

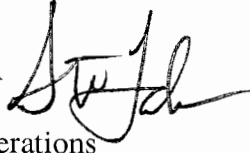
Memorandum

*Flex your power!
Be energy efficient!*

To: DISTRICT DIRECTORS

Date: June 1, 2012

From: STEVE TAKIGAWA
Deputy Director
Maintenance and Operations



ROBERT PIELOW
Acting Deputy Director
Project Delivery



Subject: **Implementation of Pavement Safety Edge**

To allow drivers who drift off the highway to return to the road safely and smoothly and to help reduce pavement edge-related crashes, the California Department of Transportation (Caltrans) is implementing use of the pavement safety edge. The safety edge is a sloped edge of 30 degrees placed at the edge of roadway pavement. The safety edge is a Federal Highway Administration Every Day Counts Initiative and is included as an action item in the "Implementation of the California Strategic Highway Safety Plan."

The effective date for the implementation of this change is October 1, 2012. This change does not apply to projects where a PS&E has already been submitted to DES OE or the project is under construction prior to October 1, 2012. The safety edge should be incorporated on all projects that include pavement items unless a specific condition can be documented that would preclude the benefit of adding the feature (see attached Safety Edge FAQ). Specifically, the safety edge will not be incorporated in the following locations:

- Next to curbs, dikes, guardrails, barriers, walls, and landscape paving.
- Where the distance from the edge of the pavement shoulder to the hinge point is less than 1 foot and there is not enough room for the safety edge.
- Within 3 feet of driveways or intersections.
- On pavement overlays that are less than 0.15 feet thick.

Continue to place embankment or shoulder backing to the edge of the pavement shoulder as shown in the attached revised Standard Plans for pavement edge treatments (RSP P74, RSP P75, and RSP P76). Also attached for your use to implement the safety edge are Standard Special Provisions for asphalt and concrete, along with examples of typical cross sections and quantities.

More information from the FHWA about the pavement safety edge can be found on the Internet at <<http://www.fhwa.dot.gov/everydaycounts/technology/safetyedge/intro.cfm>>. If you have questions or comments regarding documentation and use of the pavement safety edge, please contact Janice Benton (916-654-5176), Bill Farnbach (916-227-5845), or Chuck Suszko (916-227-7314).

Attachments

DISTRICT DIRECTORS

June 1, 2012

Page 2 of 2

- c: Terry Abbott, Chief, Division of Design
- Robert Copp, Chief, Division of Traffic Operations
- Mark Leja, Chief, Division of Construction
- Tony Tavares, Chief, Division of Maintenance
- Janice Benton, Chief, Office of Traffic Safety Program, Division of Traffic Operations
- Bill Farnbach, Chief, Office of Concrete Pavement and Pavement Foundations,
Division of Maintenance–Pavement Program
- Chuck Suszko, Chief, Office of Construction Engineering, Division of Construction

Safety Edge Implementation Frequently Asked Questions (FAQ)

Background

According to figures prepared by the US DOT, run off road crashes account for 58 % of highway fatalities. Research that has examined the role that pavement edges play in run off road collisions has documented that crashes caused by pavement drop-offs resulted in fatalities more often than other types of crashes. The chain of events that results in a simple roadway departure becoming a fatal collision begins with a vehicle that has departed the travelled portion of the roadway due to driver inattention, drowsiness or incapacitation. The driver recovers upon beginning the departure from the paved surface and when they attempt to return to the roadway they have difficulty mounting the vertical edge of pavement which over time has become exposed due to the wearing away of the shoulder backing material adjacent to the pavement. Field tests have determined that without a reduction in speed by the driver, the return of the vehicle to the roadway can be exacerbated by over steering to the left with possible loss of control. The vehicle may veer into the adjacent lane, where it could collide with, or sideswipe oncoming cars, overturn or run off the opposite side of the road and crash.

One low cost solution to this edge drop condition that has proven effective through field testing has been the application of a beveled 30-35 degree asphalt wedge or “Safety Edge” that has been applied at the right roadway edge as a part of new paving or resurfacing projects. Caltrans has applied similar treatments in the past using the “Notch Wedge” treatment to apply a beveled edge that could be more easily traversed between areas where there is a new pavement surface within a lane to an adjacent unpaved lane or correspondingly from an unpaved lane onto an adjacent paved surface. It should be noted that the Safety Edge is simply a pavement edge treatment; the application should be applied based upon a rational evaluation of safety history and the benefits that might be attained through application of various treatments relative to their costs. The application of safety edge within a roadway section would not change the safety performance of a well maintained roadway with shoulder backing in place where safety edge has not been installed.

Frequently Asked Questions

For a project with limited right of way is there a hierarchy for determining which is more important; adding shoulder width including rumble strips or safety edge?

From a cost effectiveness standpoint only, the hierarchy would be as follows: rumble strips would have the highest value as they alert a driver who is departing their lane and in many instances prevent a lane departure; a safety edge will provide a second line of defense and allow a vehicle to return to the travelled way with greater ease; a shoulder widening, which could require the purchase of additional right of way, would also provide incremental improvements in safety for each foot of additional shoulder width. Since shoulder widths already have standards that need to be evaluated (Design Exceptions in the Highway Design Manual), both rumble strips and safety edge should be considered on all appropriate projects. Each of these features has an expected safety benefit that would allow for their evaluation individually or in combination using Highway Safety Manual to determine the net improvement in safety.

Is there a greater benefit for the safety edge on rural two lane highways?

Rural two lane highways which have a disproportionate share of runoff road collisions would benefit from the implementation of the safety edge.

Why will a safety edge not be included on pavement projects that add less than 0.15' of pavement?

According to information provided by the Caltrans Pavement Program, safety edge installations accompanying AC lifts of less than 2" (0.15') have not performed well from a structural standpoint.

Will the implementation of the safety edge drive environmental considerations (e.g. footprint of impervious area, potential disturbed soil area impacts)?

The environmental concerns and the costs of mitigating them along with any costs related to addressing run off road collisions at a treatment location where run off road collisions may be a concern should be evaluated and compared with the net expected safety benefits that can be attained from the use of safety edge and other related treatments (shoulder widening, rumble strips etc). The environmental concerns and expected safety benefits will vary by location, roadway type and traffic volumes so these questions should be evaluated on a case by case basis as a part of the safety review.

Does the term "safety" edge imply that in those cases where it is not used the pavement edge is not safe?

Safety edge should be considered a pavement edge treatment only, it in itself is not going to make a road safer or less safe, it may in combination with the circumstances surrounding a particular run off road collision provide the ease of return to the roadway that makes one less collision occur. The driver's behavior and the vehicles performance also weigh heavily on this outcome. It should be installed based upon engineering judgment, but sections without it should by no means be considered less safe.

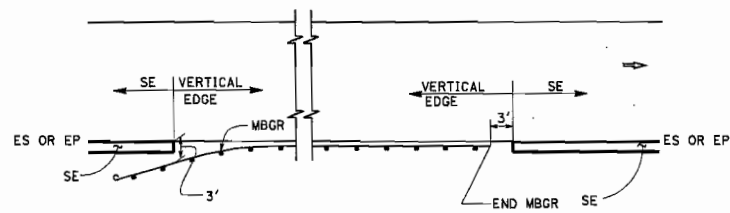
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
 January 20, 2012
 PLANS APPROVAL DATE
 THE STATE OF CALIFORNIA OR ITS OFFICERS OF AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

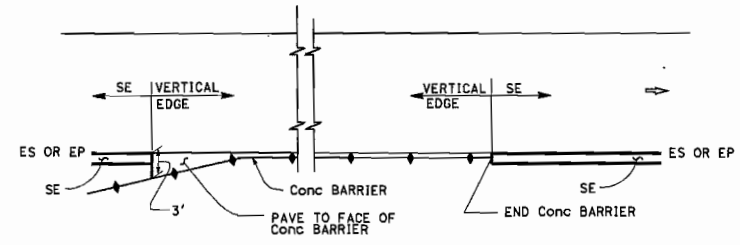
REGISTERED PROFESSIONAL ENGINEER
 Cornelius V. Horn
 C55610
 Exp. 12-31-12
 CIVIL
 STATE OF CALIFORNIA

TO ACCOMPANY PLANS DATED _____

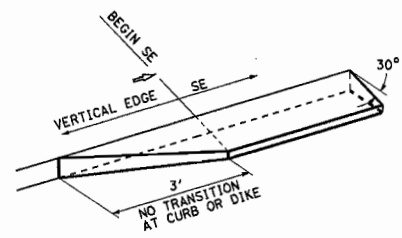
ABBREVIATIONS:
SE SAFETY EDGE



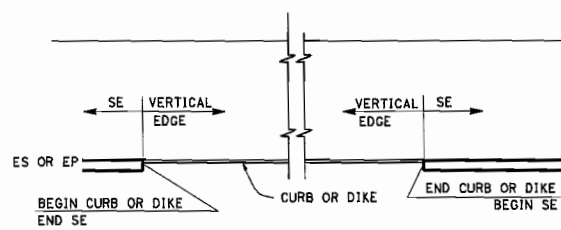
MBGR



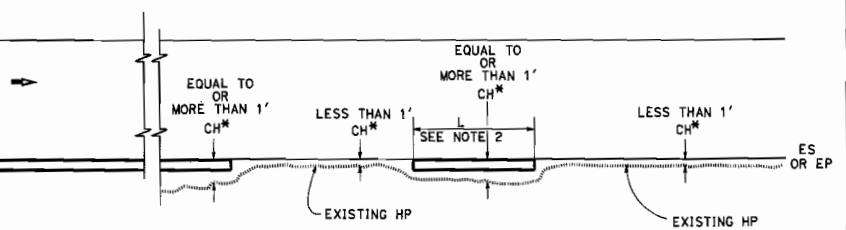
CONCRETE BARRIER



TRANSITION DETAIL FOR CONCRETE ONLY

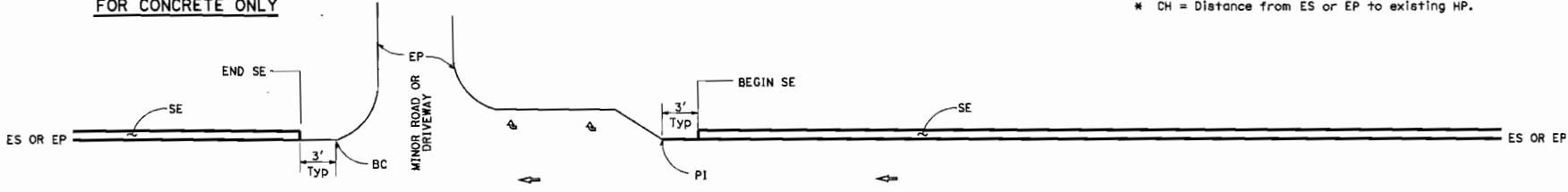


CURB OR DIKE

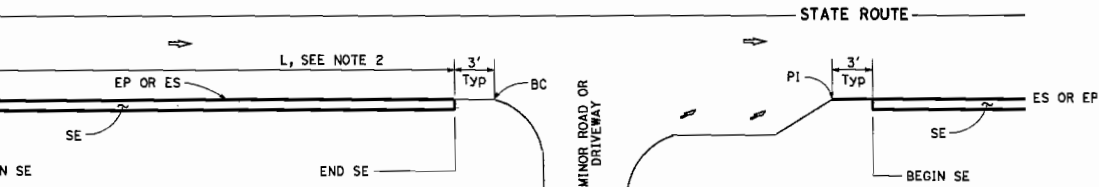


NARROW SIDE SLOPE

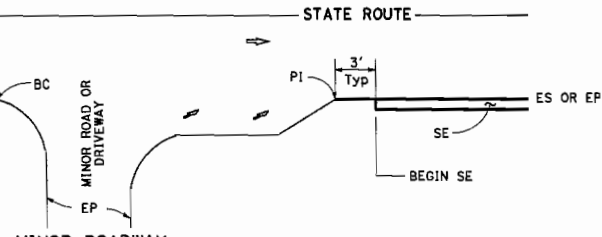
* CH = Distance from ES or EP to existing HP.



INTERSECTION



DRIVEWAY AND INTERSECTION



MINOR ROADWAY OR DRIVEWAY

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
PAVEMENT EDGE TREATMENTS
NO SCALE

RSP P74 DATED JANUARY 20, 2012 SUPPLEMENTS THE STANDARD PLANS BOOK DATED 2010.


NOTES:

1. For details not shown, see Revised Standard Plans RSP P75 and RSP P76.
2. Safety edge is optional when L is less than 30'.

REVISED STANDARD PLAN RSP P74




2010 REVISED STANDARD PLAN RSP P74

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS



 REGISTERED CIVIL ENGINEER
 January 20, 2012
 PLANS APPROVAL DATE
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LEGEND:

 HMA OVERLAY
 HMA OR CONCRETE OVERLAY
 CONCRETE OVERLAY

ABBREVIATIONS:

SE SAFETY EDGE
 TT TOTAL THICKNESS OF SE

TO ACCOMPANY PLANS DATED _____

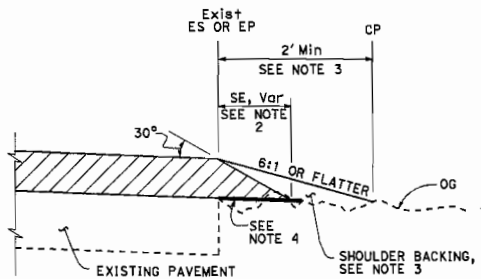
ADDITIONAL HMA OR CONCRETE QUANTITIES FOR SE/SIDE/MILE

TYPICAL CROSS SECTION	TT	TOTAL ADDITIONAL MATERIAL FOR SE/SIDE/MILE		
		HMA (TON)	CONCRETE (CY)**	CONCRETE (CY)**
	0.15'	NA	NA	NA
	0.20'	13.7	NA	NA
	0.30'	30.9	NA	NA
	0.40'	54.9	NA	NA
	0.45'	69.4	NA	NA
	0.50'	84.2	NA	NA
	0.60'	113.9	NA	NA
	0.70'	143.6	70.9	94.2
	0.80'	173.3	85.6	112.2
	0.90'	203.0	100.3	130.2
	1.00'	232.7	114.9	148.2
	1.10'	262.4	129.6	166.2
1.20'	292.1	144.3	184.2	

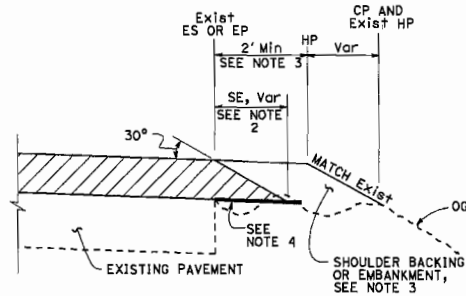
* For Detail "A"
 ** For Optional Detail "A"

**TABLE A
 EDGE TREATMENT FOR VARIOUS OVERLAY THICKNESS AND CONDITIONS**

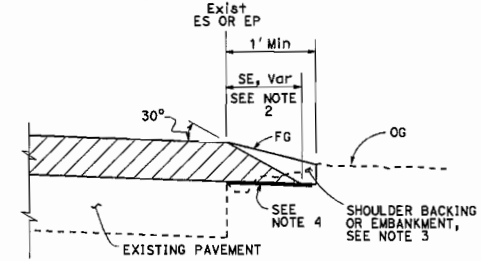
FIELD CONDITION	OVERLAY THICKNESS	
	LESS THAN 0.15'	0.15' OR MORE
Exist SLOPE 6:1 OR FLATTER	CASE E	CASE A
Exist SLOPE 3:1 TO 6:1	CASE E	CASE B
Exist SLOPE STEEPER THAN 3:1	CASE F	CASE F
CUT SECTION (REPLACE, COLD PLANE, MILL PAVEMENT)	CASE D	CASE C



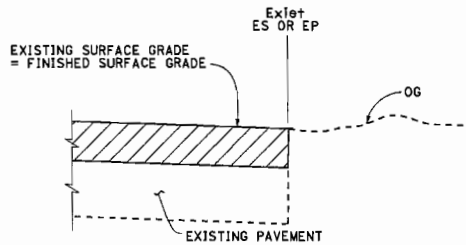
**CASE A
 Safety Edge**



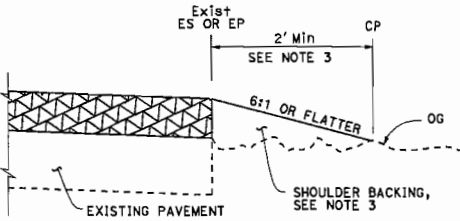
**CASE B
 Safety Edge**



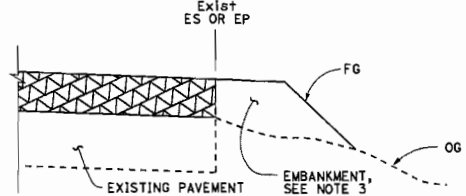
**CASE C
 Safety Edge**



**CASE D
 Vertical Edge**



**CASE E
 Vertical Edge**

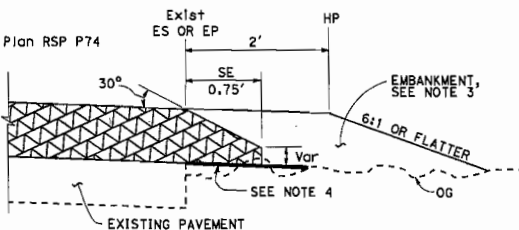


**CASE F
 Vertical Edge**

* See Table A and Revised Std Plan RSP P74

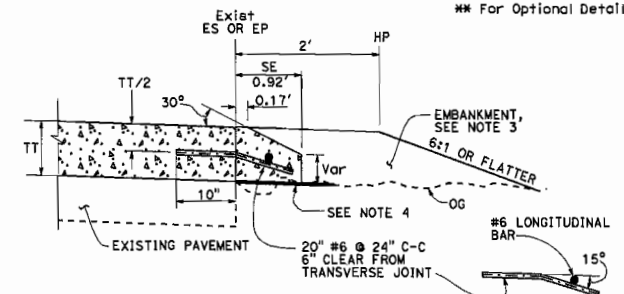
NOTES:

- For limits of safety edge and vertical edge treatments, see Revised Standard Plan RSP P74.
- Details shown for HMA overlay thickness less than 0.43'. See Detail "A" for HMA overlay thickness more than 0.43' or concrete overlay.
- For locations and limits of shoulder backing or embankment see project plans.
- Grade existing ground to place safety edge. 1' minimum width.
- Safety edge transverse joint must match overlay transverse joint. End of #6 longitudinal bar must be 2" ± 1/4" clear from transverse joint.
- Safety edge is not needed in the area of MBGR, barrier, right turn lane and acceleration lane. See Revised Standard Plan RSP P74.



DETAIL "A"

For HMA overlay thickness more than 0.43' or concrete overlay



OPTIONAL DETAIL "A"

For concrete overlay
 See Note 5

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
**PAVEMENT EDGE TREATMENTS-
 OVERLAYS**

NO SCALE
 RSP P75 DATED JANUARY 20, 2012 SUPPLEMENTS THE
 STANDARD PLANS BOOK DATED 2010.

REVISED STANDARD PLAN RSP P75

2010 REVISED STANDARD PLAN RSP P75

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER January 20, 2012 PLANS APPROVAL DATE	
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LEGEND:

HMA PAVEMENT

HMA OR CONCRETE PAVEMENT

CONCRETE PAVEMENT

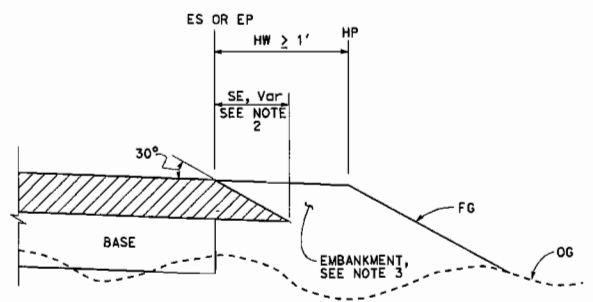
ABBREVIATIONS:

SE SAFETY EDGE

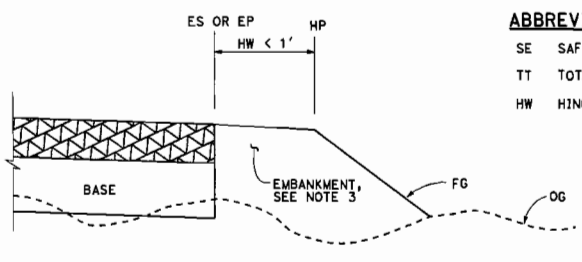
TT TOTAL THICKNESS OF SE

HW HINGE WIDTH, DISTANCE FROM ES OR EP TO HP

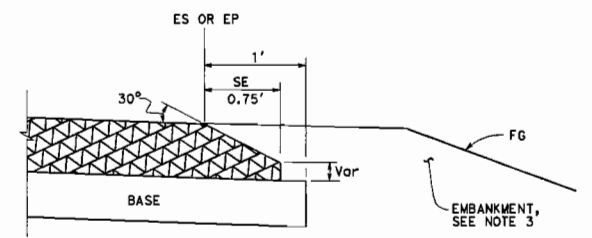
TO ACCOMPANY PLANS DATED _____



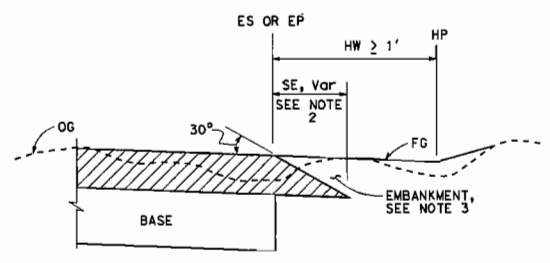
CASE K
Safety Edge - Fill Section, HW $\geq 1'$



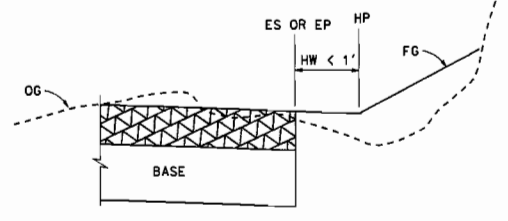
CASE L
Vertical Edge - Fill Section, HW $< 1'$



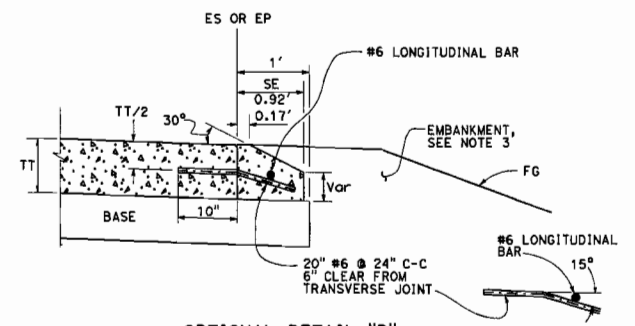
DETAIL "B"
For HMA pavement thickness more than 0.43' or concrete pavement



CASE M
Safety Edge - Cut Section, HW $\geq 1'$



CASE N
Vertical Edge - Cut Section, HW $< 1'$



OPTIONAL DETAIL "B"
For concrete pavement
See Note 4

FILL SECTION

CUT SECTION

- NOTES:**
1. For limits of safety edge and vertical edge treatments, see Revised Standard Plan RSP P74
 2. Details shown for HMA pavement thickness less than 0.43'. See Detail "B" for HMA pavement thickness more than 0.43' or concrete pavement.
 3. For locations and limits of embankment see project plans.
 4. Safety edge transverse joint must match pavement transverse joint. End of #6 longitudinal bar must be 2" ± 1/2" clear from transverse joint.
 5. Safety edge is not needed in the area of MBR, barrier, right turn lane and acceleration lane. See Revised Standard Plan RSP P74.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**PAVEMENT EDGE TREATMENTS-
NEW CONSTRUCTION**
NO SCALE

RSP P76 DATED JANUARY 20, 2012 SUPPLEMENTS THE
STANDARD PLANS BOOK DATED 2010.
REVISED STANDARD PLAN RSP P76

Section 39-1.30. Use for HMA pavement.

Replace section 39-1.30 with:

39-1.30 EDGE TREATMENT, HOT MIX ASPHALT PAVEMENT

39-1.30A General

Section 39-1.30 includes specifications for constructing the edges of HMA pavement as shown.

39-1.30B Materials

For the safety edge, use the same type of HMA used for the adjacent lane or shoulder.

39-1.30C Construction

The edge of roadway where the safety edge treatment is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade areas to receive the safety edge as required.

The safety edge treatment must be placed monolithic with the adjacent lane or shoulder and shaped and compacted with a device attached to the paver.

The device must be capable of shaping and compacting HMA to the required cross section as shown. Compaction must be by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transition to cross roads, driveways, and obstructions.

For safety edge treatment, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

If paving is done in multiple lifts, the safety edge treatment can be placed either with each lift or with the final lift.

Short sections of hand work are allowed to construct transitions for safety edge treatment.

For more information on the safety edge treatment, go to:

http://safety.fhwa.dot.gov/roadway_dept/pavement/safedge/

You can find a list of commercially available devices at the above Web site under "Frequently Asked Questions" and "Construction Questions."

39-1.30D Payment

Not Used

USE WITH 2006 STANDARDS.

Use for HMA pavement.

10-1. __ EDGE TREATMENT, HOT MIX ASPHALT PAVEMENT

GENERAL

This work includes constructing the edges of HMA pavement as shown on the plans.

MATERIALS

2

HMA for safety edge treatment must comply with Section 39, "Hot Mix Asphalt," of the Standard Specifications.

3

For the safety edge, use the same type of HMA used for the adjacent lane or shoulder.

CONSTRUCTION

4

The edge of roadway where the safety edge treatment is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade areas to receive the safety edge as required.

5

The safety edge treatment must be placed monolithic with the adjacent lane or shoulder and shaped and compacted with a device attached to the paver.

6

The device must be capable of shaping and compacting HMA to the required cross section as shown on the plans. Compaction must be by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transition to cross roads, driveways, and obstructions.

7

For safety edge treatment, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown on the plans. Measure the angle from the plane of the adjacent finished pavement surface.

8

If paving is done in multiple lifts, the safety edge treatment can be placed either with each lift or with the final lift.

9

Short sections of hand work are allowed to construct transitions for safety edge treatment.

10

For more information on the safety edge treatment, go to:

http://safety.fhwa.dot.gov/roadway_dept/pavement/safedge/

11

You can find a list of commercially available devices at the above Web site under "Frequently Asked Questions" and "Construction Questions."

MEASUREMENT AND PAYMENT

12

Full compensation for constructing edge treatments, including grading when required for preparation of the area to receive the safety edge treatment, are included in the contract price paid per ton for the type of HMA designated in the verified Bid Item List and no additional compensation will be allowed.

Section 40-1. Use for concrete pavement shoulders.

Replace "Reserved" in section 40-1.03L(1):

Construct edge treatments as shown. This work includes grading when required for the preparation of safety edge areas.

Sections 40-1.03L(2) and 40-1.03L(3) do not apply to safety edges.

For safety edges placed after the concrete pavement is complete, concrete may comply with the requirements for minor concrete.

For safety edges placed after the concrete pavement is complete, install connecting bar reinforcement under section 52.

Saw cutting or grinding may be used to construct safety edges.

For safety edges, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

USE WITH 2006 STANDARDS.

Use for concrete pavement shoulders.

10-1. __ EDGE TREATMENT, CONCRETE PAVEMENT

GENERAL

This work includes constructing the edges of concrete pavement.

2

Edge treatments must comply with Section 40, "Concrete Pavement," of the Standard Specifications except Sections 40-3.11, "Preliminary Finishing" and 40-3.12, "Final Finishing" do not apply to safety edges.

MATERIALS

3

For safety edges placed after the concrete pavement is complete, concrete may be minor concrete under Section 90-10, "Minor Concrete," of the Standard Specifications and these special provisions. If connecting bar reinforcement is installed by the drill and bond method, comply with the requirements in Section 40-2.05, "Chemical Adhesive (Drill and Bond)," of the Standard Specifications and these special provisions.

CONSTRUCTION

4

You may construct safety edges after the concrete pavement has been constructed. Install connecting bar reinforcement under Section 52, "Reinforcement," of the Standard Specifications.

5

Saw cutting or grinding may be used to construct safety edges.

6

For safety edges, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown on the plans. Measure the angle from the plane of the adjacent finished pavement surface.

MEASUREMENT AND PAYMENT

7

Full compensation for edge treatment of concrete pavement, including grading when required for preparation of the area to receive safety edges, is included in the contract paid per cubic yard for concrete pavement of the type involved and no additional compensation is allowed.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

REVISED BY
 DATE REVISED

CALCULATED-DESIGNED BY
 CHECKED BY

FUNCTIONAL SUPERVISOR

DATE PLOTTED => DATE
 00-00-00 TIME PLOTTED => 01:16

NOTES:

1. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO THE TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATION AS SHOWN OR AS DIRECTED BY THE ENGINEER.
3. FOR LOCATIONS OF HMA DIKE SEE LAYOUT SHEETS.

DESIGN DESIGNATION (Rte 222)

2010 ADT = 3055 D = 60%
 2030 ADT = 4957 T = 18.0%
 DHV = 714 V = 60 MPH
 TI = 11.5
 ESAL = 8,000,000
 CLIMATE REGION = NORTH COAST

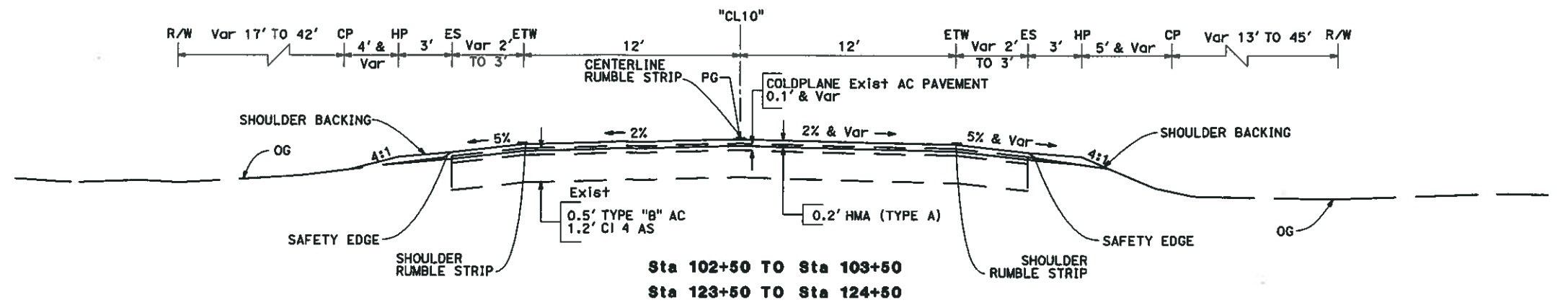
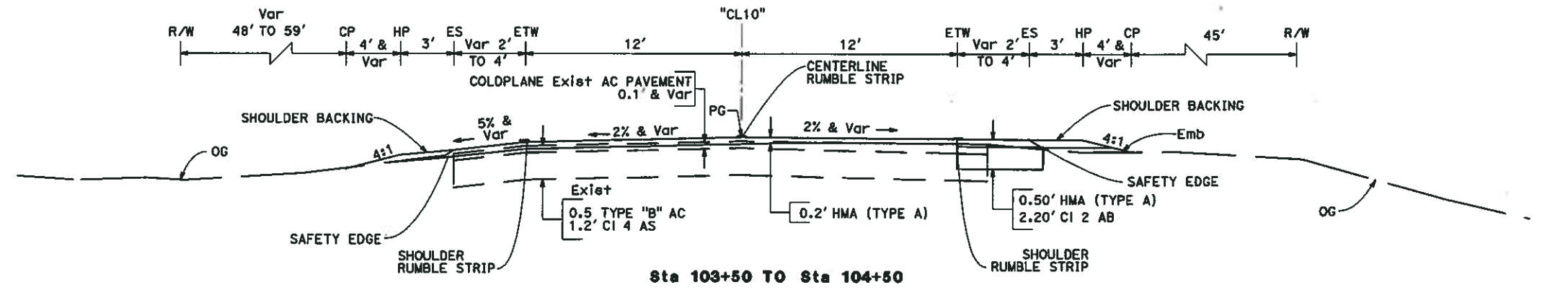
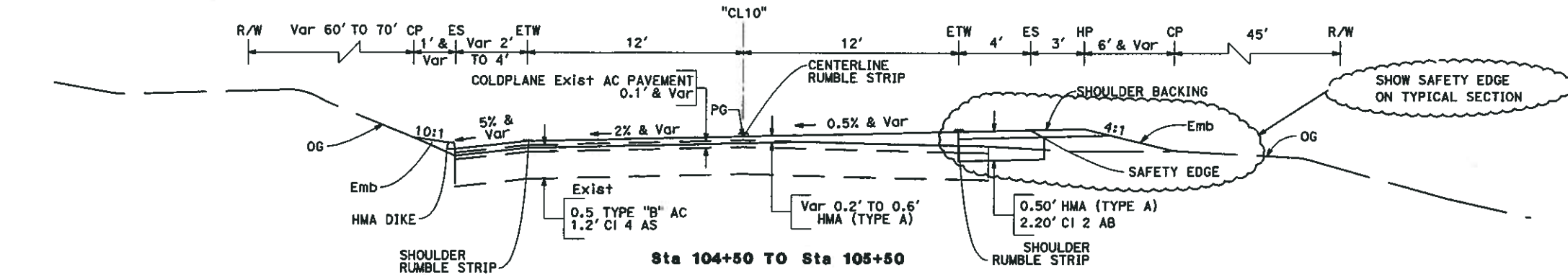
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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 STATE OF CALIFORNIA



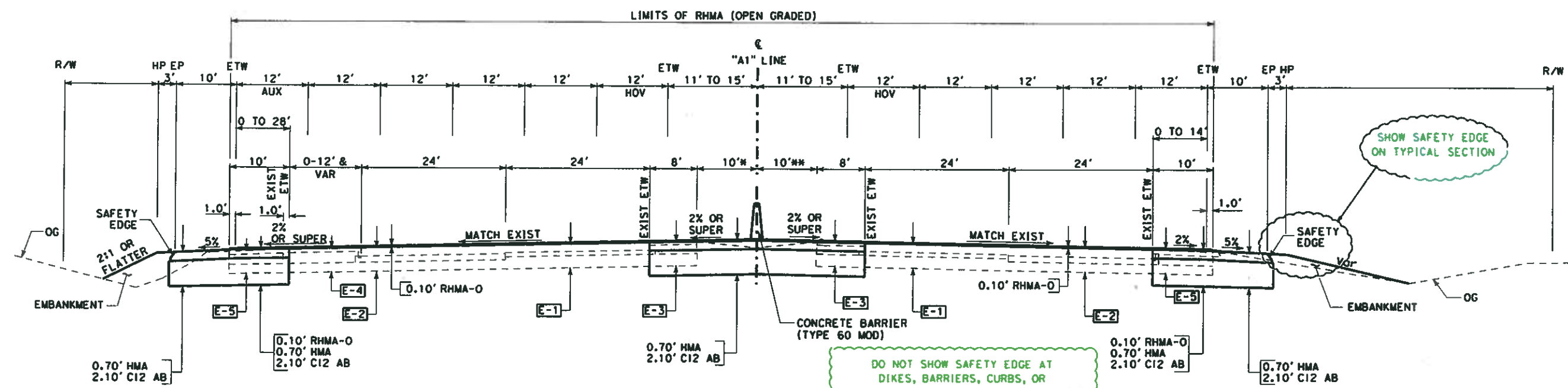
ROUTE 222

**TYPICAL CROSS SECTIONS
 NO SCALE
 X-1**

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

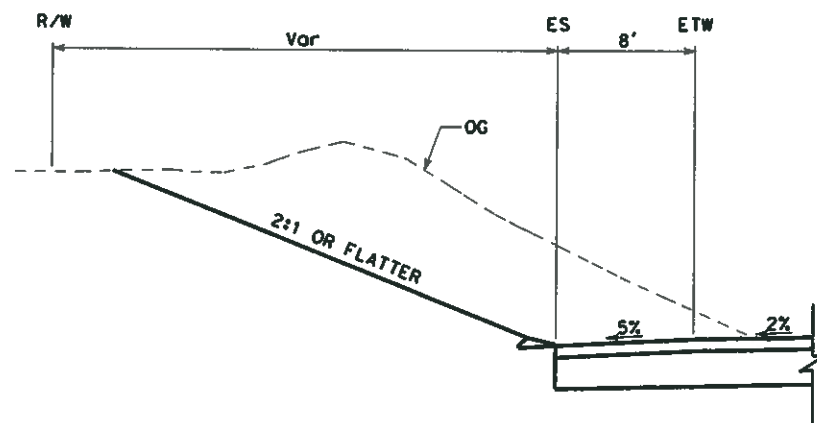
REGISTERED CIVIL ENGINEER DATE	
PLANS APPROVAL DATE	

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

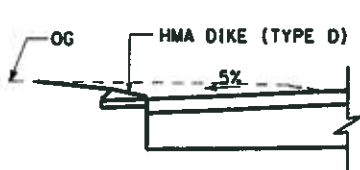


ROUTE 11
STA "A1" 706+75.22 TO 780+37.12

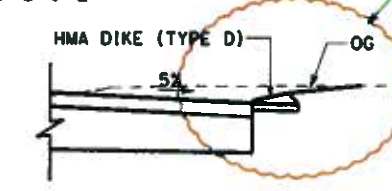
DO NOT SHOW SAFETY EDGE AT DIKES, BARRIERS, CURBS, OR OTHER LOCATION SPECIFIED IN MEMORANDUM



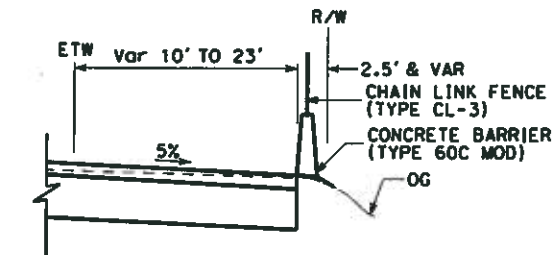
HMA DIKE
STA "A1" 622+00.00 LT TO STA "A1" 634+13.11 LT



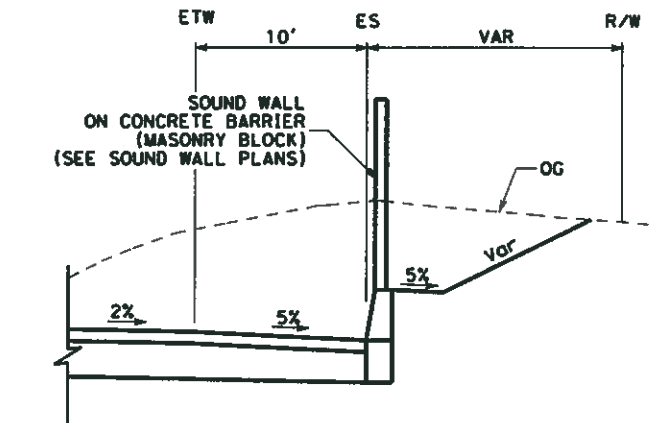
HMA DIKE
STA "A1" 574+50 TO 582+50
STA "A1" 612+15 TO "M2" 38+50



HMA DIKE
STA "A1" 580+75 TO 592+50.51
STA "A1" 624+00 TO 630+43
STA "A1" 655+00 TO 663+50
STA "A1" 728+00 TO 734+50
STA "A1" 741+00 TO 753+50
STA "A1" 625+44.90 TO "M3" 35+40
STA "M4" 50+09.79 TO "M3" 662+50



CONCRETE BARRIER
STA "A1" 680+04 TO 707+11.82



SOUND WALL
STA "A1" 621+54.96 RT TO STA "A1" 632+53.79 RT

TYPICAL CROSS SECTIONS
NO SCALE
X-3

REVISIONS: []
 DESIGNED BY: []
 CHECKED BY: []
 FUNCTIONAL SUPERVISOR: []
 DEPARTMENT OF TRANSPORTATION
 DESIGN
 STATE OF CALIFORNIA
 REQUEST

REVISIONS: REVISED BY DATE REVISIONS
 CALCULATED-DESIGNED BY CHECKED BY
 FUNCTIONAL SUPERVISOR
 STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION


Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL NO. SHEETS
REGISTERED CIVIL ENGINEER			DATE	
PLANS APPROVAL DATE				
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>				

PAVEMENT STRUCTURE

LOCATION	HMA (TYPE A)	CLASS 2 AGGREGATE BASE	IMPORTED BORROW	ROADWAY EXCAVATION	SHOULDER BACKING	IMPORTED TOPSOIL	COLD PLANE AC PAVEMENT	TACK COAT
	TON	CY	CY	CY	TON	CY	SOYD	TON
Sta 102+50 to 105+50	117	119	29	137	18		907	0.4
Sta 105+50 to 113+29	1749	2184	5996	2600	24	567		1.3
Sta 113+29 to 114+12			362	2039				
Sta 114+12 TO 118+00	1307	1130	361	2315		752		0.8
Sta 118+00 TO 123+50	746	1369	482	1066	18			0.6
Sta 123+50 TO 124+50	42				10		311	0.2
"DWY2" Sta 10+00 TO 11+28	37		85	8				
SAFETY EDGE	17							
HMA DIKE	90							
TOTAL	4105	4802	7315	8165	70	1319	1218	3.3

PLACE HMA DIKE

SHEET	LOCATION	L+	R+	TYPE			HMA* (TYPE A) TON
				A LF	D LF	F LF	
L-1	104+50 TO 109+00	X		450			
L-1	109+00 TO 111+50	X			250		
L-2	112+85 TO 113+10		X			25	
L-2	114+27 TO 114+52		X			25	
L-2	114+35 TO 114+60	X				25	
L-2	115+48 TO 121+00	X			544		
L-2	115+48 TO 121+00		X		552		
C-1	"DWY2" 10+00 TO 10+80		X	80			
TOTAL				530	1346	75	90

* - QUANTITY INCLUDED IN PAVEMENT STRUCTURE TABLE

METAL BEAM GUARD RAILING AND END TREATMENTS

SHEET	LOCATION	L+	R+	TRANSITION RAILING (TYPE WB)	REMOVE MBGR	AI+ FLARED TERMINAL SYSTEM	AI+ CRASH CUSHION SYSTEM
				EA	LF	EA	EA
L-2	112+47 TO 113+10		X	1		1	
L-2	112+97	X					1
L-2	114+27 TO 114+52		X	1		1	
L-2	114+35 TO 114+60	X		1		1	
L-2	112+97 TO 113+60		X		63		
L-2	112+30 TO 112+55	X			37		
L-2	114+12 TO 115+66		X		155		
L-2	113+30 TO 116+27	X			200		
TOTAL				3	455	3	1

SAFETY EDGE

SHEET	LOCATION	L+	R+	SAFETY EDGE (N)	
				LF	LF
L-1	102+50 TO 104+50	X		200	
L-1	102+50 TO 112+00		X	950	
L-2	112+00 TO 112+50		X	50	
L-2	121+00 TO 124+50	X		350	
L-2	121+00 TO 124+50		X	350	
TOTAL				1900	

SAFETY EDGE

SHEET	LOCATION	L+	R+	SAFETY EDGE (N)	
				LF	LF
L-1	102+50 TO 112+00	X		200	
			X	950	
L-2	112+00 TO 124+50		X	50	
		X		350	
			X	350	
TOTAL				1900	

SAFETY EDGE

SHEET	LOCATION	SAFETY EDGE (N)	
		LF	LF
L-1	102+50 TO 112+00		1150
L-2	112+00 TO 124+50		750
TOTAL			1900

(N) - NOT A SEPARATE PAY ITEM, FOR INFORMATION ONLY

SUMMARY OF QUANTITIES Q-1

* ADDITIONAL QUANTITIES SHOWN ELSEWHERE, SEE SHEET 0-4 AND 0-5 FOR TOTAL QUANTITY.

INCLUDE SAFETY EDGE QUANTITY IN APPROPRIATE PAVING ITEM OF WORK

DOCUMENT SAFETY EDGE QUANTITY AS NON PAY ITEM FOR INFO ONLY IN THE QUANTITY TABLE


ROADWAY ITEMS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE _____

PLANS APPROVAL DATE _____

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#REQUEST STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION DESIGN
 FUNCTIONAL SUPERVISOR
 CALCULATED/DESIGNED BY
 CHECKED BY
 REVISED BY
 DATE REVISED

STATION	LOCATION	LT/RT/CL	SOYD	CY	CY	CY	TON	CY	ASPHALT TREATED PERMEABLE BASE (N)		SEAL RANDOM CRACKS LNMI	HOT MIX ASPHALT (TYPE A) TON	RUBBERIZED HOT MIX ASPHALT (OPEN GRADED) TON	SAFETY EDGE (N) TON	PLACE HOT MIX ASPHALT DIKE (TYPE D)		PLACE HOT MIX ASPHALT DIKE (TYPE F) LF	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA) SOYD	TACK COAT TON	DOWEL BAR RETROFIT EA	GRIND EXISTING CONCRETE PAVEMENT SOYD	PLACE STAMPED ASPHALT SOYD	3" PLASTIC PIPE (EDGE DRAIN) LF	6" PLASTIC PIPE (EDGE DRAIN) LF	CLEANOUT ASSEMBLY (EDGE DRAIN) EA	6" PLASTIC PIPE (EDGE DRAIN OUTLET) LF	FILTER FABRIC		CLASS 1 PERMEABLE MATERIAL CY	ROCK SLOPE PROTECTION (BACKING No. 3, METHOD B) CY	ROCK SLOPE PROTECTION FABRIC SOYD	MINOR CONCRETE (CURB AND GUTTER) CY	MINOR CONCRETE (SIDEWALK) CY				
									ROADWAY	EDGEDRAIN					ROADWAY	EDGEDRAIN											ROADWAY	EDGEDRAIN									
STAGE 1																																					
"A1" 713+88.34 TO "A1" 784+61.07	LT				10872	21755	947	13384	23			8657	220				150	5											3410		1453						
"A1" 706+75.22 TO "A1" 780+37.12	RT				12568	11200	972	12212	79			8823	127	2210				5					521					657									
"Z4" 23+32.84 TO "Z4" 28+00.00	RT				2215	483						502		257										107	911	4	77		354								
"Z5" 22+09.55 TO "Z5" 29+90.74	LT		342		764	296		501	17			371					176						65	904	4	68		352									
"Z6" 15+78.20 TO "Z6" 22+50.00	LT				1684	32		705	149	11		748	35	13	15	25							40	554	3	56		216		1	4						
STAGE 2																																					
"A1" 634+08.49 TO "A1" 727+23.37	LT		1364		9487	423	410	8045	147			5854					96	3																			
"A1" 631+63.82 TO "A1" 723+32.66	RT				13083	219	478	8495	213			6215		850			119	3										2050		342							
"M4" 38+52.32 TO "M4" 55+00.00	RT		398		11989	24		2259				1631	27	780		27	117	1																1	4	10	
"M5" 47+21.06 TO "M5" 55+50.00	LT		427		2223			715				550		829																							
"M6" 39+91.59 TO "M6" 53+50.00	LT			52	3576	350		2062				1524	23	743	15	25																					
"WR2" 8+00.42 TO "WR2" 16+67.00	RT			10	69			281				54					194																				
"Z2" 8+69.71 TO "Z2" 17+88.14	LT				1587	127		1381	123	15		648											49	891	3	57		347									
"Z3" 4+30.60 TO "Z3" 12+50.00	RT				1181	68		898	156	17		325		198	15								28	781	3	66		304									
"Z4" 15+73.30 TO "Z4" 23+32.84	RT				3677	789		1349	18			993		703			131																				
"Z7" 5+73.25 TO "Z7" 18+09.82	RT			29	4679	307		2423	272	18		1190	21	650	30	26	136																				
STAGE 3																																					
"A1" 570+20.00 TO "A1" 652+88.02	LT				21902	2006	521	11451				8301	125	2401				4																			
"A1" 570+20.00 TO "A1" 648+93.91	RT				25365	1850	1137	12507				9090		1819	15			5																			
"M2" 28+50.00 TO "M2" 37+50.00	LT				5634	6		699				543		900																							
"M3" 30+43.27 TO "M3" 35+40.00	LT				4281			480				371		497																							
"M7" 32+67.73 TO "M7" 45+50.00	RT		263	24	4052	783		2504				1828	68	817		25		1																			
STAGE 4																																					
"A1" 428+62.48 TO "A1" 436+83.50	CL			17	50984			43416				30518		3852	15	90	1382	16																			
"ML1" 11+74.68 TO "ML1" 22+44.07	RT				5	29		13				2					8																				
STAGE 5																																					
"A1" 423+36.60 TO "A1" 821+04.69	LT/CL/RT										56		45987							61112	393564																
"M2" 35+90.65 TO "M2" 44+42.40	LT/CL/RT												156																								
"M3" 33+14.25 TO "M2" 40+92.95	LT/CL/RT												215																								
"M4" 38+52.32 TO "M2" 48+66.29	LT/CL/RT												308																								
"M5" 42+18.00 TO "M2" 52+79.36	LT/CL/RT												277																								
"M6" 44+93.40 TO "M2" 53+50.00	LT/CL/RT												215																								
"M7" 32+67.73 TO "M2" 40+35.43	LT/CL/RT												300																								
"Z2" 14+02.52 TO "M2" 22+74.00	LT/CL/RT												195																								
"Z3" 7+00.00 TO "M2" 12+50.00	LT/CL/RT												128																								
"Z4" 15+73.30 TO "M2" 21+43.61	LT/CL/RT												278																								
"Z5" 18+92.00 TO "M2" 27+20.11	LT/CL/RT												70																								
"Z6" 20+86.00 TO "M2" 26+00.00	LT/CL/RT												146																								
"Z7" 5+73.25 TO "Z7" 18+09.82	LT/CL/RT												320																								
TOTAL																																					
			4357	132	191877	40747	4465	125780	1162	96	56	88738	18595	646	17519	105	218	2508	43	61112	393564	3336	352	4884	22	410	5460	1900	1795	5	20	433	96				

(N) NOT A SEPERATE PAY ITEM, FOR INFORMATION ONLY

SUMMARY OF QUANTITIES
Q-1