04-Ala-80 KP 1.6-2.7
04-265-E.A. 0120L4
Project Cost: $247,033,000

Fact Sheet Exceptions to Mandatory Design Standards

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1. PROPOSED PROJECT

A. Project Description

The Oakland Touchdown (OTD) portion of the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (ESSSP) involves the construction of the final 300 meters of both westbound and eastbound structures of the east span, as well as the roadway approaches to the new east span. In order to provide contractor access for the Self-Anchored Suspension Span (SAS) portion of the new east span by January 2010 (Contract 04-0120F4), the OTD work has been split into two distinct contracts, which would implement the following elements:

<u>This Fact Sheet will approve the nonstandard features in OTD Phase 1 Contract (04-0120L4) only:</u>

- The new westbound and eastbound foundations (except for the eastbound abutment), as well as the entire westbound and Frame 1 of the eastbound structure will be constructed. This would allow access to the contractor responsible for constructing the SAS structure.
- A detour for the maintenance road will be constructed and non-public traffic will be placed on this detour. An eastbound detour will be constructed south of the existing eastbound roadway. The final AC and striping will be done in OTD Phase 2 Contract (04-0120M4). Public traffic will use the eastbound detour during the OTD phase 2 contract (04-0120M4).

<u>OTD Phase 2 Contract (04-0120M4):</u>

- Traffic will be placed on the westbound structure.
- Traffic will be placed on the eastbound detour.
- Following these traffic shifts, the existing upper deck will be demolished from bent E39 to bent E28 (the portion not directly over traffic).
- Frame 2 of the eastbound structure will be constructed.
- Portions of the existing westbound and eastbound roadways will be removed and replaced with lightweight concrete and the structural roadway for the permanent eastbound alignment.
- Eastbound traffic will be shifted to its new permanent alignment with standard width lanes and shoulders approximately 6 months following the switch of traffic to the permanent westbound alignment with the contractor working extended shifts/work weeks on critical activities.

See Attachment A for a Project Location Map.

B. Existing Highway

This 1.1 kilometer long structure and roadway is part of the Interstate 80 freeway connecting the cities of San Francisco in San Francisco County and Oakland in Alameda County. The roadway consists of five 3.6-meter wide lanes and right shoulder widths that very from 0.3 to 3 meters in both directions of travel. Left shoulder widths vary from 0.3 to 3 meters on the westbound and eastbound directions.

C. Safety Improvements

This project is a major portion of the seismic retrofit by replacement of the east span of the San Francisco Oakland Bay Bridge (SFOBB). The SFOBB is an important link in the statewide transportation system, listed as a lifeline structure, and is currently vulnerable to a major earthquake. A new East span of SFOBB is essential to public safety and the economy of the region. The improvements on the Phase 1 contract would involve the construction of the new westbound structure, a portion of the eastbound abutment, and 6 Piers of the new eastbound structure. The Phase 2 contract will construct the remainder of the eastbound structure, and will place both westbound and eastbound traffic in their final configurations.

Phase 1 is part of an overall improvement on the Bridge structure as well as on the road approaching the East Side of the Bridge starting at the Toll Plaza. Phase 1 does not present any road improvements per se, but will provide access to the contractor working on the construction of the SAS portion, per the contractual obligations of the Department. No traffic shifts in either direction will be implemented as part of the Phase 1 contract. Phase 2 contract will finish the roadway alignments in both directions, and will address all the current geometric deficiencies on this stretch of the I-80 freeway.

D. Total Project Cost

The total project cost for the Phase 1 contract (Contract 04-0120L4) in 2006 dollars is $247,033,000

The cost estimate is broken down as follows:

Project Report and Environmental Document Report:	$ 2,000,000
Design Phase (PS&E)	$ 5,000,000
Construction Phase:	
District Items:	$ 70,462,000
Structure Items:	$156,071,000
Right-of-Way/Utilities:	$ 2,500,000
Construction Administration	$ 11,000,000
Total:	$247,033,000

2. FEATURES REQUIRING AN EXCEPTION

Attention is directed to Attachments B-1 and B-2, "Nonstandard Features Exhibit - Mandatory" which graphically depict the nonstandard features for the proposed project. The nonstandard features are described as follows:

(1) Design Exception Feature #1 - Sight Distance

The following are the existing nonstandard sight distances for the freeway, and standards contained in Index 201.1 and Table 201.1; Index 203.1. Also included are Attachment B-1 locations:

Structure	Attachment B-1 Location	Location	Existing Nonstandard Stopping Sight Distance	HDM Index 201.1 and Table 201.1; Index 203.1 Stopping Sight Distance Standards
Eastbound Mainline I-80	1	Horizontal curve No. 1 in sheet L-1 of contract plans	S=101 m for a corresponding Design Speed of 68 km/hr	S=160 m (minimum for a facility with a design Speed of 90 km/h)
Eastbound Mainline I-80	2	Horizontal curve No. 2 in sheet L-1 of contract plans	S=90 m for a corresponding Design Speed of 62.5 km/hr	S=160 m (minimum for a facility with a design Speed of 90 km/h)

S= Calculated Stopping Sight Distance

Standard for which exception is requested

HDM Index 201.1 and Table 201.1; Index 203.1

201.1 Design Speed Standards

Index 201.1, "Table 201.1 shows the standards for stopping sight distance related to design speed, and these shall be the minimum values used in design." For a design speed of 90km/h the Stopping Sight Distance is 160 meters.

Reason for requesting exception

The final alignment of the new bridge following the traffic switch at the conclusion of the phase 2 contract (04-0120M4) will have no abrupt curve at the east end of the bridge, therefore eliminating the nonstandard Sight Distance.

Added cost to make standard

In order to comply with all the geometric standards a New Bridge will need to be built at a cost greater than $5 billion. In addition, Phase 2 of the Oakland Touchdown project (04-0120M4) will correct the remaining existing nonstandard conditions at a cost of about $60 million.

(2) Design Exception Feature #2 - Superelevation

The following are the existing nonstandard superelevations for the freeway, and standards contained in Index 202.2 and Table 202.2. Also included are Attachment B-1 locations:

Structure	Attachment B-1 Location	Location	Existing Nonstandard Superelevation	HDM Index 202.2 and Table 202.2 Standard Superelevation Rates and Figure 202.2 MCS on Horizontal Curves
Eastbound Mainline I-80	1	Horizontal curve No. 1 in sheet L-1 of contract plans. Radius = 610 m.	e=0.02; MCS= 103 km/h	e=0.06
Eastbound Mainline I-80	2	Horizontal curve No. 2 in sheet L-1 of contract plans. Radius = 472 m.	e=0.02; MCS= 94 km/h	e=0.08

MCS= Maximum Comfortable Speed

Standard for which exception is requested

HDM Index 202.2 and Table 202.2 and Figure 202.2 The standard superelevation rate for an emax of 0.10 and curve radius of 610 m is 0.06. The standard superelevation rate for an emax of 0.10 and curve radius of 472 m is 0.08.

Based on an e_{max} selected by the designer for one of the conditions, superelevation rates from Table 202.2 shall be used within the given range of curve radii. If less than standard superelevation rates are approved (see Index 82.1), Figure 202.2 shall be used to determine superelevation based on the curve radius and maximum comfortable speed.

Reason for requesting exception

For S1 line with a curve radius of 610 m on Table 202.2 for freeways, the rate of superelevation is 6%. From figure 202.2 for an existing superelevation of 2% and a curve radius of 610 m the maximum comfortable speed is 103 km/h. Our facility design speed is 90 km/h.

For the S2 line with a curve radius of 472 m on Table 202.2 for freeways the rate of superelevation is 8%. From figure 202.2 for an existing superelevation of 2% and a curve radius of 472 m, the maximum comfortable speed is 94 km/h. Our facility design speed is 90 km/h, still under a comfortable speed. Existing superelevations are below the minimum rate required.

At the completion of the Phase 2 contract (04-0120M4), the roadway will meet the superelevation requirements of the Highway Design Manual.

(3) Design Exception Feature #3 - Cross Slopes

The following are the existing nonstandard cross slopes for the freeway, and standards contained in Index 301.2 Also included are Attachment B-1 locations:

Structure	Attachment B-1 Location	Location	Existing Nonstandard Cross Slopes	HDM Index 301.2
Eastbound and Westbound Mainline lanes	3	Eastbound and Westbound Mainline lanes	Cross slopes less than 1.5% at Eastbound E87+20 to E88+20 and Westbound E87+00 to E95+00 Mainline lanes	Minimum 1.5%

Standard for which exception is requested

HDM Index 301.2

"(1) General. The purpose of sloping on roadway cross sections is to provide a mechanism to direct water (usually from precipitation) off the traveled way. Undesirable accumulations of water can lead to hydroplaning or other problems which can increase accident potential"

(2) Standards.

> "(b) **For resurfacing or widening when necessary to match existing cross slopes, the minimum shall be 1.5% and the maximum shall be 3 percent.** However, the cross slope on 2-lane and multilane AC highways should be increased to 2% if the cost is reasonable."

Reason for requesting exception

Cross slopes requirements will be met by the completion of the second Phase contract (04-0120M4). No accidents have occurred due to flooding. 12.3 percent of accidents have occurred when the surface has been wet. (Data from 1/1/03 to 12/31/05)

(4) Design Exception Feature #4 - Shoulder Width

The following are the existing nonstandard shoulder widths for the freeway, and standards contained in Index 302.1 and Table 302.1. Also included are Attachment B-2 locations:

Structure	Attachment B-2 Location	Location	Existing Nonstandard Shoulder Widths	HDM Index 302.1 and Table 302.1 Standards for Paved Shoulder Widths
Eastbound and Westbound Mainline lanes	4	Inside and Outside shoulders	Shoulders at the following locations are less than 3.0 m. Eastbound - inside shoulder from E82+82 to E92+00. Eastbound - outside shoulder from E82+82 to E89+00. Westbound - inside shoulder from E82+82 to E95+00. Westbound - outside shoulder from W83+11 to W93+00	Minimum Width= 3.0 m

Standard for which exception is requested

HDM Index 302.1 and Table 302.1

"The shoulder widths given in Table 302.1 shall be the minimum continuous usable width of paved shoulder. For new construction, and major reconstruction projects on conventional highways, adequate width should be provided to permit shared use by motorists and bicyclists." For freeways and expressways the shoulder width required is 3.0 meters.

Reason for requesting exception

In addition to the existing nonstandard shoulder indicated in the table above, approximately 290 meters of existing eastbound outside shoulder will be removed in this contract (04-0120L4) to accommodate a drainage pipe between the existing eastbound road and the eastbound detour from E89+00 to 89+73 and from E92+37 to E94+56. (See Attachment B-2, Location 6.) A K-rail will be placed on the shoulder to protect the drainage pipe.

The Phase 2 contract (04-0120M4), will construct standard 3 m inside and outside shoulders within the project limits.

(5) Design Exception Feature #5 - Median Width

The following are the existing nonstandard median widths for the freeway, and standards contained in Index 305.1(3)(a). Also included are Attachment B-2 locations:

Structure	Attachment B-2 Location	Location	Existing Nonstandard Median Widths	HDM Index 305.1(3)(a) Standards for Median Widths
Eastbound and Westbound Mainline lanes	5	Existing Median	Existing median less than 6.6 m from E87+00 to E89+23	Minimum Width= 6.6 m

Standard for which exception is requested

HDM Index 305.1(3)(a)

"Freeways and Expressways. **In areas where restrictive conditions prevail the minimum median width shall be 6.6 m. "**

Reason for requesting exception

The Phase 2 contract (04-0120M4), will construct standard 6.6 m medians within the project limits.

(6) Design Exception Feature #6 - Minimum Horizontal Clearances

The following are the existing nonstandard horizontal clearances for the freeway, and standards contained in Index 309.1(3). Also included are Attachment B-2 locations:

Structure	Attachment B-2 Location	Location	Existing Nonstandard Horizontal Clearances	HDM Index 309.1(3) Standards for Horizontal Clearances
Eastbound and Westbound Mainline lanes	4	Inside and outside edge of shoulder concrete barriers	Horizontal Clearances at the following locations are less than 3.0 m. Eastbound - inside shoulder from E82+82 to E92+00. Eastbound - outside shoulder from E82+82 to E89+00. Westbound - inside shoulder from E82+82 to E95+00. Westbound - outside shoulder from W83+11 to W93+00	Minimum = 3.0 m (standard shoulder width)

Standard for which exception is requested

HDM Index 309.1(3)

"(1) General. The horizontal clearance to all roadside objects should be based on engineering judgment with the objective of maximizing the distance between roadside objects and the edge of traveled way."

"Clearances are measured from the edge of the traveled way to the nearest point on the obstruction (usually the bottom). **Horizontal clearances greater than those cited below under subsection (3) - "Minimum Clearances" shall be provided where necessary to meet horizontal stopping sight distance requirements."**

"(c) **On conventional highways, frontage roads, city streets and county roads (all without curbs), the minimum horizontal clearance shall be the standard shoulder width as listed in Tables 302.1 and 307.2, except that a minimum clearance of 1.2 m shall be provided where the standard shoulder width is less than 1.2 m."**

Reason for requesting exception – Design Speed

In addition to the existing nonstandard horizontal clearances indicated in the table above, approximately 290 meters of existing eastbound outside horizontal clearances will be removed in this contract (04-0120L4) to accommodate a drainage pipe between the existing eastbound road and the eastbound detour from E89+00 to 89+73 and from E92+37 to

E94+56. (See Attachment B-2, Location 6.) A K-rail will be placed on the shoulder to protect the drainage pipe.

The Phase 2 contract (04-0120M4), will construct standard 3 m horizontal clearances within the project limits.

3. TRAFFIC DATA

Current and design peak period hourly volumes are as follows:

Direction/Peak	Existing	2025 Forecast
One Way	9,410	12,700

Current AADT is 300,300 vehicles, with an anticipated 2025 AADT volume of 405,600 vehicles.

4. ACCIDENT ANALYSIS

The following table is a summary of TASAS table B accident data from 1/1/03 to 12/31/05 for 04 Ala 80 1.0-1.7

Actual Number of Accidents			Total MV+ or MVM	Actual Accident Rates			Average Accident Rates		
Total	Fatal	Injury		Fat	F+I	Total	Fat	F+I	Total
211	1	56	218.97	0.005	0.26	0.96	0.005	0.30	0.97

Primary collision factors		
Number	PCT	Code
16	7.6	1-Influence alcohol
24	11.4	2-Follow too close
0	0	3-Failure to yield
12	5.7	4-Improper turn
84	39.8	5-Speeding
53	25.1	6-Other violations
15	7.1	B-Improper driving
1	0.5	C-Other than driver
6	2.8	D-Unknown
0	0	E-Fell sleep
0	0	< - Not stated

Road Surface		
Number	PCT	Code
183	86.7	A-Dry
26	12.3	B-Wet
1	0.5	C-Snowy, Icy
0	0.0	D-Slippery
1	0.5	< - Not Stated

Roadway Condition		
Number	PCT	Code
4	1.9	D-Construct-Repair-Zone
201	95.3	H-No unusual Condition
0	0.0	F-Flooded

Side of Highway		
Number	PCT	Code
84	39.8	E-Eastbound
127	60.2	W-Westbound

Type of Collision		
Number	PCT	Code
0	0.0	A-Head-on
74	35.1	B-Sideswipe
108	51.2	C-Rear End
3	1.4	D-Broadside
25	11.8	E-Hit Object
0	0.0	F-Overturn
1	0.5	< - Not Stated

Accident Rates expressed as number of accidents/million vehicle miles (MVM)

Most of the Accidents have occurred on the Westbound side of the highway. No fatalities have occurred due to flooding. The Phase 2 contract (04-0120M4), will correct the abrupt curve at the east end of the bridge and the smoother alignment will potentially help reduce the percentage of accidents caused due to sideswipe. Sideswipe accidents are at 35 percent for the period between 1/1/03 and 12/31/05.

5. INCREMENTAL IMPROVEMENTS

None

6. FUTURE CONSTRUCTION

As mentioned throughout this document, immediately following the completion of this Phase 1 contract, State will embark on the construction of the Phase 2 contract (Contract 04-0120M4), which is already programmed into the Toll Bridge Seismic Retrofit Program. The Phase 2 contract has a tentative start construction date of 2010, and an end completion date of early 2013. Under this Phase 2 contract, the Department will complete the construction of the eastbound structure, as well as proceeding with the construction of the I-80 median area and the eastbound roadway. At the conclusion of the Phase 2 contract, the geometric standards for both the westbound and eastbound roadways will be met. The following list highlights the major phase of work for the Phase 2 contract:

OTD Phase 2 Contract (04-0120M4):

- Traffic will be placed on the westbound structure.
- Traffic will be placed on the eastbound detour.
- Following these traffic shifts, the existing upper deck will be demolished from bent E39 to bent E28 (the portion not directly over traffic).
- Frame 2 of the eastbound structure will be constructed.
- Portions of the existing westbound and eastbound roadways will be removed and replaced with lightweight concrete and the structural roadway for the permanent eastbound alignment.
- Eastbound traffic will be shifted to its new permanent alignment with standard lane and shoulder widths.

7. PROJECT REVIEWS, CONCURRENCE

Gordon Brown, Design Reviewer for the Division of Design reviewed and concurred with this project on 11/07/06.

8. ATTACHMENTS

Attachment A:	Project Location Map
Attachments B-1 and B-2:	Nonstandard Features Exhibit – Mandatory

ATTACHMENT A
Project Location

04-Ala-80 KP 1.6-2.7

04-265-E.A. 0120L4

Project Cost: $247,033,000

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala.	80	1.6/2.7		

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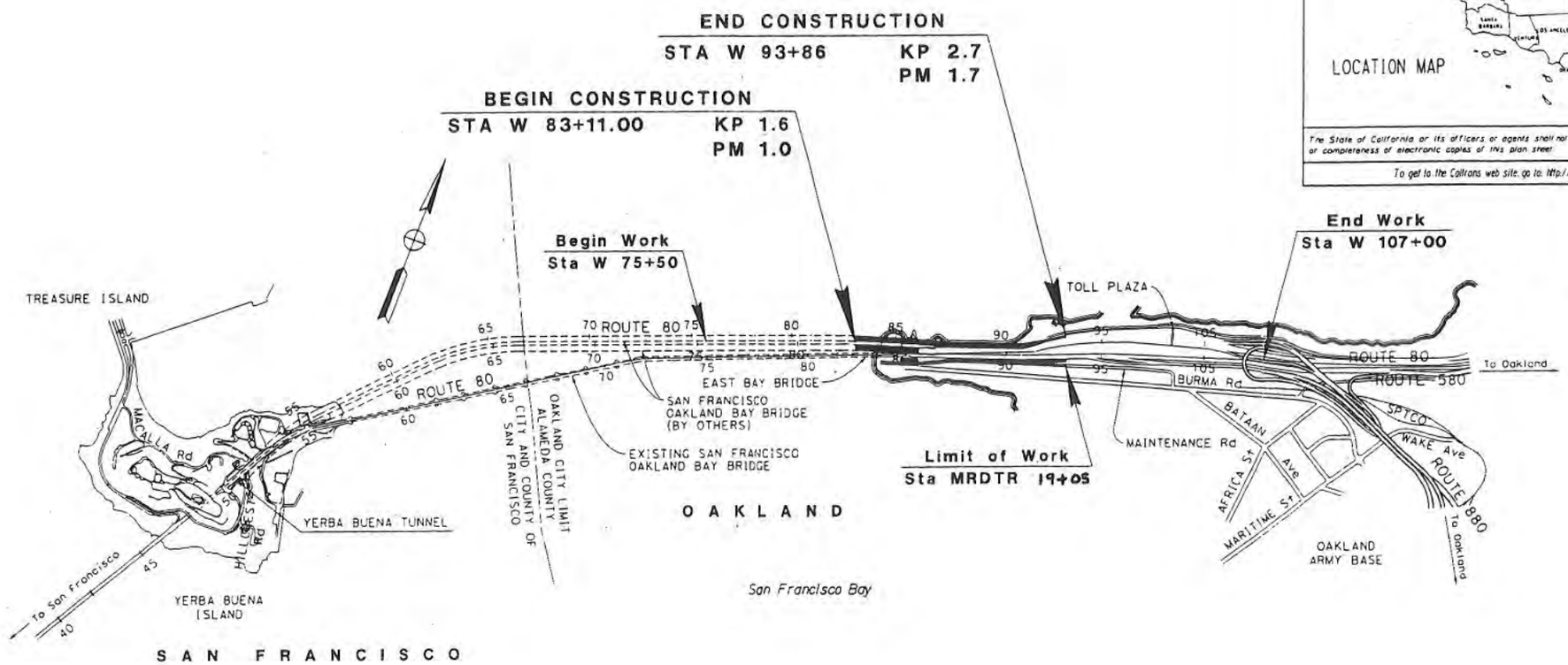
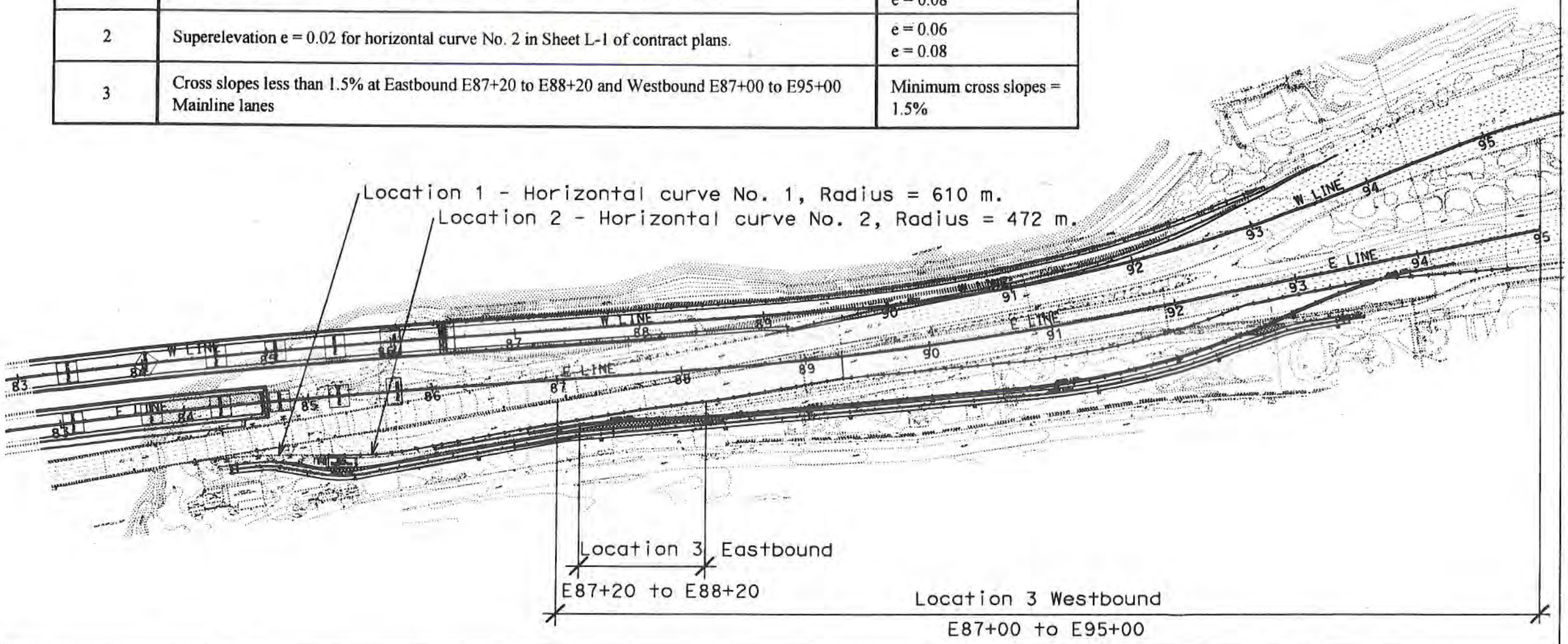


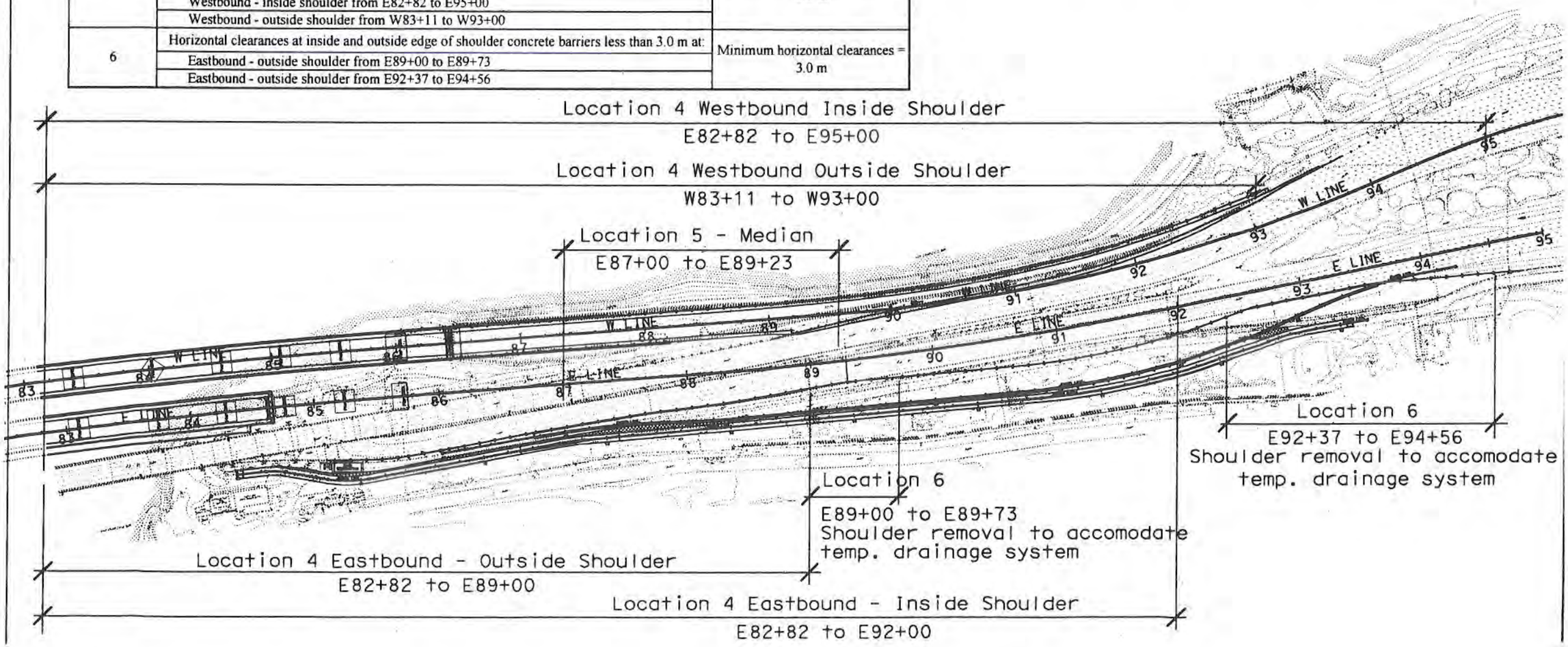
ATTACHMENT B - 1

Locations for Requested Design Exceptions

LOCATION	CONDITION	HDM STANDARD
1	Design speed of 68 km/h at horizontal curve No. 1 in Sheet L-1 of contract plans	V = 90 to 130 km/h
2	Design speed of 62.5 km/h at horizontal curve No. 2 in Sheet L-1 of contract plans.	V = 90 to 130 km/h
1	Sight distance of 101 m at horizontal curve No. 1 in sheet L-1 of contract plans	S = 160 m
2	Sight distance of 90 m at horizontal curve No. 2 in sheet L-1 of contract plans.	S = 160 m
1	Superelevation e = 0.02 for horizontal curve No. 1 in Sheet L-1 of contract plans	e = 0.06 e = 0.08
2	Superelevation e = 0.02 for horizontal curve No. 2 in Sheet L-1 of contract plans.	e = 0.06 e = 0.08
3	Cross slopes less than 1.5% at Eastbound E87+20 to E88+20 and Westbound E87+00 to E95+00 Mainline lanes	Minimum cross slopes = 1.5%



ATTACHMENT B - 2
Locations for Requested Design Exceptions

04-Ala-80 KP 1.6-2.7
04-265-E.A. 0120L4
Project Cost: $247,033,000

LOCATION	CONDITION	HDM STANDARD
4	Shoulder width at inside and outside shoulders less than 3.0 m at:	Minimum shoulder width = 3.0 m
	Eastbound - inside shoulder from E82+82 to E92+00	
	Eastbound - outside shoulder from E82+82 to E89+00	
	Westbound - inside shoulder from E82+82 to E95+00	
	Westbound - outside shoulder from W83+11 to W93+00	
6	Shoulder width at inside and outside shoulders less than 3.0 m at:	Minimum shoulder width = 3.0 m
	Eastbound - outside shoulder from E89+00 to E89+73	
	Eastbound - outside shoulder from E92+37 to E94+56	
5	Existing median less than 6.6 m from E87+00 to E89+23	Minimum median width = 6.6 m
4	Horizontal clearances at inside and outside edge of shoulder concrete barriers less than 3.0 m at:	Minimum horizontal clearances = 3.0 m
	Eastbound - inside shoulder from E82+82 to E92+00	
	Eastbound - outside shoulder from E82+82 to E89+00	
	Westbound - inside shoulder from E82+82 to E95+00	
	Westbound - outside shoulder from W83+11 to W93+00	
6	Horizontal clearances at inside and outside edge of shoulder concrete barriers less than 3.0 m at:	Minimum horizontal clearances = 3.0 m
	Eastbound - outside shoulder from E89+00 to E89+73	
	Eastbound - outside shoulder from E92+37 to E94+56