COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

APPROVED BY BOARD OF SUPERVISORS

(FOR APPROVAL DATES SEE INDEX)

EXHIBIT 1

FOREWORD

The Ventura County Road Standards establishes uniform policies and procedures for the design and construction of County roads and related structures. The plans and designs contained in this manual constitute reasonable standards, approved by the Board of Supervisors and the Road Commissioner in the exercise of their discretionary authority, that should be followed in the absence of a reasonable engineering need for a variance.

This manual is not a textbook or a substitute for engineering knowledge, experience, or judgment. Neither does it create any legal standard of conduct or duty enforceable by members of the public. Instead, the methods, procedures, and designs contained in this manual should be reviewed by the engineer using them to ensure they are applicable to the project on which that engineer is working.

When, in the engineer's professional judgment, the standards in this manual are not applicable to a given project, the engineer should request a variance from the standards and submit a new design for the structure in question, for approval by the Board of Supervisors or Road Commissioner.

CIVIL ENGINEERS IN CHARGE OF ROAD STANDARDS

Civil Engineers	Registration Number	Standards Dated
W. W. Macmillan	6954	Before 1962
T. M. Morgan	8634	1962-1991
R. E. Quinn Jr.	29614	1991-2000
A. T. Pringle	50408	2000-2009
P. L. Nelson	76144	2009-2013
H. L. Schwind	33532	2013-2015
D. L. Fleisch	79324	2015-Present

COUNTY OF VENTURA GUIDE FOR ENGINEERS DEVELOPERS AND CONTRACTORS

The following publications have been adopted by the County for regulating the design and construction of public improvements constructed by developers; work performed under County or Watershed Protection District permits; land grading; water systems; and sanitary sewer systems:

1. Ventura County Road Standards **(RdStds)**
2. Standard Specifications for Public Works Construction **(SSPWC).**
3. Standard Plans for Public Works Construction **(SPPWC).**
4. Land Development Manual.
5. Standard Land Development Specifications **(SLDS)** which adopt supplement and modify SSPWC.
6. State Standard Plans from CALTRANS **(SSP).**
7. Ventura County Water Works Manual and Sewerage Manual **(VCWWM & VCSM).**
8. Ventura County Water Works Districts Nos. 1, 16, 17, and 19; Ventura County Service Areas 29 and 30; and Lake Sherwood Community Services District Rules and Regulations **(R&R).**
9. Standard cover sheets for grading
10. Individual project plans and specifications **(P&S).**

The scope of each publication is contained within that publication. The publications should be used as follows:

Engineers -Use RdStds, VCWWM and VCSM {also R&R in Districts listed in 5 above) as the general requirements for design. Do not assume contractors have copies of these publications. If these standards are to be used for a project place the plates or formulas from these documents in the P&S. Material in SLDS, SSPWC, SPPWC, and SSP may be referred to in the P&S as contractors may be assumed to have copies of these publications.

NOTE: The Ventura County Standard Designs are no longer being published and should not be used as a reference. Use SPPWC in their place. Where SPPWC does not contain an appropriate design, SSP may be used. If neither have the needed feature, details of the feature must be shown in the P&S.

NOTE: Construction in Ventura County is also regulated by the California Regional Water Quality Control Board for the Los Angeles Region under Order R4-2010-0108 and by the State Water Resources Control Board, Division of Water Quality, by Order 2009-009-DWQ. Use appropriate Best Management Practices (BMPs) to protect water quality as required and provided in these orders.

Developers and Contractors -Use SLDS (which adopts and modifies SSPWC); SPPWC and SSP where specified in the P&S; Grading Cover Sheet and P&S.

FUTURE AMENDMENTS TO THIS MANUAL

Amendments to this manual may be issued from time to time. Users of this publication may contact the Agency to determine the latest revision date. See the "Revision" pages herein that list the latest date for each page. The latest version of this manual is available free on the Public Works Agency's web site at:

http://pwaportal.ventura.org/ESD/ESD/StandardsandManuals/docs/roadstds.pdf

If you have questions or comments about this manual please contact:

Agency: Public Works Agency Transportation Department
800 South Victoria Avenue
Ventura, California 93009-1620

Email: PWA.TransportationDepartment@ventura.org

Phone: (805) 654-2049

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The above road standard plates whose revision dates match the Board of Supervisors approval date below are hereby approved as of that approval date. The above road standard plates whose revision dates predate the Board of Supervisors approval date below were approved as of their respective revision dates.

ADOPTED BY BOARD OF SUPERVISORS: 02-04-2020

APPROVED  DATE: 02-04-2020

ROAD COMMISSIONER

RECOMMENDED  DATE: 02-04-2020

RCE 79324

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

ROAD STANDARD PLATES
APPROVED AS LISTED ABOVE

VENTURA COUNTY ROAD STANDARDS INDEX

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ADOPTED BY BOARD OF SUPERVISORS: 02-04-2020

APPROVED DATE: 02-04-2020

ROAD COMMISSIONER

RECOMMENDED DATE: 02-04-2020

RCE 79324

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

ROAD STANDARD PLATES
APPROVED AS LISTED ABOVE

US UNITS	REVISION:	PLATE A-1

1. GENERAL ROAD DESIGN POLICIES

1.1 Scope

All roads which are to be included in the County Road System shall be designed to conform to the Ventura County Road Standards. Where standards are not definitive, design shall conform to good engineering practice, and be approved by the Director of Public Works (DPW). The California Department of Transportation Highway Design Manual (HDM) generally provides guidance in "good engineering practice" of road design.

1.2 Deviations - Approval Required

Deviations from right-of-way and improvement requirements of the ROAD STANDARDS will be allowed only with the approval of the Board of Supervisors. Deviations from the technical engineering requirements of the ROAD STANDARDS may be granted by DPW, or his designee, or by the Board of Supervisors. Any request for deviation from the requirements of the ROAD STANDARDS shall be accompanied by sufficient supporting data. This supporting data shall be provided by the individual requesting the deviation and submitted and approved prior to utilizing the proposed deviation in design.

1.3 Standard Drawings

The DPW may issue, modify, or cancel standard drawings showing engineering and structural details for road and other construction. Where no standards for an item has been issued by DPW, SPPWC, or CALTRANS Standard Plans shall be used if the construction feature is covered therein. Traffic striping and marking shall comply with California Manual on Uniform Traffic Control Devices (CA MUTCD), latest edition and revision.

1.4 Adjacent to Cities

For areas of the County adjacent to incorporated cities, DPW may require the use of road geometrics compatible with adjacent city standards.

1.5 Additional Right-of-Way Required

Turning lanes at intersections, sight distance requirements, drainage improvements, pedestrian facilities and bicycle lanes, may require right-of-way and improvement widths greater than those shown on the B-series plates.

1.6 Access Policy

The Access Policy adopted by the Board of Supervisors limits the number of lots served by each of the roadway widths shown on the B-series plates. More restrictive limitations than those shown on the B-series plates required by the Fire Department and Sheriff for emergency access will govern.

1. GENERAL ROAD DESIGN POLICIES (continued)

1.7 Curve Plates Basis

The minimum horizontal curve radii provided on the B-series plates are based on a single curve on a straight grade. Similarly, the minimum vertical curve lengths provided on Plate D-1 are based on a single curve on a straight alignment. The criteria used in setting these minimums are sight distance and smooth riding characteristics.

The following design features, within any portion of the road of length equal to the required sight distance, may result in the reduction of sight distance below the required minimum:

a. More than one horizontal curve,
b. More than one vertical curve,
c. More then one allowed grade break, or
d. A combination of vertical curves, grade breaks and horizontal curves.

When such combination of features are included, the alignment must be investigated and redesigned as necessary to maintain the sight distance required by the applicable B-Series plate.

1.8 Water Quality and NPDES Requirements

Construction in Ventura County is regulated by the State Water Resources Control Board, Division of Water Quality and California Regional Water Quality Control Board for the Los Angeles Region under Permit Number CAS 004002, and/or the most current permit. During construction use site appropriate Best Management Practices (BMPs) to protect water quality as required and provided in these orders.

US UNITS	REVISION:	PLATE A-2

2. GENERAL NOTES

2.1 Standard Specifications

All work shall conform to the SLDS.

2.2 PCC Pavement

PCC Pavement may be substituted for AC Pavement on all sections when approved by PWA. See Plate A-7 for design requirements.

When PCC Pavement is used, the PCC Pavement shall extend between intersections. Transition to AC shall be made at the prolongation of the outer edge of the gutter line of the intersecting road. To enhance appearance, black pigmented curing compound may be used on PCC Pavement.

2.3 Alternative Materials

Stabilized soil or stabilized aggregate may be used instead of base materials. Test data supporting equivalency may be required.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

GENERAL NOTES

2. GENERAL NOTES (continued)

2.5 Abbreviations:

AC	Asphalt Concrete
BSB	Bituminous Stabilized Base
DPW	Director of Public Works
CTB	Cement Treated Base
LTB	Lime Treated Base
PMB	Processed Miscellaneous Base
PCC	Portland Cement Concrete
SC	Soil Cement
SS	Select Subbase
PSE	Public Service Easement.
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic in vehicles per day
E.P.	Edge of Pavement
E.S.	Edge of Shoulder
HDM	"Highway Design Manual", California Department of Transportation
SLDS	"Ventura County Standard Land Development Specifications", latest revision
SPPWC	"Standard Plans for Public Works Construction", latest edition with all adopted changes
SSP	"State Standard Plans", by State of California Department of Transportation (Caltrans), latest edition
SSPWC	"Standard Specifications for Public Works Construction", latest edition, with all adopted changes
SSS	"State Standard Specifications", by State of California, Dept. of Transportation (Caltrans), latest edition, with all adopted changes
VCSS	"Ventura County Standard Specifications"

Other abbreviations are in accordance with SSPWC.

3. MATERIAL TESTING

3.1 Administrative

3.1.1 A Materials Engineer acceptable to the DPW shall be employed and paid by the developer of any land development project and by permittee on jobs requiring County permits. A Consulting Engineer employed by the County, shall be the Materials Engineer on County projects.

3.1.2 The Materials Engineer shall be a Registered Civil Engineer knowledgeable in the field of soil mechanics and road materials.

3.1.3 All design for the thickness of pavements, soil and materials testing, and all control testing during construction shall be performed by the Materials Engineer.

3.2 Test Methods and Reports

3.2.1 Materials shall be tested in accordance with the test methods required by the "Standard Land Development Specifications", as well as those supplementary test methods required by the DPW.

3.2.2 A soil classification survey (Unified Soil Classification System) shall be performed at appropriate intervals in the street areas of subdivisions to determine the areas with similar soils. A limited number of soils tests shall be made, as required, prior to pavement design. Tests for pavement design shall not be done until rough grading has been completed to within one foot of final finish surface grade, nor until it is assured that the soils sampled are representative of those at the final grade.

3.2.3 The test report shall include the results of sampling and testing, work sheets for the subgrade strength tests, a plan showing material limits and areas represented by a given subgrade strength test and specific recommendations derived from the test data given. Any other test data not required but which will have an effect on the recommendations shall be included.

3.2.4 During construction a sufficient number of tests shall be made to assure that the quality of construction and component materials is equal to that required by specification. These specified requirements include, but are not limited to, fill densities and supporting qualities, subgrade and base quality and compaction, and asphalt concrete quality and compaction.

When treated soil or aggregate is used, a quality control plan must be submitted and approved by the Agency.

3.2.5 Though materials may be tested for conformity to specification while stockpiled, final acceptance of these materials will be subject to their conformity to specification requirements when in final position on the work.

4. DRAINAGE

4.1 Limited Use of Road Section for Drainage

Road cross-sections may be used to convey water originating from adjoining lots and from adjacent unimproved areas if vehicle and pedestrian use of the road is not unreasonably restricted, and if the road improvements and adjacent property will not be damaged. Facilities shall be installed to remove debris from flow from unimproved areas before the flow enters the street. The hydraulic design shall take into consideration the effect of non-uniform flow at changes in grade, bends and junctions of multiple streams of water.

4.2 Design Storm Flow

"Storm runoff" used in calculating the capacity of road drainage facilities is that which has a ten percent probability of occurrence (ten year average return period), provided that the adjacent lot pads shall not be flooded by the storm runoff which has a one percent probability of occurrence (100 year average return period). Drainage facilities in sumps may combine side inlet catch basins for the ten percent flow, and overflow channels for the excess flow. Additionally, flooding caused by clogged drainage facilities shall be taken into consideration. Culverts and bridges shall be designed to accommodate the two percent (50 year average return period) storm flow. Bridges and large box culverts shall include 2 feet of freeboard to allow for debris bulking. Freeboard requirements for box culverts may be waived at the discretion of the Road Commissioner.

4.3 Urban Roads (Any Section with Curbs)

4.3.1 For the ten percent storm, flow shall be accommodated below the elevation of the top of the curb. To increase the carrying capacity of roads, the curb height may be increased to 8" and/or the cross-slope reduced to not less than one percent, provided the algebraic sum of the cross-slope and the longitudinal slope is equal to or greater than two percent. Design shall insure that curbs shall not be overtopped when water is carried across the crown.

4.3.2 To prevent pavement erosion damage and danger to pedestrians, the flow (based on a ten percent storm) carried in a half road section shall not in any case exceed the value given by the formula $Q = 125/S$ where S is the longitudinal slope of the roadway in percent. In no case shall the maximum value of Q in a half road section exceed 40 cfs.

4. DRAINAGE (continued)

4.3.3 To prevent road damage caused by drainage water escaping from the road gutters, thorough engineering consideration shall be given in the design to contributing factors including the quantity of water, the effects of water carried debris, the effects of non-uniform flow conditions, and the effect of parked cars.

Such consideration may result in more conservative designs than otherwise provided by the Road Standards, including any combination of the following:

a. Reduction of the quantity of water allowed to be carried in the road cross-section by the installation of storm drains and catch basins.
b. Installation of sidewalks in accordance with ADA requirements adjacent to the curbs where not otherwise required.
c. Installation of deflectors at driveways and other vulnerable locations.
d. Utilization of higher curb faces.
e. Changing cross-slope to 1%.

4.3.4 Designs meeting the following criteria will be presumed to meet the requirements of 4.3.3:

Approximate 10% Q in ½ of road - cfs	Gutter Velocity fps	Depth of Flow to Curb Height Ratio	Special Requirements
< 25/S	< 6	≤1.0	None
25/S to 55/S	6 to 8	≤0.5 0.5 to 1.0	None [1]
> 55/S to 125/S	8 to 10	≤1.0	None

[1] Install deflectors at driveways and diagonally across unpaved parkways adjacent to curbs with maximum spacing of 200/(S-2) feet.

S is the longitudinal slope of the roadway in percent.

4.3.5 Interference to traffic flow by storm water on primary, secondary, commercial and industrial roads (Plates B-2 and B-3) shall be minimized by keeping that portion of the roadway designated on Plates B-2 and B-3 free from longitudinally flowing water during the ten percent storm. No cross gutters are permitted across primary or secondary roads (Plates B-2, B-3[A], B-3[B], B-3[C]). No cross gutters are permitted across collector roads (Plates B-4[A] and B-5[A]) except at locations where vehicular traffic is required to stop or where through traffic movement is precluded such as at the single leg of a T-intersection.

4. DRAINAGE (continued)

4.3.6 Minimum gradients required by the B-Series plates are for gutter grades. This may require street center line grades to be greater than the minimum provided by the B-Series plates where gutters are not parallel thereto.

4.3.7 Wherever possible, cul-de-sacs shall drain away from the bulb end.

4.4 Rural Roads (Not Curbed)

4.4.1 To carry drainage from the road right-of-way and from overland sheet flows of adjacent property to the nearest natural drainage way or drainage channel, lined or unlined roadside ditches shall be provided on each side of the road. A ditch may be omitted when adjacent land drains away from the road, and road runoff sheet flows over adjacent land without concentrating.

4.4.2 Roadside ditches shall not be used to intercept or divert natural or artificial channels.

4.4.3 For the ten percent storm, water shall be maintained below the elevation of the outer edge of the shoulder. For the two percent storm, water shall be maintained below the elevation of the edge of pavement.

4.4.4 Roadside ditches shall have adequate culverts at driveways. The minimum shall be 18" in diameter or an equivalent flow capacity arch or rectangular section with a minimum inside dimension of 15".

4.4.5 The side slopes of ditches shall be 2:1 or flatter. Design of the ditch shall be such that the velocity of flow will not erode the ditch. Lining of ditches may be required. Allowable velocities for unlined ditches shall not exceed the recommended velocities tabulated in the "Ventura County Watershed Protection Design Manual" (Ventura County Flood Control Design Manual, July, 1968), Section 314.

4.5 Sump Drainage

a. Catch basins at low points of a road (sumps) shall not utilize grate-only inlets.
b. An outlet for drainage shall be provided from sumps, in addition to catch basins designed for the 10% occurrence storm flow, to insure that the 1% occurrence storm flow will not flood over lot pads.

Material/Lining	Maximum Permissible Mean Velocity, ft/s
Fine Sand	2.0
Coarse Sand	4.0
Sandy Silt	2.0
Silt Clay	3.5
Clay	6.0
Gravel	6.0
Rock Riprap	15.0
Concreted Rock Riprap[1]	25.0
Concrete	40.0
Proprietary Fabricated Materials[2]	See note below

[1] Maximum permissible velocity for a soft-bottom channel shall be controlled by the invert material.

[2] Maximum permissible velocity for proprietary fabricated materials shall be based on literature specific to the material and is subject to approval.

4. DRAINAGE (continued)

4.6 Physical Standards for Drainage Facilities

The California Department of Transportation Highway Design Manual (HDM), Chapter 850, shall be the criteria for the physical design of drainage facilities in County road right-of-way except as otherwise provided herein. Where drainage facilities within County road right-of-way are or will be operated and maintained by the Ventura County Watershed Protection District, their standards must also be complied with.

4.6.1 References in the HDM to SSS shall be replaced by appropriate sections of the SLDS. Where special construction methods are required and SLDS does not provide for such method, special provisions will be required.

4.6.2 Non-Reinforced Cast-in-Place concrete pipe cannot be used in County roads.

4.6.3 Storm drainage facilities substantially paralleling the road centerline and under the pavement section shall be one of the following:

- Reinforced concrete pipe (cast-in-place or precast)
- Reinforced concrete box (cast-in-place or precast)
- Ribbed polyvinyl chloride pipe
- Exterior Corrugated/Interior Smooth, High Density Polyethylene Pipe
- Asphalt Lined and Coated Galvanized or Aluminized Corrugated Steel Pipe with smooth lining of cement or asphalt

4.6.4 Where design flow velocities of drainage facilities exceed 20 fps, adequate protection against erosion shall be provided in the invert of pipe and lined channels.

4.6.5 Flexible Pipe: Corrugated Steel Pipe, Ribbed PVC-PS46 and HDPE-Exterior Corrugated/Interior Smooth shall have a minimum cover of 24" measured from top of rigid pavements or the bottom of flexible pavement base course and shall have a maximum cover of 15' without special approval of calculation showing adequate strengths at other heights of cover.

4.6.6 Local depressions for catch basins shall not extend into the curb returns at intersections. They shall not interfere with curb ramps at any location.

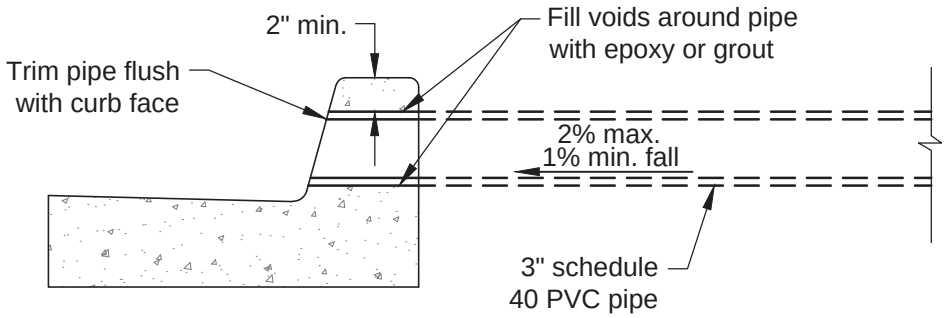
4.6.7 Grates for catch basins in the roadway and shoulder must be traffic-load rated and bicycle safe.

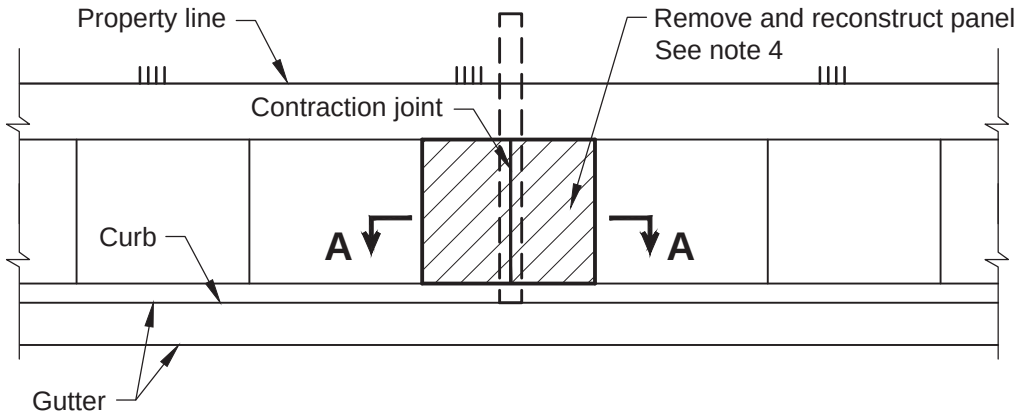
4.7 Lot Drainage

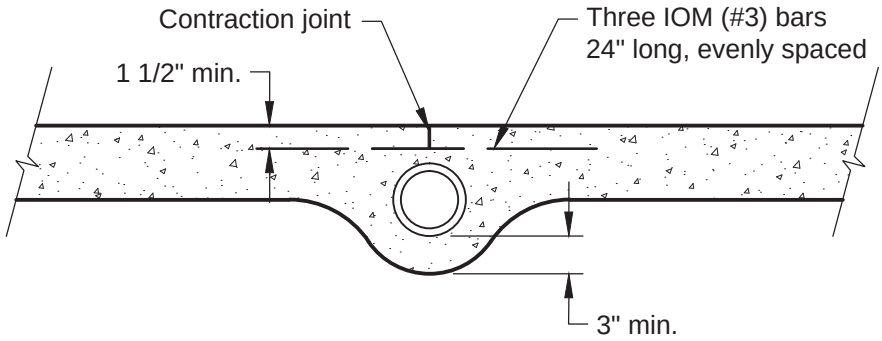
4.7.1 The direct connection of roof drains and roof gutter drains to conduits under sidewalks is prohibited by the Ventura Countywide Stormwater Quality Management Program.

4.7.2 Drainage from landscaped areas of lots may be directed to the road gutter by properly designed conduits under sidewalks.

US UNITS	REVISION:	PLATE A-4







SECTION A-A
NOT TO SCALE

NOTES:

1. This configuration may be used only where there is an existing curb in residential areas. For new construction use SPPWC Plan 150.
2. Through curb drains may be used only as provided by Plate A-4c (Section 4.7) to drain landscape areas.
3. Hole through curb must be cored. If curb is damaged, reconstruct per SPPWD Plan 150.
4. If sidewalk is existing, remove a panel by saw-cutting between adjacent construction joints, and replace per Plate E-3.
5. The direct connection of roof drains and roof gutter drains to conduits under sidewalks is prohibited by the Ventura Countywide Stormwater Quality Management Program.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

DRAINAGE
CURB DRAIN THROUGH
EXISTING CURB

SHEET 5 OF 5

US UNITS	REVISION:	PLATE A-5

5. ROADWAY FOUNDATION AND SLOPE CRITERIA

5.1 Cross-Section Stability

Roadways shall be located on a stable foundation. The slopes, both uphill and downhill from the roadway, shall be stable. Slopes outside the road right-of-way lines, shown on "B" series plates as "2:1 typ", shall be constructed in accordance with the Ventura County Building Code and the Land Development Manual, Chapters 7 and 8. These requirements may result in slopes other than 2:1.

5.2 Expansive Soils Stabilization

When basement soil R-value is 14 or less, 4" of PMB shall be placed under curbs, gutters and sidewalks.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

FOUNDATIONS & SLOPES

6. ASPHALT CONCRETE PAVEMENT DESIGN

6.1 General Principles

The design of asphalt concrete pavement is based on the principle of layers of progressively decreasing strengths from the finished surface to the sub-grade. In each case, the finished surface consists of a layer of asphalt concrete pavement of the thickness computed by the design formulas, but not less than a specified minimum thickness.

The design method provides a numerical solution to the thickness of any layer based on the following:

a. The Traffic Index, a measure of the amount and type of truck traffic that is expected over the 20-year period following construction.

b. The physical strength, measured by gravel equivalent, of the layer being designed.

c. The physical strength, measured by R-Value, of the layer immediately below the layer being designed.

d. The minimum physical strength, measured by R-Value, of the sub-grade material.

e. The thickness and physical strength, measured by gravel equivalent, of the material above the layer being designed, if any.

By varying the types of materials used, a number of different, acceptable pavements can be designed for each combination of Traffic Index and sub-grade R-Value.

6.2 Mix Design

C1 or C2-PG 64-10 for Plates B-4, B-5, B-5a and B-8
B-PG 64-10 for Plates B-2, B-3, B-3a and B-7

6. ASPHALT CONCRETE PAVEMENT DESIGN (continued)

6.2 Economic Considerations

The relative costs of the materials making up the layers of pavement vary from time to time resulting in differing combinations of layers being the most economical at any given time.

In selecting a complete pavement design, the following should be taken into consideration:

a. Sub-grade soils can be improved in strength by several types of treatment which do not require the material to be removed from the site.

b. Base materials with R-Values less than that of Standard Specification PMB may be used economically with the lower Traffic Indices. A note on the plans or a special provision is needed.

c. Existing bases and surfacing can be reused. This may require treatment in place or removal and reprocessing.

d. Materials cannot be compared on cost per ton basis alone because:

   (l) Higher strength materials require less thickness when used in place of lower strength materials.

   (2) Elimination of a complete layer by thickening the layer above may result in savings in construction costs not reflected in per ton costs alone.

   (3) Gravel equivalent of A.C. increases when thickness is over 0.4 feet.

e. Thinner overall thickness of the layered pavement sections results in less excavation and may avoid interference with or damage to utility and drainage facilities.

f. Current scarcity in the supply of any material used.

Several alternate sections should be designed, the overall cost of each estimated, and the most economical section specified. Where costs are nearly equal or where relative costs of materials are changing rapidly, it may be desirable to provide more than one acceptable design from which the contractor can choose the one to construct.

6. ASPHALT CONCRETE PAVEMENT DESIGN (continued)

6.3 Design Method

6.3.1 Nomenclature

T = Thickness of layer in feet.

TI = Traffic Index from B-series Plates or a greater value indicated by a traffic engineering study.

GF = Gravel factor of material in a layer.

GE = Gravel equivalent of the pavement or a layer. The theoretical thickness of the pavement or layer if composed entirely of material with a GF of one.

SF = Safety factor. An additional thickness of A.C. expressed as gravel equivalent.

R = Minimum resistant R-Value of material.

AC = Subscript referring to Asphalt Concrete layer.

B = Subscript referring to Base layer.

SB = Subscript referring to Subbase layer.

SG = Subscript referring to Subgrade.

MIN = Subscript referring to Minimum Allowable Thickness of a layer.

6.3.2 Constants for AC

GF = 2.5 for TI ≤ 5.

GF = 5.67 $(TI)^{½}$ for TI > 5.

T_{AC} min. over Base material or stabilized subgrade = 0.21 feet.

T_{AC} min. over unstabilized Subgrade = 0.3 feet.

6. ASPHALT CONCRETE PAVEMENT DESIGN (continued)

6.3.3 Constants for Bases and Subbase

Material	R*	GF	SF_{AC}** Ft	T Min.,Ft.
SS	60	1.0	0.00	0.33 (Subbase only)
PMB	78	1.1	0.16	0.33
LTB	80	***	0.18	0.50
SC	80	1.2	0.00	0.50
BSB	80	1.3	0.00	0.50
CTB	80	1.2	0.18	0.50

* Maximum R-Value, lesser values must be used if Standard Specifications are modified.

** For TI<8.0, SF_{AC}=0.

*** LTB GF = 0.9 + (Unconfined compressive strength in PSI/1000)

6.3.4 Conventional Design

A layered system of A. C., base and sub-base over the subgrade. The material in each layer must have a higher R-Value than the material below it. The thickness of each layer is designed, starting with the A.C. surface layer and working down, as follows:

a. $GE_{AC} = 0.0032 \times TI \times (100 - R_B) + SF_{AC}$

b. $T_{AC} = GE_{AC}/GF_{AC}$ If $T_{AC} < 0.21$, use $T_{AC} = 0.21'$

c. $GE_B = 0.0032 \times TI \times (100 - R_{SB}) - (T_{AC} \times GF_{AC})$

d. $T_B = GE_B/GF_B$ If $T_B < T_{MIN}$, use $T_B = T_{MIN}$

e. $GE_{SB} = 0.0032 \times TI \times (100 - R_{SG}) - (T_{AC} \times GF_{AC}) - (T_B \times GF_B)$

f. $T_{SB} = GE_{SB}$ If $T_{SB} < T_{MIN}$, then either

(l) $T_{SB} = T_{MIN}$ or

(2) $T_B = (GE_B + GE_{SB})/GF_B$ and $T_{SB} = 0$

6. ASPHALT CONCRETE PAVEMENT DESIGN (continued)

6.3.5 Thick Lift Design

An A.C. surface layer, 4" or more in thickness, placed either directly on the subgrade (stabilized* or unstabilized) or over a layer of base material* designed as follows:

a. $GE_{AC} = 0.0032 \times TI \times (100 - R_{SG}) - T_B \times GF_B$

b. $T_1 = GE_{AC}/GF_{AC}$

c. If $T_1 \leq 0.4'$, $T_{AC} = T_1$

d. If $T_1 > 0.4'$, $T_2 = [GE_{AC} - (0.4 \times GF_{AC})] / (1.3 \times GF_{AC})$

e. If $T_2 \leq 0.4'$, $T_{AC} = 0.4' + T_2$

f. If $T_2 > 0.4'$, $T_3 = [GE_{AC} - (0.92 \times GF_{AC})] / (1.5 \times GF_{AC})$

g. Then $T_{AC} = 0.8' + T_3$

*Base or stabilized subbase shall be 6" or thicker.

7. PORTLAND CEMENT CONCRETE (RIGID) PAVEMENT DESIGN

7.1 Thickness

7.1.1 Rigid (PCC) Section Design shall follow Caltrans HDM Section 620.

Subgrade shall be prepared per SSPWC 301-1.

7.2 Joints & Construction

7.2.1 PCC pavement shall be constructed per SSPWC 302-6 using the PCC class from 7.1 above.

7.2.2 Contact (Construction) joints and weakened plane joints shall be per SPPWC 134. Contact joints shall be installed around catch basin aprons and manhole slabs.

7.2.3 **T**he joint layout plan shall provide that, in general, joints are spaced so as the slabs between joints have a maximum dimension of 15 feet and a minimum dimension of 5 feet. To the extent practicable, longitudinal joints shall coincide with lane lines. See American Concrete Pavement Association publication "Design and Construction of Joints for Concrete Streets" for good design practice.

7.3 Concrete Class

Structures (Reinforced) Class 560-C-3250
Pavement Minimum Class 520-A-2500
Curbs, gutters, cross gutters, driveways, and walks Class 520-C-2500
Higher Classes shown on plans or in specifications will govern **.**

US UNITS	REVISION:	PLATE B-1

NOTES APPLICABLE TO ALL B-SERIES PLATES

1. Pavement widths in curbed sections, measured between top inside faces of curbs.

2. Additional right-of-way width or easements may be required for utilities. The PSE's shown on Plate B-5 shall be offered for dedication.

3. Drainage to be designed in accordance with Plate A-4.

4. Pavement to be designed in accordance with Plate A-6 or A-7.

5. No superelevation where design speed is 40 MPH or less.

6. At intersections of two road types, use curb return radius for type requiring the longer radius.

7. Curbs and gutters, median curbs and cross gutters per Plate E-1. Sidewalks per Plate E-3.

8. Hinge point of slope shall be a minimum of one foot away from sidewalks.

9. Where maximum number of lots served is a criterion, extension of roads; additional divisions of tributary land, including redivision of lots exceeding two acres in size; and rezoning effects shall be considered.

10. Prime coat may be omitted if all of the following conditions are met:

    a) Asphalt layer is placed within two weeks of completion of base course.
    b) Traffic is not routed over completed base before paving.
    c) Construction is completed during the dry season of May through October.

    If construction is performed during the wet season of November through April, prime coat may be omitted if no rain occurs between completion of base course and paving and the time between completion of base and paving is reduced to three days.

    Where prime coat has been omitted and
    (l) rain occurs,
    (2) traffic is routed over base course, or
    (3) paving is delayed,

    measures shall be taken to restore base course, subbase course and subgrade to conditions that will meet specifications, as directed by the Engineer.

11. Roadside parking must be restricted to one side for pavements widths less than 40'. Parking is prohibited on alleys, if the alley serves as a Fire Department Access.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SECTION INDEX & NOTES

NOTES APPLICABLE TO ALL B-SERIES PLATES (continued)

12. Minimum road gradients shall be as follows:

    a) For roads where both gutters are built on cut or not more than two feet of fill:

Land Gradient	Minimum Gutter Gradient
>2.5%	1%
2.5% to 1%	0.4 x Land Gradient
<1%	0.4%

    b) For roads where either gutter is built on fill more than two feet deep:

Land Gradient	Minimum Gutter Gradient
>1.67%	1%
1.67% to 1%	0.6 x Land Gradient
<1%	0.6%

    c) Where the end of a new road is not controlled by joining an existing road, or by a major land form constraint, the designer of the road shall consider minor realignments to avoid road grades under 1%.

    d) For roads using Plate B-7, minimum centerline grades shall be the same as the minimum gutter grades in "a" above.

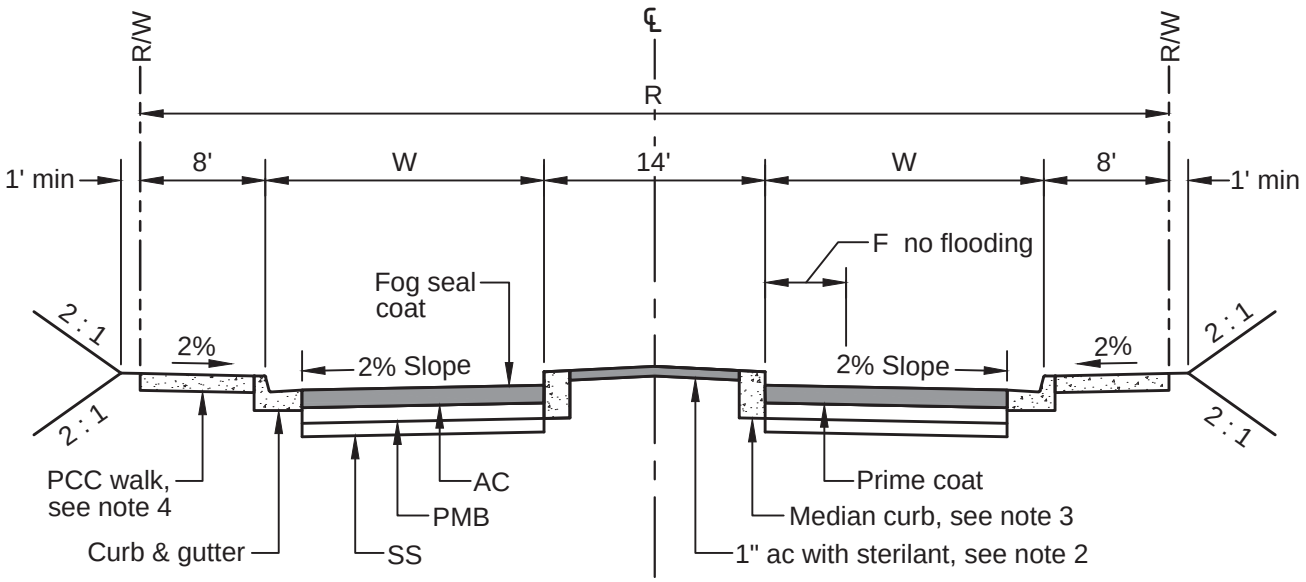
    e) "Land Gradient" shall mean the natural gradient of the land prior to grading measured along the general direction of the road.

13. Maximum road gradients for Plate B-5 sections may be increased in hillside areas to the following maximum:

	B5[A]	B5[B]	B5[C]
Over 200' length	15%	15%	15%
Less than 200' length	15%	20%	25%

14. Above-ground utility in parkways and sidewalks shall be located per SPPWC Standard Plate 101-2.

US UNITS	REVISION:	PLATE B-2



DESIGN CRITERIA	B-2 [A] PRIMARY	B-2 [B] SECONDARY
Right-of-way width, R	118'	94'
Pavement width, W	44'	32'
Flooding free width, F	26'	14'
ADT in 20 years, max	36,000	24,000
	Applies to B-2 [A] & B-2 [B]	
Superelevation, max	0.07	
Curb return radius, min	35'	
Curve length, min/max	500'/2640'	
Tangent length between curves, min	400'	
Traffic index	8.0	
	Applies to B-2 [A] & B-2 [B]	
	Flat terrain	Mountains
Design speed	60 mph	50 mph
Curve radius, min without superelevation	2400'	1400'
Gradient, min/max (%) (see plate B-1b	1.0/3.0	1.0/5.0
Stopping sight distance	580'	440'

NOTES:
1. Emergency parking only.
2. Median planter boxes may be required.
3. Median curbs required only adjacent to intersections. Extend through end of left turn pocket and transition.
4. Sidewalks, curb and gutter may be omitted when approved by the Road Commissioner and the Planning Director.
5. Provide extra R/W width at intersections for sight distance as detailed on Plate D-5.
6. Superelevated curve radii, superelevation and transitions shall be in accordance with sections 202 & 203 HDM.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:

APPROVED BY: J P

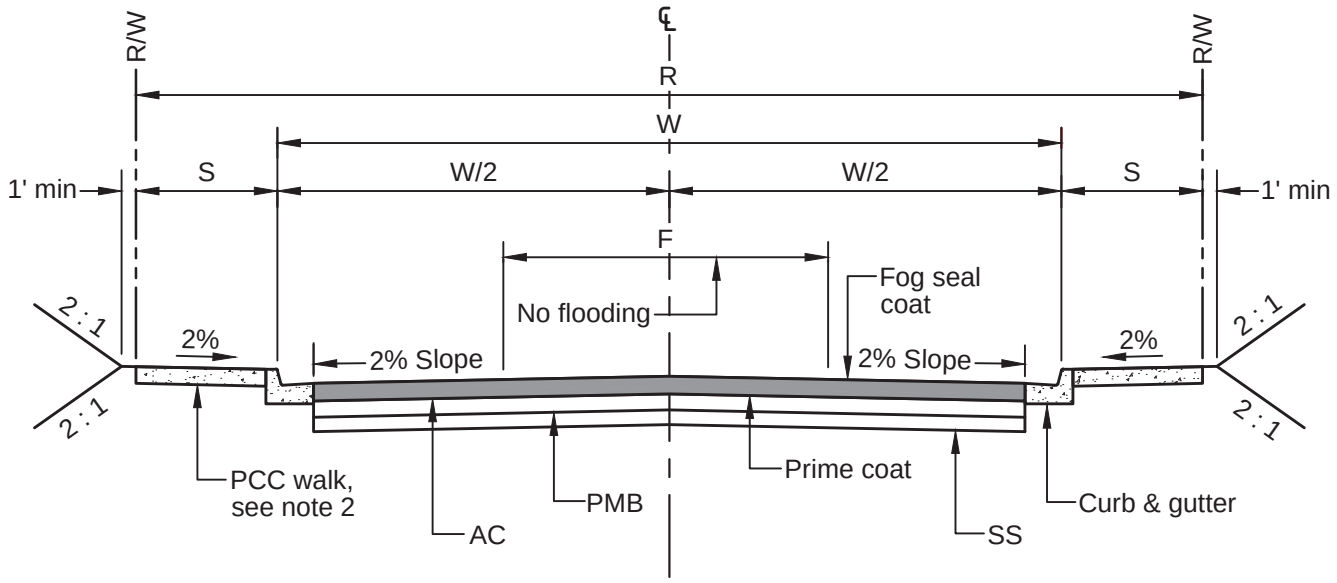
RECOMMENDED BY: D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

CONTROLLED ACCESS PRIMARY AND SECONDARY ROADS

US UNITS	REVISION:	PLATE B-3



DESIGN CRITERIA	B-3 [A] SECONDARY	B-3 [B] MAJOR COMM OR IND	B-3 [C] COMM OR IND	B-3 [D] MINOR COMM OR IND
Right-of-way width, R	80'	80'	68'	60'
When req'd by Planning Comm.	-	96'	-	-
Pavement width, W	64'	64'	52'	40'
Flooding free width, F	28'	28'	16'	4'
Sidewalk width, S	8'	8'	-	-
When req'd by Planning Comm.	-	8'-16'	8'	10'
Curb return radius	35'	45'	45'	45'
Curve length, max/min	300'/2640'	300'/2640'	-	-
Tangent length between curves, min	200'	200'	-	-
Traffic index	7.5	7.5	7.5	7.0
ADT in 20 years (max)	>20,000	>16,000	8,000-16,000	<8,000
Design speed	40 mph	40 mph	40 mph	30 mph
Curve radius, min	800'	800'	550'	300'
Gradient, min/max (%) (see Plate B-1 Notes 3 & 13)	1.0 / 5.0	1.0 / 5.0	1.0 / 6.0	1.0 /10.0
Stopping sight distance	300'	300'	300'	60'

NOTES:

1. For B-3 [C], provide extra R/W width at intersections for sight distance as detailed on plate D-5.
2. Sidewalks, curb and gutter may be omitted in rural areas, when approved by the Road Commissioner and the Planning Director.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

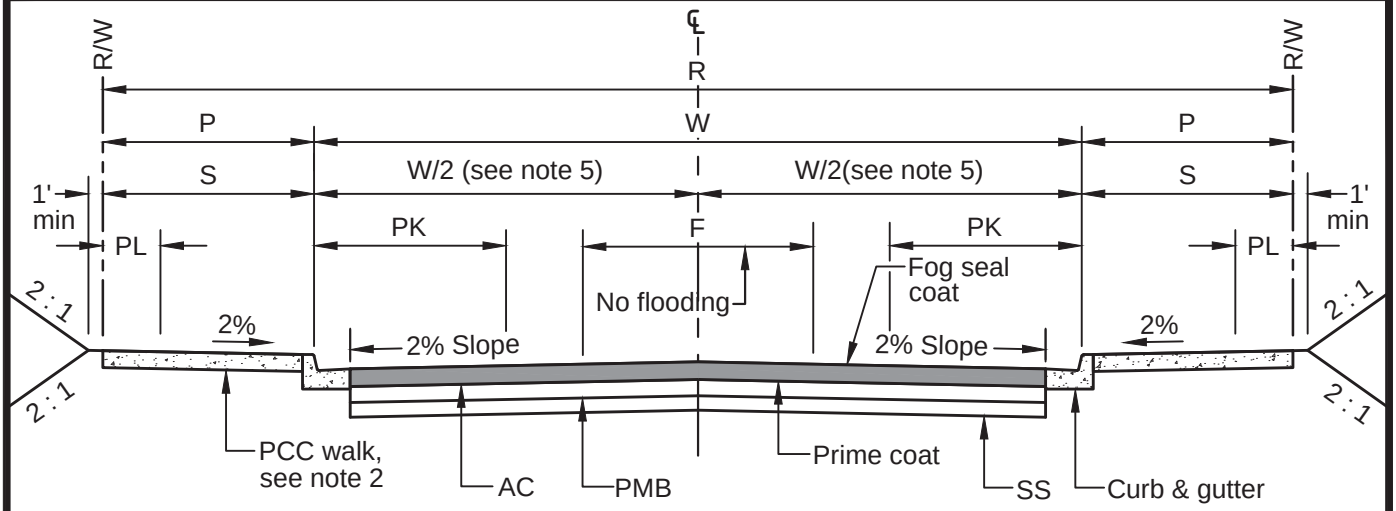
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SECONDARY FREE ACCESS AND COMMERCIAL/INDUSTRIAL ROADS

US UNITS	REVISION:	PLATE B-3S



DESIGN CRITERIA	B-3 [D] COMM OR IND COLLECTOR	B-3 [C] MINOR COMM OR IND	B-3 [B] MINOR COMM OR RES W/ MIXED PARKING[3]	B-3 [A] MINOR COMM OR RES
Right-of-way width, R, min	68'	60'	71'/80'	64'
Pavement width, W, min	52'	40'	49'/58'	40'
Parking width, PK	8'	8'	8' Par/17' Ang (see note 3)	8'
Flooding free width, F	12'	12'	12'	12'
Parkway width, P, min	8'	10'	11'	12'
Sidewalk width, S, min	6'	6'	11'	12'
When req'd by Planning Comm.	8'	10'	10'	10'
Planter / Planting Strip, PL	2'	4'	-	-
Curb return radius	45'	45'	45'	45'
Traffic index	7.5	7.0	7.0	7.0
ADT in 20 years (max)	16,000	8,000	8,000	8,000
Design speed	40 mph	30 mph	30 mph	30 mph
Curve radius, min	550'	300'	300'	300'
Gradient, min/max (%) (see Plate B-1 Notes 3 & 13)	1.0 /6.0	1.0 / 10.0	1.0 / 10.0	1.0 / 10.0
Stopping sight distance	300'	60'	60'	60'

NOTES:

1. For additional details see Saticoy Area Plan.
2. For B-3 [D], provide extra R/W width at intersections for sight distance as detailed on plate D-5.
3. Sidewalks, curb and gutter may be omitted in rural areas, when approved by the Road Commissioner and the Planning Director.
4. Mixed parking can be Parallel parking on one side of the road and Angled parking on the other or Angled parking on both sides of the road. Angled parking will be at 45°.
5. Addition of Class II or III Bike lanes as required per the Saticoy Area General Plans.
6. In the case of mixed parking where W=49', W/2= 20'(w/Par.) and 29' (w/ Ang.)
7. For additional requirements including bike and parking facilities, refer to Saticoy Area Plan.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

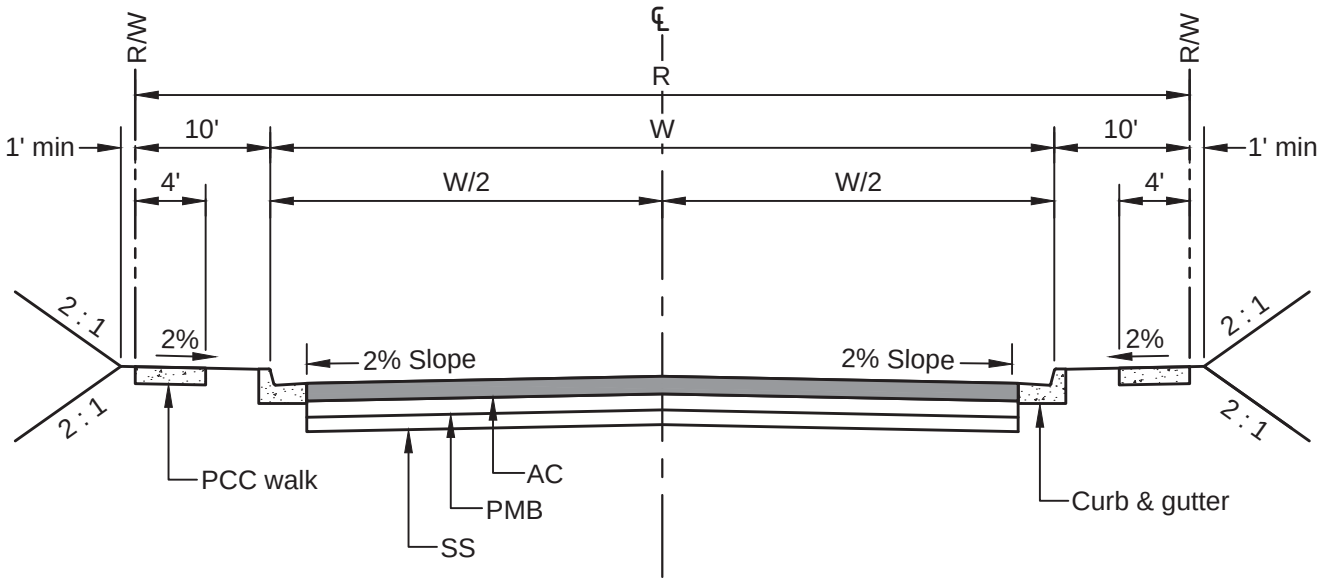
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SATICOY AREA

COMMERCIAL/INDUSTRIAL/ RESIDENTIAL ROADS

US UNITS	REVISION:	PLATE B-4P



DESIGN CRITERIA	B-4 [A] COLLECTOR	B-4 [B] MINOR	B-4 [C] CUL-DE-SAC
Right-of-way width, R	60'	56'	52'
Pavement width, W	40'	36'	32'
Curb return radius	25'	25'	25'
Traffic index, > 200 lots served	6.5	n/a	n/a
Traffic index, 141-200 lots served	6.0	n/a	n/a
Traffic index, 51-140 lots served	5.5	5.5	n/a
Traffic index, 21-50 lots served	5.0	5.0	5.0
Traffic index, ≤ 20 lots served	4.5	4.5	4.5
Lots served, max - cul-de-sac			
Lot size ≤ 20,000 sf	170	50	10
Lot size > 20,000 sf	200	140	39
Lots served, max (other)	550	140	39
Design speed	30 mph	25 mph	25 mph
Curve radius, min	300'	250'	200'
Gradient, min/max (%) (see Plate B-1)	1.0/12.0	1.0/2.0	1.0/15.0
Stopping sight distance	200'	160'	160'
Cul-de-sac length max			
Lot size ≤ 20,000 sf	any	800	200
Lot size > 20,000 sf	any	any	200
Loop length, max	any	600'	0

NOTE:
For Main Street improvements see Piru Area Plan

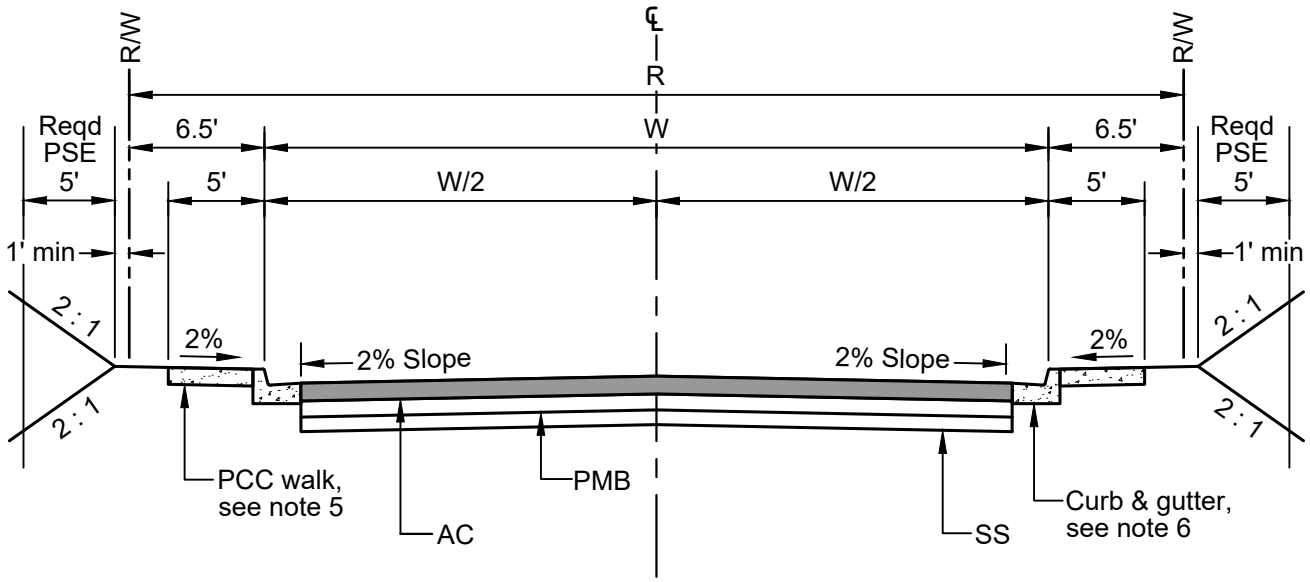
ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS
PIRU AREA
URBAN RESIDENTAL ROADS
WITH PARKWAYS

US UNITS	REVISION:	PLATE B-5



DESIGN CRITERIA	B-5 [A] COLLECTOR	B-5 [B] MINOR	B-5 [C] CUL-DE-SAC
Right-of-way width, R	53'	49'	45'
Pavement width, W	40'	36'	32'
Curb return radius	25'	25'	25'
Traffic index, > 200 lots served	6.5	n/a	n/a
Traffic index, 141-200 lots served	6.0	n/a	n/a
Traffic index, 51-140 lots served	5.5	5.5	n/a
Traffic index, 21-50 lots served	5.0	5.0	5.0
Traffic index, ≤ 20 lots served	4.5	4.5	4.5
Cul-de-sac access			
Max lots served by cul-de-sacs			
Lot size ≤ 20,000 sf	170	50	10
Lot size > 20,000 sf	200	140	39
Lots served, max (loop)	550	100	0
Lots served, max (other)	550	140	39
Design speed	30 mph	25 mph	25 mph
Curve radius, min	300'	250'	200'
Gradient, min/max (%)	1.0 / 12.0	1.0 / 12.0	1.0 / 15.0
(see Plate B-1 Notes 3, 13 & 14)			
Stopping sight distance	200'	160'	160'
Cul-de-sac length max			
Lot size ≤ 20,000 sf	any	800'	200'
Lot size > 20,000 sf	any	any	200'
Loop length, max	any	1600'	0

ADOPTED BY BOARD OF SUPERVISORS: 02-04-2020

REVISION DATE:	DESCRIPTION:	APPROVED:
01/15/2020	Added R/W reference to Plate E-2b	J P
		RECOMMENDED: D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

URBAN RESIDENTIAL ROADS

US UNITS	REVISION:	PLATE B-5

NOTES

1. Changes in R/W and improvements required between Plate B-5 and other plates shall occur only at intersections, not in midblock, except as necessary to provide right-of-way for driveways per Plate E-2b.

2. When using the design shown on Plate B-5, the transitions at intersections as shown on Plate D-9 and the sidewalk widening as shown on Plate D-10 shall be installed.

3. Where the land gradient (Plate B-1b, Section 13.e) is greater than 10%, slopes for Plate B-5 may be increased to 15% for reaches more than 100' away from intersections.

4. On Loops and Cul-de-sacs in hillside areas, crown may be eliminated and a 2% cross-fall provided, for the entire width of pavement, toward the cut slope. A Type A-1 curb may be used on the high side.

5. Sidewalk Requirements:

Abutting Lot Size	Requirement
1 Acre or smaller	PCC Sidewalk
Larger than 1 Acre and smaller than 2 Acres	PCC Sidewalk or alternate approved by Director
2 Acres or larger	No sidewalk required. Slope area behind curb up at 4%.

Preapproved alternates are:
   a. AC 4" thick, C2-PG 64-10 thickened at driveways per Plate E-1.1.
   b. AC 2" thick, C2-PG 64-10 over 4" of PMB. Driveways shall be per Plate E-1.1.

6. Where abutting lots are 2 Acres or larger, standard curb and gutter may be replaced by a rolled curb and gutter, or by a PCC gutter with sloped paving extending to a height of 6" above the gutter flow line. Rolled curb and gutter shall be per State Standard Plan A87A, Type E.

ADOPTED BY BOARD OF SUPERVISORS: 02-04-2020

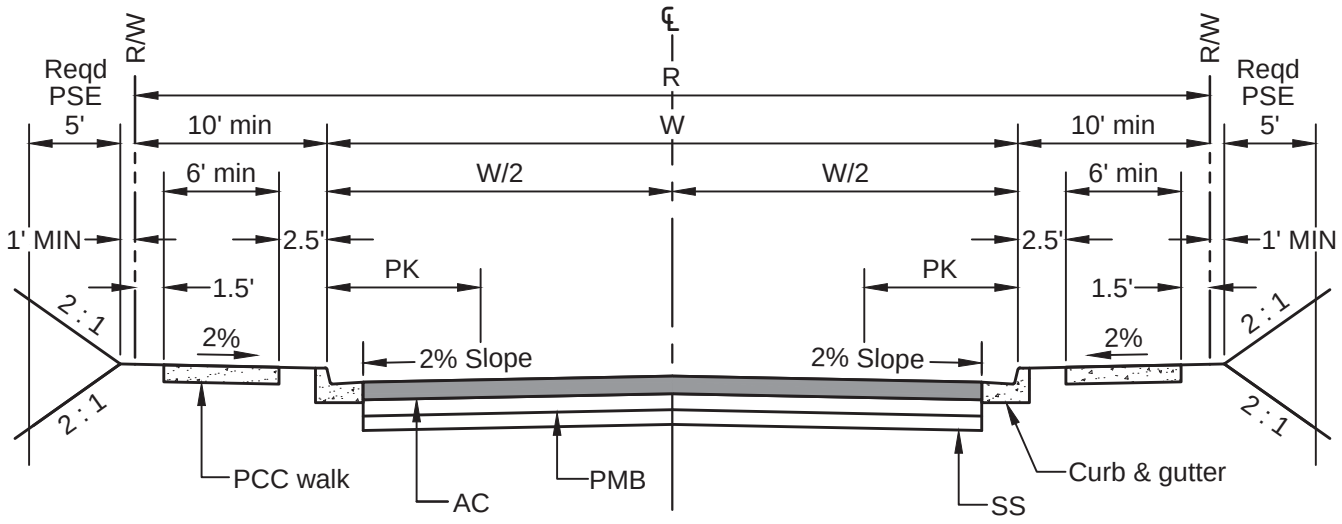
REVISION DATE:	DESCRIPTION:	APPROVED:
01/15/2020	Added R/W reference to Plate E-2b	J P
		RECOMMENDED: D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

URBAN RESIDENTIAL ROADS

US UNITS	REVISION:	PLATE B-5S



DESIGN CRITERIA	B-5 [B] MINOR		
Right-of-way width, R, min	56'		
Pavement width, W, min	36'		
Parking width, PK	8'		
Curb return radius	25'		
Traffic index, > 200 lots served	n/a		
Traffic index, 141-200 lots served	n/a		
Traffic index, 51-140 lots served	5.5		
Traffic index, 21-50 lots served	5.0		
Traffic index, ≤ 20 lots served	4.5		
Lots served, max - cul-de-sac	-		
Lot size ≤ 20,000 sf	50		
Lot size > 20,000 sf	140		
Lots served, max (loop)	100		
Lots served, max (other)	140		
Design speed	25 mph		
Curve radius, min	250'		
Gradient, min/max (%)	1.0 / 12.0		
(see Plate B-1 Notes 3, 13 & 14)			
Stopping sight distance	160'		
Cul-de-sac length max	-		
Lot size ≤ 20,000 sf	800		
Lot size > 20,000 sf	any		
Loop length, max	1600'		

NOTE:
For additional details see Saticoy Area Plan

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

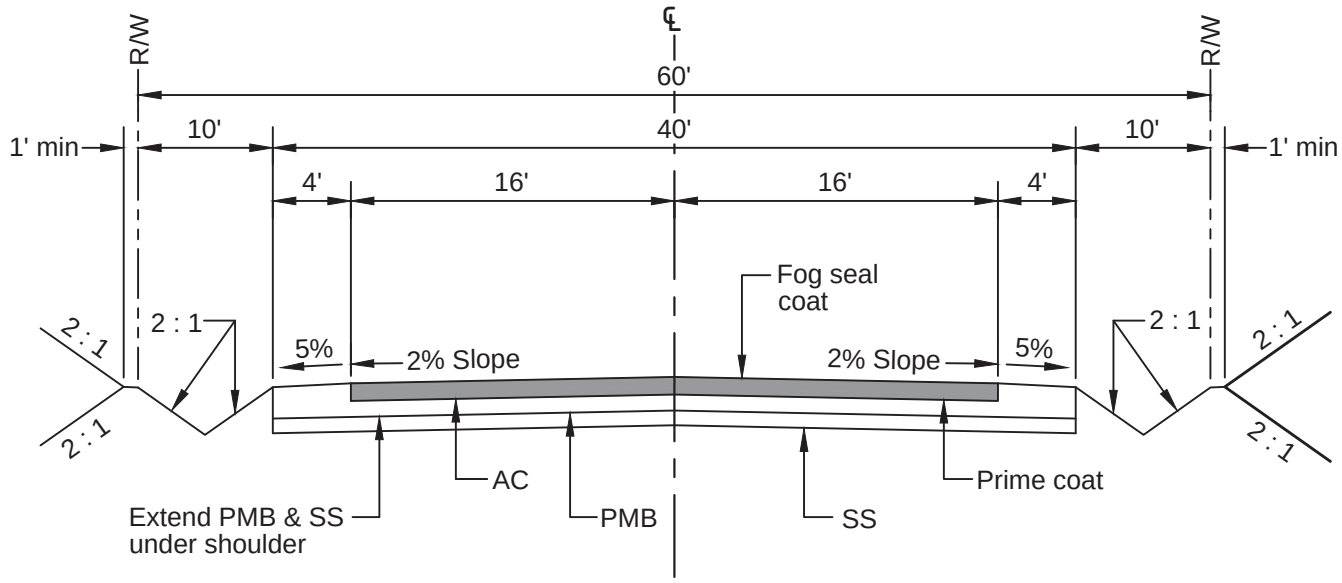
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SATICOY AREA

URBAN RESIDENTIAL ROADS WITH PARKWAYS

US UNITS	REVISION:	PLATE B-7



DESIGN CRITERIA	B-7 [A] COLLECTOR	B-7 [B] RURAL
Traffic index	7.0	6.5
ADT in 20 years, max	8000	4000
Design speed	50 mph	40 mph
Curve radius, min		
Without superelevation	1375'	550'
With max superelevation	850'	n/a
Gradient, min/max (%)	1.0/10.0	1.0/12.0
(see Plate B-1, Notes 3 & 13)		
Stopping sight distance	440'	300'
Superelevation, max	0.11	n/a

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

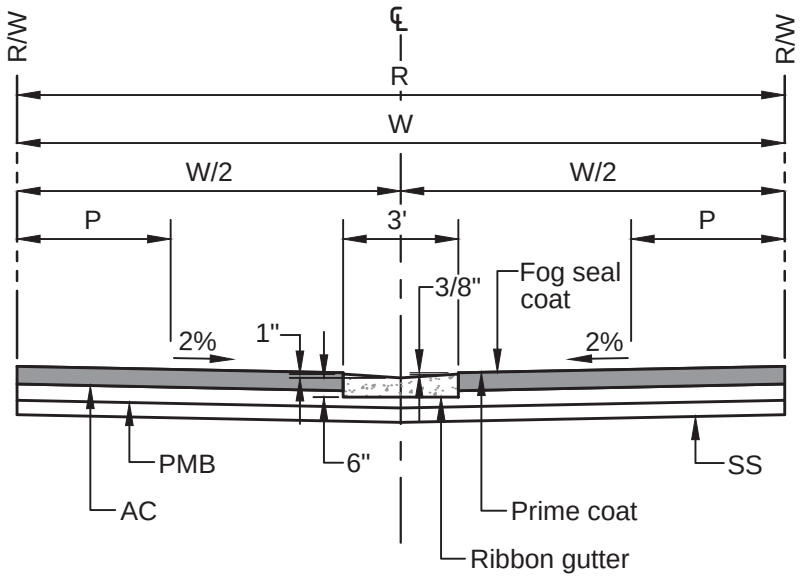
REVISION DATE:	DESCRIPTION:	APPROVED BY: J P
		RECOMMENDED BY: D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

RURAL ROADS WITHOUT CURBS

US UNITS	REVISION:	PLATE B-8S



DESIGN CRITERIA	B-8 [B] TWO-WAY ALLEY	B-8 [A] ONE-WAY ALLEY		
Right-of-way width, R	20'	20'		
Pavement width, W	20'	20'		
Parkway width, P	-	4'		
When req'd by Planning Comm.	-	-		
Curb return radius	20'	20'		
Curve lenght, max/min	-	-		
ADT in 20 years (max)	n/a	n/a		
Design speed	10 mph	10 mph		

NOTES:
1. For additional details see Saticoy Area Plan.
2. Parking is prohibited on alleys, if the alley serves as a Fire Department Access.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

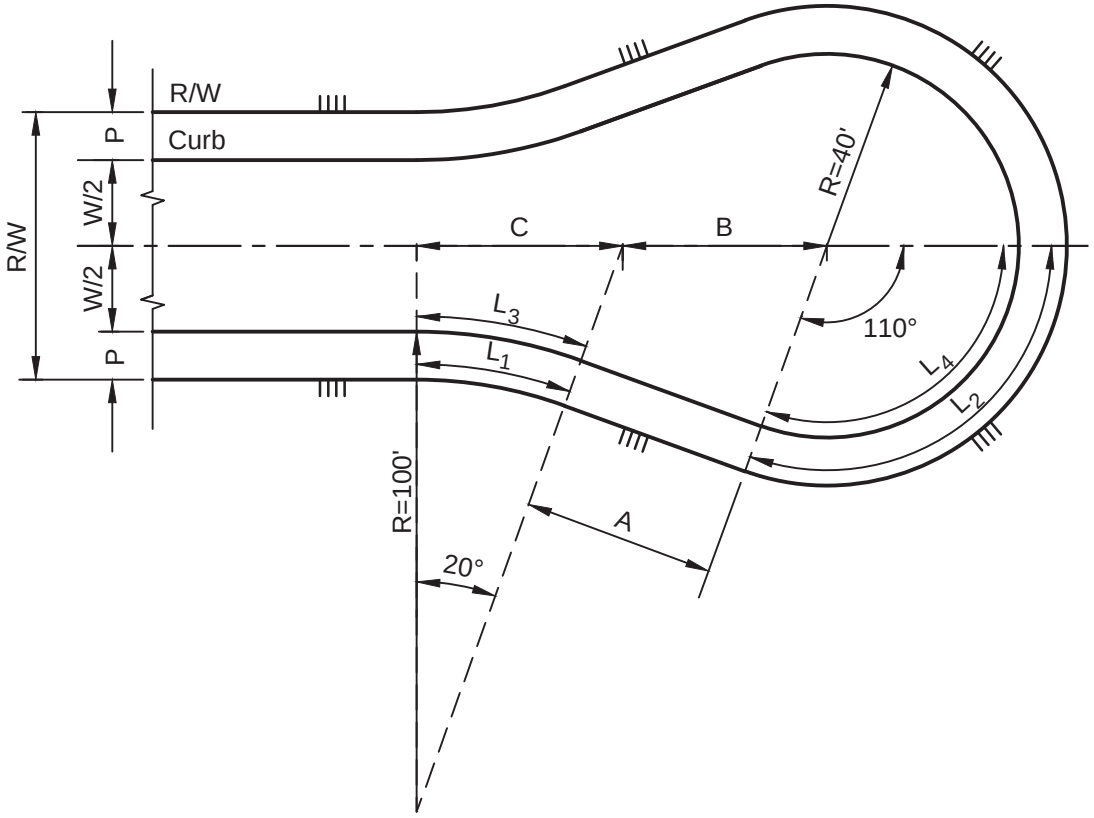
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SATICOY AREA

PRIVATE ROADS/ALLEYS WITH PUBLIC ACCESS

US UNITS	REVISION:	PLATE C-2



NOTES:

1. Roadside parking must be restricted to one side for pavements widths less than 40'.
2. For maximum length of cul-de-sac refer to plate B series.

PLATE	W	W/2	R/W	A	B	C	P	L_1	L_2	L_3	L_4
B-4P [A]	40'	20'	60'	33.79'	35.96'	43.68'	10'	31.42'	95.99'	34.91'	76.79'
B-4P [B]	36'	18'	56'	39.64'	42.18'	42.95'	10'	31.42'	95.99'	34.91'	76.79'
B-4P [C]	32'	16'	52'	45.49'	48.40'	42.22'	10'	31.42'	95.99'	34.91'	76.79'
B-5 [A]	40'	20'	53'	33.79'	35.96'	43.68'	6.5'	32.64'	89.27'	34.91'	76.79'
B-5 [B]	36'	18'	49'	39.64'	42.18'	42.95'	6.5'	32.64'	89.27'	34.91'	76.79'
B-5 [C]	32'	16'	45'	45.49'	48.40'	42.22'	6.5'	32.64'	89.27'	34.91'	76.79'

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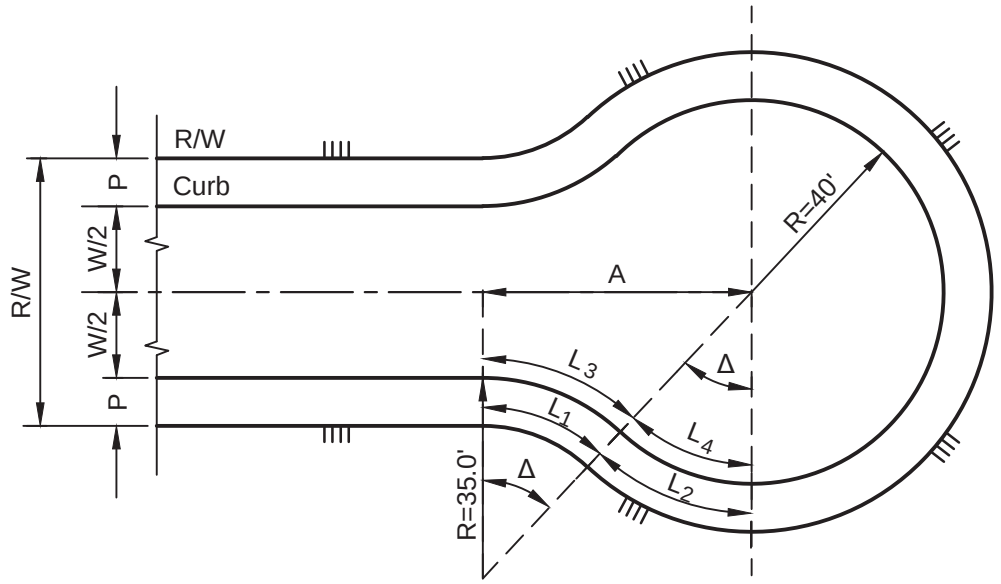
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

CUL-DE-SAC TYPE I

US UNITS	REVISION:	PLATE C-3



NOTES:

1. Roadside parking must be restricted to one side for pavements widths less than 40'.
2. For maximum length of cul-de-sac refer to plate B series.

PLATE	W	W/2	R/W	A	P	Δ	L_1	L_2	L_3	L_4
B-4P [A]	40'	20'	60'	50.99'	10'	42° 50' 00"	18.69'	37.38'	26.17'	29.90'
B-4P [B]	36'	18'	56'	53.07'	10'	45° 02' 08"	19.65'	39.30'	27.51'	31.44'
B-4P [C]	32'	16'	52'	54.99'	10'	47° 09' 23"	20.58'	41.15'	28.81'	32.92'
B-5 [A]	40'	20'	53'	50.99'	6.5'	42° 50' 00"	21.31'	34.76'	26.17'	29.90'
B-5 [B]	36'	18'	49'	53.07'	6.5'	45° 02' 08"	22.40'	36.55'	27.51'	31.44'
B-5 [C]	32'	16'	45'	54.99'	6.5'	47° 09' 23"	23.46'	38.27'	28.81'	32.92'

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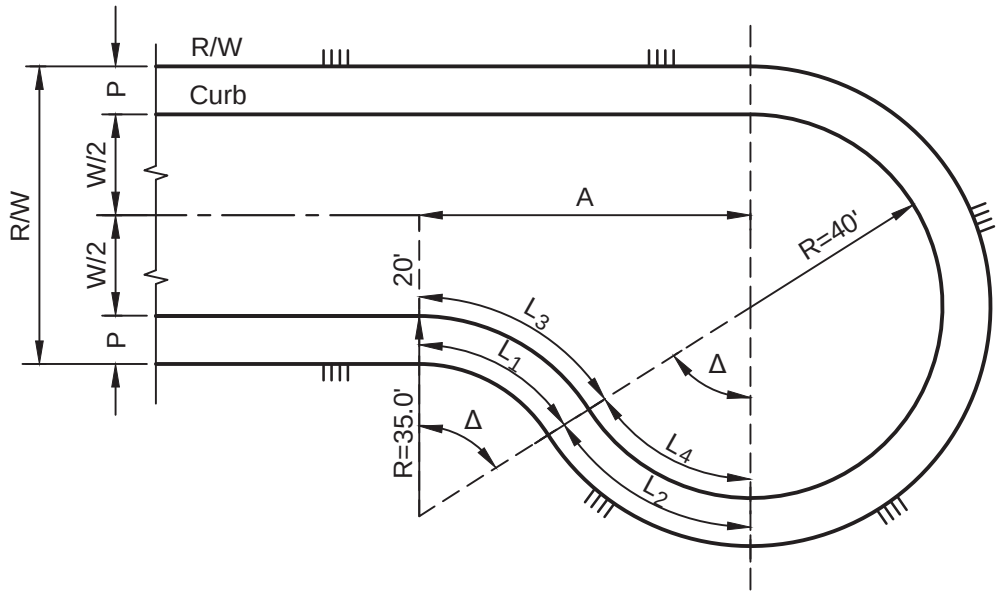
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

CUL-DE-SAC TYPE II

US UNITS	REVISION:	PLATE C-4



NOTES:

1. Roadside parking must be restricted to one side for pavements widths less than 40'.
2. For maximum length of cul-de-sac refer to plate B series.
3. The above layout is Type III (right) which is preferred. Use mirror image for Type III (left).

PLATE	W	W/2	R/W	A	P	Δ	L_1	L_2	L_3	L_4
B-4P [A]	40'	20'	60'	66.33'	10'	62° 10' 55"	27.13'	54.26'	37.98'	43.41'
B-4P [B]	36'	18'	56'	68.29'	10'	65° 35' 08"	28.62'	57.23'	40.06'	45.79'
B-4P [C]	32'	16'	52'	69.97'	10'	68° 53' 59"	30.06'	60.13'	42.09'	48.10'
B-5 [A]	40'	20'	53'	66.33'	6.5'	62° 10' 55"	30.93'	50.47'	37.98'	43.41'
B-5 [B]	36'	18'	49'	68.29'	6.5'	65° 35' 08"	32.62'	53.23'	40.06'	45.79'
B-5 [C]	32'	16'	45'	69.97'	6.5'	68° 53' 59"	34.27'	55.92'	42.09'	48.10'

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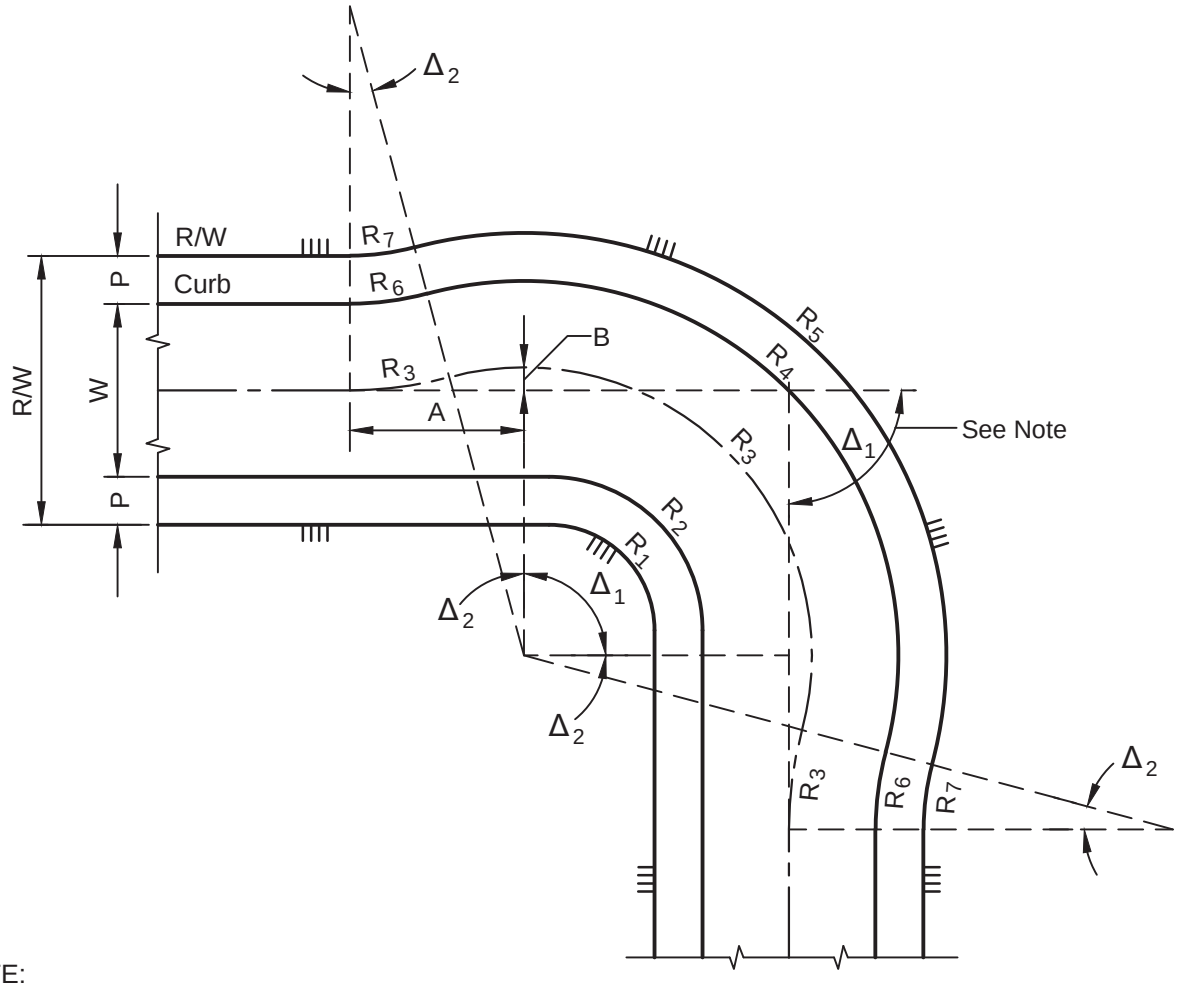
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

CUL-DE-SAC TYPE III

US UNITS	REVISION:	PLATE C-5



NOTE:
When Δ_1 is less than 72°, a smooth curve with a minimum radius conforming with the standards for the particular geometric section shall be used.

PLATE	R/W	W	P	R_1	R_2	R_3	R_4	R_5	R_6	R_7	Δ_2	A	B
B-3 [A]*	84'	64'	10'	25'	35'	80'	112'	122'	48'	38'	23° 15' 22"	63.17'	13.00'
B-3 [B1]*	84'	64'	10'	35'	45'	80'	112'	122'	48'	38'	11° 06' 46"	30.84'	3.00'
B-3 [B2]*	96'	64'	16'	29'	45'	80'	112'	128'	48'	32'	11° 06' 46"	30.84'	3.00'
B-3 [C]	68'	52'	8'	37'	45'	80'	106'	114'	54'	46'	19° 18' 32"	52.91'	9.00'
B-3 [D]	60'	40'	10'	35'	45'	70'	90'	100'	50'	40'	15° 21' 32"	37.08'	5.00'
B-5 [A]	53'	40'	6.5'	28.5'	35'	60'	80'	86.5'	40'	33.5'	16° 35' 52"	34.28'	5.00'
B-5 [B]	49'	36'	6.5'	28.5'	35'	60'	78'	84.5'	42'	35.5'	19° 40' 00"	40.39'	7.00'
B-5 [D]	45'	32'	6.5'	28.5'	35'	60'	76'	82.5'	44'	37.5'	22° 19' 54"	45.60'	9.00'

* Use only where approved by the Planning Director and the Road Commissioner.

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COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

ROAD INTERSECTION "L" SHAPE

US UNITS	REVISION:	PLATE D-1

VERTICAL CURVES - MINIMUM SIGHT DISTANCE LENGTH

DESIGN SPEED MPH		25		35		40		50		60	
SIGHT DIST. FEET		150		200		300		430		580	
Grade Diff. in %	Cul-de-sac	S	C	S	C	S	C	S	C	S	C
0.50	10	10	10	10	10	10	10	10	10	20	20
1	20	10	10	10	10	20	20	20	20	30	30
1.5	20	10	10	10	10	20	20	30	30	40	280
2	30	20	20	20	20	30	30	40	220	50	500
3	40	20	20	40	20	120	160	240	440	360	760
4	50	90	30	130	70	240	270	400	590	560	1020
5	60	130	60	190	140	320	340	500	730	700	1270
6	70	170	100	220	180	380	410	600	880	840	1520
7	80	190	140	260	220	440	480	700	1020	970	1780
8	90	220	160	300	250	500	550	800	1170	1110	2030
9	100	250	180	330	280	560	610	900	1320	1250	2280
10	110	270	200	370	310	630	680	1000	1460	1390	2530
11	120	300	220	410	340	690	750	1100	1610	1530	2790
12	130	330	240	440	370	750	820	1200	1750	1670	3040
13	140	350	260	480	400	810	880	1300	1900	1800	3290
14	150	380	270	510	430	870	950	1400	2040	1940	3550
15	160	410	290	550	460	940	1020	1500	2190	2080	3800
16	170	430	310	590	490	1000	1090	1600	2330	2220	4050
17	180	460	330	620	520	1060	1160	1700	2480	2360	4300
18	190	490	350	660	550	1120	1220	1800	2630	2500	4560
19	200	510	370	700	580	1180	1290	1900	2770	2640	4810
20	210	540	390	730	610	1250	1360	2000	2920	2770	5060
22	230	590	430	810	670	1370	1490	2200	3210	3050	5570
24	250	650	470	880	730	1490	1630	2400	3500	3330	6080
26	270	700	510								
28		750	540								
30		810	580								
32		860	620								
34		910	660								
36		970	700								
38		1020	740								
40		1070	770								
50		1340	970								

LEGEND: C=Crest Curves S=Sag Curves; V=Design Speed (MPH)
A=Alegrabraic % Diff in grades; L=Length of Curve

Grade breaks less than 0.5% may be made without a vertical curve at intervals in feet not less than (5 x A x V).

Vertical curve elevations shall be computed and staked at intervals that will insure a smooth curve made up of short chords.

Points shall not be further apart in feet than $4 \times (L/A)^{1/2}$, and BVC, Center & EVC shall always be computed and staked. See HDM for discussion of good practice in designing vertical curves.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

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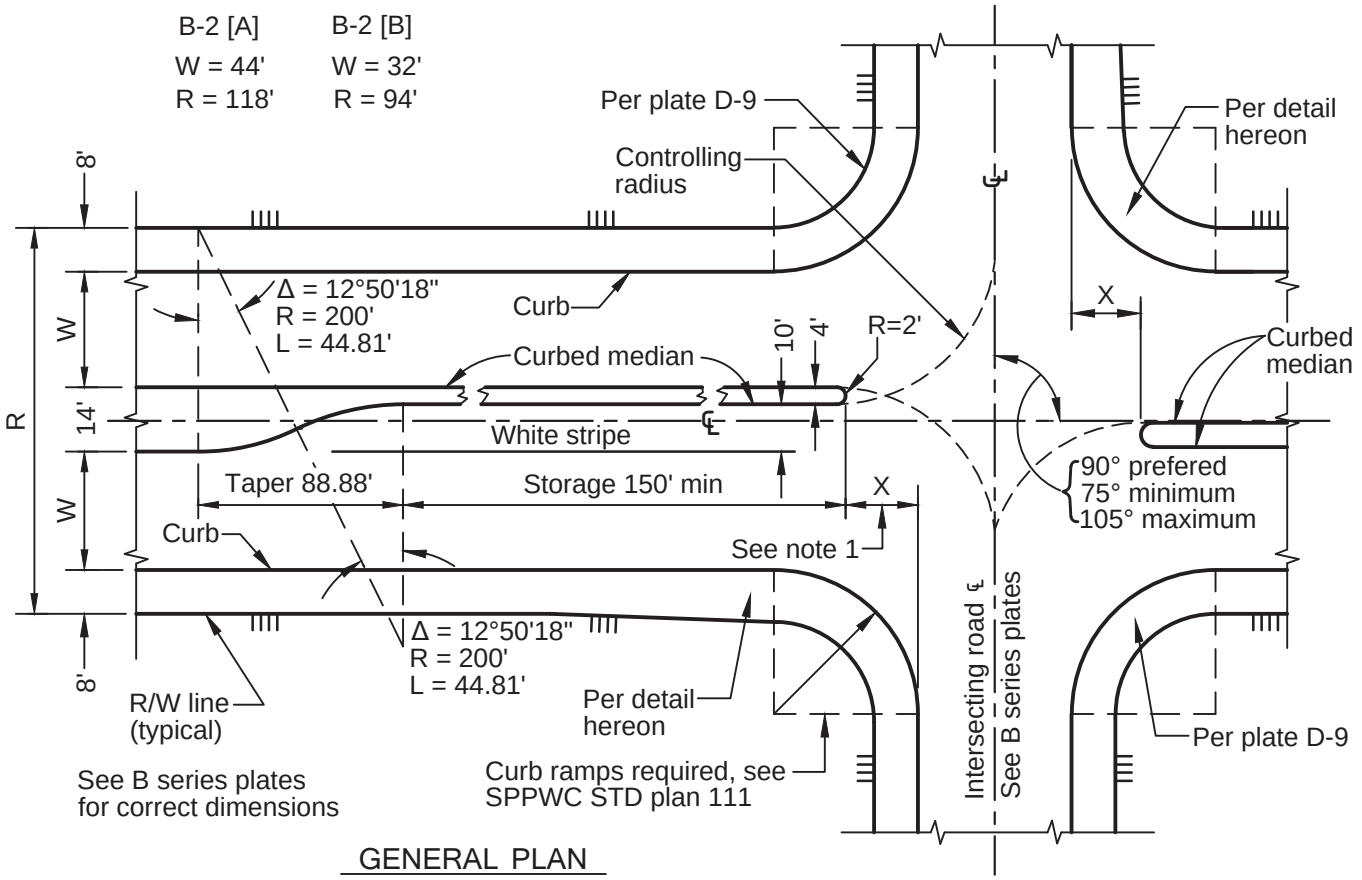
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

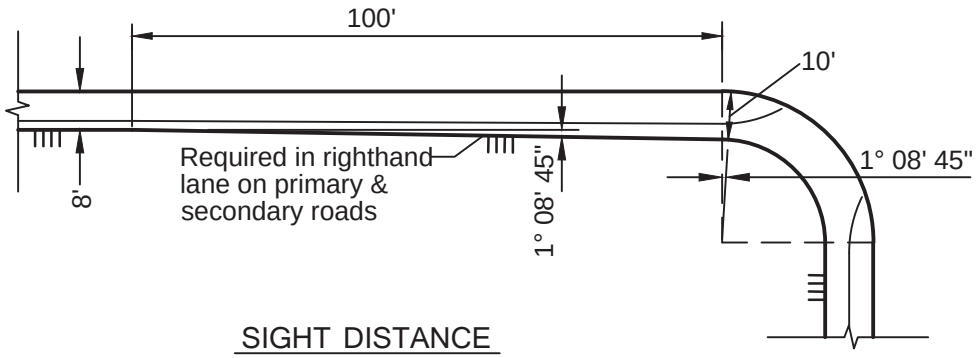
ROAD STANDARDS

VERTICAL CURVES - MINIMUM SIGHT DISTANCE LENGTH

US UNITS	REVISION:	PLATE D-5



GENERAL PLAN



SIGHT DISTANCE REQUIREMENTS DETAIL

INTERSECTING ROAD TYPE	CONTROLLING RADIUS
plate B-2	60'
B-3 [A], B-3 [B], B-3 [C], B-3 [D], B-7	50'
B-5	45'

1. Dashed curves between ℄ of intersecting road, and outside face of median curbs are controling left turn paths. End of median, "X", shall be determined using the controling radius from table and intersection angle. MInimum "X" = 10'.

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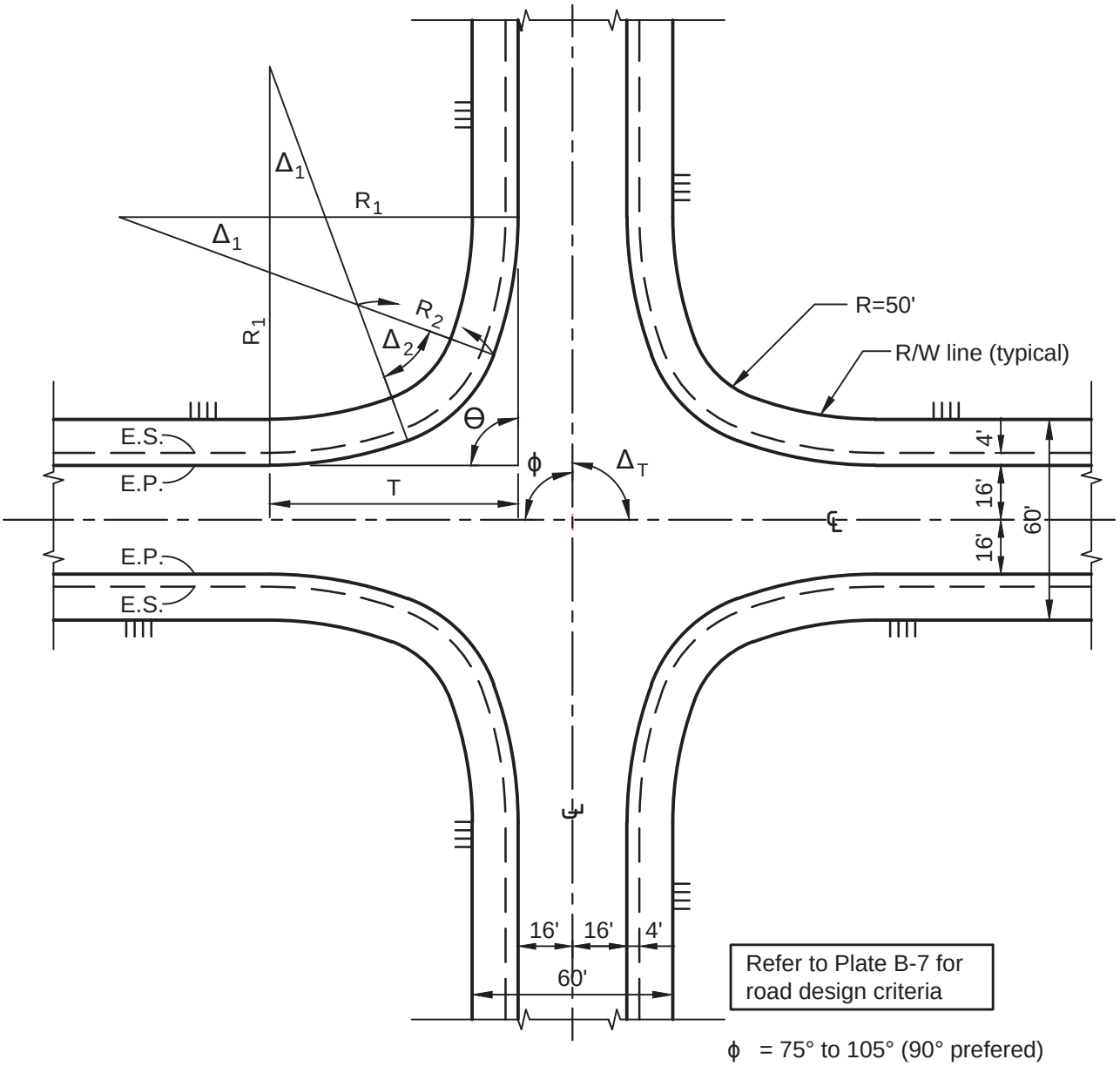
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

PRIMARY AND SECONDARY ROAD INTERSECTIONS

US UNITS	REVISION:	PLATE D-6



Refer to Plate B-7 for road design criteria

ϕ = 75° to 105° (90° prefered)

$\Delta_T = 180° - \phi$

$\Delta_1 = 20°$

$\Delta_2 = \Delta_T - 2\Delta_1$

$\Theta = 180° - \Delta_T$

$R_1 = 120'$

$R_2 = 40'$

$$T = 43.68' + \frac{47.70' \times \sin 1/2\,\Delta_2}{\sin 1/2\,\Theta}$$

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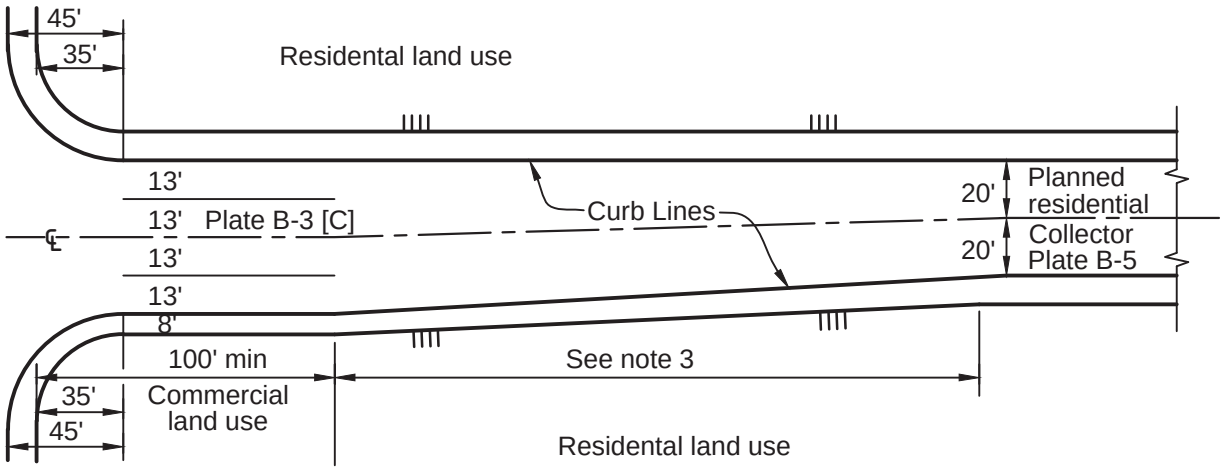
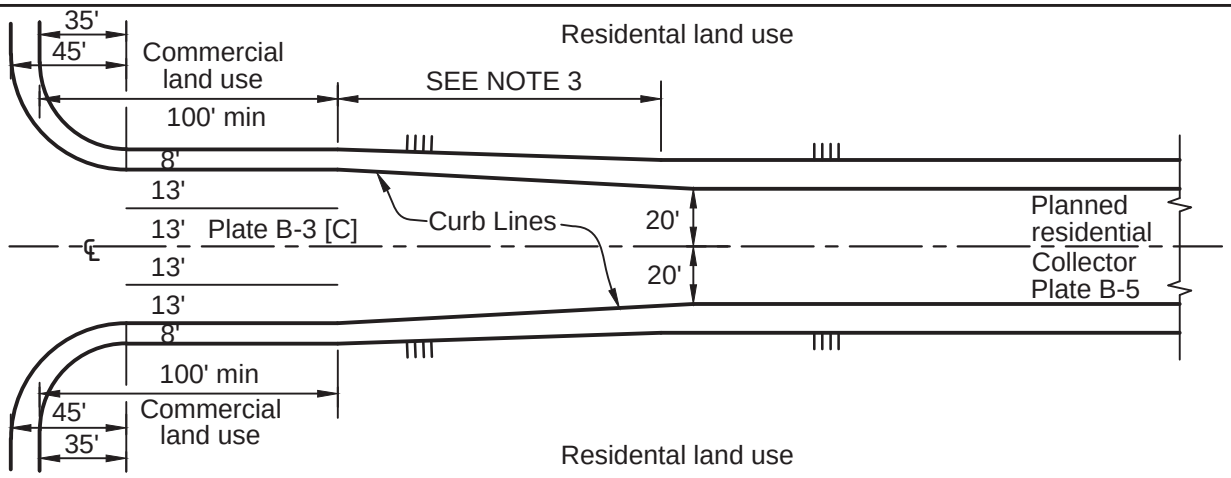
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

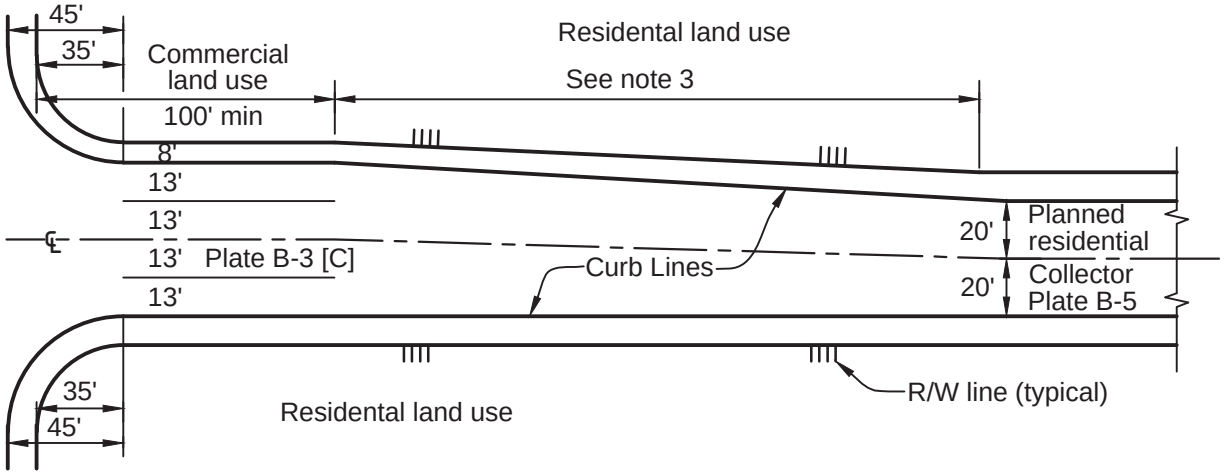
ROAD STANDARDS

RURAL ROAD INTERSECTIONS

US UNITS	REVISION:	PLATE D-7







NOTES:
1. To be used on land development projects only when a condition of approval required.
2. See plates D-5, D-12 and E-8 for intersection details.
3. Flare curb line at 6' per 100'. Flare R/W line to meet B-series plate dimension at each end of flare.

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COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

RESIDENTIAL / COMMERCIAL TRANSITION- PERMANENT CONSTRUCTION

US UNITS	REVISION:	PLATE D-9

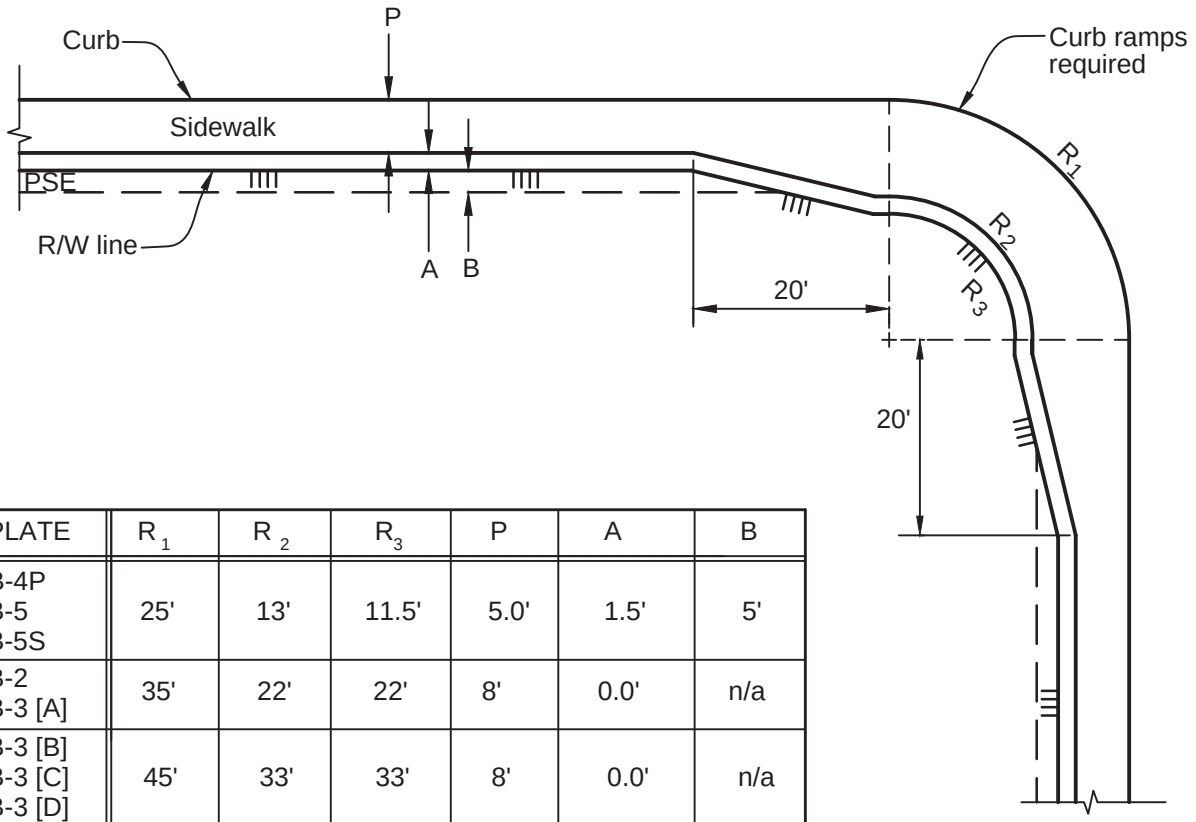
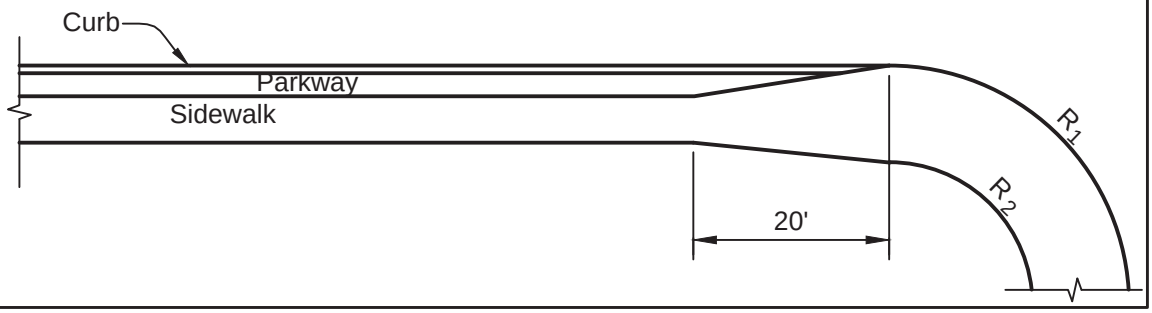


PLATE	R_1	R_2	R_3	P	A	B
B-4P B-5 B-5S	25'	13'	11.5'	5.0'	1.5'	5'
B-2 B-3 [A]	35'	22'	22'	8'	0.0'	n/a
B-3 [B] B-3 [C] B-3 [D] B-3S	45'	33'	33'	8'	0.0'	n/a
B-3 [B] w/ 16' sidewalk	45'	29'	29'	16'	0.0'	n/a

Where new construction meets a section with parkways between sidewalk and the curb, use the transition shown below.



1. PSE = public service easement.
2. See SPPWC standard plan 111 for curb ramps.
3. See SPPWC standard plan 112 for curb & sidewalk joints.

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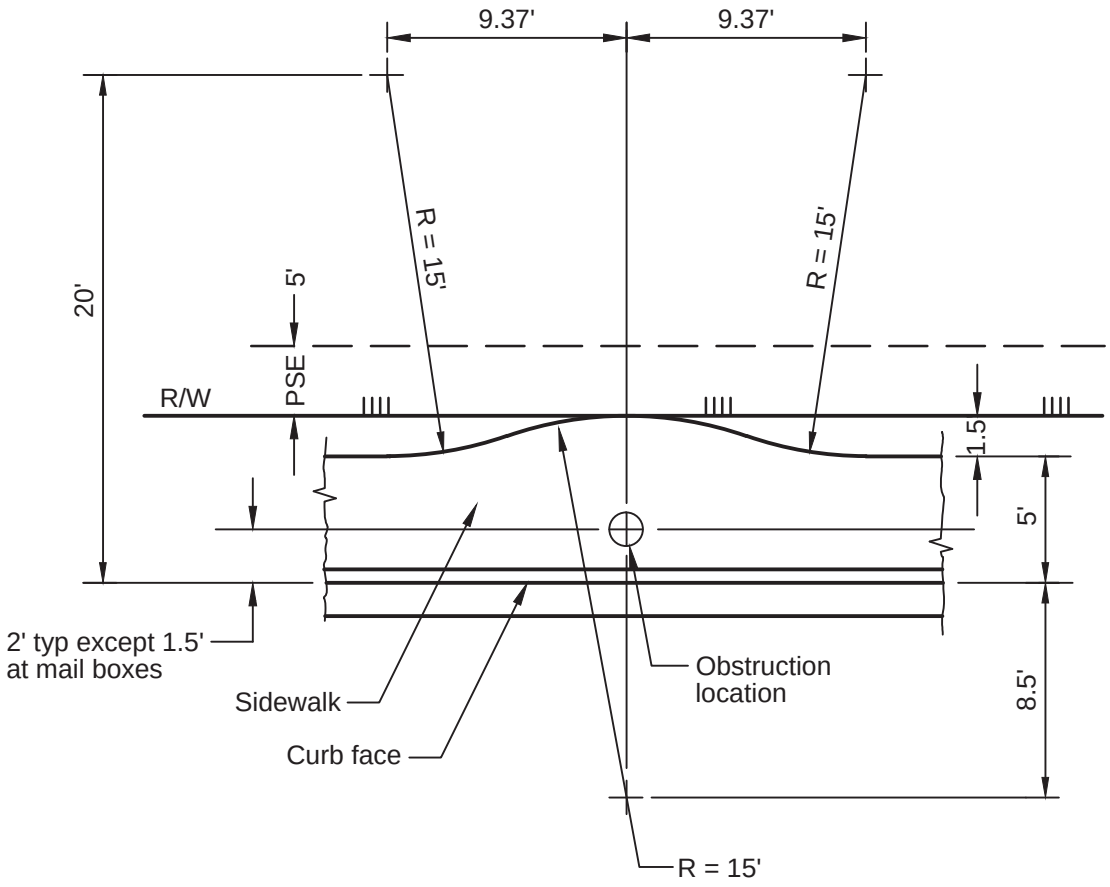
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SIDEWALK TRANSITION AT INTERSECTION

US UNITS	REVISION:	PLATE D-10



1. When plate B-5 improvement configuration is used, provide sidewalk widening as indicated above at all obstructions.
2. Street lights shall be located behind sidewalk.
3. For obstructions wider than 2' in either direction, special design is required.
4. Provide block out for mail box installation for each lot. Whenever feasible, mail boxes for adjacent lots shall be located 2' apart centered on the common lot line. Mail boxes shall be at least 2' from driveways. where necessary to avoid driveways or other obstructions, pairs of mail boxes may be located up to 5' from the common lot line.
5. PSE = public service easement.

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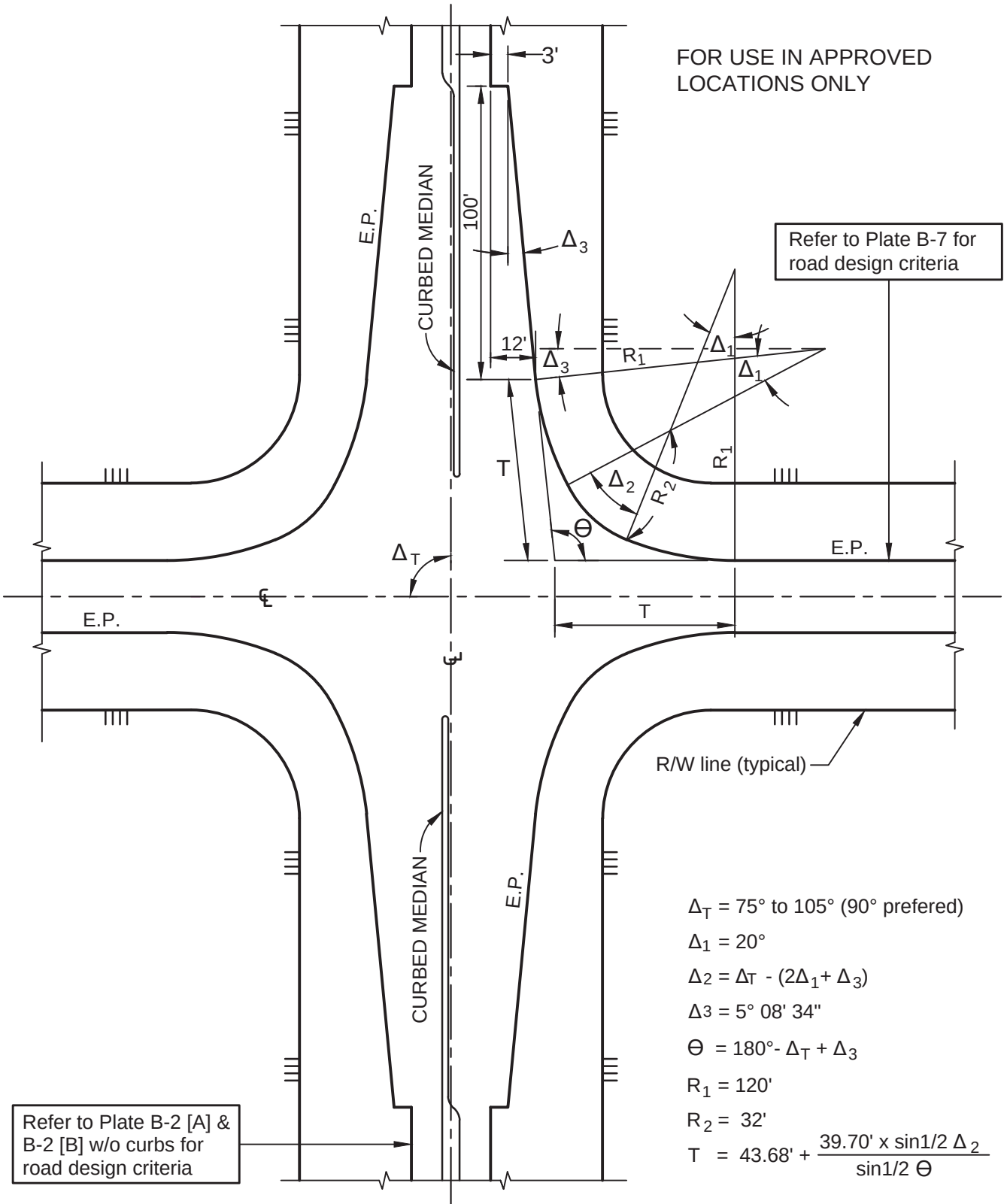
REVISION DATE:	DESCRIPTION:	APPROVED BY: J P	ROAD STANDARDS
			SIDEWALK WIDENING AT OBSTRUCTIONS
		RECOMMENDED BY: D F	

US UNITS	REVISION:	PLATE D-11



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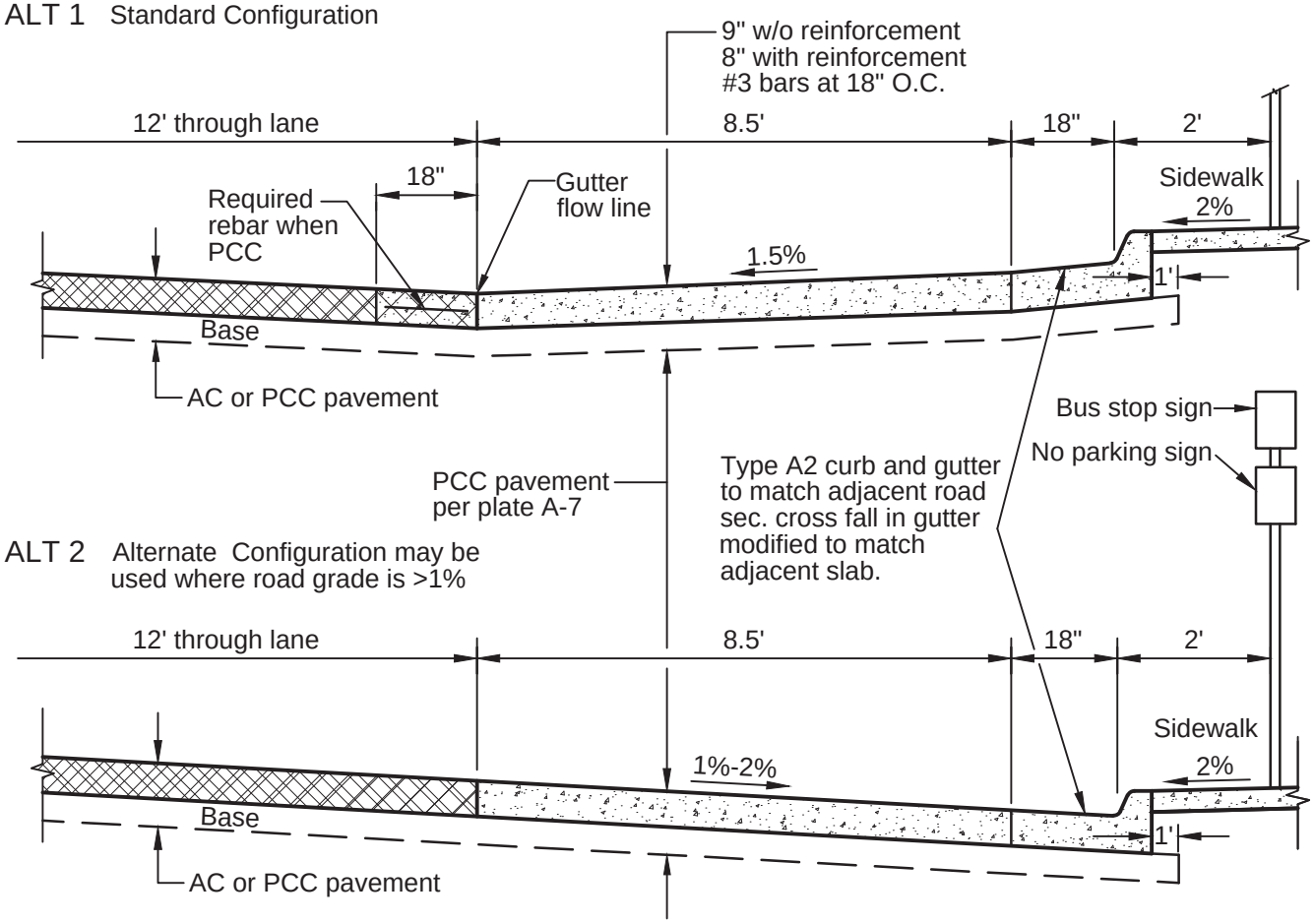
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

PRIMARY AND SECONDARY ROAD WITH RURAL ROAD INTERSECTION

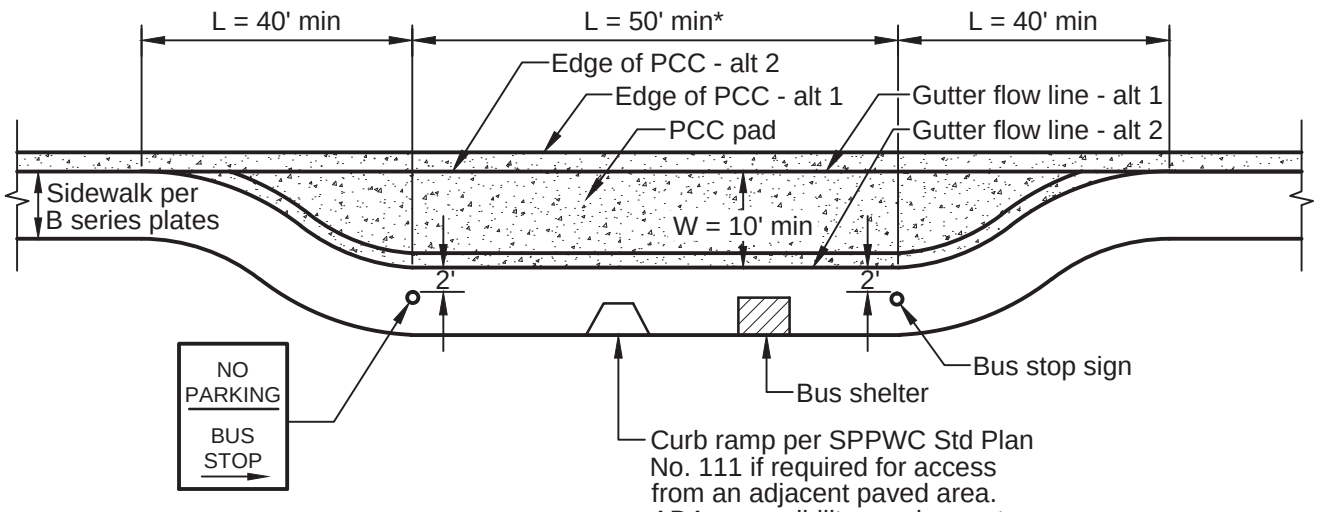
US UNITS	REVISION:	PLATE D-13

ALT 1 Standard Configuration



ALT 2 Alternate Configuration may be used where road grade is >1%

ALTERNATE CROSS-SECTIONS



* For each additional pass through bus berth add 50', and for each additional layover bus berth add 80'.

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COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

BUS TURNOUT

US UNITS	REVISION:	PLATE E-1

1. CONCRETE CURBS & GUTTERS

1.1 Where Required
The requirements for installing curbs and gutters are shown on B-Series plates.

1.2 Design
Curbs and gutters shall be constructed per SPPWC Standard Plan 120, types A1-6 and A2-6. W = 18" or to match adjacent gutter. Where a sidewalk crosses a driveway the thickness of the sidewalk must be at least 6 inches.

1.3 PCC Class
Concrete class and construction shall be as specified in Plate A-7. Permeable concrete can be used for gutters beside an A1-6 curb where a moisture barrier is used to prevent water from infiltrating into the road base and subgrade under the pavement. The moisture barrier shall be single-ply, 30 mil thick PVC, and be placed between the edge of pavement and the gutter. It must be a minimum of 5 feet in depth extending vertically from the top of the permeable concrete gutter. Excess water that cannot infiltrate must be drained into a storm drain system or a dry well system separated from the roadway.

1.4 Base Required
Where roadway subgrade has an R-value of ≤14, min 4" thickness of PMB shall be placed under curbs and gutters. Where permeable concrete is used as the gutter place 1 foot of open graded aggregate wrapped in geotextile filter fabric as the base layer.

2. CROSS GUTTERS

2.1 Where Required
Cross gutters shall be installed wherever surface drainage is to be carried across a road.

2.2 Where Prohibited
No surface drainage is to be carried across a road and no cross gutters are permitted across the following road sections:

a) Primary or Secondary roads (Plates B-2 & B-3 [A]).
b) Collector roads (Plates B-3 [A], B-4 [A], B-5 [A] and B-7 [A]) except at locations where vehicular traffic is required to stop or where through traffic movement is precluded such as at the single leg of a T-intersection.

2.3 Design
Cross gutters shall be constructed per SPPWC Standard Plan 122 and 123.

2.4 PCC Class
Concrete class and construction shall be as specified in Plate A-7.

2.5 Base Required
Cross gutters and spandrels shall be constructed over 6 " thickness of PMB.

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COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

CURBS & GUTTERS

US UNITS	REVISION:	PLATE E-2

2. DRIVEWAYS

2.1 Residential

Residential driveways shall be constructed according to Std. Plate E-2b with the following limitations:

2.1.1 W ≥ 10 feet and W ≤ 27 feet.

2.1.2 The sum of W's for all driveways shall not exceed 40% of the property frontage, however at least one W = 10 feet driveway is allowed on each lot.

2.1.3 No driveway shall be constructed in the curb return area at intersections or within 5 feet of the BCR or ECR.

2.1.4 No driveway or driveway apron shall be constructed in the area occupied by a catch basin's local depression.

2.1.5 The outer edge of the driveway warp shall be 2 feet clear of obstructions in the R/W such as fire hydrants, utility poles, street light standards, signs and mailboxes.

2.1.6 No driveway is allowed unless there is space on the private property for parking an 18 feet long vehicle.

2.1.7 Where the road grade exceeds 5% and there is no sidewalk next to the curb, an L-shaped deflector curb shall be installed on the downslope side of the driveway. The curb shall be SPPWC 120, Type A1-6, 6" high above the roadway curb, extending 5 feet along the driveway and 2 feet along the roadway curb.

2.1.8 PCC may be colored or textured or both. Texturing shall not reduce the required thickness and shall not be either so smooth or so rough as to be hazardous to pedestrians.

2.1.9 Driveways shall be PCC class 520-C-2500, 6" thick. Where the existing road does not have PCC curbs, driveways may be constructed of AC C1 or C2-PG 64-10, either 6" thick or 2" thick over 4" of PMB. Sidewalks over driveway and driveway aprons must be 6" thick.

2.2.0 Where the existing road does not have PCC curbs, driveways shall be constructed at an elevation compatible with future construction of curbs and gutters.

2.2.1 Minimum distance between outer edges of adjacent driveway slopes:

On same lot ≥ 22'

On adjacent lots ≥ 1'

ADOPTED BY BOARD OF SUPERVISORS: 02-04-2020

REVISION DATE:	DESCRIPTION:	APPROVED:
01/15/2020	Changed driveway standard to Plate E-2b	J P
		RECOMMENDED:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

RESIDENTIAL DRIVEWAYS

2. DRIVEWAYS (continued)

2.2. Commercial

Commercial driveways shall be constructed according to Std. Plate E-2b with the following limitations:

2.2.1 Minimum W = 10 feet.

The sum of all W's shall not exceed 60% of lot frontage.

Lot width	Maximum W
< 100'	20 feet
100' to 150'	30 feet
> 150'	20% of lot frontage but ≤ 60 feet

2.2.2 Minimum distance between outer edges of adjacent driveway slopes:

On same lot ≥ 22'

On adjacent lots ≥ 1'

2.2.3 No driveway shall be constructed in the curb return area at intersections or within 5 feet of the BCR or ECR.

2.2.4 No driveway is allowed where there is any obstacle that prevents any vehicle entering the driveway from completely clearing the public right-of-way when parked on the lot.

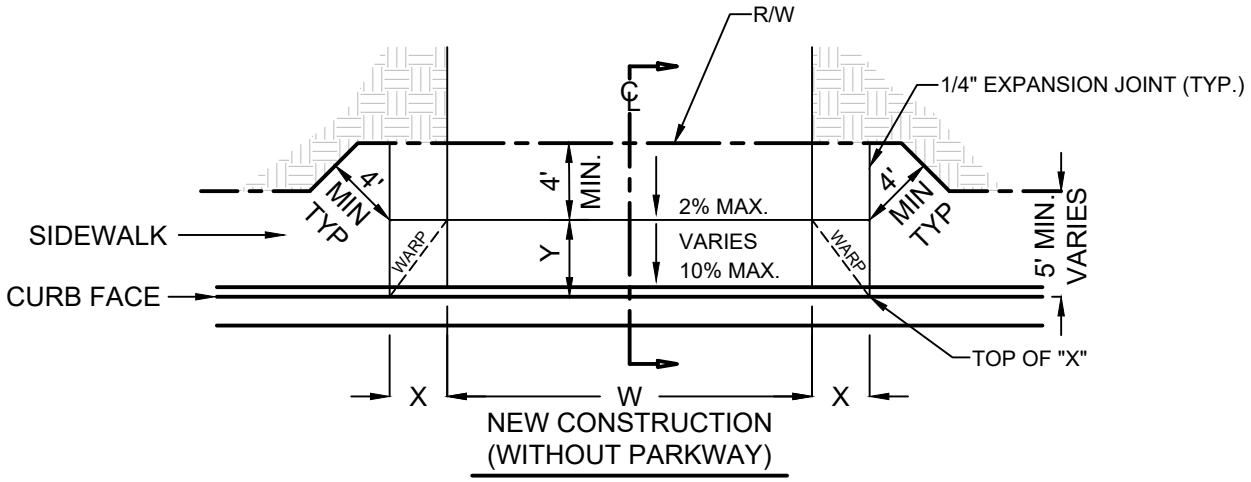
2.2.5 Driveways shall be PCC class 520-C-2500, 9" thick over 4" of PMB (Rvalue=78). Where the existing road does not have PCC curbs, driveways may be constructed of AC C1 or C2 PG-64-10, 7" thick or 3" thick over 8" of PMB.

2.2.6 The outer edge of the driveway warp shall be 5 feet clear of obstructions in the R/W such as fire hydrants, utility poles street light standards, signs and mailboxes.

2.2.7 Where the road grade exceeds 5% and there is no sidewalk next to the curb, a L-shaped deflector curb shall be installed on the downslope side of the driveway. The curb shall be SPPWC 120, Type A1-6, 6" high above the roadway curb, extending 5 feet along the driveway and 2 feet along the roadway curb.

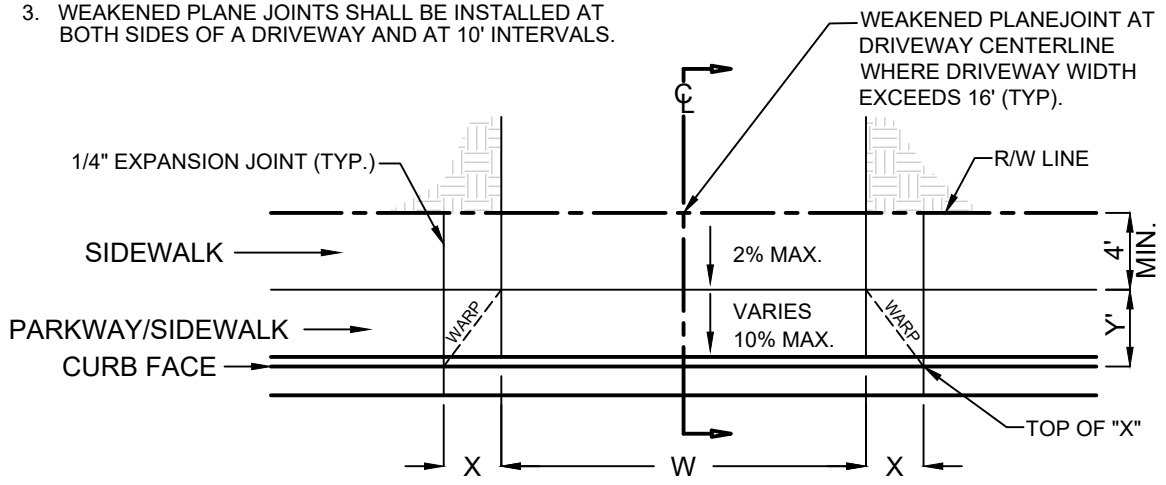
2.2.8 Where the existing road does not have PCC curbs, when requested by the County, driveways shall be constructed at an elevation compatible with future construction of curbs and gutters.

US UNITS	REVISION:	PLATE E-2b

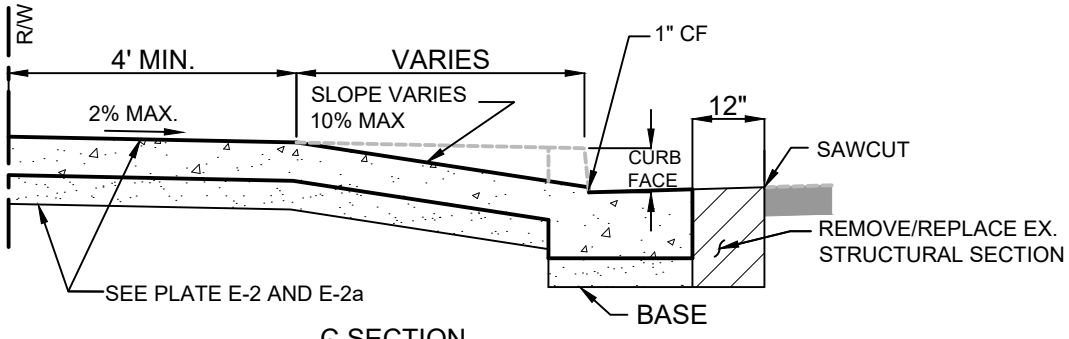


NEW CONSTRUCTION
(WITHOUT PARKWAY)

NOTES:
1. FOR CURB FACE 6" OR LESS, X=3', Y=4'
2. FOR CURB FACE >6", PER SPPWC STD. PLAN 110-2.
3. WEAKENED PLANE JOINTS SHALL BE INSTALLED AT BOTH SIDES OF A DRIVEWAY AND AT 10' INTERVALS.



NEW CONSTRUCTION
(WITH PARKWAY/WIDE SIDEWALK)



℄ SECTION

ADOPTED BY BOARD OF SUPERVISORS: 02-04-2020			COUNTY OF VENTURA PUBLIC WORKS AGENCY
REVISION DATE:	DESCRIPTION:	APPROVED: J P	ROAD STANDARDS
			DRIVEWAY DETAILS
		RECOMMENDED: D F	

3. SIDEWALKS

The requirements for installing sidewalks are shown on B-Series plates.

3.1 Design & Construction

3.1.1 Sidewalks shall be constructed per SPPWC Standard Plan 112.

3.1.2 Sidewalks shall be constructed of PCC, 4 inches thick. At driveways, sidewalks shall meet the requirements of Plates E-2 and E-2a.

3.1.3 Where roadway subgrade has a R-value ≤14, 4 inches of PMB shall be placed under the sidewalks.

3.1.4 Concrete class and construction shall be as specified in Plate A-7.

3.2 Curb Ramps

Curb ramps, as required by the Americans With Disabilities Act and state law, shall be installed at all intersections. Construction shall be per SPPWC Standard Plan 111-5, Case A. Sidewalks, sidewalk flares at intersections and right-of-way widths may have to be increased to accommodate ramp design.

4. SURFACE ACCESS TO UNDERGROUND FACILITIES (MANHOLES, etc.):

All surface accesses to underground facilities located within a sidewalk, side path or a marked or unmarked (Vehicle Code 275) crosswalk area of a roadway, shall meet the following requirements:

1 Covers shall support a load of 500 lbs. applied to a 1 in. diameter area at any location on the cover. The deflection, when so loaded, shall not exceed 1% of the longest dimension of the cover. There shall be no residual deflection after the load is removed. Plastic covers shall be ultraviolet resistant. Covers located in roadways, driveways or other locations to which vehicles have access, shall be designed for traffic loading.

2 No variation in the surface of the access closure shall exceed 1/8" from the surrounding surface.

3 No opening in the access closure shall exceed 1/2 in. in width nor 2 1/2" in length. Circular openings shall not exceed 3/4 in. in diameter.

4 Hold down fastenings shall be flush with the surface of the access closure.

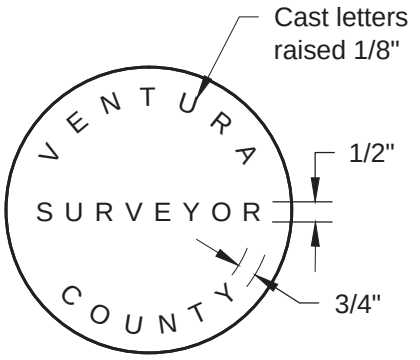
5 The exposed surface of the access closure shall have a permanent slip resistant surface.

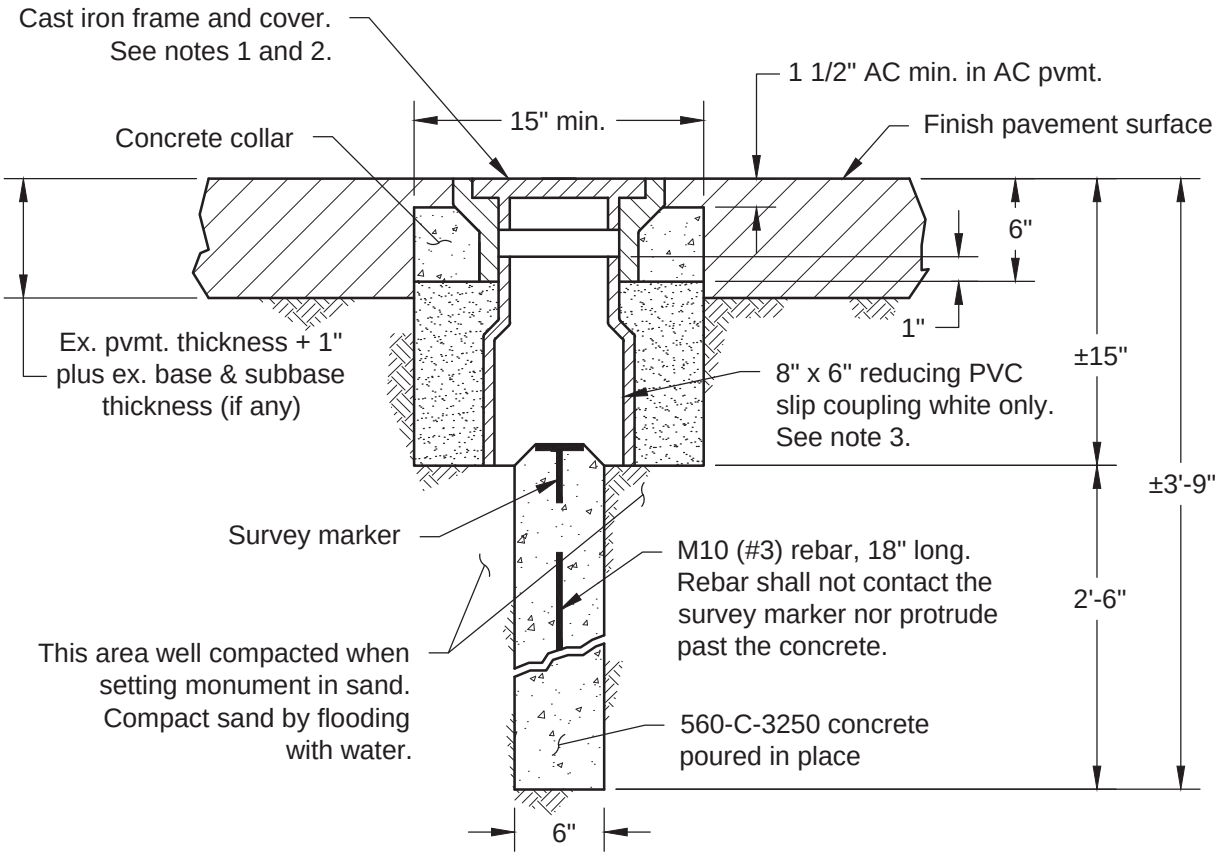
6 The resultant finished access closure, as installed, shall not result in a significant variation in the sidewalk, side path or crosswalk surface that will cause a hazard to pedestrian use.

US UNITS	REVISION:	PLATE E-4

TOP OF COVER DETAIL

Cover to be embossed with special lettering as shown





SURVEY MONUMENT

NOTES:

1. Frame is Alhambra Foundry cast iron monument handhole frame with bituminous paint, Plate No. A-2925-F.
2. Cover is Alhambra Foundry cast iron monument handhole cover with bituminous paint, Plate No. A-2925-A. marked "VENTURA COUNTY SURVEYOR" See Top of Cover Detail above.
3. 8" x 6" IPS class 125 PVC fabricated reducing slip coupling 9/32" wall thickness, colored white
4. Install concrete collar around utility structure, concrete shall be Class 560-C-3250 with maximum 3 inch slump.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

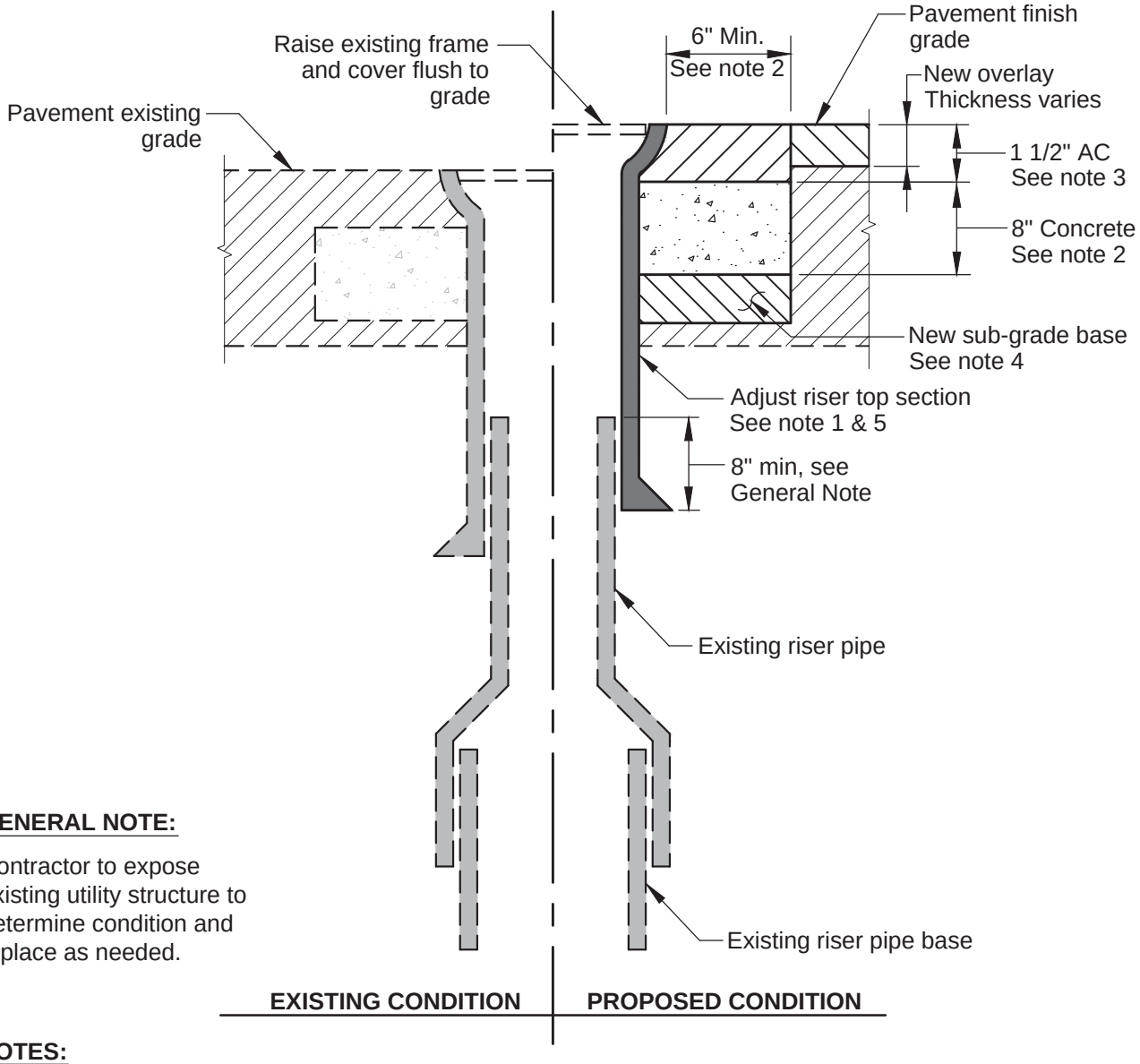
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SURVEY MONUMENT

US UNITS	REVISION:	PLATE E-4a



GENERAL NOTE:

Contractor to expose existing utility structure to determine condition and replace as needed.

NOTES:

1. All necessary portions of the subgrade base and pavement shall be neatly removed. Utility cover shall be raised and the utility riser top sections set to be backfilled to within 1 1/2 inch of the final grade with portland cement concrete. The remaining 1 1/2 inch shall be backfilled with an asphalt concrete wearing surface mixture to match the project surface course. The material shall be placed and compacted in a workmanlike manner to conform to the appearance of the surrounding pavement.
2. Install concrete collar around utility structure, concrete shall be Class 560-C-3250 with maximum 3 inch slump.
3. Asphalt concrete shall be C2-PG 64-10, placed in accordance with Section 302-5.8 of the SSPWC.
4. Backfill compaction shall be a minimum of 95% prior to placing concrete collar.
5. Existing utility installations that do not meet standards must be constructed in compliance with current standard.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

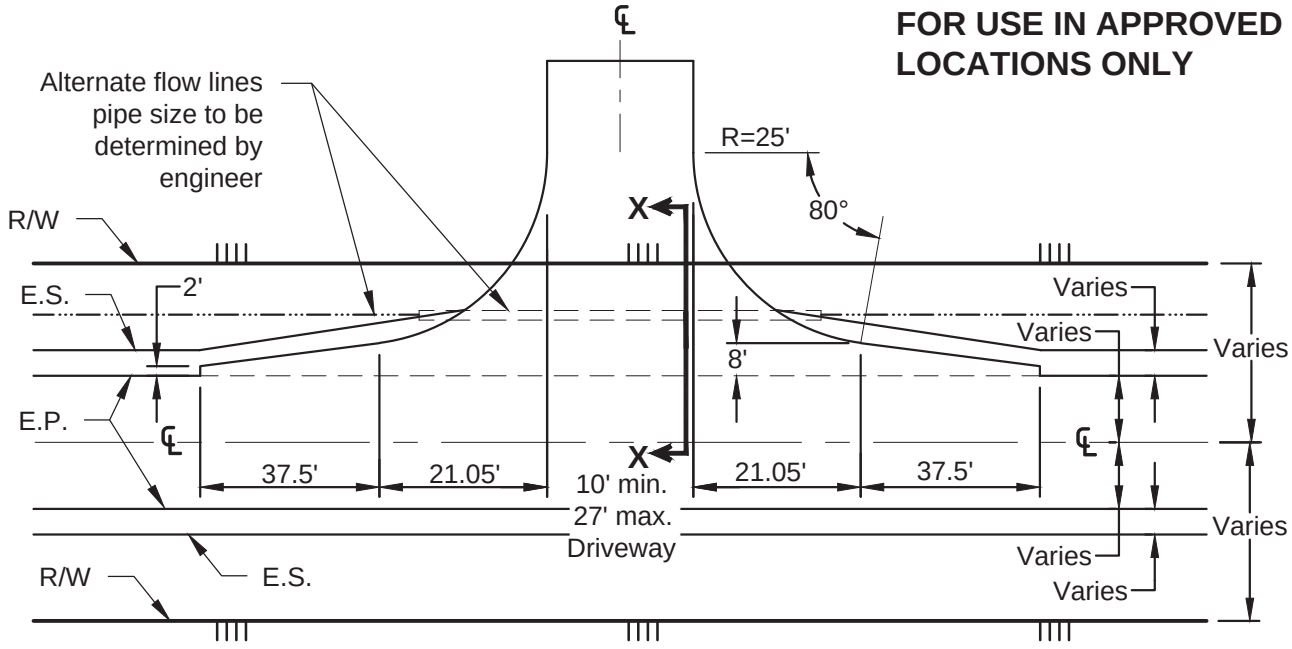
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

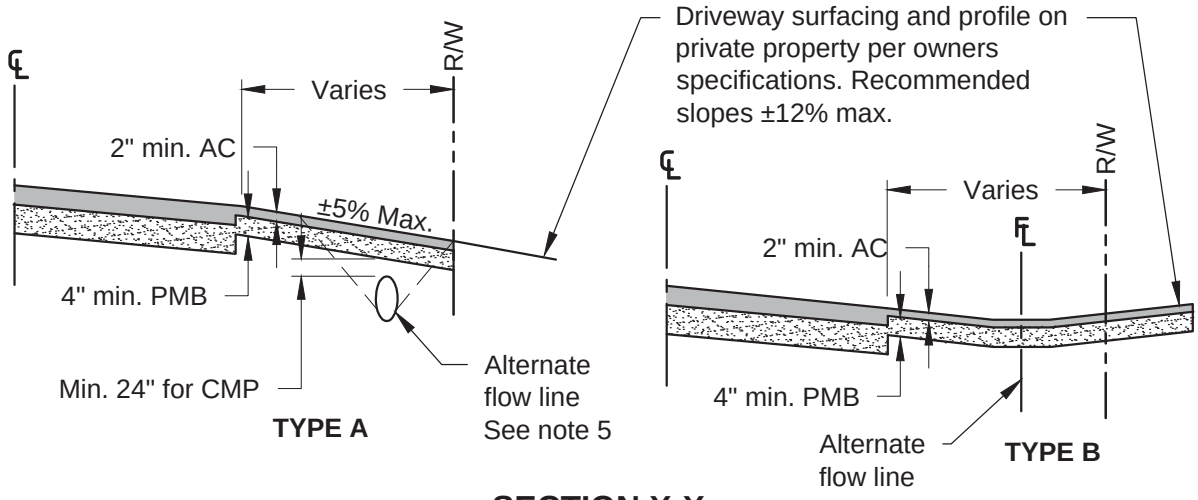
RAISE EXISTING UTILITY COVER

US UNITS	REVISION:	PLATE E-6

FOR USE IN APPROVED LOCATIONS ONLY



PLAN



SECTION X-X

NOTES:

1. The total sum of all driveway widths (exclusive of radii) shall be limited to 20% of property frontage, at least one 27' driveway will be allowed on each lot.
2. Minimum distances between outer edge of driveways approaches shall be 28' on the same property.
3. Approved locations will generally include areas of a rural nature where curbs are not installed and where curb installation in the future is unlikely and where the ADT is greater that 1,000.
4. Base under driveway may be omitted where natural ground has adequate structural strength on approval of the engineer.
5. Design of pipe per Road Standards Plate A-4 Section 4.4 and 4.6.
6. The outer edge of driveway shall be a minimum 2' clear of all vertical obstructions.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

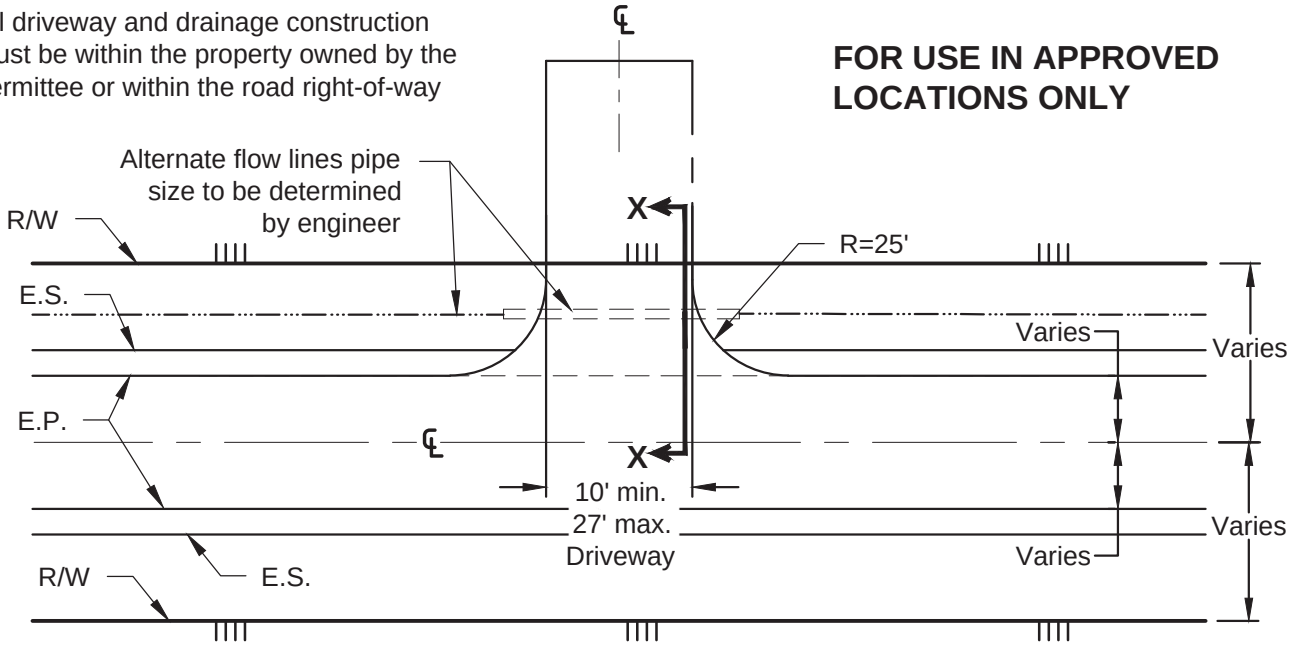
ROAD STANDARDS

RURAL DRIVEWAY
ADT > 1,000

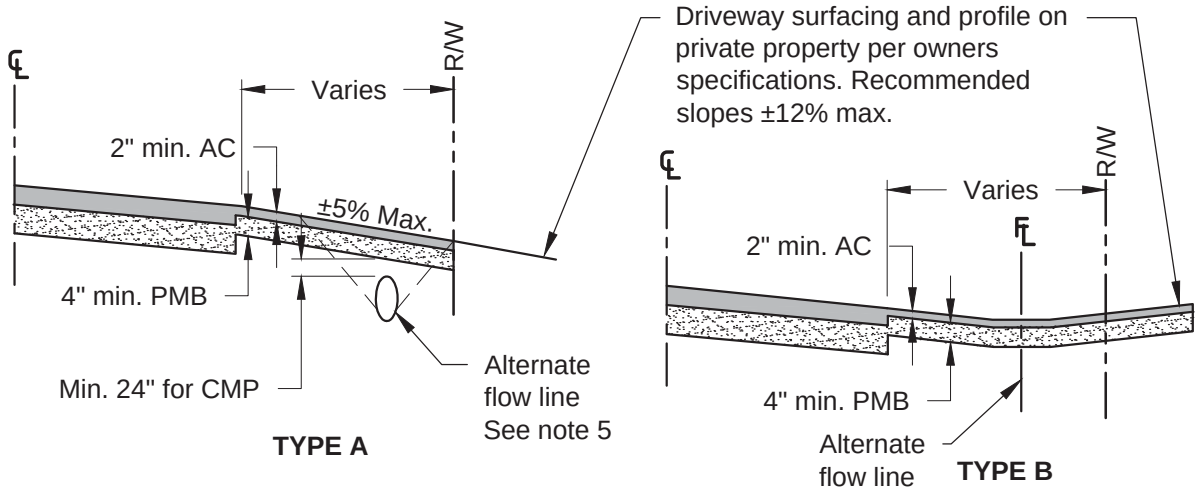
US UNITS	REVISION:	PLATE E-7

All driveway and drainage construction must be within the property owned by the permittee or within the road right-of-way

FOR USE IN APPROVED LOCATIONS ONLY



PLAN



SECTION X-X

NOTES:

1. The total sum of all driveway widths (exclusive of radii) shall be limited to 20% of property frontage, at least one 27' driveway will be allowed on each lot.
2. Minimum distances between outer edge of driveways approaches shall be 28' on the same property. Approved locations will generally include areas of a rural nature where curbs are not installed and where curb installation in the future is unlikely and where the ADT ≤ 1,000.
3. Base under driveway may be omitted where natural ground has adequate structural strength on approval of the engineer.
5. Design of pipe per Road Standards Plate A-4 Section 4.4 and 4.6.
6. The outer edge of driveway shall be a minimum 2' clear of all vertical obstructions.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

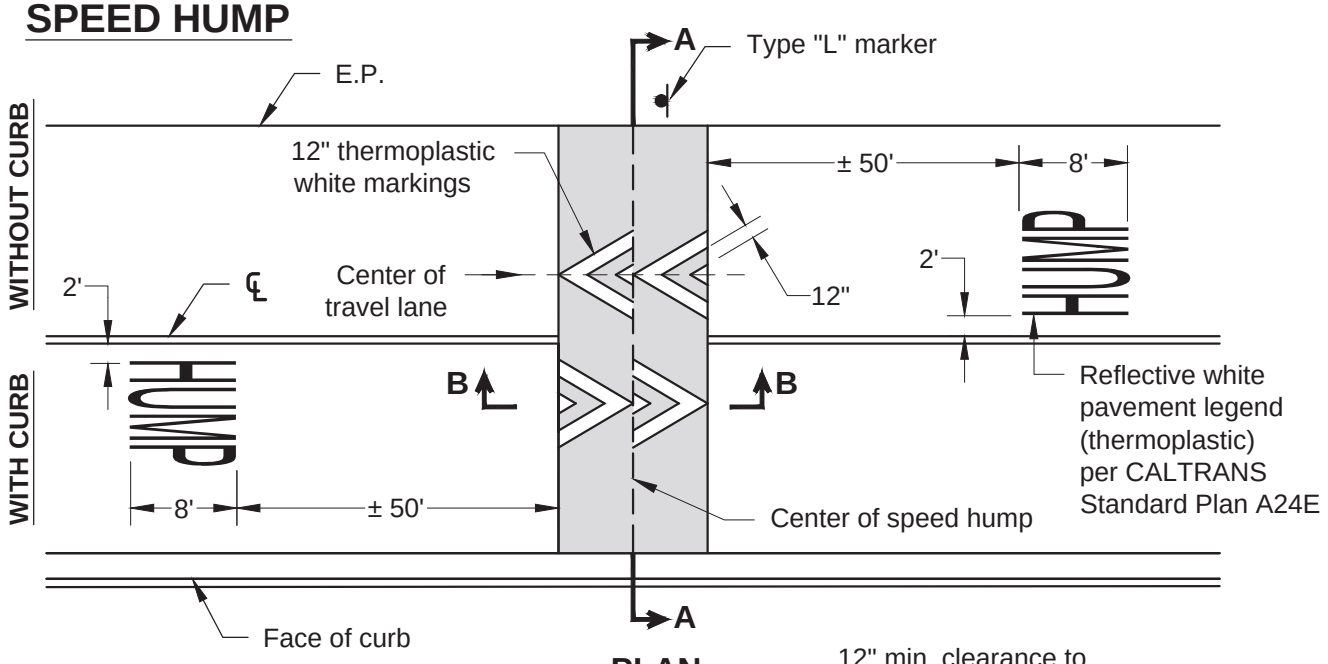
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

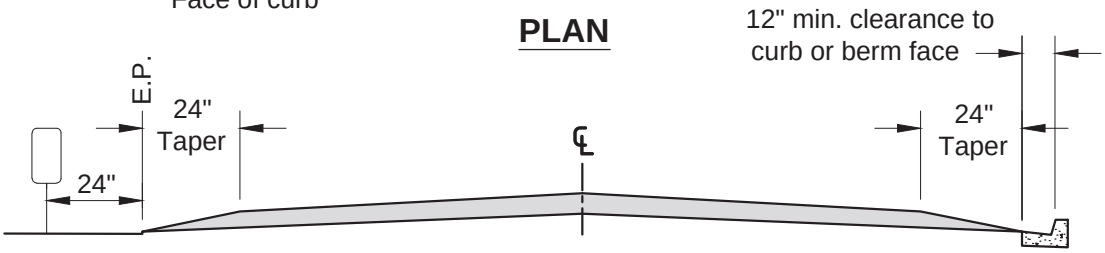
RURAL DRIVEWAY
ADT ≤ 1,000

US UNITS	REVISION:	PLATE E-9

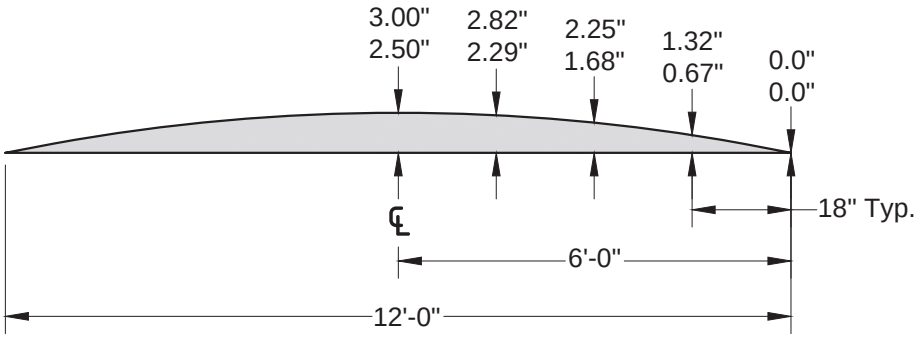
SPEED HUMP



PLAN



SECTION A-A



SECTION B-B

NOTES:

1. Speed humps may be installed only if approved by the Road Commissioner or his designee.
2. Speed hump height greater than 3" requires Board of Supervisors approval for design & height.
3. A warning sign stating "Speed Hump" (W17-1) shall be placed at the approach to the first hump. Signs shall be of high intensity sheeting (30"x30"). Co-mount a W13-1 "10 MPH" (24"x24") warning sign per CALTRANS standards.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

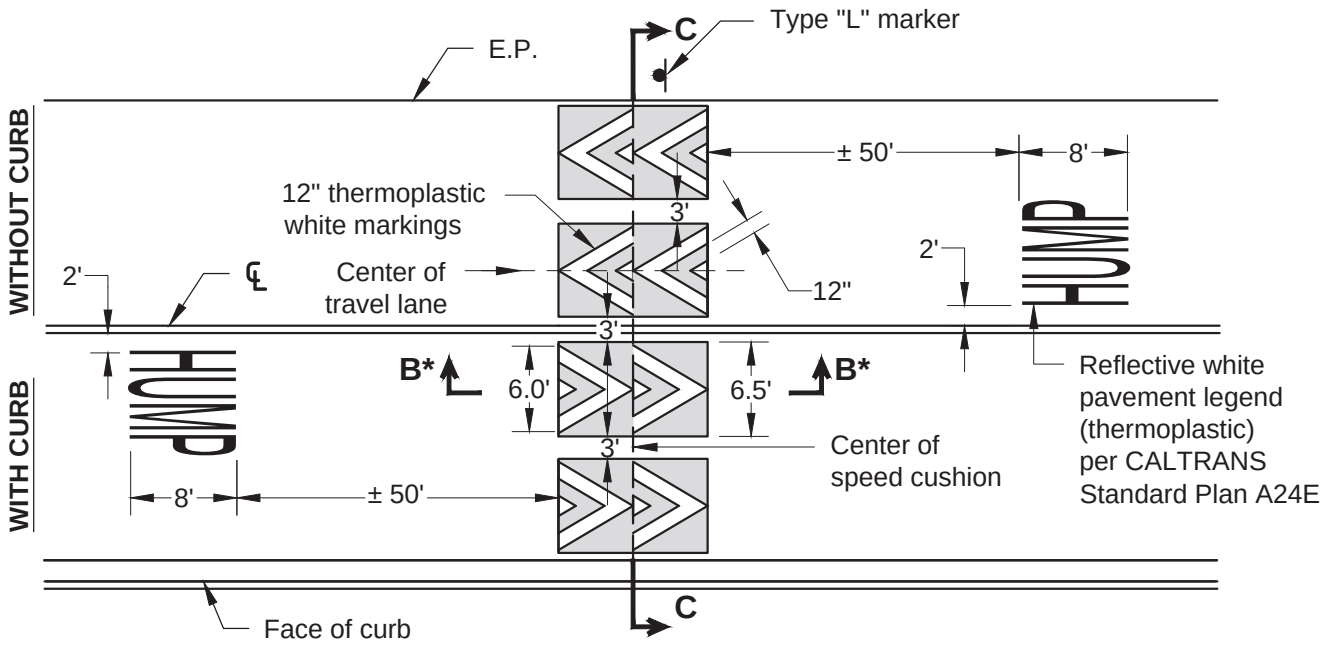
COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SPEED HUMP/CUSHION

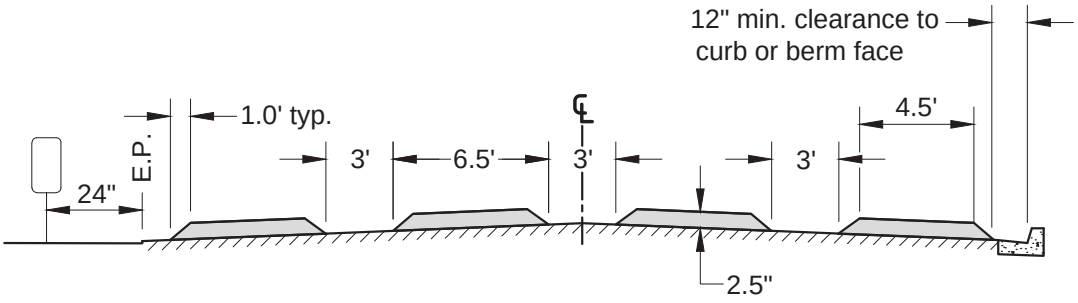
US UNITS	REVISION:	PLATE E-9

SPEED CUSHION



PLAN

B* See Section B-B on Speed Hump Road Standard Plate E-9, sheet 1 of 4



SECTION C-C

NOTES:

1. Speed cushions may be installed only if approved by the Road Commissioner or his designee.
2. A warning sign stating "Speed Hump" (W17-1) shall be placed at the approach to the first cushion. Signs shall be of high intensity sheeting (30"x30"). Co-mount a W13-1 "10 MPH" (24"x24") warning sign per CALTRANS standards.
3. For two-lane roads with a traveled way width of 24' or less, use the design shown above while omitting the two outer speed cushions.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SPEED HUMP/CUSHION

US UNITS	REVISION:	PLATE E-9

WARRANTS FOR SPEED HUMPS / CUSHIONS

1. The road must be either a residential road or a local road defined as follows:

a. A residential road, or "residence district," as defined in California Vehicle Code Section 515 is that portion of a highway and the property contiguous thereto, other than a business district, (a) upon one side of which highway, within a distance of a quarter of a mile, the contiguous property fronting thereon is occupied by 13 or more separate dwelling houses or business structures, or (b) upon both sides of which highway, collectively, within a distance of a quarter of a mile, the contiguous property fronting thereon is occupied by 16 or more separate dwelling houses or business structures. A residence district may be longer than one-quarter of a mile if the above ratio of separate dwelling houses or business structures to the length of the highway exists. The "residence district" determination must be consistent with California Vehicle Code Section 240.

Buildings must be located within 75 feet of the roadway curb face or edge of pavement and they must face and gain access from the road, to be considered as "fronting" on the road.

b. A local road is defined for the purpose of this guideline as a road intended primarily to provide direct access to abutting residential buildings. Residential buildings Include separate dwelling houses, apartment buildings, or multiple dwelling houses.

2. The speed limit on the road must be 25 miles per hour or less, established in accordance with State law or Board of Supervisors' action.

3. A speed survey must show that 67 percent of the motorists exceed the 25- miles-per-hour speed limit.

4. The road must have a paved width of 40 feet or less and no more than two traffic lanes.

5. The average traffic volume must be greater than 1,000 vehicles in a 24-hour period.

6. No speed hump/cushion may be installed on any street where the Road Commissioner or his designee determines it cannot be safely installed due to:

a. Severe horizontal or vertical curves
b. Inadequate sight distance to the humps/cushions
c. Excessive street downgrades

7. No speed hump/cushion may be installed on any street where the Road Commissioner or his designee determines it will create equal or greater traffic problems by causing traffic diversion to a nearby residential or local road.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SPEED HUMP/CUSHION WARRANTS

US UNITS	REVISION:	PLATE E-9

SPEED HUMP/CUSHION INSTALLATION POLICY

1. Speed humps/cushions will be installed only:

- If the location meets the warrants established by the Board of Supervisors.
- Upon receipt of the required petition or when the Road Commissioner or his designee initiates the proposal

  -and-
- The Board of Supervisors or the Road Commissioner or his designee approves the request

  -and-
- In conformance with the standard design in effect at the time of installation.

A petition for installation of speed humps/cushions must be signed by a minimum of 67% of the property owners on the street or the portion of the street affected concurring in the proposed installation. The petition must contain language to the effect that, if the petition is approved, the petitioners must deposit with the Public Works Agency funds in the estimated amount of the cost of installation of the speed humps/cushions before work will be authorized.

2. Since speed humps/cushions are located in the travelway, additions, alterations, or removals of any or all speed humps/cushions may be directed at any time.

3. Prior to the approval of new speed humps/cushions on any street, the County Traffic Engineer must request concurrence from the Ventura County Fire Protection District, the Sheriff's Department, and the California Highway Patrol within 20 calendar days.

4. Speed-hump/cushion construction costs must be paid by the property owners who sign the required petition. If the Road Commissioner or his designee originates a proposal and the property owners concur, construction costs will be paid by the County.

5. The Transportation Department will reassess the speed-hump/cushion program and report to the Board of Supervisors at approximately five-year intervals. Critical program issues that require Board action prior to the five-year review will be scheduled for policy guidance.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

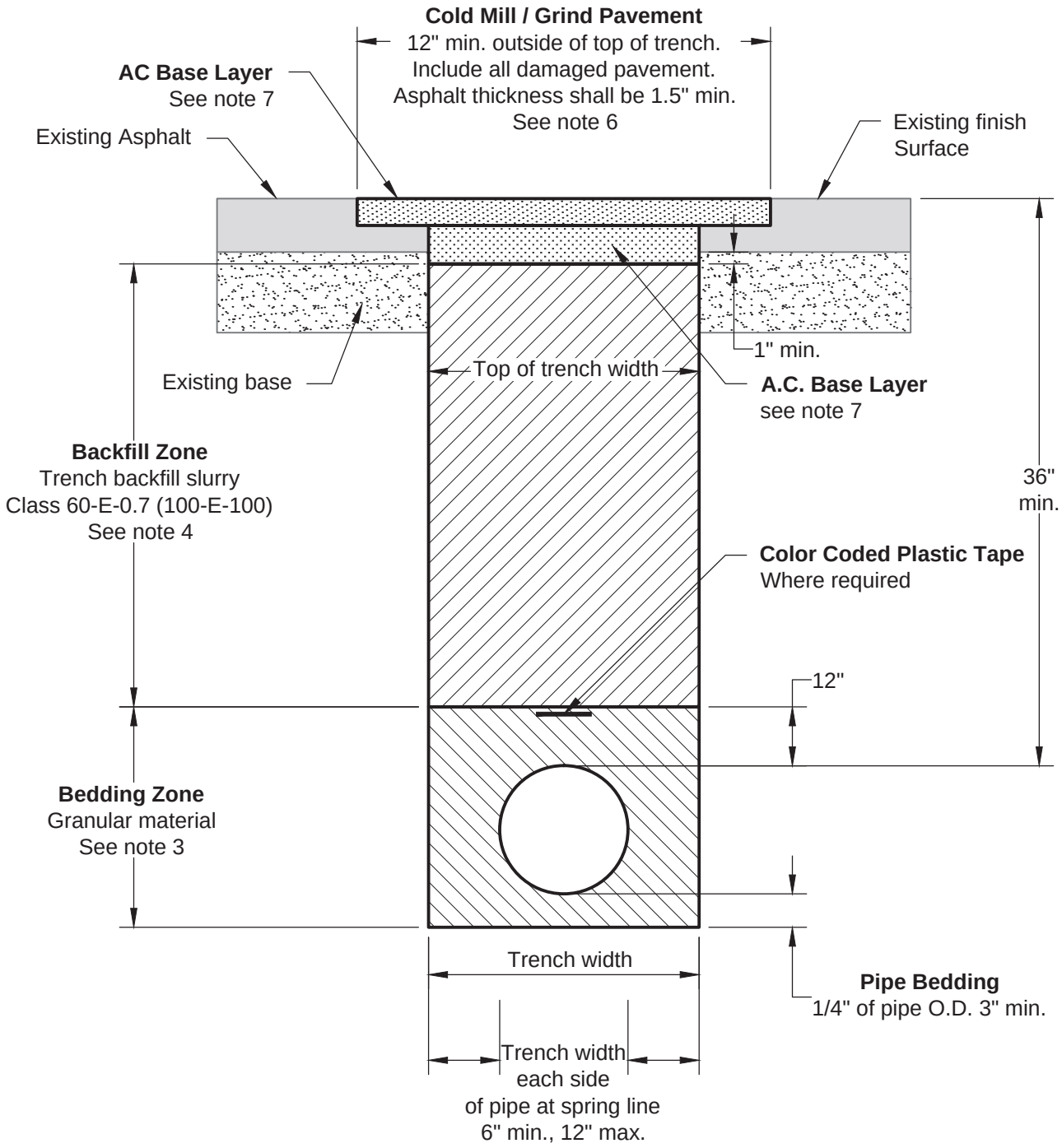
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

SPEED HUMP/CUSHION
INSTALLATION POLICY

US UNITS	REVISION:	PLATE E-11



ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017			COUNTY OF VENTURA PUBLIC WORKS AGENCY
REVISION DATE:	DESCRIPTION:	APPROVED BY: J P	ROAD STANDARDS
		RECOMMENDED BY: D F	PAVEMENT REPAIRS FOR TRENCHING

US UNITS	REVISION:	PLATE E-11

PLATE E-11 NOTES:

1. Construction shall conform to Standard Specifications for Public Works Construction (SSPWC) except as noted.

2. Trench width shall be as shown unless otherwise shown on the approved plans.

3. Bedding material shall be granular with 100% passing 3/4" sieve, 90 to 100% passing the 3/8" sieve and not more than 4% passing No. 200 sieve.

4. Backfill between the bedding zone and subgrade shall be Trench Backfill Slurry Class 60-E-0.7 (100-E-100). The Director of Public Works may approve the substitution of one of the following:
    a. Controlled Low Strength Material (SSPWC 201-6), provided that laboratory control is provided to insure compliance with the specifications.
    b. Non-cementitious backfill, provided that the backfill is tested and certified to meet the approved specifications for the material by an independent testing laboratory (SSPWC 217-2). A Quality Control Plan shall be submitted for approval.

5. Compaction shall not use flooding, ponding or jetting unless directed by Soils Engrineer.

6. A.C. Overlay shall be C1 or C2 PG 64-10, 1.5" minimum.

7. AC Base Layer
    a. Where existing pavement surface is AC the AC Base Layer thickness shall be equal to or greater than the existing AC thickness plus 1" with a minimum of 3" and a maximum of 8". For roads where Traffic Index is 7.0 or greater (Plates B-2, B-3 & B-7a), the AC Base layer thickness shall be 4" min.
    b. Where existing pavement surface is PCC pavement, saw cut 2" into the existing pavement at the outer edge of the trench and break the remaining thickness. Replace the PCC and base to the same depth as the existing pavement. The PCC shall be 560-C-3250.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

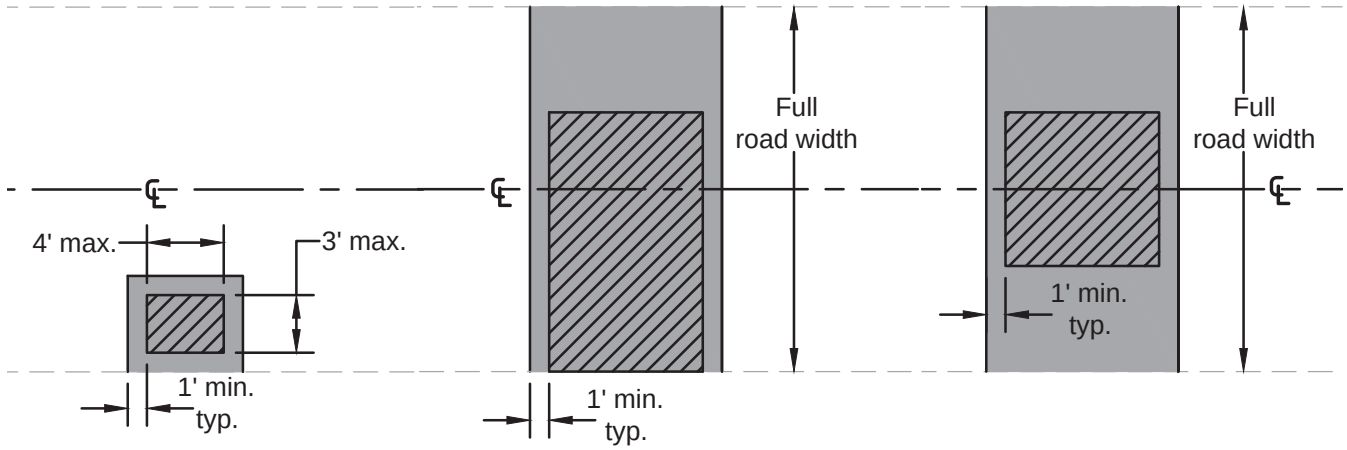
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

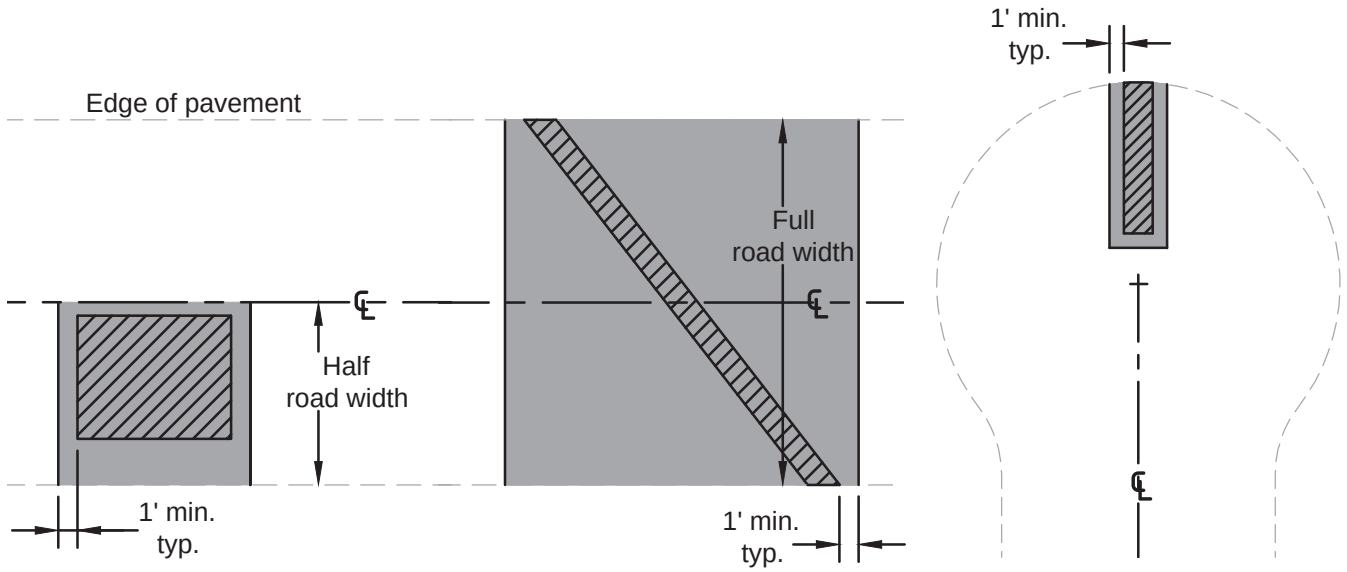
ROAD STANDARDS

PAVEMENT REPAIRS FOR TRENCHING

US UNITS	REVISION:	PLATE E-12



OUTSIDE OF TRAVEL LANE | OVER HALF OF ROAD WAY | OVER BOTH TRAVEL LANES



WITHIN TRAVEL LANE | SKEWED TRENCH ACROSS ROAD | WITHIN BULB OF CUL-DE-SAC

MORATORIUM ROAD: a county roadway that has received a pavement treatment as follows:

- Greater than one half inch (1/2") in thickness within the last five years
- Half inch (1/2") or less in thickness, within the last 3 years, excluding slurry seal

LEGEND:

Trench Area

Area to be cold milled and paved with 1 1/2" min thickness.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

PAVEMENT REPAIR FOR TRENCHING ON MORATORIUM ROADS

US UNITS	REVISION:	PLATE E-13

1. ABOVE GROUND UTILITY EQUIPMENT

1.1 Where required

It is the preference of the County of Ventura that all equipment and structures for utility company facilities be placed underground when located within the road right-of-way, or be located outside of the road right-of-way. However, the County recognizes undergrounding is not always operationally or economically practical and, therefore, establishes the following policy for the placement of poles, equipment, and structures above ground.

1.2 Categories

For the purpose of these policies, equipment will be broken into two categories, “small” and “large.” Small equipment is defined as being less than 24" in height and less than 24" by 36" in area. Large equipment is defined as all others. Equipment must be located as close to the right-of-way boundary as possible.

1.3 Design

1.3.1 Where curb, gutter, and/or sidewalk exists, all above-ground small equipment or poles, when located in the road right-of-way, shall be located per SPPWC standard plan 101-2.

1.3.2 Where no curb, gutter, and/or sidewalk exists, poles, equipment, and accessory structures must meet the minimum setback of ten (10) feet from the edge of pavement where feasible. No above-ground equipment may be placed within five feet of edge of pavement.

1.4 Exceptions

Exceptions, waivers, or variances to these policies may be granted on a case-by-case basis with review and approval by the Road Commissioner or his authorized representative.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

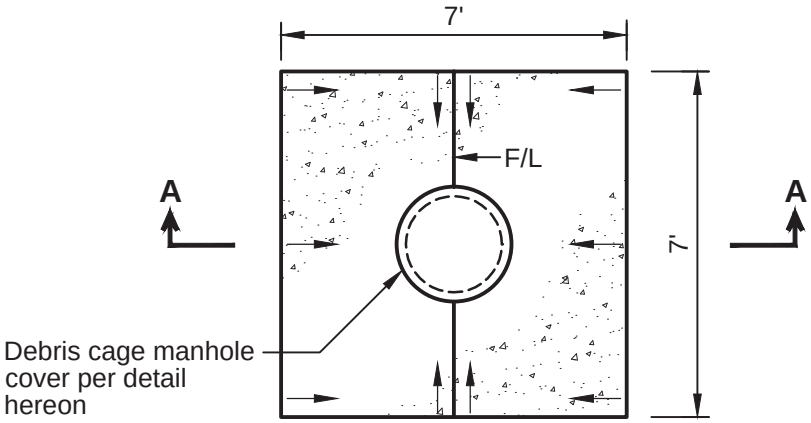
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

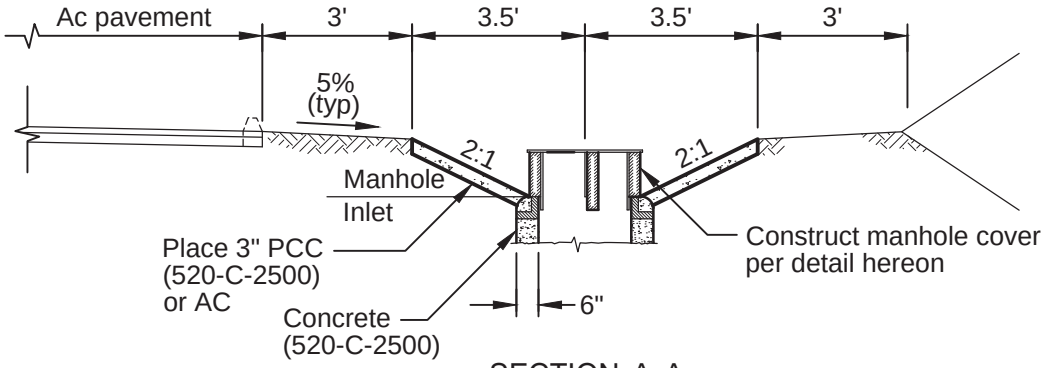
ROAD STANDARDS

ABOVE GROUND UTILITIES IN ROAD RIGHT-OF-WAY

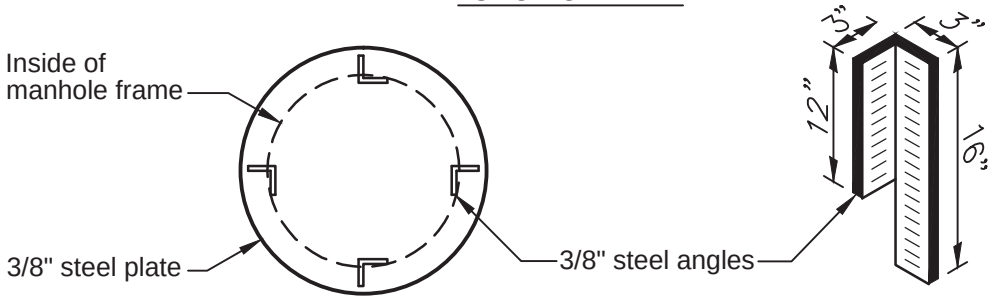
US UNITS	REVISION:	PLATE E-14

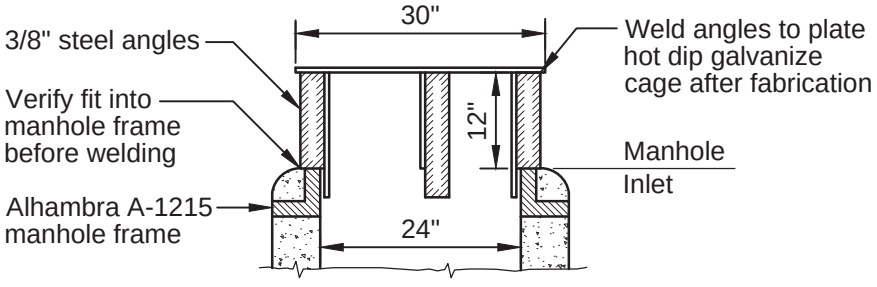


PLAN



SECTION A-A

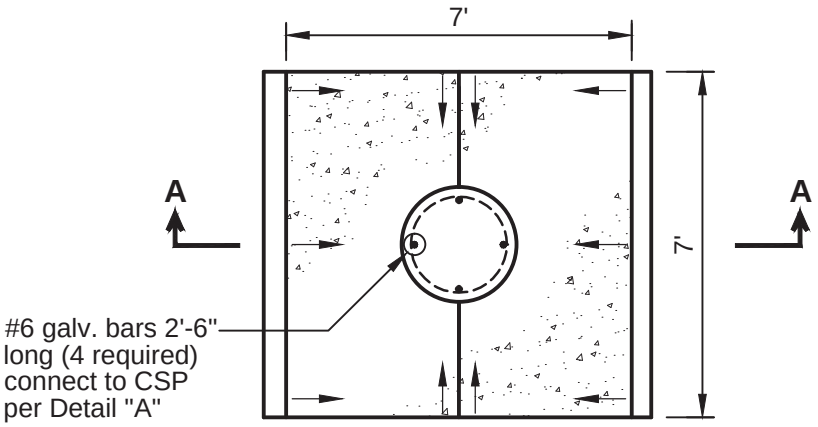




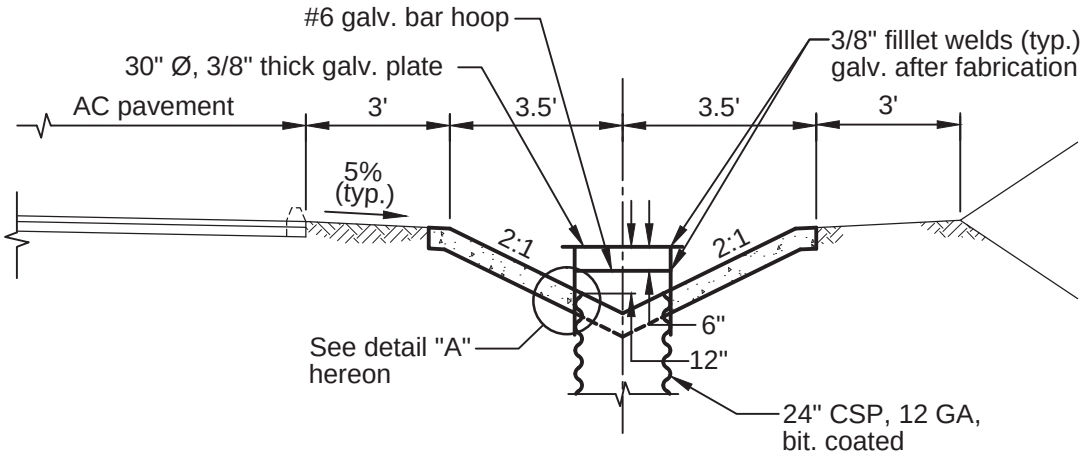
MANHOLE COVER DETAIL

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017			COUNTY OF VENTURA PUBLIC WORKS AGENCY
REVISION DATE:	DESCRIPTION:	APPROVED BY: J P	ROAD STANDARDS
		RECOMMENDED BY: D F	DROP INLET FOR CONCRETE PIPE

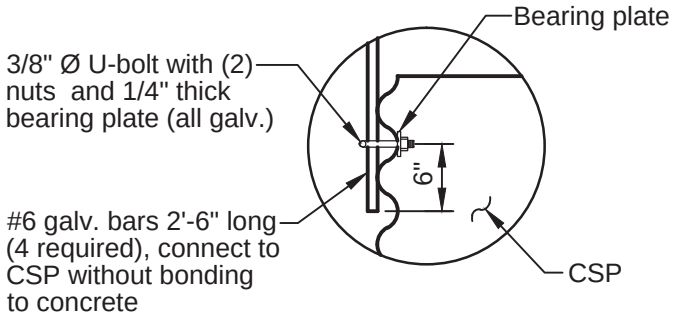
US UNITS	REVISION:	PLATE E-14a



PLAN



SECTION A-A



DETAIL "A"

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

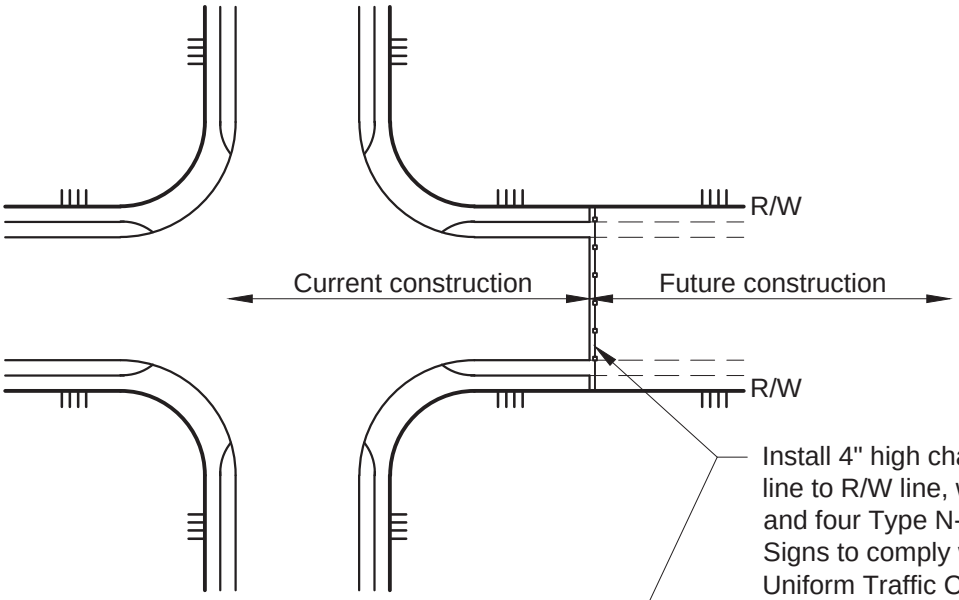
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

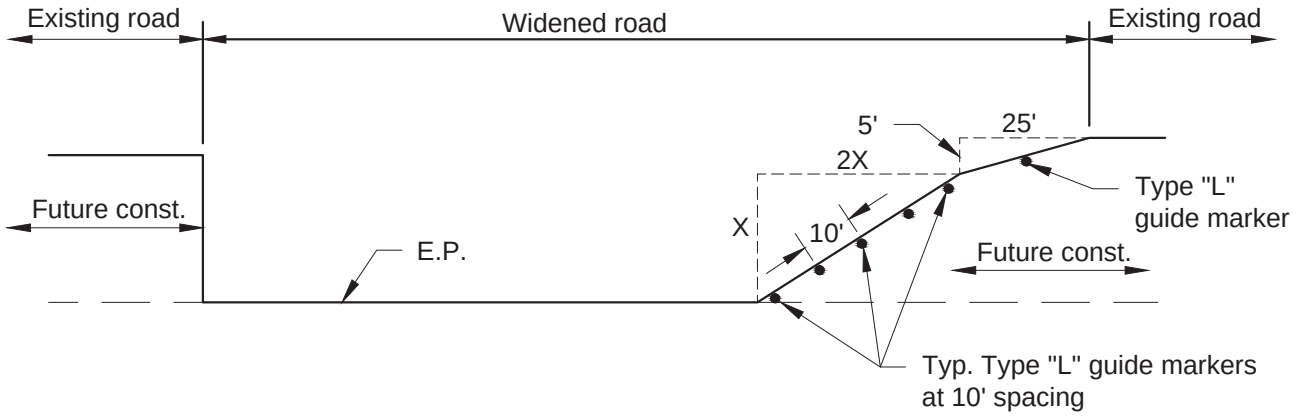
ROAD STANDARDS

DROP INLET FOR CORRUGATED STEEL PIPE

US UNITS	REVISION:	PLATE F-1



Install 4" high chain link fence from R/W line to R/W line, with one W31 (END) sign and four Type N-2 (RED) object markers. Signs to comply with California Manual on Uniform Traffic Control Devices, fence to comply with subsection 304-3 of the Standard Land Development Specifications. The W31 (END) sign shall be 30"x30" and mounted on a 4"x4" redwood post.



ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

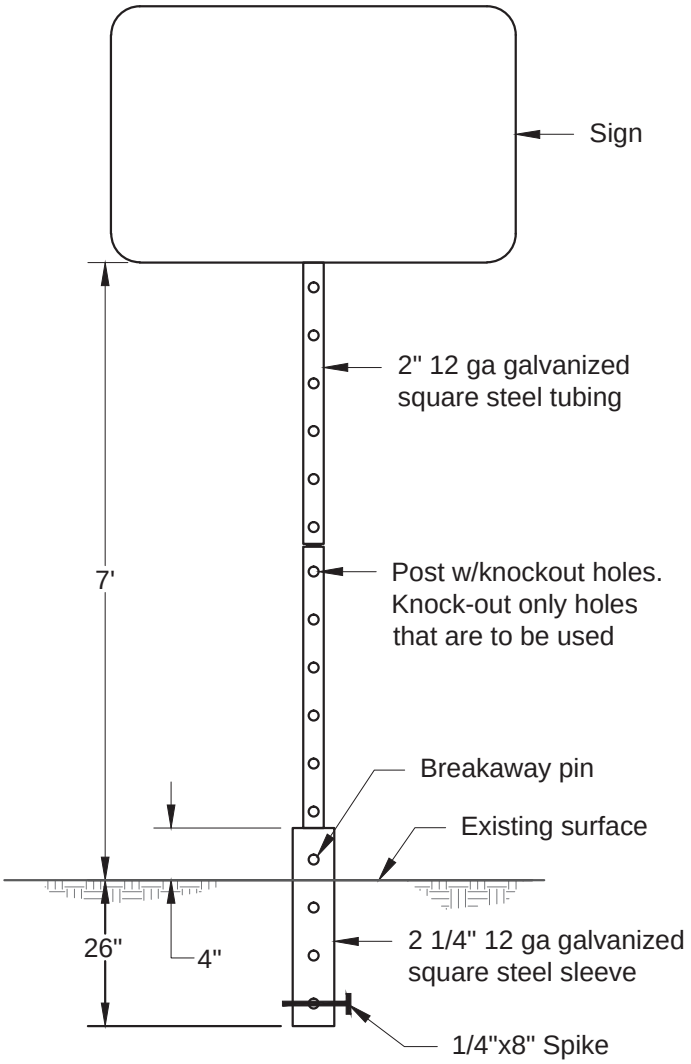
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

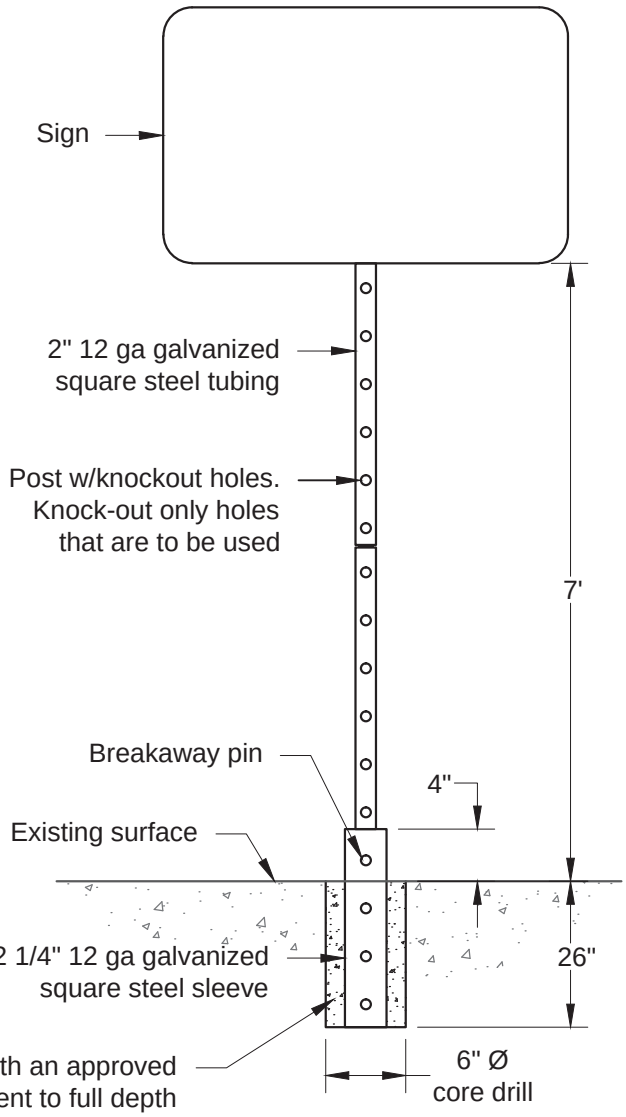
TEMPORARY TERMINATION OF ROAD IMPROVEMENTS

US UNITS	REVISION:	PLATE F-3



SIGN INSTALLATION

In dirt area



NOTE:
No concrete is required for sign posts installed in dirt areas. Maintain 7' clearance to bottom of lowest sign.

SIGN INSTALLATION

In sidewalk area

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY: J P / RECOMMENDED BY: D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

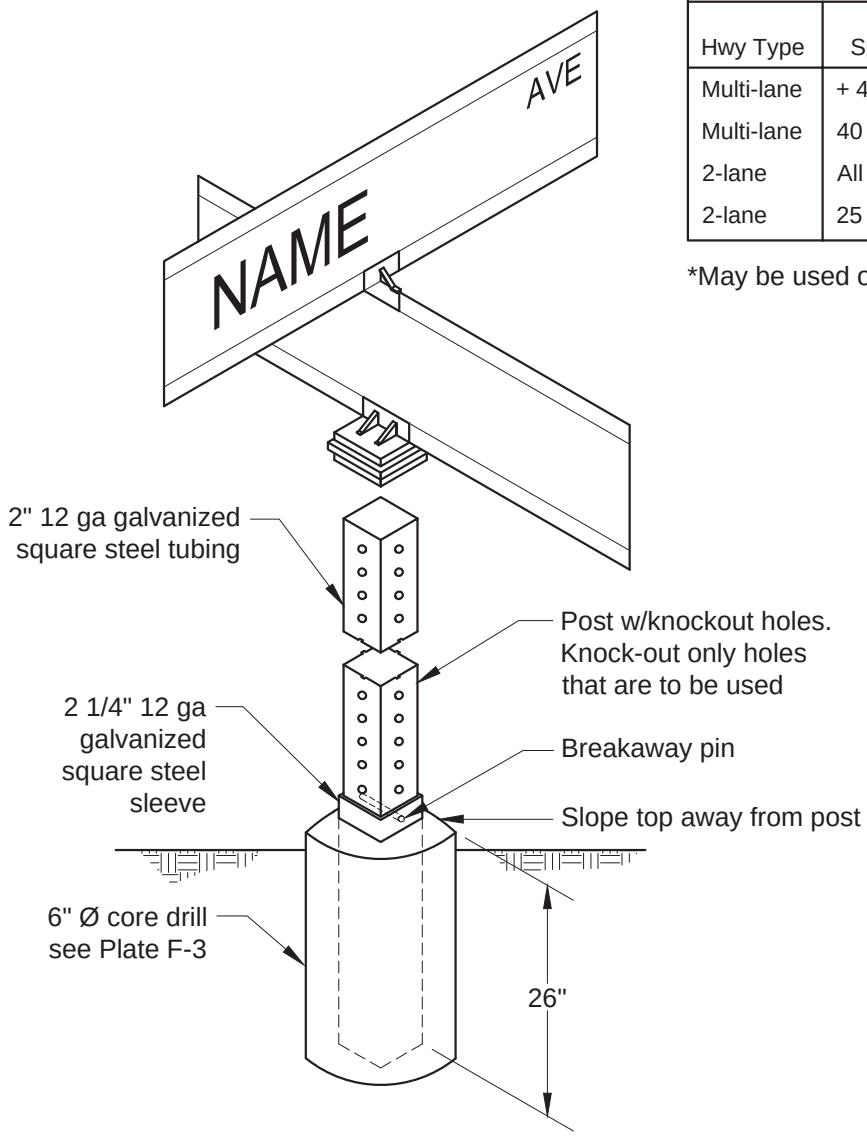
ROAD STANDARDS

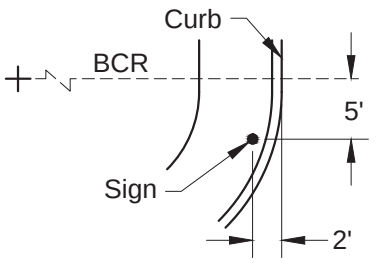
SIGN POST INSTALLATION

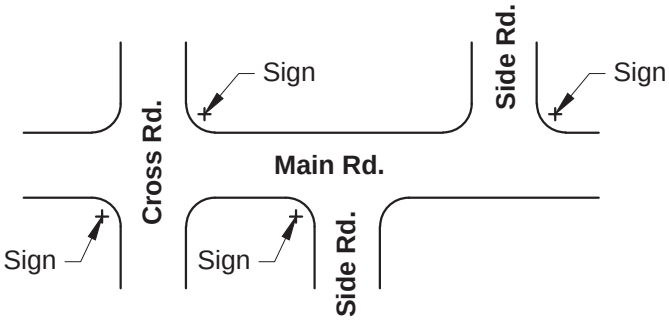
US UNITS	REVISION:	PLATE F-4

TABLE A			
Hwy Type	Speed Limit	Initial Uppercase	Lowercase
Multi-lane	+ 40 mph	8 inches	6 inches
Multi-lane	40 mph or less	6 inches	4.5 inches
2-lane	All speed limits	6 inches	4.5 inches
2-lane	25 mph or less	4 inches*	3 inches*

*May be used on two-lane local roads







TYPICAL LOCATION

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017			COUNTY OF VENTURA PUBLIC WORKS AGENCY
REVISION DATE:	DESCRIPTION:	APPROVED BY: J P	ROAD STANDARDS
			ROAD INTERSECTION NAME SIGN
		RECOMMENDED BY: D F	

US UNITS	REVISION:	PLATE F-4a

PRIVATE ROAD NAME SIGNS

Where a private road intersecting a county road is designed in accordance with Plate D-5 or D-6, a private road name sign may be installed on the same post with a county road name sign.

In all other cases, the private road name sign shall not be within the road right-of-way.

SPECIFICATIONS

DESIGN: Signs shall consist of two double face signs and have a positive locking device which will keep the signs mounted at right angles. The road name shall appear on the sign as shown on the official Record Map.

MATERIAL: Signs shall be commercially available signs meeting the State of California Department of Transportation (CALTRANS) specifications and the California Manual on Uniform Traffic Control Devices. Signs and fittings shall be made of aluminum, anodized or processed, to prevent corrosion.

FINISH: Signs shall have retroreflective high intensity sheeting applied per CALTRANS and CAMUTCD specifications. Background to be green, letters and numerals to be white.

LETTERING: Road name letter height shall be as shown in Table A, Plate F-4. The letter style shall conform to the CAMUTCD.

GUARANTEE: All road signs shall be guaranteed for seven years against chalking and/or fading due to normal atmospheric corrosion.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

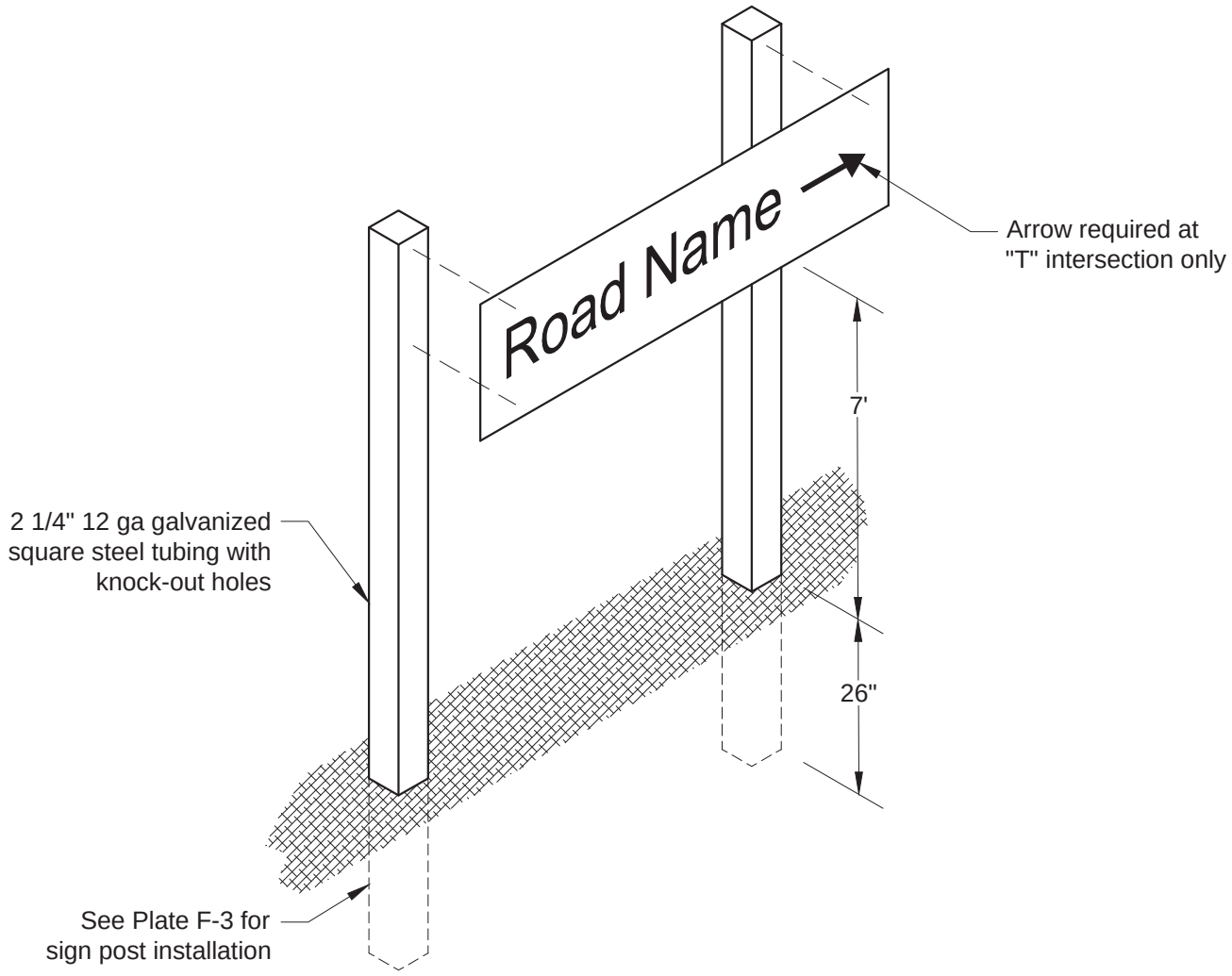
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

ROAD INTERSECTION
NAME SIGN SPECIFICATIONS

US UNITS	REVISION:	PLATE F-4b



DESIGN: Signs shall consist of one single face sign with cross road name and arrow, if applicable.

MATERIAL: Signs shall be manufactured by applying high intensity reflective sheeting and letters to sheet aluminum in conformance with CALTRANS and CAMUTCD specifications. A list of manufactures whose signs meets State specifications will be maintained by the Public Works Agency. Aluminum nuts, bolts, and washers may be substituted for galvanized hardware.

FINISH: Signs shall have retroreflective high intensity sheeting finish per CALTRANS and CAMUTCD specifications. Background to be green, letters and numerals to be white.

LETTERING: Road name letters shall be per Table A on Plate F-4. Letters and border spacing shall conform to CALTRANS and CAMUTCD specifications.

LOCATION: Advance road name signs shall be installed on all primary and secondary roads approximately 300' in advance of all cross intersections. Signs shall be placed in conformance with CAMUTCD. On free access secondary roads, signs to be installed only when required as a condition of approval.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

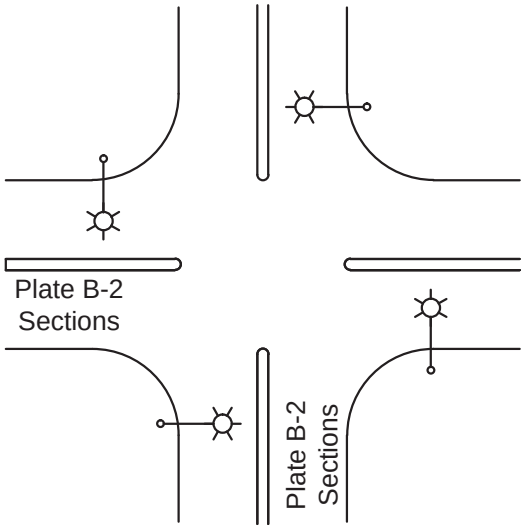
REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

ADVANCE ROAD NAME SIGNS

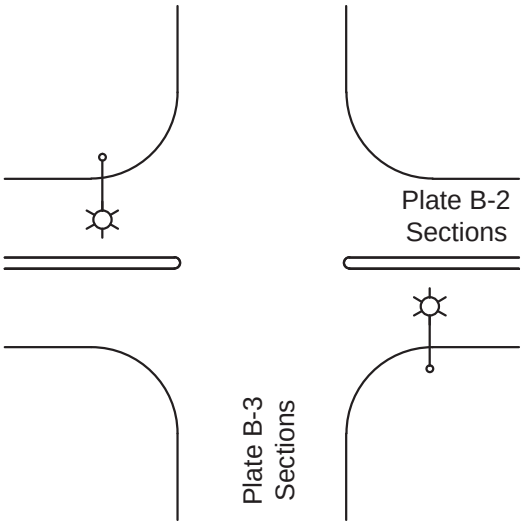
US UNITS	REVISION:	PLATE F-6



Primary to Primary

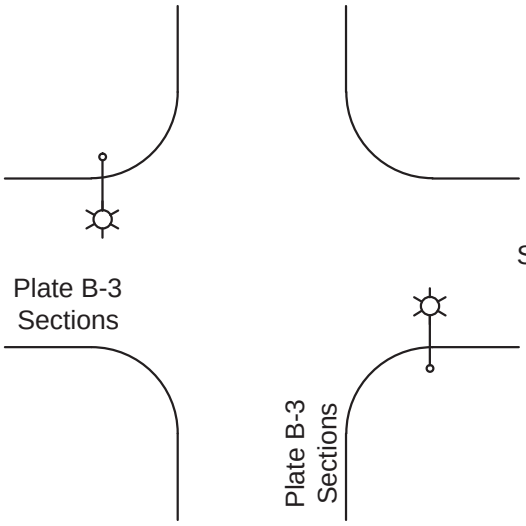
Primary to Secondary
(Controlled)

Secondary (Controlled) to
Secondary (Controlled)



Secondary (Controlled) to
Secondary (Free)

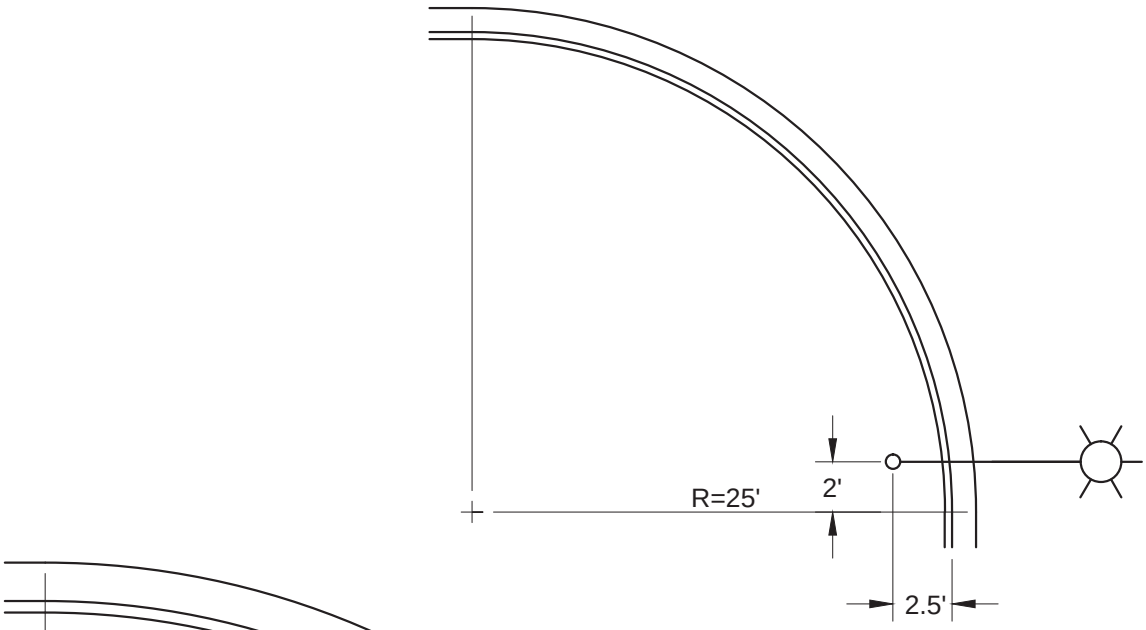
Primary to Secondary (Free)

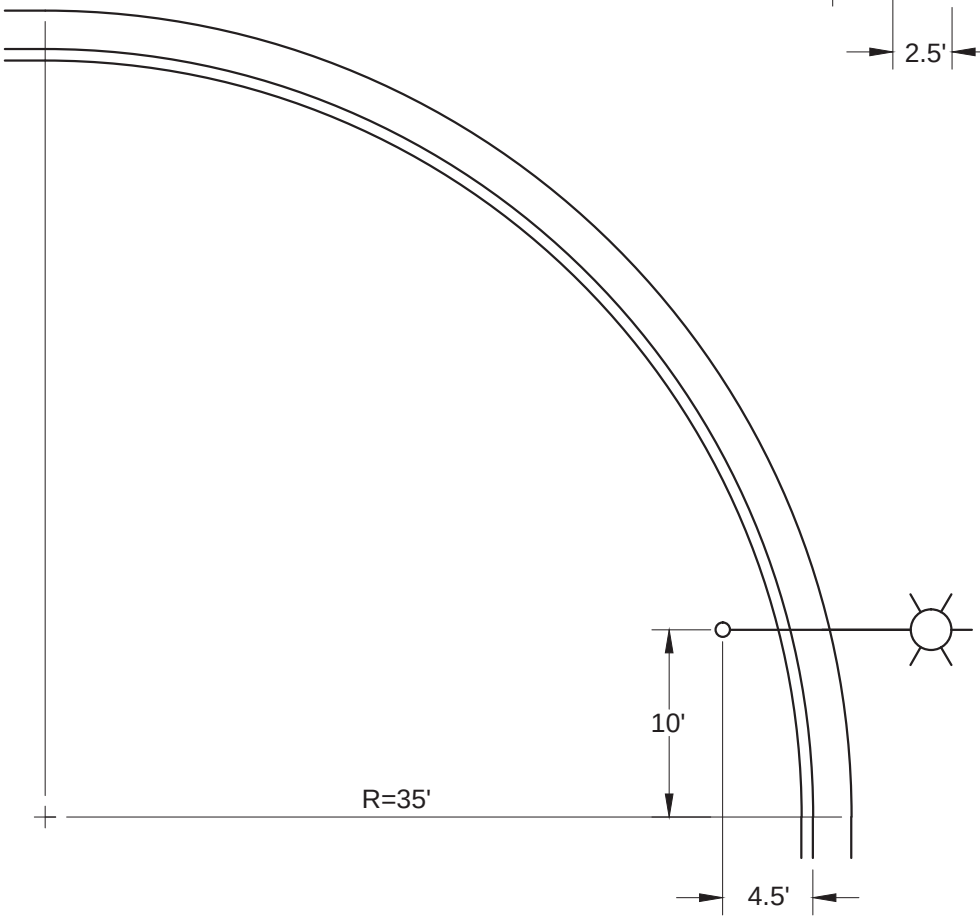


Secondary (Free) to
Secondary (Free)

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017			COUNTY OF VENTURA PUBLIC WORKS AGENCY
REVISION DATE:	DESCRIPTION:	APPROVED BY: J P	ROAD STANDARDS
			INTERSECTION LIGHTING/LOCATION
		RECOMMENDED BY: D F	
			SHEET 1 OF 2

US UNITS	REVISION:	PLATE F-6





ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

INTERSECTION LIGHTING/LOCATION

SHEET 2 OF 2

US UNITS	REVISION:	PLATE F-9

ROADWAY LIGHTING, WHEN REQUIRED, SHALL CONFORM TO THE FOLLOWING TABLE:

PLATE NO.	ROAD CLASS	LUMEN	SPACING
B-2 [A]	Primary Controlled Access		
	Commercial	22000	200'-250' both sides of median
	Residential	16000	200'-250' both sides of median
B-2 [B]	Secondary Controlled Access		
	Commercial	22000	200'-250' both sides of median
	Residential	16000	200'-250' both sides of median
B-3 [A]	Secondary Free Access and nonconforming roads with more than two lanes of traffic		
	Commercial	22000	200'-250' staggered both sides
	Residential	5800	180'-240' staggered both sides
B-3 [B]	Industrial & Commercial	22000	200'-250'
B-3 [C]	Industrial & Commercial	22000	200'-250'
B-3 [D]	Industrial & Commercial low traffic	5800	@Intersections only
B-5 [A]	Collector		
	Commercial	22000	200'-250' both sides
	Residential	5800	180'-240'
B-5 [B]	Residential- Minor	5800	180'-240'
B-5 [C]	Residential-Loop & Cul-de-Sac	5800	180'-240'
B-7 [A]	Rural Road and non-conforming roads with less than 60' of R/W		
		22000	@Intersections only
B-7 [B]	Rural collector and Non-conforming roads with 60' or greater R/W and two lanes of traffic		
		22000	@intersections only

NOTES:

1. Only Caltrans approved Light-Emitting Diode (LED) Luminaires shall be used.
2. Public Works Director may modify these requirements.
3. Intersection lighting shall be as shown on Plates F-6 & F-7.
4. Glare shields may be required when their need is indicated. Glare shields are required within the bounds of the Ojai Valley Area Plan.
5. These spacing requirements are for straight level roads. Winding roads and steep (>5%) or hilly roads may require add additional lighting.
6. Mounting shall be 25'-28' for 5800 Lumen lights and 28'-32' for 16000 and 22000 Lumen lights.

ADOPTED BY BOARD OF SUPERVISORS: 05-16-2017

REVISION DATE:	DESCRIPTION:	APPROVED BY:
		J P
		RECOMMENDED BY:
		D F

COUNTY OF VENTURA
PUBLIC WORKS AGENCY

ROAD STANDARDS

ROADWAY LIGHTING