF REVERSE CURVE	
DDCV - DOUBLE DETECTOR CHECK VALVE	PRCL - POINT OF REVERSE CURVE LEFT	
DI - DROP INLET	PRCR - POINT OF REVERSE CURVE RIGHT	
EJ - EXPANSION JOINT	PVC - POLYVINYL CHLORIDE	
ELEC - ELECTRICAL	PVMT - PAVEMENT	
ELEV - ELEVATION	RAD (R) - RADIUS	
EP - EDGE OF PAVEMENT	RCP - REINFORCED CONCRETE PIPE	
ESMT - EASEMENT	RD - ROAD	
ETW - EDGE OF TRAVELED WAY	REF - REFERENCE	
EUC - EUCALYPTUS TREE	REQ - REQUIRED	
EVC - END VERTICAL CURVE	ROW (R/W) - RIGHT OF WAY	
EXIST OR (E)- EXISTING	RSP - ROCK SLOPE PROTECTION	
FG - FINISHED GRADE	RT - RIGHT	
FH - FIRE HYDRANT	S/W - SIDEWALK	
FL - FLOWLINE	SD - STORM DRAIN	
FM - FORCE MAIN	SHLDR - SHOULDER	
FNC - FENCE	SHT - SHEET	
FS - FINISHED SURFACE	SLOCO - SAN LUIS OBISPO COUNTY	
FUT - FUTURE	SS - SANITARY SEWER	
G - GAS	STA - STATION	
GB - GRADE BREAK	STD - STANDARD	
GM - GAS METER	TB - THRUST BLOCK	
GP - GRADING PLAN	TBA - TO BE ABANDONED IN PLACE	
GR - GRATE	TBM - TEMPORARY BENCHMARK	
GV - GAS VALVE	TBR - TO BE REMOVED	
HDPE - HIGH DENSITY POLYETHYLENE	TBP - TO BE PROTECTED	
HMA - HOT MIX ASPHALT	TC - TOP OF CURB	
HORZ - HORIZONTAL	TEL - TELEPHONE	
HP - HIGH POINT	TEMP - TEMPORARY	
HW - HEADWALL	TF - TOP OF FOOTING	
ICV - IRRIGATION CONTROL VALVE	TG - TOP OF GRATE	
INV - INVERT	TRVLD - TRAVELED (LANE)	
IPR - IRRIGATION PRESSURE REDUCER	TYP - TYPICAL	

NOTES:

1. STATE STANDARD ABBREVIATIONS MAY BE USED IN CONJUNCTION OR IN SUBSTITUTION OF THE DEPARTMENT'S STANDARD ABBREVIATIONS. THE PROJECT ENGINEER MAY SUBSTITUTE COUNTY/STATE ABBREVIATIONS WITH THEIR OWN, HOWEVER, AN ABBREVIATION LEGEND SHALL BE PROVIDED ON THE TITLE SHEET OF THE CONSTRUCTION PLANS.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

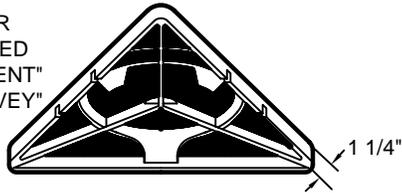
STANDARD ABBREVIATIONS

Scale:	Adopted: 2011
Drawing No:	L-2
Sheet No:	1 OF 1

Revisions

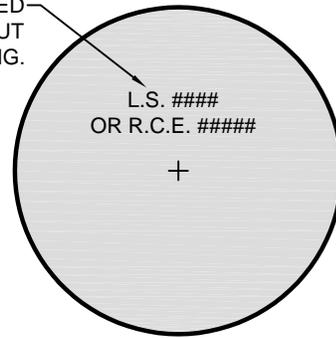
Description	Approved	Date	Description	Approved	Date
ADDED NOTE 4	REM	NOV 07			

COVER
LETTERED
"MONUMENT"
OR "SURVEY"

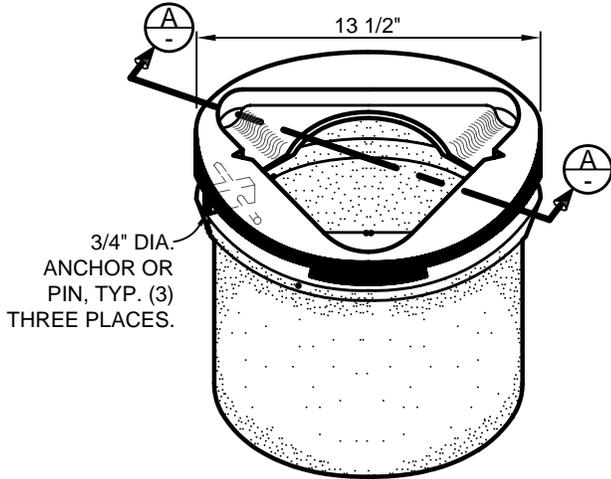


COVER (BOTTOM)

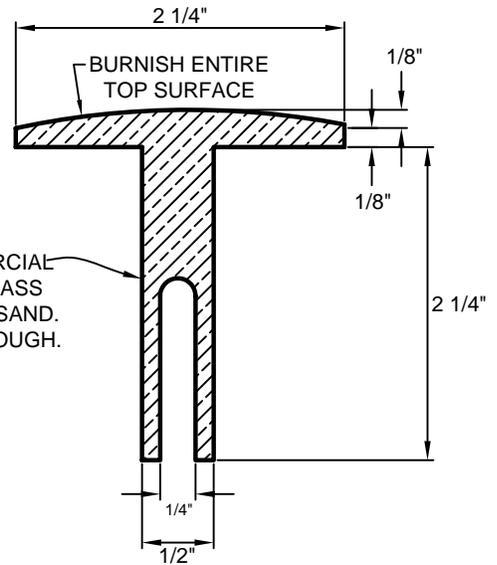
LETTERS DEPRESSED
1/32" DEEP "U" CUT
AFTER BURNISHING.



CAP PLAN



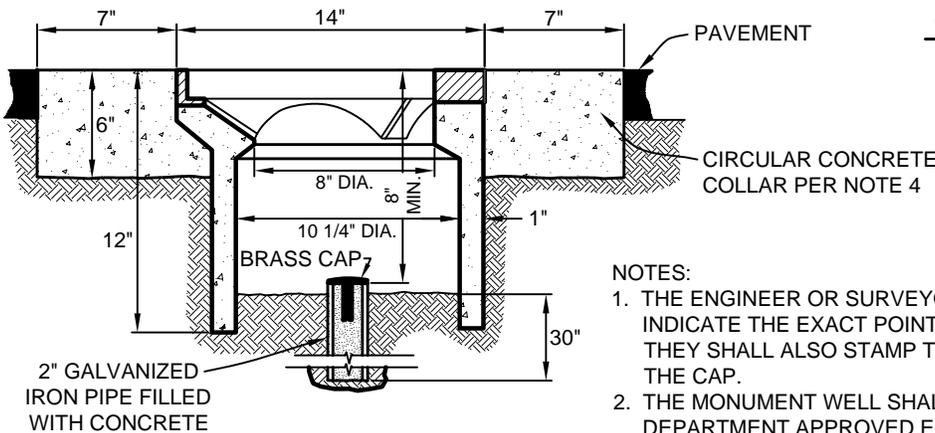
ISOMETRIC



CAP SECTION



RISER RING



SECTION A-A

NOTES:

1. THE ENGINEER OR SURVEYOR SETTING THE MONUMENT SHALL INDICATE THE EXACT POINT BY MARKING A CROSS ON THE CAP. THEY SHALL ALSO STAMP THEIR LICENSE TYPE AND NUMBER ON THE CAP.
2. THE MONUMENT WELL SHALL BE BROOKS PRODUCTS No. 4TT, OR DEPARTMENT APPROVED EQUAL.
3. BRASS CAPS ARE AVAILABLE FOR PURCHASE FROM THE COUNTY PUBLIC WORKS DEPARTMENT.
4. CONCRETE COLLAR SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK].

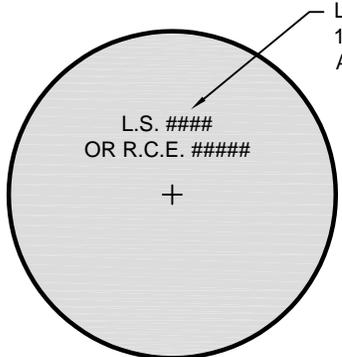


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
STANDARD STREET MONUMENT
FOR PAVED ROADS

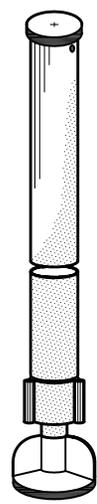
Scale: NTS	Adopted: 2011
Drawing No: M-1	
Sheet No:	1 OF 1

Revisions

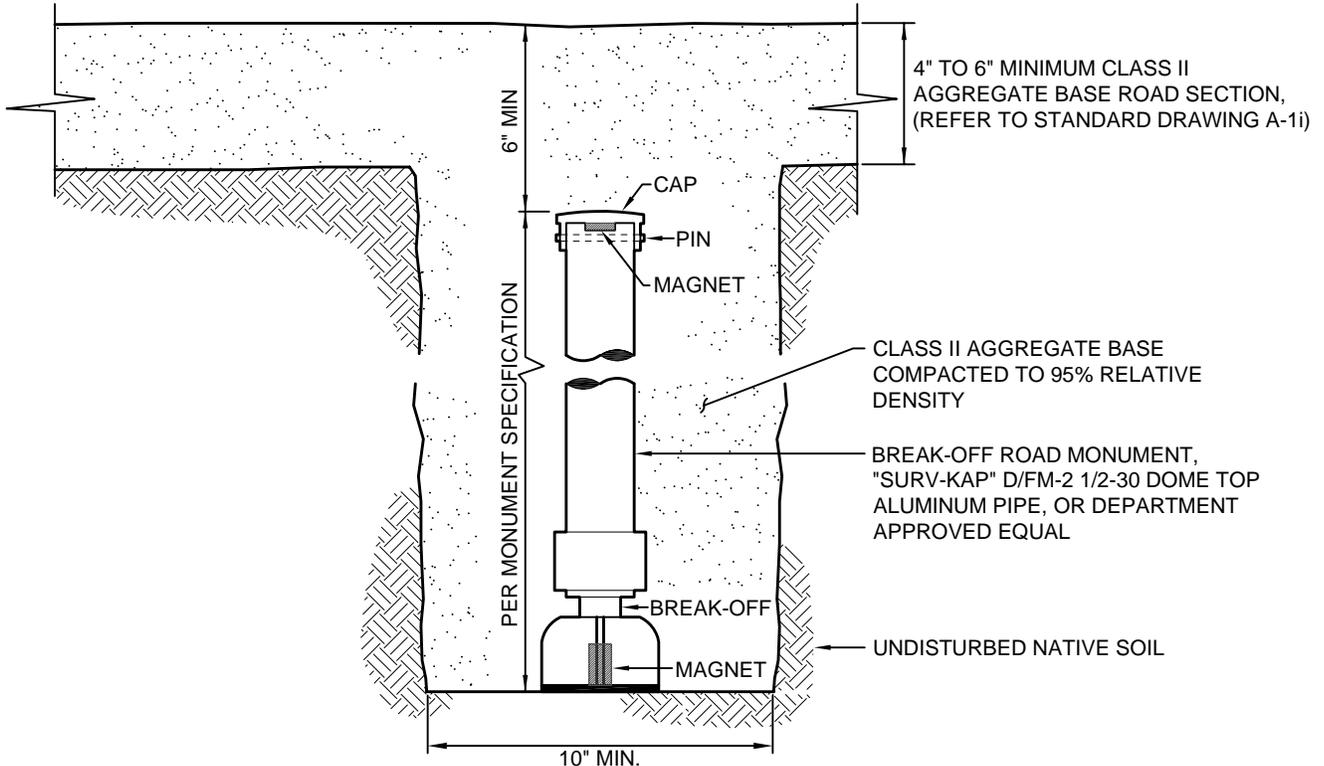
Description	Approved	Date	Description	Approved	Date



CAP PLAN



ISOMETRIC VIEW



NOTES:

1. BREAK-OFF MONUMENTS ARE DESIGNED TO BREAK OFF AT A PRE-DETERMINED POINT, LEAVING A PORTION OF THE BASE CONTAINING THE MAGNET FOR RELOCATING THE ORIGINAL SURVEY POINT.
2. BREAK-OFF MONUMENTS MAY BE SPECIFIED TO MONUMENT CENTERLINE OF COUNTY RURAL GRAVEL ROADS, (REFER TO STANDARD DRAWING A-1i).
3. NOT FOR USE IN PAVED ROADS (REFER TO STANDARD DRAWING M-1).

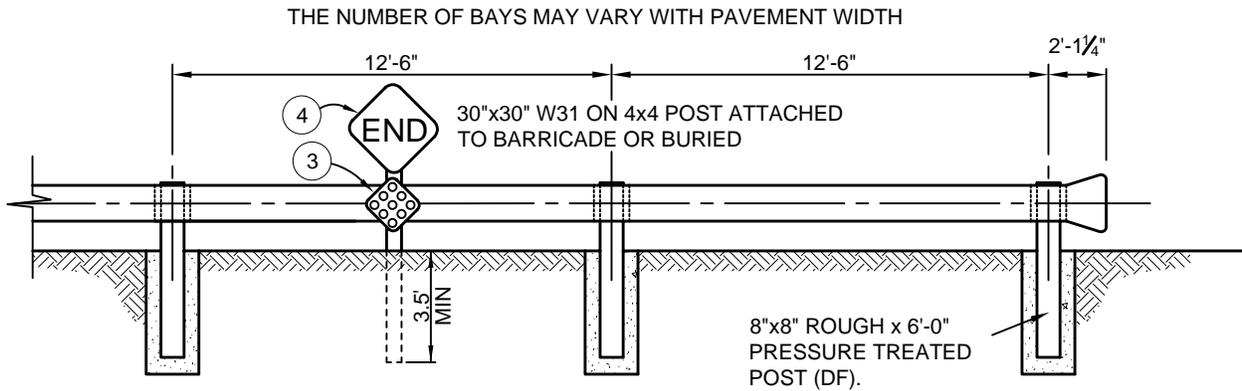


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
STANDARD STREET MONUMENT
 FOR GRAVEL ROADS

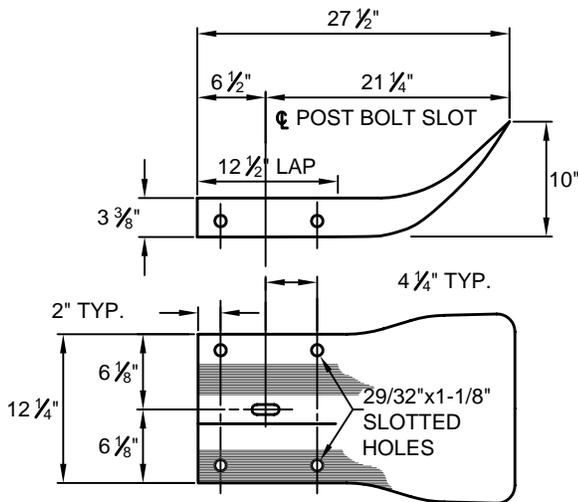
Scale: NTS	Adopted: 2011
Drawing No: M-1a	
Sheet No:	1 OF 1

Revisions

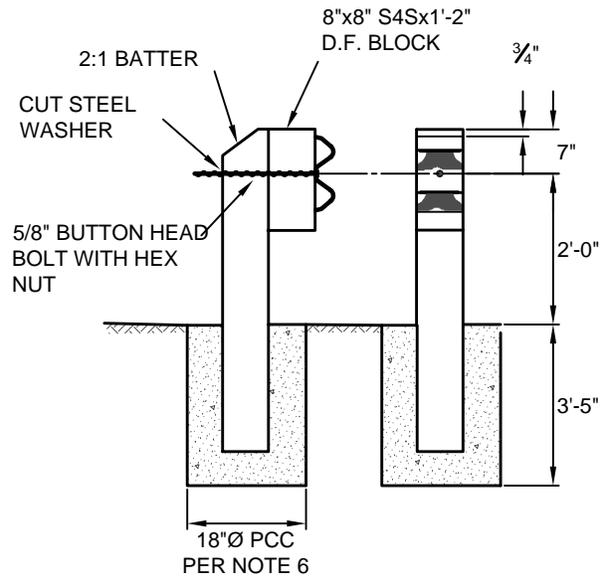
Description	Approved	Date	Description	Approved	Date
ADDED NOTE 6	REM	NOV 07			



METAL BEAM BARRICADE



TERMINAL SECTION



POST DETAIL

NOTES:

1. REFER TO STATE SPECIFICATIONS FOR LATEST GUARDRAIL STANDARDS.
2. USED ONLY WITH APPROVAL BY THE DEPARTMENT.
3. STANDARD "N2-RED RETROREFLECTIVE BACKGROUND WITH BLACK BORDER" MARKER TO BE BOLTED TO GUARD RAILING AS SHOWN.
4. 30"x30" W31 BOLTED TO 4x4 POST AND INSTALLED BEHIND BARRICADE PER STATE STANDARDS.
5. REFER TO STATE STANDARDS FOR SIGN REQUIREMENTS.
6. CONCRETE POST SET SHALL CONFORM TO STATE STANDARD 90-1.01, 520 LBS/CY CEMENTITIOUS MATERIAL [5 1/2 SACK].



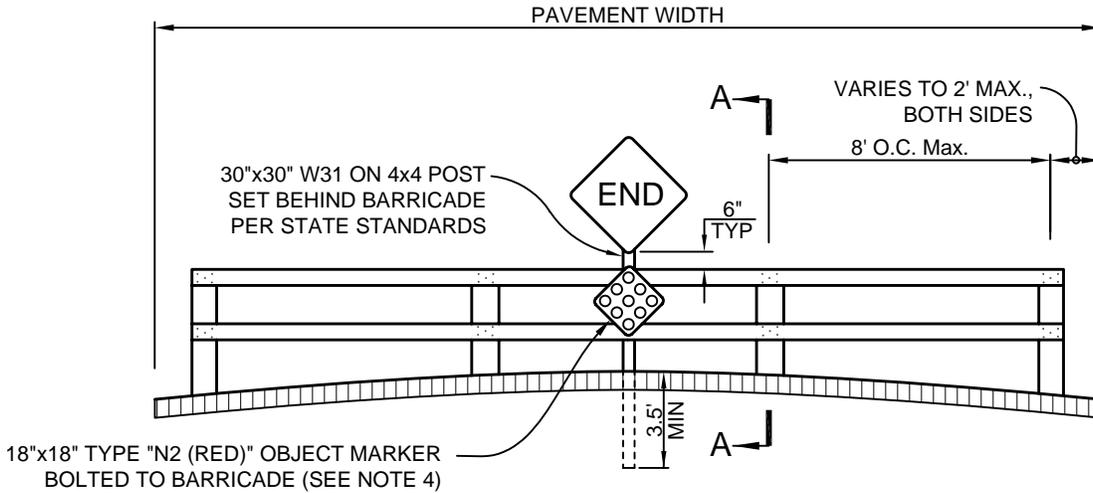
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

METAL BEAM BARRICADE

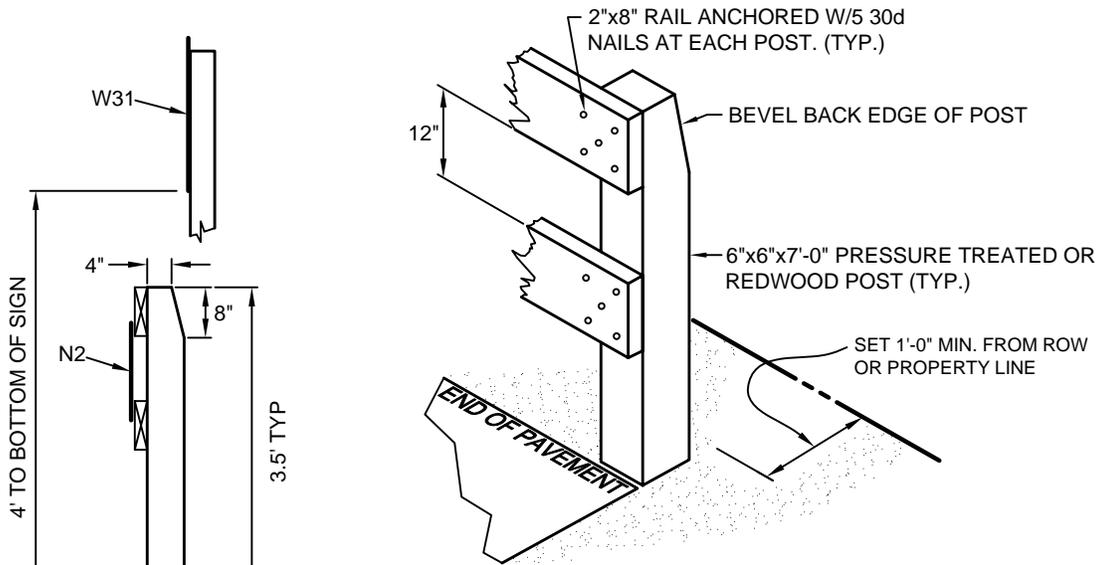
Scale: NTS	Adopted: 2011
Drawing No:	M-2
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



WOOD BEAM BARRICADE



SECTION A-A

POST DETAIL

NOTES:

1. RAILS TO BE 2"x8" CLEAR DOUGLAS FIR S4S AND POSTS TO BE 6"x6"x7'-0" PRESSURE TREATED OR REDWOOD.
2. BUTT ALL RAIL JOINTS TO CENTER OF POST.
3. ALL EXPOSED WOOD SHALL BE PAINTED EXTERIOR WHITE, 2 COATS.
4. STANDARD "N2-RED RETROREFLECTIVE BACKGROUND WITH BLACK BORDER" MARKER TO BE LOCATED AS SHOWN (REFER TO STATE STANDARDS).
5. USED ONLY WITH THE APPROVAL OF THE DEPARTMENT WHERE BARRICADE WILL ONLY BE IN PLACE A MAXIMUM OF FIVE (5) YEARS.
6. REFER TO STATE STANDARDS FOR W-31 SIGN.

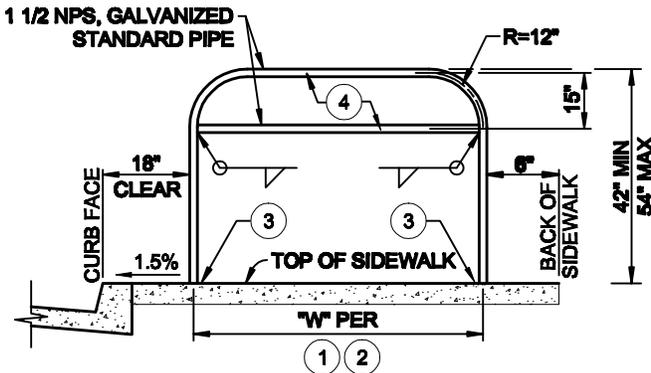


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TEMPORARY WOOD
BEAM BARRICADE

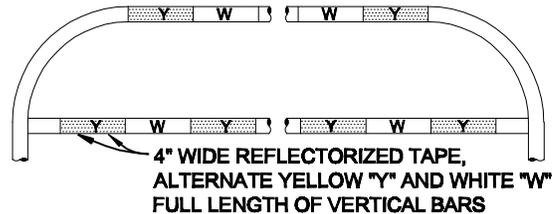
Scale: NTS	Adopted: 2011
Drawing No: M-2a	
Sheet No:	1 OF 1

Revisions

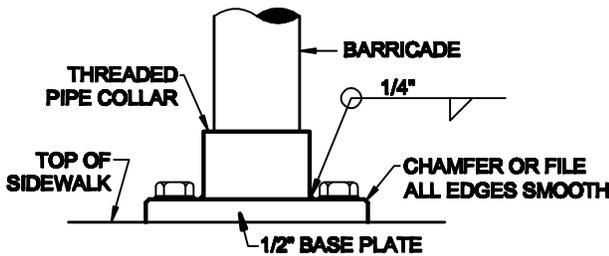
Description	Approved	Date	Description	Approved	Date
ADDED NOTE 6	REM	NOV 07			
ADDED NOTE 7	FH	AUG 14			



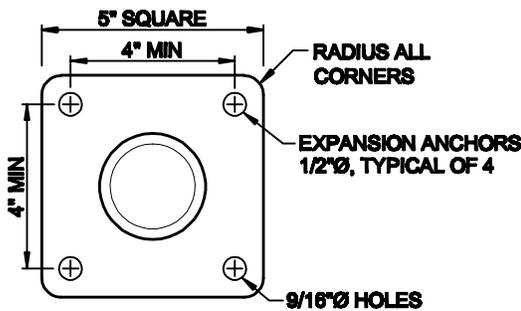
PEDESTRIAN BARRICADE
END OF SIDEWALK EXAMPLE



REFLECTIVE TAPING DETAIL

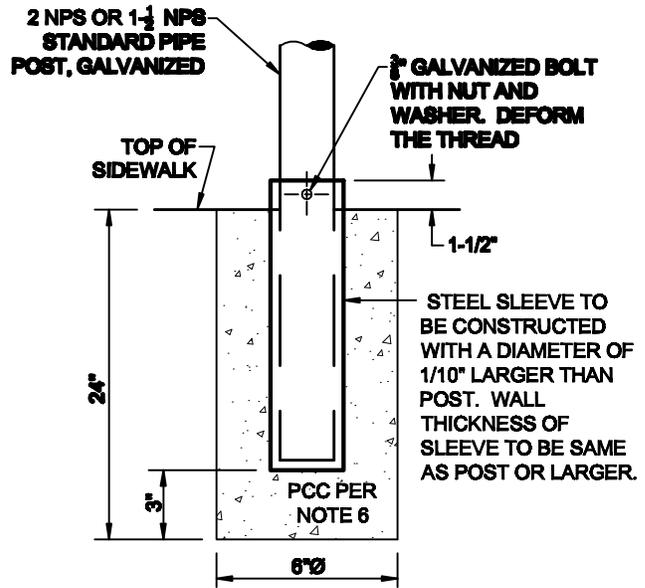


ELEVATION



PLAN

POST ANCHOR DETAIL
FOR TEMPORARY INSTALLATIONS



POST SLEEVE DETAIL
FOR PERMANENT INSTALLATIONS

NOTES:

- FOR END OF SIDEWALK APPLICATIONS THE PIPE POST SHALL BE 18-INCHES BEHIND FACE OF CURB AND 6-INCH INSIDE BACK OF SIDEWALK. "W" VARIES BASED ON SIDEWALK WIDTH.
- TO RESTRICT CROSSINGS AT INTERSECTIONS, THE BARRICADE SHALL BE 18-INCHES BEHIND CURB FACE, "W" SHALL BE 6-FEET (UNLESS NOTED OTHERWISE), AND SIGNAGE SHALL BE PROVIDED TO DIRECT PEDESTRIANS.
- FOR TEMPORARY APPLICATIONS USE THE POST ANCHOR DETAIL FOR MOUNTING THE BARRICADE. FOR PERMANENT APPLICATIONS USE THE POST SLEEVE DETAIL.
- WRAP BARRICADE RAILS WITH 4-INCH WIDE REFLECTIVE SAFETY TAPE, ALTERNATING YELLOW & WHITE PER DETAIL.
- FOR MINIMUM PIPE DIAMETERS AND WALL THICKNESS, REFER TO ASTM A6M.
- CONCRETE POST SET SHALL CONFORM TO STATE STANDARD 90-1.01, 520 LBS/CY CEMENTITIOUS MATERIAL [5 1/2 SACK].
- DEPARTMENT APPROVAL IS REQUIRED WITHIN THE RIGHT OF WAY.



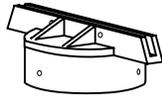
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SIDEWALK BARRICADE

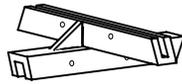
Scale:	Adopted:
NTS	2014
Drawing No:	M-3
Sheet No:	

Revisions

Description	Approved	Date	Description	Approved	Date



POST-TO-SIGN

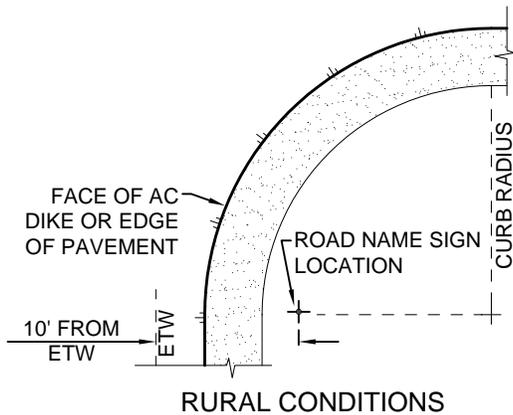


SIGN-TO-SIGN

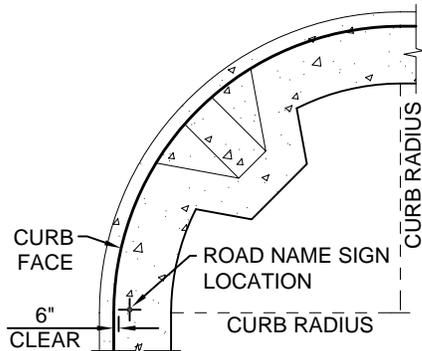
STREET NAME SIGN BRACKET DETAILS



SIGN SADDLE BRACKET DETAIL



RURAL CONDITIONS

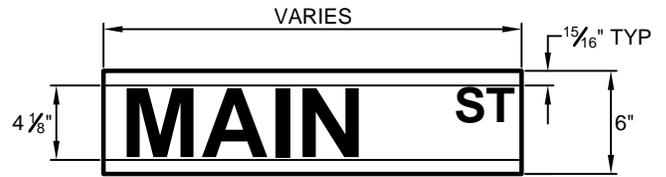


URBAN CONDITIONS

STREET SIGN PLACEMENT DETAIL

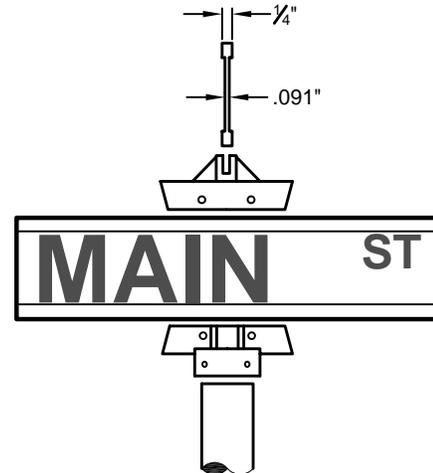
NOTES:

1. STREET NAME SIGN BLADES TO BE EXTRUDED ALUMINUM, 6063-T6 ALLOY, DEGREASED AND ETCHED WITH GREEN SCOTCHLITE APPLIED TO BOTH SURFACES.
2. POST-TO-SIGN BRACKET TO BE DIE-CAST, #360 ALLOY WITH TWO ANGLED GUSSETS EACH SIDE FOR STRENGTH. TO FIT 2-3/8" O.D. GALVANIZED PIPE (2" I.D.). SIGN-TO-SIGN BRACKET TO BE SIMILAR CONSTRUCTION WITH 90° AND 45° SEPARATION.
3. CAPITAL LETTERS TO BE DIE-CUT SILVER SCOTCHLITE, SERIES B.
4. SCREWS FOR SECURING BRACKETS TO BE ZINC PLATED HEX SOCKET HEAD SCREWS 1/4"x1/2".
5. SIGN SADDLE BRACKET TO BE EXTRUDED ALUMINUM, TO FIT 2-3/8" O.D. PIPE, FASTEN WITH A VANDAL PROOF NUT SET (HAWKINS TRAFFIC M2G-S2S, OR APPROVED EQUAL).

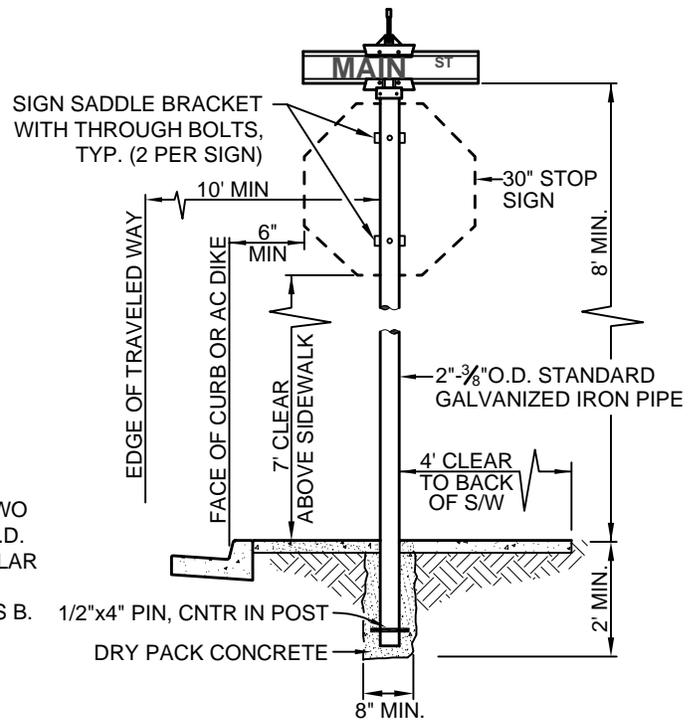


FOR COUNTY MAINTAINED ROADS, SIGN SHALL BE WHITE LETTERS ON A GREEN BACKGROUND. FOR ALL OTHER ROADS THE SIGN SHALL BE GREEN LETTERS ON A WHITE BACKGROUND.

STREET NAME SIGN DETAIL



STREET NAME SIGN ASSEMBLY DETAIL



SIGN INSTALLATION



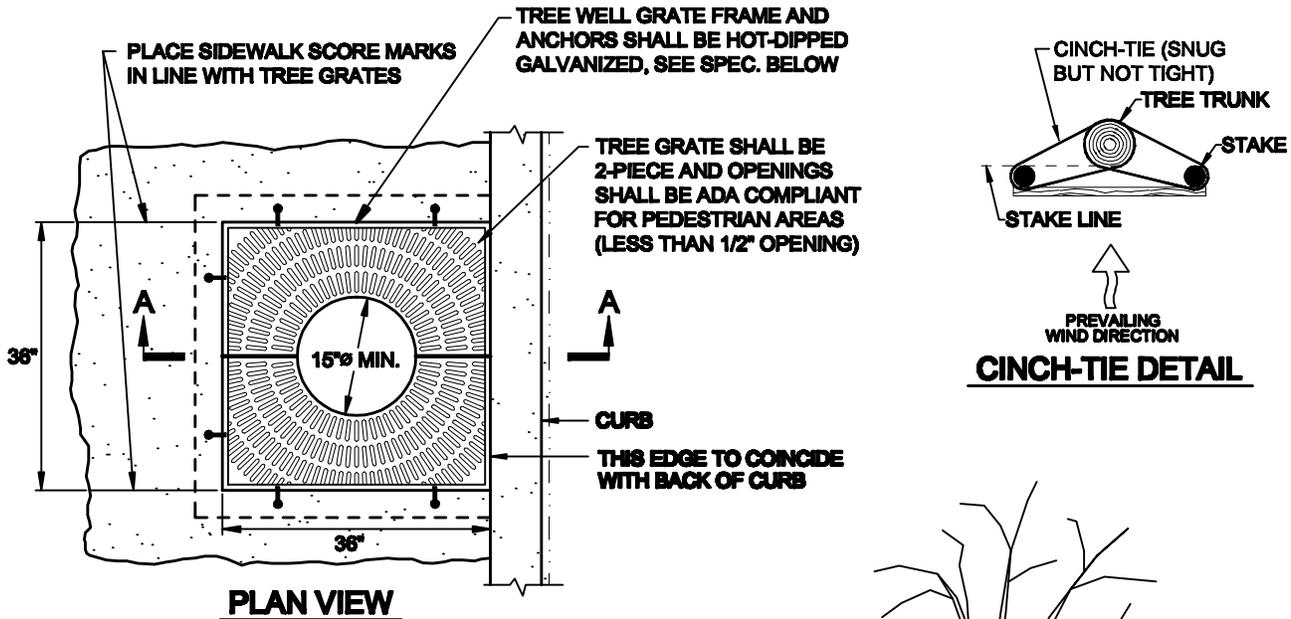
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

STANDARD STREET SIGN

Scale: NTS	Adopted: 2011
Drawing No: M-4	
Sheet No:	1 OF 1

Revisions

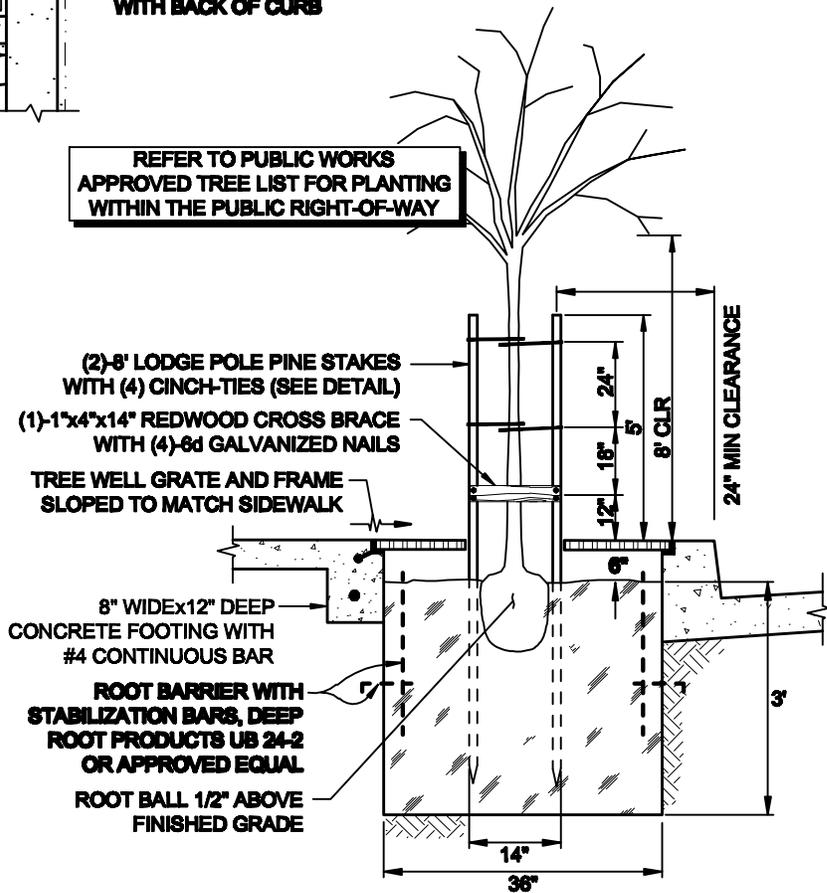
Description	Approved	Date	Description	Approved	Date
REVISED TITLE	REM	NOV 07	MIN CLEARANCE, NOTE 9		MAY 14
ADDED REFERENCE TO TREE LIST	GDM	JAN 11			



NOTES:

1. AN ENCROACHMENT PERMIT SHALL BE REQUIRED FOR ALL PLANTINGS WITHIN THE PUBLIC RIGHT OF WAY. THE PERMIT SHALL DEFINE RESPONSIBILITY FOR MAINTENANCE AND REMOVAL IF REQUIRED.
2. TREES SHALL BE SPACED A MIN. OF 20' FT. APART AS DIRECTED BY ENCROACHMENT PERMIT, TREES SHALL BE AT LEAST 60 FEET FROM CURB RETURNS, ALL TRAFFIC SIGNALS AND SIGNS SHALL REMAIN VISIBLE
3. TREE SIZE TO BE COMPARABLE TO STANDARD 24-INCH BOX TREE, NURSERY STOCK
4. TREES ARE TO BE SELECTED FROM A LIST OF THOSE APPROVED BY THE DEPARTMENT.
5. BACKFILL HOLE WITH 80/20 MIX OF COMMERCIAL PLANTING MIX AND NATIVE SOIL. LOOSEN ROOT BALL, TAMP SOIL TO ELIMINATE AIR SPACES, AND WATER SLOWLY TO PENETRATE ROOT BALL
6. INSTALL DUCTILE CAST IRON TREE WELL GRATES, 36" SQUARE WITH MINIMUM 15" CENTER OPENING.
7. INSTALL PERIMETER ROOT BARRIER WITH A MINIMUM DEPTH OF 24" FROM FINISH GRADE.
8. MAINTENANCE IS THE RESPONSIBILITY OF THE FRONTING PROPERTY OWNER. RESPONSIBILITY MUST BE TRANSFERRED TO SUBSEQUENT OWNERS BY TITLE. THE TREE SHALL BE REMOVED BY PROPERTY OWNER IF DIRECTED BY THE DEPARTMENT.
9. USE IN 10-FOOT OR WIDER SIDEWALKS

REFER TO PUBLIC WORKS APPROVED TREE LIST FOR PLANTING WITHIN THE PUBLIC RIGHT-OF-WAY



GRATE AND FRAME SPECIFICATIONS:

1. OLYMPIC FOUNDRY STA 36 w/ C1 STYLE GALVANIZED FRAME WITH ANCHORS, OR NEENAH FOUNDRY R8704-A DUCTILE CAST IRON GRATE AND GALVANIZED FRAME WITH ANCHORS, OR DEPARTMENT APPROVED EQUAL.
2. ALL GRATES SHALL BE COMPLIANT WITH THE LATEST ADA RECOMMENDATIONS.

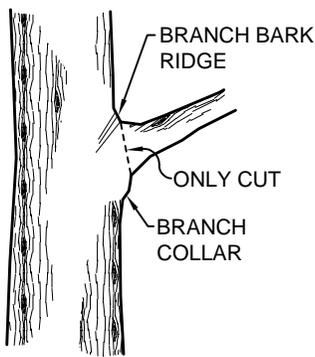


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TREE PLANTING IN
RIGHT-OF-WAY

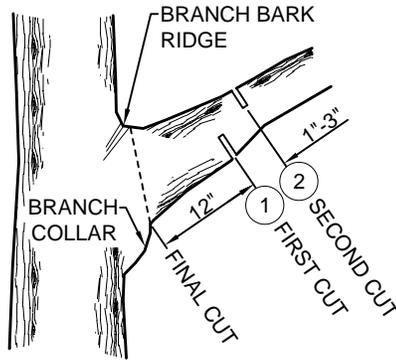
Scale:	Adopted:
NTS	2014
Drawing No:	M-5
Sheet No:	

Revisions

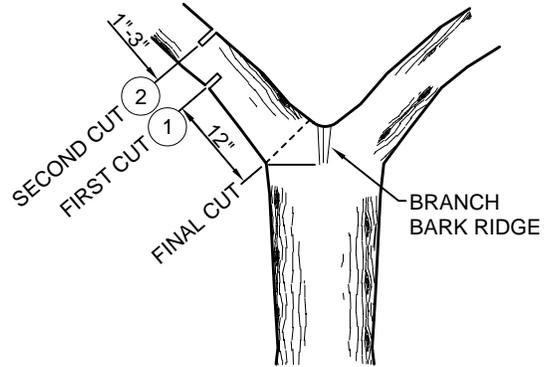
Description	Approved	Date	Description	Approved	Date
ADDED ROADWAY TO TYPICAL CLEARANCES, NOTE 11	GDM	JAN 11			



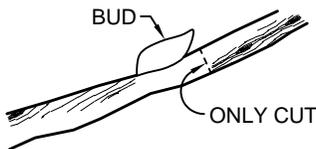
SMALL LIMB



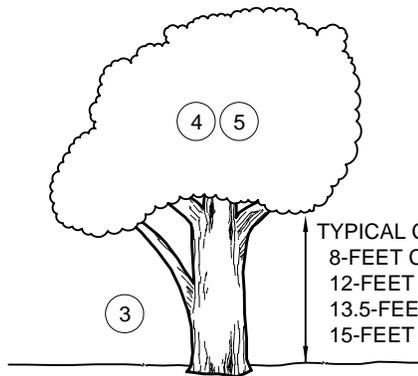
LARGE LIMB



CO-DOMINANT STEM



BRANCHES



TYPICAL CLEARANCES:
 8- FEET CLEAR ABOVE SIDEWALKS
 12- FEET CLEAR ABOVE MULTIUSE TRAILS
 13.5- FEET CLEAR ABOVE ACCESS ROADS (CAL FIRE)
 15- FEET ABOVE COUNTY MAINTAINED ROADS

NOTES:

1. FIRST CUT SHOULD BE TO A DEPTH OF 1/3 THE BRANCH DIAMETER.
2. SECOND CUT, LIMB SHOULD SPLIT AWAY CLEANLY.
3. REMOVAL OF LARGER LOWER BRANCHES SHOULD BE MINIMIZED TO AVOID:
 - A. MAKING THE TREE TOP HEAVY AND MORE SUSCEPTIBLE TO "BLOW OVERS",
 - B. REDUCING THE NUMBER OF LARGE BRANCH CUTS MINIMIZES TREE SUSCEPTIBILITY TO DISEASE.
 - C. PROVIDE WILDLIFE SHELTER.
 - D. RETAIN GROUND SHADE TO MAINTAIN SOIL MOISTURE UNDER THE TREE.
 - E. RETAIN THE NATURAL SHAPE OF THE TREE
4. REMOVAL OF THE CANOPY BRANCHES SHOULD BE DONE IN A SYMMETRICAL MANNER SO AS NOT TO UNBALANCE THE TREE.
5. TO MINIMIZE STRESS TO THE TREE LIMIT THE AMOUNT OF TRIMMING DONE IN ONE SEASON TO:
 - A. 10% OF CANOPY FOR OAK TREES
 - B. 25% OF CANOPY FOR OTHER SPECIES
6. 1/3 RULE:
 - A. NEVER REMOVE MORE THAN 1/3 OF A TREES CROWN.
 - B. ENCOURAGE SIDE BRANCHES THAT FORM ANGLES THAT ARE 1/3 OFF THE VERTICAL, THE 10:00 AND 2:00 O'CLOCK POSITIONS
 - C. FOR MOST DECIDUOUS TREES, DON'T PRUNE UP FROM THE BOTTOM ANY MORE THAN 1/3 OF THE TREE'S TOTAL HEIGHT.
7. AFTER PRUNING, IT IS NOT NECESSARY TO USE A WOUND DRESSING. WOUND DRESSINGS HAVE NOT BEEN SHOWN TO IMPROVE THE RECOVERY OF THE TREE, AND IN SOME CASES DO ACTUAL DAMAGE TO THE TREE.
8. TREE TRIMMING SHOULD OCCUR ONLY OCCUR DURING THE DRY SEASON AND AT THE DIRECTION OF THE PROJECT ARBORIST.
9. ALL WORK SHALL BE DONE IN ACCORDANCE WITH RECOGNIZED STANDARDS OF GOOD ARBORICULTURAL PRACTICES.
10. THOROUGHLY CLEAN EQUIPMENT PRIOR TO COMMENCING WORK AND BETWEEN TRIMMING SEPARATE TREES.
11. TREE TRIMMING: ABUTTING 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.



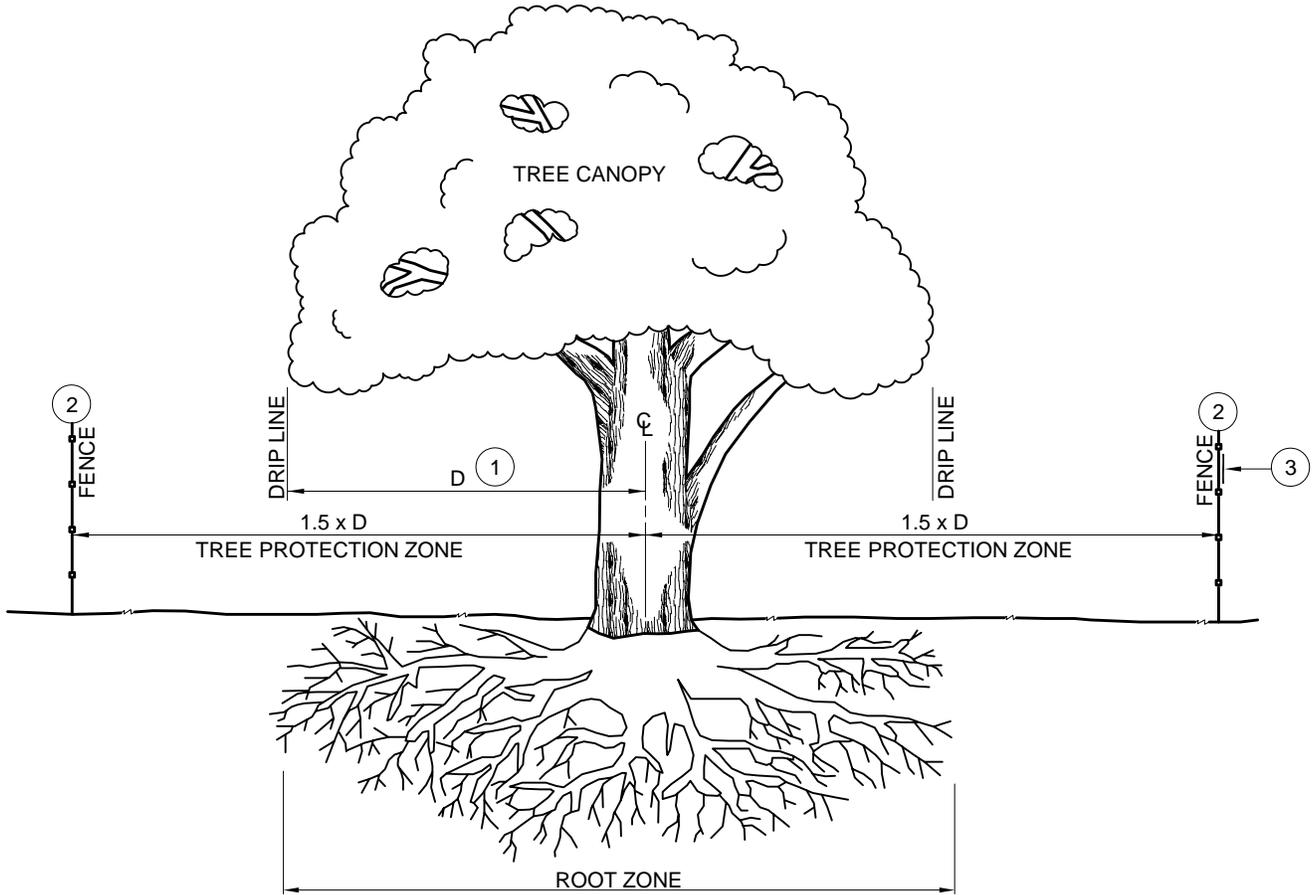
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

TREE TRIMMING METHODS

Scale: NTS	Adopted: 2011
Drawing No: M-5a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



NOTES:

1. "D" EQUALS THE GREATEST MEASURED DISTANCE FROM THE CENTER OF THE TREE TRUNK TO THE FURTHEST POINT OF THE TREE CANOPY (DRIP LINE).
2. TREE PROTECTION FENCING SHALL BE ORANGE PLASTIC "SNOW FENCE" OR APPROVED EQUAL, A MINIMUM OF 3- FEET HIGH, AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
3. AT LEAST ONE (1) WEATHERPROOF SIGN SHALL BE PLACED ON EACH FENCED AREA AND IN A VISIBLE LOCATION. THE SIGN SHALL READ "TREE PROTECTION AREA - STAY OUT" WITH LETTER SIZE NO LESS THAN 4-INCHES TALL. FOR LARGER FENCED AREAS SIGNS SHALL BE PLACED AT NO FURTHER THAN 50- FEET APART.
4. PRIOR TO COMMENCING WORK, TREE PROTECTION FENCING SHALL BE INSTALLED AT ALL TREES IDENTIFIED TO BE EITHER PROTECTED OR IMPACTED, AND AT ALL TREES WHICH ARE WITHIN 50- FEET OF THE PERMITTED WORK ACTIVITIES.
5. FOR APPROVED CHANGES TO THE LIMITS OF WORK, TREE PROTECTION FENCING SHALL BE MODIFIED PER NOTE 4.
6. WHERE WORK IS PERMITTED WITHIN THE TREE PROTECTION ZONE (IMPACTED TREES) ALL EFFORTS SHALL BE MADE (AND IDENTIFIED ON PLANS) TO MINIMIZE ENCROACHMENT AND IMPACT TO THE ROOT ZONE. THIS MAY REQUIRE THAT ALL WORK BE DONE BY HAND AND UNDER THE DIRECTION OF THE PROJECT ARBORIST.
7. ADDITIONAL TREE PROTECTION REQUIREMENTS MAY BE REQUIRED PER THE DESIGN STANDARDS AND/OR WHEN LOCATED WITHIN THE PUBLIC RIGHT-OF-WAY.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

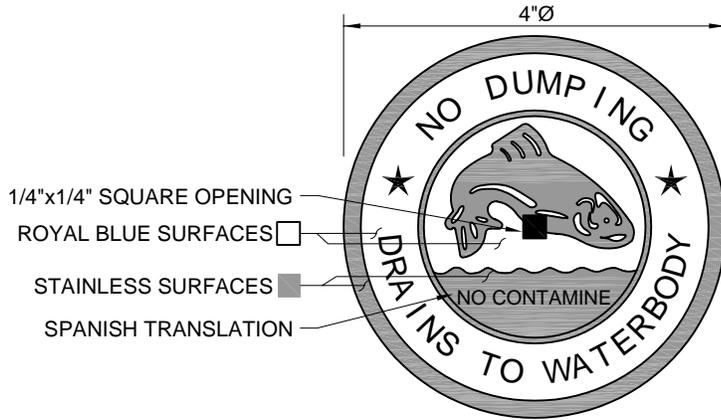
TREE PROTECTION DETAIL

Scale: NTS	Adopted: 2011
Drawing No: M-5b	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NEW STANDARD	GDM	NOV 08			

NOTE: STORM DRAIN MARKERS ARE AVAILABLE FOR PURCHASE FROM THE SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS. CALL 781-5252 FOR ADDITIONAL INFORMATION.

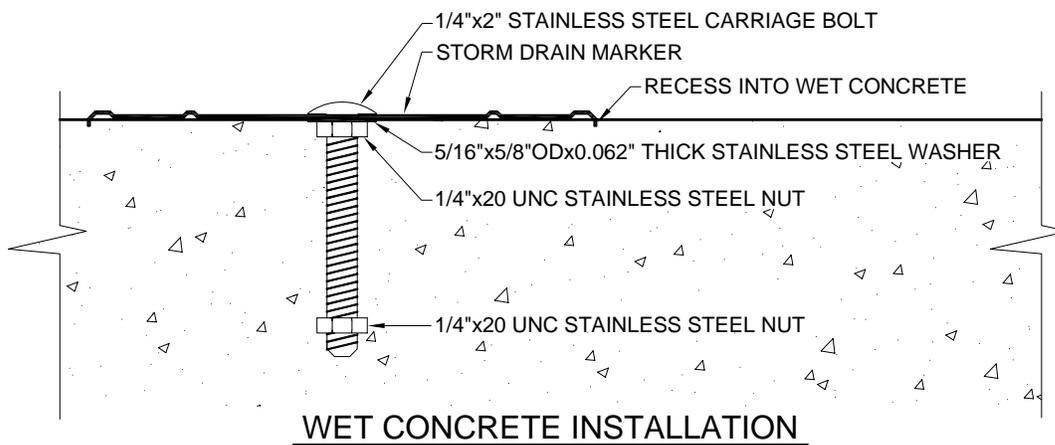
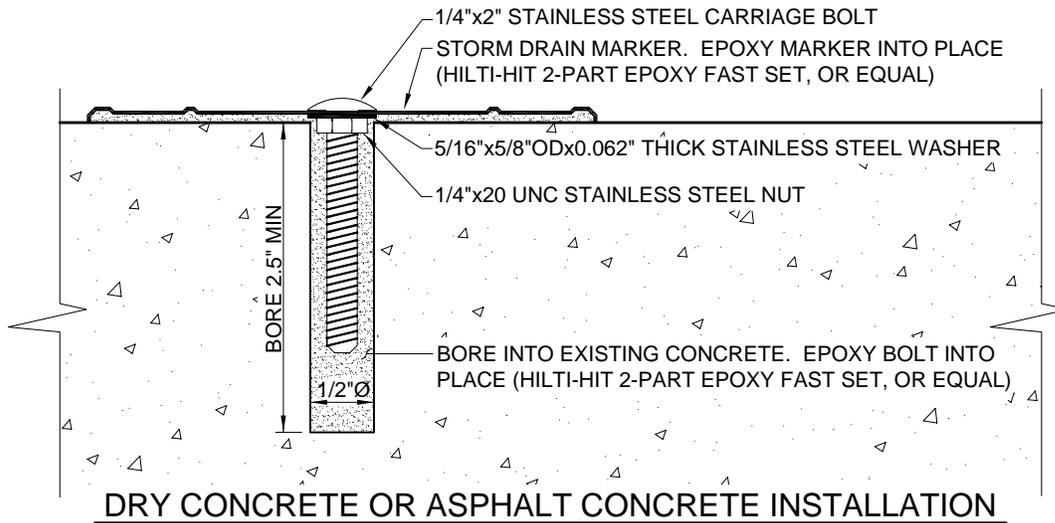


MATERIAL:
300 SERIES ANNEALED STAINLESS STEEL WITH ROLLED DOWN EDGES AND 1/4"x1/4" SQUARE MOUNTING HOLE.
THICKNESS 0.062" / WEIGHT 0.218 LBS.

FINISH:
UV BAKED ENAMEL, ROYAL BLUE DEPRESSED COLOR SAND BLASTED FRONT AND REAR FOR PAINT AND ADHESIVE BONDING.

PLACEMENT:
LOCATE AS SHOWN ON D-2 SERIES DRAWINGS.

MARKER (TOP VIEW)

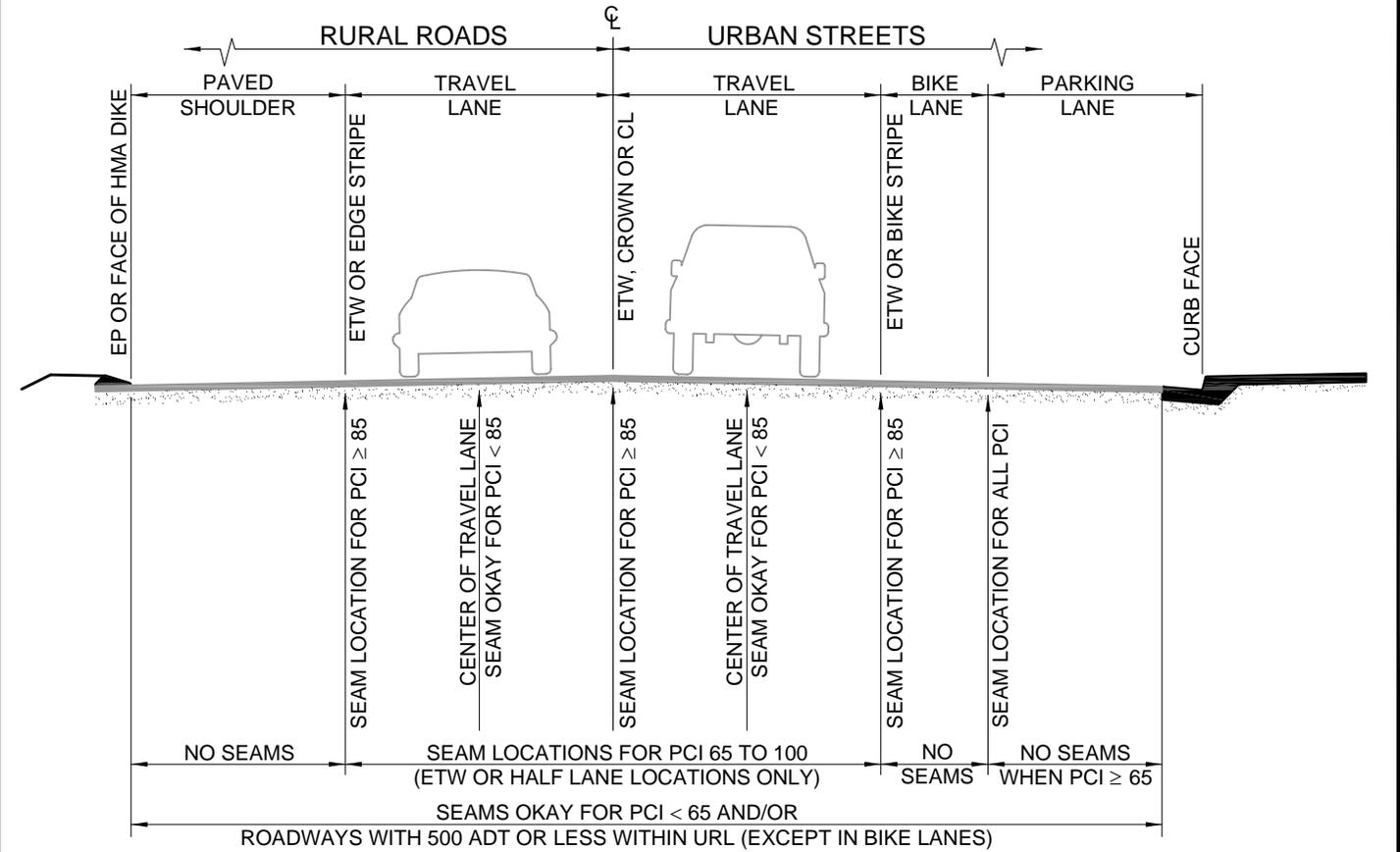


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
STORM DRAIN MARKER

Scale: NTS	Adopted: 2011
Drawing No: M-6	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



SECTION VIEW: ALLOWABLE PAVEMENT SEAM LOCATIONS

BASED ON ROAD PCI & ADT AS PROVIDED BY THE DEPARTMENT

PCI	Roadways with 500 ADT or less and within the URL	
	PCI 85-100	PCI 65-84
85-100	Full Lane Width Overlay	Full Lane Width Overlay
65-84	12" min. T-Section	Half Lane Width Overlay
<65	12" min. T-Section	12" min. T-Section

MINIMUM PAVEMENT REPAIR LIMITS

ADT = AVERAGE DAILY TRAFFIC, AS PROVIDED BY THE DEPARTMENT
 PCI = PAVEMENT CONDITION INDEX, AS PROVIDED BY THE DEPARTMENT
 ETW - EDGE OF TRAVELED WAY; OL - OVERLAY; URL - URBAN RESERVE LINE

NOTES:

- SEAM LOCATIONS MAY BE ADJUSTED BY THE DEPARTMENT BASED ON FIELD CONDITIONS.
- IN ALL CASES THE EXISTING PAVEMENT SHALL BE SAWCUT ALONG A CLEAN LINE AND SHALL BE EITHER LONGITUDINAL OR TRANSVERSE TO THE TRAVEL LANE. NO LONGITUDINAL SEAMS SHALL BE ALLOWED WITHIN ANY BIKE LANE.
- ALL SAWCUT EDGES SHALL BE VERTICAL, WITH SQUARE CORNERS, AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE.
- ROTMILLING OR GRINDING MAY BE UTILIZED IN PLACE OF SAWCUT WHEN APPROVED IN ADVANCE OF THE WORK BY THE DEPARTMENT.
- SEE R-2 SERIES DRAWING FOR RURAL ROAD AND URBAN STREET WIDENING SAWCUT REQUIREMENTS. SEE R-3 SERIES DRAWINGS FOR UTILITY TRENCHING SAWCUT REQUIREMENTS.
- A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL SAWCUT CONFORM SURFACES PRIOR TO PAVING.
- AFTER PAVING, SS1H OIL (OR APPROVED EQUAL) SHALL BE APPLIED TO ALL HMA SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.



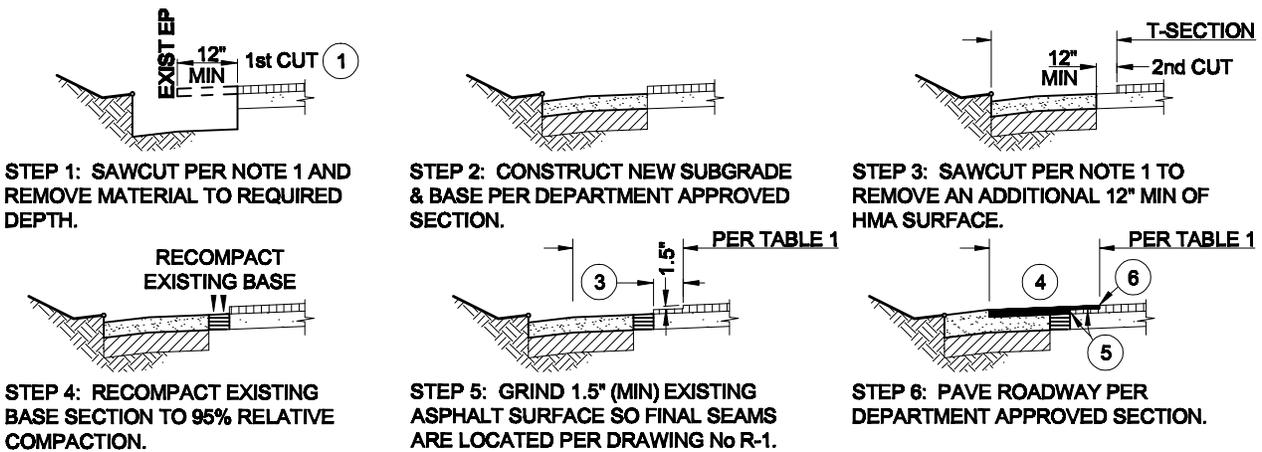
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

ALLOWABLE PAVEMENT SEAM LOCATIONS

Scale: NTS	Adopted: 2011
Drawing No:	R-1
Sheet No:	1 OF 1

Revisions

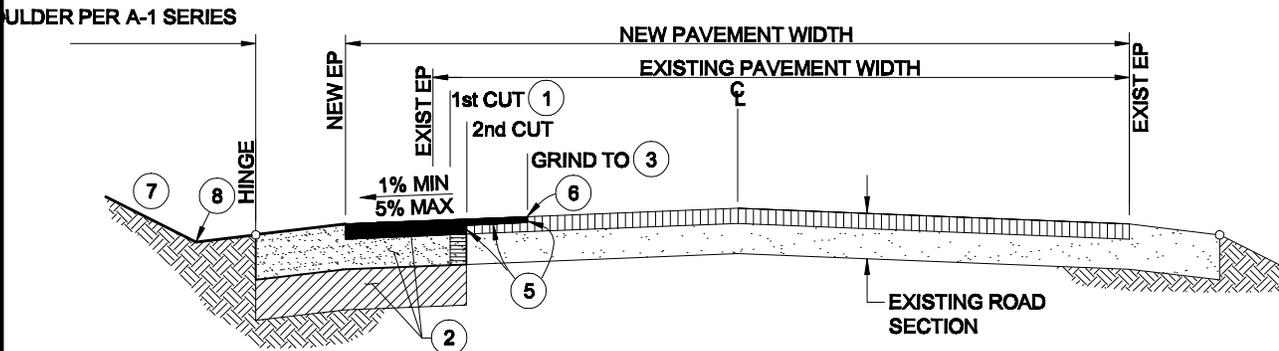
Description	Approved	Date	Description	Approved	Date
NOTE 1	REM	NOV 07	REPLACE AC WITH HMA, NOTES 1, 3 & RENUM	GDM	JAN 11
NOTE 5	GDM	NOV 08			



WIDENING PROCEDURE

Table 1: Minimum Pavement Width Repair Limits (see R-1)

PCI	Roadways with 500 ADT or less and within the URL	All Other Roadways
	85-100	Full Lane Width Overlay
65-84	12" min. T-Section	Half Lane Width Overlay
<65	12" min. T-Section	12" min. T-Section



TYPICAL RURAL ROAD WIDENING SECTION

NOTES:

- SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF PAVEMENT AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR TRANSVERSE TO THE TRAVEL LANE. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE.
- THE STRUCTURAL ROAD WIDENING SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT. IF THE EXISTING ROAD STRUCTURAL SECTION IS GREATER THAN THE DETERMINED ROAD STRUCTURAL SECTION, THEN THE EXISTING STRUCTURAL SECTION THICKNESS SHALL BE MATCHED. TYPICAL ROAD WIDENING SECTION SHALL BE:
 ■■■■■ 2" MINIMUM HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 ■■■■■ 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 ■■■■■ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- GRIND 1.5-INCHES (MINIMUM) FROM THE EXISTING ADJACENT HMA PAVEMENT SO THAT FINAL HMA SEAMS ARE LOCATED IN ACCORDANCE WITH TABLE 1 & DRAWING R-1, OR AS DIRECTED BY THE DEPARTMENT.
- NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED), WITH A MINIMUM LIFT NOT LESS THAN 1.5-INCHES.
- A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL HMA SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
- CUT AND FILL SLOPES BEYOND ROADWAY HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
- THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
- ROAD SECTIONS WITH HMA DIKE (REFER TO DRAWING No C-3) SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
RURAL ROAD WIDENING

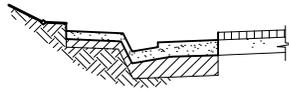
Scale:	Adopted:
NTS	2014
Drawing No:	R-2
Sheet No:	1 OF 1

Revisions

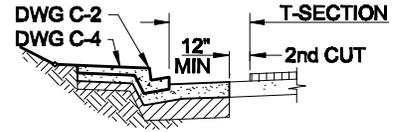
Description	Approved	Date	Description	Approved	Date
NOTE 1	REM	NOV 07	REPLACE AC WITH HMA, NOTED 1,3 & RENUM	GDM	JAN 11
NOTE 5	GDM	NOV 08			



STEP 1: SAWCUT PER NOTE 1 AND REMOVE MATERIAL TO REQUIRED DEPTH.



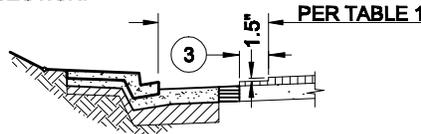
STEP 2: CONSTRUCT NEW SUBGRADE & BASE PER DEPARTMENT APPROVED SECTION.



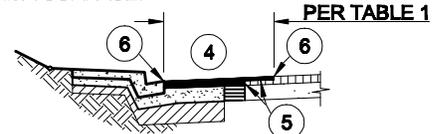
STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF HMA SURFACE.



STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.



STEP 5: GRIND 1.5" (MIN) EXISTING ASPHALT SURFACE SO FINAL SEAMS ARE LOCATED PER TABLE 1.

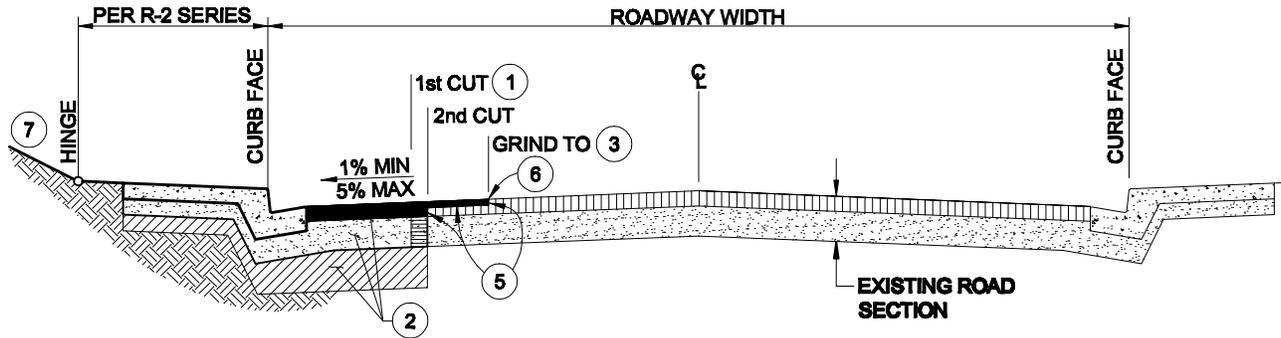


STEP 6: PAVE ROADWAY PER DEPARTMENT APPROVED SECTION.

WIDENING PROCEDURE

Table 1: Minimum Pavement Width Repair Limits (see R-1)

PCI	Roadways with 500 ADT or less and within the URL	All Other Roadways
	85-100	Full Lane Width Overlay
65-84	12" min. T-Section	Half Lane Width Overlay
<65	12" min. T-Section	12" min. T-Section



TYPICAL URBAN STREET WIDENING SECTION

NOTES:

- SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF PAVEMENT AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR TRANSVERSE TO THE TRAVEL LANE. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE.
- THE STRUCTURAL ROAD WIDENING SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT. IF THE EXISTING ROAD STRUCTURAL SECTION IS GREATER THAN THE DETERMINED ROAD STRUCTURAL SECTION, THEN THE EXISTING STRUCTURAL SECTION THICKNESS SHALL BE MATCHED. TYPICAL ROAD WIDENING SECTION SHALL BE:
 ■■■■■ 2" MINIMUM HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 ■■■■■ 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 ■■■■■ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- GRIND 1.5-INCHES (MINIMUM) FROM THE EXISTING ADJACENT HMA PAVEMENT SO THAT FINAL HMA SEAMS ARE LOCATED IN ACCORDANCE WITH TABLE 1 & DRAWING R-1, OR AS DIRECTED BY THE DEPARTMENT.
- NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED), WITH A MINIMUM LIFT NOT LESS THAN 1.5-INCHES.
- A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL HMA SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
- CUT AND FILL SLOPES BEYOND ROADWAY HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.

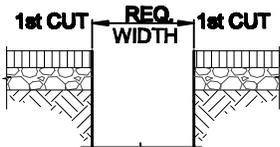


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
URBAN STREET WIDENING**

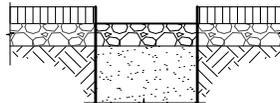
Scale: NTS	Adopted: 2014
Drawing No: R-2a	
Sheet No: 1 OF 1	

Revisions

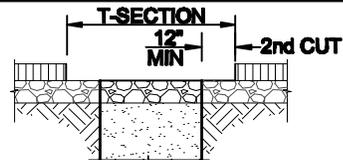
Description	Approved	Date	Description	Approved	Date
REVISE NOTES 2 AND 3	FH	AUG 14			



STEP 1: SAWCUT TO CONSTRUCT TRENCH PER U-4.



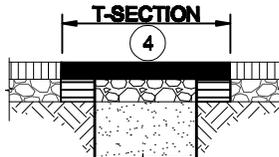
STEP 2: BACKFILL & COMPACT NEW TRENCH TO TOP OF EXISTING BASE SECTION PER U-4.



STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE.



STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.

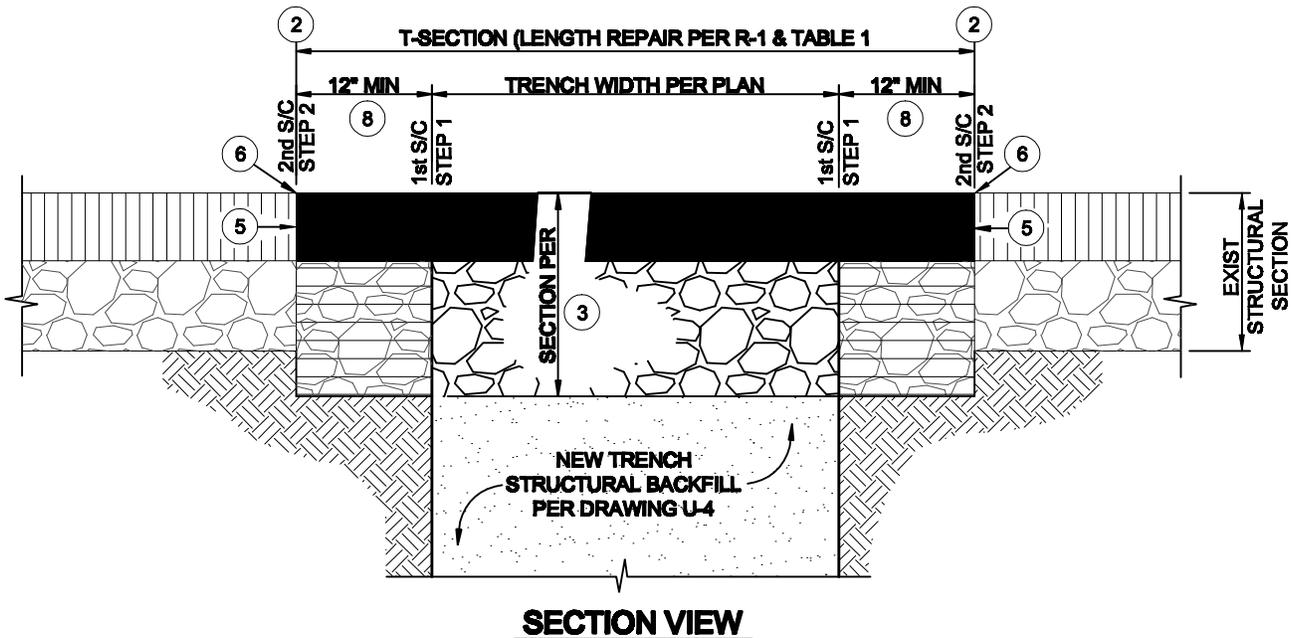


STEP 5: PAVE ROADWAY PER NOTE 3.

Table 1: Min. Trench Length Pavement Repair Limits (see R-1)

PCI	Roadways with 500 ADT or less and within the URL	All Other Roadways
85-100	Overlay To Lane Edge	Overlay To Lane Edge
65-84	12" min. T-Section	Overlay To Lane Center
<65	12" min. T-Section	12" min. T-Section

PAVEMENT REPAIR PROCEDURE



NOTES:

- TRENCHING IN A ROADWAY IS ONLY ALLOWED WHEN BORING IS SHOWN TO THE DEPARTMENT AS BEING INFEASIBLE.
- SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF TRENCH AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO THE TRAVEL LANE. SEAMS SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. ALL CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
- THE STRUCTURAL ROAD REPAIR SECTION SHALL MATCH THE EXISTING STRUCTURAL SECTION THICKNESS OR AS REQUIRED BY THE DEPARTMENT. TYPICAL ROAD WIDENING SECTION SHALL BE:
 ■■■■ 2" MINIMUM HOT MIX ASPHALT (HMA), OVER
 ○○○○ 6" MINIMUM CLASS II AGGREGATE BASE, OVER
 ■■■■ TRENCH SECTION PER DRAWING U-4 (STRUCTURAL BACKFILL TO 95% MIN RELATIVE COMPACTION)
- NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED).
- A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
- AFTER PAVING, APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL HMA SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
- THE DEPARTMENT SHALL PROVIDE ADDITIONAL REQUIREMENTS WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.
- T-SECTION WIDTHS SHALL BE INCREASED AS DIRECTED BY THE DEPARTMENT FOR UTILITY PIPES EXCEEDING 36" IN DIAMETER.

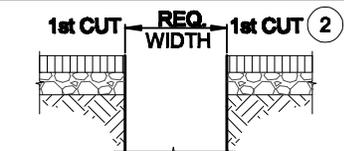


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TRENCH REPAIR
 TRANSVERSE TRENCHES AND BORE PITS

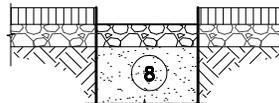
Scale:	Adopted:
NTS	2014
Drawing No:	R-3
Sheet No:	1 OF 1

Revisions

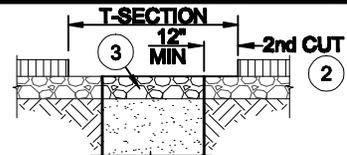
Description	Approved	Date	Description	Approved	Date
NOTES 1, 3 & 4, STEP 6 ALT, GRIND & OVERLAY TRAVEL LANE	GDM	JAN 11			
REVISE NOTES 2 AND 3	FH	AUG 14			



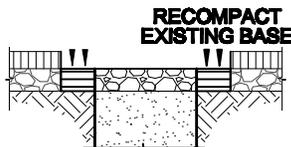
STEP 1: SAWCUT TO CONSTRUCT TRENCH PER U-4.



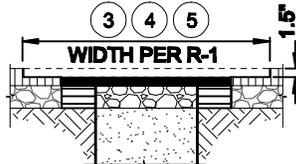
STEP 2: BACKFILL & COMPACT NEW TRENCH SECTION PER U-4.



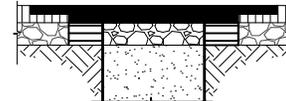
STEP 3: SAWCUT PER NOTE 2 TO REMOVE AN ADDITIONAL 12" MIN OF HMA SURFACE.



STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.



STEP 5: PAVE T-SECTION THEN GRIND 1.5" EXISTING SURFACE PER TABLE 1.

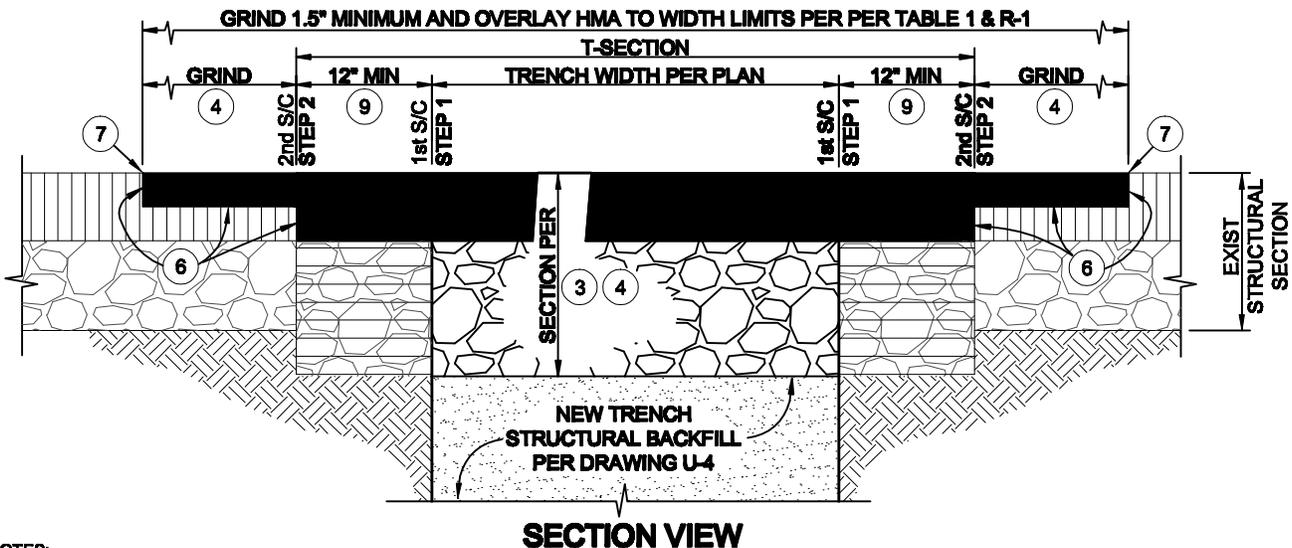


STEP 6: PAVE ROADWAY TO CONFORM TO FINAL GRADE.

PAVEMENT REPAIR PROCEDURE

Table 1: Minimum Lane Width Repair Limits (see R-1)

PCI	Roadways with 500 ADT or less and within the URL	
	All Other Roadways	All Other Roadways
85-100	Full Lane Width Overlay	Full Lane Width Overlay
65-84	12" min. T-Section	Half Lane Width Overlay
<65	12" min. T-Section	12" min. T-Section



NOTES:

- TRENCHING IN A ROADWAY IS ONLY ALLOWED WHEN BORING IS SHOWN TO THE DEPARTMENT AS BEING INFEASIBLE.
- SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF TRENCH AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO THE TRAVEL LANE. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
- THE STRUCTURAL ROAD REPAIR SECTION SHALL MATCH THE EXISTING STRUCTURAL SECTION THICKNESS OR AS REQUIRED BY THE DEPARTMENT. THE MINIMUM STRUCTURAL SECTION SHALL BE:
 ■■■■ 2-INCH MINIMUM HOT MIX ASPHALT (HMA), OVER
 ▨▨▨▨ 6-INCH MINIMUM CLASS II AGGREGATE BASE, OVER
 ▩▩▩▩ TRENCH SECTION PER DRAWING U-4 (STRUCTURAL BACKFILL TO 95% MIN RELATIVE COMPACTION)
- LONGITUDINAL: GRIND 1.5-INCHES (MINIMUM) FROM THE EXISTING ADJACENT HMA PAVEMENT SO THAT FINAL HMA SEAMS ARE LOCATED IN ACCORDANCE WITH TABLE 1 & DRAWING R-1, OR AS DIRECTED BY THE DEPARTMENT.
- NEW HMA PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED) AND SHALL BE ALLOWED TO COOL PER STATE SPECIFICATIONS PRIOR TO APPLICATION OF SUBSEQUENT LIFTS.
- A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
- AFTER PAVING APPLY SS1H OIL (OR APPROVED EQUAL) TO ALL HMA SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
- THE DEPARTMENT SHALL PROVIDE ADDITIONAL REQUIREMENTS WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.
- T-SECTION WIDTHS SHALL BE INCREASED AS DIRECTED BY THE DEPARTMENT FOR UTILITY PIPES EXCEEDING 36" IN DIAMETER.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TRENCH REPAIR
LONGITUDINAL TRENCHES

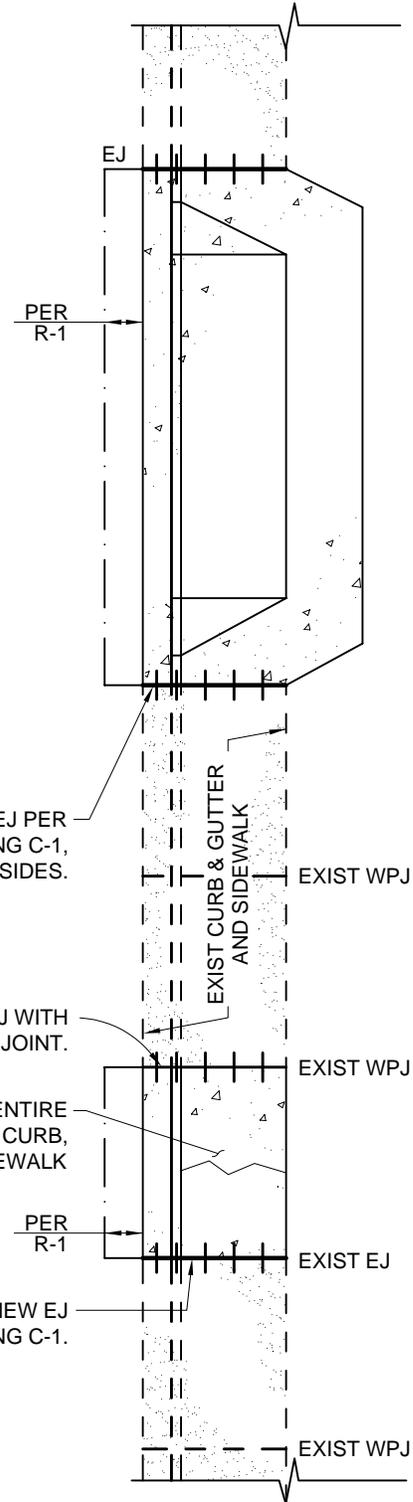
Scale:	Adopted:
NTS	2014
Drawing No:	R-3a
Sheet No:	

Revisions

Description	Approved	Date	Description	Approved	Date
ADDED NOTE 7	REM	NOV 07	NOTE 1	GDM	JAN 11
MODIFY COLD JOINT DETAIL	GDM	NOV 08			

NOTES:

1. WHEN REMOVING AND REPLACING EXISTING CURB & GUTTER, DRIVEWAY, CURB RAMP OR OTHER IMPROVEMENT ABUTTING THE ROADWAY THE PAVEMENT SHALL BE REMOVED AND REPLACED IN ACCORDANCE WITH R-1.
2. ALL SAWCUTTING SHALL BE DONE WITH AN ABRASIVE TYPE CUTTING WHEEL THAT PROVIDES A CLEAN JOIN EDGE. SAWCUTTING SHALL ALWAYS BE PERPENDICULAR OR TRANSVERSE TO THE EXISTING DIRECTION OF TRAVEL.
3. WHEN REPLACING EXISTING CURB & GUTTER AND/OR SIDEWALK, SAWCUTTING SHALL BE DONE AT THE NEAREST EXISTING EXPANSION JOINT OR WEAKENED PLANE JOINT FOR REMOVAL OF ENTIRE PANEL(S). NEW CURB & GUTTER AND SIDEWALK SHALL BE CONSTRUCTED TO THE RESPECTIVE COUNTY STANDARD.
4. WHEN REMOVING EXISTING CURB & GUTTER AND SIDEWALK TO INSTALL NEW DRIVEWAYS, CURB RAMP, OR OTHER IMPROVEMENTS THEN SAWCUTTING SHALL BE DONE AT THE NEAREST EXISTING EXPANSION JOINT OR WEAKENED PLANE JOINT FOR REMOVAL OF ENTIRE PANEL(S). NEW IMPROVEMENTS SHALL BE INSTALLED PER THEIR RESPECTIVE STANDARD DRAWING.
5. THE ROAD STRUCTURAL SECTION ADJACENT TO THE REPAIR OR REPLACEMENT SHALL BE CONSTRUCTED IN CONFORMANCE WITH STANDARD DRAWING R-3.
6. IN ALL CASES, EXPANSION JOINTS SHALL BE REPLACED PER STANDARD DRAWING C-1, AND WEAKENED PLANE JOINTS SHALL BE REPLACED WITH CONSTRUCTION JOINTS.
7. REPAIR OF EXISTING IMPROVEMENTS SHALL BE REQUIRED BY THE DEPARTMENT WHEN THE VERTICAL (LIFT) AND HORIZONTAL (GAP) DIFFERENTIALS BETWEEN EXISTING CONCRETE SECTIONS MEET OR EXCEED THOSE REQUIREMENTS LISTED IN SECTION 4.1.2.D OF THESE STANDARDS.

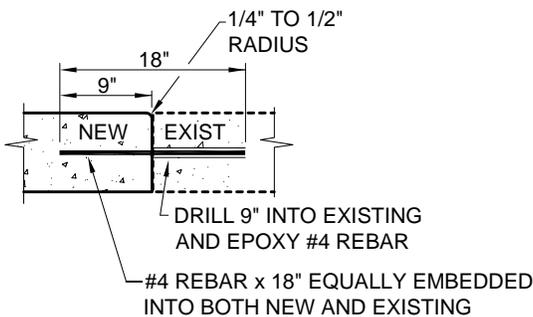


REPLACE WITH NEW EJ PER STANDARD DRAWING C-1, TYPICAL BOTH SIDES.

REPLACE EXISTING WPJ WITH CONSTRUCTION JOINT.

REMOVE TO REPLACE ENTIRE PANEL WHEN REPAIRING CURB, GUTTER, AND/OR SIDEWALK

REPLACE EXISTING EJ WITH NEW EJ PER STANDARD DRAWING C-1.



#4 REBAR, 1 EACH IN GUTTER, 1 EACH IN CURB FACE, AND 1 EVERY 18" ON-CENTER IN SIDEWALK AND OTHER FLATWORK

CONSTRUCTION (COLD) JOINT AT SAWCUT

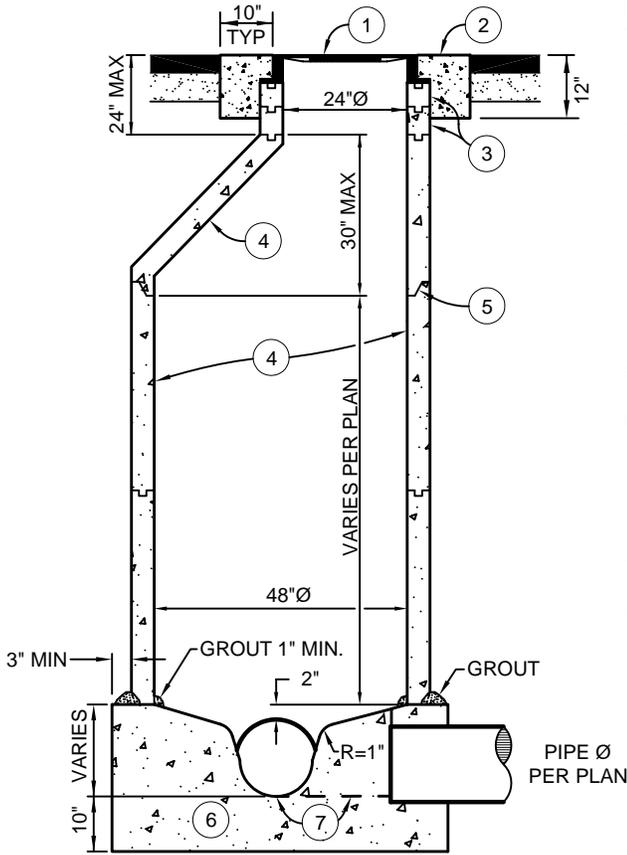


**DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
CURB, GUTTER &
SIDEWALK REPAIR**

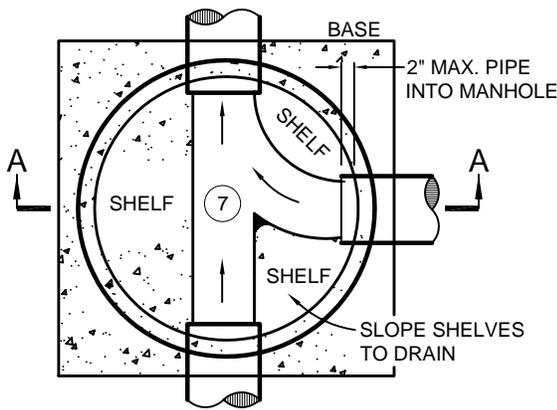
Scale: 1"=10'	Adopted: 2011
Drawing No:	R-4
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTES 2 & 6	REM	NOV 07			
NOTES 3	GDM	JAN 11			



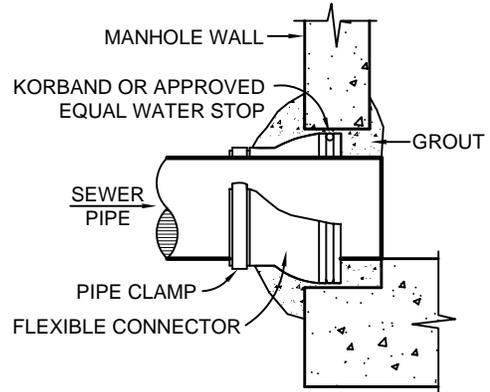
SECTION A-A



PLAN VIEW

NOTES:

1. MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24" Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE A BLIND PICKHOLE, WATERTIGHT GASKET, AND BE LETTERED "SANITARY SEWER".
2. CONCRETE COLLAR SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
3. PROVIDE 3" OR 6" (9" MAX) ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE. PROVIDE HYDRAULIC CEMENT GROUT BETWEEN MANHOLE FRAME AND TOP RING SHALL BE PER APPENDIX C3.
4. PRECAST SHAFT(S) AND ECCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
5. JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
6. CONCRETE MANHOLE BASE SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], AND REST UPON UNDISTURBED MATERIAL. BOTTOM SHAFT SHALL BE WET-SET OR SET IN FORMED GROOVE. PRECAST BASES MAY BE USED WITH PRIOR APPROVAL OF THE DEPARTMENT AND SHALL MEET ASTM C-478 61T.
7. CONCRETE CHANNEL SHALL BE STEEL TROWEL FINISH AND SHELF AREAS SHALL BE MONOLITHICALLY PLACED.
8. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.



TYPICAL CONNECTION DETAIL



PINKERTON A-640 WITH SKID RESISTANT SURFACE, BLIND PICKHOLE, WATER TIGHT GASKET, AND HS-20 TRAFFIC LOADING, OR APPROVED EQUAL, MARKED "SANITARY SEWER"

LID DETAIL



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SEWER MANHOLE

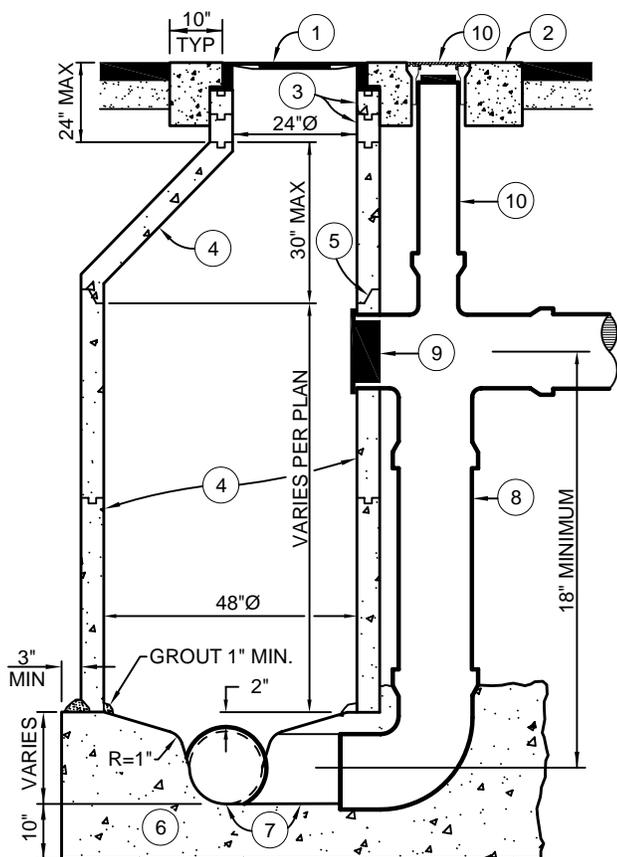
Scale: NTS	Adopted: 2011
Drawing No: S-1	
Sheet No: 1 OF 1	

Revisions

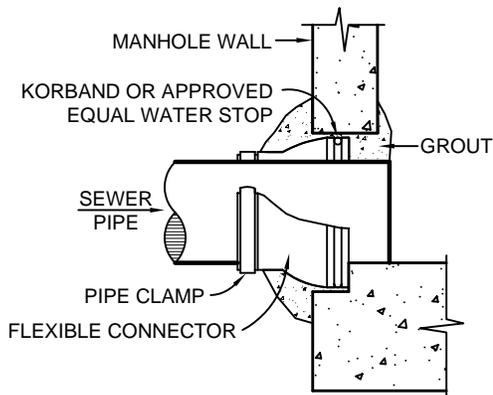
Description	Approved	Date	Description	Approved	Date
NOTES 2 & 6	REM	NOV 07			
NOTES 3	GDM	JAN 11			

NOTES:

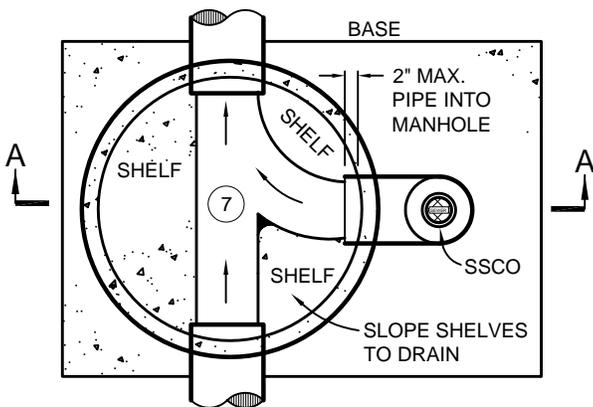
- MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24" Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE A BLIND PICKHOLE, WATERTIGHT GASKET, AND BE LETTERED "SANITARY SEWER".
- CONCRETE COLLAR SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
- PROVIDE 3" OR 6" (9" MAX) ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE. PROVIDE HYDRAULIC CEMENT GROUT BETWEEN MANHOLE FRAME AND TOP RING SHALL BE PER APPENDIX C3.
- PRECAST SHAFT(S) AND ECCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
- JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
- CONCRETE MANHOLE BASE SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], AND REST UPON UNDISTURBED MATERIAL. BOTTOM SHAFT SHALL BE WET-SET OR SET IN FORMED GROOVE. PRECAST BASES MAY BE USED WITH PRIOR APPROVAL OF THE DEPARTMENT AND SHALL MEET ASTM C-478 61T.
- CONCRETE CHANNEL SHALL BE STEEL TROWEL FINISH AND SHELF AREAS SHALL BE MONOLITHICALLY PLACED.
- LATERAL CONNECTION OVER 5' TO BE P.V.C. FOR DROP TEE, PIPE, AND 90° BEND.
- INSTALL REMOVABLE PLUG.
- SEWER CLEANOUT BOX PER STANDARD DRAWING S-2.
- UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.



SECTION A-A



TYPICAL CONNECTION DETAIL



PLAN VIEW



PINKERTON A-640 WITH SKID RESISTANT SURFACE, BLIND PICKHOLE, WATER TIGHT GASKET, AND HS-20 TRAFFIC LOADING, OR APPROVED EQUAL, MARKED "SANITARY SEWER"

LID DETAIL



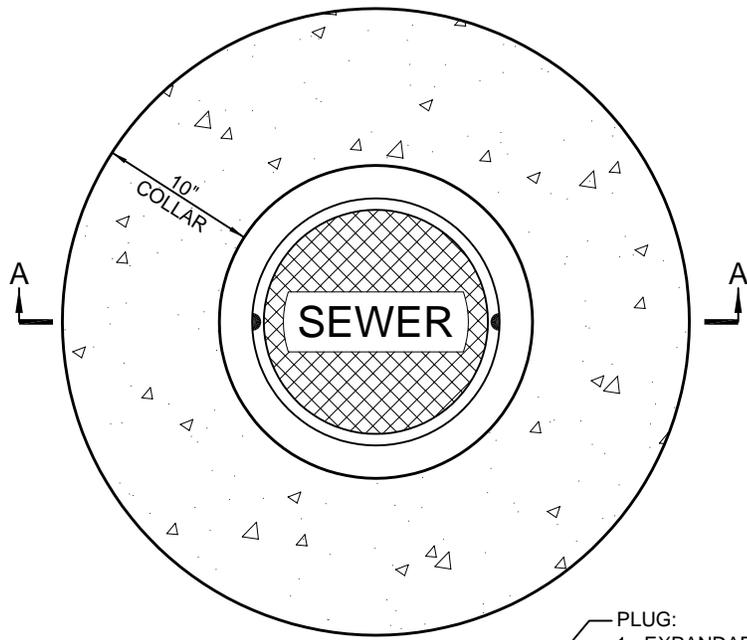
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SEWER DROP MANHOLE

Scale: NTS	Adopted: 2011
Drawing No: S-1a	
Sheet No: 1 OF 1	

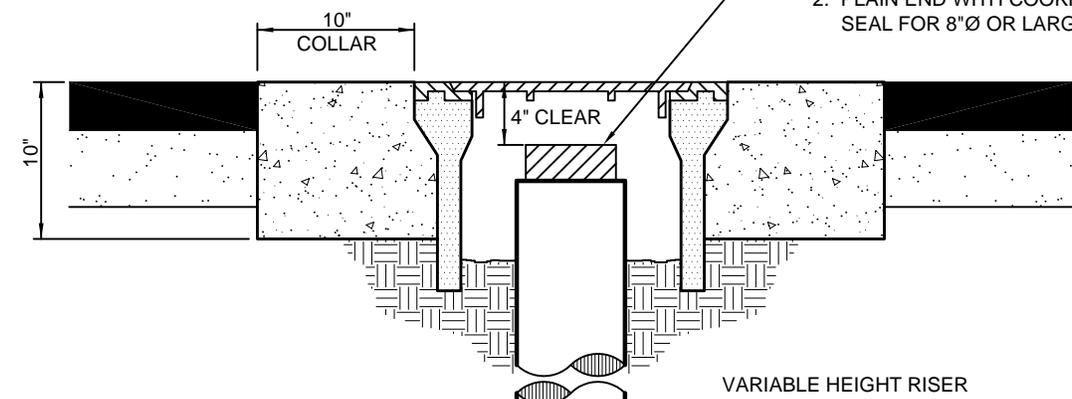
Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 3	REM	NOV 07			



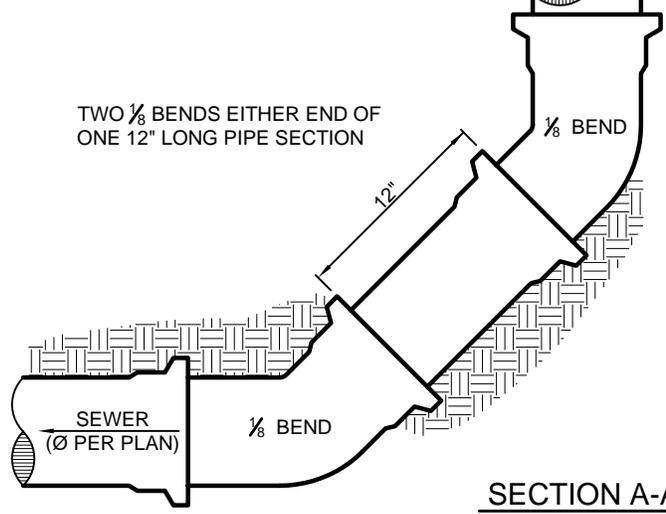
PLAN

- PLUG:
1. EXPANDABLE O-RING PLUG FOR 6" Ø PIPE BELL WITH CAP, OR
 2. PLAIN END WITH COOKIE AND BAND SEAL FOR 8" Ø OR LARGER PIPES



VARIABLE HEIGHT RISER

TWO 1/8 BENDS EITHER END OF ONE 12" LONG PIPE SECTION



SECTION A-A

- NOTES:
1. NO LATERALS ARE TO BE CONNECTED TO CLEANOUTS.
 2. VALVE BOX SHALL BE CHRISTY G-12 TRAFFIC VALVE BOX WITH G-12C LID (OR APPROVED EQUAL). COVER SHALL BE MARKED "SEWER".
 3. CONCRETE COLLAR SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
 4. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.



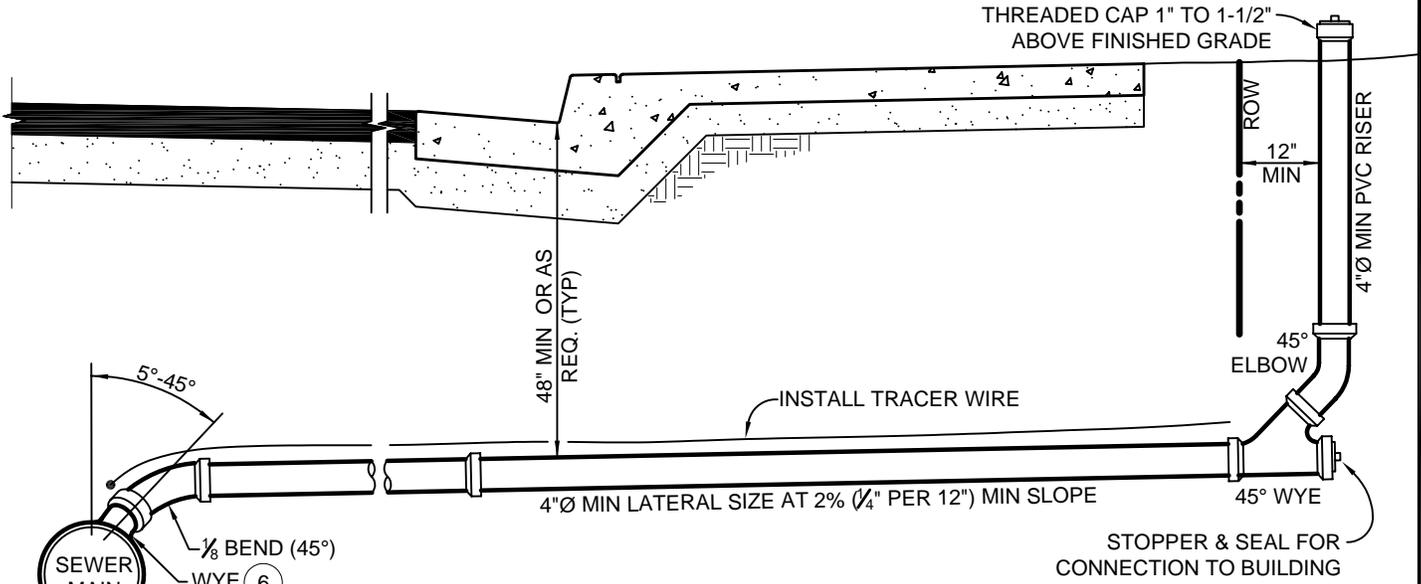
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SEWER MAIN CLEANOUT

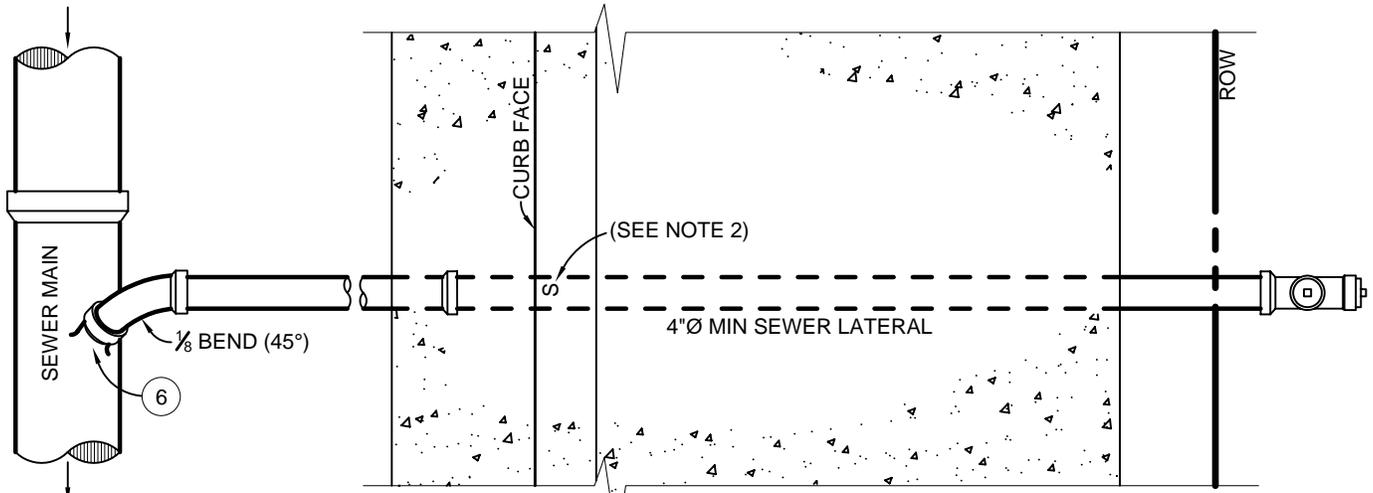
Scale: NTS	Adopted: 2011
Drawing No: S-2	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



ELEVATION



PLAN

NOTES:

1. SEWER LATERAL SHALL BE 4"Ø PVC PIPE AND SHALL MEET ASTM STANDARD D 3034, SDR 35.
2. AN "S" SHALL BE STAMPED OR CHISELED ON THE CURB OVER THE SEWER LATERAL WHEN CURB AND GUTTER IS EITHER CONSTRUCTED OR EXISTING. THE "S" SHALL BE A MINIMUM OF 3" HIGH x 2" WIDE x 3/16" DEEP.
3. MAINTAIN A 5' MINIMUM SEPARATION BETWEEN WATER AND SEWER SERVICE LATERALS.
4. SEWER LATERALS SHALL NOT BE LOCATED UNDER DRIVEWAYS.
5. SADDLE CONNECTIONS ARE NOT PERMITTED ON NEW SEWER MAINS.
6. FACTORY-FABRICATED WYE IN SEWER MAIN WITH 1/8 (45°) BEND. BEND SHALL POINT DOWNSTREAM AND ENTER MAIN AT A VERTICAL ANGLE OF NOT LESS THAN 5° OR MORE THAN 45°. FOR SEWER LATERALS CONNECTING ONTO EXISTING SEWER MAIN A SADDLE TEE-BRANCH MAYBE USED IF APPROVED BY THE DEPARTMENT.
7. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.



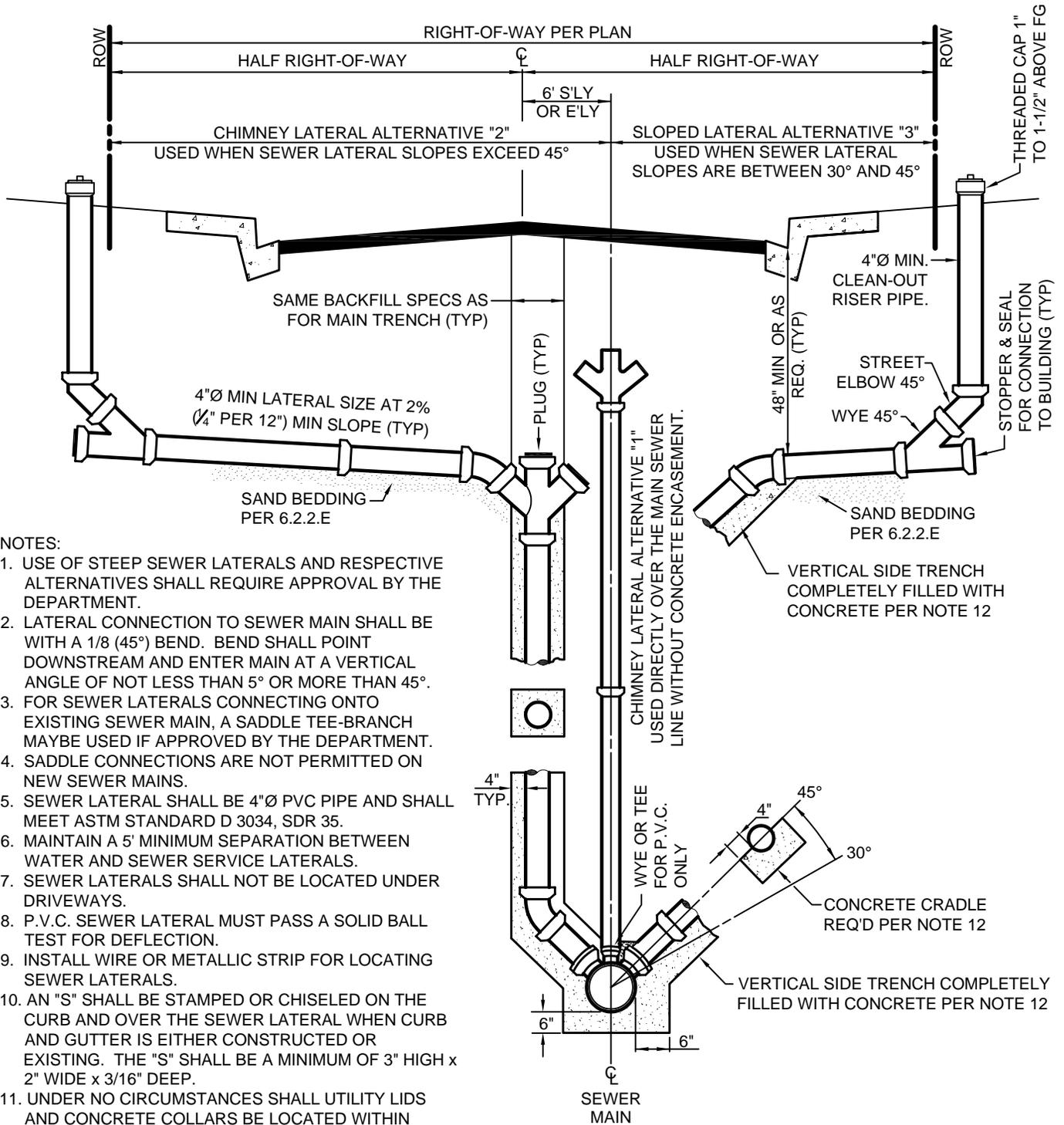
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SEWER LATERAL

Scale: NTS	Adopted: 2011
Drawing No:	S-3
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
ADDED NOTE 12	REM	NOV 07			



NOTES:

1. USE OF STEEP SEWER LATERALS AND RESPECTIVE ALTERNATIVES SHALL REQUIRE APPROVAL BY THE DEPARTMENT.
2. LATERAL CONNECTION TO SEWER MAIN SHALL BE WITH A 1/8 (45°) BEND. BEND SHALL POINT DOWNSTREAM AND ENTER MAIN AT A VERTICAL ANGLE OF NOT LESS THAN 5° OR MORE THAN 45°.
3. FOR SEWER LATERALS CONNECTING ONTO EXISTING SEWER MAIN, A SADDLE TEE-BRANCH MAYBE USED IF APPROVED BY THE DEPARTMENT.
4. SADDLE CONNECTIONS ARE NOT PERMITTED ON NEW SEWER MAINS.
5. SEWER LATERAL SHALL BE 4"Ø PVC PIPE AND SHALL MEET ASTM STANDARD D 3034, SDR 35.
6. MAINTAIN A 5' MINIMUM SEPARATION BETWEEN WATER AND SEWER SERVICE LATERALS.
7. SEWER LATERALS SHALL NOT BE LOCATED UNDER DRIVEWAYS.
8. P.V.C. SEWER LATERAL MUST PASS A SOLID BALL TEST FOR DEFLECTION.
9. INSTALL WIRE OR METALLIC STRIP FOR LOCATING SEWER LATERALS.
10. AN "S" SHALL BE STAMPED OR CHISELED ON THE CURB AND OVER THE SEWER LATERAL WHEN CURB AND GUTTER IS EITHER CONSTRUCTED OR EXISTING. THE "S" SHALL BE A MINIMUM OF 3" HIGH x 2" WIDE x 3/16" DEEP.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.
12. CONCRETE THRUST BLOCKS SHALL CONFORM TO STATE STANDARD 90-1.01, 470 LBS/CY CEMENTITIOUS MATERIAL [5 SACK].



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
SEWER LATERAL
FOR DEEP MAINS

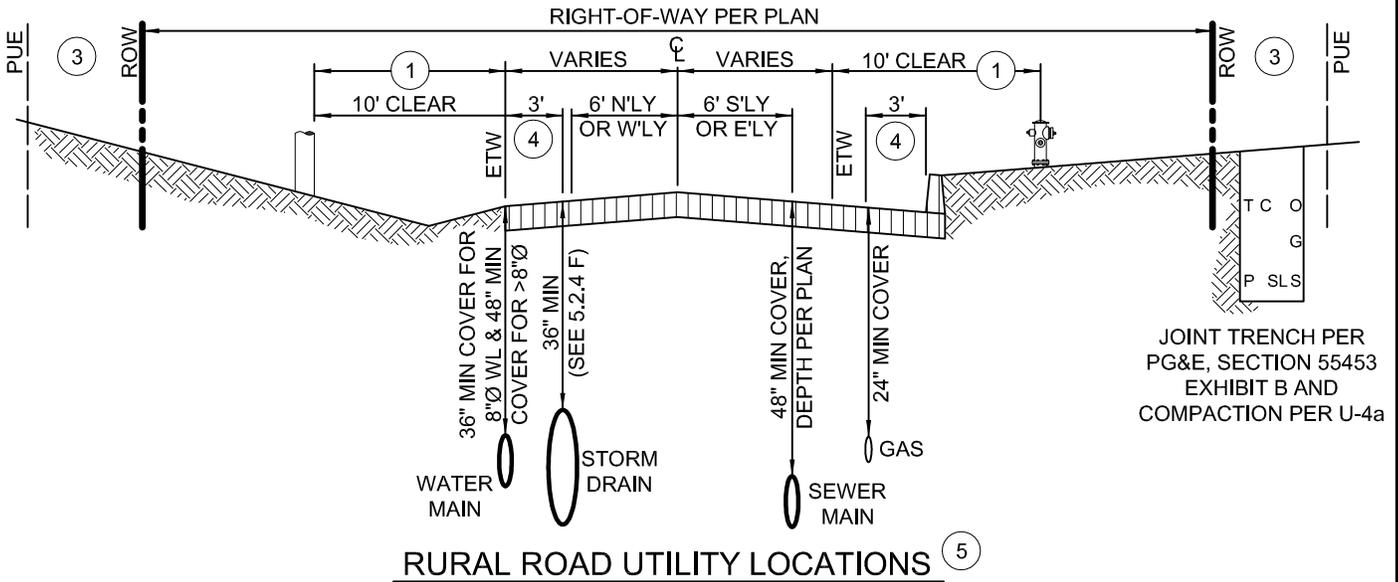
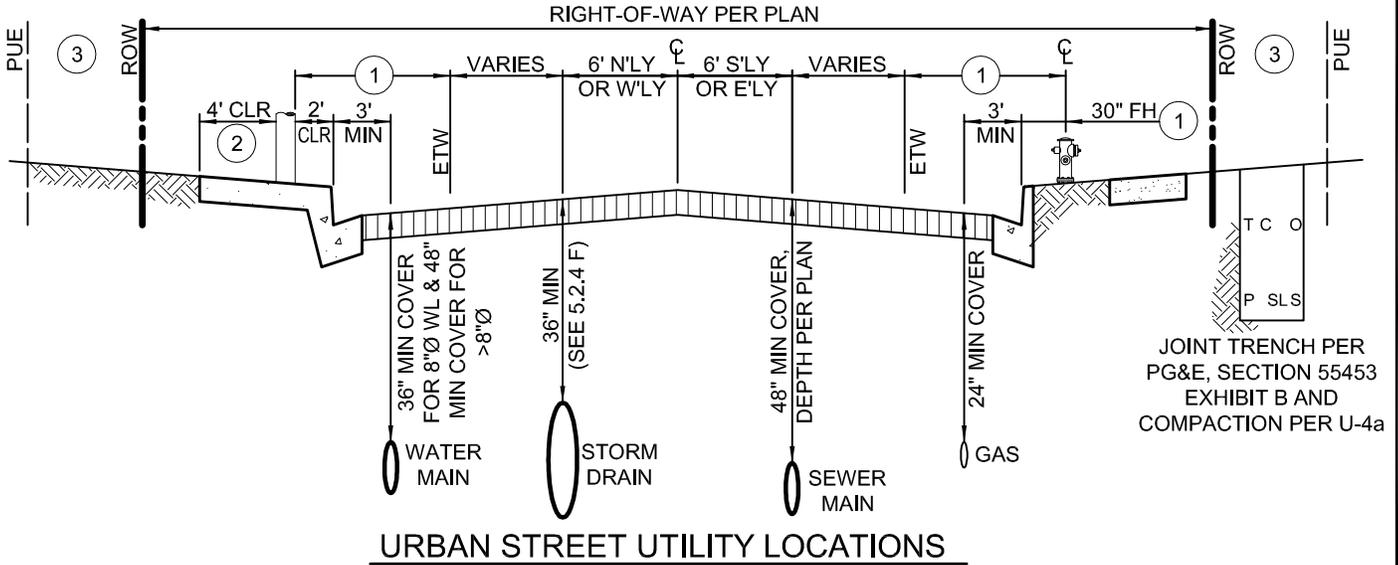
Scale: NTS	Adopted: 2011
Drawing No: S-3a	
Sheet No:	1 OF 1

THIS PAGE LEFT BLANK INTENTIONALLY

THIS PAGE LEFT BLANK INTENTIONALLY

Revisions

Description	Approved	Date	Description	Approved	Date
ADD NOTE 10	REM	NOV 07	REV. NOTE 10. REV. MINIMUM COVER OVER GAS MAIN	FH	AUG 14
MODIFY NOTE 1, MIN SD COVER, JOINT TRENCH NOTE	GDM	JAN 11			



NOTES:

1. ALL ABOVE GRADE FIXED OBJECTS (UTILITY POLES, LIGHT STANDARDS, ETC.) SHALL BE LOCATED AT LEAST 10-FOOT CLEAR FROM THE EDGE OF TRAVELED WAY.
2. PROVIDE 4-FOOT UNOBSTRUCTED CLEARANCE BETWEEN ALL ABOVE GRADE OBSTACLES AND THE BACK OF SIDEWALK (MAY REQUIRE ADDITIONAL SIDEWALK WIDENING).
3. LOCATE UTILITY VAULTS, METER BOXES, PEDESTALS, TRANSFORMERS, ETC. WITHIN PUE AND NOT WITHIN THE SIDEWALK.
4. FOR RURAL ROAD CONDITIONS, GAS AND WATER LINES SHALL BE LOCATED AT 3-FOET OFF FACE OF DIKE OR AT EDGE OF PAVEMENT.
5. THE DEPARTMENT MAY REQUIRE URBAN ROAD UTILITY STANDARD LOCATIONS FOR RURAL ROADS.
6. STREET CROSSINGS OF WIRE AND GAS UTILITIES SHALL REQUIRE A MINIMUM 30" OF COVER AND SHALL BE AT RIGHT ANGLES TO THE ROADWAY CENTERLINE.
7. ABOVE GRADE UTILITY APPURTENANCES SHALL BE LOCATED AS TO MEET DEPARTMENT SIGHT DISTANCE REQUIREMENTS (REFER TO A-5 SERIES DRAWINGS).
8. REFER TO STANDARD DRAWING U-2 FOR LOCATION OF SERVICE LATERALS AND WATER METER BOXES.
9. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.
10. PROVIDE 12-INCH MINIMUM CLEARANCE BETWEEN STORM DRAIN CROSSINGS WITH WATER AND SEWER LINES. MINIMUM 4-FOET CLEARANCE AT JOINTS.



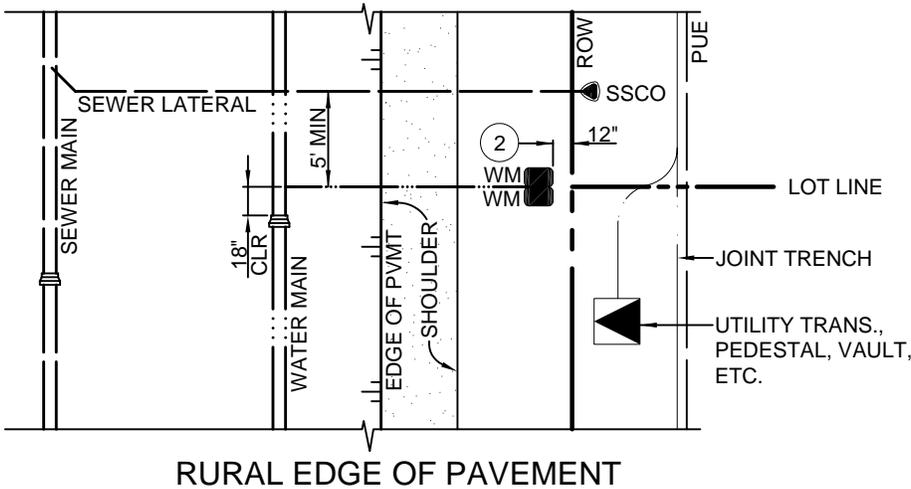
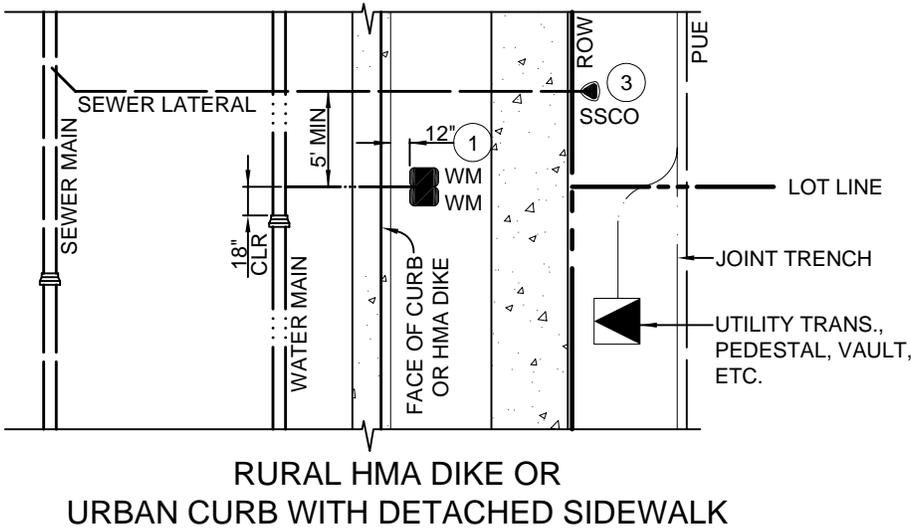
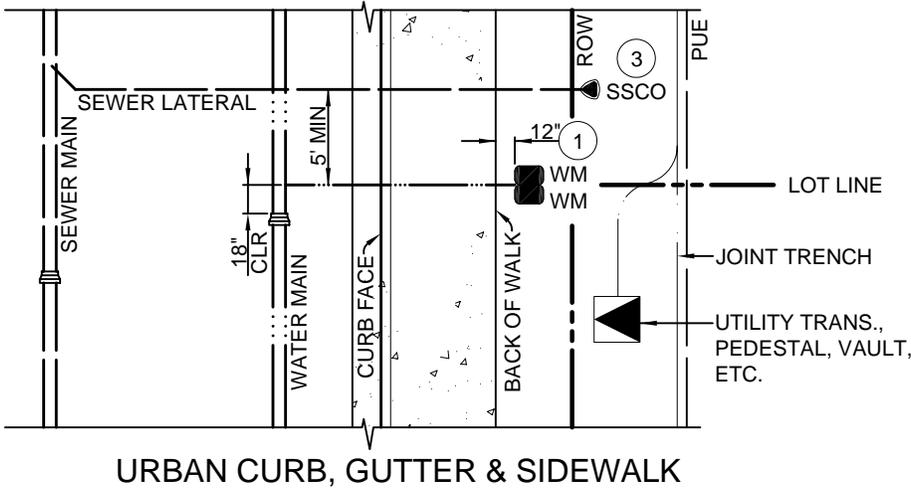
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

LOCATION OF UTILITIES

Scale: NTS	Adopted: 2014
Drawing No: U-1	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



NOTES:

1. LOCATE WATER METER VAULT 12" BEHIND BACK OF CURB OR BACK OF AC DIKE.
2. LOCATE WATER METER VAULT 12" INSIDE RIGHT-OF-WAY.
3. SEWER CLEAN-OUTS SHALL BE LOCATED OUTSIDE OF SIDEWALK AND DRIVEWAY AREAS.
4. ALL WATER METER VAULTS (BOXES) SHALL BE PER STANDARD DRAWINGS.
5. WIRE UTILITY JOINT TRENCH AND APPURTENANCES ARE SHOWN FOR REFERENCE ONLY. REFER TO THE RESPECTIVE UTILITY COMPANY'S HANDOUT PACKAGE FOR ACTUAL ALIGNMENTS AND CONSTRUCTION REQUIREMENTS.
6. WATER AND SEWER SERVICE LATERALS SHALL BE PERPENDICULAR TO THEIR RESPECTIVE MAIN LINES FOR EASE OF LOCATION. ALL WATER LINE TRENCHES SHALL HAVE BOTH TRACE WIRE AND TAPE, REFER TO STANDARD TRENCH DRAWINGS.
7. FOR UNPAVED AREAS, THE WATER METER BOX SHALL BE SET 1" TO 1-1/2" ABOVE FINISHED GRADE.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
LOCATION OF SERVICE LATERALS

Scale: NTS	Adopted: 2011
Drawing No: U-2	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date

NOTES:

THE "CALIFORNIA WATERWORKS STANDARDS" SETS FORTH THE MINIMUM SEPARATION REQUIREMENTS FOR WATER MAINS AND SEWER LINES AS CONTAINED IN SECTION 64630, TITLE 22, CALIFORNIA ADMINISTRATIVE CODE. THE FOLLOWING IS A SUMMARY OF THOSE REQUIREMENTS:

1. PARALLEL CONSTRUCTION: THE HORIZONTAL DISTANCE BETWEEN PRESSURE WATER MAINS AND SEWER LINES SHALL BE AT LEAST 10-FEET MEASURED FROM THE NEAREST EDGES OF THE FACILITIES.
2. PERPENDICULAR CONSTRUCTION (CROSSING): PRESSURE WATER MAINS SHALL BE AT LEAST 12-INCHES ABOVE SANITARY SEWER LINES WHERE THESE LINES MUST CROSS MEASURED FROM THE NEAREST EDGES OF THE FACILITIES.
3. COMMON TRENCH: WATER MAINS AND SEWER LINES SHALL NOT BE INSTALLED IN THE SAME TRENCH.
4. WHEN ADEQUATE PHYSICAL SEPARATION CANNOT BE ATTAINED, AN INCREASE IN THE FACTOR OF SAFETY SHOULD BE PROVIDED BY INCREASING THE STRUCTURAL INTEGRITY OF BOTH THE PIPE MATERIALS AND JOINTS.
5. LOCAL CONDITIONS MAY CREATE A SITUATION WHERE THERE IS NO ALTERNATIVE BUT TO INSTALL WATER MAINS OR SEWER LINES AT A DISTANCE LESS THAN THAT REQUIRED BY THE BASIC SEPARATION STANDARDS. IN SUCH CASES, ALTERNATIVE CONSTRUCTION CRITERIA AS SPECIFIED IN THIS STANDARD SHALL BE FOLLOWED.
6. DUE TO SPECIAL HAZARDS, INSTALLATIONS OF WATER MAINS AND SEWER LINES 24-INCHES DIAMETER OR LARGER SHALL BE REVIEWED AND APPROVED BY THE HEALTH AGENCY PRIOR TO CONSTRUCTION.
7. THE CONSTRUCTION CRITERIA SHOULD APPLY TO THE HOUSE LATERALS THAT CROSS ABOVE A PRESSURE WATER MAIN BUT NOT TO THOSE HOUSE LATERALS THAT CROSS BELOW A PRESSURE WATER MAIN.

ALTERNATIVE CRITERIA FOR CONSTRUCTION THE CONSTRUCTION CRITERIA FOR SEWER LINES OR WATER MAINS WHERE THE BASIC SEPARATION STANDARDS CANNOT BE ATTAINED ARE SHOWN AS CASE 1 & CASE 2 ON SHEETS 2 AND 3 OF U-3.



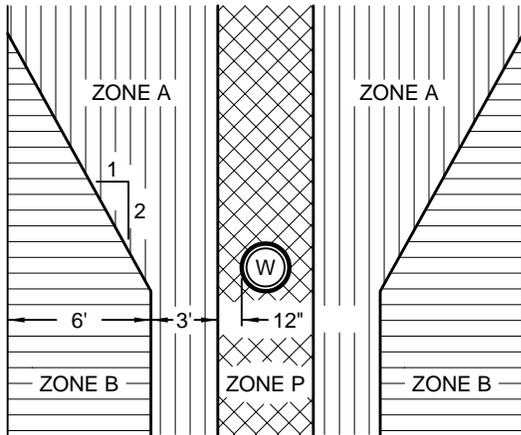
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

UTILITY SEPARATION CRITERIA

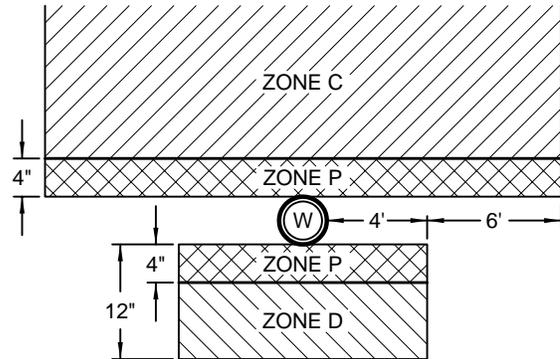
Scale:	Adopted: 2011
Drawing No:	U-3
Sheet No:	1 OF 3

Revisions

Description	Approved	Date	Description	Approved	Date



PARALLEL



CROSSING

ZONE	SPECIAL CONSTRUCTION REQUIRED FOR SEWER:
A	SEWER LINES PARALLEL TO WATER MAINS SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT APPROVAL FROM THE RESPONSIBLE HEALTH AGENCY AND WATER SUPPLIER.
B	A SEWER LINE PLACED <u>PARALLEL</u> TO A WATER LINE SHALL BE CONSTRUCTED OF: 1. CLASS 4000, TYPE II, ASBESTOS-CEMENT PIPE WITH RUBBER GASKET JOINTS. 2. PLASTIC SEWER PIPE WITH RUBBER RING JOINTS (PER ASTM D3034) OR EQUIVALENT. 3. CAST OR DUCTILE IRON PIPE WITH COMPRESSION JOINTS. 4. REINFORCED CONCRETE PRESSURE PIPE WITH COMPRESSION JOINTS (PER AWWA C302-74).
C	A SEWER LINE <u>CROSSING</u> A WATER MAIN SHALL BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING AND MECHANICAL JOINTS. 2. A CONTINUOUS SECTION OF CLASS 200 (DR 14 PER AWWA C900) PLASTIC PIPE, OR EQUIVALENT, CENTERED OVER THE PIPE BEING CROSSED. 3. A CONTINUOUS SECTION OF REINFORCED CONCRETE PRESSURE PIPE (PER AWWA C302-74) CENTERED OVER THE PIPE BEING CROSSED. 4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE.
D	A SEWER LINE <u>CROSSING</u> A WATER MAIN SHALL BE CONSTRUCTED OF: 1. A CONTINUOUS SECTION OF DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. A CONTINUOUS SECTION OF CLASS 200 (DR 14 PER AWWA C900) PLASTIC PIPE OR EQUIVALENT, CENTERED OVER THE PIPE BEING CROSSED. 3. A CONTINUOUS SECTION OF REINFORCED CONCRETE PRESSURE PIPE (PER AWWA C302-74) CENTERED OVER THE PIPE BEING CROSSED. 4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE. 5. ANY SEWER PIPE SEPARATED BY A 10-FOOT BY 10-FOOT, 4-INCH THICK REINFORCED CONCRETE SLAB.
P	ZONE P IS A PROHIBITED ZONE, SECTION 64630(E)(2) CALIFORNIA ADMINISTRATIVE CODE, TITLE 22.

CASE 1: NEW SEWER MAIN

ALTERNATIVE CONSTRUCTION CRITERIA
 APPLIES TO NEW SEWER MAINS & NEW OR EXISTING WATER MAINS

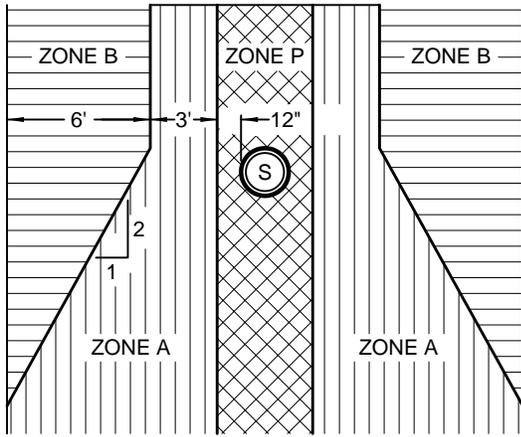


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
UTILITY SEPARATION CRITERIA
 CASE 1: NEW SEWER MAINS

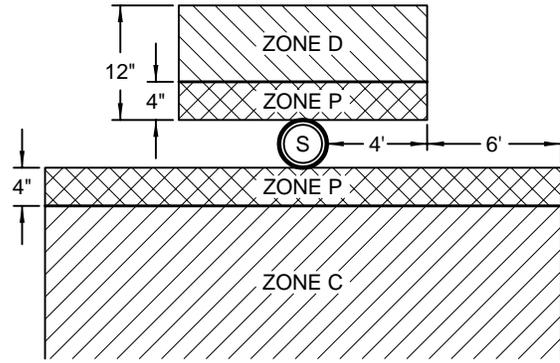
Scale: NTS	Adopted: 2011
Drawing No: U-3a	
Sheet No: 2 OF 3	

Revisions

Description	Approved	Date	Description	Approved	Date



PARALLEL



CROSSING

ZONE	SPECIAL CONSTRUCTION REQUIRED FOR WATER:
A	NO WATER MAINS PARALLEL TO SEWERS SHALL BE CONSTRUCTED WITHOUT APPROVAL FROM THE HEALTH AGENCY.
B	IF THE SEWER PARALLELING THE WATER MAIN DOES NOT MEET THE CASE 1, ZONE B REQUIREMENTS, THE WATER MAIN SHALL BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. CLASS 200 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
C	IF THE SEWER CROSSING THE WATER MAIN DOES NOT MEET THE CASE 1, ZONE C REQUIREMENTS, THE WATER MAIN SHALL HAVE NO JOINTS IN ZONE C AND BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. CLASS 200 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
D	IF THE SEWER CROSSING THE WATER MAIN DOES NOT MEET THE CASE 1, ZONE D REQUIREMENTS, THE WATER MAIN SHALL HAVE NO JOINTS WITHIN 4-FEET FROM EITHER SIDE OF THE SEWER AND SHALL BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. CLASS 200 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
P	ZONE P IS A PROHIBITED ZONE, SECTION 64630(E)(2) CALIFORNIA ADMINISTRATIVE CODE, TITLE 22.

CASE 2: NEW WATER MAIN

ALTERNATIVE CONSTRUCTION CRITERIA
APPLIES TO NEW WATER MAINS OR EXISTING SEWER MAINS



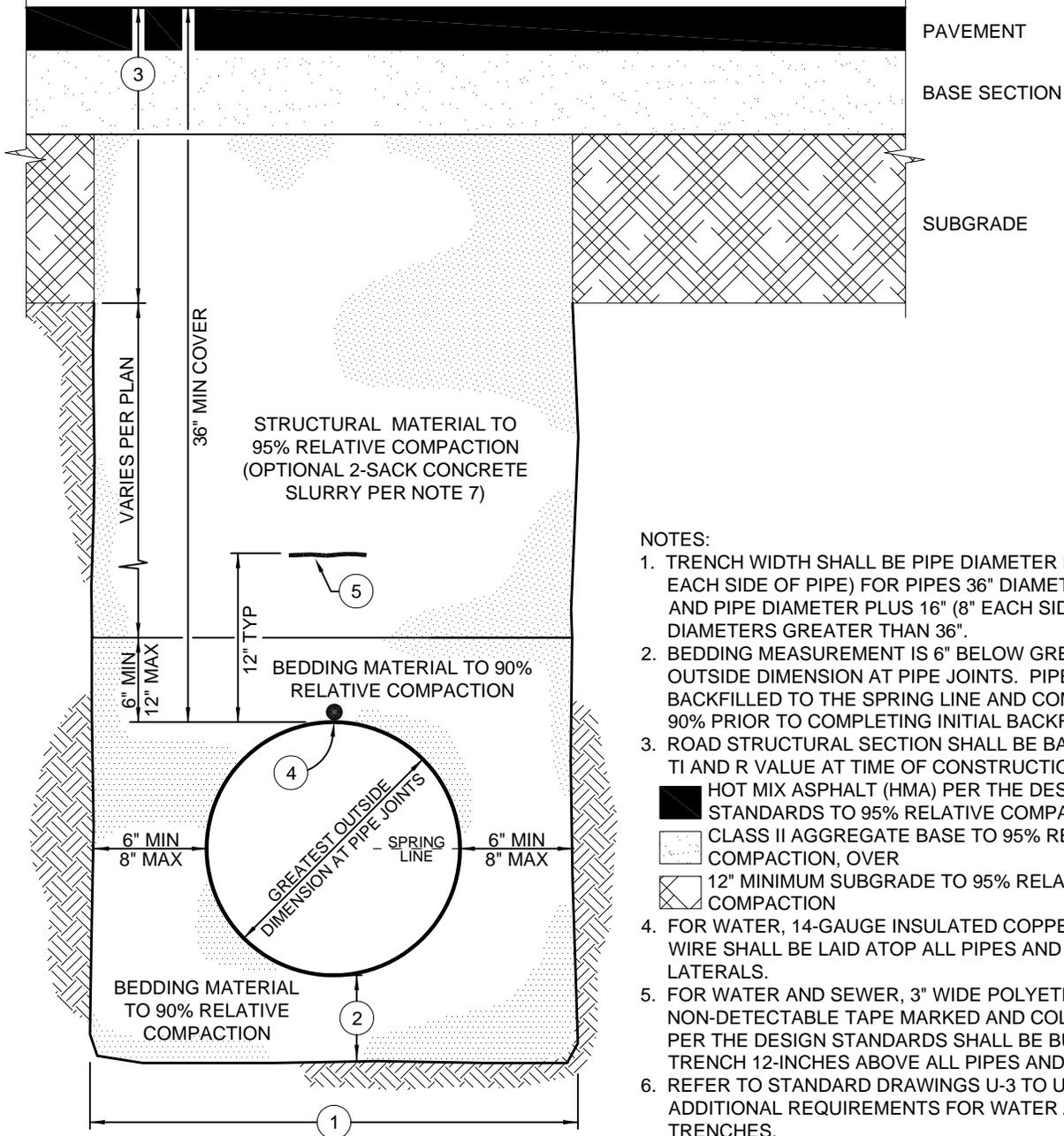
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
UTILITY SEPARATION CRITERIA
CASE 2: NEW WATER MAINS

Scale: NTS	Adopted: 2011
Drawing No: U-3b	
Sheet No: 3 OF 3	

Revisions

Description	Approved	Date	Description	Approved	Date
LOCATION OF DETECTOR WIRE & TAPE, NOTES 4 & 5	REM	NOV 07	NOTE 7 & REPLACE AC W/ HMA	GDM	JAN 11
MISC CLARIFICATION	GDM	NOV 08			

WHEN TRENCHING INTO EXISTING ROADS ALL WORK SHALL BE DONE IN ACCORDANCE WITH STANDARD DRAWINGS R-1 AND R-4.



NOTES:

- TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" (6" EACH SIDE OF PIPE) FOR PIPES 36" DIAMETER OR LESS, AND PIPE DIAMETER PLUS 16" (8" EACH SIDE) FOR PIPE DIAMETERS GREATER THAN 36".
- BEDDING MEASUREMENT IS 6" BELOW GREATEST OUTSIDE DIMENSION AT PIPE JOINTS. PIPE SHALL BE BACKFILLED TO THE SPRING LINE AND COMPACTED TO 90% PRIOR TO COMPLETING INITIAL BACKFILL.
- ROAD STRUCTURAL SECTION SHALL BE BASED ON THE TI AND R VALUE AT TIME OF CONSTRUCTION:
 - HOT MIX ASPHALT (HMA) PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
 - ▨ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - ▧ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
- FOR WATER, 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID ATOP ALL PIPES AND SERVICE LATERALS.
- FOR WATER AND SEWER, 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED AND COLOR CODED PER THE DESIGN STANDARDS SHALL BE BURIED IN THE TRENCH 12-INCHES ABOVE ALL PIPES AND LATERALS.
- REFER TO STANDARD DRAWINGS U-3 TO U-3b FOR ADDITIONAL REQUIREMENTS FOR WATER AND SEWER TRENCHES.
- CONCRETE SLURRY TRENCH BACKFILL SHALL CONFORM TO STATE STANDARD 90-1.01, 188 LBS/CY CEMENTITIOUS MATERIAL [2 SACK], TO SURFACE OF BASE COURSE SECTION. DO NOT PLACE AGGREGATE BASE ABOVE SLURRY BACKFILL.

BEDDING MATERIAL		STRUCTURAL MATERIAL	
SIEVE SIZES	PERCENT PASSING	SIEVE SIZES	PERCENT PASSING
1"	100%	3"	100%
No. 4	80% - 100%	No. 4	35% - 100%
No. 200	0% - 15%	No. 30	20% - 100%

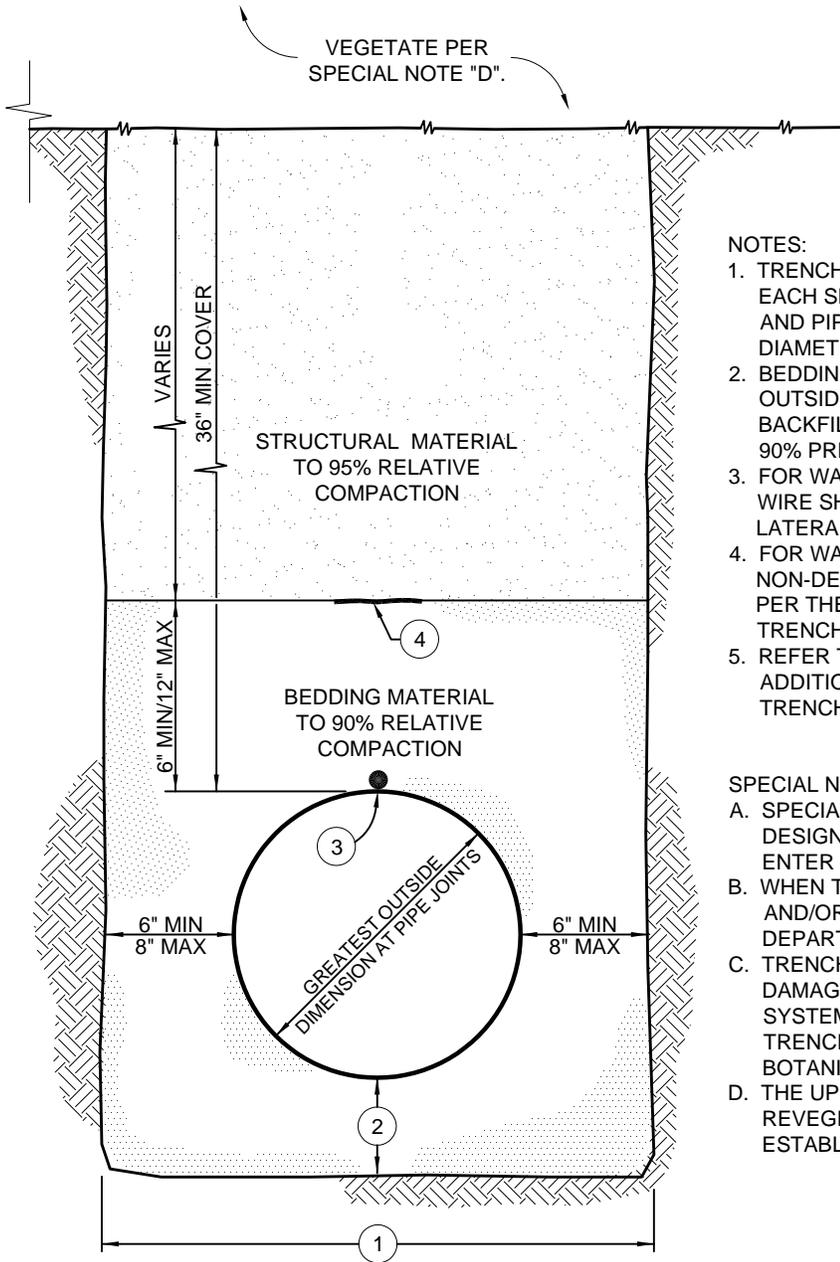


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TRENCH DETAIL
 PAVED SURFACES

Scale: NTS	Adopted: 2011
Drawing No: U-4	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
LOCATION OF DETECTOR WIRE & TAPE, NOTES 3 & 4	REM	NOV 07	PIPE COVER	GDM	JAN 11
REMOVE "SEWER" FROM NOTE 3	GDM	NOV 08			



NOTES:

1. TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" (6" EACH SIDE OF PIPE) FOR PIPES 36" DIAMETER OR LESS, AND PIPE DIAMETER PLUS 16" (8" EACH SIDE) FOR PIPE DIAMETERS GREATER THAN 36".
2. BEDDING MEASUREMENT IS 6" BELOW GREATEST OUTSIDE DIMENSION AT PIPE JOINTS. PIPE SHALL BE BACKFILLED TO THE SPRING LINE AND COMPACTED TO 90% PRIOR TO COMPLETING INITIAL BACKFILL.
3. FOR WATER, 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID ATOP ALL PIPES AND SERVICE LATERALS.
4. FOR WATER AND SEWER, 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED AND COLOR CODED PER THE DESIGN STANDARDS SHALL BE BURIED IN THE TRENCH 12-INCHES ABOVE ALL PIPES AND LATERALS.
5. REFER TO STANDARD DRAWINGS U-3 TO U-3b FOR ADDITIONAL REQUIREMENTS FOR WATER AND SEWER TRENCHES.

SPECIAL NOTES:

- A. SPECIAL CONSIDERATION SHALL BE TAKEN BY THE DESIGNER TO ENSURE SURFACE DRAINAGE WILL NOT ENTER THE TRENCH.
- B. WHEN TRENCHING ON STEEP SLOPES, CUT-OFF WALLS AND/OR PIPE ANCHORS MAY BE REQUIRED BY THE DEPARTMENT AND SHALL BE DETAILED ON THE PLANS.
- C. TRENCHING ALIGNMENT SHALL BE DESIGNED TO AVOID DAMAGE TO EXISTING TREES AND THEIR ROOT SYSTEMS. WHEN ADJACENT TO TREES THEN THE TRENCHING RECOMMENDATIONS OF THE PROJECT BOTANIST SHALL BE FOLLOWED.
- D. THE UPPER SURFACE SHALL BE SCARIFIED AND REVEGETATED. VEGETATIVE COVER SHALL BE ESTABLISHED PRIOR TO ACCEPTANCE OF WORK.

BEDDING MATERIAL

SIEVE SIZES	PERCENT PASSING
1"	100%
No. 4	80% - 100%
No. 200	0% - 15%

STRUCTURAL MATERIAL

SIEVE SIZES	PERCENT PASSING
3"	100%
No. 4	35% - 100%
No. 30	20% - 100%

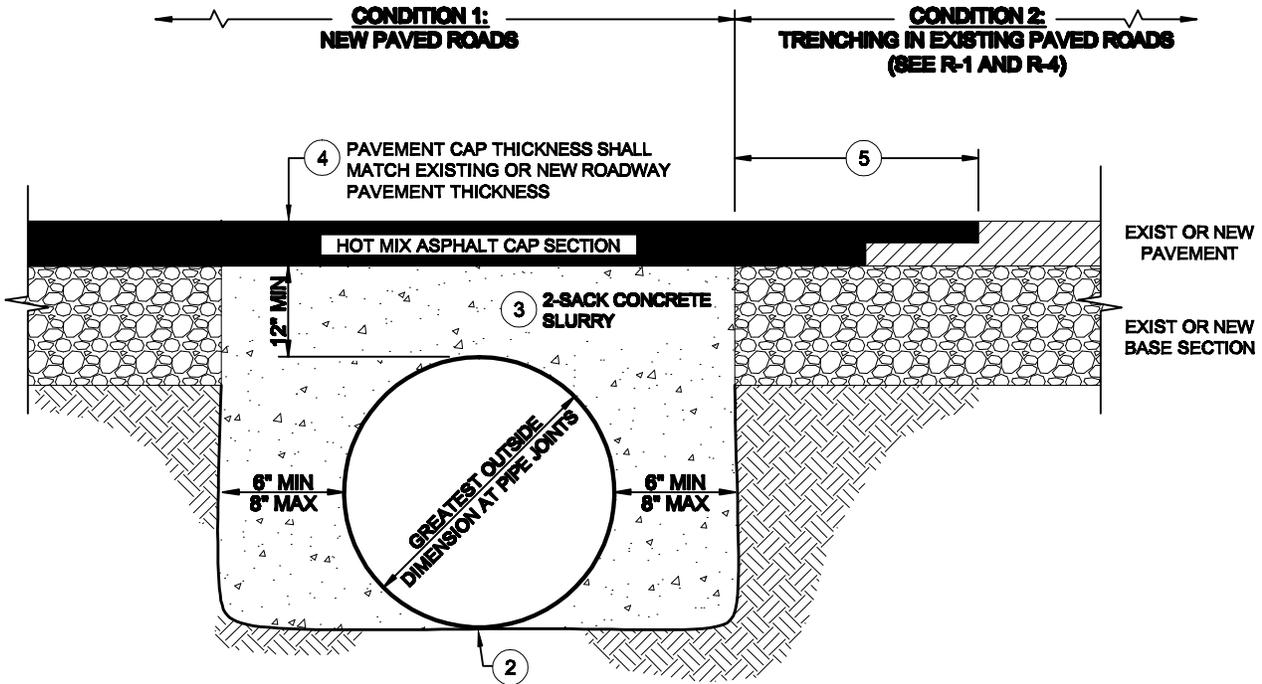


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
TRENCH DETAIL
 OUTSIDE ROADWAY PRISM

Scale: NTS	Adopted: 2011
Drawing No: U-4a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 3	REM	NOV 07	REPLACE AC WITH HMA	GDM	JAN 11
CHANGE 3 BACK TO 2 BACK, MISC CLARIFICATIONS	GDM	NOV 08	REVISE MINIMUM COVER OVER PIPE	FH	AUG 14



NOTES:

1. USE OF THIS STANDARD DRAWING REQUIRES PRIOR DEPARTMENT APPROVAL AND SHALL ONLY BE ALLOWED IF REQUIRED COVER CANNOT BE ATTAINED.
2. PIPE SHALL BE PLACED ON UNDISTURBED NATIVE MATERIAL UNLESS EXISTING SOILS CONDITIONS REQUIRE ADDITIONAL MEASURES.
3. CONCRETE SLURRY TRENCH BACKFILL SHALL CONFORM TO STATE STANDARD 90-1.01, 188 LBS/CY CEMENTITIOUS MATERIAL [2 SACK], TO SURFACE OF BASE COURSE SECTION. DO NOT PLACE AGGREGATE BASE ABOVE SLURRY BACKFILL.
4. HOT MIX ASPHALT (HMA) PAVEMENT THICKNESS TO MATCH EXISTING PAVEMENT SECTION OR MATCH APPROVED PAVEMENT THICKNESS FOR NEW ROADS.
5. WHEN TRENCHING INTO EXISTING STRUCTURAL SECTION PAVEMENT REPAIR SHALL BE IN ACCORDANCE WITH STANDARD DRAWINGS R-1 AND R-4.
6. PIPE SHALL BE SECURED IN PLACE TO KEEP LINE AND GRADE WHILE CONCRETE SLURRY IS PLACED AND UNTIL THE SLURRY HAS SET.
7. THE DEPARTMENT MAY REQUIRE ADDITIONAL WORK WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

SHALLOW TRENCH DETAIL

Scale:	Adopted:
NTS	2014
Drawing No:	U-4b
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
ADDED NOTE 3	REM	NOV 07			
TABLES 1 & 2, NOTE 4, SHT 1/2	GDM	JAN 11			

TABLE 1

Pipe Dia (in)	Pipe Class	Nom. I.D. (in)	Area (A) (sq in)	THRUST (T) AT FITTING, lbs				
				TEES	90° BEND	45° BEND	22.5° BEND	11.25° BEND
4"	PVC Class 165 (DR 25)	4.39	15	3,254	4,602	2,491	1,270	638
4"	PVC Class 235 (DR 18)	4.23	14	4,005	5,664	3,065	1,563	785
4"	PVC Class 305 (DR 14)	4.07	13	4,619	6,532	3,535	1,802	905
6"	PVC Class 165 (DR 25)	6.31	31	6,723	9,508	5,146	2,623	1,318
6"	PVC Class 235 (DR 18)	6.09	29	8,302	11,740	6,354	3,239	1,627
6"	PVC Class 305 (DR 14)	5.86	27	9,574	13,540	7,328	3,736	1,877
8"	PVC Class 165 (DR 25)	8.28	54	11,577	16,372	8,861	4,517	2,269
8"	PVC Class 235 (DR 18)	7.98	50	14,254	20,158	10,910	5,562	2,794
8"	PVC Class 305 (DR 14)	7.68	46	16,445	23,257	12,587	6,417	3,224
10"	PVC Class 165 (DR 25)	10.16	81	17,431	24,651	13,341	6,801	3,417
10"	PVC Class 235 (DR 18)	9.79	75	21,454	30,340	16,420	8,371	4,206
10"	PVC Class 305 (DR 14)	9.42	70	24,741	34,989	18,936	9,654	4,850
12"	PVC Class 165 (DR 25)	12.08	115	24,641	34,848	18,860	9,615	4,831
12"	PVC Class 235 (DR 18)	11.65	107	30,380	42,964	23,252	11,854	5,956
12"	PVC Class 305 (DR 14)	11.2	99	34,975	49,462	26,768	13,646	6,856
AWWA PVC C-900 PIPE				BASED ON P = 165 + 50 = 215 psi BASED ON P = 235 + 50 = 285 psi BASED ON P = 305 + 50 = 355 psi				

TABLE 2

HORIZONTAL BEARING STRENGTHS FOR COMMON SOILS	
SOIL TYPE	HORIZONTAL BEARING STRENGTH (Sb), lbs/sf
MUCK	0
SOFT CLAY	500
SAND	1,000
SAND & GRAVEL	1,500
SAND & GRAVEL CEMENTED WITH CLAY	2,000

NOTES:

- ALTHOUGH THE ABOVE BEARING STRENGTH VALUES HAVE BEEN USED SUCCESSFULLY IN THE DESIGN OF THRUST BLOCKS AND ARE CONSIDERED TO BE CONSERVATIVE, THEIR ACCURACY IS TOTALLY DEPENDENT ON ACCURATE SOIL IDENTIFICATION AND EVALUATION. THE ULTIMATE RESPONSIBILITY FOR SELECTING THE PROPER BEARING STRENGTH OF A PARTICULAR SOIL TYPE SHALL BE THE RESPONSIBILITY OF THE PROJECT ENGINEER.
- ALL THRUST BLOCK AREAS SHALL BE PROVIDED ON THE APPROVED PLANS.
- CONCRETE THRUST BLOCKS SHALL CONFORM TO STATE STANDARD 90-1.01, 470 LBS/CY CEMENTITIOUS MATERIAL [5 SACK].
- THRUST RESTRAINT FOR VERTICAL BENDS SHALL USE RESTRAINED JOINT FITTINGS INSTEAD OF THRUST BLOCKS.



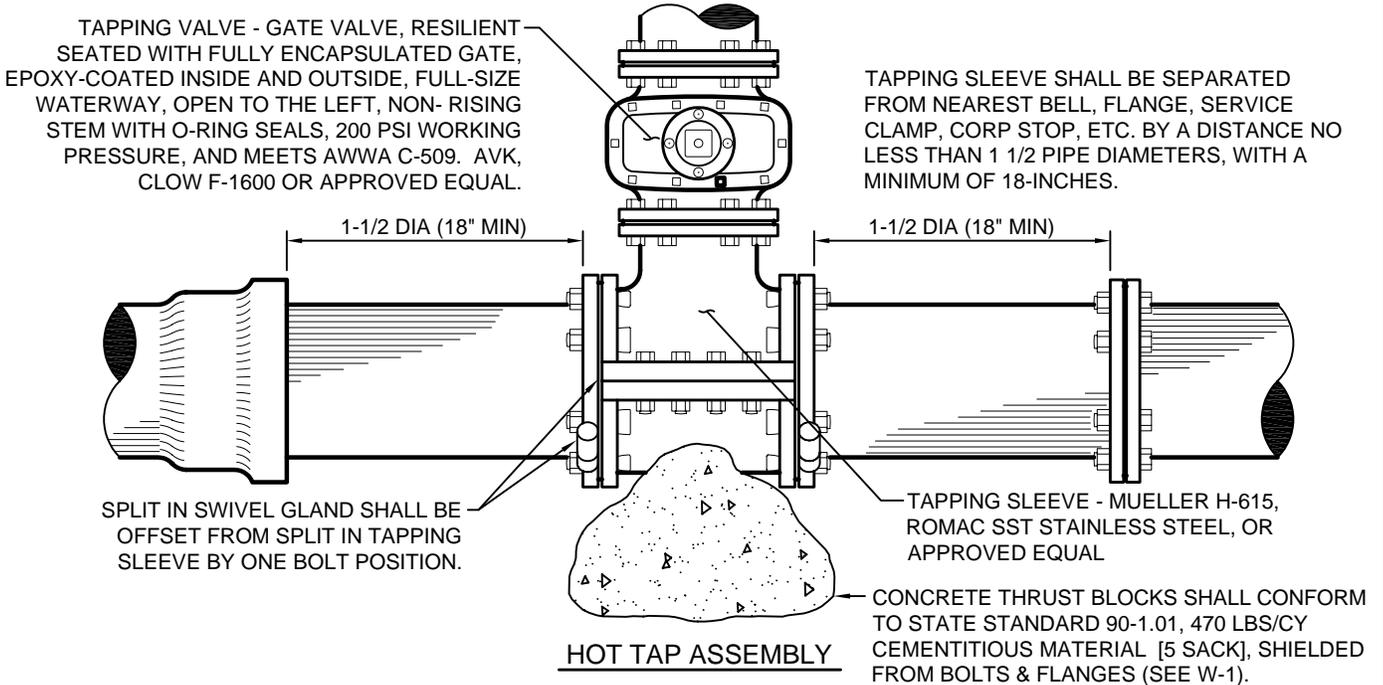
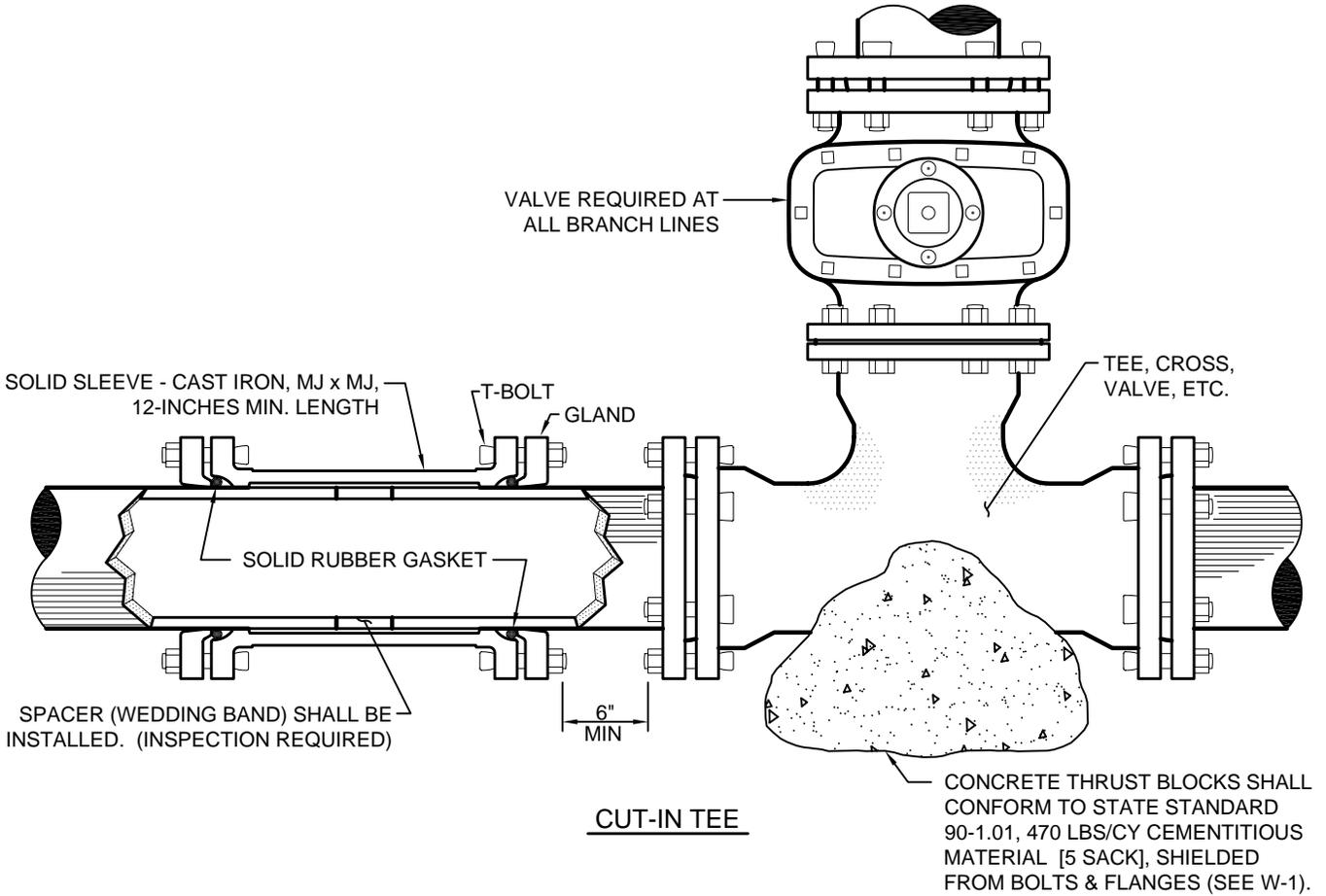
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

THRUST BLOCK REQUIREMENTS

Scale:	Adopted: 2011
Drawing No:	W-1
Sheet No:	1 OF 2

Revisions

Description	Approved	Date	Description	Approved	Date
THRUST BLOCK NOTES	REM	NOV 07			

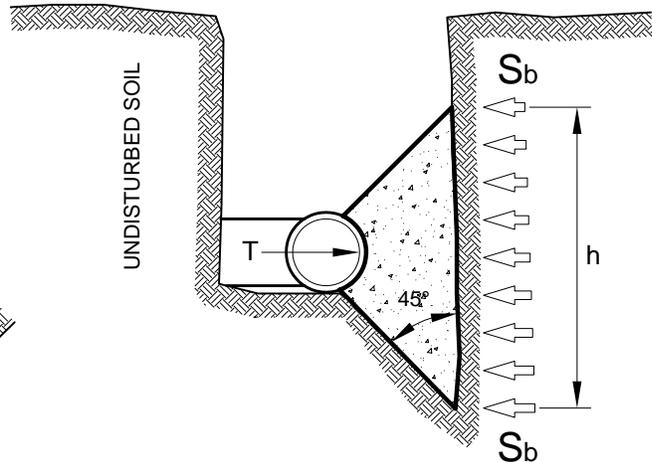
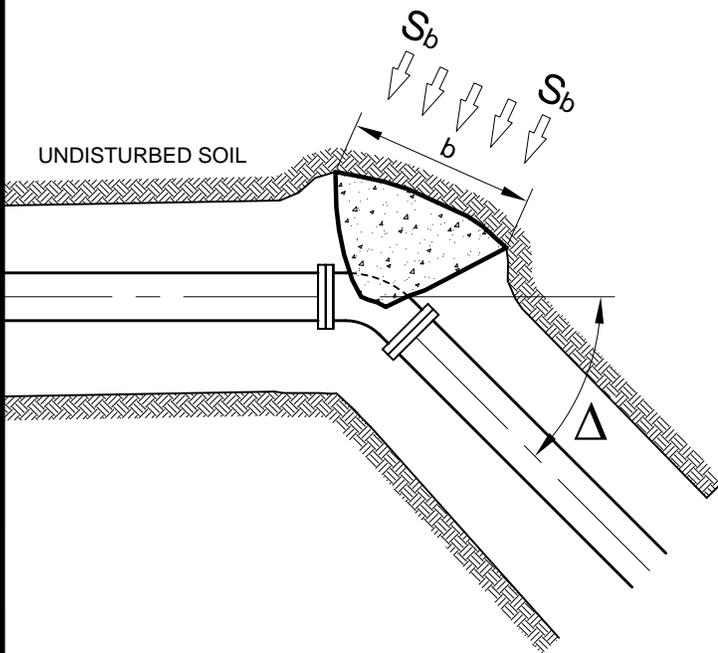


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
**WATERLINE CUT-IN TEE
 & HOT TAP ASSEMBLY**

Scale: NTS	Adopted: 2011
Drawing No: W-10	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
LEGEND, EQUATIONS, EXAMPLE, SHT 2/2	GDM	JAN 11			



LEGEND:

- T = THRUST AT FITTING (lbs) [TABLE 1]
- S_b = SOIL BEARING PRESSURE (psf) [TABLE 2]
- A = INTERNAL AREA (sq in) [TABLE 1]
- P = INTERNAL PRESSURE (psi)
- Δ = HORIZONTAL DEFLECTION ANGLE (degrees)
- S_f = FACTOR OF SAFETY [1.5 FOR THRUST BLOCK DESIGN, TYP]
- h = THRUST BLOCK HEIGHT (ft)
- b = THRUST BLOCK WIDTH (ft)
- A_b = MINIMUM THRUST BLOCK AREA (sq ft)

EQUATIONS:

THRUST AT FITTINGS:

[1] $T = (P)(A)$

THRUST AT HORIZONTAL BEND:

[2] $T = 2(P)(A) \sin(\Delta/2)$

MINIMUM BEARING (THRUST) BLOCK AREA:

[3] $A_b = (h)(b) = [(S_f)(T)]/S_b$

EXAMPLE: DETERMINE THE THRUST BLOCK AREA FOR A 90° BEND, 8" CLASS 165 PIPE IN SAND.

(STEP 1): PRESSURE = 165 + 50 (TEST PRESSURE) = 215 psi. CHOOSE T = 16,372 lbs FROM TABLE 1 SHEET 1/2 (USE EQUATION [2] IF PIPE HAS DIFFERENT INSIDE DIAMETER).

(STEP 2): DETERMINE S_b FROM TABLE 2, SHEET 1/2.

(STEP 3): USE INFORMATION TO CALCULATE A_b USING EQUATION [3]

RESULT: $A_b = [S_f(T)]/S_b = [(1.5)(16,372)]/1,000 = 24.6 \text{ sq ft}$



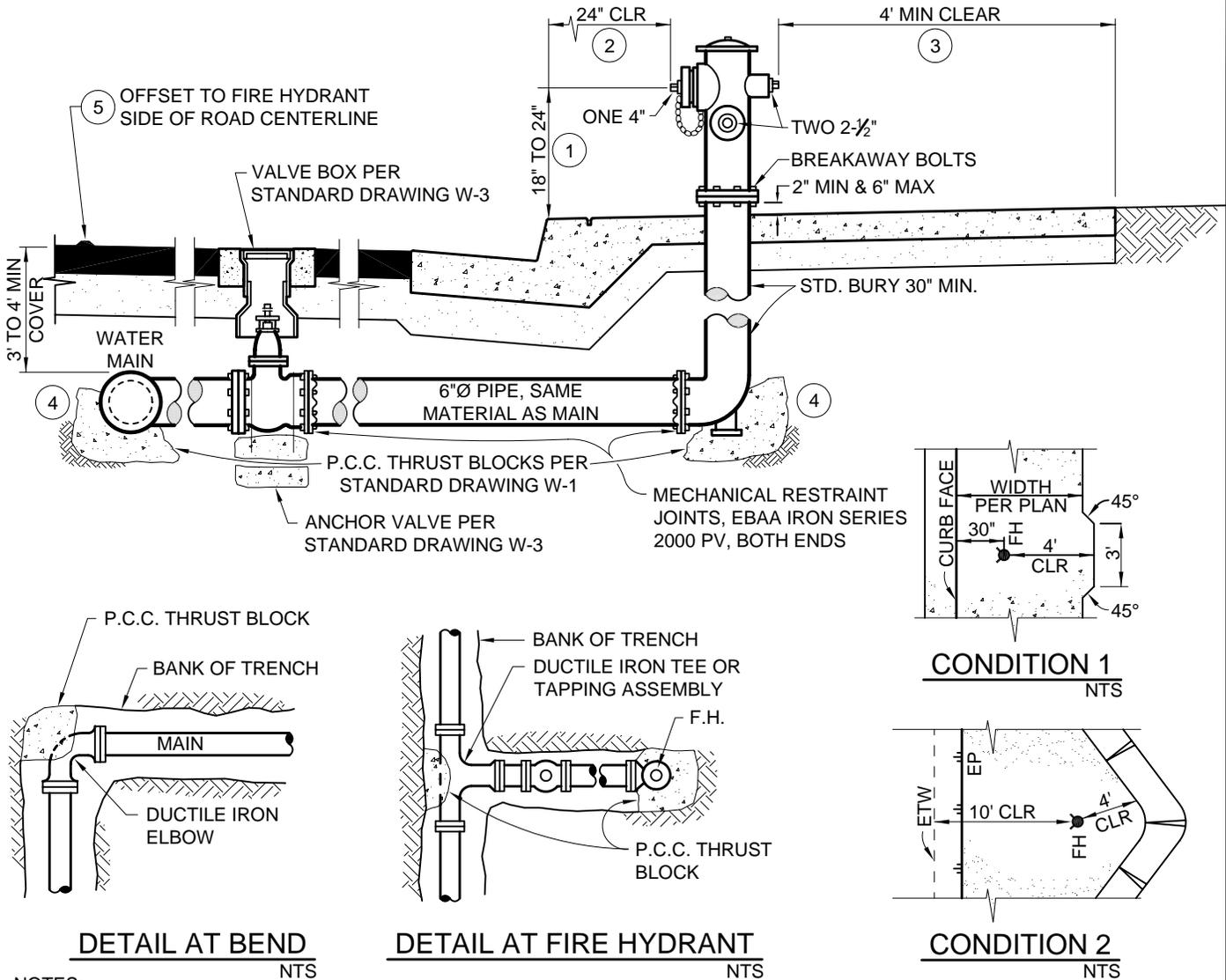
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

THRUST BLOCK REQUIREMENTS

Scale: NTS	Adopted: 2011
Drawing No: W-1a	
Sheet No: 2 OF 2	

Revisions

Description	Approved	Date	Description	Approved	Date
NOTE 4	REM	NOV 07	CLARIFIED MJ CONNECTIONS, NOTE 2	GDM	JAN 11
NOTE 8 (FROM CLOW F2060 TO CLOW F960)	GDM	NOV 08			



NOTES:

- HEIGHT SHALL BE MEASURED FROM EDGE OF PAVEMENT WHEN CONCRETE CURB OR ASPHALT DIKE ARE NOT REQUIRED PER THE DESIGN STANDARDS.
- DISTANCE SHALL BE INCREASED TO 10-FOOT CLEAR FROM THE EDGE OF TRAVELED WAY (ETW) ON RURAL ROADS (SEE U-1).
- IN RURAL AREAS A 4' MINIMUM RADIUS CLEAR AND LEVEL ZONE SURROUNDING THE FIRE HYDRANT SHALL BE REQUIRED.
- CONCRETE THRUST BLOCKS SHALL CONFORM TO STATE STANDARD 90-1.01, 470 LBS/CY CEMENTITIOUS MATERIAL [5 SACK], POURED AGAINST UNDISTURBED SOIL AND SHIELDED FROM FLANGES AND BOLTS.
- EACH HYDRANT SHALL BE IDENTIFIED BY A REFLECTORIZED BLUE RAISED PAVEMENT MARKER PER SECTION 10.301c OF THE UNIFORM FIRE CODE.
- THE HYDRANT CAP AND OUTLET NOZZLE SHALL BE PAINTED IN ACCORDANCE WITH TABLE 6.6 OF 6.2.1.D.2.
- THE CONCRETE CURB OR ASPHALT DIKE SHALL BE PAINTED RED 15-FOET EITHER SIDE OF THE FIRE HYDRANT.
- HYDRANT SHALL BE CLOW F960, OR APPROVED EQUAL.
- EACH HYDRANT SHALL HAVE TWO 2-1/2" OUTLETS AND ONE 4" OUTLET WITH EXTERNAL NSF THREAD.
- ALL FITTINGS SHALL BE CEMENT MORTAR LINED IN ACCORDANCE WITH AWWA STANDARD C-104.
- HYDRANT LATERAL SHALL BE OF THE SAME MATERIAL AS THE MAIN.
- 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE, BROUGHT ABOVE GRADE AND SECURED TO THE HYDRANT BOLT FLANGE.
- COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.



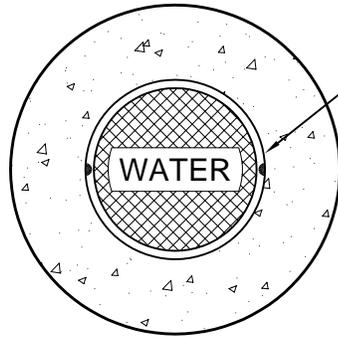
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

FIRE HYDRANT INSTALLATION

Scale: 1"=2'	Adopted: 2011
Drawing No: W-2	
Sheet No: 1 OF 1	

Revisions

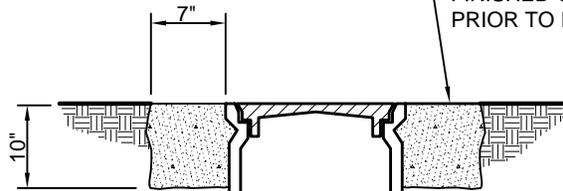
Description	Approved	Date	Description	Approved	Date
NOTE 1, CONCRETE COLLAR NOTE	REM	NOV 07			



VALVE BOX LID MARKED "WATER"

LID

10" MIN THICK BEARING CONCRETE COLLAR SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], TROWELLED TO FINISHED GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.



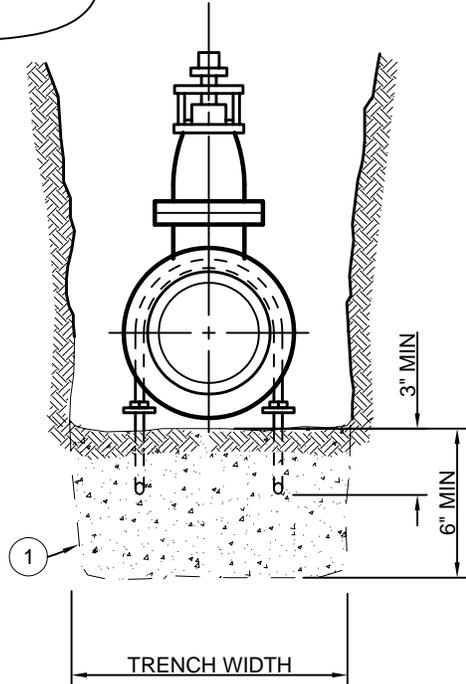
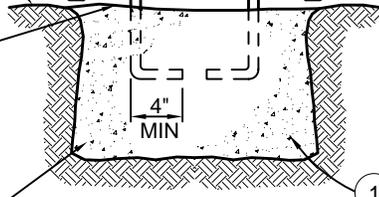
VALVE BOX - BROOKS No. 3RT OR APPROVED EQUAL WITH EXTENSIONS TO VALVE

ANCHOR STRAPS EACH SIDE

TRENCH BOTTOM

VALVE ANCHOR SHALL BE POURED LEVEL WITH TRENCH BOTTOM ANCHOR STRAPS SHALL BE FASTENED TO CONCRETE EMBEDDED ANCHOR BOLTS

P.C.C. BLOCK IS HUB-TO-HUB WIDTH



NOTES:

1. CONCRETE THRUST BLOCKS SHALL CONFORM TO STATE STANDARD 90-1.01, 470 LBS/CY CEMENTITIOUS MATERIAL [5 SACK], AND POURED AGAINST UNDISTURBED NATIVE SOIL.
2. VALVES SHALL HAVE NON-RISING STEM, RESILIENT WEDGE, RESILIENT SEAT, AND BE EPOXY COATED.
3. ALL MATERIALS AND INSTALLATION SHALL CONFORM WITH THE APPLICABLE SECTIONS OF THE DESIGN STANDARDS.
4. ALL FITTINGS SHALL BE WRAPPED IN POLYETHYLENE SHEET AND ALL FLANGES AND BOLTS SHALL BE SHIELDED FROM CONCRETE PER THE DESIGN STANDARDS.
5. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

VALVE ANCHOR & BOX

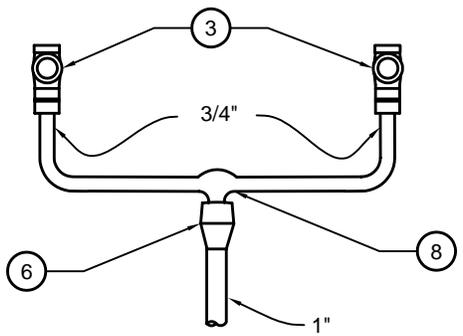
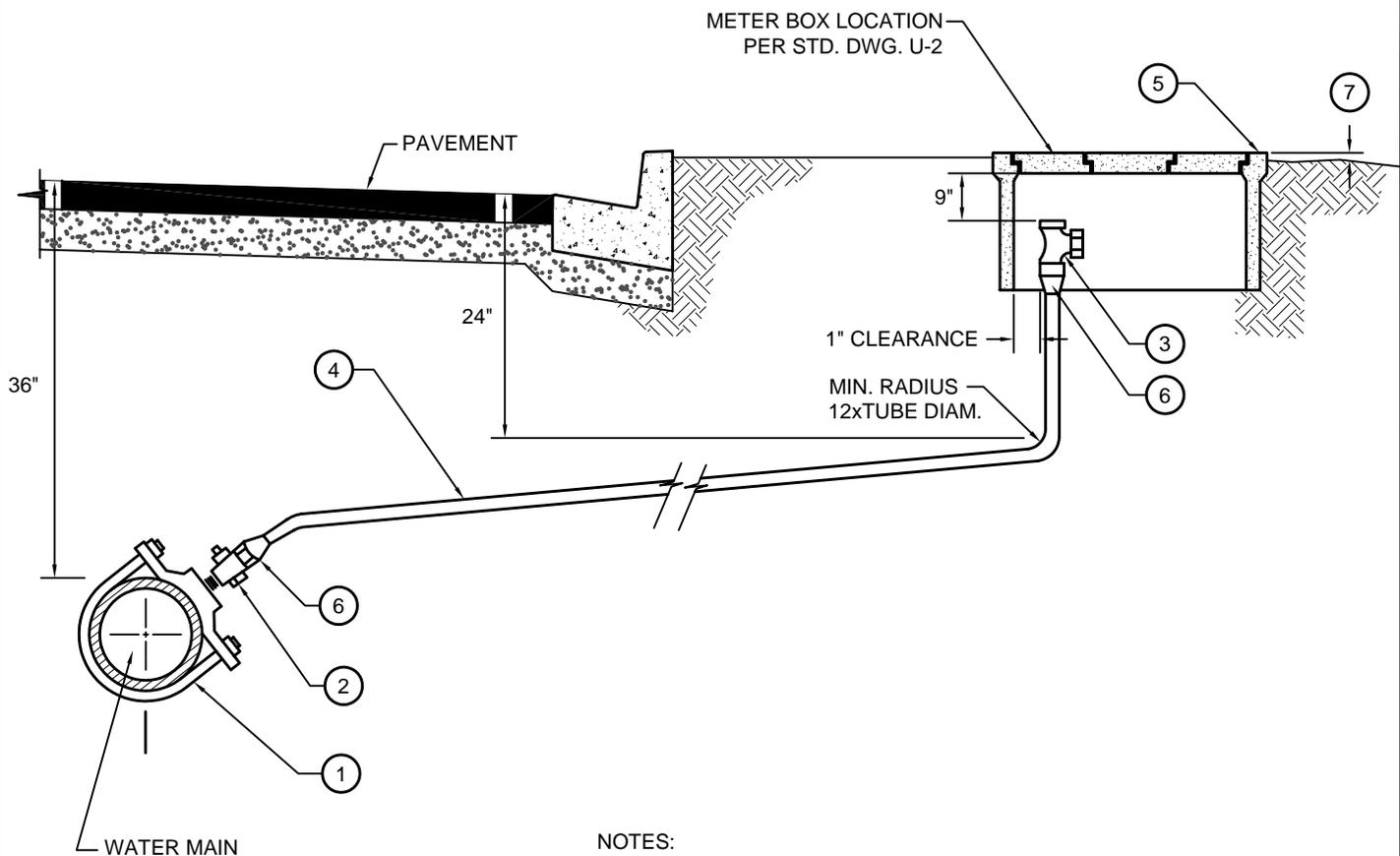
Scale: NTS Adopted: 2011

Drawing No: W-3

Sheet No: 1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



DOUBLE SERVICE CONNECTION

NOTES:

- BRONZE SERVICE SADDLE, DOUBLE STRAP, MUELLER BR 2B 0899 IP, 075 or 100, O.A.E.
- CORPORATION STOP w/ IP THREADS, MUELLER H-10012, O.A.E.
- ANGLE METER STOP, JONES J-1966W, 3/4" or 1", O.A.E.
- POLYETHYLENE PIPE, 3/4" MIN. I.D. FOR SINGLE SERVICE 1" MIN. I.D. FOR DOUBLE SERVICE.
- METER BOX, BROOKS PRODUCT 37-S, O.A.E.
- MUELLER INSTA-TITE CONNECTION H-15426(male) O.A.E. H-15456 (female).
- IN UNPAVED AREA SET METER BOX 1" to 1-1/2" ABOVE FINISHED GRADE.
- U-BRANCH CONNECTION, MUELLER H-15365, O.A.E.
- O.A.E. = "OR APPROVED EQUAL".
- WATER METER AND CUSTOMER SIDE SHUT OFF VALVE TO BE INSTALLED BY THE WATER PURVEYOR.
- CORPORATION STOPS SHALL NOT BE SPACED CLOSER THAN 12" MEASURED ALONG THE CENTERLINE OF THE PIPE.
- 3/4" SINGLE SERVICE LINE, 1" DOUBLE SERVICE LINES, USE 16" X 21" DUAL METER BOX (BROOKS PRODUCT OR APPROVED EQUAL) FOR DOUBLE SERVICE.
- SERVICES LARGER THAN 1" MAY BE PVC SCHEDULE 80 PIPE.
- 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
- COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.



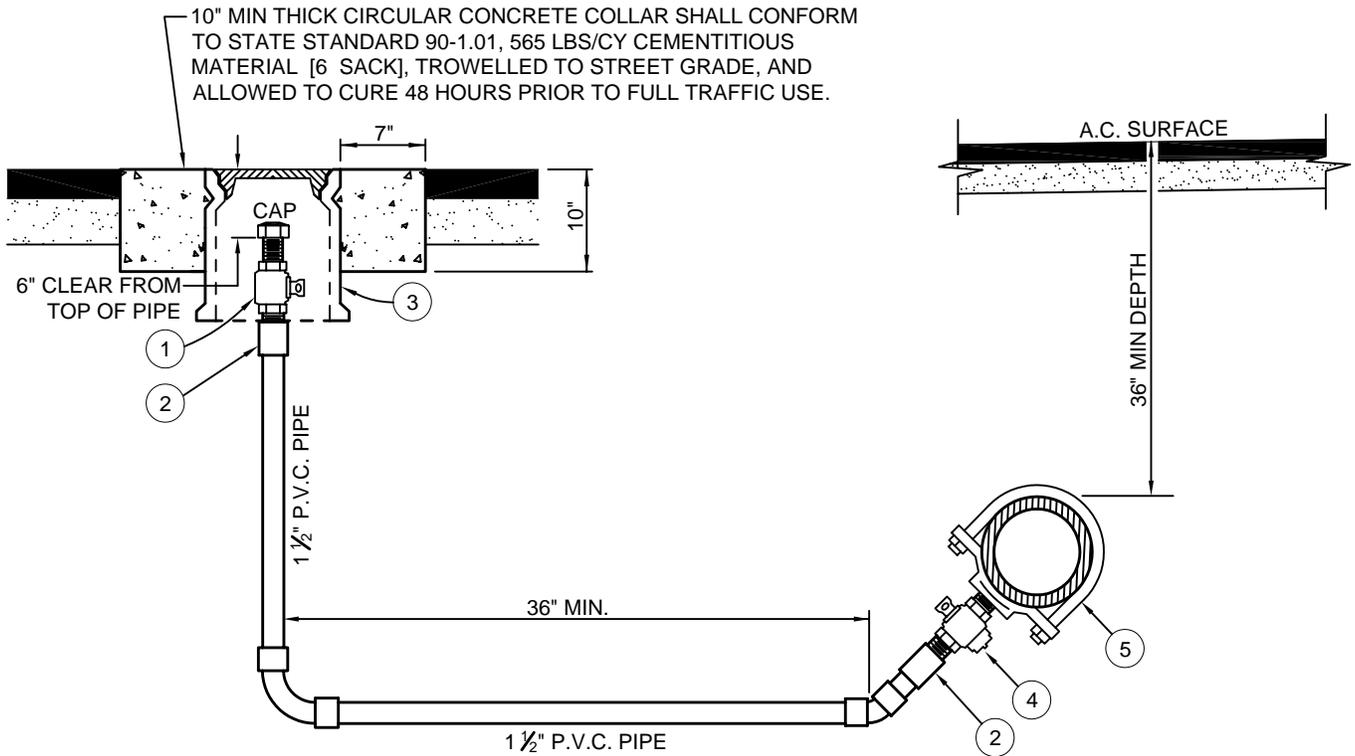
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

WATER SERVICE CONNECTION

Scale: NTS	Adopted: 2011
Drawing No: W-4	
Sheet No: 1 OF 1	

Revisions

Description	Approved	Date	Description	Approved	Date
CONCRETE COLLAR NOTE, REMOVE THRUST BLOCK	REM	NOV 07			



ON-RUN CONNECTION OR DEAD END

NOTES:

1. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
2. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.
3. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

ITEM NO.	NO. REQ'D.	SIZE AND DESCRIPTION	MATERIAL SPECIFICATION
1	1	1-1/2" CURB STOP	JAMES JONES J-182 WITH LOCKWING, MUELLER, OR APPROVED EQUAL
2	2	1-1/2" ADAPTER	I.P. THREAD-P.V.C. SLIP
3	1	VALVE BOX WITH CAST IRON LID	CHRISTY G-8, BROOKS 3-RT, OR APPROVED EQUAL
4	1	1-1/2" CORPORATION STOP	JAMES JONES J-40, MUELLER H-10012, OR APPROVED EQUAL
5	1	SERVICE SADDLE	MUELLER BRONZE DOUBLE STRAP BR 2B 0899 IP 200, O.A.E.



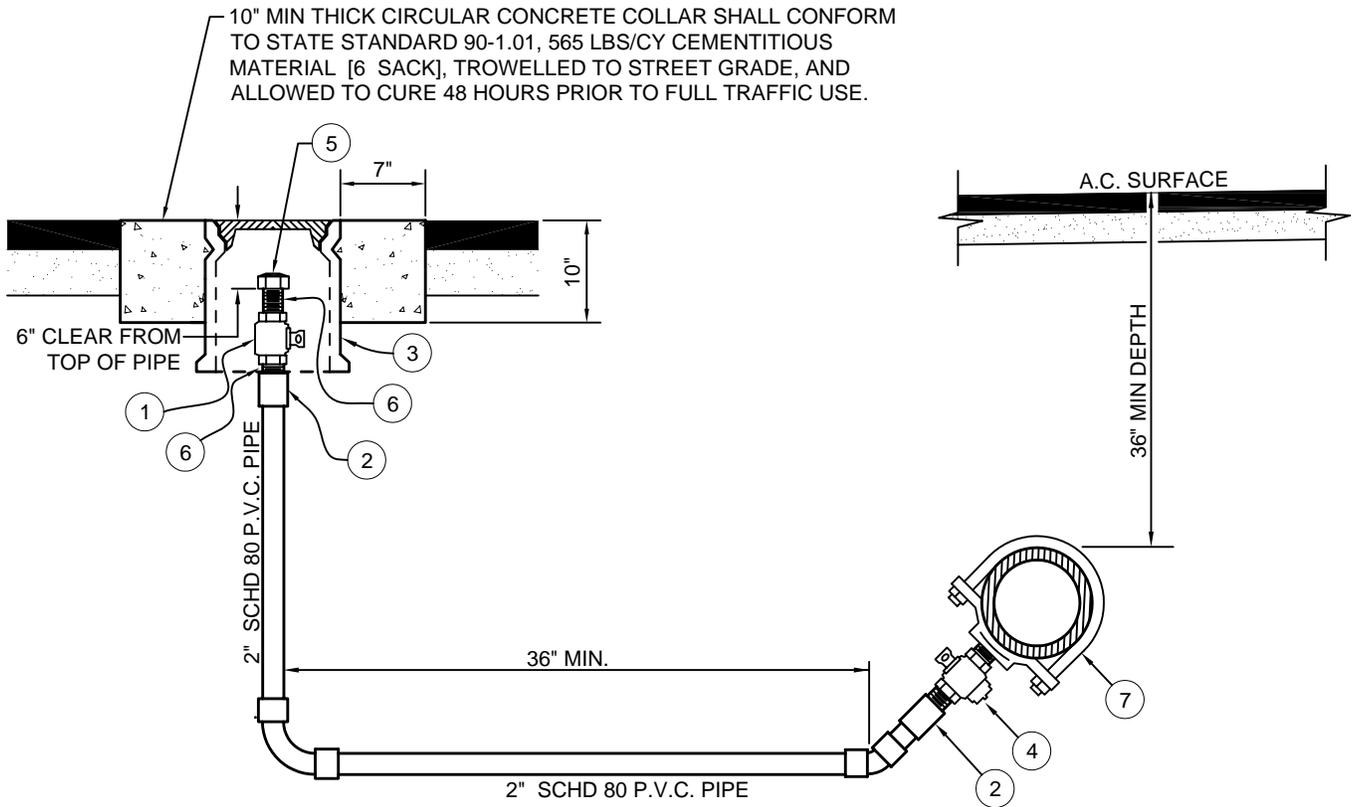
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

1-1/2" BLOW-OFF ASSEMBLY

Scale: NTS	Adopted: 2011
Drawing No:	W-5
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
CONCRETE COLLAR NOTE, REMOVE THRUST BLOCK	REM	NOV 07			



ON-RUN CONNECTION OR DEAD END

NOTES:

1. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
2. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.
3. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

ITEM NO.	QTY. REQ'D.	SIZE AND DESCRIPTION	MATERIAL SPECIFICATION
1	1	2" CURB STOP	JAMES JONES J-182 WITH LOCKWING, MUELLER, O.A.E.
2	2	2" ADAPTER	I.P. THREAD x P.V.C. SLIP
3	1	VALVE BOX WITH CAST IRON LID	CHRISTY G-8, BROOKS 3-RT, O.A.E.
4	1	2" CORPORATION STOP	JAMES JONES J-40, MUELLER H-10012, O.A.E.
5	1	2" IP GALV. CAP	
6	2	2" IP GALV. NIPPLE	
7	1	SERVICE SADDLE	MUELLER BRONZE DOUBLE STRAP BR 2B 0899 IP 200, O.A.E.

O.A.E. = "OR APPROVED EQUAL"



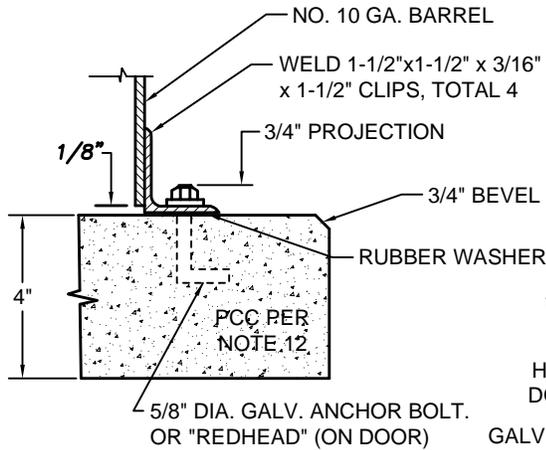
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

2" BLOW-OFF ASSEMBLY

Scale: NTS	Adopted: 2011
Drawing No: W-5a	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date
NOTES 1-7, ADDED NOTES 11 & 12, MISC NOTES, & DRAFTING	REM	NOV 07			



DETAIL "A"

SURFACE PREPARATION AND PAINT:

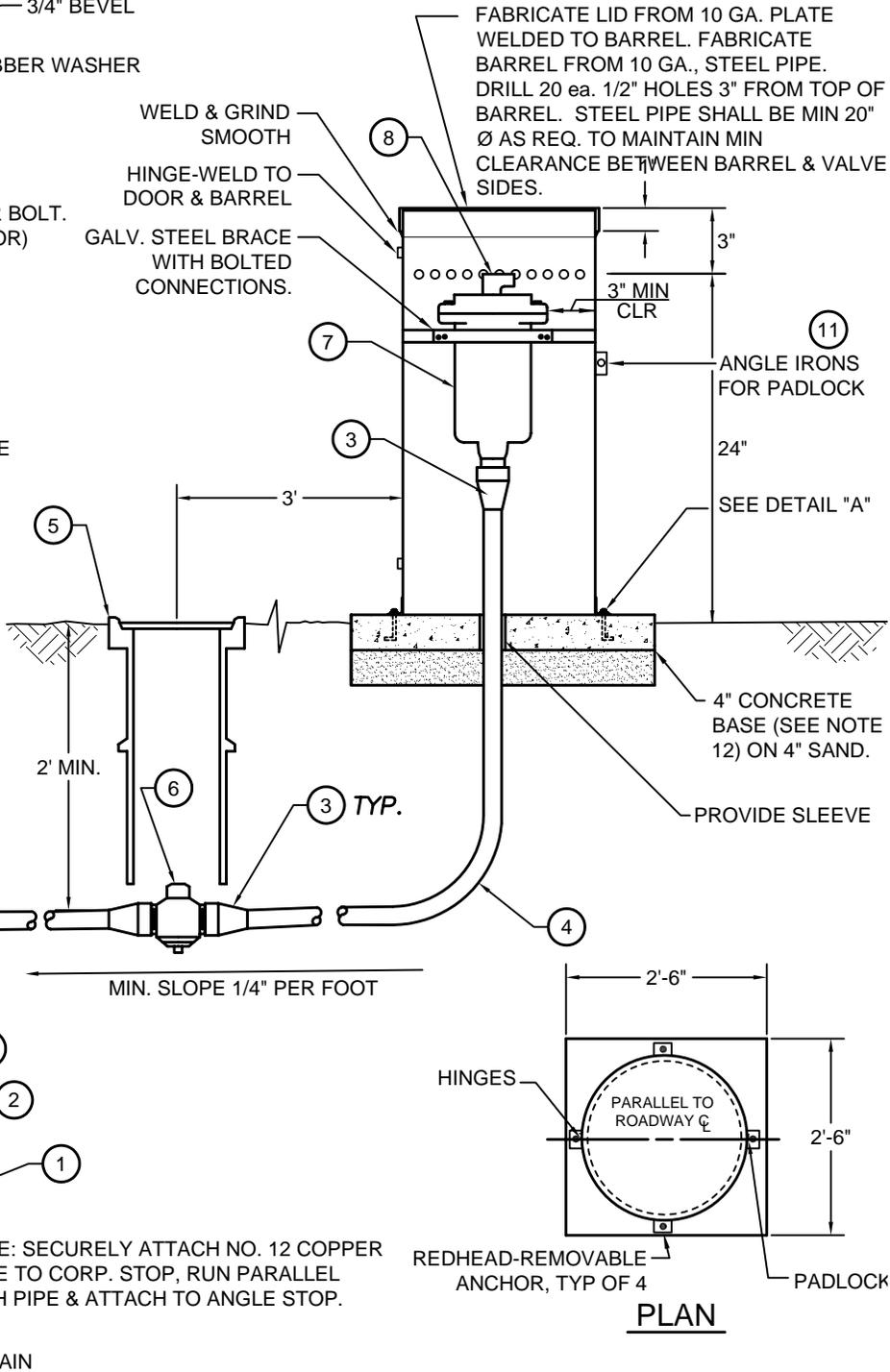
- PREPARE BOTH INSIDE AND OUTSIDE PIPE SURFACES BY WIRE BRUSH CLEANING.
- INSIDE AND OUTSIDE SURFACES SHALL BE PRIMER COATED WITH TWO COATS. PRIMER SHALL BE "RUST-OLEUM CLEAN METAL PRIMER", OR APPROVED EQUAL.
- PAINT SHALL BE RUST-OLEUM INDUSTRIAL ENAMEL COLOR "SAFETY BLUE", OR APPROVED EQUAL, TWO COATS OF PAINT ARE REQUIRED.

FABRICATE LID FROM 10 GA. PLATE WELDED TO BARREL. FABRICATE BARREL FROM 10 GA., STEEL PIPE. DRILL 20 ea. 1/2" HOLES 3" FROM TOP OF BARREL. STEEL PIPE SHALL BE MIN 20" Ø AS REQ. TO MAINTAIN MIN CLEARANCE BETWEEN BARREL & VALVE SIDES.

WELD & GRIND SMOOTH
HINGE-WELD TO DOOR & BARREL
GALV. STEEL BRACE WITH BOLTED CONNECTIONS.

NOTES:

- BRONZE SERVICE SADDLE, DOUBLE STRAP, WITH AWWA I.P. THREADS.
- CORPORATION STOP w/ I.P. THREADS.
- MUELLER INSTA-TITE CONNECTION.
- POLYETHYLENE PIPE, PIPE SIZE SHOULD MATCH AIR & VACUUM RELIEF VALVE SIZE AS SPECIFIED IN TABLE 6-5 OF THESE STANDARDS.
- CAST IRON TRAFFIC COVER & EXTENSIONS AS REQUIRED.
- BALL VALVE.
- AIR & VACUUM RELIEF VALVE w/STAINLESS STEEL TRIM
- SCH. 80 PVC ELBOW
- 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
- COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.
- ANGLE 1 1/2"x1 1/2"x3/16" LONG. WELD TO BARREL AND DOOR WITH HOLES FOR PADLOCK (2 REQ.).
- CONCRETE BASE SHALL CONFORM TO STATE STANDARD 90-1.01, 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK].



NOTE: SECURELY ATTACH NO. 12 COPPER WIRE TO CORP. STOP, RUN PARALLEL WITH PIPE & ATTACH TO ANGLE STOP.

PLAN

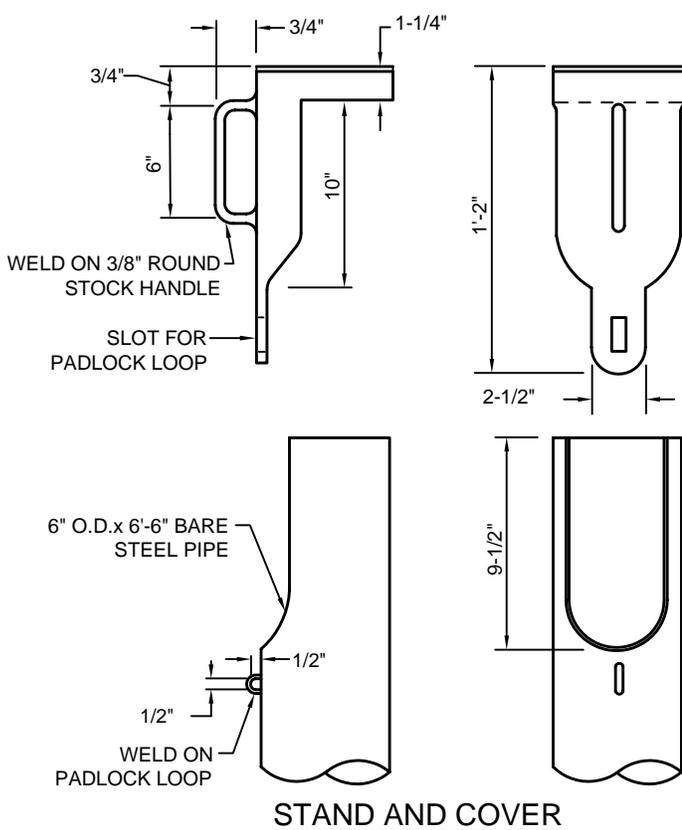


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
AIR and VACUUM RELIEF ASSEMBLY

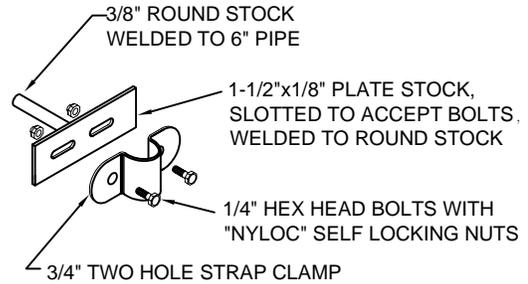
Scale: NTS	Adopted: 2011
Drawing No: W-6	
Sheet No: 1 OF 1	

Revisions

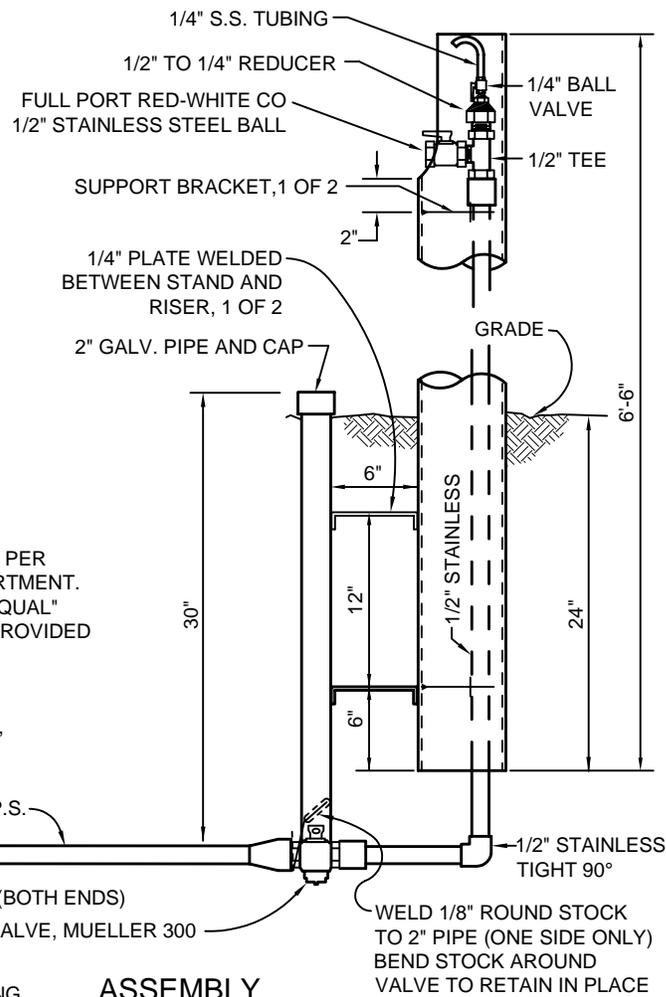
Description	Approved	Date	Description	Approved	Date



STAND AND COVER

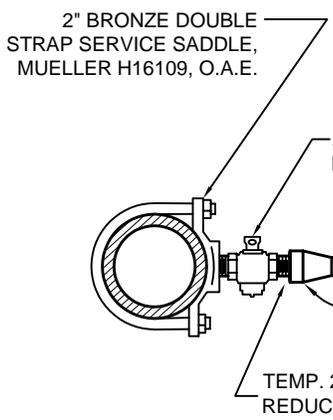


SUPPORT BRACKET



ASSEMBLY

- NOTES:
1. LOCATE SAMPLE STATION PER DIRECTION OF THE DEPARTMENT.
 2. O.A.E. = "OR APPROVED EQUAL"
 3. SAMPLE STATION TO BE PROVIDED BY WATER PURVEYOR.



- NOTES:
1. SURFACE PREPARATION AND PAINT:
 - a. WELD ALL SUPPORT BRACKETS TO PIPE PRIOR TO PAINTING.
 - b. PREPARE BOTH INSIDE AND OUTSIDE PIPE SURFACES BY WIRE BRUSH CLEANING.
 - c. INSIDE AND OUTSIDE SURFACES SHALL BE PRIMER COATED WITH TWO COATS. PRIMER SHALL BE "RUST-OLEUM CLEAN METAL PRIMER", OR APPROVED EQUAL.
 - d. PAINT SHALL BE RUST-OLEUM INDUSTRIAL ENAMEL COLOR "SAFETY BLUE", OR APPROVED EQUAL, TWO COATS OF PAINT ARE REQUIRED.
 2. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
 3. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

WATER SAMPLING STATION

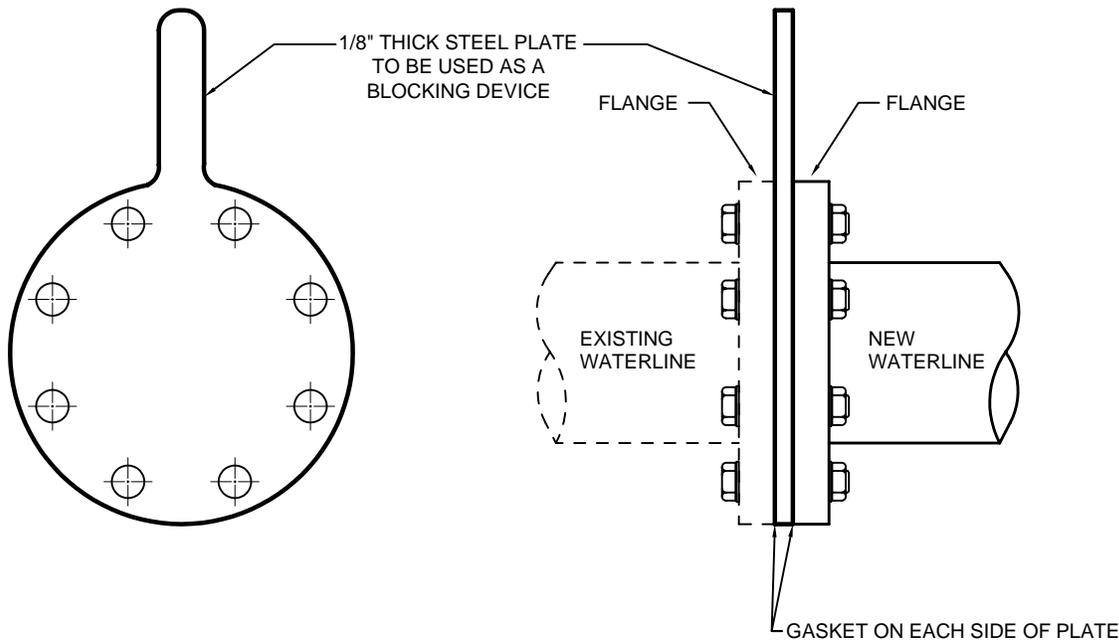
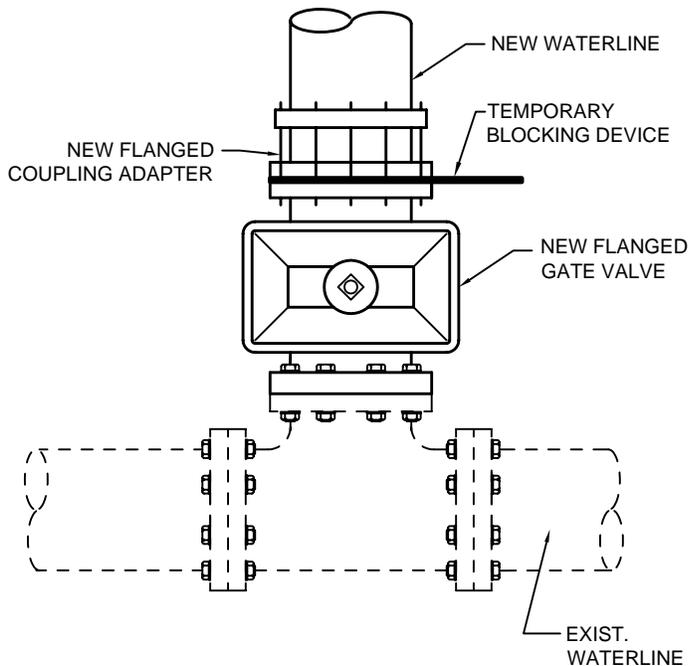
Scale: NTS	Adopted: 2011
Drawing No:	W-7
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date

NOTES:

1. DIRECT CONNECTION TO THE EXISTING WATER SYSTEM SHALL NOT BE PERMITTED UNTIL THE NEW INSTALLATION HAS PASSED BACTERIA TESTING AND A PHYSICAL CHECK BY THE WATER QUALITY MANAGER. SEPARATION SHALL BE ACHIEVED BY THE INSTALLATION OF THE TEMPORARY BLOCKING DEVICE AS SHOWN HEREON
2. PRESSURE TESTING AGAINST VALVES SHALL NOT BE ALLOWED. NEW VALVES SHALL BE SWABBED WITH CHLORINE PRIOR TO INSTALLATION.
3. WHEN TEMPORARY BLOCKING DEVICE IS REMOVED, THE CONTRACTOR SHALL ADJUST FITTING TO ELIMINATE 1/8" GAP WITHOUT FORCING THE JOINT TOGETHER.
4. TEST PRESSURE SHALL BE 50 PSI GREATER THAN THE WORKING PRESSURE OF THE PIPE MEASURED AT THE LOWEST ELEVATION OF THE SYSTEM OR 150 PSI, WHICHEVER IS GREATER.



PROCEDURE FOR CONNECTING NEW WATERLINES TO EXISTING SYSTEM (ALTERNATIVE TO THE OLD INDUSTRIAL STANDARD METHOD): AT THE POINT OF CONNECTION TO THE EXISTING SYSTEM, ALL JOINTS BETWEEN FITTINGS AND VALVES SHALL BE FLANGED. ANY CHANGE REQUIRES WRITTEN APPROVAL FROM THE DEPARTMENT. AT THE JOINT THAT CONNECTS THE EXISTING SYSTEM TO THE NEW LINE, A BLOCKING DEVICE SHALL BE INSTALLED. THIS DEVICE SHALL BE CONSTRUCTED OF 1/8" THICK STEEL PLATE. IT SHALL BE INSTALLED BETWEEN THE TWO FLANGES WITH A GASKET ON EACH SIDE. THIS WILL ALLOW ALL FITTINGS, VALVES, AND THE PIPELINE TO BE DISINFECTED AND PRESSURE TESTED AS ONE UNIT. AFTER THE NEW SYSTEM HAS MET ALL REQUIREMENTS, THE DEPARTMENT WILL ALLOW THE CONTRACTOR TO REMOVE THE BLOCKING DEVICE. THE DEVICE AND BOTH GASKETS ARE TO BE REMOVED AND A NEW GASKET SHALL BE INSTALLED BETWEEN THE FLANGES. THE NEW SYSTEM IS THEN IN SERVICE.

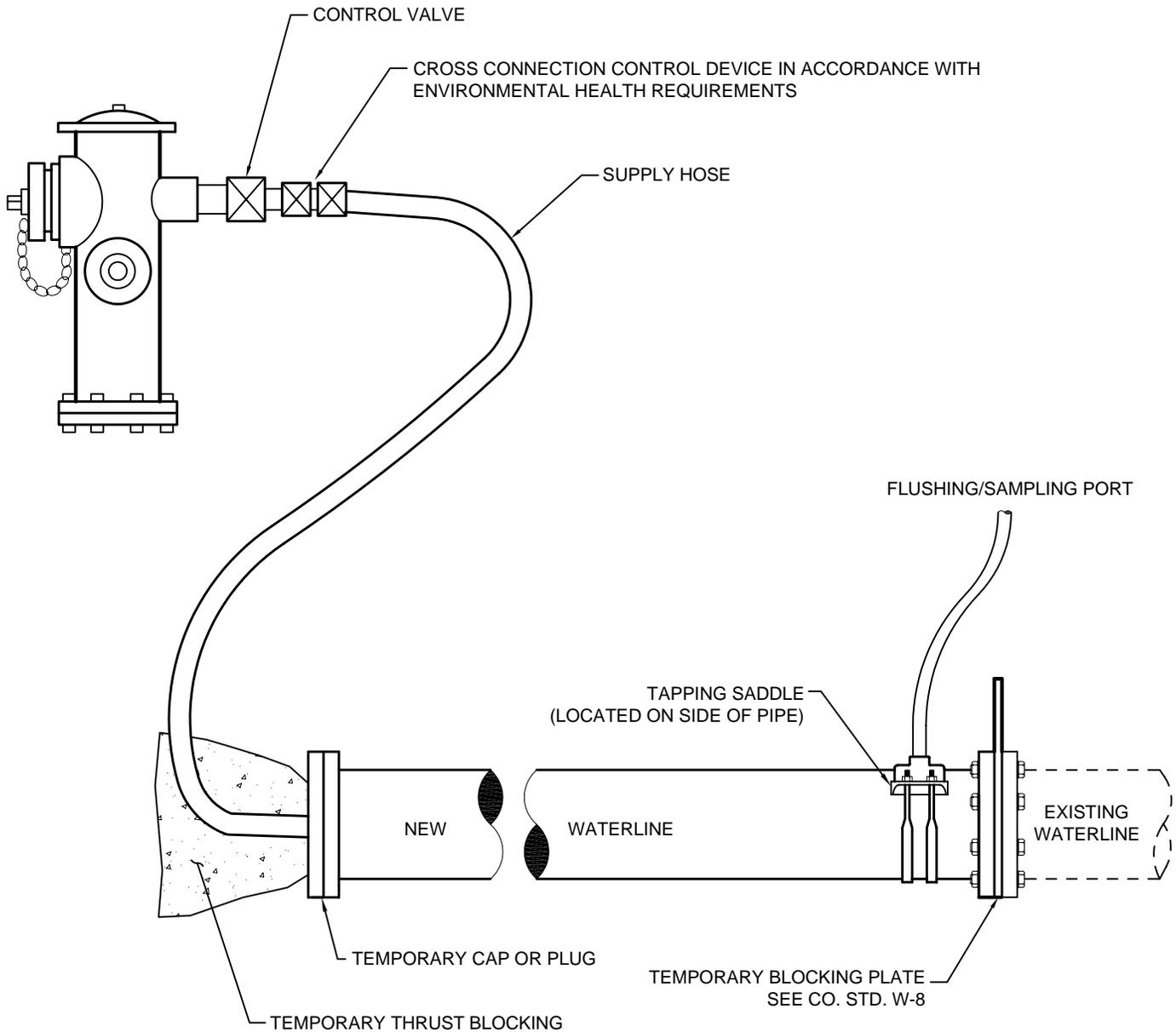


DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
**NEW WATERLINE
 CONNECTION DETAILS**

Scale: NTS	Adopted: 2011
Drawing No: W-8	
Sheet No:	1 OF 1

Revisions

Description	Approved	Date	Description	Approved	Date



NOTES:

1. DIRECT CONNECTION TO THE EXISTING WATER SYSTEM SHALL NOT BE PERMITTED UNTIL THE NEW INSTALLATION HAS PASSED BACTERIA TESTING. MAINTAIN AIR GAP PER AWWA STD. C651



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
**NEW WATERLINE
 FLUSHING DETAIL**

Scale: NTS	Adopted: 2011
Drawing No: W-9	
Sheet No:	1 OF 1

San Luis Obispo County

Department of Public Works & Transportation



APPENDIX

TO

2014 Public Improvement Standards

Available Online at:

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

Appendix

Improvement Plans A

- A1: General Notes
- A2: Erosion Control Notes
- A3: Traffic Control Notes
- A4: Traffic Signal Plan Notes
- A5: Public Improvements Acceptance for County Maintenance Inventory Data Requirements
- A6: Requirements for Subdivision Grading Permit Exceptions
- A7: Improvement Plan Checklist
- A8: Design Exception Request Application

Americans with Disabilities Act (ADA) Guidance

- B1: Reserved for ADA Grievance Form
- B2: ADA Design Exception Request Form
- B3: Caltrans DIB 82-05 – Pedestrian Accessibility Guidelines for Highway Projects
- B4: Caltrans Standard Plan – A88A – Curb Ramp Details
- B5: Caltrans Standard Plan – A88B – Curb Ramp Island Passageway Details
- B6: Caltrans Standard Plan – A90A – Accessible Parking Off-Street
- B7: Caltrans Standard Plan – A90B – Accessible Parking On-Street

Concrete C

- C1: Concrete Mix Designations
- C2: Compressive Strength Testing of Concrete
- C3: Concrete Mix by Type of Construction

Road Design D

- D1: Street Design Considerations
- D2: Recommendations for installing Marked Crosswalks
- D3: Left Turn Warrant Analysis Graphs (AASHTO)
- D4: Design Information Bulletin 79-03 – 3R and 2R Standards
- D5: Caltrans High Risk Utilities Policy

Encroachment E

- E1: Encroachment Permit Application and Procedures
- E2: Special Event Application and Procedures
- E3: County Lane Closure Restriction List
- E4: MUTCD – Typical Application 3 – Work on Shoulders (TA-3)
- E5: MUTCD – Typical Application 6 – Shoulder Work with Minor Encroachment (TA-6)
- E6: Reserved for future Public Work Approved Tree Planting List
- E7: Subdivision Project Security

Drainage F

- F1: Drainage Report Format
- F2: “n” Values for Manning’s Formula
- F3: Geotextile Selection
- F4: LID Specifications

Waterline G

- G1: Waterline Disinfection Procedures
- G2: Well Water Metering Standards and Installation Guidelines
- G3: CDPH Supplemental Separation Guidelines

Selected Board of Supervisor Policies

G

- H1: Resolution 2003-412: A Resolution Adopting a Policy Establishing Clearance Requirements for County Right-of-Way
- H2: Resolution 2007-344: Establishing Requirements for Financing Maintenance of New Streets and Roads Constructed by Subdivisions
- H3: Resolution 2008-152: Revising Policies Regarding Land Development Improvements on County Maintained Streets and Roads

Selected Calfire Standards on Developing Private Roads

I

- Standard 1 Water Supply
- Standard 2 Addressing
- Standard 3 Roof Access
- Standard 4 Access Roads and Driveways
- Standard 5 Tents Membranes and Canopies
- Standard 5A Gate Requirements
- FP-1: Residential Sample Site Plan for Fire Safety Application
- FP-2: Residential Water Supply Tanks
- FP-3: Residential Fire Connection
- FP-4: Fire Hydrant Bollards
- FP-5: Driveway and Access Road Gates
- FP-6: Vegetation Clearance Requirements
- FP-7: Private Driveway and Access Road – Paved Road Standard
- FP-8: Private Driveway and Access Road – Gravel Road Standard
- FP-9: Road Slope Standard
- FP-10: Fire Truck Design Template
- FP-11: Private Driveway and Access Road – Vertical Curve Standard
- FP-12: Private Driveway and Access Road – Horizontal Curve Standard
- FP-13: Private Driveway and Access Road – Turn Around and Bulbout
- FP-14: Private Driveway and Access Road – Turn Around and Hammerhead
- FP-15: Private Driveway and Access Road – Turn Around and Modified Hammerhead

APPENDIX A
Improvement Plans

These notes are subject to change. Please check the Department website to confirm you have the most-current version.

A1: General Notes

1. No construction shall be started without plans approved by the County Department of Public Works. The Department of Public Works shall be notified at least 24 hours prior to starting of construction and of the time location of the preconstruction conference. Any construction performed without approved plans or prior notification to the Department of Public Works will be rejected and will be at the contractor's and/or owner's risk.
2. For any construction performed that is not in compliance with plans or permits approved for the project the Public Works Department may revoke all active permits and recommend that County Code Enforcement provide a written notice or stop work order in accordance with Section 22.52.140 [23.10] of the Land Use Ordinance.
3. All construction work and installations shall conform to the most current County of San Luis Obispo Public Improvement Standards and all work shall be subject to the approval of the Department of Public Works.
4. The project owner and contractor shall be responsible for providing and/or maintaining all weather access at all times to existing properties located in the vicinity of work. Additionally, they shall be responsible for maintaining all existing services, including utility, garbage collection, mail distribution, etc., to all existing properties located in the vicinity of work.
5. On-site hazards to public safety shall be shielded by construction fencing. Fencing shall be maintained by the project owner and contractor until such time that the project is completed and occupied, potential hazards have been mitigated, or alternative protective measures have been installed.
6. Soils tests shall be done in accordance with the County Public Improvement Standards, Section 3.2.3. All tests must be made within 15 days prior to the placing material. The test results shall clearly indicate the location and source of the material.
7. Roadway compaction tests shall be made on subgrade material, aggregate base material, and material as specified by the Soils Engineer. Said tests shall be made prior to the placement of the next material lift.
8. Subgrade material shall be compacted to a relative compaction of 95% in the zone between finished subgrade elevation and a minimum of 1-foot below. All material in fill sections below the zone mentioned above shall be compacted to 90% relative compaction.
9. A registered civil engineer shall certify that the improvements when completed are in accordance with the plans prior to the request for a final inspection. Record Drawings shall be prepared after construction is completed. The civil engineer certifying the improvements and preparing as-built plans may be present when the final inspection is made by the County.
10. An Engineer of Work Agreement and an Engineer Checking and Inspection Agreement are required prior to the start of construction. The Public Works Department shall be notified in writing of any changes to the Engineer of Work Agreement. Construction shall not proceed without an Engineer or Work.
11. All utility companies shall be notified prior to the start of construction.
12. A County Encroachment Permit is required for all work done within the County right-of-way. The Encroachment Permit may establish additional construction, utility and traffic control requirements.

13. The County Inspector acting on behalf of the County Department of Public Works may require revisions in the plans to solve unforeseen problems that may arise in the field. All revisions shall be subject to the approval of the Developer's Engineer of Work.
14. The structural section shall be based on soils tests taken at the time of construction and using a Traffic Index of _____ for _____ (road name). The structural section shall be approved by the Public Works Department prior to road construction.
15. Hydro-seeding or other permanent erosion control shall be placed and established with 90% coverage on all disturbed surfaces (other than paved or gravel surfaces) prior to the final inspection.
16. For any public improvements to be maintained by the County, if environmental permits from the U.S. Army Corps of Engineers, the California Regional Water Quality Control Board/State Water Resources Control Board, or the California Department of Fish & Game are required, the Developer shall:
 - a. submit a copy of all such completed permits to the County Department of Public Works OR,
 - b. document that the regulatory agencies determined that said permit is not required; prior to acceptance of the completed improvements for County maintenance and release of improvement security. Any mitigation monitoring required by said permits will remain the responsibility of the Developer.
17. When the project site earthwork is not intended to balance then a separate grading permit for the sending or receiving property may be required. A copy of the permit/s or evidence that no permits are required shall be submitted to the Department prior to commencing project earthwork.

These notes are subject to change. Please check the Department website to confirm you have the most-current version.

A2: Erosion Control Notes

1. Erosion control measures for wind, water, material stockpiles, and tracking shall be implemented on all projects at all times and shall include source control, including protection of stockpiles, protection of slopes, protection of all disturbed areas, protection of accesses, and perimeter containment measures. Erosion control shall be placed prior to the commencement of grading and site disturbance activities unless the Public Works Department determines temporary measures to be unnecessary based upon location, site characteristics or time of year. The intent of erosion control measures shall be to keep all generated sediments from entering a swale, drainage way, watercourse, atmosphere, or migrate onto adjacent properties or onto the public right-of-way.
2. Site inspections and appropriate maintenance of all erosion control measures/devices shall be conducted and documented at all times during construction and especially prior to, during, and after rain events.
3. The Developer shall be responsible for the placement and maintenance of all erosion control measures/devices as specified by the approved plan until such time that the project is accepted as complete by the Public Works Department or until released from the Conditions of Approval of their General Permit. Erosion control measures/devices may be relocated, deleted or additional measures/devices may be required depending on the actual conditions encountered during construction. Additional erosion control measures/devices shall be placed at the discretion of the Engineer of Work, County Inspector, SWPPP Monitor, or RWQCB Inspector. Guidelines for determining appropriate erosion control devices shall be included in the plans with additional measures/devices noted from the appendix of the Public Improvement Standards.
4. Wet weather erosion control measures/devices shall be available, installed, and/or applied between October 15 and April 15 or anytime when the rain probability exceeds 30%.
5. The Contractor, Developer, and Engineer of Work shall be responsible to review the project site prior to October 15 (rainy season) and to coordinate an implementation plan for wet weather erosion control devices. A locally based standby crew for emergency work shall be available at all times during the rainy season (October 15 through April 15). Necessary materials shall be available and stock piled at convenient locations to facilitate rapid construction or maintenance of temporary devices when rain is imminent.
6. In the event of a failure, the Developer and/or his representative shall be responsible for cleanup and all associated costs or damage. In the event that damage occurs within the right-of-way and the County is required to perform cleanup, the owner shall be responsible for County reimbursement of all associated costs or damage.
7. In the event of failure and/or lack of performance by the owner and/or contractor to correct erosion control related problems the Public Works Department may revoke all active permits and recommend that County Code Enforcement provide a written notice or stop work order in accordance with Section 22.52.140 [23.10] of the Land Use Ordinance.
8. Permanent erosion control shall be placed and established with 90% coverage on all disturbed surfaces other than paved or gravel surfaces, prior to final inspection. Permanent erosion control shall be fully established prior to final acceptance. Temporary erosion control measures shall remain in place until permanent measures are established.

9. The County Air Pollution Control District (APCD) may have additional project specific erosion control requirements. The Contractor, Developer, and Engineer of Work shall be responsible for maintaining self-regulation of these requirements.

10. All projects involving site disturbance of one acre or greater shall comply with the requirements of the National Pollutant Discharge Elimination System (NPDES). 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. WDID No.:

Person to contact 24 hours a day in the event there is an erosion control/sedimentation problem (Storm Water Compliance Officer): Name _____ Local Phone No: _____

These notes are subject to change. Please check the Department website to confirm you have the most-current version.

A3: Traffic Control Notes

1. The Encroachment Permit applicant shall be responsible to assure that the appropriate existing traffic controls remain in place and functional during all construction phases. The Contractor shall cover any conflicting signs that exist along the roadway.
2. No work shall commence without the Construction Signs installed and other necessary traffic control devices on site. Stationary mounted construction area signs shall be fluorescent orange, using materials from the Caltrans “Prequalified Products List” for Signing and Delineation Materials. The list is available at the website of the Caltrans Office Engineer: www.dot.ca.gov/hq/esc/approved_products_list/
3. No lane closures are permitted on the roads and between the times listed in the Department’s “Lane Closure Restriction List.” No lane closure shall be permitted on Friday afternoon before weekends with Federal legal holidays, on the roads listed. Affected streets will be shown in the Encroachment Permit. [The “County Lane Closure Restriction List” is provided in Appendix E3.]
4. At the conclusion of each work day, all paved traveled-way surfaces shall be restored to an all-weather, traversable condition. There shall not be a drop-off along the edge of traveled way >0.15-feet. “Low Shoulder” signs shall be placed along the traveled way where there is any drop-off. Drop-offs >0.15-feet shall require either:
 - a. Backfilling the drop-off to a minimum 4:1 slope;
 - b. Providing appropriate steel plates over excavation;
 - c. Providing temporary concrete railing along the work zone in conformance with the *State Standard Plans* and Specifications.
5. Excavations beyond eight (8) feet from the edge of traveled way may utilize portable delineators at appropriate spacing, along with “Open Trench” signs.
6. Where steel plates are used, they shall be pinned, and have a cold-mix slope of 12:1 placed on all sides. They shall be friction-coated for traction. Appropriate warning signs shall be placed.
7. Pedestrian access shall be afforded through the work area on County Roads in urban areas, either by providing necessary facilities for safe and viable access, or by providing appropriate advance warning to pedestrians to use alternate routes. Bicycle routes and lanes, when impacted by construction, shall be signed to afford safe passage through the work zone or to designate alternate routes. For both pedestrians and bicycles, surfaces shall be maintained free of loose debris and gravel.
8. No construction equipment or materials shall be parked or stored within six (6) feet of the edge of the traveled way. When construction equipment or materials are stored within the right-of-way, further than six (6) feet from the edge of the traveled way, the shoulder area shall be signed as closed, and portable delineators shall be used to mark a taper in advance of the material or equipment.
9. Removal of existing pavement striping or markings shall be by sandblasting or grinding. When the change of position will be greater than two (2) feet, the removed striping shall be further obscured by use of a Chip Seal, as required by Section 9.1.2 D. The Chip Seal shall extend the full width of the roadway.

10. Parking restrictions shall be posted 24 hours before any work starts. Posting shall be done by the Contractor.
11. All private driveways and side streets shall be kept open at all times, except when construction takes place immediately in front of the driveway or side street.
12. Any work that disturbs normal traffic signal operations shall be coordinated with the Public Works Transportation Division at least three (3) business days prior to beginning the work involving the signal. The Contractor shall replace all traffic signal loop detectors, damaged during construction, within five (5) days of the completion of construction involving the signal. Any damage to existing in-pavement loop detectors will require replacement within five days of the start of any trench cut work. Intersection detection shall be replaced with video detection system(s) acceptable to the Department. All components shall be available on the job site prior to commencing the trench work which will affect the loop(s). All costs, including Department operations time, shall be paid by the Developer.
13. All delineators shall be equipped with nighttime reflective bands, and spaced no greater than 50-foot intervals along tapers, lane control, and/or edge of work zone.
14. The operator of any transit operation affected by the work shall be notified two (2) working days prior to work commencing.
15. All flaggers shall hold current certifications. As defined under Cal OSHA Construction Safety Order Section 1599, all flaggers on the roadway shall be trained by qualified and experienced personnel to the aspects noted in Section 1599. The Developer or Project Engineer shall be responsible to ensure that the Contractor or other agents utilize trained personnel only. All workers within the roadway shall wear Type 2 CAL-OSHA high-visibility vests.

These notes are subject to change. Please check the Department website to confirm you have the most-current version.

A4: Traffic Signal Plan Notes

When the installation and modification of any signal for the County of San Luis Obispo is proposed the following notes must be included on the plans:

1. All work, material and equipment shall conform to the provisions of the Standard Plans and Specifications of the State of California, Department of Transportation (Caltrans) dated May 2006, and the Special Provisions.
2. A County Encroachment Permit shall be required to perform work within the County right-of-way. County approved plans do not relieve the contractor from the responsibility of obtaining an Encroachment Permit. A copy of the permit shall be kept on the construction site at all times.
3. The contractor shall be responsible for providing a detailed traffic control plan for any lane closures associated with the traffic signal construction.
4. The location of all existing underground utilities is approximate only. The contractor shall be responsible for verifying the exact location and depth of all utilities including those not shown on the plan prior to start of work. Contact Underground Service Alert at (800) 422-4133 at least 48 hours in advance.
5. The Developer shall be responsible for coordinating with Pacific Gas & Electric Company (PG&E) to have a power supply and meter installed.
6. The contractor shall be responsible for obtaining an Electrical Permit from the County's Planning Department for the service pedestal.
7. The contractor shall be responsible for obtaining all necessary permits and notifying affected agencies at least 72 hours prior to start of work.
8. Unless shown otherwise, inductive loop detectors shall be Type "C", loop detector wire shall be Type "1" and detector lead-in cable shall be Type "B". Prior to installation, the Department shall verify all loop detector locations in the field. Unless stated otherwise, all necessary striping shall be in place prior to positioning of detectors. Loop detectors shall be sealed with a "Hot Melt Sealant".
9. The Conductor Schedule is furnished as an installation guideline only. It shall be the Contractor's responsibility to provide the appropriate number of conductors required for the intended operation.
10. All vehicle signal indications shall be 12-inches. The signal housing, backplates and visors shall be metal. All signal indications shall be LED.
11. The Contractor shall provide the Department with a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the LED signal modules comply with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the LED signal modules.
12. All pull boxes shall be No. 6, unless otherwise noted on the plans. Pull boxes shall not be located in or within 1-foot of any curb access ramp or driveway. All pull boxes and covers shall be concrete and shall be marked "Traffic Signal"

13. The contractor shall verify with the Department the exact location of all traffic signal equipment prior to installation.
14. The Contractor shall arrange to have a signal technician, qualified to work on the controller unit and employed by the controller unit manufacturer, or the manufacturer's representative, present at the time the equipment is turned on.
15. All conduits shall be 3-inch unless otherwise noted. All stub-outs shall be 3-inch conduit. All conduits under roadway section shall be installed without open cutting.
16. Each conductor shall be permanently identified. Identification shall be by direct labeling, tags or bands permanently fastened to the conductors. The identification shall be placed on each conductor or group of conductors in each pull box and near the end of each conductor where the conductors are terminated.
17. Luminaires shall be High Pressure Sodium with full cut-off lens, 200W integral ballast unless otherwise noted.
18. Internally Illuminated Street Name signs shall be Type "A".
19. Underground traffic signal conductors shall not be spliced.
20. Any landscaping damaged by signal construction shall be repaired or replaced to the satisfaction of the Department and the property owner.
21. The contractor shall give the County Traffic Engineer 48 hour notice prior to signal turn-on.
22. The contractor shall be responsible for completing all "punch list" items prior to signal turn-on.
23. The controller cabinet schematic wiring diagram and intersection sketch shall be combined into one drawing, so that, when the cabinet door is fully open, the drawing is oriented with the intersection.
24. A maintenance manual shall be furnished for all controller units, auxiliary equipment, and vehicle detector sensor units, control units, and amplifiers. The maintenance manual and operation manual may be combined into one manual. The maintenance manual or combined maintenance and operation manual shall be submitted at the time the controllers are delivered for testing or, if ordered by the Department, prior to purchase. The maintenance manual shall include, but need not be limited to, the following items:
 - a. Specifications
 - b. Design characteristics
 - c. General operation theory
 - d. Function of all controls
 - e. Trouble shooting procedure (diagnostic routine)
 - f. Block circuit diagram
 - g. Geographical layout of components
 - h. Schematic diagrams
 - i. List of replaceable component parts with stock numbers

Typical Traffic Signal Construction Notes

1. Construct Type 332 Cabinet foundation and furnish and install Type 170E controller assembly in a Type 332 Cabinet. The controller assembly shall be equipped with one (1) Model 412C System Memory Module, one (1) GDI Modem and BiTran Systems 233 Program. The controller assembly shall be housed in a Type 332 Cabinet wired for 8 phase operation, and include functions indicated on the plans. The cabinet shall include cabinet drawer assembly, and cabinet light assembly. The cabinet's Police panel shall be equipped with a connection for a traffic signal controller manual override switch. All equipment shall be on the current State of California "Qualified Products List". GDI load switches will not be accepted.
2. Furnish and install a dual-metered Type III-CF Service equipment EVPE enclosure with the following circuit breakers:
 - a. 120/240V - 100A Main
 - b. 120V – 50A Metered Signals
 - c. 240V – 40A Metered Lighting
 - d. 120V – 15A Metered IISNS
 - e. Dual Type V – P.E.C.
3. Furnish and install emergency vehicle pre-emption equipment and 4-channel discrimination equipment required in the controller cabinet. EVPE optical detector shall be mounted on signal mast arm by clamping method. Exact location of detector shall be determined in the field by the Department. Mount on mast arm as shown on Detail "A".
4. Furnish and install Type "V" PEC unit in service cabinet.
5. Furnish and install mast arm mounted sign per Standard Plan ES-7N, Detail "U".
6. Furnish and install 3" conduit with pullrope.
7. Furnish and install #6 pull box as shown.
8. Furnish and install battery back-up system in controller cabinet. Furnish and install battery cabinet on rear of controller cabinet and wire per manufacturer's specifications. Battery back-up cabinet dimensions shall be 27"H x 24"W x 8"D.

A5: Public Improvements Acceptance for County Maintenance Inventory Data Requirements

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 the format listed below. 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.

A. Roads and Controls

1. Street Name
2. Postmile
3. Street Width (feet)
4. Curb Gutter & Sidewalk (yes/no)
5. Intersection Features

B. Drainage Systems

1. Storm Drain Diameter (inches)
2. Storm Drain Material
3. Storm Drain Inlet Postmile
4. Storm Drain Outlet Postmile
5. Catch Basin Type (D-2, etc.)
6. Drainage Basin
 - i. Type of Drainage Basin (Surface shallow or deep, subsurface, etc.)
 - ii. Capacity of Drainage Basin (cubic feet)
 - iii. Fence Material
 - iv. Maintained by (HOA, County, Owner, etc.)

C. Signs/Markings

1. Street Name
2. Sign Type
3. Road Markings
4. Postmile
5. Direction Facing (N, S, E, or W)

D. Map

1. AutoCAD® file with street centerline layouts and drainage layouts.

E. Permits – Copies of Facility Permits from the following regulatory agencies:

1. Corps of Engineers
2. Department of Fish & Game
3. Other regulatory agencies as determined necessary by project characteristics
4. Regional Water Quality Control Board

A6: Requirements for Subdivision Grading Permit Exceptions

Applicable only to applications accepted for processing by the Planning and Building Department prior to May 13, 2010, subdivision projects which are permitted and inspected by the Public Works Department under the Subdivision Exemption (LUO Section 22.52.050 (B) (1) (a) (6) and CZLUO Section 23.05.026 (c)) shall be subject to the *California Building Code* (CBC) and County Buildings And Construction Ordinance, Title 19, requirements for on-site grading, outside of the (current or future) public right of way.

All references are to the 2007 CBC

- A. Building Official. The Director of the Department of Public Works (“Director” as defined in these Public Improvement Standards) will act as a deputy to the Building Official for all Subdivision Grading Permit Exceptions.
- B. Inspections. Inspections shall be performed as required by CBC Appendix Chapter 1, “Administration,” Section 109 (as amended by Section 19.02.020 (h) of Title 19 of the County Code) and the specific chapters and sections covering the particular construction involved.
- C. Special Inspections. The Registered Design Professional in responsible charge (Project Engineer) shall either: (1) document that no Special Inspections are required, or (2) prepare a Statement of Special Inspections and provide a Table on the plans including the following (an excerpt of the tables from the CBC are included at the end of Appendix A6):
 - 1. List required inspection tasks,
 - 2. Delineate continuous or periodic inspection for that task,
 - 3. List who is the qualified Special Inspector to perform the inspections, and
 - 4. Delineate when the report will be provided.
(CBC Chapter 17, Sections 1702, 1704 and 1705)
- D. Special Inspectors. Special inspectors shall be employed by the owner or Registered Design Professional in responsible charge (Project Engineer) acting as the owner’s agent and not by the contractor. Special inspectors shall be a qualified person who shall demonstrate competence to the satisfaction of the Public Works Department. Names and qualifications of special inspector(s) shall be submitted to and approved by the Public Works Department prior to plan approval, unless otherwise requested of, and allowed by, the Department of Public Works. (CBC Chapter 17, Section 1704.1)
- E. Reports. Interim and Final reports shall be submitted as follows:
 - 1. Interim reports will be submitted to the Department of Public Works and the Registered Design Professional in Responsible Charge (Project Engineer). A schedule of interim reports shall be submitted to and approved by the Public Works Department prior to plan approval, unless otherwise requested of, and allowed by, the Department of Public Works.
 - 2. A Final Report of Special Inspections documenting required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted to the Department of Public Works prior to final.
(CBC Chapter 17, Section 1704.1.2)

- F. Soils. Special inspections are required for compaction and any other conditions identified by the preparer of the foundation and soils investigation and/or the engineering geologic report which require additional special inspections. The final report shall include pad elevation certification as needed.

- G. Retaining Walls. The following is a non-exclusive list of possible required inspections. Excluded are retaining walls that are not over 4 feet in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge, impounding hazardous liquids, or located within 3 feet of a property line and retaining soil more than 2 feet in height per Title 19, Section 19.02.020 (c) (4). Wall shall be certified by the project engineer.
 - 1. Reinforced Concrete Retaining Walls Special Inspections:
 - a. Foundation
 - b. Concrete with compressive strength > 2,500 psi
 - c. Pours of greater than 50 cy
 - d. Welded reinforcement

 - 2. Reinforced Concrete Masonry Unit (CMU) Retaining Walls Inspections:
 - a. Foundation
 - b. Grout
 - c. Reinforcement

Excerpt of Table from the CBC

Notation Used in Table:

Column headers:

- C Indicates continuous inspection is required.
- P Indicates periodic inspections are required. The table notes or other plan notes shall clearly describe the level or frequency of inspection.

Box entries:

- X Is placed in the appropriate column to denote either “C” continuous or “P” periodic inspections.
- Denotes an activity that is either a one-time activity or one whose frequency is defined in some other manner which shall be clearly delineated on the plans.

Additional tables are listed in CBC Chapter 17.

Edit table(s) for the specific project (eliminate unused portions, add notes, etc.) and include on the project plans.

Verification and Inspection	C	P	Notes
Table 1704.4 - Concrete			(add project specific notes as required)
1. Inspection of reinforcing steel, including prestressing tendons and placement.		X	
2. Inspection of reinforcing steel welding in accordance with Table 1704.3 Item 5b.	---	---	
3. Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased.	X		
4. Verifying use of required design mix.		X	
5. At time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests and determine the temperature of the concrete.	X		
6. Inspection of concrete and shotcrete placement for proper application techniques.	X		
7. Inspection for maintenance of specified curing temperature and techniques.		X	
8. Inspection of prestressed concrete.			
8a. Application of prestressing forces.	X		
8b. Grouting of bonded prestressing tendons in the seismic force-resisting system.	X		
9. Erection of precast concrete members.		X	
10. Verification of in-situ concrete strength, prior to stressing of tendons in postensioned concrete and prior to removal of shores and forms from beams and structural slabs.		X	
11. Inspect formwork for shape, location, and dimensions of the concrete member being formed.		X	

Verification and Inspection	C	P	Notes
Table 1704.5.1 - Level 1 Masonry Inspections.			(add project specific notes as required)
1. At the start of masonry construction verify the following to ensure compliance:			
1a. Proportions of site-prepared mortar.		X	
1b. Construction of mortar joints.		X	
1c. Location of reinforcement, connectors, prestressing tendons, and anchorages.		X	
1d. Prestressing technique.		X	
1e. Grade and size of prestressing tendons and anchorages.		X	
2. Verify:			
2a. Size and location of structural elements.		X	
2b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.		X	
2c. Specified size, grade, and type of reinforcement.		X	
2d. Welding of reinforcing bars.	X		
2e. Protection of masonry during cold weather (temperature below 40 degrees F) or hot weather (temperature above 90 degrees F)		X	
2f. Application and measurement of prestressing force.		X	
3. Prior to grouting verify the following to verify compliance.			
3a. Grout space is clean.		X	
3b. Placement of reinforcement and connectors and prestressing tendons and anchorages.		X	
3c. Proportions of site-prepared grout and prestressing grout for bonded tendons.		X	
3d. Construction of mortar joints.		X	
4. Verify grout placement to ensure compliance with code and construction document provisions.	X		
4a. Observe grouting of prestressing bonded tendons.	X		
5. Observe preparation of required grout specimens, mortar specimens, and/or prisms.	X		
6. Verify compliance with required inspection provisions of the construction documents and the approved submittals.		X	

Verification and Inspection	C	P	Notes
Table 1704.7 - Inspection of Soils			(add project specific notes as required)
1. Verify materials below footings are adequate to achieve the desired bearing capacity.		X	
2. Verify excavations are extended to proper depth and have reached proper material.		X	
3. Perform classification and testing of controlled fill materials.		X	
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X		
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.		X	

This checklist is subject to change. Please check the Department website to confirm you have the most-current version.

A7: Improvement Plan Checklist

San Luis Obispo County Public Works Department: Improvement Plan Checklist

Engineer of Work: _____	File: _____
Developer: _____	W.O: _____
Tentative Approval Date: _____	Plan Checker: _____
Main File Review Date: _____	Field Review Date: _____

	Date Received	Date Checked	Date Returned
1 st Submittal			
2 nd Submittal			
3 rd Submittal			
4 th Submittal			

Item	1 st	2 nd	3 rd	4 th
Checking & Inspection Agreement received				
Checklist and check prints returned with resubmittal				
Conditions of Approval attached to plan check, all construction COA addressed				
Engineer of Work Agreement received				
Soils report received (Tract Map SMA §66490 & Co. Code §21.02.048(a)(7)(i))				
Transmittal letter received with submittal				
Two good blue-line drawing sets received				

Approved Design Exception [Section 1.2]:

Description of Exception	Approval Date

Project Conditions of Approval:

Revised May 2012
 V:_DEVSERV Forms\Plan Check Unit\Form-Plan Checklist.doc

San Luis Obispo County Public Works Department: Improvement Plan Checklist

Approvals Required Prior to Permit Issuance:	1st	2nd	3rd	4th
▶ All plan check comments sufficiently addressed by design engineer				
All construction related project Conditions of Approval have been satisfied				
Conforms to County Drainage Ordinance and Policies				
Conforms to County Stormwater Pollution Prevention Discharge Ordinance				
Copies of all recorded easements (if not done with map recordation)				
Copies of all Right-of-Entries provided (when working outside permitted site)				
Copies of all State and Federal Environmental Permits (ACOE, F&G, SWRCB, etc)				
Engineers seal, signature, date, and expiration date on each sheet of plan set				
WDID Number shown on plans (No: _____)				
Outside Agencies (signatures on Title Sheet)				
• Cal Fire (or local fire agency)				
• Electric purveyor				
• Gas purveyor				
• Telephone purveyor				
• Cable Television purveyor				
County Agencies (verification collected by County plan checker)				
• Parks Department Review				
• Planning Department Review				
• PW Design Division Review				
• PW Roads Division Review				
• PW Transportation Division Review				
• PW Utilities Division Review				
▶ Other plan check comments:				

Roadway Design Parameters:

Road	T.I.	ADT	Terrain	Design Speed	Min Radius	Max Grade %

San Luis Obispo County Public Works Department: Improvement Plan Checklist

Improvement Plans [Section 1.1]:	1st	2nd	3rd	4th
► Conforms with Public Improvement Standards, Section 1				
All existing and proposed physical features clearly differentiated				
All existing physical features clearly shown and labeled to retain or remove				
All proposed physical features clearly shown and labeled for construction				
All tangent and vertical curve information labeled on profiles				
Basis of Bearing provided				
Benchmark provided and ties into County approved datum				
Centerline data shown (curve data & tangent bearing and distance)				
Conforms clearly shown and detailed as necessary				
County Title Block on each sheet and accurately completed [L-1]				
Drafting media and sheet size conforms to County Standards				
Earthwork quantities shown				
Erosion control plan and standard notes provided [Appendixes A & B]				
Existing centerline profile shown				
General notes provided [Appendix A]				
No recent or proposed improvements conflict with this project				
North arrow, scale and graphic scale shown accurately on each sheet				
Official Road Names shown (includes Planning Dept approval of road names)				
Plan and Profile sheets match grading plan sheets				
Plan scale 1:20 (1:30 max), Profile scale 1:2 or 1:4 (1:6 max) [1.1.2]				
Plan Sheets				
• Title Sheet				
• Grading & Drainage Plan				
• Erosion Control Plan (construction phase & post construction permanent)				
• Road Plan and Profile				
• Traffic Control Plan				
• Composite Utility Plan (shows all required utility installation)				
• Striping, Signage and Signalization Plan				
• Wall Plan, Profile, Notes, Sections and Details				
• Details (all County and other agency standard details referenced in plans)				
Plan sheets are legible and able to microfilm				
Plans conform to County Specifications [1.1.3]				
Plans conform with project conditions of approval				
Plans conform with subdivision map act (easement, etc)				
Plans conform with tentative map				
Profile Plans show existing centerline				
Proposed improvements conform to existing improvements				
Sheets numbered and appropriately indexed				
Standard Abbreviations conform to County Standards [L-2]				
Stationing accurately shown in both plan and profile				
Stationing conforms to approved County stationing (provided by County)				
U.S.A. Note and Phone number shown on Title Sheet [8.1.1 C]				
Vicinity map adequate to identify project location with north arrow and scale				
► Other plan check comments:				

San Luis Obispo County Public Works Department: Improvement Plan Checklist

Site Preparation and Grading [Section 2.1]:	1st	2nd	3rd	4th
► Conforms with Public Improvement Standards, Section 2				
Conforms to recommendations of the project Soils Report				
Cut and fills conform to CBC requirements (height, benches, setbacks, drains, etc)				
Demolition shown clearly states separate permit required (Planning Dept)				
Existing and proposed contours clearly shown				
Grading conforms with County Specifications [Section 2, Appendix O]				
Limits of disturbance accurately shown and identified				
Parking lots shall conform to LUO 22/23 standards				
Plans clearly address abandonment of wells, septic systems, etc				
Retaining wall details shown (typical sections, drainage, etc)				
Retaining wall plan and profile provided				
Retaining wall structural calculations provided (sign, seal, date)				
Slope easements shown on map (or recorded prior to plan approval)				
Tree removal clearly shown and identified on plans [Appendix G]				
Tree removal conforms to project environmental determination				
Tree trimming conforms to project COA and County Standards [M-5 series]				
► Other plan check comments:				

Roadways [Section 3.1]:	1st	2nd	3rd	4th
► Conforms with Public Improvement Standards, Section 3				
Barricades conform to County Standards [M-2 series]				
Bike lanes (Class II) shall be identified (5' w/ curb, 4' w/ EP) [Co Bikeways Plan]				
Bike ways (Class III) shall be identified (12' min pave lane) [Co Bikeways Plan]				
Bus Turnout conforms to County Standards [A-6c]				
Cul-de-Sac conforms to County Standards [A-6 & A-6a]				
Curve radii conforms to County Standards [A-1, A-2 & A-3]				
Disjointed effect meets AASHTO minimum guidelines				
Horizontal curves meet County Standards [A-5]				
Intersection grades meet County Standards [3.1.2 D]				
Intersections meet at near 90 degrees				
Knuckle conforms to County Standards, allowed in urban areas only [A-6b]				
Longitudinal grades conform to County Standards [3.1.2 A]				
Road widths and transitions clearly shown (or detailed)				
Road section conforms to County Public Improvement Standards [A-1 to A-3 series]				
Road section conforms to project Conditions of Approval				
Road Section shows required structural section calculation note and T.I. <i>"The structural section shall be determined at the time of construction and based on the subgrade R-Value and a Traffic Index of = _____. Prior to construction the structural section calculations shall be submitted to the Department for review and approval. In no case shall the zone of compaction be less than 24-inches."</i>				
Road widening conform to County Standards [R-series]				
Road widening cross sections provided (spacing: 50' min/25' min for long ≤0.5%)				
Road widening cross slopes between 1% min to 5% max				
Roadway prism cut/fill limits shown				
Right-of-Way contains all elements of the roadway prism				
Sawcut limits shown on plans				
Street monuments (existing) tie out or replaced				
Street monuments wells shown and conform to County Standards [M-1 series]				
Super-elevation diagram shown [A-4b & HDM 202.5]				

X = Not Applicable O = Requires Compliance ✓ = Complied Page 4 of 7

San Luis Obispo County Public Works Department: Improvement Plan Checklist

Roadways [Section 3.1]:	1 st	2 nd	3 rd	4 th
Tangent lengths conform to County Standards (50' min betw vertical curves [A-4b])				
Tapers- Intersection tapers conform to 3.1.2 L				
Tapers- Mid block road tapers conform to 3.1.2 K				
Trench repair conforms to County Standards [R series]				
Trenching conforms to County Standards [U-4 series]				
Typical Road Section shown on each sheet				
Vertical curves meet County Standards [A-4 & A-4a]				
Vertical curves used at grade breaks >1%				
▶ Other plan check comments:				

Road Edges [Section 4.1]:	1 st	2 nd	3 rd	4 th
▶ Conforms with Public Improvement Standards, Section 4				
Angled parking conforms to County Standards [4.1.6]				
Asphalt dikes conform to County Standards [C-3 & 4.1.7 G]				
Bulb-Out conforms to County Standards [A-6d & A-6e]				
Curb Gutter and Sidewalk repair conform to County Standards [R-3 & 4.1.2 D]				
Curb Ramps accurately drawn and detailed [spot elevations, slopes, etc] (A detailed design for each ramp is required when adjacent street longitudinal slope is >5%)				
Curb Ramps conform to County Standards [C-1, C-2, C-6 and RSP A88A]				
Curb return radii conform to County Standards [3.1.2 G]				
Curbs conform to County Standards [C-1, C-2 & C-2a]				
Cut and fill catch inside right-of-way				
Driveway profiles detailed (if required by plan checker)				
Driveway sight distance conforms to County Standards [A-5a]				
Driveways conform to County Standards [B-1 to B-3 series & 4.1.5]				
Driveways conform to multiple parking space requirements [B-1, B-2 & B-3]				
Fixed objects outside "clear zone" [4.1.7 A]				
Guardrail requirement worksheet provided				
Guardrails shown on plan and all relevant construction details provided				
Intersection (rural) sight distance meets County Standards [HDM 201.1]				
Intersection (urban) sight distance meets County Standards [A-5b]				
Mailboxes conform to County Standards [4.1.7 F]				
Multi use trails conform to County Standards [A-1a, A-2a & 4.1.3]				
Pedestrian barricades conform to County Standards [M-3 & 4.1.7 C]				
Pedestrian crossings conform to County Standards [4.1.4]				
Pedestrian easements shown on map [or recorded prior to plan approval]				
Ramps and trails cross only at intersections [4.1.3 C]				
Sidewalks conform to County Standards [C-1 & C-4]				
Sidewalks meet ADA accessibility requirements [4.1.2 A]				
Signs shown and conform to County Standards [M-4]				
▶ Other plan check comments:				

San Luis Obispo County Public Works Department: Improvement Plan Checklist

Storm Drainage [Section 5.1]:	1st	2nd	3rd	4th
▶ Conforms with Public Improvement Standards, Section 5				
Adequate topography shown for drainage design				
Catch Basins conform to County Standards [D-2 series & 5.2.1 B]				
Cross Gutters & Spandrels conform to County Standards [D-5]				
Cross gutters shall not cross roadways with future ADT>3,000 ADT				
Downstream evaluation conforms with County Standards [5.1.2 C]				
Drainage conforms with adopted Area Drainage Studies				
Drainage easements shown on map (or recorded prior to plan approval)				
Drainage Report accurately reflect plans				
Drainage Report conforms to County Standards [Appendix H & H-series drawings]				
Drainage Report provided and adequate design approach (sign, seal, date)				
Headwall conform to County Standards [5.2.1 D]				
Hydraulic calculations acceptable				
Hydrology calculations acceptable				
Manholes conform to County Standards [D-3 series & 5.2.1 A]				
Plans identify "Point of Discharge" per CBC 1805.3.4 (2001 CBC 1806.5.5)				
Primary & secondary design storm evaluated [5.1.1 E]				
Primary design storm HGL 0.5' below inlet grate and manhole covers [5.1.2 B]				
Provision for overland escape [5.1.2 D]				
Retaining walls in basins "suitable for intended use" letter (sign, seal, date)				
Retention & Detention Basins conform to County Standards [D-1 series & 5.2.2]				
Sidewalk underdrains conform to County Standards [D-4 series]				
Storm drainage system conforms to County Standards [5.1.4]				
Storm drains conform to County Standards [5.2.4 & 5.2.5]				
▶ Other plan check comments:				

Water Supply [Section 6.1]:	1st	2nd	3rd	4th
▶ Conforms with Public Improvement Standards, Section 6				
Project connects to existing community water system				
<ul style="list-style-type: none"> ▪ Water purveyor's standard details provided in plan set ▪ Construction callouts for valves, blowoffs, airvacs, meters, thrust blocks, etc ▪ Water purveyor's signature block on title sheet 				
<or> Project utilizes individual wells				
<or> Project utilizes private water system				
<ul style="list-style-type: none"> ▪ Airvacs shown as required ▪ Blowoffs shown as required [or fire hydrants] ▪ Cross connections ▪ Distribution lines ▪ Flow requirements met ▪ Hydrant location and spacing ▪ Services provided to each lot ▪ Standard details provided in plan set ▪ Storage requirements met ▪ Valves and thrust blocks at line intersections and bends 				
▶ Other plan check comments:				

San Luis Obispo County Public Works Department: Improvement Plan Checklist

Wastewater Disposal [Section 7.1]:	1st	2nd	3rd	4th
► Conforms with Public Improvement Standards, Section 7				
Project connects to existing community sewer system				
• Sewer purveyor's standard details provided in plan set				
• Construction callouts for all manholes, cleanouts, backflow devices, etc				
• Sewer purveyor's signature block on title sheet				
<or> Project utilizes individual septic disposal system				
<or> Project utilizes private sewer collection and treatment system				
• Collection lines				
• Cross connections				
• Flow requirements met				
• Lift stations				
• Manholes, cleanouts				
• Services provided to each lot				
• Standard details provided in plan set				
• Storage requirements met				
• Treatment requirements met				
► Other plan check comments:				

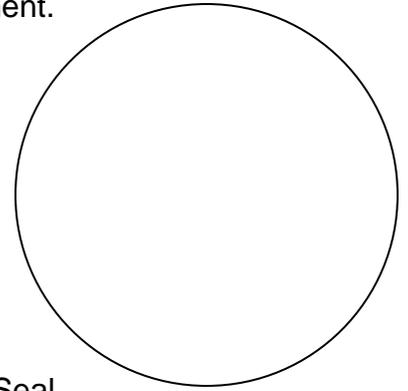
Utilities [Section 8.1]:	1st	2nd	3rd	4th
► Conforms with Public Improvement Standards, Section 8				
All above ground utilities are located outside "clear zone" [4.1.7 A]				
All utilities are stubbed to serve each new or existing lot [8.1.1 E]				
Any offsite utility tie-in shown and labeled on plans				
Fire hydrant location and spacing conforms to Fire Agency standards [W-2]				
Plans show and label all utility easements & P.U.E.				
Plans show County Standard Utility Notes [8.1.1 B4]				
Trenching conforms to County Standards [U-4 series]				
Undergrounding of frontage utilities in urban areas [Title 21]				
Utility appurtenances located out of sidewalk [C-4 note 10]				
Utility company signature block on title sheet (Electric, Gas, Telephone, CATV)				
Utility location conforms to County Standards [U-1 & U-2]				
Water-Sewer separation conforms to Public Health Standards [U-3 series]				
► Other plan check comments:				

Traffic Control [Section 9.1]:	1st	2nd	3rd	4th
► Conforms with Public Improvement Standards, Section 9				
All plan sheets reviewed and approved by PW Transportation				
Permanent traffic controls conform to County Standards [9.1.2]				
Standard signal and lighting plan notes provided [9.1.2 B8]				
Standard traffic control notes provided [Appendixes A, K & L]				
Traffic Control Plan conforms to County Standards [9.1.1]				
► Other plan check comments:				

6. For the reasoning and professional judgment indicated above, I recommend this design exception be approved by the Public Works Department.

Name

Date



Seal

Development Services Engineer Concurrence

Date

Transportation Engineer Concurrence

Date

Utility Division Manager Concurrence

Date

Design Exception Approved

Deputy Director of Public Works

Date

APPENDIX B

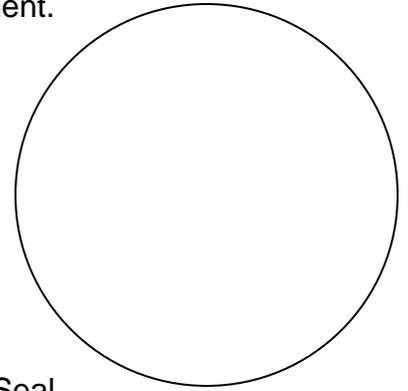
Americans with Disabilities Act (ADA) Guidance

B1: Reserved for future ADA Grievance Form

6. For the reasoning and professional judgment indicated above, I recommend this design exception be approved by the Public Works Department.

Name

Date



Seal

Development Services Engineer Concurrence

Date

Transportation Engineer Concurrence

Date

ADA Design Exception Approved

Public Works ADA Design Coordinator

Date

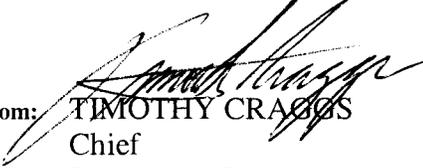
Road File:
V:_DEVSERV Forms\Plan Check Unit\Form-ADA Design Exception Request Form.doc

Memorandum

*Flex your power!
Be energy efficient!*

To: DISTRICT DIRECTORS
DEPUTY DIRECTORS
DIVISION CHIEFS

Date: October 1, 2013

From: 
TIMOTHY CRAGGS
Chief
Division of Design

File: 608

Subject: **DESIGN INFORMATION BULLETIN (DIB) 82-05**

DIB 82, "Pedestrian Accessibility Guidelines for Highway Projects", has been updated. Version 82-05 is now available on the Division of Design website: www.dot.ca.gov/hq/oppd/dib/dib82-05.pdf and is effective as of the date of this memorandum. Projects, where project development efforts have started, shall comply with Highway Design Manual (HDM) Index 82.5 "Effective Date for Implementing Design Revisions to Design Standards."

SUMMARY OF SIGNIFICANT CHANGES IN DIB 82-05

This revision reflects recent changes in Federal and State guidance. The following is a summary of the key changes:

- The 1991 Americans with Disabilities Act Accessibility Guidelines (ADAAG) has been replaced by the 2010 ADA (Americans with Disabilities Act) Standards.
- The Federal Highway Administration (FHWA) has issued revised guidance for when curb ramps are required on resurfacing projects.
- The FHWA has allowed more use of the draft Public Rights of Way Accessibility Guidelines (PROWAG) as design standards.
- The California Building Code 2013 (Title 24) has been updated and was published in July 2013.
- Incorporation of the previously distributed "Curb Ramp Scoping and Design Memo" as an appendix to the DIB.
- In addition, minor changes were also made to update terminology, provide clarifications, etc.

Training on pedestrian accessibility design for highway projects and this DIB is available from the Office of Geometric Design Standards on an as needed basis. If training is desired in the Region or District, please inform the Division of Design Coordinator to arrange for its delivery.

If you have any questions on this DIB, please contact Kevin Herritt, Chief, Office of Geometric Design Standards, at (916) 653-0253, or David Cordova, Office of Geometric Design Standards, at (916) 653-0485. Project specific applicability and questions should be referred to the Division of Design District Coordinators.

DISTRICT DIRECTORS, et al
October 1, 2013
Page 2

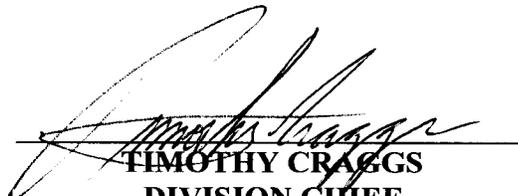
c: DCordova
KMHerritt
JBenton
Design Coordinators and Design Reviewers
Design Files

DESIGN INFORMATION BULLETIN NUMBER 82-05

Department of Transportation
Division of Design
Office of Geometric Design Standards

PEDESTRIAN ACCESSIBILITY GUIDELINES FOR HIGHWAY PROJECTS

APPROVED BY:



TIMOTHY CRAIGS
DIVISION CHIEF
DIVISION OF DESIGN

October 1, 2013

Table of Contents

		<u>Page Number</u>
1.0	Background	1
2.0	Definitions	1
3.0	Procedures	2
3.1	Applicability and Review Process	2
3.2	Rail and Transit Stations	3
3.2.1	Filing Fees for Rail and Transit Station Projects	3
4.0	Design Guidance and Best Practices for Pedestrian Facilities	4
4.1	Pedestrian Accessibility	4
4.1.1	New Construction	4
4.1.2	Alterations	4
4.1.3	Accessibility Requirements on 2R, 3R and CAPM Projects	5
4.1.4	Minimum Accessibility	5
4.1.5	Historic Preservation	5
4.1.6	Program Accessibility	6
4.2	Placement of Pedestrian Facilities	6
4.3	Accessibility Design Standards	6
4.3.1	Surface	7
4.3.2	Vertical Clearance	7
4.3.3	Clear Width	8
4.3.4	Grade	8
4.3.5	Cross Slope	9
4.3.6	Grates and Railroad Tracks	9
4.3.7	Ramps	9
4.3.8	Curb Ramps	10
4.3.9	Medians and Islands	11
4.3.10	Handrails	11
4.3.11	Warning Curb and Guard	12
4.3.12	Curb or Barrier	13
4.3.13	Landings	13
4.3.14	Detectable Warning Surface	13

Table of Contents (Continued)

	<u>Page Number</u>
4.3.15 Grooves	14
4.3.16 Bus Stops	15
4.3.17 Parking	15
4.3.18 Trails	16
4.3.19 Protruding Objects	17
4.4 Shared Facilities	17
4.5 Alternate Standards	17
4.6 Temporary Traffic Control	18
4.7 Exhibits	18

Attachment

Exception to Accessibility Design Standards	A-1
---	-----

Appendix

Curb Ramp Scoping and Design	Appendix-1
------------------------------	------------

Tables

TABLE 4.3.7	Helical Radius Requirements	10
TABLE 4.3.8	Curb Ramp Runs for Sidewalks with 2.0% Cross Slopes	11
TABLE 4.3.17	Off Street Accessible Parking Space Requirements	16

1.0 BACKGROUND

The Americans with Disabilities Act (ADA) of 1990, along with its implementing regulations, and the California Government Code Sections 4450 et seq. prescribe that facilities shall be made accessible to persons with disabilities. To comply with the ADA, the 2010 ADA Standards, as adopted by the United States Department of Justice (DOJ), shall apply to the design of the California Department of Transportation (Caltrans) facilities. Although the 2010 ADA Standards are not specifically written for public rights-of-way projects, some of the provisions can apply to the highway environment and are included in this Design Information Bulletin (DIB). Until the draft Public Rights-of-Way Accessibility Guidelines (PROWAG) are adopted and binding, the 2010 ADA Standards are to be used as the primary basis of accessibility standards for public rights-of-way.

In addition to the 2010 ADA Standards, other Federal documents on designing accessible pedestrian facilities in public rights-of-way were used to develop this DIB. For example, the publication *Designing Sidewalks and Trails for Access* is referred to several times and is available on the Internet at:

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/tranmemo.cfm

Also, certain portions of the PROWAG, as agreed to by the Federal Highway Administration (FHWA), are used in this DIB.

Title 24 of the California Code of Regulations (Title 24) is similar to the 2010 ADA Standards in that it prescribes accessibility design standards for the State of California; in Part 2, the California Building Code. The Department of General Services - Division of the State Architect (DSA) oversees California Building Code compliance. However, for transportation facilities on the State highway system, Caltrans (in addition to DSA) is authorized to certify, on a project-by-project basis, that a project complies with State pedestrian accessibility design standards. Rail and transit stations are the exception. Rail and transit stations are to be reviewed and require an approval from DSA to certify accessibility compliance.

This DIB has been written to provide general design guidance on how to comply with the various Federal laws and State codes on pedestrian accessibility for public use. The accessibility requirements typically associated with projects constructed in public rights-of-way have been presented in this DIB as “accessibility design standards” only to facilitate Caltrans processes and procedures. It is not the intent of this DIB to discuss all of the various Federal laws and State codes that apply to making buildings and public facilities accessible; nor is it the intent of this DIB to diminish the importance of and the requirement to comply with those accessibility standards not specifically mentioned in this DIB and as may be required on a project-by-project basis. See Section 3.1 of this DIB for further guidance on the review process for projects.

2.0 DEFINITIONS

The following words and phrases that are shown in bold text are used in this DIB and are defined as follows. As appropriate, referenced documents are noted within the brackets to indicate the source of the definition.

Accessible: A site, building, facility, or portion thereof that complies with this part (of the 2010 ADA Standards) [2010 ADA Standards].

Element: An architectural or mechanical component of a building, facility, space, site, or public right-of-way [PROWAG].

Facility: All or any portion of buildings, structures, improvements, elements, and pedestrian or vehicular routes located in a public right-of-way [PROWAG].

Historic Property/Historical Resources: Under Federal law [36 CFR 800.16(1)] the term used is “Historic Property” and includes any building, structure, site, object or district that is listed in or eligible for listing in the National Register of Historic Places.

Under State law [CEQA Guidelines 15064.5 and California Public Resources Code 5020] the term used is “Historical Resources” and includes any building, structure, site, object or district that meets one of the following:

- Listed in or eligible for listing in the National Register of Historic Places,
- Listed in or eligible for listing in the California Register of Historical Resources,
- Has been identified as significant for purposes of the California Environmental Quality Act (CEQA) by the lead agency because it meets the eligibility criteria of the California Register,
- Is listed in a local register of historical resources or has been identified as significant in an historical resource survey meeting the California Office of Historic Preservation’s standards.

Path or Pathway: A track or route along which people are intended to travel [*Designing Sidewalks and Trails for Access*].

Pedestrian: A person who travels on foot or who uses assistive devices, such as a wheelchair, for mobility [*Designing Sidewalks and Trails for Access*].

Public Right-of-Way: Public land or property, usually in interconnected corridors, that is acquired for or devoted to transportation purposes [PROWAG].

Sidewalk: A surfaced pedestrian way contiguous to a street used by the public [Title 24 11B-106.5]. Also, see the discussion in Section 4.3.1, “Surface” of this DIB.

State Highway: A traversable highway adopted as or designated in the Streets and Highways Code as a state highway.

Structurally Impracticable: Rare circumstances when the unique characteristics of terrain prevent the incorporation of accessibility features. [28 CFR 35.151(a)(2)(i)].

Technically Infeasible: With respect to an alteration of a building or a facility, something that has little likelihood of being accomplished because existing structural conditions would require removing or altering a load-bearing member that is an essential part of the structural frame; or because other existing physical or site constraints prohibit modification or addition of elements, spaces, or features that are in full and strict compliance with the minimum requirements. [2010 ADA Standards].

Transition Plan: Caltrans’ written commitment to accomplish ADA compliance in its services, programs, and activities.

Walk or Walkway: An exterior prepared surface for pedestrian use, including pedestrian areas such as plazas and courts. [2010 ADA Standards].

3.0 PROCEDURES

3.1 Applicability and Review Process

Every highway project (Capital and Maintenance; including all Encroachment Permit projects) within the State highway right-of-way, regardless of the project sponsor, that proposes to construct pedestrian facilities [See Section 4.1], must be designed in accordance with the policies and standards of this DIB. Accessibility design standards are listed in Section 4.3. Documentation of project compliance with this DIB will be at Ready-to-List (RTL) Certification (by checking the appropriate box on Section 4c of the RTL Certification Form), or at encroachment permit issuance, whichever is applicable.

If an accessibility design standard cannot be fully incorporated in a design, an accessibility design exception will be required. For an accessibility design exception to be approved, it will be necessary to document that, in the case of alterations to existing facilities, it is technically infeasible to do so. For new construction, the accessibility design standard must be structurally impracticable. Approval of accessibility design exceptions shall occur prior to project approval or as soon as the recommended alternative is identified. Accessibility design exceptions shall be documented, using the Exception to Accessibility Design Standards document format [See Attachment], and approved by the Design Coordinator. The Division of Engineering Services (DES) – Office of Transportation Architecture (OTA) will determine the compliance with accessibility design standards that pertain to building projects. Please note, the external site work not part of the building PS&E will be subject to the procedures in this DIB. OTA will provide ADA site design assistance for the Districts on building projects that they are responsible for designing.

3.2 Rail and Transit Stations

Approval authority for accessibility design of rail and transit stations rests with DSA and must occur by RTL or encroachment permit issuance. The appropriate filing fees [See Section 3.2.1] and a completed application form [See www.documents.dgs.ca.gov/dsa/forms/DSA-1.pdf] need to be transmitted to DSA along with the title sheet and pertinent project plans that show the details of the rail or transit station facilities being altered or newly constructed. DSA's office locations are listed on their website at:

www.dgs.ca.gov/dsa/AboutUs/contact.aspx

An Exception to Accessibility Design Standards document [See Attachment] must also be submitted as supplemental information when an exception is being requested to the accessibility design standards listed in Section 4.3 of this DIB. The DSA Regional Office will need to be contacted to discuss these details and confirm their specific requirements. Early submittal to DSA is recommended once enough design information, such as layouts, cross sections, profiles, construction details, etc. are developed and it is certain that the pedestrian facility design will not change. In the event of disagreement with the DSA Regional Office, DSA has an appeal process, which may invoke the involvement with their Headquarters DSA Office. The Headquarters Division of Design ADA Technical Specialist should be contacted immediately to assist with the negotiations and to contact the FHWA California Division Office for their assistance in resolving the issue(s). The DSA Regional Office normal review process is expected to take between 30 and 60 days from application submittal until receipt of their approval letter. Approval letters will be sent by DSA to the Project Engineer for incorporation into the project history files. DSA will stamp copies of the plan sheets that have been sent to them for their use during the project review and will retain them for their records.

3.2.1 Filing Fees for Rail and Transit Station Projects

Filing fees are to be calculated according to the fee schedule as prescribed in the *California Building Code* and as administered by DSA. The DSA website provides a fee calculator to determine the filing fee [See www.apps.dgs.ca.gov/tracker/FeeCalculator.aspx]. The fees to be paid by Caltrans can be authorized by completing the "Request for Revolving Fund Check" form (FA-0017). This form should indicate that the "Vendor" is DSA and that the expenditure is to be charged against the Project ID and the appropriate Object Code. The check can be mailed directly to the DSA Regional Office, if requested on the form. On the form, under "Purpose," indicate that this payment is for the DSA filing fee and reference the District and Project ID. The District and Project ID will then be referenced on the check for identification purposes. The completed form FA-0017 should then be mailed to Mail Station 25 (MS 25) or faxed (916-227-8766) to the Division of Accounting, Service Payables Branch, Alpha G. The completed DSA

application form for the project must be sent with this form to substantiate payment. It is anticipated that it should not take more than 5 working days to obtain this check.

4.0 DESIGN GUIDANCE AND BEST PRACTICES FOR PEDESTRIAN FACILITIES

4.1 Pedestrian Accessibility

All pedestrian facilities on all projects are to be accessible in accordance with State and Federal laws. The following guidance and best practices capture the lessons learned through the years since the passage of the ADA and to document the Federal and State regulatory standards that apply. Early consultation with the Design Coordinator is recommended to discuss pedestrian accessibility issues and their resolution. In addition, for safety roadside rest facilities, vista points, and park and ride facilities, early consultation is recommended with the Landscape Architecture Program District Coordinator.

4.1.1 New Construction

Federal regulations require that each facility or part of a facility constructed on State right-of-way shall be designed and constructed in such a manner that the facility or part of the facility is readily accessible to and usable by individuals with disabilities.

4.1.2 Alterations

Federal regulations require that each facility or part of a facility altered in the State right-of-way in a manner that affects or could affect the usability of the facility or part of the facility shall, to the maximum extent feasible, be altered in such manner that the altered portion of the facility is readily accessible to and usable by individuals with disabilities.

Where existing elements, spaces, or facilities are altered, each altered element, space or facility within the scope of the project shall comply with the applicable requirements for new construction. The work that will physically impact a pedestrian feature is due to the scope of the project identified in the project initiation document or the project report.

More specifically, the following types of highway work are considered to be alterations of existing facilities:

1. Pavement Reconstruction. For more information, see Chapter 600 of the *Highway Design Manual*.
2. Pavement focused (2R) and resurfacing, restoration, and rehabilitation (3R) work. For additional guidance see DIB 79 – “Design Guidance and Standards for Roadway Rehabilitation Projects [Pavement Focused (2R) and Resurfacing, Restoration, and Rehabilitation (3R) Projects] . . .”
3. Capital Preventive Maintenance (CAPM) projects. For additional guidance see DIB 81 – “Capital Preventive Maintenance (CAPM) Guidelines.”
4. Major Maintenance, HM-1 Program (Pavement), thin overlay projects or projects to place open-graded surface course, microsurfacing, cape seals, and in-place asphalt recycling. For additional guidance see Highway Maintenance Guidelines (Maintenance Policy Directives).
5. Any work that physically impacts existing curb ramps.

Regarding items 1 through 5, for the intersections that are altered, existing nonstandard curb ramps will be required to be reconstructed to current standards; and where missing, curb ramps are to be constructed where there are sidewalks or other pedestrian facilities. Additionally, item 1 will require the marked crosswalk (or unmarked crosswalk to pedestrian facilities) cross slope and grade to be reconstructed to current standards. Item 2 will require the marked crosswalk (or unmarked crosswalk to pedestrian facilities) grade to be reconstructed to current standards. Routine maintenance work is not considered to be

an alteration and may be designed following the guidance in this DIB, but they are not required to unless the work significantly affects a pedestrian facility.

4.1.3 Accessibility Requirements on 2R, 3R, and CAPM Projects

2R, 3R, and CAPM projects are SHOPP funded pavement projects that have specific program requirements for the inclusion of safety and operational improvements. Other improvements may supplement the minimum accessibility requirements in Section 4.1.2, such as, including sidewalk and driveway corrections. The accessibility needs of the communities and highway users, in particular the needs of users with disabilities, need to be considered on each 2R, 3R, and CAPM project. Early stakeholder participation, as appropriate, to identify accessibility deficiencies is recommended.

Any pedestrian facility work that needs to be completed outside of the scope of a 2R, 3R, or CAPM project should be added to the Transition Plan through the following process. The pedestrian facility needing accessibility improvements must be specifically identified and documented by memorandum to the project history file. The District ADA Engineer needs to be contacted and involved in submitting this information. Externally sponsored work that is not being designed by Caltrans is not exempt from this requirement. The Caltrans representative that is working with the external sponsor for the work is required to contact the District ADA Engineer and assist the external partner in submitting any work for inclusion in the Caltrans Transition Plan.

4.1.4 Minimum Accessibility

Newly constructed or altered (see Section 4.1.2) streets, roads, and highways must contain curb ramps or other sloped areas at any intersection having curbs or other barriers to entry from a street level pedestrian walkway. This context refers to entry to a sidewalk or pedestrian path from a street level pedestrian walkway.

To the maximum extent feasible, at least one accessible route must be provided from one facility to another. If a more direct route exists that is not an accessible route, the accessible route must be in the same vicinity as the other route.

Whether the project is for new construction or for an alteration of an existing facility, full compliance with the design standards contained herein are not required where it can be demonstrated that it is structurally impracticable (for new construction) or technically infeasible (for alterations projects) to meet the requirements. An exception would be required as explained in Section 3.1. Any portion of the new facility that can be made accessible to persons with disabilities shall comply to the extent that it is not structurally impracticable. Also, any elements or features of the facility that are being altered and can be made accessible shall be made accessible within the scope of the alteration. Regarding scope, a more extensive discussion is provided in the Appendix of this DIB.

4.1.5 Historic Preservation

In meeting the aforementioned requirements of “Minimum Accessibility,” a design that would alter or destroy the historic significance of a historic property/historical resource should not be constructed. Historic property/historical resource is any property listed or eligible for listing in the National Register of Historic Places, or properties designated as historic under State or local law. In order to comply with Public Resources Code 5024 and CEQA, the District Heritage Resources Coordinator should be contacted as early as possible in the planning process in order to initiate the required consultation. Non-construction strategies may be an option. See Section 4.1.6, “Program Accessibility” of this DIB.

The fourth item under Section 4.3.7 in this DIB may be used to maintain historic preservation of a historic property/historical resource based on the California State Historic Building Code, which is the mandatory

code for State-owned historical resources. An approved accessibility design exception must be obtained to use this standard. Additionally, consultation with the State Historical Building Safety Board is required

4.1.6 Program Accessibility

In some situations, an operational solution may achieve accessibility without the need for construction. Alterations to existing facilities do not have to be made accessible if other methods of providing access are effective. Non-construction approaches may include alternate accessible routings, relocating services or activities to accessible locations, or taking the service or benefit directly to the individual. Coordination with local agencies, transit agencies, or other affected entities may be required to achieve these strategies.

4.2 Placement of Pedestrian Facilities

Vehicular lanes and shoulders are not required to be designed as accessible pedestrian routes. Where vehicular lanes and shoulders are intended by Caltrans for pedestrian use, thus rendering them walkways, they shall be made accessible.

Deciding to construct pedestrian facilities and elements where none exist is an important consideration. In built-up urban areas with pedestrians present, pedestrian facilities should be constructed. In rural areas where few or no pedestrians exist, it may not be reasonable or cost effective to construct pedestrian facilities. For situations between these two extremes the designer should consult with the affected local agency, and special interest groups. Any decision made should be clearly documented in the Project History Files.

All pedestrian facilities proposed within the State highway right-of-way shall follow the guidance in Chapter 31 “Non-motorized Transportation Facilities” in the *Project Development Procedures Manual*. Pedestrian facilities proposed by non-Departmental entities within State highway access controlled right-of-way shall also comply with Chapter 17 “Encroachments in Caltrans’ Right of Way,” in the *Project Development Procedures Manual*.

4.3 Accessibility Design Standards

The most current version of the *Standard Plans* (this includes Revised Standard Plans) for Curbs and Driveways A87A, Curb Ramp Details A88A, Curb Ramp and Island Passageway Details A88B, Accessible Parking Off-Street A90A, and Accessible Parking On-Street A90B should be used for designing accessible facilities. The *Standard Plans* are used for commonly designed accessible features and are consistent with this DIB. Curb ramps or pedestrian paths in the *Standard Plans* contain conservative slopes and widths (not the same slopes and widths as in this DIB) and may be used where the designer has determined that due to relatively flat terrain and ample space these conservative designs are realistically attainable. However, where the designer has determined that due to existing grades and space constraints the *Standard Plans* may not achieve accessibility, a Construction Detail according to the standards and best practices of this section should be developed. Construction Details for curb ramps and driveway crossings designed as part of the pedestrian route should specify the slopes and dimensional widths that require contractor surveys (see the PS&E section of the Appendix and the *Plans Preparation Manual* for further guidance). In many cases, designing to the maximum slope or minimum width is unnecessary. The concept of designing using conservative slopes and widths is recommended. Modifying the features shown on the *Standard Plans* or designing pedestrian facilities not covered by the *Standard Plans*, such as in a Construction Detail, shall be in accordance with the following standards and best practices. Following each accessibility design standard is a reference to the applicable Federal and/or State regulation.

4.3.1 Surface

- (1) All surfaces on an accessible route shall be stable, firm, and slip resistant.
[2010 ADA Standards 302.1 and Title 24 11B-302.1]
- (2) Changes in level up to ¼ inch may be vertical and without edge treatment.
[2010 ADA Standards 303.2 and Title 24 11B-303.2]
- (3) Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1V:2H.
[2010 ADA Standards 303.3 and Title 24 11B-303.3]
- (4) Changes in level greater than ½ inch shall be accomplished by means of a ramp.
[2010 ADA Standards 303.4 and Title 24 11B-303.4]

Surface types on State right of way can vary due to the type of facility served. Normally, sidewalks are made of Portland cement concrete, or in some situations asphalt concrete. Surface type selection is a decision made by the designer. Design factors to consider for surface materials are discussed in *Designing Sidewalks and Trails for Access*.

The use of paving units, stamped concrete, or stamped asphalt concrete, although within the surface uniformity requirements of an accessible route, could lead to a vibration effect causing repeated jarring to a wheelchair user. No roughness index exists for walkways, as it does for roadway surfaces. Until such guidance becomes available, engineering judgment must be used; the Design Reviewer or Traffic Operations Liaison can be consulted for further assistance. As a general rule, cobblestone or similar treatments should not be used. It should be noted that the change in level standards in (2) and (3) does not apply to the curb ramp – gutter transition; it should be flush (no lip).

If paving units are used, they must meet the specification requirements of the American Society for Testing and Materials (ASTM) C936.

All walkway surfaces shall have a broom finish texture or an equivalent. A broom finish surface is described in Section 73 of the current *Standard Specifications*. Regardless of surface type, if the walkway encroaches onto a roadway, as in the case of a crosswalk, the surface must have a coefficient of friction not less than 0.35 as determined by using California Test Method 342.

At present, no particular color requirement is prescribed in Federal guidelines for an accessible route; see the Detectable Warning Surface section of this DIB regarding the color specification. However, material used to provide contrast of detectable warnings on walkway surfaces should have a contrast of at least 70%. This contrast is intended to assist the visually impaired pedestrian. This contrast is calculated by $[(B1-B2)/B1] \times 100$, where B1=light reflectance value (LRV) of the lighter area, and B2=light reflectance value (LRV) of the darker area. Visual contrast can be quantified with a luminance meter that measures the amount of light reflected by each subject (where zero is total darkness and 100 is theoretical complete light reflection). This contrast may be used to distinguish elements of a walkway, such as to differentiate a curb ramp from the sidewalk, or the crosswalk from the rest of the pavement. Also, crosswalk or sidewalk surfacing shall not cause glare to the user. Colored pavement or paving units are not to be used in lieu of striping for marked crosswalks.

4.3.2 Vertical Clearance

- (1) Vertical clearance shall be 80 inches high minimum.
[2010 ADA Standards 307.4 and Title 24 11B-307.4]

It should be noted that the Federal and California State version of the *Manual on Uniform Traffic Control Devices (MUTCD)* requires a vertical clearance at pedestrian pathways to the bottom of signs to be at least

7 feet. This will meet most pedestrian vertical clearance needs. Pedestrian pathways that are part of a shared facility, i.e., bicyclists and equestrians, shall follow the appropriate guidance in the *Highway Design Manual*. See Section 4.4, “Shared Facilities” of this DIB for further information.

4.3.3 Clear Width

See the *Highway Design Manual (HDM)* Index 105.2 for the discussion and Advisory Design Standard, of sidewalk width. In many locations, local agency sidewalk standards will require greater widths; which can provide even greater accessibility than the minimum standard stated in the *HDM*. If for a specific project this is the case, the local agency standard should be used. Street furniture, signs, above ground utilities and poles, business frontage needs, street landscaping, etc. should all be placed outside of the clear width of a sidewalk.

In addition to the standards referenced above, the following Accessibility Design Standards are to be followed:

- (1) If an accessible route has less than 60 inches clear width, then passing spaces at least 60 inches by 60 inches shall be located at intervals not to exceed 200 feet.
[2010 ADA Standards 403.5.3 and Title 24 11B-403.5.3]
- (2) The clear width for sidewalks and walks shall be 48 inches minimum, exclusive of the width of the curb.
[Title 24 11B-403.5.1.3 and PROWAG R302.3]
- (3) When, because of right-of-way restrictions, natural barriers or other existing conditions, the enforcing agency determines that compliance with the 48-inch clear sidewalk width would create an unreasonable hardship, the clear width may be reduced to 36 inches.
[Title 24 11B-403.5.1.3]

Regarding (3) above, an unreasonable hardship must be concurred with by the Design Coordinator and documented using the Exception to Accessibility Design Standards format (see attached). In the exception document under Reason for Exception, the following factors for an unreasonable hardship are to be discussed for each location: 1) the cost of providing access, 2) the impact of proposed improvements on financial feasibility of the project, 3) the nature of the accessibility which will be gained or lost, and 4) the nature of the use of the facility under construction and its availability to persons with disabilities.

4.3.4 Grade

- (1) All walks with continuous gradients shall have resting areas, 5 feet in length, at intervals of 400 feet maximum.
[Title 24 11B-403.7]
- (2) Where pedestrian access routes are contained within a street or highway right-of-way, the grade of pedestrian access routes shall not exceed the general grade established for the adjacent street or highway. Where pedestrian access routes are not contained within a street or highway right-of-way, the grade of pedestrian access routes shall be 5.0% maximum.
[PROWAG R302.5]
- (3) When pedestrian access routes are contained within pedestrian street crossings, the grade of the pedestrian route shall be 5.0% maximum.
[PROWAG R302.5.1]

The accessibility standard in (1) above does not apply to sidewalks, but (2) does. The grade or slope of an accessible route should be as flat as possible. Since exterior facilities must drain, a walkway can be at 2.0% and still be considered level. The practical use of the accessibility standard in (1) above is thus applied for grades exceeding 2.0%; the “resting areas” are considered level, not exceeding 2.0%. Any part

of an accessible route with a slope greater than 1V:20H (5.0%) shall be considered a ramp, and must comply with the standards of a ramp. See Section 4.3.7 of this DIB, "Ramps," for further information.

A profile of the pedestrian pathway should be developed to ensure compliance with grade and other design parameters.

4.3.5 Cross Slope

- (1) Except as provided in Section 4.3.5(2) and (3), the cross slope of pedestrian access shall be 2.0% maximum.
[PROWAG R302.6]
- (2) Where pedestrian access routes are contained within pedestrian street crossings without yield or stop control, the cross slope of the pedestrian access route shall be 5.0% maximum.
[PROWAG R302.6.1]
- (3) Where pedestrian access routes are contained within midblock pedestrian street crossings, the cross slope of the pedestrian access route shall be permitted to equal the street or highway grade.
[PROWAG R302.6.2]

Drainage is always a design consideration for exterior facilities. Walkways shall be designed so that water will not accumulate on the surface. "Yield or stop control" refers to yield or stop signs for the State highway traffic movement.

4.3.6 Grates and Railroad Tracks

- (1) If gratings are located in walks, then they shall have spaces no greater than ½ inch in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel.
[2010 ADA Standards 302.3 and Title 24 11B-302.3]
- (2) Where a path crosses tracks, the opening for wheel flanges shall be permitted to be 2-½ inches maximum.
[2010 ADA Standards 810.10 and Title 24 11B-810.10 Exception]

Walks shall be free of grating whenever possible.

4.3.7 Ramps

- (1) Slopes that are greater than 1V:20H (5.0%) will be considered ramps and must not exceed a 30-inch rise without landings.
[2010 ADA Standards 106.5, 405.6 and Title 24 11B-403.3, 11B-405.6]
- (2) The maximum slope of a ramp shall not exceed 1V:12H (8.3%).
[2010 ADA Standards 405.2 and Title 24 11B-405.2]
- (3) The cross slope of ramp surfaces shall be no greater than 2.0%.
[2010 ADA Standards 405.3 and Title 24 11B-405.3]
- (4) In the case of a historic property/historical resource, ramps no greater than 1V:10H, cannot exceed a horizontal distance of 5 feet. Or, ramps of 1V:6H slope cannot exceed a horizontal distance of 13 inches. Signs shall be posted at upper and lower levels to indicate steepness of the slope.
[Title 24 8-603.6]

This standard should only be used with an approved exception.

It should be noted that a sidewalk is not bound by the requirements of a ramp. Curved (or helical) ramps shall be subject to the same design standards as straight ramps. However, because of the complexity,

curved ramps should not be constructed if a straight ramp can accomplish the same accessibility. If a curved ramp is sloped at the maximum 1V:12H (8.3%), then the minimum radius needed is 50 feet; otherwise, a smaller radius will provide a path that exceeds the maximum 2.0% cross slope. Table 4.3.7 shows the minimum radius required for a given ramp slope:

TABLE 4.3.7 – HELICAL RADIUS REQUIREMENTS

Slope	Minimum Radius Required to Inner Side of Ramp
5.0%	30 feet
8.3%	50 feet

4.3.8 Curb Ramps

The most common curb ramps are the perpendicular (Case A) and the parallel (Case C); these standards and their variations are contained in the *Standard Plans*. The blended transition is also acceptable, although not shown in the *Standard Plans*; it would require a Construction Detail. See the Appendix for a graphical representation of these curb ramps.

- (1) Perpendicular and parallel curb ramps shall have a running slope not steeper than 1V:12H (8.3%) maximum but shall not require the ramp length to exceed 15 feet. Blended transitions shall have a running slope not steeper than 1V:20H (5.0%).
[2010 ADA Standards 406.1, 405.2 and Title 24 11B-406.2.1, 406.3.1, 406.4.1, PROWAG R304.2.2, R304.3.2 and R304.4.1]
- (2) The clear width of curb ramp runs (excluding any flared sides), blended transitions, and turning spaces shall be 48 inches minimum.
[Title 24 11B-406.5.2]
- (3) Landings shall be provided at the tops of curb ramps and blended transitions. The landing clear length shall be 48 inches minimum. Exception: parallel curb ramps shall not be required to comply with the top landing requirement.
[2010 ADA Standards 406.4 and Title 24 11B-406.5.3 including Exception]
- (4) Counter slopes of adjoining gutters and road surfaces immediately adjacent to and within 24 inches of the curb ramp shall not be steeper than 1V:20H (5.0%). The adjacent surfaces at transitions at curb ramps to walks, gutters, and streets shall be at the same level.
[2010 ADA Standards 406.2 and Title 24 11B-406.5.8]
- (5) Where provided, curb ramp flares shall not be steeper than 1V:10H (10.0%).
[2010 ADA Standards 406.3 and Title 24 11B-406.2.2]
- (6) Diagonal curb ramps with flared sides shall have a segment of curb 24 inches long minimum located on each side of the curb ramp and within the marked crossing.
[2010 ADA Standards 406.6 and Title 24 11B-406.5.10]
- (7) Diagonal curb ramps provided at marked crossings shall provide the 48 inches minimum clear space within the markings.
[2010 ADA Standards 406.6 and Title 24 11B-406.5.9]
- (8) The cross slope of curb ramps, blended transitions, and turning spaces (landings) shall be 2.0% maximum. At pedestrian street crossings without yield or stop control and at midblock pedestrian street crossings, the cross slope shall be permitted to equal the street or highway grade.
[PROWAG R304.5.3]

Regarding (6) above, this standard applies only on flared sides, such as the Case A curb ramp (see Detail B of Standard Plan A88A); the Case C curb ramp and others without flares are not subject to this standard.

Regarding (8) above, the designer should strive to hold a 2.0% cross slope before deciding to match the street or highway grade. In most cases, the 2.0% can be held and a detail would be needed to show the transition and pavement/sidewalk conformance. To accomplish this, the gutter pan must be warped before additional slope, beyond the 2%, is introduced outside of the curb ramp itself (on the pavement and sidewalk). The crosswalk must comply with Section 4.3.5 (also see Section 4.1.2); therefore, cross slope of curb ramps should not exceed that of the crosswalk regardless of roadway profile grade.

Standard Plan A88A shows the illustration of curb ramps that may apply to curved alignments on a corner or on a tangent. The ramp width shall be consistent with the width of an accessible route. Flares are needed if the curb ramp is located where pedestrians may traverse across the ramp.

The Federal recommendation found in Part II of *Designing Sidewalks and Trails for Access* is for curb ramps to be aligned perpendicular to curb face. However, directional curb ramps may be designed by the use of a construction detail that shows a bottom grade break perpendicular to crosswalk travel.

In addition to the curb ramp slope, the cross slope of a sidewalk will determine the horizontal length of the curb ramp run, since anything more than a flat surface (no slope) will require more length to intercept the sidewalk surface. Table 4.3.8 can be used as a design aide when the sidewalk has a 2.0% cross slope.

TABLE 4.3.8 – Curb Ramp Runs for Sidewalks with 2.0% Cross Slopes

Height of Curb Face	Curb Ramp Run (Horizontal Length)
4 inches	63 inches
5 inches	78 inches
6 inches	95 inches
7 inches	111 inches
7-½ inches	118-½ inches
8 inches	126 inches

4.3.9 Medians and Islands

- (1) Raised islands in crossings shall be cut through level with the street or have curb ramps at both sides.

[2010 ADA Standards 406.7]

The width of the cut through raised medians or islands should be consistent with the widths required in Section 4.3.3 in this DIB. Since the cut for the path through the raised median or island is adjacent to traffic and without a “barrier,” it must have a detectable warning surface as described in Section 4.3.14 in this DIB. The detectable warning surface width and placement shall follow the details in Standard Plan A88B.

4.3.10 Handrails

Handrails are not required on curb ramps or along sidewalks. In all other situations, the following applies:

- (1) Ramp runs with a rise greater than 6 inches shall have handrails. Handrails shall be provided on both sides of stairs and ramps.

[2010 ADA Standards 405.8, 505.2 and Title 24 11B-505.2]

- (2) Handrails shall be continuous within the full length of each stair flight or ramp run. Inside handrails on switchback or dogleg stairs and ramps shall be continuous between flights and runs.

[2010 ADA Standards 505.3 and Title 24 11B-505.3]

- (3) Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-½ inches minimum.
[2010 ADA Standards 505.5 and Title 24 11B-505.5]
- (4) Gripping surfaces shall be continuous.
[2010 ADA Standards 505.6 and Title 24 11B-505.6]
- (5) Top of handrail gripping surfaces shall be mounted between 34 inches and 38 inches above ramp surface.
[2010 ADA Standards 505.4 and Title 24 11B-505.4]
- (6) Handrails shall not rotate within their fittings.
[2010 ADA Standards 505.9 and Title 24 11B-505.9]
- (7) Handrail gripping surfaces with a circular cross section shall have an outside diameter of 1¼ inches minimum and 2 inches maximum. Handrail gripping surfaces with a non-circular cross section shall have a perimeter dimension of 4 inches minimum and 6¼ inches maximum, and a cross-section dimension of 2¼ inches maximum.
[2010 ADA Standards 505.7.1, 505.7.2 and Title 24 11B-505.7.1, 505.7.2]
- (8) Ramp handrails shall extend horizontally above the landing for 12 inches minimum beyond the top and bottom of ramp runs. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous to the handrail of an adjacent ramp run.
[Title 24 11B-505.10.1]

4.3.11 Warning Curb and Guard

Guard as used in this section is defined in the *California Building Code* [Title 24 202] as a building component or a system of building components located at or near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to the lower level. It should be noted that a guard is not an accessibility design feature and not subject to the ADA. A guard is a fire and life safety design feature for elevated pedestrian paths. The guard standards in this DIB do not apply to bridge structures and railings. The Division of Engineering Services guidance on bridge structures applies.

- (1) Abrupt changes in level exceeding 4 inches in a vertical dimension between walks, sidewalks or other pedestrian ways and adjacent surfaces or features shall be identified by warning curbs at least 6 inches in height above the walk or sidewalk surface. Exception: a warning curb is not required between a walk or sidewalk and an adjacent street or driveway.
[Title 24 11B-303.5 including Exception #1]
- (2) A warning curb is not required when a guard or handrail is provided with a guide rail centered 2 inches minimum and 4 inches maximum above the surface of the walk or sidewalk.
[Title 24 11B-303.5 Exception #2]
- (3) Guards shall be located along open-sided walking surfaces, including mezzanines, equipment platforms, stairs, ramps and landings that are located more than 30 inches measured vertically to the floor or grade below at any point within 36 inches horizontally to the edge of the open side.
[Title 24 1013.2]
- (4) Required guards shall not be less than 42 inches high, measured vertically as follows: 1) From the adjacent walking surfaces; 2) On stairs, from the line connecting the leading edges of the tread nosings; and 3) On ramps, from the ramp surface at the guard.
[Title 24 1013.3]

- (5) Required guards shall not have openings which allow passage of a sphere 4 inches in diameter from the walking surface to the required guard height.
[Title 24 1013.4]

Chain link fence Type CL-4 satisfies the requirements of a guard, see the *Standard Plans* for details.

4.3.12 Curb or Barrier

Where the ramp surface is not bounded by a wall, the ramp shall comply with the following requirements:

- (1) A curb, 2 inches high minimum, or barrier shall be provided that prevents the passage of a 4 inch diameter sphere, where any portion of the sphere is within 4 inches of the finish floor or ground surface. To prevent wheel entrapment, the curb or barrier shall provide a continuous and uninterrupted barrier along the length of the ramp.
[2010 ADA Standards 405.9.2 and Title 24 11B-405.9.2]

This requirement is not applicable to sidewalks or curb ramps.

4.3.13 Landings

A level landing is allowed to be sloped up to 2.0% to accommodate drainage. For curb ramp landing guidance, see Section 4.3.8 of this DIB. This DIB does not discuss the situation where a door opens onto a landing at a building entrance. For this situation, as well as with any building egress design, refer to the Office of Transportation Architecture in the Division of Engineering Services. DSA may review and approve building entrance design in combination with the State highway rights-of-way. Processing plans through DSA would be similar to the process described in Sections 3.2 and 3.2.1 of this DIB.

Landings shall be designed as following:

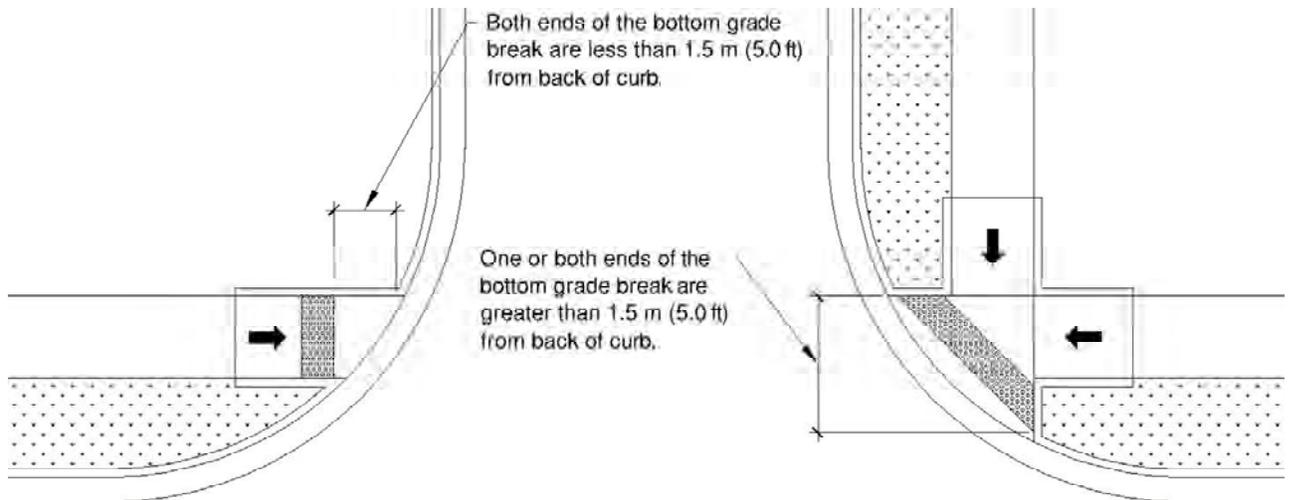
- (1) Ramps shall have landings at the top and the bottom of each ramp run.
[2010 ADA Standards 405.7 and Title 24 11B-405.7]
- (2) The landing clear width shall be at least as wide as the widest ramp run leading to the landing.
[2010 ADA Standards 405.7.2 and Title 24 11B-405.7.2]
- (3) The landing clear length shall be at least 60 inches long minimum. However, the bottom landing length shall be not less than 72 inches.
[2010 ADA Standards 405.7.3 and Title 24 11B-405.7.3, 11B-405.7.3.1]
- (4) Top landings shall be not less than 60 inches wide.
[Title 24 11B-405.7.2.1]
- (5) Ramps that change direction between runs at landings shall have a clear landing 60 inches minimum by 72 inches minimum in the direction of downward travel from the upper ramp run.
[2010 ADA Standards 405.7.4 and Title 24 11B-405.7.4]

4.3.14 Detectable Warning Surface

- (1) Detectable warnings at hazardous vehicular areas shall be 36 inches in width.
[Title 24 11B-705.1.2.5]
- (2) On perpendicular curb ramps, detectable warning surfaces shall be placed as follows (also see figure below):
- (a) Where the ends of the bottom grade break are in front of the back of curb, detectable warning surfaces shall be placed at the back of curb.

- (b) Where the ends of the bottom grade break are behind the back of curb and the distance from either end of the bottom grade break to back of curb is 5.0 ft or less, detectable warning surfaces shall be placed on the ramp run within one dome spacing of the bottom grade break.
- (c) Where the ends of the bottom grade break are behind the back of curb and the distance from either end of the bottom grade break to the back of curb is more than 5.0 ft, detectable warning surfaces shall be placed on the lower landing at the back of curb.

[PROWAG R305.2.1]



Detectable warnings on curb ramps shall consist of raised truncated domes with the 3 foot depth and full width standard shown on Standard Plans A88A, A88B, A90A, and A90B. Detectable warning products generally come in a 4 foot width; this width meets the full width intent when placed on the 4 foot 2 inch curb ramp width shown on the Standard Plans. Additionally, Section 73 of the *Standard Specifications* contains the color, warranty, and Authorized Material List specifications for detectable warning surfaces. Detectable warning surfaces are not normally placed at driveways. However, in some cases driveways at high traffic generators are designed similarly to street intersections; including curb returns and curb ramps. Detectable warning surfaces may be necessary in these instances.

4.3.15 Grooves

- (1) Curb ramps shall have a grooved border 12 inches wide along the top of the curb ramp at the level surface of the top landing and at the outside edges of the flared sides. The grooved border shall consist of a series of grooves $\frac{1}{4}$ inch wide by $\frac{1}{4}$ inch deep, at $\frac{3}{4}$ inch on center. Exceptions: 1) At parallel curb ramps, the grooved border shall be on the upper approach immediately adjacent to the curb ramp across the full width of the curb ramp. 2) A grooved border shall not be required at blended transitions.

[Title 24 11B-406.5.11 including Exceptions]

See Standard Plan A88A for grooving detail.

4.3.16 Bus Stops

- (1) Bus Stop boarding and alighting areas shall provide a clear length of 96 inches minimum, measured perpendicular to the curb or vehicle roadway edge, and a clear width of 60 inches minimum, measured parallel to the vehicle roadway.
[2010 ADA Standards 810.2.2 and Title 24 11B-810.2.2]
- (2) Where provided, new or replaced bus shelters shall be installed or positioned so as to permit a wheelchair or mobility aid user to enter from the public way and to reach a location, having a minimum clear floor area of 30 inches by 48 inches, entirely within the perimeter of the shelter.
[2010 ADA Standards 305.3 and Title 24 11B-810.3]
- (3) Bus stop boarding and alighting areas shall be connected to streets, sidewalks, or pedestrian paths by an accessible route. Newly constructed bus stop pads shall provide a square curb transition between the pad and roadway elevations or detectable warnings.
[Title 24 11B-810.2.3]
Caltrans Type A or B curb, will satisfy the square curb requirement. See *Standard Plans*.
- (4) Parallel to the roadway, the slope of the bus stop boarding and alighting area shall be the same as the roadway, to the maximum extent practicable. Perpendicular to the roadway, the slope of the bus stop boarding and alighting area shall not be steeper than 2.0%.
[2010 ADA Standards 810.2.4 and Title 24 11B-810.2.4]

4.3.17 Parking

The following applies to off street accessible parking.

- (1) For off street parking, Table 4.3.17 establishes the number of accessible parking spaces required.
[2010 ADA Standards 208.2 and Title 24 11B-208.2]
- (2) For every six or fraction of six accessible parking spaces, at least one shall be a van parking space.
[2010 ADA Standards 208.2.4]
- (3) Car and van parking spaces shall be 216 inches (18 ft) long minimum. Car parking spaces shall be 108 inches (9 ft) wide minimum and van parking spaces shall be 144 inches (12 ft) wide minimum, shall be marked to define the width, and shall have an adjacent access aisle. Exception: Van parking spaces shall be permitted to be 108 inches (9 ft) wide minimum where the access aisle is 96 inches (8 ft) wide minimum.
[Title 24 11B-502.2 including Exception]
- (4) Access aisles serving car and van parking spaces shall be 60 inches wide minimum.
[2010 ADA Standards 502.3.1 and Title 24 11B-502.3.1]
- (5) Access aisles shall be at the same level as the parking spaces they serve. Changes in level are not permitted. Exception: Slopes not steeper than 2.0% shall be permitted.
[2010 ADA Standards 502.4 including Exception and Title 24 11B-502.4 including Exception]

Parking spaces that serve a particular building or facility shall be located on the shortest accessible route from the parking to an entrance. Where parking serves more than one accessible entrance, parking spaces shall be dispersed and located on the shortest accessible route to the accessible entrances. In parking

facilities that do not serve a particular building or facility, parking spaces shall be located on the shortest accessible route to an accessible pedestrian entrance of the parking facility.

In each parking area, a bumper or curb shall be provided and located to prevent encroachment of cars over the required width of walkways. Also, the space shall be so located that persons with disabilities are not compelled to wheel or walk behind parked cars other than their own. Pedestrian ways which are accessible to persons with disabilities shall be provided from each such parking space to related facilities, including curb cuts or ramps as needed. Ramps shall not encroach into any accessible parking space or the adjacent access aisle.

TABLE 4.3.17 – OFF STREET ACCESSIBLE PARKING SPACE REQUIREMENTS

Total Number of Parking Spaces Provided in Parking Facility	Minimum Number of Required Accessible Parking Spaces
1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1,000	See Note 1
1,001 and over	See Note 2

Notes:

1. Two percent of total.
2. Twenty plus one for each 100, or fraction thereof, over 1,000.

Signing and striping for on and off street parking shall conform to the design details shown on Standard Plans A90A and A90B. Consult with the Division of Traffic Operations Liaison regarding proposed signing and striping changes.

4.3.18 Trails

Trails within the State highway right of way are considered to be pedestrian facilities if pedestrians may traverse the path, either for their exclusive use or shared with other users. Trails that are intended for nonpedestrian use only, e.g., equestrian or for mountain bikes, are not subject to the guidance in this section.

- (1) This DIB adopts the trail guidance provided within Sections 1016 through 1018 of the Federal Guide on “Outdoor Developed Areas” as found on the US Access Board website:

www.access-board.gov/guidelines-and-standards/recreation-facilities/outdoor-developed-areas

The provisions found on this website shall be regarded as design standards.

[Final Guidelines for Outdoor Developed Areas]

Any proposed exception to the design standards in the “Outdoor Developed Areas Guide” must make reference to those applicable sections in the exception request. The conditions described in Section 1019 Conditions for Exceptions may be used, as specified in the provisions, to support an exception.

4.3.19 Protruding Objects

- (1) Objects with leading edges more than 27 inches and not more than 80 inches above the finish floor or ground shall protrude 4 inches maximum horizontally into the circulation path. Exception: Handrails shall be permitted to protrude 4½ inches maximum.
[2010 ADA Standards 307.2 and Title 24 11B-307.2 including Exception]
- (2) Guardrails or other barriers shall be provided where the vertical clearance is less than 80 inches high. The leading edge of such guardrail or barrier shall be located 27 inches maximum above the finish floor or ground. Where a guy support is used parallel to a circulation path, including but not limited to sidewalks, a guy brace, sidewalk guy or similar device shall be used to prevent an overhanging obstruction.
[2010 ADA Standards 307.4 and Title 24 11B-307.4]
- (3) Free-standing objects mounted on posts or pylons shall overhang circulation paths 12 inches maximum when located 27 inches minimum and 80 inches maximum above the finish floor or ground. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches, the lowest edge of such sign or obstruction shall be 27 inches maximum or 80 inches minimum above the finish floor or ground.
[2010 ADA Standards 307.3 and Title 24 11B-307.3]
- (4) Protruding objects shall not reduce the clear width required for accessible routes.
[2010 ADA Standards 307.5 and Title 24 11B-307.5]

In general, street furniture or any item placed within the pedestrian environment must be cane detectable. Objects that protrude over a pedestrian pathway above a height of 27 inches are not considered detectable by cane. A critical zone, which is not considered detectable, is between 27 inches and 80 inches above the pedestrian pathway surface. Many transportation elements within the pedestrian pathway are cane detectable, such as electrical systems hardware, as specified in the Caltrans *Standard Plans*.

Where it is decided to prohibit pedestrian crossings at an intersection or ramp crossing, a pedestrian barricade per Standard Plan ES-7Q should be used. Consult with your Division of Traffic Operations Liaison for further guidance.

4.4 Shared Facilities

Pedestrian facilities that are part of nonmotorized transportation facilities must be designed in accordance with the *Highway Design Manual* for the appropriate bikeway classification, and the *Designing Sidewalks and Trails for Access* for best practice equestrian design.

Designers of pedestrian-shared facilities must consider the geometric requirements that are most critical for the intended users. In some cases designing for pedestrians may govern the geometric features. For example, a designated Class 1 bikeway may legally be used by pedestrians and bicycles. But, it may not be practical to design for both users at certain segments of the path. In such cases, appropriate documentation of the deviation from standard will either be required for a bicycle standard in Chapter 1000 of the *Highway Design Manual* or for a pedestrian accessibility standard in this DIB; consult with your Design Coordinator.

4.5 Alternate Standards

Federal regulations allow the use of other accessibility standards, if they provide substantially equivalent or greater access to the facility system, as the minimum Federal accessibility standards. Similarly, the *California Building Code* allows the enforcing agency to make design judgments as to equivalent designs.

Local Agency standards that provide equivalent or greater accessibility than the Federal 2010 ADA Standards and the *California Building Code* may be used in lieu of the minimum standards in this DIB. Those standards not in this DIB should be discussed with the Design Coordinator and the decision documented in the project files. In the case of a historic property/historical resource, use of the California State Historical Building Code is mandatory for State-owned facilities as well as consultation with the State Historical Building Safety Board.

4.6 Temporary Traffic Control

Temporary traffic control zones can impact a wide range of State highway users, including persons with disabilities. During the design phase, a decision must be made whether or not to include plans to accommodate pedestrians and/or special provisions consistent with the *California Manual on Uniform Traffic Control Devices (CA MUTCD)*. If plans and/or special provisions are provided for this purpose, the Transportation Management Plan Guidelines must be followed. If it is elected to close any sidewalk(s) due to construction and if it is elected to provide a temporary route for use by the public, the various provisions for pedestrian accommodation as set forth in the *CA MUTCD* Part 6 must be followed. For projects under construction, the Resident Engineer must discuss the provisions of the *CA MUTCD* with the contractor prior to the beginning of work during the preconstruction meeting, as required in the *Construction Manual*.

4.7 Exhibits

Pedestrian facilities that are part of nonmotorized transportation facilities may include vertical exhibit panels, wayside exhibits panels, and touchable exhibits. The following information is taken from the Programmatic Accessibility Guidelines for National Park Service Interpretive Media. This publication is available at www.nps.gov/hfc/accessibility/accessibilityGuideVersion2.1.pdf.

The smallest type in a vertical exhibit panel should be placed within a zone containing the range of eye level for a person in a wheelchair to a standing adult for a panel that must be approachable, with no physical barriers. This eye-level zone is approximately 40 inches to 60 inches from the finished grade. Adjustments would have to be made based on lighting conditions, colors, contrasts, layouts, and other design considerations. This typically applies to the body copy and photo caption type. If type cannot be placed at the appropriate eye level, increase readability with a larger type size, more leading, smaller line length, and/or more contrasting color and background.

Wayside exhibit panels shall be installed at heights and angles favorable for viewing by all visitors, including wheelchair users. For low-profile exhibits (angled at 30 or 45 degrees) the recommended height is 28 to 34 inches from the bottom of the exhibit frame to finished grade (based on the California State Parks Accessibility Guidelines); for upright exhibits and bulletin boards the height is 24 to 36 inches from the bottom of the exhibit frame to the finished grade, depending on the panel.

The following reach ranges refer to items briefly touched with one hand, such as a push button or small tactile exhibit or display:

- Reach Ranges: See Architectural Barriers Act Accessibility Standards 308 for more information, including children's reach ranges, obstructed/unobstructed reaches, and exceptions.
- Forward Reach (unobstructed): For touchable exhibits positioned unobstructed on a vertical surface, the high forward reach will be 44 inches maximum, and the low forward reach will be 16 inches minimum above the finished grade. These are common measurements for adults and children ages 9 and above.
- Side Reach (unobstructed): Where a clear floor space allows a parallel approach to a touchable exhibit and the side reach is unobstructed, the high side reach will be 44 inches maximum, and the low side reach shall be 16 inches minimum above the finished grade. These are common measurements for adults and children ages 9 and above.

Dist – Co – Rte
PM
Project ID or Encroachment Permit Number

EXCEPTION TO ACCESSIBILITY DESIGN STANDARDS



Prepared by:

(Name), Registered Civil Engineer³

Submitted by: _____
(Name), Design Engineer

Date: _____

Recommended by: _____
(Name), Project Manager

Date: _____

Concurrence¹ by: _____
(Name), Office Chief
Or District/Region Division Chief of Design

Date: _____

Approved² by: _____
(Name), Design Coordinator

Date: _____

Notes:

1. Must be a Supervising Transportation Engineer or higher Civil Service Engineering Classification.
2. Delete this signature line for Rail or Transit Station projects (DSA is the approving entity).
3. A Licensed Architect or Licensed Landscape Architect may prepare this document and sign and seal it in lieu of a Registered Civil Engineer, provided the same Licensed Architect or Licensed Landscape Architect designed the on-site improvements. Use the seal of the appropriate licensed person in responsible charge.

This documentation shall be filed in the district Project History Files. A copy shall be sent to Division of Design, Division Chief, attention Design Exception. Attach, as necessary, the information discussed in Item Number 3. At a minimum, the Exception to Accessibility Design Standards should contain the following sections:

1. Project Description

Describe the overall project scope and the proposed pedestrian facility design portion. Provide geographic project limits and lengths. Also, describe the existing highway facility as well as the existing pedestrian facilities.

If using an accessibility standard not listed in DIB 82-05, describe the accessibility standard and its reference of origin.

2. Project Costs

Provide the total capital cost estimate of the project. Also, provide an estimate of the capital cost of the proposed pedestrian features.

3. Nonstandard Feature(s)

Describe the nonstandard accessibility feature(s) to be constructed or to be maintained in an alteration. Provide sufficient information in written and graphic (layouts, cross sections, profiles, details, etc.) format to convey the extent of noncompliance with accessibility standards.

4. Standard(s) for Which Exception is Requested

State the accessibility standard from DIB 82-05.

5. Reason for Exception

The request for exception to accessibility design standards must state the reason why the facility or element is in whole or in part structurally impracticable (for new construction) or technically infeasible (for alterations) to comply with DIB 82-05 standards. Exceptions must be based on factors which may include historical significance, existing terrain, environmental issues, right of way constraints, conflicts with other design standards, and/or other significant considerations. Excessive cost may be supplemental information but cannot be used to support an exception related to a structural impracticability or technical infeasibility.

The four (4) factors for unreasonable hardships related to Clear Width, discussed in Section 4.3.3 of DIB 82-05, are to be documented in this section.

6. Work Required to Make Standard

Provide a description of the additional work in excess of the proposed project work required to meet the subject accessibility standard.

7. Reviews and Concurrence

As appropriate, provide the names of the Headquarters Design and District personnel who have discussed and concurred with this document; and include date of their concurrence.

Curb Ramp Scoping and Design Guide

A. Introduction

This guidance has been developed to assist designers of curb ramps to be familiar with design requirements and construction considerations for these facilities. Section 4.3 of this DIB contains the accessibility standards in accordance with the 2010 ADA Standards, which replaced the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG). The goal is to design fully accessible facilities. However, in certain circumstances where physical or project scope constraints prevent meeting strict compliance with the accessibility standards, the facilities may be designed to be compliant to the extent practicable as explained in this guide.

The *Highway Design Manual* (HDM), Index 105.5 provides a discussion on pedestrian movement, location of curb ramp placement, and the number of curb ramps at each corner. Also discussed in HDM Topic 401 is the pedestrian as a factor in design of intersections.

B. Project Scoping

Curb ramps may be included as part of the project scope and funded from many different sources. Generally, projects with curb ramp work are considered roadway alterations (see Section 4.1.2). The Clarification of FHWA's Oversight Role Memorandum, Questions and Answers Attachment at http://www.fhwa.dot.gov/civilrights/programs/ada_sect504qa.cfm#q1, dated September 12, 2006, states the following regarding project scope and alterations:

17. What projects constitute an alteration to the public right-of-way?

An alteration is a change to a facility in the public right-of-way that affects or could affect access, circulation, or use. Projects altering the use of the public right-of-way must incorporate pedestrian access improvements within the scope of the project to meet the requirements of the ADA and Section 504. These projects have the potential to affect the structure, grade, or use of the roadway. Alterations include items such as reconstruction, rehabilitation, widening, resurfacing (see USDOJ-FHWA technical assistance dated 6-28-13 for additional clarification), signal installation and upgrades, and projects of similar scale and effect (6-28-2013).

The draft implementing ADA regulations, Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG), recognizes that existing highway grades built to the surrounding terrain are appropriate reasons for not building to full standard. Although this is currently a draft document, the FHWA has recommended this document as best practice guidance. The draft PROWAG says:

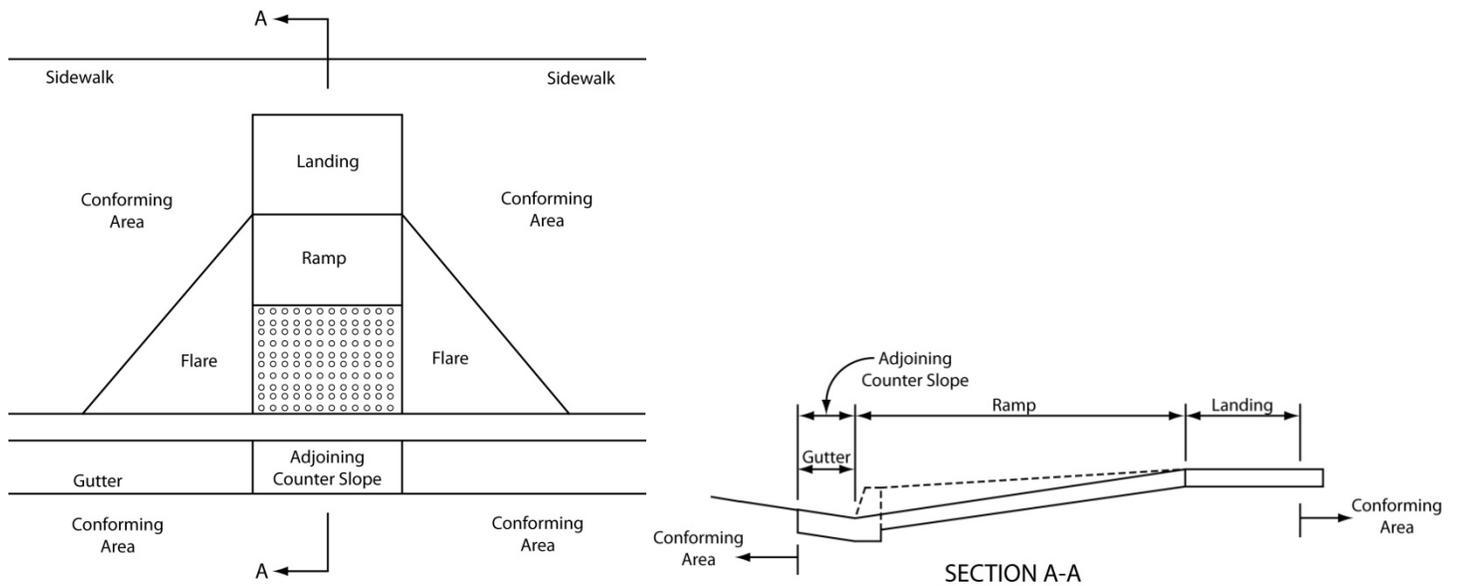
R202.3.1 Existing Physical Constraints. Where existing physical constraints make it impracticable for altered elements, spaces, or facilities to fully comply with the requirements for new construction, compliance is required to the extent practicable within the scope of the project. Existing physical constraints include, but are not limited to, underlying terrain, right-of-way availability, underground structures, adjacent developed facilities, drainage, or the presence of a notable natural or historic feature.

The ADAAG and its replacement, the 2010 ADA Standards, discusses how both physical constraints and limits of the project's scope may determine when ADA facilities may be considered "technically infeasible". Therefore, both the 2010 ADA Standards and the draft PROWAG allows for ADA improvements to be constructed to the extent technically feasible or practicable. The clear primary goal of each document is to construct accessible facilities in compliance with their standards.

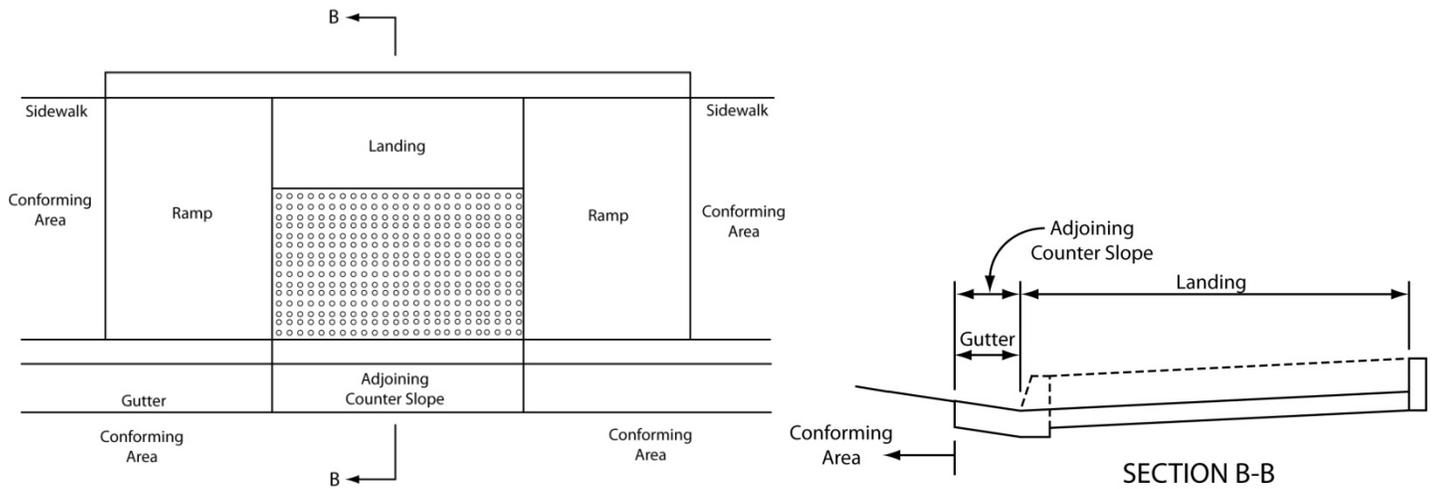
Curb ramps are a key accessibility feature in the public right of way since they will act as a refuge associated with a pedestrian crossing. It may be a challenge to design curb ramps into an existing network of pedestrian sidewalks and crossings because sidewalks and crossings are subject to the existing roadway features, which are designed according to geometric highway standards approved by the Federal Highway Administration in the HDM. In spite of this potential dichotomy, curb ramps are to be given the priority of meeting the full accessibility standards and then conforming to the surrounding area as necessary. Conforming to the surrounding area should also be designed to fully meet accessibility standards. In some limited instances constraints may prevent strict compliance of the conforming area. In these instances the conforming area shall comply with the ADA to the “extent practicable within the scope of the project.”

For the purpose of this guide, a typical curb ramp (Case A and Case C) will consist of basic features shown below. A Blended Transition is also shown, which would require a Construction Detail. These features are to be designed to meet full accessibility standards. See Section 4.3 and Standard Plan A88A for more details and the applicable standards.

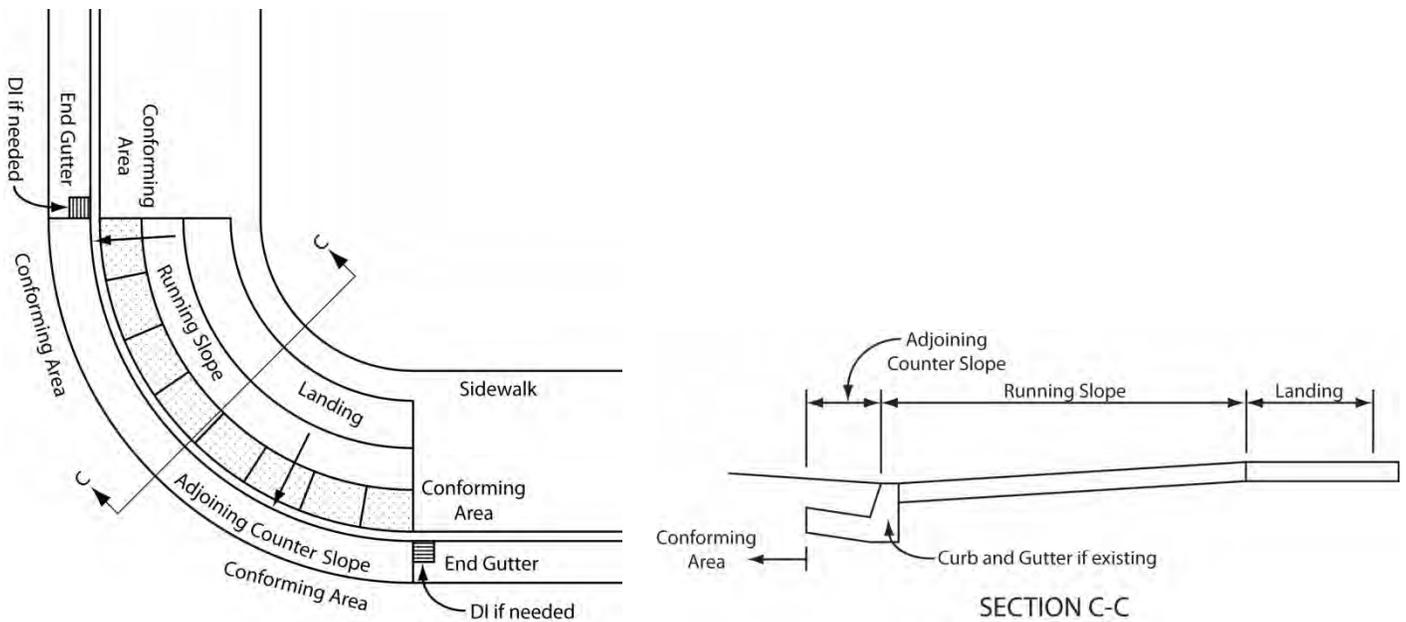
Perpendicular Curb Ramp (Case A):



Parallel Curb Ramp (Case C):



Blended Transition:



It is expected that scoping decisions will lead to designing the curb ramp features to full accessibility standards. Consultation with the Design Coordinator or the Design Reviewer will help ensure these expectations are met.

C. Project Development

The level of design detail will depend on the phase of the project in the project development process. The following should be considered for each phase.

Project Initiation Document (PID)

1. Seek sufficient funds to allow ADA facilities to be adequately scoped into the project. This should be a project development team decision.
2. Identify where curb ramps are missing or if they exist, but do not meet the accessibility standards and best practices (see Section 4.0). Usually, a recommendation from the District Traffic Operations unit will be the basis of this early scope. An access request or grievance filed by the public or the need identified in the ADA Transition Plan could also be the basis of the project.
3. Identify potential constraints, e.g., utilities, signal hardware, electrical, drainage, structures, R/W, etc. using as-built plans, mapping and photos.
4. Perform a site visit with staff from District/Region Design, Traffic, District ADA Engineer and other functional units as needed, e.g., Structures, Surveys, Hydraulics, R/W, etc.
 - a. Measure the existing curb ramps or other pedestrian facilities to determine if they meet the standards in Section 4.3. Measurements of curb heights, sidewalk width, sidewalk running/cross slope, flow line slope, pavement cross slope, etc., will help to ascertain what will be required in order for a curb ramp to be designed to meet full standards.
 - b. Determine the appropriate type of curb ramp for each location.
 - c. Determine approximate dimensions of each proposed curb ramp, considering existing curb height, existing slopes of roadbed gutter, roadbed pavement, and sidewalks.
 - d. Identify all existing features within limits of each proposed curb ramp, e.g., signal poles, drainage inlets, utilities, R/W fence, bridge, buildings, evidence of truck offtracking, pavement markings, etc.
 - e. Consider capturing stormwater runoff prior to each curb ramp.
 - f. Include other features (see Section 4.0) that improve accessibility within the project.
5. Determine what portion of the adjacent sidewalk will need to be reconstructed to provide a standard top landing (e.g., Case A Curb Ramp) as well as a transition section to conform back to the existing sidewalk. Transition sections should be outside the boundary of the top landing to a reasonable distance, e.g., a sidewalk contraction joint or to a structure. Consult with the Design Reviewer or Design Coordinator regarding the reasonable conforming distance.
6. Work with the District Traffic Operations unit to determine the proper scope and cost of traffic related items such as striping and signal activation details.
7. Avoid designing to maximum slopes and minimum dimensions of the accessibility standards. See the conservative slopes and widths in the curb ramp standard plans.
8. Identify right of way, utility relocation, and drainage needs at each location.
9. Include the necessary funds and time for resolving conflicts as noted above in the schedule and estimate.
10. Evaluate reconstructing the roadbed pavement if necessary. Readily achievable roadbed work is considered practicable.
11. Curb ramps are the most common solution when a curb obstructs the pedestrian accessible route. Occasionally, solutions such as raising roadbed pavement to the top of curb, thereby creating a blended curb ramp or transition, is a valid alternate design.
12. Consider scoping stand alone ADA curb ramp projects to combine curb ramps with similar work involved, such as those on existing structures requiring special construction materials and techniques, those with significant relocations, and the less complex locations. This may lead to the decision to break up the curb ramps identified in the PID process for multiple highway projects.
13. Estimate contract item quantities to provide sufficient funding to meet the ADA standards at each location.

Project Approval and Environmental Document (PA&ED)

1. Perform a site visit with staff from District/Region Design, Traffic, District ADA Engineer and other functional units as needed, e.g., Structures, Surveys, Hydraulics, R/W, etc. to:
 - a. Verify type of curb ramp or pedestrian facility for each location.
 - b. Verify dimensions of each proposed curb ramp, considering existing curb height, existing slopes of gutter, pavement, and sidewalks.
 - c. Verify all existing features within limits of each proposed curb ramp, e.g., signal poles, drainage inlets, utilities, R/W fence, bridge, buildings, evidence of truck offtracking, pavement markings, etc.
 - d. Consider capturing stormwater runoff prior to each curb ramp.
 - e. Consider other features that should be included in the project to enhance accessibility (see Section 4.0).
2. Prepare survey request for locations with many constraints, e.g., R/W, significant utilities, street grades, and elevation changes.
3. Meet with functional units to determine feasibility of relocating existing features in conflict with each proposed curb ramp, e.g., Hydraulics, Electrical Design, Utilities, R/W (easements), Structures, etc.
4. Meet with functional units to identify additional features to be added to the project to improve pedestrian access, e.g., additional drainage, signs, profile adjustments, pavement markings, etc.
5. Prepare curb ramp designs that are fully compliant with the accessibility standards and best practices in Section 4.0. Once standard curb ramps and landings are designed, the transition to the existing sidewalk also should strictly meet the accessibility standards. When it is not feasible to design the transition to the accessibility standards, the transition shall be designed to comply with the accessibility standards to the “extent practicable within the scope of the project.” Documentation of the nonstandard conforming area is to be included in the Transition Plan and coordinated by the District ADA Engineer once a request is initiated by the designer. Documentation of the request (memo, e-mail, etc) is to be included in the Project History File. Documentation of an Exception to Accessibility Design Standards is not required.
6. If the curb ramps themselves cannot be designed to full accessibility standards, an approved Exception to Accessibility Design Standards, see Section 3.1, will be required. This will also document compliance with the ADA to the “extent practicable within the scope of the project.”

Plans, Specifications, and Estimates (PS&E)

1. Use the survey data and field notes provided during the Project Report (PA&ED) phase to design the curb ramps.
2. The current curb ramp standard plans contain conservative slopes and widths in order to account for errors in design and construction; these show a 1.5% instead of 2.0%, 7.5% instead of 8.3%, 9% instead of 10%, and 50 inches instead of 4 ft. However, a Construction Detail should be developed for situations where the adjacent roadway is on a grade or there are space constraints. These Construction Details are to indicate the slopes and widths, and will require contractor surveys. Utilize SSP 73-3 (using minor concrete) for all sidewalks, curb ramps, or driveway crossings designed as part of the pedestrian route. For the contractor surveys, use the Bid Item for Pre/Post Construction Surveys. Follow the DES – Office Engineers guidance on how to use the specification and estimate the cost for the contractor surveys.
3. Follow the guidance in the *Plans Preparation Manual* regarding the placement, off-sets, call-outs, and features to be surveyed by the contractor.
4. Discuss with District Construction the need to provide cross sections.
5. Update the nonstandard accessibility documentation in the Transition Plan and/or the Exception to Accessibility Design Standards, per the discussion in Numbers 5 and 6 under PA&ED above, if necessary.

6. Asphalt concrete pavement conforming areas and Blended Transitions should use ½" Type B HMA for better workability.

D. Compliance

Curbs ramps that are designed and constructed in accordance with DIB 82, standard plans and specifications will achieve compliance with the ADA. Design compliance is documented at Ready-to-List or at encroachment permit issuance per Section 3.1 of this DIB. Regions/Districts also document compliance at the conclusion of construction per the October 5, 2012 ADA Compliance Memo signed by Robert Pieplow.

If the Design Coordinator has approved an Exception to Accessibility Design Standards, this documentation will be referenced in the Project Report and will be made part of the Project History File. Also, if a request from the designer to the District ADA Engineer is made to include nonstandard conforming area designs to the existing facility in the Transition Plan, this request is to be included in the Project History File.

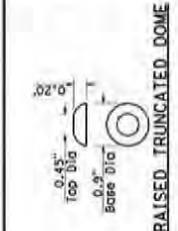
For existing pedestrian facilities, the documentation of not designing to full accessibility standards contained in a previously Project History File may be useful when deciding to scope a project in the beginning.

E. Other Considerations

The following are recommendations and reminders when designing curb ramps:

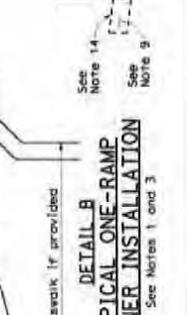
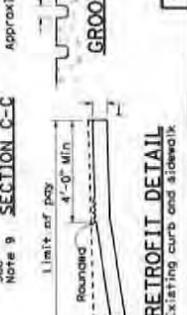
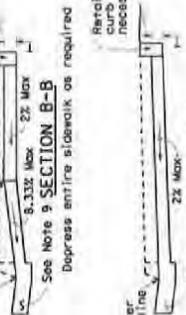
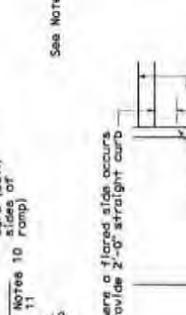
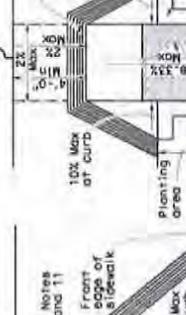
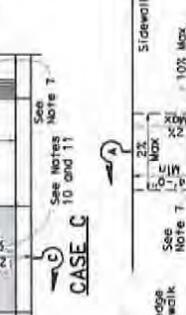
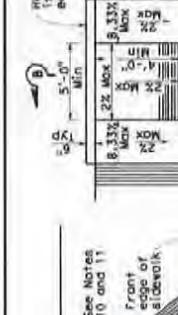
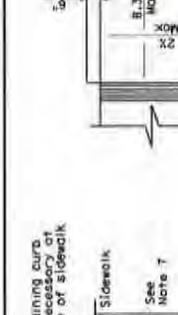
- Whether projects are stand alone curb ramp projects or other alterations of roadways, DIB 82 standards apply to all pedestrian facilities.
- When using the curb ramp standard plans, make sure to verify that a standard curb ramp can meet the accessibility standards in construction. Check to see if ample space is available and that there are no obstructions, e.g., utilities, drainage inlets, etc. If that is not the case, construction details will be required.
- Provide an adequate estimate and schedule at the PID phase to provide full standard curb ramp design.
- Do not design to the maximum slopes or the minimum widths if feasible.
- Consider relocating/redesigning the drainage system of an intersection in order to intercept flow before the curb ramp location.
- If pavement reconstruction is not part of the project scope, consider minor pavement work as needed to achieve standards.
- Consider modifying the alignment of the sidewalk transition segment to achieve standard slopes.
- Make sure the marked crossings are well placed. Involve the District Traffic Operations unit to help decide the need and/or placement of marked crosswalks in accordance with accessibility standards and the *CA MUTCD*.
- Right of way acquisition (fee, easements, etc.) or utility relocation may be necessary to solve an accessibility issue. This should be identified early in the process.
- Consider designing a curb extension (bulbout), see HDM Index 303.4, where right-of-way is limited to accommodate a standard curb ramp.
- Consider directional curb ramps (curb ramps aligned in the direction of pedestrian crossing) if an engineered design can show that no instability will occur.
- Curb ramps are normal solutions when a curb obstructs the pedestrian accessible route. However, there may be other solutions, e.g., a blended curb ramp. Consult with your Design Coordinator or Design Reviewer.

H. Paul Cohen
 September 1, 2006
 15250 WILSON AVENUE, SUITE 100
 BAYVIEW, CALIFORNIA 94026
 (415) 331-1111

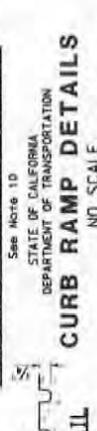


NOTES:

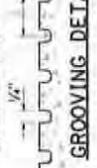
- As site conditions dictate, Case A through Case G curb ramps may be used for former installations similar to those shown in Detail A and Detail B. Case A through Case G curb ramps also may be used at mid block locations, as site conditions dictate.
- If distance from curb to back of sidewalk is too short to accommodate ramp and 4'-0" platform (landing) as shown in Case A, the sidewalk may be depressed longitudinally as in Case B, or C or may be sloped as in Case D.
- When ramp is located in center of curb return, crosswalk configuration must be similar to that shown for Detail B.
- As site conditions dictate, the retaining curb side and the flared side of the Case G ramp shall be constructed in reversed position.
- If located on a curve, the sides of the ramp need not be parallel, but the minimum width of the ramp shall be 4'-0".
- Side slope of ramp flares vary uniformly from a maximum of 10% of curb to conform with longitudinal sidewalk slope adjacent to top of the ramp, except in Case E and Case F.
- The curb ramp shall be outlined, as shown, with a 1'-0" wide border with 1/4" grooves approximately 3/4" on center. See grooving detail.
- Transitions from ramps and landing to walks, gutters or streets shall be flush and free of abrupt changes.
- Maximum slopes of adjoining gutters, the road surface immediately adjacent to the curb and the sidewalk shall be as shown. A maximum 5 percent within 4'-0" of the top and bottom of the curb ramps.
- Curb ramps shall have a detectable warning surface that extends the full width and 3'-0" depth of the ramp, detectable warning surface shall be as shown on this plan and the requirements in the Special Provisions.
- The edge of the detectable warning surface nearest the street shall be between 6" and 8" from the gutter flooring.
- Sidewalk and ramp thickness, "T", shall be 3/4" minimum.
- Utility pull boxes, manholes, vaults and all other utility facilities shall be located at least 2'-0" from the curb. They shall be located or adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
- For retrofit conditions, removal and replacement of curb abran will be at the contractor's option, unless otherwise shown on project plans.



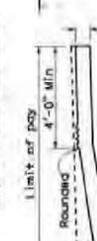
RAISED TRUNCATED DOME PATTERN (IN-LINE)
 DETECTABLE WARNING SURFACE



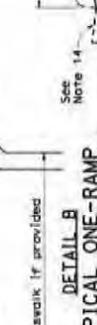
GROOVING DETAIL



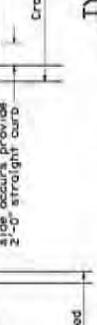
RETROFIT DETAIL



DETAIL A



DETAIL B



STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION

REVISOR: 11/05
 RSP A88A DATED SEPTEMBER 1, 2006 SUPERSEDES STANDARD PLAN A88A
 DATED MAY 1, 2006 - PAGE 115 OF THE STANDARD PLANS BOOK DATED MAY 2006.

REVISED STANDARD PLAN RSP A88A

DIST.	COUNTY	ROUTE	POST MILES	SHEET NO.	TOTAL SHEETS

H. Paul Cook
REGISTERED CIVIL ENGINEER

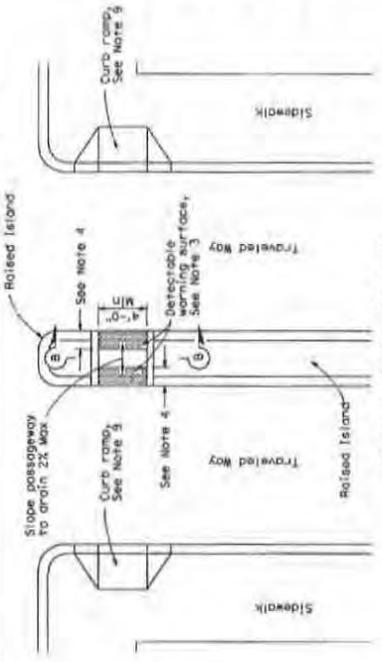
May 1, 2006
Joaquin District
No. 3-31-06

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DESIGNED FOR THE STANDARD PLAN A88B
BY THE UNIVERSITY OF CALIFORNIA
IN COOPERATION WITH THE CALIFORNIA
DEPARTMENT OF TRANSPORTATION

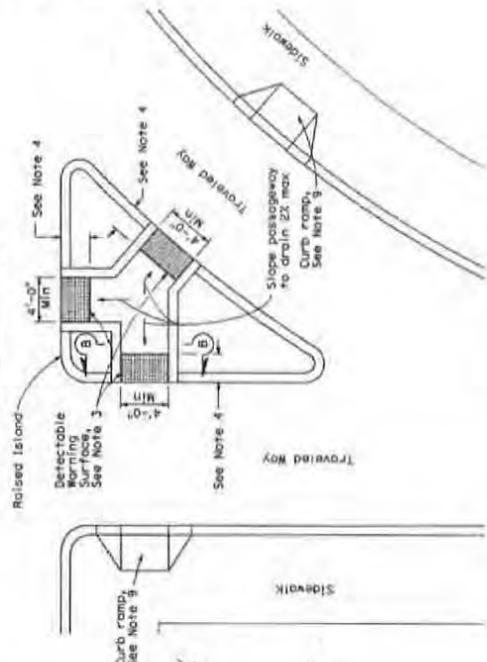
31 1/2" to 1/8" Vertical Scale
1" = 10' Horizontal Scale

NOTES:

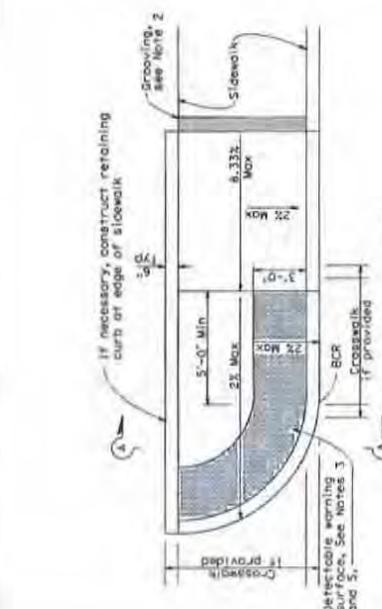
1. Sidewalk ramp and passageway thickness, "T", shall be 3/2" minimum.
2. For details of grooving used with Case CM curb ramp, see Standard Plan A88A.
3. For details of detectable warning surfaces, see Standard Plan A88A.
4. Where an island passage way length is less than 8'-0" the detectable warning surface shall extend the full width and full depth of the passage way length. Where an island passage way length is greater than or equal to 8'-0" the detectable warning surface shall extend the full width and 3'-0" depth of the passage way length. Where an island passage way length is greater than or equal to 8'-0", each detectable warning surface shall extend the full width and 3'-0" depth of the passage way length.
5. For Case CM curb ramp, the edge of the detectable warning surface nearest the street shall be between 6" and 8" from the gutter fronting.
6. Transitions from ramps to walks, gutters or streets shall be flush and free of abrupt changes.
7. Maximum slopes of adjoining gutters, the road surface shall not exceed 5 percent within 1'-0" of the top and bottom of the curb ramp.
8. Utility pull boxes, manholes, vaults and all other utility facilities within the boundaries of the curb ramp will be relocated or adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
9. For additional curb ramp details, see Standard Plan A88A.



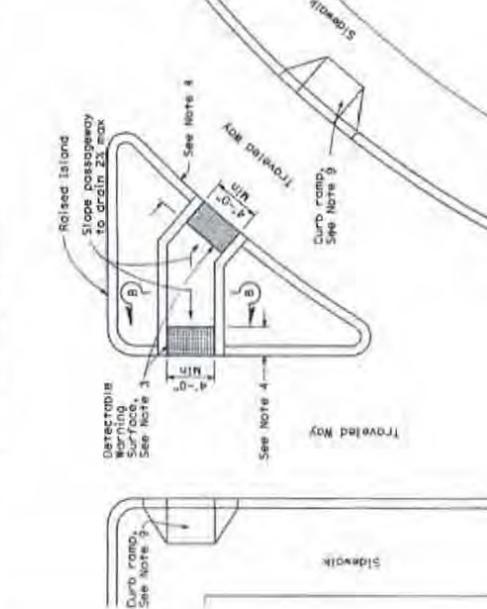
TYPE A PASSAGEWAY



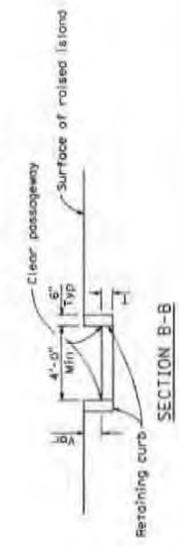
TYPE B PASSAGEWAY



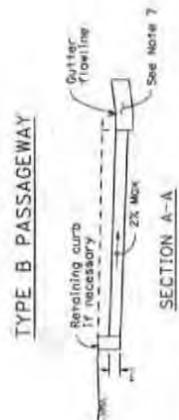
CASE CM CURB RAMP



TYPE C PASSAGEWAY



SECTION B-B

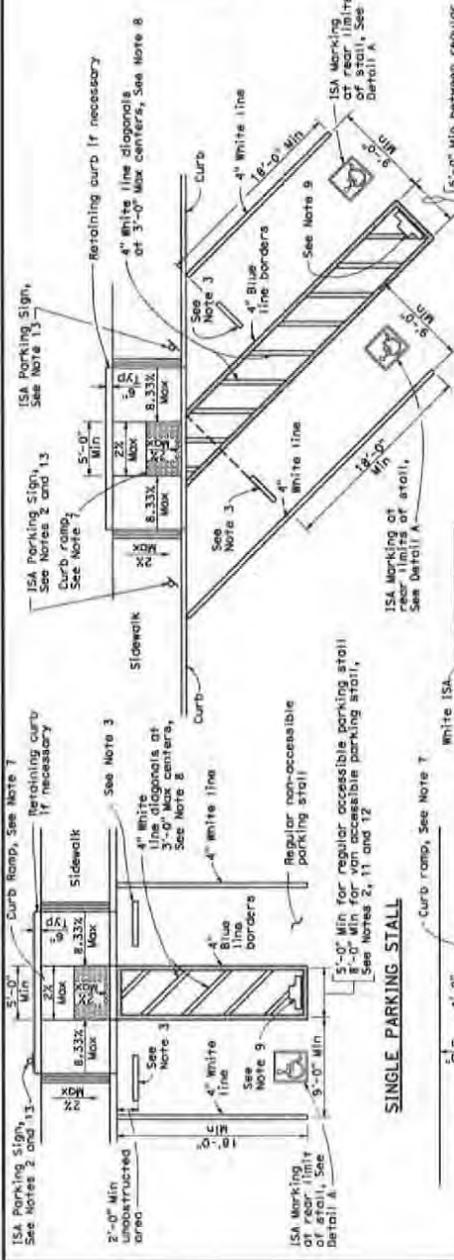


SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CURB RAMP AND ISLAND PASSAGEWAY DETAILS
NO SCALE
A88B

COUNTY: _____ DISTRICT: _____ CITY: _____ COUNTY: _____ DISTRICT: _____ CITY: _____
 REGISTERED CIVIL ENGINEER
H. David Cook
 JUN 6, 2008
 CALIFORNIA
 3-31-08
 THE STATE OF CALIFORNIA
 REGISTERED CIVIL ENGINEER
 License No. 42866
 License Expires 06/06/2011

- NOTES:**
1. Accessible parking spaces serving a particular building shall be located adjacent to the building entrance. In parking facilities that do not serve a particular building, accessible parking shall be located on the shortest accessible route of travel to an accessible pedestrian entrance of the parking facility.
 2. One in every eight accessible off-street parking stalls, but not less than one, shall be served by an accessible aisle of 8'-0" minimum width and shall be marked with an International Symbol of Accessibility (ISA) plaque or the R99C (CA) sign.
 3. In each parking stall, a curb or bumper shall be provided and located to prevent an accessible vehicle from encroaching on the required aisle. The curb or bumper shall be located behind the vehicle with disabilities are not compelled to wheel or walk behind parked cars other than their own.
 4. Surface slopes of accessible off-street parking stalls shall be the minimum possible and shall not exceed 2 percent in any direction.
 5. Table A shall be used to determine the required number of accessible parking stalls in each parking lot or garage.
 6. Where Plaque R99B (CA), Sign R99C (CA) or Sign R7-Rb are installed, the bottom of the sign or plaque panel shall be a minimum of 7'-0" above the surrounding surface.
 7. Curb ramps shall conform to the details shown on Revised Standard Plan RSP A88A.
 8. Blue paint, instead of white may be used for markings to not be visible.
 9. The words "NO PARKING" shall be painted in white letters, no less than 1'-0" high and located so that it is visible to traffic enforcement officials. See Revised Standard Plan RSP A90B for details of the "NO PARKING" pavement marking.
 10. A R100B (CA) sign shall be posted in a conspicuous place at each entrance to off-street parking facilities or immediately adjacent to and visible from each stall. The sign shall include the address where the towed vehicle may be reclaimed and the telephone number of the local traffic law enforcement agency.
 11. Where a single (non-van) accessible parking space is provided, the loading and unloading access aisle shall be on the passenger side of the vehicle as the vehicle is going forward into the parking space.
 12. Where a van accessible parking space is provided, the loading and unloading access aisle shall be 8'-0" wide minimum, and shall go forward into the parking space.
 13. Accessible Parking Only Sign shall be Sign R99C (CA) or Sign R99 (CA) with Plaque R99B (CA).



DIAGONAL DOUBLE PARKING STALLS



ISA MARKING
See Revised Std Plan RSP A24C
DETAIL A



Sign R100B (CA)
See Note 10



Sign R99C (CA)
See Note 6



Sign R99 (CA)
Plaque R99B (CA)
See Note 6

DOUBLE PARKING STALL

TABLE A

Total Number of Parking Spaces or Stalls	Minimum Number of Accessible Parking Spaces or Stalls
1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2 percent of total
Greater than 1001	20 plus 1 percent for each 100 or fraction thereof over 1001

OFF-STREET PARKING SIGNS
(Parking lot or garage)
See Note 6

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
ACCESSIBLE PARKING OFF-STREET

NO SCALE
RSP A90A DATED JUNE 6, 2008 SUPERSEDES STANDARD PLAN A90A
DATED MAY 1, 2006 - PAGE 117 OF THE STANDARD PLANS BOOK DATED MAY 2008.

REVISED STANDARD PLAN RSP A90A

Page Intentionally Left Blank

APPENDIX C

Concrete

C1: Concrete Mix Designations

All Portland Cement Concrete shall conform to Section 90 of the *State Standards*.

- Whenever the 28-day compressive strength specified is greater than 3,600 psi, the concrete shall be designated by compressive strength. If the specified 28-day compressive strength is 4,000 psi or greater, an additional 14 days will be allowed to obtain the specified strength. If the 28-day compressive strength is 3,600 psi or less it is given for design information only and is not a requirement for acceptance of the concrete.
- Concrete with a 28-day compressive strength of 3,600 psi or less shall contain the minimum amount of cementitious material listed in Table D-1.
- Concrete with a 28-day compressive strength greater than 3,600 psi shall be proportioned such that the concrete will attain the strength required by the project plans and specifications.
- Concrete for County Public Works contracts shall be specified on the project plans and in the project special provisions.

Materials. All portland cement concrete materials shall comply with the provisions of Section 90-2 of the *State Standards*, except that prequalification tests in conformance with California Test 549 will not be required for the construction types listed in Table D-1.

C2: Compressive Strength Testing of Concrete

Public Works Contracts. For County Public Works contracts, compressive strengths and production methods shall be required in accordance with the State Construction Manual, the project Special Conditions and the provisions of Section 90-9 of the *State Standards*.

Public Improvements Constructed by Development Projects. For public improvements constructed by development projects, when the compressive strength of the specified portland cement concrete is greater than 3,600 psi, the prescribed compressive strengths shall be tested in accordance with the provisions of Section 90-9 of the *State Standards*. The Contractor shall maintain copies of test reports at the job site, which shall be available for review and inspection.

- Projects of 50 CY or More. One set of standard cylinders shall be collected from each day's run volume, for every lot and class of concrete. Additional cylinder sets shall be collected not less than once for every 150 CY of each concrete class.
- Projects Less than 50 CY. When the daily lot or class of concrete is less than 50 CY, a Certificate of Compliance, signed by the manufacturer, may be submitted in-lieu of standard cylinder tests. The Certificate of Compliance shall state the average compressive strength of each lot, and that it complies in all respects with the requirements of the specifications. As is required in section 6.1 of the *State Standards*, Certificates of Compliance for Portland cement concrete shall be furnished prior to use or placement of the material.

Curing Concrete. Curing concrete shall comply with the requirements of Section 90-7 of the *State Standards*.

C3: Concrete Mix by Type of Construction

Type of Construction	Minimum Cementitious Material Content		Minimum Compressive Strength at 28 days (PSI)
	Ibs./CY	Sacks/CY	
Street Surface Improvements			
Curb, Gutter, Sidewalk, Concrete Pavement, Alleys, Driveways, Curb Ramps, Cross Gutters and Spandrels	520	5-1/2	2,500
Extruded Curb, Curb and Gutter when using 3/8" aggregate	548	6	2,500
Water, Sewer & Storm Drainage Facilities			
Pipe Collars, Pre-Cast Manhole Components, Catch Basins, Sidewalk Culverts, Utility Lid Collars	565	6	3,250
Side hill Surface Drainage Facilities	520	5-1/2	2,500
Pipe Bedding and Encasement Anchors, Thrust Blocks, Wall Support for Pipe	470	5	2,500
2 Sack Trench Backfill Slurry	188	2	
Manhole Ring Support – Hydraulic cement grout, non-shrink, packaged dry (ASTM C1107)			7,000
Reinforced Structures			
Section 2.1.2 H. Retaining Walls and footings not requiring a construction permit by Title 19 of the County Code	590	6-1/4	3,250
Channels and Boxes	590	6-1/4	3,250
Miscellaneous			
Street Light and Traffic Signal Foundations, Survey Monuments	565	6	3,250
Fence and Guardrail Post Foundations	520	5-1/2	2,500
Concrete Not Otherwise Specified	565	6	3,250
Shotcrete (Wet Mix)	632	6-3/4	3,250
Coarse Masonry Grout	610	6-1/2	2,000

APPENDIX D

Road Design

Page Intentionally Left Blank

D1: Street Design Considerations

Street Design Considerations, from the Circulation Element chapter of Framework for Planning, are as follows.

F. STREET DESIGN CONSIDERATIONS

The location and design of streets can have a major effect on adjacent land uses. The design of residential streets is particularly important since improper design of such routes can have a long-term adverse effect on residents using them. The following guidelines offer general design parameters for providing safe, convenient routes for movement of automobiles, bicycles and pedestrians within residential neighborhoods and local commercial areas.

General Design Guidelines

- a. Street and pedestrian circulation patterns in newly developed areas should be compatible with the land use recommendations of the community plans for the planning areas.
- b. Arterial roads and streets should be developed to provide appropriate service for local trips, to minimize traffic on principal arterials.
- c. Pedestrian circulation should be expressly addressed in street designs so that walking is accommodated by various methods of implementation.
- d. New street network designs should minimize the overall length of streets.
- e. Driveway entrances should be avoided on arterials.
- f. Local residential streets should generally be designed to serve limited, localized access needs, rather than through traffic.
- g. All dwellings and structures should be readily accessible to emergency and service vehicles.
- h. Street standards should be developed using the guidelines of the "Guide to Urban and Rural Street Design" published by the association of State and Highway Transportation Officials.
- i. Horizontal and vertical street alignments should be located to minimize grading and to incorporate natural ground contours as much as possible without creating hazards to traffic, and should be consistent with other design objectives.
- j. Street layouts should be planned to avoid adverse concentration of storm water runoff.
- k. Street design should promote safe bicycling by considering the placement of bike lanes that will provide for the safety of the cyclist as well as the automobile driver with whom they share the streets.

Local Street Intersections

Residential street layouts should generally be designed to minimize the use of four-way local street intersections by avoiding conventional gridiron street layout patterns.

Parking

Adequate off-street parking for residents and guests, including spaces for recreational vehicles, should be provided in both urban and rural areas.

Street Landscaping

- a. Street landscaping should be included in planned street designs to improve the appearance and aesthetic value of urban and village areas.
- b. Landscaping should be planned for safety and beauty, to provide buffering to minimize conflicts between streets, parking, structures, and pedestrian paths.
- c. New street development projects should include landscaping along with funding for its installation and maintenance, either through the county or other agencies such as community service districts.
- d. The design and construction of new roads or the expansion of existing roads, to the degree that right-of-way and traffic safety allow, should incorporate and preserve natural features, such as native woodlands or significant mature trees, rock outcrops and other landmarks.
- e. Implementation of street landscaping projects should occur after the assignment of departmental responsibilities for installation and maintenance and discussion of funding sources and methods by the Board of Supervisors. For example, the Public Works and General Services Departments may develop a coordinated program for design and a funding mechanism through the Public Works Department, and installation and maintenance by the General Services Department. These decisions should be made to avoid problems with inadequate staffing or financial capability to develop and maintain projects.

Alternative Street Design

Due to the considerations listed above, special street designs may be necessary in unique local situations, such as in developments where public roads are not a consideration. In such cases, special design standards or criteria may be utilized that do not conform to the County Standard Improvement Specifications and Drawings.

Some special design needs are noted in the Land Use Element area plans as guidelines in the Circulation chapter programs or as requirements in Article 9 of the Land Use Ordinance (Community Planning Standards). Special designs that are available in the "Guide to Urban and Rural Street Design," or other design guidebooks will be necessary to implement them. Other special design needs may come to light during review of applications for land use permits and subdivisions or capital improvement projects, for example to preserve a woodland or to create a paved pathway separate from a street. In such cases, streets should be designed to accommodate those needs if traffic safety can be assured.

Street Construction

Before the construction of new or expanded streets and roads, detailed plans must be developed. At that stage, engineering feasibility studies and geometric designs should carry out the guidelines listed in the previous sections with the coordination of Planning and Public Works Department staff as a general plan conformity report is prepared.

An environmental determination is then made for the preliminary design of each project. The Public Works Department prepares construction drawings based on the process of plan development and the environmental determination.

D2: Recommendations for installing Marked Crosswalks

Use the following table for determining appropriate locations for marking crosswalks:

Table 1. Recommendations for installing marked crosswalks and other needed pedestrian improvements at uncontrolled locations.^a

Roadway Type (Number of Travel Lanes and Median Type)	Vehicle ADT \leq 9,000										Vehicle ADT < 12,000 - 15,000			Vehicle ADT > 15,000	
	Speed Limit ^b					Speed Limit ^b					Speed Limit ^b			Speed Limit ^b	
	\leq 30 mph	35 mph	40 mph	\leq 30 mph	35 mph	40 mph	9000 to 12,000	\leq 30 mph	35 mph	40 mph	40 mph	\leq 30 mph	35 mph	40 mph	
2-Lanes	C	C	P	C	C	P	C	C	P	P	C	C	P	N	
3-Lanes	C	C	P	C	C	P	C	C	P	P	C	C	P	N	
Multi-Lane (4 or More Lanes) With Raised Median ^c	C	C	P	C	C	P	C	C	P	P	C	C	P	N	
Multi-Lane (4 or More Lanes) Without Raised Median	C	P	N	P	P	N	C	P	N	N	C	P	N	N	

* These guidelines include intersection and midblock locations with no traffic signals or stop sign on the approach to the crossing. They do not apply to school crossings. A two-way center turn lane is not considered a median. Crosswalks should not be installed at locations which could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, substantial volumes of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone will not make crossings safer, nor necessarily result in more vehicles stopping for pedestrians. Whether marked crosswalks are installed, it is important to consider other pedestrian facility enhancements, as needed, to improve the safety of the crossing (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic calming measures, curb extensions). These are general recommendations; good engineering judgment should be used in individual cases for deciding where to install crosswalks.

** Where speed limit exceeds 40 mph, marked crosswalks alone should not be used at unsignalized locations.

C = Candidate sites for marked crosswalks. Marked crosswalks must be installed carefully and selectively. Before installing new marked crosswalks, an engineering study is needed to show whether the location is suitable for a marked crosswalk. For an engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volumes, vehicle speeds, sight distance, vehicle mix, etc. may be needed at other sites. It is recommended that a minimum of 20 pedestrian crossings per peak hour (or 15 or more elderly and/or child pedestrians) exist at a location before placing a high priority on the installation of a marked crosswalk lane.

P = Possible increase in pedestrian crash risk may occur if crosswalks are added without other pedestrian facility enhancements. These locations should be closely monitored and enhanced with other pedestrian crossing improvements, if necessary, before adding a marked crosswalk.

N = Marked crosswalks alone are not recommended, since pedestrian crash risk may be increased with marked crosswalks. Consider using other treatments, such as traffic signals with pedestrian signals to improve crossing safety for pedestrians.

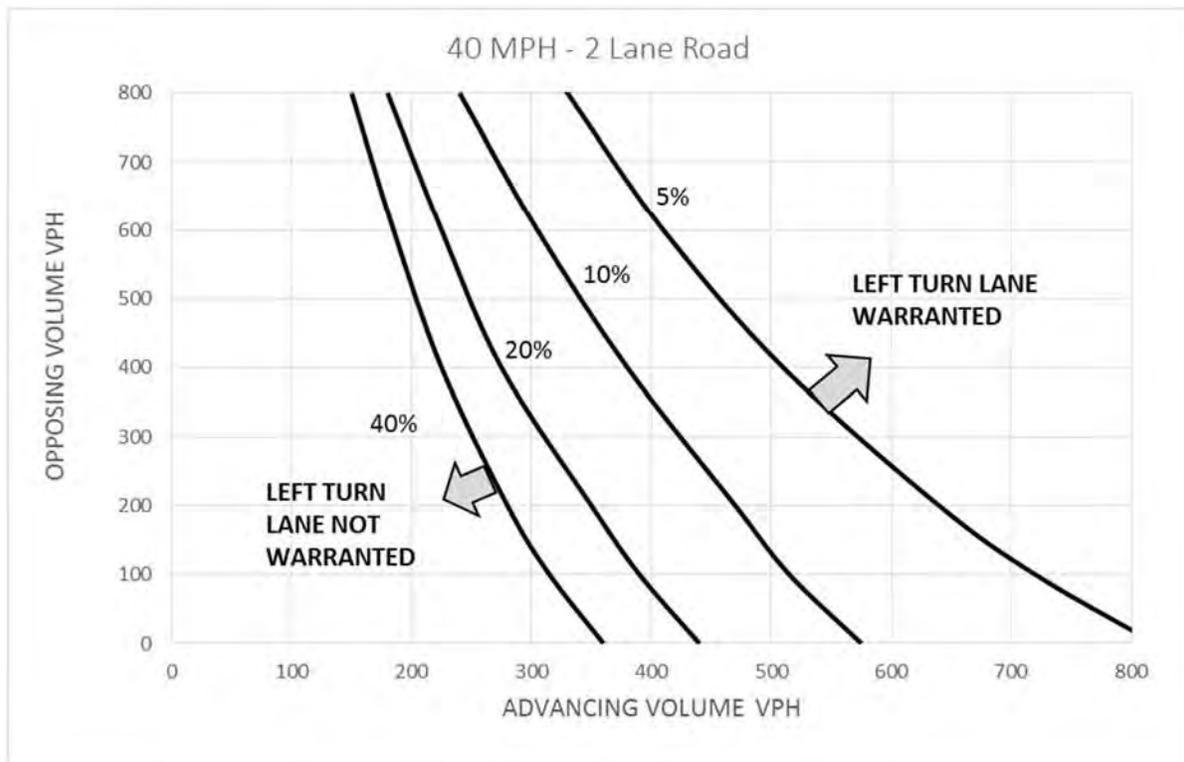
† The raised median or crossing island must be at least 4 ft wide and 6 ft long to adequately serve as a refuge area for pedestrians in accordance with MUTCD and AASHTO guidelines.

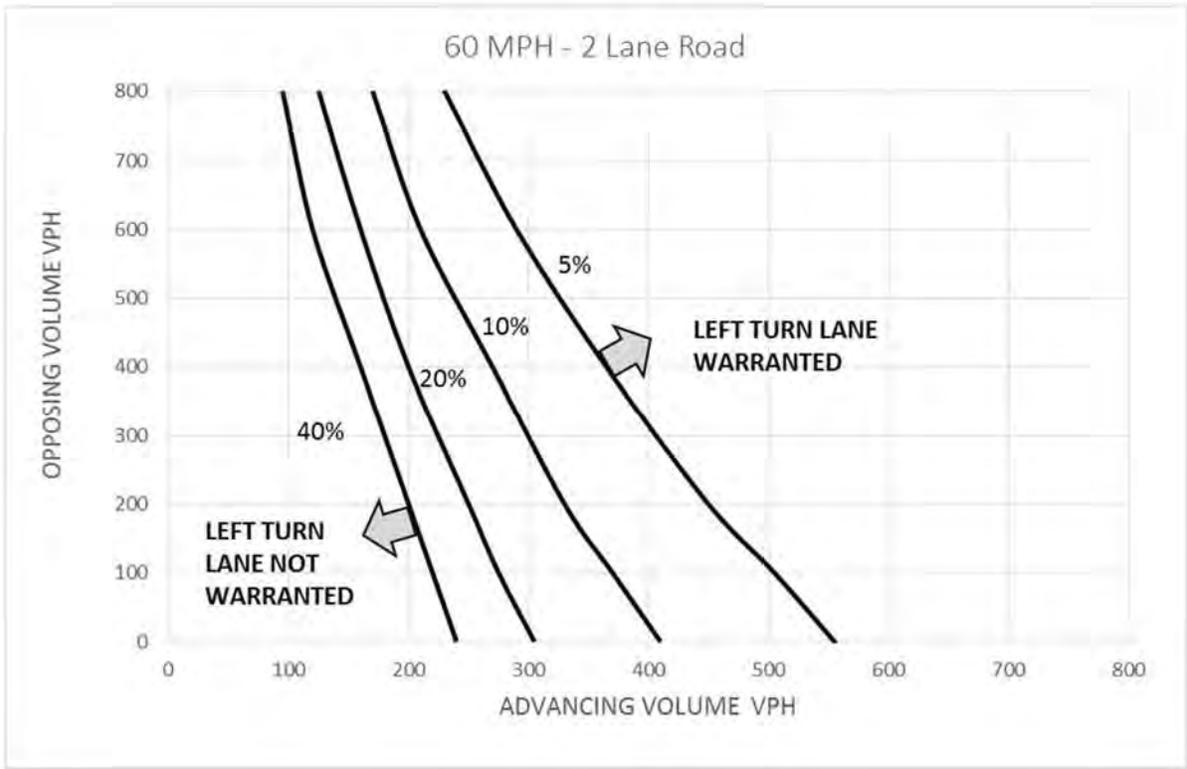
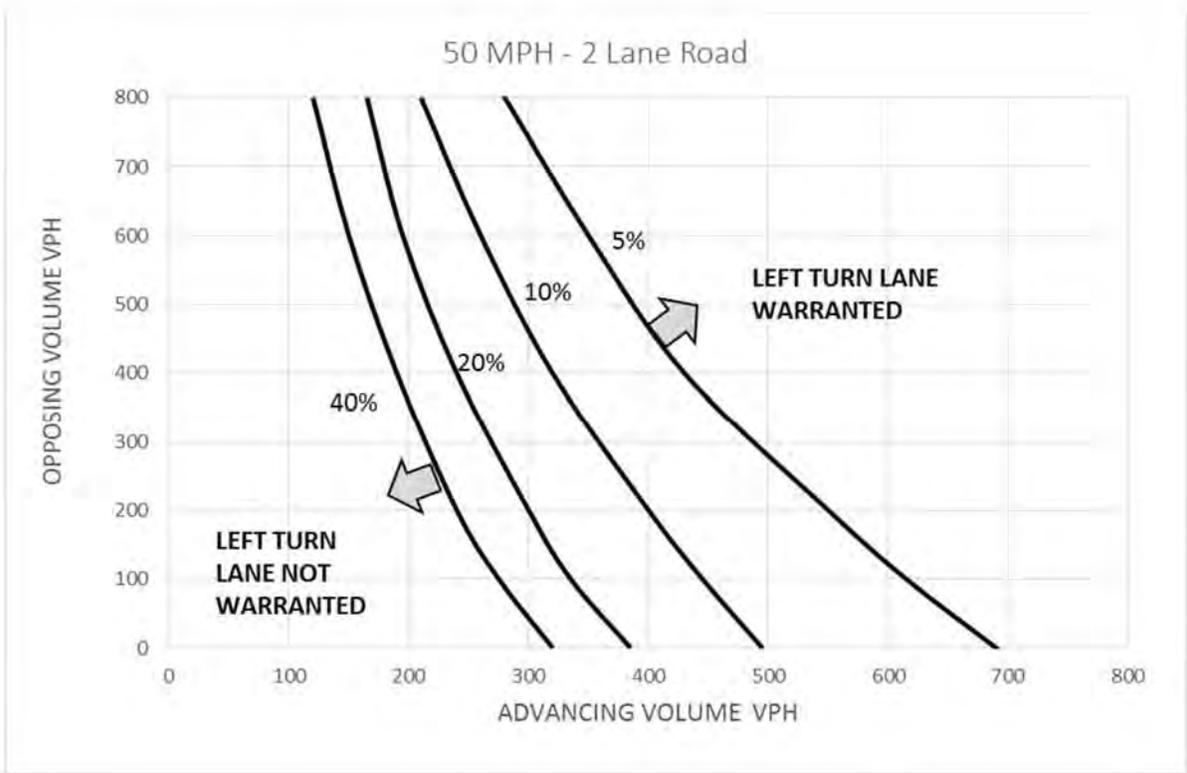
D3: Left Turn Warrant Analysis Graphs (AASHTO)

The table and graphs for left turn warrant analysis on the next two pages were taken from the AASHTO manual.

Table 2. AASHTO (5) guide for left-turn lanes on two-lane highways, 2004.

Operating Speed (mph)	Opposing Volume (veh/hr)	Advancing Volume (veh/hr)			
		5% Left Turns	10% Left Turns	20% Left Turns	30% Left Turns
40	800	330	240	180	160
	600	410	305	225	200
	400	510	380	275	245
	200	640	470	350	305
	100	720	515	390	340
50	800	280	210	165	135
	600	350	260	195	170
	400	430	320	240	210
	200	550	400	300	270
	100	615	445	335	295
60	800	230	170	125	115
	600	290	210	160	140
	400	365	270	200	175
	200	450	330	250	215
	100	505	370	275	240





DESIGN INFORMATION BULLETIN NUMBER 79-03

Department of Transportation
Division of Design
Office of Geometric Design Standards

Design Guidance and Standards For Roadway Rehabilitation Projects

[Pavement Focused (2R) and Resurfacing, Restoration, and Rehabilitation (3R) Projects]

And

Certain Other Projects

[Storm Damage, Protective Betterment, Operational Improvement and Safety-funded Projects]

APPROVED BY:

A handwritten signature in black ink, appearing to read "Timothy Craggs", is written over a horizontal line.

TIMOTHY CRAGGS
ACTING DIVISION CHIEF
DIVISION OF DESIGN

November 19, 2007

Table of Contents

		<u>Page Number</u>
1.0	Capital Pavement Improvements to the State Highway System	1
1.1	Pavement Repair Program Elements in the State Highway and Protection Program (SHOPP)	1
1.2	Capital Preventive Maintenance (CAPM) Projects	2
1.3	Project Development Guidance for 2R and 3R Projects	2
1.3.1	Purpose and Need	2
1.3.2	Existing Pavement Condition	2
1.3.3	Safety Screening to Identify 2R Projects	2
1.3.4	Alternative Countermeasures to Reconstruction for Safety Improvement	3
1.4	Applicability to Certain Other Types of Projects	3
2.0	2R Projects	5
2.1	Pavement Rehabilitation Strategies	5
2.2	Project Scoping Guidance	5
2.2.1	General Guidance	5
2.2.2	Pedestrian Accessibility and the Americans with Disabilities Act (ADA)	5
2.2.3	Bicyclist Accommodation	6
2.2.4	Storm Water Management	6
2.2.5	Pavement Edges and Tapers	6
2.2.5.1	Edge Drop-offs	6
2.2.5.2	Shoulder Backing	6
2.2.5.3	Pavement Tapers	7
2.2.6	Curbs and Dike	7
2.2.7	Drainage Facilities	7
2.2.8	Vertical Clearance at Structures	7
2.2.9	Shoulders on and Connections to Conventional Highways	7
2.2.10	Traffic Operations Strategies	8
2.2.10.1	Roadway Safety (Protection) Devices	8
2.2.10.2	Signs and Delineation	8
2.2.10.3	Shoulder and Centerline Rumble Strips	8
2.2.11	All Other Highway Appurtenances and Design Features	8
2.3	Documentation of Design Exceptions	8

3.0	3R Projects	9
3.1	Pavement Rehabilitation Strategies	9
3.2	Project Scoping Guidance	9
3.2.1	General Guidance	9
3.2.2	Pedestrian Accessibility and the Americans with Disabilities Act (ADA)	9
3.2.3	Bicyclist Accommodation	10
3.2.4	Storm Water Management	10
3.2.5	Pavement Edges and Tapers	10
3.2.6	Curbs and Dike	10
3.2.7	Drainage Facilities	10
3.2.8	Structures	10
	3.2.8.1 Vertical Clearance	10
	3.2.8.2 Structural Bridge Capacity	11
	3.2.8.3 Bridge Rail and Other Structure Improvements	11
3.2.9	Maintenance	11
3.2.10	Traffic Operations Strategies	11
	3.2.10.1 Roadway Safety (Protection) Devices	11
	3.2.10.2 Signs and Delineation	11
	3.2.10.3 Shoulder and Centerline Rumble Strips	12
3.2.11	Highways Appurtenances	12
3.2.12	Landscaping	12
3.3	Geometric Design Guidance	12
	3.3.1 Projects on Freeways, Expressways, and Multilane Conventional Highways	12
	3.3.2 Additional Geometric Design Guidance for Projects on Freeways and Expressways	12
	3.3.2.1 Cross Slope (Traveled Way)	12
	3.3.2.2 Ramps and Gore Areas	13
	3.3.2.3 Interchange Spacing	13
	3.3.3 Geometric Design Guidance for Two- and Three-Lane Conventional Highways	13
	3.3.3.1 Selection of Design Speed	13
	3.3.3.2 Stopping Sight Distance at Grade Crests and Sags	13

3.3.3.3	Superelevation	14
3.3.3.4	Horizontal Alignment	14
3.3.3.5	Intersections (Public and Private Connections) and Driveways	15
3.3.3.5.1	General	15
3.3.3.5.2	Corner Sight Distance	16
3.3.3.5.3	Left- and Right-Turn Channelization	16
3.3.3.5.4	Skew Angle	16
3.3.3.5.5	Truck Turning	16
3.3.3.6	Cross Section Design Elements	17
3.3.3.6.1	Widths	17
3.3.3.6.1.1	Traveled Way	17
3.3.3.6.1.2	Shoulders	17
3.3.3.6.1.2.1	Roadbed	17
3.3.3.6.1.2.2	Bridges	18
3.3.3.6.2	Cross Slopes	19
3.3.3.6.2.1	Traveled Way	19
3.3.3.6.2.2	Shoulders	19
3.3.3.6.3	Clear Recovery Zone (CRZ)	19
3.3.3.6.4	Side Slopes	20

Tables

		<u>Page Number</u>
Table 1	Alternative Countermeasures to Reconstruction	4
Table 2	Two-Lane Conventional Highway 3R Standards for Shoulder Widths	18

Attachments

Attachment 1	Pavement Repair on the State Highway System
Attachment 2	2R Project Certification Form

1.0 Capital Pavement Improvements to the State Highway System

The focus of this Design Information Bulletin (DIB) is to provide guidance on design procedures and standards for roadway rehabilitation projects, both 2R and 3R, and to provide guidance on how to identify safety enhancements and other upgrades to include in these projects. This DIB supplements the highway design guidance and standards provided in the California Department of Transportation *Highway Design Manual (HDM)*. The standards established herein are communicated in the same manner as defined in Chapter 80 of the *HDM*. When this DIB is silent on a subject covered in the *HDM*, the new construction design guidance in the *HDM* applies.

This DIB is not a textbook or a substitute for engineering knowledge, experience or judgment. Many of the instructions given herein are subject to amendment as conditions and experience may warrant. Special situations may call for variation from the policies and procedures described in this document, subject to Division of Design approval, or such other approval as may be specifically provided for in the text.

More information regarding highway design for roadway rehabilitation projects can be found in the *American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide* and *AASHTO "Highway Safety Design and Operations Guide - Chapter 4: "Rural Highways."* Copies of these publications can be ordered through the AASHTO website. Other resources that are available and should be reviewed include:

- *DIB 82: "Pedestrian Accessibility Guidelines for Highway Projects;"*
- *Storm Water Quality Handbook "Project Planning and Design Guide;"*
- Chapter 7 of the *Traffic Manual*;
- *California MUTCD*;
- *"Guidelines for Reconstruction of Intersections,"* dated August 1985, which is available through the Headquarters Division of Traffic Operations;
- *HDM Pavement Engineering Chapters 600 through 670*; and the,
- *Life-Cycle Cost Analysis (LCCA) Procedures Manual*.

1.1 Pavement Repair Program Elements in the State Highway and Protection Program (SHOPP)

The SHOPP has various funding programs that the Department uses to repair the pavements on the State Highway System. Specifically:

- 3R Projects are programmed in and funded out of the SHOPP 201.120 Program;
- Capital Preventive Maintenance (CAPM) Projects are programmed in and funded out of the SHOPP 201.121 Program;
- 2R Projects are programmed in and funded out of the SHOPP 201.122 Program; and,
- Long-life Pavement Rehabilitation projects are programmed in and funded out of the SHOPP 201.125 Program.

This DIB provides guidance for projects in the SHOPP 201.120 and 201.122 Programs. For further information about these SHOPP program elements, see Chapter 7 in the *Coding Manual* on the Headquarters Division of Accounting website.

1.2 Capital Preventive Maintenance (CAPM) Projects

CAPM Projects are not covered by this document. See the *Project Development Procedures Manual (PDPM)*, *HDM Topic 603*, and *DIB 81: Capital Preventative Maintenance (CAPM) Guidelines* on the Departmental website for more guidance on CAPM Projects.

1.3 Project Development Guidance for 2R and 3R Projects

Chapter 9 of the *PDPM* describes the project development process for roadway rehabilitation projects. The Project Initiation Document (PID) typically used for roadway rehabilitation projects is the “*Project Scope Summary Report (PSSR) for 3R Projects*.” This document should be used for both pavement resurfacing, restoration, and rehabilitation (3R) and pavement resurfacing and restoration (2R) projects. In addition, the “*Main Streets: Flexibility in Design and Operations*” publication located on the Department Division of Design “Context Sensitive Solutions” website should be consulted for guidance during the scoping process.

1.3.1 Purpose and Need

Generally speaking, the purpose and need for 2R and 3R Projects is to restore the facility to a state of good repair so that the roadway will be in a condition that only requires minimal maintenance expenditures by the Department; see *HDM Topic 612* for further guidance on Department standards related to pavement design life. 2R Projects are to be programmed as “pavement-focused” projects, with their primary goal being to extend the service life of the identified pavement structure; while 3R Projects, in addition to extending the service life of the pavement structure, also replace and upgrade other highway appurtenances and facilities within the project limits that are failing, worn out or functionally obsolete. The determination of whether a segment of highway is to proceed as either a 2R or 3R Project is to be made after Safety Screening has occurred and during the pre-PID phase; see Section 1.3.3 for further guidance.

1.3.2 Existing Pavement Condition

The scope of a roadway rehabilitation project is driven by the purpose and need for the project. Roadway rehabilitation projects will vary in scope depending on pavement condition needs and the identified safety enhancements, and other facility upgrades, needed within the project limits. Analysis of the pavement condition data reported in the Pavement Management System will identify the structural deficiencies of the pavement structure that needs to be repaired and trigger the need for a project. Additional data including testing data and materials analysis such as deflection test results for flexible pavements; and notes from field reviews of the project site may also dictate the viable pavement repair strategies for the project. The *PDPM* should be consulted for further guidance on scoping roadway rehabilitation projects, the Scoping Team Review process, and additional guidance on deflection studies and field reviews. The *HDM*, particularly Topics 625, 635, and 645, should be consulted for further guidance on rehabilitation designs and requirements for pavements.

1.3.3 Safety Screening to Identify 2R Projects

Safety Screening to identify and analyze the collisions within the limits of all proposed roadway rehabilitation projects is required, regardless of highway type; see *HDM Index 62.3*. A review of collision data and other relevant information is required to determine if the highway segment in need of pavement repairs qualifies as a 2R Project, or if it should be repaired and upgraded as a 3R Project. The District Traffic Safety unit will perform the Safety Screening prior to the initiation of the PID phase. The results of the Safety Screening, in addition to the results of the pavement condition analysis, will be used to determine and adequately define the scope of the project. Integrating targeted (e.g., addition of protection devices,

such as Metal Beam Guard Rail) and cost-effective safety improvements (e.g., signing, striping) into 2R Projects is an effective way for the Department to preserve both mobility and safety. District Traffic Safety can be contacted to obtain more details on the Safety Screening process and procedures.

If the Safety Screening determines that targeted and cost-effective traffic operation strategies are the only needed safety enhancements within the project limits, the project can be identified as a “pavement-focused” 2R Project. If the Safety Screening results in the determination that more extensive safety work is required, which is beyond the targeted and cost-effective traffic operation strategies mentioned above, then the project will be identified as a 3R Project. In either case, the scope of the project should incorporate the recommendations of the Safety Screening.

If during the Safety Screening, a safety issue is identified and recommended for corrective action, District Traffic Safety will consider initiating a separate safety improvement project. In most cases, safety enhancements incorporated into 2R and 3R Projects are considered proactive safety measures.

1.3.4 Alternative Countermeasures to Reconstruction for Safety Improvement

In some cases, reconstruction measures to enhance safety in a corridor are impractical. When that is the case for a given location or segment of highway, it is important to remember that there exists a broad range of alternative measures that can be used alone or in combination with others to improve the safety along an existing highway. The Headquarters Division of Traffic Operations Office of Traffic Safety Program website has additional guidance on countermeasures to reconstruction which provides a list of “*General Countermeasures for Accident Patterns and Their Probable Cause*” that may aid designers. See *Highway Safety Improvement Program (HSIP) Guidelines*, Chapter 3.0, pages 3-15 through 3-21 for further information. Table 1 in this DIB serves as a supplement to the *HSIP* guidance and provides a partial list of alternative countermeasures to reconstruction for various existing geometric conditions.

1.4 Applicability to Certain Other Types of Projects

Certain storm damage repair, protective betterment, operational improvement and safety-funded non-freeway projects, as defined below, are to be designed using the geometric design guidance provided in Section 3.3 of this DIB:

- All projects costing less than the Minor A limit (excluding the cost of Right of Way and Environmental Mitigation);
- Projects costing more than the Minor A dollar limit and do not involve extensive grading, paving, or retaining structures that are not spot locations.
- Projects that are considered “spot” improvements; typically, these projects can be up to approximately one-half mile in length. Examples of this type of work include storm damage repairs, curve improvements, adding turn pockets, miscellaneous pavement widening, culvert replacement, and rock slope protection.
- Permanent Restoration projects, triggered due to fire, earthquake, slides or storm damage, that do not include structures such as walls or bridges, may be restored to the “condition” that existed prior to the damage.
- The 2R and 3R guidance in this DIB also applies to bridge deck rehabilitation projects funded from the Bridge Rehabilitation (20.xx.210.110) Program that necessitate the inclusion of improvements to the geometric features, and other improvements, in addition to the work being performed to restore the bridge deck.

TABLE 1
ALTERNATIVE COUNTERMEASURES TO RECONSTRUCTION

Existing Geometric Condition:	Alternate Countermeasure:
<p style="text-align: center;">Narrow lanes and shoulders</p>	<ul style="list-style-type: none"> ◆ Pavement edge lines ◆ Raised pavement markers ◆ Recessed pavement markers in snow areas ◆ Post (roadside) delineators ◆ Rumble strips
<p style="text-align: center;">Steep side slopes</p>	<ul style="list-style-type: none"> ◆ Shield with guardrail ◆ Roadside delineators
<p style="text-align: center;">Roadside obstacles</p>	<ul style="list-style-type: none"> ◆ Remove or relocate obstacle ◆ Slope flattening (including ditches) ◆ Add breakaway hardware to obstacle ◆ Shield with guardrail ◆ Delineate
<p style="text-align: center;">Narrow bridge</p>	<ul style="list-style-type: none"> ◆ Traffic control devices ◆ Approach guardrail ◆ Object markers ◆ Rumble strips placed on approaches
<p style="text-align: center;">Poor sight distance at vertical crest</p>	<ul style="list-style-type: none"> ◆ Traffic control devices ◆ Fixed-object removal ◆ Shoulder widening ◆ Relocate driveway or local road to a location with better sight distance ◆ Lighting
<p style="text-align: center;">Sharp horizontal curve</p>	<ul style="list-style-type: none"> ◆ Traffic control & warning devices ◆ Add lighting ◆ Shoulder widening ◆ Appropriate superelevation ◆ Slope flattening ◆ Pavement antiskid treatment ◆ Obstacle removal ◆ Obstacle shielding
<p style="text-align: center;">Various Intersections Issues</p>	<ul style="list-style-type: none"> ◆ Traffic control devices ◆ Traffic signalization (warrants must be met) ◆ Fixed lighting ◆ Speed controls ◆ Add turn lanes ◆ Increase sight distance

2.0 2R Projects

2.1 Pavement Rehabilitation Strategies

2R pavement rehabilitation strategies do not differ from those used on 3R Projects; see Section 3.1 of this DIB for further guidance.

2.2 Project Scoping Guidance

2.2.1 General Guidance

All roadway rehabilitation projects are to be scoped taking into consideration all modes of travel and the context of the facility being rehabilitated. A life cycle cost analysis shall be performed to assist the decision-making process being used to select the pavement rehabilitation strategy or strategies used within the project limits; see *HDM Topic 619* and the *LCCA Procedures Manual* for further guidance. The Maintenance Supervisor in the area of the project should also be contacted for input on highway deficiencies and needed safety upgrades. Maintenance personnel are typically very familiar with their segments of highway system and can often identify upgrades or deficiencies that might otherwise be overlooked such as drainage issues, pavement failures, collision locations, deficiencies related to bicycle and pedestrian usage, slope stability problems, the need for maintenance pullouts, safety concerns, and any other problematic issues. If the identified upgrades or deficiencies are significant (e.g., most highway appurtenances are failing, worn out or functionally obsolete, work necessary to upgrade the geometric design features requires additional right of way, environmental impacts are encountered that require additional study), the project may no longer qualify as a 2R Project and the Design Coordinator should be contacted as soon as possible for further project specific guidance.

In addition, the *PDPM* should also be consulted to review the current Departmental requirements, practices, and procedures related to project scoping and project delivery documentation.

2.2.2 Pedestrian Accessibility and the Americans with Disability Act (ADA)

Pedestrian accessibility and compliance with the ADA is to be decided on a project-by-project basis in accordance with *DIB 82* and *HDM Topic 105*. Upgrades and additions to pedestrian facilities must be considered on projects covered by this DIB. Federal and State law require the installation of curb ramps at intersections with curbs where they are absent. Pedestrian facilities that are altered must be upgraded to current ADA accessibility standards. If the project does not alter pedestrian facilities, consideration should still be given to upgrading the facilities, especially if pedestrian safety can be enhanced. Although new sidewalks should be considered, projects covered by this DIB are not required to add new pedestrian facilities throughout the limits of every project. Upgrades such as walkway (sidewalk) gap closures, widening sidewalks to current standards, upgrading curb ramps to current standards, relocating path width obstructions, sidewalk cross slope, and accessible driveways are to be evaluated and considered. Where pedestrians will use the shoulder in locations where sidewalks are not justified, see Section 2.2.9 of this DIB for further guidance. Facilities near school zones, rail grade crossings, parks, playgrounds, and other uses that have the potential to generate pedestrian activity are to be evaluated per the guidance in *DIB 82*. The Departmental website, under Traffic Operations, should also be visited to obtain guidance in the *California Manual of Uniform Traffic Control Devices (California MUTCD)* and additional Departmental guidance on work zone requirements during construction related to pedestrians.

2.2.3 Bicyclist Accommodation

Bicyclist safety must be taken into consideration on all 2R Projects. On 2R Projects it may be appropriate to widen shoulders; see Section 2.2.9 of this DIB for further guidance. *HDM Index 1003.2* should also be reviewed for guidance on bicycle lane widths when bicycle lanes are adjacent to on-street parallel vehicle parking to avoid conflicts between the parked vehicle doors, the bicyclists and the vehicles in the traveled way.

Also, see *HDM Chapter 1000* for further bicycle design criteria noting *HDM Index 1003.6(2)* regarding surface quality and the use of rumble strips, and *HDM Index 1003.6(3)* for requirements pertaining to drainage inlet grates. The Traffic Operations and the Office Engineers websites should be visited to obtain further guidance in Part 3 of the *California MUTCD* and the appropriate *Standard Plans* on rumble strips and their placement related to the needs of bicyclists. The Traffic Operations website should also be visited to obtain guidance in the *California MUTCD* and Departmental guidance on work zone requirements during construction related to the needs of bicyclists.

2.2.4 Storm Water Management

Features required for compliance with the Caltrans National Pollutant Discharge Elimination System (NPDES) Permit / Storm Water Management Plan (SWMP) must be included in the scope of work for 2R Projects. This not only involves the Best Management Practices (BMPs) required based on the work performed as part of the pavement repair strategies, plus any appurtenance and facility upgrades, but may also include BMPs for NPDES Permit compliance.

Contact the District Storm Water Coordinator for guidance on the current Caltrans NPDES Permit requirements and BMPs to include in the project. After consulting the District Storm Water Coordinator, consult with the District Maintenance Supervisor for the area to discuss the proposed BMPs and issues related to their maintenance.

2.2.5 Pavement Edges and Tapers

2.2.5.1 Edge Drop-offs

Pavement edge drop (e.g., vertical drops or ruts) can develop at the edge of paved surfaces and must be investigated for safety concerns. Consideration should be given to adding shoulder backing, see Section 2.2.5.2, or reconstructing the embankment on overlay projects because edge drops often develop over time. Visit the Department's Pavement website to review Pavement Tech Notes on "*Pavement Tapers*" for further guidance.

In addition, longitudinal edge differences are problematic for bicycles and motorcycles and are to be avoided. On the outside of superelevated curves, overlays and surface treatments (including Open Graded Friction Courses, OGFC) must extend to the edge of shoulder; see *HDM Index 645.1*.

Unpaved driveways, public road intersections and private road intersections should be paved to prevent pavement edge drops from developing. Such facilities are to be evaluated location-by-location and selectively paved on an as needed basis.

2.2.5.2 Shoulder Backing

Shoulder backing is a common design element for paving projects. Shoulder backing is a granular material that is used to protect the outside edge of pavement from edge cracking, avoid pavement edge loss, provide

edge support and minimize edge drop-offs. Guidance has been prepared to assist designers with shoulder backing. Visit the Department's Pavement website to review Pavement Tech Notes on "*Shoulder Backing*" for further guidance.

2.2.5.3 Pavement Tapers

Pavement tapers are a common design detail for 2R Projects. The goal of these tapers is to provide a smooth, ideally unnoticeable transition from one pavement type, overlay, or surface to another. Guidance has been prepared to assist designers with pavement tapers. Visit the Department's Pavement website to review Pavement Tech Notes on "*Guidance for Pavement Tapers*" for further information.

2.2.6 Curbs and Dike

Curb and dike placement, removal, and replacement may be done on 2R Projects as needed. Curbs and dikes have safety implications and must be evaluated based upon *HDM Topic 303*. Current practice involves placing or replacing curb and dike only when necessary and after all safety aspects have been considered. Curb and dike that is currently nonstandard should be removed or replaced based on the guidance in *HDM Topic 303*, unless specific circumstances dictate otherwise. The District Hydraulics unit, District Landscape, and Maintenance Supervisor in the area of the project should review any design proposals that involve dike removal or placement to ensure that it's removal does not impact an erodible slope.

2.2.7 Drainage Facilities

Only drainage repairs for structural deficiencies and the restoration of function and capacities are to be included in 2R Projects. The Maintenance Supervisor in the area of the project should be contacted to assist in identifying such drainage facility needs. District Maintenance should be contacted to have their culvert inspection crew(s) check all of the culverts to identify any structural deficiencies and possible need for replacement. If extensive modifications are needed to address or mitigate fish passage (e.g., grade control structures, step pools), then the project will be identified as a 3R Project.

2.2.8 Vertical Clearance at Structures

On 2R Projects, improving nonstandard vertical clearance should be based on the Safety Screening. However, where existing vertical clearance does not meet the requirements stated in *HDM Index 309.2* and cannot be achieved by milling prior to overlaying the pavement, the removal and replacement of the existing pavement may be necessary.

2.2.9 Shoulders on and Connections to Conventional Highways

2R Projects on conventional highways should be brought to the attention of the Design Coordinator as early as possible in the project development process to obtain their concurrence on the appropriate shoulder width(s) for project. Shoulders on conventional highways may need to be widened in urbanized areas, suburban areas with commercial and residential development adjacent to central business districts, and other locations where it is known or anticipated that shoulder usage by pedestrians and bicyclists is common. The need to widen the shoulder to accommodate pedestrians and bicyclists should be discussed with the Design Coordinator as early as possible in the project development process, if it has not already been discussed during the pre-PID phase. The Design Coordinator should also be made aware of the number and frequency of residential road and commercial connections to the conventional highway to determine if widening the existing shoulder is desirable.

2.2.10 Traffic Operation Strategies

Targeted and cost-effective traffic operation strategies such as roadway safety (protection) devices, signing, and striping to address identified accident patterns should be included in 2R Projects as needed. The Safety Screening completed by District Traffic Operations should be used to identify and determine what features are to be added to each pavement focused 2R Project.

2.2.10.1 Roadway Safety (Protection) Devices

The District Traffic Safety Systems Coordinator must be consulted regarding the application of and appropriate use of all roadway safety devices. Roadway safety devices typically include Metal Beam Guard Rail (MBGR), guardrail end treatments, crash cushions, median barrier, bridge rail, and bridge approach transition railing. Roadway safety devices that do not meet *NCHRP Report 350* criteria (or the latest crashworthiness criteria adopted by FHWA) are to be identified during the project's Safety Screening and upgraded or replaced. Roadway safety devices such as MBGR, bridge rails, and barriers may also require reconstruction when pavement overlays, shoulder backing, or slope changes necessitate adjusting their heights to meet the allowable limits. Consult with the District Traffic Safety Systems Coordinator to identify and discuss all of the roadway safety devices that may require an adjustment in height.

2.2.10.2 Signs and Delineation

Signs and pavement markings within the project limits should be evaluated for replacement and/or upgrading on an as needed basis. This evaluation should consider visibility performance, conformance with existing policies, appearance, and legibility for both day and night conditions.

2.2.10.3 Shoulder and Centerline Rumble Strips

Shoulder and Centerline Rumble strips are an effective proactive safety measure in reducing run-off-road or cross centerline collisions. Rumble strips can be used adjacent to the outside lane and along the centerline of undivided highways, or adjacent to both inside and outside lanes of divided highways. Consideration should also be given to adding a centerline buffer zone with rumble strips on highway segments where collision data exhibits a high number of cross centerline collisions. Consult with District Traffic regarding potential locations for installation of shoulder and centerline rumble strips. The Traffic Operations and the Office Engineers websites should be visited on the Department website to obtain further guidance in Part 3 of the *California MUTCD* and the appropriate *Standard Plans* on rumble strips.

2.2.11 All Other Highway Appurtenances and Design Features

The purpose of a 2R Project is to focus on repairing the pavement to extend the service life of the facility. If the Safety Screening for the segment of highway under consideration as a 2R Project indicates that the highway segment needs repairs and upgrading of its appurtenant facilities, the highway must be scoped as a 3R Project. If this is the case for a proposed project, a decision will need to be made to either rescope or modify the project in some manner to conform to the 2R guidance in this DIB.

2.3 Documentation of Design Exceptions

The philosophy of the 2R Program and its projects is that the geometric features and the safety of the facility will not be degraded. If the Safety Screening concludes that a 2R Project is appropriate for the proposed project, both Mandatory and Advisory Design Exception fact sheets will not be required for geometric design features, but a statement to document that conclusion should be included in both the Project History File and the PID for the project. All newly proposed nonstandard features must be

documented in a Mandatory or Advisory Design Exception Fact Sheet, as appropriate. Newly proposed nonstandard geometric design features are to be documented using the procedures in Chapter 21 of the *PDPM*.

Pavement designs for 2R Projects must meet the requirements found in *HDM Chapters 600 through 670*.

Exceptions to Accessibility Design Standards on 2R Projects are to be documented following the guidance provided in *DIB 82*.

3.0 3R Projects

3.1 Pavement Rehabilitation Strategies

Pavement rehabilitation strategies are constantly evolving with new technologies and materials. The following needs to be taken into account when selecting the 3R pavement strategy:

- Pavement design life (see *HDM Topic 612*);
- Minimizing maintenance worker exposure;
- Minimizing maintenance effort;
- Consistency with adjacent corridor pavement;
- Long term corridor plan;
- Constructability;
- Traffic handling during construction; and,
- Cost-effectiveness (both initial and life cycle – see *LCCA Procedures Manual* and *HDM Topic 619*).

Pavement repair techniques and rehabilitation strategies are to be developed in coordination with District Materials, District Maintenance, and the Office of Pavement Design. Refer to the *HDM Pavement Engineering Chapters 600 through 670* and the Departmental Pavement website for additional pavement guidance and information. Exceptions to the pavement design standards and guidance in the *HDM* are to be documented appropriately.

3.2 Project Scoping Guidance

3.2.1 General Guidance

3R Projects differ from New Construction and Reconstruction projects in that they do not include capacity improvements, major highway realignments, or major upgrades to geometric features to meet current standards. The guidance provided for 2R Projects in Section 2.2.1 of this DIB also applies to 3R Projects except that instead of a project “no longer qualifying as a 2R Project” because the upgrades needed to eliminate the identified deficiencies are significant (e.g., most highway appurtenances are failing, worn out or functionally obsolete, work necessary to upgrade the geometric design features requires additional right of way, environmental impacts are encountered that require additional study), upgrades that are not appropriate for 3R Projects may warrant the initiation and programming of a New Construction or Reconstruction project.

3.2.2 Pedestrian Accessibility and the Americans with Disability Act (ADA)

The guidance provided for 2R Projects in Section 2.2.2 of this DIB also applies to 3R Projects.

3.2.3 Bicyclist Accommodation

The guidance provided for 2R Projects in Section 2.2.3 of this DIB also applies to 3R Projects.

3.2.4 Storm Water Management

The guidance provided for 2R Projects in Section 2.2.4 of this DIB also applies to 3R Projects.

3.2.5 Pavement Edges and Tapers

The guidance provided for 2R Projects in Sections 2.2.5.1, 2.2.5.2, and 2.2.5.3 of this DIB also applies to 3R Projects.

3.2.6 Curbs and Dike

The guidance provided for 2R Projects in Section 2.2.6 of this DIB also applies to 3R Projects.

3.2.7 Drainage Facilities

On 3R Projects, the guidance in *HDM Indexes 803.3* and *804.3* regarding the need for repair, replacement, and upgrading of existing drainage facilities applies. In addition, the Maintenance Supervisor in the area of the project should be contacted to assist in identifying the drainage facility needs. District Maintenance should be contacted to have their culvert inspection crew(s) check all of the culverts to identify any structural deficiencies and possible need for replacement.

Where shoulders carry roadway drainage, the hydraulic capacity should be verified. If the cross slope is modified, the designer should be aware that additional pavement thickness or cross slope modifications may require modifying drainage facilities such as dikes, inlets, and slotted pipe.

Drainage features can present clear recovery zone issues and should be evaluated for modification. Refer to the *AASHTO Roadside Design Guide* for further information on traversable drainage features. However, if traversable drainage features in the *Roadside Design Guide* are being considered for use, the District Hydraulics unit needs to be contacted to discuss their utilization.

3.2.8 Structures

3.2.8.1 Vertical Clearance

In addition to the guidance provided for 2R Projects in Section 2.2.8 of this DIB and *HDM Index 309.2*, the following guidance also applies to 3R Projects:

- Structures Maintenance must be contacted to determine the past history of structure “hits” to existing structures within the project limits. When it is proposed to reduce the existing vertical clearance of a structure, either temporarily or permanently, the Transportation Permits Region Manager must be contacted to determine the potential use of the roadway at the structure location by over-height and over-width permit loads.
- Milling, grinding, or replacing the existing pavement should always be considered to avoid reducing the vertical clearance. Raising the structure is another option that may be considered.

- The final decision should include consideration of adjacent structure clearances and the likelihood of over-height loads passing beneath the structure in question. Vertical clearance signs should be modified, as necessary.

3.2.8.2 Structural (Bridge) Capacity

Existing structures within the project limits may have inadequate load capacity to meet the Transportation Permits Program needs. Consequently, the Transportation Permits Region Manager should be contacted to determine the potential use of the facility by overweight vehicles and the impacts of any load-restricted bridges within the project limits. If a bridge is determined to require strengthening for loads, the bridge reconstruction work should normally be considered as a part of the project. Although strongly discouraged, under certain circumstances, structure reconstruction can be deferred to avoid delaying the overall project due to environmental and/or right of way clearance problems, structure design time constraints, etc. The guidance regarding the deferral of a structure widening provided in the *PDPM* may also be applied to the deferral of a structure replacement.

3.2.8.3 Bridge Rail and Other Structure Improvements

Departmental Policy (Structures Maintenance and Investigations Policy and Procedures Memo Number 2003.1) states that the upgrade of bridge rail classified as not meeting currently acceptable standards will be made on a Department-wide programmatic basis for all bridges on the State highway system. On 3R Projects, bridge rail within the project limits that does not meet *NCHRP Report 350* criteria (or the latest crashworthiness criteria adopted by FHWA) are to be identified during the project's Safety Screening and upgraded or replaced by the project. This need should be identified early on during the project development process when scoping the 3R Project. The Office of Structure Design Technical Liaison Engineer should be contacted to discuss the need, if any, to upgrade the bridge rails within the project limits and any other structure improvements identified in the *Structures Replacement And Improvement Needs (STRAIN) Report*.

3.2.9 Maintenance

Maintenance vehicle pullouts should be placed upstream of recurrent work areas so the maintenance vehicles can shield the workers from errant vehicles. Similarly, it is appropriate to locate work areas downstream of large "fixed shields" such as structures, while keeping in mind sight distance for ingress/egress. The designer should look for opportunities to provide vehicle parking and access from adjacent parallel facilities (local roads) through use of gates and pathways. See *HDM Index 107.2* for further guidance on providing features that can enhance the personal safety of maintenance workers and law enforcement officers that work on the State Highway system.

3.2.10 Traffic Operation Strategies

3.2.10.1 Roadway Safety (Protection) Devices

The guidance provided for 2R Projects in Section 2.2.10.1 of this DIB also applies to 3R Projects.

3.2.10.2 Signs and Delineation

All signs and pavement markings within the project limits should be evaluated for replacement and/or upgrading. This evaluation should consider visibility performance, conformance with existing policies, appearance, and legibility for both day and night conditions.

While traffic control devices may not fully mitigate all problems associated with nonstandard geometric features, they can compensate for certain operational deficiencies. In addition, minimizing or eliminating possible adverse safety and operational features by judicious use of special traffic regulations, positive

guidance techniques and traffic operational improvements can often reduce extensive reconstruction of existing highways. District Traffic should be contacted for guidance when additional signs, markings, or other traffic control devices are being considered as a possible mitigation for a nonstandard geometric feature or to address a safety issue.

Signs with information regarding vertical clearance shall be updated or installed per Division of Traffic Operations Policy Directive #00-03, effective September 1, 2000. Interchange exit numbers shall be added per Division of Traffic Operations Policy Directive #02-04, effective February 1, 2002.

3.2.10.3 Shoulder and Centerline Rumble Strips

The guidance provided for 2R Projects in Section 2.2.10.3 of this DIB also applies to 3R Projects.

3.2.11 Highway Appurtenances

The effects on accessibility, relating to both existing and proposed highway appurtenances, on all roadway users must be carefully reviewed and appropriately addressed.

Also, the need to adjust highway appurtenances such as object markers, sign supports, luminaries, irrigation systems, etc., should be reviewed for potential or known maintenance worker safety issues. Although the highway appurtenances will be analyzed during the Safety Screening for the project, every functional unit, particularly Maintenance, should also evaluate them. See *HDM Index 210.6* for guidance regarding safety railing, fences, and concrete barriers that may be appropriate to include in the project. For additional guidance, see Section 3.3.3.6.3, "Clear Recovery Zone," in this DIB.

3.2.12 Landscaping

Typically, projects covered under this DIB do not involve landscape work. However, there may be a need to replace existing landscaping due to construction activities. Consult with the District Landscape Architecture unit regarding the Roadside Program and the need for replacement planting and/or other roadside features.

3.3 Geometric Design Guidance

3.3.1 Projects on Freeways, Expressways, and Multilane Conventional Highways

3R Projects on Freeways, Expressways, and Multilane Conventional Highways shall not degrade the safety or the geometric features of the facility. 3R Projects on these facilities are required to meet the current geometric standards for new construction as stated in the *HDM* and the additional guidance that is provided in Section 3.3.2 of this DIB. Any exceptions to Mandatory and Advisory design standards are to be documented appropriately; see the *PDPM* for further guidance.

3.3.2 Additional Geometric Design Guidance for Projects on Freeways and Expressways

3.3.2.1 Cross Slope (Traveled Way)

To achieve an economy in materials and to minimize the impact on median facilities such as slotted drains, drainage inlets, and median barriers, it may be acceptable to reduce the thickness of the overlay on the inner lanes of the traveled way to the minimum thickness and cross-slope tolerances. Breaks, or crowns, in the resurfacing should occur at the lane lines, not in the wheel paths. However, before it is decided to reduce the thickness of the overlay and adjust the various cross slopes, the District Materials and Hydraulics units need to be consulted with to concur with these decisions.

In addition, on expressways and multilane conventional highways, where the existing traveled way cross slope exceeds the standard and it is not reasonable to adjust the existing curb, gutter, and sidewalk, milling or removal and replacement of the existing pavement may be necessary.

3.3.2.2 Ramps and Gore Areas

Removing or relocating fixed objects such as overhead signs, lighting, curbs, and existing crash cushions in the vicinity of on-ramp and off-ramp gores should be considered. A review should be made of the collision and maintenance history of “hits” into existing signs and crash cushions to determine the advisability of removing or relocating the signs and crash cushions. District Traffic and Maintenance should assist when performing this evaluation.

Gore curbs that are not in accordance with the guidance in *HDM Indexes 504.3(11)* and *504.2(5)*, and *Topic 303* should be removed. When the overlay thickness matches or exceeds the height of curb, it may be unnecessary to remove the curb pending an investigation for the need to convey runoff.

When rehabilitating ramps on the National Network or on Service Terminal Access routes, consideration should be given to modifying the ramps to accommodate Surface Transportation Assistance Act (STAA) of 1982 design vehicles. Consult with the District Truck Service Manager for routes on and connecting to National Network and Terminal Access routes. See *HDM Indexes 404.3(2)* and *404.3(3)* for further guidance on the use of truck turn templates.

Consideration should be given to paving areas that will reduce the maintenance worker’s exposure to traffic and removing, or relocating, maintainable features such as: inlets, controller cabinets, ITS equipment, etc. See *HDM Chapter 500* for guidance related to gore paving. Contact the local area Maintenance Supervisor for assistance in determining these locations. Also see Design Memo dated September 30, 1998 and entitled: “*New Design for Safety Practice: Roadside Paving*” located on the Department website, under Project Delivery Memos.

3.3.2.3 Interchange Spacing

A design exception for interchange spacing as stated in *HDM Index 501.3* and *DIB 77* is not required unless the project involves a new interchange or an interchange is being relocated. If the project involves a new or relocated interchange, *HDM Index 501.3* and *DIB 77* must be consulted.

3.3.3 Geometric Design Guidance for Two- and Three-Lane Conventional Highways

Federal Code, Title 23 CFR Section 625.2(b), states: “Resurfacing, restoration and rehabilitation (RRR) projects, other than those on the Interstate system and other freeways, shall be constructed in accordance with standards which preserve and extend the service life of highways and enhance highway safety.” The following additional guidance applies to projects on two- and three-lane conventional highways.

3.3.3.1 Selection of Design Speed

The criteria for design speed as discussed in *HDM Index 101.1* applies to projects on two- and three-lane conventional highways covered by this DIB. The Design Coordinator and/or Design Reviewer should be consulted regarding the design speed, and the design speed should be documented in the PID or PR.

3.3.3.2 Stopping Sight Distance at Grade Crests and Sags

The criteria for stopping sight distance at vertical curves in *HDM Indexes 201.1*, *201.4*, and *201.5* apply to projects covered by this DIB. The Safety Screening should also be used to identify and determine which, if any, grade crests or sags may warrant improvement. The vertical alignment within the limits of the project

shall be evaluated for possible improvements at “spot” locations taking into consideration the collision data at the location. Performing this evaluation at all “spot” locations is not meant to imply that all of the vertical curves should be upgraded. District Traffic Operations should be consulted to assist with determining which vertical curves should be upgraded.

Special attention should be given to crest vertical curves where the available sight distance corresponding to the design speed of the crest vertical curve is 20 mph or more below the 85th percentile speed of the section of highway preceding the curve; District Traffic Operations can assist in estimating the 85th percentile. Where this condition exists and the crest vertical curve conceals highway features such as intersections, driveways, horizontal curves, narrow bridges, at-grade railroad crossings, etc., consideration must be given to reconstructing these vertical curves or removing these features. If a crest vertical curve is not upgraded following the evaluation because reconstruction is not feasible, consider installing warning signs or using other mitigation strategies.

Sag vertical curves are rarely related to collisions because drivers have adequate sight distance during daylight hours, and at night the driver’s range of sight is restricted to the vehicle’s headlight limitations. If necessary, street lighting can be added to mitigate reduced stopping sight distance on sag vertical curves. Discussions should be held with District Electrical regarding the feasibility of lighting. Sag vertical curves can be slightly improved during overlays with little extra cost or impacts.

3.3.3.3 Superelevation

The criteria for superelevation contained in *HDM Index 202.2* apply to projects covered by this DIB. If nonstandard superelevation rates exist, they must be evaluated for possible improvement.

Superelevation improvements can often be attained inexpensively and with minimal impact on overlay projects, and should therefore be incorporated. Where as-built plans do not exist or no longer reflect the current conditions, a Digital Inclinometer (Smart Level) may be used to estimate the superelevation rate.

3.3.3.4 Horizontal Alignment

The criteria for horizontal alignment contained in *HDM Index 201.6* and *Topic 203* apply to projects covered by this DIB. Horizontal alignments shall be evaluated for possible improvements at “spot” locations. The evaluation of horizontal curves must consider collision data. District Traffic Operations should assist when performing this evaluation. Typically, nonstandard horizontal curves requiring additional right of way and/or that result in significant environmental impacts are not upgraded without supporting collision data that justifies the additional costs or impacts. Where the radius of a curve is less than 300 feet, with an interior angle greater than 60 degrees, consideration must be given to providing additional lane width to accommodate vehicle offtracking. See *HDM Topic 404* and *Index 504.3(b)* for more information and widening criteria.

Although individual horizontal and vertical curves may meet design criteria, their use in combination must be considered to avoid undesirable alignments. For example, the alignment of a segment of highway may consist of a series of curves. The first curve in this series, particularly if it follows a long tangent, must receive special attention because, once a driver safely passes through it, the driver should be prepared for the subsequent curves in the series. To prepare a driver for a series of curves, the design speed of this first curve, especially if it follows a long tangent, should be at least equal to the design speed of the tangent section of highway leading into it; which is important because drivers tend to travel at higher speeds on tangent segments of highway. The other curves in the series should only differ from the design speed of the curve that follows or precedes it by 10 mph; which is the desired maximum reduction or increase in speed

between curves in a series. Special attention should also be given to any curve within a series of curves that has a significantly smaller radius than the other curves. If improvements are being considered at any of the curves in a series of curves, the effects of the proposed change(s) to an individual curve will need to also be evaluated on the entire series of curves; this particularly needs to be done to curves adjacent to the one being improved. The intended outcome from all of this analysis is to avoid “moving” a collision concentration from one curve in the series to another. See *HDM Index 203.3* for additional information regarding alignment consistency.

Also see *HDM Index 204.6* and the AASHTO document “*A Policy on Geometric Design of Highways and Streets*” for guidance of desirable and undesirable alignment combinations.

The following should be considered when evaluating horizontal curves for improvements:

- Reconstruction with a larger horizontal radius.
- Correction or improvement of superelevation.
- Widening the shoulders.
- Installing rumble strips.
- Widening lanes or providing a buffer for truck offtracking.
- Flattening fill slopes that are 4:1 or steeper on the inside and outside of the curve. For slopes between 3:1 and 4:1, check for adequate run out distance. See the AASHTO “*Roadside Design Guide*” for methods of determining the run out distance.
- Installation of roadside barrier. See the *Traffic Manual* on the Department website, under Division of Traffic Operations, and discuss with the District Traffic Operations personnel for guidance.
- Permanently removing vegetation or cutting back slopes to provide a “sight bench” at locations where the stopping sight distance is reduced by vegetation growth or cut sections.
- Consult with District Traffic Operations or the Headquarters Division of Traffic Operations Liaison about adding signs, delineation, and/or markers to mitigate operational deficiencies.
- Add lighting.
- Move intersections outside of curves.

3.3.3.5 Intersections (Public and Private Connections) and Driveways

3.3.3.5.1 General

Road connections (both public and private) and driveways must be evaluated for possible improvements. The decision to improve intersections can often be made by observing vehicle, bicycle, and pedestrian movements during field visits. *DIB 82* and *HDM Topic 105* should be reviewed for pedestrian accessibility and compliance with the ADA; which is decided on a project-by-project basis.

3R Projects also present an opportunity for driveway upgrades. Contact the District Encroachment Permits office to see if there are issues with any existing driveways that may need to be addressed.

To facilitate movements in and out of driveways and local streets, connections should be paved to the edge of the right of way or far enough beyond the right of way line so that the rear drive wheels of longer vehicles can accelerate on a paved surface. This is to prevent vehicles wheels from spinning while attempting to enter the highway. It also serves to prevent rock and debris from collecting on the mainline shoulder, which can be a problem for both bicycles and pedestrians.

HDM Topic 205, HDM Indexes 405.7, 405.8, and 405.9 provide further guidance on the design of public road intersections and driveways.

3.3.3.5.2 Corner Sight Distance

The Corner Sight Distance criteria in *HDM Topic 405* apply to these projects. All intersections shall be evaluated for possible improvements. The evaluation of corner sight distance must consider collision data. District Traffic should assist when performing this evaluation. It is often difficult to obtain corner sight distance per *HDM Topic 405* at all intersections, but that does not preclude the need to evaluate cost-effective solutions (e.g., those that do not physically impact homes, businesses, historic buildings, large natural land features) at each location.

3.3.3.5.3 Left- and Right-Turn Channelization

Left and/or right turn channelization should be considered at intersections to public roads and other potential higher volume intersections.

Consult with both District Traffic Operations and Traffic Safety when establishing the need for turn channelization. See *HDM Indexes 405.2 and 405.3* for further geometric guidance on right- and left-turn channelization. Also see “*Guidelines for Reconstruction of Intersections*,” dated August 1985, which is available through Headquarters Division of Traffic Operations.

3.3.3.5.4 Skew Angle

The criteria pertaining to intersection skew in *HDM Index 403.3* applies and should be reviewed. The Safety Screening should also be used to identify and determine which, if any, skewed intersections may warrant realignment. Skew angles less than 75 degrees must be investigated for potential upgrades. If realigning the local street will require a large expense of funds and right of way impacts are significant, an intersection is typically not modified.

Skewed “T” intersections are typically easier to upgrade than through streets because they impact only one side of the highway. Small radius curves can be added on the cross street because speeds on the cross street are typically low due to the stopped condition. When “T” intersections cannot be upgraded without extensive realignments, improvements may be accomplished by minor widening at the curb returns and the striping realigned to an angle closer to perpendicular; see Section 3.3.3.5.5, “Truck Turning,” in this DIB for issues related to pedestrian movements when increasing the curb return radii. Also see *HDM Index 403.3* for additional discussion on the angle of intersections.

3.3.3.5.5 Truck Turning

The criteria for truck turning in *HDM Index 404.3 (2) and (3)* apply to these projects. Intersections experiencing frequent truck use should be evaluated to accommodate truck offtracking. See *HDM Topic 404* and *HDM Index 405.8* for further information on designing for offtracking. Designers should inspect the ground adjacent to intersection curb returns for physical evidence of vehicle offtracking, which can identify those locations most in need of upgrades.

It is often impractical to provide for truck turning on most local streets due to the infrequency of truck use at these locations. Where truck volumes are very low, bus turning may be a more appropriate application, especially if it is a school bus or transit route. There are several factors affecting the decision to increase the curb return radii at these locations:

- Large curb return radii could promote higher than desirable speeds for motor vehicles making right turn moves.

- Assure trucks and buses will off-track into same direction lanes and shoulders of the receiving roadway and not intrude upon the lanes in the opposite direction of travel.
- Pedestrian crossings will become longer; therefore, the additional length of the pedestrian crossings and its impacts to wheelchair ramp placement (see *DIB 82* for additional guidance on ADA design issues) will need to be evaluated.
- Pedestrians waiting to cross are set further from turning vehicles, which might place pedestrians out of the field of vision of the Driver.
- Impacts to adjacent property and right of way cost.

3.3.3.6 Cross Section Design Elements

3.3.3.6.1 Widths

3.3.3.6.1.1 Traveled Way

All lane widths for projects covered by this DIB shall be 12 feet except as follows:

In urbanized areas with restricted right of way and operating speeds 35 mph or less, it may be appropriate to reduce right- and left-turn pocket lane widths to 11 feet when supported by an approved design exception. The lower speeds in the left- and right-turn lanes make it reasonable to use narrower widths in urban areas. As an order of importance, the right-turn lane is typically reduced first because the left-turn lane is adjacent to oncoming traffic. Truck turning can be an important factor when reducing lane widths under these conditions. A truck usage study and turning analysis must be applied to each location where turning lane widths are reduced.

Further reductions in right-turn lane width, to 10 feet, are sometimes warranted in severely constrained situations.

See Section 3.3.3.4 of this DIB for guidance on lane widening to accommodate truck offtracking on radii less than 300 feet.

3.3.3.6.1.2 Shoulders

3.3.3.6.1.2.1 Roadbed

The shoulder widths given in Table 2 shall be the minimum paved shoulder width for two-lane conventional highway projects covered by this DIB. Shoulders less than the “Minimum Existing In-Place Shoulder Width” shall be widened to the “3R Shoulder Width.” Shoulders at or above the “Minimum Existing In-Place Shoulder Width” may be rehabilitated at their existing widths, including minor widening for lateral support or uniformity of pavement width, **unless pavement widening or realignment is performed, then the 3R shoulder width criteria applies. If the Safety Screening recommends widening beyond the “Minimum Existing In-Place Shoulder Width,” the roadbed shall be widened to the “3R Shoulder Width” or the “3R Bridge Shoulder Width,”** as appropriate.

Shoulders are important to accommodate bicycle traffic, and pedestrian traffic where sidewalks are not present. The minimum usable shoulder for bicycles and pedestrians is 4 feet, but wider shoulders are more appropriate. Wider shoulders should be considered on highways with higher vehicular volumes and speeds.

The truck, bus and recreational vehicle usage on the highway should be taken into account when determining shoulder widths. When truck, bus and/or recreational vehicle volumes are generally higher than

10%, particularly on curvilinear highways, shoulder widths greater than those in Table 2 should be considered.

When adding passing or climbing lanes or right turn lanes, the minimum width of the adjacent shoulder shall be 4 feet.

Where a left turn lane is provided and a right turn lane is not, the right shoulder width shall be the “3R shoulder width” as provided in Table 2, but not less than 4 feet (5 feet where a gutter is present). The minimum right shoulder width adjacent to right turn pockets shall be 4 feet (5 feet where a gutter is present).

TABLE 2

Two-Lane Conventional Highway 3R Standards for Shoulder Widths

Existing ADT (vehicles)	3R Bridge Shoulder Width (ft)	3R Shoulder Width (ft)	Minimum Existing In-Place Bridge Shoulder Width (ft)	Minimum Existing In-Place Shoulder Width (ft)
0-250	4	0 *	0	0
251-1000	4	2 *	2	0
1001-3000	8	4 *	4	2
3001-6000	8	8	6	4
6001-18,000	8	8	8	4
Over 18,000	8	8	8	8

* See discussion in Section 3.3.3.6.1.2.1, “Roadbed.” Under certain conditions, the minimum width of the adjacent right shoulder shall be 4 feet, or 5 feet where a gutter is present.

3.3.3.6.1.2.2 Bridges

The bridge shoulder widths given in Table 2 shall be the minimum paved bridge shoulder for two-lane conventional highway projects covered by this DIB. The structure clear width (width between curbs or rails, whichever is less) shall equal or exceed the approach roadbed width. Shoulders less than the “Minimum Existing In-Place Bridge Shoulder Width” shall be widened to the “3R Bridge Shoulder Width.” Bridge shoulders at or above the “Minimum Existing In-Place Bridge Shoulder Width” may be rehabilitated at their existing widths.

Upgrading existing bridge rail, approach guardrail, and guardrail transition railing connections is to be included in the project regardless of the bridge shoulder width requirements discussed above. **If bridge rail is being replaced, the shoulders shall be widened to the bridge 3R shoulder width.** The Headquarters

Bridge Preservation Program Manager must be consulted in determining if a bridge rail type requires upgrading.

Bridge replacement strategies shall meet new construction standards.

3.3.3.6.2 Cross Slopes

3.3.3.6.2.1 Traveled Way

The criteria in *HDM Index 301.2* apply.

3.3.3.6.2.2 Shoulders

The shoulder cross-slope criteria contained in *HDM Indexes 302.2* and *307.2* also apply, except as follows: **On tangent sections of conventional urban highways with operating speeds of less than or equal to 45 mph and where it is necessary to match existing curb and gutter, the maximum shoulder cross slope shall be 8% except when snow and ice conditions prevail.** Locations with snow and ice removal operations are to follow the guidance in *HDM Index 302.2 (3)*.

When shoulder widths are 2 feet or less, shoulder cross slopes shall match the traveled way cross slope, but may be increased to 9% if necessary for drainage.

When curb ramps are present, shoulder cross slopes greater than 5% may exceed ADA standards where the maximum grade break at the base of the curb ramp is 13.3%. See *DIB 82* for further guidance regarding compliance with the ADA.

Where shoulder cross slopes do not meet the above criteria and it is not reasonable to adjust existing curb, gutter and sidewalk, grinding or removal and replacement of the pavement may be necessary. Each project must be evaluated on an individual basis. Where shoulders carry roadway drainage, the hydraulic capacity of the shoulder should be verified.

See *HDM Indexes 301.2* and *302.2* for the maximum grade break between edge of traveled way and shoulder cross slopes.

3.3.3.6.3 Clear Recovery Zone (CRZ)

The horizontal clearance criteria in *HDM Index 309.1* apply to these projects with the exception of the following: It is not the intent to flatten all of the side slopes within the project limits. Typically, existing side slopes are not flattened unless the project incorporates grading on a slope, or there are CRZ concerns identified in the Safety Screening. When widening or modifying existing embankment slopes, 4:1 or flatter side slopes should be used. Although cut slopes represent a form of fixed object and should also be 4:1 or flatter, less emphasis is placed on them. In any case, slopes should be designed as flat as is reasonable. Slopes steeper than 4:1 may require special erosion control features as described in the *Storm Water Quality Handbook, "Project Planning and Design Guide" (PPDG)*. See *HDM Topic 304* and Chapter 7 in the *Traffic Manual*, on the Headquarters Division of Traffic Operations website, for further guidance on side slopes and their relation to the CRZ and placement of roadside safety devices at the top of embankment slopes.

The Safety Screening process will look at the CRZ associated with the segment of highway being evaluated. The absence of collisions should not be used as a reason to not include CRZ strategies in the scope of a project. Improving the CRZ is an effective proactive measure in reducing the occurrence or severity of run-

off-road collisions along corridors. Refer to Table 1 for alternative countermeasures regarding roadside obstacles.

The AASHTO publication “*Roadside Design Guide*” provides detailed design guidance for creating a forgiving roadside environment. Also, see Chapter 7 in the *Traffic Manual*, on the Headquarters Division of Traffic Operations website.

3.3.3.6.4 Side Slopes

The following geometric design standard from *HDM Topic 304* is permissive for two- and three-lane conventional highway projects:

In projects involving grading where slopes catch in a distance less than 18 feet from the edge of the shoulder, a uniform catch point, at least 18 feet from the edge of the shoulder, should be used.

This should be done not only to improve errant vehicle recovery and aesthetics, but also to promote the use of large production grading equipment, which can reduce the construction costs associated with grading on the project.

Policy on High and Low Risk Underground Facilities Within Highway Rights of Way

– **January 1997** –

Excerpted from Appendix LL from the Caltrans Project Development Procedures Manual
http://www.dot.ca.gov/hq/oppd/pdpm/apdx_pdf/apdx_ll.pdf



STATE OF CALIFORNIA
Department of Transportation
Division of Design

APPENDIX LL - Utilities

Table of Contents

APPENDIX LL - Utilities	LL-i
Policy on High and Low Risk Underground Facilities Within Highway Rights of Way	LL-3
SECTION 1 - General Policy	LL-7
1-1 Policy Statement	LL-7
1-2 Effective Date	LL-7
1-3 General Responsibility	LL-7
1-4 Deviation from Policy	LL-8
1-5 Change in Policy	LL-8
SECTION 2 - Definitions	LL-8
2-1 High Risk Facilities	LL-8
2-2 Low Risk Facilities	LL-8
2-3 Exempt Facilities	LL-9
2-4 Other Definitions	LL-9
SECTION 3 - Clearance Requirements for Construction Projects	LL-12
3-1 Existing Facilities On New Projects	LL-12
3-2 New and Relocated Facilities	LL-13
3-3 Existing Facilities Not in Conflict With New Projects	LL-13
SECTION 4 - Locating High and Low Risk Facilities	LL-14
4-1 Positive Location Requirements	LL-14
4-2 Methods of Positive Location	LL-14
4-3 Exceptions to Positive Location	LL-15
4-4 Exempt Projects	LL-17
4-5 Allowable Omissions	LL-17
4-6 Authority To Approve Exceptions	LL-17
SECTION 5 - Alternatives to Relocation	LL-18
5-1 Exposing During Construction	LL-18
5-2 Protection During Construction	LL-18
5-3 Special Contract Provisions	LL-18
SECTION 6 - Responsibilities	LL-18
6-1 Preparation of Plans	LL-18
6-2 Surveying	LL-19
6-3 Decisions to Relocate, Adjust, or Protect	LL-19
6-4 Contractor Notification Requirement	LL-19
6-5 Certifying Policy Compliance	LL-19
6-6 Retention of Records	LL-19
SECTION 7 - Right of Way Procedures	LL-20
7-1 Identification	LL-20
7-2 Notices	LL-20
7-3 Financial Liability	LL-20
7-4 Expenditure Authorizations	LL-20
SECTION 8 - New Installations Under Encroachment Permit	LL-20
8-1 Installation Standards	LL-20
8-2 Permit Application	LL-21
8-3 Location Data	LL-21
8-4 Financial Liability	LL-21
8-5 Retention of Records	LL-21
SECTION 9 - Local Agency Projects	LL-22

Appendixes

Project Development Forms and Letters plus Policy and Procedures Documents

9-1 General.....	LL-22
9-2 Certifying Policy Compliance.....	LL-22
9-3 Financial Liability.....	LL-22
SECTION 10 - Project Engineer's Certification.....	LL-22
10-1 Guidelines	LL-22
10-2 Certification & Sample Form.....	LL-23

TABLE OF CONTENTS

SECTION 1 - GENERAL POLICY

- 1-1 Policy Statement
- 1-2 Effective Date
- 1-3 General Responsibility
- 1-4 Deviation from Policy
- 1-5 Change in Policy

SECTION 2 - DEFINITIONS

- 2-1 High Risk Facilities
- 2-2 Low Risk Facilities
- 2-3 Exempt Facilities
- 2-4 Other Definitions

SECTION 3 - CLEARANCE REQUIREMENTS FOR CONSTRUCTION PROJECTS

- 3-1 Existing Facilities on New Projects
- 3-2 New and Relocated Facilities
- 3-3 Existing Facilities Not in Conflict with New Projects

SECTION 4 - LOCATING HIGH AND LOW RISK FACILITIES

- 4-1 Positive Location Requirements
- 4-2 Methods of Positive Location
- 4-3 Exceptions to Positive Location
- 4-4 Exempt Projects
- 4-5 Allowable Omissions
- 4-6 Authority to Approve Exceptions

SECTION 5 - ALTERNATIVES TO RELOCATION

- 5-1 Exposing During Construction
- 5-2 Protection During Construction
- 5-3 Special Contract Provisions

SECTION 6 - RESPONSIBILITIES

- 6-1 Preparation of Plans
- 6-2 Surveying
- 6-3 Decisions to Relocate, Adjust, or Protect
- 6-4 Contractor Notification Requirement
- 6-5 Certifying Policy Compliance
- 6-6 Retention of Records

TABLE OF CONTENTS

SECTION 7 - RIGHT OF WAY PROCEDURES

- 7-1 Identification
- 7-2 Notices
- 7-3 Financial Liability
- 7-4 Expenditure Authorizations

SECTION 8 - NEW INSTALLATIONS UNDER ENCROACHMENT PERMIT

- 8-1 Installation Standards
- 8-2 Permit Application
- 8-3 Location Data
- 8-4 Financial Liability
- 8-5 Retention of Records

SECTION 9 - LOCAL AGENCY PROJECTS

- 9-1 General
- 9-2 Certifying Policy Compliance
- 9-3 Financial Liability

SECTION 10 - PROJECT ENGINEER'S CERTIFICATION

- 10-1 Guidelines
- 10-2 Certification & Sample Form

SECTION 1 - General Policy

1-1 Policy Statement

The Department is responsible to provide a safe environment for the employees of both Caltrans and its contractors, as well as the traveling public. An important element of the safe environment is to provide a clear and safe right of way through the proper placement, protection, relocation, abandonment or removal of utility facilities that may pose a safety risk to the highway worker or user when the utility is excavated, cut or penetrated. Toward this end, Caltrans must establish and enforce mandatory standards and procedures for the placement and protection of underground utility facilities within highway rights of way and for the safe conduct of highway workers involved in maintenance or construction operations carried out in proximity to underground utility facilities.

This policy is applicable to the design phase of a project. For the construction phase, the contractor must follow applicable statutes, which require that all utilities be located and marked out on the ground by a regional notification center prior to any excavation. (Chapter 3.5 of Division 5 of the Government Code.)

1-2 Effective Date

This policy supersedes all previous instructions and policies concerning High and Low Risk underground facilities and is effective upon issuance.

1-3 General Responsibility

The District **Utility Coordinator** is responsible to coordinate the requirements of this policy with all underground facility owners, and must work with the Project Engineer in accomplishing the coordination.

The District **Permit Engineer** is responsible for enforcing the terms and conditions set forth in Section 8 of this policy.

The **Project Engineer** is responsible for the administration of the policy requirements specified herein, and must certify to the Office Engineer that the High and Low Risk policy has been met whenever submitting Plans, Specifications and Estimate for project advertisement. The Office Engineer will not list a project for advertisement until the project has been certified as meeting the High and Low Risk policy.

The District must work closely with any affected utility owners. A pre-design meeting must be held with the affected utility owners to discuss available alternatives to resolving any conflicts. It is important that the utility owners be consulted during project design and concerning any alternative selection that involves their utilities. Also, final design plans must be made available to the appropriate utility owners prior to advertisement of the project, and a pre-construction meeting should be held with the affected utility owners.

1-4 Deviation from Policy

Any deviation from the requirements contained in this policy must be submitted by the Project Engineer to the Division Chief, Division of Design (DOD), for approval.

1-5 Change in Policy

All requests for change to requirements contained in this policy must be submitted to the DOD, Attention: High/Low Risk Exception.

SECTION 2 - Definitions

2-1 High Risk Facilities

Facilities conducting the following materials, whether encased or not, are considered to be High Risk facilities:

1. Petroleum products,
2. Oxygen,
3. Chlorine,
4. Toxic or flammable gases,
5. Natural gas in pipelines greater than 150 mm (6 inches) nominal pipe diameter, or pipelines with normal operating pressures greater than 415 kPa gauge (60 p.s.i.g.)
6. Underground electric supply lines, conductors or cables that have a potential to ground of more than 300 volts, either directly buried or in duct or conduit, which do not have concentric grounded or other effectively grounded metal shields or sheaths.

2-2 Low Risk Facilities

Facilities conducting the following materials are considered to be Low Risk facilities:

1. Natural gas in pipelines 150 mm (6 inches) or smaller (nominal pipe diameter) with normal operating pressures of 415 kPa gauge (60 p.s.i.g.) or less.
2. Underground electric supply lines, conductors or cables with a potential to ground of more than 300 volts, either directly buried or in duct or conduit, which do have concentric grounded or other effectively grounded metal shields or sheaths.

shields or sheaths, and for which the utility owner furnished location information in conformance with the requirements of Article 17.7, "Location Information" of General Order No. 128 of the California Public Utility Commission, or electrical underground conductors with a potential to ground of 300 volts or less.

2-3 Exempt Facilities

The following facilities are exempt from the requirements of this policy:

1. Natural gas service lines of 50 mm (2 inches) or less nominal pipe diameter and with normal operating pressures of 415 kPa gauge (60 p.s.i.g.) or less.
2. Underground electrical service conductors with a potential to ground of 300 volts or less.
3. Any electrical facility with a potential to ground of 50 volts or less.
4. State-owned electrical facilities operating at 300 volts or less potential to ground.

2-4 Other Definitions

Access Control Full or partial restriction of the access of owners or occupants of abutting land to or from a highway.

Approximate Location The "approximate location of subsurface installations" is defined in Section 4216 of the Government Code as a strip of land not more than 600 mm (24 inches) on either side of the exterior surface of the subsurface installation.

Cable An insulated conductor, or combination of insulated conductors, enclosed in a sheath.

Conductor A wire, or combination of wires not insulated from one another, suitable for carrying electric current.

Conduit A pipe or tube in which smaller pipes, tubes, or electrical conductors are inserted.

<i>Construction Area</i>	Specifically identified work areas within a construction project in which <u>all</u> construction activities will take place. It is normally coincident with the overall project limits except where specifically set forth in the Project Plans.
<i>Department</i>	The Department of Transportation of the State of California, as created by law.
<i>District</i>	One of the twelve California Department of Transportation Districts, or in the case of a district that is tailored under a regional district for capital outlay support, the district having the delegated authority for performing the subject function.
<i>Duct</i>	A fabricated tube for receiving and containing conductors and cables.
<i>Electric Lines</i>	Underground conductors or cables with the conduit in which they are contained.
<i>Electronic Detector</i>	A device designed to detect underground utility facilities via electronic signals with sufficient accuracy to determine horizontal and vertical location.
<i>Encasement</i>	A sleeve or jacket.
<i>Encroachment</i>	A non-highway structure or object of any kind or character that is placed in, under, or over any portion of a highway.
<i>Excavation</i>	Any operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means of tools, equipment, or explosives in any of the following ways: grading, trenching, digging, ditching, drilling, auguring, tunneling, scraping, cable or pipe plowing and driving, or any other way.
<i>Finished Grade</i>	Finished grade is the finished surface of the completed highway.
<i>Grading Plane</i>	The basement material surface upon which the lowest layer of sub-base, base, pavement, surfacing, or other specified layer, is placed, or the upper surface of the ground or earthwork in the absence of base, pavement, surfacing or other specified layer.
<i>Highway</i>	The entire width of the right of way of a highway, whether or not such entire area is used for highway purposes.
<i>Jacket</i>	An encasement of reinforced concrete poured around a pipeline or

	conduit.
<i>kPa</i>	KiloPascals gauge pressure. (Metric version of Pounds per Square Inch)
<i>Local Agency</i>	A city, county or other local public agency.
<i>Local Assistance Projects</i>	Local agency projects on local streets and roads involving either Federal-aid or State highway funds.
<i>Longitudinal</i>	A facility located parallel to and within highway right of way.
<i>Median</i>	That portion of a divided highway separating the traveled ways for traffic in opposite directions including inside shoulders.
<i>Owner</i>	The owner of the underground facility or its authorized agent.
<i>Pipeline</i>	A pipe used to transport liquids or gases.
<i>Positive Location Determination</i>	Determining the existence and location of a utility to within 150mm (0.5 foot) using any of the means listed in Section 4, or any combination of those means.
<i>Pothole</i>	An excavation to expose an underground facility.
<i>Probes</i>	Rods physically inserted in the ground to mechanically or electronically locate an underground facility without exposing the facility.
<i>Project Limits</i>	The entire right of way width lying within the project termini.
<i>P.S.I.G.</i>	Pounds per square inch gauge pressure. (Now to be stated in terms of kiloPascals.)
<i>Relocations</i>	The removal, rearrangement, reinstallation, or adjustment of a utility facility required by a transportation improvement project.
<i>Right of Way</i>	A general term for a strip of land, or rights in a strip of land, used for highway, public utility services, or other purposes. The right of way of a freeway includes any adjacent frontage road until such time as the frontage road is relinquished. Thereafter, the right of way line of the freeway is usually the access control line between the freeway and the frontage road.
<i>Roadbed</i>	That portion of the roadway extending from curb line to curb line or shoulder line to shoulder line. A divided highway is considered

as including two separate roadbeds.

<i>Roadway</i>	That portion of the highway included between the outside lines of the sidewalks, or curbs, slopes, ditches, channels, waterways, and including all the appertaining structures, and other features necessary for proper drainage and protection.
<i>Service</i>	The portion of the electrical or gas system that connects a customer, usually at the meter location, to the utility distribution or supply system.
<i>Shoulders</i>	The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.
<i>Sleeve</i>	A pipe in which a pipeline or conduit is inserted.
<i>Special Funded Projects</i>	Those projects on the State Highway System that are locally sponsored through the use of local and/or private funds.
<i>Special Provisions</i>	The special provisions are specific clauses setting forth conditions or requirements peculiar to the work and supplementary to the Department's Standard Specifications.
<i>Transverse</i>	A facility passing from one side of the highway right of way to the other side of the highway right of way.

SECTION 3 - Clearance Requirements for Construction Projects

3-1 Existing Facilities On New Projects

Existing underground High and Low Risk facilities within the planned construction area must meet the following minimum clearances, or they must be protected in place or relocated in accordance with this policy:

High Risk Facilities

1. 450 mm (18 inches) below the grading plane.
2. 300 mm (12 inches) below disturbed ground, and in areas of unsuitable material.
3. 300 mm (12 inches) below the grading plane of drainage structures.
4. 450 mm (18 inches) below flow line of unlined ditches.
5. 600 mm (24 inches) horizontally from face of pile or from side of excavation.

The above clearances are minimum safety margins for safe operation of equipment in proximity to High Risk facilities. The Project Engineer should verify their adequacy with the utility owners whenever heavy traffic loading is anticipated. When planned clearances are less than the above, the Project Engineer and district Utility Coordinator should work with the utility to determine methods to protect the facility or to have it relocated.

Low Risk Facilities

Existing Low Risk facilities must clear proposed construction as determined by the Project Engineer, including determination of loading factors.

3-2 New and Relocated Facilities

New or relocated High or Low Risk facilities within proposed new projects must meet the standards of Section 8.

3-3 Existing Facilities Not in Conflict With New Projects

High and Low Risk facilities installed within conventional highway rights of way and facilities transversely installed in freeway rights of way prior to this policy and not in conflict with proposed construction may remain in place during their useful life.

High and Low Risk facilities longitudinally installed within freeway or expressway rights of way prior to this policy and not in conflict with proposed construction should be reviewed in context with current encroachment policy to determine if they should be relocated outside the controlled access right of way. If this review determines that the utilities can remain inside the rights of way, and is concurred in by the Division of Design Division Chief, then they may remain in place during their useful life.

SECTION 4 - Locating High and Low Risk Facilities

4-1 Positive Location Requirements

Except as noted in Section 4-3, all High Risk facilities within the construction area must be positively located to within 150 mm (0.5 foot) for both horizontal and vertical location. The requirements shown below are minimums and additional determinations should be made if there is any question or doubt as to location.

Transverse Facilities

Location determinations for transverse facilities must be done:

1. On each side of an undivided highway
2. On each side and in the median of a divided highway. In the event that the utility or casing was originally placed by boring or jacking and is considered sufficiently rigid to have maintained direction throughout the installation, the location need not be determined in the median. For median determinations, Caltrans maintenance should be requested to furnish appropriate traffic control.

In no event should there be spacing greater than 30 m (100 feet) between location determinations.

Longitudinal Facilities

Location determinations for longitudinal facilities must be done at intervals sufficient to establish the location of the line, but in no event greater than 30 m (100-foot) intervals as, defined in Section 4-2 below.

4-2 Methods of Positive Location

Positive location of all High or Low Risk facilities must be accomplished by potholing or other acceptable methods. Combinations of methods may be more effective than a single method. The **Project Engineer** is responsible for determining the methods of specifically identifying the facility and of locating the horizontal and vertical position. These determinations should be made after obtaining input from the utility owners and the District Utility Coordinator.

Pothole

Location by digging, or "potholing," to expose the facility is the preferred method to specifically identify the facility and to determine the precise horizontal and vertical position.

NOTE: Machine excavation to expose the high-risk facility in order to physically locate it must be done by, or at the authorization of, the owner. Due to the potential State liability resulting from machine excavation around a High Risk facility, Caltrans employees should neither pothole the facility nor authorize others to pothole it, except by hand excavation and after obtaining written authorization of the owner.

Probe

Locating facilities by probing is an acceptable method of determining the horizontal and vertical position of a facility. The owner may probe the facility at the required intervals with the addition of one or more potholes to ensure positive identification of the facility. The **Project Engineer** must determine the number and location of potholes and probes, after obtaining input from the utility owners and the District Utility Coordinator.

Electronic Detection

Electronic detection for determining the horizontal and vertical location is acceptable when used in conjunction with potholing to ensure proper facility identification and to verify accuracy of electronic readings. Electronic detection is particularly effective for determining that the utility is outside the construction area or well below a prescribed depth. The **Project Engineer** is responsible for determining the number and frequency of the supplemental potholing and/or probing requirements, after obtaining input from the utility owners and the District Utility Coordinator.

As-Builts

Utility facility "As-Builts" may be accepted only when signed by a responsible utility owner representative certifying as to the acceptable location accuracy of the installed facility, and verified by potholing or other positive locating methods at critical locations determined by the Project Engineer.

Other Acceptable Methods

Other methods that will provide positive location of facilities may be used by the owner upon verification of the accuracy of the proposed method and approval of the **Project Engineer**. Such other methods should stand the tests of common sense, field measurements and good judgment.

4-3 Exceptions to Positive Location

Facilities Outside Planned Excavation

For High Risk facilities lying outside the identified construction area but within the project limits, and for all Low Risk facilities within the project limits, the approximate horizontal location must be determined within 600 mm (2 feet) of either side of the outside dimensions of the facility (required by Section 4216 of the Government Code).

High Risk facilities that have been determined by the owner to be more than 1.1 m (42 inches) below the lowest planned work, or more than 1.2 m (4 feet) horizontally from

the side of the planned excavation, are considered to be outside of the construction area and do not require plotting of the facility elevation on the plans. The method and required accuracy to be used in locating the facility will depend on its proximity to the construction area.

Facilities that are at depths greater than 1.1 m (42 inches) below planned work must be horizontally plotted with a notation that "DEPTH EXCEEDS 1.1 m (42 INCHES) BELOW PLANNED WORK." The horizontal location of all High Risk and Low Risk facilities within the project limits must be plotted on the plans.

Where High and Low Risk utilities exist within the project limits but outside areas of planned excavation, the Obstructions Section of the project Special Provisions must call out such utilities by type, owner and location, and must caution the contractor that "no excavation may be made within 1.2m (4 feet) of these utilities unless and until such utilities have been positively located as to horizontal and vertical position".

Special Projects

For the following types of projects, the vertical location of the facilities need not be included in the contract plans. Positive location will be performed during construction via the utility owner markout as required by Government Code Section 4215 et seq., and not prior to the PS&E. The basis for this exception is that any conflicts identified during the positive location activity may be resolved by adjusting the location of the proposed highway facility to miss the identified High Risk facility. The District **Utility Coordinator** must make the necessary arrangements to have the owner locate the facilities in conjunction with the contractor's operation and in accordance with the aforementioned Sections of the Government Code. The coordination for this work must be covered by special clauses in the Special Provisions for the contract. The special projects are:

1. Street lighting, traffic signal and ramp metering installations and similar projects where the boring, trenching or jacking operations are being made for electrical conduit runs only.

Note: If the project includes foundations for street lights, traffic signals or ramp meters, then it is not considered a special project -- it only qualifies as a special project if the only excavation is for the conduit runs.

2. Highway planting projects where the excavations are being made for plants and/or irrigation lines and appurtenances only.
3. Type 1 edge drain as shown on RSP-D981D1 when the maximum depth does not exceed 375 mm (15 inches).

Temporary Construction Signs

Construction signs, when shown on the plans, will be cleared in the same manner as for any other construction feature requiring excavation. (Typical post hole depth is 1.7 m (5 1/2 feet).)

If the exact sign locations are not shown on the plans, post holes must be dug by hand except where potential conflicts can be eliminated by:

1. An appropriate Regional Notification Center has been contacted and they indicate there are no utility facilities in the area of the proposed post hole.
2. The Regional Notification Center has identified underground facilities but post holes can be dug in another acceptable location that has also been cleared; and it is mutually agreeable with the operator and the excavator.

NOTE: Standard Special Provision No. 12.00 must be included in all projects that include temporary construction signs.

4-4 Exempt Projects

This policy does not apply to those projects where planned excavation is pavement removal only, is 150 mm (six inches) or less below existing ground level, or 300 mm (one foot) or less below existing road surface when trenching beneath existing pavement. Plans for such exempt projects must include a note on all plan sheets that states that "EXISTING UTILITY FACILITIES HAVE NOT BEEN PLOTTED ON THESE PLANS".

4-5 Allowable Omissions

If the Project Engineer wishes to omit utility facility plotting on plans, for portions of a project where planned excavation does not exceed 150 mm (0.5 foot), the following are required:

1. A note must be included on the plan sheets stating that "EXISTING UTILITY FACILITIES HAVE NOT BEEN PLOTTED ON PORTIONS OF THESE PLANS".
2. The plans must clearly show with bold labels those parts of the plans on which utility facilities have been omitted.

4-6 Authority To Approve Exceptions

The **Project Engineer** is responsible for determining that the positive location requirements have been met, or that exception requirements for positive location, exempt projects, and allowable omissions have been complied with, and that the appropriate special provisions are used on a project. Approval must be obtained from the Division of Design Division Chief for any deviation not meeting these exception requirements.

SECTION 5 - Alternatives to Relocation

5-1 Exposing During Construction

When approved by the Division of Design (DOD) Division Chief, High Risk facilities may be permitted to remain in limited critical areas, provided the owner agrees to fully expose the facility prior to work being done in close proximity. This determination must be made by the **Project Engineer** after consultation with the owner, but the determination must be made by the Project Engineer and not by the owner. These conditions must be fully explained in the contract Special Provisions.

5-2 Protection During Construction

When approved by the DOD Division Chief, the **Project Engineer** has the option of protecting rather than relocating high risk facilities. The Project Engineer should discuss this option with the utility owner and the District Utility Coordinator prior to making the decision.

5-3 Special Contract Provisions

Facilities that can be adjusted during construction must be covered by special clauses in the Special Provisions that provide for the necessary coordination between the owner and the highway contractor. Approval by the DOD Division Chief must be obtained whenever the clearance requirements of Section 3-1 or the exceptions of Section 4-3 are not met.

SECTION 6 - Responsibilities

6-1 Preparation of Plans

The preparation of contract plans and the delineation of underground facility information thereon will be the responsibility of the Unit (Design, Traffic, etc.) preparing the plans, specifications and estimates. See Chapter 4 of the *Drafting and Plans Manual* for preparation of the Utility Plan.

High Risk Facilities

Horizontal and vertical positions as required by Section 4 must be shown on or included in the contract plans.

Low Risk Facilities

Horizontal alignment must be shown on or included in the contract plans. Elevations may be included, but are not required.

6-2 Surveying

It is Caltrans' responsibility to tie utilities to the State's datum. The district's Survey Branch should establish the alignment and elevation of High Risk facilities that are within the construction area, on the State's datum. This information is to be furnished for inclusion on the contract plans.

6-3 Decisions to Relocate, Adjust, or Protect

The decision to relocate, adjust or protect High Risk facilities must be made by the **Project Engineer** after consultation with the owner and the District Utility Coordinator. The method of protection is subject to approval as a deviation by the Division of Design Division Chief.

6-4 Contractor Notification Requirement

Whenever underground facilities (including High and Low Risk facilities) are located within the limits of a project, Standard Special Provision No. 8.02 must be inserted in the Special Provisions (without deletion modifications) to require the contractor to notify the Resident Engineer and the Regional Notification Center when any excavation is to be performed.

The **Project Engineer** has the responsibility for including this requirement in the Special Provisions.

6-5 Certifying Policy Compliance

The **Project Engineer** must certify that the facilities conform to the requirements of this policy, prior to listing of the project for advertisement. See Section 10 for guidelines and a sample format for the "Project Engineer's Certification of Utility Facilities".

6-6 Retention of Records

The records of locations of existing, relocated or new installations under permits must be retained so the information may be recalled. The type of records maintained will be at the discretion of the district. Maintenance of records must be determined by the district, providing that any procedure adopted will allow for ready retrieval and permanent retention.

SECTION 7 - Right of Way Procedures

7-1 Identification

Facility identification, including categorization as High or Low Risk facilities, is a part of the preliminary phase of project development.

7-2 Notices

Owners of High Risk utility facilities are issued a "Notice To Owner" to positively locate their facilities by potholing, probing, or other acceptable method.

7-3 Financial Liability

Determination of the State's financial liability for work performed by an owner to comply with this policy will be made by Right of Way in accordance with applicable statutes and policies.

7-4 Expenditure Authorizations

The State's cost of work resulting from potholing and/or locating facilities as determined by Right of Way should be charged to a Phase 1 Expenditure Authorization (may be charged to Phase 0 on an exception basis with prior approval of the Division of Right of Way).

Any required adjustment of facilities ordered by the State at State's liability should be charged to a Phase 9 or Phase 4 Expenditure Authorization, as appropriate.

SECTION 8 - New Installations Under Encroachment Permit

8-1 Installation Standards

The new installation of High and Low Risk facilities within existing or ultimate State Highway rights of way must be not less than 1.1 m (42 inches) below existing ground level. New installations in proposed projects must meet the following minimum clearances along the location of the utility facility:

1. 1.1 m (42 inches) below finished grade or 450 mm (18 inches) below grading plane of a currently planned project, whichever is greater.

2. 300 mm (12 inches) below existing or future drainage structures, but not less than in "1" above.
3. 750 mm (30 inches) below flow line of unlined ditches.
4. 600 mm (24 inches) horizontally from face of pile or side of excavation for a currently planned project.
5. 900mm (36 inches) below concrete sidewalks, where future street widening in the sidewalk area is not contemplated. This minimum may be reduced at the discretion of the utility owner, with the permission of the Permit or Project Engineer.

NOTE: All highway related facilities, such as signal and lighting conduits, that meet the definition of High and Low Risk facilities must meet these standards.

New installations within streets or frontage roads to be turned over to a local agency may be installed at lesser depths, as allowed by Public Utility Commission General Orders or normal procedures.

8-2 Permit Application

For installation of High and Low Risk facilities, the owner must furnish a plan showing location and construction details with their application. Such plans are normally delivered to the Permit Engineer, then reviewed by the District Utility Coordinator, Design and other district functions.

8-3 Location Data

Locations must be tied to points that are compatible with the State's datum for the area. If no datum exists, permanent reference points must be set so that the High and Low Risk facilities can be accurately located. This should be worked out with the utility owner, and if necessary may be performed by the District's Survey Unit.

8-4 Financial Liability

The costs of conforming to the requirements of Section 8-1 through 8-4 should be borne by the facility owner.

8-5 Retention of Records

Records of High and Low Risk facilities installed under permit must be retained so the information may be recalled. The type of records maintained will be at the discretion of the district. Maintenance of records must be determined by the district, providing that any procedure adopted will allow for ready retrieval and permanent retention.

SECTION 9 - Local Agency Projects

9-1 General

All Local Agency projects designed or administered by the State and all Special Funded State Highway projects must conform to the requirements of Section 1 through 6, inclusive.

For the purposes of this section, the term "**Project Engineer**" as used in this policy is the responsible engineer of the local agency.

A State administered project is any project that is advertised by the State, where the State opens bids and awards the contract and where the State pays the contractor directly.

9-2 Certifying Policy Compliance

On State administered local projects, or any Local Agency prepared project on the State Highway System (Special Funded), the local agency must certify to the State that the High Risk facilities conform to the requirements of this policy.

On Federally aided Local Streets and Roads projects, the State, as a part of its certification, must certify that the agency has been made aware of this policy.

9-3 Financial Liability

Reimbursement of utility owners for work associated with positively locating and/or relocating facilities for local street and road projects should be in accordance with local agency's normal procedures. Reimbursement for these costs on State projects must follow Caltrans procedures.

The cost of surveying and mapping of high risk facilities should be borne by the local agency in the same manner as its other plan preparation costs.

SECTION 10 - Project Engineer's Certification

10-1 Guidelines

Any project that involves High or Low Risk utilities will not be advertised by the Office Engineer until there is a "Project Engineer's Certification of Utility Facilities" in the PS&E file. On the Certification, each High and Low Risk utility is to be listed, and its description and disposition must include:

1. Horizontal and vertical location in relation to the work area (accuracy, as appropriate)
2. Size and type of material transmitted
3. Pressure or voltage of High and Low Risk facilities
4. Disposition of facility:
 - Remain in place
 - Relocated
 - Expose prior to construction
 - Expose during construction
 - Protect during construction
 - Etc.

10-2 Certification & Sample Form

The "Project Engineer's Certification of Utility Facilities" is a mandatory attachment to the PS&E submittal. A sample form is provided on the following page.

Project Engineer's Certification Of Utility Facilities on

[Dist-Co-Rte-PM]	(EA)

(description)	Within Construction Area?		
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border: 1px solid black; text-align: center;">yes*</td> <td style="width: 50%; border: 1px solid black; text-align: center;">no</td> </tr> </table>	yes*	no
yes*	no		

----- REQUIRED INFORMATION -----

High Risk Facilities (list, describe with location, and disposition):

Low Risk Facilities (list, describe with location, and disposition):

* (All High and Low Risk Utilities within the construction area must be positively identified.)

----- OPTIONAL INFORMATION -----

Other Utility Facilities (list, describe w/location, and disposition):

I hereby certify that the above listed facilities are located within the project limits and that this project conforms to the Policy on High and Low Risk Underground Facilities:

(PROJECT ENGINEER)	(DATE)	(ENGINEER'S SEAL)
--------------------	--------	-------------------

Page Intentionally Left Blank

APPENDIX E
Encroachment

E1: Encroachment Permit Application and Procedures

Case Number: PMT _____ - _____
Permit Number: ENC _____ - _____



SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS
ENCROACHMENT PERMIT APPLICATION

Paavo Ogren, Director

County Government Center, Room 207 • San Luis Obispo CA 93408 • (805) 781-5252
Fax (805) 781-1229 email address: pwd@co.slo.ca.us

LAND OWNER INFORMATION

Name: _____ Email: _____
Mailing Address: _____ City, Zip: _____
Telephone (24-hr): _____ Fax: _____
Signature of Land Owner: _____ (Date) _____

I, the above signed applicant, do hereby certify that the information provided on the Encroachment Permit Application is true, accurate, and to the best of my knowledge. I also, by signing this Application do hereby agree to abide with the Agreement Clause stated below.

CONTRACTOR / UTILITY FRANCHISE INFORMATION

Name: _____ License No: _____
Mailing Address: _____ City, Zip: _____
Contact Name: _____ Email: _____
Telephone (24-hr): _____ Fax: _____
Signature: _____ (Date) _____

I, the above signed applicant, do hereby certify that the information provided on the Encroachment Permit Application is true, accurate, and to the best of my knowledge. I also, by signing this Application do hereby agree to abide with the Agreement Clause stated below.

PROJECT SITE INFORMATION

Project Address: _____ City, Zip: _____
Est. Start Date: _____ Est. Completion Date: _____

Project Description (check all that apply):

- Curb, Gutter, Sidewalk** Driveway Public Improvement Special Event
 Transportation Utility Utility Blanket Other

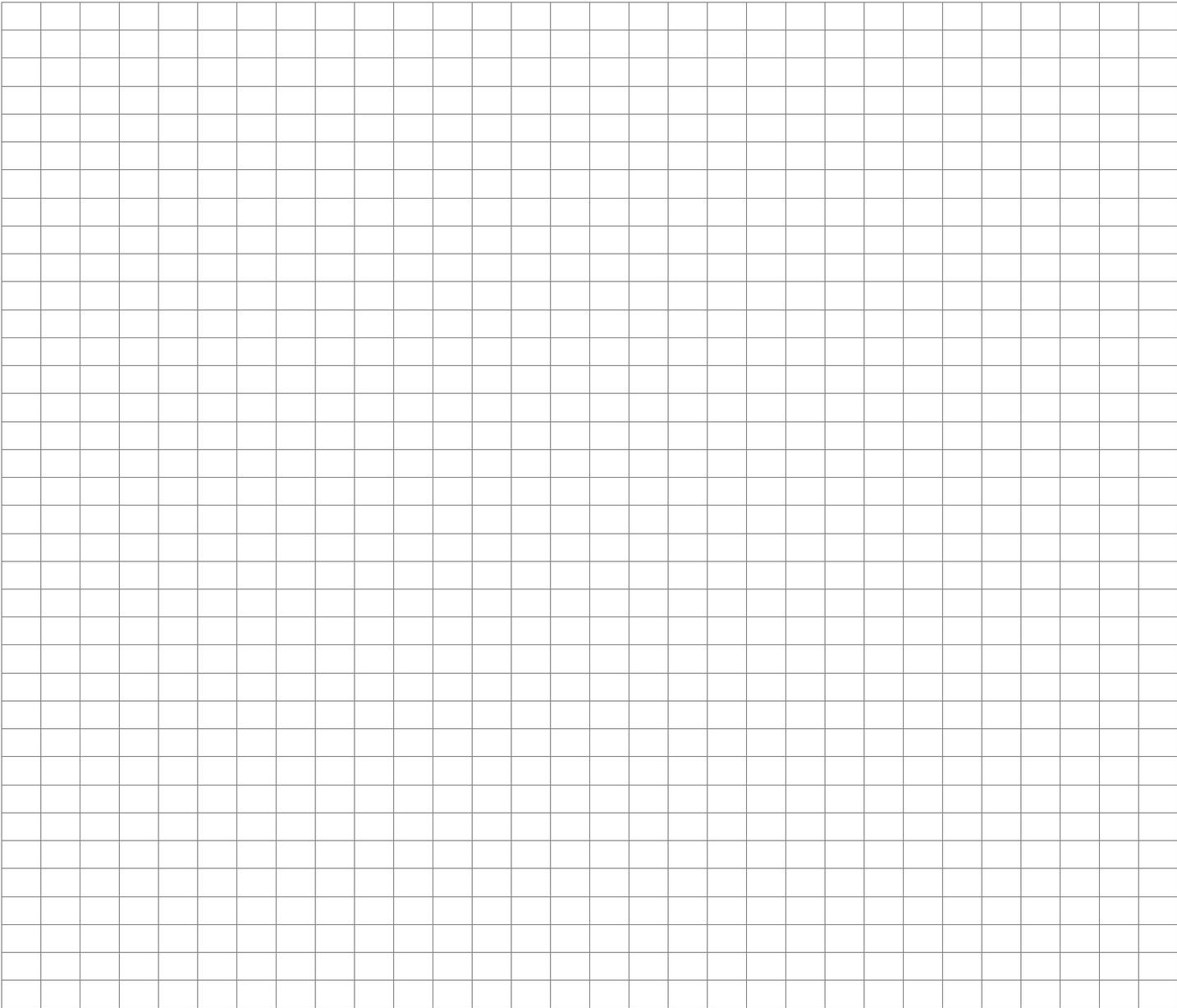
*For Transportation Permits (one trip and annual) and Special Event Permits (with or without road closures) refer to separate application(s) found at http://www.slocounty.ca.gov/PW/DevServ/Encroachment_Special_Event_and_Transportation_Permits.htm

**For Curb, Gutter, and Sidewalk installation with a building permit see <http://www.slocounty.ca.gov/PW/DevServ/permitInfo/CGSInfo.htm> for additional information.

Description of Work: _____

Agreement Clause:

- The applicant agrees and accepts that the work will be conducted in accordance with the County Standards and Specifications, Encroachment Permit Conditions, California Manual of Uniform Traffic Control Devices, State Standards and Specifications, State Streets and Highways Code, State Vehicle Code, and the attached Provisions.
- The applicant agrees and accepts that any work within the right of way of a county maintained road shall be performed by an appropriately licensed and bonded contractor, and shall provide traffic control per the latest California Manual of Uniform Traffic Control Devices.
- The permittee shall defend, indemnify and save harmless the County of San Luis Obispo, its officers, agents and employees from any and all claims, demands, damages, costs, expenses, or liability that relate in any way to this permit, including, but not limited to, any act or omission on the part of the permittee, or of agents, employees, or independent contractors directly responsible to the permittee; including, but not limited to, any defects, flaws or errors in the design or performance of any work under this permit, providing further that the foregoing shall apply to any acts, or omissions to act, committed jointly or concurrently by the permittee, the permittee's agents, employees or independent contractors, and the County, its agents, employees or independent contractors. Nothing contained in the foregoing indemnity provisions shall be construed to require the permittee to indemnify the County against any responsibility or liability in contravention of Section 2782 of the Civil Code.



DRAW AND LABEL ALL EXISTING IMPROVEMENTS (STRUCTURES, HARDSCAPE, LANDSCAPE, ETC.) AND THE PROPOSED NEW IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING (CLEARLY DIFFERENTIATE BETWEEN EXISTING AND PROPOSED):

1. Hardscape (asphalt and/or concrete) to include driveway approaches, parking areas, paving, curbing and/or berms, sidewalks, curb and gutters, etc. Label type and dimensions.
2. Drainage facilities, both major and minor.
3. Trenching and/or the placement of utilities to include utility boxes, pedestals, pads, vaults and poles, etc. shall be delineated in a typical trench detail outlining the size, type, length, location, etc.
4. Landscaping to include trees, shrubs, groundcover, irrigation facilities, walls, pillars, fences, gates, and a planting schedule/legend.
5. All other miscellaneous construction and improvements (mailboxes, etc).

IF APPLYING FOR A UTILITY ENCROACHMENT:

IF THE PROPOSED UTILITY INSTALLATION / WORK INVOLVES LESS THAN 100 LINEAR FEET, USE THE ATTACHED GRAPH SHEET TO PROVIDE A DETAILED DRAWING OF UTILITY INSTALLATION / WORK PLANS FOR YOUR PROJECT. MAKE SURE TO INCLUDE ACCURATE DIMENSIONS OF ANY UTILITY LINES IN ORDER TO PROCESS YOUR PERMIT APPLICATION. BE PREPARED ALSO TO PREPARE ANY APPROVED PROJECT PLANS THAT ARE AVAILABLE TO THE PERMIT ENGINEER AS REQUESTED.

IF THE PROPOSED UTILITY INSTALLATION / WORK PROJECT INVOLVES 100 LINEAR FEET OR MORE IN LENGTH, SUBMIT THE FOLLOWING TO THE PERMIT ENGINEER ALONG WITH YOUR APPLICATION.

Three (3) sets of plans (No larger than 24" x 36") to include the following information:

1. Site Plan (Vicinity Map) showing the private property line and County Road Right of Way in relationship to the edge of street pavement.
2. The edge of the pavement and gutter lip.
3. North Arrow and Scale. Scale must not be smaller than 1"=20'.
4. Addresses and Assessor's Parcel Numbers.
5. Trenching and/or the placement of utilities to include utility boxes, pedestals, pads, vaults and poles, etc. shall be delineated in a typical trench detail outlining the size, type, length, location, etc.
6. Trench Detail (Depth, Width, etc.)

IF APPLYING FOR A DRIVEWAY ENCROACHMENT:

USE THE ATTACHED GRAPH SHEET TO PROVIDE A DETAILED DRAWING OF THE PROPERTY ADJACENT TO THE COUNTY MAINTAINED ROAD AND THE LOCATION OF THE PROPOSED DRIVEWAY. SHOW PROPERTY LINES AND BUILDINGS IN RELATION TO THE COUNTY ROADWAY.

(ENCROACHMENTS REQUIRED BY BUILDING PERMITS ARE EXEMPT FROM COMPLETING THE APPLICATION. ENCROACHMENT PERMIT WILL BE ISSUED THROUGH THE BUILDING PERMIT PROCESS.)

IF APPLYING FOR A MISCELLANEOUS ENCROACHMENT:

PLEASE PROVIDE A DETAILED DRAWING OF YOUR PROPOSED MISCELLANEOUS PROJECT ON THE GRAPH SHEET ATTACHED. MORE COMPLEX PROJECTS MAY REQUIRE ENGINEERED PLANS, AND WILL BE DETERMINED BY THE PERMIT ENGINEER AT THE TIME OF APPLICATION.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD ENCROACHMENT PERMIT PROVISIONS

GENERAL

1. Authority. This permit is issued pursuant to Chapter 13.08 of the San Luis Obispo County Code and Chapter 5.5 (commencing with Section 1450) of the Division 2 of the California Streets and Highways Code, the provisions of which are incorporated herein by reference as though fully set forth herein. Special event permits with are issued pursuant to Chapter 15.610 of the San Luis Obispo County Code and Chapter 2 (commencing with Section 942) of the Division 2 of the California Streets and Highways Code, the provisions of which are incorporated herein by reference as though fully set forth herein. Issuance or denial of permit may be appealed to the Board of Supervisors. All board decisions are final and conclusive.
2. Definitions. The word "County" as used herein means the County of San Luis Obispo acting by and through its director of Public Works or his duly authorized representative. For special event permits, the word "work" as used herein refers to all activities related to the special event.
3. No Precedent Established. This permit is granted with the understanding that this action is not to be considered to establish a precedent concerning any kind of encroachment within the county right-of-way.
4. Permits from Others. When the law requires the consent to any work hereunder from any other public board or person having jurisdiction, this permit shall be suspended unless and until such consent is obtained.
5. Permission from Property Owners. Whenever it is necessary to secure permission from abutting property owners, such authority must be secured by the permittee prior to the starting of work.
6. Responsible Party. No party other than the named permittee or their agent is authorized to work under any permit.
7. Notice Prior to Starting Work. Before starting work under the Encroachment Permit, the permittee shall notify the county inspector 24 hours prior to initial start of work.
8. Indemnity. The permittee shall defend, indemnify and save harmless the County of San Luis Obispo, its officers, agents and employees from any and all claims, demands, damages, costs, expenses, or liability that relate in any way to this permit, including, but not limited to, any act or omission on the part of the permittee, or of agents, employees, or independent contractors directly responsible to the permittee; including, but not limited to, any defects, flaws or errors in the design or performance of any work under this permit, providing further that the foregoing shall apply to any acts, or omissions to act, committed jointly or concurrently by the permittee, the permittee's agents, employees or independent contractors, and the County, its agents, employees or independent contractors. Nothing contained in the foregoing indemnity provisions shall be construed to require the permittee to indemnify the County against any responsibility or liability in contravention of Section 2782 of the Civil Code.
9. Other Work. This permit is to be strictly construed, and no work other than that specifically mentioned is authorized hereby.
10. Safety. All work shall be performed in a safe and workmanlike manner in accordance with all applicable laws and regulations.
11. Keep Permit on the Job. This permit shall be kept at the site of the work and shall be shown to any representative of the County Department of Public Works, or any law enforcement officer on request.
12. Protection of the Public. The work shall cause the least possible inconvenience to the traveling public. At least one-way traffic shall be maintained at all times during the working day (7 a.m. through 5 p.m.). Two-way traffic shall be maintained from the close of the working day to the start of the next working day. Department approval required for full width road closures. All warning signs, lights, devices, and procedures shall conform to the latest California Manual of Uniform Traffic Control Devices (CAMUTCD). All traffic associated with the work shall follow the provisions of the California Vehicle Code.
13. Standards of Construction. Any matter not specifically mentioned herein, or covered by direct reference, shall conform to the County Standard Improvement Specifications and drawings, and, if not covered therein, to Caltrans Standard Specifications and Plans.
14. County Inspection. All work shall be subject to County inspection, and shall be performed in accordance with County Standards to the satisfaction of the County.
15. Expense of Inspection. On work which in the judgment of the County requires the presence of an employee of the Department of Public Works as inspector, the actual cost (including salary, traveling expense, and overhead) of such inspection shall be paid by the permittee upon presentation of a statement therefore. The cost of any tests required by the County shall be borne by the permittee.
16. Bonds. The applicant shall provide a cash bond (with assignment to the County) in the amount specified on the Encroachment Permit which sum is deemed sufficient by the Department of Public Works and which bond or deposit aforesaid shall guarantee payment to the County for all costs of work of improvement, engineering, inspection, and related incidental expenses done or incurred by the County as is provided for herein. Expense of Inspections shall be paid current and/or the finalization of Encroachment Permit is required prior to release of Bonds.
17. Restoration of Right-of-Way. All portions of the right-of-way, and all adjacent areas directly affecting such, if disturbed by work pursuant to this permit, shall be promptly restored to prior condition (including the replacement of suitable material and/or the planting of vegetation) and shall be left in a presentable condition.
18. Existing Utilities. The permittee shall contact all utilities to determine the location of any existing facilities prior to any excavation. The underground Service Alert ticket number and name shall be kept on the job site and be available to any representative of the County Department of Public Works or any law enforcement officer on request. The permittee shall also contact the local water purveyor, sanitation district or other utility not affiliated with Underground Service Alert to advise them of the proposed project. The date and name

of this contact must also be kept on the job site. The permittee shall immediately notify the owning utility of any damage to the existing facility.

19. Future Moving of Installation. In the event it becomes necessary, in the opinion of the County, to remove or relocate the encroachment permitted hereunder, such shall be accomplished by, and at the sole expense of, the permittee, and within such time and manner as may be required by the County. (Curb and gutter improvements constructed in accordance with approved County plans are exempted from this provision).
20. Taxation of Possessory Interests. Permittee recognizes and understands that this permit may create a possessory interest subject to property taxation, and that permittee may be subject to payment of taxes levied on such interest.
21. Joint and Several Obligation. If there is more than one permittee subject to the terms of this permit, then all of the terms of this permit shall bind the permittees individually and collectively, and said permittees shall be individually and collectively liable therefore.
22. Maintenance. The permittee agrees by the acceptance of this permit to exercise reasonable care to maintain properly any encroachment placed by it in the highway and to exercise reasonable care in inspecting for and immediately repairing and making good any injury to any portion of the highway which occurs as a result of the maintenance of the encroachment in the highway or as a result of the work done under this permit, including any and all injury to the highway which would not have occurred had such work not been done or such encroachment not placed therein.
23. Clear Zone. Any work performed in the right-of-way shall be designed and constructed so that a 10-foot wide area beside the edge of traveled way is clear of any obstructions (Section 14.1.7A). No above grade unyielding fixed objects shall be constructed within this clear zone unless specifically permitted by the County Director of Public Works. The director of Public Works may consider construction within the clear zone when it is designed in a manner to break away easily if hit by a moving vehicle.

USA MEMBERSHIP REQUIREMENTS

24. California Law. Every operator of a subsurface installation, except the Department of Transportation, shall become a member of, participate in, and share in the costs of, a regional notification center, (USA). Cal. Govt. Code Sections 4216-4216.9. "Operator" means any person, corporation, partnership, business trust, public agency, or other entity which owns, operates, or maintains a subsurface installation. For purposes of Section 4216.1 an "operator" does not include any owner of real property where subsurface facilities are exclusively located if they are used exclusively to furnish services on that property and the subsurface facilities are under the operation and control of that owner. "Subsurface installation" means any underground pipeline, conduit, duct, wire, or other structure, except non-pressurized sewer lines, non-pressurized storm drains, or other non-pressurized drain lines.

UTILITY AND UNDERGROUND

25. Cutting Pavement. All construction in asphalt shall be bored wherever possible. Open cut construction must be specifically permitted or may be authorized by the County inspector to accommodate unexpected field conditions. When pavement is cut it shall be done in a manner which causes the least possible damage to the adjacent pavement. After the utility is placed and the trench backfilled and based, the pavement shall be trimmed by sawing or other approved means to a sufficient width to removal displaced or damaged pavement. If the trench edge is within 2-feet of the edge of the roadway pavement, the entire 2-feet shall be removed and replaced.
26. Backfill. Bedding and shading material shall be consolidated and compacted by a field approved method. Backfill material shall be consolidated and compacted to the following standards: (Std. Dwg. U-4, U-4a, U-4b). Compaction tests shall be taken in locations as determined by the County Inspector. If approved by the County Inspector, excavations may be backfilled with vibrated sand slurry, or two sack cement slurry. All tests shall be conducted using Caltrans test methods.
27. Replacement of Pavement. The surface of all trenches in the traveled way shall be temporarily patched or otherwise surfaced at the end of each working day. Such temporary patching or other field approved surfacing shall be kept in a smooth, firm, dust-free condition for the safe use of the public for no more than 30 days or the final surface patch is required. Cold mix asphalt may be used as a temporary patch material; however, recessed metal plates are required on all arterial and major collector streets. Steel plate bridging shall conform to State Standards TR-0157. After the ditch edges have been trimmed, the base and pavement shall be replaced. The thickness of the base and paving to be replaced shall be determined in the field and shall be at least equal in section to that adjacent to the trench area; however, no pavement shall be less than 3" inches thick. Pavement shall be replaced with Type A hot mix asphalt which shall conform to State requirements for 1/2" maximum medium grading. Base material shall conform to State requirements for Class 2 Base.
28. Plowing. The use of a static plow within 5-feet of the edge of the pavement is prohibited. A vibrating plow may be used to within 1-foot off the edge of the pavement. Any pavement that is broken or otherwise disturbed by the plowing operations shall be removed and replaced. After plowing and prior to any compactive effort, the plow trench shall be flooded to attain a plastic condition. The trench shall then be compacted by wheel rolling or other suitable means.
29. General. Minimum cover over utilities shall conform to the County Standard U-1 drawing for installation. Maximum length of work under construction at any time shall not exceed 1,000 feet. Disposal of spoil material shall be outside the road right-of-way unless otherwise specifically approved by the County. Reasonable care shall be taken to avoid damage to major roots of trees. If an independent contractor installs a utility, the operator of the utility must accept the work before final approval of the work by the County.
30. Responsibility for Failures. The utility/service company that required the installation of facilities within the limits of the County right-of-way shall assume maintenance responsibility, in perpetuity, for any damage/failure to County maintained facilities as a result of such installation.

E2: Special Event Application and Provisions

Permit Number: ENC _____ - _____

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS
SPECIAL EVENT PERMIT APPLICATION

Paavo Ogren, Director



County Government Center, Room 207 • San Luis Obispo CA 93408 • (805) 781-5252

Fax (805) 781-1229

email address: pwd@co.slo.ca.us

APPLICANT INFORMATION

TAX ID #: _____

Organization: _____ Non Profit: Yes No

Mailing Address: _____ City, Zip: _____

Contact Name: _____ Email: _____

Telephone (24-hr): _____ Fax: _____

Signature of Authorized Individual: _____ (Date) _____

Printed Name (if different from contact): _____ **Email:** _____

I, the above signed applicant, do hereby certify that the information provided on the Encroachment (Special Event) Permit Application is true, accurate, and to the best of my knowledge. I also, by signing this Application do hereby agree to abide with the Agreement Clause stated below.

EVENT INFORMATION (attach additional sheets if needed)

Annual Event: Yes No

Event Name: _____

Event Description: _____

Event Date: _____ Event Time (in Right-of-Way): _____

Event Location/Route: _____

Road Closure: Yes No If Yes, where: _____

of Participants: _____ # of Spectators: _____ # of Volunteers: _____

Event Activities in County Right-of-Way (check all that apply) *Do not check if located on Private Property:*

- | | | | | |
|------------------|---|--|--|----------------------------------|
| Traffic Control: | <input type="checkbox"/> Cones/Barricades | <input type="checkbox"/> Flaggers | <input type="checkbox"/> Pavement Markings | <input type="checkbox"/> Signs |
| Encroachments: | <input type="checkbox"/> Aid Stations | <input type="checkbox"/> Alcohol Sales | <input type="checkbox"/> Restrooms | <input type="checkbox"/> Vendors |
| Other: | <input type="checkbox"/> Ambulance | <input type="checkbox"/> Cal Fire | <input type="checkbox"/> CHP | <input type="checkbox"/> Sheriff |
| | <input type="checkbox"/> Parking | <input type="checkbox"/> Spectators | <input type="checkbox"/> Volunteers | <input type="checkbox"/> _____ |

Rules of the Road Event: Yes No Participant Fees: Yes No Participant Waiver: Yes No

Pre-Event Advertizing: Yes No If Yes, type/where/when: _____

Has CHP been contacted? Yes No Is CHP traffic control required? Yes No

If CHP has not been contacted, the County will initiate any required correspondence.

Agreement Clause:

- The applicant agrees and accepts that the work will be conducted in accordance with the County Standards and Specifications, Encroachment Permit Conditions, California Manual of Uniform Traffic Control Devices, State Standards and Specifications, State Streets and Highways Code, State Vehicle Code, and the attached Provisions.
- The permittee shall defend, indemnify and save harmless the County of San Luis Obispo, its officers, agents and employees from any and all claims, demands, damages, costs, expenses, or liability that relate in any way to this permit, including, but not limited to, any act or omission on the part of the permittee, or of agents, employees, or independent contractors directly responsible to the permittee; including, but not limited to, any defects, flaws or errors in the design or performance of any work under this permit, providing further that the foregoing shall apply to any acts, or omissions to act, committed jointly or concurrently by the permittee, the permittee's agents, employees or independent contractors, and the County, its agents, employees or independent contractors. Nothing contained in the foregoing indemnity provisions shall be construed to require the permittee to indemnify the County against any responsibility or liability in contravention of Section 2782 of the Civil Code.

GUIDELINES FOR SPECIAL EVENT PERMIT CONDITIONS AND SUBMITTALS (due prior to issuance of permits)			
CONDITION/SUBMITTAL	REQUIRED?		NOTES
	YES	NO	
A. Permit Required	If any traffic control, route markings, road/lane closures, pre-event advertizing, participant fee, or event activities in ROW.	No impacts to free flow traffic and no encroachments in the County ROW.	
B. Application Fee	If participant fee, vendors or not exempt per Title 13.08.055. General Encroachment Permit fee. (See Fee List on website)	Title 13.08.055 (i.e non-profits)	If required, fee is required prior to permit issuance. Fee is payable at PW counter or via USPS.
C. Checking and Inspection Agreement	Events with multiple road closures where staff review is expected to exceed fees. Agreement allows applicant to be billed at time and materials.	Most events	If required, must be executed at least 60 days prior to event. Standard agreement can be found online at http://www.slocounty.ca.gov/PW/Dev/Serv/OnlineForms.htm
D. Traffic Control Plan	Required for all special events (See Traffic Control Plan Guidelines & Examples.pdf on website)	N/A	Draft Traffic Control Plan must be submitted with application. Traffic Control Plan must approved by the County prior to issuance of permit.
E. CHP Review and Agreement for Services	CHP must be notified of all special events. Each CHP office has different requirements. If CHP will be providing traffic control, applicant must enter into an agreement w/CHP.	N/A	If CHP will be providing traffic control, the fully executed agreement (or confirmation from CHP) must be on file prior to issuance of permit.
F. Insurance Policy	Required for all special events. \$1M-\$2M per occurrence general liability for most events; up to \$5M per occurrence for large events. Check with the Department for requirements (based on duration, # of participants/spectators, alcohol sales, etc.)	N/A	Applicant must name County of San Luis Obispo and CHP as additional insured. A copy of the certificate and endorsement (one for each entity) must be on file prior to issuance of permit. Umbrella policies are not accepted in lieu of general liability requirements.
G. Participant Waiver/ Release and Hold Harmless Agreement	Most events. At a minimum, waivers must "indemnify the County of San Luis Obispo from any and all liability for any and all loss(es), damage(s), and any and all claims...in connection with participation in the event" Additional language is required when participants are adjacent to traffic.	N/A	Waivers must be reviewed and approved by County Counsel prior issuance of permit. County may request originals. Contact the Department for waiver boilerplates.
H. Damage Bond	If ancillary facilities (Restrooms, Staging, Stations, Vendors) in the ROW. \$500 most events; \$1000 large events.	If no ancillary facilities in ROW.	If required, bond is payable at PW counter upon issuance of permit. In permit conditions are met, bond will be returned two (2) weeks after event.
I. Caltrans/City Permits	If required by jurisdiction(s), based on event location.	If event is only on SLO County maintained roads.	The permittee is responsible for obtaining any other permits or approvals that may be required.
J. Public Outreach	Based on event size, location and traffic control (i.e. road closures), County may require the following: <ul style="list-style-type: none"> • Letter to residents/businesses • Pre-event signage • Press release 	N/A	At a minimum, applicant must notify emergency services and community organizations 14-30 days prior to event. County may require review of press release and/or letters prior to issuance of permit. Changeable message signs or other pre-notification signs may be required.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD ENCROACHMENT PERMIT PROVISIONS

GENERAL

1. Authority. This permit is issued pursuant to Chapter 13.08 of the San Luis Obispo County Code and Chapter 5.5 (commencing with Section 1450) of the Division 2 of the California Streets and Highways Code, the provisions of which are incorporated herein by reference as though fully set forth herein. Special event permits with are issued pursuant to Chapter 15.610 of the San Luis Obispo County Code and Chapter 2 (commencing with Section 942) of the Division 2 of the California Streets and Highways Code, the provisions of which are incorporated herein by reference as though fully set forth herein. Issuance or denial of permit may be appealed to the Board of Supervisors. All board decisions are final and conclusive.
2. Definitions. The word "County" as used herein means the County of San Luis Obispo acting by and through its director of Public Works or his duly authorized representative. For special event permits, the word "work" as used herein refers to all activities related to the special event.
3. No Precedent Established. This permit is granted with the understanding that this action is not to be considered to establish a precedent concerning any kind of encroachment within the county right-of-way.
4. Permits from Others. When the law requires the consent to any work hereunder from any other public board or person having jurisdiction, this permit shall be suspended in operation unless and until such consent is obtained.
5. Permission from Property Owners. Whenever it is necessary to secure permission from abutting property owners, such authority must be secured by the permittee prior to the starting of work.
6. Responsible Party. No party other than the named permittee or their agent is authorized to work under any permit.
7. Notice Prior to Starting Work. Before starting work under the Encroachment Permit, the permittee shall notify the county inspector 24 hours prior to initial start of work.
8. Indemnity. The permittee shall defend, indemnify and save harmless the County of San Luis Obispo, its officers, agents and employees from any and all claims, demands, damages, costs, expenses, or liability that relate in any way to this permit, including, but not limited to, any act or omission on the part of the permittee, or of agents, employees, or independent contractors directly responsible to the permittee; including, but not limited to, any defects, flaws or errors in the design or performance of any work under this permit, providing further that the foregoing shall apply to any acts, or omissions to act, committed jointly or concurrently by the permittee, the permittee's agents, employees or independent contractors, and the County, its agents, employees or independent contractors. Nothing contained in the foregoing indemnity provisions shall be construed to require the permittee to indemnify the County against any responsibility or liability in contravention of Section 2782 of the Civil Code.
9. Other Work. This permit is to be strictly construed, and no work other than that specifically mentioned is authorized hereby.
10. Safety. All work shall be performed in a safe and workmanlike manner in accordance with all applicable laws and regulations.
11. Keep Permit on the Job. This permit shall be kept at the site of the work and shall be shown to any representative of the County Department of Public Works, or any law enforcement officer on request.
12. Protection of the Public. The work shall cause the least possible inconvenience to the traveling public. At least one-way traffic shall be maintained at all times during the working day (7 a.m. through 5 p.m.). Two-way traffic shall be maintained from the close of the working day to the start of the next working day. Department approval required for full width road closures. All warning signs, lights, devices, and procedures shall conform to the latest California Manual of Uniform Traffic Control Devices (CMUTCD). All traffic associated with the work shall follow the provisions of the California Vehicle Code.
13. Standards of Construction. Any matter not specifically mentioned herein, or covered by direct reference, shall conform to the County Standard Improvement Specifications and drawings, and, if not covered therein, to Caltrans Standard Specifications and Plans.
14. County Inspection. All work shall be subject to County inspection, and shall be performed in accordance with County Standards to the satisfaction of the County.
15. Expense of Inspection. On work which in the judgment of the County requires the presence of an employee of the Department of Public Works as inspector, the actual cost (including salary, traveling expense, and overhead) of such inspection shall be paid by the permittee upon presentation of a statement therefore. The cost of any tests required by the County shall be borne by the permittee.
16. Bonds. The applicant shall provide a cash bond (with assignment to the County) in the amount specified on the Encroachment Permit which sum is deemed sufficient by the Department of Public Works and which bond or deposit aforesaid shall guarantee payment to the County for all costs of work of improvement, engineering, inspection, and related incidental expenses done or incurred by the County as is provided for herein. Expense of Inspections shall be paid current and/or the finalization of Encroachment Permit is required prior to release of Bonds.
17. Restoration of Right-of-Way. All portions of the right-of-way, and all adjacent areas directly affecting such, if disturbed by work pursuant to this permit, shall be promptly restored to prior condition (including the replacement of suitable material and/or the planting of vegetation) and shall be left in a presentable condition.
18. Existing Utilities. The permittee shall contact all utilities to determine the location of any existing facilities prior to any excavation. The underground Service Alert ticket number and name shall be kept on the job site and be available to any representative of the County Department of Public Works or any law enforcement officer on request. The permittee shall also contact the local water purveyor, sanitation district or other utility not affiliated with Underground Service Alert to advise them of the proposed project. The date and name

of this contact must also be kept on the job site. The permittee shall immediately notify the owning utility of any damage to the existing facility.

19. Future Moving of Installation. In the event it becomes necessary, in the opinion of the County, to remove or relocate the encroachment permitted hereunder, such shall be accomplished by, and at the sole expense of, the permittee, and within such time and manner as may be required by the County. (Curb and gutter improvements constructed in accordance with approved County plans are exempted from this provision).
20. Taxation of Possessory Interests. Permittee recognizes and understands that this permit may create a possessory interest subject to property taxation, and that permittee may be subject to payment of taxes levied on such interest.
21. Joint and Several Obligation. If there is more than one permittee subject to the terms of this permit, then all of the terms of this permit shall bind the permittees individually and collectively, and said permittees shall be individually and collectively liable therefore.
22. Maintenance. The permittee agrees by the acceptance of this permit to exercise reasonable care to maintain properly any encroachment placed by it in the highway and to exercise reasonable care in inspecting for and immediately repairing and making good any injury to any portion of the highway which occurs as a result of the maintenance of the encroachment in the highway or as a result of the work done under this permit, including any and all injury to the highway which would not have occurred had such work not been done or such encroachment not placed therein.
23. Clear Zone. Any work performed in the right-of-way shall be designed and constructed so that a 10-foot wide area beside the edge of traveled way is clear of any obstructions (Section 14.1.7A). No above grade unyielding fixed objects shall be constructed within this clear zone unless specifically permitted by the County Director of Public Works. The director of Public Works may consider construction within the clear zone when it is designed in a manner to break away easily if hit by a moving vehicle.

USA MEMBERSHIP REQUIREMENTS

24. California Law. Every operator of a subsurface installation, except the Department of Transportation, shall become a member of, participate in, and share in the costs of, a regional notification center, (USA). Cal. Govt. Code Sections 4216-4216.9. "Operator" means any person, corporation, partnership, business trust, public agency, or other entity which owns, operates, or maintains a subsurface installation. For purposes of Section 4216.1 an "operator" does not include any owner of real property where subsurface facilities are exclusively located if they are used exclusively to furnish services on that property and the subsurface facilities are under the operation and control of that owner. "Subsurface installation" means any underground pipeline, conduit, duct, wire, or other structure, except non-pressurized sewer lines, non-pressurized storm drains, or other non-pressurized drain lines.

UTILITY AND UNDERGROUND

25. Cutting Pavement. All construction in asphalt shall be bored wherever possible. Open cut construction must be specifically permitted or may be authorized by the County inspector to accommodate unexpected field conditions. When pavement is cut it shall be done in a manner which causes the least possible damage to the adjacent pavement. After the utility is placed and the trench backfilled and based, the pavement shall be trimmed by sawing or other approved means to a sufficient width to removal displaced or damaged pavement. If the trench edge is within 2-feet of the edge of the roadway pavement, the entire 2-feet shall be removed and replaced.
26. Backfill. Bedding and shading material shall be consolidated and compacted by a field approved method. Backfill material shall be consolidated and compacted to the following standards: (Std. Dwg. U-4, U-4a, U-4b). Compaction tests shall be taken in locations as determined by the County Inspector. If approved by the County Inspector, excavations may be backfilled with vibrated sand slurry, or two sack cement slurry. All tests shall be conducted using Caltrans test methods.
27. Replacement of Pavement. The surface of all trenches in the traveled way shall be temporarily patched or otherwise surfaced at the end of each working day. Such temporary patching or other field approved surfacing shall be kept in a smooth, firm, dust-free condition for the safe use of the public for no more than 30 days or the final surface patch is required. Cold mix asphalt may be used as a temporary patch material; however, recessed metal plates are required on all arterial and major collector streets. Steel plate bridging shall conform to State Standards TR-0157. After the ditch edges have been trimmed, the base and pavement shall be replaced. The thickness of the base and paving to be replaced shall be determined in the field and shall be at least equal in section to that adjacent to the trench area; however, no pavement shall be less than 3" inches thick. Pavement shall be replaced with Type A hot mix asphalt which shall conform to State requirements for 1/2" maximum medium grading. Base material shall conform to State requirements for Class 2 Base.
28. Plowing. The use of a static plow within 5-feet of the edge of the pavement is prohibited. A vibrating plow may be used to within 1-foot off the edge of the pavement. Any pavement that is broken or otherwise disturbed by the plowing operations shall be removed and replaced. After plowing and prior to any compactive effort, the plow trench shall be flooded to attain a plastic condition. The trench shall then be compacted by wheel rolling or other suitable means.
29. General. Minimum cover over utilities shall conform to the County Standard U-1 drawing for installation. Maximum length of work under construction at any time shall not exceed 1,000 feet. Disposal of spoil material shall be outside the road right-of-way unless otherwise specifically approved by the County. Reasonable care shall be taken to avoid damage to major roots of trees. If an independent contractor installs a utility, the operator of the utility must accept the work before final approval of the work by the County.
30. Responsibility for Failures. The utility/service company that required the installation of facilities within the limits of the County right-of-way shall assume maintenance responsibility, in perpetuity, for any damage/failure to County maintained facilities as a result of such installation.

Revised: May 28, 2013

V:\DEVSERV Encroachment\ENC PERMITS - Permit Application-Provisions & Info\Special Event EP Application and Provisions.doc

E3: County Lane Closure Restriction List

County Road	No Closures Permitted Between	
Avila Beach Drive*	0700-0830	1500-1800
Burton Drive (SR 1 to Main St)	0700-0830	1500-1800
El Camino Real	0700-0830	1500-1800
Foothill Road*	0700-0830	1500-1800
Halcyon Road* (A.G. to El Campo Rd	0700-0830	1430-1800
Hutton and Joshua Roads*	0700-0800	1600-1800
Las Tablas Road	0700-0830	1600-1800
Lopez Drive*	0700-0830	1600-1800
Los Berros Road	0700-0830	1500-1800
Los Osos Valley Road*	0700-0830	1500-1800
Los Ranchos Road	0700-0830	1430-1800
Main Street, Cambria	0730-0830	1430-1730
Main Street, Templeton	0700-0830	1600-1800
Nacimiento Lake Drive*	0700-0830	1600-1800
O'Connor Way	0700-0830 (unless off school schedule)	
Orchard Avenue*	0700-0830	1600-1800
Pomeroy Road Willow Rd to Tefft St	0700-0830	1600-1800
Price Canyon Road*	0700-0830	1600-1800
San Luis Bay Drive*	0700-0830	1430-1800
Santa Ysabel Avenue	0700-0830	1700-1800
South Bay Boulevard*	0700-0830	1500-1800
South Frontage Road	0700-0800	1600-1800
Tank Farm Road	0700-0830	1600-1800
Tefft Street*	0700-0830	1430-1800
Thompson Avenue Tefft St to US 101	0700-0830	1430-1800
Valley Road	0700-0830	1500-1800
Vineyard Drive* SR 46 to Main St	0700-0830	1430-1800
Willow Road*	0700-0830	1600-1800

* Lane closures not permitted on Friday afternoons preceding three-day weekend of a Federal holiday.

Figure 6H-3. Work on the Shoulders (TA-3)

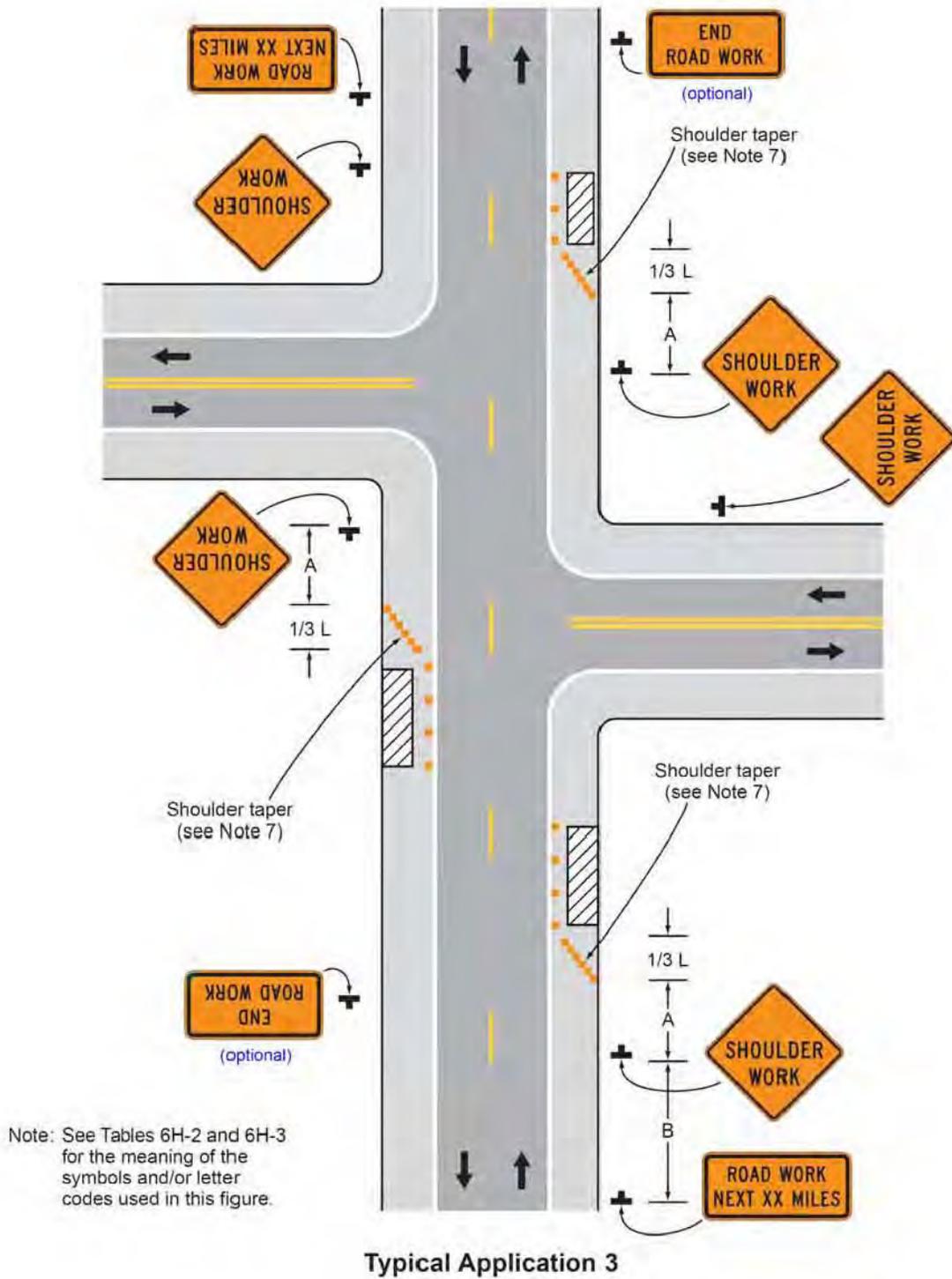
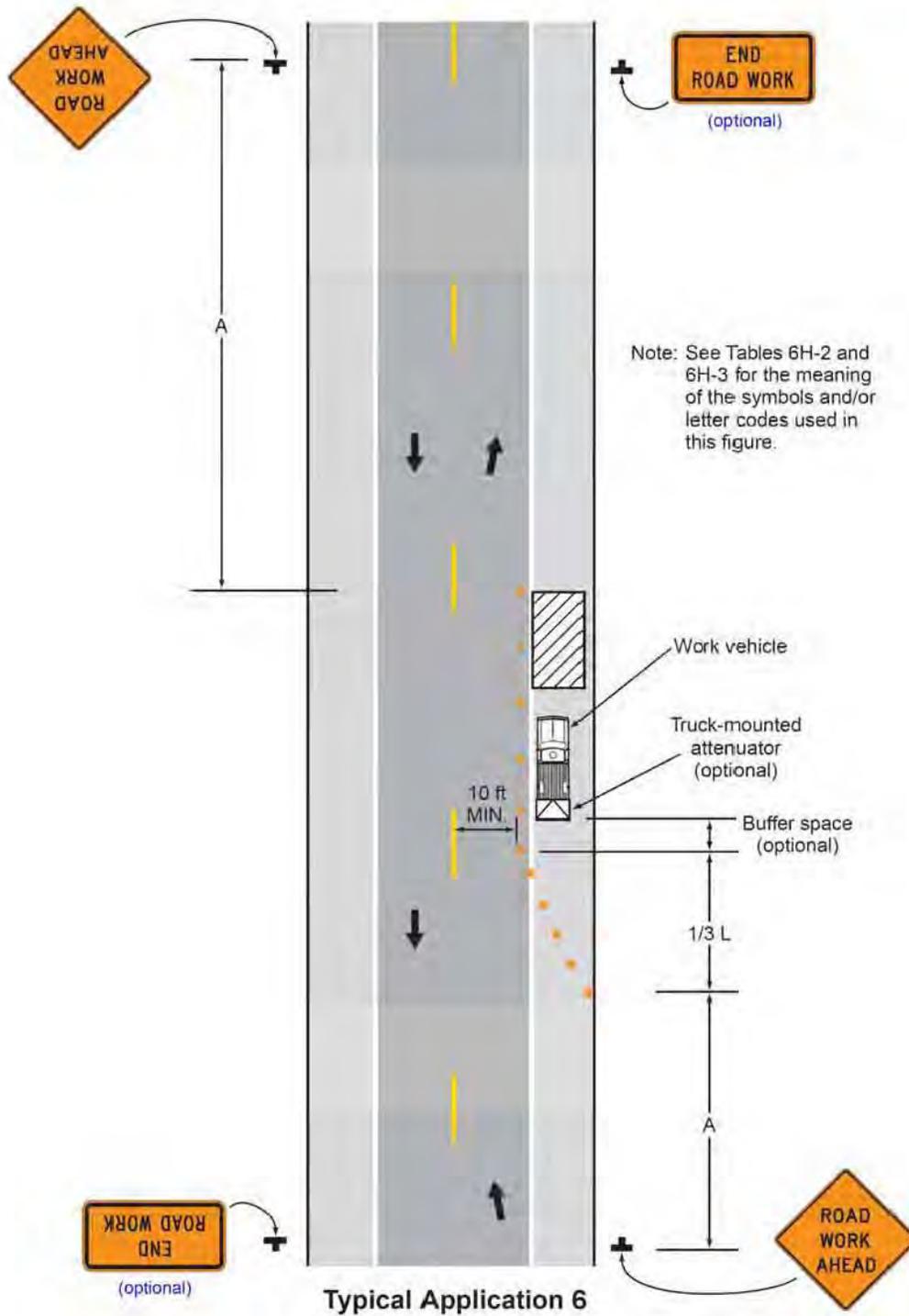


Figure 6H-6. Shoulder Work with Minor Encroachment (TA-6)



E6: Reserved for future Public Works Approved Tree Planting List

**San Luis Obispo County
Department of Public Works**

Subdivision Project Security

Security required. Security (also referred to as “bonding”) must be posted with most subdivision projects, to ensure completion of the public improvements that are required as conditions of approval. Following approval of the improvement plans, we will review an Engineer’s Estimate of the cost of construction that is to be secured. Please note that the cost estimate must be based on unit costs that would be experienced if the County were to claim the bonds and construct the improvements under public agency contracting rules.

Once we have approved the estimate of construction cost, the following factors must be added:

Construction cost	Contingency	Inflation	Administrative costs
<\$75,000	10%	10%	40%
\$75,000 - \$200,000	10%	10%	30%
>\$200,000	10%	10%	20%

(Construction cost) + (Contingency) + (Inflation) + (Administrative costs) = **Bonding Amount**

Items to be secured. There are three different items to be secured during the bonding period:

Performance = 100% of the bonding amount. Once all the required public improvements have been accepted and a Guarantee Bond posted, the Performance Bond will be exonerated. Note that acceptance includes the completion of the improvements **and** the preparation of “as-built” plans, submittal of required reports, and the engineer’s certification.

Payment and Materials = 50% of the bonding amount. The Payment and Materials Bond will be held for 90 days after acceptance of the improvements.

Guarantee = 10% of the bonding amount. The Guarantee Bond will be held for one year from date of completion and acceptance of improvements.

Types of security. The types of security accepted by San Luis Obispo County are listed below. Note that all forms of security must be made payable to the County of San Luis Obispo.

Cash. Submit 100% of the bonding amount. A certified check may also be submitted in this amount. Because we pay you interest, a Taxpayer Identification Number is required with cash bonds. You will need to fill out an IRS form W-9 and return it to Public Works with your check. The form may be obtained from us or at: <http://www.irs.gov/pub/irs-pdf/fw9.pdf>

Certificate of Deposit. Submit three separate certificates – 1 @ 50%, 1 @ 40%, 1 @ 10% of the bonding amount.

Letters of Credit. Submit three separate letters of credit – 1 @ 100%, 1 @ 50%, 1 @ 10% of the bonding amount. The Guarantee letter of credit (10%) may be submitted at the time of acceptance of improvements. Important - any Letters of Credit with expiration dates need to include an automatic extension and notice provision.

Surety Bonds. Submit two separate bonds – 1 @ 100%, 1 @ 50% of the bonding amount. The Performance bond (100%) will be reduced to 10%, to become the Guarantee bond, at the time of acceptance of improvements.

Page Intentionally Left Blank

APPENDIX F

Drainage

Page Intentionally Left Blank

F1: Drainage Report Format

All Drainage Reports submitted to the Department shall be prepared in the following format:

- A. Cover Sheet
 - Title of Report (Ex: Hydrologic and Hydraulic Drainage Report for Tract ##)
 - Approximate Location (Street, Town)
 - Seal and Signature of the Project Engineer
 - Name & Address of Client
 - Report Date

- B. Table of Contents
 - List All Headings & Page Numbers
 - Number All Pages

- C. Introduction
 - Description of Site Size, Location and surroundings
 - Description of Pre/Post-Development Drainage Conditions
 - Description of Historic Hydrologic/Hydraulic Information

- D. Procedure
 - Description of Methodology & Assumptions
 - Description of Special Requirements (i.e. retention, detention, etc.)

- E. Hydrology
 - Description of Historic Flows vs. Post-Development Flows
 - Pre-Development Drainage Map (May be included in Appendix)
 - Property lines
 - Existing Contours (Beyond project limits if necessary)
 - Existing Improvements/Structures/Drainage Facilities/ Waterways
 - Arrows Denoting Historic Drainage Path
 - Watershed Boundaries (Beyond project limits if necessary)
 - Label ID #
 - Label Area

Table of Flow Calculations for each Watershed Area

	C Value	Area (ac)	Tc (min)	I2 (in/hr)	I25 (in/hr)	I50 (in/hr)	I100 (in/hr)	Q2 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)
Area 1											
Area 2											

- Post-Development Drainage Map (May be included in Appendix)
 - Property lines
 - Existing Contours
 - Existing Improvements/Structures/Drainage Facilities/ Waterways
 - Proposed Improvements/Structures/Drainage Facilities
 - Arrows Denoting Proposed Drainage Path
 - Labeled Overland Escape Route
 - Watershed Boundaries (Both on and Off-Site)
 - Label ID #
 - Label Area

Table of Flow Calculations for each Watershed Area

	C Value	Area (ac)	Tc (min)	I2 (in/hr)	I25 (in/hr)	I50 (in/hr)	I100 (in/hr)	Q2 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)
Area 1											
Area 2											

F. Hydraulics

- Drainage System Schematic Map (May be included in Appendix)
 - Gray-Scaled Proposed/Existing Improvements
 - Darkened Proposed & Existing Drainage Facilities
 - Label all Drainage Facilities with ID#
 - Pipes
 - Inlets
 - Outlets
 - Channels
 - Basins
 - Arrows Denoting Drainage Flow
- Storm Drainage (if applicable)
 - Description of System Design
 - Discuss Overland Escape Route
 - Discuss Ability to Meet County Requirements
 - Culvert – 2 ft/s > Primary Design Storm Velocity < 15 ft/s
 - Inlets – Enough Capacity for Primary Design Storm
 - Inlets/Junctions – HGL (Primary Design Storm) > 0.5' Below Top of Grates, Bottom of Curb Openings, & Manhole Covers

Table of Pipe Segment Analysis (Example Below)

	Size (in)	Length (ft)	Slope (%)	Invert IN (ft)	Invert OUT (ft)	Q25* (cfs)	HGL25* IN (ft)	HGL25* OUT (ft)	V25* AVG (ft/s)	Pipe Capacity (cfs)
Pipe 1										
Pipe 2										

* Primary Design Storm

Table of Inlet Analysis (Example Below)

	Q25* (cfs)	Invert (ft)	Top of Structure (ft)	HGL25* (ft)	HGL100 (ft)	Freeboard** (ft)	Inlet*** Capacity (cfs)
Inlet 1							
Manhole 1							
Outlet 1							

* Primary Design Storm

** Freeboard = Top of Structure – HGL25*

*** Inlet capacity shall account for 50% clogging in a sump condition

- Channels & Swales (if applicable)
 - Description of Channels (Shape, Location, Watershed Area, Lining, etc.)
 - Discuss Ability to Meet County Requirements
 - Channel – 2 ft/s > Primary Design Storm Velocity < 4 ft/s or 10 ft/s for Concrete-lined
 - Channel – Freeboard = 0.2 x Specific Energy or 1'

Table of Channel Analysis (Example Below)

	Q25* (cfs)	Slope (%)	V25* AVG (ft/s)	Specific Energy (ft)	Surface Elevation (ft)	Top of Channel (ft)	Freeboard (ft)
Channel 1							
Channel 2							

* Primary Design Storm

- Retention Basins (if applicable)
 - Description of Project Retention Requirements
 - Discuss Locations/Types of Basins
 - Discuss Water Quality Measures & Maintenance Plan
 - Discuss Non-Erosive Overland Escape Route/Spillway Design for 100-yr Storm
 - Discuss Ability to Meet County Retention Requirements
 - Volume Designed for 50-yr Storm, 10-hr Intensity, 10-hr Duration
 - Antecedent Moisture Factor = 1.3 in Areas of Natural Sump
 - Basin Shall Percolate Within 7 Days (Provide Percolation Tests)
 - Freeboard – Deep Basin = 1 Ft, Shallow Basin = 15%, Subsurface Basin = 20%

Retention Basin Volume Table (Example Below)

	Type (Subsurface, Deep, Shallow)	Q50 (cfs)	I50 (in/hr)	Duration (hr)	VOL Required (cf)	Freeboard (cf)	VOL Total (cf)
Basin 1							
Basin 2							

- Detention Basins (if applicable)
 - Description of Project Detention Requirements
 - Discuss Locations/Types of Basins
 - Discuss Access & Maintenance Plan
 - Discuss Non-Erosive Overland Escape Route/Spillway Design for 100-yr Storm
 - Discuss Ability to Meet County Retention Requirements
 - Volume to Detain Developed 50-yr Flows and Release Pre-Developed 2-yr Flows
 - Freeboard – Deep Basin = 1 Ft, Shallow Basin = 15%, Subsurface Basin = 20%

Detention Basin Volume Table (Example Below)

	Type (Subsurface, Deep, Shallow)	VOL IN* (cf)	VOL OUT** (cf)	VOL*** Maximum (cf)	Freeboard (cf)	VOL Total (cf)
Basin 1						
Basin 2						

* Based on flows from fully-developed 50-yr storm

** Based on flows from pre-developed 2-yr storm

*** The maximum result of VOLin – VOLout at a specific time within a 10-hour duration

- Rock Slope Protection (if applicable)
 - Description of Location
 - Discuss Sizing Based on County Standard Drawings H-5

- Spreadwidth
 - Description of Street Sections
 - Discuss Ability to Meet County Requirements
 - Design Speed < 45 mph – Spread Shall be Less Than ½ Outside Lane Width
 - Design Speed > 45 mph – Spread shall not encroach traveled way
 - Street Section Shall be Sufficient to Convey 100-yr Flows within the right-of-way

Table of Q25* Spreadwidth Analysis (Example Below)

	Design Speed (mph)	Station (ft)	Side of Street (Lt/Rt)	Q25* (cfs)	Street Half-Width (ft)	Bikelane (Yes/No)	Spreadwidth (ft)
Street A							
Street B							

* Primary Design Storm

Table of Q100 Spreadwidth Analysis (Example Below)

	Station (ft)	Q100 (cfs)	Street Width (ft)	R/W Width (ft)	Spreadwidth (ft)
Street A					
Street B					

G. Conclusion & Recommendations

- Summary of Proposed Drainage Design
- Statement/Description of Design’s Ability to Meet Drainage Requirements

H. Drainage Report Appendix

- Calculations
- Additional Maps/Exhibits
- References (Standards, Specifications, Letters, etc.)

F2: “n” values for Manning’s Formula

[Source: Urban Drainage Design Manual, FHWA-NHI-01-021]

The Project Engineer shall provide the source(s) for other “n” values used in situations not listed below.

Table 1: Street and Pavement Gutters

Type of Gutter or Pavement	Manning’s “n”
Concrete gutter, troweled finish – greater than 0.5% slope	0.012
Concrete gutter, troweled finish – 0.5% or flatter	0.032
Hot Mix Asphalt pavement – greater than 0.5% slope	0.016
Hot Mix Asphalt pavement – 0.5% or flatter	0.036
Concrete gutter and Hot Mix Asphalt pavement combination – greater than 0.5% slope	0.015
Concrete gutter and Hot Mix Asphalt pavement combination – 0.5% or flatter	0.035

Table 2: Storm Drain Culverts

Type of Culvert	Roughness or Corrugation	Manning’s “n”
Concrete pipe	smooth	0.012
Concrete boxes	smooth	0.013
Spiral rib metal pipe	smooth	0.013
Corrugated metal pipe, pipe-arch	2-2/3 by ½ in annular	0.025
	2-2/3 by ½ in helical	0.023
	6 by 1 in helical	0.024
	5 by 1 in	0.026
	3 by 1 in	0.028
	6 by 2 in structural plate	0.035
	9 by 2-1/2 in structural plate	0.035
Corrugated polyethylene	smooth	0.015
Corrugated polyethylene	corrugated	0.025
Polyvinyl chloride (PVC)	smooth	0.012

Table 3: Open Channels

Lining Category	Lining Type	“n” for given depth ranges		
		0-0.5 ft	0.5-2 ft	>2 ft
Rigid	Concrete	0.015	0.013	0.013
	Grouted riprap	0.040	0.030	0.028
	Stone masonry	0.042	0.032	0.030
	Soil element	0.025	0.022	0.020
	Hot Mix Asphalt	0.018	0.016	0.016
Unlined	Bare soil	0.023	0.020	0.020
	Rock cut	0.045	0.035	0.025
Temporary*	Woven paper net	0.016	0.015	0.015
	Jute net	0.028	0.022	0.019
	Fiberglass roving	0.028	0.021	0.019
	Straw with net	0.065	0.033	0.025
	Curled wood mat	0.066	0.035	0.028
	Synthetic mat	0.036	0.025	0.021
Gravel riprap	1 inch D ₅₀ **	0.044	0.033	0.030
	2 inch D ₅₀ **	0.066	0.041	0.034
Rock riprap	6 inch D ₅₀ **	0.104	0.069	0.035
	12 inch D ₅₀ **	–	0.078	0.040

* Some “temporary” linings become permanent when buried.

** D₅₀ = median aggregate diameter

F3: Geotextile Selection

Topsoil with soil amendments, fertilizer and seed is required beneath all blanket liners. Seed shall be watered regularly until there is 80% successful coverage over the area planted. Additional seeding, watering and amending, as needed, shall be completed immediately if, at any point during the rainy season, the initial planting fails, or is removed or disturbed.

Geotextile blanket installation shall conform to the following requirements:

1. Temporary blankets shall be used only on mild to moderate slopes (less than 5%) and where Primary Design Storm flow velocities (intermittent) are less than 2.5 feet per second (fps).
2. Extended-term blankets shall be used on steep slopes (5 to 10%), where intermittent flow velocities exceed 2.5 fps in sand, or 4.0 fps in gravel, and where the establishment of adequate vegetation is delayed.
3. Permanent blankets shall be used on steep to severe slopes (greater than 10%), where intermittent flow velocities exceed 2.5 fps in sand, or 4.0 fps in gravel.
4. Trapezoidal or parabolic channel cross-sections are preferred over V-sections. V-sections shall not be used where intermittent flow velocities exceed 2.5 fps in sand, or 4.0 fps in gravel.
5. Geotextile blankets shall be installed in firm and continuous contact with the soil.
6. Blankets shall be longitudinally lapped or anchor trenched, and installed according to the manufacturer's detailed installation requirements.
7. Blankets shall be inspected, maintained and repaired until they have become vegetated and stable.

F4: LID Specifications

**Appendix E -
Low Impact Development (LID) Specifications**

Appendix E – Low Impact Development Institute (LIDI) Specifications

BIORETENTION SOIL MEDIA (BSM)

BSM shall by comprise of:

INGREDIENT	PERCENT BY VOLUME
Mature Compost	30-40
Sand	60-70

BSM shall not be mixed on site.

Mature Compost

Unless otherwise approved by the Low Impact Development Initiative staff, compost must be derived from one or a combination of the following types of materials:

1. Green material consisting of chipped, shredded or ground vegetation or clean, processed recycled wood products
2. Biosolids*
3. Mixed food waste

*Compost must not be derived from mixed, municipal solid waste and must not contain paint, petroleum products, pesticides or other chemical residues harmful to plant or animal life. Compost shall be relatively free of inert ingredients, including glass, plastic and paper,

Mature compost must arrive on site at a temperature < 120° F and meet at least one of the following stability methods:

METHOD	UNITS	REQUIREMENT
NH ₄ - : NO ₃ -N Ratio	None	< 3
Total NH ₃ -N	ppm, dry basis	< 500
Seed Germination	Percent	> 80 of control
Plant Trials®	Percent	> 80 of control
Solvita®	Index value	> 5

AND at least one of the following maturity indices in the following table:

METHOD	UNITS	REQUIREMENT
OUR Test	O ₂ / unit TS / hr	< 1.3
SOUR Test	O ₂ / unit BVS / hr	< 1.5
CO ₂ Test	C / unit VS / day	< 8
Dewar	Temp. rise (oC)	< 20
Solvita®	Index value	> 5

Compost must comply with the following gradation requirements below

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)	
	<i>MIN</i>	<i>MAX</i>
1 inch	99	100
½-inch	90	100
¼-inch	40	90
No. 200	2	10

Compost shall comply with the requirements shown in the following table:

PROPERTY	REQUIREMENT
Bulk Density	500 and 1100 dry lbs/cubic yard
Moisture Content	30% - 55% of dry solids
Inert Materials	< 1 % by weight or volume combined total
Carbon : Nitrogen Ratio	15:1 < C:N < 25:1
Salinity	< 6.0 mmhos/cm
pH	6.5 < pH < 8.0
Total Nitrogen content	> 0.9%
Boron	< 8- ppm dry < 2.5 ppm soluble

Where TMECC= Test Methods for the Examination of Composting and Compost

Sand

ASTM C33 for fine aggregate, or...the following gradation requirements:

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)	
	<i>Min</i>	<i>Max</i>
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40	5	55
No. 100	0	15
No. 200	0	5

COMPOST MULCH

Compost mulch shall consist of 100% of mature compost. See BSM for aged compost specifications.

GRAVEL FILTER

Gravel filter shall consist of 3" deep layer of ¾" (no. 4) open-graded aggregate.

OR

Gravel filter shall conform to Caltrans Class 2 Permeable Material (Section 68-2.02F(3)) gradation requirements:

SIEVE SIZE	PERCENT PASSING
1 inch	100
3/4 inch	90 -100
3/8 inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Class 2 permeable material must have a sand equivalent value of not less than 75.

PLANT PALETTE The plant palette shall be according the Plant List found in [Appendix F](#).

Page Intentionally Left Blank

APPENDIX G

Waterline

G1: Waterline Disinfection Procedure

Based on July 15, 2002 Procedural Memorandum O-3 (Revised)

The following memorandum outlines the revised procedures to be followed by laboratory personnel, water operators, inspectors and contractors for the disinfection and testing of new waterline extensions and/or water mains. This procedure is an extraction from the American Waterworks Association (AWWA) *Standards for Disinfecting Water Mains* (C651-99) and the new drinking water requirements from the California Department of Health Services. **Note: This Memorandum should be included in specifications for all waterline projects.**

This standard presents essential procedures for disinfecting new and repaired water mains, including installation of fire hydrants. All new water mains shall be disinfected before they are placed in service. All water mains taken out of service for inspection, repair, or other activities that might lead to contamination of water shall be disinfected before they are returned to service. Additionally, steps shall be taken to prevent contaminated materials from entering the water main during storage, construction, or repair.

Any activity associated with this procedure that may disrupt or affect the overall water system in regard to: system pressure, water supplied to customers, contamination of existing lines, or other major events must be cleared through the Water Quality Manager prior to commencing that activity.

BASIC DISINFECTION PROCEDURE

The basic disinfection procedure shall be:

1. Inspect all materials to be used to insure the integrity of the materials.
2. Prevent contaminating materials from entering the water main during storage, construction, or repair and noting potential contamination at the construction site.
3. Remove, by flushing, those materials that may have entered the water main.
4. Chlorinate any residual contamination that remains in the new water main using the “continuous feed” method as described below. Note that “tablet/granule” and “slug” methods are no longer acceptable.

Before the main is chlorinated, it shall be filled to remove air pockets and flushed to remove particles. The flushing velocity in the main shall not be less than 2.5 ft/s.

Water supplied from a temporary backflow-protected connection to the existing distribution system or other approved supply source shall flow at a constant metered rate into the newly installed water main. The point of entry shall not be more than 5 feet from the beginning of the new line.

Liquid Sodium hypochlorite solution conforming to ANSI/AWWA B300 standards shall be fed at or before the entry point in an amount sufficient to produce not less than 25 mg/L of free chlorine residual throughout the new main and its appurtenances. Chlorine application shall not cease until the entire main is filled within the heavily chlorinated water.

The chlorinated water shall be retained in the main for a minimum of 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of the 24 hour period, the treated water in all portions of the main shall have a free chlorine residual of not less than 10 mg/L.

FINAL FLUSHING

1. Clear the main of heavily chlorinated water. After a 24-hour retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is not higher than that generally prevailing in the distribution system or acceptable for domestic use (typically 2 ppm).
2. Dispose of heavily chlorinated water. The environment to which the chlorinated water is to be discharged shall be inspected. If there is any question that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. Where necessary, Federal, State and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

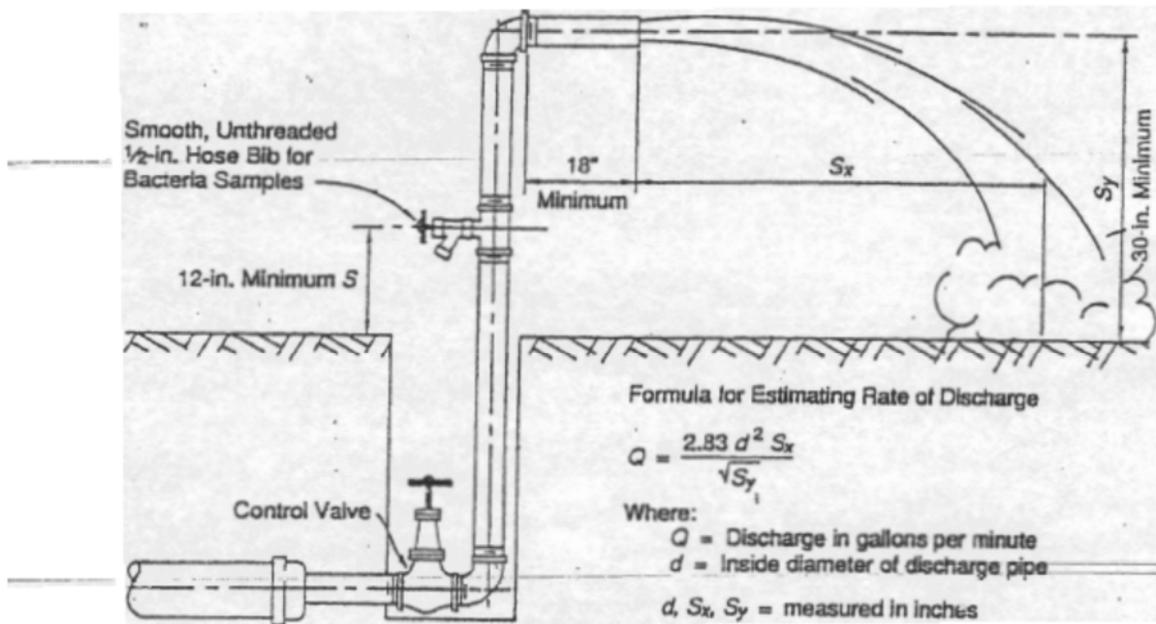
BACTERIOLOGICAL TESTS

1. **Standard conditions.** After final flushing and before the new water main is connected to the distribution system, two consecutive tests of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1,200 ft of the new water main, plus one set from the end of the line and at least one set from each branch. All samples shall be tested for bacteriological (chemical and physical) quality in accordance with Standard Methods for the Examination of Water and Wastewater; and shall show the absence of coliform organisms. A standard plate count and general physical analysis (odor, turbidity, color) are also required.
2. **Sampling procedure.** Samples for bacteriological analysis shall be collected by Water Treatment Operators or laboratory personnel in sterile bottles with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrant shall be used in collection of samples. A combination blow off and sampling tap for mains up to including 8-inch diameter may be used as corporation stop that is installed in the main with a copper-tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use. Each sample site must be positioned so that it may be flushed for several minutes (during sampling) without contamination of the hose bib, sample bottles, etc. when samples are being taken.
3. **Notification procedure.** Initial arrangement for scheduling sampling of new/repared main shall be made with the Water Quality Manager. The Water Quality Manager will arrange sampling dates and time with the Water System Operator in charge of the effected system. The Water System Operator shall notify the Engineering Inspector of the time and particular location that samples are to be taken. The Inspector shall insure that the Contractor in charge of the line has installed adequate sampling stations (see attached drawing) on the days that samples are to be taken.

Once it has been determined that all bacteriological and general physical analysis meet current requirements, the Water Quality Manager shall notify the in-charge Water System Operator of the same. The Operator shall in turn notify the Engineering Inspector in charge of the job. It shall be the Inspector’s responsibility to notify the contractor/property owner of the test results.

If the test results do not meet current requirements, the same notification procedure as outlined above shall be followed. Once the contractor/property owner has been notified it shall be his responsibility to perform the following (as determined by the Water Quality Manager): flush the line, re-chlorinate the lines (for a period of 24 hours), flush to an acceptable chlorine residual level, have the line re-sampled.

4. **Analysis Charges.** Unless otherwise stated in the construction contract, the cost of the initial sampling and analysis shall be paid by the contractor/property owner. In the event that follow-up analyses are required due to failed tests, the contractor/property owner will be liable for all costs associated with the follow-up sampling and analysis.



NOTE: This figure applies to pipes up to and including 8-in. (200 mm) diameter.

G2: Well Water Metering Standards and Installation Guidelines



SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

Paavo Ogren, Director

County Government Center, Room 206 • San Luis Obispo, CA 93408 • (805) 781-5252

Fax (805) 781-1229

email address: pwd@co.slo.ca.us

June 17, 2014

PROCEDURAL MEMORANDUM O-10

TO: All Division Heads
All Utilities Division Personnel

FROM: Dean Benedix, Utilities Division Manager

SUBJECT: Well Water Metering Standards and Installation Guidelines

PURPOSE

Provided below are the water meter technical standards and installation guidelines that shall be followed 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.

BACKGROUND

County of San Luis Obispo Ordinance No. 3246

Under Ordinance No. 3246, water meters must be installed on all wells on properties with issued Offset Clearances. Ordinance 3246, Section 7.A.2.b states:

“Within 30 days of installation of a well for which a permit has been issued pursuant to Chapter 8.40 of the County Code, or prior to final building inspection, whichever is applicable, evidence shall be submitted to the Public Works Director that the property owner has installed a meter on the well serving the use to measure all groundwater used from that well. The configuration of the installation shall conform to a drawing prepared by the property owner and shall conform to the technical standards set forth by the Public Works Director.”

Nacimiento lakeside water users

Under the current San Luis Obispo County Flood Control and Water Conservation District policy for Nacimiento lakeside users, property owners submitting well permit applications shall enter into an Agreement for the Sale of Nacimiento Water (Agreement). The Agreement states:

“Water furnished by the facilities provided by BUYER shall be metered in a manner approved by the Director of Public Works at locations mutually agreeable to the two parties. The metering equipment shall be maintained by the BUYER in good working order at all times; and all costs of said equipment, including the installation, operation, maintenance, repair, and replacement thereof, shall be borne by the BUYER.”

County of San Luis Obispo Ordinance No. 2343

Under Ordinance No. 2343, the county engineer may require that a well permit applicant participate in a water monitoring program and install a water meter on the well associated with the subject well permit. Ordinance No. 2343 § 3 states:

“In certain areas of the coastal zone established by the California Coastal Act of 1976, groundwater is limited and extraction must be monitored to satisfy the requirements of the Coastal Act. All water well permit applications within the coastal zone shall be reviewed by the county engineer to determine if participation in a water monitoring program is necessary to assure records are available for use in the resource management system. The manner in which a permit applicant shall participate in the monitoring program, including the frequency and type of reporting shall be determined by the county engineer.”

All others

Under any other situations where metering of a private water well is required by San Luis Obispo County or San Luis Obispo County Flood Control and Water Conservation District, these water meter technical standards and installation guidelines shall be followed.

WELL WATER METERING TECHNICAL STANDARDS

The basic standards shall be:

1. The type of metering device shall be in accordance with standards established by the American Water Works Association (AWWA) and approved by the Utilities Division Manager or designee in advance of installation. In addition, “wet dial face” meters are not permitted.

2. The property owner where any well requiring a metering device is located shall be responsible for operation and maintenance of said device, including accuracy of the meter in accordance with AWWA Standards. The County shall not be responsible for operation and maintenance of these devices.
3. Metering devices shall be constructed in accordance with AWWA Standards. The County of San Luis Obispo Public Works Department Utilities Division maintains a list of water meter manufacturers that are satisfactory to the County (Attachment A).
4. Metering device calibration shall be performed in accordance with AWWA Standards and/or manufacturer recommendations and at the request of the Utilities Division Manager or designee.
5. Metering devices shall be installed in accordance with AWWA Standards and/or manufacturer recommendations. The following standards and guidelines are provided to assist with installation:
 - a. The metering device shall be situated such that all water produced from the well is measured.
 - b. The metering device shall be configured to provide a full flow of water in the pipe at the metering device under all flow conditions.
 - c. A minimum of eight diameters of straight pipe upstream and downstream of the centerline of the metering device (i.e. no bends or valves) shall be provided to limit turbulence at the metering device. Exceptions can be made if it can be demonstrated that the metering device is installed according to the manufacturer's recommendations.
 - d. The specified flow range of the metering device shall be consistent with the range of flows from the well.
 - e. The metering device should be installed in accordance with good practices with sufficient space provided to allow access for inspection and testing as may be deemed necessary.
 - f. If solid material (e.g. silt, sand, rust particles, etc.) is present in the discharge from the well, a strainer or filter should be installed in the pipe upstream of the meter to avoid fouling of the metering device.
 - g. The metering device and discharge line shall be protected from freezing.
 - h. Appropriate fittings should be used to allow easy installation and maintenance of the metering device.
 - i. The metering device should be installed by a qualified, experienced professional.
 - j. Upon completion of installation, each metering device shall be inspected by County staff.

G3: CDPH Supplemental Separation Guidelines

Memorandum

Date: April 14, 2003 (**Revised Date: October 16, 2003**)

To: Regional and District Engineers

From: David P. Spath, Ph.D., Chief (*Original signed by Dave*)
Drinking Water and Environmental Management
601 North 7th Street, MS 216
Sacramento, CA 95814
(916) 322-2308

Subject: **GUIDANCE MEMO NO. 2003-02: GUIDANCE CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES**

The purpose of this memo is to update guidance dated April 5, 1983 for consistency with proposed 2003 regulations. Should there be any modification to the proposed Water Works Standards that may impact the content of this guidance, the guidance will be amended accordingly.

GUIDANCE: CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES

BACKGROUND

When buried water mains are in close proximity to non-potable pipelines, the water mains are vulnerable to contamination that can pose a risk of waterborne disease outbreaks. For example, sewers (sanitary sewer mains and sewage force mains) frequently leak and saturate the surrounding soil with sewage due to structural failure, improperly constructed joints, and/or subsidence or upheaval of the soil encasing the sewer. If a nearby water main is depressurized and no pressure or negative pressure occurs, that situation is a public health hazard that is compounded if an existing sewer is broken during the installation or repair of the water main. Further, failure of a water main in close proximity to other pipelines may disturb their bedding and cause them to fail. In the event of an earthquake or other disaster, simultaneous failure of all pipelines could occur.

The most effective protection against this type of drinking water contamination is adequate construction and separation of non-potable pipelines and water mains. The Waterworks Standards (Title 22, Chapter 16, Section 64572) provide separation criteria for new construction. However, when these criteria cannot be met, the risk of contamination can be reduced by increasing the structural integrity of pipe materials and joints, and ensuring minimum separation requirements are met. Therefore, the following guidance details construction criteria for the installation of water mains and non-potable pipelines to minimize the risk of contamination of drinking water.



Do your part to help California save energy. To learn more about saving energy, visit the following web site:
www.consumerenergycenter.org/flex/index.html

DEFINITIONS

- **COMPRESSION JOINT** - A push-on joint that seals by means of the compression of a rubber ring or gasket between the pipe and a bell or coupling.
- **CONTINUOUS SLEEVE** - A protective tube of high-density-polyethylene (HDPE) pipe with heat fusion joints or other non-potable metallic casing without joints into which a pipe is inserted.
- **DISINFECTED TERTIARY RECYCLED WATER** - Wastewater that has been filtered and subsequently disinfected in accordance with Section 60301.230, Chapter 3 (Water Recycling Criteria), Title 22, California Code of Regulations.
- **HOUSE LATERAL** - A sewer line connecting the building drain and the sanitary sewer main serving the street.
- **SUPPLY LINE** - Pipelines conveying raw water to be treated for drinking purposes in accordance with Section 64572 ©, **proposed** Water Works Standards.
- **WATER MAIN** - Means any pipeline, except for user service lines, within the distribution system in accordance with Section 64551.70, **proposed** Water Works Standards.
- **RATED WORKING WATER PRESSURE** - A pipe classification system based on internal working pressure of the fluid in the pipe, type of pipe material, and the thickness of the pipe wall.
- **SANITARY SEWER MAIN** - A gravity sewer conveying untreated municipal wastewater.
- **SEWAGE FORCE MAIN** - A pressurized sewer conveying untreated municipal wastewater.

APPLICABILITY

Note that the construction criteria presented in this document apply to house laterals that cross above a water main, but not to those house laterals that cross below a water main.

Water mains or non-potable pipelines that are 24-inches in diameter or larger may pose a higher degree of public health concern because of the large volumes of flow involved. Therefore, installation of water mains or non-potable pipelines 24-inches in diameter or larger should be reviewed and approved in writing by the Department on a case-by-case basis prior to construction.

In no case, should water mains and non-potable pipelines conveying sewage or other liquids be installed in the same trench.

REGULATORY REQUIREMENTS

Any new development project in which all the underground facilities are being constructed for the first time must comply with the following regulatory requirements:

Existing requirements:

Section 64630. (Title 22 CA Code of Regulations) Water Main Installation⁴

- (c) Water mains shall be installed at least:
 - (1) Ten feet (3 meters) horizontally from and 1 foot (0.3 meters) higher than sanitary sewer mains located parallel to the main.
 - (2) One foot (0.3 meters) higher than sanitary sewer mains crossing the main.
 - (3) Ten feet (3 meters), and preferably 25 feet (7.5 meters), horizontally from sewage leach fields, cesspools, seepage pits and septic tanks.

- (d) Separation distances specified in (c) shall be measured from the nearest outside edges of the facilities.

- (e) Where the requirements of (c) and (d) cannot be met due to topography, inadequate right-of-way easements, or conflicts with other provisions of these regulations, lesser separation is permissible if:
 - (1) The water main and the sewer are located as far apart as feasible within the conditions listed above.
 - (2) The water main and the sewer are not installed within the same trench.
 - (3) The water main is appropriately constructed to prevent contamination of the water in the main by sewer leakage.

- (f) Water mains shall be disinfected according to AWWA Standard C601-81 before being placed in service.

- (g) Installation of water mains near the following sources of potential contamination shall be subject to written approval by the Department on a case-by-case basis:
 - (1) Storage ponds or land disposal sites for wastewater or industrial process water containing toxic materials or pathogenic organisms.
 - (2) Solid waste disposal sites.
 - (3) Facilities such as storage tanks and pipe mains where malfunction of the facility would subject the water in the main to toxic or pathogenic contamination.

Although the following requirements have not yet been adopted, they should be within the next two years and should be used as guidance for future construction.

Proposed requirements as of the date of this document:

Section 64572. Water Main Separation

(a) New water mains and new supply lines shall not be installed in the same trench as, and shall be at least 10 feet horizontally from, and one foot vertically above, any parallel pipeline conveying:

- (1) Untreated sewage,
- (2) Primary or secondary treated sewage,
- (3) Disinfected secondary-2.2 recycled water (defined in section 60301.220),
- (4) Disinfected secondary-23 recycled water (defined in section 60301.225), and
- (5) Hazardous fluids such as fuels, industrial wastes, and wastewater sludge.

(b) New water mains and new supply lines shall be installed at least 4 feet horizontally from, and one foot vertically above, any parallel pipeline conveying:

- (1) Disinfected tertiary recycled water (defined in section 60301.230), and
- (2) Storm drainage.

(c) New supply lines conveying raw water to be treated for drinking purposes shall be installed at least 4 feet horizontally from, and one foot vertically below, any water main.

(d) If crossing a pipeline conveying a fluid listed in subsection (a) or (b), a new water main shall be constructed perpendicular to and at least one foot above that pipeline. No connection joints shall be made in the water main within eight horizontal feet of fluid pipeline.

(e) The vertical separation specified in subsections (a), (b), and (c) is required only when the horizontal distance between a water main and pipeline is ten feet or less.

(f) New water mains shall not be installed within 100 horizontal feet of any sanitary landfill, wastewater disposal pond, or hazardous waste disposal site, or within 25 feet of any cesspool, septic tank, sewage leach field, seepage pit, or groundwater recharge project site.

(g) The minimum separation distances set forth in this section shall be measured from the nearest outside edge of each pipe barrel.

ALTERNATIVE CRITERIA FOR CONSTRUCTION

Water Mains, and Sewers and Other Non-potable Fluid-carrying Pipelines

When new water mains, new sanitary sewer mains, or other non-potable fluid-carrying pipelines are being installed in existing developed areas, local conditions (e.g., available space, limited slope, existing structures) may create a situation in which there is no alternative but to install water mains, sanitary sewer mains, or other non-potable pipelines at a distance less than that required by the regulations [existing Section 64630 (proposed Section 64572)]. In such cases, through permit action, the Department may approve

alternative construction criteria. The alternative approach is allowed under the proposed regulation Section 64551(c):

"A water system that proposes to use an alternative to the requirements in this chapter shall demonstrate to the Department how it will institute additional mitigation measures to ensure that the proposed alternative would not result in an increased risk to public health."

Appropriate alternative construction criteria for two different cases in which the regulatory criteria for sanitary sewer main and water main separation cannot be met are shown in **Figures 1 and 2**.

- **Case 1** - New sanitary sewer main and a new or existing water main; alternative construction criteria apply to the sanitary sewer main.
- **Case 2** - New water main and an existing sanitary sewer main; alternative construction criteria may apply to either or both the water main and sanitary sewer main.

Case 1: New Sanitary Sewer Main Installation (Figures 1 and 2)

Zone Special Construction Required for Sanitary Sewer Main

- A Sanitary sewer mains parallel to water mains shall not be permitted in this zone without prior written approval from the Department and public water system.
- B If the water main paralleling the sanitary sewer main does not meet the Case 2 Zone B requirements, the sanitary sewer main should be constructed of one of the following:
1. High-density-polyethylene (HDPE) pipe with fusion welded joints (per AWWA C906-99);
 2. Spirally-reinforced HDPE pipe with gasketed joints (per ASTM F-894);
 3. Extra strength vitrified clay pipe with compression joints;
 4. Class 4000, Type II, asbestos-cement pipe with rubber gasket joints;
 5. PVC sewer pipe with rubber ring joints (per ASTM D3034) or equivalent;
 6. Cast or ductile iron pipe with compression joints; or
 7. Reinforced concrete pressure pipe with compression joints (per AWWA C302-95).

- C If the water main crossing below the sanitary sewer main does not meet the requirements for Case 2 Zone C, the sanitary sewer main should have no joints within ten feet from either side of the water main (in Zone C) and should be constructed of one of the following:
1. A continuous section of ductile iron pipe with hot dip bituminous coating; or
 2. One of the Zone D options 1, 3, 4, or 5 below.
- D If the water main crossing above the sanitary sewer main does not meet the Case 2 Zone D requirements, the sanitary sewer main should have no joints within four feet from either side of the water main (in Zone D) and be constructed of one of the following:
1. HDPE pipe with fusion-welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating and mechanical joints (gasketed, bolted joints);
 3. A continuous section of Class 200 (DR 14 per AWWA C900-97) PVC pipe or equivalent, centered over the pipe being crossed;
 4. A continuous section of reinforced concrete pressure pipe (per AWWA C302-95) centered over the pipe being crossed; or
 5. Any sanitary sewer main within a continuous sleeve.

Case 2: New water mains Installation (Figures 1 and 2)

Zone Special Construction Required for Water Main

- A No water mains parallel to sanitary sewer mains shall be constructed without prior written approval from the Department.
- B If the sanitary sewer main paralleling the water main does not meet the Case 1 Zone B requirements, the water main should be constructed of one of the following:
1. HDPE pipe with fusion welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating;
 3. Dipped and wrapped one-fourth-inch-thick welded steel pipe;
 4. Class 200, Type II, asbestos-cement pressure pipe;

5. Class 200 pressure rated PVC water pipe (DR 14 per AWWA C900-97 & C905-97) or equivalent; or
 6. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-97 or C302-99 or C303-95).
- C If the sanitary sewer main crossing above the water main does not meet the Case 1 Zone C requirements, the water main should have no joints within ten feet from either side of the sanitary sewer main (in Zone C) and be constructed of one of the following:
1. HDPE pipe with fusion-welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating;
 3. Dipped and wrapped one-fourth-inch-thick welded steel pipe;
 4. Class 200 pressure rated PVC water pipe (DR 14 per AWWA C900-97 & C905-97); or
 5. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-97 or C301-99 or C303-95).
- D If the sanitary sewer main crossing below the water main does not meet the requirements for Case 1 Zone D, the water main should have no joints within eight feet from either side of the sanitary sewer main (in Zone D) and should be constructed as for Zone C.

Water Mains and Pipelines Conveying Non-potable Fluids

When the basic separation criteria cannot be met between water mains and pipelines conveying non-potable fluids, the requirements described above for sanitary sewer mains should apply. This includes the requirements for selecting special construction materials and the separation requirements shown in Figures 1 and 2. Note that not all construction materials allowed for sanitary sewer mains will be appropriate for other non-potable fluid lines. For example, certain plastic lines may not be appropriate for the transport of some fuel products. The selection of compatible materials of construction for non-potable fluids is a decision to be made by the project engineer.

Water Mains and Sewage Force Mains

- Sewage force mains shall not be installed within ten feet (horizontally) of a water main.

- When a sewage force main must cross a water main, the crossing should be as close as practical to the perpendicular. The sewage force main should be at least one foot below the water main.
- When a new sewage force main crosses under an existing water main, and a one-foot vertical separation cannot be provided, all portions of the sewage force main within eight feet (horizontally) of the outside walls of the water main should be enclosed in a continuous sleeve. In these cases, a minimum vertical separation distance of 4 inches should be maintained between the outside edge of the bottom of the water main and the top of the continuous sleeve.
- When a new water main crosses over an existing sewage force main, the water main should be constructed of pipe materials with a minimum rated working pressure of 200 psig or the equivalent.

Water Mains and Tertiary Treated Recycled Water or Storm Drainage

The basic separation criteria for water mains and pipelines conveying tertiary treated recycled water or storm drainage lines are a 4-foot horizontal separation where lines are running parallel and a 1-foot vertical separation (water line above recycled or storm drainage) where the lines cross each other.

When these criteria cannot be met, the Zone A criteria apply where lines are running parallel, and the Zone C and Zone D criteria apply where the lines cross each other as shown on Figures 1 and 2. For these situations, the Zone "P" criteria are in effect and prohibit construction less than 1 foot in parallel installations and less than 4 inches in vertical (crossing) situations.

For tertiary treated recycled water and storm drainage lines, the Zone B criteria (requirements for special pipe) do not apply as the basic separation criteria is a four-foot horizontal separation criteria for parallel lines. The tertiary treated recycled water lines should be constructed in accordance with the color-coding, and labeling requirements per Section 116815, California Health and Safety Code of Regulations.

MISCELLANEOUS GUIDANCE

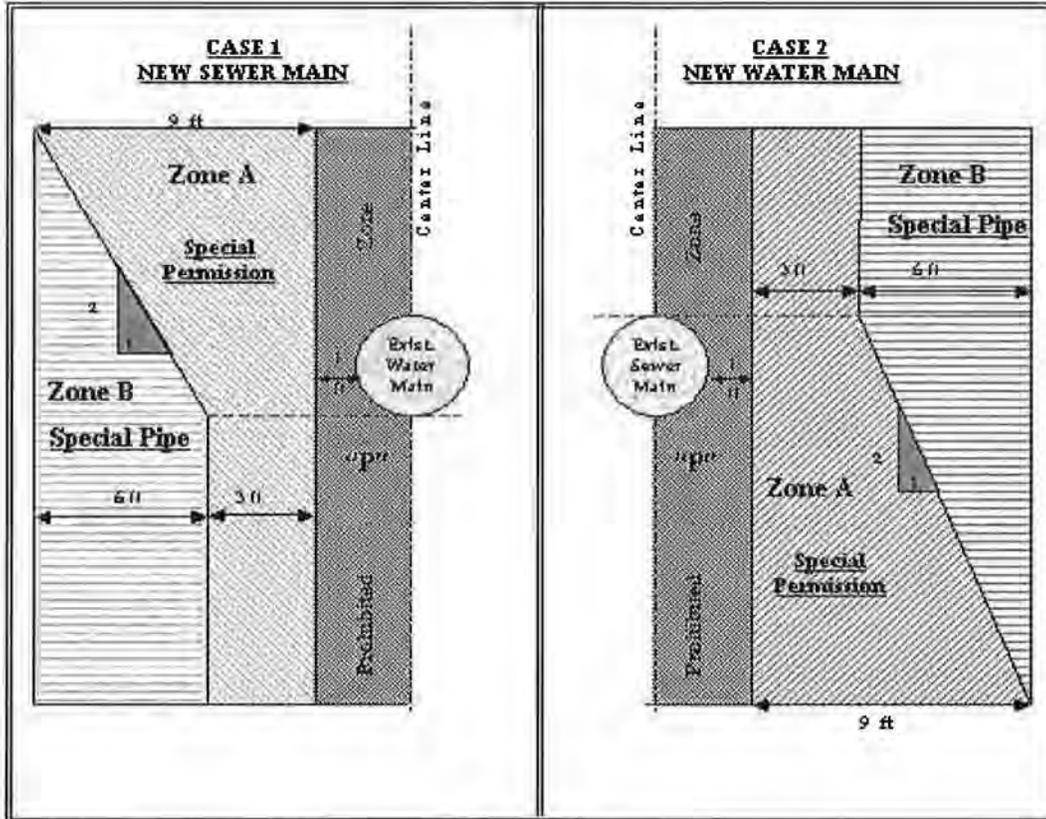
- More stringent requirements may be necessary if conditions such as high groundwater exist. HDPE or similar pipe may be required to provide flexibility to move without potential joint leaks.
- Sanitary sewer mains should not be installed within 25 feet horizontally of a low head (5 psig or less pressure) water main.
- New water mains and sanitary sewer mains should be pressure tested in accordance with manufacturer's specifications.

- When installing water mains, sewers, or other pipelines, measures should be taken to prevent or minimize disturbances of existing pipelines. Disturbance of the conduit's supporting base could eventually result in pipeline failure.
- Special consideration should be given to the selection of pipe materials if corrosive conditions are likely to exist. These conditions may be due to soil type and/or the nature of the fluid conveyed in the conduit, such as a septic sewage producing corrosive hydrogen sulfide.

NOTE: Dimensions are from the outside of the water main to the outside of the other pipeline, manhole, or sleeve.

FIGURE 1 PARALLEL CONSTRUCTION

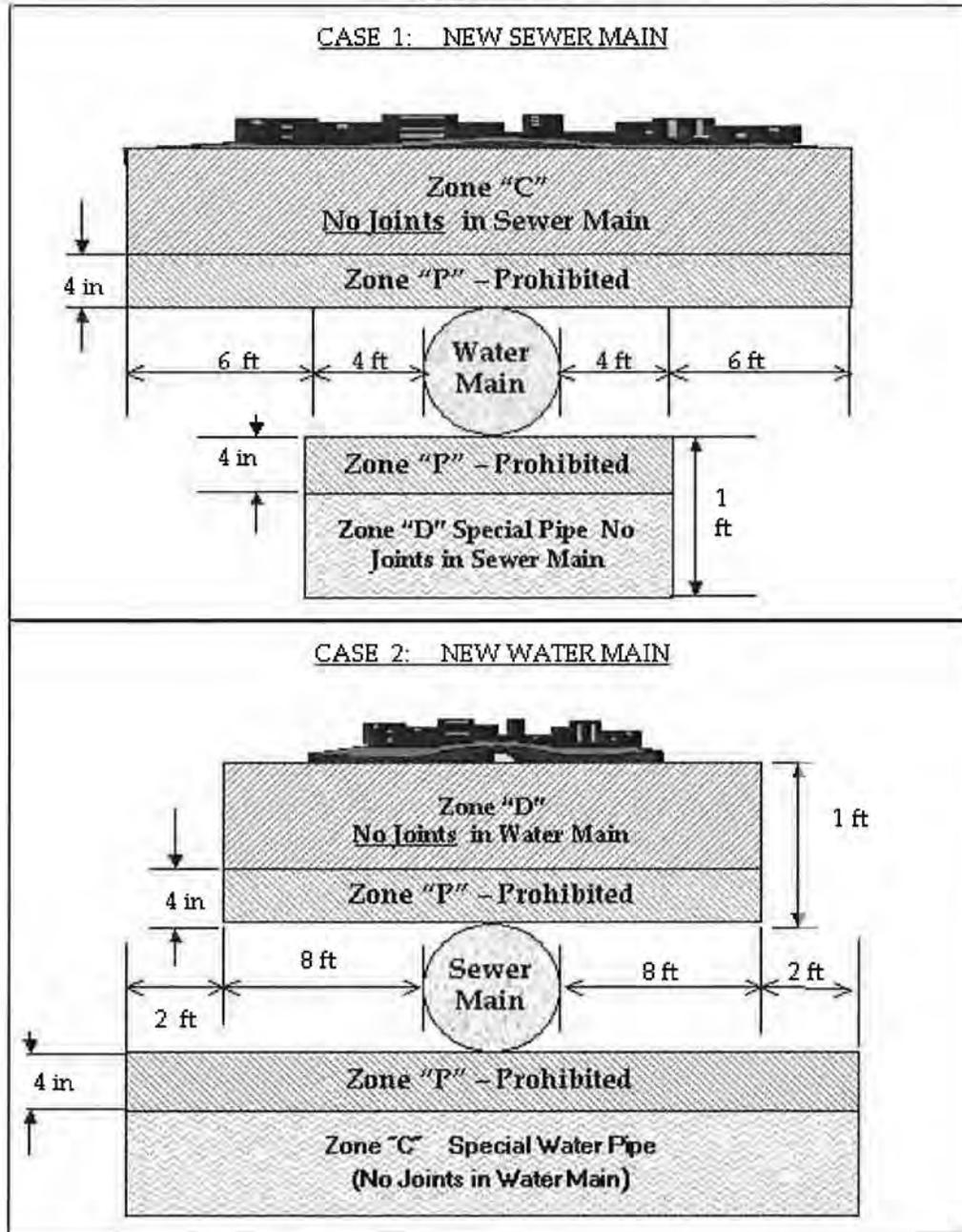
Not To Scale



Note: Zones identical on either side of center lines

Zones "P" is a prohibited zone. Section 64630 (e) (2) California Code of Regulations, Title 22 (Current); or Section 64572 (a) California Code of Regulations, Title 22 (Proposed).

FIGURE 2 CROSSINGS
Not To Scale



APPENDIX H

Selected Board of Supervisor Policies

H1: Resolution 2003-412: A Resolution Adopting a Policy Establishing Clearance Requirements for County Right-of-Way

Note: The following is a non-conforming copy of the resolution but is easier to reproduce and read within this document.

RESOLUTION NO. {2003-412}

**A RESOLUTION ADOPTING A POLICY ESTABLISHING
CLEARANCE REQUIREMENTS FOR
COUNTY RIGHT-OF-WAY**

The following resolution is now offered and read:

WHEREAS, the County adopted a Trails Plan in 1991, which designates pedestrian and equestrian trail corridors within the County, including some trails which run along the untraveled shoulder of County Road right-of-way; and

WHEREAS, the Trails Plan is the policy document which guides the construction and/or implementation of new trail corridors within the County; and

WHEREAS, although a trails corridor may not be open to public use as a County-maintained trail until all segments of that corridor have been properly improved and specifically accepted by the County as a “trail” under the provisions of the Trails Plan, the County desires to establish a policy prohibiting placement of obstructions along the shoulder of the traveled way of County Roads.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED by the board of supervisors of the County of San Luis Obispo, State of California:

1. The recitals set forth herein above are true and correct.
2. The “Policy Establishing Clearance Requirements for County Right-of-way,” as set forth in attached Exhibit A hereto, is hereby approved.
3. The Director of Public Works and Transportation is hereby authorized to implement said policy.
4. Once all segments of a trail corridor have been accepted by the County as a “trail,” the Parks Division of the Department of General Services shall be responsible for signifying such acceptance by the posting of the appropriate signs which will mark the location of the trail, subject to the approval of the Director of Public Works and Transportation.

Upon motion of Supervisor _____, seconded by Supervisor _____, and on the following roll call vote, to wit:

AYES:

NOES:

ABSENT:

ABSTAINING:

the foregoing Resolution is hereby adopted.

Chairperson of the Board of Supervisors

ATTEST:

Clerk of the Board of Supervisors

[SEAL]

APPROVED AS TO FORM AND LEGAL EFFECT:

JAMES B. LINDHOLM, JR.
County Counsel

By: _____
Deputy County Counsel

Dated: _____

L:\DEVELOP\NOV03\BOS\clearance.reso.wpd.REM:CAH

Exhibit A
POLICY

**A POLICY ESTABLISHING CLEARANCE REQUIREMENTS FOR
COUNTY RIGHTS-OF-WAY**

Policy. It is the policy of the Board of Supervisors of the County of San Luis Obispo, State of California, as follows:

I. Definitions.

a. County Trails Plan defined. The most recent update of the County Trails Plan, originally adopted by the Board of Supervisors November 26, 1991.

b. Lateral Clearance Area defined. On a paved County Road with concrete sidewalks, a horizontal dimension measured from edge to edge of a concrete sidewalk. On a paved County Road without concrete sidewalks, a horizontal dimension measured outward from the edge of pavement. On an unpaved County Road, a horizontal dimension measured outward from the edge of the traveled way. It is not the intent of this policy to address naturally occurring obstacles found within the right-of-way.

c. Vertical Clearance Area defined. A vertical dimension measured from the ground surface at any point within the width of the Lateral Clearance.

d. Right-of-Way defined. Property which the County has the right to use for street, road or related purposes pursuant to a dedication, deed, easement, resolution, deed or other legal means, and includes both the traveled and untraveled portions of said property. It is not the intent of this policy to expand any existing rights-of-way or to create any new rights-of-way.

e. Roadway defined. The traveled portion of the right-of-way.

II. Maintenance of Clearance Areas. The clearance areas, as defined in this Policy, shall be maintained free of all encroachments, including but not limited to landscaping or other vegetation, or fences or other obstructions which would restrict the passage of pedestrians and equestrians along the County right-of-way, unless an encroachment permit is issued under the provisions of Chapter 13.08 of the San Luis Obispo County Code. Property owners are allowed to plant ground cover, or cover the area with mulch or other material which will retard soil erosion, provided that said ground cover, mulch or other material can be walked or ridden upon.

III. Clearance Requirements established. Clearance requirements shall be established on all County rights-of-way as follows:

a. Minimum clearance requirements for all rights-of-way. There shall be a lateral clearance a minimum of four (4) feet in width, except where a greater width is required for concrete sidewalks in the Standard Improvement Specifications and Drawings. There shall also be a vertical clearance eight (8) feet in height. These clearance requirements shall apply to both sides of all County roadways. Under this policy, property owners may not place or maintain any obstructions within the clearance areas.

b. Minimum clearance requirements for rights-of-way within the County Trails Plan. There shall be a lateral clearance a minimum of eight (8) feet, and a vertical clearance twelve (12) feet in height. These clearance requirements shall apply to both sides of all such County roadways which are designated trail routes in the County Trails Plan. Under this policy, property owners may not place or maintain any obstructions within the clearance areas.

c. Applicability. In no case shall the requirement for lateral clearance, as defined in subsections (a) and (b) above, extend beyond the limits of the right-of-way of the County Road that has been accepted by the Board of Supervisors on behalf of the public.

d. Feasibility. The Director of Public Works and Transportation shall have the authority to determine whether it is feasible to apply the clearance requirements as defined in this Policy, in cases of severe terrain or other natural obstructions.

L:\DEVELOP\NOV03\BOS\clearance.policy.wpd

Exhibit B
PROCEDURE

Procedure. Following is the adopted procedure for implementing the Policy Establishing Clearance Requirements for County Rights-of-Way (hereafter, “Clearance Requirements Policy”):

1. Neighbors/community members experiencing obstructions which are in violation of the Clearance Requirements Policy may contact the property owner (where the obstruction is occurring) and request that the owner move or remove the obstruction. The neighbors/community members may offer their assistance.
2. If the property owner is agreeable, no correspondence with the County is necessary. If the owner refuses to move or remove the obstruction, the neighbors/community members contact the Public Works Department – Road Operations Division. A brief letter indicating the nature and location of the problem should be provided by the neighbors/community members.
3. The Public Works Department will review the situation (perform a site visit and determine the right-of-way width in this area). A letter is written to the property owner from the County Public Works Department (citing the safety issue and the Clearance Requirements policy) with a request that the property owner move or remove the obstruction by a certain date. The assistance of the neighbors/ community members may be offered.
4. If the Public Works Department determines there is no concern, a letter is sent to the neighbors/community members indicating the property in question has been reviewed and found not to be in violation of the Clearance Requirements Policy.
5. If the property owner does not remove the obstruction by the date requested, a second letter is sent to the property owner (from the Public Works Department), indicating the obstruction will be removed at the applicant’s cost. The date this will occur is specified in the letter. The obstructions are then removed by County staff as designated in the County letter and the property owner is billed for this action. Prior to any obstructions being removed or the applicant billed, the applicant will have the ability to appeal Public Works’ decision to the Board of Supervisors. (Reference: Sections 1480 *et seq.* Streets & Highways Code)

L:\DEVELOP\NOV03\BOS\clearance.procedure.wpd

Page Intentionally Left Blank

H2: Resolution 2007-344: Establishing Requirements for Financing Maintenance of New Streets and Roads Constructed by Subdivisions

IN THE BOARD OF SUPERVISORS

County of San Luis Obispo, State of California

Tues day September 11, 2007

PRESENT: Supervisors Harry L. Ovitt, Bruce S. Gibson, K.H. 'Katcho' Achadjian,
James R. Patterson, and Chairperson Jerry Lenthall

ABSENT: None

RESOLUTION NO. 2007-344 *APPROVED 2007-316*

RESOLUTION ESTABLISHING REQUIREMENTS FOR FINANCING MAINTENANCE OF NEW STREETS AND ROADS CONSTRUCTED BY SUBDIVISIONS

The following Resolution is now offered and read:

WHEREAS, on May 15, 2007, the Board of Supervisors considered a report by the Department of Public Works on existing and proposed policies regarding the County-maintained road system; and

WHEREAS, the County receives a portion of the taxes levied on the sale of gasoline, which is apportioned mainly on the basis of the number of registered vehicles; and

WHEREAS, there is not sufficient funding from gasoline taxes to maintain the road system properly; and

WHEREAS, on June 7, 2005, the Board of Supervisors endorsed the "Guiding Principles of Smart Growth," which are attached hereto and incorporated by reference herein; and

WHEREAS, the application of Smart Growth Principles can be one tool to address the growing concerns about financing the ongoing maintenance of new streets and roads, since by creating subdivisions with higher density, a smaller length of new streets or roads is constructed which will need to be maintained; and

WHEREAS, even with the implementation of Smart Growth Principles, the County will need to secure additional sources of revenue to finance maintenance of streets and roads which are in the County-maintained system; and

WHEREAS, the Board of Supervisors finds that it is in the interest of the County to limit the length of new streets and roads which are accepted into the County-maintained Road System, and to establish new sources of revenue for financing the maintenance of those new streets and roads which are accepted.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED by the Board of Supervisors of the County of San Luis Obispo, State of California, as follows:

Acceptance of Streets and Roads

1. The County will accept into the County-maintained Road System, any widening extension or other improvement of existing County-maintained streets or roads.

2. The County will accept into the County-maintained Road System, any new street or road which is depicted as a "Proposed" Principal Arterial, Arterial, or Collector in the Circulation Element of the General Plan.
3. The County will accept into the County-maintained Road System, any new streets or roads in a new subdivision, which satisfy both of the following criteria:
 - a. The length of new streets or roads is below the maximum "Road/Lot Ratio." The "Road/Lot Ratio" is defined as the total centerline-feet of new streets or roads constructed by a subdivision, divided by the total number of new lots created by that subdivision. The maximum "Road/Lot Ratio" is established as 100.
 - b. The new street or road shall serve at least six (6) residences, or non-residential equivalent as determined by the Department of Public Works based on traffic-generating characteristics.
4. All streets and roads to be accepted into the County-maintained Road System shall be constructed to County Public Improvement Standards, within valid Offers of Dedication to the Public. Acceptance shall be recommended to the Board of Supervisors upon completion of construction and approval of the Department of Public Works.
5. New streets or roads which do not satisfy the criteria in #1, 2 or 3 above shall not be accepted into the County-maintained Road System. Persons constructing such streets or roads shall have the option of forming a Property Owners' Association or other acceptable organized and perpetual mechanism to ensure adequate private maintenance of these new streets or roads. Offers of Dedication, or access easements, shall be recorded which satisfy the requirements of Title 21 of the San Luis Obispo County Code, and which ensure that all parcels relying on the new street or road have necessary access rights. All non-County-maintained streets or roads shall be constructed to County Public Improvement Standards as required by Title 21, recognizing that the adjustment procedure is available for unusual circumstances.

THAT PERSONS WHOSE HOME CONSTRUCTION INCLUDES OPEN TO PUBLIC.

Establishment of Financing Mechanism

1. The developer of any new public street or road which is to be accepted into the County-maintained Road System shall be required to establish a service charge for road maintenance. Procedures for service charge establishment shall be developed by the Department of Public Works according to the requirements of Article XIII of the California Constitution, which were adopted by State voters in 1996 as "Proposition 218."
2. A land development project may be exempt from establishment of service charges, as follows:
 - a. Attached to this Resolution are lists of screening criteria for each of several land use categories. Satisfaction of each of the listed criteria earns the indicated number of points. The total number of points available in each land use category is indicated in Column B of Table 1, below. Projects receiving at least the number of points indicated in Column C are eligible for priority processing.
 - b. Those criteria which have the potential to reduce the need for street maintenance, by making it possible for residents of these new developments to meet more of their daily needs by walking or bicycling, rather than by automobile, are indicated by * on the lists. The total number of * points available in each land use category is indicated in Column D of Table 1, below. Projects receiving at least the number of points indicated in Column E shall be exempt from the establishment of service charges described above.

Table 1. Qualifications for Smart Growth Exemption From Maintenance Fee

(A) Land Use Category	(B) Total Points Available	(C) # Points to Qualify for Priority Processing	(D) Total * Points Available	(E) # * Points to Qualify for Maintenance Finance Exemption
Residential Single Family	28	12	14	9
Residential Multi Family	29	15	13	8
Commercial Retail or Office Professional	34	15	19	12

General Provisions

1. The requirements established by this Resolution shall apply to all streets or roads constructed as a requirement of subdivision or land use permit applications which are deemed complete on or after the date of approval of this Resolution.

Upon motion of Supervisor Achadjian, seconded by Supervisor Gibson, and on the following roll call vote, to wit:

AYES: Supervisors Achadjian, Gibson, Patterson, Chairperson Lenthall

NOES: Supervisor Dvitt

ABSENT: None

ABSTAINING: None

the foregoing Resolution is hereby adopted.

JERRY LENTHALL

Chairperson of the Board of Supervisors

ATTEST:

JULIE L. RODEWALD

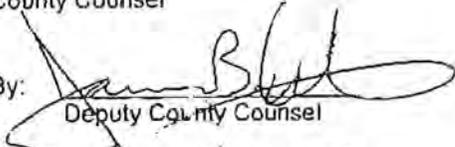
Clerk of the Board of Supervisors

By: C.M. CHRISTENSEN Deputy Clerk

[SEAL]

APPROVED AS TO FORM AND LEGAL EFFECT:

JAMES B. LINDHOLM, JR.
County Counsel

By: 
Deputy County Counsel

Dated: August 21, 2007

1:\DEVELOP\AUG07\BOS\Road Maintenance Financing 2 rd.doc,rem,ls,w

STATE OF CALIFORNIA, } ss.
County of San Luis Obispo, }

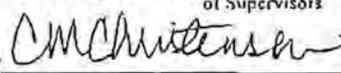
I, JULIE L. RODEWALD, County Clerk and ex-officio Clerk of the Board of Supervisors, in and for the County of San Luis Obispo, State of California, do hereby certify the foregoing to be a full, true and correct copy of an order made by the Board of Supervisors, as the same appears spread upon their minute book.

WITNESS my hand and the seal of said Board of Supervisors, affixed this 18th day of September, 20 07.

(SEAL)

JULIE L. RODEWALD

County Clerk and Ex-Officio Clerk of the Board of Supervisors

By: 

Deputy Clerk

CD-325



SMART GROWTH CRITERIA FOR DEVELOPMENT PROJECTS

SAN LUIS OBISPO COUNTY DEPARTMENT OF PLANNING AND BUILDING

976 OSOS STREET • ROOM 300 • SAN LUIS OBISPO • CALIFORNIA 93408 • (805) 781-5600

Promoting the Wise Use of Land • Helping to Build Great Communities

"Smart growth is the way to grow the economy, preserve the environment and have healthy communities without sacrificing the quality of life for future generations. Smart growth is the planning side of sustainable development." Christine Todd Whitman, Chief Administrator, Environmental Protection Agency, former Governor of New Jersey.

There is a growing call for new tools to help deal with the challenges will be confronting us as a region over the next several decades. We face a serious shortage of affordable workforce housing, our economic strength is threatened, our major roadways are becoming more congested, and our open space and natural resources are threatened by continued sprawl into rural areas. On June 7, 2005 the Board of Supervisors endorsed the "Guiding Principles of Smart Growth". The Board endorsed these principles "with the intent of engaging in implementing actions, programs and projects to succeed in achieving the principles." Since that time, widespread acceptance and implementation of these principles is occurring and the term "Smart Growth" is becoming accepted vernacular for decision-makers as they review projects.

The term "Smart Growth" was coined by the State of Maryland in 1990 to guide governance that respects and coordinates economics, the environment and social equity (the three "E's"), to create sustainable growth. The concept of sustainability has risen from Native American cultures as an important governing principle itself, which is to aim to meet the needs of current generations without compromising future generations' ability to meet their own needs, that is to think long term in decision-making. The United States Environmental Protection Agency endorses and promotes Smart Growth as a way of bringing together traditionally opposing interests to improve community quality of life while at the same time improving the environment and the economy.

Smart Growth principles address current development patterns that are often dominated by what many call "sprawl," or low density, automobile-oriented development. Typical land development policies and ordinances are often at odds with Smart Growth. It is becoming clear that these patterns are no longer in the long-term interest of our communities, cities, suburbs, and agricultural areas. In response, Smart Growth policies draw upon the successful models of the past and present, and plan for growth that will more successfully serve the present and future population.

One action that implements the concept of Smart Growth is a priority processing system for Smart Growth-rated projects. This system is being prepared as a pilot program by county Planning staff. It allows expedited processing of land use, land division and building permits for projects that include features attributed to Smart Growth principles. Attached are draft criteria that projects would be evaluated against to determine if projects possess Smart Growth principles and therefore qualify for priority processing. Projects that qualify for expedited processing will not receive any less scrutiny for compliance with land use or environmental regulations. Examples of Smart Growth principles include developments that contain a variety of smaller and standard lot sizes with large common open areas, internal connectivity, densities that achieve intended zoning standards, smaller home sizes and close proximity to transit routes, shopping and other services.

The projects that qualify for expedited processing are those that give priority for resources and services to compact, life-enriching, healthy neighborhoods and commercial development, compared to low-density development that sprawls all over the rural areas of our county.

Smart Growth Criteria for Priority Processing

In addition to acquiring the required number of points detailed on the following pages, each development must have the following characteristics in order to qualify for priority processing:

- Within a Urban Reserve Line or Village Reserve Line served by community water and sewer
- Provides for logical, attractive and safe pedestrian circulation within the site - At minimum, all units have direct access to common open area (where applicable) and commercial areas (where applicable) via pedestrian route where automobile access has minimum impact on the pedestrian experience (ie, not via a driveway)
- Provides for logical, attractive and safe pedestrian and bicycle connections from the site to adjacent facilities - At minimum, all units connect to nearby parks, open space, public streets, transit stop, and/or commercial area (where applicable) via pedestrian route, automobile access has minimum impact on the pedestrian experience (ie, not via a driveway), and there are pedestrian links between the end of cul-de-sacs and an adjacent cul-de-sac or between a cul-de-sac and larger pathway system.
- Development protects, preserves, and/or restores important on-site natural features where applicable (i.e. wetlands, riparian corridors, watersheds, steep slopes, oak trees). Development buffers on and off-site natural features. * Must be shown on plans

In order to qualify for priority processing, all projects within the Residential Single Family, Residential Multi-Family, Commercial Retail, or Office/Professional land use categories must incorporate the following essential components of Smart Growth development. Please explain how your project meets each of the following:

- Buildings are arranged to provide usable and easily accessible private outdoor living spaces. Please explain:
- Buildings are arranged to provide usable and centrally located common areas. Please explain:
- Building arrangement also maximizes the use of natural lighting, solar access and to the extent feasible implements sustainable site drainage concepts. Please explain:
- Buildings exhibit high quality architectural design consistent with local community design plans if applicable and take into account the neighborhood context in terms of building scale, style and site planning. Please explain:
- Building design reflects local historic building type in the community. Please explain:
- Treatment of façade breaks down massing, articulates depth, and defines the street edge for pedestrians. Please explain:

Scale and mass of buildings relate to neighborhood. Please explain:

RSF

All projects within the Residential Single Family land use category must incorporate project characteristics in order to achieve at least 12 points.		
Possible Points	Criteria	Points Earned
2	Project is within ¼ mile walking distance of any of the following: food/convenience store, retail/services, schools, daycare, recreation centers	
1	Project is located within ¼ mile walking distance of an existing transit stop or proposes a transit stop	
3	All lots of 6,000 square feet or larger provide for secondary dwellings	
3	Average lot size is 4,000 square feet or less	
3	Common area is provided at a minimum of 200 square feet per unit consisting of tables, benches, and shade provided by structures or landscaping	
2	At least 75% of garages are located at least five feet behind the front of the house	
3	15% of units are very low or low income affordable; or 20% of units are moderate income affordable; or 30% of units are middle income affordable	
1	Setbacks are varied on the street. Each group of three adjacent houses contain at least one house whose front yard setback differs from those of its neighbors by a minimum of 5 feet.	
1	All buildings with street frontage shall face the street with visible entrances.	
1	Creates a continuation of the existing neighborhood. Development provides a series of through street connections within the site that connect to other through streets in the surrounding area.	
2	Streets continue the existing grid pattern of the neighborhood.	
1	All new streets are the minimum allowable width	
1	Solar access considered in the site design (quantify – Templeton, countywide design)	
1	Site design maximizes solar access to all buildings.	
1	Exceeds California Energy Code by at least 20%	
1	All landscaping is irrigated through drip irrigation (except turf).	
1	All pedestrian walkways are landscaped and illuminated with pedestrian scaled elements.	
TOTAL		

*
*
*
*
*
*
*
*
*
*
*
*
*

EMF

All projects within the Residential Multi-Family land use category must incorporate project characteristics in order to achieve at least 15 points.		
Possible Points	Criteria	Points Earned
3	Must provide one of the following: Density greater than or equal to 20 units/useable acre; or Density greater than or equal to 90 percent of the maximum density allowed by ordinance; or Density greater than or equal to 15 units/ gross acre	
3		
2		
2	Project is within ¼ mile walking distance of any of the following: food/convenience store, retail/services, schools, daycare, recreation centers	
1	Project is located within ¼ mile walking distance of an existing transit stop or proposes a transit stop	
2	Provides common facilities such as day care facilities, senior or teen centers, cultural facilities	
2	Common area is provided at a minimum of 200 square feet per unit consisting of tables, benches, and shade provided by structures or landscaping	
2	Private open space is provided for each unit at a minimum of 6 feet by 8 feet in size	
3	15 percent of the units are no larger than 900 square feet	
2	10 percent of the units are one bedroom or studio units	
3	15% of units are very low or low income affordable; or 20% of units are moderate income affordable; or 30% of units are middle income affordable	
1	Parking is placed in below grade structures, individual garage structures, or behind buildings.	
1	All buildings with street frontage shall face the street with visible entrances.	
1	Creates a continuation of the existing neighborhood. Development provides a series of through street connections within the site that connect to other through streets in the surrounding area.	
1	All new streets are the minimum allowable width	
1	Solar access considered in the site design (quantify – Templeton, countywide design)	
1	Site design maximizes solar access to all buildings.	
1	Exceeds California Energy Code by at least 20%	
1	All landscaping is irrigated through drip irrigation (except turf).	
1	All pedestrian walkways are landscaped and illuminated with pedestrian scaled elements.	
TOTAL		

*
*
*
*
*
*
*
*
*
*
*
*
*
*

H3: Resolution 2008-152: Revising Policies Regarding Land Development Improvements on County Maintained Streets and Roads

IN THE BOARD OF SUPERVISORS

County of San Luis Obispo, State of California

Tuesday May 6, 2008

PRESENT: Supervisors Harry L. Ovitt, Bruce S. Gibson, Jerry Lenthall,
K.H. 'Katcho' Achadjian, and Chairperson James R. Patterson

ABSENT: None

RESOLUTION NO. 2008-152

RESOLUTION REVISING POLICIES REGARDING LAND DEVELOPMENT IMPROVEMENTS ON COUNTY MAINTAINED STREETS AND ROADS

The following Resolution is now offered and read:

WHEREAS, on July 2, 1991, the Board of Supervisors adopted Resolution No. 91-367, establishing requirements for subdivision street and road improvements on County-Maintained Roads; and

WHEREAS, since that time there has been increased interest in a type of development known as Agricultural Cluster subdivisions; and

WHEREAS, there have been other types of intensification of land use in rural areas which need to have appropriate levels of road improvements required as conditions of approval in order to provide safe conditions for the public using the County-maintained road system; and

WHEREAS, the rate of vehicle collisions in the rural areas of San Luis Obispo County have had an increasing trend for several years, indicating a need to revise development policies.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED by the Board of Supervisors of the County of San Luis Obispo, State of California, as follows:

A. Road Improvement Requirements

1. Improvements required with subdivisions. County-maintained streets or roads fronting subdivisions shall be improved to current County Public Improvement Standards, including bikeways where designated in the latest adopted edition of the County Bikeways Plan, when the subdivision is within:
 - a. Industrial, Commercial Retail, Commercial Service, Office/Professional, Residential Suburban, Residential Single Family or Residential Multi Family land use categories or,
 - b. Residential Rural land use category, where that roadway has a projected Average Daily Traffic (ADT) greater than 100.

In cases (a) and (b), the County-maintained street or road shall be improved fronting the property, and continuing to the nearest paved publicly-maintained road which meets or exceeds the standard improvements required. The level of improvement (e.g., A-1 rural, A-1j gravel, A-2 urban or A-3 commercial/industrial) shall be required as defined in the Public Improvement Standards and as further defined by this Resolution.

c. Agriculture or Rural Lands land use categories, where the subdivision is a cluster.

In case (c), the County-maintained road shall be improved to widen to complete the project side of an A-1 (rural) standard according to the criteria in Table 1:

Table 1. Criteria for road improvements for Ag/RL cluster subdivisions

Number of residential lots per entrance*	Improve this length of road**
1-7	300 feet each side of entrance
8-20	1/4 mile, centered on entrance
21-40	1/2 mile, centered on entrance
41+	1 mile, centered on entrance

* For projects which propose a "loop" configuration, half of the lots along the loop shall be assumed to be served by each entrance.

** Where the subdivision adjoins two or more County-maintained roads, the length shall be measured along the road with the highest traffic volume, measured from the intersection with the road with the second-highest traffic volume, as determined by the Department of Public Works.

2. **Improvements required for developments which attract public traffic.** Land development projects in rural areas which are not subdivisions, and which will attract general public traffic (e.g., wine tasting, ag tourism, events, etc.) on County-maintained roads, shall be approved with a condition to widen to complete the project side of an A-1 (rural) standard according to the criteria in Table 2 below, prior to occupancy of any new structure, or initiation of the use, if no structure is proposed. In addition, all land development projects shall be subject to the requirements of the County Public Improvement Standards for requirements of any driveway connections to the County-maintained road system. This may involve paving, grading or vegetation clearance as necessary to provide proper sight distance and handling of drainage.

Table 2. Criteria for road improvements for non-subdivision developments

Development regular ops. General public peak hour trips	Development event General public peak hour trips	Improve this length of road*
1-10	1-100	RSA** only
11-20	101-200	1/4 mile from entrance toward nearest intersection + RSA**
21-40	201-400	1/2 mile from entrance toward nearest intersection + RSA**
41+	400+	1 mile from entrance toward nearest intersection + RSA**

* Where the development adjoins two or more County-maintained roads, the length shall be measured along the road with the highest traffic volume, measured from the intersection with the road with the second-highest traffic volume, as determined by the Department of Public Works.

** RSA: Roadway Safety Analysis, defined in Section B (below).

3. **Public traffic on privately-maintained roads.** No proposed land development project in rural areas which will attract general public traffic (e.g., wine tasting, ag tourism, events, etc.), shall be permitted on roads which are privately maintained, without submission of a road maintenance agreement, signed by the owners of all property on which the access roads are located and binding upon their heirs and assigns. The agreement shall be required to establish an organized and perpetual mechanism to ensure adequate maintenance of the roads, acceptable to the Department of Public Works. Required improvements for the privately-maintained roads shall be based upon recommendations from the applicable fire protection agency.
4. **Cross-section required.** When subdivisions or other land development projects are required to construct improvements on streets or roads which are, or will become, County-maintained, they shall contain the following cross-sectional elements:
 - a. Streets or roads which are entirely within a subdivision or development shall be improved to the full width of the appropriate standard section.
 - b. When the subdivision or development fronts a part-width street or road previously constructed through the activities of others, whether publicly-maintained or private, the subdivision or development shall be required to widen to complete the project side of the appropriate standard section from the Public Improvement Standards, fronting the property or for length determined by Tables 1 and 2 above.
 - c. When the subdivision or development fronts a street or road which is to be newly constructed, the initial part-width improvement shall be to construct the full improvement on the project side plus a full travel lane on the opposite side, according to the appropriate standard section from the Public Improvement Standards, fronting the property or for length determined by Tables 1 and 2 above. Any offsite extension to connect with existing streets or roads shall be constructed to the same standards.
5. **Additional safety improvements.** When a development project is required to perform a Roadway Safety Analysis, as defined in Section B below, the analysis shall consider all the improvements required by Section A to be in place, and then shall determine whether additional improvements are warranted to mitigate potential safety impacts of the traffic generated by the proposed development.

B. Roadway Safety Analysis

1. **When required.** To limit the exposure of increasing the number of collisions on the road, all developments in rural areas which will attract general public traffic (e.g., wine, tasting, ag tourism, events, etc.) shall be required to perform a Roadway Safety Analysis (RSA).
2. **Improvements to reduce expected collision rate.** The Department of Public Works shall provide the existing collision rate for the road. In cases where the collision rate is greater than one standard deviation above the average collision rate for rural roads, the RSA shall proceed with an analysis of potential road improvements which would reduce the expected collision rate to acceptable limits. The improvements may include, but are not limited to, the following:
 - Superelevation revisions on existing curves
 - Widening of shoulders at curves to create a roadside recovery area
 - Removal of roadside obstacles
 - Improvement of shoulder width (minimum two feet) for recovery area
 - Reduction of vertical curves to improve sight distance
 - Enhance existing access points to improve safety
 - Turn movement channelization
3. **Limits of analysis.** The RSA shall evaluate the following length of road shown in Table 3:

Table 3. Roadway Safety Analysis requirements

Development regular ops. General public peak hour trips	Development event General public peak hour trips	Study/Improve this length of road
1-10	1-100	½ mile from entrance toward nearest intersection
11-20	101-200	1 mile from entrance toward nearest intersection
21-40	201-400	2 miles from entrance toward nearest intersection
41+	400+	3 miles from entrance toward nearest intersection

4. **Preparation requirements.** The analysis shall be performed by a Registered Civil Engineer or Registered Traffic Engineer, utilizing accident reduction factors as provided in Caltrans Local Programs Guidelines Manual, Chapter 9, "Hazard Elimination Systems," and models from Transportation Research Board Special Report 214 "Designing Safer Roads," which will quantify collision reduction based on curve and shoulder improvements.
5. **Coordination with project environmental determination.** The RSA shall be performed as part of the environmental determination for the proposed development project. Its recommendations shall then be incorporated into the Developer's Statement and conditions of approval for the project.

C. General Provisions

1. The determination of the necessary requirements to provide for the safety of the public using County roads will be based upon the maximum amount of general public traffic which will be generated by the proposed land use project. The Department of Public Works shall use the factors in Table 4 to estimate general public trip generation and determine what level of requirements in Tables 2 and 3 above shall apply.

For land development projects which include both regular operations and events, the amount of general public traffic generated by each shall be calculated by the Department of Public Works. The amount of traffic for regular operations and for events shall be considered separately. The amount of general public traffic (regular operations or events) which results in the greater improvement requirement in Tables 2 and 3 above shall determine the conditions for the project.

Table 4. General public trip generation factors

Type of land use	Trip generation factor
Single-family residential	Assume no <u>general public</u> trip generation
Farm support quarters	Assume no <u>general public</u> trip generation
Agricultural processing	Assume no <u>general public</u> trip generation
Retail, other visitor-serving areas	2.71 peak hour trips (pht) per 1,000 square feet
Events	0.4 pht per max. permitted attendance

Other land uses not shown in this table shall be estimated by Public Works staff based on information provided by the applicant and the Institute of Transportation Engineers Trip Generation Manual, most recent edition.

2. The requirements established by this Resolution shall apply to all street or road improvements constructed as a requirement of subdivision or land use permit applications which are deemed complete on or after the date of approval of this Resolution.
4. Nothing in this resolution shall be construed to preempt requirements of the California Environmental Quality Act or other applicable rules as adopted by appropriate authorities. Those other rules may require even greater mitigation measures which involve constructing greater levels of improvement.
3. This resolution supersedes and replaces Resolution 91-367.

Upon motion of Supervisor Achadjian, seconded by Supervisor Gibson, and on the following roll call vote, to wit:

AYES: Supervisors Achadjian, Gibson, Ovitt, Lenthall, and Chairperson Patterson

NOES: None

ABSENT: None

ABSTAINING: None

the foregoing Resolution is hereby adopted.

JAMES R. PATTERSON
Chairperson of the Board of Supervisors

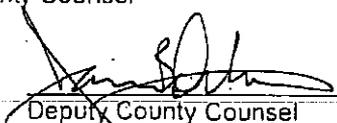
ATTEST:

JULIE L. RODEWALD
Clerk of the Board of Supervisors

[SEAL] By: SANDY CURRENS
Deputy Clerk

APPROVED AS TO FORM AND LEGAL EFFECT:

R. WYATT CASH
County Counsel

By: 
Deputy County Counsel

Dated: April 18, 2008

L:\Trans\May08\BOS\Road Improvements rsl.doc.rem.law

STATE OF CALIFORNIA) COUNTY OF SAN LUIS OBISPO) ss
I, JULIE L. RODEWALD, County Clerk of the above established County, and Ex-Officio Clerk of the Board of Supervisors thereof, do hereby certify the foregoing to be a full, true and correct copy of an order entered in the minutes of said Board of Super-visors, and now remain- ing of record in my office.
Witness, my hand and seal of said Board of Super- visors this <u>May 15, 2008</u>
JULIE L. RODEWALD County Clerk and Ex-Officio Clerk of the Board of Supervisors
By <u>Sandy Currens</u> Deputy Clerk

APPENDIX I

Selected CalFire Standard on Developing Private Roads

Page Intentionally Left Blank



Robert Lewin, Fire Chief

• STANDARD 1 • WATER SUPPLY

SCOPE:

To identify minimum water supply requirements for fire fighting purposes relative to commercial, industrial or residential development. This Standard provides requirements for water from fire hydrants for the purpose of fire suppression activities.

GENERAL REQUIREMENTS:

All fire hydrants and required access roads shall be installed **PRIOR** to structural construction.

AMOUNT OF WATER STORAGE REQUIRED:

This information is derived from the current adopted California Fire Code, Local Ordinances and NFPA. If your project requires Fire Sprinklers please contact a Fire Protection Engineer (FPE) or C-16 contractor.

Flammable vegetation Defensible Space requirements

Landscaping and vegetation shall be in accordance with San Luis Obispo County Planning and building "screening requirements". CAL FIRE requires that landscaping selections do not readily transmit fire.

Fire resistant landscaping located within 100 feet of site improvements (structures or fire water tanks) shall be in accordance with CFC, Public resources code 4291 and Title 19 Div 1 described as "vegetation that are well-pruned and maintained so as to effectively manage fuels and not form a means of rapidly transmitting fire from other nearby vegetation to a structure or from a structure to other nearby vegetation. The intensity of fuels management may vary within the 100-foot perimeter of the structure, the most intense being within the first 30 feet around the structure. Consistent with fuels management objectives, steps should be taken to minimize erosion. For the purposes of this paragraph, "fuel" means any combustible material, including petroleum-based products and wildland fuels.

www.calfireslo.org website has several links with recommended planning tools for landscape and fuels management plans.

RESIDENTIAL

- One- and Two-Family Dwellings:

Private Water System

- ✓ A C-16 contractor will design sprinkler system, and determine required dedicated fire water storage amount for structure of design.
- ✓ CAL FIRE will determine minimum dedicated fire water storage amount for structure(s) and site (Minimum 2500 gallons per NFPA 1142). See CAL FIRE Exhibit 2 & 3 for schematics
- ✓ Most projects will require a minimum 5,000 water storage tank. The 2500 gallon minimum dedicated fire water reserve combined with average domestic water usage dictates a standard tank size of 5,000 gallons.

- ✓ CAL FIRE does not require the installation of a dedicated fire water tank, only the required dedicated water storage amount.

Exception(s):

- ✓ *Large shops, multi-level residential and/or large atrium or vaulted ceiling designs may require the review of a fire protection engineer.*
- ✓ *Large and/or multiple structures with less than 50 feet separation may require additional dedicated fire water storage.*

Community Water System

- ✓ One and two family dwellings on a community water system shall meet the California Fire Code Appendix B fire-flow requirements, and Appendix C hydrant locations and distribution. A signed will serve letter from the water purveyor must be submitted with your fire safety plan, and received prior to final of the project.

1. Building construction type and square footage will determine fire flow requirements. The minimum allowable fire flow will be 1000 GPM for 2 hours if structure is less than 3600 square feet. For determining fire flow requirements on any structure over 3600 square feet refer to Appendix B table B105.1

Exceptions:

2. *Los Osos CSD: a reduction to 750 gpm is permitted in areas served by the water purveyors.*

Remodel/Alterations:

For the purpose of calculating square footage for the application of fire sprinkler requirements and fire flow requirements, the floor area shall include all combustible areas attached to the structure, including garages, patio covers, overhangs, covered walkways and alterations, additions and remodel square footage will be considered a combined and cumulative sum of floor area.

COMMERCIAL

A Fire Protection Engineer is required to design and review fire protection systems in new commercial development. For complex facilities a master fire protection plans is also required. The FPE will determine water storage capacity.

- ✓ The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in CFC Appendix B Table BB105.1. Buildings over 100,000 square feet will require secondary power supply for the fire protection system pumps.

Exceptions:

1. *A reduction in fire-flow of up to 75 percent, as approved by the chief, is allowed when the building is provided with an approved automatic sprinkler system. The resulting fire-flow shall not be less than 1500 gallons per minute.*
2. *In rural areas where there are no water purveyors and the building is protected by an approved automatic sprinkler system, the provisions in NFPA 13 for combined inside and outside hose lines may be utilized to determine fire-flow and duration. The water storage total quantity will be a combination of the sprinkler demand and the fire flow requirements. The location, connections and other appurtenances of tanks shall be approved by the fire department.*

Please note:

- When using this option, the resulting fire flow (hose demand) shall double for every 10,000 square feet of building area or portion thereof. The fire sprinkler demand only needs to be provided once per building. Use of this option is limited

to up to 2 buildings on the same property and ownership.

- Buildings classified as Group U, agricultural buildings used as barns, storage structures, stables, poultry buildings and other similar uses with a total fire area of 3,000 square feet or less are not required to provide fire-flow.
- Buildings classified as Group U, agricultural buildings used as greenhouses, horticultural structures, nurseries and similar uses may use NFPA 1142 provisions for water storage regardless of number of buildings of this type.
- Buildings with a total floor area of 500 square feet or less are not required to provide fire-flow.
- Domestic water demands shall be in addition to required fire water storage.

SUBDIVISIONS

- ✓ Subdivisions will require community water systems that comply with Appendix C of the California Fire Code. For additional information relative to this requirement contact the San Luis Obispo County Planning and Building Department.

SCHOOLS

- Public Schools:

- ✓ The State Fire Marshal (SFM) requires the Division of State Architect (DSA) to request water and access requirements and approval from the local jurisdiction. The minimum fire-flow and duration for public school buildings shall be as specified in Table BB105.1 of the CFC.

Note: A reduction in fire-flow of up to 75 percent, as approved by the chief, is allowed when the building is provided with an approved automatic sprinkler system. CAL FIRE will consult with the approving Fire Protection Engineer prior to permitting reduced fire-flow.

- Private Schools:

- ✓ Private schools shall comply with all the requirements for an educational building. Local requirements are applicable to private schools.

MULTIPLE TANKS

Daisy chaining of tanks is prohibited.

Exception: When topographical or soil conditions prohibit large tanks (technical report required) and/or Planning and Building Department land use conditions require reduced visual impact reduction (Coastal Zone screening) and where approved by the fire chief multiple tanks may be installed. Multiple tanks systems must: all valves must be chained and locked open, each tank must be installed with monitored tamper resistance, all tanks must feed into one common manifold serving the fire protection systems and on site hydrants or other appurtenances.

TENANT IMPROVEMENTS

Tenant Improvement requiring a Fire Safety Plan and alternations to an existing Sprinkler system must also provide a letter and/or a review from a Fire Protection Engineer verifying the fire and life safety function of the installed system. Examples of thresholds for alterations requiring FPE review include walls moved, removed or new walls installed. Occupancy change, hazard class change and or additional heads added to system.

DEFINITIONS:

CBC: California Building Code 2010, California Code of Regulations Title 24, Part 2

FLOOR AREA, GROSS: For the purpose of calculating square footage for the application of fire sprinkler requirements and for fire flow requirements, the floor area shall include all combustible areas attached to the structure, including garages, patio covers, overhangs, covered walkways, etc.

FIRE FLOW: The flow rate of a water supply, measured at 20 pounds per square inch (PSI) (137.9kPa) residual pressure that is available for firefighting. When water supply tanks are approved for use, the flow rate of a water supply may be at draft.

LOCAL ORDINANCE: Amendments to the CFC adopted by the County of San Luis Obispo, Avila Beach CSD, City of Pismo Beach and Los Osos CSD.

NFPA 13: National Fire Protection Association 2011, Standard for the Installation of Sprinkler Systems.

OCCUPANCY TYPE: The purpose for which a building or part thereof is used or intended to be used, as determined by Chapter 3, CBC.

SINGLE FAMILY DWELLING (SFD): One and two family dwellings, including attached or detached private garages.

TYPE OF CONSTRUCTION: Determined from Chapter 6 of the CBC.

CFC: California Fire Code 2013, California Code of Regulations, Title 24, Part 2

CRC: California Residential Code 2013, California Code of Regulations, Title 24, Part 2.5

WATER PURVEYOR: A public utility, a mutual water company, a governmental body, or other entity, owning and operating a water system and holding a valid permit from the State or County Health Department to purvey water.



Robert Lewin, Fire Chief

• **STANDARD 2** • **ADDRESSING**

SCOPE:

To provide consistent identification of all buildings throughout the County so they can be located during an emergency. Reference: 2013 California Fire Code, Section 505 & SLO County Title 20.

General:

New and existing buildings shall have approved address numbers, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property and may be required in additional locations to facilitate emergency response.

Address numbers shall be Arabic numerals or alphabet letters, contrast with their background, and be a minimum width of 0.5 inch and (12.7mm) and Height per occupancy type as follows:

- Residential 6 inches,
- Commercial 8 inches
- Industrial 10 inches high with a minimum stroke

- Address numbers & street names are assigned by the County of San Luis Obispo Planning Department. You may contact them at (805) 781-5157 for an application for new address or more information.
- Addresses shall be assigned to the road from which the primary driveway originates.
- Address numbers at the driveway entrance shall be clearly visible from both directions, preferably using reflectorized numbers.
- Where multiple addresses are required at a single driveway, such addresses shall be mounted on a single approved post.
- When a building is not visible from the roadway or when required by the fire chief, additional numbers or addresses shall be provided on an elevated post or monument adjacent to roads or driveway leading to buildings.
- Approved street or road signs and address numbers shall be installed prior to occupancy of any new building, and prior to construction when required by the fire chief.
- For complexes with multiple buildings, the fire chief may require directories, premises maps and directional signs at approved locations. The site plan submitted to the fire department for approval shall also include the location and details of directories, maps, signs, building and unit numbers and any other information deemed necessary by the Fire Department. (See Directory Requirements on page 2 for more information).

Requirements:

- One and Two Family Dwellings and Mobile Homes: Address numbers shall be a minimum of six (6) inches in height, one-half inch (1/2") stroke. Where buildings are set back from the street, larger numbers shall be required. Each dwelling unit requires a separate address that is assigned by the SLO County Planning Department. Identifying units with A, B, C, 1, 2, 3, etc... is not allowed. Please contact the Planning Department at (805) 781-5157 to obtain the correct address numbers for your home.
- Commercial Buildings: Address numbers shall be a minimum of eight (8) inches in height, and on-half inch (1/2") stroke. Where buildings are set back from the street, larger numbers shall be required.
- Industrial Buildings: Address numbers shall be a minimum of ten (10) inches in height, and on-half inch (1/2") stroke. Where buildings are set back from the street, larger numbers shall be required.
- All numbers shall be of a contrasting color to the background. Reflectorized or lighted numbers are highly recommended, especially at the driveway entrance.
- Address numbers shall be of a contrasting color to the background. Reflectorized or lighted numbers are highly recommended.
- Address numbers shall be visible at all times. Trim trees, bushes and shrubs if foliage obstructs visibility.
- Suite numbers shall be located above or adjacent to the entrance door. Multi-unit buildings with rear doors shall also provide suite numbers above or adjacent to each rear door. Numbers shall be a minimum of six (6) inches in height, of contrasting color to the background, and readily visible.
- Apartments, Towns Houses and Condominiums: Building address numbers shall be a minimum of eight (8) inches in height, of contrasting color to the background, and readily visible. Each individual unit number shall be above or adjacent to the entrance door. Numbers shall be a minimum of six (6) inches in height, of contrasting color to the background and readily visible.

Directory Requirements:

When required by the fire code official, complexes with multiple buildings may be required to provide directories, premises maps and directional signs. The scale, design and location of directory signs shall be approved by the fire code official and may be required to be illuminated.

- Must be provided at every entrance into the complex.
- Must be set back two (2) feet from the curb, facing the driveway.
- A directory shall be a minimum of 3 feet X 2 feet.
- Individual unit numbers shall be a minimum of 1/2" in height.
- Building numbers shall be a minimum of 1/2 inch in height.
- Lettering shall be a minimum of 1/2" in height.
- Must be illuminated, either internally or externally.
- Subject to Fire Department approval prior to directory printing and installation.

Street Signs:

- Street signs shall meet the SLO County Public Improvement standards road sign specification M-4, available from the County Engineering Department at (805) 781-5252 or online: <http://www.slocounty.ca.gov/Assets/PW/DevServ/general/2008+Standards.pdf>
- If the road is maintained by the County, the sign will also be maintained by the County.
- If the road is maintained by another agency (road maintenance agreement, Homeowner' Association, district, etc), the signs shall be maintained by that entity.
- If the road is not maintained by either the County or another agency, the road signs shall be maintained by the party or parties who requested the road name or the construction permit.
- All signs not maintained by the County shall have reflective green lettering on a reflective white background and can be purchased from any sign vendor.



CAL FIRE
San Luis Obispo
County Fire Department

635 N. Santa Rosa • San Luis Obispo, CA 93405
Phone: 805-543-4244 • Fax: 805-543-4248
www.calfireslo.org



Robert Lewin, Fire Chief

• STANDARD 3 • ROOF ACCESS

DEFINITIONS:

- **High-Piled Combustible Storage:** is storage of combustible materials in closely packed piles or combustible material on pallets, in racks or on shelves where the top storage is greater than 12 feet in height.
- **Standpipe System:** is a wet or dry system of piping, valves, outlets and related equipment designed to provide water at specified pressures and installed exclusively for the fighting of fires. They are classified into three classes.

REQUIREMENTS:

- **Stairway access to roof.** New buildings *two* or more stories above grade plane, except those with a roof slope greater than four units vertical in 12 units horizontal (33.3-percent slope), shall be provided with a stairway to the roof *or other access to the roof for emergency personnel approved by the fire code official*. Stairway access to the roof shall be in accordance with Section 1009. Such stairway *or other approved access* shall be marked at street and floor levels with a sign indicating that the stairway *or access continues* to the roof. Where roofs are used for roof gardens or for other purposes, stairways shall be provided as required for such occupancy classification.
- **Building height and area.** Class III standpipe systems shall be installed throughout buildings where the floor level of the highest story is located more than 30 feet (9144 mm) above the lowest level of the fire department vehicle access, or where the floor level of the lowest story is located more than 30 feet (9144) below the highest level of fire department vehicle access *and in any parking structure*.

A building that is greater than 20,000 square feet (1.858 m²) or floor area and greater than 18 feet (5.49 m) in height shall have a dry or wet standpipe system with a 2 ½ inch (64 mm) outlet at the roof near the roof access. Location of the outlet and the fire department connectin to the standpipe shall be labeled and approved by the fire code official.



CAL FIRE
San Luis Obispo
County Fire Department

635 N. Santa Rosa • San Luis Obispo, CA 93405
Phone: 805-543-4244 • Fax: 805-543-4248
www.calfireslo.org



Robert Lewin, Fire Chief

• STANDARD 4 • ACCESS ROADS AND DRIVEWAYS

SCOPE:

Fire Apparatus Access Roads shall be provided and maintained according to California Fire Code section 503. Access to residential and commercial parcels shall provide for safe access for emergency equipment and civilian evacuation concurrently during fire and rescue operations. Additionally, roads shall provide occupants and emergency vehicles unobstructed traffic circulation. (CFC 503, LUO, PRC 4290/4291)

DEFINITIONS:

- **PRIVATE ACCESS ROAD(S):** Must be constructed to CAL FIRE/San Luis Obispo County Fire and San Luis Obispo County Department of Public Works Standards when serving more than one parcel; when providing access to any industrial or commercial occupancy, or vehicular access to a single parcel with more than two buildings or four or more dwelling units. (PRC 4290/4291)
- **CFC:** California Fire Code current edition
- **PRC:** Public Resources Code
- **LUO:** Land Use Ordinance of San Luis Obispo County

COMMERCIAL AND RESIDENTIAL ACCESS ROAD STANDARDS

All road design criteria will meet the San Luis Obispo County Department of Public Works Public Improvement Standards. Standard construction drawing exhibits can be located on line at:

<http://www.slocounty.ca.gov/Assets/PW/DevServ/ImprovementPlans/2011+SLOCo+PW+Stds+Final.pdf>

COMMERCIAL AND RESIDENTIAL ROAD GRADES

The grade for all roads, streets, private lands and driveways shall not exceed 16 percent unless approved by fire code official. Design criteria shall be in accordance with San Luis Obispo County Public Works public improvement standards. Roads 12%-16% shall be a nonskid asphalt or concrete surface as specified in San Luis Obispo County public improvement Standards, specifications and drawings.

All roads shall:

- *be able to support Fire Apparatus.*
- *Provide a vertical clearance of 13'6"*
- *Provide a 10 foot fuel modification zone on both sides.*

COMMERCIAL:

- The access road must be a minimum of 24 feet in width for two way traffic and shall be constructed to SLO County Public Works Standards. Two (2) 10- foot driving lanes and Two (2) – Two (2) foot shoulders.
- Parking is only allowed where an additional 8 feet of width is added to each side of the road to accommodate parking. “No Parking - Fire Lane” signs may be required.
- Fire lanes shall be provided as set forth in Chapter 5 of the 2013 California Fire Code.
- Fire access shall be provided to within 150 feet of the outside building perimeter.

SECONDARY ACCESS ROAD

More than one Fire Apparatus access road shall be required when potential for the impairment of a single road by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

RESIDENTIAL ACCESS ROADS – (serving more than one legal parcel)

- The road must be named and properly signed according to San Luis Obispo County Planning and Building.
- The access road must be a minimum of 24 feet in width for two way traffic and shall be constructed to SLO County Public Works Standards. (2) 10- foot driving lanes and (2) - 2 foot shoulders.
- Parking is only allowed where an additional 8 feet of width is added to each side of the road that will require parking.
- “No Parking - Fire Lane” signs may be required.

SECONDARY DWELLING:

Access road and driveway requirements for an additional dwelling allowed by section 22.10.130 of the LUO must be reviewed by the San Luis Obispo County Planning and Building Department.

DRIVEWAY STANDARDS:

Driveway specifications shall be provided and maintained when serving no more than one legal parcel or lot with no more than 3 dwelling units, and any number of accessory buildings.

- Driveway minimum width in Moderate Fire Hazard Severity zones 10 feet.
- Driveway minimum width in High and Very High fire Hazard Severity zones:
 - 0-49 feet, 10 feet is required.
 - 50-199 feet, 12 feet is required.
 - Greater than 200 feet, 16 feet is required.
- Turnarounds must be provided if driveway exceeds 300 feet, and shall be within 50 feet of the building. For driveways exceeding 300 feet, a turn-around shall be at the building site and must be within 50 feet of the dwelling.
- For driveways exceeding 800 feet, turnouts shall be provided no more than 400 feet apart. Driveways exceeding 150 feet in length, but less than 800 feet in length, shall provide a turnout near the midpoint of the driveway.
- A turnout shall be provided near the midpoint and shall be a minimum of 10 feet wide and 30 feet long with a minimum 25 foot taper on each end.

DEAD-END ROAD:

A dead-end road has only one point of vehicular ingress/egress, including cul-de-sacs and looped roads.

- The maximum length of a dead end road, including all dead-end roads accessed from that dead-end road, shall not exceed the following cumulative lengths, regardless of the number of parcels served:
 - Parcels less than 1 acre 800 feet
 - Parcels 1 acre to 4.99 acres 1320 feet
 - Parcels 5 acres to 19.99 acres 2640 feet
 - Parcels 20 acres or larger 5280 feet

- A turnaround must be provided if the dead end road exceeds 150 feet.

ONE-WAY ROADS:

- When allowed, one-way roads serving residential use only shall be constructed to provide a minimum of one 10-foot traffic lane.
- All one-way roads shall connect to a two-lane roadway at both ends, and shall provide access to an area currently zoned for no more than 10 dwelling units. In no case shall it exceed 2,640 feet in length.
- A turnout shall be placed and constructed at approximately the midpoint of each one-way road.

BRIDGES:

Commercial, subdivision and bridges on access roads must meet the standards outlined by Caltrans for bridge designs on public roads. Additional design criteria and information may be obtained from San Luis Obispo County Public Works. San Luis Obispo County Public Works defers to Cal Trans standards.

Caltrans link is:

<http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/bridge-design-specifications/bds.html>

Private bridges must meet the following requirements:

- Be designed by a Registered Civil Engineer.
- Engineer must provide written design load and specifications to CAL FIRE/County Fire.
- Bridge weight limit and vertical clearance signs posted at each entrance.
- Provide a minimum of 20 ton capacity.
- Provide vehicle & pedestrian guard rails on each side.
- Provide turnouts on either side of bridge entry.
- One lane bridges must be approved by the fire department.



Robert Lewin, Fire Chief

• STANDARD 5 • TENTS MEMBRANES AND CANOPIES

SCOPE:

This standard shall apply to individual tents, temporary structures or membrane structures exceeding 200 square feet and/or canopies exceeding 400 square feet in size used as booths for carnivals, street fairs and flea markets.

Permits, approvals and inspections shall be in accordance with the California Code of Regulations-Title 19 (Chapter 2), 2013 California Fire Code (Section 906 & Chapter 31), 2013 California Building Code (Chapter 31), California Health & Safety Code (Division 104, Part 7, and Chapter 4), CAL FIRE/San Luis Obispo County Fire Department, and the San Luis Obispo County Health Department.

BOOTHS:

- Sidewalls, drops, and tops of all such structures shall be made of a flame-resistant material or treated with a flame retardant approved by the California State Fire Marshal.
- The California State Fire Marshal's seal shall be permanently affixed to the structure or a label showing the name, type and applicant of flame retardant materials.
- A 10-foot wide separation shall be provided for every 200 lineal feet of vendor booths.
- A fire access of 20 feet between rows of booths shall be maintained at all times.
- Sale or display items shall not be allowed within the fire access.
- Booths shall be used for not more than 180 days in a 12 month period.
- Booths or rows of booths shall be located more than 20 feet from property lines, buildings, parking areas or internal combustible engines.
- Booths shall have at least one exit.
- All structures shall be adequately braced and anchored to prevent collapse.

PORTABLE FIRE EXTINGUISHERS:

- Portable fire extinguishers shall be installed throughout the premises, (display areas), so as to not exceed 75 feet of travel.
- Portable fire extinguishers shall be a minimum rating of 2A:10B:C.
- Booths with cooking facilities inside or adjacent to them shall have a fire extinguisher rating of a minimum 3A:40B:C.
- Permanent businesses shall have a portable fire extinguisher with a minimum rating of 2A: 10B:C.

IGNITION SOURCES:

- Smoking, fireworks, open flame or hot objects capable of ignited combustible materials shall not be allowed inside the booths.
- 'No Smoking' signs shall be posted.
- Cooking and BBQs shall be a minimum of 10 feet from any booth and shall be protected from access by the public.

ELECTRICAL & GENERATORS:

- Extension cords shall be of a grounded type and listed for exterior use.
- Extension cords shall be unplugged after each daily use.
- Extension cords shall not be used in lieu of hardwiring.
- Generators shall be a minimum of 20 feet from all structures and protected from public access.

COMPRESSED GAS TANKS:

- LPG and other compressed gas tanks shall be secured in an upright position.
- All tanks shall be protected from public access.
- Empty tanks shall be removed on a daily basis.

COOKING AREA LAYOUT:

- A minimum of 2-foot side clear space shall be provided between the cooking space area and the back of the tent.
- A minimum of 18-inch wide clear space shall be provided between the cooking space and the side and rear of the cooking area.
- Cooking & barbecues shall be a minimum of 10 feet from any booth and shall be protected from access by the public.

USE OF LIQUID PETROLEUM GAS:

- Vendors may use Liquefied Petroleum Gas (LPG) in booths as defined above, when the booth is separated from other booths, tents & canopies by at least twenty feet and approved by the SLO County Health Department.
- LPG cylinders shall be located outside tents and canopies.
- Vendors using LPG or liquid fueled appliances in a tent or canopy will not be allowed to participate in the event. Wood booths would be required.

BARBECUES:

- Trailer barbecues shall not be located within 10 feet of combustible walls, roofs, or other combustible material.
- Charcoal and LPG gas barbecues may be located in the cooking space, but in other use locations shall not be located within 10 feet of combustible walls, roofs or other combustible material.
- Small barbecues and hibachis may be placed on tables in the cooking space if a thermal barrier is provided between the barbecue and table. This may be a concrete block underneath the barbecue, as long as the entire area of the barbecue is provided with protection underneath.

SPECIAL APPLIANCES:

- Warming appliances/steaming trays, both electric and solid fuel types, shall be located inside tents. They will be monitored by the event organizers, the County Health Department and the Cal Fire/SLO County Fire Department. The intent is that food preparation will occur within the tent.
- Deep-fat fryers and other unique appliances for the cooking and holding of food until served will be reviewed by Cal Fire/SLO County Fire Department and are only approved on a case-by-case basis. If approved, a Class K portable fire extinguisher shall be located within 30 feet of the fryer.
- If the appliances used would require food preparation to occur outside, the Fire Marshal may evaluate the heat potential of the appliance and approve its' use within the tent.



Robert Lewin, Fire Chief

EXHIBIT 5A GATE REQUIREMENTS

Effective January 1, 2014 all gates for residential and commercial use shall meet Section 503.6 of the 2013 California Fire Code requirements for access:

- All gates shall be set back from the road a minimum of 30 feet from the edge of roadway, and shall open to allow a vehicle to stop without obstructing traffic on the public road. Local ordinance, certain conditions or County Public Works may require a greater setback.
- All gates shall be 2 feet wider on each side of the road/driveway.
- All electric gates shall automatically open with no special knowledge upon exiting.
- All electric gates shall have a KNOX switch for emergency fire department access.
- All electric gates shall have an approved means of emergency operation at all times, either through the use of solar power, battery back-up or fail to the open position upon a power outage.
- Security gates and their emergency operation shall be maintained operational at all times.
- Gates designed for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F 2200.
- Residential non-electric gates may be secured by a padlock.
- Commercial non-electric gates shall be secured by a KNOX padlock.

The use of a red “Fire Dept Access” box is no longer allowed for either residential or commercial use. CAL FIRE no longer maintains a list of gate codes due to security concerns and the extreme difficulty in maintaining current data. Your request for a Knox switch or padlock must include the address of the location where the product(s) will be installed. Once the order form has been completed, please send it, along with payment directly to the Knox Company.

The KNOX Company will not process CAL FIRE orders without an official KNOX Corporation order form, including an authorized original signature from approved CAL FIRE staff. A signed KNOX form will be sent to you via the U.S. Postal Service and will not be faxed due to security requirements. CAL FIRE orders placed on-line through the Knox website will not be processed.

Once you have received your KNOX gate switch/padlock and it has been installed, please contact the Fire Prevention Office at (805) 543-4244 extension #3490 to schedule an appointment for CAL FIRE staff to test the switch/padlock and ensure that it has been installed correctly.



APPROVED KNOX SWITCH



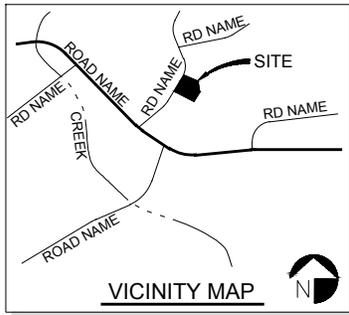
NEVER APPROVED



NO LONGER APPROVED

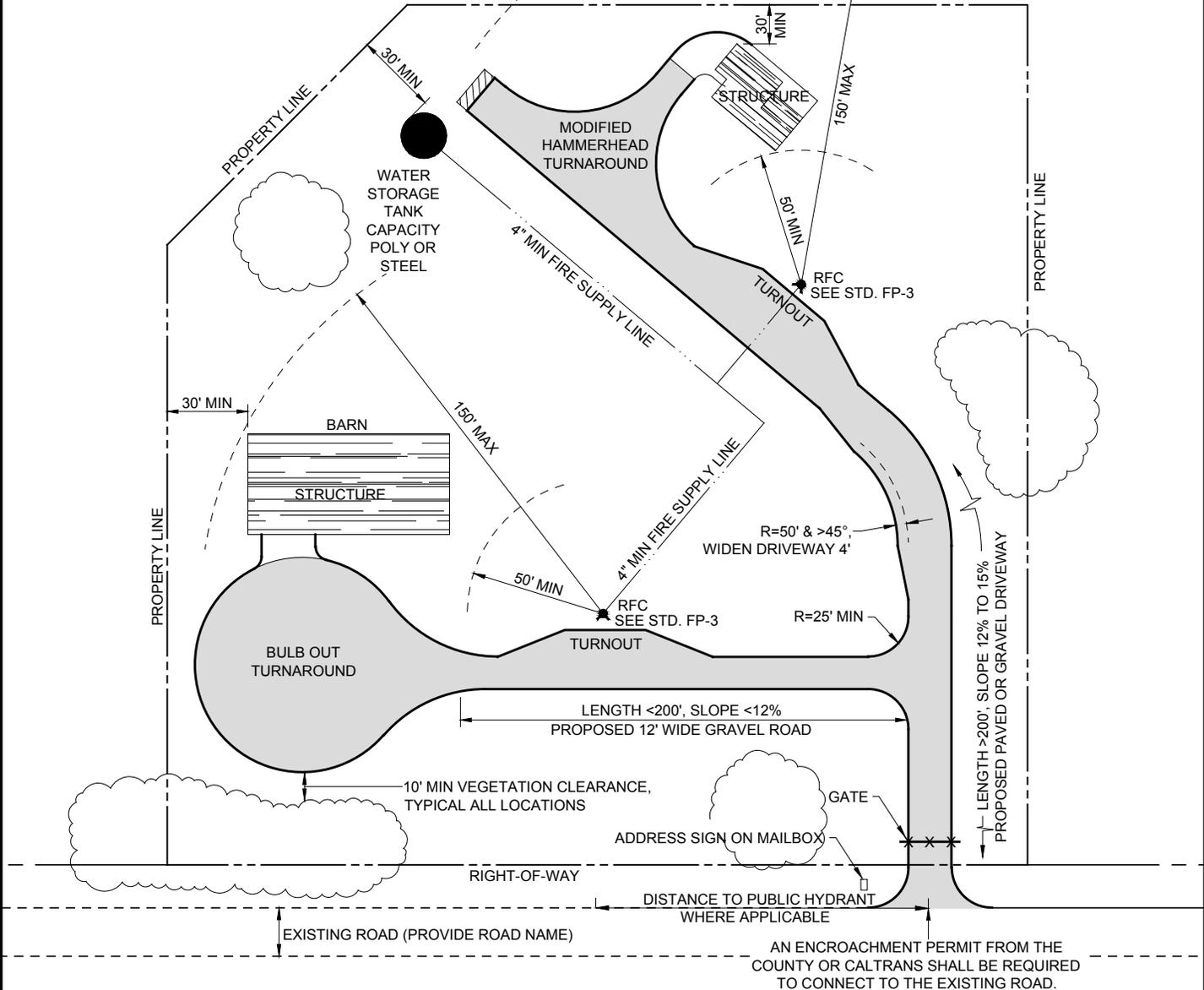
Revisions

Description	Approved	Date	Description	Approved	Date



PROJECT INFORMATION REQUIRED ON SITE PLAN:

PROJECT NAME: _____
 PROJECT ADDRESS/CITY: _____
 APPLICANT'S NAME: _____
 APPLICANT'S PHONE: () _____
 PERMIT No: _____



SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
RESIDENTIAL
 SAMPLE SITE PLAN FOR FIRE SAFETY APPLICATION

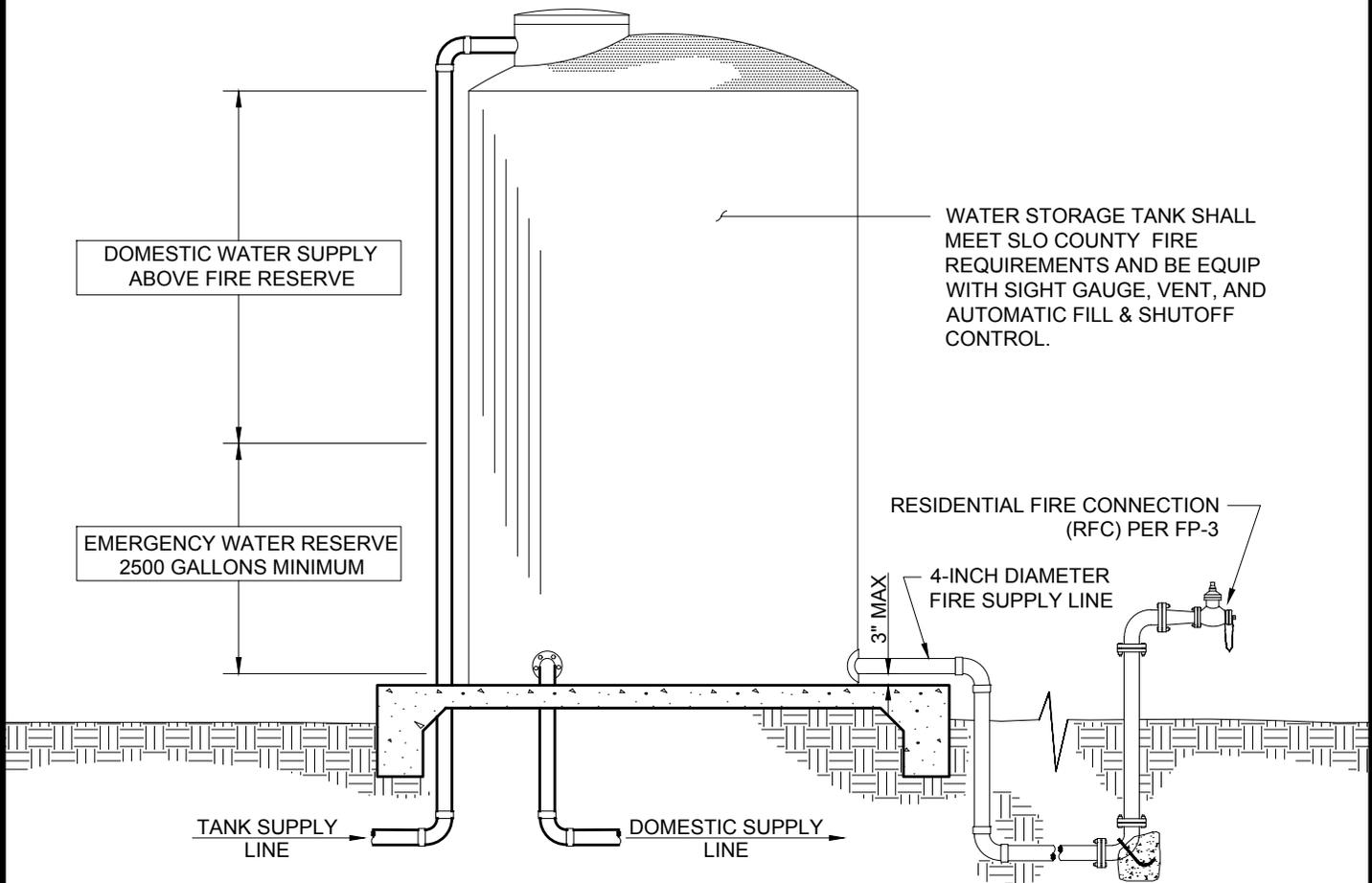
Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-1	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date

NOTES:

1. REFER TO WATER STORAGE REQUIREMENTS FOR TOTAL REQUIRED TANK CAPACITY.
2. WHEN MULTIPLE WATER STORAGE TANKS ARE USED THE CONNECTION BETWEEN THE TANKS SHALL BE BY AN APPROVED 4-INCH MINIMUM DIAMETER WATER LINE.
3. POLY TANKS ALLOWABLE IN MODERATE FIRE HAZARD SEVERITY ZONES ONLY. STEEL TANKS REQUIRED IN HIGH AND VERY HIGH FIRE HAZARD SEVERITY ZONES.
4. MOST SINGLE FAMILY HOMES REQUIRE 5,000 GAL TANK MINIMUM SHARED FIRE AND DOMESTIC STORAGE.
5. TANKS OVER 5,000 GAL AND ALL COMMERCIAL WATER STORAGE TANKS SHALL REQUIRE ADDITIONAL DESIGN.



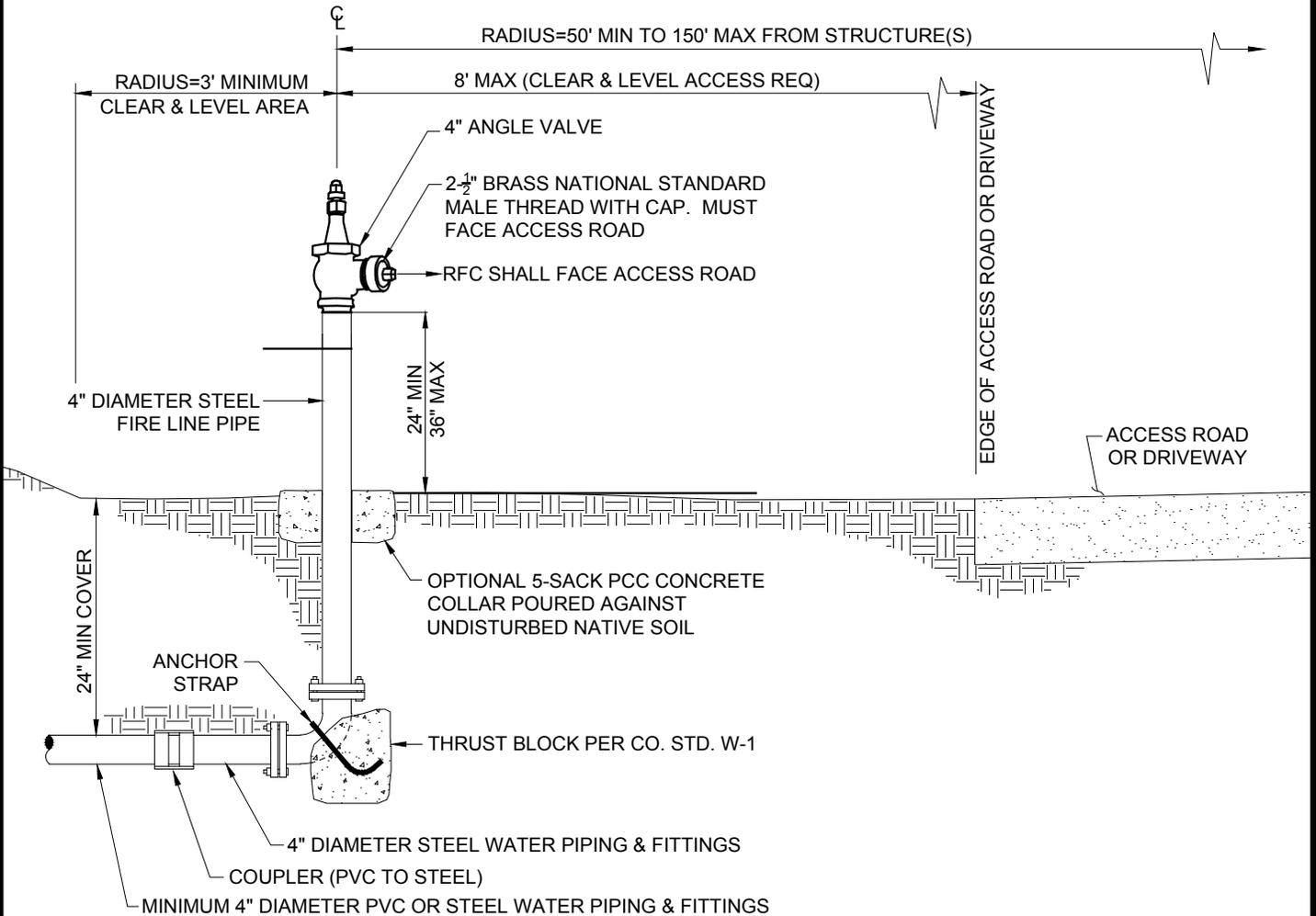
SAN LUIS OBISPO COUNTY FIRE DEPARTMENT

RESIDENTIAL WATER SUPPLY TANKS

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-2	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date



NOTES:

1. RESIDENTIAL FIRE CONNECTION (RFC) SHALL BE INSTALLED AND FULLY FUNCTIONAL PRIOR TO AND DURING CONSTRUCTION.
2. RFC SHALL BE INSTALLED WITHIN 8-FEET OF THE EDGE OF ACCESS ROAD OR DRIVEWAY AND THE AREA BETWEEN SHALL BE LEVEL AND CLEAR OF ALL OBSTACLES.
3. THE RFC OUTLET SHALL BE 24-INCHES ABOVE FINISHED GRADE.
4. THE RFC SHALL BE EQUIPPED WITH EITHER A BRASS OR PLASTIC RED CAP.
5. THE RFC SHALL BE LOCATED BETWEEN 50-FEET AND 150-FEET FROM THE STRUCTURE(S).
6. A 3-FOOT MINIMUM CLEAR AND LEVEL ZONE SHALL BE PROVIDED ALL AROUND THE CENTER OF THE RFC.
7. A 3-INCH BLUE REFLECTOR MEETING CAL FIRE REQUIREMENTS SHALL BE PROVIDED.
8. A 10' CLEAR ZONE PER FSS No 5 SHALL BE PROVIDED AROUND RFC.
9. COMMERCIAL HYDRANTS AND BOLLARDS SHALL COMPLY WITH CO. STD. W-2.



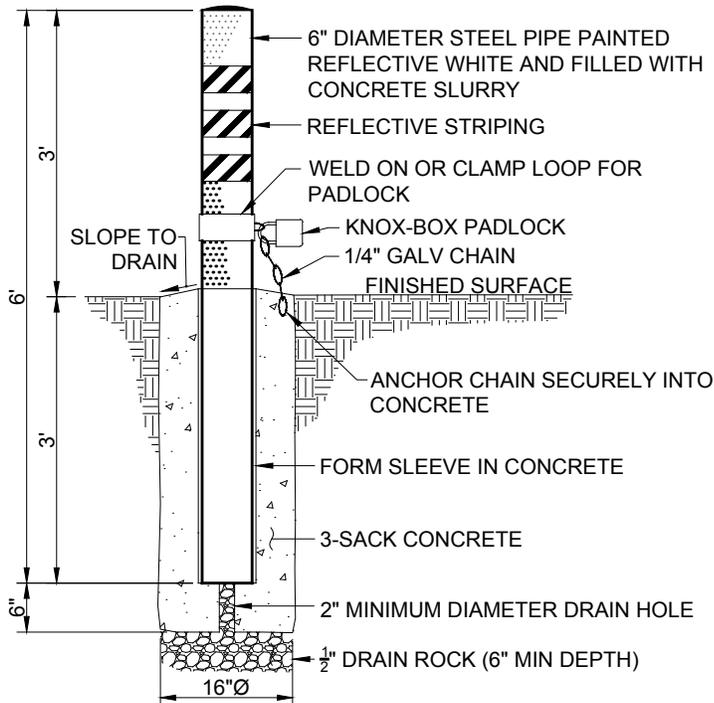
SAN LUIS OBISPO COUNTY FIRE DEPARTMENT

RESIDENTIAL FIRE CONNECTION (RFC)

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-3	
Sheet No:	OF

Revisions

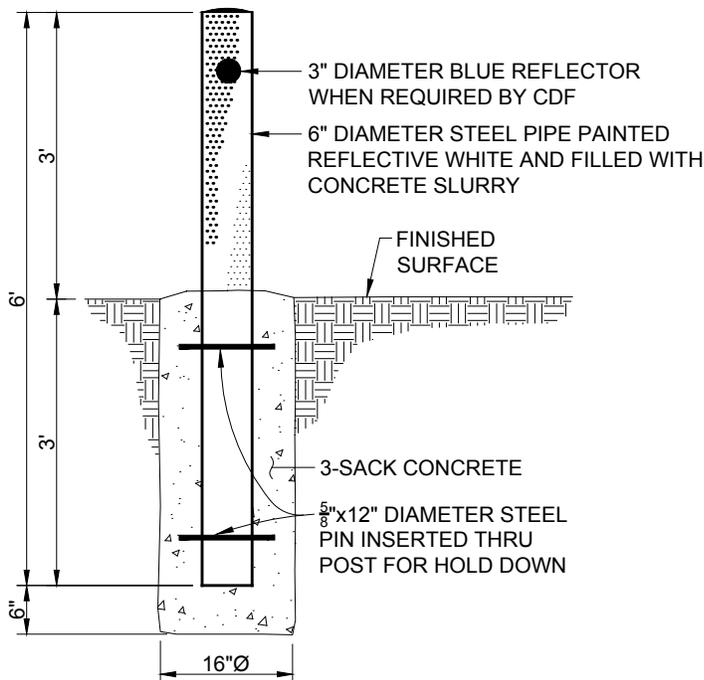
Description	Approved	Date	Description	Approved	Date



REMOVABLE BOLLARD

NOTES:

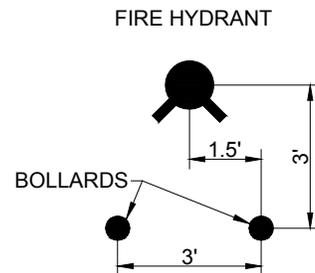
1. REMOVABLE BOLLARDS SHALL BE INSTALLED WHEN REQUIRED BY CDF TO PROVIDE ACCESS TO ROUTES NORMALLY CLOSED TO VEHICLES.
2. PROVIDE KNOX-BOX PADLOCKS PER CDF.
3. PROVIDE 48" CLEAR SPACING BETWEEN BOLLARDS (53" ON CENTER).
4. YELLOW REFLECTIVE TAPE SHALL BE PLACED ON EACH FACE OF BOLLARD.



PERMANENT BOLLARD

NOTES:

1. BOLLARDS SHALL BE INSTALLED ONLY WHEN REQUIRED BY CDF TO PROTECT FIRE HYDRANTS AND OTHER FIRE APPURTENANCES.
2. WHEN REQUIRED, BOLLARDS SHALL BE INSTALLED PER "TYPICAL BOLLARD LOCATION" DETAIL, THIS SHEET.
3. BOLLARDS SHALL NOT BE LOCATED WITHIN THE PUBLIC RIGHT-OF-WAY WITHOUT FIRST OBTAINING AN ENCROACHMENT PERMIT FROM COUNTY PUBLIC WORKS DEPARTMENT OR CALTRANS.



TYPICAL BOLLARD LOCATION

SCALE: 1"=4'



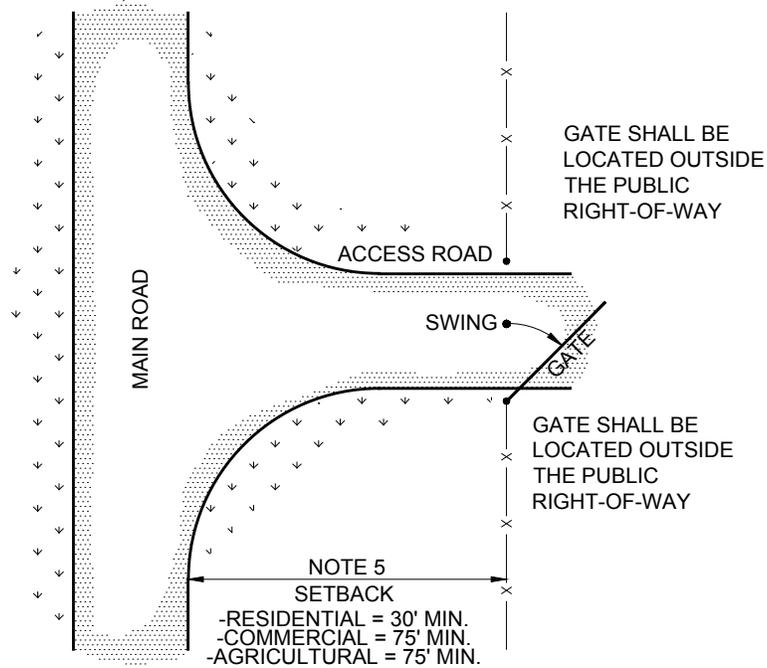
SAN LUIS OBISPO COUNTY FIRE DEPARTMENT

FIRE HYDRANT BOLLARDS

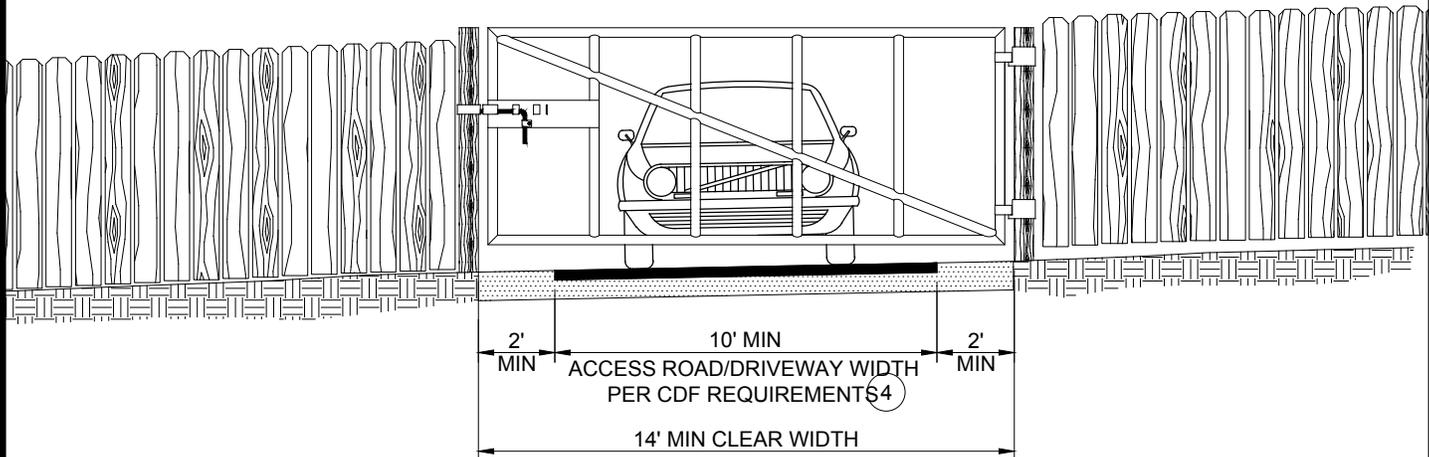
Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-4	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date



GATE LOCATION



NOTES:

1. INSTALLATION OF GATES SHALL REQUIRE PRIOR DEPARTMENT APPROVAL.
2. INSTALLATION OF GATES MAY REQUIRE A BUILDING PERMIT FROM COUNTY PLANNING AND BUILDING DEPARTMENT. CONTACT 805/781-5200 FOR ADDITIONAL INFORMATION.
3. ALL LOCKED GATES SHALL BE EQUIP WITH A DEPARTMENT APPROVED EMERGENCY ACCESS LOCK. CONTACT CDF A 805/543-4244 FOR ADDITIONAL INFORMATION.
4. CLEAR WIDTH SHALL BE NO LESS THAN THE WIDTH OF THE ACCESS ROAD OR DRIVEWAY PLUS A TWO FOOT SHOULDER ON EACH SIDE, AND IN NO CASE BE LESS THAT 14-FEET WIDE.
5. THE APPLICANT SHALL OBTAIN PRIOR APPROVAL FROM CALTRANS OR SAN LUIS OBISPO COUNTY PUBLIC WORKS FOR ACTUAL GATE SETBACK REQUIREMENTS. MINIMUM SETBACK GUIDELINES ARE PROVIDED AS FOLLOWS:
 - A. FOR RESIDENTIAL DRIVEWAYS, GATES SHALL BE SET BACK A MINIMUM OF 30-FEET FROM THE NEAREST INTERSECTING ROAD PER CALIFORNIA FIRE CODE.
 - B. FOR COMMERCIAL AND AGRICULTURAL ACCESS ROADS, GATES SHALL BE SETBACK A MINIMUM OF 75-FEET FROM THE NEAREST INTERSECTING ROAD.

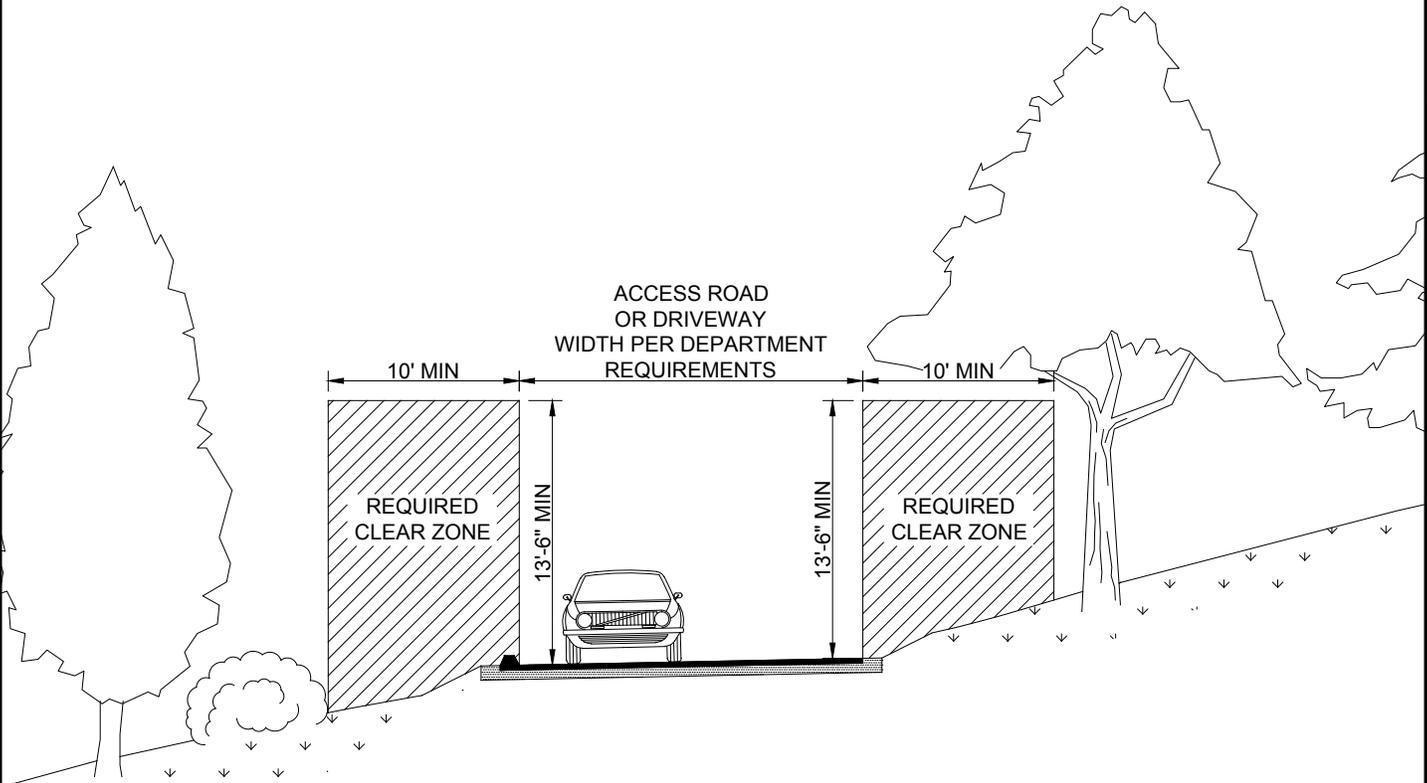


SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
DRIVEWAY & ACCESS ROAD GATES

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-5	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date



VERTICAL CLEARANCE TO FLAMMABLE VEGETATION:
13'-6" MINIMUM ABOVE ROAD SURFACE

HORIZONTAL CLEARANCE TO FLAMMABLE VEGETATION:
10' MINIMUM FROM EDGE OF ROADWAY

NOTES:

1. VEGETATION CLEARANCE REQUIREMENTS PER CALIFORNIA FIRE CODE, SECTION 304.1.2
2. VEGETATION CLEARANCE ZONE APPLIES TO DRIVEWAYS, ACCESS ROADS, TURNOUTS, CUL-DE-SACS, HAMMERHEADS, AND ALL OTHER SITE ACCESS IMPROVEMENTS.
3. DRIVEWAY AND ACCESS ROAD WIDTHS SHALL BE PER DEPARTMENT REQUIREMENTS.



SAN LUIS OBISPO COUNTY FIRE DEPARTMENT

VEGETATION CLEARANCE REQUIREMENTS

Scale:
NTS

Adopted:
AUG 2014

Fire Safe Drawing No:

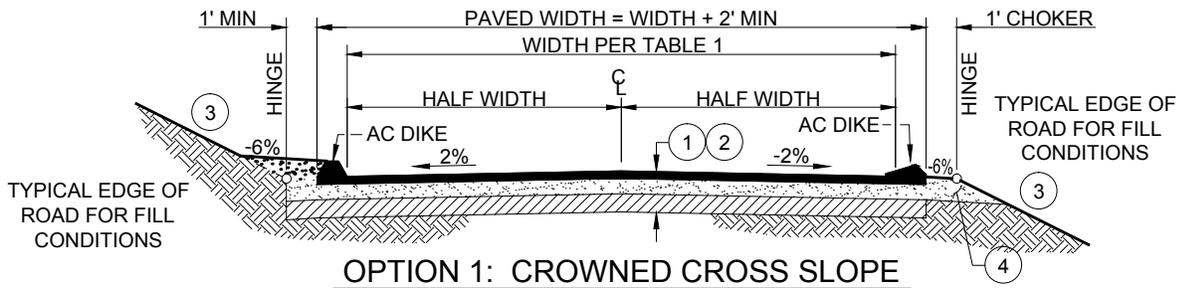
FP-6

Sheet No:

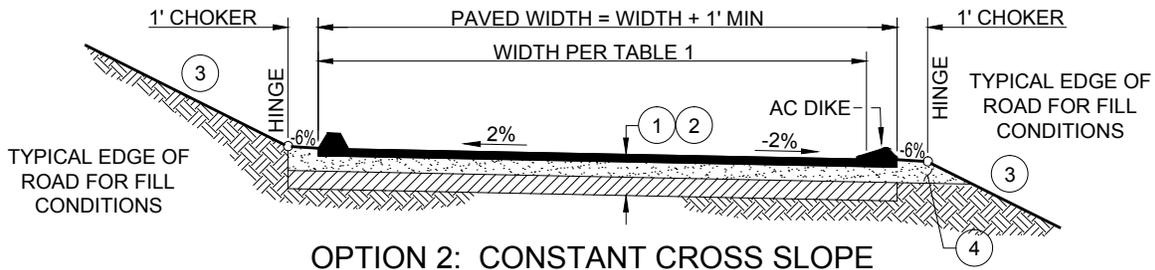
OF

Revisions

Description	Approved	Date	Description	Approved	Date



OPTION 1: CROWNED CROSS SLOPE



OPTION 2: CONSTANT CROSS SLOPE

NOTES:

1. THE STRUCTURAL SECTION SHALL BE DETERMINED BY THE DESIGNER AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND A MINIMUM TRAFFIC INDEX (TI) OF 4.5.
2. TYPICAL SECTION SHALL BE:
 - TYPE B ASPHALT CONCRETE TO 95% RELATIVE COMPACTION, OVER
 - ▨ CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
 - ▩ 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
5. ADDITIONAL WIDTH SHALL BE PROVIDED AS NECESSARY TO ACCOMMODATE FOR ROADSIDE DRAINAGE. DRAINAGE SHALL NOT BE ALLOWED TO ENCROACH WITHIN THE TRAVEL LANE.
6. ASPHALT DIKE SHALL BE REQUIRED WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 5% OR GREATER. DIKE SHALL CONFORM TO SAN LUIS OBISPO COUNTY STANDARD DRAWING C-3.

TABLE 1: DRIVEWAY/ACCESS ROAD WIDTH REQUIREMENTS

<p>DRIVEWAY WIDTH REQUIREMENTS (RESIDENTIAL): 10- FEET MINIMUM WIDTH FOR LENGTHS TO 49- FEET 12- FEET MINIMUM WIDTH FOR LENGTHS 50 TO 199- FEET 16- FEET MINIMUM WIDTH FOR LENGTHS GREATER THAN 200- FEET</p>
<p>DRIVEWAY WIDTH REQUIREMENTS (COMMERCIAL): 24- FEET MINIMUM WIDTH - INCLUDES SECONDARY EGRESS 18- FEET MINIMUM WIDTH FOR EMERGENCY EGRESS</p> <p>FIRE LANES PER CFC SECTION 503 MUST BE PAVED</p>
<p>ACCESS ROAD WIDTH REQUIREMENTS (RESIDENTIAL): 18- FEET MINIMUM WIDTH WITH NO- PARKING 8- FEET ADDITIONAL WIDTH PER SIDE WITH PARKING 10- FEET MINIMUM WIDTH FOR ONE- WAY (REQUIRES PRIOR DEPARTMENT APPROVAL)</p>
<p>ACCESS ROAD WIDTH REQUIREMENTS (COMMERCIAL): 24- FEET MINIMUM WIDTH WITH NO- PARKING (INCLUDES SECONDARY EGRESS) 8- FEET ADDITIONAL WIDTH PER SIDE WITH PARKING 18- FEET MINIMUM WIDTH FOR EMERGENCY EGRESS FIRE LANES PER CFC SECTION 503 MUST BE PAVED</p>

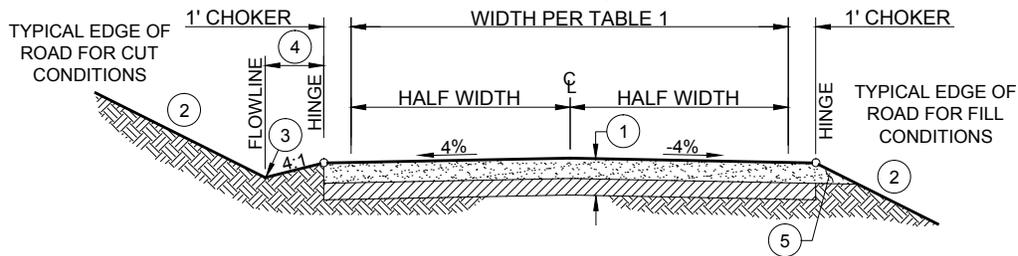


**SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
 PRIVATE DRIVEWAY & ACCESS ROAD
 PAVED ROAD STANDARD**

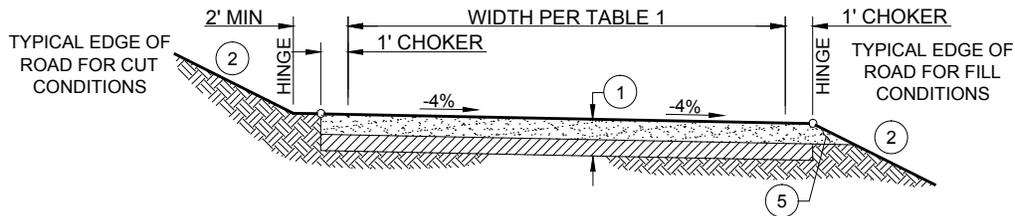
Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-7	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date



OPTION 1: GRAVEL ROAD SECTION WITH CROWNED CROSS SLOPE



OPTION 2: GRAVEL ROAD SECTION WITH CONSTANT CROSS SLOPE

NOTES:

- TYPICAL SECTION SHALL BE:
 - 10" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION FOR R ≥40 & SE=50, OR
 - 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION FOR R <40, OVER
 - 12" MINIMUM SUBGRADE COMPACTED TO 95% RELATIVE COMPACTION
- CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND).
- ROADSIDE DRAINAGE SHALL BE ACCOMMODATED FOR SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
- ADDITIONAL WIDTH SHALL BE PROVIDED AS NECESSARY TO ACCOMMODATE FOR ROADSIDE DRAINAGE. DRAINAGE SHALL NOT BE ALLOWED TO ENCROACH WITHIN THE TRAVEL LANE.
- THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.

TABLE 1: DRIVEWAY/ACCESS ROAD WIDTH REQUIREMENTS

DRIVEWAY WIDTH REQUIREMENTS (RESIDENTIAL): 10-FEET MINIMUM WIDTH FOR LENGTHS TO 49-FEET 12-FEET MINIMUM WIDTH FOR LENGTHS 50 TO 199-FEET 16-FEET MINIMUM WIDTH FOR LENGTHS GREATER THAN 200-FEET
DRIVEWAY WIDTH REQUIREMENTS (COMMERCIAL): 24-FEET MINIMUM WIDTH - INCLUDES SECONDARY EGRESS 18-FEET MINIMUM WIDTH FOR EMERGENCY EGRESS FIRE LANES PER CFC SECTION 503
ACCESS ROAD WIDTH REQUIREMENTS (RESIDENTIAL): 18-FEET MINIMUM WIDTH WITH NO-PARKING 8-FEET ADDITIONAL WIDTH PER SIDE WITH PARKING 10-FEET MINIMUM WIDTH FOR ONE-WAY (REQUIRES PRIOR DEPARTMENT APPROVAL)
ACCESS ROAD WIDTH REQUIREMENTS (COMMERCIAL): 24-FEET MINIMUM WIDTH WITH NO-PARKING (INCLUDES SECONDARY EGRESS) 8-FEET ADDITIONAL WIDTH PER SIDE WITH PARKING 18-FEET MINIMUM WIDTH FOR EMERGENCY EGRESS FIRE LANES PER CFC SECTION 503

ADDITIONAL DESIGN CRITERIA:

- ALL WEATHER ROAD STANDARD IS FOR RESIDENTIAL USE ONLY AND NOT ALLOWED IN COMMERCIAL PROJECTS.
- FOR ROAD LONGITUDINAL SLOPE STANDARDS REFER TO FP-9
- FOR ROAD HORIZONTAL AND VERTICAL STANDARDS REFER TO FP DRAWING SERIES.

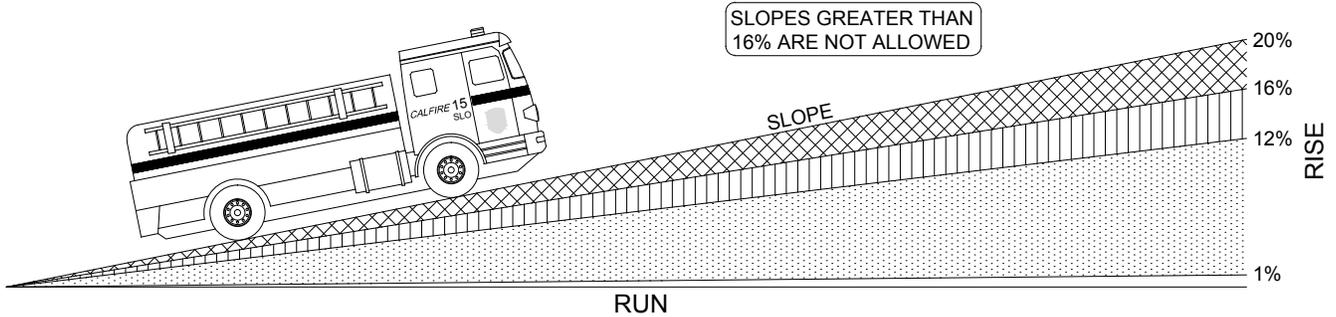


**SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
PRIVATE DRIVEWAY & ACCESS ROAD
GRAVEL ROAD STANDARD**

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-8	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date



-  1% TO 11.9%: ALL WEATHER AGGREGATE BASE SURFACE (MINIMUM).
-  12% TO 15.9%: NON-SKID ASPHALT OR CONCRETE SURFACE (MINIMUM).
-  16% THE GRADE FOR ALL STREETS ROADS, PRIVATE LANDS AND DRIVEWAYS SHALL NOT EXCEED 16% UNLESS APPROVED BY FIRE CODE OFFICIAL.

FIGURE 1: SURFACE REQUIREMENTS FOR DRIVEWAYS & ACCESS ROADS BASED ON SLOPE

EXAMPLES:

EXAMPLE 1:

GIVEN: THE PROPOSED DRIVEWAY OR ACCESS ROAD GRADES RANGE FROM 2% TO 11%

REQUIREMENT: BASED ON FIGURE 1, AN ALL-WEATHER (GRAVEL) ROAD SURFACE IS THE MINIMUM REQUIRED ROAD SURFACE.

EXAMPLE 2:

GIVEN: THE PROPOSED DRIVEWAY OR ACCESS ROAD GRADES RANGE FROM 12% TO 16%

REQUIREMENT: BASED ON FIGURE 1, PORTIONS OF THE DRIVEWAY OR ACCESS ROAD WITH SLOPES LESS THAN 12% MAY BE CONSTRUCTED WITH AN ALL-WEATHER (GRAVEL ROAD) SURFACE, HOWEVER THE REMAINING PORTIONS HAVING SLOPES BETWEEN 12% AND 16% SHALL BE CONSTRUCTED WITH A NON-SKID PAVED SURFACE. THE APPLICANT HAS THE OPTION TO CONSTRUCT THE ENTIRE LENGTH WITH A NON-SKID PAVED SURFACE.

EXAMPLE 3:

GIVEN: THE PROPOSED DRIVEWAY OR ACCESS ROAD GRADES RANGE FROM 4.5% TO 16%

REQUIREMENT: SIMILAR TO EXAMPLE 2 BUT WITH THE ADDED REQUIREMENT THAT ALL PORTIONS OF THE DRIVEWAY OR ACCESS ROAD SHALL NOT EXCEED 16% UNLESS APPROVED BY THE FIRE CODE OFFICIAL.

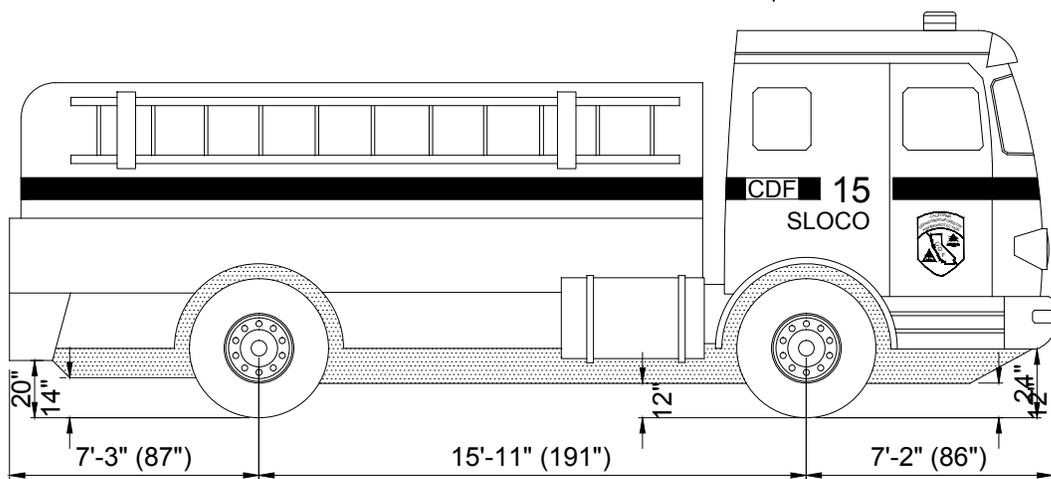
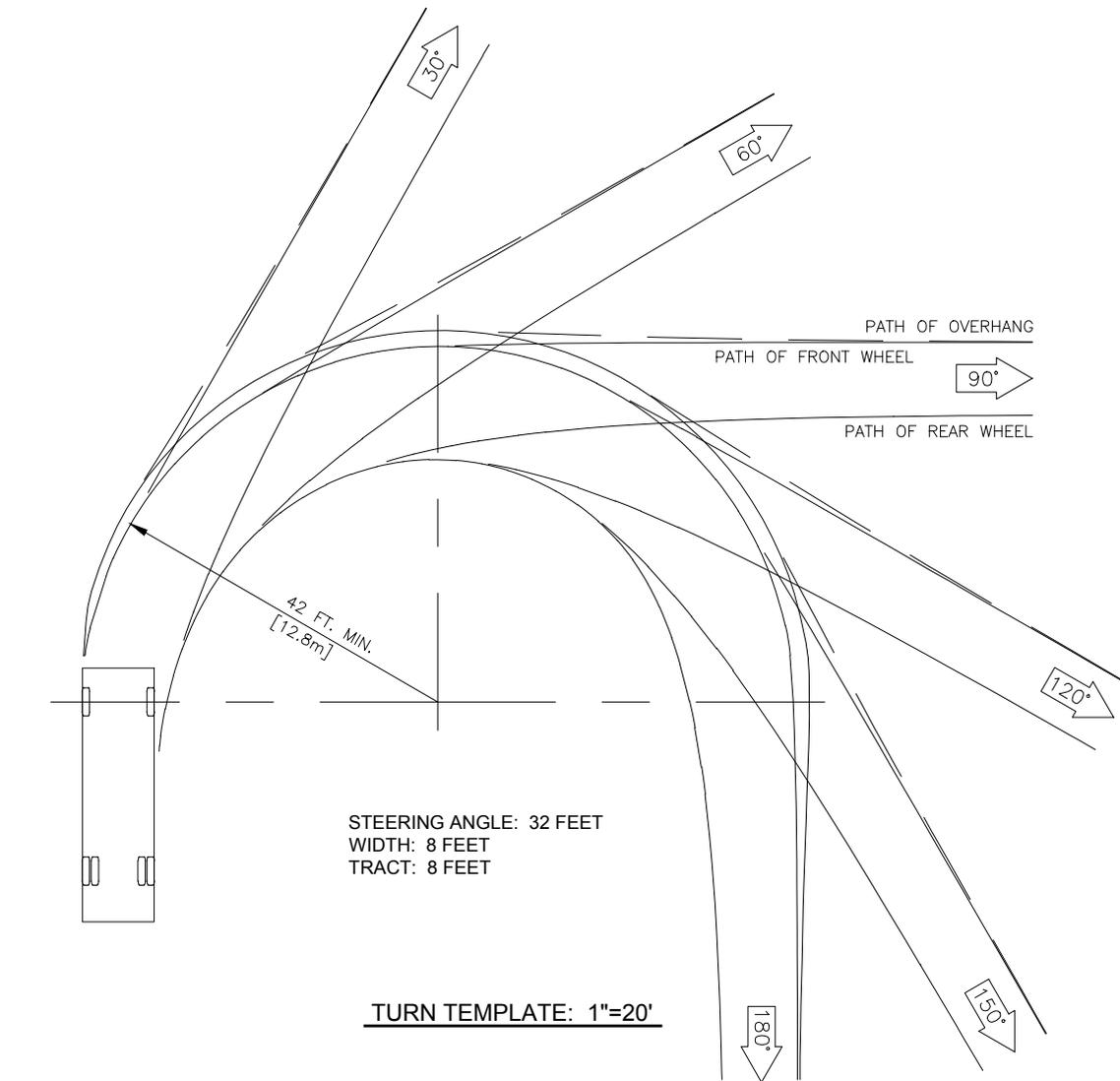


**SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
PRIVATE DRIVEWAY & ACCESS ROAD
ROAD SLOPE STANDARDS**

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-9	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date



DESIGN TRUCK: 1"=5'



SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
FIRE TRUCK DESIGN TEMPLATE

Scale: AS SHOWN	Adopted: AUG 2014
Fire Safe Drawing No: FP-10	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date

DESIGN CRITERIA:

1. VERTICAL CURVES ARE REQUIRED FOR ALL GRADE BREAKS GREATER THAN 1%
2. MINIMUM VERTICAL CURVE LENGTH (L) SHALL BE 10-FEET
3. LENGTH OF VERTICAL CURVE (L) = KA
4. GRADE BREAK (A)=S2-S1
5. K DETERMINE FROM TABLE 2

TABLE 1: MINIMUM DESIGN SPEED

	MIN DESIGN SPEED
DRIVEWAYS	15 mph
ACCESS ROADS	25 mph

TABLE 2: MINIMUM DESIGN K-VALUE

DESIGN SPEED (mph)	SAG VERTICAL CURVE (minimum K-value, ft/%)	CREST VERTICAL CURVE (minimum K-value, ft/%)
15	3	10
20	7	17
25	12	26
30	19	37
35	29	49

FOR DESIGN SPEEDS GREATER THAN 35 mph REFER TO SAN LUIS OBISPO COUNTY PUBLIC WORKS STANDARD DRAWINGS FOR DESIGN REQUIREMENTS

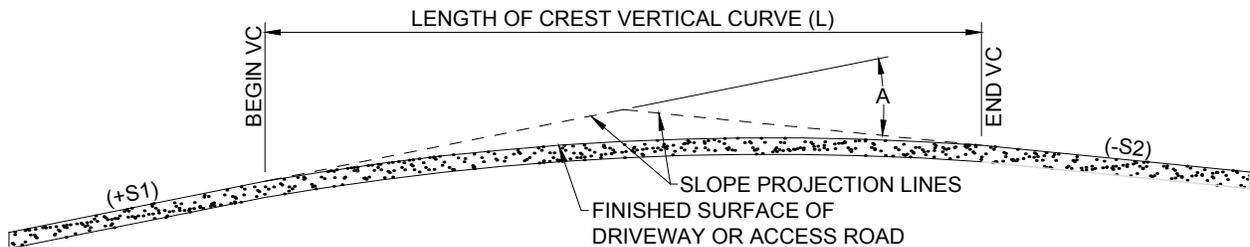


FIG 1: CREST VERTICAL CURVE

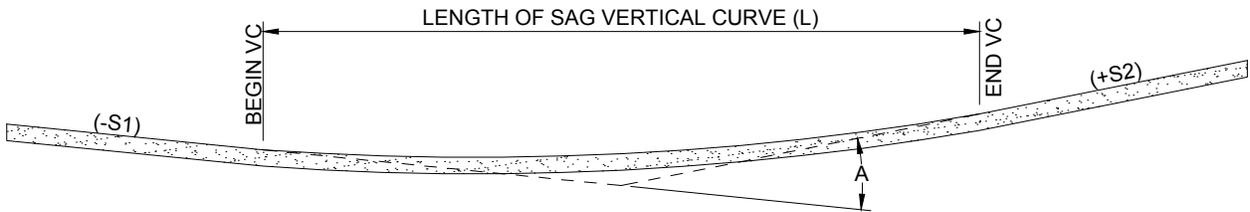


FIG 2: SAG VERTICAL CURVE

EXAMPLE 1:

GIVEN:

DRIVEWAY WITH A DESIGN SPEED OF 20 mph, SAG CONDITION, A DOWNHILL SLOPE IN (S1) OF -5% AND A UPHILL SLOPE OUT (S2) OF +3%, DETERMINE THE MINIMUM VERTICAL CURVE LENGTH.

SOLUTION:

FROM TABLE 2 & FIG 2, SAG CONDITION, 20mph DESIGN SPEED, THEN K=7
 GIVEN THAT S1=-5 & S2=+3, THEN A=S2-S1=(+3)-(-5)=8
 REQUIRED MINIMUM LENGTH OF VERTICAL CURVE (L)=KA=7x8=56 ft

EXAMPLE 2:

GIVEN:

ACCESS ROAD WITH A DESIGN SPEED OF 20 mph, CREST CONDITION, A UPHILL SLOPE IN (+S1) OF +3% AND A DOWNHILL SLOPE OUT (S2) OF -10%, DETERMINE THE MINIMUM VERTICAL CURVE LENGTH.

SOLUTION:

FROM TABLE 2 & FIG 1, CREST CONDITION, 20mph DESIGN SPEED, THEN K=17
 GIVEN THAT S1=+3 & S2=-10, THEN A=S2-S1=(-10)-(3)=-7, OR 7
 REQUIRED MINIMUM LENGTH OF VERTICAL CURVE (L)=KA=17x7=119 ft



**SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
 PRIVATE DRIVEWAY & ACCESS ROAD
 VERTICAL CURVE STANDARD**

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-11	
Sheet No:	OF

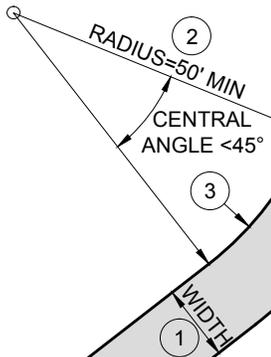
Revisions

Description	Approved	Date	Description	Approved	Date

NOTES:

1. THE MINIMUM WIDTH OF THE DRIVEWAY OR ACCESS ROAD SHALL BE PER DEPARTMENT STANDARDS.
2. MINIMUM INSIDE RADIUS OF ALL DRIVEWAY AND ACCESS ROAD CURVES SHALL BE 50-FEET.
3. NO ADDITIONAL WIDTH IS REQUIRED FOR ANY INSIDE RADIUS HAVING A CENTRAL ANGLE LESS THAN 45° (SEE EXAMPLE 2).
4. 4-FOOT WIDENING OF THE INSIDE RADIUS IS REQUIRED WHEN THE RADIUS IS LESS THAN 100-FEET AND THE CENTRAL ANGLE IS GREATER THAN 45° (SEE EXAMPLE 1).
5. 2-FOOT WIDENING OF THE INSIDE CURVE IS REQUIRED WHEN THE RADIUS IS GREATER THAN 100-FEET BUT LESS THAN 200-FEET AND THE CENTRAL ANGLE IS GREATER THAN 45° (SEE EXAMPLE 3).
6. A MINIMUM 5:1 TAPER SHALL BE PROVIDED EACH SIDE OF THE REQUIRED WIDENING.

EXAMPLE 2: NO WIDENING REQUIRED IF THE CENTRAL ANGLE IS LESS THAN 45°

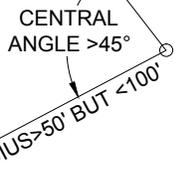


EDGE OF ROAD SURFACE OR FACE OF CURB (ASPHALT OR CONCRETE)

CENTRAL ANGLE > 45°

RADIUS > 100' BUT < 200'

EXAMPLE 3: 2-FOOT WIDENING REQUIRED IF THE RADIUS IS GREATER THAN 100' BUT LESS THAN 200- FEET AND THE CENTRAL ANGLE IS GREATER THAN 45°



EXAMPLE 1: 4-FOOT WIDENING REQUIRED IF THE RADIUS IS LESS THAN 100' AND THE CENTRAL ANGLE IS GREATER THAN 45°



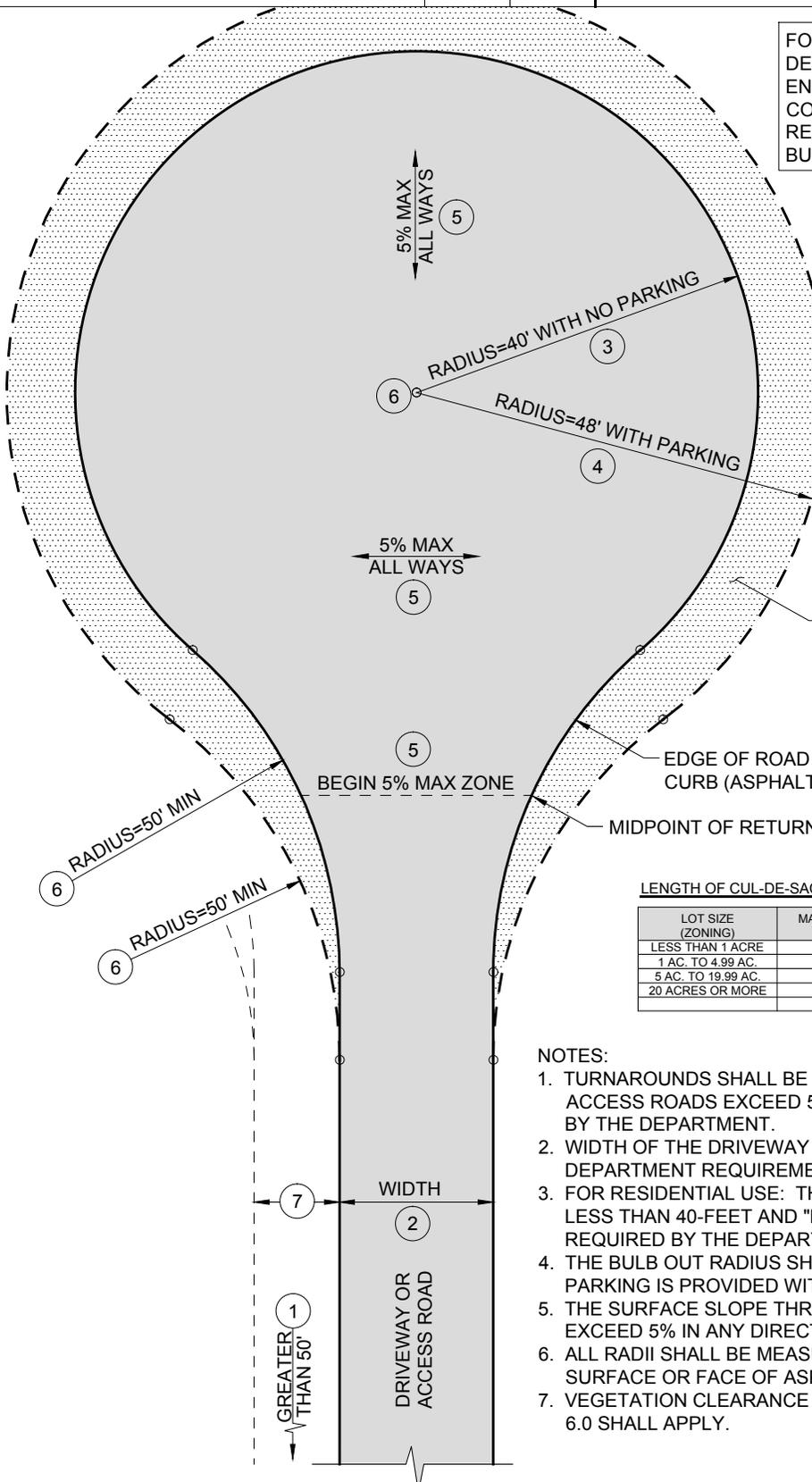
SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
 PRIVATE DRIVEWAY & ACCESS ROAD
 HORIZONTAL CURVE STANDARD

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-12	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date

FOR COMMERCIAL USE: THE BULB SHALL BE DESIGNED BY A REGISTERED CIVIL ENGINEER TO ACCOMMODATE ANTICIPATED COMMERCIAL TRUCK TURNING REQUIREMENTS. IN NO CASE SHALL THE BULB HAVE A RADIUS LESS THAN 48-FEET.



LENGTH OF CUL-DE-SAC

LOT SIZE (ZONING)	MAX. LENGTH
LESS THAN 1 ACRE	800'
1 AC. TO 4.99 AC.	1320'
5 AC. TO 19.99 AC.	2640'
20 ACRES OR MORE	5280'

NOTES:

1. TURNAROUNDS SHALL BE REQUIRED WHEN DRIVEWAYS OR ACCESS ROADS EXCEED 50-FEET IN LENGTH OR AS REQUIRED BY THE DEPARTMENT.
2. WIDTH OF THE DRIVEWAY OR ACCESS ROAD SHALL BE PER DEPARTMENT REQUIREMENTS.
3. FOR RESIDENTIAL USE: THE BULB OUT RADIUS SHALL NOT BE LESS THAN 40-FEET AND "NO PARKING" SIGNS MAY BE REQUIRED BY THE DEPARTMENT.
4. THE BULB OUT RADIUS SHALL NOT BE LESS THAN 48-FEET WHEN PARKING IS PROVIDED WITHIN THE BULB.
5. THE SURFACE SLOPE THROUGHOUT THE BULB OUT SHALL NOT EXCEED 5% IN ANY DIRECTION.
6. ALL RADII SHALL BE MEASURED TO THE EDGE OF DRIVING SURFACE OR FACE OF ASPHALT DIKE OR CONCRETE CURB.
7. VEGETATION CLEARANCE REQUIREMENTS PER FSS EXHIBIT No. 6.0 SHALL APPLY.



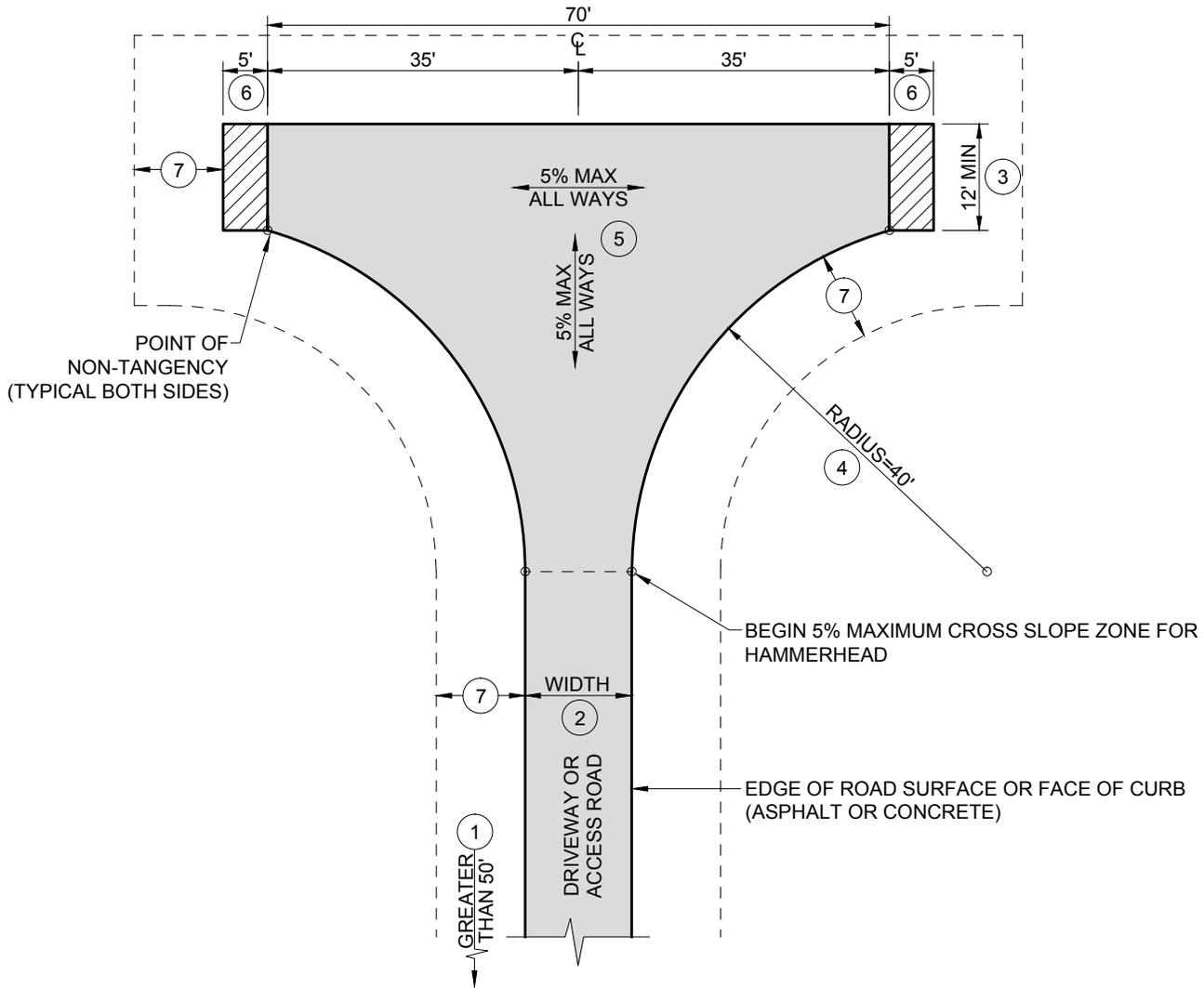
SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
PRIVATE DRIVEWAY & ACCESS ROAD
 TURNAROUND-BULBOUT

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-13	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date

COMMERCIAL USE: HAMMERHEADS SHALL NOT BE USED FOR COMMERCIAL PROJECTS



NOTES:

1. TURNAROUNDS SHALL BE REQUIRED WHEN DRIVEWAYS OR ACCESS ROADS EXCEED 50-FEET IN LENGTH OR AS REQUIRED BY THE DEPARTMENT.
2. WIDTH OF THE DRIVEWAY OR ACCESS ROAD SHALL BE PER DEPARTMENT REQUIREMENTS.
3. WIDTH SHALL BE WIDTH OF DRIVEWAY OR ACCESS ROAD BUT 12-FOOT MINIMUM IS REQUIRED.
4. ALL RADII SHALL BE MEASURED TO THE EDGE OF DRIVING SURFACE OR FACE OF ASPHALT DIKE OR CONCRETE CURB.
5. MAXIMUM CROSS SLOPE THROUGHOUT THE TURNOUT SHALL NOT EXCEED 5% IN ANY DIRECTION.
6. OPTIONAL: VEHICLE OVERHANG LIMITS, DRIVING SURFACE IN THIS AREA IS NOT REQUIRED HOWEVER SURFACE SHALL BE CLEAR OF OBSTRUCTIONS AND HAVE A LEVEL SURFACE.
7. VEGETATION CLEARANCE REQUIREMENTS PER FP-6 SHALL APPLY.



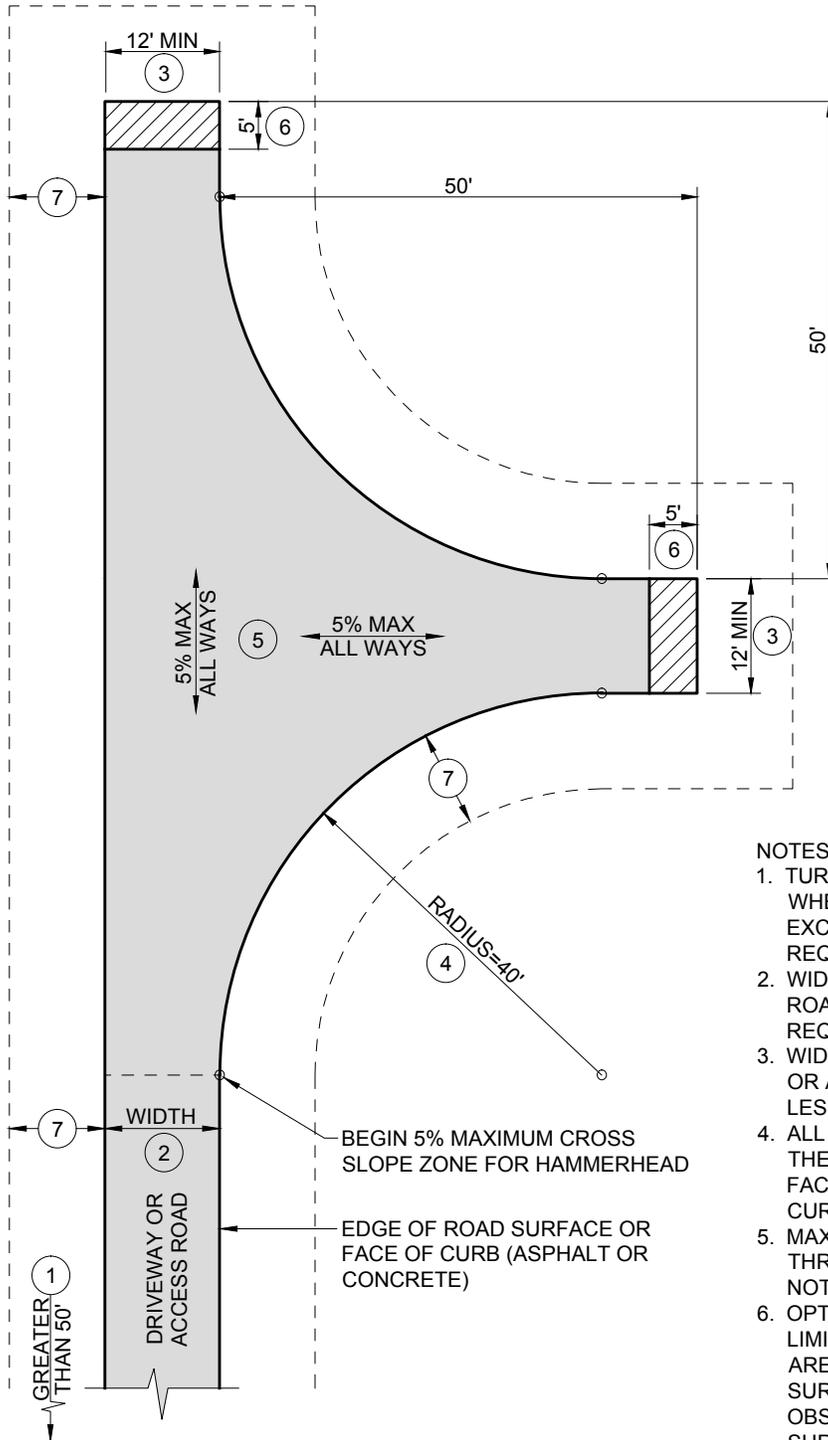
SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
PRIVATE DRIVEWAY & ACCESS ROAD
 TURNAROUND-HAMMERHEAD

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-14	
Sheet No:	OF

Revisions

Description	Approved	Date	Description	Approved	Date

COMMERCIAL USE: HAMMERHEADS SHALL NOT BE USED FOR COMMERCIAL PROJECTS



- NOTES:
1. TURNAROUNDS SHALL BE REQUIRED WHEN DRIVEWAYS OR ACCESS ROADS EXCEED 50-FEET IN LENGTH OR AS REQUIRED BY THE DEPARTMENT.
 2. WIDTH OF THE DRIVEWAY OR ACCESS ROAD SHALL BE PER DEPARTMENT REQUIREMENTS.
 3. WIDTH SHALL BE WIDTH OF DRIVEWAY OR ACCESS ROAD BUT SHALL NOT BE LESS THAN 12-FEET.
 4. ALL RADII SHALL BE MEASURED TO THE EDGE OF DRIVING SURFACE OR FACE OF ASPHALT DIKE OR CONCRETE CURB.
 5. MAXIMUM CROSS SLOPE THROUGHOUT THE TURNOUT SHALL NOT EXCEED 5% IN ANY DIRECTION.
 6. OPTIONAL: VEHICLE OVERHANG LIMITS, DRIVING SURFACE IN THIS AREA IS NOT REQUIRED HOWEVER SURFACE SHALL BE CLEAR OF OBSTRUCTIONS AND HAVE A LEVEL SURFACE.
 7. VEGETATION CLEARANCE REQUIREMENTS PER FSS EXHIBIT No. 4.0 SHALL APPLY.



SAN LUIS OBISPO COUNTY FIRE DEPARTMENT
 PRIVATE DRIVEWAY & ACCESS ROAD
 TURNAROUNDS-MODIFIED HAMMERHEAD

Scale: NTS	Adopted: AUG 2014
Fire Safe Drawing No: FP-15	
Sheet No:	OF