Appendix N Alternative 2 (LPA) Initial Phase

N.1 Phasing Plan for Alternative 2 (Locally Preferred Alternative)

RCTC has designated Alternative 2 as the LPA because it would result in fewer financial constraints in terms of the availability of funding at specific periods of time, and would provide greater benefits than would occur under Alternative 1. As a result, additional detail related to the Initial Phase for Alternative 2 is provided in this appendix.

The following background assumptions were made regarding the phasing plan for Alternative 2:

- All the project components and features in Alternative 2 would be constructed no later than 2035.
- The project features and components implemented in the Alternative 2 Initial Phase and subsequent phases would provide independent utility and have logical termini.

Implementation of Alternative 2 is proposed in phases over a 20-year period beginning with the Initial Phase and culminating in the completed project. Separate phases would be identified and programmed to incorporate the components of the improvements on SR-91 and I-15 under Alternative 2 between the Initial Phase in 2015 and completion of Alternative 2 by 2035. The phasing plan for Alternative 2 is shown on Figure N-1.

Because part of the funding for Alternative 2 would come from toll revenue bonds, the exact amount that can be raised would not be known until the project is ready to be financed. In addition, because delivery of the project is proposed to be a best value design-build (for design-build, many design and construction activities occur concurrently) contract, the exact cost of Alternative 2 would not be known until the design-build proposals are received and evaluated. As a result, there would need to be flexibility in defining the Initial Phase of Alternative 2 and the timing and scope of the project components in the following phases to the completion of Alternative 2.

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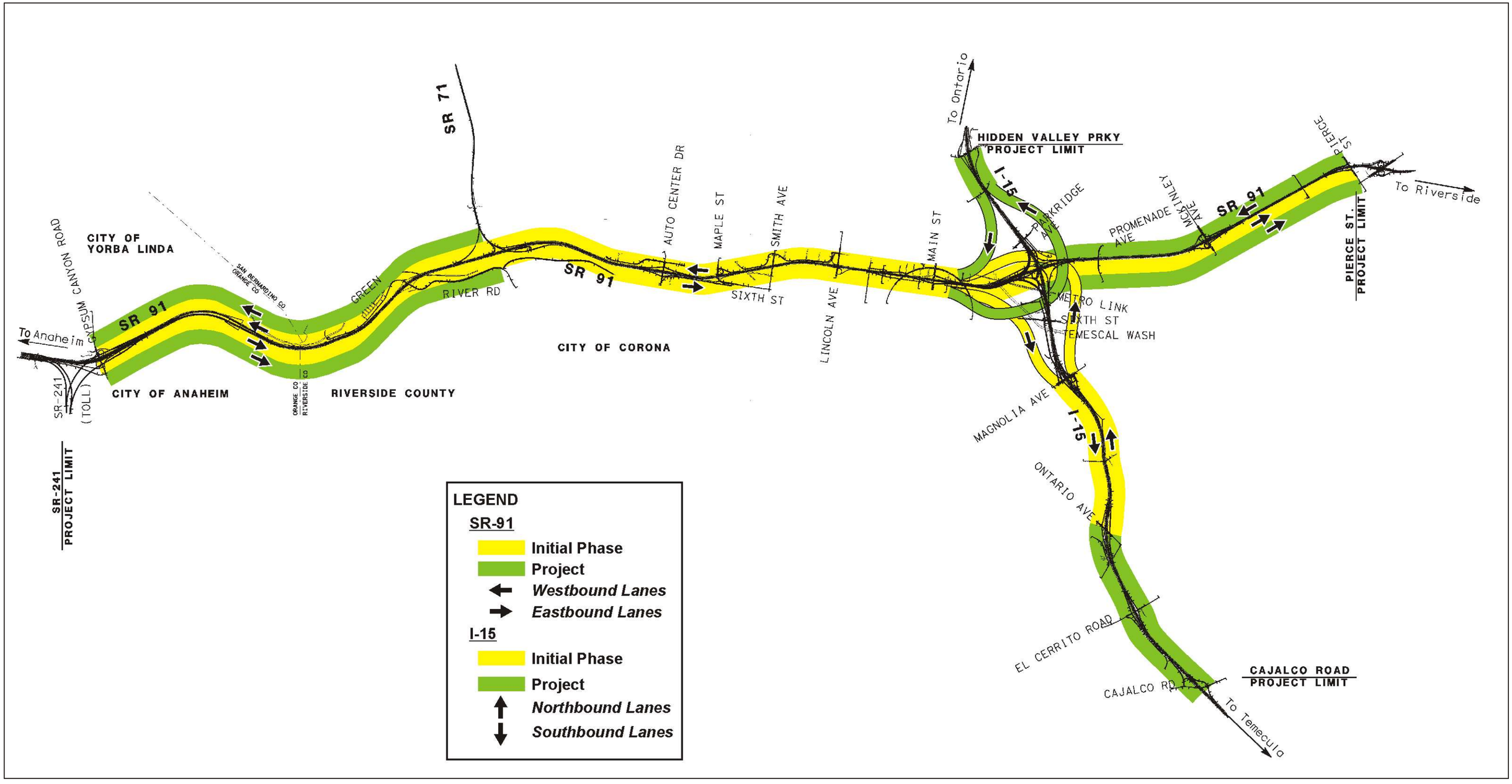

Note: The Initial Phase only needs striping and does not require any road widening for the segments west of SR-71 on SR-91 eastbound, west of Green River Road on SR-91 westbound, and east of I-15 on SR-91 eastbound.

Refer also to Appendix L, Project Features, which provides detailed preliminary design plans on an aerial photograph base for the two Build Alternatives and their design variations.

N

NOT TO SCALE

FIGURE N-1

SR-91 Corridor Improvement Project

Phasing Plan for the Initial Phase of the Alternative 2 (LPA) Project

12-Ora-91-R14.43/R.18.19
08-Riv-91-R.0.00//R13.04
08-Riv-15-35.64/45.14
EA 0F540

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N.2 Initial Phase for Alternative 2 (Locally Preferred Alternative)

The Initial Phase of Alternative 2 is the minimum project that could provide early benefits to the traveling public with logical termini and independent utility. If the design-build price and funds available from toll revenue bonds could provide for early construction of additional phases of the project, RCTC and the Department would have the option of adding phases with the Initial Phase of Alternative 2.

As shown on Figure N-1, the Initial Phase of Alternative 2 includes improvements on SR-91 from approximately the Orange/Riverside County line to the I-15 interchange (a distance of approximately 8 mi) and single-lane direct connectors to and from I-15 south, extending from SR-91 to the Ontario Avenue interchange (a distance of approximately 3 mi). The Initial Phase of Alternative 2 would generally implement shorter segments of Alternative 2. The project components on SR-91 and I-15 provided in the Initial Phase of Alternative 2 are described in detail in Table N.1. Typical cross sections on SR-91 and I-15 for the Initial Phase of Alternative 2 are shown on Table N.2. Typical cross sections for the No Build Alternative and Alternative 2 are provided in the table for comparison purposes.

N.2.1 Nonstandard Mandatory and Advisory Design Features

The categories of nonstandard mandatory and advisory design features proposed with the Initial Phase of Alternative 2 are listed in Table N.3.

Additional information on the nonstandard design features for the Initial Phase of Alternative 2 is contained in Attachment 4 of the *Draft Project Report* (September 2010). These nonstandard design features are currently proposed but have not been approved.

N.2.2 Permanent Features

N.2.2.1 Bridges

The Initial Phase of Alternative 2 would require bridge work involving up to 26 structures as shown in Table N.4. The bridge work would be a combination of modifications to existing structures, replacement of existing structures, and construction of new bridges. Some of the existing bridges that would be widened would also be seismically retrofitted.

Table N.1 Project Components for the Initial Phase of Alternative 2 (LPA)

State Route 91 – Initial Phase of Alternative 2 (LPA)	
Eastbound SR-91 (from west to east)	**Westbound SR-91 (from west to east)**
From SR-241 to Green River Road, an auxiliary lane would be provided between the egress (exit) and ingress (entrance) points for the proposed tolled express lanes at the Orange/Riverside County line. This would be achieved by restriping the existing pavement.	The westbound Green River Road off-ramp would be reconstructed to accommodate the completed Alternative 2.
	From Green River Road to the Orange/Riverside County line, Green River Road would be realigned to its location in the completed Alternative 2.
	From Green River Road to SR-241, an auxiliary lane would be provided between the egress and ingress points for the tolled express lanes at the Orange/Riverside County line, which would be achieved by a combination of widening and restriping the existing pavement.
From the Orange/Riverside County line to SR-71, the two existing HOV lanes would be converted to two tolled express lanes.	From SR-71 to the Riverside/Orange County line, the existing HOV lane would be converted to a tolled express lane, and a second tolled express lane would be added.
From the Green River Road on-ramp to the SR-71 east-north loop connector, an auxiliary lane would be added. An optional second lane would be added at the entrance to the loop connector.	From the SR-71 south-west connector to the Green River Road off-ramp, an auxiliary lane would be added.
From SR-71 to I-15, the existing HOV lane would be converted to a tolled express lane, a second tolled express lane would be added, and a fifth general-purpose lane would be added with interchange improvements at Serfas Club Drive/Auto Center Drive, Maple Street, Lincoln Avenue, and Main Street.	From I-15 to SR-71 on SR-91, the existing HOV lane would be converted to a tolled express lane, a second tolled express lane would be added, and a fifth general-purpose lane would be added with interchange improvements at Main Street, Lincoln Avenue, Maple Street, and Serfas Club Drive/Auto Center Drive.
The I-15 connectors would diverge from SR-91 and merge with the eastbound Main Street on-ramp within a collector-distributor road.	The I-15 connectors would merge with the westbound Main Street off-ramp within a collector-distributor road before merging with SR-91.
From I-15 to Pierce Street on SR-91, a single tolled express lane would transition to a fourth general-purpose lane, and an HOV lane would be added by restriping the existing pavement.	No improvements are proposed from Pierce Street to I-15 on SR-91.
I-15 – Initial Phase of Alternative 2 (LPA)	
A single-lane tolled express lane connector would be provided from eastbound SR-91 to southbound I-15 that would continue as a single-lane tolled express lane in the median of I-15, terminating south of the Ontario Avenue interchange.	
A single-lane tolled express lane would be constructed in the median of I-15 that would begin south of the Ontario Avenue interchange and would continue northbound as a single-lane express lane connector to westbound SR-91.	

Source: *Draft Project Report* (September 2010).

HOV = high-occupancy vehicle
I-15 = Interstate 15
LPA = Locally Preferred Alternative
SR-71 = State Route 71
SR-91 = State Route 91
SR-241 = State Route 241

Table N.2 Typical Mainline Cross Sections for the Initial Phase of Alternative 2 (LPA)

Freeway Segments	No Build Alternative	Initial Phase of Alternative 2 (LPA)	Alternative 2 (LPA)
Typical Cross Sections on SR-91			
SR-241 to the Orange/Riverside County line	• 2 tolled express lanes • 5 general-purpose lanes	• 2 tolled express lanes • 5 general-purpose lanes • **1 tolled express auxiliary lane**	• 2 tolled express lanes • **6 general-purpose lanes** • 1 tolled express auxiliary lane
Orange/Riverside County line to SR-71	• 2 HOV lanes • 5 general-purpose lanes	• **2 tolled express lanes** • 5 general-purpose lanes • **1 tolled express auxiliary lane**	• 2 tolled express lanes • **6 general-purpose lanes** • 1 tolled express auxiliary lane
SR-71 to I-15	• 1 HOV lane • 4 general-purpose lanes	• **2 tolled express lanes** • **5 general-purpose lanes** • **1 auxiliary lane**	• 2 tolled express lanes • 5 general-purpose lanes • 1 auxiliary lane
I-15 to Pierce Street	• 1 HOV lane • 3 general-purpose lanes	• 1 HOV lane • 3 general-purpose lanes	• **1 tolled express lane** • **4 general-purpose lanes**
Typical Cross Sections on I-15			
Cajalco Road to Ontario Avenue	• 3 general-purpose lanes	• 3 general-purpose lanes	• **1 tolled express lane** • 3 general-purpose lanes
Ontario Avenue to SR-91	• 4 general-purpose lanes	• **1 tolled express lane** • 4 general-purpose lanes	• 1 tolled express lane • 4 general-purpose lanes
SR-91 Interchange to Hidden Valley Parkway	• 4 general-purpose lanes	• 4 general-purpose lanes	• **1 tolled express lane** • 4 general-purpose lanes

Source: *Draft Project Report* (September 2010).
Note: **Bold** indicates a change in the cross section when compared to the cross sections in the column to the immediate left.
HOV = high-occupancy vehicle
I-15 = Interstate 15
LPA = Locally Preferred Alternative
SR-71 = State Route 71
SR-91 = State Route 91
SR-241 = State Route 241

Table N.3 Nonstandard Mandatory and Advisory Design Features

Design Features		
• Clear Width to Bridge Rails • Compound/Reverse Curves • Corner Sight Distance • Decision Sight Distance • Design Speed • Distance Between Successive On-Ramps • Diversion Angle • Grade of Local Road at Ramp Connection • Horizontal Clearance to Wall • Horizontal Curve Radius	• HOV Guidelines • HOV Preferred Lane (On-Ramp) • Interchange Spacing • Lane Drop • Mainline Reduction at Interchange • Median Width • Outer Separation • Ramp Gore Geometry • Shoulder Width • Side Slope	• Single Lane Branch Connectors • Single Lane Ramps • Standards for Curvature • Stopping Sight Distance • Superelevation Rate/ Transition/Runoff • Traveled Way Width • Two Lane Exit Ramps • Vertical Curve Length

Table N.4 Structures Work Under the Initial Phase of Alternative 2 (LPA)

PM	Bridge Name	Bridge No.	New	Replace	Widen	Retrofit
Riv-91- R0.07	County Line Creek	56-0366			X	
Riv-91-TBA	Green River WB Off	TBA	X			
Riv-91-R1.14	West Prado OH	56-0634 L			X	
Riv-91-R2.08	Rte 91/71 Sep	56-0587			X	
Riv-91-R2.08	E91-N71 Conn Sep	56-0635			X	
Riv-91-R2.84	Prado OH	56-0637 L/R			X	
Riv-91-R3.71	Serfas Club Drive UC	56-0368 L/R			X	
Riv-91-TBA	Westbound Maple On-ramp	TBA	X[1]			
Riv-91-TBA	Eastbound Mable Off-ramp	TBA	X			
Riv-91-4.16	Maple Street OC	56-0344		X		
Riv-91-4.71	Smith Avenue OC	56-0357		X[1]		
Riv-91-TBA	Smith Avenue Drop-ramp	TBA	X[1]			
Riv-91-5.38	Lincoln Avenue OC	56-0362			X	
Riv-91-5.70	Buena Vista Avenue UC	56-0373 L/R			X	
Riv-91-5.99	West Grand Boulevard UC	56-0445 L/R			X	X
Riv-91-6.34	Main Street UC	56-0448 L/R		X		
Riv-91-TBA	Main Street EB On-Ramp BOH	TBA	X			
Riv-91-6.65	East Grand Boulevard UC	56-0364 L/R			X	X
Riv-91-TBA	EB On-ramp E Grand Blvd UC	TBA	X			
Riv-91-6.93	Temescal Wash BOH	56-0446 L/R			X	
Riv-91-TBA	E91-N15/S15 Connector BOH	TBA	X			
Riv-91-TBA	N15/S15-W91 Connector BOH	TBA	X			
Riv-91-TBA	91-15 Express Viaduct	TBA	X			
Riv-91-TBA	S-W Express Viaduct	TBA	X			
Riv-38.69	Ontario Avenue UC	56-0498 L R			X	
Riv-39.40	Old Temescal Rd UC	56-0644 L/R			X	

Source: *Draft Project Report* (September 2010).

[1] Selected variations

BOH = bridge and overhead
Conn Sep = Connector Separation
EB = eastbound
L/R = left/right
LPA = Locally Preferred Alternative
OC = overcrossing
OH = overhead
Ora = Orange County
R = realigned
RCB = reinforced concrete box
Riv = Riverside County
SW = southwest
TBA = to be assigned
UC = undercrossing
WB = westbound

N.2.2.2 Interchanges

The existing local road interchanges on SR-91 at Green River Road, Auto Center Drive, Maple Street, Lincoln Avenue, West Grand Boulevard, and Main Street would be modified to accommodate the mainline improvements on SR-91 under the Initial Phase of Alternative 2. The existing system interchanges with SR-91 at SR-71 and I-15 would also be modified to accommodate the improvements on SR-91 under the Initial Phase of Alternative 2.

N.2.2.3 Major Drainage and Culvert Facilities

Over 30 major cross-drainage structures and numerous inlets and contributory structures would be affected by the Initial Phase of Alternative 2. The affected drainage/culvert structures and how they would be modified under the Initial Phase of Alternative 2 are summarized in Table N.5.

N.2.2.4 Water Quality/Erosion Control

Erosion control would be required for the Initial Phase of Alternative 2 to assure storm water quality compliance and minimize long-term facility maintenance requirements. For slopes steeper than 4:1 (vertical to horizontal), an erosion control plan would be developed under the supervision of the Department District Landscape Architect stating how steeper slopes would be stabilized. For slopes steeper than 2:1, the erosion control plan would include a Geotechnical Report that addresses the stability of slopes steeper than 2:1 and would have concurrence by the Department District Maintenance Storm Water Coordinator. In addition, temporary BMPs would be implemented during construction of the Initial Phase of Alternative 2. Permanent BMPs for long-term operations of the Initial Phase of Alternative 2 would include biofiltration swales, infiltration basins, detention basins, and/or media filters (also referred to as Austin sand filters).

The increased impervious surface areas and disturbed soil areas under the Initial Phase of Alternative 2 are summarized by segment in Table N.6.

The quantities of feasible treatment BMPs estimated for the three project segments for the Initial Phase of Alternative 2 are listed in Table N.7.

The preliminary estimated costs for temporary (construction) and permanent BMPs for the three project segments for the Initial Phase of Alternative 2 are listed in Table N.8.

Table N.5 Drainage Structures Work Under the Initial Phase of Alternative 2 (LPA)

Post Mile	Initial Phase of Alternative 2 (LPA) Structure Impacts		
	Existing Structure	Impact	Modification
SR-91 – Orange County			
R16.4	Trpl 12'x10' RCB	None	None
R16.61	60" RCP	None	None
R17.00	60" RCP	None	None
R17.09	60" CMP	None	None
R17.38	5'x5' RCB	None	None
R17.43	5'x5' RCB	None	None
R17.70	3'x3' RCB	None	None
R17.94	Dbl 10'x8' RCB	None	None
R18.16	36" RCP	None	See Note 1
R18.25	36" RCP	None	See Note 1
R18.37	36" RCP	None	See Note 1
R18.55	48" RCP	None	See Note 1
R18.66	48" RCP	None	See Note 1
R18.72	60" RCP	None	See Note 1
R18.82	30" RCP	None	See Note 1
R18.89	54" RCP	None	See Note 1
SR-91 – Riverside County			
R0.07	Tunnel	None	See Note 1
R0.12	54" RCP	None	See Note 1
R0.21	36" CMP	None	See Note 1
R0.35	12'x12' RCB	None	See Note 1
R0.47	36" CMP	Protect In Place	None
R0.59	36" CMP	Protect In Place	None
R0.78	36" CMP	Protect In Place	None
R0.91	24" CMP	Protect In Place	None
R1.13	24" CMP	Protect In Place	None
R1.22	54" CMP	Protect In Place	None
R1.38	72" CMP	Protect In Place	None
R1.52	72" CMP	Protect In Place	None
R1.73	12'x9' RCB	Protect In Place	None
R2.55	24" CMP	Protect In Place	None
R3.13	24" CMP	Extend Rt	33' Rt
R3.26	24" CMP	Protect In Place	None
R3.41	24" CMP	Protect In Place	None
R3.47	8'x8' RCB	Extend Rt	87' Rt
R3.98	42" RCP	Extend Rt & Lt	17' Rt & 4' Lt
4.24	42" RCP	Extend Rt & Lt	28' Rt & 39' Lt
4.39	30" RCP	Extend Rt & Lt	55' Rt & 64' Lt
4.44	24" RCP	Extend Rt & Lt	62' Rt & 63' Lt
4.51	4'x3' RCB	Extend Rt	66' Rt
4.65	Dbl 4'x3' RCB	Extend Rt	60' Rt
4.71	24" RCP	Extend Rt & Lt	41' Rt & 46' Lt
4.74	24" RCP	Extend Rt & Lt	39' Rt & 25' Lt
4.91	24" RCP	Extend Rt	25' Rt
5.05	2-30" RCP	Extend Rt	36' Rt
5.20	24" RCP	Extend Rt & Lt	50' Rt & 50' Lt
5.39	30" RCP	Abandon Portion Rt	Abandon 40' Rt
5.43	12'x7.5' RCB	Extend Rt & Lt	110' Rt & 32' Lt
5.45	17'x14' RCB	Protect In Place	None
5.50	24" RCP	Extend Lt	20' Lt
5.58	24" RCP	Extend Rt & Lt	65' Rt & 60' Lt

Table N.5 Drainage Structures Work Under the Initial Phase of Alternative 2 (LPA)

Post Mile	Initial Phase of Alternative 2 (LPA) Structure Impacts		
	Existing Structure	Impact	Modification
5.71	54” RCP	Protect In Place	None
5.72	18” RCP	Extend Rt & Lt	78’ Rt & 75’ Lt
5.84	30” RCP	Abandon Portion Rt	60’ New 30” RCP Rt
5.85	30” RCP	Abandon Portion Rt	55’ New 30” RCP Rt
6.00	36” RCP	Protect In Place	None
6.02	18” RCP	Abandon Entire	Abandon 270’
6.06	84” RCP	Protect In Place	None
6.08	36” RCP	Protect In Place	None
6.14	36” RCP	Extend Rt & Lt	5’ Rt & 226’ Lt
6.22	48” RCP	Extend Rt	30’ Rt
6.29	48” RCP	Extend Rt	25’ Rt
6.32	18” RCP	Extend Lt	50’ New 24” RCP Lt
6.35	48” RCP	Protect In Place	None
6.37	48” RCP	Protect In Place	None
6.38	18” RCP	Extend Lt	90’ Lt
6.43	48” RCP	Protect In Place	None
6.50	30” RCP	Extend Rt	125’ Rt
6.58	48” RCP	Extend Rt & Lt	110’ Rt & 190’ Lt
6.63	30” RCP	Extend Rt	70’ Rt
6.68	18” RCP	Protect In Place	None
6.82	18” RCP	Abandon Entire	Abandon 146’
6.92	18” RCP	Extend Lt	40’ New 24” RCP Lt
7.29	24” RCP	None	None
7.33	18” RCP	None	None
7.38	24” RCP	None	None
7.49	24” RCP	None	None
7.56	18” RCP	None	None
7.78	18” CSP	None	None
7.88	54” RCP	None	None
8.26	8’x6’ RCB	None	None
8.64	18” RCP	None	None
8.74	Dbl 8’x5’ RCB	None	None
8.79	18” RCP	None	None
8.91	30” RCP	None	None
9.05	18” RCP	None	None
9.12	24” RCP	None	None
9.19	48” RCP	None	None
9.19	48” RCP	None	None
9.21	18” RCP	None	None
9.38	18” RCP	None	None
9.55	24” RCP	None	None
9.60	30” RCP	None	None
9.73	36” RCP	None	None
10.00	Trpl 5’x3’ RCB	None	None
10.08	18” RCP	None	None
10.14	18” RCP	None	None
10.18	48” RCP	None	None
10.47	18” RCP	None	None
10.52	18” RCP	None	None
10.59	3-4’X2’ RCB	None	None
10.70	3-12’X9’ RCB	None	None

Table N.5 Drainage Structures Work Under the Initial Phase of Alternative 2 (LPA)

Post Mile	Initial Phase of Alternative 2 (LPA) Structure Impacts		
	Existing Structure	Impact	Modification
10.72	18" RCP	None	None
10.82	18" RCP	None	None
10.86	18" RCP	None	None
10.94	18" RCP	None	None

Source: *Draft Project Report* (September 2010).

[1] These cross culverts are being extended as part of the SR-91 Eastbound Lane Addition Project on the south side of SR-91 and the United States Army Corps of Engineers' Santa Ana River Reach 9 Phase 2B Project on the north side of SR-91.

CMP = corrugated metal pipe
CSP = corrugated steel pipe
Dbl = double
LPA = Locally Preferred Alternative
Lt = left
N/A = not applicable
R = realigned
RCB = reinforced concrete box
RCP = reinforced concrete pipe
Rt = right
SR-91 = State Route 91
Trpl = triple

Table N.6 Storm Water Effect Areas for the Initial Phase of Alternative 2 (LPA)

Project Segment	Initial Phase of Alternative 2	
	New Impervious Surface Area (acres)	Disturbed Soil Area (acres)
1	39	163
2	54	123
3	19	19
Total	**112**	**305**

Source: *Draft Project Report* (September 2010).
LPA = Locally Preferred Alternative

Table N.7 Estimated Quantities of Treatment Best Management Practices for the Initial Phase of Alternative 2 (LPA)

Project Segment	Initial Phase of Alternative 2			
	Biofiltration Swales/Strips (Each)	Infiltration Devices (Each)	Detention Devices (Each)	Media Sand Filters (Each)
1	7	6	6	6
2	5	7	7	8
3	1	1	1	1
Total	**13**	**14**	**14**	**15**

Source: *Draft Project Report* (September 2010).
Note: The design variation would not impact the implementation or number of the best management practices listed in the table above.
LPA = Locally Preferred Alternative

Table N.8 Cost Estimates for Temporary and Permanent Best Management Practices for the Initial Phase of Alternative 2 (LPA)

Project Segment	Initial Phase of Alternative 2	
	Temporary BMPs	Permanent BMPs
1	$2,422,000	$2,798,250
2	$2,649,000	$1,926,750
3	$562,000	$1,050,000
Total	**$5,633,000**	**$5,775,000**

Source: *Draft Project Report* (September 2010).
BMPs = best management practices
LPA = Locally Preferred Alternative

N.2.2.5 Retaining Walls

Several retaining walls are required to retain fill or cut slopes along the project segments of the Initial Phase of Alternative 2. The approximate wall locations and average heights on SR-91 and I-15 for the Initial Phase of Alternative 2 are listed in Table N.9.

N.2.2.6 Noise Barriers

There are existing noise barriers on the north side of the SR-91 mainline in the vicinity of the SR-91/SR-241/Gypsum Canyon Road interchange. Those walls would remain under the Initial Phase of Alternative 2 although some of these walls would be reconstructed as part of Alternative 2. Preliminary locations for new or replacement noise barriers on SR-91 and I-15 under the Initial Phase of Alternative 2 are summarized in Table N.10.

N.2.2.7 Utilities

There are several known utility facilities within the project limits. The following utility companies have facilities within the project limits on SR-91 that may be impacted by the Initial Phase of Alternative 2:

- SCE
- SCG
- AT&T
- City of Corona water and sewer
- Comcast Cable
- Sprint
- Time Warner Cable
- Questar

Table N.9 Alternative 2 (LPA) Initial Phase Average Retaining Wall Heights

RW No.	Location	Type	Beg PM	End PM	Length (ft)	Height (ft)
Westbound SR-91						
21	Green River Road and Corps Embankment	1	0.50	0.52	100	4
23	Mainline & Green River on-ramp	MSE	0.50	0.88	2,000	13
43	Green River on-ramp	1	0.88	0.90	100	3
43	Green River on-ramp	Tieback	0.90	0.94	200	8
61	Mainline & Green River off-ramp	1	1.24	1.90	3,500	20
115	Mainline and 71 W-N Connector	Tieback	2.23	2.75	2,750	10
141	Mainline	1	2.75	2.89	700	4
193 (Var 1)	Autocenter off-ramp & Maple on-ramp	1	3.74	4.28	2,850	9
TBA	Serfas Club Dr UC	Tieback	3.68	3.75	400	11
TBA	Maple St OC	Tieback	4.12	4.14	115	12.4
197 (Var 1)	Maple Loop on-ramp between mainline	1	3.70	4.20	2,650	2
223 (Var 1)	Maple off-ramp & Mainline	1	4.19	4.80	3,200	6
193 (Var 2)	Autocenter off-ramp & Maple on-ramp	1	3.74	4.28	2,850	9
197 (Var 2)	Maple Loop on-ramp between mainline	1	3.82	4.32	2,650	2
223 (Var 2)	Maple off-ramp & Mainline	1	4.19	4.80	3,200	7
235 (Var 2)	Smith Drop Ramp	1	4.43	4.56	700	22
TBA	Smith Ave OC	Tieback	4.70	4.73	124	9.7
251 (Var 2)	West side of Smith OC	1	4.71	4.72	50	6
253 (Var 2)	East side of Smith OC	1	4.73	4.74	50	6
193 (Var 3)	Autocenter off-ramp	1	3.74	4.29	2,900	10
199 (Var 3)	Maple off-ramp RT between Mainline	1	3.85	4.01	850	14
201 (Var 3)	Maple off-ramp LT between Autocenter off-ramp	1	3.87	3.95	400	19
223 (Var 3)	Maple off-ramp Mainline	1	4.19	4.80	3,200	3
193 (Var 4)	Autocenter off-ramp	1	3.74	4.26	2,750	10
199 (Var 4)	Maple off-ramp RT between Mainline	1	3.86	3.95	450	18
201 (Var 4)	Maple off-ramp LT between Autocenter off-ramp	1	3.86	3.95	450	18
223 (Var 4)	Maple off-ramp & Mainline	1	4.31	4.91	3,200	6
235 (Var 4)	Smith Drop Ramp	1	4.43	4.56	700	22
251 (Var 4)	West side of Smith OC	1	4.71	4.72	50	6
253 (Var 4)	East side of Smith OC	1	4.73	4.74	50	6
223	Mainline	1	4.796	5.364	3,000	10
284	Mainline	1	5.352	5.412	315	6
287.2	Lincoln Ave off-ramp	1	5.402	5.686	1,500	17
304	Mainline & Main St on-ramp	1	5.717	6.023	1,616	23
325	Main St on-ramp	1	6.124	6.312	992	22
333	Mainline	1	6.264	6.339	398	19
338.2	Mainline	1	6.376	6.524	783	21
339	Main St off-ramp	1	6.386	6.587	1,058	22
342	HOT Connectors	MSE	6.444	6.577	705	7
353	Mainline	1	6.660	6.899	1,262	28
374	NB I-15 to WB SR-91 conn	1	7.051	7.163	591	8
384	SB I-15 to WB SR-91 conn	1	7.239	7.257	95	4
Eastbound SR-91						
110	Mainline	1	2.15	2.21	300	4
148	Mainline (goes past Riv1 line)	1	2.89	3.02	700	4
192 (Var 1/3)	Autocenter on-ramp & Mainline	1	3.73	3.98	1,300	6
198 (Var 1-4)	Maple Off Ramp LT between Mainline	1	3.83	3.97	700	9
200 (Var 1-4)	Maple Off Ramp RT between Autocenter on-ramp	1	3.83	3.97	700	6

Table N.9 Alternative 2 (LPA) Initial Phase Average Retaining Wall Heights

RW No.	Location	Type	Beg PM	End PM	Length (ft)	Height (ft)
TBA	Serfas Club Dr UC	Tieback	3.68	3.75	400	11
TBA	Maple St OC	Tieback	4.13	4.14	98	12.4
216 (Var 1/2)	Maple Off Ramp at intersection	1	4.18	4.28	550	14
224 (Var 1)	Mainline & Maple St. on-ramp	1	4.20	4.80	3,150	4
192 (Var 2)	Autocenter on-ramp & Mainline		3.73	4.01	1,500	6
224 (Var 2)	Mainline & Maple St. on-ramp	1	4.20	4.80	3,150	4
235 (Var 2)	Smith Drop Ramp	1	4.43	4.56	700	22
251 (Var 2)	West side of Smith OC	1	4.68	4.70	100	6
253 (Var 2)	East side of Smith OC	1	4.70	4.72	100	6
216 (Var 3)	Maple off-ramp at intersection	1	4.18	4.27	450	9
220 (Var 3)	Mainline	1	4.26	4.34	438	7
228 (Var 3)	Maple on-ramp & Mainline	1	4.29	4.80	2,700	2
192 (Var 4)	Autocenter on-ramp & Mainline	1	3.73	4.02	1,550	9
216 (Var 4)	Maple off-ramp at intersection	1	4.18	4.13	-312	19
222 (Var 4)	Mainline	1	4.27	4.35	438	9
228 (Var 4)	Maple on-ramp & Mainline	1	4.29	4.80	2,700	4
235 (Var 4)	Smith Drop Ramp	1	4.43	4.56	700	22
251 (Var 4)	West side of Smith OC	1	4.71	4.72	50	6
253 (Var 4)	East side of Smith OC	1	4.73	4.74	50	6
228	Mainline	1	4.796	4.834	200	5
273 (Var 1/2)	Lincoln off-ramp	1	5.137	5.222	450	4
279 (Var 1/2)	Lincoln off-ramp	1	5.241	5.382	745	9
278 (Var 3/4)	Mainline/Lincoln off-ramp	1	5.222	5.403	956	5
285 (Var 3/4)	Mainline	Tieback	5.375	5.398	125	11
287.1 (Var 1/2)	Lincoln on-ramp	1	5.397	5.468	376	18
295 (Var 1/2)	Lincoln on-ramp	1	5.559	5.690	690	13
299 (Var 3/4)	Lincoln on-ramp	1	5.625	5.717	488	13
303	Mainline	1	5.730	6.006	1,459	22
321	Mainline & Main St off-ramp	1	6.053	6.292	1,263	20
334.1	Mainline	1	6.284	6.347	332	13
334.2	Main St off-ramp	1	6.292	6.340	252	5
338.1	Mainline	1	6.376	6.548	907	15
342	HOT Connectors	MSE	6.444	6.577	705	7
343	Main St on-ramp & braid on-ramp	1	6.462	6.696	1,234	16
351	Mainline	1	6.605	6.670	343	6
355	Mainline	1	6.694	6.718	127	6
356.1	SR-91 CD road to I-15	1	6.709	6.902	1,023	20
356.2	Main St braid on-ramp	1	6.719	6.766	247	19
357	Mainline	1	6.737	6.785	254	6
361	Main St braid on-ramp	1	6.803	6.919	612	8
381	EB SR-91 to SB I-15 conn	1	7.197	7.277	425	6
383	Mainline	1	7.242	7.296	283	6
Southbound I-15						
2149	HOT Connectors	MSE	40.708	40.819	586	8
Northbound I-15						
2149	HOT Connectors	MSE	40.708	40.819	586	8

71 W-N = 71 West to North
CD = collector-distributor
Corps = United States Army Corps of Engineers
EB = eastbound
ft = foot/feet
HOT = high-occupancy toll
I-15 = Interstate 15
LPA = Locally Preferred Alternative
LT = Left Turn
MSE = Mechanically Stabilized Earth
NB = northbound
OC = Overcrossing
PM = Post Mile
RT = Right Turn
RW = Retaining Wall
SB = southbound
SR-91 = State Route 91
TBA = To Be Assigned
UC = Undercrossing
WB = westbound

Table N.10 Initial Phase for Alternative 2 (LPA) Recommended Noise Barrier Locations on SR-91 and I-15

Segment	Location – From	Location – To	Beg PM	End PM	Length (ft)	Height (ft)
1	**Eastbound SR-91**					
	0.46 mi West Auto Center Drive	0.09 mi W Auto Center Drive	3.25	3.62	1,921	14
	0.01 mi E Auto Center Drive	0.02 mi W Maple Street	3.72	4.13	2,755	14
	0.10 mi W Auto Center Drive	0.30 mi E Auto Center Drive	3.32	3.72	1,879	14
	0.35 mi E Auto Center Drive	0.02 mi W Maple Street	3.77	3.95	1,186	14
	0.30 mi W SR-71	0.20 mi W SR-71	1.88	1.98	680	10
	0.01 mi E SR-71	0.21 mi E SR-71	2.08	2.28	1,798	12
	0.25 mi E Maple Street	0.02 mi W Smith Avenue	4.35	4.60	1,332	14
	Westbound SR-91					
	0.48 mi E Coal Canyon Road	0.95 mi W Green River Road	*18.42	0.00	2,126	14
2	**Eastbound SR-91**					
	0.02 mi E Smith Avenue	0.03 mi W Lincoln Avenue	4.64	5.35	3,367	14
	0.05 mi W Lincoln Avenue	0.16 mi E Lincoln Avenue	5.33	5.54	1,224	14
	0.09 mi E Lincoln Avenue	0.09 mi W Main Street	5.48	6.26	4,250	14
	0.05 mi E Main Street	0.01 mi E Grand Boulevard	6.41	6.75	1,774	12
	Westbound SR-91					
	0.08 mi E Main Street	0.04 mi W E Grand Boulevard	6.45	6.70	1,319	14
	0.14 mi E Lincoln Avenue	0.08 mi W Main Street	5.53	6.28	4,181	12
	0.15 mi W Main Street	0.14 mi E Main Street	6.19	6.48	1,617	14
	0.04 mi E I-15	0.17 mi E I-15	7.49	7.63	721	12
	0.34 mi W Buchanan Street	0.01 mi W Buchanan Street	9.95	10.28	2,011	14
3	**Northbound I-15**					
	0.23 mi N Parkridge Avenue	0.19 mi S Corona Avenue	42.05	42.26	424	14

* Post Mile entry is in Orange County, all others are Riverside County.

E = east
ft = feet
I-15 = Interstate 15
LPA = Locally Preferred Alternative
mi = mile/miles
N = north
PM = Post Mile
S = south
SR-71 = State Route 71
SR-91 = State Route 91
W = west

Some existing utility facilities would only require encasement or protection in place during construction of the Initial Phase of Alternative 2. However, the relocation of some existing utility facilities would be necessary to accommodate the construction of the Initial Phase of Alternative 2. Appendix J, Utility Relocations, summarizes the anticipated utility relocations for the Initial Phase of Alternative 2. Several of these utility facilities have been identified as “high/low risk” under the Department “Policy on High and Low Risk Underground Facilities Within Highway Rights of Way,” as defined in Chapter 13 of the Caltrans *Right-of-Way Manual*. All the utility relocation work needed to construct the proposed improvements under the Initial Phase of Alternative 2 is considered to be part of the project. The utility conflicts for the Initial Phase of Alternative 2 are similar to Alternative 2, but result in approximately $5 million less in utility conflicts.

N.2.2.8 Landscaping and Irrigation Systems

The Department District 8 Landscape Architecture Branch developed the *215/91 Landscape Corridor Master Plan* (Master Plan; September 5, 2006) that includes the Riverside County segment of SR-91 within the project limits. That Master Plan provides guidance on plant material selection and hardscape elements that consider water use, ease and safety of maintenance, nonnative plant exclusion, corridor continuity, local cultural integration, and other context-sensitive factors.

Most of the existing highway planting and landscaping along SR-91 in the project limits would be removed under the Initial Phase of Alternative 2. Replacement planting/landscaping and hardscape elements, consistent with the Master Plan, would be provided on SR-91 under the Initial Phase of Alternative 2. The contract for planting/landscaping would be separate from the prime construction contract. Landscaping would commence before the end of construction of the Initial Phase and would be considered for each subsequent phase.

The improvements on I-15 under the Initial Phase of Alternative 2 would be constructed in the median. There is currently no landscaping or irrigation in the existing median on I-15 within the project limits.

N.2.2.9 Ramp Metering

Ramp metering would be provided on all the local on-ramps on SR-91 in the project limits, if not present already. HOV bypass lanes would be constructed on ramps that are modified where feasible.

The connectors between SR-91 and I-15 (existing or proposed) are not planned to be metered, with one exception. The proposed westbound collector-distributor road where I-15 traffic joins SR-91 would be metered. The existing meter on the southbound SR-71 to eastbound SR-91 connector would be maintained. No new metering is proposed for other connectors at the SR-71 and SR-91 interchange.

N.2.2.10 California Highway Patrol Enforcement Activities

CHP enforcement areas would be provided at new ramp meter installations and along the SR-91 mainline for the Initial Phase of Alternative 2 as shown in Table N.11.

Table N.11 California Highway Patrol Median Refuge Locations for the Initial Phase of Alternative 2 (LPA)

Co-Rte-PM	SR-91 Eastbound	SR-91 Westbound	Existing or New	Occurs in Initial Phase of Alternative 2 (LPA)
Ora-91-17.0	X	X	Existing	Yes
Ora-91-17.7	X	X	New	Yes
Ora-91-18.0	X	X	Existing	No
Riv-91-3.2	X	X	New	Yes
Riv-91-9.7	X	X	Existing	**No**

Source: *Draft Project Report* (September 2010).
CHP = California Highway Patrol
CO = County
LPA = Locally Preferred Alternative
Ora = Orange County
PM = Post Mile
Riv = Riverside County
Rte = Route
SR-91 = State Route 91
X = CHP median refuge provided at this location

N.2.2.11 Non-Motorized and Pedestrian Features

Existing local road interchanges with SR-91 would be modified as a result of the Initial Phase of Alternative 2. Construction of improvements at the local road connections would implement current ADA standards for curb ramp and sidewalks. These types of modifications are planned at Auto Center Drive, Maple Street, Lincoln Avenue, and Main Street interchanges in the City of Corona.

The Initial Phase of Alternative 2 accommodates the existing Santa Ana River Trail and bicycle facilities on local streets. Bike lanes would be provided at Maple Street, Lincoln Avenue, and Main Street. The existing equestrian trails in Santa Ana Canyon would not be affected by the Initial Phase of Alternative 2.

N.2.3 Permanent Right-of-Way Acquisition

The Initial Phase of Alternative 2 would require the permanent acquisition of additional right-of-way. Those acquisitions would include new right-of-way acquired in fee and permanent subsurface and aerial easements. The Initial Phase of Alternative 2 would also require the temporary use of land during construction for TCEs. The extent of acquisition and TCEs varies for the Initial Phase of Alternative 2 among its design variations. The numbers of full and partial acquisitions for the Initial Phase of Alternative 2 are summarized by segment in Table N.12.

Table N.12 Right-of-Way Requirements for the Initial Phase of Alternative 2 (LPA) – Segments 1, 2, and 3

Part of Freeway	Number of Partial Takes	Number of Full Takes
Segment 1[1]		
Orange County	9	0
Riverside County – County Line	17	0
Auto Center Drive/Maple Street – Variation 1	55	26
Auto Center Drive/Maple Street – Variation 1 with Smith Avenue – Variation 2	73	29*
Auto Center Drive/Maple Street – Variation 2	66	18
Auto Center Drive/Maple Street – Variation 2 with Smith Avenue – Variation 2	78*	26
Total	**104**	**29**
Segment 2		
West – Variation 1	47	25
West – Variation 2	48	26*
West – Variation 3	50	21
West – Variation 4	50*	23
Interchange	45*	39
Total	**95**	**65**
Segment 3		
South of SR-91	39	0
Total	**39**	**0**

Source: *Draft Project Report* (September 2010).
[1] Worst-case evaluation used in totals for Segments 1 and 2.
SR-91 = State Route 91
LPA = Locally Preferred Alternative

N.2.4 Temporary Project Features

N.2.4.1 Construction Staging

Construction staging would be required for all ramp reconstruction, freeway widening, and profile adjustments under the Initial Phase of Alternative 2. The existing number of mainline through lanes would be maintained during construction by restriping the existing lanes and by shifting traffic within the corridor to maintain the existing capacity during construction. Complete closures of SR-91 and I-15 are not anticipated to be required during the construction of the Initial Phase of Alternative 2.

A *Final Work Zone Mainline Analysis* (February 2010) for the SR-91 corridor was conducted to identify ways to minimize congestion along the corridor during the construction of the Initial Phase of Alternative 2. That analysis was used to compare and select optimal construction staging strategies. The work zone analysis examined ramp and connector closures in addition to two SR-91 mainline construction scenarios. With either mainline scenario, Stage 1 would construct outside improvements without impacting the mainline traffic lanes. Lane restrictions during Stage 2 would vary between the two scenarios evaluated.

The first mainline work zone scenario for SR-91 would consist of narrowing the existing mainline through lanes to 10.5 ft wide and maintaining a total of four GP lanes and one HOV lane in each direction. The second scenario would consist of converting the HOV lane to a GP lane and maintaining the three other GP lanes on weekends only. Both weekend and weekday peak periods were examined.

Congestion would occur with both scenarios and neither scenario demonstrated a clear advantage from a traffic impact perspective. Under the second scenario, the tradeoffs involve avoidance of weekday impacts with greatly increased construction duration and costs. The first scenario is favored because it results in shorter construction duration with lower construction costs and earlier project completion.

Ramp and connector closures would also be required on SR-91 during the construction of the Initial Phase of Alternative 2. Preliminary recommendations for the duration of, and detours for, those ramp and connector closures on eastbound and westbound SR-91 are summarized in Table N.13.

Table N.13 Preliminary Proposed Ramp and Connector Closures along SR-91 for the Initial Phase of Alternative 2 (LPA)

Interchange	Ramps (Off/On)	Closure ID	Phase	Time of Closure	Duration
SR-91 Eastbound					
SR-71 SB – SR-91 EB	On	X2	Initial	Weekends	2 weekends
Auto Center Drive	On	X3	Initial	Weekdays	6 months
Second Street/Grand Boulevard	Off	X4	Initial	Permanent	--
Main Street	On	X5	Initial	Weekdays & Weekends	12 months
SR-91 EB – I-15 NB	Off	X6	Initial	Weekends	2 weekends
SR-91 EB – I-15 SB	Off	X7	Initial	Weekends	2 weekends
SR-91 EB – SR-71 NB	Off	X12	Initial	Weekends	2 weekends
SR-91 Westbound					
SR-71 SB – SR-91 WB	On	Y3	Initial	Weekends	1 weekend
SR-91 WB – SR-71 NB	Off	Y4	Initial	Weekends	4 weekends
Auto Center Drive	Off	Y5	Initial	Weekdays & Weekends	6 months
Maple Street	Off	Y6	Initial	Weekdays & Weekends	2 months
Grand Boulevard	On	Y7	Initial	Permanent	--
Main Street	Off	Y8	Initial	Weekdays & Weekends	12 months
I-15 SB – SR-91 WB	On	Y9	Initial	Weekends	1 weekend

Source: *Final Ramp Closure Study* (February 2010)
EB = eastbound
I-15 = Interstate 15
ID = identification
LPA = Locally Preferred Alternative
NB = northbound
SB = southbound
SR-241 = State Route 241
SR-71 = State Route 71
SR-91 = State Route 91
WB = westbound

N.2.4.2 Construction Vehicle Access and Material Staging

Under the Initial Phase of Alternative 2, construction vehicle access and staging of construction materials would occur within existing disturbed or developed areas inside the existing right-of-way or the additional right-of-way acquired for the Initial

Phase. Vehicle access and materials staging during construction of walls outside of and immediately adjacent to the State right-of-way would occur in approved designated areas. All construction vehicle access, materials staging and storage, and other construction activities would occur within the defined disturbance limits for the Initial Phase of Alternative 2.

The TCEs and permanent right-of-way limits for the Initial Phase of Alternative 2 and their design features, which include areas for construction vehicle access and material staging, are shown on the detailed figures provided in Appendix L, Project Features.

N.2.4.3 Transportation Management Plan During Construction

A Preliminary TMP (May 2010) was prepared to address transportation management during construction of the Initial Phase of Alternative 2. Key elements in the TMP are:

- Public information/PAC
- Motorist information strategies
- Incident management
- Construction strategies
- Demand management
- Alternate route strategies
- Other strategies

N.2.4.4 Temporary Construction Easements

TCEs would be necessary under the Initial Phase of Alternative 2 for constructing walls along the State or other public rights-of-way, for extending major drainage facilities, for utility relocation/modifications, and for widening bridges. Land used as a TCE would be returned to its original or better condition prior to the return of that land to the original owners after the completion of the construction activities requiring that TCE.

N.2.4.5 Construction Lighting

The Initial Phase of Alternative 2 would require nighttime construction activities in some areas. If work is conducted at night, lighting would be directed away from land uses outside the freeway rights-of-way.

N.2.4.6 Project Costs

The Initial Phase of Alternative 2 would cost between $1.009 billion and $1.096 billion, depending on the design variation. The roadway, structure, right-of-way, and total costs for the Initial Phase of Alternative 2 for each design variation are provided in Table N.14.

Table N.14 Initial Phase of Alternative 2 (LPA) Summary of Costs

Alternative	Roadway	Structure	Right-of-Way	Total
2A	$372,800,000	$419,100,000	$227,600,000	$1,019,500,000
2B	$372,400,000	$417,600,000	$219,400,000	$1,009,400,000
2C	$386,400,000	$447,400,000	$247,000,000	$1,080,800,000
2D	$386,000,000	$445,800,000	$244,600,000	$1,076,400,000
2E	$371,100,000	$439,300,000	$212,700,000	$1,023,100,000
2F	$370,700,000	$437,800,000	$204,500,000	$1,013,000,000
2G	$384,400,000	$467,000,000	$244,500,000	$1,095,900,000
2H	$383,900,000	$465,400,000	$242,200,000	$1,091,500,000

Source: *Draft Project Report* (September 2010).
LPA = Locally Preferred Alternative