I-10/SR 85 CORRIDOR PROFILE STUDY

CALIFORNIA STATE LINE TO I-8

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PREPARED FOR:

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PREPARED BY:

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ACRONYMS & ABBREVIATIONS

AADT	Average Annual Daily Traffic
ADOT	Arizona Department of Transportation
ASLD	Arizona State Land Department
AZTDM	Arizona Travel Demand Model
BCA	Benefit-Cost Analysis
BLM	Bureau of Land Management
BQAZ	Building a Quality Arizona
CCTV	Closed Circuit Television
CR	Cracking Rating
DMS	Dynamic Message Sign
DCR	Design Concept Report
FY	Fiscal Year
HCRS	Highway Condition Reporting System
HERE	Real time traffic conditions database produced by American Digital Cartography Inc.
HPMS	Highway Performance Monitoring System
I-	Interstate
IRI	International Roughness Index
ITS	Intelligent Transportation System
LCCA	Life-Cycle Cost Analysis
LOS	Level of Service
LRTP	Long Range Transportation Plan
MAG	Maricopa Association of Governments
MAP 21	Moving Ahead for Progress in the 21st Century
MP	Milepost
MPD	Multimodal Planning Division
NB	Northbound
NPV	Net Present Value
OP	Overpass
PES	Performance Effectiveness Score
P2P	Planning to Programming
PDI	Pavement Distress Index
PSR	Pavement Serviceability Rating
PTI	Planning Time Index
RTP	Regional Transportation Plan
SB	Southbound
SHSP	Strategic Highway Safety Plan
SR	State Route
TI	Traffic Interchange
TIP	Transportation Improvement Plan
TPTI	Truck Planning Time Index
TTI	Travel Time Index
TTTI	Truck Travel Time Index
UP	Underpass
USDOT	United States Department of Transportation
V/C	Volume to Capacity Ratio
V/MT	Vehicle-Miles Travelled
WIM	Weigh-in-Motion

EXECUTIVE SUMMARY

INTRODUCTION

The Arizona Department of Transportation (ADOT) is the lead agency for this Corridor Profile Study (CPS) of Interstate 10 (I-10) between the California State Line and State Route 85 (SR 85), and SR 85 between I-10 and Interstate 8 (I-8). This study examines key performance measures relative to the I-10/SR 85 Corridor, and the results of this performance evaluation are used to identify potential strategic improvements. The intent of the corridor profile program, and of ADOT's Planning-to-Programming (P2P) process, is to conduct performance-based planning to identify areas of need and make the most efficient use of available funding to provide an efficient transportation network.

ADOT is conducting eleven CPS within three separate groupings. The I-10/SR 85 Corridor, depicted in **Figure ES-1**, is one of the strategic statewide corridors identified and the subject of this CPS.

Corridor Study Purpose, Goals and Objectives

The purpose of the CPS is to measure corridor performance to inform the development of strategic solutions that are cost-effective and account for potential risks. This purpose can be accomplished by following the process described below:

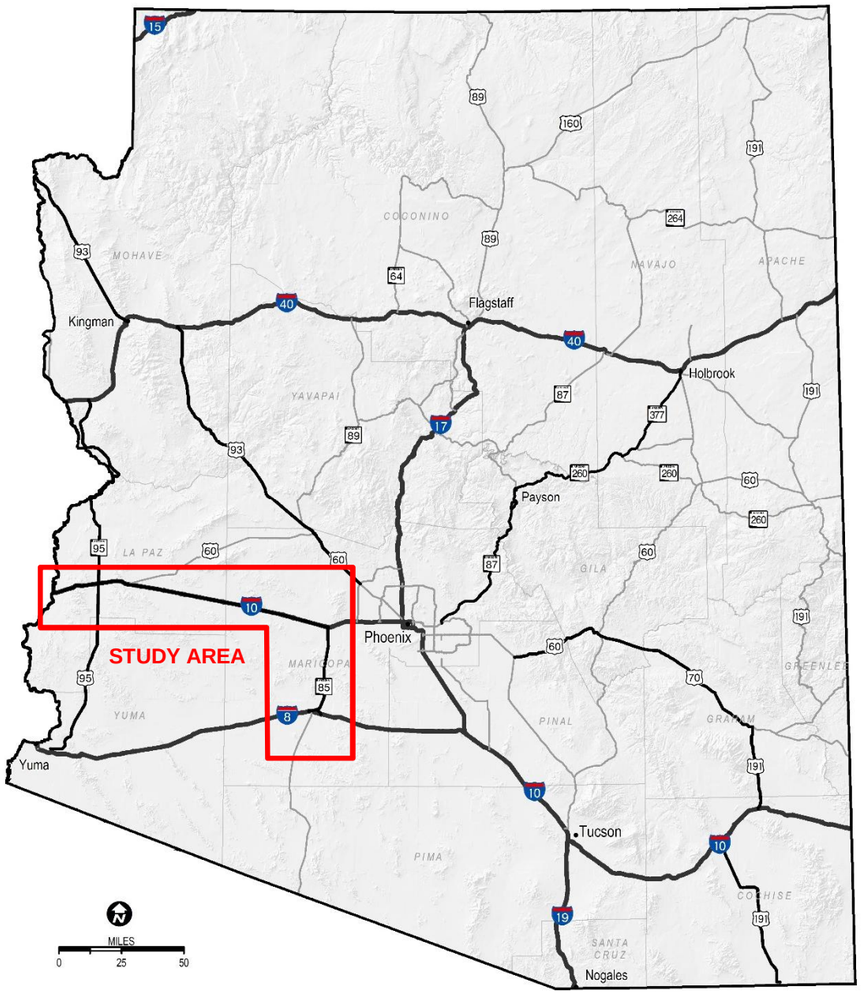
- Inventory past improvement recommendations
- Define corridor goals and objectives
- Assess existing performance based on quantifiable performance measures
- Propose various solutions to improve corridor performance
- Identify specific solutions that can provide quantifiable benefits relative to the performance measures
- Prioritize solutions for future implementation

The objective of this study is to identify a recommended set of prioritized potential solutions for consideration in future construction programs, derived from a transparent, defensible, logical, and replicable process. The I-10/SR 85 Corridor Profile Study defines solutions and improvements for the corridor that are evaluated and ranked to determine which investments offer the greatest benefit to the corridor in terms of enhancing performance.

The following goals are identified as the outcome of this study:

- Link project decision-making and investments on key corridors to strategic goals.
- Develop solutions that address identified corridor needs based on measured performance.
- Prioritize improvements that cost-effectively preserve, modernize, and expand transportation infrastructure.

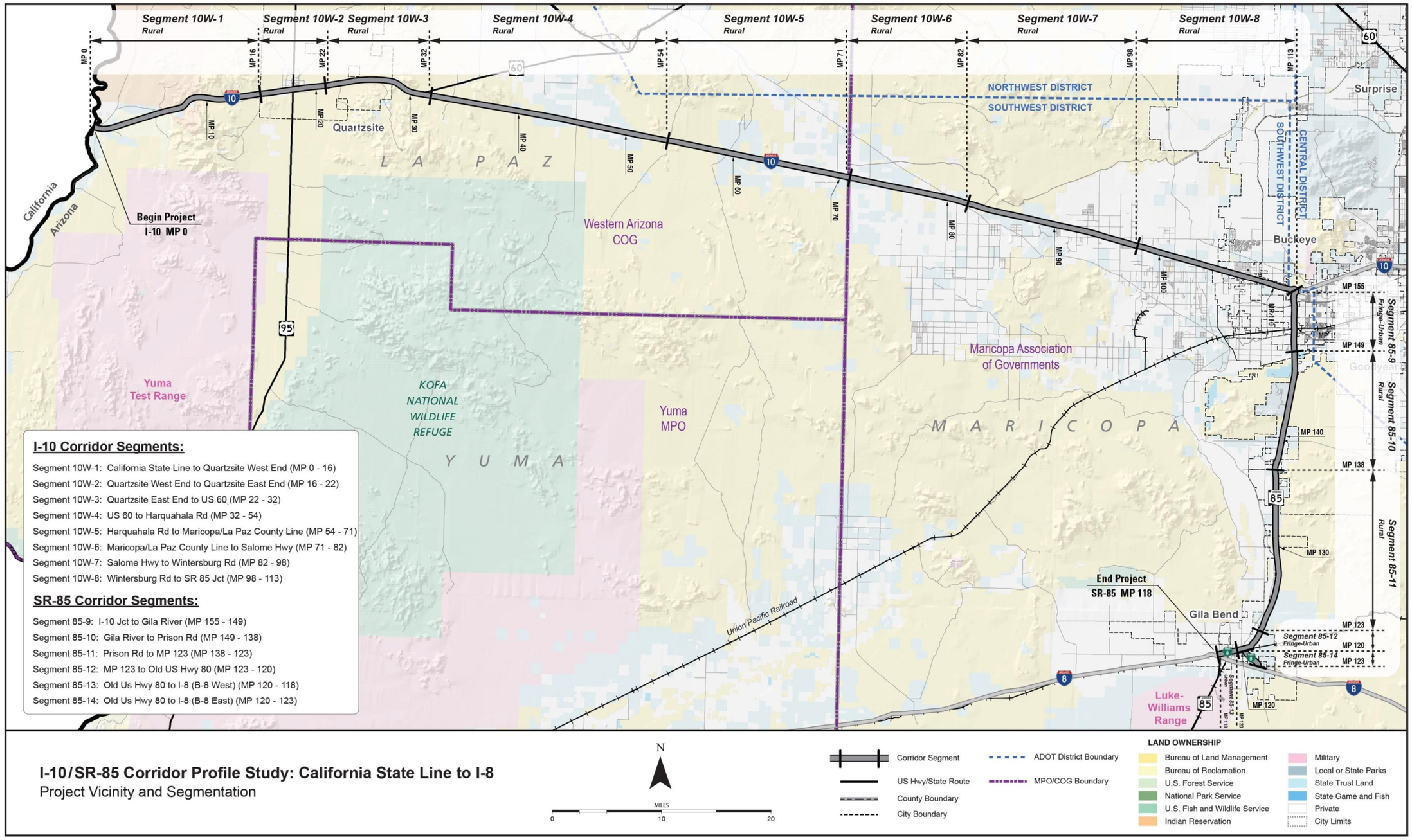
Figure ES-1: Corridor Study Area



Study Location and Corridor Segments

The I-10/SR 85 Corridor is divided into 14 planning segments for analysis and evaluation. The corridor is segmented at logical breaks where the context changes due to differences in characteristics such as terrain, daily traffic volumes, or roadway typical sections. Corridor segments are shown in **Figure ES-2**.

Figure ES-2: Corridor Location and Segments



CORRIDOR PERFORMANCE

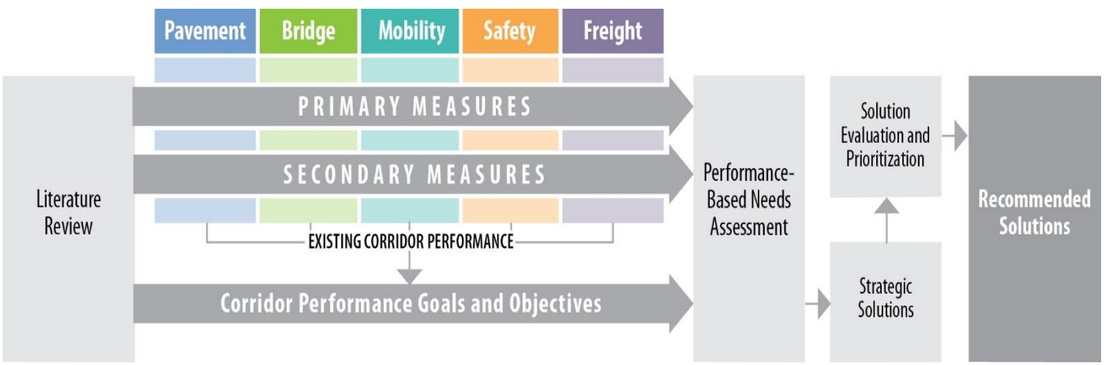
A series of performance measure is used to assess the I-10/SR 85 Corridor. The results of the performance evaluation are used to define corridor needs relative to the long term goals and objectives for the corridor.

Corridor Performance Framework

This study uses a performance-based process to define baseline corridor performance, diagnose corridor needs, develop corridor solutions, and prioritize strategic corridor investments. In support of this objective, a framework for the performance-based process was developed through a collaborative process involving ADOT and the CPS consultant teams.

Figure ES-3 illustrates the performance framework, which includes a two-tiered system of performance measures (primary and secondary) to evaluate baseline performance.

Figure ES-3: Corridor Profile Performance Framework



The following five performance areas guide the performance-based corridor analyses:

- Pavement
- Bridge
- Mobility
- Safety
- Freight

The performance measures include five primary measures: Pavement Index, Bridge Index, Mobility Index, Safety Index, and Freight Index. Additionally, a set of secondary performance measures provides for a more detailed analysis of corridor performance. **Table ES-1** provides the complete list of primary and secondary performance measures for each of the five performance areas.

Table ES-1: Corridor Performance Measures

Performance Area	Primary Measure	Secondary Measures
Pavement	**Pavement Index** Based on a combination of International Roughness Index and Cracking	· Directional Pavement Serviceability · Pavement Failure · Pavement Hot Spots
Bridge	**Bridge Index** Based on lowest of deck, substructure, superstructure and structural evaluation rating	· Bridge Sufficiency · Functionally Obsolete Bridges · Bridge Rating · Bridge Hot Spots
Mobility	**Mobility Index** Based on combination of existing and future daily volume-to-capacity ratios	· Future Congestion · Peak Congestion · Travel Time Reliability · Multimodal Opportunities
Safety	**Safety Index** Based on frequency of fatal and incapacitating injury crashes	· Directional Safety Index · Strategic Highway Safety Plan Emphasis Areas · Crash Unit Types · Safety Hot Spots
Freight	**Freight Index** Based on bi-directional truck planning time index	· Recurring Delay · Non-Recurring Delay · Closure Duration · Bridge Vertical Clearance · Bridge Vertical Clearance Hot Spots

Each of the primary and secondary performance measures identified in the table above is comprised of one or more quantifiable indicators. A three-level scale was developed to standardize the performance scale across the five performance areas, with numerical thresholds specific to each performance measure:

Good/Above Average Performance	– Rating is above identified desirable/average range
Fair/Average Performance	– Rating is within identified desirable/average range
Poor/Below Average Performance	– Rating is below identified desirable/average range

The terms “good”, “fair”, and “poor” apply to the Pavement, Bridge, Mobility, and Freight performance measures, which have defined thresholds. The terms “above average”, “average”, and “below average” apply to the Safety performance measures, which have thresholds referenced to statewide averages.

Corridor Performance Summary

Table ES-2 shows a summary of corridor performance for all primary measures and secondary measure indicators for the I-10/SR85 Corridor. A weighted corridor average rating (based on the length of the segment) was calculated for each primary and secondary measure as shown in **Table ES-2**.

94% of the corridor segments show "Good" performance in the Pavement Index. Approximately 96% of the segments show "Good" performance in Mobility, while the remaining 4% show "Poor" performance. In the Freight Index, approximately 65% of the segments show "Good" performance, while 20% is rated "Fair" and 15% is rated "Poor". The Bridge index displays only 30% of the segments in "Good" condition, and 70% in "Fair" condition. Almost half of the corridor segments in the Safety index show as "Below Average" condition, where 31% of the segments show as "Average" condition, and only 22% show "Above Average" performance.

It appears that the lowest performance along the I-10/SR 85 corridor occurs in the Bridge and Safety Performance Areas while the Pavement and Mobility Performance Areas showing the highest performance.

- The pavement is generally in "good" condition with the exception of a few isolated locations
- The bridges are generally in "fair" condition overall with only eight bridges with a single rating of 5 along the corridor.
- The general mobility and freight indices along the corridor are displaying "good" performance where both are also showing very little recurring and non-recurring delays along the I-10 portion of the corridor. The segments along SR 85 show elevated levels of delay in the southern end of the corridor.
- The closures along the corridor are generally lower than the statewide average for both the closure frequency and duration, however there is one outlier in segment 9 in the southbound direction
- Overall, based on the weighted average of the Safety Index, the corridor rates in "below average performance" condition.
- There are a few hot spot crashes throughout the corridor in Segments 10W-3 through 10W-8 and in Segment 85-9.

Table ES-2: Corridor Performance Summary by Segment and Performance Measure

Segment	Length (miles)	Pavement Performance Area				Bridge Performance Area				Mobility Performance Area											
		Pavement Index	Directional PSR		Pavement Failure	Bridge Index	Bridge Sufficiency	Bridge Rating	% Deck Area of Functionally Obsolete Bridges	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent (instances/milepost/ year/mile)		Directional TTI (all vehicles)		Directional PTI (all vehicles)		% Bicycle Acc.	% Non-Single Occupancy Vehicle (SOV) Opportunities
			EB/SB	WB/NB								EB/SB	WB/NB	EB/SB	NB/WB	EB/SB	NB/WB	EB/SB	NB/WB		
10W-1^a2	16	3.76	3.96	3.93	13.0%	5.11	67.26	5	5.8%	0.27	0.30	0.28	0.28	0.05	0.30	1.20	1.17	1.57	1.54	100.00%	11.9%
10W-2^a2	6	3.61	3.87	4.06	0.0%	5.92	95.30	5	9.0%	0.30	0.32	0.29	0.29	0.03	0.23	1.13	1.10	1.30	1.25	100.00%	15.2%
10W-3^a2	10	3.90	3.88	3.97	0.0%	6.00	87.89	6	36.8%	0.27	0.29	0.28	0.28	0.18	0.08	1.15	1.10	1.34	1.24	99.00%	19.7%
10W-4^a2	22	3.76	3.52	3.74	27.0%	6.50	97.22	5	0.0%	0.31	0.34	0.34	0.34	0.11	0.14	1.11	1.09	1.24	1.23	100.00%	10.7%
10W-5^a2	17	4.37	4.22	4.16	0.0%	6.48	98.35	6	0.0%	0.29	0.32	0.29	0.29	0.28	0.13	1.11	1.08	1.27	1.20	100.00%	5.3%
10W-6^a2	11	3.85	3.55	3.68	18.0%	7.00	97.41	7	0.0%	0.29	0.32	0.27	0.31	0.36	0.24	1.10	1.09	1.21	1.23	100.00%	6.1%
10W-7^a2	16	3.95	3.81	3.94	0.0%	6.25	97.70	6	0.0%	0.32	0.36	0.29	0.34	0.11	0.40	1.10	1.10	1.24	1.23	100.00%	12.5%
10W-8^b2	15	3.95	3.67	3.80	13.0%	6.71	96.12	5	0.0%	0.53	0.70	0.34	0.35	0.11	0.12	1.11	1.10	1.25	1.25	100.00%	14.6%
85-9^c1	6	4.01	3.85	3.63	0.0%	NO BRIDGES IN SEGMENT				0.30	0.39	0.18	0.18	0.77	0.07	1.05	1.00	1.32	1.76	1.05	1.00
85-10^c2	11	3.83	3.82	4.11	14.0%	6.53	99.47	6	0.0%	0.23	0.28	0.15	0.16	0.00	0.25	1.07	1.00	1.83	1.07	100.00%	13.6%
85-11^c2	15	3.80	4.35	3.78	22.0%	NO BRIDGES IN SEGMENT				0.17	0.20	0.09	0.09	0.03	0.13	1.09	1.01	1.16	1.84	1.09	1.01
85-12*e2	3	3.32	3.42	3.21	17.0%	5.00	83.40	5	0.0%	0.92	1.11	0.56	0.56	0.07	0.27	1.00	1.19	1.00	3.19	32.00%	8.8%
85-13*d1	2	5.00	5.00	5.00	0.00	5.21	89.61	5	0.0%	0.32	0.35	0.25	0.25	NO DATA AVAILABLE		1.47	1.85	4.26	72.41	47.00%	9.0%
85-14*e1	3	5.00	5.00	5.00	0.00	6.86	94.25	6	0.0%	1.01	1.24	0.66	0.67	NO DATA AVAILABLE		1.89	1.28	4.25	9.05	42.00%	7.0%
Weighted Corridor Average		3.93	3.88	3.85	11.69%	6.26	92.58	5.6	3.9%	0.33	0.38	0.28	0.29	0.15	0.20	1.11	1.11	1.47	1.47	96%	11%
SCALES																					
Performance Level		Interstate (Non-Interstate)								Urban or Rural						Uninterrupted or Interrupted					
Good/Above Average		> 3.75 (3.5)			< 5%	> 6.5	> 80	> 6	< 12%	< 0.71[1] < 0.56[2]				< 0.22		< 1.15^ < 1.30*		< 1.30^ < 3.00*		> 90%	> 17%
Fair/Average		3.2 - 3.75 (2.9-3.5)			5% - 20%	5.0 - 6.5	50 - 80	5 – 6	12% - 40%	0.71 - 0.89[1] 0.56 - 0.76[2]				0.22 – 0.62		1.15-1.33^ 1.30-2.00*		1.30-1.50^ 3.00-6.00*		60% - 90%	11% - 17%
Poor/Below Average		< 3.2 (2.9)			> 20%	< 5.0	< 50	< 5	> 40 %	> 0.89[1] >0.76[2]				> 0.62		> 1.33^ > 2.00*		> 1.50^ > 6.00*		< 60%	< 11%

^Uninterrupted Flow Facility [a]4 Lane Freeway with Daily Volume < 25,000 [c]2 or 3 or 4 Lane Divided Highway [e]2 or 3 Lane Undivided Highway [1]Urban Operating Environment
*Interrupted Flow Facility [b]4 Lane Freeway with Daily Volume > 25,000 [d]4 or 4 Lane Undivided Highway [2]Rural Operating Environment

Table ES-2: Corridor Performance Summary by Segment and Performance Measure (continued)

Segment	Length (miles)	Safety Performance Area					Freight Performance Area							
		Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	% of Fatal + Incapacitating Injury Crashes Involving Trucks	Freight Index	Directional Truck TTI		Directional Truck PTI		Closure Duration (minutes/milepost closed/year/mile)		Vertical Bridge Clearance
			EB/SB	NB/WB				EB/SB	NB/WB	EB/SB	NB/WB	EB/SB	NB/WB	
10W-1^a2	16	0.76	0.43	1.10	58%	8%	0.71	1.14	1.19	1.36	1.46	50.47	25.03	16.11
10W-2^a2	6	0.99	0.12	1.86	40%	Insufficient Data	0.89	1.05	1.04	1.13	1.11	43.57	4.80	15.96
10W-3^a2	10	1.03	1.20	0.87	54%	15%	0.89	1.05	1.04	1.14	1.10	8.78	60.66	16.14
10W-4^a2	22	1.79	1.92	1.65	54%	11%	0.90	1.04	1.05	1.09	1.12	35.48	136.64	15.90
10W-5^a2	17	1.60	2.08	1.12	35%	35%	0.87	1.06	1.06	1.17	1.13	42.00	59.85	16.25
10W-6^a2	11	1.66	2.62	0.70	56%	17%	0.90	1.06	1.05	1.11	1.12	100.12	97.78	16.00
10W-7^a2	16	2.60	1.48	3.72	40%	20%	0.88	1.05	1.06	1.13	1.15	197.56	36.99	16.58
10W-8^b2	15	1.05	1.39	0.71	50%	19%	0.90	1.04	1.04	1.11	1.12	44.39	31.35	15.92
85-9^c1	6	3.12	3.05	3.20	Insufficient Data	Insufficient Data	0.66	1.00	1.07	1.40	1.64	17.87	187.62	No UP
85-10^c2	11	0.54	1.08	0.00	Insufficient Data	Insufficient Data	0.73	1.11	1.00	1.71	1.03	93.75	0.00	No UP
85-11^c2	15	0.26	0.50	0.03	Insufficient Data	Insufficient Data	0.65	1.06	1.15	1.15	1.94	21.20	4.17	No UP
85-12*e2	3	Insufficient Data			Insufficient Data	Insufficient Data	0.60	1.00	1.19	1.00	1.19	1.00	2.35	30.67
25.03	2	Insufficient Data			Insufficient Data	Insufficient Data	0.14	1.47	2.17	2.17	2.17	2.59	2.59	16.63
4.80	3	Insufficient Data			Insufficient Data	Insufficient Data	0.17	1.91	1.27	1.27	1.27	3.82	3.82	No UP
60.66		1.37	1.44	1.31	49%	18%	0.80	1.10	1.08	1.48	1.32	56.77	61.68	16.12
136.64														
59.85		Urban 4 Lane Freeway or Rural 4 Lane < 25,000 vpd					Uninterrupted or Interrupted							
Good/Above Average		< 0.79[a] < 0.73[b]			< 49.1%[a] < 42.8% [b]	N/A	> 0.77^ > 0.33*		< 1.15 ^ < 1.30*	< 1.30^ < 3.00*		< 44.18		> 16.5
Fair/Average		0.79-1.21[a] 0.73-1.27[b]			49.1%-59.4%[a] 42.8%-52.9%[b]	N/A	0.67 - 0.77^ 0.17 - 0.33*		1.15 -1.33^ 1.30 -2.00*	1.30-1.50^ 3.00-6.00*		44.18 -124.86		16.0-16.5
Poor/Below Average		> 1.21[a] > 1.27[b]			> 59.4%[a] > 52.9%[b]	N/A	< 0.67^ < 0.17*		> 1.33^ > 2.00*	>1.50^ > 6.00*		> 124.86		< 16.0

^Uninterrupted Flow Facility [a]4 Lane Freeway with Daily Volume < 25,000 [c]2 or 3 or 4 Lane Divided Highway [e]2 or 3 Lane Undivided Highway [1]Urban Operating Environment
*Interrupted Flow Facility [b]4 Lane Freeway with Daily Volume > 25,000 [d]4 or 4 Lane Undivided Highway [2]Rural Operating Environment

Note: "Insufficient Data" indicates there was not enough data available to generate reliable performance ratings

NEEDS ASSESSMENT

Corridor Description

The I-10/SR 85 Corridor provides an important connection from Southern California to economic and recreational opportunities in Central Arizona and other destinations to the east. I-10 is a 4-lane divided freeway from the California border to SR 85 while SR 85 is generally a two-lane state route facility connecting I-10 to I-8. Together, the two roadways provide a passage from Southern California to Tucson while bypassing the Metropolitan Phoenix Area.

Corridor Objectives

Statewide goals and performance measures were established by the ADOT Long-Range Transportation Plan (LRTP), 2010-2035. Statewide performance goals that are relevant to I-10/SR 85 performance areas were identified and corridor goals were then formulated for each of the five performance areas that aligned with the overall statewide goals established by the LRTP. Based on stakeholder input, corridor goals, corridor objectives, and performance results, three "Emphasis Areas" were identified for the I-10/SR 85 Corridor, Mobility, Safety, and Freight.

Taking into account the corridor goals and identified Emphasis Areas, performance objectives were developed for each quantifiable performance measure that identify the desired level of performance based on the performance scale levels for the overall corridor and for each segment of the corridor. For the performance Emphasis Areas, the corridor-wide weighted average performance objectives are identified with a higher standard than for the other performance areas.

Achieving corridor and segment performance objectives will help ensure that investments are targeted toward improvements that support the safe and efficient movement of travelers on the corridor. Corridor performance is measured against corridor and segment objectives to determine needs – the gap between observed performance and performance objectives.

Needs Assessment Process

The performance-based needs assessment evaluates the difference between the baseline performance and the performance objectives for each of the five performance areas used to characterize the health of the corridor: Pavement, Bridge, Mobility, Safety, and Freight. The performance-based needs assessment process is illustrated in **Figure ES-4**.

The needs assessment compares baseline corridor performance with performance objectives to provide a starting point for the identification of performance needs. This mathematical comparison results in an initial need rating of None, Low, Medium, or High for each primary and secondary performance measure. An illustrative example of this process is shown in **Figure ES-5.**

Figure ES-4: Needs Assessment Process

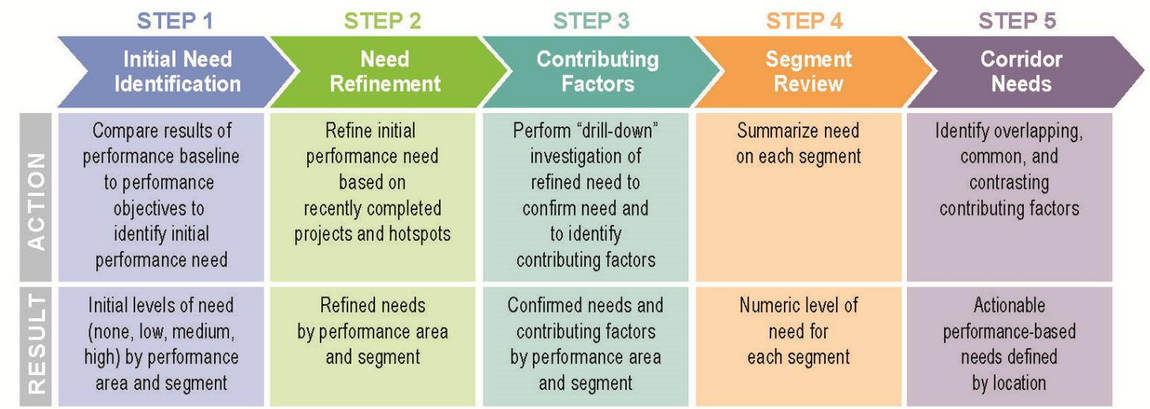


Figure ES-5: Initial Need Ratings in Relation to Baseline Performance (Bridge Example)

Performance Thresholds	Performance Level	Initial Level of Need	Description
6.5	Good	None	All levels of Good and top 1/3 of Fair (>6.0)
	Good		
	Good		
	Fair		
	Fair	Low	Middle 1/3 of Fair (5.5-6.0)
5.0	Fair	Medium	Lower 1/3 of Fair and top 1/3 of Poor (4.5-5.5)
	Poor		
	Poor	High	Lower 2/3 of Poor (<4.5)
	Poor		

The initial level of need for each segment is refined to account for hot spots and recently completed or under construction projects, resulting in a final level of need for each segment. The final levels of need for each primary and secondary performance measure are combined to produce a weighted final need rating for each segment. A detailed review of available data helps identify contributing factors to the need and if there is a high level of historical investment.

Summary of Needs

Table ES-3 provides a summary of needs for each segment across all performance areas, with the average need score for each segment presented in the last row of the table. A weighting factor of 1.5 is applied to the average need scores of the performance areas identified as emphasis areas (Mobility, Safety, and Freight for the I-10/SR 85 Corridor). There are no segments with a High average need, nine segments with a Medium average need, and five segments with a Low average need. More information on the identified final needs in each performance area is provided below.

Pavement Needs

- Pavement failure hot spots were identified on 1 mile of Eastbound I-10, 3 miles of Westbound I-10, and 3 miles of Northbound SR 85.
- Segment 10-4 appears to have a higher level of need in percentage of pavement failure, which may warrant consideration of alternative treatments on the concentrated area.

Bridge Needs

- There are zero bridge Hot Spots within the I-10/SR 85 Corridor
- 7 of the 14 segments within the I-10/SR 85 Corridor exhibit Bridge needs
- Only 1 bridge has a current rating of multiple 5's.
- 7 bridges have current deck ratings of 5.
- 3 bridges indicate as Functionally Obsolete in the I-10/SR 85 Corridor
- Only 1 bridge, Tom Wells Rd TI UP at MP 5.84, has potential repetitive investment issues which may be a candidate for life-cycle cost analysis to evaluate alternative solutions.

Mobility Needs

- Future (2035) travel demand is anticipated to exceed capacity on approximately 13% of corridor, generally in Buckeye near the I-10/SR 85 Junction, and in Gila Bend.
- A higher than average number of closures, primarily due to accidents and or incidents, occurs on SR 85 from MP 155-149 possibly due to the I-10/SR 85 System Interchange.
- The PTI in Westbound Segment 10-1 exhibits high levels of need due to the California border and Port of Entry. Additionally PTI levels in Northbound Segments 85-13 and 85-14 exhibit high levels of need possibly due to construction activity over the timeframe in which data was collected, and Segment 85-13 serving as Main Street for Gila Bend.

Safety Needs

- Safety Needs were identified in ten of fourteen segments, 130 miles (86%) of the corridor.
- The highest levels of need have been identified from MP 32 to 98 on the I-10 portion of the Corridor and from MP 155-149 on the SR 85 portion of the Corridor.
- More than half of the crashes involve single vehicle, which may indicate events due to excessive speed.
- Elevated numbers of rear-end crashes in Segment Northbound 85-9 due to large trucks slowly merging on to I-10 at the Junction.
- Segments 85-10 through 85-14 have too small of a sample to present accurate data.

Freight Needs

- The highest level of need was identified on SR 85 from MP 155 to 149 due to the I-10 and SR 85 System Interchange, and B 8 MP 120-118 and 120-123 possibly due to construction. MP 0-16 on I-10 exhibits a medium level of need, due to the Ehrenberg Port of Entry.
- 100% of closures were related to incidents/accidents along the Corridor.
- There are two Bridge Clearance Hot Spots in the Corridor, Ramsey Mine Rd UP located at MP 33.78 and 355th Ave UP located at MP 101.4.

Overlapping Needs

This section identifies overlapping performance needs on the I-10/SR 85 Corridor, which provides guidance to develop strategic solutions that address more than one performance are with elevated levels of need. Completing projects that address multiple needs presents the opportunity to more effectively improve overall performance. A summary of the overlapping needs that relate to locations with elevated levels of need is provided below:

- Segment 10-1 has overlapping needs in all five performance areas. Pavement needs are impacted by failure hot spots at MP 9-11, MP 13, and MP 15. Bridge needs are impacted by the Tom Wells Rd TI UP at MP 5.84 being identified for historical review. Additionally, the Ehrenberg Bridge at MP 1.01 and Poston Rd TI UP at MP 0.62 both have ratings of 5. Mobility and Freight in Segment 10-1 are impacted by the high PTI values due to Ehrenberg POE at the Arizona/California border. Safety needs are impacted by a high percentage of fatal and incapacitating injury crashes involving SHSP top 5 Emphasis Areas Behaviors.
- Segment 10-2 has overlapping needs in Bridge, Safety, and Freight. Bridge needs are impacted by the structural rating of the West Quartzsite TI UP Bridge at MP 17.50 and the SR 95 UP at MP 18.89. Safety needs are impacted by the Safety Index and the WB Directional Safety Index. Freight is impacted by the West Quartzsite Pedestrian Overpass having low clearance, though it does have a ramp-around option for oversize mainline traffic to avoid the bridge.

- Segment 10-3 has overlapping needs in Safety and Freight. Safety needs are impacted by Safety Hot Spots at Westbound MP 25 and MP 29. Additionally, Safety needs are impacted by a high percentage of Fatal and Incapacitating Injury Crashes in the segment. Freight needs are impacted by the Brenda TI UP at MP 31.17 which does not have a ramp to allow oversize mainline traffic to avoid bridge.
- Segment 10-4 has overlapping needs in Pavement, Bridge, Safety, and Freight. Pavement needs are impacted by Failure Hot Spots at EB Mileposts 36-37, 38-45, and 47-48, and WB Mileposts 41-42, 47-48, and 51-52. Bridge needs are impacted by the structural rating of Vicksburg Road TI UP located at MP 45.34. Safety needs are impacted by Directional Safety Index and a high percentage of Fatal and Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors. Safety Hot Spots are located at WB MP 49 and EB Mileposts 35, 37, and 42. Freight needs are impacted by the Ramsey Mine Rd UP at MP 33.78, which is a Truck Height Restriction Hot Spot. Additionally, Freight needs are impacted by the high levels of Closure Duration in the EB direction.
- Segment 10-5 has overlapping needs in Safety and Freight. Safety needs are impacted by Safety Index, Directional Safety Index, and a high percentage of Fatal and Incapacitating Injury Crashes Involving Trucks. Safety Hot spots are located at EB Mileposts 61-62. Freight needs are impacted by roadway closures due to incidents or accidents, and low bridge clearance.
- Segment 10-6 has overlapping needs in Pavement, Mobility, Safety, and Freight. Pavement needs are impacted by Directional PSR and Failure Hot Spots which are located at EB Mileposts 77-79 and WB Mileposts 71-73. Mobility needs are impacted by a low level of closure frequency in the EB direction. Safety needs are impacted by the Safety Index, EB

  Directional Safety Index, a high percentage of Fatal and Incapacitating Injury Crashes involving SHSP Top 5 Emphasis Areas Behaviors, and a high percentage of Fatal and Incapacitating Injury Crashes Involving Trucks. Safety Hot Spots are located at WB Mileposts 70-74.Freight needs are impacted by medium and low levels of Closure Duration due to incidents or accidents, and low bridge clearance.
- Segment 10-7 has overlapping needs in Mobility, Safety, and Freight. Mobility needs are impacted by Closure frequency in the WB direction. Safety needs are impacted by the Safety Index, Directional Safety Index, and a high percentage of Fatal and Incapacitating Injury Crashes Involving Trucks. Safety Hot Spots are located at EB Mileposts 82 and 86-88. Freight needs are impacted by elevated levels of Closure Duration in the WB direction and Bridge Clearance.
- Segment 10-8 has overlapping needs in Bridge, Mobility, Safety, and Freight. Bridge needs are impacted by the structural rating of Oglesby Road Ramp Bridge UP located at MP 112.75. Mobility needs are impacted elevated levels of Future Daily V/C. Safety needs are impacted by the Safety Index, EB Directional Safety Index, a high percentage of Fatal and Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors, and a high percentage of Fatal and Incapacitating Injury Crashes Involving Trucks. Safety Hot Spots are located at EB Mileposts 107 and 109-112, and WB Mileposts 111-112. Freight needs are impacted by elevated levels of Closure Duration in the WB direction, and a Truck Height Restriction Hot Spot at the 355th Ave UP, located at MP 101.4.
- Segment 85-9 has overlapping needs in Mobility, Safety, and Freight. Mobility needs are impacted by elevated Closure Frequencies in the SB direction, elevated PTI in the SB direction, and an at-grade railroad crossing at MP 151 causing delays. Freight needs are impacted by elevated Freight Index, elevated Directional PTI, and elevated Closure Duration in the SB direction.
- Segment 85-10 has overlapping needs in Pavement, Mobility, Safety, and Freight. Pavement needs are impacted by Failure Hot Spots located at NB Mileposts 143-146. Mobility Needs are impacted by elevated PTI in the NB direction. Safety needs are impacted by SB Safety Index. Freight needs are impacted by Freight Index, elevated PTI in the NB direction, and elevated Closure Duration in the NB direction.
- Segment 85-11 has overlapping needs in Mobility and Freight. Mobility needs are impacted by elevated PTI in the SB Direction. Freight needs are impacted by Freight Index and elevated PTI in the SB direction.
- Segment 85-12 has overlapping needs in Bridge and Mobility. Bridge needs are impacted by the structural evaluation of Gillespie Canal Bridge at MP 120.25. Mobility needs are impacted by Mobility Index due to Current and Future V/C, and high level of need in Bicycle Accommodation due to shoulder widths.
- Segment 85-13 has overlapping needs in Mobility and Freight. Mobility needs are impacted by elevated scores due to Current and Future V/C, elevated TTI and PTI scores, and Bicycle Accommodation showing a higher level of need due to shoulder widths.

Table ES-3: Summary of Needs by Segment

Performance Area	Segment Number and Mileposts (MP)													
	10W-1	10W-2	10W-3	10W-4	10W-5	10W-6	10W-7	10W-8	85-9	85-10	85-11	85-12	85-13	85-14
	MP 0-16	MP 16-22	MP 22-32	MP 32-54	MP 54-71	MP 71-82	MP 82-98	MP 98-113	MP 155-149	MP 149-139	MP 138-123	MP 123-120	MP 120-118	MP 120-123
Pavement	Low	None*	None*	Low	None*	Low	None*	None*	None*	Low	None*	None*	None*	None*
Bridge	Medium	Low	Low	Low	None*	None*	None*	Low	None*	None*	None*	Medium	Medium	None*
Mobility+	Low	None*	None*	None*	None*	Low	Low	Low	Low	Low	Low	High	Low	High
Safety+	Low	Low	Medium	High	High	High	High	Low	High	Low	None*	N/A	N/A	N/A
Freight+	Medium	Low	Low	Low	Low	Low	Low	Low	High	Low	Medium	None*	High	High
Average Need (0-3)	**1.38**	**0.62**	**0.85**	**1.23**	**0.92**	**1.31**	**1.15**	**0.85**	**1.62**	**0.85**	**0.69**	**1.30**	**1.60**	**1.80**

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

+ Identified as an emphasis area for the I-10/SR 85 Corridor.

STRATEGIC SOLUTIONS

The principal objective of the CPS is to identify strategic solutions (investments) that are performance-based to ensure that available funding resources are used to maximize the performance of the State's key transportation corridors. One of the first steps in the development of strategic solutions is to identify areas of elevated levels of need as addressing these needs will have the greatest effect on corridor performance. Segments with Medium or High needs and specific locations of hot spots are considered strategic investment areas for which strategic solutions should be developed. Segments with lower levels of need or without identified hot spots are not considered candidates for strategic investment and are expected to be addressed through other ADOT programming processes.

The I-10/SR 85 strategic investment areas (resulting from the elevated needs) are shown in **Figure ES-6**.

Screening Process

In some cases, needs that are identified do not advance to solutions development and are screened out from further consideration because they have been or will be addressed through other measures including:

- A project has is programmed to address this need.
- The need is a result of a Pavement or Bridge hot spot that does not show historical investment issues. These hot spots will likely be addressed through other ADOT programming means.
- A bridge is not a hot spot but is located within a segment with a Medium or High level of need. This bridge will likely be addressed through current ADOT bridge maintenance and preservation programming processes.
- The need is determined to be non-actionable (i.e., cannot be addressed through an ADOT project).
- The conditions/characteristics of the location have changed since the performance data was collected that was used to identify the need.

Candidate Solutions

For each elevated need within a strategic investment area that is not screened out, a candidate solution is developed to address the identified need. Each candidate solution is assigned to one of the following three P2P investment categories based on the scope of the solution:

- Preservation
- Modernization
- Expansion

Documented performance needs serve as the foundation for developing candidate solutions for corridor preservation, modernization, and expansion. Candidate solutions are not intended to be a substitute or replacement for traditional ADOT project development processes where various ADOT technical groups and districts develop candidate projects for consideration in the performance-based programming in the P2P process. Rather, these candidate solutions are intended to complement ADOT's traditional project development processes through a performance-based process to address needs in one or more of the five performance areas of Pavement, Bridge, Mobility, Safety, and Freight. Candidate solutions developed for the I-10/SR 85 Corridor will be considered along with other candidate projects in the ADOT statewide programming process.

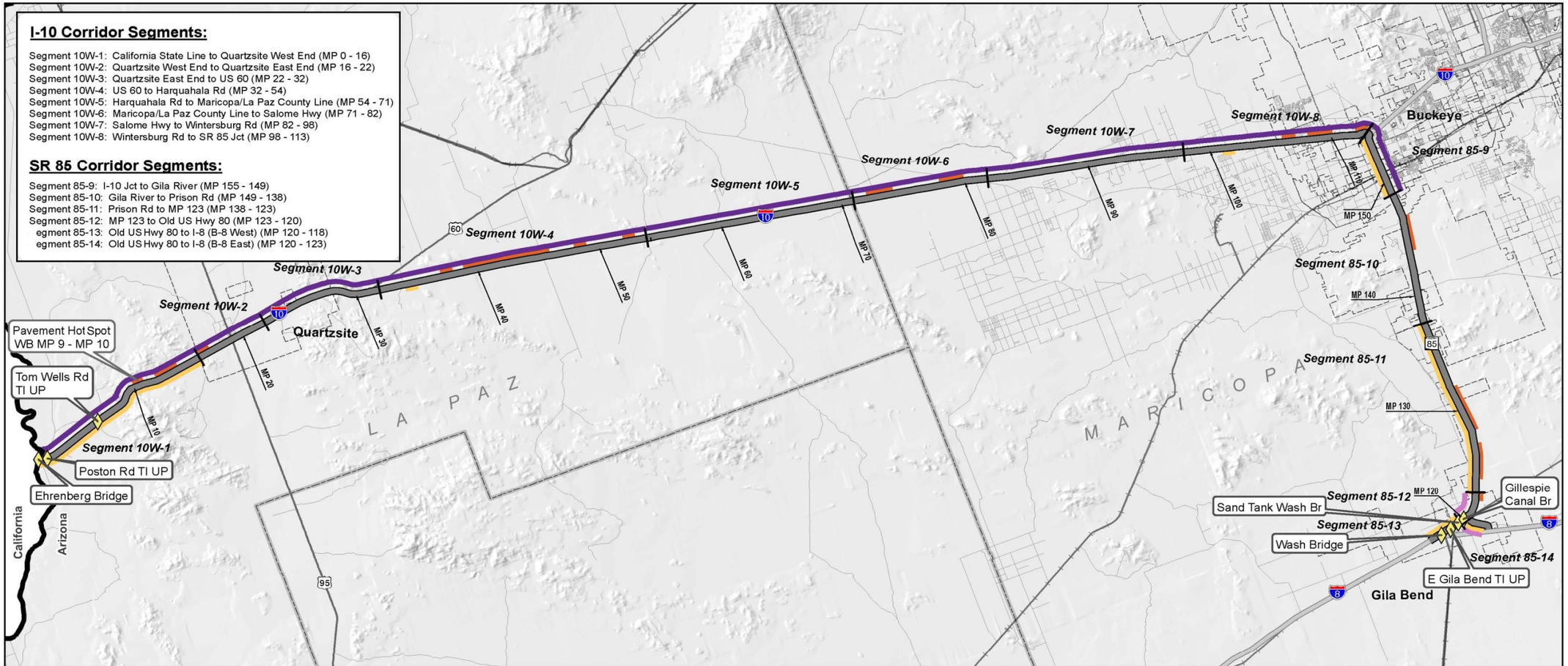
Candidate solutions include some or all of the following characteristics:

- Do not recreate or replace results from normal programming processes
- May include programs or initiatives, areas for further study, and infrastructure projects
- Address elevated levels of need (High or Medium) and hot spots
- Focus on investments in modernization projects (to optimize current infrastructure)
- Address overlapping needs
- Reduce costly repetitive maintenance
- Extend operational life of system and delay expansion
- Leverage programmed projects that can be expanded to address other strategic elements
- Provide measurable benefit

Candidate solutions developed to address an elevated need in the Pavement or Bridge performance areas include two options; rehabilitation or full replacement. These solutions are initially evaluated through a Life-Cycle Cost Analysis (LCCA) to provide insights into the cost-effectiveness of these options so a recommended approach can be identified. Candidate solutions developed to address an elevated need in the Mobility, Safety, or Freight performance areas are advanced directly to the Performance Effectiveness Evaluation. In some cases, there may be multiple solutions identified to address the same area of need.

Candidate solutions that are recommended to expand or modify the scope of an already programmed project are noted and are not advanced to solution evaluation and prioritization. These solutions are directly recommended for programming.

Figure ES-6: Strategic Investment Areas



Performance Area	10W-1	10W-2	10W-3	10W-4	10W-5	10W-6	10W-7	10W-8	85-9	85-10	85-11	85-12	85-13	85-14
Pavement	Hot Spots	-	-	Hot Spots	-	Hot Spots	-	Hot Spots	-	Hot Spots	Hot Spots	Hot Spots	-	-
Bridge	Medium	-	-	-	-	-	-	-	-	-	-	Medium	Medium	-
Mobility*	-	-	-	-	-	-	-	-	-	-	-	High	-	High
Safety*	-	-	Medium	High	High	High	High	Hot Spots	High	-	-	N/A	N/A	N/A
Freight*	Medium	-	-	Hot Spots	-	-	-	Hot Spots	High	-	Medium	-	High	High

Notes: Figure shows strategic investment areas, which are segments with Medium and High levels of need and locations of hot spots.
A "-" symbol indicates a segment level of need of Low or None, which is not considered strategic.
* Identified as emphasis area for I-10/SR 85 Corridor

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Strategic Investment Areas

N
MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

Performance Area Needs
Pavement
Mobility
Safety
Freight
Bridge

Level of Need
Low
Medium
High

SOLUTION EVALUATION AND PRIORITIZATION

Candidate Solutions were evaluated in multiple steps including a LCCA (where applicable), Performance Effectiveness Evaluation, Solution Risk Analysis, and Candidate Solution Prioritization. The methodology and approach to this evaluation is shown in **Figure ES-7** and described more fully below.

Life-Cycle Cost Analysis

All pavement and bridge candidate solutions have multiple options, rehabilitate the area of need, or fully reconstruct the issue area or structure. These options will be evaluated through a LCCA to determine the best approach for each location where a pavement or bridge solution is recommended. The LCCA could eliminate options from further consideration and will identify which options should be carried forward for further evaluation.

All Mobility, Safety, and Freight strategic investment areas that result in multiple independent candidate solutions are advanced directly to the Performance Effectiveness Evaluation.

Performance Effectiveness Evaluation

After the LCCA process are complete, all remaining candidate solutions are evaluated based on their performance effectiveness. This process includes determining a performance effectiveness score (PES) based on how much each solution impacts the existing performance and needs scores for each segment. This evaluation also includes a Performance Area Risk Evaluation to help differentiate between similar solutions based on factors that are not directly addressed in the performance system.

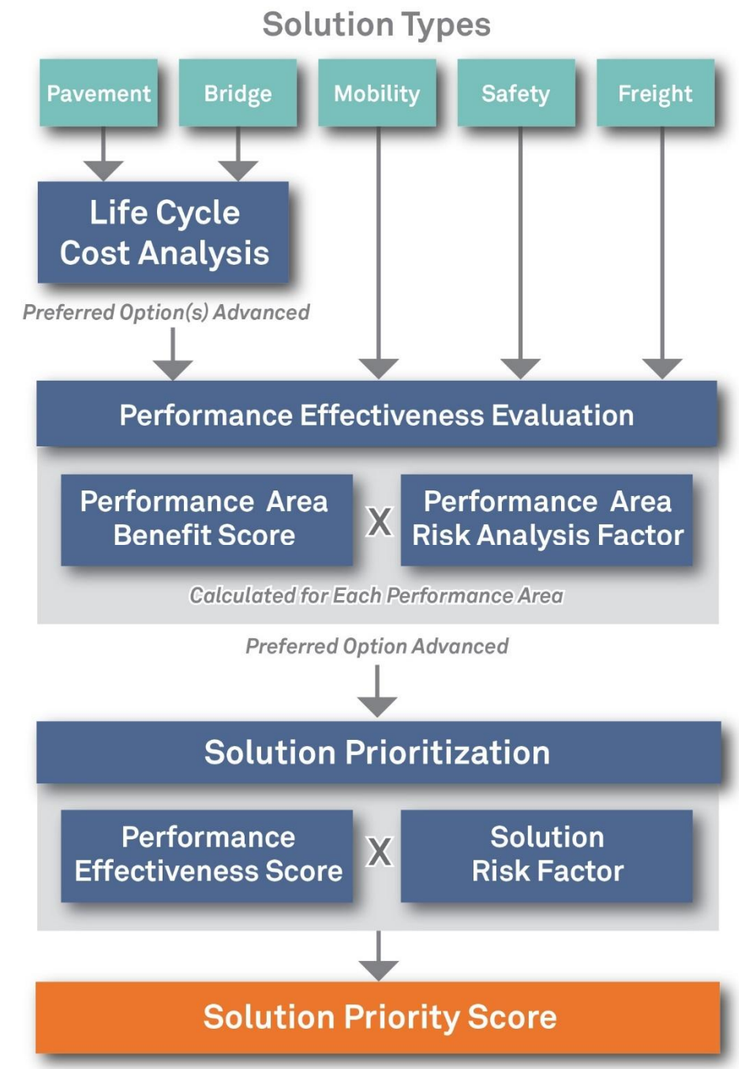
Risk Analysis

All candidate solutions advanced through the Performance Effectiveness Evaluation are also evaluated through a Risk Analysis process. The risk analysis is conducted to develop a risk weighting factor. This risk analysis is a numeric scoring system to help address the risk of not implementing a solution based on the likelihood and severity of the performance failure.

Candidate Solution Prioritization

The PES and risk factor are combined to create a prioritization score. The candidate solutions are sorted by prioritization score from highest to lowest. The highest prioritization score indicates the candidate solution that is recommended as the highest priority. Solutions that address multiple performance areas tend to score higher in this process.

Figure ES-7: Candidate Solution Evaluation Process



SUMMARY OF CORRIDOR RECOMMENDATIONS

Prioritized Candidate Solution Recommendations

Table ES-4 and **Figure ES-8** show the prioritized candidate solutions recommended for the I-10/SR 85 Corridor. Implementation of these solutions is anticipated to improve performance of the I-10/SR 85 Corridor, primarily in the Mobility, Safety, and Freight performance areas. The highest priority solutions address needs in the Gila Bend and Buckeye areas.

Other Corridor Recommendations

As part of the investigation of strategic investment areas and candidate solutions, other corridor recommendations can also be identified. These recommendations could include modifications to the existing Statewide Construction Program, areas for further study, or other corridor specific recommendations that are not related to construction or policy. The list below identifies other corridor recommendations for the I-10/SR 85 corridor:

- When recommending future projects along the I-10/SR 85 corridor, review historical ratings and levels of investment. According to data used for this study, the following pavement and bridge locations have exhibited high historical investment (pavement) or rating fluctuation (bridge) issues:
    - Pavement: MP 0-16
    - Pavement: MP 54-71
    - Bridge: Tom Wells Rd TI (MP 5.84)

Policy and Initiative Recommendations

In addition to location-specific needs, general corridor and system-wide needs have also been identified through the CPS process. While these needs are more overarching and cannot be individually evaluated through the CPS process, it is important to document them. A list of recommended policies and initiatives was developed for consideration when programming future projects not only on I-10/SR 85, but across the entire state highway system where conditions are applicable. The following list, which is in no particular order of priority, was derived from the Round 1, Round 2, and Round 3 CPS:

- Install Intelligent Transportation System (ITS) conduit with all new infrastructure projects
- Prepare strategic plans for Closed Circuit Television (CCTV) camera and Road Weather Information System (RWIS) locations statewide
- Leverage power and communication at existing weigh-in-motion (WIM), dynamic messaging signs (DMS), and call box locations to expand ITS applications across the state
- Consider solar power for lighting and ITS where applicable
- Investigate ice formation prediction technology where applicable
- Conduct highway safety manual evaluation for all future programmed projects
- Develop infrastructure maintenance and preservation plans (including schedule and funding) for all pavement and bridge infrastructure replacement or expansion projects
- Develop standardized bridge maintenance procedures so districts can do routine maintenance work
- Review historical ratings and level of previous investment during scoping of pavement and bridge projects; in pavement locations that warrant further investigation, conduct subsurface investigations during project scoping to determine if full replacement is warranted
- For pavement rehabilitation projects, enhance the amount/level of geotechnical investigations to address issues specific to the varying conditions along the project
- Expand programmed and future pavement projects as necessary to include shoulders
- Expand median cable barrier guidelines to account for safety performance
- Install CCTV cameras with all DMS
- In locations with limited communications, use CCTV cameras to provide still images rather than streaming video
- Develop statewide program for pavement replacement
- Install additional continuous permanent count stations along strategic corridors to enhance traffic count data
- When reconstruction or rehabilitation activities will affect existing bridge vertical clearance, the dimension of the new bridge vertical clearance should be a minimum of 16.25 feet where feasible
- All new or reconstructed roadway/shoulder edges adjacent to an unpaved surface should be constructed with a Safety Edge
- Collision data on tribal lands may be incomplete or inconsistent; additional coordination for data on tribal lands is recommended to ensure adequate reflection of safety issues
- Expand data collection devices statewide to measure freight delay
- Evaluate and accommodate potential changes in freight and goods movement trends that may result from improvements and expansions to the state roadway network

Next Steps

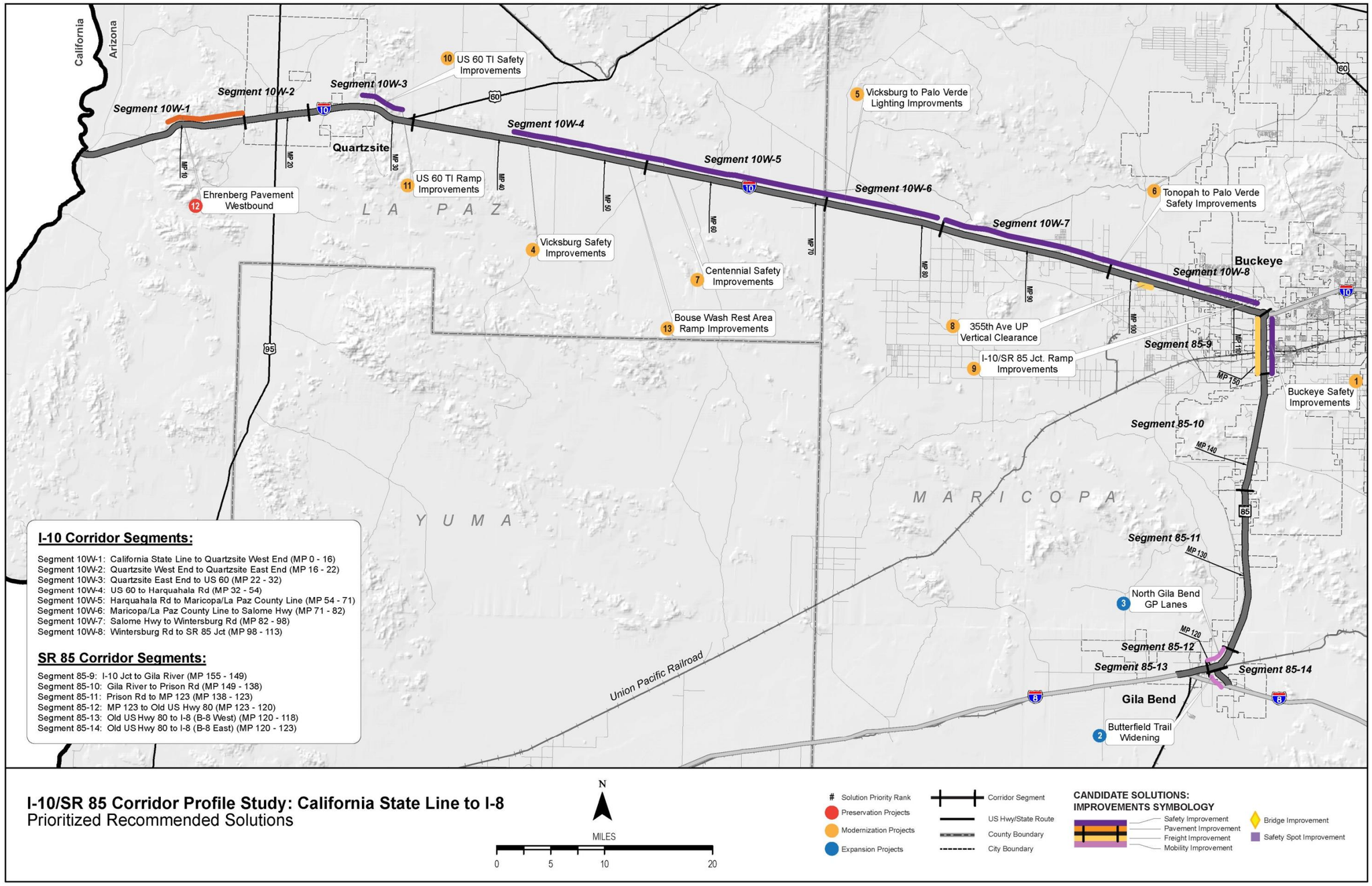
Candidate solutions developed for the I-10/SR 85 corridor will be considered along with other candidate projects in the ADOT statewide programming process. It is important to note that the candidate solutions are intended to represent strategic solutions to address existing performance needs related to the Pavement, Bridge, Mobility, Safety, and Freight performance areas. Therefore, the strategic solutions are not intended to preclude recomme3ndations related to the ultimate vision for the corridor that may have been defined in the context of prior planning studies and/or design concept reports. Recommendations from such studies are still relevant to addressing the ultimate corridor objectives.

Upon completion of all three CPS rounds, the results will be incorporated into a summary document comparing all corridors that is expected to provide a performance-based review of statewide needs and candidate solutions.

Table ES-4: Prioritized Solution List

Priority Rank	Candidate Solution #	Candidate Solution Name	Scope	Estimated Cost (in millions)	Investment Category [P] Preservation [M] Modernization [E] Expansion	Prioritization Score
1	85.12A	Buckeye Safety	Install chevrons on the I-10/SR 85 interchange ramps. Install intersection warning beacons on SR 85 at the intersection approaches for Broadway, Southern, and Baseline Roads. Install larger stop signs with flashing beacons along Broadway, Southern, and Baseline Roads (both directions) at approaches to SR 85 intersection. Project will include the construction of acceleration and decelerations lanes for cross traffic merging at Broadway and Southern Roads.	$2.13	M	**164**
2	85.14A	Butterfield Trail Widening	Construct new general purpose lanes and a center left turn lane along Butterfield Trail between MP 120 (Jct. I-8) and MP 123 (Jct. SR 85). Project will convert existing 2 lane undivided facility to a 5 lane undivided facility including shoulder rehabilitation.	$11.75	E	**158**
3	85.13	N. Gila Bend GP Lanes	Construct 2 Southbound general purpose lanes west of the existing alignment to create a 4-lane divided highway between MP 123 and Maricopa Road. The existing alignment will become 2 Northbound general purpose lanes. As part of this project, access to the airport on the east side of SR 85 will need to be reconfigured.	$30.07	E	**65**
4	10W.5	Vicksburg Safety	Rehabilitate the outside shoulder including mill and replace pavement, rumble strips, raised pavement markers, and necessary striping from MP 32 to 50 in both EB and WB directions. Project will also include the installation of CCTV cameras at the existing EB and WB DMS at MP 49.4.	$10.25	M	**49**
5	10W.8	Vicksburg to Palo Verde Lighting	Install lighting at EB and WB interchange merge points at MP 54, 69, 81, 98, 103 to improve visibility.	$2.49	M	**34**
6	10W.9	Tonopah to Palo Verde Safety	Widen the outside shoulder including mill and replace pavement, rumble strips, raised pavement markers, and necessary striping from MP 82 to 112 in both EB and WB directions. Project will include the installation of dynamic speed feedback signs at EB MP 85 and WB MP 110. In addition a CCTV camera will be installed at the existing DMS at MP 110.	$38.36	M	**26**
7	10W.7	Centennial Safety	Widen the outside shoulder including mill and replace, rumble strips, raised pavement markers, and necessary striping from MP 54 to 71 in both EB and WB directions. Project will include the installation of dynamic weather warning beacons at MP 66, 68, 70, 76, 78, and 80 as well as RWIS at MP 70 and 77.	$23.42	M	**19**
8	10W.10	355th Ave Vertical Clearance	Re-profile mainline I-10 to increase vertical clearance under the 355th Avenue overpass.	$0.48	M	**14**
9	10W.11	I-10/SR 85 Jct. Ramps	Modify existing EB/WB entry and exit ramps to a parallel configuration.	$4.43	M	**7**
10	10W.3	US 60 Interchange Safety	Improve skid resistance of pavement between MP 27 and 31 in both EB and WB directions. Project will include the installation of chevrons throughout the curve between MP 28 and 29.5 in both directions as well as dynamic speed feedback signs at the approaches to the curve (EB MP 27 and WB MP 31).	$13.73	M	**7**
11	10W.4	US 60 TI Ramp	Modify existing EB/WB entry and exit ramps to a parallel configuration.	$4.43	M	**4**
12	10W.1	Ehrenberg Pavement WB	Replace pavement between MP 9 and 16 in the WB direction. Project to include pavement, over excavation, striping, delineators, raised pavement markers, and rumble strips.	$25.15	P	**4**
13	10W.6	Bouse Wash Rest Area Ramps	Modify existing EB/WB entry and exit ramps to a parallel configuration	$4.43	M	**2**

Figure ES-8: Prioritized Recommended Solutions



1.0 INTRODUCTION

The Arizona Department of Transportation (ADOT) is the lead agency for this Corridor Profile Study (CPS) of Interstate 10 (I-10)/State Route 85 (SR 85) between the California State Line and Interstate 8 (I-8). The study examines key performance measures relative to the I-10/SR 85 Corridor, and the results of this performance evaluation are used to identify potential strategic improvements. The intent of the corridor profile program, and of ADOT's Planning-to-Programming (P2P) process, is to conduct performance-based planning to identify areas of need and make the most efficient use of available funding to provide an efficient transportation network.

ADOT is conducting eleven CPS within three separate groupings.

The eleven corridors are being evaluated within three separate groups.

The first three studies (**Round 1**) began in Spring 2014, and encompass:

- I-17: SR 101L to I-40
- I-19: Nogales to Junction I-10
- I-40: California State Line to I-17

The second round (**Round 2**) of studies, initiated in Spring 2015, include:

- I-8: California State Line to I-10
- I-40: I-17 to New Mexico State Line
- SR 95: I-8 to I-40

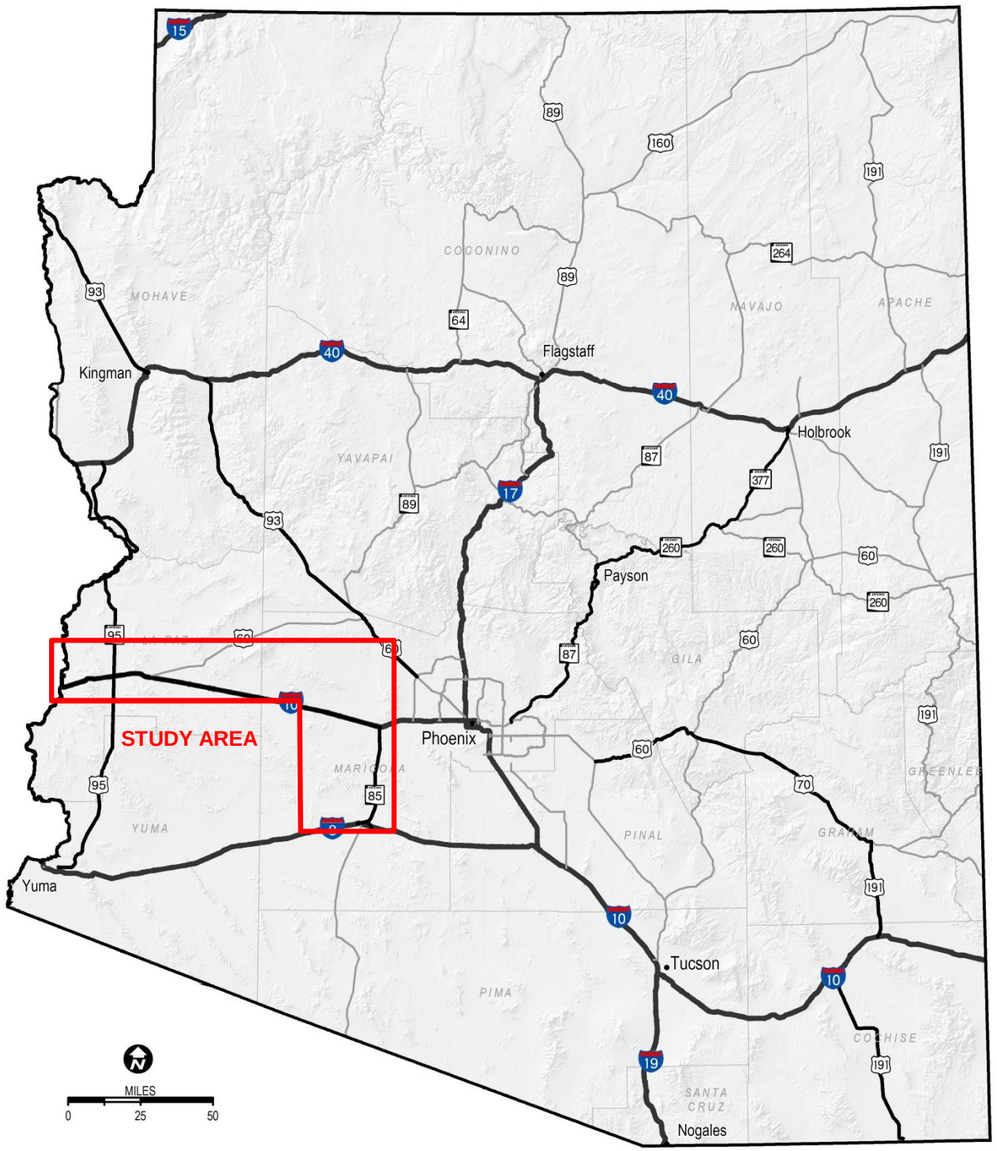
The third round (**Round 3**) of studies, initiated in Fall 2015, include:

- I-10: California State Line to SR 85 and SR 85: I-10 to I-8
- I-10: SR 202L to New Mexico State Line
- SR 87/SR 260/SR 377: SR 202L to I-40
- US 60/US 70: SR 79 to US 191 and US 191: US 70 to SR 80
- US 93/US 60: Nevada State Line to SR 303L

The studies under this program assess the overall health, or performance, of the state's strategic highways. The CPS will identify candidate solutions for consideration in the Multimodal Planning Division's (MPD) P2P project prioritization process, providing information to guide corridor-specific project selection and programming decisions.

The I-10/SR 85corridor, depicted in **Figure 1,** is one of the strategic statewide corridors identified and the subject of this Round 3 CPS.

Figure 1: Corridor Study Area



1.1 Corridor Study Purpose

The purpose of the CPS is to measure corridor performance to inform the development of strategic solutions that are cost-effective and account for potential risks. This purpose can be accomplished by following the process described below:

- Inventory past improvement recommendations
- Define corridor goals and objectives
- Assess existing performance based on quantifiable performance measures
- Propose various solutions to improve corridor performance
- Identify specific solutions that can provide quantifiable benefits relative to the performance measures
- Prioritize solutions for future implementation

1.2 Study Goals and Objectives

The objective of this study is to identify a recommended set of prioritized potential solutions for consideration in future construction programs, derived from a transparent, defensible, logical, and replicable process. The I-10/SR 85 CPS defines solutions and improvements for the corridor that are evaluated and ranked to determine which investments offer the greatest benefit to the corridor in terms of enhancing performance. Corridor benefits can be categorized by the following three investment types:

- Preservation: Activities that protect transportation infrastructure by sustaining asset condition or extending asset service life
- Modernization: Highway improvements that upgrade efficiency, functionality, and safety without adding capacity
- Expansion: Improvements that add transportation capacity through the addition of new facilities and/or services

This study identifies potential actions to improve the performance of the I-10/SR 85 Corridor. Proposed actions are compared based on their likelihood of achieving desired performance levels, life-cycle costs, and cost effectiveness to produce a prioritized list of solutions that help achieve corridor goals.

The following goals are identified as the desired outcome of this study:

- Link project decision-making and investments on key corridors to strategic goals
- Develop solutions that address identified corridor needs based on measured performance
- Prioritize improvements that cost-effectively preserve, modernize, and expand transportation infrastructure

1.3 Corridor Overview and Location

The I-10/SR 85 corridor provides an important connection from Southern California to economic and recreational opportunities in Central Arizona and other destinations to the east. I-10 is a four-lane divided freeway from the California border to SR 85, while SR 85 is generally a four-lane divided highway between I-10 and I-8, except in Gila Bend. Together, I-10 and SR 85 provide a passage from Southern California to Tucson while bypassing the Metropolitan Phoenix Area.

Plans have been made to upgrade SR 85 to a freeway facility between I-10 and I-8, which will greatly increase accessibility for both freight and tourism travel. I-10 between California and SR 85 is part of a direct connection between Phoenix and Los Angeles. Similarly, SR 85 between I-10 and I-8 is both a bypass route for freight traffic wishing to avoid the Phoenix Area and a major corridor in the linkage between Phoenix and San Diego. Therefore, the entire corridor is considered an important connection for both freight and tourism travel in the state.

The I-10/SR 85 corridor extends from the California State Line (milepost [MP] 0) to SR 85 (MP 113) and from I-10 (MP 155) to I-8 (MP 118) on SR 85, which is approximately 150 miles**.** The corridor is located in two ADOT Districts (Southwest and Central), two planning areas (Western Arizona Council of Governments [WACOG] and Maricopa Association of Governments [MAG]), and two counties (La Paz and Maricopa).

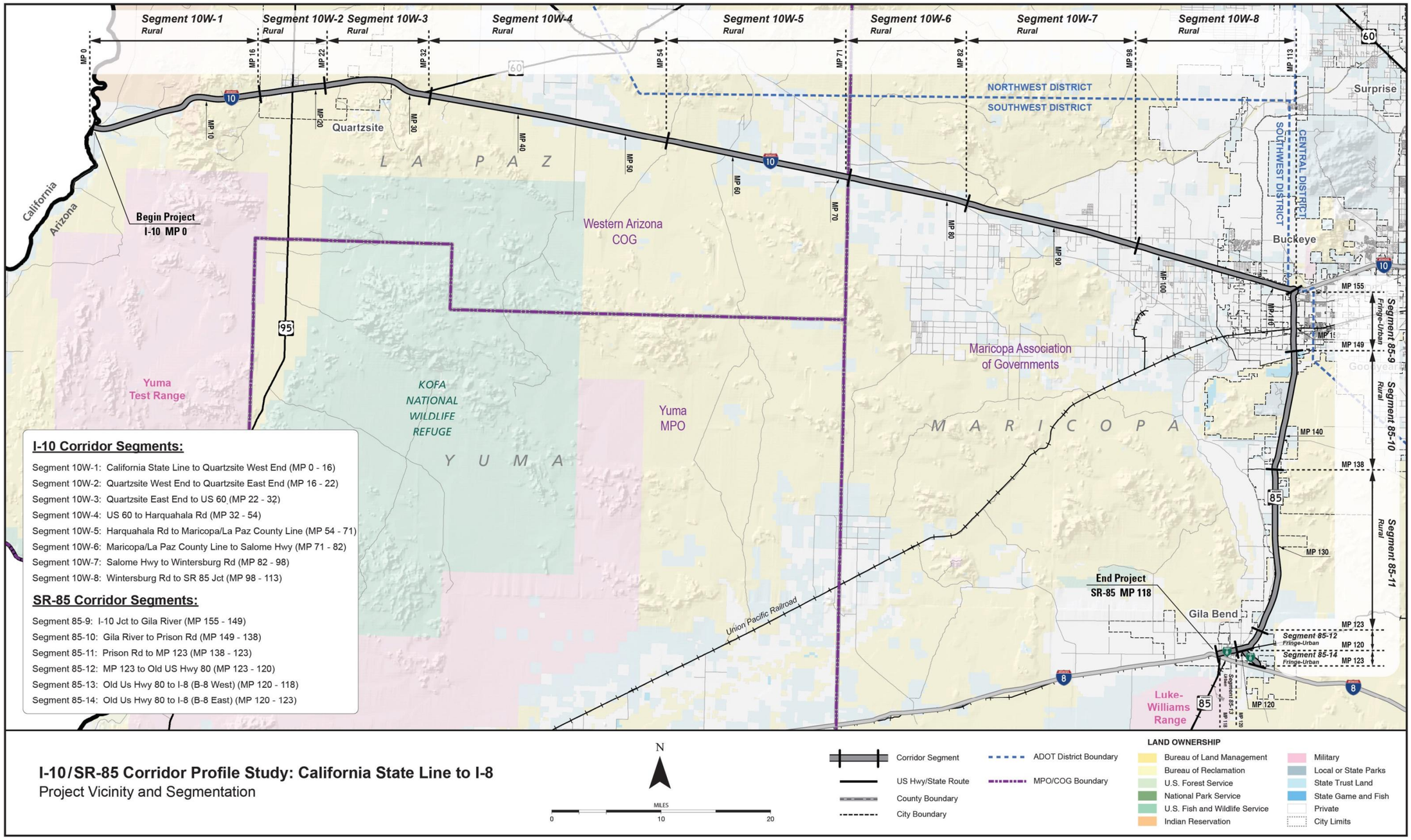
1.4 Corridor Segments

The I-10/SR 85 Corridor is divided into 14 planning segments to allow for an appropriate level of detailed needs analysis, performance evaluation, and comparison between different segments of the corridor. The corridor is segmented at logical breaks where the context changes due to differences in characteristics such as terrain, daily traffic volumes, or roadway typical section. Corridor segments are described in **Table 1** and shown in **Figure 2**.

Table 1: I-10/SR 85 Corridor Segments

Segment #	Route	Begin	End	Approx Begin Milepost	Approx End Milepost	Approx Length (miles)	Typical Through Lanes (NB/EB, SB/WB)	2014 Average Annual Daily Traffic Volume (vpd)	Character Description
10W-1	I-10	California State Line	West Quartzsite	0	16	16	2 EB, 2 WB	16,000 - 20,000	This segment includes the Ehrenberg Port of Entry at milepost 3.8 which is a required checkpoint for commercial traffic entering Arizona. It is a four-lane divided section that has been classified as a rural operating environment.
10W-2	I-10	West Quartzsite	East Quartzsite	16	22	6	2 EB, 2 WB	16,000 - 21,600	This segment passes through Quartzsite and includes the I-10/SR 95 junction. It is six miles long and sustains consistent traffic volumes on a four-lane section.
10W-3	I-10	East Quartzsite	Jct US 60	22	32	10	2 EB, 2 WB	18,500 - 21,600	This segment is 10 miles long between the eastern border of Quartzite and the I-10/US 60 junction. It has been classified as a rural.
10W-4	I-10	Junction US 60	Harquehala Rd	32	54	22	2 EB, 2 WB	20,400 - 21,500	This segment is 22 miles long between the US 60 junction and Harquehala Road. It is a four-lane section that has been classified as a rural environment.
10W-5	I-10	Harquehala Rd	La Paz/ Maricopa County Border	54	71	17	2 EB, 2 WB	19,100 - 21,500	This segment runs from Eastern La Paz County to the Maricopa County border. It is 17 miles long and has been classified as a rural environment.
10W-6	I-10	La Paz/ Maricopa County Border	Salome Rd	71	82	11	2 EB, 2 WB	19,100 - 20,500	This segment is 11 miles long, includes two general purpose lanes in each direction, and has been classified as a rural environment.
10W-7	I-10	Salome Rd	Wintersburg Rd	82	98	16	2 EB, 2 WB	20,500 - 25,500	This segment includes the Town of Tonopah. It is a four-lane section where traffic volumes begin to increase towards the east.
10W-8	I-10	Wintersburg Rd	I-10/SR 85 Interchange	98	I-10 113, SR 85 155	15	2 EB, 2 WB	25,500 - 32,200	This segment is 15 miles long and includes the portion of I-10 that serves as a principal evacuation route for the Palo Verde Nuclear Generating Station, which is located six miles south of I-10. It is a four-lane section, and it has been classified as a rural environment.
85-9	SR 85	I-10/SR 85 Interchange	Gila River (MP 149)	I-10 113, SR 85 155	149	6	2 EB, 2 WB	15,100 - 13,700	This segment is a 4-lane section that connects I-10 south to the Gila River. It passes through the western portion on the Town of Buckeye and has been classified as a fringe urban operating environment.
85-10	SR 85	Gila River (MP 149)	Patterson Rd/ Prison Access	149	138	11	2 NB, 2 SB	15,100 - 8,900	This segment is 11 miles long and is a four-lane divided section. The southern limit provides direct access to the Arizona State Prison complex.
85-11	SR 85	Patterson Rd/ Prison Access	Gila Bend Limits	138	123	15	2 NB, 2 SB	8,900 - 10,600	This segment starts at the southern limits of Buckeye and ends at approximately the northern limits of Gila Bend. It is a 4-lane divided section and has been classified as a rural environment.
85-12	SR 85	Gila Bend Limits	Jct B-8	123	120	3	2 NB, 2 SB	10,600 - 12,000	This segment transitions to one lane in each direction on a non-divided section. The speed limit drops entering into Gila Bend and this segment has been classified as fringe urban.
85-13	SR 85	Jct B-8	Jct I-8 WB	120	118	2	2 EB, 2 WB, 1 LT	9,300 – 11,500	This segment starts at SR 85 and transitions onto B-8 through Gila Bend. It is a five-lane arterial section with a dedicated left-turn lane. This segment provides direct access to commercial businesses within Gila Bend and acts as an arterial roadway.
85-14	SR 85	Jct B-8	Jct I-8 EB	SR 85 120	123	3	1 NB, 1 SB	12,000 – 12,100	This segment starts at SR 85 and transitions onto S Butterfield Trail. It is a two lane non-divided section that provides access to I-8 without going through Gila Bend. Various commercial businesses have direct access to this segment as well.

Figure 2: Corridor Location and Segments



1.5 Corridor Characteristics

The I-10/SR 85 corridor provides an important connection from Southern California to economic and recreational opportunities in Central Arizona and other destinations to the east. I-10 is generally a 4-lane divided freeway from the California border to SR 85 while SR 85 is a two-lane highway facility connecting I-10 to I-8. Together, the two roadways provide a passage from Southern California to Tucson while bypassing the Metropolitan Phoenix Area.

Plans have been made to upgrade SR 85 to a freeway facility between I-10 and I-8, which will greatly increase accessibility for both freight and tourism travel. I-10 between California and SR 85 is a direct connection between Phoenix and Los Angeles. Similarly, SR 85 between I-10 and I-8 is both a bypass route for freight traffic wishing to avoid the Phoenix Area and a major corridor in the linkage between Phoenix and San Diego. Therefore, the entire corridor is considered an important connection for both freight and tourism travel in the state.

National Context

I-10 provides east-west connectivity from Arizona to California, and further east as a major corridor to the entire United States. It provides the most direct and fastest link between Phoenix and Los Angeles, and Southern Arizona and the port of Nogales to Los Angeles and the rest of California. Arizona is also uniquely positioned to connect export producers to three of the United States' largest consumer markets (Southern California, Dallas, and Houston), as well as the exponentially growing market in Northwest Mexico.

SR 85 connects I-8 with I-10 as a Phoenix bypass route for traffic traveling beyond Phoenix.

Another major consideration for this corridor is the role it plays in the CANAMEX system. CANAMEX is the name commonly used to describe a planned future roadway system that will connect Mexico to Canada through several U.S. states, Arizona included. The CANAMEX Corridor in Arizona is designated along I-10 from the Tucson area to I-8, west to SR 85, then along SR 85 between I-8 and I-10 to Wickenburg Road. From there the corridor will travel north through Wickenburg, eventually to Las Vegas and beyond. The I-10/SR 85 corridor constitutes a large portion of the Arizona CANAMEX system, making it an important route in interstate and international travel.

Regional Connectivity

I-10/SR 85 crosses the mostly rural terrain of Western Arizona. It provides the most direct and fastest link between Phoenix and the nation's largest two seaports, Los Angeles and Long Beach. I-10/SR 85 also connects to southern California via I-8, included in its own corridor profile study. The corridor offers a principal interstate highway link for freight traffic from the ports in California to the Southwest, eventually terminating on the East Coast in Jacksonville, Florida.

Total traffic volumes (AADT 2014) are approximately 16,000 to 32,000 throughout the length of the I-10 portion of corridor, where the daily volumes peak on either end. The traffic volumes for the SR 85 portion of the corridor are 10,000- 14,000. The Arizona Travel Demand Model (AZTDM2) projects that traffic will more than double by 2035.

Commercial Truck Traffic

Arizona is a pass-through state for freight traffic coming from the ports of Los Angeles and Long Beach and going east to the central U.S. for distribution. ADOT conducted an extensive stakeholder outreach program during the Arizona Multimodal Freight Analysis Study. The I-10 corridor is designated as one of the six Corridors of the Future (COF) under a program sponsored by USDOT. This designation will expedite delivery of corridor improvements, where the I-10/SR 85 corridor is located.

SR 85, the popular Phoenix bypass route from I-10 to I-8 carries over 4,000 trucks per day, which is forecasted to exceed the capacity of the roadway before 2030.

The U.S. Department of Transportation, under Section 167(c) of title 23 United States Code (U.S.C.), created by Section 1115 of the Moving Ahead for Progress in the 21st Century Act (MAP–21), is directed to establish a National Freight Network (NFN) to assist States in strategically directing resources toward improved system performance for efficient movement of freight on the highway portion of the Nation's freight transportation system. I-10, a portion of the corridor, has been designated by ADOT as part of the National Primary Freight Network.

Commuter Traffic

Significant commuter traffic is present on I-10/SR 85, especially at the junction around segments 10-8 and 85-9, where peak travel times are congested due to commuters in and out of the Phoenix region. Traffic forecasts indicate that this segment will become severely congested by 2035 without capacity increases and other modifications to the current mainline. Other population centers along the corridor, including the California/Arizona border and Quartzsite, experience intra-city commuter traffic on the I-10/SR 85 to a much lesser degree. Segment 85-13 serves as Main Street in Gila Bend and an access route to many local businesses and residences.

Arizona Public Service (APS), a major utility company in the state, operates a large nuclear power station in Tonopah, located near segment 10-7. This major employment generator attracts commuter traffic to and from the east directions on the corridor.

Recreation and Tourism

Arizona offers a variety of recreational opportunities for its citizens as well as the millions of visitors that travel to the state in search of warmer weather, outdoor adventure, and exploration opportunities. Arizona's warm weather and natural beauty makes tourism one of the state's top industries. According to the Arizona Office of Tourism, in 2013, 33.8 million people visited Arizona who collectively spent $19.8 billion in the state, which supports jobs and generates tax revenue.

Recreation and tourism is a key industry along the corridor, especially in the Phoenix area. I-10 carries on east, and connects to I-17 the principal gateway to Northern Arizona and the Grand Canyon National Park, one of the most visited sites in the country, with over 4.7 million visitors last year. Phoenix offers many outdoor attractions and opportunities for travelers, such as Major League Baseball's Spring Training during March, which attracts a lot of California visitors whose teams train in the Phoenix Metropolitan region.

Multi-Modal Uses

Freight Rail

Union Pacific Railroad's Sunset Route is a 760-mile corridor between Los Angeles and El Paso that intersects the southern-most portion of the I-10/SR 85 Corridor in Gila Bend. The route then carries on East to meet up and parallel the I-10 East, which is included in its own corridor profile study. As of 2007, the number of trains per day on the route was between 50 and 60.

Just south of the I-10/SR 85 junction is the Wellton Branch line of the Union Pacific Railroad. The track is currently out of service, however handles roughly 11,000 carloads of grain annually. Several improvements have been identified to reduce the impacts the at-grade crossing on the corridor would have on surrounding communities and traffic congestion.

Passenger Rail

The entire I-10 portion of the corridor, as well as segments 85-9 and 85-10 of the SR 85 portion are identified as potential routes in the Southwest Interstate High Speed Rail Corridor. There has been no planning yet, but prior studies indicate this as a potential key corridor.

Bicycles/Pedestrians

Shoulders generally average 8-10 feet in width to accommodate cyclists on I-10/SR 85.

Bus/Transit

Greyhound operates intercity bus transit the length of the I-10/SR 85 Corridor connecting Phoenix to Los Angeles via the I-10 portion of the corridor, and Phoenix to San Diego via the SR 85 portion of the corridor to I-8. Local transit service by Valley Metro operates rural routes connecting Gila Bend to Phoenix via SR 85.

Aviation

There is one airport along the I-10/SR 85 Corridor, the Gila Bend Municipal Airport. The airport is located in Gila Bend and is a public use airport.

Land Ownership, Land Uses, and Jurisdictions

As shown previously in **Figure 2**, I-10/SR 85 crosses multiple jurisdictions and land holdings throughout Maricopa and La Paz Counties. A majority of the land surrounding the corridor in segments 10-1 through 10-5 is owned by the Bureau of Reclamation, with sporadic clusters of State Trust Land and Private ownership. A small part of segment 10-1 crosses through a bit of land owned by an Indian Reservation. A majority of the land between segments 10-5 and 10-8 is a checker board of State Trust Land and Private Ownership, where Segment 10-8 is also part of Buckeye City Limits. All of segment 85-9 is within Buckeye City Limits, and segments 85-12, 85-13, and 85-14 are within Gila Bend City Limits. Portions of segments 85-10 and 85-11 contain land owned by The Bureau of Reclamation, State Trust Land, and Private Ownership.

Population Centers

The I-10/SR 85 Corridor, through two counties, is mostly rural. There are three major population centers along the corridor in Buckeye, Gila Bend and Quartzsite. Significant growth is projected to continue in the Buckeye and Gila Bend areas. **Table 2** shows current (2014) population by county and city along with projected future (2040) population and growth

Table 2: Current and Future Population

Area	2010 Population	2014 Population	Projected 2040 Population	% Change 2010-2040	Total Growth
La Paz County	**20,489**	**20,231**	**23,530**	15%	**3,041**
Parker	3,083	3,044	3,057	-1%	-26
Quartzsite	3,677	3,881	5,904	61%	2,227
Unincorporated	13,729	14,020	14,569	6%	840
Maricopa County	**3,817,117**	**4,087,191**	**6,030,950**	**58%**	**2,213,833**
Avondale	76,238	79,646	128,400	68%	52,162
Buckeye	50,876	59,470	251,100	394%	200,224
Carefree	3,363	3,526	4,400	31%	1,037
Cave Creek	5,015	5,253	8,400	67%	3,385
Chandler	236,123	254,276	301,400	28%	65,277
El Mirage	31,797	33,532	47,400	49%	15,603
Fountain Hills	22,489	23,573	31,200	39%	8,711
Gila Bend	1,922	2,001	14,500	654%	12,578
Gilbert	208,453	239,277	315,400	51%	106,947
Glendale	226,721	237,517	307,900	36%	81,179
Goodyear	65,275	75,664	226,200	247%	160,925
Guadalupe	5,523	6,106	6,800	23%	1,277
Litchfield Park	5,476	5,392	8,200	50%	2,724
Mesa	439,041	464,704	581,800	33%	142,759
Paradise Valley	12,820	13,663	14,500	13%	1,680
Peoria	154,065	166,934	303,000	97%	148,935
Phoenix	1,445,632	1,537,058	2,116,900	46%	671,268
Scottsdale	217,385	230,512	296,300	36%	78,915
Surprise	117,517	126,275	280,500	139%	162,983
Tempe	161,719	172,816	271,500	68%	109,781
Tolleson	6,545	6,929	8,900	36%	2,355
Wickenburg	6,363	6,685	15,700	147%	9,337
Youngtown	6,156	6,542	7,600	23%	1,444
Unincorporated	310,603	329,840	482,950	55%	172,347

Major Traffic Generators

Much of the traffic on I-10/SR 85 results from interstate commercial and long distance personal travel. The Phoenix Metropolitan region generates high volumes of traffic locally, and Southern California serves as a popular vacation destination for Arizona residents. I-10 serves as the principal gateway to the region, connecting travelers to I-17, a route to two of the state's largest tourist spots, Sedona and the Grand Canyon, and carries on to I-10 East, a major interstate route connecting major cities across the entire country. SR 85 serves as a bypass route to Southern California via I-8 for those in the Western Phoenix Metropolitan region, as well as a truck by-pass route from the east wishing to avoid the Phoenix region traffic.

The Palo Verde Nuclear Generating Station, operated by APS, constitutes a major employment traffic generator for commuter traffic. The power station is located near Tonopah, 45 miles west of downtown Phoenix, and is the largest power plant in the United States. The power station attracts commuter traffic mostly from the east.

Tribes

The Colorado River Indian Tribes (CRIT) includes the Mohave, Chemehuevi, Hopi, and Navajo tribes, and is primarily located in Parker, Arizona. Parker is located about 40 minutes north of the corridor; however the land owned by the tribe extends to portions of segment 10-1 of the corridor. The CRIT encompasses the length of the Colorado River on both sides of Arizona and California. *(Source: https://en.wikipedia.org/wiki/Navajo_Nation)*

Wildlife Linkages

The Colorado River Indian Tribes (CRIT) includes the Mohave, Chemehuevi, Hopi, and Navajo tribes, and is primarily located in Parker, Arizona. Parker is located about 40 minutes north of the corridor; however the land owned by the tribe extends to portions of segment 10-1 of the corridor. The CRIT encompasses the length of the Colorado River on both sides of Arizona and California. *(Source: https://en.wikipedia.org/wiki/Navajo_Nation)*

- Wildlife waters to the north and south of I-10 just east of Quartzsite
- I-10.SR 85 travels through the Sonoran Desert National Monument allotments from the California State line to Segment 10W-5 and Segments 85-10 and 85-11
- Gila River is designated as a Riparian, which intersects the SR 85 portion of the corridor at Segment 85-9
- Species of Greatest Conservation need are identified continuously along the entire corridor, and increases at the intersection of SR 85 and the Gila River near segment 85-9
- A high level of Species of Economic and Recreational Importance are identified along the entire SR 85 portion of the corridor. A low level is identified throughout the corridor from the California State Line along I-10 to the SR 85 junction.

Corridor Assets

Corridor transportation assets of note are summarized in **Figure 3**.

A freight weigh station is located near the California border in Ehrenberg, Arizona. There are seven grade separated road crossings on the corridor, fifteen traffic interchanges along the corridor, and twenty-two at-grade interchanges—the majority located in segment 85-13 due to it serving as Gila Bend's Main Street. There are sixteen permanent traffic counters located along the I-10/SR 85 corridor.

1.6 Corridor Stakeholders and Input Process

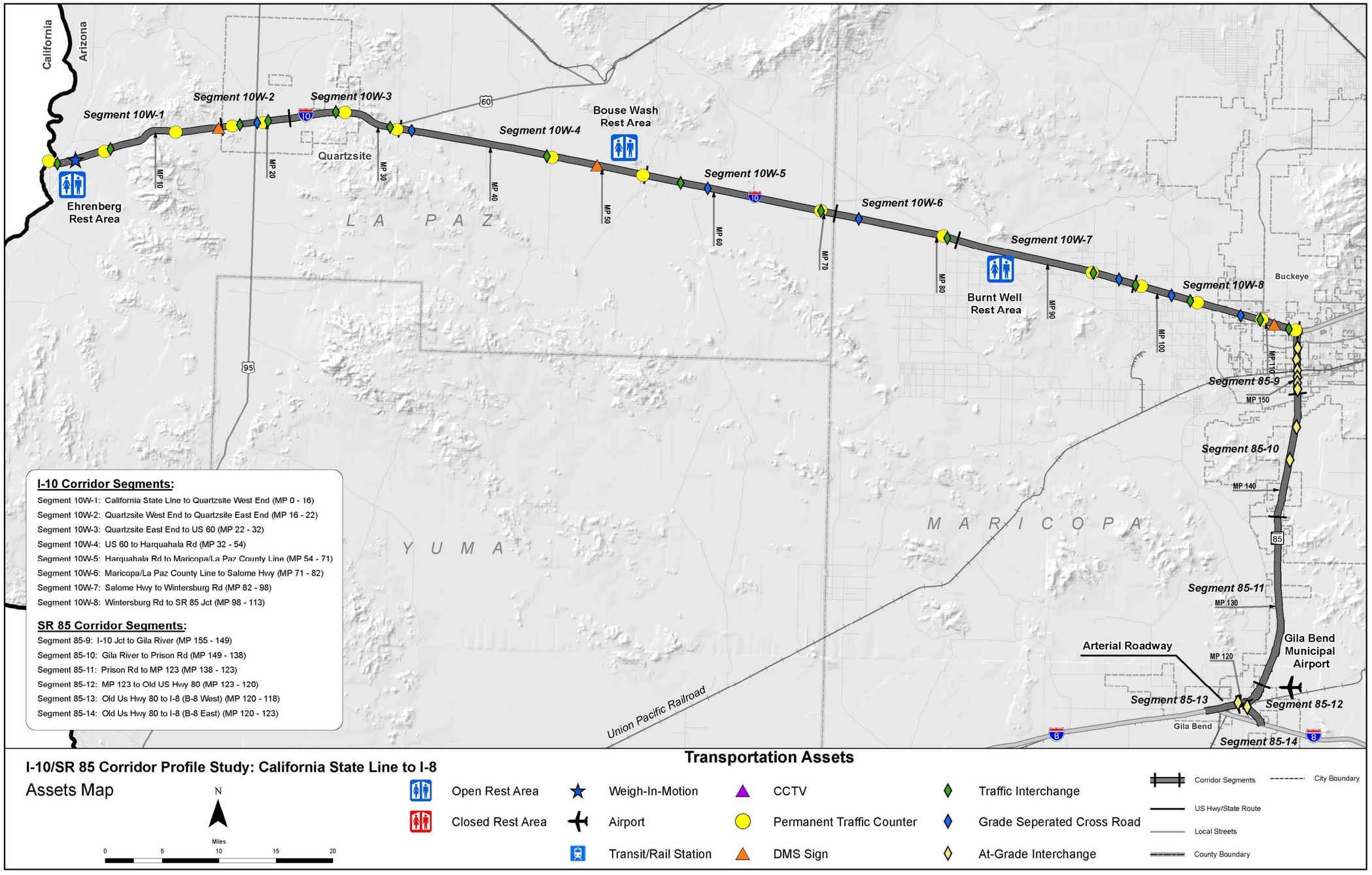
A Technical Advisory Committee (TAC) was created which was comprised of representatives from the stakeholders. TAC meetings were held at key milestones to present results and obtain feedback. In addition, several meetings were conducted with key stakeholders between June 2014 and October 2016 to present the results and obtain feedback.

Key stakeholders identified for this study include:

- ADOT Central District
- ADOT Southwest District
- ADOT Technical Groups
- MAG
- WACOG
- Federal Highway Administration (FHWA)

Several Working Papers were developed during the course of the Corridor Profile Study. The Working Papers were provided to the TAC for review and comment.

Figure 3: Corridor Assets



1.7 Prior Studies and Recommendations

This study identified recommendations from previous studies, plans, and preliminary design documents. Studies, plans, and programs pertinent to the I-10/SR 85 Corridor were reviewed to understand the full context of future planning and design efforts within and around the study area. These studies are organized below into four categories: Framework and Statewide Studies, Regional Planning Studies, Planning Assistance for Rural Areas (PARAs) and Small Area Transportation Studies (SATS), and Design Concept Reports (DCRs) and Project Assessments (PAs).

Corridor-Specific Studies

- Interstate 10- Phoenix to CA Border, Multimodal Corridor Profile Study, 2013, ADOT
- Access Management Study State Route 85, 2005, ADOT

Statewide and Regional Studies

- 2016-2020 Five-Year Transportation Facilities and Construction Program
- La Paz County Comprehensive Plan, 2005, La Paz County
- Town of Quartzsite General Plan, 2014, Town of Quartzsite
- Town of Gila Bend General Plan, 2006, Gila Bend
- What Moves You Arizona; Long-Range Transportation Plan, 2011, ADOT
- Strategic Long-Range Transportation Plan for the Colorado River Indian Tribes, 2014, Colorado River Indian Tribes
- 2035 Regional Transportation Plan, 2014, Maricopa Association of Governments
- Southwest Area Transportation Study, 2003, MAG
- Tonopah/Arlington Area Plan, 2000, Maricopa County
- Arizona's State Wildlife Action Plan 2012-2022, 2012, Arizona Game & Fish Department
- BQAZ Interstate 10- Hassayampa Valley Roadway Framework Study, 2007, MAG
- BQAZ Interstate 8 and 10 Hidden Valley, 2009, MAG
- Corridor Concept Report: I-11 and Intermountain West Corridor Study, 2014, I-11 Core Agency Partners
- Multimodal Freight Analysis Study, 2008, ADOT
- Arizona Ports of Entry Study, 2014, ADOT
- Arizona's Key Commerce Corridors, 2013, ADOT
- State Transportation Improvement Program, FY 2016-2020; 2015, ADOT
- Western Arizona Human Service Transportation Coordination Plan Upgrade Serving Region IV, 2014, WACOG and LHMPO
- Arizona Statewide Dynamic Message Master Plan, 2011, ADOT
- Climbing and Passing Lane Prioritization Study, 2015, ADOT
- Statewide Bicycle and Pedestrian Plan Update, 2013, ADOT
- Arizona State Airport System Plan, 2008, ADOT
- Arizona State Rail Plan, 2011, ADOT
- Arizona Statewide Rail Framework Study, 2010, ADOT
- Arizona Statewide Rest Area Study, 2011, ADOT
- Bureau of Land Management Travel Management Plan, 2012, BLM
- Arizona Roadway Departure Safety Implementation Plan (RDSIP), 2012, ADOT

Design Concept Reports

- Initial Project Assessment, Bridge Scour Retrofit Project, 2015, ADOT
- Statewide Weigh-In-Motion System, Final Feasibility Report, 2015, ADOT
- US 60 – MP 42, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2015, ADOT
- West Quartzsite Traffic Interchange Ehrenburg to Phoenix Highway, Interstate 10, Final Project Assessment, 2014, ADOT
- MP 42 – Hovatter Road, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2013, ADOT
- Gas Line Road – County Line, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2011, ADOT
- Sun Valley Parkway TI, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2010, ADOT
- Copperleaf Traffic Interchange, Final Change or Access Report, 2010, ADOT
- County Line – Salome Road, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2010, ADOT
- Bouse Wash Rest Area – Gas Line Road, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2009, ADOT
- Final Design Concept Report, SR 85 at Gila Bend, 2009, ADOT
- Initial Feasibility Report, Interstate 10 at Canamex T.I., Ehrenberg-Phoenix Highway, 2008, ADOT
- I-10 Right-of-Way Delineation/Feasibility Report, I-10: La Paz County Line to SR 85, Ehrenberg-Phoenix Highway, 2007, ADOT
- Ehrenberg POE – West Quartzsite, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2003, ADOT
- Salome – Burnt Wells, Ehrenberg-Phoenix Highway, I-10, Final Project Assessment, 2003, ADOT
- Final Location/Design Concept Report, SR 85, Gila Bend to I-10, 2002, ADOT

Summary of Prior Recommendations

Various studies and plans, including several Design Concept Reports (DCRs), have recommended improvements to the I-10/SR 85 Corridor as shown in **Table 3** and **Figure 4**. They include, but are not limited to:

- Widening of numerous sections of I-10/SR 85, some of which will require right-of-way acquisition. Many other proposed improvements are associated with the recommended widening:
  - Widening from 4 to 6 lanes at MP 89 on I-10 W in both directions
  - 2 new GP lanes and 1 HOV lane in both directions from MP 89-114 on I-10 W
  - Upgrade to 6-lane freeway with HOV lanes on SR 85 from MP 155-35
- Major TI improvements at the following locations:
  - Poston Road TI
  - Tom Wells Road TI
  - Dome Rock Road TI
  - West Quartzsite TI
  - Riggles Avenue TI
  - Gold Nugget Road TI
  - US 60 TI
  - 459th Avenue TI
  - 443rd Avenue TI
  - 427th Avenue TI
  - 395th Avenue TI
  - 379th Avenue TI (Signalize Ramps)
  - 347th Avenue TI
  - Desert Creek Parkway TI
  - Johnson Road TI
  - Wilson Road TI
  - I-10/SR 85 TI (Upgraded System)
  - Hassayampa Freeway System TI
  - Patterson Road
  - MP 133 TI (Proposed)
  - Pierpont Road TI (New)
  - De Anza Scenic Way TI (New)
- Ehrenberg Port of Entry Improvements
- Ehrenberg Rest Areas Parking Expansion and System Repairs
- Bridge Scour Retrofit
- Pavement Preservation
- Traffic Counter Updates
- Bouse Wash Rest Areas Parking Expansion and System Repairs
- System Interchange at I-10 to Hassayampa Freeway
- ITS improvements, such as closed circuit television and dynamic message signs
- Curve realignment and flattening
- Construct Warner Street Bridge
- At grade intersection/future interchange location at Lower Buckeye Road
- At-Grade Crossing and Future TI:
  - Broadway Road
  - Southern Avenue
  - Baseline Road
  - Hazen Road
  - Robbins Butte Wildlife Area Access
  - Buckeye Hills Drive
  - Riggs Road
  - MP 136
  - Woods Road
  - Gila Mountain Road
  - Gila Bend Airport Access Road
- SB DMS at SR 30/SR 85 Interchange
- NB DMS south of I-10/SR 85 TI
- Maricopa Road At-Grade intersection for full access
- SB DMS north of I-8 Junction
- I-8 Proposed System TI

Table 3: Corridor Recommendations from Previous Studies

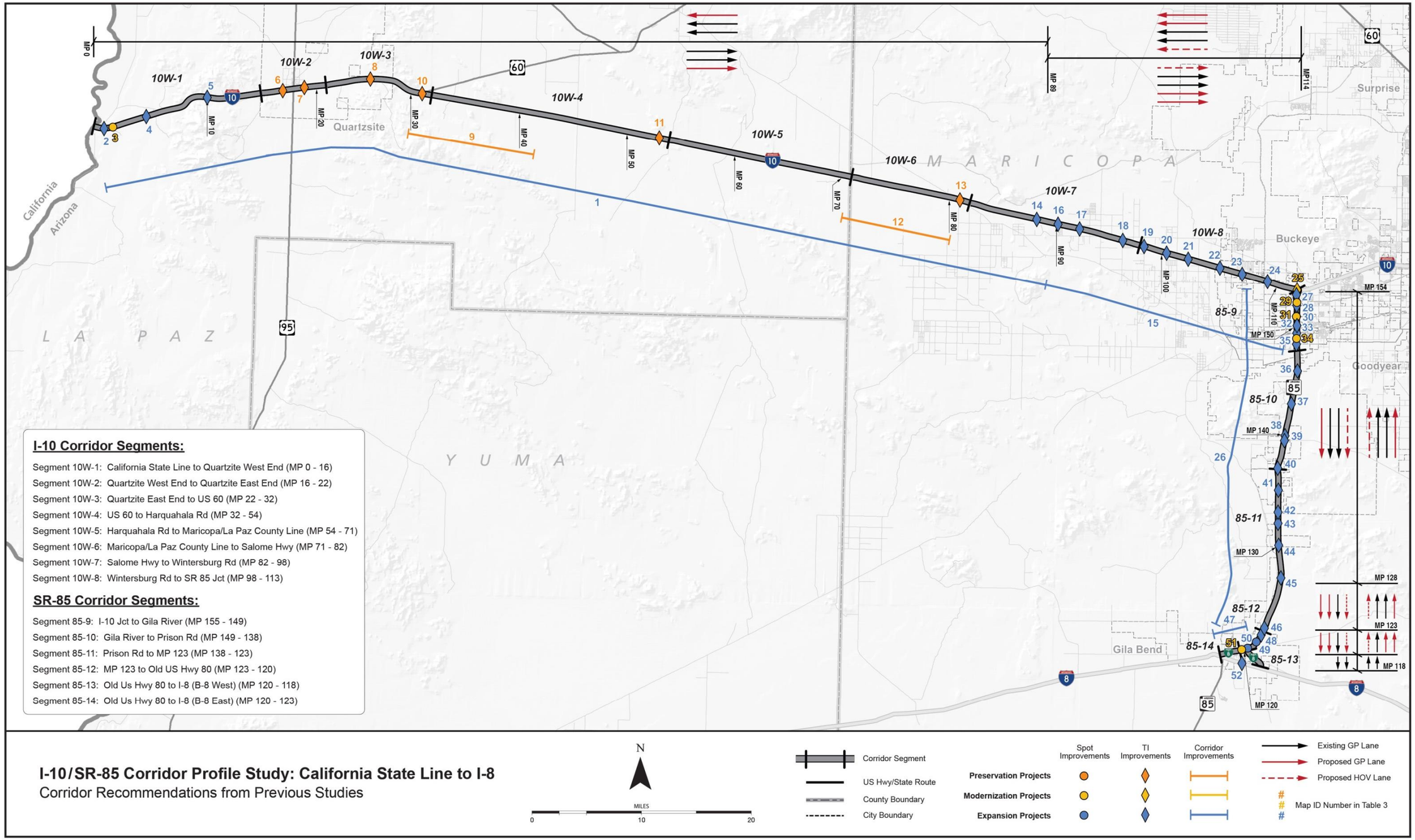
Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation		Name of Study
					P	M	E	Program Year	Project No.	
I-10										
1	0	89	89	Widen from 4 to 6 lanes			**X**	N/A	N/A	I-10 – Multimodal Corridor Profile Study
2	1	1	-	Poston Road (New TI)			**X**	N/A	N/A	La Paz Transportation Planning Study
3	1.85	1.85	-	Ehrenberg Port of Entry Improvements		**X**		2016	010 LA 1 H6014 01C	Arizona Ports of Entry Study
4	4	4	-	Ehrenberg Rest Areas Parking Expansion and System Repairs			**X**	N/A	N/A	Arizona Statewide Rest Areas Study
5	5	5	-	Tom Wells Road (New TI)			**X**	N/A	N/A	I-10 – Multimodal Corridor Profile Study
6	11	11	-	Dome Rock Road (New TI)			**X**	N/A	N/A	I-10 – Multimodal Corridor Profile Study
7	17	17	-	West Quartzite TI Improvements	**X**			2016	H851701C	STIP, FY 2016-2020; West Quartzsite Traffic Interchange Ehrenburg to Phoenix Highway, Interstate 10, Final Project Assessment
8	18.61	18.61	-	Bridge Scour Retrofit Project		**X**		2015	010 LA 18 H8630 01C	Initial Project Assessment, May 2015
9	19	19	-	Riggles Avenue; TI Improvements	**X**			N/A	N/A	I-10 – Multimodal Corridor Profile Study
10	26	26	-	Gold Nugget Road; TI Improvements	**X**			N/A	N/A	I-10 – Multimodal Corridor Profile Study
11	29.85	41.98	12.13	Pavement preservation, safety enhancements, and traffic counter updates	**X**			2016	010 LA 29 H8712 01D	STIP, FY 2016-2020
12	31	31	-	US 60; TI Improvements	**X**			N/A	N/A	I-10 – Multimodal Corridor Profile Study
13	52	52	-	Bouse Wash Rest Areas Parking Expansion and System Repairs			**X**	N/A	N/A	Arizona Statewide Rest Areas Study
14	53	53	-	Harquahala / Hovatter Road; TI Improvements	**X**			N/A	N/A	La Paz County Comprehensive Plan
15	70.8	80.8	10	Pavement preservation and safety enhancements	**X**			2019	010 MA 70 H892301C	STIP, FY 2016-2020

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation		Name of Study
					P	M	E	Program Year	Project No.	
16	81	81	-	Salome Road; TI improvements	**X**			N/A	N/A	I-10 – Multimodal Corridor Profile Study
17	82	82	-	Burt Well Rest Areas Parking Expansion and System Repairs			**X**	N/A	N/A	Arizona Statewide Rest Areas Study
18	88.2	88.2	-	459th Ave (New TI)			**X**	N/A	N/A	BQAZ
19	89	114	25	2 New GP Lanes, 1 HOV Lane in each direction			**X**	N/A	N/A	Arizona's Key Commerce Corridors
20	90.2	90.2	-	443rd Ave (New TI)			**X**	N/A	N/A	BQAZ
21	92.2	92.2	-	427th Ave (New TI)			**X**	N/A	N/A	BQAZ
22	96.3	96.3	-	395th Ave (New TI)			**X**	2020	H708301C	STIP, FY 2016-2020 (RTP Freeway Program)
23	98.3	98.3	-	379th Ave (Signalize TI Ramps)		**X**		N/A	N/A	BQAZ; Copperleaf Traffic Interchange, Final Change of Access Report
24	100.45	100.45	-	System interchange I-10 to Hassayampa Freeway			**X**	Canceled	010 MA 101 H7079 01L	BQAZ
25	102.5	102.5	-	347th Ave (New TI)			**X**	N/A	N/A	BQAZ, Statewide Weigh-In-Motion System, Final Feasibility Report
26	105.5	105.5	-	Desert Creek Parkway (New TI)			**X**	2020	H683801C	STIP, FY 2016-2020 (RTP Freeway Program)
27	107.6	107.6	-	Johnson Road (New TI)			**X**	N/A	N/A	BQAZ
28	110	110	-	Wilson Road (New TI)			**X**	N/A	N/A	I-10 – Multimodal Corridor Profile Study
29	112.8	112.8	-	I-10/SR 85 Upgraded System TI		**X**		N/A	N/A	BQAZ
SR 85										
30	120	155	35	Upgrade to 6 lane freeway with HOV lanes			**X**	N/A	N/A	2035 Regional Transportation Plan (MAG), Gila Bend SATS

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation		Name of Study
					P	M	E	Program Year	Project No.	
31	153	153	-	Construct Warner Street Bridge			X	2018	44811	STIP, FY 2016-2020 (RTP Freeway Program)
32	154	154	-	At grade intersection/ future interchange location at Lower Buckeye Road			X	N/A	N/A	Access Management Study SR 85
33	153	153	-	Broadway Road At-Grade crossing and future TI			X	N/A	N/A	Access Management Study SR 85
34	153	153	-	SB DMS at SR 30/SR 85 Interchange		X		N/A	N/A	Arizona Statewide DMS Master Plan
35	152	152	-	Southern Ave At-Grade crossing and future TI			X	N/A	N/A	Access Management Study SR 85
36	152	152	-	NB DMS south of I-10/SR 85 TI		X		N/A	N/A	Arizona Statewide DMS Master Plan
37	151	151	-	Baseline Rd At-Grade crossing and future TI			X	N/A	N/A	Access Management Study SR 85
38	150.5	150.5	-	MC-85 At-Grade crossing and future TI			X	N/A	N/A	Access Management Study SR 85
39	150	150	-	NB DMS at SR 30/SR 85 Interchange		X		N/A	N/A	Arizona Statewide DMS Master Plan
40	149.5	149.5	-	Hazen Road At-Grade crossing and future TI			X	N/A	N/A	Access Management Study SR 85
41	147	147	-	Robbins Butte Wildlife Area Access At-grade crossing and future TI			X	N/A	N/A	Access Management Study SR 85
42	144	144	-	Buckeye Hills Drive At-Grade crossing and future new TI			X	N/A	N/A	BQAZ
43	141	141	-	Hassayampa Freeway, System TI			X	N/A	N/A	BQAZ
44	140.9	140.9	-	Riggs Rd At grade crossing and future TI			X	N/A	N/A	Access Management Study SR 85
45	138	138	-	Patterson Road (New TI)			X	N/A	N/A	BQAZ
46	136	136	-	Future proposed TI Near MP 136			X	N/A	N/A	BQAZ
47	134	134	-	Woods Rd At-Grade crossing and future new TI			X	N/A	N/A	BQAZ

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation		Name of Study
					P	M	E	Program Year	Project No.	
48	133	133	-	Proposed TI near MP133			**X**	N/A	N/A	BQAZ
49	131	131	-	Pierpont Road (New TI)			**X**	N/A	N/A	BQAZ
50	128	128	-	Gila Mountain Rd At-Grade crossing and future TI			**X**	N/A	N/A	BQAZ
51	123	123	-	Watermelon Rd At Grade crossing and future TI			**X**	N/A	N/A	Access Management Study SR 85
52	120.32	123	2.68	Construct a new 4-lane freeway facility from Gila Bend Airport to I-8 Interchange			**X**	N/A	NH-085-B(AOM)	Final DCR, SR 85 at Gila Bend
53	122.5	122.5	-	De Anza Scenic Way (New TI)			**X**	N/A	N/A	BQAZ
54	121.68	121.68	-	Gila Bend Airport Access Rd At-Grade crossing			**X**	N/A	N/A	Final DCR, SR 85 at Gila Bend
55	120.68	120.68	-	Maricopa Rd At-Grade intersection for full access			**X**	N/A	N/A	Access Management Study SR 85
56	120	120	-	SB DMS north of I-8 Junction		**X**		N/A	N/A	Arizona Statewide DMS Master Plan
57	115	115	-	I-8 Proposed System TI			**X**	N/A	N/A	2035 Regional Transportation Plan (MAG)

Figure 4: Corridor Recommendations from Previous Studies



2.0 CORRIDOR PERFORMANCE

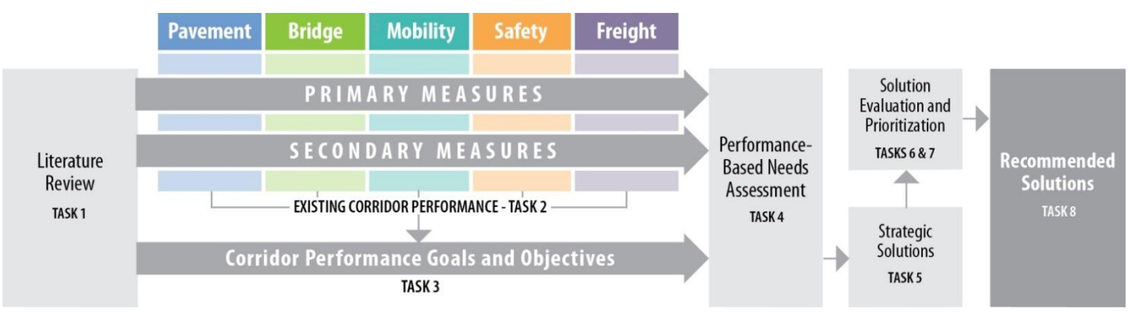
This chapter describes the evaluation of the existing performance of the I-10/SR 85 corridor. A series of performance measures is used to assess the corridor. The results of the performance evaluations are used to define corridor needs relative to the long term goals and objectives for the corridor.

2.1 Corridor Performance Framework

This study uses a performance-based process to define baseline corridor performance, diagnose corridor needs, develop corridor solutions, and prioritize strategic corridor investments. In support of this objective, a framework for the performance-based process was developed through a collaborative process involving ADOT and the CPS consultant teams.

Figure 5 illustrates the performance framework, which includes a two-tiered system of performance measures (primary and secondary) to evaluate baseline performance. The primary measures in each of five performance areas are used to define the overall health of the corridor, while the secondary measures identify locations that warrant further diagnostic investigation to delineate needs. Needs are defined as the difference between baseline corridor performance and established performance objectives.

Figure 5: Corridor Profile Performance Framework



The following five performance areas guide the performance-based corridor analyses:

- Pavement
- Bridge
- Mobility
- Safety
- Freight

These performance areas reflect national performance goals stated in *Moving Ahead for Progress in the 21st Century* (MAP-21):

- Safety: To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- Infrastructure Condition: To maintain the highway infrastructure asset system in a state of good repair.
- Congestion Reduction: To achieve a significant reduction in congestion on the National Highway System.
- System Reliability: To improve the efficiency of the surface transportation system.
- Freight Movement and Economic Vitality: To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- Environmental Sustainability: To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- Reduced Project Delivery Delays: To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion.

The MAP-21 performance goals were considered in the development of ADOT's P2P process, which integrates transportation planning with capital improvement programming and project delivery. Because the P2P program requires the preparation of annual transportation system performance reports using the five performance areas adopted for the CPS, consistency is achieved in the performance measures used for various ADOT analysis processes.

The performance measures include five primary measures: Pavement Index, Bridge Index, Mobility Index, Safety Index, and Freight Index. Additionally, a set of secondary performance measures provides for a more detailed analysis of corridor performance.

Each of the primary and secondary performance measures is comprised of one or more quantifiable indicators. A three-level scale was developed to standardize the performance scale across the five performance areas, with numerical thresholds specific to each performance measure:

Good/Above Average Performance	– Rating is above the identified desirable/average range
Fair/Average Performance	– Rating falls within the identified desirable/average range
Poor/Below Average Performance	– Rating is below the identified desirable/average range

Table 4 provides the complete list of primary and secondary performance measures for each of the five performance areas.

Table 4: Corridor Performance Measures

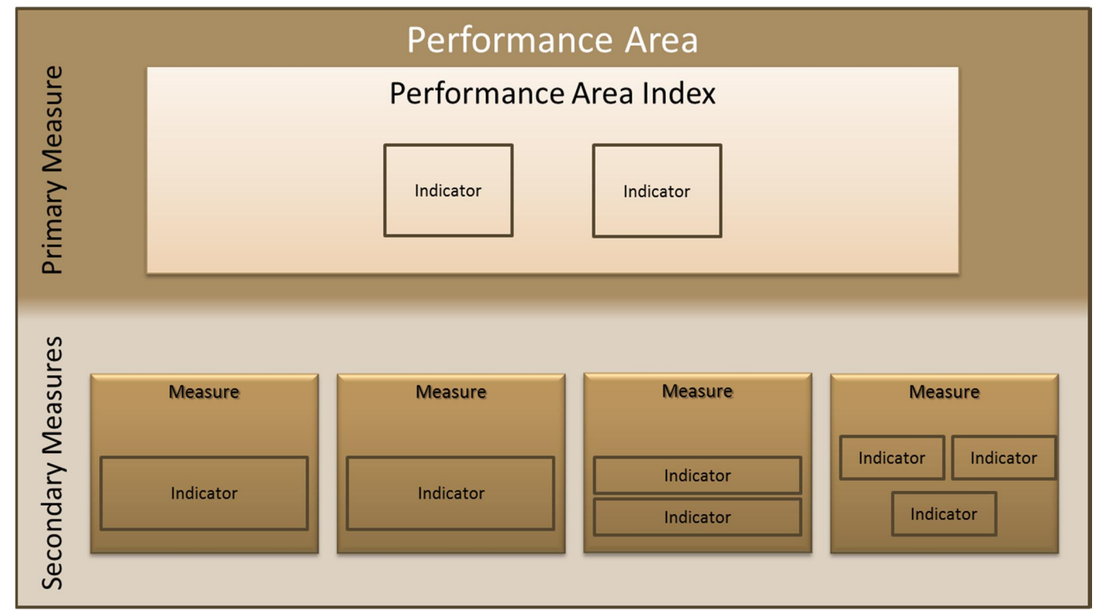
Performance Area	Primary Measure	Secondary Measures
Pavement	**Pavement Index** Based on a combination of International Roughness Index and cracking	· Directional Pavement Serviceability · Pavement Failure · Pavement Hot Spots
Bridge	**Bridge Index** Based on lowest of deck, substructure, superstructure and structural evaluation rating	· Bridge Sufficiency · Functionally Obsolete Bridges · Bridge Rating · Bridge Hot Spots
Mobility	**Mobility Index** Based on combination of existing and future daily volume-to-capacity ratios	· Future Congestion · Peak Congestion · Travel Time Reliability · Multimodal Opportunities
Safety	**Safety Index** Based on frequency of fatal and incapacitating injury crashes	· Directional Safety Index · Strategic Highway Safety Plan Emphasis Areas · Crash Unit Types · Safety Hot Spots
Freight	**Freight Index** Based on bi-directional truck planning time index	· Recurring Delay · Non-Recurring Delay · Closure Duration · Bridge Vertical Clearance · Bridge Vertical Clearance Hot Spots

The general template for each performance area is illustrated in **Figure 6**.

The guidelines for performance measure development are:

- Indicators and performance measures for each performance area should be developed for relatively homogeneous corridor segments
- Performance measures for each performance area should be tiered, consisting of primary measure(s) and secondary measure(s)
- Primary and secondary measures should assist in identifying those corridor segments that warrant in-depth diagnostic analyses to identify performance-based needs and a range of corrective actions known as solution sets
- One or more primary performance measures should be used to develop a Performance Index to communicate the overall health of a corridor and its segments for each performance area; the Performance Index should be a single numerical index that is quantifiable, repeatable, scalable, and capable of being mapped; primary performance measures should be transformed into a Performance Index using mathematical or statistical methods to combine one or more data fields from an available ADOT database
- One or more secondary performance measure indicators should be used to provide additional details to define corridor locations that warrant further diagnostic analysis; secondary performance measures may include the individual indicators used to calculate the Performance Index and/or "hot spot" features

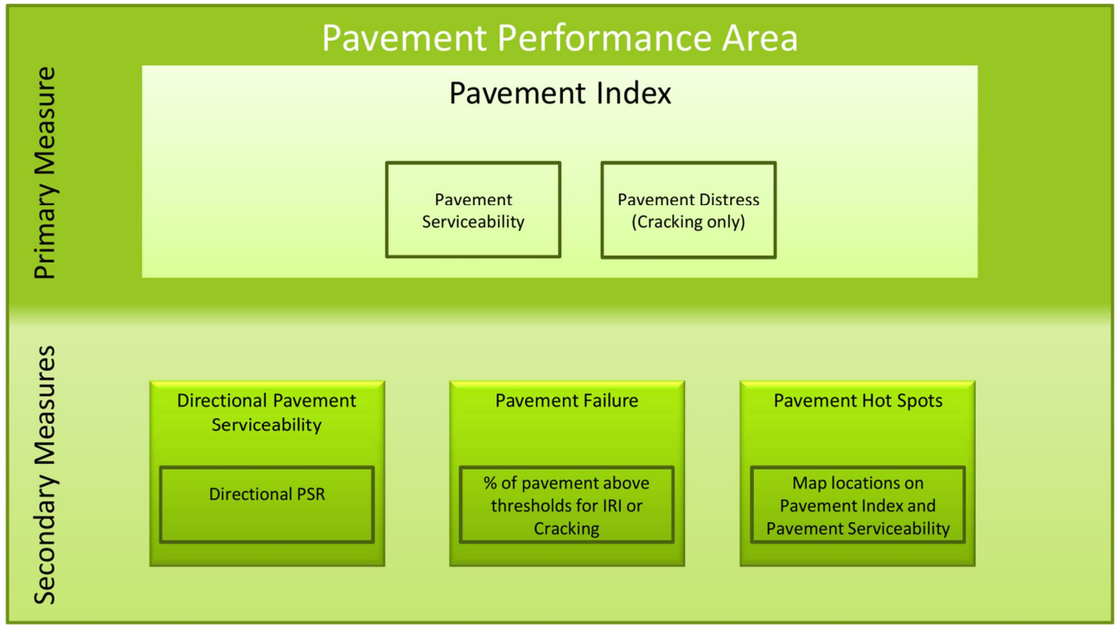
Figure 6: Performance Area Template



2.2 Pavement Performance Area

The Pavement performance area consisted of a primary measure (Pavement Index) and three secondary measures, as shown in **Figure 7**. These measures assess the condition of the existing pavement along the I-10/SR 85 Corridor. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 7: Pavement Performance Measures



Primary Pavement Index

The Pavement Index is calculated using two pavement condition ratings: the Pavement Serviceability Rating (PSR) and the Pavement Distress Index (PDI).

The PSR is extracted from the International Roughness Index (IRI), a measurement of pavement roughness based on field-measured longitudinal roadway profiles. The PDI is extracted from the Cracking Rating (CR), a field-measured sample from each mile of highway.

Both the PSR and PDI use a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest. The Pavement Index for each segment is a weighted average of the directional ratings based on the number of travel lanes. Therefore, the condition of a section with more travel lanes will have a greater influence on the resulting segment Pavement Index than the condition of a section with fewer travel lanes.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Pavement performance area, the relevant operating environments are designated as interstate and non-interstate segments. For the I-10/SR 85 corridor, the following operating environments were identified:

- Interstate (I-10)
- Non-interstate (SR 85)

Secondary Pavement Measures

Three secondary measures provide an in-depth evaluation of the different characteristics of pavement performance.

Directional Pavement Serviceability

- Weighted average (based on number of lanes) of the PSR for the pavement in each direction of travel

Pavement Failure

- Percentage of pavement area rated above failure thresholds for IRI or Cracking

Pavement Hot Spots

- A Pavement “hot spot” exists where a given one-mile section of roadway rates as being in “poor” condition
- Highlights problem areas that may be under-represented in a segment average. This measure is recorded and mapped, but not included in the Pavement performance area rating calculations

Pavement Performance Results

The Pavement Index provides a high-level assessment of the pavement condition for the corridor and for each segment. The three secondary measures provide more detailed information to assess pavement performance.

Based on the results of this analysis, the following observations were made:

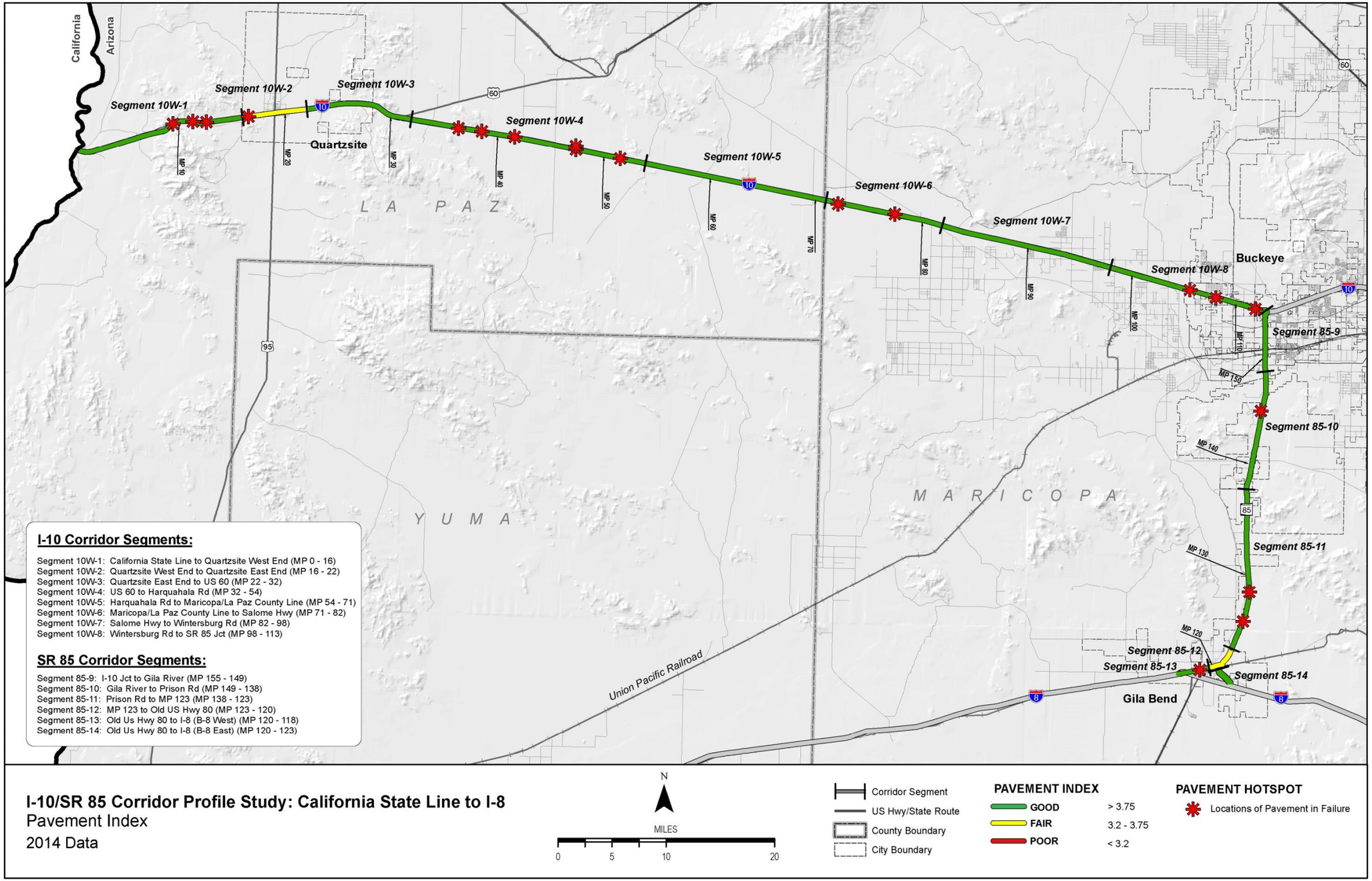
- Overall, based on the weighted average of the Pavement Index, the pavement is in "good" condition
- According to the Pavement Index, all of the Pavement is in "good" condition except Segments 10W-2 and 85-12, which have "fair" performance
- There are several failure hot spots along the corridor in segments 10W-1, 4, 6, and 8, and in segments 85-10, 11 and 12.
- 27% of the pavement in segment 10W-4 and 22% of the pavement in segment 85-11 is considered to be in failure.
- The Directional PSR performance is "good", with the exception of "fair" performance in segments 10W-4, 6, and 8, and in segments 85-12.
- Segment 10W-4 has the highest% Area Failure, and both Directional PSR values are "fair".

Table 5 summarizes the Pavement performance results for the I-10/SR 85 Corridor. **Figure 8** illustrates the primary Pavement Index performance and locations of Pavement hot spots along the I-10/SR 85 Corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 5: Pavement Performance

Segment #	Segment Length (miles)	Pavement Index	Directional PSR		% Area Failure
			EB/SB	WB/NB	
10W-1	16	3.76	3.96	3.93	13%
10W-2	6	3.61	3.87	4.06	0%
10W-3	10	3.90	3.88	3.97	0%
10W-4	22	3.76	3.52	3.74	27%
10W-5	17	4.37	4.22	4.16	0%
10W-6	11	3.85	3.55	3.68	18%
10W-7	16	3.95	3.81	3.94	0%
10W-8	15	3.95	3.67	3.80	13%
85-9	6	4.01	3.85	3.63	0%
85-10	11	3.83	3.82	4.11	14%
85-11	15	3.80	4.35	3.78	22%
85-12	3	3.32	3.42	3.21	17%
85-13	2	5.00	5.00	5.00	0.00
85-14	3	5.00	5.00	5.00	0.00
Weighted Corridor Average		3.93	3.88	3.85	11.69%
SCALES					
Performance Level		**Interstate (Non-interstate)**			
Good		> 3.75 (3.5)	> 3.75 (3.5)		< 5%
Fair		3.20 – 3.75 (2.9-3.5)	3.20 – 3.75 (2.9-3.5)		5% - 20%
Poor/ Below Average Performance		< 3.20 (2.9)	< 3.20 (2.9)		> 20%

Figure 8: Pavement Performance

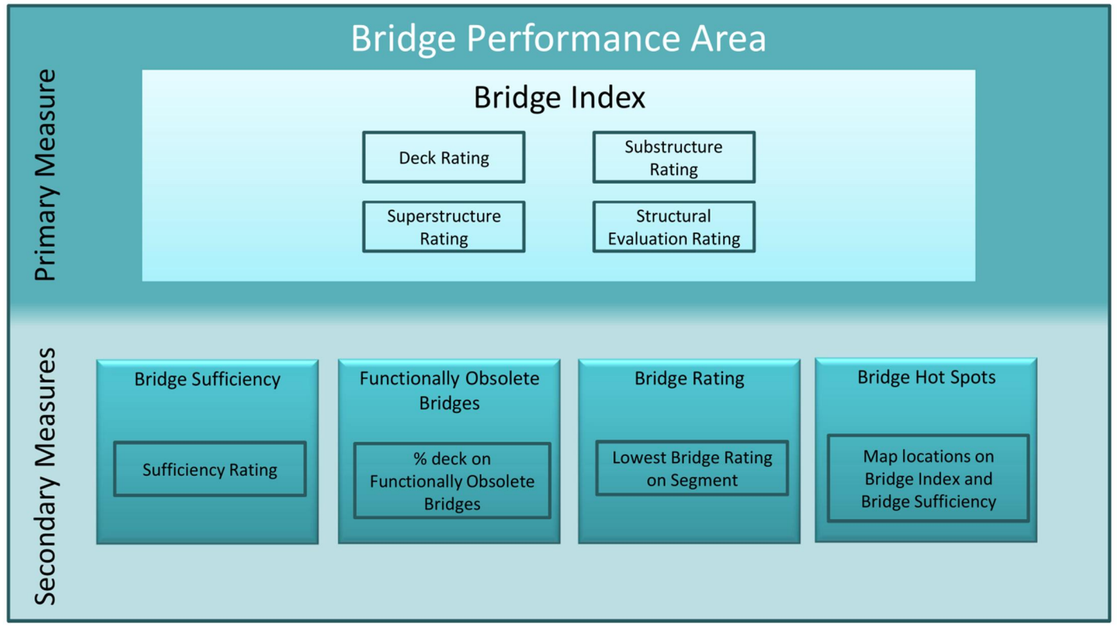


2.3 Bridge Performance Area

The Bridge Performance Area consists of a primary measure (Bridge Index) and four secondary measures, as shown in **Figure 9**. These measures assess the condition of the existing bridges along the I-10/SR 85 Corridor.

Only bridges that carry mainline traffic or bridges that cross the mainline are included in the calculation. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 9: Bridge Performance Measures



Primary Bridge Index

The Bridge Index is calculated based on the use of four different bridge condition ratings from the ADOT Bridge Database, also known as the Arizona Bridge Information and Storage System (ABISS). The four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating. These ratings are based on inspection reports and establish the structural adequacy of each bridge. The performance of each individual bridge is established by using the lowest of these four ratings. The use of these ratings, and the use of the lowest rating, is consistent with the approach used by the ADOT Bridge Group to assess the need for bridge rehabilitation. The Bridge Index is calculated as a weighted average for each segment based on deck area.

Secondary Bridge Measures

Four secondary measures provide an in-depth evaluation of the characteristics of each bridge:

Bridge Sufficiency

- Multipart rating includes structural adequacy and safety factors as well as functional aspects such as traffic volume and length of detour
- Rates the structural and functional sufficiency of each bridge on a 100-point scale

Functionally Obsolete Bridges

- Percentage of total deck area in a segment that is on functionally obsolete bridges
- Identifies bridges that no longer meet standards for current traffic volumes, lane width, shoulder width, or bridge rails
- A bridge that is functionally obsolete may still be structurally sound

Bridge Rating

- The lowest rating of the four bridge condition ratings (substructure, superstructure, deck, and structural evaluation) on each segment
- Identifies lowest performing evaluation factor on each bridge

Bridge Hot Spots

- A Bridge “hot spot” is identified where a given bridge has a bridge rating of 4 or lower or multiple ratings of 5 between the deck, superstructure, and substructure ratings
- Identifies particularly low-performing bridges or those that may decline to low performance in the immediate future

Bridge Performance Results

The Bridge Index provides a high-level assessment of the structural condition of bridges for the corridor and for each segment. The four secondary measures provide more detailed information to assess bridge performance.

Based on the results of this analysis, the following observations were made:

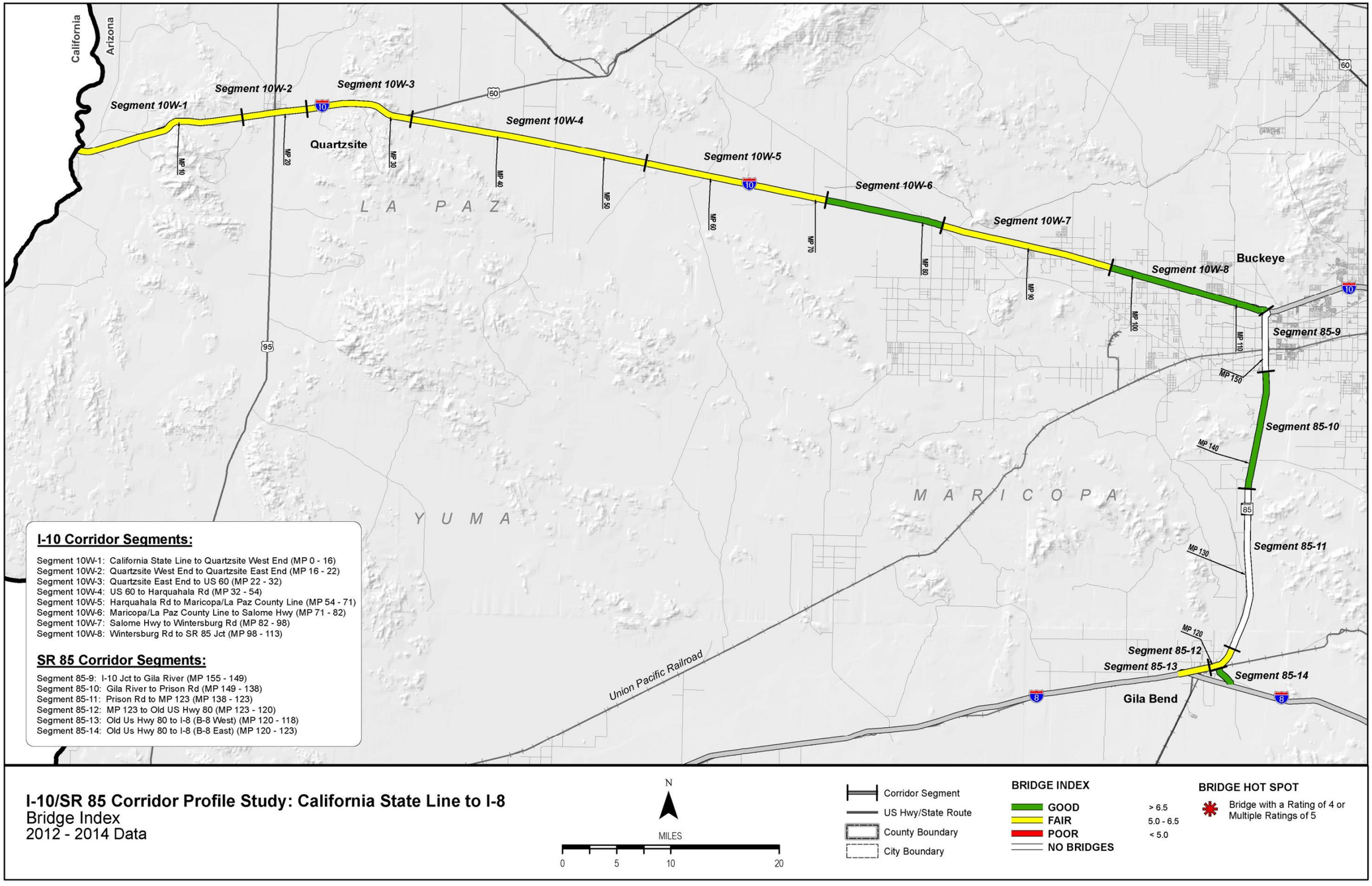
- Overall, based on the weighted average of the Bridge Index the corridor is performing in a "fair" manner. Over half of the segments have "fair" performance, while there are only 5 segments with "good" performance.
- There are no bridges designated as structurally deficient along the corridor.
- There are eight bridges with a rating of 5 along the corridor, none of which have multiple 5 ratings.
- There are no bridges with a sufficiency rating of "poor" in the corridor.
- Only 3 bridges rate as functionally obsolete throughout the entire corridor.
- There are no bridges located in segments 85-9 and 85-11.
- There are no bridge hot spots located throughout the entire corridor.

Table 6 summarizes the Bridge performance results for the I-10/SR 85 Corridor. **Figure 10** illustrates the primary Bridge Index performance and locations of Bridge hot spots along the I-10/SR 85 Corridor. Maps for each secondary measure can be found in **Appendix A.**

Table 6: Bridge Performance

Segment #	Segment Length (miles)	# of Bridges	Bridge Index	Bridge Sufficiency	Lowest Bridge Rating	% of Deck Area on Functionally Obsolete Bridges
10W-1	16	5	5.11	67.26	5	5.83%
10W-2	6	6	5.92	95.30	5	9.02%
10W-3	10	2	6.00	87.89	6	36.76%
10W-4	22	9	6.50	97.22	5	0.00%
10W-5	17	6	6.48	98.35	6	0.00%
10W-6	11	2	7.00	97.41	7	0.00%
10W-7	16	6	6.25	97.70	6	0.00%
10W-8	15	10	6.71	96.12	5	0.00%
85-9	6	0	No Bridges			
85-10	11	6	6.53	99.47	6	0.00%
85-11	15	0	No Bridges			
85-12	3	1	5.00	83.40	5	0.00%
85-13	2	4	5.21	89.61	5	0.00%
85-14	3	2	6.86	94.25	5	0.00%
Weighted Corridor Average			6.26	92.58	5.6	3.9%
SCALES						
Performance Level			**ALL**			
Good			> 6.5	> 80	> 6	< 12%
Fair			5.0 – 6.5	50 - 80	5 – 6	12% - 40%
Poor			< 5.0	< 50	< 5	> 40 %

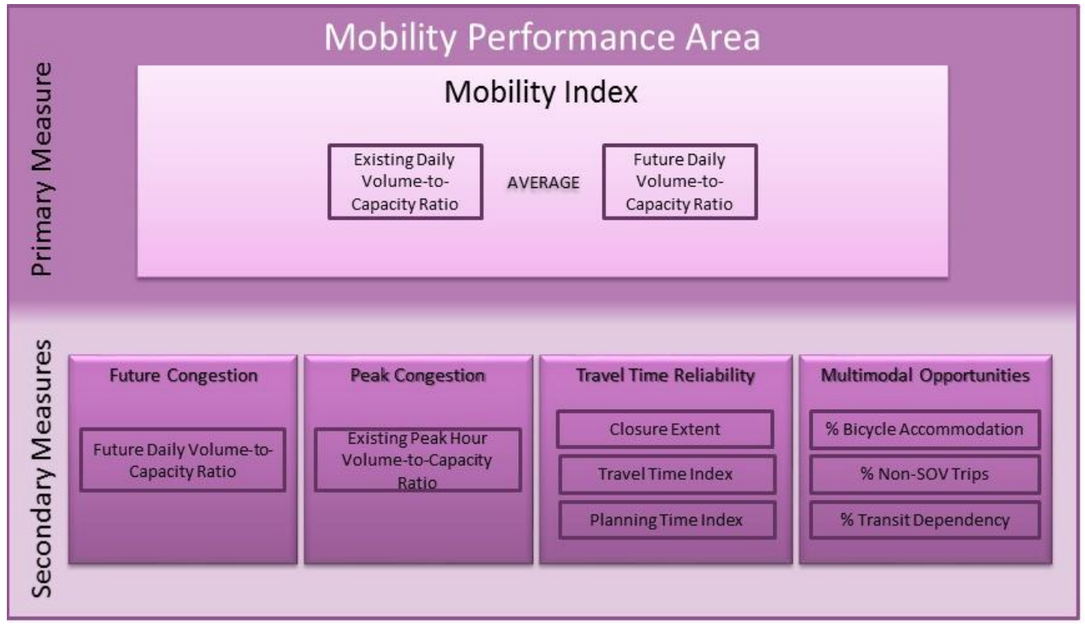
Figure 10: Bridge Performance



2.4 Mobility Performance Area

The Mobility performance area consists of a primary measure (Mobility Index) and four secondary measures, as shown in **Figure 11**. These measures assess the condition of existing mobility along theI-10/SR 85 Corridor. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 11: Mobility Performance Measures



Primary Mobility Index

The Mobility Index is an average of the existing (2014) daily volume-to-capacity (V/C) ratio and the future (2035 AZTDM) daily V/C ratio for each segment of the corridor. The V/C ratio is an indicator of the level of congestion. This measure compares the average annual daily traffic (AADT) volume to the capacity of the corridor segment as defined by the service volume for level of service (LOS) E. By using the average of the existing and future year daily volumes, this index measures the level of daily congestion projected to occur in approximately ten years (2025) if no capacity improvements are made to the corridor.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Mobility performance area, the relevant operating environments are urban vs. rural setting and interrupted flow (e.g., signalized at-grade intersections are present) vs. uninterrupted flow (e.g., controlled access grade-separated conditions such as a freeway or interstate highway). For the I-10/SR 85 Corridor, the following operating environments were identified:

- Urban Interrupted Flow: Segments 85-12 through 85-14
- Rural Uninterrupted Flow: Segments 10W-1 through 10W-8 and 85-9 through 85-11

Secondary Mobility Measures

Four secondary measures provide an in-depth evaluation of operational characteristics of the corridor:

Future Congestion – Future Daily V/C

- The future (2035 AZTDM) daily V/C ratio. This measure is the same value used in the calculation of the Mobility Index
- Provides a measure of future congestion if no capacity improvements are made to the corridor

Peak Congestion – Existing Peak Hour V/C

- The peak hour V/C ratio for each direction of travel
- Provides a measure of existing peak hour congestion during typical weekdays

Travel Time Reliability– Three separate travel time reliability indicators together provide a comprehensive picture of how much time may be required to travel within the corridor:

- Closure Extent:
  - The average number of instances a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel; a weighted average was applied to each closure that takes into account the distance over which the closure occurs
  - Closures related to crashes, weather, or other incidents are a significant contributor to non-recurring delays; construction-related closures were excluded from the analysis
- Directional Travel Time Index (TTI):
  - The ratio of the average peak period travel time to the free-flow travel time (based on the posted speed limit) in a given direction

  - The TTI recognizes the delay potential from recurring congestion during peak periods; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
- Directional Planning Time Index (PTI):
  - The ratio of the 95th percentile travel time to the free-flow travel time (based on the posted speed limit) in a given direction
  - The PTI recognizes the delay potential from non-recurring delays such as traffic crashes, weather, or other incidents; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
  - The PTI indicates the amount of time in addition to the typical travel time that should be allocated to make an on-time trip 95% of the time in a given direction

Multimodal Opportunities – Three multimodal opportunity indicators reflect the characteristics of the corridor that promote alternate modes to the single occupancy vehicle (SOV) for trips along the corridor:

- % Bicycle Accommodation:
  - Percentage of the segment that accommodates bicycle travel; bicycle accommodation on the roadway or on shoulders varies depending on traffic volumes, speed limits, and surface type
  - Encouraging bicycle travel has the potential to reduce automobile travel, especially on non-interstate highways
- % Non-SOV Trips:
  - The percentage of trips (less than 50 miles in length) by non-SOVs
  - The percentage of non-SOV trips in a corridor gives an indication of travel patterns along a section of roadway that could benefit from additional multimodal options
- % Transit Dependency:
  - The percentage of households that have zero or one automobile and households where the total income level is below the federally defined poverty level
  - Used to track the level of need among those who are considered transit dependent and more likely to utilize transit if it is available

Mobility Performance Results

The Mobility Index provides a high-level assessment of mobility conditions for the corridor and for each segment. The four secondary measures provide more detailed information to assess mobility performance.

Based on the results of this analysis, the following observations were made:

- Overall, based on the weighted average of the Mobility Index, the performance of traffic operations is “good”
- The performance for existing peak hour traffic operations is “good” along the entire corridor
- The performance of future traffic operations is anticipated to be “poor” in two of the fourteen segments: segments 85-12 and 85-14
- Segments 85-12 and 85-14 have the lowest Mobility Index and perform the worst in the Future V/C performance measure
- Closure Extent data was not available for segments 85-13 and 85-14
- Half of the segments show “fair” performance in the Closure Extent performance measure
- Segment 85-9 has the highest number of closures
- The TTI measures generally show “good” performance along the corridor, except for three segments with “fair” performance: segments 10W-1, 85-13, and 85-14Half of the segments in the PTI measures show “poor” performance
- Reliable PTI data was not available for segment 85-13
- A majority of the corridor shows “poor” or “fair” performance for non-SOV trips, meaning that many vehicles carry only a single occupant
- The majority of the segments show “good” performance for accommodation of bicycles, however three segments show “poor” performance, and two segments show “fair”
- Bicycles are not prohibited on any segment of the I-10/SR 85 corridor. Segments 85-12, 85-13, and 85-14 have the lowest percentage of bicycle accommodations along the corridor.

Table 7 summarizes the Mobility performance results for the I-10/SR 85 Corridor. **Figure 12** illustrates the primary Mobility Index performance along I-10/SR 85. Maps for each secondary measure can be found in **Appendix A**.

Table 7: Mobility Performance

Segment	Segment Length (miles)	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent (occurrences /year/mile)		Directional TTI (all vehicles)		Directional PTI (all vehicles)		% Bicycle Acc.	% Non-SOV Trips
				EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB		
10W-1^[2]	16	0.27	0.30	0.28	0.28	0.05	0.30	1.20	1.17	1.57	1.54	100%	11.9%
10W-2^[2]	6	0.30	0.32	0.29	0.29	0.03	0.23	1.13	1.10	1.30	1.25	100%	15.2%
10W-3^[2]	10	0.27	0.29	0.28	0.28	0.18	0.08	1.15	1.10	1.34	1.24	99%	19.7%
10W-4^[2]	22	0.31	0.34	0.34	0.34	0.11	0.14	1.11	1.09	1.24	1.23	100%	10.7%
10W-5^[2]	17	0.29	0.32	0.29	0.29	0.28	0.13	1.11	1.08	1.27	1.20	100%	5.3%
10W-6^[2]	11	0.29	0.32	0.31	0.27	0.36	0.24	1.10	1.09	1.21	1.23	100%	6.1%
10W-7^[2]	16	0.32	0.36	0.34	0.29	0.11	0.40	1.10	1.10	1.24	1.23	100%	12.5%
10W-8^[2]	15	0.53	0.70	0.34	0.35	0.11	0.12	1.11	1.10	1.25	1.25	100%	14.6%
85-9^[1]	6	0.30	0.39	0.18	0.18	0.77	0.07	1.00	1.05	1.32	1.76	88%	19.3%
85-10^[2]	11	0.23	0.28	0.16	0.15	0.00	0.25	1.07	1.00	1.83	1.07	100%	13.6%
85-11^[2]	15	0.17	0.20	0.09	0.09	0.03	0.13	1.01	1.09	1.16	1.84	94%	8.2%
85-12*[2]	3	0.92	1.11	0.56	0.56	0.07	0.27	1.00	1.19	1.00	3.19	32%	8.8%
85-13*[1]	2	0.32	0.35	0.25	0.25	No Data		1.85	1.47	No Data	4.26	47%	9.0%
85-14*[1]	3	1.01	1.24	0.67	0.66	No Data		1.28	1.89	9.05	4.25	42%	7.0%
Weighted Corridor Average		0.33											

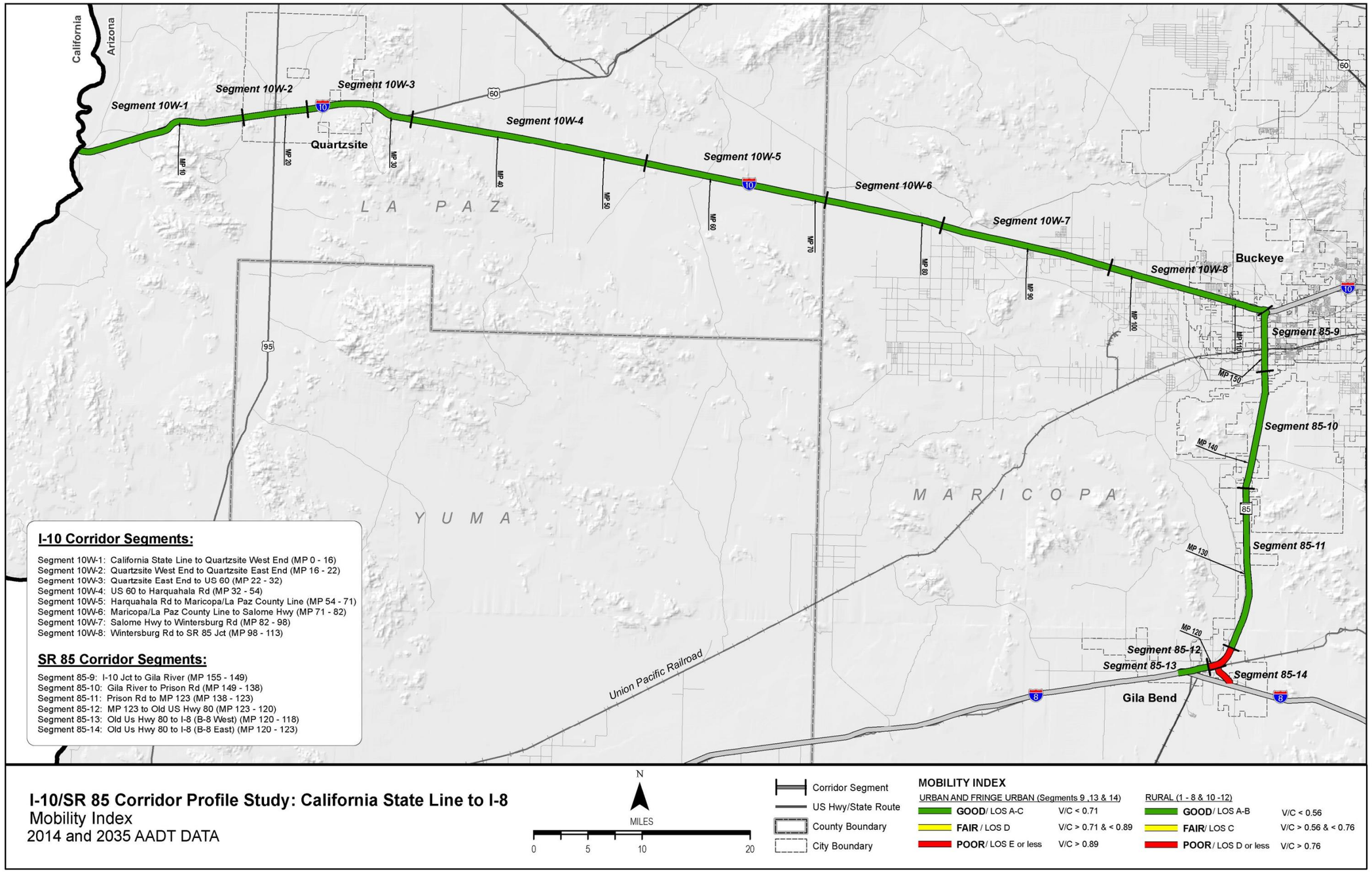
SCALES

Performance Level	Urban (Rural)	All	Uninterrupted Flow			
Good	< 0.71 (< 0.56)	< 0.22	< 1.15	< 1.30	> 90%	> 17%
Fair	0.71 – 0.89 (0.56 – 0.76)	0.22 – 0.62	1.15 – 1.33	1.30 – 1.50	60% - 90%	11% - 17%
Poor	> 0.89 (> 0.76)	> 0.62	> 1.33	> 1.50	< 60%	< 11%

Interrupted Flow	
<1.30	<3.00
1.30-2.00	3.00-6.00
>2.00	>6.00

^Uninterrupted Flow Facility
*Interrupted Flow Facility
[1]Urban Operating Environment
[2]Rural Operating Environment

Figure 12: Mobility Performance



2.5 Safety Performance Area

The Safety performance area consists of a primary measure (Safety Index) and four secondary measures, as illustrated in **Figure 13**. All measures relate to crashes that result in fatal and incapacitating injuries, as these types of crashes are the emphasis of the ADOT Strategic Highway Safety Plan (SHSP), FHWA, and MAP-21. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 13: Safety Performance Measures

Primary Safety Index

The Safety Index is based on the bi-directional frequency and rate of fatal and incapacitating injury crashes, the relative cost of those types of crashes, and crash occurrences on similar roadways in Arizona. According to ADOT's 2010 Highway Safety Improvement Program Manual, fatal crashes have an estimated cost that is 14.5 times the estimated cost of incapacitating injury crashes ($5.8 million compared to $400,000).

Each corridor segment is rated on a scale by comparing the segment score with the average statewide score for similar operating environments. Because crash frequencies and rates vary depending on the operating environment of a particular roadway, statewide values were developed for similar operating environments defined by functional classification, urban vs. rural setting, number of travel lanes, and traffic volumes.

For the I-10/SR 85 Corridor, the following operating environments were identified:

- Rural 4 Lane Freeway with Volume < 25,000: Segments 10W1through 10W7
- Rural 4 Lane Freeway with Volume >25,000: Segment 10W-8
- 2 or 3 or 4 Lane Divided Highway: Segments 85-9 through 85-11
- 2 or 3 Lane Undivided Highway: Segments 85-12 and 85-14
- 4 or 5 Lane Undivided Highway: Segment 85-13

Secondary Measures

Four secondary measures provide an in-depth evaluation of the different characteristics of safety performance:

Directional Safety Index

- This measure is based on the directional frequency and rate of fatal and incapacitating injury crashes

SHSP Emphasis Areas

ADOT's 2014 SHSP identified several emphasis areas for reducing fatal and incapacitating injury crashes. This measure compared rates of crashes in the top five SHSP emphasis areas to other corridors with a similar operating environment. The top five SHSP emphasis areas related to the following driver behaviors:

- Speeding and aggressive driving
- Impaired driving
- Lack of restraint usage
- Lack of motorcycle helmet usage
- Distracted driving

Crash Unit Types

- The percentage of total fatal and incapacitating injury crashes that involves crash unit types of motorcycles, trucks, or non-motorized travelers is compared to the statewide average on roads with similar operating environments

Safety Hot Spots

- The hot spot analysis identifies abnormally high concentrations of fatal and incapacitating injury crashes along the study corridor by direction of travel

Safety Performance Results

The Safety Index provides a high-level assessment of safety performance for the corridor and for each segment. The four secondary measures provide more detailed information to assess safety performance.

For the I-10/SR 85 Corridor, it was determined that the crash unit type performance measures for crashes involving motorcycles and non-motorized travelers have insufficient data (i.e., too small of a sample size) to generate reliable performance ratings. Therefore, these measures were not included

in the performance evaluation for this corridor. Similarly, segments 85-12 through 85-14 have insufficient data to generate reliable performance ratings and were therefore not included in the performance evaluation.

Based on the results of this analysis, the following observations were made:

- A total of 185 fatal and incapacitating injury crashes occurred along the I-10/SR 85 Corridor in 2010-2014; of these crashes, 73 were fatal and 112 involved incapacitating injuries
- Overall, based on the weighted average of the Safety Index, the corridor shows "below average" performance
- For the Safety Index, the segments are about divided evenly among the three performance rating levels, with 5 segments showing "above average" performance, 4 segments showing "average" performance, and 5 segments showing "below average" performance
- Segment 10W-4 performs "below average" in the Safety Index, Top 5 SHSP Emphasis Areas, and both directions of travel for the Directional Safety Index.
- There are several locations of high crash frequency, including eastbound/southbound in Segments 10W-4 through 10W-8 and 85-9, and northbound/westbound in Segments 10W-2 through 10W-7 and 85-9.
- Safety hot spots include:
  - Westbound MP 25 (Segment 10W-3)
  - Westbound MP 29 (Segment 10W-3)
  - Eastbound MP 35 (Segment 10W-4)
  - Eastbound MP 37 (Segment 10W-4)
  - Eastbound MP 42 (Segment 10W-4)
  - Westbound MP 40 (Segment 10W-4)
  - Eastbound MP 61-62 (Segment 10W-5)
  - Westbound MP 70-74 (Segment 10W-6)
  - Eastbound MP 82 (Segment 10W-7)
  - Eastbound MP 86-88 (Segment 10W-7)
  - Eastbound MP 107 (Segment 10W-8)
  - Eastbound MP 109-112 (Segment 10W-8)
  - Westbound MP 111-112 (Segment 10W-8)
  - Northbound MP 153 (Segment 85-9)
  - Southbound MP 154 (Segment 85-9)

Table 8 summarizes the Safety performance results for the I-10/SR 85 Corridor. **Figure 14** illustrates the primary Safety Index performance and locations of safety hot spots along the I-10/SR 85 Corridor. Maps for each secondary measure can be found in **Appendix A**.

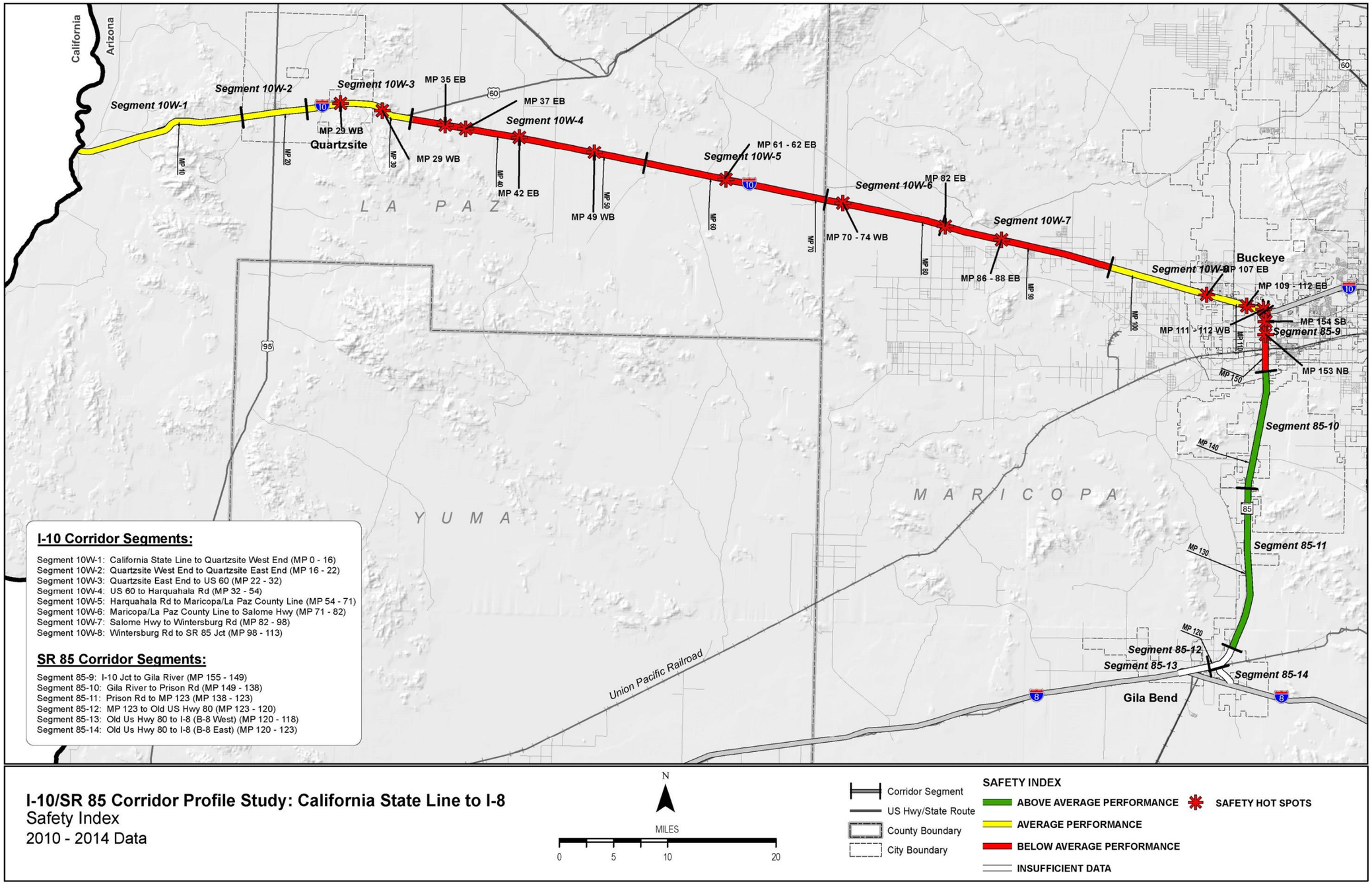
Table 8: Safety Performance

Segment #	Segment Length (miles)	Total Fatal & Incapacitating Injury Crashes (F/I)	Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	% of Fatal + Incapacitating Injury Crashes Involving Trucks
				EB/SB	NB/WB		
10W-1[a]	16	4/8	0.76	0.43	1.10	58%	8%
10W-2[a]	6	2/3	0.99	0.12	1.86	40%	Insufficient Data
10W-3[a]	10	3/10	1.03	1.20	0.87	54%	15%
10W-4[a]	22	13/24	1.79	1.92	1.65	54%	11%
10W-5[a]	17	9/17	1.60	2.08	1.12	35%	35%
10W-6[a]	11	6/12	1.66	2.62	0.70	56%	17%
10W-7[a]	16	15/10	2.60	1.48	3.72	40%	20%
10W-8[b]	15	12/14	1.05	1.39	0.71	50%	19%
85-9[c]	6	6/9	3.12	3.20	3.05	Insufficient Data	Insufficient Data
85-10[c]	11	2/0	0.54	1.08	0.00	Insufficient Data	Insufficient Data
85-11[c]	15	1/2	0.26	0.50	0.03	Insufficient Data	Insufficient Data
85-12[e]	3	0/1	0.11	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data
85-13[d]	2	0/2	0.17	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data
85-14[e]	3	0/0	0.00	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data
Weighted Corridor Average			1.37	1.20	0.87	49%	18%
SCALES							
Performance Level	**Rural 4 Lane Freeway with Daily Volume < 25,000**						
Above Average	< 0.73					< 42.8%	< 13.2%
Average	0.73 – 1.27					42.8% - 52.9%	13.2% - 17.0%
Below Average	> 1.27					> 52.9%	> 17.0%
Performance Level	**Rural 4 Lane Freeway with Daily Volume > 25,000**						
Above Average	< 0.68					< 40.8%	< 7.2%
Average	0.68 – 1.32					40.8% - 57.1%	7.2% - 12.9%
Below Average	> 1.32					> 57.1%	> 12.9%
Performance Level	**2 or 3 or 4 Lane Divided Highway**						
Above Average	< 0.77					< 44%	< 16%
Average	0.77 – 1.23					44% - 54%	16% - 26%
Below Average	> 1.23					> 54%	> 26%
Performance Level	**4 or 5 Lane Undivided Highway**						
Above Average	< 0.80					< 42%	< 6%
Average	0.80 – 1.20					42% - 51%	6% - 9%
Below Average	> 1.20					> 51%	> 9%
Performance Level	**2 or 3 Lane Undivided Highway**						
Above Average	< 0.94					< 51%	< 19%
Average	0.94 – 1.06					51% - 58%	19% - 27%
Below Average	> 1.06					> 58%	> 27%

Note: "Insufficient Data" indicates there was not enough data available to generate reliable performance ratings.

[a]4 lane Freeway with Daily Volume < 25,000 [b]4 Lane Freeway with Daily Volume > 25,000 [c]2 or 3 or 4 Lane Divided Highway [d]4 or 5 Lane Undivided Highway [e]2 or 3 Lane Undivided Highway

Figure 14: Safety Performance



2.6 Freight Performance Area

The Freight performance area consists of a single Freight Index and five secondary measures as illustrated in **Figure 15**. All measures relate to the reliability of truck travel as measured by observed truck travel time speed and delays to truck travel from freeway closures or physical restrictions to truck travel. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 15: Freight Performance Measures

Primary Freight Index

The Freight Index is a reliability performance measure based on the PTI for truck travel. The Truck Planning Time Index (TPTI) is the ratio of the 95th percentile truck travel time to the free-flow truck travel time. The TPTI reflects the extra buffer time needed for on-time delivery while accounting for non-recurring delay. Non-recurring delay refers to unexpected or abnormal delay due to closures or restrictions resulting from circumstances such as crashes, inclement weather, and construction activities.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Freight performance area, the relevant operating environments are interrupted flow (e.g., signalized at-grade intersections are present) and uninterrupted flow (e.g., controlled access grade-separated conditions such as a freeway or interstate highway).

For the I-10/SR 85 Corridor, the following operating environments were identified:

- Uninterrupted Flow: Segments 10W-1 through 10W-8 and 85-9 through 85-11
- Interrupted Flow: Segments 85-12 through 85-14

Secondary Measures

The Freight performance area includes five secondary measures that provide an in-depth evaluation of the different characteristics of freight performance:

Recurring Delay (Directional Truck Travel Time Index [TTTI])

- The ratio of the average peak period truck travel time to the free-flow truck travel time (based on the posted speed limit up to a maximum of 65 miles per hour) in a given direction
- The TTTI recognizes the delay potential from recurring congestion during peak periods; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics

Non-Recurring Delay (Directional TPTI)

- The ratio of the 95th percentile truck travel time to the free-flow truck travel time (based on the posted speed limit up to a maximum of 65 miles per hour) in a given direction
- The TPTI recognizes the delay potential from non-recurring delays such as traffic crashes, weather, or other incidents; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
- The TPTI indicates the amount of time in addition to the typical travel time that should be allocated to make an on-time trip 95% of the time in a given direction

Closure Duration

- The average time (in minutes) a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel; a weighted average is applied to each closure that takes into account the distance over which the closure occurs

Bridge Vertical Clearance

- The minimum vertical clearance (in feet) over the travel lanes for underpass structures on each segment

Bridge Vertical Clearance Hot Spots

- A Bridge vertical clearance "hot spot" exists where the underpass vertical clearance over the mainline travel lanes is less than 16.25 feet and no exit/entrance ramps exist to allow vehicles to bypass the low clearance location
- If a location with a vertical clearance less than 16.25 feet can be avoided by using immediately adjacent exit/entrance ramps rather than the mainline, it is not considered a hot spot

Freight Performance Results

The Freight Index provides a top-level assessment of the freight mobility for the corridor and for each segment. The four secondary measures provide more detailed information to assess freight performance for each segment.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the freight performance area, the relevant operating environments included interrupted flow (signalized at-grade intersections are present) and uninterrupted flow (controlled access grade-separated conditions such as a freeway or interstate highway).

Based on the results of this analysis, the following observations could be made:

- Overall, based on the weighted average of the Freight Index, the freight mobility shows "good" performance
- Slightly more than half of the segments show "good" performance in the Freight Index, and the majority show "good" performance in directional TTTI and TPTI
- The majority of the segments along the SR 85 portion of the corridor show "poor" or "fair" performance for TTTI and TPTI.
- Closure Duration data was not available for segments 85-13 and 85-14
- A majority of the segments show "good" performance in the Closure Duration performance indicator
- Segments 10W-4, 6, and 7, and 85- 9, and 10 have the longest duration of closures
- There are two locations along the corridor that have a vertical clearance restriction that cannot be by-passed by using ramps, Ramsey Mine Road UP (MP 33) and 355th Avenue UP (MP 101).
- Segments 85-9 through 85-12 and 85-14 do not contain any bridges under which SR 85 passes

Table 9 summarizes the freight performance for the I-10/SR 85 corridor. **Figure 16** illustrates the primary freight index performance and locations of freight hot spots along I-10/SR 85. Maps for each secondary measure can be found in **Appendix A.**

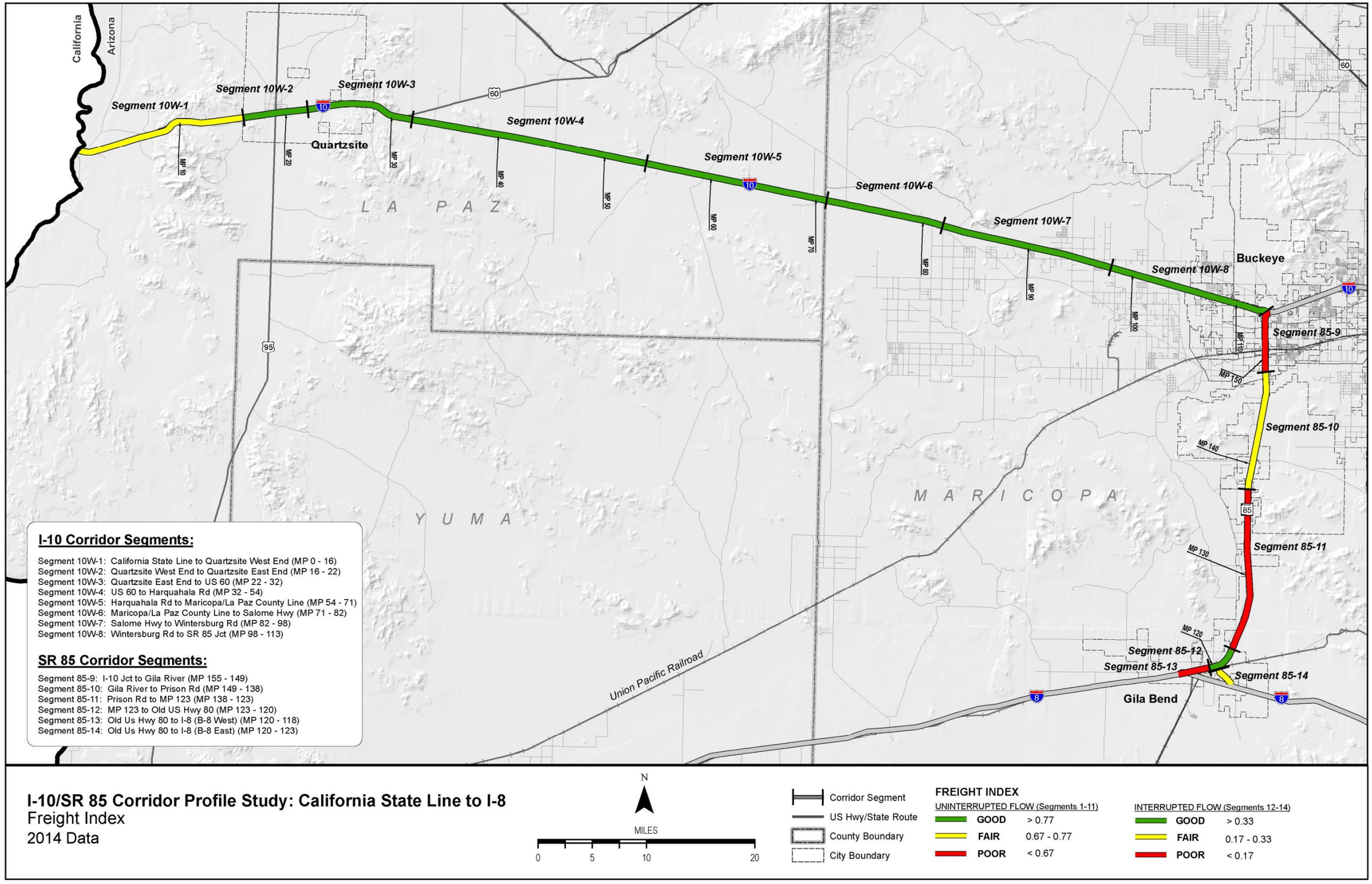
Table 9: Freight Performance

Segment #	Segment Length (miles)	Freight Index	Directional TTTI		Directional TPTI		Closure Duration (minutes/milepost closed/year/mile)		Bridge Vertical Clearance (feet)
			EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB	
10W-1[2^]	16	0.71	1.14	1.19	1.36	1.46	50.47	25.03	16.11
10W-2[2^]	6	0.89	1.05	1.04	1.13	1.11	43.57	4.80	15.96
10W-3[2^]	10	0.89	1.05	1.04	1.14	1.10	8.78	60.66	16.14
10W-4[2^]	22	0.90	1.04	1.05	1.09	1.12	35.48	136.64	15.90
10W-5[2^]	17	0.87	1.06	1.06	1.17	1.13	42.00	59.85	16.25
10W-6[2^]	11	0.90	1.06	1.05	1.11	1.12	100.12	97.78	16.00
10W-7[2^]	16	0.88	1.05	1.06	1.13	1.15	197.56	36.99	16.58
10W-8[2^]	15	0.90	1.04	1.04	1.11	1.12	44.39	31.35	15.92
85-9[1^]	6	0.66	1.00	1.07	1.40	1.64	17.87	187.62	No UP
85-10[2^]	11	0.73	1.11	1.00	1.71	1.03	93.75	0.00	No UP
85-11[2^]	15	0.65	1.06	1.15	1.15	1.94	21.20	4.17	No UP
85-12[2]*	3	0.60	1.00	1.19	1.00	2.35	30.67	5.33	No UP
85-13[1]*	2	0.14	1.47	2.17	2.59	12.08	No Data		16.63
85-14[1]*	3	0.17	1.91	1.27	3.82	8.04	No Data		No UP
Weighted Corridor Average		0.89	1.10	1.08	1.35	1.48	56.77	61.68	16.12

SCALES

Performance Level	Uninterrupted Interrupted			All	
Good	> 0.77^ > 0.33*	< 1.15^ < 1.30*	< 1.30^ < 3.00*	< 44.18	> 16.5
Fair	0.67 - 0.77^ 0.17 - 0.33*	1.15 -1.33^ 1.30 - 2.00*	1.30 - 1.50^ 3.00-6.00*	44.18 -124.86	16.0 - 16.5
Poor	< 0.67^ < 0.17*	> 1.33^ > 2.00*	> 1.50^ > 6.00*	> 124.86	< 16.0

Figure 16: Freight Performance



2.7 Corridor Performance Summary

Based on the results presented in the preceding sections, the following general observations were made related to the performance of the I-10/SR 85 corridor:

- The pavement performance is generally n "good" except at a few isolated locations
- The bridge performance is generally in "fair" overall with only eight bridges with a single rating of 5 along the corridor.
- The general mobility and freight indices along the corridor have "good" performance where both are also showing very little recurring and non-recurring delays along the I-10 portion of the corridor. The segments along SR 85 show elevated levels of delay in the southern end of the corridor.
- The closures along the corridor are generally lower than the statewide average for both the closure frequency and duration, however there is one outlier in segment 9 in the southbound direction
- Overall, based on the weighted average of the Safety Index, the corridor performs "below average"
- There are a few Safety hot spot crashes throughout the corridor in segments 10W-3 through 10W-8 and 85-9.

Figure 17 shows the percentage of the I-10/SR 85 corridor that rates either "good/above average performance", "fair/average performance", or "poor/below average" performance for each primary measure. Approximately 94% of the corridor shows "good" performance in the Pavement Index. For the Bridge Index, 47% of the corridor shows "good" performance, and 53% shows "fair" performance. Approximately 96% of the corridor shows "good" performance in Mobility, while the remaining 4% shows "poor" performance. Almost half of the corridor (47%) for the Safety index shows "below average" performance, while 31% of the corridor shows "average" performance, and 22% of the corridor shows "above average" performance. For the Freight Index, approximately 65% of the corridor shows "good" performance while 20% shows "fair" performance and 15% shows "poor" performance.

The lowest performance along the I-10/SR 85 corridor generally occurs in the Bridge and Safety performance areas while the Pavement and Mobility performance areas showing the highest performance.

Table 10 shows a summary of corridor performance for all primary measures and secondary measure indicators for the I-10/SR 85 corridor. A weighted corridor average rating (based on the length of the segment) was calculated for each primary and secondary measure. The weighted average ratings are summarized in **Figure 18** which also provides a brief description of each performance measure. **Figure 18** represents the average for the entire corridor and any given segment or location could have a higher or lower rating than the corridor average.

Figure 17: Performance Summary by Primary Index

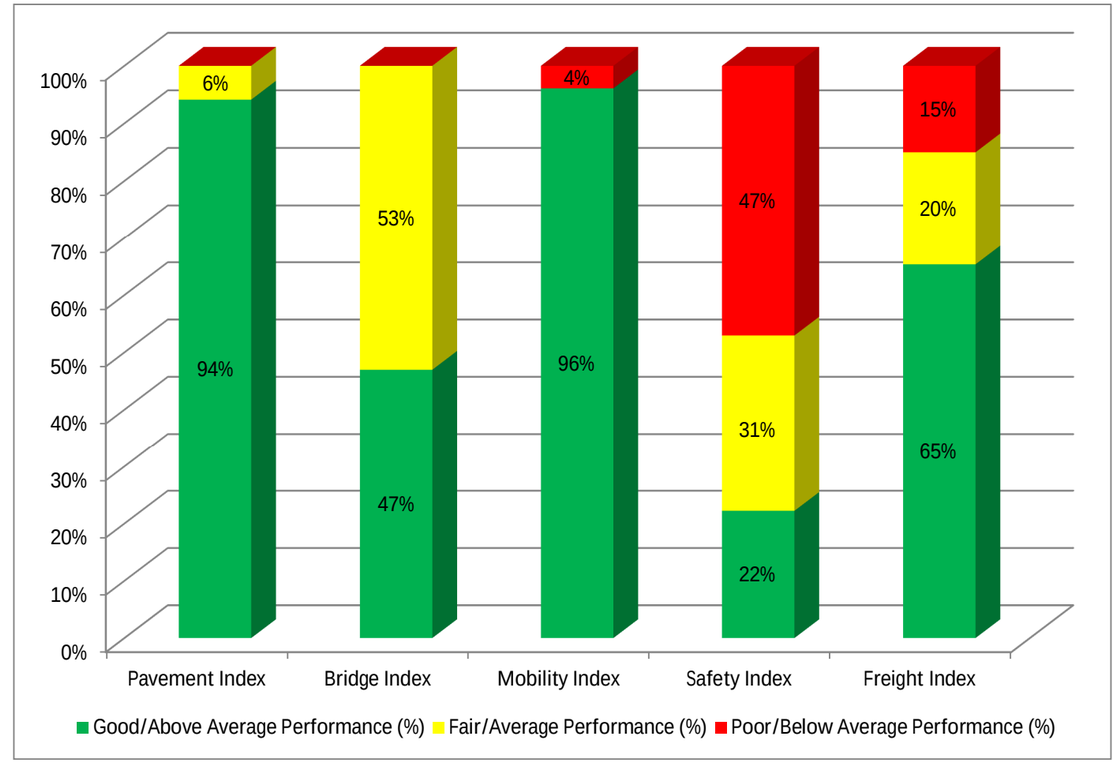


Figure 18: Corridor Performance Summary by Performance Measure

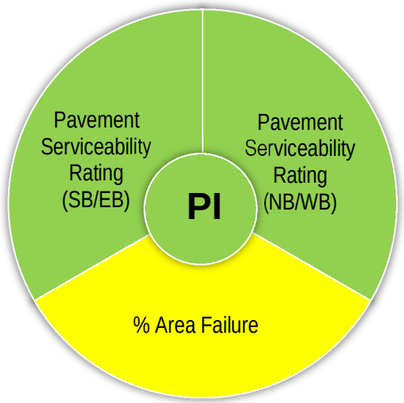
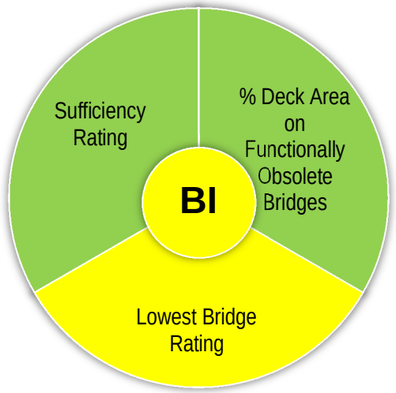
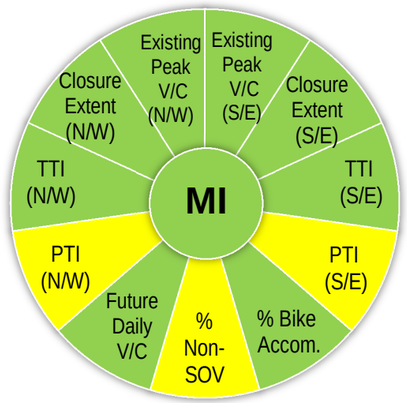
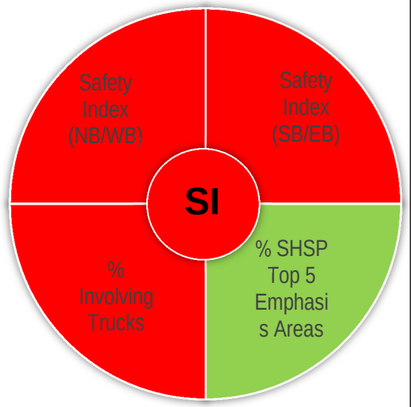
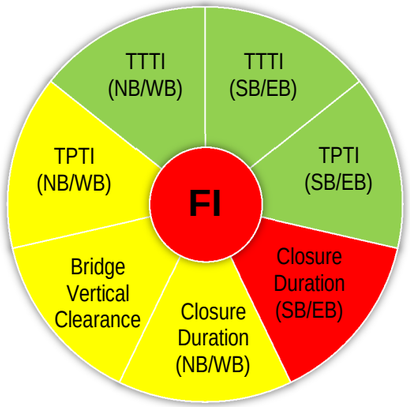
Pavement	Bridge	Mobility	Safety	Freight
				
Pavement Index (PI): based on two pavement condition ratings from the ADOT Pavement Database; the two ratings are the International Roughness Index (IRI) and the Cracking Rating.	Bridge Index (BI): based on four bridge condition ratings from the ADOT Bridge Database; the four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating	Mobility Index (MI): an average of the existing daily volume-to-capacity (V/C) ratio and the projected 2035 daily V/C ratio	Safety Index (SI): combines the bi-directional frequency and rate of fatal and incapacitating injury crashes, compared to crash occurrences on similar roadways in Arizona	Freight Index (FI): a reliability performance measure based on the bi-directional planning time index for truck travel
Ø Directional Pavement Serviceability Rating (PSR) – the weighted average (based on number of lanes) of the PSR for the pavement in each direction of travel Ø % Area Failure – the percentage of pavement area rated above failure thresholds for IRI or Cracking	Ø Sufficiency Rating– multipart rating includes structural adequacy and safety factors as well as functional aspects such as traffic volume and length of detour Ø % of Deck Area on Functionally Obsolete Bridges– the percentage of deck area in a segment that is on functionally obsolete bridges; identifies bridges that no longer meet standards for current traffic volumes, lane width, shoulder width, or bridge rails; a bridge that is functionally obsolete may still be structurally sound Ø Lowest Bridge Rating –the lowest rating of the four bridge condition ratings on each segment	Ø Future Daily V/C – the future 2035 V/C ratio provides a measure of future congestion if no capacity improvements are made to the corridor Ø Existing Peak Hour V/C – the existing peak hour V/C ratio for each direction of travel provides a measure of existing peak hour congestion during typical weekdays Ø Closure Extent – the average number of instances a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel Ø Directional Travel Time Index (TTI) – the ratio of the average peak period travel time to the free-flow travel time; the TTI represents recurring delay along the corridor Ø Directional Planning Time Index (PTI) – the ratio of the 95th percentile travel time to the free-flow travel time; the PTI represents non-recurring delay along the corridor Ø % Bicycle Accommodation – the percentage of a segment that accommodates bicycle travel Ø % Non-single Occupancy Vehicle (Non-SOV) Trips –the percentage of trips that are taken by vehicles carrying more than one occupant	Ø Directional Safety Index – the combination of the directional frequency and rate of fatal and incapacitating injury crashes, compared to crash occurrences on similar roadways in Arizona Ø % of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors – the percentage of fatal and incapacitating crashes that involve at least one of the five Strategic Highway Safety Plan (SHSP) emphasis areas on a given segment compared to the statewide average percentage on roads with similar operating environments Ø % of Fatal + Incapacitating Crashes Involving SHSP Crash Unit Types – the percentage of total fatal and incapacitating injury crashes that involves a given crash unit type (motorcycle, truck, non-motorized traveler) compared to the statewide average percentage on roads with similar operating environments.	Ø Directional Truck Travel Time Index (TTTI) – the ratio of the average peak period truck travel time to the free-flow truck travel time; the TTTI represents recurring delay along the corridor Ø Directional Truck Planning Time Index (TPTI) – the ratio the 95th percentile truck travel time to the free-flow truck travel time; the TPTI represents non-recurring delay along the corridor Ø Closure Duration – the average time a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel Ø Bridge Vertical Clearance – the minimum vertical clearance over the travel lanes for underpass structures on each segment

Table 10: Corridor Performance Summary by Segment and Performance Measure

Segment	Length (miles)	Pavement Performance Area				Bridge Performance Area				Mobility Performance Area											
		Pavement Index	Directional PSR		Pavement Failure	Bridge Index	Bridge Sufficiency	Bridge Rating	% Deck Area Functionally Obsolete	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent (instances/milepost/year/mile)		Directional TTI (all vehicles)		Directional PTI (all vehicles)		% Bicycle Acc.	% Non-Single Occupancy Vehicle (SOV) Opportunities
			EB/SB	WB/NB								EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB		
10W-1^[a2]	16	3.76	3.96	3.93	13.0%	5.11	67.26	5	5.8%	0.27	0.30	0.28	0.28	0.05	0.30	1.20	1.17	1.57	1.54	100.00%	11.9%
10W-2^[a2]	6	3.61	3.87	4.06	0.0%	5.92	95.30	5	9.0%	0.30	0.32	0.29	0.29	0.03	0.23	1.13	1.10	1.30	1.25	100.00%	15.2%
10W-3^[a2]	10	3.90	3.88	3.97	0.0%	6.00	87.89	6	36.8%	0.27	0.29	0.28	0.28	0.18	0.08	1.15	1.10	1.34	1.24	99.00%	19.7%
10W-4^[a2]	22	3.76	3.52	3.74	27.0%	6.50	97.22	5	0.0%	0.31	0.34	0.34	0.34	0.11	0.14	1.11	1.09	1.24	1.23	100.00%	10.7%
10W-5^[a2]	17	4.37	4.22	4.16	0.0%	6.48	98.35	6	0.0%	0.29	0.32	0.29	0.29	0.28	0.13	1.11	1.08	1.27	1.20	100.00%	5.3%
10W-6^[a2]	11	3.85	3.55	3.68	18.0%	7.00	97.41	7	0.0%	0.29	0.32	0.27	0.31	0.36	0.24	1.10	1.09	1.21	1.23	100.00%	6.1%
10W-7^[a2]	16	3.95	3.81	3.94	0.0%	6.25	97.70	6	0.0%	0.32	0.36	0.29	0.34	0.11	0.40	1.10	1.10	1.24	1.23	100.00%	12.5%
10W-8^[b2]	15	3.95	3.67	3.80	13.0%	6.71	96.12	5	0.0%	0.53	0.70	0.34	0.35	0.11	0.12	1.11	1.10	1.25	1.25	100.00%	14.6%
85-9^[c1]	6	4.01	3.85	3.63	0.0%	NO BRIDGES IN SEGMENT				0.30	0.39	0.18	0.18	0.77	0.07	1.05	1.00	1.32	1.76	88.00%	1.32
85-10^[c2]	11	3.83	3.82	4.11	14.0%	6.53	99.47	6	0.0%	0.23	0.28	0.15	0.16	0.00	1.83	1.07	1.00	1.83	1.07	100.00%	13.6%
85-11^[c2]	15	3.80	4.35	3.78	22.0%	NO BRIDGES IN SEGMENT				0.17	0.20	0.09	0.09	0.03	0.13	1.09	1.01	1.16	1.84	94.00%	1.16
85-12*[e2]	3	3.32	3.42	3.21	17.0%	5.00	83.40	5	0.0%	0.92	1.11	0.56	0.56	0.07	0.27	1.00	1.19	1.00	3.19	32.00%	8.8%
85-13*[d1]	2	5.00	5.00	5.00	0.00	5.21	89.61	5	0.0%	0.32	0.35	0.25	0.25	NO DATA AVAILABLE		1.47	1.85	4.26	72.41	47.00%	9.0%
85-14*[e1]	3	5.00	5.00	5.00	0.00	6.86	94.25	6	0.0%	1.01	1.24	0.66	0.67	NO DATA AVAILABLE		1.89	1.28	4.25	4.25	42.00%	7.0%
Weighted Corridor Average		3.93	3.88	3.85	11.69%	6.26	92.58	5.6	3.9%	0.33	0.38	0.28	0.29	0.15	0.20	1.11	1.11	1.47	1.47	96%	7.0%
SCALES																					
		Interstate (Non-Interstate)								Urban (Rural)						Uninterrupted (Interrupted)					
Good/Above Average		> 3.75 (3.5)			< 5%	> 6.5	> 80	> 6	< 12%	< 0.71 (< 0.56)				< 0.22		< 1.15 (1.30)		<1.30 (3.00)		> 90%	> 17%
Fair/Average		3.2 - 3.75 (2.9-3.5)			5% - 20%	5.0 - 6.5	50 - 80	5 – 6	12% - 40%	0.71 - 0.89 (0.56 - 0.76)				0.22 – 0.62		1.15-1.33 (1.3-2)		1.30-1.50 (3-6)		60% - 90%	11% - 17%
Poor/Below Average		< 3.2 (2.9)			> 20%	< 5.0	< 50	< 5	> 40 %	> 0.89(> 0.76)				> 0.62		> 1.33 (2.00)		>1.50 (6.00)		< 60%	< 11%

^Uninterrupted Flow Facility
*Interrupted Flow Facility
[a]4 Lane Freeway with Daily Volume < 25,000
[b]4 Lane Freeway with Daily Volume > 25,000
[c]2 or 3 or 4 Lane Divided Highway
[d]4 or 4 Lane Undivided Highway
[e] 2 or 3 Lane Undivided Highway
[1]Urban Operating Environment
[2]Rural Operating Environment

Table 10: Corridor Performance Summary by Segment and Performance Measure (Continued)

		Safety Performance Area					Freight Performance Area							
Segment	Length (miles)	Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	% of Fatal + Incapacitating Injury Crashes Involving Trucks	Freight Index	Directional TTI (trucks only)		Directional PTI (trucks only)		Closure Duration (mins/milepost closed/year/mile)		Bridge Vertical Clearance (feet)
			EB/SB	WB/NB				EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB	
10W-1^[a2]	16	0.76	0.43	1.10	58%	8%	0.71	1.14	1.19	1.36	1.46	50.47	25.03	16.11
10W-2^[a2]	6	0.99	0.12	1.86	40%	Insufficient Data	0.89	1.05	1.04	1.13	1.11	43.57	4.80	15.96
10W-3^[a2]	10	1.03	1.20	0.87	54%	15%	0.89	1.05	1.04	1.14	1.10	8.78	60.66	16.14
10W-4^[a2]	22	1.79	1.92	1.65	54%	11%	0.90	1.04	1.05	1.09	1.12	35.48	136.64	15.90
10W-5^[a2]	17	1.60	2.08	1.12	35%	35%	0.87	1.06	1.06	1.17	1.13	42.00	59.85	16.25
10W-6^[a2]	11	1.66	2.62	0.70	56%	17%	0.90	1.06	1.05	1.11	1.12	100.12	97.78	16.00
10W-7^[a2]	16	2.60	1.48	3.72	40%	20%	0.88	1.05	1.06	1.13	1.15	197.56	36.99	16.58
10W-8^[b2]	15	1.05	1.39	0.71	50%	19%	0.90	1.04	1.04	1.11	1.12	44.39	31.35	15.92
85-9^[c1]	6	3.12	3.05	3.20	Insufficient Data	Insufficient Data	0.66	1.00	1.07	1.40	1.64	17.87	187.62	No UP
85-10^[c2]	15	0.54	1.08	0.00	Insufficient Data	Insufficient Data	0.73	1.11	1.00	1.71	1.03	93.75	0.00	No UP
85-11^[c2]	3	0.26	0.50	0.03	Insufficient Data	Insufficient Data	0.65	1.06	1.15	1.15	1.94	21.20	4.17	No UP
85-12*[e2]	2	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data	0.60	1.00	1.19	1.00	2.35	30.67	5.33	No UP
85-13*[d1]	3	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data	0.14	1.47	2.17	2.59	12.08	No Data	No Data	16.63
85-14*[e1]		Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data	Insufficient Data	0.17	1.91	1.27	3.82	8.04	No Data	No Data	No UP
Weighted Corridor Averages		1.37	1.44	1.31	49%	18%	0.80	1.10	1.08	1.35	1.48	56.77	61.68	16.12
							Uninterrupted (Interrupted)							
Good/Above Average		Varies					> 0.77(0.33)	<1.15(1.30)		<1.30(3.00)		< 44.18		> 16.5
Fair/Average		Varies					.67-.77(.17-.33)	1.15-1.33(1.3-2)		1.30-1.50(3-6)		44.18 -124.86		16.0-16.5
Poor/Below Average		Varies					< 0.67(.17)	>1.33(2.00)		>1.50(6.00)		> 124.86		< 16.0

^Uninterrupted Flow Facility [a]4 Lane Freeway with Daily Volume < 25,000 [c]2 or 3 or 4 Lane Divided Highway [e]2 or 3 Lane Undivided Highway [1]Urban Operating Environment
*Interrupted Flow Facility [b]4 Lane Freeway with Daily Volume > 25,000 [d]4 or 4 Lane Undivided Highway [2]Rural Operating Environment

3.0 NEEDS ASSESSMENT

3.1 Corridor Objectives

Statewide goals and performance measures were established by the ADOT Long-Range Transportation Plan (LRTP), 2010-2035. Statewide performance goals that are relevant to I-10/SR85 performance areas were identified and corridor goals were then formulated for each of the five performance areas that aligned with the overall statewide goals established by the LRTP. Based on stakeholder input, corridor goals, corridor objectives, and performance results, three "Emphasis Areas" were identified for the I-10/SR 85 corridor: Mobility, Safety, and Freight.

Taking into account the corridor goals and identified emphasis areas, performance objectives were developed for each quantifiable performance measure that identify the desired level of performance based on the performance scale levels for the overall corridor and for each segment of the corridor. For the performance emphasis areas, the corridor-wide weighted average performance objectives are identified with a higher standard than for the other performance areas. **Table 11** shows the I-10/SR 85 Corridor goals, corridor objectives, and performance objectives, and how they align with the statewide goals.

It is not reasonable within a financially constrained environment to expect that every performance measure will always be at the highest levels on every corridor segment. Therefore, individual corridor segment objectives have been set as fair or better and should not fall below that standard.

Achieving corridor and segment performance objectives will help ensure that investments are targeted toward improvements that support the safe and efficient movement of travelers on the corridor. Addressing current and future congestion, thereby improving mobility on congested segments, will also help the corridor fulfill its potential as a significant contributor to the region's economy.

Corridor performance is measured against corridor and segment objectives to determine needs – the gap between observed performance and performance objectives.

Goal achievement will improve or reduce current and future congestion, increase travel time reliability, and reduce fatalities and incapacitating injuries resulting from vehicle crashes. Where performance is currently rated "good", the goal is always to maintain that standard, regardless of whether or not the performance is in an emphasis area.

Table 11: Corridor Performance Goals and Objectives

ADOT Statewide LRTP Goals	I-10/SR 85Corridor Goals	I-10/SR 85 Corridor Objectives	Performance Area	Primary Measure	Performance Objective	
				Secondary Measure Indicators	Corridor Average	Segment
Improve Mobility and Accessibility **Support Economic Growth**	Improve mobility through additional capacity and improved roadway geometry Provide a safe and reliable route for recreational and tourist travel to/from Mexico, Southern California, and Southern Arizona destinations Provide safe, reliable and efficient connection to all communities along the corridor to permit efficient regional travel	Reduce current congestion and plan to facilitate future congestion that accounts for anticipated growth and land use changes Reduce delays from recurring and non-recurring events to improve reliability, especially in Payson and Holbrook Improve bicycle and pedestrian accommodations	Mobility (*Emphasis Area*)	Mobility Index	Good	Fair or better
				Future Daily V/C		
				Existing Peak Hour V/C		
				Closure Extent		
				Directional Travel Time Index		
				Directional Planning Time Index		
				% Bicycle Accommodation		
				% Non-SOV Trips		
	Provide a safe, reliable and efficient freight route between Arizona, California and Mexico	Reduce delays and restrictions to freight movement to improve reliability Improve travel time reliability (including impacts to motorists due to freight traffic)	Freight *(Emphasis Area)*	Freight Index	Good	Fair or better
				Directional Truck Travel Time Index		
				Directional Truck Planning Time Index		
				Closure Duration		
				Bridge Vertical Clearance		
Preserve and Maintain the State Transportation System	Preserve and modernize highway infrastructure	Maintain structural integrity of bridges	Bridge	Bridge Index	Fair or better	Fair or better
				Sufficiency Rating		
				% of Deck Area on Functionally Obsolete Bridges		
				Lowest Bridge Rating		
		Improve pavement ride quality for all corridor users Reduce long-term pavement maintenance costs	Pavement	Pavement Index	Fair or better	Fair or better
				Directional Pavement Serviceability Rating		
				% Area Failure		
Enhance Safety and Security	Provide a safe, reliable, and efficient connection for the communities along the corridor Promote safety by implementing appropriate countermeasures	Reduce fatal and incapacitating injury crashes for all roadway users	Safety *(Emphasis Area)*	Safety Index	Above Average	Average or better
				Directional Safety Index		
				% of Crashes Involving SHSP Top 5 Emphasis Areas Behaviors		
				% of Crashes Involving Crash Unit Types		

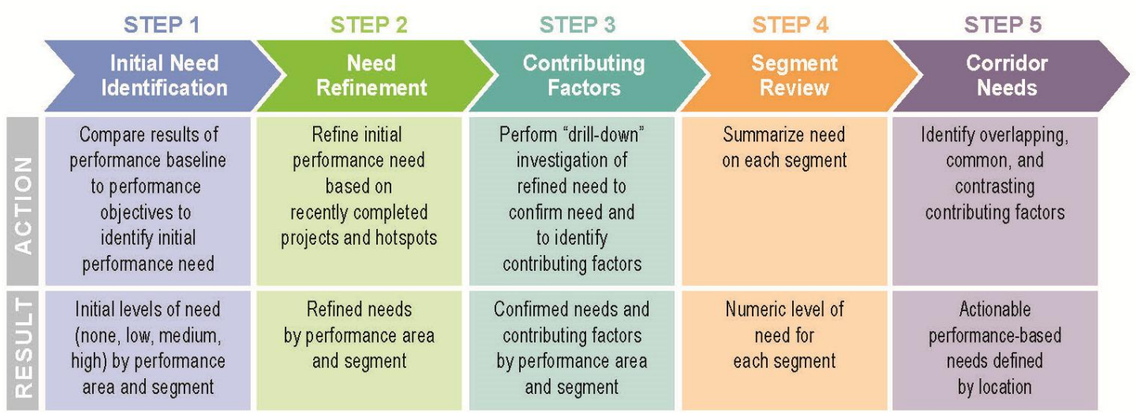
3.2 Needs Assessment Process

The following guiding principles were used as an initial step in developing a framework for the performance-based needs assessment process:

- Corridor needs are defined as the difference between the corridor performance and the performance objectives
- The needs assessment process should be systematic, progressive, and repeatable, but also allow for engineering judgment where needed
- The process should consider all primary and secondary performance measures developed for the study
- The process should develop multiple need levels including programmatic needs for the entire length of the corridor, performance area-specific needs, segment-specific needs, and location-specific needs (defined by MP limits)
- The process should produce actionable needs that can be addressed through strategic investments in corridor preservation, modernization, and expansion

The performance-based needs assessment process is illustrated in **Figure 19** and described in the following sections

Figure 19: Needs Assessment Process



Step 1: Initial Needs Identification

The first step in the needs assessment process links baseline (existing) corridor performance with performance objectives. In this step, the baseline corridor performance is compared to the performance objectives to provide a starting point for the identification of performance needs. This mathematical comparison results in an initial need rating of None, Low, Medium, or High for each primary and secondary performance measure. An illustrative example of this process is shown below in **Figure 20**.

Figure 20: Initial Need Ratings in Relation to Baseline Performance (Bridge Example)

Performance Thresholds	Performance Level	Initial Level of Need	Description
6.5	Good	None	All levels of Good and top 1/3 of Fair (>6.0)
	Good		
	Good		
	Fair		
	Fair	Low	Middle 1/3 of Fair (5.5-6.0)
5.0	Fair	Medium	Lower 1/3 of Fair and top 1/3 of Poor (4.5-5.5)
	Poor		
	Poor	High	Lower 2/3 of Poor (<4.5)
	Poor		

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

The initial level of need for each segment is refined to account for hot spots and recently completed or under construction projects, resulting in a final level of need for each segment. The final levels of need for each primary and secondary performance measure are combined to produce a weighted final need rating for each segment. Values of 0, 1, 2, and 3 are assigned to the initial need levels of None, Low, Medium, and High, respectively. A weight of 1.0 is applied to the Performance Index need and equal weights of 0.20 are applied to each need for each secondary performance measure. For directional secondary performance measures, each direction of travel receives a weight of 0.10.

Step 2: Need Refinement

In Step 2, the initial level of need for each segment is refined using the following information and engineering judgment:

- For segments with an initial need of None that contain hot spots, the level of need should be increased from None to Low
- For segments with an initial level of need where recently completed projects or projects under construction are anticipated to partially or fully address the identified need, the level of need should be reduced or eliminated as appropriate
- Programmed projects that are expected to partially or fully address an identified need are not justification to lower the initial need because the programmed projects may not be implemented as planned; in addition, further investigations may suggest that changes in the scope of a programmed project may be warranted

The resulting final needs are carried forward for further evaluation in Step 3.

Step 3: Contributing Factors

In Step 3, a more detailed review of the condition and performance data available from ADOT is conducted to identify contributing factors to the need. Typically, the same databases used to develop the baseline performance serve as the principle sources for the more detailed analysis. However, other supplemental databases may also be useful sources of information. The databases used for diagnostic analysis are listed below:

Pavement Performance Area

- Pavement Rating Database

Bridge Performance Area

- ABISS

Mobility Performance Area

- Highway Performance Monitoring System (HPMS) Database
- AZ Travel Demand Model (AZTDM)
- Real time traffic conditions database produced by American Digital Cartography Inc. (HERE) Database
- Highway Conditions Reporting System (HCRS) Database

Safety Performance Area

- Crash Database

Freight Performance Area

- HERE Database
- HCRS Database

In addition, other sources were considered to help identify the contributing factors such as:

- Maintenance history (from ADOT PeCoS for pavement), the level of past investments, or trends in historical data were used to help provide context for pavement and bridge history.
- Field observations from ADOT district personnel could be used to provide additional information regarding a need that has been identified.
- Previous studies can provide additional information regarding a need that has been identified.

Step 3 results in the identification of performance-based needs and contributing factors by segment (and MP locations, if appropriate) that can be addressed through investments in preservation, modernization, and expansion projects to improve corridor performance. See **Appendix D** for more information.

Step 4: Segment Review

In this step, the needs identified in Step 2 and refined in Step 3 are quantified for each segment to numerically estimate the level of need for each segment. Values of 0 to 3 were assigned to the final need levels (from Step 3) of None, Low, Medium, and High, respectively. A weighting factor is applied to the performance areas identified as emphasis areas and a weighted average need was calculated for each segment. The resulting average need score can be used to compare levels of need between segments within a corridor and between segments in different corridors.

Step 5: Corridor Needs

In this step, the needs and contributing factors for each performance area are reviewed on a segment-by-segment basis to identify actionable needs and to facilitate the formation of solution sets that address multiple performance areas and contributing factors. The intent of this process is to identify overlapping, common, and contrasting needs to help develop strategic solutions. This step will result in the identification of corridor needs by specific location.

3.3 Corridor Needs Assessment

This section documents the results of the needs assessment process described in the prior section. The needs in each performance area were classified as either None, Low, Medium, or High based on how well each segment performed in the existing performance analysis. The needs for each segment were numerically combined to estimate the average level of need for each segment of the corridor

The final needs assessments for each performance measure, along with the scales used in the analysis are shown in **Table 12** through **Table 16**.

Pavement Needs Refinements and Contributing Factors

- Pavement hot spots were identified in Segments 10W-1, 10W-4, 10W-6, 10W-8, 85-10, 85-11, and 85-12.
- Three segments (10W-8, 85-11 and 85-12) had recent paving projects that addressed the Needs, resulting in changing the need from "Low" to "None".
- With pavement rating data not available in Segments 85-13 and 85-14, a field review was conducted to provide an estimated level of need of None based on visual observation of pavement condition.
- The final pavement segment needs are classified as None except for four segments classified as Low.
- See **Appendix D** for detailed information on contributing factors.

Table 12: Final Pavement Needs

Segment #	Performance Score and Level of Need				Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Pavement Index	Directional PSR		% Pavement Area Failure				
		EB/SB	WB/NB					
10W-1	3.76	3.93	3.96	13.0%	0.2	EB MP 12-13, WB MP 9-10, 11-12, and 15-16	None	Low
10W-2	3.61	4.06	3.87	0.0%	0.0	-	None	None
10W-3	3.90	3.97	3.88	0.0%	0.0	-	None	None
10W-4	3.76	3.74	3.52	27.0%	0.7	EB MP 36-37, 38-45, and47-48, WB MP 41-42, 47-48, and 51-52	None	Low
10W-5	4.37	4.16	4.22	0.0%	0.0	-	None	None
10W-6	3.85	3.68	3.55	18.0%	0.5	EB MP 77-79 and WB MP 71-73	None	Low
10W-7	3.95	3.94	3.81	0.0%	0.0	-	None	None
10W-8	3.95	3.80	3.67	13.0%	0.2	EB MP 107-109 and 112-113. WB MP 105-106	Recent paving project addressed pavement need	None
85-9	4.01	3.63	3.85	0.0%	0.0	-	None	None
85-10	3.83	4.11	3.82	14.0%	0.2	NB MP 143-146	None	Low
85-11	3.80	3.78	4.35	22.0%	0.4	SB MP 123-126 and 127-131	Recent paving project addressed pavement need	None
85-12	3.32	3.21	3.42	17.0%	0.5	SB MP 122-123	Recent paving project addressed pavement need	None
85-13	5.00	5.00	5.00	0.00	0.0	-	None	None
85-14	5.00	5.00	5.00	0.00	0.0	-	None	None

Level of Need (Score)	Performance Score Need Scale		Segment Level Need Scale
None* (0)	> 3.30	< 10%	0
Low (1)	3.10 – 3.30	10% - 15%	< 1.5
Medium (2)	2.70 – 3.10	15% - 25%	1.5 – 2.5
High (3)	< 2.70	> 25%	> 2.5

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Bridge Needs Refinement and Contributing Factors

- Bridge needs occur due to under-performing bridges on nine of the twelve segments with bridges.
- Bridge needs were identified at 11 of the total 59 bridges (19%).
- One bridge (Tom Wells Rd TI UP at MP 5.84) has potential repetitive investment issues
- See **Appendix D** for detailed information on contributing factors.

Table 13: Final Bridge Needs

Segment #	Performance Score and Level of Need				Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Bridge Index	Sufficiency Rating	Lowest Bridge Rating	% of Deck on Functionally Obsolete Bridges				
10-1	5.11	67.26	5	5.8%	2.4	None	None	Medium
10-2	5.92	95.30	5	9.0%	1.2	None	None	Low
10-3	6.00	87.89	6	36.8%	0.2	None	None	Low
10-4	6.50	97.22	5	0.0%	0.2	None	None	Low
10-5	6.48	98.35	6	0.0%	0.0	None	None	None
10-6	7.00	97.41	7	0.0%	0.0	None	None	None
10-7	6.25	97.70	6	0.0%	0.0	None	None	None
10-8	6.71	96.12	5	0.0%	0.2	None	None	Low
85-9	No Bridges				0.0	None	None	None
85-10	6.53	99.47	6	0.0%	0.0	None	None	None
85-11	No Bridges				0.0	None	None	None
85-12	5.00	83.40	5	0.0%	2.2	None	None	Medium
85-13	5.21	89.61	5	0.0%	2.2	None	None	Medium
85-14	6.86	94.25	6	0.0%	0.0	None	None	None
Level of Need (Score)	**Performance Score Need Scale**				**Segment Level Need Scale**			
None (0)	> 6.0	> 70	> 5.0	< 21.0%	0			
Low (1)	5.5 – 6.0	60 – 70	5.0	21.0% - 31.0%	< 1.5			
Medium (2)	4.5 – 5.5	40 – 60	4.0	31.0% - 49.0%	1.5 – 2.5			
High (3)	< 4.5	< 40	< 4.0	> 49.0%	> 2.5			

*A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicated that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.

Mobility Needs Refinement and Contributing Factors

- Low Mobility needs were identified on eight of the fourteen segments (57% of corridor).
- High Mobility needs were identified on Segments 85-12 and 85-14 primarily due to the Mobility Index score
- A majority of the needs are related to future travel demand, directional TTI and PTI issues, and closures.
- See **Appendix D** for detailed information on contributing factors.

Table 14: Final Mobility Needs

Segment	Performance Score and Level of Need											Initial Segment Need	Recently Completed Projects	Final Segment Need
	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent		Directional TTI		Directional PTI		% Bicycle Accommodation			
			EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB				
10W-1[a]	0.27	0.30	0.28	0.28	0.05	0.30	1.17	1.20	1.54	1.57	100.00%	0.5	None	Low
10W-2[a]	0.30	0.32	0.29	0.29	0.03	0.23	1.10	1.13	1.25	1.30	100.00%	0	None	None
10W-3[a]	0.27	0.29	0.28	0.28	0.18	0.08	1.10	1.15	1.24	1.34	99.00%	0	None	None
10W-4[a]	0.31	0.34	0.34	0.34	0.11	0.14	1.09	1.11	1.23	1.24	100.00%	0	None	None
10W-5[a]	0.29	0.32	0.29	0.29	0.28	0.13	1.08	1.11	1.20	1.27	100.00%	0	None	None
10W-6[a]	0.29	0.32	0.27	0.31	0.36	0.24	1.09	1.10	1.23	1.21	100.00%	0.1	None	Low
10W-7[a]	0.32	0.36	0.29	0.34	0.11	0.40	1.10	1.10	1.23	1.24	100.00%	0.1	None	Low
10W-8[a]	0.53	0.70	0.34	0.35	0.11	0.12	1.10	1.11	1.25	1.25	100.00%	0.4	None	Low
85-9[a]	0.30	0.39	0.18	0.18	0.77	0.07	1.05	1.00	1.76	1.32	88.00%	0.6	None	Low
85-10[a]	0.23	0.28	0.15	0.16	0.00	0.25	1.00	1.07	1.07	1.83	100.00%	0.3	None	Low
85-11[a]	0.17	0.20	0.09	0.09	0.03	0.13	1.09	1.01	1.84	1.16	94.00%	0.3	None	Low
85-12[b]	0.92	1.11	0.56	0.56	0.07	0.27	1.19	1.00	3.19	1.00	32.00%	4.2	None	High
85-13[b]	0.32	0.35	0.25	0.25	No Data		1.47	1.85	4.26	No Data	47.00%	1.2	None	Low
85-14[b]	1.01	1.24	0.66	0.67	No Data		1.89	1.28	4.25	9.05	42.00%	4.8	None	High

Level of Need (Score)	Performance Score Need Scale					Segment Level Need Scale
None* (0)	≤ 0.77 (Urban) ≤ 0.63 (Rural)	< 0.35	< 1.21[a] < 1.53[b]	< 1.37[a] < 4.00[b]	> 80%	0
Low (1)	0.77 - 0.83 (Urban) 0.63 - 0.69 (Rural)	0.35 – 0.49	1.21 – 1.27[a] 1.53 – 1.77[b]	1.37 – 1.43[a] 4.00 – 5.00[b]	70% - 80%	< 1.5
Medium (2)	0.83 - 0.95 (Urban) 0.69 - 0.83 (Rural)	0.49 – 0.75	1.27 – 1.39[a] 1.77 – 2.23[b]	1.43 – 1.57[a] 5.00 – 7.00[b]	50% - 70%	1.5 - 2.5
High (3)	≥ 0.95 (Urban) ≥ 0.83 (Rural)	> 0.75	> 1.39[a] > 2.23[b]	> 1.57[a] > 7.00[b]	< 50%	> 2.5

a: Uninterrupted b: Interrupted

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Safety Needs

- High Safety Needs were identified on five of the fourteen segments (28% of corridor).
- Multiple safety hot spots were identified, especially on the I-10 portion of the corridor between Segments 10W-3 and 10W-8, and the northern portion of SR 85 in Segment 85-9.
- Segments 85-12, 85-13, and 85-14 have insufficient data due to the small number of crashes, making it difficult to provide reliable analysis results.
- See **Appendix D** for detailed information on contributing factors.

Table 15: Final Safety Needs

Segment	Performance Score and Level of Need					Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Area Behaviors	% of Fatal + Incapacitating Injury Crashes Involving Trucks				
		EB/SB	WB/NB						
10W-1[a]	0.76	0.43	1.10	58%	8%	0.8	None	Ehrenberg TI completed 10-8-14	Low
10W-2[a]	0.99	0.12	1.86	40%	*Insufficient Data*	1.3	None	None	Low
10W-3[a]	1.03	1.20	0.87	54%	15%	1.6	MP 25 WB, MP 29 WB	None	Medium
10W-4[a]	1.79	1.92	1.65	54%	11%	4.0	MP 49 WB, MP 35 EB, MP 37 EB, MP 42 EB	Pavement Preservation MP 42-52	High
10W-5[a]	1.60	2.08	1.12	35%	35%	3.5	MP 61-62 EB	None	High
10W-6[a]	1.66	2.62	0.70	56%	17%	3.9	MP 70-74 WB	None	High
10W-7[a]	2.60	1.48	3.72	40%	20%	4.2	MP 82 EB, MP 86-88 EB	None	High
10W-8[b]	1.05	1.39	0.71	50%	19%	1.4	MP 107 EB, MP 109-112 EB, MP 111-112 WB	Pavement Rehab MP 80-112.5	Low
85-9[c]	3.12	3.05	3.20	*Insufficient Data*	*Insufficient Data*	3.6	MP 153 NB, MP 154 SB	None	High
85-10[c]	0.54	1.08	0.00	*Insufficient Data*	*Insufficient Data*	0.2	None	None	Low
85-11[c]	0.26	0.50	0.03	*Insufficient Data*	*Insufficient Data*	0.0	None	Pavement Preservation under construction MP 121-131	None
85-12[e]	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	N/A	None	Pavement Preservation under construction MP 121-131	N/A
85-13[d]	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	N/A	None	Pavement Preservation MP 117-120	N/A
85-14[e]	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	*Insufficient Data*	N/A	None	None	N/A

Level of Need (Score)		Performance Score Needs Scale			Segment Level Need Scale
None* (0)	a	≤ 0.91	≤ 46%	≤ 14%	0
	b	≤ 0.89	≤ 46%	≤ 9%	
	c	≤ 0.92	≤ 47%	≤ 5%	
	d	≤ 0.93	≤ 45%	≤ 7%	
	e	≤ 0.98	< 53%	≤ 6%	
Low (1)	a	0.91 - 1.09	46% - 49%	14% -15%	≤ 1.5
	b	0.89 - 1.1	46% - 51%	9% - 11%	
	c	0.92 - 1.07	47% - 50%	5% - 6%	
	d	0.93 - 1.06	45% - 48%	7% - 8%	
	e	0.98 - 1.02	53% - 55%	6% - 7%	
Medium (2)	a	1.09 – 1.45	49% - 56%	15% - 18%	1.5 - 2.5
	b	1.1 – 1.53	51% - 52%	11% - 15%	
	c	1.07 – 1.38	50% - 57%	6% - 8%	
	d	1.06 - 1.33	48% - 54%	8% - 11%	
	e	1.02 – 1.10	55% - 59%	7% - 8%	
High (3)	a	≥ 1.45	≥ 56%	≥ 18%	≥ 2.5
	b	≥ 1.53	≥ 62%	≥ 15%	
	c	≥ 1.38	≥ 57%	≥ 8%	
	d	≥ 1.33	≥ 54%	≥ 11%	
	e	≥ 1.10	≥ 59%	≥ 8%	

a: 4 Lane Freeway with Daily Volume <25,000
b: 4 Lane Freeway with Daily Volume >25,000
c: 2 or 3 or 4 Lane Divided Highway
d: 4 or 5 Lane Undivided Highway
e: 2 or 3 Lane Undivided Highway

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Freight Needs

- Freight Needs are Low for the majority of the I-10W portion of the corridor, with Segment 10W-1 showing Medium need.
- Three segments on the SR 85 portion of the corridor have High needs (segments 85-9, 13, and 85-14) while segment 85-11 has a Medium need
- Elevated values for TTTI and TPTI are generally shown near the I-10/SR 85 and the I-8/SR 85 junctions
- Closure durations are higher than the statewide average in EB Segment 10W-4, WB Segment 10W-7, and SB Segment 85-9.
- Two bridges provide less than 16' vertical clearance and cannot by by-passed by using ramps:
  - Ramsey Mine Rd UP, #1202 (MP 33.78)
  - 355th Ave UP, #1647 (MP101.4)
- See **Appendix D** for detailed information on contributing factors.

Table 16: Final Freight Needs

Segment	Performance Score and Level of Need								Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Freight Index	Directional TTTI		Directional TPTI		Closure Duration		Bridge Vertical Clearance				
		EB/SB	WB/NB	EB/SB	WB/NB	EB/SB	WB/NB					
10W-1[a]	0.71	1.19	1.14	1.46	1.36	25.03	50.47	16.11	1.6	None	Ehrenberg POE Improvements under construction	Medium
10W-2[a]	0.89	1.04	1.05	1.11	1.13	4.80	43.57	15.96	0.4	None	None	Low
10W-3[a]	0.89	1.04	1.05	1.10	1.14	60.66	8.78	16.14	0.4	None	None	Low
10W-4[a]	0.90	1.05	1.04	1.12	1.09	136.64	35.48	15.90	0.6	Ramsey Mine Rd UP, #1202, MP 33.78	None	Low
10W-5[a]	0.87	1.06	1.06	1.13	1.17	59.85	42.00	16.25	0.2	None	None	Low
10W-6[a]	0.90	1.05	1.06	1.12	1.11	97.78	100.12	16.00	0.7	None	None	Low
10W-7[a]	0.88	1.06	1.05	1.15	1.13	36.99	197.56	16.58	0.3	None	None	Low
10W-8[b]	0.90	1.04	1.04	1.12	1.11	31.35	44.39	15.92	0.4	355th Ave UP, #1647, MP 101.4	None	Low
85-9[c]	0.66	1.07	1.00	1.64	1.40	187.62	17.87	No UP	2.7	None	None	High
85-10[c]	0.73	1.00	1.11	1.03	1.71	0.00	93.75	No UP	1.4	None	None	Low
85-11[c]	0.65	1.15	1.06	1.94	1.15	4.17	21.20	No UP	2.3	None	None	Medium
85-12[e]	0.60	1.19	1.00	2.35	1.00	5.33	30.67	No UP	0.0	None	None	None
85-13[d]	0.14	1.47	2.17	2.59	12.08	No Data	No Data	16.63	2.5	None	None	High
85-14[e]	0.17	1.91	1.27	3.82	8.04	No Data	No Data	No UP	2.5	None	None	High

Level of Need (Score)		Performance Score Need Scale					Segment Level Need Scale
None* (0)	a b	> 0.74 > 0.28	< 1.21 < 1.53	< 1.37 < 4.00	< 71.07	> 16.33	0
Low (1)	a b	0.70 - 0.74 0.22 – 0.28	1.21 - 1.27 1.53 – 1.77	1.37 - 1.43 4.00 – 5.00	71.07 - 97.97	16.17 - 16.33	< 1.5
Medium (2)	a b	0.64 - 0.70 0.12 – 0.22	1.27 - 1.39 1.77 – 2.23	1.43 - 1.57 5.00 – 7.00	97.97 - 151.75	15.83 - 16.17	1.5 - 2.5
High (3)	a b	< 0.64 < 0.12	> 1.39 > 2.23	> 1.57 > 7.00	> 151.75	< 15.83	> 2.5

a: Uninterrupted Flow b: Interrupted Flow

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Segment Review

The needs for each segment were combined to numerically estimate the average level of need for each segment of the corridor. **Table 17** provides a summary of needs for each segment across all performance areas, with the average need score for each segment presented in the last row of the table. A weighting factor of 1.5 is applied to the need scores of the performance areas identified as emphasis areas (Mobility, Safety, and Freight for the I-10/SR 85 corridor). There are nine segments with a Medium overall average need, and five segments with a Low overall average need.

Table 17: Summary of Needs by Segment

Performance Area	Segment Number and Mileposts (MP)													
	10W-1	10W-2	10W-3	10W-4	10W-5	10W-6	10W-7	10W-8	85-9	85-10	85-11	85-12	85-13	85-14
	MP 0-16	MP 16-22	MP 22-32	MP 32-54	MP 54-71	MP 71-82	MP 82-98	MP 98-113	MP 155-149	MP 149-139	MP 138-123	MP 123-120	MP 120-118	MP 120-123
Pavement	Low	None*	None*	Low	None*	Low	None*	None*	None*	Low	None*	None*	None*	None*
Bridge	Medium	Low	Low	Low	None*	None*	None*	Low	None*	None*	None*	Medium	Medium	None*
Mobility+	Low	None*	None*	None*	None*	Low	Low	Low	Low	Low	Low	High	Low	High
Safety+	Low	Low	Medium	High	High	High	High	Low	High	Low	None*	N/A	N/A	N/A
Freight+	Medium	Low	Low	Low	Low	Low	Low	Low	High	Low	Medium	None*	High	High
Average Need (0-3)	**1.38**	**0.62**	**0.85**	**1.23**	**0.92**	**1.31**	**1.15**	**0.85**	**1.62**	**0.85**	**0.69**	**1.30**	**1.60**	**1.80**

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

+ Identified as an emphasis area for the I-10/SR 85 Corridor.

Scale	
None	< 0.1
Low	0.1 - 1.0
Medium	1.0 - 2.0
High	> 2.0

Summary of Corridor Needs

The needs in each performance area are shown in **Figure 21** and summarized below:

Pavement Needs

- The Pavement Performance Area is not an emphasis area for I-10/SR 85;
- Four of the fourteen segments (10W-1, 10W-4, 10W-6, and 85-10) of the I-10/SR 85 Corridor exhibit a Low level of Pavement need
  Pavement hot spot failure needs were identified along the corridor, including areas that have levels of historical investment

Bridge Needs

- The Bridge Performance Area is not an emphasis area for I-10/SR 85.
- Three of the fourteen segments (10W-1, 85-12, 85-13) exhibit Medium level of need.
- Four of the fourteen segments (10W-2, 10W-3, 10W-4, and 10W-8) exhibit a Low level of need.
- One of fifty-nine bridges exhibit historical issues:
  - Tom Wells Rd TI UP MP 5.84
- There are two programmed projects for bridges.
  - West Quartzsite TI Improvements programmed in FY 16
  - New Bridge Construction on SR 85 at Warner Street (MP 153) programmed in FY 20

Mobility Needs

- The Mobility Performance Area is an emphasis area for I-10/SR 85.
- Two segments (85-12 and 85-14) exhibit a High level of need.
- Eight segments (10W-1, 10W-6, 10W-7, 10W-8, 85-9, 85-10, 85-11, and 85-13) exhibit a Low level of need.
- 100% of closures on I-10/SR 85 are due to incidents/accidents
- Segment 85-12 exhibits an elevated Mobility Index score due to current and future V/C
- Segment 85-14 exhibits an elevated Mobility index score due to current and future V/C

Safety Needs

- The Safety Performance Area is an emphasis area for I-10/SR 85.
- Safety needs exist on ten of the fourteen segments.
- Five of the fourteen segments (10W-4through 10W-7, and 85-9) exhibit a High level of need.
- Two of the fourteen segments (10W-3 and 10W-8) exhibit a Medium level of need.
- Three of the fourteen segments (10W-1, 10W-2, and 85-10) exhibit a Low level of need.

Freight Needs

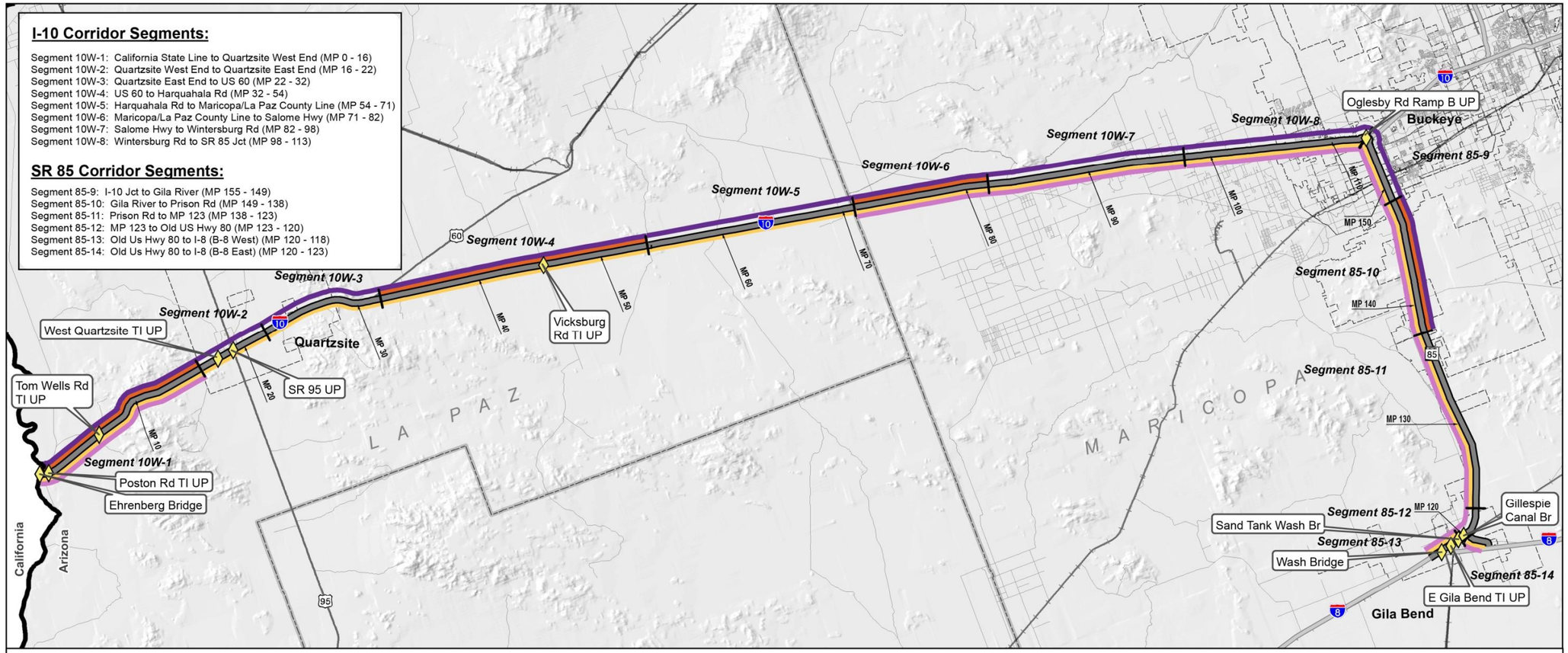
- The Freight Performance Area is an emphasis area for I-10/SR 85.
- Two of the fourteen segments (10W-1 and 85-11) exhibit a “Medium” level of need.
- Three of the fourteen segments (85-9, 85-13, and 85-14) exhibit a “High” level of need.
- The SR 85 portion of the corridor exhibits a Freight Index need in every segment except for Segment 85-12.
- Similar to Mobility, 100% of road closures are due to incidents/accidents and impact freight performance

Overlapping Needs

This section identifies overlapping performance needs on the I-10/SR 85 Corridor, which provides guidance to develop strategic solutions that address more than one performance area with elevated (i.e., Medium or High) levels of need. Completing projects that address multiple needs presents the opportunity to more effectively improve overall performance. A summary of the overlapping needs that relate to locations with elevated levels of need is provided below:

- Segment 10W-1 contains needs in all five performance areas
- Segments 10W-1, and 85-9, 85-12, 85-13, and 85-14, have more than one elevated need in Safety and Freight

Figure 21: Corridor Needs Summary



Performance Area	10W-1	10W-2	10W-3	10W-4	10W-5	10W-6	10W-7	10W-8	85-9	85-10	85-11	85-12	85-13	85-14
Pavement	Low	None*	None*	Low	None*	Low	None*	None*	None*	Low	None*	None*	None*	None*
Bridge	Medium	Low	Low	Low	None*	None*	None*	Low	None*	None*	None*	Medium	Medium	None*
Mobility (Emphasis Area)	Low	None*	None*	None*	None*	Low	Low	Low	Low	Low	Low	High	Low	High
Safety (Emphasis Area)	Low	Low	Medium	High	High	High	High	Low	High	Low	None*	NA	NA	NA
Freight (Emphasis Area)	Medium	Low	Low	Low	Low	Low	Low	Low	High	Low	Medium	None*	High	High
Average Need (0-3)	1.38	0.62	0.85	1.23	0.92	1.31	1.15	0.85	1.62	0.85	0.69	1.30	1.60	1.80

*A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Summary of Needs

N

MILES 0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

Needs Summary
Safety
Pavement
Freight
Mobility
Bridge

Level of Need
Low
Medium
High

4.0 STRATEGIC SOLUTIONS

The principal objective of the CPS is to identify strategic solutions (investments) that are performance-based to ensure that available funding resources are used to maximize the performance of the State's key transportation corridors. One of the first steps in the development of strategic solutions is to identify areas of elevated levels of need (i.e., Medium or High). Addressing areas of Medium or High need will have the greatest effect on corridor performance and are the focus of the strategic solutions. Segments with Medium or High needs and specific locations of hot spots are considered strategic investment areas for which strategic solutions should be developed. Segments with lower levels of need or without identified hot spots are not considered candidates for strategic investment and are expected to be addressed through other ADOT programming processes. The I-10/SR 85 strategic investment areas (resulting from the elevated needs) are shown in **Figure 22**.

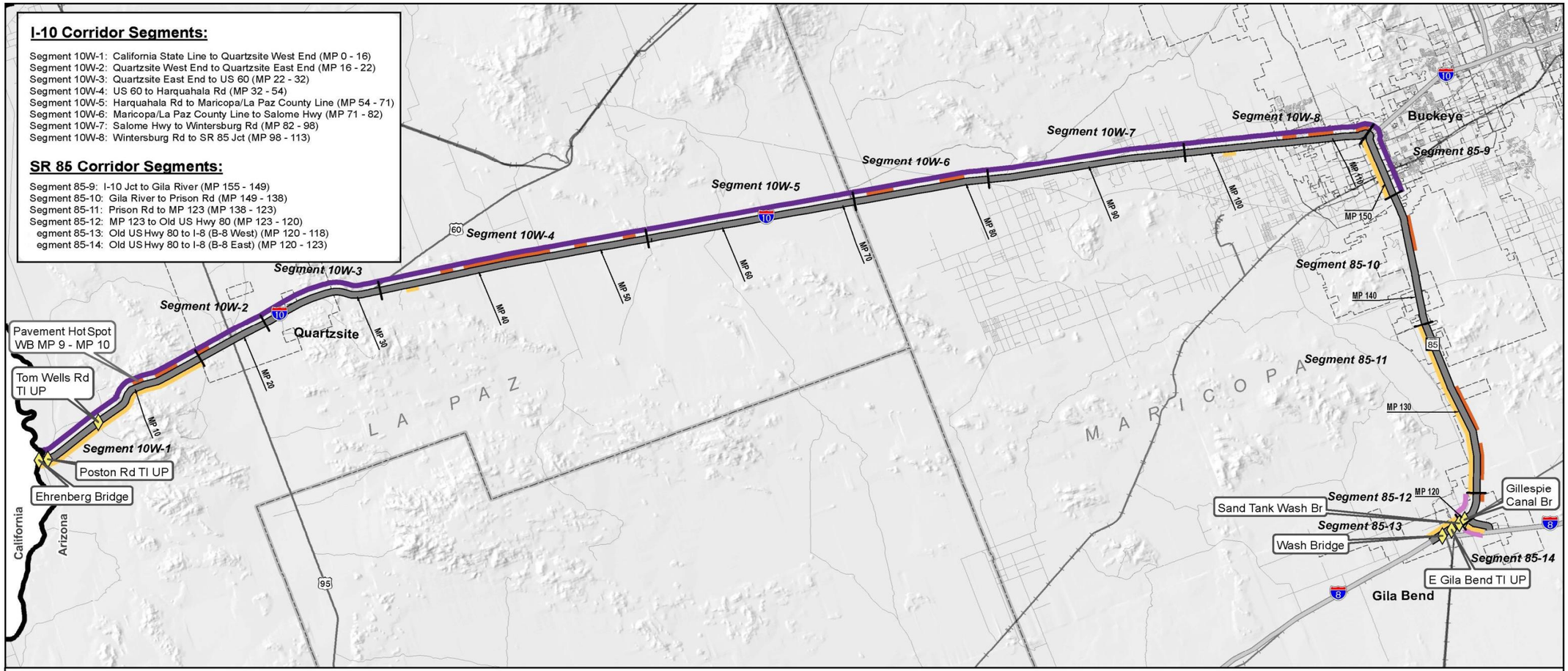
4.1 Screening Process

This section examines qualifying strategic needs and determines if the needs in those locations require action. In some cases, needs that are identified do not advance to solutions development and are screened out from further consideration because they have been or will be addressed through other measures including:

- A project is programmed to address this need
- The need is a result of a Pavement or Bridge hot spot that does not show historical investment or rating issues; these hot spots will likely be addressed through other ADOT programming means.
- A bridge is not a hot spot but is located within a segment with a Medium or High level of need; this bridge will likely be addressed through current ADOT bridge maintenance and preservation programming processes.
- The need is determined to be non-actionable (i.e., cannot be addressed through an ADOT project)
- The conditions/characteristics of the location have changed since the performance data was collected that was used to identify the need

Table 18 notes if each potential strategic need advanced to solution development, and if not, the reason for screening the potential strategic need out of the process. Locations advancing to solutions development are marked with Yes (Y); locations not advancing are marked with No (N) and highlighted. This screening table provides specific information about the needs in each segment that will be considered for strategic investment. The table identifies the level of need – either Medium or High segment needs, or segments without Medium or High level of need that have a hot spot. Each area of need is assigned a location number in the screening table to help document and track locations considered for strategic investment.

Figure 22: Strategic Investment Areas



Performance Area	10W-1	10W-2	10W-3	10W-4	10W-5	10W-6	10W-7	10W-8	85-9	85-10	85-11	85-12	85-13	85-14
Pavement	Hot Spots	-	-	Hot Spots	-	Hot Spots	-	Hot Spots	-	Hot Spots	Hot Spots	Hot Spots	-	-
Bridge	Medium	-	-	-	-	-	-	-	-	-	-	Medium	Medium	-
Mobility*	-	-	-	-	-	-	-	-	-	-	-	High	-	High
Safety*	-	-	Medium	High	High	High	High	Hot Spots	High	-	-	N/A	N/A	N/A
Freight*	Medium	-	-	Hot Spots	-	-	-	Hot Spots	High	-	Medium	-	High	High

Notes: Figure shows strategic investment areas, which are segments with Medium and High levels of need and locations of hot spots.
A "-" symbol indicates a segment level of need of Low or None, which is not considered strategic.
* Identified as emphasis area for I-10/SR 85 Corridor

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Strategic Investment Areas

N
MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

Performance Area Needs
Pavement
Mobility
Safety
Freight
Bridge

Level of Need
Low
Medium
High

Table 18: Strategic Investment Area Screening

Segment # and MP	Level of Strategic Need					Location #	Type	Need Description	Advance (Y/N)	Screening Description
	Pavement	Bridge	Mobility	Safety	Freight					
10W-1 MP 0-16	Hot Spot	Medium	-	-	Medium	L1	Bridge	Ehrenberg Bridge at MP .01 has current Sub Rating of 5	N	Bridge does not meet criteria for historical review, and have multiple ratings of 5, therefore not considered strategic.
						L2	Bridge	Poston Road TI UP at MP 0.62 has current Deck Rating of 5	N	Bridge does not meet criteria for historical review, and have multiple ratings of 5, therefore not considered strategic.
						L3	Bridge	Tom Wells Rd TI UP at MP 5.84 has Current Deck Rating of 5 and was identified as potentially having a repetitive investment issue	N	Bridge does meet criteria for historical review and have multiple ratings of 5, therefore not considered strategic
						L4	Pavement	Hot Spots WB MP 9-12 with High level of historical investment	Y	
						L5	Pavement	Hot Spots WB MP 15-16 with High level of historical investment	Y	
						L6	Pavement	Hot Spots EB MP 12-13 with High level of historical investment	Y	
						L7	Freight	Freight Needs primarily associated with elevated Eastbound TPTI levels.	N	Elevated TPTI due to truck stop location in EB direction, considered non-actionable therefore not strategic
10W-2 MP 16-22	-	-	-	-	-	No Strategic Needs Identified				
10W-3 MP 22-32	-	-	-	Medium	-	L8	Safety	Hot Spots at WB MP 25 and 29. Crash trends show overturning (54%), speed too fast for conditions (54%), and running off of the road (38%). Driver and road conditions show no safety device usage (23%), involve wet conditions (15%), and under the influence of drugs or alcohol (8%).	Y	

Segment # and MP	Level of Strategic Need					Location #	Type	Need Description	Advance (Y/N)	Screening Description
	Pavement	Bridge	Mobility	Safety	Freight					
10W-4 MP 32-54	Hot Spot	-	-	High	Hot Spot	L9	Freight	Ramsey Mine Rd UP at MP 33.78 cannot be ramped around	N	Reprofiling Project will mitigate issue; Tracs #: 010 LA 29 H871201D
						L10	Pavement	Hot Spots EB MP 36-45 with Medium level of historical investment	N	Does not meet criteria for previous investment and Project programmed for FY 16 should mitigate issues; Tracs #: 010 LA 29 H871201D
						L11	Safety	Hot Spots at EB MP 35, 37 and 42, and at WB MP 49. Crash trends show overturning (57%), collision with another vehicle (22%), and involve speed too fast for conditions (57%). Driver and road conditions show fatigue and/or fell asleep (24%), no shoulder or lap belt used (19%), and involve dry conditions (100%).	Y	
						L12	Pavement	Hot Spots WB MP 41-42 with Medium level of historical investment	N	Does not meet criteria for previous investment and project programmed for FY 16 should mitigate issues; Tracs #: 010 LA 29 H871201D
						L13	Pavement	Hot Spots WB MP 47-48 with Medium level of historical investment	N	Does not meet criteria for previous investment, therefore not considered strategic
						L14	Pavement	Hot Spots EB MP 47-48 with Medium level of historical investment	N	Does not meet criteria for previous investment, therefore not considered strategic
						L15	Pavement	Hot Spots WB MP 51-52 with Medium level of historical investment	N	Does not meet criteria for previous investment, therefore not considered strategic
10W-5 MP 54-71	-	-	-	High	-	L16	Safety	Hot Spots at EB MP 61-62. Crash trends show collision with another vehicle (35%), rear-end collisions (27%), and involve speed too fast for conditions (46%). Driver and road conditions show occurrences in dark-unlighted conditions (38%), fatigue or fell asleep (15%), and no shoulder and lap belt used (15%).	Y	
10W-6 MP 71-82	Hot Spot	-	-	High	-	L17	Safety	Hot Spots at WB MP 70-74. Crash trends show overturning (72%), involving a rear-end collision (22%), and involving inattention or distraction (22%). Driver and road conditions show influence of drugs or alcohol (11%), dry conditions (100%), and occurrences in dark or unlighted conditions (33%).	Y	
						L18	Pavement	Hot Spots WB MP 71-73 with Low level of historical investment	N	Does not meet criteria for historical investment and project programmed for FY 19 should mitigate issues; Tracs #: 010 MA 70 H892301C
						L19	Pavement	Hot Spots EB MP 77-79 with Low level of historical investment	N	Does not meet criteria for historical investment and project programmed for FY 19 should mitigate issues; Tracs #: 010 MA 70 H892301C
10W-7 MP 82-98	-	-	-	High	-	L20	Safety	Hot Spots at EB MP 82 and 86-88. Crash trends show overturned vehicles (54%), involving speed too fast for conditions (29%), and involve a single vehicle (67%). Driver and road conditions show no shoulder and lap belt used (13%), influence of drugs or alcohol (8%), and involving dry conditions (96%).	Y	

Segment # and MP	Level of Strategic Need					Location #	Type	Need Description	Advance (Y/N)	Screening Description
	Pavement	Bridge	Mobility	Safety	Freight					
10W-8 MP 98-113	Hot Spot	-	-	Hot Spot	Hot Spot	L21	Freight	355th Ave UP at MP 101.4 has a low clearance and no ramp around option for oversized vehicle traffic	Y	
						L22	Pavement	Hot Spots WB MP 105-106 with Medium level of historical investment	N	Issues will be addressed through Pavement Preservation Project in FY18; Tracs #: H886501C
						L23	Safety	Hot Spots at EB MP 107, 109-112, and WB MP 111-112. Crash trends show involving a single vehicle (65%), vehicle overturning (55%), and speed too fast for conditions (45%). Driver and road conditions show no shoulder and lap belt being used (20%), no apparent influence (60%), and involving dry conditions (100%).	Y	
						L24	Pavement	Hot Spots EB MP 107-109 with Medium level of historical investment	N	Issues will be addressed through district maintenance Pavement Preservation Project; Tracs #: H886501C scheduled for FY 18
						L25	Pavement	Hot Spots EB MP 112-113 with Medium level of historical investment	N	Issues will be addressed through district maintenance Pavement Preservation Project; Tracs #: H886501C scheduled for FY 18
85-9 MP 155-149	-	-	-	High	High	L26	Safety	Hot Spots at NB MP 153 and SB MP 154. Crash trends show collisions involving motor vehicles (87%), involving running a stop sign (40%), and involve an angle (73%). Driver and road conditions show no shoulder or lap belt being used (40%), involve wet conditions (13%), and occurring in dark and unlighted conditions (40%).	Y	
						L27	Freight	Freight needs primarily associated with elevated TPTI levels	Y	
85-10 MP 149-138	Hot Spot	-	-	-	-	L28	Pavement	Hot Spots SB MP 143-146 with Low level of historical investment	N	Does not meet criteria for historical investment, therefore not considered strategic
85-11 MP 138-123	Hot Spot	-	-	-	Medium	L29	Pavement	Hot Spots NB MP 123-131 with Medium level of historical investment	N	Hot Spots have been addressed by recent pavement preservation project; Tracs #: H873801C
						L30	Freight	Freight needs primarily associated with elevated TPTI levels	N	Elevated levels likely due to the State Prison and Landfill being located within this segment. Considered non-actionable, therefore not strategic
85-12 MP 123-120	Hot Spot	Medium	High	-	-	L31	Pavement	Hot Spots NB MP 122-123 with Low level of historical investment	N	Hot Spots have been addressed by recent pavement preservation project; Tracs #: H873801C
						L32	Bridge	Gillespie Canal Bridge at MP 120.25 has a Current Structural Evaluation rating of 5	N	Bridge does not meet criteria for historical investment, and does not have multiple ratings of 5, therefore not considered strategic
						L33	Mobility	Mobility needs primarily associated with elevated current and Future V/C levels	Y	

Segment # and MP	Level of Strategic Need					Location #	Type	Need Description	Advance (Y/N)	Screening Description
	Pavement	Bridge	Mobility	Safety	Freight					
85-13 MP 120-118	-	Medium	-	-	High	L34	Bridge	Wash Bridge at MP 118.15 has a Current Structural Evaluation Rating of 5	N	Bridge does not meet criteria for historical investment, and does not have multiple ratings of 5, therefore not considered strategic
						L35	Bridge	E Gila Bend TI UP at MP 119.42 has a Current Deck Rating of 5	N	Bridge does not meet criteria for historical investment, and does not have a multiple rating of 5, therefore not considered strategic
						L36	Bridge	Sand Tank Wash Bridge at MP 119.76 has a Current Structural Evaluation Rating of 5	N	Bridge does not meet criteria for historical investment, and does not have a multiple rating of 5, therefore not considered strategic
						L37	Freight	Freight needs primarily associated with elevated TPTI and TTTI values	N	Elevated levels likely due to truck stop location at B-8/SR 85 interchange. Considered non-actionable, therefore not strategic
85-14 MP 120-123	-	-	High	-	High	L38	Mobility	Mobility needs primarily associated with elevated current and future V/C values, and elevated TTI and PTI scores.	Y	
						L39	Freight	Freight needs primarily associated with elevated TPTI and TTTI values	Y	

Legend: Strategic investment area screened out from further consideration.

4.2 Candidate Solutions

For each elevated need within a strategic investment area that is not screened out, a candidate solution is developed to address the identified need. Each candidate solution is assigned to one of the following three P2P investment categories based on the scope of the solution:

- Preservation
- Modernization
- Expansion

Documented performance needs serve as the foundation for developing candidate solutions for corridor preservation, modernization, and expansion. Candidate solutions are not intended to be a substitute or replacement for traditional ADOT project development processes where various ADOT technical groups and districts develop candidate projects for consideration in the performance-based programming in the P2P process. Rather, these candidate solutions are intended to complement ADOT's traditional project development processes through a performance-based process to address needs in one or more of the five performance areas of Pavement, Bridge, Mobility, Safety, and Freight. Candidate solutions developed for the I-10/SR 85 Corridor will be considered along with other candidate projects in the ADOT statewide programming process.

Characteristics of Strategic Solutions

Candidate solutions should include some or all of the following characteristics:

- Do not recreate or replace results from normal programming processes
- May include programs or initiatives, areas for further study, and infrastructure projects
- Address elevated levels of need (High or Medium) and hot spots
- Focus on investments in modernization projects (to optimize current infrastructure)
- Address overlapping needs
- Reduce costly repetitive maintenance
- Extend operational life of system and delay expansion
- Leverage programmed projects that can be expanded to address other strategic elements
- Provide measurable benefit

Candidate Solutions

A set of 14 candidate solutions are proposed to address the identified needs on the I-10/SR 85 Corridor.

Table 19 identifies each strategic location that has been assigned a candidate solution with a number (e.g., CS10W.1, CS10W.2, etc.). Each candidate solution is comprised of one or more components to address the identified needs. The assigned candidate solution numbers are linked to the location number and provide tracking capability through the rest of the process. The locations of proposed solutions are shown on the map in **Figure 23**.

Candidate solutions developed to address an elevated need in the Pavement or Bridge performance area will include two options; rehabilitation or full replacement. These solutions are initially evaluated through a Life-Cycle Cost Analysis (LCCA) to provide insights into the cost-effectiveness of these options so a recommended approach can be identified. Candidate solutions developed to address an elevated need in the Mobility, Safety, or Freight performance areas are advanced directly to the Performance Effectiveness Evaluation. In some cases, there may be multiple solutions identified to address the same area of need.

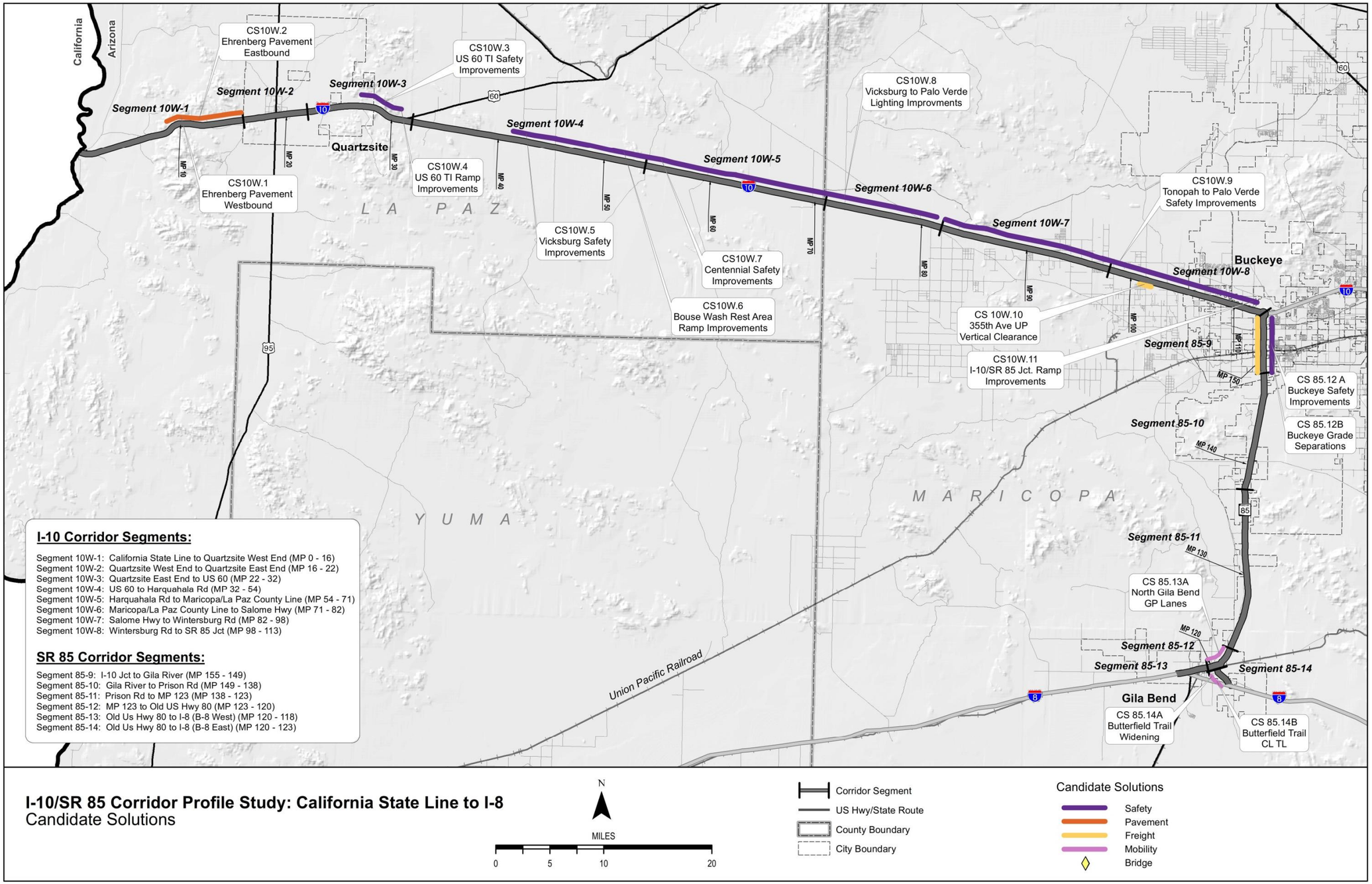
Candidate solutions that are recommended to expand or modify the scope of an already programmed project are noted and are not advanced to solution evaluation and prioritization. These solutions are directly recommended for programming.

Table 19: Candidate Solutions

Candidate Solution #	Segment #	Location #	Beg Milepost	End Milepost	Candidate Solution Name	Option*	Scope	Investment Category Preservation [P] Modernization [M] Expansion [E]
CS 10W.1	10-1	L4, L5	WB 9	WB 16	Ehrenberg Pavement Westbound	A B	Rehabilitate pavement Replace pavement	P
CS 10W.2	10-1	L6	EB 12	EB 16	Ehrenberg Pavement Eastbound	A B	Rehabilitate pavement Replace pavement	P
CS 10W.3	10-3	L8	27	31	US 60 Interchange Safety Improvements	-	Install dynamic speed feedback signs WB MP 31 and EB MP 27 at approach to curve Install chevrons on curves MP 28 to MP 29.5 (both directions) Improve skid resistance	M
CS 10W.4	10-3	L8	31	31	US 60 Interchange Ramp Improvements	-	Modify entry/exit ramps to parallel configuration	M
CS 10W.5	10-4	L11	32	50	Vicksburg Safety Improvements	-	Rehabilitate shoulder in both directions Install Closed Circuit Television (CCTV) cameras at EB and WB DMS MP 49.4	M
CS 10W.6	10-4	L11	52.5	52.5	Bouse Wash Rest Area Ramp Improvements	-	Modify entry/exit ramps to parallel configuration	M
CS 10W.7	10-5	L16, L17	54	71	Centennial Safety Improvements	-	Widen shoulder in both directions Install dynamic weather warning beacons (MP 66, 68, 70, 76, 78, 80) Install RWIS (MP 70 and 77)	M
CS 10W.8	10-5 10-6 10-8	L16, L17, L20, L23	54	103	Vicksburg to Palo Verde Lighting Improvements	-	Install lighting at interchange merge points (MP 54, 69, 81, 98, 103)	M
CS 10W.9	10-7 10-8	L20, L23	82	112	Tonopah to Palo Verde Safety Improvements	-	Install CCTV cameras at EB DMS MP 110 Install dynamic speed feedback signs EB MP 85 and WB MP 110 Widen shoulder in both directions	M
CS 10W.10	10-8	L21	101.4	101.4	355th Ave UP Vertical Clearance	-	Re-profile mainline	M
CS 10W.11	10-8	L23	112	113	I-10/SR 85 junction Ramp Improvements	-	Modify all 4 entry/exit ramps at I-10/SR 85 junction to parallel configuration	M
CS 85.12	85-9	L26, L27	155	149	Buckeye Safety Improvements	A	Install chevrons on the I-10/SR 85 interchange ramps Install intersection warning beacons on SR 85 at intersection approaches for Broadway, Southern and Baseline Install larger stop signs with beacons at Broadway, Southern, and Baseline (both directions) Add acceleration and deceleration lanes for cross-traffic merging at Southern and Broadway	M
						B	Construct grade separations at Broadway, Southern, Baseline/Union Pacific Railroad	
CS 85.13	85-12	L33	123	120	North Gila Bend SB general purpose Lanes	-	Construct 2 SB general purpose lanes west of existing alignment to create 4-lane divided highway between MP 123 and Maricopa Rd. Existing alignment to become 2 NB general purpose lanes	E
CS 85.14	85-14	L38, L39	120	123	Butterfield Trail Mobility Improvements	A B	Widen to two lanes in each direction w/ center left turn lane Widen to add center left turn lane and widen shoulder on both sides	E/M

* '-'indicates only one solution is being proposed and no options are being considered

Figure 23: Candidate Solutions



5.0 SOLUTION EVALUATION AND PRIORITIZATION

Candidate solutions are evaluated using the following steps: LCCA (where applicable), Performance Effectiveness Evaluation, Solution Risk Analysis, and Candidate Solution Prioritization. The methodology and approach to this evaluation are shown in **Figure 24** and described more fully below.

Life-Cycle Cost Analysis

All Pavement and Bridge candidate solutions have two options: rehabilitation/repair or reconstruction. These options are evaluated through an LCCA to determine the best approach for each location where a Pavement or Bridge solution is recommended. The LCCA can eliminate options from further consideration and identify which options should be carried forward for further evaluation.

When multiple independent candidate solutions are developed for Mobility, Safety, or Freight strategic investment areas, these candidate solution options advance directly to the Performance Effectiveness Evaluation without an LCCA.

Performance Effectiveness Evaluation

After completing the LCCA process, all remaining candidate solutions are evaluated based on their performance effectiveness. This process includes determining a Performance Effectiveness Score (PES) based on how much each solution impacts the existing performance and needs scores for each segment. This evaluation also includes a Performance Area Risk Analysis to help differentiate between similar solutions based on factors that are not directly addressed in the performance system.

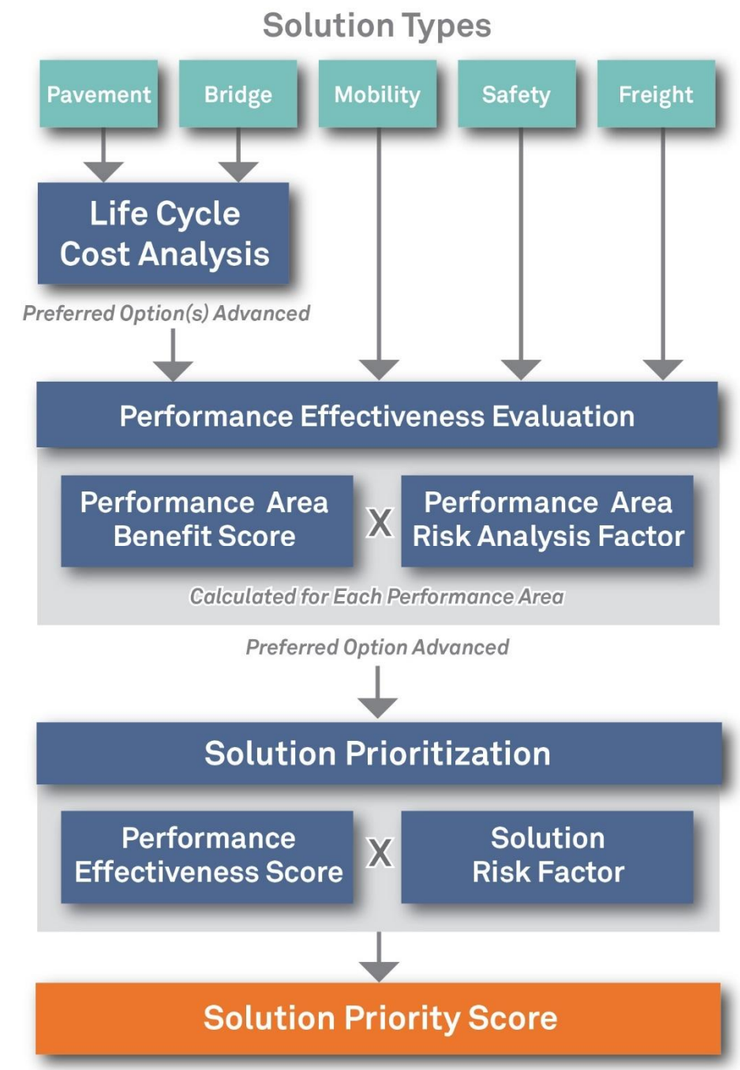
Solution Risk Analysis

All candidate solutions advanced through the Performance Effectiveness Evaluation are also evaluated through a Solution Risk Analysis process. A solution risk probability and consequence analysis is conducted to develop a solution-level risk weighting factor. This risk analysis is a numeric scoring system to help address the risk of not implementing a solution based on the likelihood and severity of performance failure.

Candidate Solution Prioritization

The PES, weighted risk factor, and segment average need score are combined to create a prioritization score. The candidate solutions are ranked by prioritization score from highest to lowest. The highest prioritization score indicates the candidate solution that is recommended as the highest priority. Solutions that address multiple performance areas tend to score higher in this process.

Figure 24: Candidate Solution Evaluation Process



5.1 Life-Cycle Cost Analysis

LCCA is conducted for any candidate solution that is developed as a result of a need in the Pavement or Bridge Performance Area. The intent of the LCCA is to determine which options warrant further investigation and eliminate options that would not be considered strategic.

LCCA is an economic analysis that compares cost streams over time and presents the results in a common measure, the present value of all future costs. The cost stream occurs over an analysis period that is long enough to provide a reasonably fair comparison among alternatives that may differ significantly in scale of improvement actions over shorter time periods. For both bridge and pavement LCCA, the costs are focused on agency (ADOT) costs for corrective actions to meet the objective of keeping the bridge or pavement serviceable over a long period of time.

LCCA is performed to provide a more complete holistic perspective on asset performance and agency costs over the life of an investment stream. This approach helps ADOT look beyond initial and short-term costs, which often dominate the considerations in transportation investment decision making and programming.

Bridge LCCA

For the bridge LCCA, three basic strategies are analyzed that differ in timing and scale of improvement actions to maintain the selected bridges, as described below:

- Bridge replacement (large upfront cost but small ongoing costs afterwards)
- Bridge rehabilitation until replacement (moderate upfront costs then small to moderate ongoing costs until replacement)
- On-going repairs until replacement (low upfront and ongoing costs until replacement)

The bridge LCCA model developed for the CPS reviews the characteristics of the candidate bridges including bridge ratings and deterioration rates to develop the three improvement strategies (full replacement, rehabilitation until replacement, and repair until replacement). Each strategy consists of a set of corrective actions that contribute to keeping the bridge serviceable over the analysis period. Cost and effect of these improvement actions on the bridge condition are essential parts of the model. Other considerations in the model include bridge age, elevation, pier height, length to span ratio, skew angle, and substandard characteristics such as shoulders and vehicle clearance. The following assumptions are included in the bridge LCCA model:

- The bridge LCCA only addresses the structural condition of the bridge and does not address other issues or costs
- The bridge will require replacement at the end of its 75-year service life regardless of current condition
- The bridge elevation, pier height, skew angle, and length to span ratio can affect the replacement and rehabilitation costs
- The current and historical ratings are used to estimate a rate of deterioration for each candidate bridge
- Following bridge replacement, repairs will be needed every 20 years
- Different bridge repair and rehabilitation strategies have different costs, expected service life, and benefit to the bridge rating
- The net present value of future costs are discounted at 3% and all dollar amounts are in 2015 dollars
- If the LCCA evaluation recommends rehabilitation or repair, the solution is not be considered strategic and the rehabilitation or repair will be addressed by normal programming processes
- Because this LCCA is conducted at a planning level, and due to the variabilities in costs and improvement strategies, the LCCA net present value results that are within 15% should be considered equally; in such a case, the solution should be carried forward as a strategic replacement project – more detailed scoping will confirm if replacement or rehabilitation is needed

Based on the candidate solutions presented in **Table 19**, LCCA was not conducted for any bridges on the I-10/SR 85 corridor. A summary of this analysis is shown in **Table 20**. Additional information regarding the bridge LCCA is included in **Appendix E**.

Pavement LCCA

The LCCA approach to pavement is very similar to the process used for bridges. For the pavement LCCA, three basic strategies are analyzed that differ in timing and scale of improvement actions to maintain the selected pavement, as described below:

- Pavement replacement (large upfront cost but small ongoing costs afterwards – could be replacement with asphalt or concrete pavement)
- Pavement major rehabilitation until replacement (moderate upfront costs then small to moderate ongoing costs until replacement)
- Pavement minor rehabilitation until replacement (low upfront and ongoing costs until replacement)

The pavement LCCA model developed for the CPS reviews the characteristics of the candidate paving locations including the historical rehabilitation frequency to develop potential improvement strategies (full replacement, major rehabilitation until replacement, and minor rehabilitation until replacement, for either concrete or asphalt, as applicable). Each strategy consists of a set of corrective actions that contribute to keeping the pavement serviceable over the analysis period. The following assumptions are included in the pavement LCCA model:

- The pavement LCCA only addresses the condition of the pavement and does not address other issues or costs
- The historical pavement rehabilitation frequencies at each location are used to estimate future rehabilitation frequencies
- Different pavement replacement and rehabilitation strategies have different costs and expected service life
- The net present value of future costs are discounted at 3% and all dollar amounts are in 2015 dollars

- If the LCCA evaluation recommends rehabilitation or repair, the solution will not be considered strategic and the rehabilitation will be addressed by normal programming processes
- Because this LCCA is conducted at a planning level, and due to the variabilities in costs and improvement strategies, the LCCA net present value results that are within 15% should be considered equally; in such a case, the solution should be carried forward as a strategic replacement project – more detailed scoping will confirm if replacement or rehabilitation is needed

Based on the candidate solutions presented in **Table 19**, LCCA was conducted for two pavement solutions on the I-10/SR 85 Corridor. A summary of this analysis is shown in **Table 21.** Additional information regarding the pavement LCCA is included in **Appendix E.**

As shown in **Table 20** and **Table 21**, the following conclusions were determined based on the LCCA:

- Rehabilitation or repair was determined to be the most effective approach for CS10W.1 (MP 9 – MP 16) which does not have other Needs identified in the same location. However, the costs associated with the reconstruction option in this same location are within 15% of the lowest rehabilitation case. Given the planning level of detail used for this analysis, these costs are assumed to be close enough to advance both the rehabilitation and replacement options to the performance effectiveness evaluation.
- Rehabilitation or repair was determined to be the most effective approach for CS10W.2 (MP 12 – 16) which does not have other Needs identified in the same location. Therefore, it is assumed that the identified need will be addressed by normal programming processes and this candidate solution will be dropped from further consideration.

Table 20: Bridge Life-Cycle Cost AnalysisResults

Candidate Solution	Present Value at 3% Discount Rate ($)			Ratio of Present Value Compared to Lowest Present Value			Other Needs	Results
	Replace	Rehab	Repair	Replace	Rehab	Repair		
No LCCA conducted for any bridges on the I-10/SR 85 corridor.								

Table 21: Pavement Life-Cycle Cost Analysis Results

Candidate Solution	Present Value at 3% Discount Rate ($)				Ratio of Present Value Compared to Lowest Present Value				Other Needs	Results
	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehabilitation	Asphalt Light Rehabilitation		
Ehrenberg Pavement WB (CS 10W.1) (WB MP 9-16)	$30,783,900	$28,183,400	$28,610,900	$28,690,200	1.09	1.00	1.02	1.02	N	Carry forward reconstruction as option
Ehrenberg Pavement EB (CS 10W.2) (MP 12-16)	$17,590,800	$16,104,800	$13,298,300	$14,068,800	1.32	1.21	1.00	1.06	N	Not strategic as a stand-alone solution

5.2 Performance Effectiveness Evaluation

The results of the Performance Effectiveness Evaluation are combined with the results of a Performance Area Risk Analysis to determine a Performance Effectiveness Score (PES). The objectives of the Performance Effectiveness Evaluation include:

- Measure the benefit to the performance system versus the cost of the solution
- Include risk factors to help differentiate between similar solutions
- Apply to each performance area that is affected by the candidate solution
- Account for emphasis areas identified for the corridor

The Performance Effectiveness Evaluation includes the following steps:

- Estimate the post-solution performance for each of the five performance areas (Pavement, Bridge, Mobility, Safety, and Freight)
- Use the post-solution performance scores to calculate a post-solution level of need for each of the five performance areas
- Compare the pre-solution level of need to the post-solution level of need to determine the reduction in level of need (potential solution benefit) for each of the five performance areas
- Calculate performance area risk weighting factors for each of the five performance areas
- Use the reduction in level of need (benefit) and risk weighting factors to calculate the PES

Post-Solution Performance Estimation

For each performance area, a slightly different approach is used to estimate the post-solution performance. This process is based on the following assumptions:

- Pavement:
  - The IRI rating would decrease (to 30 for replacement or 45 for rehabilitation)
  - The Cracking rating would decrease (to 0 for replacement or rehabilitation)
- Bridge:
  - The structural ratings would increase (+1 for repair, +2 for rehabilitation, or increase to 8 for replacement)
  - The Sufficiency Rating would increase (+10 for repair, +20 for rehabilitation, or increase to 98 for replacement)
- Mobility:
  - Additional lanes would increase the capacity and therefore affect the Mobility Index and associated secondary measures
  - Other improvements (e.g., ramp metering, parallel ramps, variable speed limits) would also increase the capacity (to a lesser extent than additional lanes) and therefore would affect the Mobility Index and associated secondary measures
  - Changes in the Mobility Index (due to increased capacity) would have a direct effect on the TTI secondary measure
  - Changes in the Mobility Index (due to increased capacity) and Safety Index (due to crash reductions) would have a direct effect on the PTI secondary measure
  - Changes in the Safety Index (due to crash reductions) would have a direct effect on the Closure Extent secondary measure
- Safety:
  - Crash modification factors were developed that would be applied to estimate the reduction in crashes (for additional information see **Appendix F**)
- Freight:
  - Changes in the Mobility Index (due to increased capacity) and Safety Index (due to crash reductions) would have a direct effect on the Freight Index and the TPTI secondary measure
  - Changes in the Mobility Index (due to increased capacity) would have a direct effect on the TTTI secondary measure
  - Changes in the Safety Index (due to crash reductions) would have a direct effect on the Closure Duration secondary measure

Performance Area Risk Analysis

The Performance Area Risk Analysis is intended to develop a numeric risk weighting factor for each of the five performance areas (Pavement, Bridge, Mobility, Safety, and Freight). This risk analysis addresses other considerations for each performance area that are not directly included in the performance system. A risk weighting factor is calculated for each candidate solution based on the specific characteristics at the solution location. For example, the Pavement Risk Factor is based on factors such as the elevation, daily traffic volumes, and amount of truck traffic. Additional information regarding the Performance Area Risk Factors is included in **Appendix G**.

Following the calculation of the reduction in level of need (benefit) and the Performance Area Risk Factors, these values are used to calculate the PES. In addition, the reduction in level of Need in each emphasis area is also included in the PES.

Net Present Value Factor

The benefit (reduction in need) is measured as a one-time benefit. However, different types of solutions will have varying service lives during which the benefits will be obtained. For example, a preservation solution would likely have a shorter stream of benefits over time when compared to a modernization or expansion solution. To address the varying lengths of benefit streams, each solution is classified as a 10-year, 20-year, 30-year, or 75-year benefit stream, or the net present value (NPV) factor (F_{NPV}). A 3% discount rate is used to calculate F_{NPV} for each classification of solution. The service lives and respective factors are described below:

- A 10-year service life is generally reflective of preservation solutions such as pavement and bridge preservation; these solutions would likely have a 10-year stream of benefits; for these solutions, a F_{NPV} of 8.8 is used in the PES calculation

- A 20-year service life is generally reflective of modernization solutions that do not include new infrastructure; these solutions would likely have a 20-year stream of benefits; for these solutions, a F_{NPV} of 15.3 is used in the PES calculation
- A 30-year service life is generally reflective of expansion solutions or modernization solutions that include new infrastructure; these solutions would likely have a 30-year stream of benefits; for these solutions, a F_{NPV} of 20.2 is used in the PES calculation
- A 75-year service life is used for bridge replacement solutions; these solutions would likely have a 75-year stream of benefits; for these solutions, a F_{NPV} of 30.6 is used in the PES calculation

Vehicle-Miles Travelled Factor

Another factor in assessing benefits is the number of travelers who would benefit from the implementation of the candidate solution. This factor varies between candidate solutions depending on the length of the solution and the magnitude of daily traffic volumes. Multiplying the solution length by the daily traffic volume results in vehicle-miles travelled (VMT), which provides a measure of the amount of traffic exposure that would receive the benefit of the proposed solution. The VMT is converted to a VMT factor (known as F_{VMT}), which is on a scale between 0 and 5, using the equation below:

$$F_{VMT} = 5 - (5 \times e^{VMT \times -0.0000139})$$

Performance Effectiveness Score

The PES is calculated using the following equation:

PES = (Sum of all Risk Factored Benefit Scores + Sum of all Risk Factored Emphasis Area Scores) / Cost) x F_{VMT} x F_{NPV}

Where:

Risk Factored Benefit Score = Reduction in Segment-Level Need (benefit) x Performance Area Risk Weighting Factor (calculated for each performance area)

Risk Factored Emphasis Area Score = Reduction in Corridor-Level Need x Performance Area Risk Factors x Emphasis Area Factor (calculated for each emphasis area)

*Cost = estimated cost of candidate solution in millions of dollars (see **Appendix H**)*

F_{VMT} = Factor between 0 and 5 to account for VMT at location of candidate solution based on existing (2014) daily volume and length of solution

F_{NPV} = Factor (ranging from 8.8 to 30.6 as previously described) to address anticipated longevity of service life (and duration of benefits) for each candidate solution

The resulting PES values are shown in **Table 22**. Additional information regarding the calculation of the PES is contained in **Appendix I**.

For candidate solutions with multiple options to address Mobility, Safety, or Freight needs, the PES should be compared to help identify the best performing option. If one option clearly performs better than the others (more than twice the PES value and a difference in magnitude of at least 20 points) the lower scoring options can be eliminated from further consideration. If multiple options have similar PES values, or there are other factors not accounted for in the performance system that could significantly influence the ultimate selection of an option (e.g., potential environmental concerns, potential adverse economic impacts), those options should all be advanced to the prioritization process. On the I-10/SR 85 corridor, the following candidate solutions have options to address Mobility, Safety, or Freight needs:

- CS85.12 (A and B) – Buckeye Safety Improvements and Grade Separations
- CS85.14 (A and B) – Butterfield Trail Mobility Improvements

Based on a review of the PES values for the candidate solutions with options, CS 85.12B – Buckeye Grade Separations and CS 85.14B – Butterfield Trail Center Left Turn Lane have been removed from consideration and do not advance to the prioritization process due to a large difference in PES values between Options A and B. As shown in **Table 22**, the performance effectiveness of CS 85.12B (PES = 9.8) is considerably lower than CS 85.12A (PES = 63.2). While the total factored benefit of the grade separations option is more than double that of the intersection safety improvements, the cost associated with constructing grade separations outweighs those benefits at this point in time. The performance effectiveness of CS85.14B (PES = 30.0) is less than twice the value of CS85.14A (PES = 64.5). While both options score well, the mobility benefit of widening Butterfield Trail to two lanes in each direction in addition to adding a Center Left Turn Lane outweighs the less expensive option of just constructing a Center Left Turn Lane.

As was previously mentioned, repair was determined to be the most effective approach for the candidate solution listed below that was subjected to LCCA so this candidate solution was dropped from further consideration. No PES value was calculated for this solution, as shown in **Table 22**.

- Ehrenberg Pavement EB (CS 10W.2)

Table 22: Performance Effectiveness Scores

Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost* ($ million)	Risk Factored Benefit Score					Risk Factored Emphasis Area Scores			Total Factored Benefit Score	F^{VMT}	F^{NPV}	Performance Effectiveness Score
					Pavement	Bridge	Safety	Mobility	Freight	Safety	Mobility	Freight				
10W.1	10-1	Ehrenberg Pavement WB	9 to 16	$25.15	0.767	0.000	0.182	0.221	0.737	0.085	0.000	0.019	2.011	2.98	8.8	2.1
10W.3	10-3	US 60 TI Safety	27 to 31	$13.73	0.000	0.000	0.981	0.071	0.028	0.089	0.000	0.078	1.247	3.22	15.3	4.5
10W.4	10-3	US 60 TI Ramp	31	$4.43	0.000	0.000	1.026	0.139	0.042	0.107	0.011	0.120	1.445	0.61	15.3	3.0
10W.5	10-4	Vicksburg Safety	32 to 50	$10.25	0.000	0.000	2.076	0.080	0.243	0.402	0.000	0.295	3.095	4.97	15.3	23.3
10W.6	10-4	Bouse Wash Rest Area Ramp	52.5	$4.43	0.000	0.000	0.084	0.138	0.019	0.041	0.027	0.077	0.385	0.67	15.3	0.9
10W.7	10-5	Centennial Safety	54 to 71	$23.42	0.000	0.000	2.654	0.138	0.101	0.368	0.000	0.297	3.559	4.95	15.3	11.8
10W.8	10-5 10-6 10-8	Vicksburg to PV Lighting	54 to 103	$2.49	0.000	0.000	0.843	0.042	0.087	0.177	0.000	0.057	1.207	2.72	15.3	20.2
10W.9	10-7 10-8	Tonopah to PV Safety	82 to 112	$38.36	0.000	0.000	5.624	0.342	0.380	0.810	0.000	0.391	7.547	5.00	15.3	15.1
10W.10	10-8	355th Ave Vertical Clearance	101.4	$0.48	0.120	0.000	0.000	0.000	0.627	0.029	0.000	0.000	0.776	0.37	20.2	12.0
10W.11	10-8	I-10/SR 85 Jct. Ramps	112 to 113	$4.43	0.000	0.000	1.060	0.259	0.025	0.130	0.007	0.071	1.552	0.88	15.3	4.7
85.12A	85-9	Buckeye Safety Improvements	154 to 149	$2.13	0.000	0.000	5.486	0.838	3.274	0.296	0.004	0.067	9.965	0.88	15.3	63.2
85.12B[1]	*85-9*	*Buckeye Grade Separations[1]*	*154 to 149*	*$62.83*	*0.000*	*0.000*	*8.737*	*1.504*	*6.361*	*0.445*	*0.005*	*0.112*	*17.164*	*1.77*	*20.2*	*9.8*
85.13	85-12	N Gila Bend GP Lanes	120 to 123	$30.07	1.241	0.000	0.467	28.014	0.067	0.051	0.121	0.137	30.096	1.82	20.2	36.7
85.14A	85-14	Butterfield Trail Widening	120 to 123	$11.75	0.000	0.000	0.000	18.368	0.399	0.104	0.070	0.012	18.953	1.98	20.2	64.5
85.14B[1]	*85-14*	*Butterfield Trail CTL[1]*	*120 to 123*	*$7.85*	*0.000*	*0.000*	*0.000*	*7.259*	*0.399*	*0.104*	*0.013*	*0.000*	*7.775*	*1.98*	*15.3*	*30.0*

[1] Not carried forward for Prioritization

5.3 Solution Risk Analysis

Following the calculation of the PES, an additional step is taken to develop the prioritized list of solutions. A solution risk probability and consequence analysis is conducted to develop a solution-level risk weighting factor. This risk analysis is a numeric scoring system to help address the risk of not implementing a solution based on the likelihood and severity of performance failure. **Figure 25** shows the risk matrix used to develop the risk weighting factors.

Figure 25: Risk Matrix

		Severity/Consequence				
		Insignificant	Minor	Significant	Major	Catastrophic
Frequency/Likelihood	Very Rare	Low	Low	Low	Moderate	Major
	Rare	Low	Low	Moderate	Major	Major
	Seldom	Low	Moderate	Moderate	Major	Severe
	Common	Moderate	Moderate	Major	Severe	Severe
	Frequent	Moderate	Major	Severe	Severe	Severe

Using the risk matrix in **Figure 25**, numeric values were assigned to each category of frequency and severity. The higher the risk, the higher the numeric factor assigned. The risk weight for each area of the matrix was calculated by multiplying the severity factor times the frequency factor. These numeric factors are shown in **Figure 26**.

Figure 26: Numeric Risk Matrix

			Severity/Consequence				
			Insignificant	Minor	Significant	Major	Catastrophic
		Weight	1.00	1.10	1.20	1.30	1.40
Frequency/Likelihood	Very Rare	1.00	1.00	1.10	1.20	1.30	1.40
	Rare	1.10	1.10	1.21	1.32	1.43	1.54
	Seldom	1.20	1.20	1.32	1.44	1.56	1.68
	Common	1.30	1.30	1.43	1.56	1.69	1.82
	Frequent	1.40	1.40	1.54	1.68	1.82	1.96

Using the values in **Figure 26**, risk weighting factors were calculated for each of the four risk categories (low, moderate, major, and severe). These values are simply the average of the values in **Figure 26** that fall within each category. The resulting average risk weighting factors are:

Low	Moderate	Major	Severe
1.14	1.36	1.51	1.78

The risk weighting factors listed above are assigned to the five performance areas as follows:

- Safety = 1.78
  - The Safety performance area quantifies the likelihood of fatal or incapacitating injury crashes; therefore, it is assigned the Severe (1.78) risk weighting factor
- Bridge = 1.51
  - The Bridge performance area focuses on the structural adequacy of bridges; a bridge failure may result in crashes or traffic being detoured for long periods of time resulting in significant travel time increases; therefore, it is assigned the Major (1.51) risk weighting factor
- Mobility and Freight = 1.36
  - The Mobility and Freight performance areas focus on capacity and congestion; failure in either of these performance areas would result in increased travel times but would not have significant effect on safety (crashes) that would not already be addressed in the Safety performance area; therefore, they are assigned the Moderate (1.36) risk weighing factor
- Pavement = 1.14
  - The Pavement performance area focuses on the ride quality of the pavement; failure in this performance area would likely be a spot location that would not dramatically affect drivers beyond what is already captured in the Safety performance area; therefore, it is assigned the Low (1.14) risk weighting factor

The benefit in each performance area is calculated for each candidate solution as part of the Performance Effectiveness Evaluation. Using this information on benefits and the risk factors listed above, a weighted (based on benefit) solution-level numeric risk factor is calculated for each candidate solution. For example, a solution that has 50% of its benefit in Safety and 50% of its benefit in Mobility has a weighted risk factor of 1.57 (0.50 x 1.36 + 0.50 x 1.78 = 1.57).

5.4 Candidate Solution Prioritization

The PES, weighted risk factor, and segment average need score are combined to create a prioritization score as follows:

Prioritization Score = PES x Weighted Risk Factor x Segment Average Need Score

Where:

PES = Performance Effectiveness Score as shown in ***Table 22***

Weighted Risk Factor = Weighted factor to address risk of not implementing a solution based on the likelihood and severity of the performance failure

Segment Average Need Score = Segment level need score as shown in ***Table 17***

The candidate solutions are prioritized based on the calculation above as shown in **Table 23**. The highest prioritization score indicates the candidate solution that is recommended as the highest priority. Solutions that address multiple performance areas tend to score higher in this process. The prioritized list of candidate solutions is provided in the subsequent section. See **Appendix J** for additional information on the prioritization process.

6.0 SUMMARY OF CORRIDOR RECOMMENDATIONS

6.1 Prioritized Candidate Solution Recommendations

Table 24 and **Figure 27** show the ranked prioritized candidate solutions recommended for the I-10/SR 85 corridor. Implementation of these solutions is anticipated to improve performance of the I-10/SR 85 corridor. The following observations were noted about the prioritized solutions:

- Most of the anticipated improvements in performance are in the Mobility, Safety, and Freight performance areas
- The highest ranking solutions tended to have overlapping benefits in the Mobility, Safety, and Freight performance areas
- The highest priority solutions address needs in the Buckeye Area (MP 155-149) along SR 85.

6.2 Other Corridor Recommendations

As part of the investigation of strategic investment areas and candidate solutions, other corridor recommendations can also be identified. These recommendations could include modifications to the existing Statewide Construction Program, areas for further study, or other corridor-specific recommendations that are not related to construction or policy. The list below identifies other corridor recommendations for the I-10/SR 85 corridor:

- When recommending future projects along the I-10/SR 85 Corridor, review historical ratings and levels of investment. According to data used for this study, the following pavement and bridge locations have exhibited high historical investment (pavement) or rating fluctuation (bridge) issues:
    - Pavement MP 0-16
    - Pavement MP 54-71
    - Bridge: Tom Wells Rd TI (MP 5.84)

Continue to pursue funding and support the ultimate plan for SR 85 as a full divided facility and for the development of the SR 85/1-8 interchange in the future per the approved Design Concept Report.

6.3 Policy and Initiative Recommendations

In addition to location-specific needs, general corridor and system-wide needs have also been identified through the CPS process. While these needs are more overarching and cannot be individually evaluated through this process, it is important to document them. A list of recommended policies and initiatives was developed for consideration when programming future projects not only on I-10/SR 85, but across the entire state highway system where the conditions are applicable. The following list, which is in no particular order of priority, was derived from the Round 1, Round 2, and Round 3 CPS:

- Install Intelligent Transportation System (ITS) conduit with all new infrastructure projects
- Prepare strategic plans for Closed Circuit Television (CCTV) camera and Road Weather Information System (RWIS) locations statewide
- Leverage power and communication at existing weigh-in-motion (WIM), dynamic message signs (DMS), and call box locations to expand ITS applications across the state
- Consider solar power for lighting and ITS where applicable
- Investigate ice formation prediction technology where applicable
- Conduct highway safety manual evaluation for all future programmed projects
- Develop infrastructure maintenance and preservation plans (including schedule and funding) for all pavement and bridge infrastructure replacement or expansion projects
- Develop standardized bridge maintenance procedures so districts can do routine maintenance work
- Review historical ratings and level of previous investment during scoping of pavement and bridge projects. In pavement locations that warrant further investigation, conduct subsurface investigations during project scoping to determine if full replacement is warranted
- For pavement rehabilitation projects, enhance the amount/level of geotechnical investigations to address issues specific to the varying conditions along the project
- Expand programmed and future pavement projects as necessary to include shoulders
- Expand median cable barrier guidelines to account for safety performance
- Install CCTV cameras with all DMS
- In locations with limited communications, use CCTV cameras to provide still images rather than streaming video
- Develop statewide program for pavement replacement
- Install additional continuous permanent count stations along strategic corridors to enhance traffic count data
- When reconstruction or rehabilitation activities will affect existing bridge vertical clearance, the dimension of the new bridge vertical clearance should be a minimum of 16.25 feet where feasible
- All new or reconstructed roadway/shoulder edges adjacent to an unpaved surface should be constructed with a Safety Edge
- Collision data on tribal lands may be incomplete or inconsistent; additional coordination for data on tribal lands is required to ensure adequate reflection of safety issues
- Expand data collection devices statewide to measure freight delay
- Evaluate and accommodate potential changes in freight and goods movement trends that may result from improvements and expansions to the state roadway network

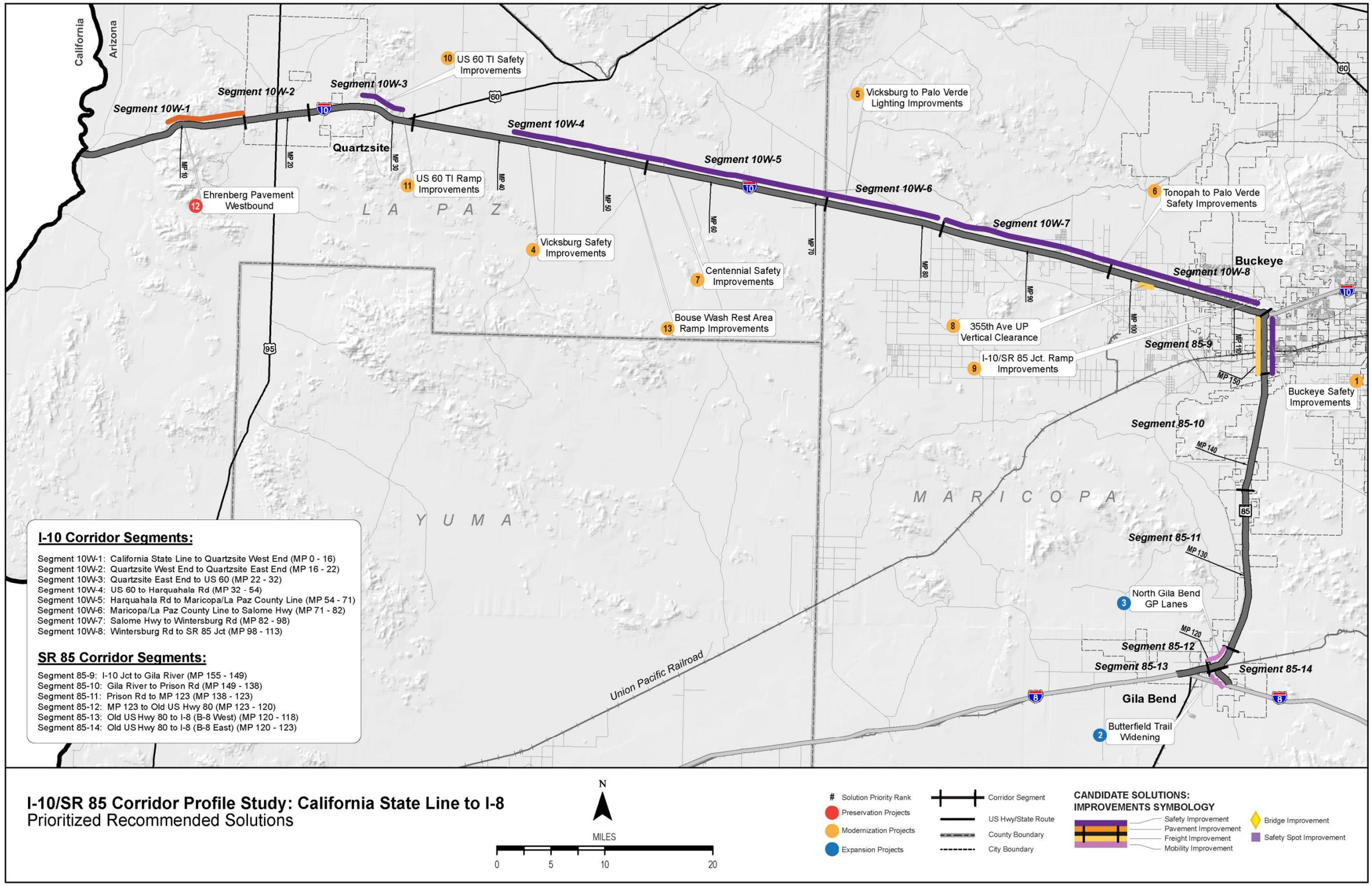
Table 23: Prioritization Scores

Candidate Solution #	Segment	Option	Candidate Solution Name	Milepost Location	Estimated Cost ($ million)	Performance Effectiveness Score	**Weighted Risk Factor**	Segment Need	Prioritization Score	**Percentage by which Solution Reduces Performance Area Segment Needs**				
										Pavement	Bridge	Safety	Mobility	Freight
10W.1	10W-1	-	Ehrenberg Pavement WB	9 - 16	$25.15	2.1	1.332	1.38	4	86%	0%	15%	6%	12%
10W.3	10W-3	-	US 60 TI Safety	27 – 31	$13.73	4.5	1.720	0.85	7	0%	0%	46%	3%	1%
10W.4	10W-3	-	US 60 TI Ramp	31	$4.43	3.0	1.689	0.85	4	0%	0%	48%	7%	2%
10W.5	10W-4	-	Vicksburg Safety	32 – 50	$10.25	23.3	1.696	1.23	49	0%	0%	39%	2%	6%
10W.6	10W-4	-	Bouse Wash Rest Area Ramp	52.5	$4.43	0.9	1.496	1.23	2	0%	0%	2%	7%	0.5%
10W.7	10W-5	-	Centennial Safety	54 – 71	$23.42	11.8	1.717	0.92	19	0%	0%	60%	4%	5%
10W.8	10W-5 10W-6 10W-8	-	Vicksburg to PV Lighting	54 – 103	$2.49	20.2	1.715	0.97	34	0%	0%	7%	1%	1%
10W.9	10W-7 10W-8	-	Tonopah to PV Safety	82 – 112	$38.36	15.1	1.718	1.01	26	0%	0%	44%	4%	7%
10W.10	10W-8	-	355th Vertical Clearance	101.4	$0.48	12.0	1.342	0.85	14	10%	0%	0%	0%	38%
10W.11	10W-8	-	I-10/SR 85 Jct Ramps	112 – 113	$4.43	4.7	1.682	0.85	7	0%	0%	38%	22%	1%
85.12	85-9	A	Buckeye Safety	154 – 149	$2.13	63.2	1.604	1.62	164	0%	0%	44%	25%	30%
85.13	85-12	-	N Gila Bend GP Lanes	123 – 120	$30.07	36.7	1.358	1.30	65	52%	0%	64%	91%	8%
85.14	85-14	A	Butterfield Trail Widening	120 – 123	$11.75	64.5	1.362	1.80	158	0%	0%	0%	83%	4%

Table 24: Prioritized Recommended Solutions

Priority Rank	Candidate Solution #	Candidate Solution Name	Scope	Estimated Cost (in millions)	Investment Category [P] Preservation [M] Modernization [E] Expansion	Prioritization Score
1	85.12A	Buckeye Safety	Install chevrons on the I-10/SR 85 interchange ramps. Install intersection warning beacons on SR 85 at the intersection approaches for Broadway, Southern, and Baseline Roads. Install larger stop signs with flashing beacons along Broadway, Southern, and Baseline Roads (both directions) at approaches to SR 85 intersection. Project will include the construction of acceleration and decelerations lanes for cross traffic merging at Broadway and Southern Roads.	$2.13	M	**164**
2	85.14A	Butterfield Trail Widening	Construct new general purpose lanes and a center left turn lane along Butterfield Trail between MP 120 (Jct. I-8) and MP 123 (Jct. SR 85). Project will convert existing 2 lane undivided facility to a 5 lane undivided facility including shoulder rehabilitation.	$11.75	E	**158**
3	85.13	N. Gila Bend GP Lanes	Construct 2 Southbound general purpose lanes west of the existing alignment to create a 4-lane divided highway between MP 123 and Maricopa Road. The existing alignment will become 2 Northbound general purpose lanes. As part of this project, access to the airport on the east side of SR 85 will need to be reconfigured.	$30.07	E	**65**
4	10W.5	Vicksburg Safety	Rehabilitate the outside shoulder including mill and replace pavement, rumble strips, raised pavement markers, and necessary striping from MP 32 to 50 in both EB and WB directions. Project will also include the installation of CCTV cameras at the existing EB and WB DMS at MP 49.4.	$10.25	M	**49**
5	10W.8	Vicksburg to Palo Verde Lighting	Install lighting at EB and WB interchange merge points at MP 54, 69, 81, 98, 103 to improve visibility.	$2.49	M	**34**
6	10W.9	Tonopah to Palo Verde Safety	Widen the outside shoulder including mill and replace pavement, rumble strips, raised pavement markers, and necessary striping from MP 82 to 112 in both EB and WB directions. Project will include the installation of dynamic speed feedback signs at EB MP 85 and WB MP 110. In addition a CCTV camera will be installed at the existing DMS at MP 110.	$38.36	M	**26**
7	10W.7	Centennial Safety	Widen the outside shoulder including mill and replace, rumble strips, raised pavement markers, and necessary striping from MP 54 to 71 in both EB and WB directions. Project will include the installation of dynamic weather warning beacons at MP 66, 68, 70, 76, 78, and 80 as well as RWIS at MP 70 and 77.	$23.42	M	**19**
8	10W.10	355th Ave Vertical Clearance	Re-profile mainline I-10 to increase vertical clearance under the 355th Avenue overpass.	$0.48	M	**14**
9	10W.11	I-10/SR 85 Jct. Ramps	Modify existing EB/WB entry and exit ramps to a parallel configuration.	$4.43	M	**7**
10	10W.3	US 60 Interchange Safety	Improve skid resistance of pavement between MP 27 and 31 in both EB and WB directions. Project will include the installation of chevrons throughout the curve between MP 28 and 29.5 in both directions as well as dynamic speed feedback signs at the approaches to the curve (EB MP 27 and WB MP 31).	$13.73	M	**7**
11	10W.4	US 60 TI Ramp	Modify existing EB/WB entry and exit ramps to a parallel configuration.	$4.43	M	**4**
12	10W.1	Ehrenberg Pavement WB	Replace pavement between MP 9 and 16 in the WB direction. Project to include pavement, over excavation, striping, delineators, raised pavement markers, and rumble strips.	$25.15	P	**4**
13	10W.6	Bouse Wash Rest Area Ramps	Modify existing EB/WB entry and exit ramps to a parallel configuration	$4.43	M	**2**

Figure 27: Recommended Solutions



I-10 Corridor Segments:

Segment 10W-1: California State Line to Quartzsite West End (MP 0 - 16)
Segment 10W-2: Quartzsite West End to Quartzsite East End (MP 16 - 22)
Segment 10W-3: Quartzsite East End to US 60 (MP 22 - 32)
Segment 10W-4: US 60 to Harquahala Rd (MP 32 - 54)
Segment 10W-5: Harquahala Rd to Maricopa/La Paz County Line (MP 54 - 71)
Segment 10W-6: Maricopa/La Paz County Line to Salome Hwy (MP 71 - 82)
Segment 10W-7: Salome Hwy to Wintersburg Rd (MP 82 - 98)
Segment 10W-8: Wintersburg Rd to SR 85 Jct (MP 98 - 113)

SR 85 Corridor Segments:

Segment 85-9: I-10 Jct to Gila River (MP 155 - 149)
Segment 85-10: Gila River to Prison Rd (MP 149 - 138)
Segment 85-11: Prison Rd to MP 123 (MP 138 - 123)
Segment 85-12: MP 123 to Old US Hwy 80 (MP 123 - 120)
Segment 85-13: Old US Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old US Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

6.4 Next Steps

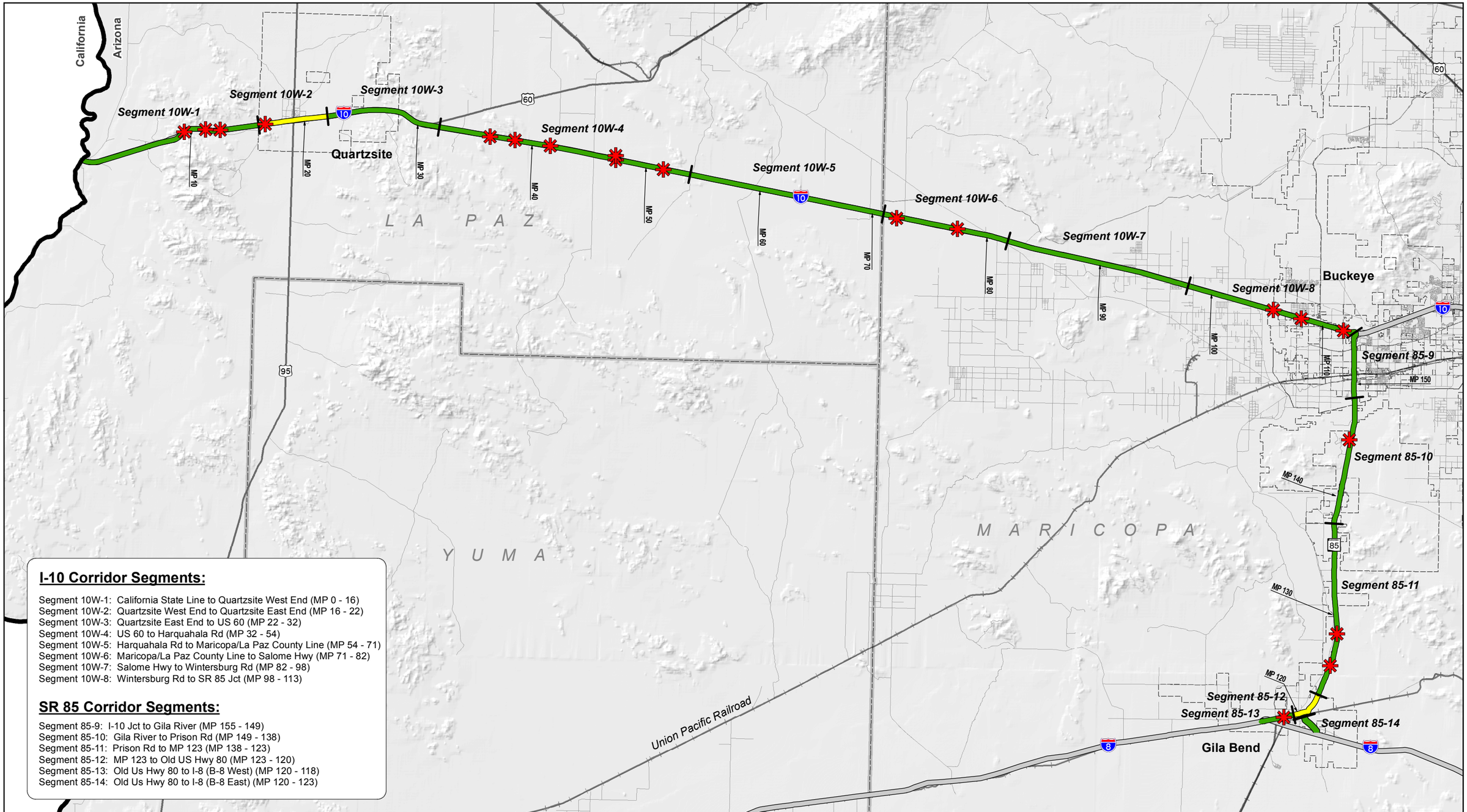
The candidate solutions recommended in this study are not intended to be a substitute or replacement for traditional ADOT project development processes where various ADOT technical groups and districts develop candidate projects for consideration in the performance-based programming in the P2P process. Rather, these candidate solutions are intended to complement ADOT's traditional project development processes through a performance-based process to address needs in one or more of the five performance areas of Pavement, Bridge, Mobility, Safety, and Freight. Candidate solutions developed for the I-10/SR 85 corridor will be considered along with other candidate projects in the ADOT statewide programming process.

It is important to note that the candidate solutions are intended to represent strategic solutions to address existing performance needs related to the Pavement, Bridge, Mobility, Safety, and Freight performance areas. Therefore, the strategic solutions are not intended to preclude recomme3ndations related to the ultimate vision for the corridor that may have been defined in the context of prior planning studies and/or design concept reports. Recommendations from such studies are still relevant to addressing the ultimate corridor objectives.

Upon completion of all three CPS rounds, the results will be incorporated into a summary document comparing all corridors that is expected to provide a performance-based review of statewide needs and candidate solutions.

Appendix A: Corridor Performance Maps

P:\Projects\ADOT\ADOT_TPD\60476359_MPDI-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Pavement_Index_kb.mxd (BD 12/14/2016)



I-10 Corridor Segments:

Segment 10W-1: California State Line to Quartzsite West End (MP 0 - 16)
Segment 10W-2: Quartzsite West End to Quartzsite East End (MP 16 - 22)
Segment 10W-3: Quartzsite East End to US 60 (MP 22 - 32)
Segment 10W-4: US 60 to Harquahala Rd (MP 32 - 54)
Segment 10W-5: Harquahala Rd to Maricopa/La Paz County Line (MP 54 - 71)
Segment 10W-6: Maricopa/La Paz County Line to Salome Hwy (MP 71 - 82)
Segment 10W-7: Salome Hwy to Wintersburg Rd (MP 82 - 98)
Segment 10W-8: Wintersburg Rd to SR 85 Jct (MP 98 - 113)

SR 85 Corridor Segments:

Segment 85-9: I-10 Jct to Gila River (MP 155 - 149)
Segment 85-10: Gila River to Prison Rd (MP 149 - 138)
Segment 85-11: Prison Rd to MP 123 (MP 138 - 123)
Segment 85-12: MP 123 to Old US Hwy 80 (MP 123 - 120)
Segment 85-13: Old Us Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old Us Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

I-10/SR 85 Corridor Profile Study: California State Line to I-8

Pavement Index
2014 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

PAVEMENT INDEX

GOOD	> 3.75
FAIR	3.2 - 3.75
POOR	< 3.2

PAVEMENT HOTSPOT

Locations of Pavement in Failure

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Pavement Serviceability
2014 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

PAVEMENT SERVICEABILITY

INTERSTATE (Segments 1 - 8)		NON-INTERSTATE (Segments 9 - 14)	
GOOD	> 3.75	GOOD	> 3.5
FAIR	3.2 - 3.75	FAIR	2.9 - 3.5
POOR	< 3.2	POOR	< 2.9

PAVEMENT HOTSPOTS
Pavement in Poor Condition

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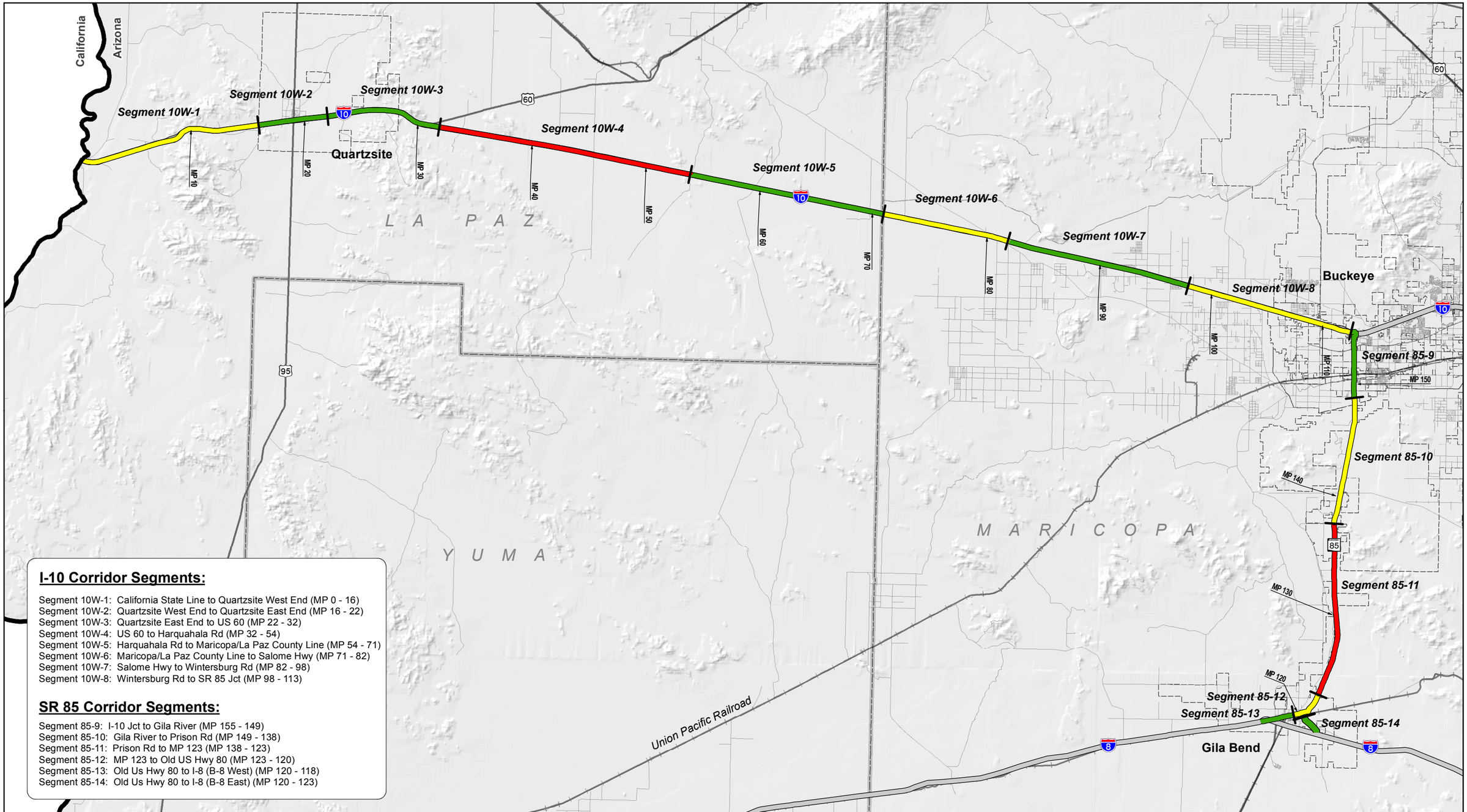

I-10 Corridor Segments:

Segment 10W-1: California State Line to Quartzsite West End (MP 0 - 16)
Segment 10W-2: Quartzsite West End to Quartzsite East End (MP 16 - 22)
Segment 10W-3: Quartzsite East End to US 60 (MP 22 - 32)
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Segment 10W-8: Wintersburg Rd to SR 85 Jct (MP 98 - 113)

SR 85 Corridor Segments:

Segment 85-9: I-10 Jct to Gila River (MP 155 - 149)
Segment 85-10: Gila River to Prison Rd (MP 149 - 138)
Segment 85-11: Prison Rd to MP 123 (MP 138 - 123)
Segment 85-12: MP 123 to Old US Hwy 80 (MP 123 - 120)
Segment 85-13: Old Us Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old Us Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

I-10/SR 85 Corridor Profile Study: California State Line to I-8

Pavement Failure

2014 - 2015 Data

N

MILES

0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

PAVEMENT FAILURE

ABOVE AVERAGE PERFORMANCE	<5
AVERAGE PERFORMANCE	5-20
BELOW AVERAGE PERFORMANCE	>20

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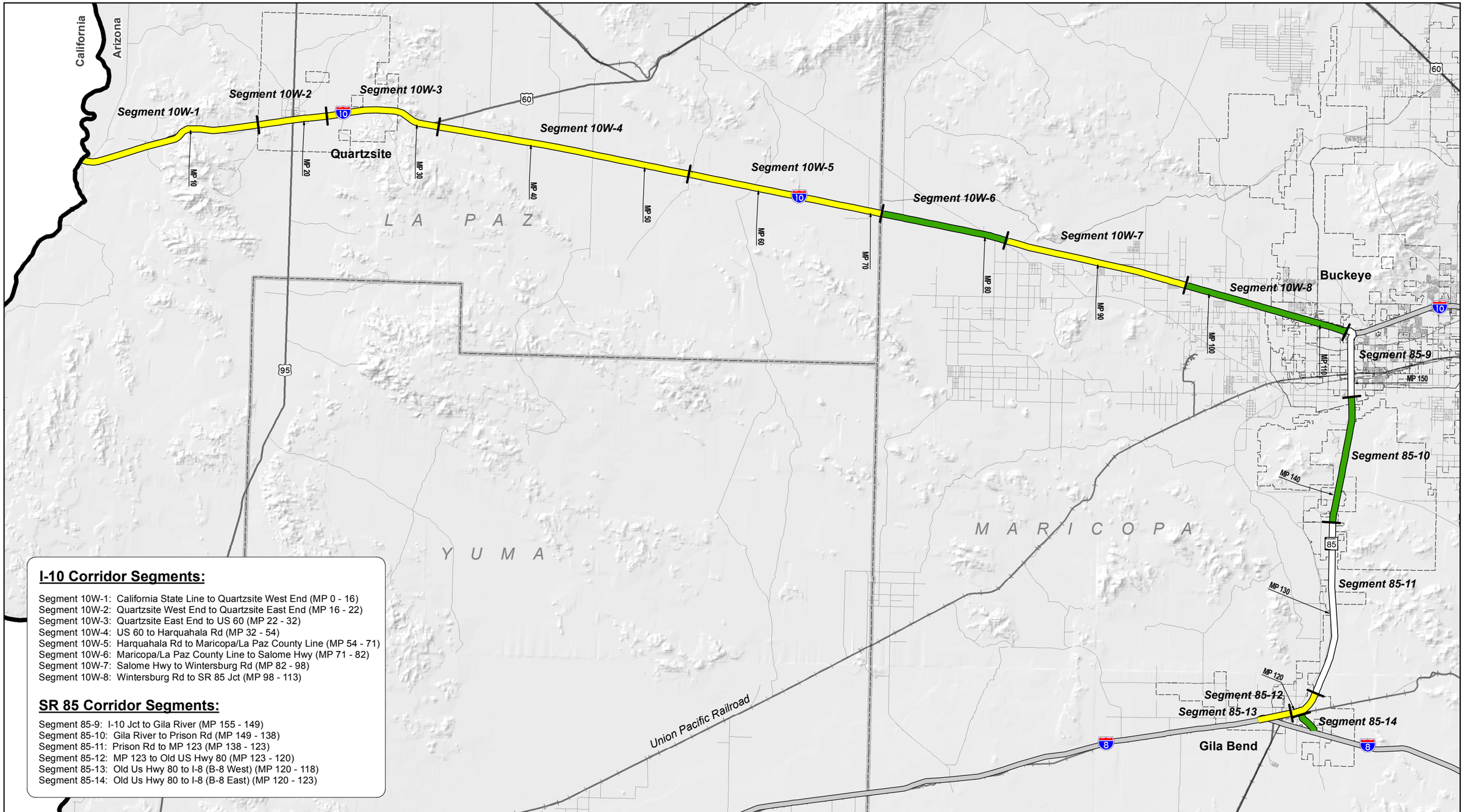

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I-10/SR 85 Corridor Profile Study: California State Line to I-8

Bridge Index
2012 - 2014 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

BRIDGE INDEX

GOOD	>6.5
FAIR	5.0-6.5
POOR	< 5.0
NO BRIDGES	

BRIDGE HOT SPOT

Bridge with a Rating of 4 or Multiple Ratings of 5

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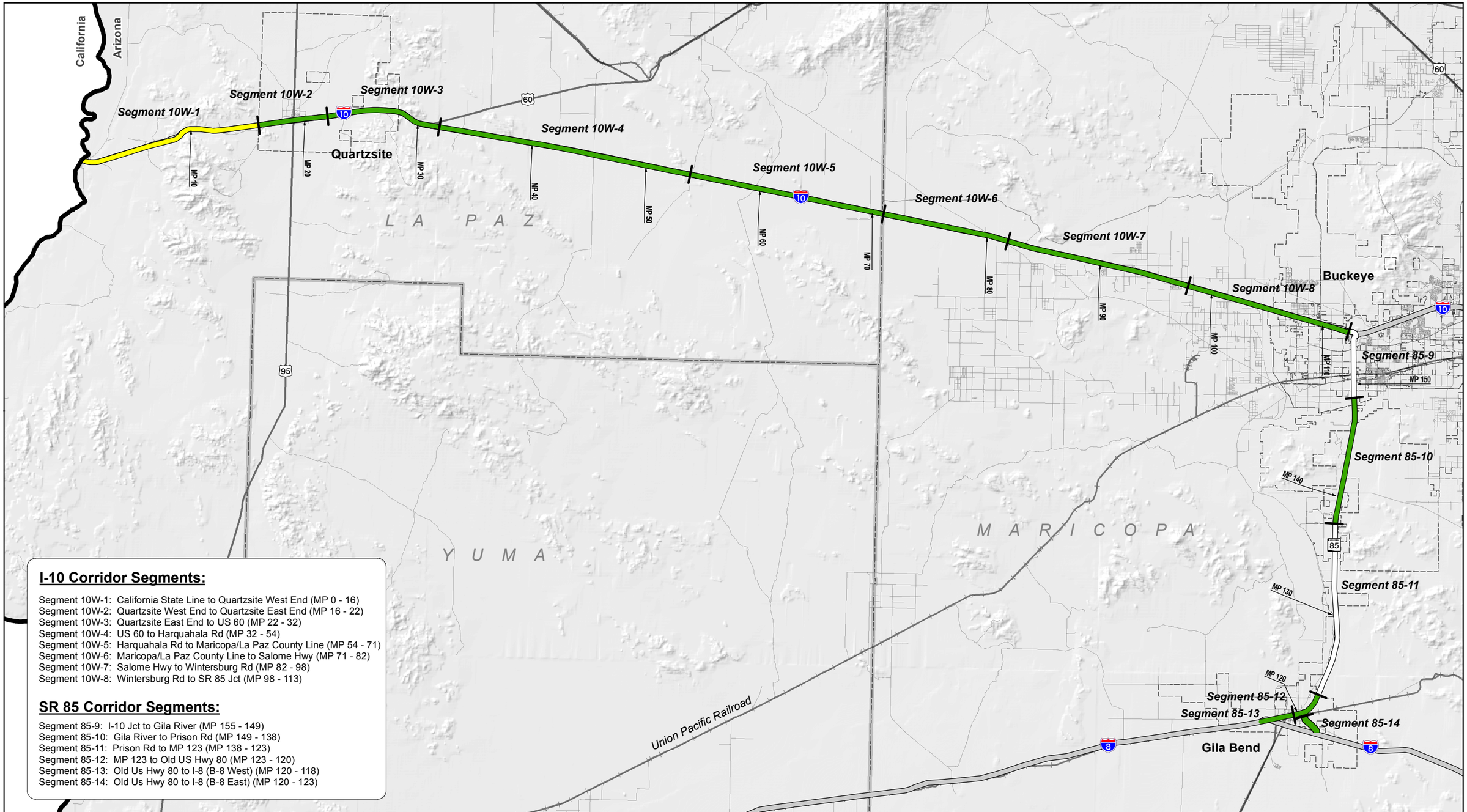

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I-10/SR 85 Corridor Profile Study: California State Line to I-8

Bridge Sufficiency
2014 - 2015 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

BRIDGE SUFFICIENCY

GOOD	> 80
FAIR	50-80
POOR	< 50
NO BRIDGES	

SUFFICIENCY HOT SPOT

Sufficiency Rating < 50

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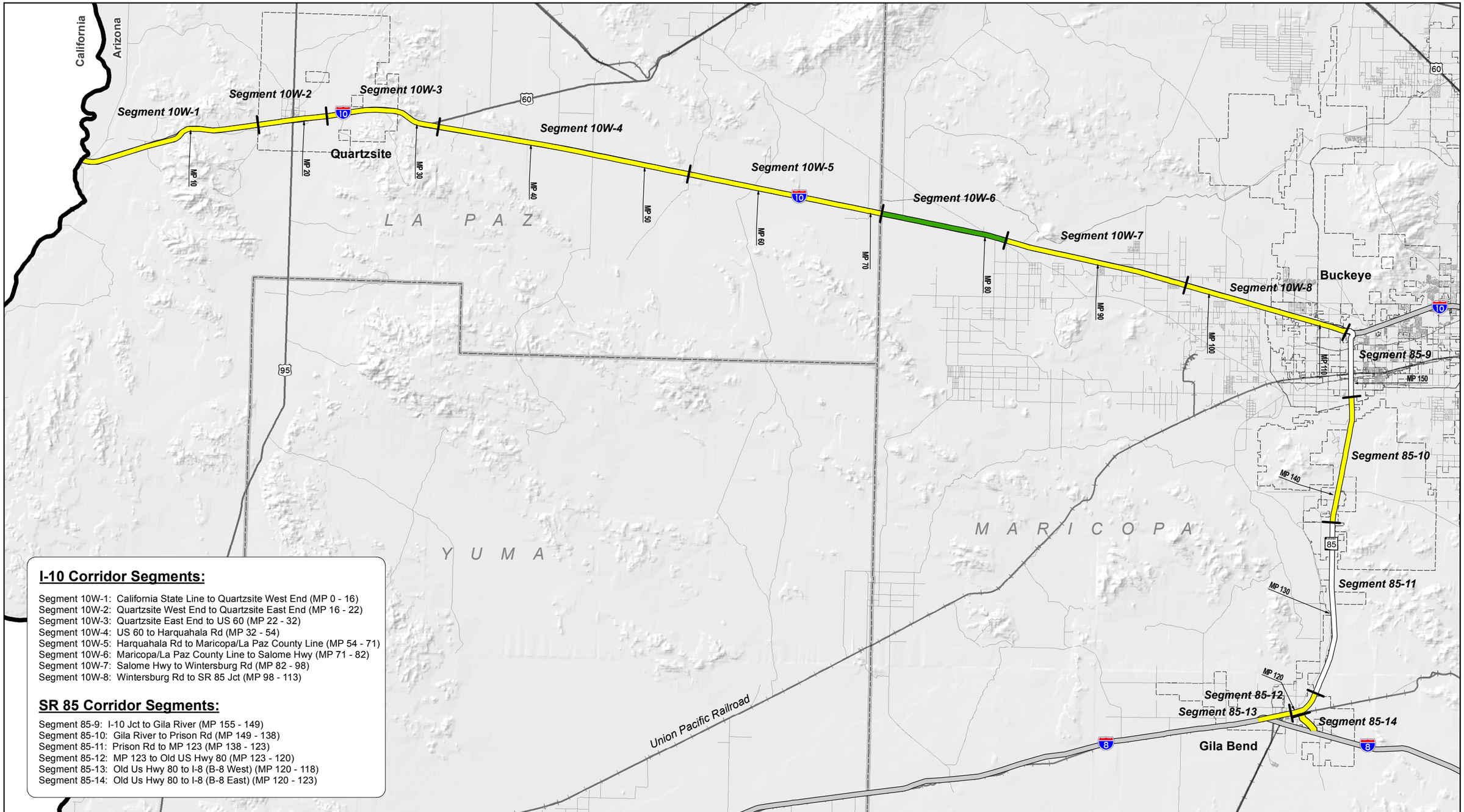

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I-10/SR 85 Corridor Profile Study: California State Line to I-8

Bridge Rating
2014 - 2015 Data

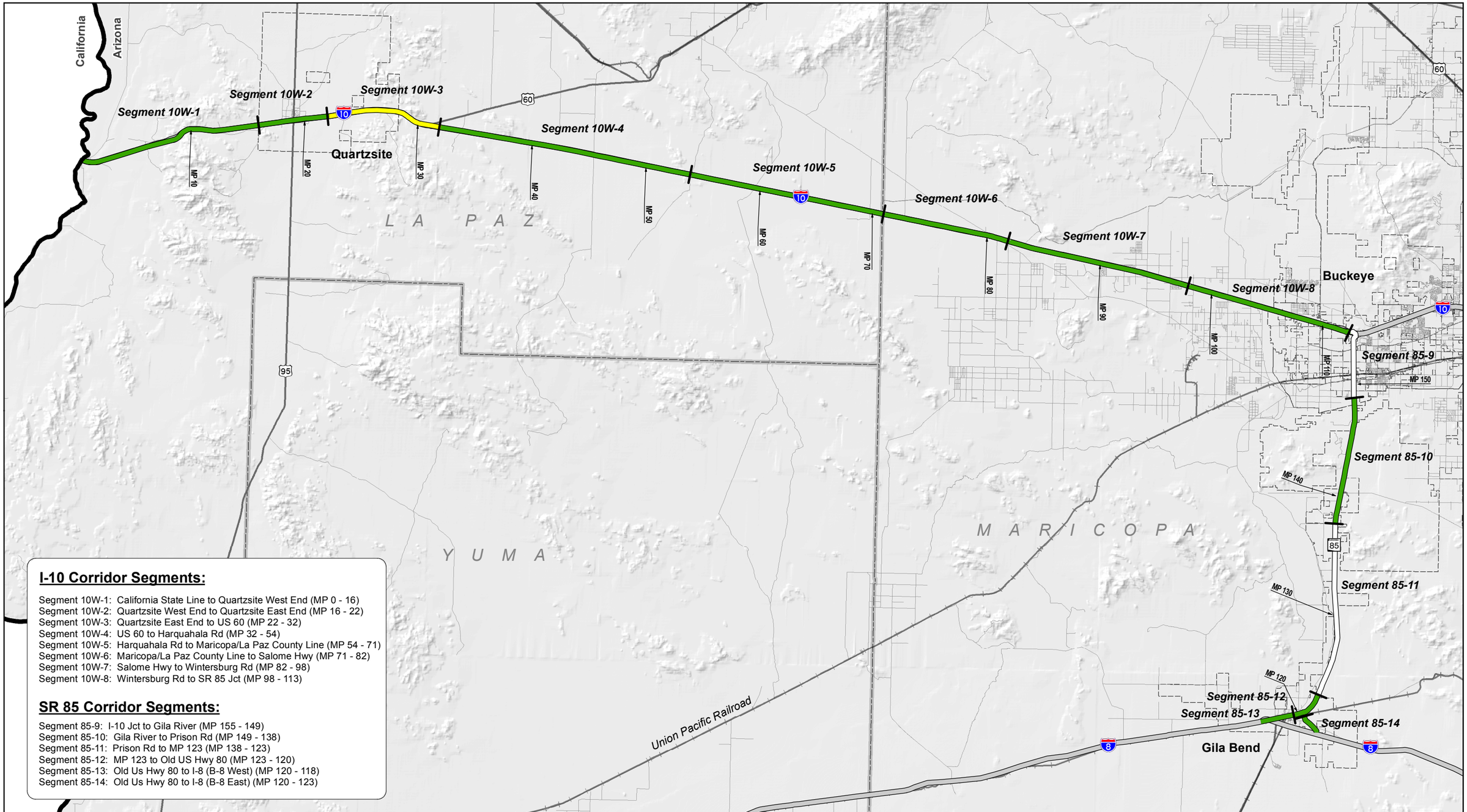
N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

BRIDGE RATING

GOOD	> 6
FAIR	5 - 6
POOR	< 5
NO BRIDGES	



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I-10/SR 85 Corridor Profile Study: California State Line to I-8

Functionally Obsolete Bridges
2014 - 2015 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

FUNCTIONALLY OBSOLETE BRIDGES

ABOVE AVERAGE PERFORMANCE	< 12%
AVERAGE PERFORMANCE	12% - 40%
BELOW AVERAGE PERFORMANCE	> 40%
NO BRIDGES	

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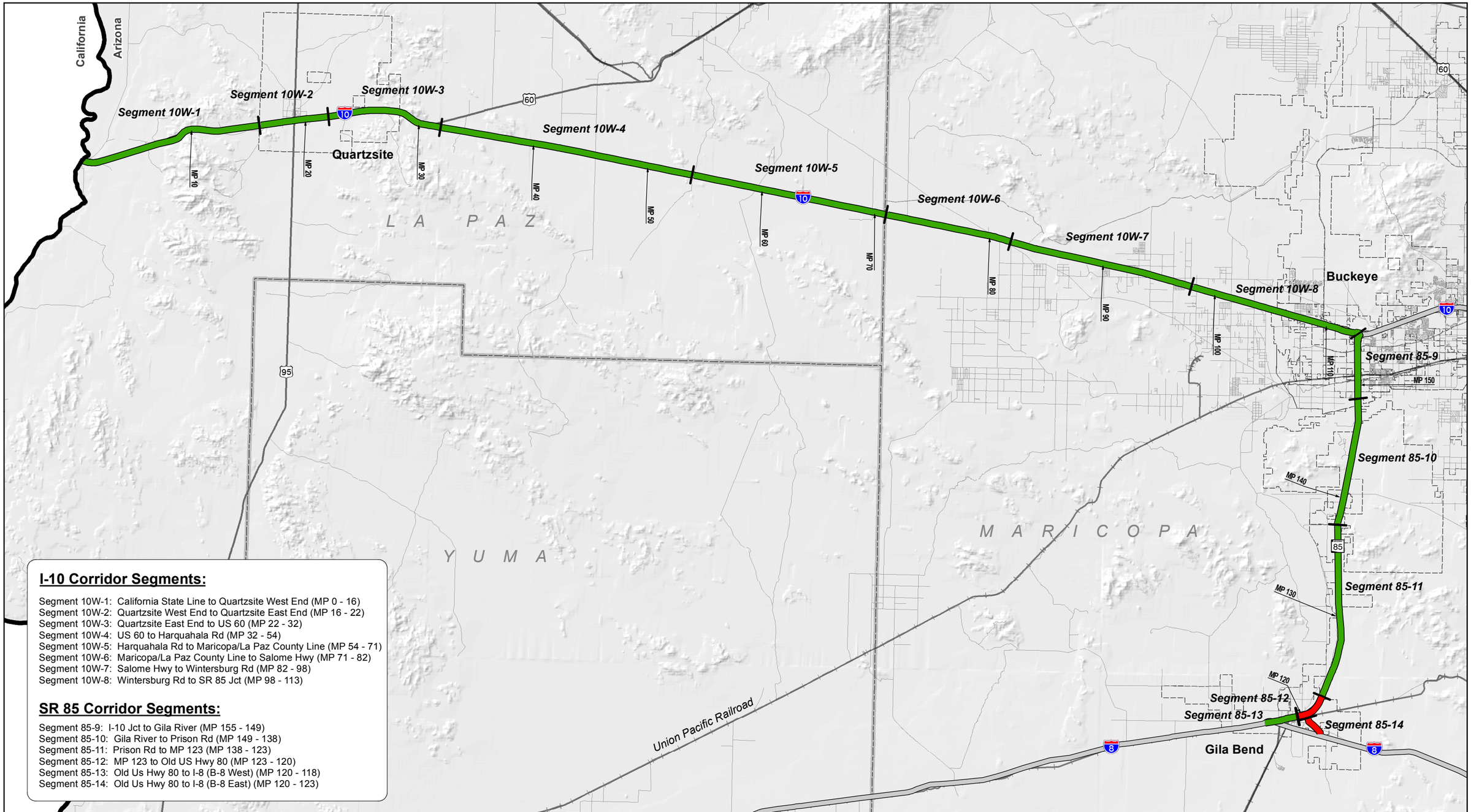

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I-10/SR 85 Corridor Profile Study: California State Line to I-8

Mobility Index
2014 and 2035 AADT DATA

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

MOBILITY INDEX

URBAN AND FRINGE URBAN (Segments 9 ,13 & 14)

GOOD / LOS A-C	V/C < 0.71	
FAIR / LOS D	V/C > 0.71 & < 0.89	
POOR / LOS E or less	V/C > 0.89	

RURAL (1 - 8 & 10 -12)

GOOD / LOS A-B	V/C < 0.56
FAIR / LOS C	V/C > 0.56 & < 0.76
POOR / LOS D or less	V/C > 0.76

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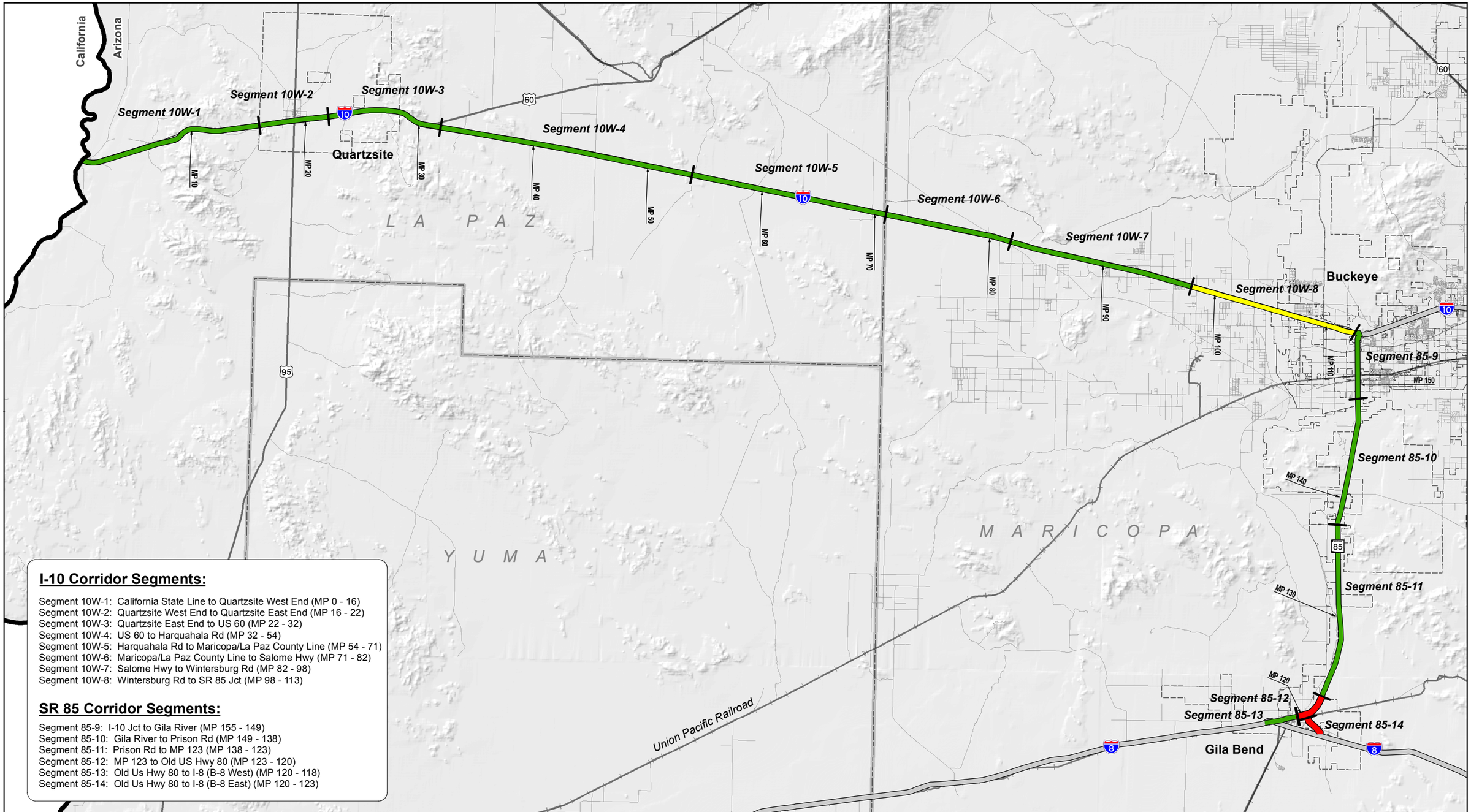

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I-10/SR 85 Corridor Profile Study: California State Line to I-8

Future Daily V/C
2035 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

FUTURE DAILY V/C

URBAN AND FRINGE URBAN (Segments 9 ,13 & 14)		RURAL (1 - 8 & 10 -12)	
GOOD / LOS A-C	V/C < 0.71	**GOOD** / LOS A-B	V/C < 0.56
FAIR / LOS D	V/C > 0.71 & < 0.89	**FAIR** / LOS C	V/C > 0.56 & < 0.76
POOR / LOS E or less	V/C > 0.89	**POOR** / LOS D or less	V/C > 0.76

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Existing Peak Hour V/C
2014 - 2015 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

EXISTING PEAK HOUR V/C

URBAN and FRINGE URBAN (Segments 9, 13 &14)		RURAL (Segments 1- 8 & 10-12)	
GOOD / LOS A-C	V/C ≤ 0.71	**GOOD** / LOS A-B	V/C ≤ 0.56
FAIR / LOS D	V/C > 0.71 & ≤ 0.89	**FAIR** / LOS C	V/C > 0.56 & ≤ 0.76
POOR / LOS E or less	V/C > 0.89	**POOR** / LOS D or less	V/C > 0.76

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I-10/SR 85 Corridor Profile Study: California State Line to I-8
Closure Frequency
2014 - 2015 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

CLOSURE FREQUENCY
(#/miles/year)

ABOVE AVERAGE PERFORMANCE	< 0.22
AVERAGE PERFORMANCE	0.22 - 0.62
BELOW AVERAGE PERFORMANCE	> 0.62
NO DATA AVAILABLE	

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I-10/SR 85 Corridor Profile Study: California State Line to I-8
Directional Travel Time Index
2013 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

MOBILITY TRAVEL TIME INDEX

UNINTERRUPTED (Segments 1 - 11)		INTERRUPTED (Segments 12 - 14)	
GOOD	< 1.15	GOOD	< 1.30
FAIR	1.15 - 1.33	FAIR	1.3 - 2.00
POOR	> 1.33	POOR	> 2.00

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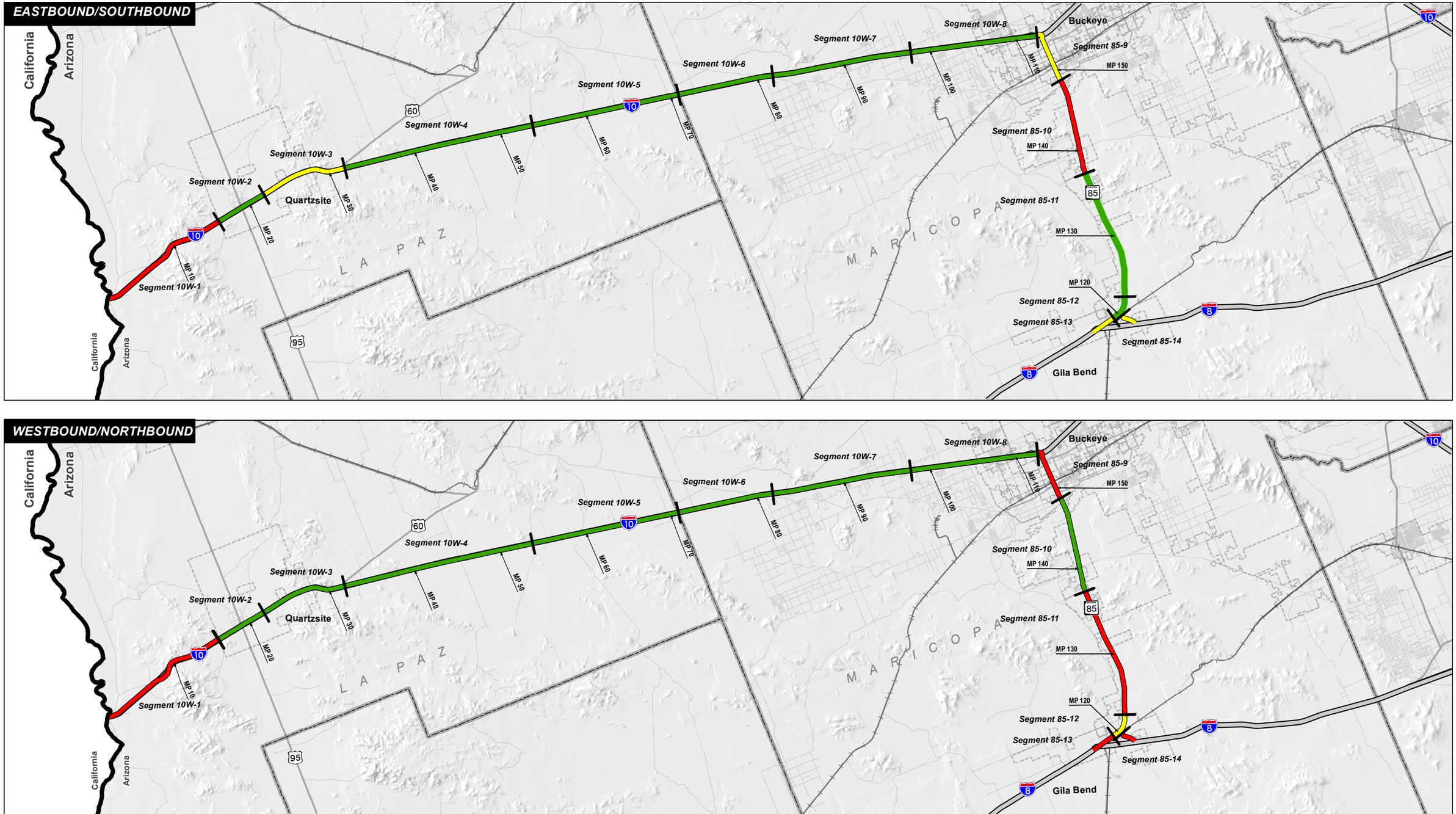

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Directional Planning Time Index
2013 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

MOBILITY PLANNING TIME INDEX

UNINTERRUPTED (Segments 1 - 11)		INTERRUPTED (Segments 12 - 14)	
GOOD	< 1.30	GOOD	< 3.00
FAIR	1.30 - 1.50	FAIR	3.00 - 6.00
POOR	> 1.50	POOR	> 6.00

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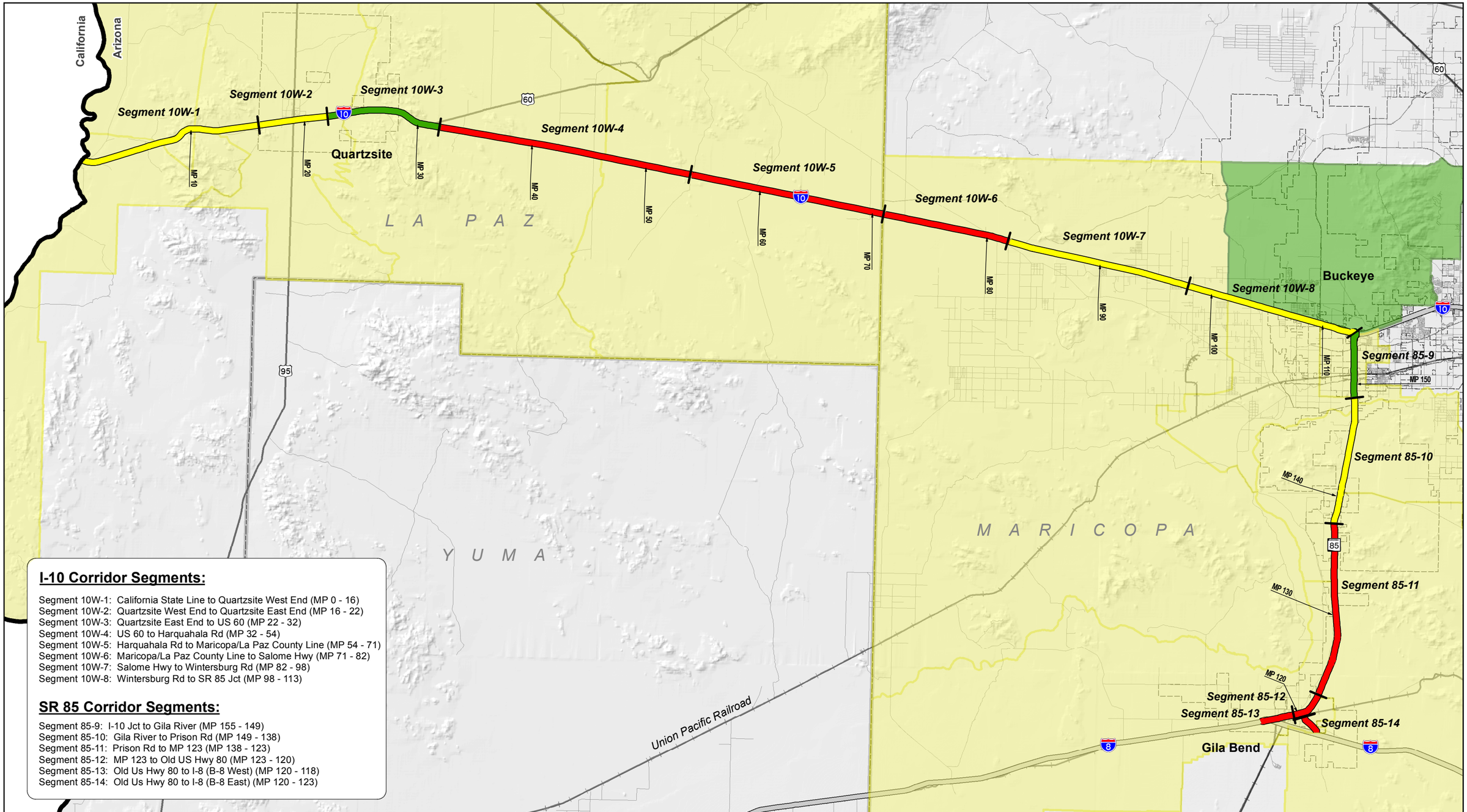

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I-10/SR 85 Corridor Profile Study: California State Line to I-8
Multimodal Opportunities
2014 Data/2010 - 2014 US Census American Community Survery Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

Census Tracts of Zero/One Vehicle households and population in Poverty:

Tracts BELOW the Arizona statewide average range
Tracts WITHIN the Arizona statewide average range
Tracts ABOVE the Arizona statewide average range

Average Non-Single Occupancy Vehicle Trips by Corridor Segment:

Segments ABOVE the Statewide average for Non-Single Occupancy Vehicle Trips
Segments WITHIN the Statewide average for Non-Single Occupancy Vehicle Trips
Segments BELOW the Statewide average for Non-Single Occupancy Vehicle Trips

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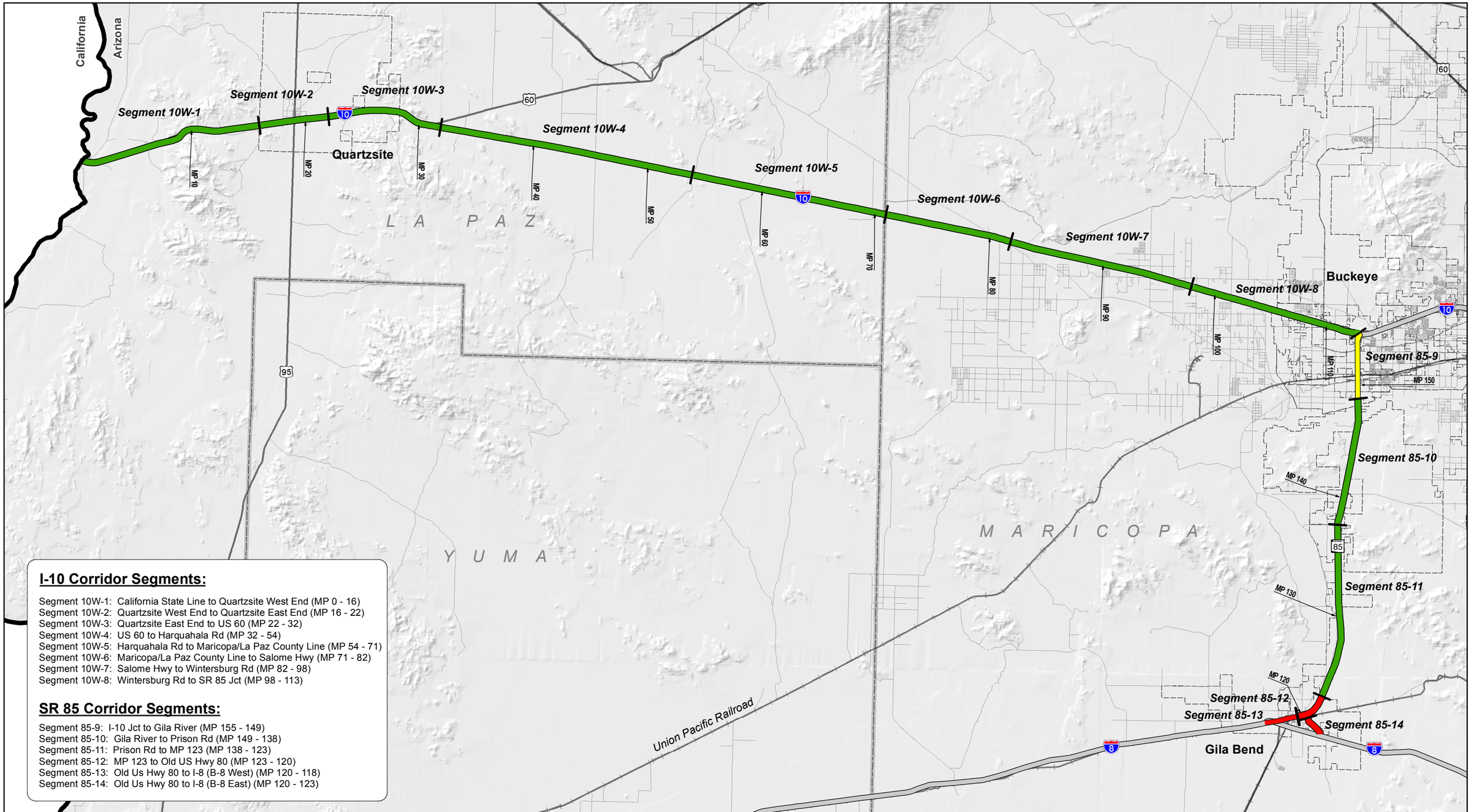

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I-10/SR 85 Corridor Profile Study: California State Line to I-8
Bicycle Accommodations
2012 - 2014 Data

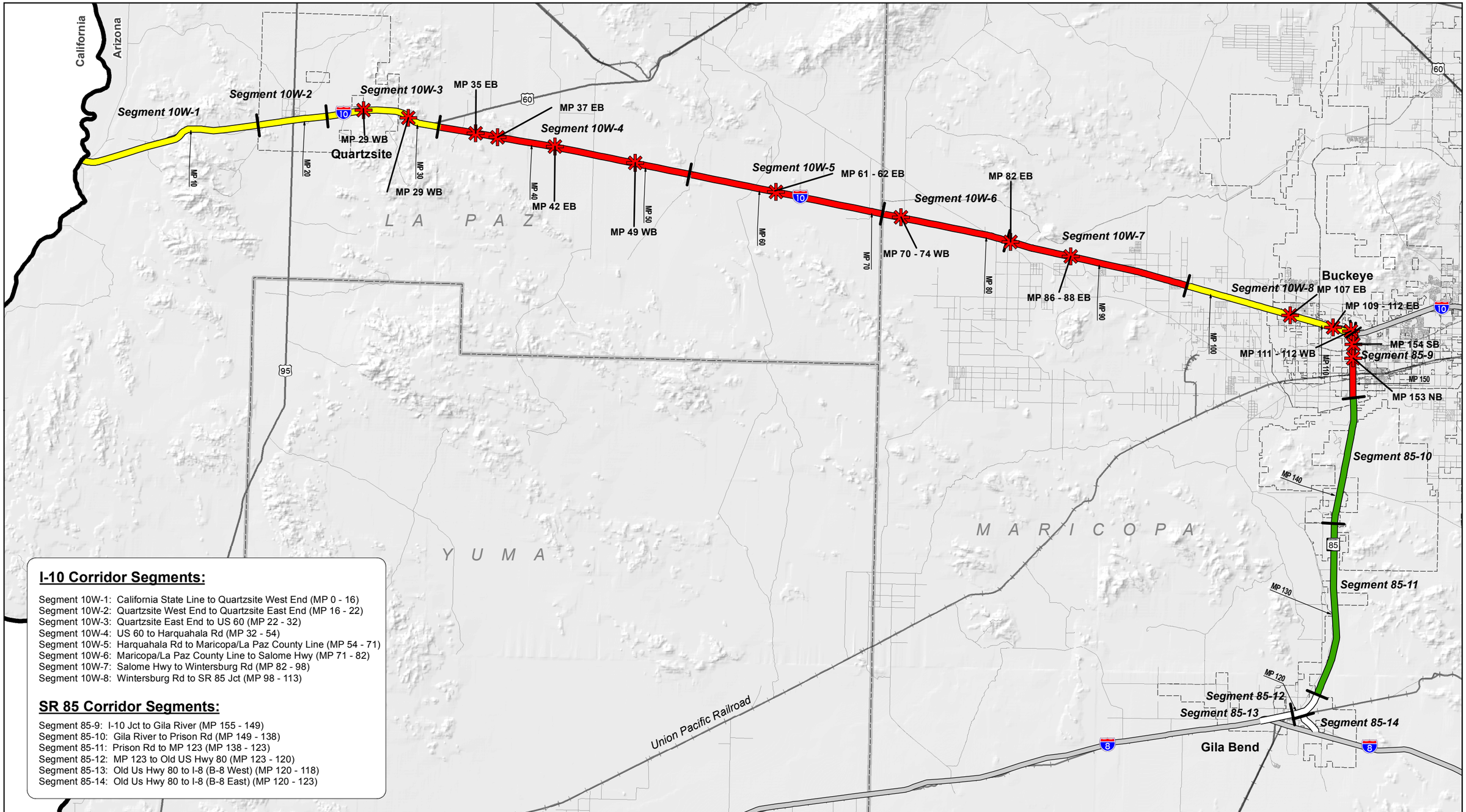
N
MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

BICYCLE ACCOMMODATIONS

GOOD	≥ 90%
FAIR	60% - 90%
POOR	< 60%

P:\Projects\ADOT\ADOT_TPD\60476359_MPD-I-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Safety_Index_kb.mxd (BD 12/15/2016)



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SR 85 Corridor Segments:

Segment 85-9: I-10 Jct to Gila River (MP 155 - 149)
Segment 85-10: Gila River to Prison Rd (MP 149 - 138)
Segment 85-11: Prison Rd to MP 123 (MP 138 - 123)
Segment 85-12: MP 123 to Old US Hwy 80 (MP 123 - 120)
Segment 85-13: Old Us Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old Us Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

I-10/SR 85 Corridor Profile Study: California State Line to I-8

Safety Index

2010 - 2014 Data

N

MILES

0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

SAFETY INDEX

URBAN and FRINGE URBAN (Segments 1 & 2)

GOOD	<0.79
FAIR	0.79 - 1.21
POOR	>1.21

RURAL (Segments 3 - 12)

GOOD	<0.73
FAIR	0.73 - 1.27
POOR	>1.27

SAFETY HOTSPOT

Safety Hotspots

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Directional Safety Index
2013 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

DIRECTIONAL SAFETY INDEX
- ABOVE AVERAGE PERFORMANCE
- AVERAGE PERFORMANCE
- BELOW AVERAGE PERFORMANCE
- INSUFFICIENT DATA

Document Path: P:\Projects\ADOT\ADOT_TPD\60476359_MPD-I-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Safety_DirectionalIndex_kb.mxd

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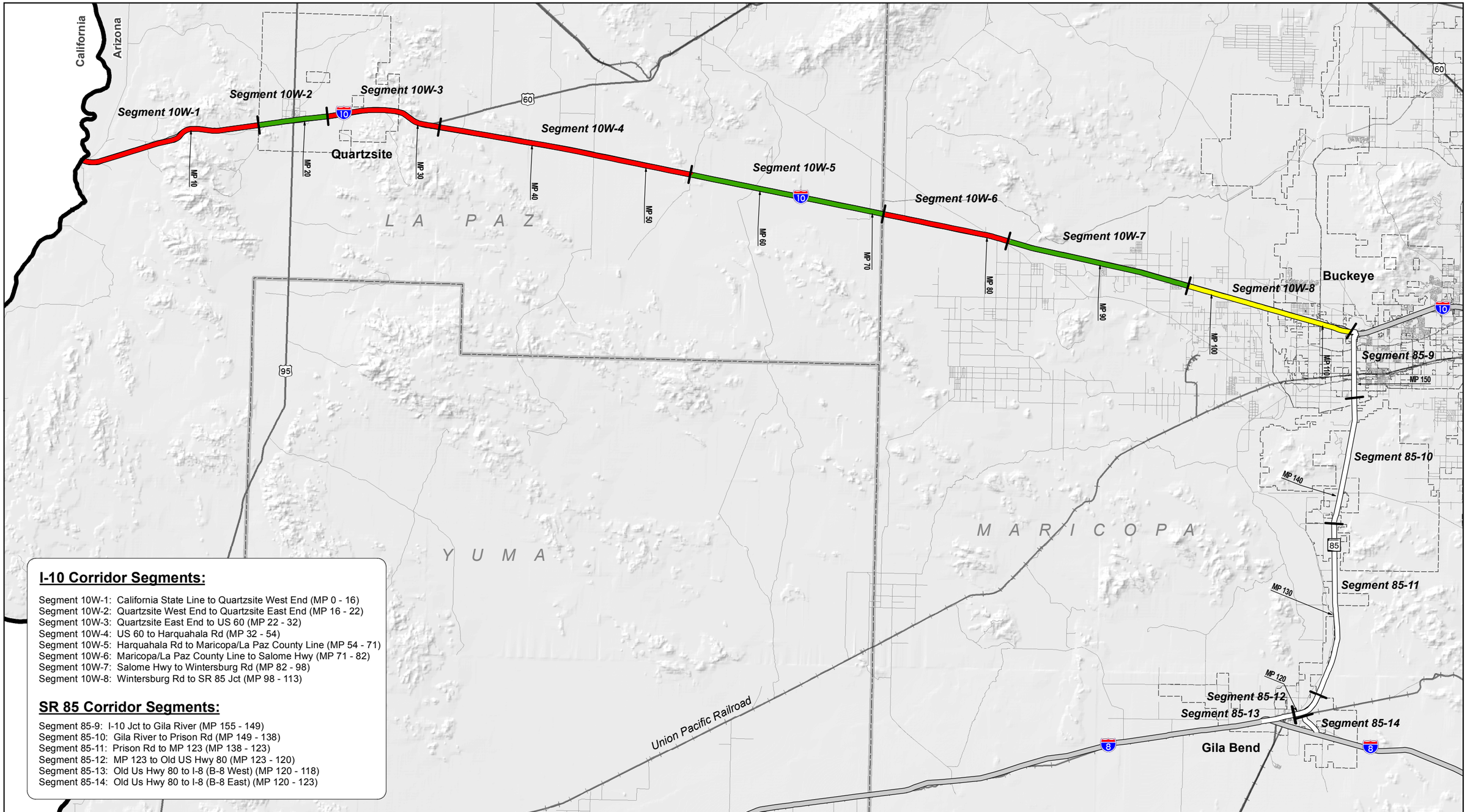


I-10 Corridor Segments:

Segment 10W-1: California State Line to Quartzsite West End (MP 0 - 16)
Segment 10W-2: Quartzsite West End to Quartzsite East End (MP 16 - 22)
Segment 10W-3: Quartzsite East End to US 60 (MP 22 - 32)
Segment 10W-4: US 60 to Harquahala Rd (MP 32 - 54)
Segment 10W-5: Harquahala Rd to Maricopa/La Paz County Line (MP 54 - 71)
Segment 10W-6: Maricopa/La Paz County Line to Salome Hwy (MP 71 - 82)
Segment 10W-7: Salome Hwy to Wintersburg Rd (MP 82 - 98)
Segment 10W-8: Wintersburg Rd to SR 85 Jct (MP 98 - 113)

SR 85 Corridor Segments:

Segment 85-9: I-10 Jct to Gila River (MP 155 - 149)
Segment 85-10: Gila River to Prison Rd (MP 149 - 138)
Segment 85-11: Prison Rd to MP 123 (MP 138 - 123)
Segment 85-12: MP 123 to Old US Hwy 80 (MP 123 - 120)
Segment 85-13: Old Us Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old Us Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Relative Frequency of 2009-2013 Fatal & Incapacitating Crashes Involving SHSP Top 5 Emphasis Areas

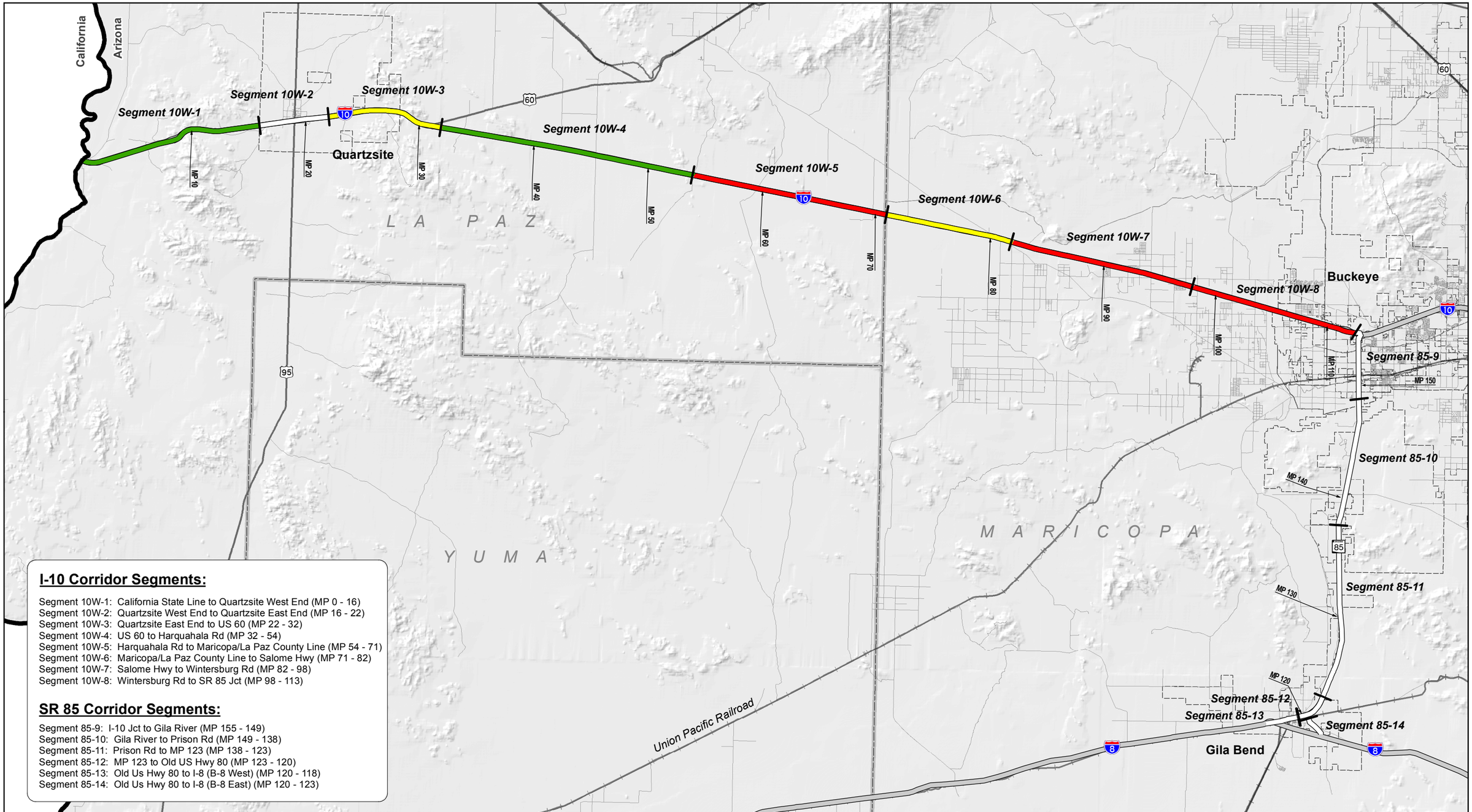
N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

CRASHES INVOLVING SHSP TOP 5 EMPHASIS AREAS
ABOVE AVERAGE PERFORMANCE
AVERAGE PERFORMANCE
BELOW AVERAGE PERFORMANCE
INSUFFICIENT DATA

P:\Projects\ADOT\ADOT_TPD\60476359_MPD-I-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Safety_TruckCrashes_kb.mxd (BD 12/16/2016)



I-10 Corridor Segments:

Segment 10W-1: California State Line to Quartzsite West End (MP 0 - 16)
Segment 10W-2: Quartzsite West End to Quartzsite East End (MP 16 - 22)
Segment 10W-3: Quartzsite East End to US 60 (MP 22 - 32)
Segment 10W-4: US 60 to Harquahala Rd (MP 32 - 54)
Segment 10W-5: Harquahala Rd to Maricopa/La Paz County Line (MP 54 - 71)
Segment 10W-6: Maricopa/La Paz County Line to Salome Hwy (MP 71 - 82)
Segment 10W-7: Salome Hwy to Wintersburg Rd (MP 82 - 98)
Segment 10W-8: Wintersburg Rd to SR 85 Jct (MP 98 - 113)

SR 85 Corridor Segments:

Segment 85-9: I-10 Jct to Gila River (MP 155 - 149)
Segment 85-10: Gila River to Prison Rd (MP 149 - 138)
Segment 85-11: Prison Rd to MP 123 (MP 138 - 123)
Segment 85-12: MP 123 to Old US Hwy 80 (MP 123 - 120)
Segment 85-13: Old Us Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old Us Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Relative Frequency of 2009-2013 Fatal & Incapacitating Crashes Involving Trucks

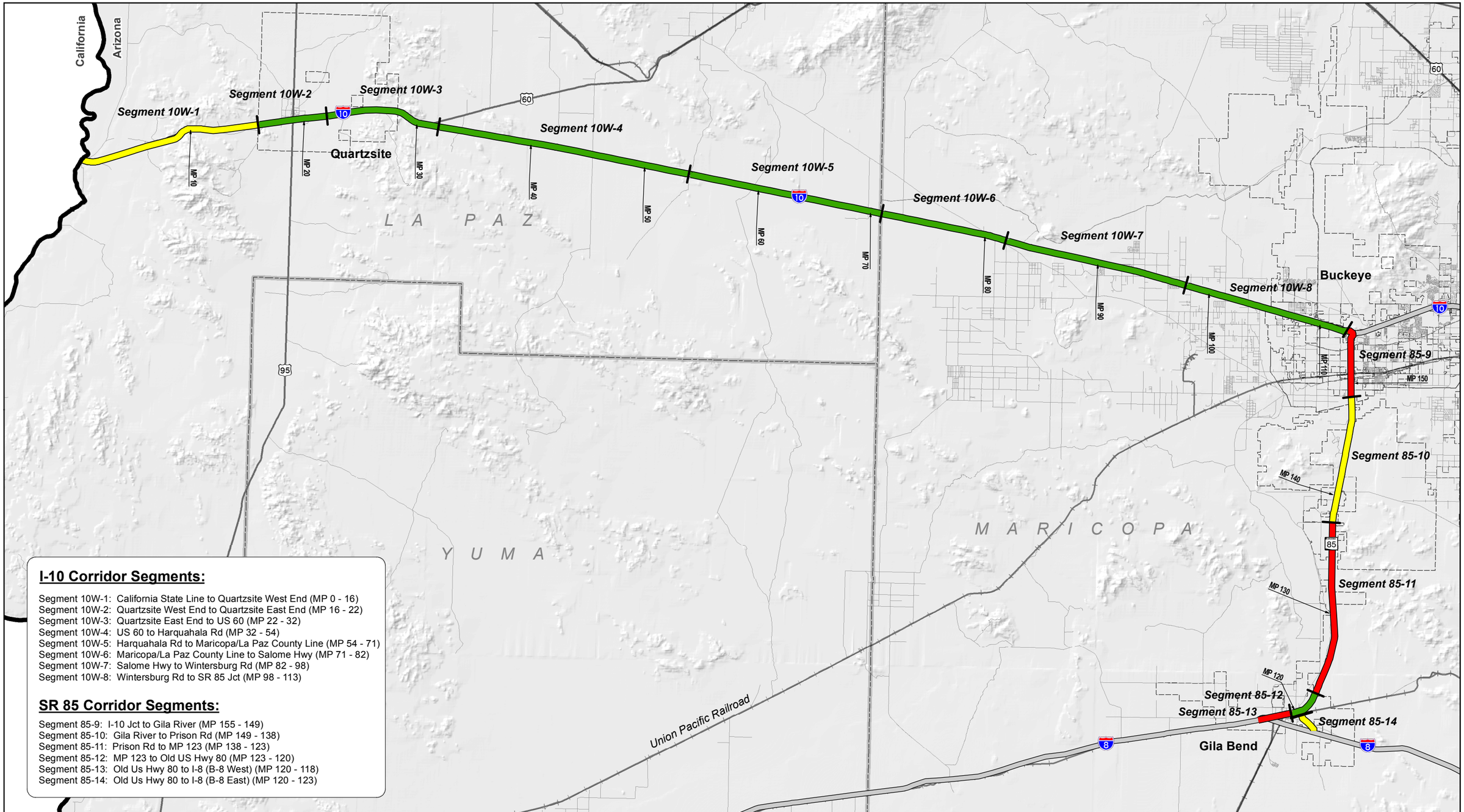
N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

FREQUENCY OF CRASHES INVOLVING TRUCKS
ABOVE AVERAGE PERFORMANCE
AVERAGE PERFORMANCE
BELOW AVERAGE PERFORMANCE
INSUFFICIENT DATA

P:\Projects\ADOT\ADOT_TPD\60476359_MPD-I-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Freight_Index_kb.mxd (BD 12/16/2016)



I-10 Corridor Segments:

Segment 10W-1: California State Line to Quartzsite West End (MP 0 - 16)
Segment 10W-2: Quartzsite West End to Quartzsite East End (MP 16 - 22)
Segment 10W-3: Quartzsite East End to US 60 (MP 22 - 32)
Segment 10W-4: US 60 to Harquahala Rd (MP 32 - 54)
Segment 10W-5: Harquahala Rd to Maricopa/La Paz County Line (MP 54 - 71)
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Segment 10W-7: Salome Hwy to Wintersburg Rd (MP 82 - 98)
Segment 10W-8: Wintersburg Rd to SR 85 Jct (MP 98 - 113)

SR 85 Corridor Segments:

Segment 85-9: I-10 Jct to Gila River (MP 155 - 149)
Segment 85-10: Gila River to Prison Rd (MP 149 - 138)
Segment 85-11: Prison Rd to MP 123 (MP 138 - 123)
Segment 85-12: MP 123 to Old US Hwy 80 (MP 123 - 120)
Segment 85-13: Old Us Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old Us Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

I-10/SR 85 Corridor Profile Study: California State Line to I-8

Freight Index

2014 Data

N

MILES

0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

FREIGHT INDEX

UNINTERRUPTED FLOW (Segments 1-11)		INTERRUPTED FLOW (Segments 12-14)	
GOOD	> 0.77	GOOD	> 0.33
FAIR	0.67 - 0.77	FAIR	0.17 - 0.33
POOR	< 0.67	POOR	< 0.17

I-10/SR 85 Corridor Profile Study: California State Line to I-8

Directional Truck Travel Time Index
2013 Data

N

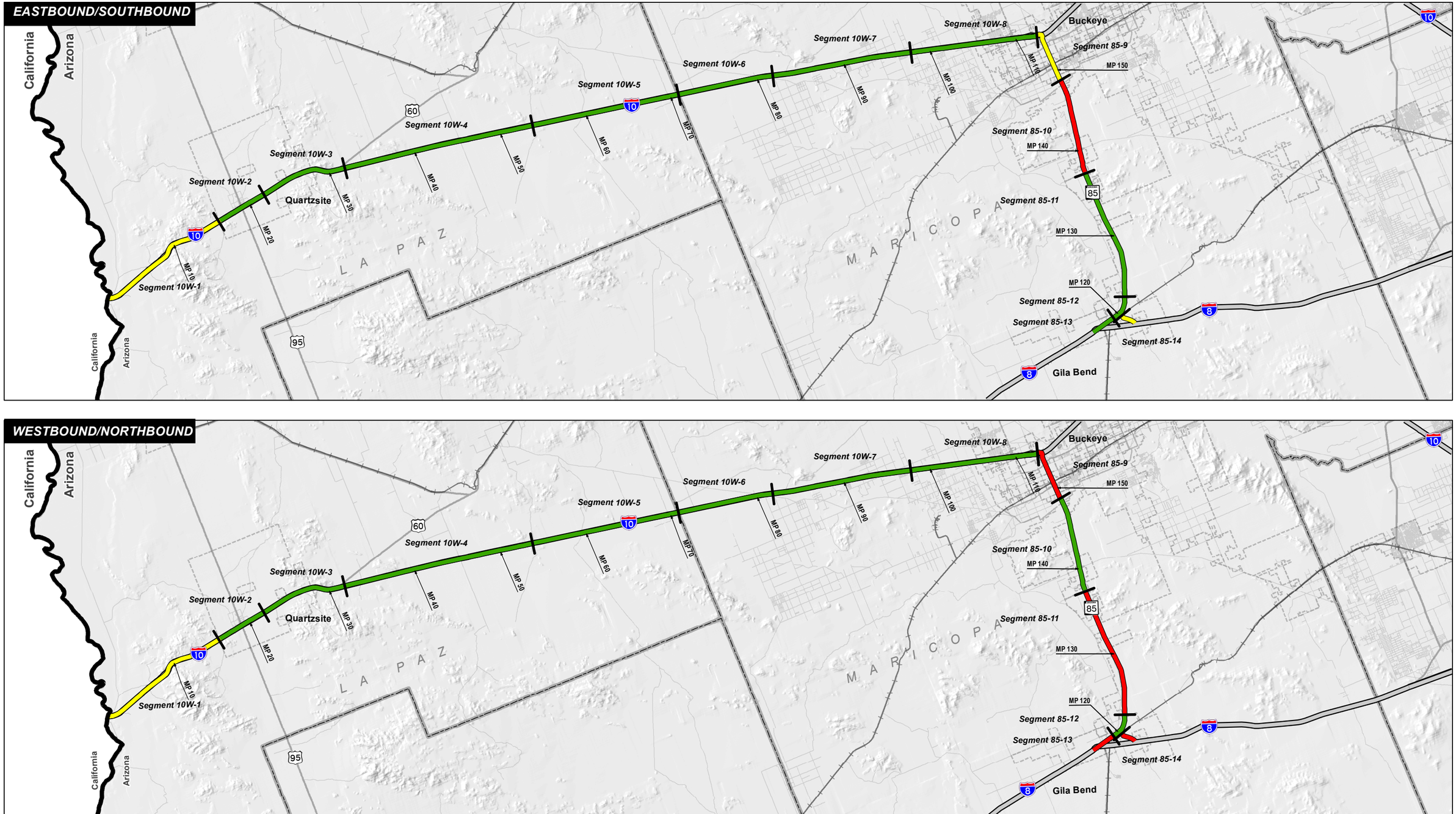
MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

TRUCK TRAVEL TIME INDEX

UNINTERRUPTED (Segments 1 - 11)		INTERRUPTED (Segments 12 - 14)	
GOOD	< 1.15	GOOD	< 1.30
FAIR	1.15 - 1.33	FAIR	1.3 - 2.00
POOR	> 1.33	POOR	> 2.00

Document Path: P:\Projects\ADOT\ADOT_TPD\60476359_MPD-I-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Freight_TruckTravelTimeIndex_kb.mxd



I-10/SR 85 Corridor Profile Study: California State Line to I-8
Directional Truck Planning Time Index
2013 Data

N

MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

TRUCK PLANNING TIME INDEX

UNINTERRUPTED (Segments 1 - 11)		INTERRUPTED (Segments 12 - 14)	
GOOD	< 1.30	GOOD	< 3.00
FAIR	1.30 - 1.50	FAIR	3.00 - 6.00
POOR	> 1.50	POOR	> 6.00

Document Path: P:\Projects\ADOT\ADOT_TPD\60476359_MPD-I-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Freight_TruckPlanningTimeIndex_kb.mxd

I-10/SR 85 Corridor Profile Study: California State Line to I-8
Closure Duration
2013 Data

N
MILES
0 5 10 20

Corridor Segment
US Hwy/State Route
Counties
Cities

CLOSURE DURATION
(min/miles/year)

ABOVE AVERAGE PERFORMANCE	< 44.2
AVERAGE PERFORMANCE	44.2 - 124.9
BELOW AVERAGE PERFORMANCE	> 124.9
NO DATA AVAILABLE	

Document Path: P:\Projects\ADOT\ADOT_TPD\60476359_MPD-I-10 CA Stateline\Docs\Final Report\GIS\MXDs\I-10W_Freight_ClosureDuration_kb.mxd

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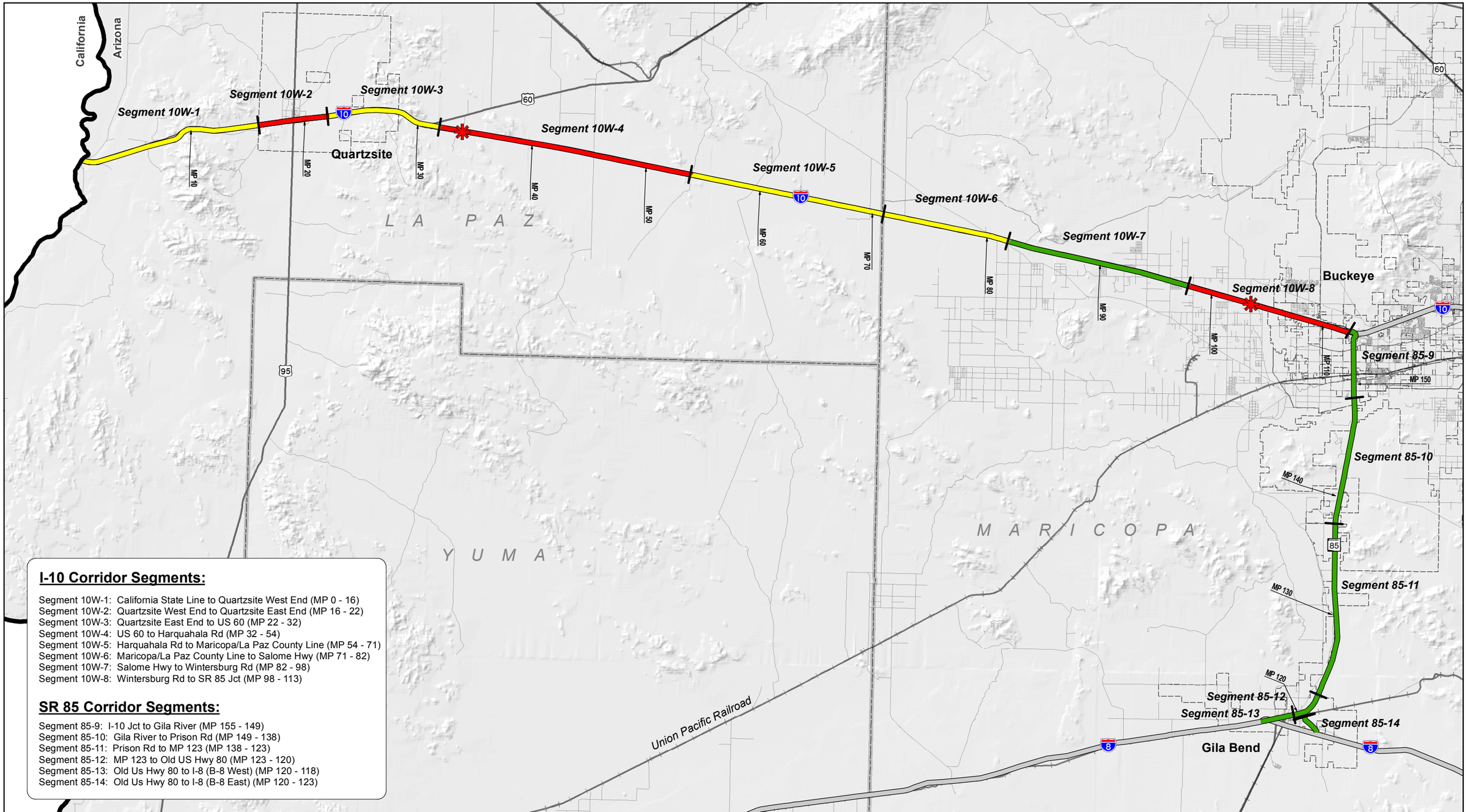

I-10 Corridor Segments:

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Segment 85-13: Old Us Hwy 80 to I-8 (B-8 West) (MP 120 - 118)
Segment 85-14: Old Us Hwy 80 to I-8 (B-8 East) (MP 120 - 123)

I-10/SR 85 Corridor Profile Study: California State Line to I-8

Truck Restrictions

2014 - 2015 Data

N

MILES

0 5 10 20

Corridor Segment
US Hwy/State Route
County Boundary
City Boundary

BRIDGE VERTICAL CLEARANCE

GOOD	> 16.5
FAIR	16.0 - 16.5
POOR	< 16.0

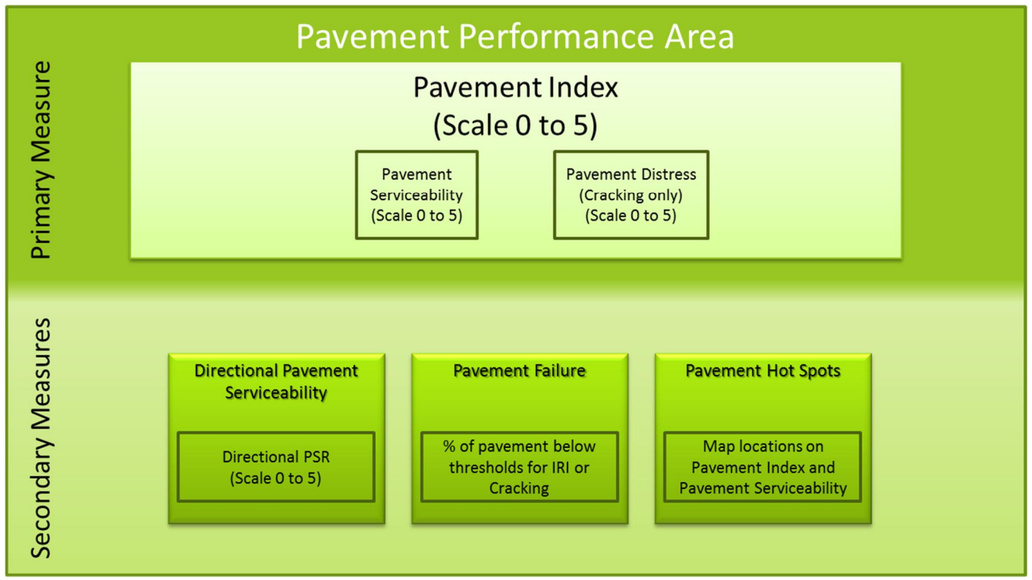
BRIDGE HOTSPOT

Bridges with Vertical Clearance < 16.5' and No Ramp

Appendix B: Performance Area Detailed Calculation Methodologies

Pavement Performance Area Calculation Methodologies

The section summarizes the approach for developing the primary and secondary performance measures in the Pavement Performance Area as shown in the following graphic.



This performance area is used to evaluate mainline pavement condition. Pavement condition data for ramps, frontage roads, crossroads, etc. was not included in the evaluation.

Primary Measure:
The Pavement Index is calculated based on the use of two pavement condition ratings from the ADOT Pavement Database. The two ratings are the International Roughness Index (IRI) and the Cracking Rating. The calculation of the Pavement Index uses a combination these two ratings.

The IRI is a measurement of the pavement roughness based on field-measured longitudinal roadway profiles. To facilitate the calculation of the index, the IRI rating was converted to a Pavement Serviceability Rating (PSR) using the following equation:

$$PSR = 5 * e^{-0.0038*IRI}$$

The Cracking Rating is a measurement of the amount of surface cracking based on a field-measured area of 1,000 square feet that serves as a sample for each mile. To facilitate the calculation of the index, the Cracking Rating was converted to a Pavement Distress Index (PDI) using the following equation:

$$PDI = 5 - (0.345 * C^{0.66})$$

Both the PSR and PDI use a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest performance. The performance thresholds shown in the tables below were used for the PSR and PDI.

Table 1 - Performance Thresholds for Interstates

	IRI (PSR)	Cracking (PDI)
Good	<75 (>3.75)	<7 (>3.75)
Fair	75 - 117 (3.20 - 3.75)	7 - 12 (3.22 - 3.75)
Poor	>117 (<3.20)	>12 (<3.22)

Table 2 - Performance Thresholds for Non-Interstates

	IRI (PSR)	Cracking (PDI)
Good	<94 (>3.5)	<9 (>3.5)
Fair	94 - 142 (2.9 - 3.5)	9 - 15 (2.9 - 3.5)
Poor	>142 (<2.9)	>15 (<2.9)

The PSR and PDI are calculated for each 1-mile section of roadway. If PSR or PDI falls into a poor rating (<3.2 for Interstates, for example) for a 1-mile section, then the score for that 1-mile section is entirely (100%) based on the lower score (either PSR or PDI). If neither PSR or PDI fall into a poor rating for a 1-mile section, then the score for that 1-mile section is based on a combination of the lower rating (70% weight) and the higher rating (30% weight). The end result is a score between 0 and 5 for each direction of travel of each mile of roadway based on a combination of both the PSR and the PDI.

The project corridor has been divided into segments. The Pavement Index for each segment is a weighted average of the directional ratings based on the number of travel lanes. Therefore, the condition of a section with more travel lanes will have a greater influence on the resulting segment Pavement Index than a section with fewer travel lanes.

The resulting Pavement Index (good/fair/poor) for each segment will be presented on a corridor map. In addition, the calculated Pavement Index for each segment will be presented in tabular format.

Secondary Measures:
Two secondary measures will be evaluated:

- Directional Pavement Serviceability
- Pavement Failure
- Pavement Hot Spots

Directional Pavement Serviceability: Similar to the Pavement Index, the Directional Pavement Serviceability will be calculated as a weighted average (based on number of lanes) for each segment. However, this rating will only utilize the PSR and will be calculated separately for each

direction of travel. The PSR uses a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest performance. The resulting Directional Pavement Serviceability (good/fair/poor) for each direction of each segment will be presented on a corridor map. In addition, the calculated Directional Pavement Serviceability for each segment will be presented in tabular format.

Pavement Failure: The percentage of pavement area rated above the failure thresholds for IRI or Cracking will be calculated for each segment. The calculated percentage for each segment will be presented in a table. In addition, the Standard score (z-score) will be calculated for each segment.

The Standard score (z-score) is the number of standard deviations above or below the mean. Therefore, a Standard score between -0.5 and +0.5 is "average", less than -0.5 is lower (better) than average, and higher than +0.5 is above (worse) average. The resulting Standard Score (better/average/worse) for each segment will be presented on a corridor map. The thresholds for this performance measure have been established based on the first six corridors.

Hot Spot Identification:
The Pavement Index map will identify locations that have an IRI rating or Cracking rating that fall above the failure threshold as identified by ADOT Pavement Group. For Interstates, an IRI rating above 105 or a Cracking rating above 15 will be used as the thresholds which are slightly different than the ratings shown in the table above. For non-Interstates, an IRI rating above 142 or a Cracking rating above 15 will be used as the thresholds. The locations will be identified by displaying a symbol on the map. A single symbol will be used to represent consecutive/adjacent sections. However, if there is a gap between the sections, then a second symbol will be displayed on the map.

The Directional Serviceability map will identify locations that have an IRI rating above 105 for Interstates or above 142 for non-Interstates by displaying a symbol and labeling the location. A single symbol will be used to represent consecutive/adjacent sections. However, if there is a gap between the sections, then a second symbol will be displayed on the map.

Scoring:

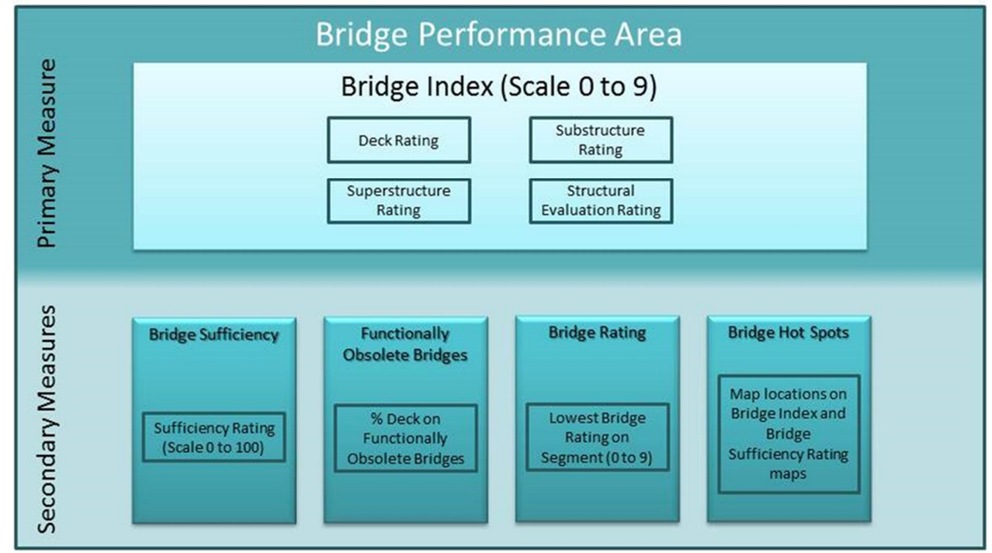
	Pavement Index	
	Interstates	Non-Interstates
Good	>3.75	>3.5
Fair	3.2 - 3.75	2.9 - 3.5
Poor	<3.2	<2.9

	Directional Pavement Serviceability	
	Interstates	Non-Interstates
Good	>3.75	>3.5
Fair	3.2 - 3.75	2.9 - 3.5
Poor	<3.2	<2.9

% Pavement Failure	
Better	< 5%
Average	5% – 20%
Worse	>20%

Bridge Performance Area Calculation Methodologies

The section summarizes the approach for developing the primary and secondary performance measures in the Bridge Performance Area as shown in the following graphic.



This performance area is used to evaluate mainline bridges. Bridges on ramps (that do not cross the mainline), frontage roads, etc. should not be included in the evaluation. Basically, any bridge that carries mainline traffic or carries traffic over the mainline should be included and bridges that do not carry mainline traffic, run parallel to the mainline (frontage roads), or do not cross the mainline should not be included.

Primary Measure:
The Bridge Index is calculated based on the use of four bridge condition ratings from the ADOT Bridge Database, also known as the Arizona Bridge Information and Storage System (ABISS). The four ratings are the Deck Rating (N58), Substructure Rating (N60), Superstructure Rating (N59), and Structural Evaluation Rating (N67). The calculation of the Bridge Index uses the lowest of these four ratings.

Each of the four condition ratings use a 0 to 9 scale with 0 representing the lowest performance and 9 representing the highest performance.

The project corridor has been divided into segments and the bridges are grouped together according to the segment definitions. In order to report the Bridge Index for each corridor segment, the Bridge Index for each segment is a weighted average based on the deck area for each bridge. Therefore, the condition of a larger bridge will have a greater influence on the resulting segment Bridge Index than a smaller bridge.

The resulting Bridge Index (good/fair/poor) for each segment will be presented on a corridor map. In addition, the calculated Bridge Index for each segment will be presented in tabular format.

Secondary Measures:
Three secondary measures will be evaluated:

- Bridge Sufficiency Rating
- Bridge Rating
- Functionally Obsolete Bridges
- Bridge Hot Spots

Bridge Sufficiency Rating: Similar to the Bridge Index, the Bridge Sufficiency Rating will be calculated as a weighted average (based on deck area) for each segment. The Sufficiency Rating is a scale of 0 to 100 with 0 representing the lowest performance and 100 representing the highest performance. A rating of 80 or above represents "good" performance, a rating between 50 and 80 represents "fair" performance, and a rating below 50 represents "poor" performance. The resulting Sufficiency Rating (good/fair/poor) for each segment will be presented on a corridor map. The calculated Sufficiency Rating for each segment will be presented in tabular format.

Bridge Rating: The Bridge Rating will simply identify the lowest bridge rating on each segment. This performance measure is not an average and therefore is not weighted based on the deck area. The Bridge Index identifies the lowest rating for each bridge, as described above. This secondary performance measure will simply identify the lowest rating on each segment. Each of the four condition ratings use a 0 to 9 scale with 0 representing the lowest performance and 9 representing the highest performance. The resulting Bridge Rating (good/fair/poor) for each segment will be presented on a corridor map. The Bridge Rating for each segment will be presented in tabular format.

Functionally Obsolete Bridges: The percentage of deck area on functionally obsolete bridges will be calculated for each segment. The deck area for each bridge within each segment that has been identified as functionally obsolete will be totaled and divided by the total deck area for the segment to calculate the percentage of deck area on functionally obsolete bridges for each segment. The calculated percentage for each segment will be presented in tabular format.

The thresholds for this performance measure were determined based on the Standard score (z-score). The Standard score (z-score) is the number of standard deviations above or below the mean. Therefore, a Standard score between -0.5 and +0.5 is "average", less than -0.5 is lower (better) than average, and higher than +0.5 is above (worse) average. The resulting performance (better/average/worse) for each segment will be presented on a corridor map. The thresholds for this performance measure have been established based on the first 6 corridors.

Hot Spot Identification:
The Bridge Index map will identify individual bridge locations that are identified as Hot Spots in the excel file by displaying a symbol and labeling the location. Hot Spots are bridges that have a single rating of 4 in any of the 4 ratings, or multiple ratings of 5 in the deck, substructure or superstructure ratings.

The Sufficiency Rating map will identify individual bridge locations that have a Sufficiency Rating less than 50 by displaying a symbol and labeling the location.

Scoring:

Bridge Index	
Good	>6.5
Fair	5.0-6.5
Poor	<5.0

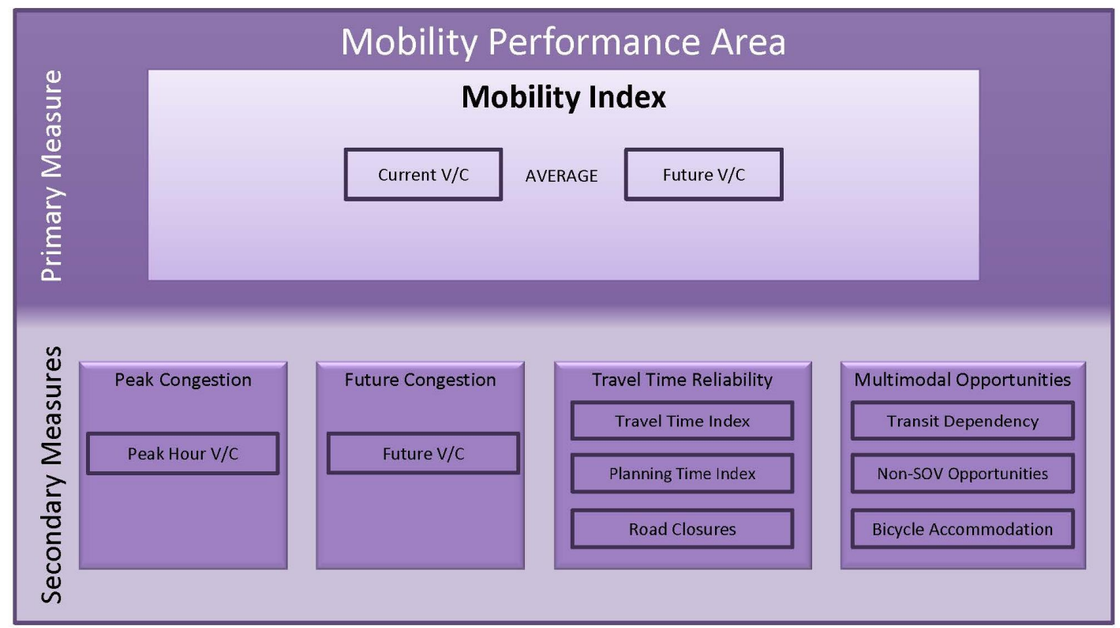
Sufficiency Rating	
Good	>80
Fair	50-80
Poor	<50

Bridge Rating	
Good	>6
Fair	5-6
Poor	<5

% Functionally Obsolete	
Better	< 12%
Average	12%-40%
Worse	>40%

Mobility Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Mobility Performance Area as shown in the following graphic.



Primary Measure

The primary Mobility Index is an average of the current volume to capacity (V/C) ratios and the projected future V/C ratios for each segment throughout the corridor.

Current V/C: The current V/C ratio for each segment is calculated by dividing the 2014 Annual Average Daily Traffic (AADT) volume for each segment by the total Level of Service (LOS) E capacity volume for that segment

The capacity (C) is calculated using the HERS Procedures for Estimating Highway Capacity[1]. The HERS procedure incorporates HCM 2010 methodologies. The methodology includes capacity estimation procedures for multiple facility types including freeways, rural two-lane highways, multilane highways, and signalized and non-signalized urban sections.

The segment capacity is defined as a function of the number of mainline lanes, shoulder width, interrupted or uninterrupted flow facilities, terrain type, percent of truck traffic, and the designated urban or rural environment.

The AADT (V) for each segment is calculated by applying a weighted average across the length of the segment based on the individual 24 hour volumes and distances associated with each HPMS count station within each segment.

The following example equation was used to determine the weighted average of a segment with two HPMS count locations within the corridor

((HPMS 1 Distance x HPMS 1 Volume) + (HPMS 2 Distance x HPMS 2 Volume))/Total Segment Length

For specific details regarding the HERS methodology used, refer to the *Procedures for Estimating Highway Capacity, draft Technical Memorandum.*

Future V/C: The future V/C ratio for each segment is calculated by dividing the 2035 AADT volume for each segment by the 2013 LOS E capacity. The capacity volume used in this calculation is the same as was utilized in the current V/C equation.

The future AADT volumes are generated by applying an annual compound growth rate (ACGR) to each 2013 AADT segment volume. The following equation was used to apply an annual compound growth rate:

2035 AADT = 2013 AADT x ((1+ACGR)^22)

The ACGR for each segment was defined by comparing the total volumes in the 2010 Arizona Travel Demand Model (AZTDM2) to the 2035 AZTDM2 traffic volumes at each existing HPMS count station location throughout the corridor. Each 2010 and 2035 segment volume was defined using the same weighted average equation described in the *Current V/*C section above then summing the directional volumes for each location. The following equation was used to determine the ACGR for each segment:

ACGR = ((2035 Volume/2010 Volume)^(1/25))-1

Primary Index Rating Thresholds

The following V/C thresholds were assigned for each environment type as indicated based on current ADOT roadway design standards.

Urban and Fringe Urban

Good - LOS A-C	V/C ≤ 0.71	*Note - ADOT Roadway Design Standards indicate Urban and Fringe Urban roadways should be designed to level of service C or better
Fair - LOS D	V/C > 0.71 & ≤ 0.89	
Poor - LOS E or less	V/C > 0.89	

Rural

Good - LOS A-B	V/C ≤ 0.56	*Note - ADOT Roadway Design Standards indicate Rural roadways should be designed to level of service B or better
Fair - LOS C	V/C > 0.56 & ≤ 0.76	
Poor - LOS D or less	V/C > 0.76	

Secondary Measures

Peak Congestion: Peak Congestion has been defined as the peak hour V/C ratio in both directions of the corridor. The peak hour V/C ratio is calculated using the HERS method as described above. The Peak Hour volume utilizes the directional AADT for each segment which is calculated by applying a weighted average across the length of the segment based on the individual directional 24 hour volumes and distances associated with each HPMS count station within each segment. The segment capacity is defined based on the characteristics of each segment including Number of Lanes, Terrain Type, and Environment, similar to the 24 hour volumes using the HERS method.

Peak Congestion Rating Thresholds

The same thresholds identified for the 24hr V/C ratios were applied to the Peak Congestion V/C values.

Future Congestion: The future V/C ratios for each segment in the corridor that were calculated and used in the Primary Mobility Index as part of the overall average between Current V/C and Future V/C were applied independently as a secondary measure. The methods to calculate the Future V/C can be referenced in the Primary Mobility Index section.

[1] HERS Support – 2011, Task 6: Procedures for Estimating Highway Capacity, draft Technical Memorandum. Cambridge Systematics. Prepared for the Federal Highway Administration. March 2013.

Travel Time Reliability

Travel time reliability is a measure that includes the number of times a piece of a corridor is closed for any specific reason, the directional Travel Time Index (TTI), and the Planning Time Index (PTI).

Directional Closures: The number of times a roadway is closed is documented through the HCRS dataset. Directional Closures was defined as the average number of times a segment of the corridor was closed per year mile in a specific direction of travel per year. The weighted average of each occurrence takes into account the distance over which a specific occurrence spans.

Directional Closures Thresholds

Thresholds that determine levels of good, fair, and poor are based on the average number of closures per mile per year within each of the nine identified statewide significant corridors by ADOT. The following thresholds represent statewide averages cross those corridors:

Good	≤ 0.22
Fair	> 0.22 & ≤ 0.62
Poor	V/C > 0.62

Directional Travel Time and Planning Time Index

In terms of overall mobility, the travel time index (TTI) is the relationship of the posted speed limit in a specific section of the corridor to the mean peak hour speed in the same location. The planning time index (PTI) is the relationship of the 5th percentile of the lowest mean speed to the posted speed limit in a specific section of the corridor. Using HERE data provided by ADOT, four time periods for each data point were collected throughout the day (AM Peak, Mid-Day, PM Peak, and Off-peak). Using the mean speeds and 5th percentile lowest mean speeds collected over 2013 for these time periods for each data location, four TTI and PTI calculations were made using the following formulas:

TTI = Posted Speed Limit/Mean Peak Hour Speed

PTI = Posted Speed Limit/5th Percentile Lowest Speed

The highest value of the four time periods calculation was defined as the TTI for that data point. The average TTI was calculated within each segment based on the number of data points collected. The value of the average TTI across each entry was used as the TTI for each respective segment within the corridor.

Directional Travel Time and Planning Time Index Thresholds

Based on national research and coordination with ADOT, the following thresholds were applied to the TTI:

Uninterrupted Flow Facilities

- Good: < 1.15
- Fair: ≥ 1.15 & < 1.33
- Poor: ≥ 1.33

Interrupted Flow Facilities

- Good: < 1.30
- Fair: ≥ 1.30 & < 2.00
- Poor: ≥ 2.00

Based on national research and coordination with ADOT, the following thresholds were applied to the PTI:

Uninterrupted Flow Facilities

- Good: < 1.30
- Fair: ≥ 1.30 & < 1.50
- Poor: ≥ 1.50

Interrupted Flow Facilities

- Good: < 3.00
- Fair: ≥ 3.00 & < 6.00
- Poor: ≥ 6.00

Multimodal Opportunities

Transit Dependency: 2008-2012 U.S. Census American Community Survey tract and state level geographic data and attributes from the tables B08201 (Number of Vehicles Available by Household Size) and B17001 (Population in Poverty within the Last 12 Months) were downloaded with margins of error included from the Census data retrieval application Data Ferret. Population ranges for each tract were determined by adding and subtracting the margin of error to each estimate in excel. The tract level attribute data was then joined to geographic tract data in GIS. Only tracts within a one mile buffer of each corridor are considered for this evaluation.

Tracts that had a statistically significantly larger number of either people in poverty or households with only one or no vehicles available than the state average was considered potentially transit dependent.

Example: The state average for Zero or One Vehicles HHs is between 44.1% and 45.0%. Tracts which have the LOWER bound of their range above the UPPER bound of the state range definitely have a greater percentage of zero/one vehicle HHs than the state average. Tracts that have their UPPER bound beneath the LOWER bound of the state range definitely have a lesser percentage of zero/one vehicles HHs than the state average. All other tracts that have one of their

bounds overlapping with the state average cannot be considered statistically significantly different because there is a chance the value is actually the same.

Transit Dependency Rating Methodology

- Tracts with both zero and one vehicle household and population in poverty percentages below the statewide average
- Tracts with either zero and one vehicle household OR population in poverty percentages within the statewide average
- Tracts with both zero and one vehicle household and population in poverty percentages above the statewide average

In addition to transit dependency, the following attributes were added to the Multimodal Opportunities map based on available data.

1. Shoulder width throughout the corridor based on 'Shoulder Width' GIS dataset provided by ADOT.
2. Intercity bus routes
3. Multiuse paths within the corridor ROW if applicable

% Non SOV Trips: The percentage of non-single occupancy vehicle trips over distances less than 50 miles gives an indication of travel patterns along a section of the corridor that could benefit from additional multimodal options in the future.

% Non-SOV Thresholds

Thresholds that determine levels of good, fair, and poor are based on the % Non SOV trips within each of the nine identified statewide significant corridors by ADOT. The following thresholds represent statewide averages cross those corridors:

Good	≥ 17%
Fair	> 11% & ≤ 17%
Poor	< 11%

Bicycle Accommodation: For this secondary performance evaluation, shoulder widths are evaluated considering the roadway's context and conditions. This requires use of the roadway data that includes right shoulder widths, shoulder surface types, and speed limits. All of which are available in the following ADOT GIS data sets:

- Right Shoulder Widths
- Left Shoulder Widths (for undivided roadways)
- Shoulder Surface Type (Both Left/Right)
- Speed Limit

Additionally, each segment's average AADT, estimated earlier in the Mobility methodology, will be used for the criteria to determine if the existing shoulder width meets the effective width.

The criteria for screening if a shoulder segment meets the recommended width criteria are as followed:

(1) If AADT <= 1500 OR Speed Limit <= 25 MPH:
The segment's general purpose lane can be shared with bicyclists (no effective shoulder width required)

(2) If AADT > 1500 AND Speed Limit between (25 - 50 MPH) AND Pavement Surface is Paved:
Effective shoulder width required is 4 feet or greater

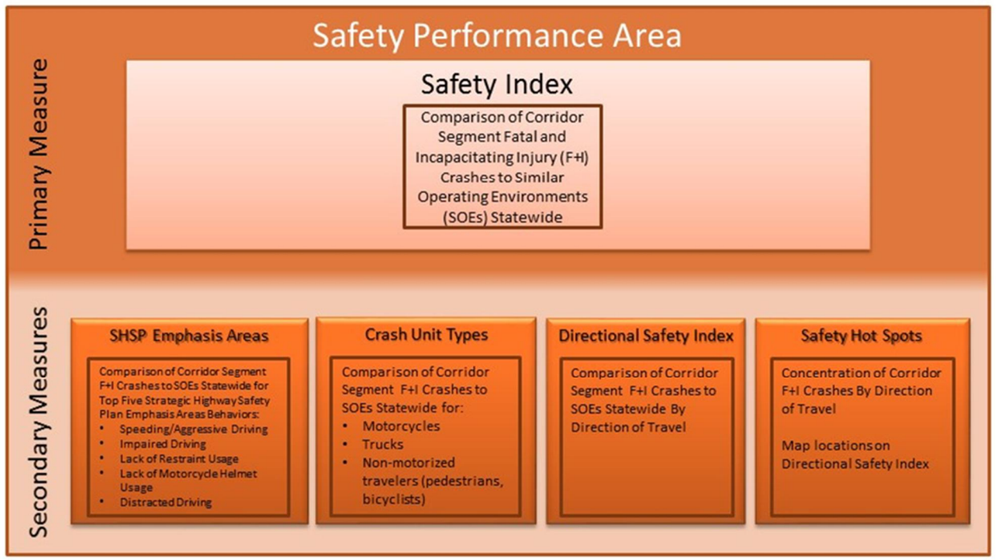
(3) If AADT > 1500 AND Speed Limit >= 50 MPH And Pavement Surface is Paved:
Effective shoulder width required is 6 feet or greater

The summation of the length of the shoulder sections that meet the defined effective width criteria, based on criteria above, will be divided by the segments total length to estimate the percent of the segment that accommodates bicycles as illustrated below with the following thresholds.

Good	≥ 90%
Fair	> 60% & ≤ 90%
Poor	< 60%

Safety Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Safety Performance Area as shown in the following graphic.



Primary Measure

The Safety Index is a safety performance measure based on the bi-directional (i.e., both directions combined) frequency and rate of fatal and incapacitating injury crashes, the relative cost of those types of crashes, and crash occurrences on similar roadways in Arizona. According to ADOT's 2010 Highway Safety Improvement Program Manual, fatal crashes have an estimated cost that is 14.5 times the estimated cost of incapacitating injury crashes ($5.8 million compared to $400,000).

The Combined Safety Score (CSS) is an interim measure that combines fatal and serious injury crashes into a single value. The CSS is calculated using the following generalized formula:

*CSS = 14.5 * (Normalized Fatal Crash Rate + Frequency) + (Normalized Incapacitating Injury Crash Rate + Frequency)*

Because crashes vary depending on the operating environment of a particular roadway, statewide CSS values were developed for similar operating environments defined by functional classification, urban vs. rural setting, number of travel lanes, and traffic volumes. To determine the Safety Index of a particular segment, the segment CSS was compared to the average statewide CSS for the similar statewide operating environment.

The Safety Index is calculated using the following formula:

Safety Index = Segment CSS / Statewide Similar Operating Environment CSS

The average annual Safety Index for a segment is compared to the statewide similar operating environment annual average, with one standard deviation from the statewide average forming the scale break points.

The more a particular segment's Safety Index value is below the statewide similar operating environment average, the better the safety performance is for that particular segment as a lower value represents fewer crashes.

The scale for rating the Safety Index depends on the operating environments selected for a particular corridor. For I-40 West the scales for rating the Safety Index are:

Urban 4 Lane Freeway

- Above average performance: < 0.79
- Average performance: 0.79 - 1.21
- Below average performance: > 1.21

Rural 4 Lane Freeway with Daily Volume < 25,000

- Above average performance: < 0.73
- Average performance: 0.73 – 1.27
- Below average performance: > 1.27

Secondary Measures

The Safety Performance Area has four secondary measures related to fatal and incapacitating injury crashes:

- Directional Safety Index
- Strategic Highway Safety Plan (SHSP) Behavior Emphasis Areas
- SHSP Crash Unit Type Emphasis Areas
- Safety Hot Spots

The SHSP behavior emphasis areas and SHSP crash unit type emphasis areas secondary safety performance measures for the Safety Performance Area include proportions of specific types of crashes within the total fatal and incapacitating injury crash frequencies. This more detailed categorization of fatal and incapacitating injury crashes can result in low crash frequencies (i.e., a small sample size) that translate into performance ratings that can be unstable. In some cases, a change in crash frequency of one crash (one additional crash or one less crash) could result in a change in segment performance of two levels. To avoid reliance on performance ratings where small changes in crash frequency result in large changes in performance, the following criteria

were developed to identify segments with "insufficient data" for assessing performance for the two SHSP-related secondary safety performance measures:

- If the crash sample size (total fatal plus serious injury crashes) for a given segment is less than five crashes over the five-year analysis period, the segment has "insufficient data" and performance ratings are unreliable.
- If a change in one crash results in a change in segment performance by two levels (i.e., a change from below average to above average performance or a change from above average to below average frequency), the segment has "insufficient data" and performance ratings are unreliable.
- If the corridor average segment crash frequency for a specific SHSP-related secondary safety performance measure type is less than two crashes over the five-year analysis period, the entire SHSP-related secondary performance measure has "insufficient data" and performance ratings are unreliable.

Directional Safety Index

The Direction Safety Index shares the same calculation procedure and thresholds as the Safety Index. However, the measure is based on the directional frequency and rate of fatal and incapacitating injury crashes.

Similar to the Safety Index, the segment CSS was compared to the average statewide CSS for the similar statewide operating environment.

SHSP Behavior Emphasis Areas

ADOT's 2014 SHSP identifies several emphasis areas for reducing fatal and incapacitating injury crashes. The top five SHSP emphasis areas relate to the following driver behaviors:

- Speeding and aggressive driving
- Impaired driving
- Lack of restraint usage
- Lack of motorcycle helmet usage
- Distracted driving

To develop a performance measure that reflects these five emphasis areas, the percentage of total fatal and incapacitating injury crashes that involves at least one of the emphasis area driver behaviors on a particular segment is compared to the statewide average percentage of crashes involving at least one of the emphasis area driver behaviors on roads with similar operating environments in a process similar to how the Safety Index is developed.

To increase the crash sample size for this performance measure, the five behavior emphasis areas are combined to identify fatal and incapacitating injury crashes that exhibit one or more of the behavior emphasis areas.

The SHSP behavior emphasis areas performance is calculated using the following formula:

% Crashes Involving SHSP Behavior Emphasis Areas = Segment Crashes Involving SHSP Behavior Emphasis Areas / Total Segment Crashes

The percentage of total crashes involving SHSP behavior emphasis areas for a segment is compared to the statewide percentages on roads with similar operating environments. One standard deviation from the statewide average percentage forms the scale break points.

When assessing the performance of the SHSP behavior emphasis areas, the more the frequency of crashes involving SHSP behavior emphasis areas is below the statewide average implies better levels of segment performance. Thus, lower values are better, similar to the Safety Index.

Application of the aforementioned crash sample size criteria determined that several segments with crashes involving the SHSP behavior emphasis areas have insufficient data to generate reliable performance ratings.

SHSP Crash Unit Type Emphasis Areas

ADOT's SHSP also identifies emphasis areas that relate to the following "unit-involved" crashes:

- Heavy vehicle (trucks)-involved crashes
- Motorcycle-involved crashes
- Non-motorized traveler (pedestrians and bicyclists)-involved crashes

To develop a performance measure that reflects the aforementioned crash unit type emphasis areas, the percentage of total fatal and incapacitating injury crashes that involves a given crash unit type emphasis area on a particular segment is compared to the statewide average percentage of crashes involving that same crash unit type emphasis area on roads with similar operating environments in a process similar to how the Safety Index is developed.

The SHSP crash unit type emphasis areas performance is calculated using the following formula:

% Crashes Involving SHSP Crash Unit Type Emphasis Areas = Segment Crashes Involving SHSP Crash Unit Type Emphasis Areas / Total Segment Crashes

The percentage of total crashes involving SHSP crash unit type emphasis areas for a segment is compared to the statewide percentages on roads with similar operating environments. One standard deviation from the statewide average percentage forms the scale break points.

When assessing the performance of the SHSP crash unit type emphasis areas, the more the frequency of crashes involving SHSP crash unit type emphasis areas is below the statewide

average implies better levels of segment performance. Thus, lower values are better, similar to the Safety Index.

Application of the aforementioned crash sample size criteria determined that several segments with truck-involved crashes have insufficient data to generate reliable performance ratings. The criteria determined that motorcycle-involved and non-motorized traveler-involved crashes have such a low average segment crash frequency that there is insufficient data at the corridor level to generate reliable performance ratings so motorcycle-involved and non-motorized traveler-involved secondary safety performance measures were removed from the performance evaluation.

The scale for rating the truck-involved crash performance depends on the crash history on similar statewide operating environments.

Safety Hot Spots

A "hot spot" analysis was conducted that identified abnormally high concentrations of fatal and incapacitating injury crashes along the study corridor by direction of travel. The identification of crash concentrations involves a geographic information system (GIS)-based function known as "kernel density analysis". This measure is mapped for graphical display purposes with the Directional Safety Index but is not included in the Safety Performance Area rating calculations

Freight Performance Area Calculation Methodologies

The section summarizes the approach for developing the primary and secondary performance measures in the Freight Performance Area as shown in the following graphic.

Primary Measure

The Freight Index is a reliability performance measure based on the planning time index for truck travel. The industry standard definition for the Truck Planning Time Index (TPTI) is the ratio of total travel time needed for 95% on-time arrival to free-flow travel time. The TPTI reflects the extra buffer time needed for on-time delivery while accounting for non-recurring delay. Non-recurring delay refers to unexpected or abnormal delay due to closures or restrictions resulting from circumstances such as crashes, inclement weather, and construction activities.

The TPTI can be converted into a speed-based index by recognizing that speed is equal to distance traveled divided by travel time. The inverse relationship between travel time and speed means that the 95th percentile highest travel time corresponds to the 5th percentile lowest speed. The speed-based TPTI is calculated using the following formula:

TPTI = Free-Flow Truck Speed / Observed 5th Percentile Lowest Truck Speed

Observed 5th percentile lowest truck speeds are available in the 2014 American Digital Cartography, Inc. HERE (formerly NAVTEQ) database to which ADOT has access. The free-flow truck speed is assumed to be 65 miles per hour or the posted speed, whichever is less. This upper limit of 65 mph accounts for governors that trucks often have that restrict truck speeds to no more than 65 mph, even when the speed limit may be higher.

For each corridor segment, the TPTI is calculated for each direction of travel and then averaged to create a bi-directional TPTI. When assessing performance using TPTI, the higher the TPTI value is above 1.0, the more buffer time is needed to ensure on-time delivery.

The Freight Index can be calculated using the following formula to invert the overall TPTI:

Freight Index = 1 / Bi-directional TPTI

This inversion of the TPTI allows the Freight Index to have a scale where the higher the value, the better the performance, which is similar to the directionality of the scales of most of the other Primary Measures. This Freight Index scale is based on inverted versions of TPTI scales created previously by ADOT.

The scale for rating the Freight Index is:

Uninterrupted Flow Facilities

- Good: > 0.77
- Fair: 0.67 - 0.77
- Poor: < 0.67

Interrupted Flow Facilities

- Good: > 0.33

- Fair: 0.17 - 0.33
- Poor: < 0.17

Secondary Measures

The Freight Performance Area has five secondary measures:

- Recurring Delay (Directional TTTI)
- Non-Recurring Delay (Directional TPTI)
- Road Closures (Directional Road Closure Duration)
- Bridge Vertical Clearance
- Bridge Vertical Clearance Restriction Hot Spots

Recurring Delay (Directional TTTI)

The performance measure for recurring delay is the Directional Truck Travel Time Index (TTTI). The industry standard definition for TTTI is the ratio of average peak period travel time to free-flow travel time. The TTTI reflects the extra time spent in traffic during peak times due to recurring delay. Recurring delay refers to expected or normal delay due to roadway capacity constraints or traffic control devices.

Similar to the TPTI, the TTTI can be converted into a speed-based index by recognizing that speed is equal to distance traveled divided by travel time. The speed-based TTTI can be calculated using the following formula:

TTTI = Free-Flow Truck Speed / Observed Average Peak Period Truck Speed

Observed average peak period truck speeds are available in the 2014 American Digital Cartography, Inc. HERE (formerly NAVTEQ) database to which ADOT has access. The free-flow truck speed is assumed to be 65 mph or the posted speed, whichever is less.

For each corridor segment, the TTTI is calculated for each direction of travel. With the TTTI, the higher the TTTI value is above 1.0, the more time is spent in traffic during peak times. TTTI values are generally lower than TPTI values. The Directional TTTI scale is based on TTTI scales created previously by ADOT.

The scale for rating the Directional TTTI is:

Uninterrupted Flow Facilities

- Good: < 1.15
- Fair: 1.15 – 1.33
- Poor: > 1.33

Interrupted Flow Facilities

- Good: < 1.30
- Fair: 1.30 – 2.00
- Poor: > 2.00

Non-Recurring Delay (Directional TPTI)

The performance measure for non-recurring delay is the Directional TPTI. Directional TPTI is calculated as described previously as an interim step in the development of the Freight Index.

For each corridor segment, the TPTI is calculated for each direction of travel. With the TPTI, the higher the TPTI value is above 1.0, the more buffer time is needed to ensure on-time delivery.

The scale for rating the Directional TPTI is the inverse of the Freight Index:

Uninterrupted Flow Facilities

- Good: < 1.30
- Fair: 1.30 – 1.50
- Poor: > 1.50

Interrupted Flow Facilities

- Good: < 3.00
- Fair: 3.00 – 6.00
- Poor: > 6.00

Road Closures (Directional Closure Duration)

The performance measure related to road closures is average roadway closure (i.e., full lane closure) duration time. There are three main components to full closures that affect reliability – frequency, duration, and extent. In the freight industry, closure duration is the most important component because trucks want to minimize travel time and delay.

Data on the frequency, duration, and extent of full roadway closures on the ADOT State Highway System is available for 2010-2014 in the HCRS database that is managed and updated by ADOT.

The average closure duration in a segment – in terms of the average time a milepost is closed per mile per year on a given segment – is calculated using the following formula:

*Closure Duration = Sum of Segment (Closure Clearance Time * Closure Extent) / Segment Length*

The segment closure duration time in minutes can then be compared to statewide averages for closure duration in minutes, with one-half standard deviation from the average forming the scale break points. The scale for rating closure duration in minutes is:

- Good: < 44.18 Minutes
- Fair: 44.18 Minutes – 124.86 Minutes
- Poor: > 124.86 Minutes

Bridge Vertical Clearance

This secondary measure uses the vertical clearance information from the ADOT Bridge Database to identify locations with low vertical clearance. The minimum vertical clearance for all underpass structures (i.e., structures under which mainline traffic passes) is determined for each segment. The performance thresholds for the Bridge Vertical Clearance are as follows:

- Good: > 16.5’
- Fair: 16.0’-16.5’
- Poor: < 16.0’

Bridge Vertical Clearance Restriction Hot Spots

The performance measure related to truck restrictions is the locations, or “hot spots”, where bridge vertical clearance issues restrict truck travel. Sixteen feet three inches is the minimum standard vertical clearance value for state highway bridges over travel lanes.

Locations with lower vertical clearance values than the minimum standard are categorized by the ADOT Intermodal Transportation Department Engineering Permits Section as either locations where ramps exist that allow the restriction to be avoided or locations where ramps do not exist and the restriction cannot be avoided. The locations with vertical clearances below the minimum standard that cannot be ramped around are considered “hot spots”. This measure is mapped for graphical display purposes with the Bridge Vertical Clearance but is not included in the Freight Performance Area rating calculations

Appendix C: Performance Data

Pavement Performance Area Data

				Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 1		***Interstate?***		**Yes**														
Mile 1	0	to	1	2	63.31	3	2	53.49	4	3.93	4.3	4.08	4.1	4.04	4.10		0	0
Mile 2	1	to	2	2	75.08	10	2	53.23	3	3.76	3.4	4.08	4.3	3.52	4.15		0	0
Mile 3	2	to	3	2	67.42	4	2	52.41	2	3.87	4.1	4.10	4.5	3.95	4.20		0	0
Mile 4	3	to	4	2	74.04	3	2	61.74	2	3.77	4.3	3.95	4.5	3.93	4.10		0	0
Mile 5	4	to	5	2	64.43	4	2	42.95	2	3.91	4.1	4.25	4.5	3.98	4.31		0	0
Mile 6	5	to	6	2	61.85	4	2	55.19	3	3.95	4.1	4.05	4.3	4.01	4.12		0	0
Mile 7	6	to	7	2	57.99	4	2	49.93	5	4.01	4.1	4.14	4.0	4.05	4.04		0	0
Mile 8	7	to	8	2	55.08	3	2	73.42	4	4.06	4.3	3.78	4.1	4.13	3.89		0	0
Mile 9	8	to	9	2	53.85	3	2	77.92	4	4.07	4.3	3.72	4.1	4.14	3.84		0	0
Mile 10	9	to	10	2	62.59	4	2	59.70	19	3.94	4.1	3.99	2.6	4.00	2.59		0	2
Mile 11	10	to	11	2	50.11	4	2	107.50	20	4.13	4.1	3.32	2.5	4.13	2.51		0	2
Mile 12	11	to	12	2	61.75	3	2	71.74	9	3.95	4.3	3.81	3.5	4.05	3.61		0	0
Mile 13	12	to	13	2	59.61	22	2	62.05	6	3.99	2.3	3.95	3.9	2.35	3.90		2	0
Mile 14	13	to	14	2	57.31	11	2	70.40	9	4.02	3.3	3.83	3.5	3.53	3.62		0	0
Mile 15	14	to	15	2	61.58	11	2	65.64	11	3.96	3.3	3.90	3.3	3.51	3.49		0	0
Mile 16	15	to	16	2	53.47	11	2	65.72	16	4.08	3.3	3.90	2.8	3.55	2.85		0	2
			Total	32			32											8
			Weighted Average							3.96	3.88	3.93	3.78	3.80	3.71			
			Factor							1.00		1.00						
			Indicator Score							**3.96**		**3.93**						**12.5%**
			Pavement Index													**3.76**		
Segment 2		***Interstate?***		**Yes**														
Mile 1	16	to	17	2	56.61	10	2	61.62	14	4.03	3.4	3.96	3.0	3.61	3.03		0	0
Mile 2	17	to	18	2	69.56	8	2	60.44	13	3.84	3.6	3.97	3.1	3.70	3.12		0	0
Mile 3	18	to	19	2	75.92	5	2	54.92	15	3.75	4.0	4.06	2.9	3.82	2.94		0	0
Mile 4	19	to	20	2	65.00	9	2	48.65	9	3.91	3.5	4.16	3.5	3.64	3.72		0	0
Mile 5	20	to	21	2	75.23	5	2	55.52	5	3.76	4.0	4.05	4.0	3.83	4.02		0	0
Mile 6	21	to	22	2	61.20	5	2	48.30	7	3.96	4.0	4.16	3.8	3.97	3.88		0	0
			Total	12			12											0
			Weighted Average							3.87	3.77	4.06	3.40	3.76	3.45			
			Factor							1.00		1.00						
			Indicator Score							**3.87**		**4.06**						**0.0%**
			Pavement Index													**3.61**		

				Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 3		***Interstate?***		**Yes**														
Mile 1	22	to	23	2	65.91	15	2	48.28	10	3.89	2.9	4.16	3.4	2.94	3.64		0	0
Mile 2	23	to	24	2	70.34	8	2	75.72	10	3.83	3.6	3.75	3.4	3.70	3.52		0	0
Mile 3	24	to	25	2	63.94	9	2	58.45	8	3.92	3.5	4.00	3.6	3.65	3.75		0	0
Mile 4	25	to	26	2	60.57	6	2	57.05	3	3.97	3.9	4.03	4.3	3.90	4.10		0	0
Mile 5	26	to	27	2	60.65	4	2	53.52	3	3.97	4.1	4.08	4.3	4.02	4.14		0	0
Mile 6	27	to	28	2	46.54	5	2	52.13	4	4.19	4.0	4.10	4.1	4.06	4.11		0	0
Mile 7	28	to	29	2	51.78	3	2	46.21	1	4.11	4.3	4.19	4.7	4.16	4.33		0	0
Mile 8	29	to	30	2	60.21	3	2	68.66	0	3.98	4.3	3.85	5.0	4.07	4.20		0	0
Mile 9	30	to	31	2	98.99	0	2	102.82	6	3.43	5.0	3.38	3.9	3.90	3.53		0	0
Mile 10	31	to	32	2	91.77	0	2	50.16	1	3.53	5.0	4.13	4.7	3.97	4.29		0	0
			Total	20			20											0
			Weighted Average							3.88	4.07	3.97	4.14	3.84	3.96			
			Factor							1.00		1.00						
			Indicator Score							**3.88**		**3.97**						**0.0%**
			Pavement Index													**3.90**		

				Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 4		***Interstate?***		**Yes**														
Mile 1	32	to	33	2	51.66	1	2	43.01	1	4.11	4.7	4.25	4.7	4.27	4.37		0	0
Mile 2	33	to	34	2	62.76	1	2	59.02	3	3.94	4.7	4.00	4.3	4.15	4.08		0	0
Mile 3	34	to	35	2	79.22	1	2	50.28	3	3.70	4.7	4.13	4.3	3.99	4.18		0	0
Mile 4	35	to	36	2	86.64	1	2	64.60	2	3.60	4.7	3.91	4.5	3.91	4.07		0	0
Mile 5	36	to	37	2	158.50	2	2	72.19	2	2.74	4.5	3.80	4.5	2.74	4.00		2	0
Mile 6	37	to	38	2	80.41	7	2	62.34	7	3.68	3.8	3.95	3.8	3.70	3.81		0	0
Mile 7	38	to	39	2	116.33	4	2	64.92	7	3.21	4.1	3.91	3.8	3.49	3.80		2	0
Mile 8	39	to	40	2	116.39	5	2	86.76	8	3.21	4.0	3.60	3.6	3.45	3.61		2	0
Mile 9	40	to	41	2	148.93	3	2	76.79	5	2.84	4.3	3.73	4.0	2.84	3.81		2	0
Mile 10	41	to	42	2	139.21	6	2	105.84	7	2.95	3.9	3.34	3.8	2.95	3.47		2	2
Mile 11	42	to	43	2	110.95	2	2	101.84	12	3.28	4.5	3.40	3.2	3.63	3.27		2	0
Mile 12	43	to	44	2	109.97	6	2	98.63	12	3.29	3.9	3.44	3.2	3.47	3.29		2	0
Mile 13	44	to	45	2	107.28	10	2	59.71	1	3.33	3.4	3.99	4.7	3.36	4.19		2	0
Mile 14	45	to	46	2	93.64	6	2	90.00	1	3.50	3.9	3.55	4.7	3.61	3.88		0	0
Mile 15	46	to	47	2	84.72	6	2	84.86	6	3.62	3.9	3.62	3.9	3.70	3.70		0	0
Mile 16	47	to	48	2	118.02	3	2	107.21	8	3.19	4.3	3.33	3.6	3.19	3.42		2	2
Mile 17	48	to	49	2	87.03	8	2	86.85	12	3.59	3.6	3.59	3.2	3.61	3.33		0	0
Mile 18	49	to	50	2	80.34	7	2	85.62	2	3.68	3.8	3.61	4.5	3.71	3.86		0	0
Mile 19	50	to	51	2	78.61	6	2	87.39	0	3.71	3.9	3.59	5.0	3.76	4.01		0	0
Mile20	51	to	52	2	103.20	0	2	106.25	0	3.38	5.0	3.34	5.0	3.86	3.84		0	2
Mile 21	52	to	53	2	30.77	0	2	58.51	0	4.45	5.0	4.00	5.0	4.61	4.30		0	0
Mile 22	53	to	54	2	29.71	0	2	46.73	0	4.47	5.0	4.19	5.0	4.63	4.43		0	0
			Total	44			44											24
			Weighted Average							3.52	4.24	3.74	4.18	3.67	3.85			
			Factor							1.00		1.00						
			Indicator Score							**3.52**		**3.74**						**27.3%**
			Pavement Index													**3.76**		

				Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 5		***Interstate?***		**Yes**														
Mile 1	54	to	55	2	48.37	0	2	51.56	0	4.16	5.0	4.11	5.0	4.41	4.38		0	0
Mile 2	55	to	56	2	51.28	3	2	47.73	0	4.11	4.3	4.17	5.0	4.17	4.42		0	0
Mile 3	56	to	57	2	53.13	3	2	49.38	0	4.09	4.3	4.14	5.0	4.15	4.40		0	0
Mile 4	57	to	58	2	40.62	4	2	44.20	0	4.28	4.1	4.23	5.0	4.18	4.46		0	0
Mile 5	58	to	59	2	50.50	4	2	40.71	0	4.13	4.1	4.28	5.0	4.13	4.50		0	0
Mile 6	59	to	60	2	48.25	3	2	48.78	0	4.16	4.3	4.15	5.0	4.20	4.41		0	0
Mile 7	60	to	61	2	37.50	4	2	54.99	0	4.34	4.1	4.06	5.0	4.20	4.34		0	0
Mile 8	61	to	62	2	48.54	2	2	51.14	0	4.16	4.5	4.12	5.0	4.25	4.38		0	0
Mile 9	62	to	63	2	38.80	3	2	49.33	0	4.31	4.3	4.15	5.0	4.30	4.40		0	0
Mile 10	63	to	64	2	43.17	0	2	48.09	0	4.24	5.0	4.16	5.0	4.47	4.42		0	0
Mile 11	64	to	65	2	42.66	0	2	48.25	0	4.25	5.0	4.16	5.0	4.48	4.41		0	0
Mile 12	65	to	66	2	34.77	0	2	44.60	0	4.38	5.0	4.22	5.0	4.57	4.45		0	0
Mile 13	66	to	67	2	38.79	0	2	50.19	0	4.31	5.0	4.13	5.0	4.52	4.39		0	0
Mile 14	67	to	68	2	44.29	0	2	45.99	0	4.23	5.0	4.20	5.0	4.46	4.44		0	0
Mile 15	68	to	69	2	41.88	0	2	39.59	0	4.26	5.0	4.30	5.0	4.49	4.51		0	0
Mile 16	69	to	70	2	41.44	0	2	47.37	0	4.27	5.0	4.18	5.0	4.49	4.42		0	0
Mile 17	70	to	71	2	57.54	0	2	64.95	0	4.02	5.0	3.91	5.0	4.31	4.23		0	0
			Total	34			34											0
			Weighted Average							4.22	4.65	4.16	5.00	4.34	4.41			
			Factor							1.00		1.00						
			Indicator Score							**4.22**		**4.16**						**0.0%**
			Pavement Index													**4.37**		
Segment 6		***Interstate?***		**Yes**														
Mile 1	71	to	72	2	90.88	2	2	110.64	2	3.54	4.5	3.28	4.5	3.81	3.64		0	2
Mile 2	72	to	73	2	82.45	3	2	105.35	2	3.66	4.3	3.35	4.5	3.84	3.68		0	2
Mile 3	73	to	74	2	84.98	2	2	80.57	2	3.62	4.5	3.68	4.5	3.87	3.91		0	0
Mile 4	74	to	75	2	87.35	1	2	86.97	2	3.59	4.7	3.59	4.5	3.91	3.85		0	0
Mile 5	75	to	76	2	88.05	1	2	79.43	2	3.58	4.7	3.70	4.5	3.90	3.92		0	0
Mile 6	76	to	77	2	96.43	2	2	84.46	1	3.47	4.5	3.63	4.7	3.76	3.94		0	0
Mile 7	77	to	78	2	105.45	2	2	79.54	2	3.35	4.5	3.70	4.5	3.68	3.92		2	0
Mile 8	78	to	79	2	106.52	3	2	81.36	2	3.34	4.3	3.67	4.5	3.62	3.91		2	0
Mile 9	79	to	80	2	95.78	2	2	81.18	1	3.47	4.5	3.67	4.7	3.77	3.97		0	0
Mile 10	80	to	81	2	82.36	9	2	53.41	2	3.66	3.5	4.08	4.5	3.57	4.19		0	0
Mile 11	81	to	82	2	69.59	5	2	52.31	4	3.84	4.0	4.10	4.1	3.89	4.11		0	0
			Total	22			22											8
			Weighted Average							3.55	4.34	3.68	4.46	3.78	3.91			
			Factor							1.00		1.00						
			Indicator Score							**3.55**		**3.68**						**18.2%**
			Pavement Index													**3.85**		

				Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 7		***Interstate?***		**Yes**														
Mile 1	82	to	83	2	78.29	8	2	52.98	6	3.71	3.6	4.09	3.9	3.66	3.94		0	0
Mile 2	83	to	84	2	69.79	10	2	51.28	10	3.84	3.4	4.11	3.4	3.55	3.63		0	0
Mile 3	84	to	85	2	60.64	9	2	60.26	3	3.97	3.5	3.98	4.3	3.66	4.07		0	0
Mile 4	85	to	86	2	55.71	4	2	57.14	4	4.05	4.1	4.02	4.1	4.07	4.06		0	0
Mile 5	86	to	87	2	51.54	4	2	54.85	6	4.11	4.1	4.06	3.9	4.12	3.93		0	0
Mile 6	87	to	88	2	69.18	4	2	59.68	7	3.84	4.1	3.99	3.8	3.93	3.82		0	0
Mile 7	88	to	89	2	68.63	5	2	63.06	3	3.85	4.0	3.93	4.3	3.90	4.04		0	0
Mile 8	89	to	90	2	75.51	6	2	61.63	5	3.75	3.9	3.96	4.0	3.79	3.97		0	0
Mile 9	90	to	91	2	67.17	2	2	60.64	5	3.87	4.5	3.97	4.0	4.05	3.98		0	0
Mile 10	91	to	92	2	91.50	6	2	92.74	2	3.53	3.9	3.51	4.5	3.63	3.80		0	0
Mile 11	92	to	93	2	82.65	3	2	64.66	1	3.65	4.3	3.91	4.7	3.84	4.13		0	0
Mile 12	93	to	94	2	91.36	1	2	74.74	6	3.53	4.7	3.76	3.9	3.87	3.80		0	0
Mile 13	94	to	95	2	72.87	1	2	57.35	1	3.79	4.7	4.02	4.7	4.05	4.21		0	0
Mile 14	95	to	96	2	70.84	1	2	71.16	1	3.82	4.7	3.82	4.7	4.07	4.07		0	0
Mile 15	96	to	97	2	70.36	1	2	65.25	1	3.83	4.7	3.90	4.7	4.08	4.13		0	0
Mile 16	97	to	98	2	67.40	0	2	62.21	0	3.87	5.0	3.95	5.0	4.21	4.26		0	0
			Total	32			32											0
			Weighted Average							3.81	4.20	3.94	4.22	3.91	3.99			
			Factor							1.00		1.00						
			Indicator Score							**3.81**		**3.94**						**0.0%**
			Pavement Index													**3.95**		
Segment 8		***Interstate?***		**Yes**														
Mile 1	98	to	99	2	68.44	2	2	62.85	0	3.85	4.5	3.94	5.0	4.03	4.26		0	0
Mile 2	99	to	100	2	63.74	1	2	63.36	1	3.92	4.7	3.93	4.7	4.14	4.15		0	0
Mile 3	100	to	101	2	77.16	1	2	62.63	0	3.73	4.7	3.94	5.0	4.01	4.26		0	0
Mile 4	101	to	102	2	63.58	1	2	80.13	3	3.93	4.7	3.69	4.3	4.15	3.87		0	0
Mile 5	102	to	103	2	66.24	2	2	74.82	1	3.89	4.5	3.76	4.7	4.06	4.03		0	0
Mile 6	103	to	104	2	61.58	0	2	58.86	2	3.96	5.0	4.00	4.5	4.27	4.13		0	0
Mile 7	104	to	105	2	75.87	0	2	74.81	0	3.75	5.0	3.76	5.0	4.12	4.13		0	0
Mile 8	105	to	106	2	97.31	1	2	141.92	5	3.45	4.7	2.92	4.0	3.81	2.92		0	2
Mile 9	106	to	107	2	98.29	5	2	61.93	1	3.44	4.0	3.95	4.7	3.61	4.16		0	0
Mile 10	107	to	108	2	118.14	0	2	61.27	2	3.19	5.0	3.96	4.5	3.19	4.11		2	0
Mile 11	108	to	109	2	119.50	0	2	61.79	1	3.18	5.0	3.95	4.7	3.18	4.16		2	0
Mile 12	109	to	110	2	63.51	0	2	68.60	1	3.93	5.0	3.85	4.7	4.25	4.09		0	0
Mile 13	110	to	111	2	73.46	1	2	70.29	2	3.78	4.7	3.83	4.5	4.04	4.02		0	0
Mile 14	111	to	112	2	63.96	2	2	78.28	1	3.92	4.5	3.71	4.7	4.08	4.00		0	0
Mile 15	112	to	113	2	124.85	0	2	68.84	0	3.11	5.0	3.85	5.0	3.11	4.19		2	0
			Total	30			30											8
			Weighted Average							3.67	4.71	3.80	4.64	3.87	4.03			
			Factor							1.00		1.00						
			Indicator Score							**3.67**		**3.80**						**13.3%**
			Pavement Index													**3.95**		

				Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 9		***Interstate?***		**No**														
Mile 1	149	to	150	2	71.81	7	2	129.36	6	3.81	3.8	3.06	3.9	3.77	3.30		0	0
Mile 2	150	to	151	2	81.17	0	2	120.13	0	3.67	5.0	3.17	5.0	4.07	3.72		0	0
Mile 3	151	to	152	2	50.75	1	2	71.21	1	4.12	4.7	3.81	4.7	4.28	4.07		0	0
Mile 4	152	to	153	2	56.38	0	2	54.56	1	4.04	5.0	4.06	4.7	4.32	4.24		0	0
Mile 5	153	to	154	2	60.27	1	2	60.77	0	3.98	4.7	3.97	5.0	4.18	4.28		0	0
Mile 6	154	to	155	2	95.61	0	2	79.01	1	3.48	5.0	3.70	4.7	3.93	3.99		0	0
			Total	12			12											0
			Weighted Average							3.85	4.68	3.63	4.64	4.09	3.93			
			Factor							1.00		1.00						
			Indicator Score							**3.85**		**3.63**						**0.0%**
			Pavement Index													**4.01**		
Segment 10		***Interstate?***		**No**														
Mile 1	138	to	139	2	37.83	1	2	44.85	0	4.33	4.7	4.22	5.0	4.43	4.45		0	0
Mile 2	139	to	140	2	33.62	0	2	55.75	2	4.40	5.0	4.05	4.5	4.58	4.17		0	0
Mile 3	140	to	141	2	31.05	0	2	40.83	0	4.44	5.0	4.28	5.0	4.61	4.50		0	0
Mile 4	141	to	142	2	48.19	3	2	41.84	0	4.16	4.3	4.26	5.0	4.20	4.49		0	0
Mile 5	142	to	143	2	88.96	12	2	40.89	0	3.57	3.2	4.28	5.0	3.32	4.50		0	0
Mile 6	143	to	144	2	81.66	25	2	33.83	0	3.67	2.1	4.40	5.0	2.11	4.58		2	0
Mile 7	144	to	145	2	87.76	20	2	33.73	0	3.58	2.5	4.40	5.0	2.51	4.58		2	0
Mile 8	145	to	146	2	84.07	45	2	36.56	0	3.63	0.7	4.35	5.0	0.74	4.55		2	0
Mile 9	146	to	147	2	87.74	7	2	38.59	1	3.58	3.8	4.32	4.7	3.63	4.42		0	0
Mile 10	147	to	148	2	106.90	10	2	97.01	2	3.33	3.4	3.46	4.5	3.36	3.76		0	0
Mile 11	148	to	149	2	110.08	7	2	116.44	11	3.29	3.8	3.21	3.3	3.43	3.24		0	0
			Total	22			22											6
			Weighted Average							3.82	3.50	4.11	4.72	3.36	4.29			
			Factor							1.00		1.00						
			Indicator Score							**3.82**		**4.11**						**13.6%**
			Pavement Index													**3.83**		

				Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 11		***Interstate?***		**No**														
Mile 1	123	to	124	1	35.16	0	1	90.14	30	4.37	5.0	3.55	1.7	4.56	1.74		0	1
Mile 2	124	to	125	2	38.98	4	2	94.74	45	4.31	4.1	3.49	0.7	4.19	0.74		0	2
Mile 3	125	to	126	2	39.69	2	2	89.78	30	4.30	4.5	3.55	1.7	4.35	1.74		0	2
Mile 4	126	to	127	2	45.09	1	2	123.00	4	4.21	4.7	3.13	4.1	4.35	3.43		0	0
Mile 5	127	to	128	2	38.99	4	2	145.28	30	4.31	4.1	2.88	1.7	4.19	1.74		0	2
Mile 6	128	to	129	2	35.10	1	2	129.66	30	4.38	4.7	3.05	1.7	4.46	1.74		0	2
Mile 7	129	to	130	2	35.28	0	2	122.15	35	4.37	5.0	3.14	1.4	4.56	1.40		0	2
Mile 8	130	to	131	2	38.47	0	2	79.09	22	4.32	5.0	3.70	2.3	4.52	2.35		0	2
Mile 9	131	to	132	2	36.04	0	2	35.89	0	4.36	5.0	4.36	5.0	4.55	4.55		0	0
Mile 10	132	to	133	2	33.46	0	2	39.13	0	4.40	5.0	4.31	5.0	4.58	4.52		0	0
Mile 11	133	to	134	2	37.79	0	2	39.03	0	4.33	5.0	4.31	5.0	4.53	4.52		0	0
Mile 12	134	to	135	2	34.49	1	2	44.44	4	4.39	4.7	4.22	4.1	4.47	4.16		0	0
Mile 13	135	to	136	2	33.10	0	2	37.16	0	4.41	5.0	4.34	5.0	4.59	4.54		0	0
Mile 14	136	to	137	2	27.56	0	2	33.46	0	4.50	5.0	4.40	5.0	4.65	4.58		0	0
Mile 15	137	to	138	2	40.07	0	2	45.89	0	4.29	5.0	4.20	5.0	4.51	4.44		0	0
			Total	29			29											13
			Weighted Average							4.35	4.77	3.78	3.37	4.47	3.13			
			Factor							1.00		1.00						
			Indicator Score							**4.35**		**3.78**						**22.4%**
			Pavement Index													**3.80**		
Segment 12		***Interstate?***		**No**														
Mile 1	120	to	121	1	58.95	0	1	76.41	0	4.00	5.0	3.74	5.0	4.30	4.12		0	0
Mile 2	121	to	122	1	113.74	0	1	134.45	0	3.25	5.0	3.00	5.0	3.77	3.60		0	0
Mile 3	122	to	123	1	133.83	12	1	144.55	40	3.01	3.2	2.89	1.1	3.07	1.06		0	1
			Total	3			3											1
			Weighted Average							3.42	4.41	3.21	3.69	3.71	2.93			
			Factor							1.00		1.00						
			Indicator Score							**3.42**		**3.21**						**16.7%**
			Pavement Index													**3.32**		

			Eastbound (SB SR85)			Westbound (NB SR85)			EB (SB SR85)		WB (NB SR 85)		Composite		Pavement Index	% Pavement Failure	
			# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	EB/SB	WB/NB		EB/SB	WB/NB
Segment 13	***Interstate?***	**No**															
Mile 1	118 to 119		2		0	2			5.00	5.0	5.00	5.0	n/a	n/a		n/a	n/a
Mile 2	119 to 120		2		0	2			5.00	5.0	5.00	5.0	n/a	n/a		n/a	n/a
		Total	4			4											n/a
		Weighted Average							5.00	5.00	5.00	5.00	n/a	n/a			
		Factor							1.00		1.00						
		Indicator Score							**5.00**		**5.00**						n/a
		Pavement Index													n/a		
Segment 14	***Interstate?***	**No**															
Mile 1	120 to 121		1		0	1			5.00	5.0	5.00	5.0	n/a	n/a		n/a	n/a
Mile 2	121 to 122		1		0	1			5.00	5.0	5.00	5.0	n/a	n/a		n/a	n/a
Mile 3	122 to 123		1		0	1			5.00	5.0	5.00	5.0	n/a	n/a		n/a	n/a
		Total	3			3											n/a
		Weighted Average							5.00	5.00	5.00	5.00	n/a	n/a			
		Factor							1.00		1.00						
		Indicator Score							**5.00**		**5.00**						n/a
		Pavement Index													n/a		

Bridge Performance Area Data

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 1												
Ehrenberg Bridge	619	0.01	10,733	61.80	6	5	7	5	5.0	0		
Poston Rd TI UP	1704	0.62	857	95.50	5	6	7	6	5.0	0		
Tom Wells Rd TI UP	767	5.84	762	85.20	5	6	7	6	5.0	762		
Dome Rock TI OP EB	755	11.95	361	96.00	7	7	7	7	7.0	0		
Dome Rock TI OP WB	756	11.95	361	96.00	7	7	7	7	7.0	0		
Total			13,074									
Weighted Average				67.26					5.11	5.83%		
Factor				1.00					1.00	1.00		
Indicator Score				**67.26**						**5.83%**	**5**	
Bridge Index									**5.11**			
Segment 2												
West Quartzsite TI UP	826	17.50	768	76.00	5	6	7	6	5.0	768		
Quartzsite Ped OP	813	18.09	203	-2.00	7	7	7	N	7.0	0		
Tyson Wash Bridge EB	791	18.61	1,722	97.30	6	7	6	6	6.0	0		
Tyson Wash Bridge WB	792	18.61	1,722	97.10	6	7	6	6	6.0	0		
SR 95 UP	1451	18.89	2,099	96.00	5	8	7	7	5.0	0		
Riggles Avenue TI UP	2726	19.90	2,004	98.70	7	8	7	7	7.0	0		
Total			8,517									
Weighted Average				95.30					5.92	9.02%		
Factor				1.00					1.00	1.00		
Indicator Score				**95.30**						**9.02%**	**5**	
Bridge Index									**5.92**			
Segment 3												
Gold Nugget TI UP	769	26.65	725	93.90	6	6	7	6	6.0	725		
Brenda TI UP	1201	31.17	1,247	84.40	7	6	7	6	6.0	0		
Total			1,971									
Weighted Average				87.89					6.00	36.76%		
Factor				1.00					1.00	1.00		
Indicator Score				**87.89**						**36.76%**	**6**	
Bridge Index									**6.00**			

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 4												
Ramsey Mine Rd UP	1202	33.78	969	98.00	7	6	7	6	6.0	0		
Wash Bridge EB	1203	37.11	619	96.20	7	7	7	7	7.0	0		
Wash Bridge WB	1204	37.11	622	96.20	7	7	6	6	6.0	0		
New Water Mtn Br EB	1205	39.37	419	96.20	7	7	7	7	7.0	0		
New Water Mtn Br WB	1206	39.37	419	96.20	7	7	7	7	7.0	0		
Vicksburg Rd TI UP	1207	45.34	1,098	96.60	5	6	7	6	5.0	0		
CAP Canal Br WB	1410	52.24	965	97.20	7	8	8	8	7.0	0		
CAP Canal Br EB	1409	52.25	1,083	97.20	7	8	7	7	7.0	0		
Hovatter Rd TI UP	1384	53.94	1,396	98.70	7	7	7	7	7.0	0		
Total			7,589									
Weighted Average				97.22					6.50	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**97.22**						**0.00%**	**5**	
Bridge Index									**6.50**			
Segment 5												
CAP Canal Br EB	1411	54.34	476	97.20	7	8	8	8	7.0	0		
CAP Canal Br WB	1412	54.35	403	97.20	7	8	8	8	7.0	0		
CAP Canal Br WB	1414	59.15	449	97.20	7	8	7	7	7.0	0		
CAP Canal Br EB	1413	59.16	449	97.20	7	8	7	7	7.0	0		
Sore Finger Rd UP	1282	59.47	969	100.00	7	6	7	6	6.0	0		
Ave 75 E TI UP	1283	69.60	972	98.80	7	6	7	6	6.0	0		
Total			3,718									
Weighted Average				98.35					6.48	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**98.35**						**0.00%**	**6**	
Bridge Index									**6.48**			
Segment 6												
Aguila Road UP	1208	72.71	972	97.90	7	7	7	7	7.0	0		
Salome Road TI UP	1209	81.21	1,174	97.00	7	7	7	7	7.0	0		
Total			2,146									
Weighted Average				97.41					7.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**97.41**						**0.00%**	**7**	
Bridge Index									**7.00**			

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 7												
411th Ave TI UP	1523	94.15	970	99.60	6	7	7	7	6.0	0		
Old Camp Wash Br WB	1524	95.30	355	97.10	7	7	6	6	6.0	0		
Old Camp Wash Br EB	1525	95.30	355	97.10	7	7	6	6	6.0	0		
Belmont Rd UP	1526	96.21	765	97.00	6	6	7	6	6.0	0		
Coyote Wash Br WB	1527	96.53	404	96.10	7	7	7	7	7.0	0		
Coyote Wash Br EB	1528	96.53	404	97.10	7	7	7	7	7.0	0		
Total			3,251									
Weighted Average				97.70					6.25	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**97.70**						**0.00%**	**6**	
Bridge Index									**6.25**			
Segment 8												
Wintersburg Rd TI UP	1529	98.29	765	88.60	6	6	7	6	6.0	0		
355th Ave UP	1647	101.40	672	97.90	6	6	6	6	6.0	0		
339th Avenue TI UP	1644	103.44	719	80.70	6	6	6	6	6.0	0		
Hassayampa Rvr Br WB	1645	104.69	4,911	96.70	7	7	7	7	7.0	0		
Hassayampa Rvr Br EB	1646	104.69	4,911	96.70	7	7	7	7	7.0	0		
Johnson Road UP	1664	107.60	672	94.30	6	6	6	6	6.0	0		
Palo Verde Rd TI UP	2078	109.68	3,041	98.70	7	7	7	7	7.0	0		
Oglesby Rd Ramp B UP	1725	112.75	728	96.60	5	7	7	7	5.0	0		
Oglesby Rd Ramp C OP	1727	112.83	441	96.00	7	7	7	7	7.0	0		
Oglesby Rd Ramp C UP	1726	112.92	744	98.50	7	6	6	6	6.0	0		
Total			17,605									
Weighted Average				96.12					6.71	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**96.12**						**0.00%**	**5**	
Bridge Index									**6.71**			
Segment 9												
									n/a			
Total			0									
Weighted Average				#VALUE!					n/a	n/a		
Factor				1.00					1.00	1.00		
Indicator Score				**#VALUE!**						n/a	n/a	
Bridge Index									n/a			

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 10												
Lewis Prison RD TI OP NB	2524	138.38	574	99.50	7	8	7	7	7.0	0		
Lewis Prison RD TI OP SB	2680	138.38	574	99.50	7	8	8	8	7.0	0		
Rainbow Wash Bridge NB	466	141.08	339	92.30	7	7	7	6	6.0	0		
Rainbow Wash Bridge SB	2771	141.10	841	99.60	7	8	8	8	7.0	0		
Gila River Bridge SB	2279	147.75	15,222	99.60	6	8	7	7	6.0	0		
Gila River Bridge NB	2280	147.75	15,222	99.50	7	8	7	7	7.0	0		
Total			32,772									
Weighted Average				99.47					6.53	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**99.47**						**0.00%**	**6**	
Bridge Index									**6.53**			
Segment 11												
									n/a	0		
Total			0									
Weighted Average				n/a					n/a	n/a		
Factor				1.00					1.00	1.00		
Indicator Score				n/a						n/a	n/a	
Bridge Index									n/a			
Segment 12												
Gillespie Canal Br	465	120.25	499	83.40	7	7	7	5	5.0	0		
Total			499									
Weighted Average				83.40					5.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**83.40**						**0.00%**	**5**	
Bridge Index									**5.00**			

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 13												
Wash Bridge	443	118.15	250	84.70	6	6	6	5	5.0	0		
State Rte 85 OP	702	118.23	580	94.20	6	6	7	6	6.0	0		
E Gila Bend TI UP	1345	119.42	1,108	93.30	5	7	7	7	5.0	0		
Sand Tank Wash Br	444	119.76	768	82.40	6	6	6	5	5.0	0		
Total			2,705									
Weighted Average				89.61					5.21	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**89.61**						**0.00%**	**5**	
Bridge Index									**5.21**			
Segment 14												
SPRR OP EB	118	120.46	369	93.90	6	6	6	6	6.0	0		
UPRR OP	2966	120.46	2,315	94.30	7	8	8	8	7.0	0		
Total			2,684									
Weighted Average				94.25					6.86	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**94.25**						**0.00%**	**6**	
Bridge Index									**6.86**			

Mobility Performance Area Data

Segment	Begin MP	End MP	Length (mi)	Facility Type	Terrain	No. of Lanes	Capacity Environment Type	Lane Width (feet)	EB/NB Right Shoulder Width	WB/SB Right Shoulder Width	EB/NB Left Shoulder Width	WB/SB Left Shoulder Width	NB/EB AADT	SB/WB AADT	2014 AADT	K Factor	D Factor	T Factor	Posted Speed Limit (mph)	Divided or Undivided
1	0	16	16	Rural	Level	4	Freeway Segment	12.00	9.83	9.84	N/A	N/A	9469	9155	18624	12%	51%	26%	72.2	Divided
2	16	22	6	Rural	Level	4	Freeway Segment	12.00	9.00	9.00	N/A	N/A	10492	10492	20983	11%	50%	26%	75	Divided
3	22	32	10	Rural	Level	4	Freeway Segment	12.00	9.71	9.58	N/A	N/A	9279	9279	18558	12%	50%	26%	75	Divided
4	32	54	22	Rural	Level	4	Freeway Segment	12.00	9.93	9.90	N/A	N/A	10487	10363	20849	13%	52%	25%	75	Divided
5	54	71	17	Rural	Level	4	Freeway Segment	12.00	9.92	9.94	N/A	N/A	9556	9556	19112	12%	50%	26%	75	Divided
6	71	82	11	Rural	Level	4	Freeway Segment	12.00	9.91	10.00	N/A	N/A	10241	8876	19118	12%	54%	26%	75	Divided
7	82	98	16	Rural	Level	4	Freeway Segment	12.00	9.67	10.00	N/A	N/A	11464	9662	21,126	12%	54%	26%	75	Divided
8	98	113	15	Rural	Level	4	Freeway Segment	12.00	10.00	10.00	N/A	N/A	14027	13672	27,699	10%	51%	26%	75	Divided
9	155	149	6	Fringe Urban	Level	4	Multilane Highway	12.00	8.83	8.85	5.84	7.92	6921	7057	13,979	9%	52%	19%	52.7	Divided
10	149	138	11	Rural	Level	4	Multilane Highway	12.00	9.76	9.82	5.90	4.04	6058	5999	12059	9%	51%	21%	65	Divided
11	138	123	15	Rural	Level	4	Multilane Highway	11.50	9.94	9.58	3.99	5.92	4407	4343	8750	7%	50%	26%	65	Divided
12	123	120	3	Rural	Level	2	Urban/Rural Single or Multilane Signalized	12.00	7.61	6.00	N/A	N/A	5412	5412	10825	8%	50%	22%	43.2	Undivided
13	120	118	2	Fringe Urban	Level	4	Urban/Rural Single or Multilane Signalized	12.00	4.91	4.99	N/A	N/A	4950.00	4896.00	9846	9%	50%	7%	35	Undivided
14	120	123	3	Fringe Urban	Level	2	Urban/Rural Single or Multilane Signalized	11.00	6.76	5.32	N/A	N/A	6118.00	5983.00	12101	9%	51%	15%	49.5	Undivided

Segment	Facility Type	Terrain	Lane Width (Rounded, feet)	NB/EB Rt. Shoulder	SB/WB Rt. Shoulder	F_{lw} or f_w or f_{LS}	NB/EB F_{lc}	SB/WB F_{lc}	Total Ramp Density[1]	PHF	E_T	f_{HV}	f_M	f_A	g/C^2	f_G	f_{NP}	Nm	f_p	Freeway NB/EB FFS	Freeway SB/WB FFS	NB/EB FFS	SB/WB FFS	NB/EB Peak-Hour Capacity	SB/WB Peak-Hour Capacity	Daily Capacity[3]
1	Rural	Level	12.00	9.83	9.84	0.0	0	0	0	0.94	1.5	0.885	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	3993	3993	76,056
2	Rural	Level	12.00	9.00	9.00	0.0	0	0	0	0.94	1.5	0.885	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	3993	3993	76,056
3	Rural	Level	12.00	9.71	9.58	0.0	0	0	0	0.94	1.5	0.885	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	3993	3993	76,056
4	Rural	Level	12.00	9.93	9.90	0.0	0	0	0	0.94	1.5	0.889	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	4011	4011	76,394
5	Rural	Level	12.00	9.92	9.94	0.0	0	0	0	0.94	1.5	0.885	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	3993	3993	76,056
6	Rural	Level	12.00	9.91	10.00	0.0	0	0	0	0.94	1.5	0.885	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	3993	3993	76,056
7	Rural	Level	12.00	9.67	10.00	0.0	0	0	0	0.94	1.5	0.885	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	3993	3993	76,056
8	Rural	Level	12.00	10.00	10.00	0.0	0	0	0	0.94	1.5	0.885	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75.40	75.40	75.40	75.40	3993	3993	76,056
9	Fringe Urban	Level	12.00	8.83	8.85	0.0	0	0	N/A	0.95	1.5	0.913	0	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	51.20	51.20	3512	3512	66,895
10	Rural	Level	12.00	9.76	9.82	0.0	0	0.4	N/A	0.88	1.5	0.905	0	0.25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	64.75	64.35	3504	3504	66,744
11	Rural	Level	11.50	9.94	9.58	0.0	0.4	0	N/A	0.88	1.5	0.885	0	0.25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	64.35	64.75	3427	3427	65,268
12	Rural	Level	12.00	7.61	6.00	1.0	N/A	N/A	N/A	0.9	2	0.820	N/A	N/A	0.55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14,684
13	Fringe Urban	Level	12.00	4.91	4.99	1.0	N/A	N/A	N/A	0.9	2	0.935	N/A	N/A	0.55	N/A	N/A	1.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	33,485
14	Fringe Urban	Level	11.00	6.76	5.32	1.0	N/A	N/A	N/A	0.9	2	0.870	N/A	N/A	0.55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15,578

TTI and PTI Eastbound& Northbound

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Speed	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks Peak TTI	Cars Peak PTI	Trucks Peak PTI	Segment Average Cars TTI	Segment Average Trucks TTI	Segment Average Cars PTI	Segment Average Trucks PTI
1	115N04891	1 AM Peak	Weekday	I-10	EB	58.6	57.0	47.3	47.3	65	65	1.11	1.14	1.37	1.37	1.12	1.15	1.51	1.37	1.20	1.14	1.57	1.36
	115N04891	2 Mid Day	Weekday	I-10	EB	61.0	57.4	47.3	47.3	65	65	1.07	1.13	1.37	1.37								
	115N04891	3 PM Peak	Weekday	I-10	EB	61.1	57.2	47.3	47.3	65	65	1.06	1.14	1.37	1.37								
	115N04891	4 Evening	Weekday	I-10	EB	57.8	56.6	43.0	47.3	65	65	1.12	1.15	1.51	1.37								
	115N04890	1 AM Peak	Weekday	I-10	EB	58.5	57.3	44.7	45.2	65	65	1.11	1.13	1.45	1.44	1.12	1.14	1.45	1.44				
	115N04890	2 Mid Day	Weekday	I-10	EB	60.7	57.9	47.7	48.4	65	65	1.07	1.12	1.36	1.34								
	115N04890	3 PM Peak	Weekday	I-10	EB	60.6	58.1	49.8	50.5	65	65	1.07	1.12	1.31	1.29								
	115N04890	4 Evening	Weekday	I-10	EB	58.2	57.2	44.7	45.8	65	65	1.12	1.14	1.45	1.42								
	115N04889	1 AM Peak	Weekday	I-10	EB	56.4	56.1	41.9	47.3	75	65	1.33	1.16	1.79	1.37	1.33	1.16	1.79	1.37				
	115N04889	2 Mid Day	Weekday	I-10	EB	58.8	56.8	42.2	48.7	75	65	1.28	1.14	1.78	1.33								
	115N04889	3 PM Peak	Weekday	I-10	EB	58.8	56.8	42.8	49.1	75	65	1.28	1.14	1.75	1.32								
	115N04889	4 Evening	Weekday	I-10	EB	56.7	56.2	42.8	47.3	75	65	1.32	1.16	1.75	1.37								
	115N04888	1 AM Peak	Weekday	I-10	EB	61.2	59.2	49.8	52.8	75	65	1.23	1.10	1.51	1.23	1.23	1.10	1.54	1.24				
	115N04888	2 Mid Day	Weekday	I-10	EB	64.0	59.5	51.6	53.7	75	65	1.17	1.09	1.45	1.21								
	115N04888	3 PM Peak	Weekday	I-10	EB	64.2	59.7	52.4	54.6	75	65	1.17	1.09	1.43	1.19								
	115N04888	4 Evening	Weekday	I-10	EB	61.2	59.2	48.8	52.4	75	65	1.23	1.10	1.54	1.24								
2	115N04887	1 AM Peak	Weekday	I-10	EB	67.0	62.8	59.4	59.5	75	65	1.12	1.04	1.26	1.09	1.12	1.04	1.26	1.11	1.13	1.05	1.30	1.13
	115N04887	2 Mid Day	Weekday	I-10	EB	68.8	62.6	60.6	59.4	75	65	1.09	1.04	1.24	1.09								
	115N04887	3 PM Peak	Weekday	I-10	EB	68.8	62.6	61.0	59.7	75	65	1.09	1.04	1.23	1.09								
	115N04887	4 Evening	Weekday	I-10	EB	67.3	62.5	59.4	58.5	75	65	1.11	1.04	1.26	1.11								
	115N04886	1 AM Peak	Weekday	I-10	EB	66.0	62.0	56.5	57.2	75	65	1.14	1.05	1.33	1.14	1.14	1.05	1.33	1.15				
	115N04886	2 Mid Day	Weekday	I-10	EB	68.0	62.1	57.9	57.6	75	65	1.10	1.05	1.30	1.13								
	115N04886	3 PM Peak	Weekday	I-10	EB	68.1	62.1	58.7	57.9	75	65	1.10	1.05	1.28	1.12								
	115N04886	4 Evening	Weekday	I-10	EB	66.7	61.9	56.5	56.5	75	65	1.12	1.05	1.33	1.15								
3	115N04885	1 AM Peak	Weekday	I-10	EB	65.0	61.7	55.9	57.6	75	65	1.15	1.05	1.34	1.13	1.15	1.06	1.34	1.14	1.15	1.05	1.34	1.14
	115N04885	2 Mid Day	Weekday	I-10	EB	67.2	61.7	57.7	57.7	75	65	1.12	1.05	1.30	1.13								
	115N04885	3 PM Peak	Weekday	I-10	EB	67.4	61.7	58.6	58.3	75	65	1.11	1.05	1.28	1.11								
	115N04885	4 Evening	Weekday	I-10	EB	65.4	61.6	56.6	57.2	75	65	1.15	1.06	1.33	1.14								
	115N04884	1 AM Peak	Weekday	I-10	EB	65.3	62.0	56.0	57.1	75	65	1.15	1.05	1.34	1.14	1.15	1.05	1.34	1.14				
	115N04884	2 Mid Day	Weekday	I-10	EB	67.6	61.9	56.7	57.5	75	65	1.11	1.05	1.32	1.13								
	115N04884	3 PM Peak	Weekday	I-10	EB	68.0	62.0	58.2	57.9	75	65	1.10	1.05	1.29	1.12								
	115N04884	4 Evening	Weekday	I-10	EB	65.8	61.9	56.0	56.9	75	65	1.14	1.05	1.34	1.14								
4	115N04883	1 AM Peak	Weekday	I-10	EB	68.1	63.0	61.6	60.7	75	65	1.10	1.03	1.22	1.07	1.10	1.03	1.22	1.08	1.11	1.04	1.24	1.09
	115N04883	2 Mid Day	Weekday	I-10	EB	70.1	63.0	62.5	60.7	75	65	1.07	1.03	1.20	1.07								
	115N04883	3 PM Peak	Weekday	I-10	EB	70.5	63.0	63.4	60.9	75	65	1.06	1.03	1.18	1.07								
	115N04883	4 Evening	Weekday	I-10	EB	68.8	62.9	62.5	60.3	75	65	1.09	1.03	1.20	1.08								

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Speed	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks Peak TTI	Cars Peak PTI	Trucks Peak PTI	Segment Average Cars TTI	Segment Average Trucks TTI	Segment Average Cars PTI	Segment Average Trucks PTI
	115N04882	1 AM Peak	Weekday	I-10	EB	67.0	62.2	59.0	59.3	75	65	1.12	1.05	1.27	1.10	1.12	1.05	1.27	1.11				
	115N04882	2 Mid Day	Weekday	I-10	EB	69.1	62.1	60.9	59.3	75	65	1.09	1.05	1.23	1.10								
	115N04882	3 PM Peak	Weekday	I-10	EB	69.7	62.1	62.0	59.6	75	65	1.08	1.05	1.21	1.09								
	115N04882	4 Evening	Weekday	I-10	EB	67.7	62.0	59.6	58.8	75	65	1.11	1.05	1.26	1.11								
5	115N04881	1 AM Peak	Weekday	I-10	EB	65.5	60.4	52.2	52.2	75	65	1.14	1.08	1.44	1.24	1.14	1.08	1.44	1.24	1.11	1.06	1.27	1.17
	115N04881	2 Mid Day	Weekday	I-10	EB	67.9	60.6	55.7	53.7	75	65	1.10	1.07	1.35	1.21								
	115N04881	3 PM Peak	Weekday	I-10	EB	68.8	60.5	57.9	53.7	75	65	1.09	1.07	1.29	1.21								
	115N04881	4 Evening	Weekday	I-10	EB	66.6	60.5	54.7	52.2	75	65	1.13	1.08	1.37	1.24								
	115N04880	1 AM Peak	Weekday	I-10	EB	68.3	62.0	62.2	59.7	75	65	1.10	1.05	1.21	1.09	1.10	1.05	1.21	1.09				
	115N04880	2 Mid Day	Weekday	I-10	EB	70.0	61.8	62.8	59.9	75	65	1.07	1.05	1.19	1.09								
	115N04880	3 PM Peak	Weekday	I-10	EB	70.7	61.7	63.7	60.0	75	65	1.06	1.05	1.18	1.08								
	115N04880	4 Evening	Weekday	I-10	EB	69.0	61.8	62.8	59.4	75	65	1.09	1.05	1.19	1.09								
	115N04879	1 AM Peak	Weekday	I-10	EB	68.5	60.9	61.5	57.0	75	65	1.09	1.07	1.22	1.14	1.09	1.07	1.22	1.14				
	115N04879	2 Mid Day	Weekday	I-10	EB	70.4	60.9	61.5	57.0	75	65	1.07	1.07	1.22	1.14								
	115N04879	3 PM Peak	Weekday	I-10	EB	71.2	60.8	63.2	57.0	75	65	1.05	1.07	1.19	1.14								
	115N04879	4 Evening	Weekday	I-10	EB	69.3	60.8	61.5	57.0	75	65	1.08	1.07	1.22	1.14								
	115N04691	1 AM Peak	Weekday	I-10	EB	69.0	61.7	61.8	54.9	75	65	1.09	1.05	1.21	1.18	1.09	1.06	1.21	1.18				
	115N04691	2 Mid Day	Weekday	I-10	EB	71.8	61.7	61.8	54.9	75	65	1.04	1.05	1.21	1.18								
	115N04691	3 PM Peak	Weekday	I-10	EB	72.6	61.7	61.8	54.9	75	65	1.03	1.05	1.21	1.18								
	115N04691	4 Evening	Weekday	I-10	EB	70.3	61.5	61.8	54.9	75	65	1.07	1.06	1.21	1.18								
6	115N04690	1 AM Peak	Weekday	I-10	EB	68.4	61.6	61.9	58.9	75	65	1.10	1.06	1.21	1.10	1.10	1.06	1.21	1.11	1.10	1.06	1.21	1.11
	115N04690	2 Mid Day	Weekday	I-10	EB	69.9	61.6	62.3	59.1	75	65	1.07	1.06	1.20	1.10								
	115N04690	3 PM Peak	Weekday	I-10	EB	70.7	61.5	63.4	59.3	75	65	1.06	1.06	1.18	1.10								
	115N04690	4 Evening	Weekday	I-10	EB	69.0	61.6	62.5	58.6	75	65	1.09	1.06	1.20	1.11								
7	115N04689	1 AM Peak	Weekday	I-10	EB	67.9	62.4	60.0	58.2	75	65	1.11	1.04	1.25	1.12	1.11	1.05	1.25	1.13	1.10	1.05	1.24	1.13
	115N04689	2 Mid Day	Weekday	I-10	EB	69.2	62.2	60.0	57.7	75	65	1.08	1.05	1.25	1.13								
	115N04689	3 PM Peak	Weekday	I-10	EB	69.8	62.0	61.0	58.1	75	65	1.07	1.05	1.23	1.12								
	115N04689	4 Evening	Weekday	I-10	EB	68.5	62.3	61.0	58.1	75	65	1.10	1.04	1.23	1.12								
	115N04688	1 AM Peak	Weekday	I-10	EB	68.1	61.6	60.9	57.1	75	65	1.10	1.06	1.23	1.14	1.10	1.06	1.23	1.14				
	115N04688	2 Mid Day	Weekday	I-10	EB	69.6	61.4	61.1	57.1	75	65	1.08	1.06	1.23	1.14								
	115N04688	3 PM Peak	Weekday	I-10	EB	70.4	61.3	61.9	57.7	75	65	1.06	1.06	1.21	1.13								
	115N04688	4 Evening	Weekday	I-10	EB	68.6	61.4	61.3	56.9	75	65	1.09	1.06	1.22	1.14								
8	115N04687	1 AM Peak	Weekday	I-10	EB	67.3	62.7	59.0	58.8	75	65	1.11	1.04	1.27	1.11	1.11	1.04	1.27	1.11	1.11	1.04	1.25	1.11
	115N04687	2 Mid Day	Weekday	I-10	EB	69.1	62.6	60.4	58.8	75	65	1.08	1.04	1.24	1.11								
	115N04687	3 PM Peak	Weekday	I-10	EB	70.4	62.7	61.6	59.3	75	65	1.06	1.04	1.22	1.10								
	115N04687	4 Evening	Weekday	I-10	EB	68.4	62.7	60.9	58.4	75	65	1.10	1.04	1.23	1.11								
	115N04686	1 AM Peak	Weekday	I-10	EB	67.9	62.9	60.9	59.3	75	65	1.10	1.03	1.23	1.10	1.10	1.04	1.23	1.11				
	115N04686	2 Mid Day	Weekday	I-10	EB	69.7	62.8	61.5	59.3	75	65	1.08	1.04	1.22	1.10								

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Speed	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks Peak TTI	Cars Peak PTI	Trucks Peak PTI	Segment Average Cars TTI	Segment Average Trucks TTI	Segment Average Cars PTI	Segment Average Trucks PTI
	115N04686	3 PM Peak	Weekday	I-10	EB	71.1	62.8	62.8	59.7	75	65	1.06	1.03	1.19	1.09								
	115N04686	4 Evening	Weekday	I-10	EB	68.4	62.7	60.9	58.6	75	65	1.10	1.04	1.23	1.11								
	115N04685	1 AM Peak	Weekday	I-10	EB	67.3	62.5	59.9	58.8	75	65	1.11	1.04	1.25	1.11	1.11	1.04	1.25	1.11				
	115N04685	2 Mid Day	Weekday	I-10	EB	69.0	62.5	60.7	59.1	75	65	1.09	1.04	1.24	1.10								
	115N04685	3 PM Peak	Weekday	I-10	EB	70.9	62.7	62.3	59.7	75	65	1.06	1.04	1.20	1.09								
	115N04685	4 Evening	Weekday	I-10	EB	68.2	62.5	60.7	58.8	75	65	1.10	1.04	1.24	1.11								
9	115P05959	1 AM Peak	Weekday	AZ-85	NB	56.2	55.4	44.1	46.3	55	55	1.00	1.00	1.25	1.19	1.00	1.03	1.29	1.31	1.05	1.07	1.76	1.64
	115P05959	2 Mid Day	Weekday	AZ-85	NB	57.0	54.9	46.1	45.4	55	55	1.00	1.00	1.19	1.21								
	115P05959	3 PM Peak	Weekday	AZ-85	NB	57.6	54.6	46.7	44.8	55	55	1.00	1.01	1.18	1.23								
	115P05959	4 Evening	Weekday	AZ-85	NB	54.9	53.6	42.8	41.9	55	55	1.00	1.03	1.29	1.31								
	115P06167	1 AM Peak	Weekday	AZ-85	NB	55.8	54.6	43.6	43.0	55	55	1.00	1.01	1.26	1.28	1.00	1.03	1.26	1.37				
	115P06167	2 Mid Day	Weekday	AZ-85	NB	57.1	54.0	47.0	40.6	55	55	1.00	1.02	1.17	1.36								
	115P06167	3 PM Peak	Weekday	AZ-85	NB	58.2	54.1	49.0	40.1	55	55	1.00	1.02	1.12	1.37								
	115P06167	4 Evening	Weekday	AZ-85	NB	55.4	53.3	45.2	40.1	55	55	1.00	1.03	1.22	1.37								
	115P06166	1 AM Peak	Weekday	AZ-85	NB	45.8	46.9	23.6	27.4	55	55	1.20	1.17	2.33	2.01	1.21	1.21	2.72	2.06				
	115P06166	2 Mid Day	Weekday	AZ-85	NB	47.3	46.9	23.6	27.9	55	55	1.16	1.17	2.33	1.97								
	115P06166	3 PM Peak	Weekday	AZ-85	NB	47.8	46.2	24.9	26.7	55	55	1.15	1.19	2.21	2.06								
	115P06166	4 Evening	Weekday	AZ-85	NB	45.5	45.6	20.2	27.4	55	55	1.21	1.21	2.72	2.01								
	115P06165	1 AM Peak	Weekday	AZ-85	NB	48.0	45.1	25.8	24.9	45	45	1.00	1.00	1.74	1.81	1.00	1.02	1.77	1.81				
	115P06165	2 Mid Day	Weekday	AZ-85	NB	48.4	45.5	26.7	27.0	45	45	1.00	1.00	1.69	1.67								
	115P06165	3 PM Peak	Weekday	AZ-85	NB	49.3	45.4	25.4	24.9	45	45	1.00	1.00	1.77	1.81								
	115P06165	4 Evening	Weekday	AZ-85	NB	46.9	44.1	25.8	25.2	45	45	1.00	1.02	1.74	1.79								
10	115P06164	1 AM Peak	Weekday	AZ-85	NB	63.6	61.1	51.6	53.6	55	55	1.00	1.00	1.07	1.03	1.00	1.00	1.07	1.03	1.00	1.00	1.07	1.03
	115P06164	2 Mid Day	Weekday	AZ-85	NB	65.0	61.0	56.2	53.9	55	55	1.00	1.00	1.00	1.02								
	115P06164	3 PM Peak	Weekday	AZ-85	NB	66.3	62.2	59.7	57.2	55	55	1.00	1.00	1.00	1.00								
	115P06164	4 Evening	Weekday	AZ-85	NB	64.1	62.1	51.6	56.6	55	55	1.00	1.00	1.07	1.00								
11	115P06163	1 AM Peak	Weekday	AZ-85	NB	60.1	57.3	38.5	35.4	65	65	1.08	1.13	1.69	1.83	1.09	1.15	1.84	1.94	1.09	1.15	1.84	1.94
	115P06163	2 Mid Day	Weekday	AZ-85	NB	61.0	57.3	42.6	37.3	65	65	1.07	1.14	1.53	1.74								
	115P06163	3 PM Peak	Weekday	AZ-85	NB	61.4	57.3	43.5	38.7	65	65	1.06	1.13	1.49	1.68								
	115P06163	4 Evening	Weekday	AZ-85	NB	59.6	56.6	35.4	33.6	65	65	1.09	1.15	1.84	1.94								
12	115P05958	1 AM Peak	Weekday	AZ-85	NB	29.4	29.3	11.0	14.9	35	35	1.19	1.19	3.19	2.35	1.19	1.19	3.19	2.35	1.19	1.19	3.19	2.35
	115P05958	2 Mid Day	Weekday	AZ-85	NB	30.5	30.1	11.8	14.9	35	35	1.15	1.16	2.97	2.35								
	115P05958	3 PM Peak	Weekday	AZ-85	NB	30.9	30.3	11.2	15.8	35	35	1.13	1.15	3.13	2.21								
	115P05958	4 Evening	Weekday	AZ-85	NB	31.2	30.7	13.7	16.8	35	35	1.12	1.14	2.56	2.09								
13	115P06169	1 AM Peak	Weekday	AZ-85	NB	27.5	20.7	4.4	3.7	45	45	1.63	2.17	10.34	12.08	1.85	2.17	72.41	12.08	1.85	2.17	72.41	12.08
	115P06169	2 Mid Day	Weekday	AZ-85	NB	26.8	22.5	3.7	5.0	45	45	1.68	2.00	12.13	9.05								
	115P06169	3 PM Peak	Weekday	AZ-85	NB	25.4	22.1	2.5	5.6	45	45	1.77	2.04	18.10	8.05								
	115P06169	4 Evening	Weekday	AZ-85	NB	24.3	23.2	0.6	6.8	45	45	1.85	1.94	72.41	6.59								

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Speed	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks Peak TTI	Cars Peak PTI	Trucks Peak PTI	Segment Average Cars TTI	Segment Average Trucks TTI	Segment Average Cars PTI	Segment Average Trucks PTI
14	115P11293	1 AM Peak	Weekday	I-8-BL	NB	38.3	38.0	5.6	7.5	45	45	1.18	1.19	8.04	6.03	1.28	1.27	9.05	8.04	1.28	1.27	9.05	8.04
	115P11293	2 Mid Day	Weekday	I-8-BL	NB	38.4	37.4	5.6	7.5	45	45	1.17	1.20	8.04	6.03								
	115P11293	3 PM Peak	Weekday	I-8-BL	NB	39.5	38.7	5.6	5.6	45	45	1.14	1.16	8.04	8.04								
	115P11293	4 Evening	Weekday	I-8-BL	NB	35.2	35.5	5.0	6.8	45	45	1.28	1.27	9.05	6.58								

TTI & PTI Westbound & Southbound

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Spee	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks _Peak TTI	Cars_ Peak PTI	Trucks _Peak PTI	Segment Avg Max Cars Peak TTI WB/SB	Segment Avg Max Trucks Peak TTI (TTTI) WB/SB	Segment Avg Max Cars Peak PTI WB/SB	Segment Avg Max Trucks Peak PTI (TPTI) WB/SB
1	115P04891	1 AM Peak	Weekday	I-10	WB	50.0	43.6	34.9	33.1	65	65	1.30	1.49	1.86	1.96	1.40	1.60	2.30	2.30	1.17	1.19	1.54	1.46
	115P04891	2 Mid Day	Weekday	I-10	WB	49.1	41.9	31.6	30.8	65	65	1.32	1.55	2.06	2.11								
	115P04891	3 PM Peak	Weekday	I-10	WB	47.4	40.7	28.2	28.2	65	65	1.37	1.60	2.30	2.30								
	115P04891	4 Evening	Weekday	I-10	WB	46.3	41.3	33.1	31.6	65	65	1.40	1.57	1.96	2.06								
	115P04890	1 AM Peak	Weekday	I-10	WB	65.2	60.5	51.6	51.7	65	65	1.00	1.07	1.26	1.26	1.02	1.08	1.26	1.26				
	115P04890	2 Mid Day	Weekday	I-10	WB	65.7	60.8	54.4	54.3	65	65	1.00	1.07	1.19	1.20								
	115P04890	3 PM Peak	Weekday	I-10	WB	64.9	60.6	54.3	55.2	65	65	1.00	1.07	1.20	1.18								
	115P04890	4 Evening	Weekday	I-10	WB	63.8	60.3	52.4	51.9	65	65	1.02	1.08	1.24	1.25								
	115P04889	1 AM Peak	Weekday	I-10	WB	69.7	63.5	61.5	59.4	75	65	1.08	1.02	1.22	1.09	1.10	1.03	1.26	1.11				
	115P04889	2 Mid Day	Weekday	I-10	WB	69.4	63.1	61.0	59.2	75	65	1.08	1.03	1.23	1.10								
	115P04889	3 PM Peak	Weekday	I-10	WB	68.6	63.0	60.7	59.4	75	65	1.09	1.03	1.24	1.09								
	115P04889	4 Evening	Weekday	I-10	WB	67.9	62.9	59.7	58.4	75	65	1.10	1.03	1.26	1.11								
	115P04888	1 AM Peak	Weekday	I-10	WB	67.7	61.8	57.2	56.5	75	65	1.11	1.05	1.31	1.15	1.13	1.06	1.33	1.15				
	115P04888	2 Mid Day	Weekday	I-10	WB	67.7	61.7	57.9	57.4	75	65	1.11	1.05	1.30	1.13								
	115P04888	3 PM Peak	Weekday	I-10	WB	66.5	61.6	56.7	57.5	75	65	1.13	1.06	1.32	1.13								
	115P04888	4 Evening	Weekday	I-10	WB	66.1	61.8	56.5	56.7	75	65	1.13	1.05	1.33	1.15								
2	115P04887	1 AM Peak	Weekday	I-10	WB	69.0	62.5	60.4	58.6	75	65	1.09	1.04	1.24	1.11	1.11	1.04	1.28	1.13	1.10	1.04	1.25	1.11
	115P04887	2 Mid Day	Weekday	I-10	WB	68.7	62.3	59.5	58.6	75	65	1.09	1.04	1.26	1.11								
	115P04887	3 PM Peak	Weekday	I-10	WB	67.9	62.3	59.0	58.6	75	65	1.10	1.04	1.27	1.11								
	115P04887	4 Evening	Weekday	I-10	WB	67.3	62.3	58.6	57.3	75	65	1.11	1.04	1.28	1.13								
	115P04886	1 AM Peak	Weekday	I-10	WB	70.5	63.7	63.0	60.2	75	65	1.06	1.02	1.19	1.08	1.09	1.03	1.22	1.09				
	115P04886	2 Mid Day	Weekday	I-10	WB	70.2	63.2	62.7	60.3	75	65	1.07	1.03	1.20	1.08								
	115P04886	3 PM Peak	Weekday	I-10	WB	69.3	63.2	62.1	60.3	75	65	1.08	1.03	1.21	1.08								
	115P04886	4 Evening	Weekday	I-10	WB	68.8	63.4	61.5	59.7	75	65	1.09	1.03	1.22	1.09								
3	115P04885	1 AM Peak	Weekday	I-10	WB	70.1	63.4	60.8	58.4	75	65	1.07	1.03	1.23	1.11	1.11	1.04	1.26	1.11	1.10	1.04	1.24	1.10

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Spee	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks _Peak TTI	Cars_ Peak PTI	Trucks _Peak PTI	Segment Avg Max Cars Peak TTI WB/SB	Segment Avg Max Trucks Peak TTI (TTTI) WB/SB	Segment Avg Max Cars Peak PTI WB/SB	Segment Avg Max Trucks Peak PTI (TPTI) WB/SB
	115P04885	2 Mid Day	Weekday	I-10	WB	69.9	62.9	60.8	58.9	75	65	1.07	1.03	1.23	1.10								
	115P04885	3 PM Peak	Weekday	I-10	WB	68.6	62.7	59.6	58.9	75	65	1.09	1.04	1.26	1.10								
	115P04885	4 Evening	Weekday	I-10	WB	67.8	63.0	59.4	58.4	75	65	1.11	1.03	1.26	1.11								
	115P04884	1 AM Peak	Weekday	I-10	WB	70.0	62.9	62.8	60.0	75	65	1.07	1.03	1.19	1.08	1.10	1.04	1.21	1.08				
	115P04884	2 Mid Day	Weekday	I-10	WB	70.0	62.6	62.8	60.3	75	65	1.07	1.04	1.19	1.08								
	115P04884	3 PM Peak	Weekday	I-10	WB	68.7	62.5	62.2	60.4	75	65	1.09	1.04	1.21	1.08								
	115P04884	4 Evening	Weekday	I-10	WB	68.2	62.8	61.9	60.0	75	65	1.10	1.04	1.21	1.08								
4	115P04883	1 AM Peak	Weekday	I-10	WB	70.2	62.2	62.2	59.1	75	65	1.07	1.04	1.21	1.10	1.10	1.05	1.22	1.10	1.09	1.05	1.23	1.12
	115P04883	2 Mid Day	Weekday	I-10	WB	69.6	62.0	61.9	59.3	75	65	1.08	1.05	1.21	1.10								
	115P04883	3 PM Peak	Weekday	I-10	WB	68.6	61.9	61.3	59.5	75	65	1.09	1.05	1.22	1.09								
	115P04883	4 Evening	Weekday	I-10	WB	68.4	62.3	61.5	59.1	75	65	1.10	1.04	1.22	1.10								
	115P04882	1 AM Peak	Weekday	I-10	WB	70.4	61.7	60.8	57.1	75	65	1.06	1.05	1.23	1.14	1.09	1.06	1.23	1.14				
	115P04882	2 Mid Day	Weekday	I-10	WB	70.0	61.7	60.8	57.8	75	65	1.07	1.05	1.23	1.12								
	115P04882	3 PM Peak	Weekday	I-10	WB	69.3	61.6	60.8	57.8	75	65	1.08	1.06	1.23	1.12								
	115P04882	4 Evening	Weekday	I-10	WB	69.0	61.7	60.8	57.1	75	65	1.09	1.05	1.23	1.14								
5	115P04881	1 AM Peak	Weekday	I-10	WB	70.8	61.9	63.8	59.4	75	65	1.06	1.05	1.18	1.09	1.09	1.06	1.19	1.10	1.08	1.06	1.20	1.13
	115P04881	2 Mid Day	Weekday	I-10	WB	70.4	61.7	63.5	59.7	75	65	1.07	1.05	1.18	1.09								
	115P04881	3 PM Peak	Weekday	I-10	WB	69.4	61.6	63.3	59.7	75	65	1.08	1.06	1.19	1.09								
	115P04881	4 Evening	Weekday	I-10	WB	68.9	61.9	62.8	59.3	75	65	1.09	1.05	1.19	1.10								
	115P04880	1 AM Peak	Weekday	I-10	WB	70.6	60.9	63.0	57.1	75	65	1.06	1.07	1.19	1.14	1.09	1.07	1.22	1.14				
	115P04880	2 Mid Day	Weekday	I-10	WB	70.2	60.8	61.4	57.8	75	65	1.07	1.07	1.22	1.12								
	115P04880	3 PM Peak	Weekday	I-10	WB	69.2	60.8	61.4	57.8	75	65	1.08	1.07	1.22	1.12								
	115P04880	4 Evening	Weekday	I-10	WB	68.8	60.8	61.4	57.1	75	65	1.09	1.07	1.22	1.14								
	115P04879	1 AM Peak	Weekday	I-10	WB	72.1	63.1	64.2	56.2	75	65	1.04	1.03	1.17	1.16	1.07	1.04	1.17	1.16				
	115P04879	2 Mid Day	Weekday	I-10	WB	71.6	62.7	64.2	56.2	75	65	1.05	1.04	1.17	1.16								
	115P04879	3 PM Peak	Weekday	I-10	WB	70.8	62.6	64.2	56.2	75	65	1.06	1.04	1.17	1.16								
	115P04879	4 Evening	Weekday	I-10	WB	70.1	62.7	64.2	56.2	75	65	1.07	1.04	1.17	1.16								
	115P04691	1 AM Peak	Weekday	I-10	WB	70.5	61.6	63.3	58.5	75	65	1.06	1.06	1.18	1.11	1.09	1.06	1.21	1.11				
	115P04691	2 Mid Day	Weekday	I-10	WB	69.9	61.3	62.8	58.9	75	65	1.07	1.06	1.20	1.10								
	115P04691	3 PM Peak	Weekday	I-10	WB	69.0	61.1	62.1	58.7	75	65	1.09	1.06	1.21	1.11								
	115P04691	4 Evening	Weekday	I-10	WB	68.7	61.5	62.1	58.4	75	65	1.09	1.06	1.21	1.11								
6	115P04690	1 AM Peak	Weekday	I-10	WB	70.3	62.4	62.1	58.2	75	65	1.07	1.04	1.21	1.12	1.09	1.05	1.23	1.12	1.09	1.05	1.23	1.12
	115P04690	2 Mid Day	Weekday	I-10	WB	69.4	62.2	61.1	58.3	75	65	1.08	1.05	1.23	1.11								
	115P04690	3 PM Peak	Weekday	I-10	WB	68.6	62.1	60.9	58.3	75	65	1.09	1.05	1.23	1.11								
	115P04690	4 Evening	Weekday	I-10	WB	68.6	62.6	61.5	58.3	75	65	1.09	1.04	1.22	1.11								
7	115P04689	1 AM Peak	Weekday	I-10	WB	69.9	60.7	61.5	55.4	75	65	1.07	1.07	1.22	1.17	1.10	1.08	1.23	1.18	1.10	1.06	1.23	1.15
	115P04689	2 Mid Day	Weekday	I-10	WB	69.1	60.3	60.9	55.0	75	65	1.09	1.08	1.23	1.18								

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Spee	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks _Peak TTI	Cars_ Peak PTI	Trucks _Peak PTI	Segment Avg Max Cars Peak TTI WB/SB	Segment Avg Max Trucks Peak TTI (TTTI) WB/SB	Segment Avg Max Cars Peak PTI WB/SB	Segment Avg Max Trucks Peak PTI (TPTI) WB/SB
	115P04689	3 PM Peak	Weekday	I-10	WB	68.5	60.6	61.3	56.3	75	65	1.09	1.07	1.22	1.16								
	115P04689	4 Evening	Weekday	I-10	WB	68.2	60.9	61.2	56.5	75	65	1.10	1.07	1.23	1.15								
	115P04688	1 AM Peak	Weekday	I-10	WB	69.8	62.6	61.5	58.4	75	65	1.07	1.04	1.22	1.11	1.10	1.04	1.23	1.11				
	115P04688	2 Mid Day	Weekday	I-10	WB	69.2	62.5	61.3	59.1	75	65	1.08	1.04	1.22	1.10								
	115P04688	3 PM Peak	Weekday	I-10	WB	68.6	62.6	61.3	59.1	75	65	1.09	1.04	1.22	1.10								
	115P04688	4 Evening	Weekday	I-10	WB	68.2	62.7	60.8	58.4	75	65	1.10	1.04	1.23	1.11								
8	115P04687	1 AM Peak	Weekday	I-10	WB	70.2	62.7	61.9	58.9	75	65	1.07	1.04	1.21	1.10	1.10	1.04	1.24	1.11	1.10	1.04	1.25	1.12
	115P04687	2 Mid Day	Weekday	I-10	WB	69.2	62.6	61.5	59.3	75	65	1.08	1.04	1.22	1.10								
	115P04687	3 PM Peak	Weekday	I-10	WB	68.8	62.7	61.3	59.5	75	65	1.09	1.04	1.22	1.09								
	115P04687	4 Evening	Weekday	I-10	WB	68.2	62.7	60.7	58.7	75	65	1.10	1.04	1.24	1.11								
	115P04686	1 AM Peak	Weekday	I-10	WB	70.0	62.4	61.7	57.6	75	65	1.07	1.04	1.22	1.13	1.10	1.04	1.25	1.13				
	115P04686	2 Mid Day	Weekday	I-10	WB	68.9	62.2	61.5	58.7	75	65	1.09	1.04	1.22	1.11								
	115P04686	3 PM Peak	Weekday	I-10	WB	68.6	62.4	61.2	58.8	75	65	1.09	1.04	1.23	1.11								
	115P04686	4 Evening	Weekday	I-10	WB	68.0	62.3	60.2	57.8	75	65	1.10	1.04	1.25	1.13								
	115P04685	1 AM Peak	Weekday	I-10	WB	69.5	62.7	60.8	58.5	75	65	1.08	1.04	1.23	1.11	1.10	1.04	1.25	1.11				
	115P04685	2 Mid Day	Weekday	I-10	WB	68.8	62.4	60.8	59.2	75	65	1.09	1.04	1.23	1.10								
	115P04685	3 PM Peak	Weekday	I-10	WB	68.5	62.7	60.8	59.2	75	65	1.09	1.04	1.23	1.10								
	115P04685	4 Evening	Weekday	I-10	WB	68.0	62.6	59.8	58.5	75	65	1.10	1.04	1.25	1.11								
9	115N05959	1 AM Peak	Weekday	AZ-85	SB	56.3	56.1	45.8	45.4	55	55	1.00	1.00	1.20	1.21	1.00	1.00	1.28	1.32	1.00	1.00	1.32	1.40
	115N05959	2 Mid Day	Weekday	AZ-85	SB	56.9	56.2	46.6	45.4	55	55	1.00	1.00	1.18	1.21								
	115N05959	3 PM Peak	Weekday	AZ-85	SB	58.6	57.2	47.8	45.8	55	55	1.00	1.00	1.15	1.20								
	115N05959	4 Evening	Weekday	AZ-85	SB	55.3	56.1	42.9	41.6	55	55	1.00	1.00	1.28	1.32								
	115N06167	1 AM Peak	Weekday	AZ-85	SB	59.9	57.1	52.6	51.4	55	55	1.00	1.00	1.04	1.07	1.00	1.00	1.08	1.07				
	115N06167	2 Mid Day	Weekday	AZ-85	SB	59.9	57.5	52.0	52.0	55	55	1.00	1.00	1.06	1.06								
	115N06167	3 PM Peak	Weekday	AZ-85	SB	60.7	57.7	52.0	52.0	55	55	1.00	1.00	1.06	1.06								
	115N06167	4 Evening	Weekday	AZ-85	SB	59.2	57.1	50.8	51.4	55	55	1.00	1.00	1.08	1.07								
	115N06166	1 AM Peak	Weekday	AZ-85	SB	59.0	56.0	51.9	49.0	55	55	1.00	1.00	1.06	1.12	1.00	1.00	1.09	1.29				
	115N06166	2 Mid Day	Weekday	AZ-85	SB	59.2	55.9	51.1	45.8	55	55	1.00	1.00	1.08	1.20								
	115N06166	3 PM Peak	Weekday	AZ-85	SB	60.1	56.0	51.9	43.0	55	55	1.00	1.00	1.06	1.28								
	115N06166	4 Evening	Weekday	AZ-85	SB	58.3	55.3	50.4	42.5	55	55	1.00	1.00	1.09	1.29								
	115N06165	1 AM Peak	Weekday	AZ-85	SB	50.9	46.4	28.6	25.4	45	45	1.00	1.00	1.57	1.77	1.00	1.00	1.83	1.91				
	115N06165	2 Mid Day	Weekday	AZ-85	SB	51.0	47.8	26.7	27.1	45	45	1.00	1.00	1.69	1.66								
	115N06165	3 PM Peak	Weekday	AZ-85	SB	51.7	48.4	28.0	28.9	45	45	1.00	1.00	1.61	1.56								
	115N06165	4 Evening	Weekday	AZ-85	SB	49.9	46.8	24.5	23.6	45	45	1.00	1.00	1.83	1.91								
10	115N06164	1 AM Peak	Weekday	AZ-85	SB	51.5	49.4	31.1	32.8	55	55	1.07	1.11	1.77	1.68	1.07	1.11	1.83	1.71	1.07	1.11	1.83	1.71
	115N06164	2 Mid Day	Weekday	AZ-85	SB	52.1	50.0	31.1	33.5	55	55	1.06	1.10	1.77	1.64								
	115N06164	3 PM Peak	Weekday	AZ-85	SB	52.6	50.8	30.9	35.4	55	55	1.05	1.08	1.78	1.55								

Segment	TMC	Time Period	Week Type	Road Number	Road Dir	Cars Mean Spee	Trucks Mean Speed	Cars 5th Perct Speed	Trucks 5th Perct Speed	Assumed Car Free-Flow Speed	Assumed Truck Free-Flow Speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars Peak TTI	Trucks _Peak TTI	Cars_ Peak PTI	Trucks _Peak PTI	Segment Avg Max Cars Peak TTI WB/SB	Segment Avg Max Trucks Peak TTI (TTTI) WB/SB	Segment Avg Max Cars Peak PTI WB/SB	Segment Avg Max Trucks Peak PTI (TPTI) WB/SB
	115N06164	4 Evening	Weekday	AZ-85	SB	51.8	49.9	30.1	32.1	55	55	1.06	1.10	1.83	1.71								
11	115N06163	1 AM Peak	Weekday	AZ-85	SB	65.0	61.8	57.6	57.2	65	65	1.00	1.05	1.13	1.14	1.01	1.06	1.16	1.15	1.01	1.06	1.16	1.15
	115N06163	2 Mid Day	Weekday	AZ-85	SB	65.2	61.4	57.8	56.7	65	65	1.00	1.06	1.12	1.15								
	115N06163	3 PM Peak	Weekday	AZ-85	SB	65.7	61.9	58.6	57.2	65	65	1.00	1.05	1.11	1.14								
	115N06163	4 Evening	Weekday	AZ-85	SB	64.4	61.9	55.9	56.4	65	65	1.01	1.05	1.16	1.15								
12	115N05958	1 AM Peak	Weekday	AZ-85	SB	61.5	58.6	46.6	43.8	35	35	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	115N05958	2 Mid Day	Weekday	AZ-85	SB	61.1	57.8	42.9	42.2	35	35	1.00	1.00	1.00	1.00								
	115N05958	3 PM Peak	Weekday	AZ-85	SB	61.1	57.8	41.2	42.3	35	35	1.00	1.00	1.00	1.00								
	115N05958	4 Evening	Weekday	AZ-85	SB	60.2	57.7	38.3	37.4	35	35	1.00	1.00	1.00	1.00								
13	115N06169	1 AM Peak	Weekday	AZ-85	SB	30.9	30.5	14.0	17.4	45	45	1.46	1.47	3.22	2.59	1.47	1.47	4.26	2.59	1.47	1.47	4.26	2.59
	115N06169	2 Mid Day	Weekday	AZ-85	SB	30.7	30.6	12.7	17.4	45	45	1.46	1.47	3.53	2.59								
	115N06169	3 PM Peak	Weekday	AZ-85	SB	30.6	30.6	10.6	18.6	45	45	1.47	1.47	4.26	2.42								
	115N06169	4 Evening	Weekday	AZ-85	SB	31.4	31.1	12.0	18.6	45	45	1.43	1.45	3.75	2.42								
14	115N11293	1 AM Peak	Weekday	I-8-BL	SB	25.7	23.5	15.0	13.3	45	45	1.75	1.91	3.01	3.39	1.89	1.91	4.25	3.82	1.89	1.91	4.25	3.82
	115N11293	2 Mid Day	Weekday	I-8-BL	SB	25.1	24.0	11.8	12.4	45	45	1.79	1.88	3.82	3.63								
	115N11293	3 PM Peak	Weekday	I-8-BL	SB	27.0	24.0	10.6	11.8	45	45	1.66	1.88	4.25	3.82								
	115N11293	4 Evening	Weekday	I-8-BL	SB	23.8	24.1	12.4	12.4	45	45	1.89	1.87	3.63	3.63								

Closure Data

						Mobility				Freight	
				Total miles of closures		Avg Occurances/Mile/Year		Total minutes of closures		Avg Mins/Mile/Year	
Segment	Length (miles)	# of closures		EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)
1	16	14		24.0	4.0	0.30	0.05	4038.0	2002.0	50.47	25.03
2	6	6		7.0	1.0	0.23	0.03	1307.0	144.0	43.57	4.80
3	10	13		4.0	9.0	0.08	0.18	439.0	3033.0	8.78	60.66
4	22	25		15.0	12.6	0.14	0.11	3903.0	15030.2	35.48	136.64
5	17	19		11.0	24.0	0.13	0.28	3570.0	5087.0	42.00	59.85
6	11	16		13.1	20.0	0.24	0.36	5506.5	5378.0	100.12	97.78
7	16	25		32.2	9.0	0.40	0.11	15805.1	2959.0	197.56	36.99
8	15	17		9.0	8.0	0.12	0.11	3329.0	2351.0	44.39	31.35
9	6	24		2.0	23.1	0.07	0.77	536.0	5628.7	17.87	187.62
10	11	4		14.0	0.0	0.25	0.00	5156.0	0.0	93.75	0.00
11	15	3		10.0	2.0	0.13	0.03	1590.0	313.0	21.20	4.17
12	3	4		4.0	1.0	0.27	0.07	460.0	80.0	30.67	5.33
13		0		0.0	0.0	n/a	n/a	0.0	0.0	n/a	n/a
14		0		0.0	0.0	n/a	n/a	0.0	0.0	n/a	n/a

	Closures		Incidents/Accidents		Incidents/Crashes		Obstruction Hazards		Winds		Winter Storm Codes	
Segment	EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)	EB (or SB)	WB (or NB)
1	0	0	10	4	0	0	0	0	0	0	0	0
2	0	0	5	1	0	0	0	0	0	0	0	0
3	0	0	4	9	0	0	0	0	0	0	0	0
4	0	0	15	10	0	0	0	0	0	0	0	0
5	0	0	11	8	0	0	0	0	0	0	0	0
6	0	0	5	11	0	0	0	0	0	0	0	0
7	0	0	16	9	0	0	0	0	0	0	0	0
8	0	0	9	8	0	0	0	0	0	0	0	0
9	0	0	2	22	0	0	0	0	0	0	0	0
10	0	0	4	0	0	0	0	0	0	0	0	0
11	0	0	1	2	0	0	0	0	0	0	0	0
12	0	0	3	1	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0

Safety Performance Area Data

Segment	Similar Operating Environment	Segment Length (mi)	Segment NB/EB Fatal Crashes	Segment SB/WB Fatal Crashes	Segment NB/EB Incapacitating Injury Crashes	Segment SB/WB Incapacitating Injury Crashes	Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	% of Total Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors
1	Rural 4 Lane Freeway with Daily Volume < 25,000	16.0	3	1	4	4	7	58%
2	Rural 4 Lane Freeway with Daily Volume < 25,000	6.0	2	0	1	2	2	40%
3	Rural 4 Lane Freeway with Daily Volume < 25,000	10.0	1	2	8	2	7	54%
4	Rural 4 Lane Freeway with Daily Volume < 25,000	22.0	6	7	11	13	20	54%
5	Rural 4 Lane Freeway with Daily Volume < 25,000	17.0	3	6	8	9	9	35%
6	Rural 4 Lane Freeway with Daily Volume < 25,000	11.0	1	5	6	6	10	56%
7	Rural 4 Lane Freeway with Daily Volume < 25,000	16.0	11	4	3	7	10	40%
8	Rural 4 Lane Freeway with Daily Volume > 25,000	15.0	4	8	5	9	13	50%
9	2 or 3 or 4 Lane Divided Highway	6.0	3	6	6	3	1	6%
10	2 or 3 or 4 Lane Divided Highway	11.0	0	2	0	0	1	50%
11	2 or 3 or 4 Lane Divided Highway	15.0	0	1	1	1	2	67%
12	2 or 3 Lane Undivided Highway	3.0	0	0	1	0	0	0%
13	4 or 5 Lane Undivided Highway	2.0	0	0	0	2	1	50%
14	2 or 3 Lane Undivided Highway	3.0	0	0	0	0	0	0%

Segment	Similar Operating Environment	Segment Length (mi)	Fatal + Incapacitating Injury Crashes Involving Trucks	Fatal + Incapacitating Injury Crashes Involving Motorcycles	Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers	Weighted Average NB/EB AADT	Weighted Average SB/WB AADT	Weighted Average Total AADT
1	Rural 4 Lane Freeway with Daily Volume < 25,000	16.0	1	2	0	10412	10321	20732
2	Rural 4 Lane Freeway with Daily Volume < 25,000	6.0	1	0	0	10627	10097	20724
3	Rural 4 Lane Freeway with Daily Volume < 25,000	10.0	2	1	0	9308	9308	18615
4	Rural 4 Lane Freeway with Daily Volume < 25,000	22.0	4	0	0	10276	10155	20432
5	Rural 4 Lane Freeway with Daily Volume < 25,000	17.0	9	2	0	10312	10312	20624
6	Rural 4 Lane Freeway with Daily Volume < 25,000	11.0	3	1	0	10478	9896	20374
7	Rural 4 Lane Freeway with Daily Volume < 25,000	16.0	5	2	0	10705	10486	21192
8	Rural 4 Lane Freeway with Daily Volume > 25,000	15.0	5	2	0	15214	15056	30270
9	2 or 3 or 4 Lane Divided Highway	6.0	2	0	0	6656	6421	13077
10	2 or 3 or 4 Lane Divided Highway	11.0	0	0	0	5891	5946	11838
11	2 or 3 or 4 Lane Divided Highway	15.0	0	0	0	4262	4366	8628
12	2 or 3 Lane Undivided Highway	3.0	0	0	0	4865	4939	9804
13	4 or 5 Lane Undivided Highway	2.0	0	0	0	5551	5559	11111
14	2 or 3 Lane Undivided Highway	3.0	0	0	0	4828	4736	9564

Freight Performance Area Data

See the Mobility Performance Area Data section for Freight related data

Appendix D: Needs Analysis Contributing Factors and Scores

Appendix D Needs Analysis

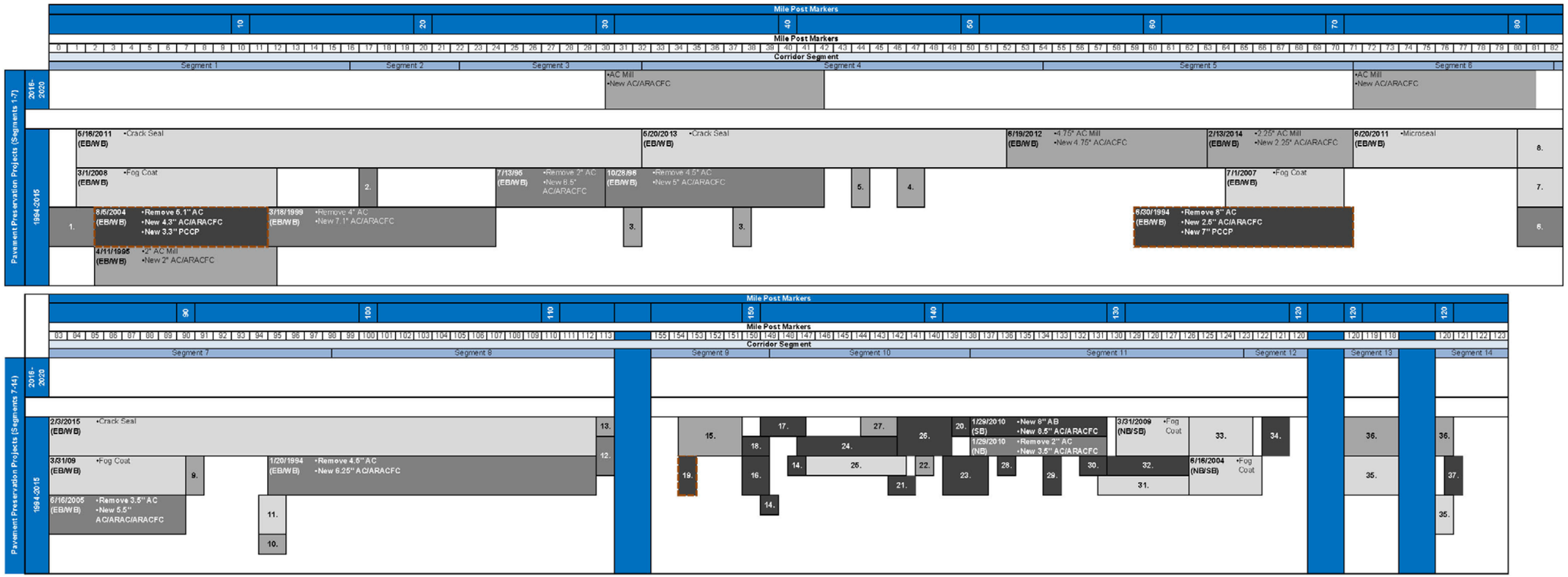
Pavement Performance Area - Needs Analysis Step 1

Segment	Segment Length (miles)	Segment Mileposts (MP)	Facility Type	Pavement Index			Directional PSR					% Pavement Failure			Initial Need
				Performance Score	Performance Objective	Level of Need	Performance Score		Performance Objective	Level of Need		Performance Score	Performance Objective	Level of Need	
							NB	SB		NB	SB				
10-1	16	0-16	Interstate	3.76	Fair or Better	None	3.93	3.96	Fair or Better	None	None	13.0%	Fair or Better	Low	Low
10-2	6	16-22	Interstate	3.61	Fair or Better	None	4.06	3.87	Fair or Better	None	None	0.0%	Fair or Better	None	None
10-3	10	22-32	Interstate	3.90	Fair or Better	None	3.97	3.88	Fair or Better	None	None	0.0%	Fair or Better	None	None
10-4	22	32-54	Interstate	3.76	Fair or Better	None	3.74	3.52	Fair or Better	None	Low	27.0%	Fair or Better	High	Low
10-5	17	54-71	Interstate	4.37	Fair or Better	None	4.16	4.22	Fair or Better	None	None	0.0%	Fair or Better	None	None
10-6	11	71-82	Interstate	3.85	Fair or Better	None	3.68	3.55	Fair or Better	None	Low	18.0%	Fair or Better	Medium	Low
10-7	16	82-98	Interstate	3.95	Fair or Better	None	3.94	3.81	Fair or Better	None	None	0.0%	Fair or Better	None	None
10-8	15	98-113	Interstate	3.95	Fair or Better	None	3.80	3.67	Fair or Better	None	None	13.0%	Fair or Better	Low	Low
85-9	6	155-149	Highway	4.01	Fair or Better	None	3.63	3.85	Fair or Better	None	None	0.0%	Fair or Better	None	None
85-10	11	149-138	Highway	3.83	Fair or Better	None	4.11	3.82	Fair or Better	None	None	14.0%	Fair or Better	Low	Low
85-11	15	138-123	Highway	3.80	Fair or Better	None	3.78	4.35	Fair or Better	None	None	22.0%	Fair or Better	Medium	Low
85-12	3	123-120	Highway	3.32	Fair or Better	None	3.21	3.42	Fair or Better	Low	None	17.0%	Fair or Better	Medium	Low
85-13	2	120-118	Highway	5.00	Fair or Better	None	5.00	5.00	Fair or Better	None	None	0.00%	Fair or Better	None	None
85-14	3	120-123	Highway	5.00	Fair or Better	None	5.00	5.00	Fair or Better	None	None	0.00%	Fair or Better	None	None
Emphasis Area?	No	Weighted Average		3.89	Fair or Better	None									

Pavement Performance Area - Needs Analysis Step 2

Segment	Segment Length (miles)	Segment Mileposts (MP)	Initial Need	Need Adjustments		Final Need	Comments (may include programmed projects or issues from previous reports)
				Hot Spots	Previous Projects (which supersede condition data)		
10-1	16	0-16	Low	EB MP 12-13, WB MP 9-10, 11-12, and 15-16	None	Low	Failure hotspots EB MP 12-13, WB MP 9-10, 11-12, and 15-16
10-2	6	16-22	None	-	None	None	No need identified
10-3	10	22-32	None	-	None	None	No need identified
10-4	22	32-54	Low	EB MP 36-37, 38-45, and 47-48. WB MP 41-42, 47-48, and 51-52	Pavement Preservation (MP 42-52) completed 2/18/16	Low	Pavement preservation project addressed some hotspots but not all. Need level remains 'Low'. Project is programmed in FY 16 will address remaining hotspots
10-5	17	54-71	None	-	None	None	No need identified
10-6	11	71-82	Low	EB MP 77-79 and WB MP 71-73	None	Low	Failure hotspots EB MP 77-79 and WB MP 71-73; Project is programmed in FY 2019 (MP 71-81) should mitigate issues
10-7	16	82-98	None	-	None	None	No need identified; 395th Ave TI programmed FY 20 (MP 96.20)
10-8	15	98-113	Low	EB MP 107-109 and 112-113. WB MP 105-106	Pavement Rehab (MP 80-112.5) completed 2/3/15	None	Pavemet rehab project addressed all issues. Need level reduced to 'None'; Desert Creek TI programmed FY 20 (MP 105.30)
85-9	6	155-149	None	-	None	None	No need identified
85-10	11	149-138	Low	SB MP 143-146	None	Low	Failure hotspots NB MP 143-146; Several intersection improvements recommended but not programmed
85-11	15	138-123	Low	NB MP 123-126 and 127-131	None	None	Pavement preservation (MP 121-131) is currently under construction and will mitigate issues. Need level reduced to 'None'
85-12	3	123-120	Low	NB MP 122-123	None	None	Pavement preservation (MP 121-131) is currently under construction and will mitigate issues. Need level reduced to 'None'
85-13	2	120-118	None	-	Pavement Preservation completed 5/5/14 for MP 117-120.25 (H800001C)	None	Limited data available for segment. Need level remains 'None' due to recently completed project
85-14	3	120-123	None	-	None	None	Limited data available for segment. Field review resulted in no identified need

Pavement History



Pavement Treatment Reference Numbers

1. **12/4/1999 (EB/WB):** 2" AC Mill, New 2.5" ARAC/ARACFC
2. **10/11/2000 (EB/WB):** New 2" AC
3. **6/10/2009 (EB/WB):** 2" AC Mill, New 2" AC/ACFC
4. **11/1/06 (EB/WB):** 4" AC Mill, New 4" AC/ARACFC
5. **10/15/2011 (EB/WB):** 3.5" AC Mill, New 3.5" AC/ACFC
6. **6/16/2005 (EB/WB):** 3.5" AC Mill, New 5.5" AC/ARAC/ARACFC
7. **3/31/09 (EB/WB):** Fog Coat
8. **2/3/2015 (EB/WB):** Crack Seal
9. **1/20/1994 (EB/WB):** 1.75" AC Mill, New 1.75" AC/ARACFC
10. **11/5/2008 (WB):** 2" AC Mill, New 2" AC/ACFC
11. **5/16/2011 (EB/WB):** Crack Seal
12. **6/21/1995 (EB/WB):** 3.75" AC Mill, New 6.75" AC
13. **10/27/2014 (EB):** 4" AC Mill, New 4" AC/ARACFC
14. **5/1/1995 (SB):** New 10" AB, New 8" AC/ARACFC
16. **6/18/1998 (NB/SB):** 3" AC Mill, New 2.5" AC/ARACFC
16. **6/18/1998 (NB/SB):** New 3.5" AC/ARACFC
17. **6/5/2000 (NB):** New 10" AB, New 8" AC/ACFC
18. **7/10/2003 (SB):** New 4" AB, New 8.5" AC/ARACFC
19. **9/23/2010 (NB/SB):** New 4" AB, New 13" PCCP, New 0.5" ARACFC
20. **5/31/1998 (SB):** New 7" AB, New 4" AC, Fog Coat
21. **6/15/1999 (NB):** New 4" AB, New 3.5" AC/ACFC
22. **11/13/2002 (NB):** 2.5" AC Mill, New 2.5" AC/ACFC
23. **3/17/2004 (NB/SB):** New 7" AB, New 7.5" AC/ARACFC
24. **12/15/2005 (NB):** New 5" AB, New 7.5" AC/ARACFC
25. **12/15/2005 (SB):** 1" AC Mill, New 0.5" ARACFC
26. **11/26/2008 (NB/SB):** New 8" AB, New 4" AC/ARACFC
27. **9/23/2010 (SB):** 3" AC Mill, New 3" AC/ACFC
28. **6/15/1999 (SB):** New 4" AB, New 3.5" AC/ACFC
29. **4/11/2000 (NB/SB):** New 4" AB, New 3.5" AC/ACFC
30. **4/11/2000 (NB):** New 4" AB, New 3.5" AC/ACFC
31. **8/9/2005 (NB):** 1" AC Mill, New 0.5" ARACFC
32. **8/9/2005 (SB):** New 9" AB, New 7.5" AC/ARACFC
33. **10/13/2005 (NB/SB):** 1" AC Mill, New 0.5" ARACFC
34. **4/11/2000 (NB/SB):** New 4" AB, New 4" AC/ACFC
35. **7/13/2009 (EB/WB):** Slurry Seal
36. **5/5/2014 (EB/WB):** 3" AC Mill, New 3" AC, Fog Coat
37. **8/29/2012 (EB/WB):** New 9" AB, New 7" AC/ARACFC

Legend

- New Paving or Reconstruction
- Mill and Overlay (Adding Structural Thickness)
- Mill and Replace (No Change Structural Thickness)
- Fog Coat or Thin Overlay Treatments
- PCCP Pavement Border
- AC Pavement Border

Pavement Performance Area - Needs Analysis Step 3

Segment	Segment Length (miles)	Segment Mileposts (MP)	Final Need	Bid History Investment	PeCos History Investment	Resulting Historical Investment	Contributing Factors and Comments
10-1	16	0-16	Low	High	Low	High	Failure hotspots EB MP 12-13, WB MP 9-10, 11-12, and 15-16; Historical investment is high; No programmed projects identified
10-2	6	16-22	None	Medium	Low	Medium	
10-3	10	22-32	None	Medium	Medium	Medium	
10-4	22	32-54	Low	Low	High	Medium	Failure hotspots EB MP 36-37, 38-45, and 47-48. WB MP 41-42, 47-48, and 51-52; 27% of segment has pavement failure; Historical investment level increased to medium based on PeCos investement; Project is programmed for FY 16 (MP 30-42) should mitigate issues
10-5	17	54-71	None	High	Low	High	No identified need, historical investement is high
10-6	11	71-82	Low	Low	Low	Low	Failure hotspots: EB MP 77-79 and WB MP 71-73; Historical investement level is low; Project is programmed in FY 19 (MP 71-81) should mitigate issues
10-7	16	82-98	None	Medium	Medium	Medium	395th Ave TI construction programmed FY 20
10-8	15	98-113	None	Medium	Low	Medium	Failure hotspots EB MP 107-109 and 112-113, WB MP 105-106 have been addressed by recent pavement preservation project; Desert Creek TI construction programmed FY 20
85-9	6	155-149	None	Low	Low	Low	
85-10	11	149-138	Low	Low	Low	Low	Failure hotspots SB MP 143-146; Several intersection projects recommended but nothing programmed
85-11	15	138-123	None	Low	High	Medium	Failure hotspots NB MP 123-126 and 127-131 have been addressed by recent pavement preservation project
85-12	3	123-120	None	Low	Medium	Low	Failure hotspots NB MP 122-123 have been addressed by recent pavement preservation project
85-13	2	120-118	None	Low	Low	Low	Limited data available for segment. Need level remains 'None' due to recently completed project
85-14	3	120-123	None	Low	Low	Low	Limited data available for segment. Field review resulted in no identified need

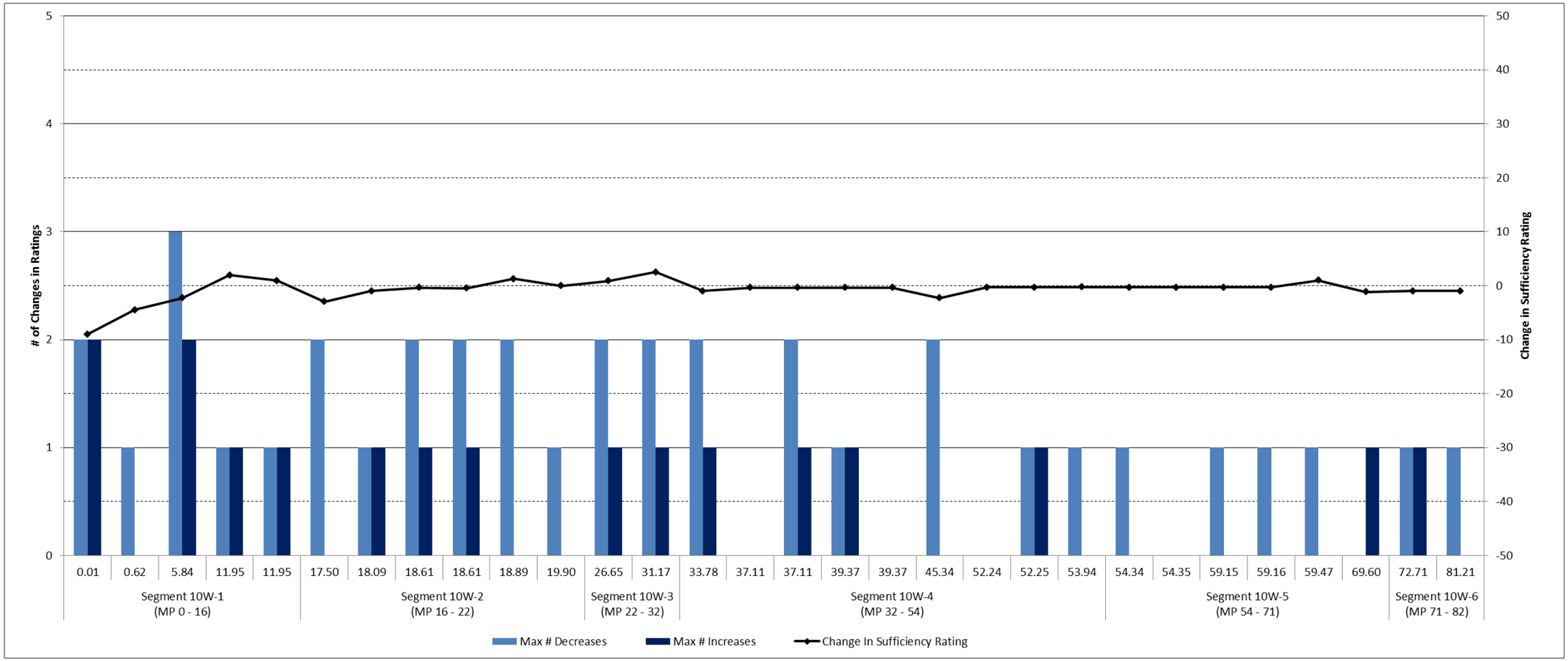
Bridge Performance Area - Needs Analysis Step 1

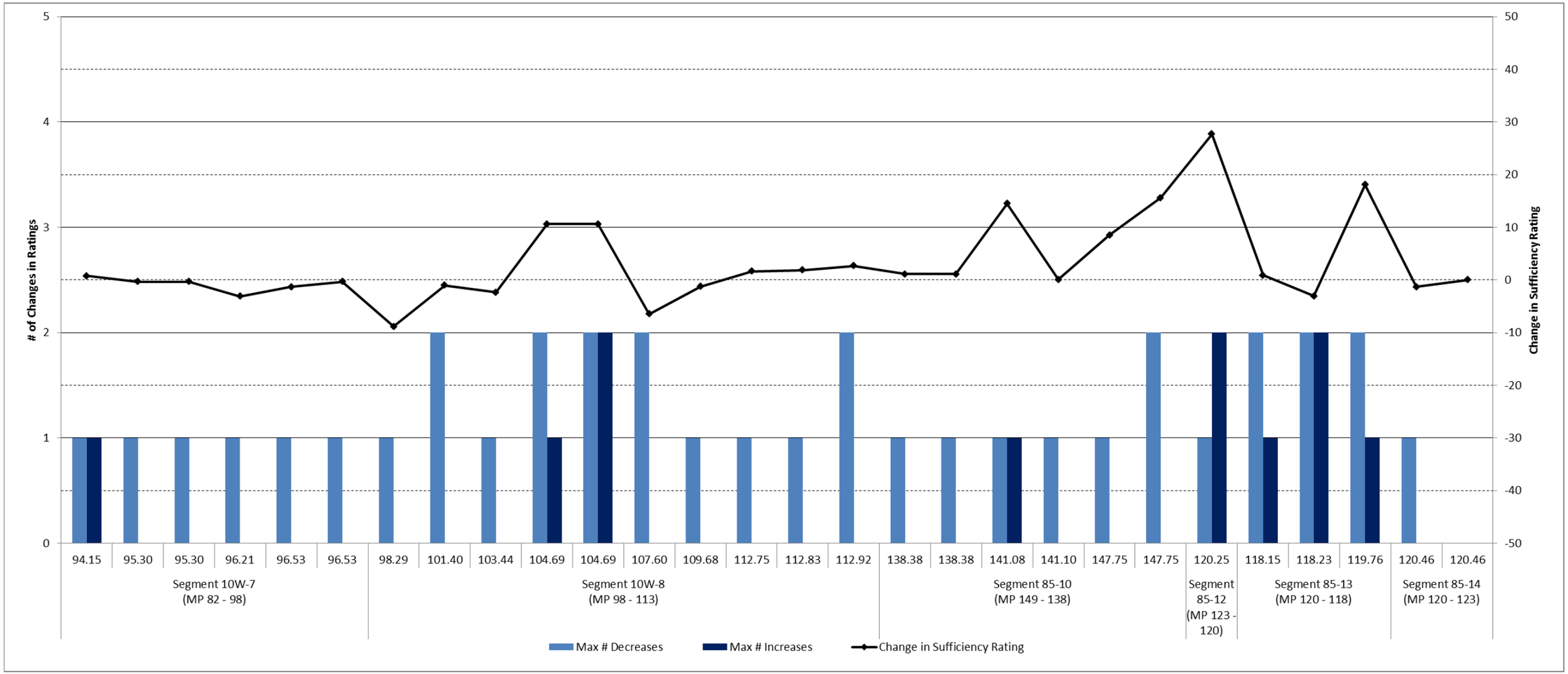
Segment	Segment Length (miles)	Segment Mileposts (MP)	Number of Bridges in Segment	Bridge Index			Bridge Rating			Bridge Sufficiency			% Functionally Obsolete Bridges			Initial Need
				Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	
10-1	16	0-16	5	5.11	Fair or Better	Medium	5	Fair or Better	Low	67.26	Fair or Better	Low	5.8%	Fair or Better	None	Medium
10-2	6	16-22	6	5.92	Fair or Better	Low	5	Fair or Better	Low	95.30	Fair or Better	None	9.0%	Fair or Better	None	Low
10-3	10	22-32	2	6.00	Fair or Better	None	6	Fair or Better	None	87.89	Fair or Better	None	36.8%	Fair or Better	Medium	Low
10-4	22	32-54	9	6.50	Fair or Better	None	5	Fair or Better	Low	97.22	Fair or Better	None	0.0%	Fair or Better	None	Low
10-5	17	54-71	6	6.48	Fair or Better	None	6	Fair or Better	None	98.35	Fair or Better	None	0.0%	Fair or Better	None	None
10-6	11	71-82	2	7.00	Fair or Better	None	7	Fair or Better	None	97.41	Fair or Better	None	0.0%	Fair or Better	None	None
10-7	16	82-98	6	6.25	Fair or Better	None	6	Fair or Better	None	97.70	Fair or Better	None	0.0%	Fair or Better	None	None
10-8	15	98-113	10	6.71	Fair or Better	None	5	Fair or Better	Low	96.12	Fair or Better	None	0.0%	Fair or Better	None	Low
85-9	6	155-149	0	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	None
85-10	11	149-138	6	6.53	Fair or Better	None	6	Fair or Better	None	99.47	Fair or Better	None	0.0%	Fair or Better	None	None
85-11	15	138-123	0	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	None
85-12	3	123-120	1	5.00	Fair or Better	Medium	5	Fair or Better	Low	83.40	Fair or Better	None	0.0%	Fair or Better	None	Medium
85-13	2	120-118	4	5.21	Fair or Better	Medium	5	Fair or Better	Low	89.61	Fair or Better	None	0.0%	Fair or Better	None	Medium
85-14	3	120-123	2	6.86	Fair or Better	None	6	Fair or Better	None	94.25	Fair or Better	None	0.0%	Fair or Better	None	None
Emphasis Area?	No	Weighted Avg		5.40	Fair or Better	Medium										

Bridge Performance Area - Needs Analysis Step 2

Segment	Segment Length (miles)	Segment Mileposts (MP)	Number of Bridges in Segment	Initial Need	Need Adjustments		Final Need	Historical Review	# Functionally Obsolete Bridges	Comments
					Hot Spots (Rating of 4 or multiple 5's)	Previous Projects (which supersede condition data)				
10-1	16	0-16	5	Medium	None	-	Medium	**Tom Wells Rd TI UP (#767) MP 5.84**	1	Ehrenberg Bridge (Sub and Sturctural Evaluation), Poston Rd TI UP (Deck), Tom Wells Rd TI UP (Deck); No programmed projects
10-2	6	16-22	6	Low	None	-	Low	None	1	West Quartzsite TI UP (Deck), SR 95 UP (Deck); West Quartzsite TI Improvments programmed FY 16
10-3	10	22-32	2	Low	None	-	Low	None	1	No programmed projects
10-4	22	32-54	9	Low	None	-	Low	None	0	Vicksburg Rd TI UP (Deck); No programmed projects
10-5	17	54-71	6	None	None	-	None	None	0	
10-6	11	71-82	2	None	None	-	None	None	0	
10-7	16	82-98	6	None	None	-	None	None	0	
10-8	15	98-113	10	Low	None	-	Low	None	0	Oglesby Rd Ramp B UP (Deck)
85-9	6	155-149	0	None	None	-	None	None	0	New Bridge Construction at Warner Street (MP 153) Programmed for FY 20
85-10	11	149-138	6	None	None	-	None	None	0	
85-11	15	138-123	0	None	None	-	None	None	0	
85-12	3	123-120	1	Medium	None	-	Medium	None	0	Gillespie Canal Br (Structural Evaluation); No programmed projects
85-13	2	120-118	4	Medium	None	-	Medium	None	0	Wash Bridge (Sturctural Evaluation), E Gila Bend TI UP (Deck), Sand Tank Wash Br (Structural Evaluation); No programmed projects
85-14	3	120-123	2	None	None	-	None	None	0	

Bridge History

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3
2
1
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# of Changes in Ratings
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40
30
20
10
0
-10
-20
-30
-40
-50
Change in Sufficiency Rating
94.15
95.30
95.30
96.21
96.53
96.53
98.29
101.40
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104.69
104.69
107.60
109.68
112.75
112.83
112.92
138.38
138.38
141.08
141.10
147.75
147.75
120.25
118.15
118.23
119.76
120.46
120.46
Segment 10W-7 (MP 82 - 98)
Segment 10W-8 (MP 98 - 113)
Segment 85-10 (MP 149 - 138)
Segment 85-12 (MP 123 - 120)
Segment 85-13 (MP 120 - 118)
Segment 85-14 (MP 120 - 123)
Max # Decreases
Max # Increases
Change in Sufficiency Rating

Bridge Performance Area - Needs Analysis Step 3

Segment	Segment Length (Miles)	Segment Mileposts (MP)	Number of Bridges in Segment	# Functionally Obsolete Bridges	Final Need	Contributing Factors			Comments
						Bridge	Current Ratings	Historical Review	
10-1	16	0-16	5	1	Medium	**Ehrenberg Bridge (#619) MP 1.01**	Current Sub Rating 5 and Evaluation Rating of 5	This structure was not identified in historical review	Not considered a hotspot due to Evaluation rating
						Poston Rd TI UP (#1704) MP 0.62	Current Deck Rating 5	This structure was not identified in historical review	
						Tom Wells Rd TI UP (#767) MP 5.84	Current Deck Rating 5	Could have a repetitive investment issue	
10-2	6	16-22	6	1	Low	**West Quartzsite TI UP (#826) MP 17.50**	Current Deck rating 5	This structure was not identified in historical review	
						SR 95 UP (#1451) MP 18.89	Current Deck Rating 5	This structure was not identified in historical review	
10-3	10	22-32	2	1	Low	**No bridges with current ratings less than 6 or identified for historical review**			Percentage of functionally obsolete bridges in segment cause 'low' bridge need score
10-4	22	32-54	9	0	Low	**Vicksburg Rd TI UP (#1207) MP 45.34**	Current Deck Rating 5	This structure was not identified in historical review	
10-5	17	54-71	6	0	None	**No bridges with current ratings less than 6 or identified for historical review**			
10-6	11	71-82	2	0	None	**No bridges with current ratings less than 6 or identified for historical review**			
10-7	16	82-98	6	0	None	**No bridges with current ratings less than 6 or identified for historical review**			
10-8	15	98-113	10	0	Low	**Oglesby Rd Ramp B UP (#1725) MP 112.75**	Current Deck Rating 5	This structure was not identified in historical review	
85-9	6	155-149	0	0	None	**N/A**			
85-10	11	149-138	6	0	None	**No bridges with current ratings less than 6 or identified for historical review**			
85-11	15	138-123	0	0	None	**N/A**			
85-12	3	123-120	1	0	Medium	**Gillespie Canal Br (#465) MP 120.25**	Current Structural Evaluation rating 5	This structure was not identified in historical review	Only bridge in segment 12. Structural evaluation rating of 5 causes 'medium' need score
85-13	2	120-118	4	0	Medium	**Wash Bridge (#443) MP 118.15**	Current Structural Evaluation rating 5	This structure was not identified in historical review	
						E Gila Bend TI UP (#1345) MP 119.42	Current Deck Rating 5	This structure was not identified in historical review	
						Sand Tank Wash Br (#444) MP 119.76	Current Structural Evaluation rating 5	This structure was not identified in historical review	
85-14	3	120-123	2	0	None	**No bridges with current ratings less than 6 or identified for historical review**			

Mobility Performance Area - Needs Analysis Step 1

Segment	Segment Mileposts	Segment Length (miles)	Environment Type	Facility Operation	Mobility Index			Future Daily V/C			Existing Peak Hour V/C					Closure Extent (occurrences/year/mile)				
					Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score		Performance Objective	Level of Need		Performance Score		Performance Objective	Level of Need	
											NB/WB	EB/SB		NB/WB	EB/SB	NB/WB	EB/SB		NB/SB	EB/SB
10-1	0-16	16	Rural	Uninterrupted	0.27	Fair or Better	None	0.30	Fair or Better	None	0.28	0.28	Fair or Better	None	None	0.30	0.05	Fair or Better	None	None
10-2	16-22	6	Rural	Uninterrupted	0.30	Fair or Better	None	0.32	Fair or Better	None	0.29	0.29	Fair or Better	None	None	0.23	0.03	Fair or Better	None	None
10-3	22-32	10	Rural	Uninterrupted	0.27	Fair or Better	None	0.29	Fair or Better	None	0.28	0.28	Fair or Better	None	None	0.08	0.18	Fair or Better	None	None
10-4	32-54	22	Rural	Uninterrupted	0.31	Fair or Better	None	0.34	Fair or Better	None	0.34	0.34	Fair or Better	None	None	0.14	0.11	Fair or Better	None	None
10-5	54-71	17	Rural	Uninterrupted	0.29	Fair or Better	None	0.32	Fair or Better	None	0.29	0.29	Fair or Better	None	None	0.13	0.28	Fair or Better	None	None
10-6	71-82	11	Rural	Uninterrupted	0.29	Fair or Better	None	0.32	Fair or Better	None	0.31	0.27	Fair or Better	None	None	0.24	0.36	Fair or Better	None	Low
10-7	82-98	16	Rural	Uninterrupted	0.32	Fair or Better	None	0.36	Fair or Better	None	0.34	0.29	Fair or Better	None	None	0.40	0.11	Fair or Better	Low	None
10-8	98-113	15	Rural	Uninterrupted	0.53	Fair or Better	None	0.70	Fair or Better	Medium	0.35	0.34	Fair or Better	None	None	0.12	0.11	Fair or Better	None	None
85-9	155-149	6	Urban	Uninterrupted	0.30	Fair or Better	None	0.39	Fair or Better	None	0.18	0.18	Fair or Better	None	None	0.07	0.77	Fair or Better	None	High
85-10	149-138	11	Rural	Uninterrupted	0.23	Fair or Better	None	0.28	Fair or Better	None	0.16	0.15	Fair or Better	None	None	0.25	0.00	Fair or Better	None	None
85-11	138-123	15	Rural	Uninterrupted	0.17	Fair or Better	None	0.20	Fair or Better	None	0.09	0.09	Fair or Better	None	None	0.13	0.03	Fair or Better	None	None
85-12	123-120	3	Rural	Interrupted	0.92	Fair or Better	High	1.11	Fair or Better	High	0.56	0.56	Fair or Better	None	None	0.27	0.07	Fair or Better	None	None
85-13	120-118	2	Urban	Interrupted	0.32	Fair or Better	None	0.35	Fair or Better	None	0.25	0.25	Fair or Better	None	None	*No Data*	*No Data*	Fair or Better	N/A	N/A
85-14	120-123	3	Urban	Interrupted	1.01	Fair or Better	High	1.24	Fair or Better	High	0.67	0.66	Fair or Better	None	None	*No Data*	*No Data*	Fair or Better	N/A	N/A

Segment	Segment Mileposts	Segment Length (miles)	Environment Type	Facility Operation	Directional TTI (all vehicles)					Directional PTI (all vehicles)					Bicycle Accommodation			Initial Need
					Performance Score		Performance Objective	Level of Need		Performance Score		Performance Objective	Level of Need		Performance Score	Performance Objective	Level of Need	
					NB/WB	EB/SB		NB/WB	EB/SB	NB/WB	EB/SB		NB/SB	EB/SB				
10-1	0-16	16	Rural	Uninterrupted	1.20	1.17	Fair or Better	None	None	1.57	1.54	Fair or Better	High	Medium	100%	Fair or Better	None	Low
10-2	16-22	6	Rural	Uninterrupted	1.13	1.10	Fair or Better	None	None	1.30	1.25	Fair or Better	None	None	100%	Fair or Better	None	None
10-3	22-32	10	Rural	Uninterrupted	1.15	1.10	Fair or Better	None	None	1.34	1.24	Fair or Better	None	None	99%	Fair or Better	None	None
10-4	32-54	22	Rural	Uninterrupted	1.11	1.09	Fair or Better	None	None	1.24	1.23	Fair or Better	None	None	100%	Fair or Better	None	None
10-5	54-71	17	Rural	Uninterrupted	1.11	1.08	Fair or Better	None	None	1.27	1.20	Fair or Better	None	None	100%	Fair or Better	None	None
10-6	71-82	11	Rural	Uninterrupted	1.10	1.09	Fair or Better	None	None	1.21	1.23	Fair or Better	None	None	100%	Fair or Better	None	Low
10-7	82-98	16	Rural	Uninterrupted	1.10	1.10	Fair or Better	None	None	1.24	1.23	Fair or Better	None	None	100%	Fair or Better	None	Low
10-8	98-113	15	Rural	Uninterrupted	1.11	1.10	Fair or Better	None	None	1.25	1.25	Fair or Better	None	None	100%	Fair or Better	None	Low
85-9	155-149	6	Urban	Uninterrupted	1.00	1.05	Fair or Better	None	None	1.32	1.76	Fair or Better	None	High	88%	Fair or Better	None	Low
85-10	149-138	11	Rural	Uninterrupted	1.07	1.00	Fair or Better	None	None	1.83	1.07	Fair or Better	High	None	100%	Fair or Better	None	Low
85-11	138-123	15	Rural	Uninterrupted	1.01	1.09	Fair or Better	None	None	1.16	1.84	Fair or Better	None	High	94%	Fair or Better	None	Low
85-12	123-120	3	Rural	Interrupted	1.00	1.19	Fair or Better	None	None	1.00	3.19	Fair or Better	None	None	32%	Fair or Better	High	High
85-13	120-118	2	Urban	Interrupted	1.85	1.47	Fair or Better	Medium	None	72.41	4.26	Fair or Better	High	Low	47%	Fair or Better	High	Low
85-14	120-123	3	Urban	Interrupted	1.28	1.89	Fair or Better	None	Medium	9.05	4.25	Fair or Better	High	Low	42%	Fair or Better	High	High

Mobility Performance Area - Needs Analysis Step 2

Segment	Segment Mileposts (MP)	Segment Length (miles)	Initial Need	Need Adjustments Recent Projects Since 2013	Final Need	Planned and Programmed Future Projects
10-1	0-16	16	Low	Ehrenberg POE Improvements under construction	Low	Planned: - Widen the mainline to six lanes, I-10 Multimodal Corridor Profile Study - Poston Rd TI (MP 1) - La Paz Transportation Study - Ehrenberg Rest Area Improvements (MP 4) - AZ Statewide Rest Areas Study - Tom Wells Rd TI (MP 5), Dome Rock Rd TI (MP 11) - I-10 Multimodal Corridor Profile Study
10-2	16-22	6	None	None	None	Programmed: - West Quartzsite TI Improvments FY 16 Planned: - Widen the mainline to six lanes - I-10 Multimodal Corridor Profile Study - Riggles Avenue TI (MP 19) - I-10 Mulitmodal Corridor Profile Study
10-3	22-32	10	None	None	None	Planned: - Widen the mainline to six lanes - I-10 Multimodal Corridor Profile Study - Gold Nugget Rd TI (MP 26), US 60 T (MP 31) - I-10 Mulitmodal Corridor Profile Study
10-4	32-54	22	None	Bouse Wash Rest Area Rehab at MP 52.0	None	Planned: - Widen the mainline to six lanes I-10 Multimodal Corridor Profile Study - Harquahala/Hovatter Rd TI (MP 53) - La Paz County Comprehensive Plan
10-5	54-71	17	None	None	None	Planned: - Widen the mainline to six lanes - I-10 Multimodal Corridor Profile Study
10-6	71-82	11	Low	None	Low	Planned: - Widen the mainline to six lanes - I-10 Multimodal Corridor Profile Study - Salome Rd TI (MP 81) - I-10 Multimodal Corridor Profile Study
10-7	82-98	16	Low	Burnt Wells Rest Area Rehab at MP 86.0	Low	Programmed: - 395th Ave TI (MP 96) - RTP FY 20 Planned: - Widen the mainline to eight lanes plus HOV - Key Commerce Corridors - 459th Ave TI (MP 88), 443rd Ave TI (MP 90), 427th Ave TI (MP 92) - BQAZ - 379th Ave Signalized TI (MP 98) - BQAZ
10-8	98-113	15	Low	None	Low	Programmed: - Desert Creek Parkway TI (MP 105) - RTP FY 20 Planned: - Widen the mainline to eight lanes plus HOV - Key Commerce Corridors - System Interchange I-10 to Hassayampa Freeway (MP 100), I-10/SR 85 System TI (MP 112) - BQAZ - 347th Ave TI (MP 102), Johnson Rd TI (MP 107), Wilson Rd TI (MP 110) - BQAZ
85-9	155-149	6	Low	None	Low	Programmed: - Warner Street Bridge (MP 153) - RTP FY 20 Planned: - Widen SR 85 to six lane freeway - MAG 2035 RTP - TI improvements at Lower Buckeye Rd (MP 154), Broadway Rd (MP 153), Southern Ave (MP 152), Baseline Rd (MP 151), MC-85 (MP 150.5), Hazen Rd (MP 149) - SR 85 Access Management Study - NB/SB DMS (MP 152/153) - AZ Statewide DMS Plan
85-10	149-138	11	Low	None	Low	Planned: - Widend SR 85 to six lane freeway - MAG 2035 RTP - TI improvements at Robbins Butte (MP 147), Riggs Rd (MP 140) - SR 85 Access Management Study - Buckey Hills TI (MP 144), Patterson Rd TI (MP 138) - BQAZ - Hassayampa Freeway Interchange (MP 141) - BQAZ
85-11	138-123	15	Low	None	Low	Planned: - Widen SR 85 to six lane freeway - MAG 2035 RTP - TI Improvements at MP 136, Woods Rd (MP 134), MP 133, Pierpont Rd (MP 131), Gila Mountain Rd (MP 128) - BQAZ - Watermelon Rd At-Grade Crossing (MP 123) - SR 85 Access Management Study
85-12	123-120	3	High	None	High	Planned: - Widen SR 85 to six lane freeway - MAG 2035 RTP - Construct 4 lane freeway facility to I-8 interchange - DCR - De Anza Scenic Way TI (MP 122) - BQAZ - Gila Bend Access Rd At-Grade Crossing (MP 121.68) - DCR - Maricopa Rd At-Grade Crossing (MP 120.68) - SR 85 Access Management Study - SB DMS (MP 120) - AZ Statewide DMS Plan
85-13	120-118	2	Low	None	Low	Planned: Construct 4 lane freeway facility to I-8 interchange - DCR
85-14	120-123	3	High	None	High	Planned: Construct 4 lane freeway facility to I-8 interchange - DCR I-8 System Interchange - MAG 2035 RTP

Mobility Performance Area - Needs Analysis Step 3

Segment	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Roadway Variables								Traffic Variables					Relevant Mobility Related Existing Infrastructure
				Functional Classification	Environmental Type (Urban/Rural)	Terrain	# of Lanes/ Direction	Speed Limit	Aux Lanes	Divided/ Non-Divided	% No Passing	Existing LOS	Future 2035 LOS	% Trucks	NB Buffer Index (PTI-TTI)	SB Buffer Index (PTI-TTI)	
10-1	0-16	16	Low	Interstate	Rural	Level	2	72.2	No	Divided	0%	A/B	A/B	26%	0.37	0.37	Ehrenberg Port of Entry; DMS EB MP 15.6
10-2	16-22	6	None	Interstate	Rural	Level	2	75	No	Divided	0%	A/B	A/B	26%	0.17	0.15	None
10-3	22-32	10	None	Interstate	Rural	Level	2	75	No	Divided	0%	A/B	A/B	26%	0.19	0.14	None
10-4	32-54	22	None	Interstate	Rural	Level	2	75	No	Divided	0%	A/B	A/B	25%	0.13	0.14	DMS EB MP 49.4
10-5	54-71	17	None	Interstate	Rural	Level	2	75	No	Divided	0%	A/B	A/B	26%	0.16	0.12	None
10-6	71-82	11	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A/B	A/B	26%	0.11	0.14	None
10-7	82-98	16	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A/B	A/B	26%	0.14	0.13	None
10-8	98-113	15	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A/B	A/B	26%	0.14	0.15	DMS EB MP 110.3
85-9	155-149	6	Low	State Highway	Fringe Urban	Level	2	52.7	No	Divided	0%	A-C	A-C	19%	0.32	0.71	Railroad Crossing at MP 151
85-10	149-138	11	Low	State Highway	Rural	Level	2	65	No	Divided	0%	A/B	A/B	21%	0.76	0.07	None
85-11	138-123	15	Low	State Highway	Rural	Level	2	65	No	Divided	0%	A/B	A/B	26%	0.15	0.75	None
85-12	123-120	3	High	State Highway	Rural	Level	1	43.2	No	Non-Divided	50%	A/B	A/B	22%	0.00	2.00	None
85-13	120-118	2	Low	State Highway	Fringe Urban	Level	2	35	No	Non-Divided	0%	A-C	A-C	7%	70.56	2.79	Arterial roadway for Gila Bend
85-14	120-123	3	High	State Highway	Fringe Urban	Level	1	49.5	No	Non-Divided	10%	A-C	A-C	15%	7.77	2.36	None

Mobility Performance Area - Needs Analysis Step 3 (Continued)

Segment	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Closure Extent							Non-Actionable Conditions	Programmed and Planned Projects or Issues from Previous Documents Relevant to Final Need	Contributing Factors
				Total Number of Closures	# Incidents/ Accidents	% Incidents/ Accidents	# Obstructions/ Hazards	% Obstructions/ Hazards	# Weather Related	% Weather Related			
10-1	0-16	16	Low	14	14	100%	0	0%	0	0%	Ehrenberg POE at AZ/CA Border	Planned: - Widen the mainline to six lanes - Poston Rd TI (MP 1) - Ehrenberg Rest Area Improvements (MP 4) - Tom Wells Rd TI (MP 5), Dome Rock Rd TI (MP 11)	- Ehrenberg POE at AZ/CA boder resulting in high PTI values - 100% of closures due to incidents
10-2	16-22	6	None	6	6	100%	0	0%	0	0%	None	Programmed: - West Quartzsite TI Improvments FY 16 Planned: - Widen the mainline to six lanes - Riggles Avenue TI (MP 19)	- No identified need
10-3	22-32	10	None	13	13	100%	0	0%	0	0%	None	Planned: - Widen the mainline to six lanes - Gold Nugget Rd TI (MP 26), US 60 T (MP 31)	- No identified need - 100% of closures due to incidents
10-4	32-54	22	None	25	25	100%	0	0%	0	0%	None	Planned: - Widen the mainline to six lanes - Harquahala/Hovatter Rd TI (MP 53)	- No identified need - 100% of closures due to incidents
10-5	54-71	17	None	19	19	100%	0	0%	0	0%	None	Planned: - Widen the mainline to six lanes	- No identified need - 100% of closures due to incidents
10-6	71-82	11	Low	16	16	100%	0	0%	0	0%	None	Planned: - Widen the mainline to six lanes - Salome Rd TI (MP 81)	- Low level of closure frequency in EB direction - 100% of closures due to indcidents
10-7	82-98	16	Low	25	25	100%	0	0%	0	0%	None	Programmed: - 395th Ave TI (MP 96) - RTP FY 20 Planned: - Widen the mainline to eight lanes plus HOV - 459th Ave TI (MP 88), 443rd Ave TI (MP 90), 427th Ave TI (MP 92) - 379th Ave Signalized TI (MP 98)	- Low level of closure frequency in WB direction - 100% of closures due to indcidents
10-8	98-113	15	Low	17	17	100%	0	0%	0	0%	None	Programmed: - Desert Creek Parkway TI (MP 105) - RTP FY 20 Planned: - Widen the mainline to eight lanes plus HOV - System Interchange I-10 to Hassayampa Freeway (MP 100), I-10/SR 85 System TI (MP 112) - 347th Ave TI (MP 102), Johnson Rd TI (MP 107), Wilson Rd TI (MP 110)	- Elevated future daily V/C - 100% of closures due to incidents
85-9	155-149	6	Low	24	24	100%	0	0%	0	0%	None	Programmed: - Warner Street Bridge (MP 153) - RTP FY 20 Planned: - Widen SR 85 to six lane freeway - TI improvements at Lower Buckeye Rd (MP 154), Broadway Rd (MP 153), Southern Ave (MP 152), Baseline Rd (MP 151), MC-85 (MP 150.5), Hazen Rd (MP 149)	- SB closure frequecy elevated, 100% due to incidents - Elevated PTI in SB direction causing increased SB buffer index score - At-grade railroad crossing at MP 151

												- NB/SB DMS (MP 152/153)	
85-10	149-138	11	Low	4	4	100%	0	0%	0	0%	None	Planned: - Widend SR 85 to six lane freeway - TI improvements at Robbins Butte (MP 147), Riggs Rd (MP 140) - Buckey Hills TI (MP 144), Patterson Rd TI (MP 138) - Hassayampa Freeway Interchange (MP 141)	- Elevated NB PTI causing increased NB buffer index score
85-11	138-123	15	Low	3	3	100%	0	0%	0	0%	None	Planned: - Widen SR 85 to six lane freeway - TI Improvements at MP 136, Woods Rd (MP 134), MP 133, Pierpont Rd (MP 131), Gila Mountain Rd (MP 128) - Watermelon Rd At-Grade Crossing (MP 123)	- Elevated SB PTI causing increased SB buffer index score
85-12	123-120	3	High	4	4	100%	0	0%	0	0%	None	Planned: - Widen SR 85 to six lane freeway - Construct 4 lane freeway facility to I-8 interchange - De Anza Scenic Way TI (MP 122) - Gila Bend Access Rd At-Grade Crossing (MP 121.68) - Maricopa Rd At-Grade Crossing (MP 120.68) - SB DMS (MP 120)	- Elevated mobility index score due to current and future V/C - Bicycle Accomodation showing high level of need due to shoulder widths
85-13	120-118	2	Low	0	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	None	Planned: Construct 4 lane freeway facility to I-8 interchange	- Elevated NB TTI and PTI scores, possibly due to construction staging - Arterial roadway for Main St in Gila Bend - Many at-grade access points throughout segment
85-14	120-123	3	High	0	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	None	Planned Construct 4 lane freeway facility to I-8 interchange I-8 System Interchange	- Elevated mobility index scores due to current and future V/C - Elevated TTI and PTI scores, possibly due to construction staging - Bicycle Accomodation showing high level of need due to shoulder widths

Safety Performance Area - Needs Analysis Step 1

Segment	Operating Environment	Segment Length (miles)	Segment Mileposts (MP)	Safety Index			Directional Safety Index					% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors		
				Performance Score	Performance Objective	Level of Need	NB/WB Directional Safety Index	EB/SB Directional Safety Index	Performance Objective	NB/WB Level of Need	EB/SB Level of Need	Performance Score	Performance Objective	Level of Need
10-1	Rural 4 Lane Freeway with Daily Volume < 25,000	16	0-16	0.76	Average or Better	None	1.10	0.43	Average or Better	Medium	None	58%	Average or Better	High
10-2	Rural 4 Lane Freeway with Daily Volume < 25,000	6	16-22	0.99	Average or Better	Low	1.86	0.12	Average or Better	High	None	40%	Average or Better	None
10-3	Rural 4 Lane Freeway with Daily Volume < 25,000	10	22-32	1.03	Average or Better	Low	0.87	1.20	Average or Better	None	Medium	54%	Average or Better	Medium
10-4	Rural 4 Lane Freeway with Daily Volume < 25,000	22	32-54	1.79	Average or Better	High	1.65	1.92	Average or Better	High	High	54%	Average or Better	Medium
10-5	Rural 4 Lane Freeway with Daily Volume < 25,000	17	54-71	1.60	Average or Better	High	1.12	2.08	Average or Better	Medium	High	35%	Average or Better	None
10-6	Rural 4 Lane Freeway with Daily Volume < 25,000	11	71-82	1.66	Average or Better	High	0.70	2.62	Average or Better	None	High	56%	Average or Better	High
10-7	Rural 4 Lane Freeway with Daily Volume < 25,000	16	82-98	2.60	Average or Better	High	3.72	1.48	Average or Better	High	High	40%	Average or Better	None
10-8	Rural 4 Lane Freeway with Daily Volume > 25,000	15	98-113	1.05	Average or Better	Low	0.71	1.39	Average or Better	None	Medium	50%	Average or Better	Low
85-9	2 or 3 or 4 Lane Divided Highway	6	155-149	3.12	Average or Better	High	3.20	3.05	Average or Better	High	High	Insufficient Data	Average or Better	N/A
85-10	2 or 3 or 4 Lane Divided Highway	11	149-138	0.54	Average or Better	None	0.00	1.08	Average or Better	None	Medium	Insufficient Data	Average or Better	N/A
85-11	2 or 3 or 4 Lane Divided Highway	15	138-123	0.26	Average or Better	None	0.03	0.50	Average or Better	None	None	Insufficient Data	Average or Better	N/A
85-12	2 or 3 Lane Undivided Highway	3	123-120	0.11	Average or Better	None	0.23	0.00	Average or Better	None	None	Insufficient Data	Average or Better	N/A
85-13	4 or 5 Lane Undivided Highway	2	120-118	0.17	Average or Better	None	0.35	0.00	Average or Better	None	None	Insufficient Data	Average or Better	N/A
85-14	2 or 3 Lane Undivided Highway	3	120-123	0.00	Average or Better	None	0	0	Average or Better	None	None	Insufficient Data	Average or Better	N/A

Segment	Operating Environment	Segment Length (miles)	Segment Mileposts (MP)	% of Fatal + Incapacitating Injury Crashes Involving Trucks			% of Fatal + Incapacitating Injury Crashes Involving Motorcycles			% of Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers			Initial Need
				Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	
10-1	Rural 4 Lane Freeway with Daily Volume < 25,000	16	0-16	8%	Average or Better	None	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Low
10-2	Rural 4 Lane Freeway with Daily Volume < 25,000	6	16-22	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Low
10-3	Rural 4 Lane Freeway with Daily Volume < 25,000	10	22-32	15%	Average or Better	Low	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Medium
10-4	Rural 4 Lane Freeway with Daily Volume < 25,000	22	32-54	11%	Average or Better	None	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	High
10-5	Rural 4 Lane Freeway with Daily Volume < 25,000	17	54-71	35%	Average or Better	High	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	High
10-6	Rural 4 Lane Freeway with Daily Volume < 25,000	11	71-82	17%	Average or Better	Medium	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	High
10-7	Rural 4 Lane Freeway with Daily Volume < 25,000	16	82-98	20%	Average or Better	High	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	High
10-8	Rural 4 Lane Freeway with Daily Volume > 25,000	15	98-113	19%	Average or Better	High	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Low
85-9	2 or 3 or 4 Lane Divided Highway	6	155-149	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	High
85-10	2 or 3 or 4 Lane Divided Highway	11	149-138	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Low
85-11	2 or 3 or 4 Lane Divided Highway	15	138-123	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	None
85-12	2 or 3 Lane Undivided Highway	3	123-120	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	None
85-13	4 or 5 Lane Undivided Highway	2	120-118	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	None
85-14	2 or 3 Lane Undivided Highway	3	120-123	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	Insufficient Data	Average or Better	N/A	None

Safety Performance Area - Needs Analysis Step 2

Segment	Segment Length (miles)	Segment Mileposts (MP)	Initial Need	Hot Spots	Relevant Recently Completed or Under Construction Projects (which supersede performance data)*	Final Need	Comments (may include tentatively programmed projects with potential to address need or other relevant issues identified in previous reports)
10-1	16	0-16	Low	None	Ehrenberg TI completed 10-8-14	Low	No programmed projects to address Safety Needs
10-2	6	16-22	Low	None	None	Low	West Quartzsite TI improvements programmed FY 16
10-3	10	22-32	Medium	MP 25 WB, MP 29 WB	None	Medium	No programmed projects identified to address Safety Needs
10-4	22	32-54	High	MP 49 WB, MP 35 EB, MP 37 EB, MP 42 EB	Pavement Preservation MP 42-52	High	Recent project does not reduce level of need; Pavement preservation MP 30-42 programmed FY 16
10-5	17	54-71	High	MP 61-62 EB	None	High	No programmed projects to address Safety Needs
10-6	11	71-82	High	MP 70-74 WB	None	High	Pavement preservation MP 71-81 programmed FY 19
10-7	16	82-98	High	MP 82 EB, MP 86-88 EB	None	High	395th Ave New TI programmed FY 20
10-8	15	98-113	Low	MP 107 EB, MP 109-112 EB, MP 111-112 WB	Pavement Rehab MP 80-112.5	Low	Recent project does not reduce level of need; Desert Creek Parkway TI programmed FY 20
85-9	6	155-149	High	MP 153 NB, MP 154 SB	None	High	Warner Street Bridge construction programmed FY 18
85-10	11	149-138	Low	None	None	Low	No programmed projects to address Safety Needs
85-11	15	138-123	None	None	Pavement Preservation under construction MP 121-131	None	No programmed projects to address Safety Needs
85-12	3	123-120	None	None	Pavement Preservation under construction MP 121-131	None	No programmed projects to address Safety Needs
85-13	2	120-118	None	None	Pavement Preservation MP 117-120	None	No programmed projects to address Safety Needs
85-14	3	120-123	None	None	None	None	No programmed projects to address Safety Needs

Safety Performance Area - Needs Analysis Step 3

Segment Number	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	85-9	85-10	85-11	85-12	85-13	85-14	Corridor-Wide Crash Characteristics
Segment Length (miles)	16	6	10	22	17	11	16	15	6	11	15	3	2	3	
Segment Milepost (MP)	0-16	16-22	22-32	32-54	54-71	71-82	82-98	98-113	155-149	149-138	138-123	123-120	120-118	120-123	
Final Need	Low	Low	Medium	High	High	High	High	Low	High	Low	None	None	None	None	
Segment Crash Overview	4 Crashes were fatal	2 Crashes were fatal	3 Crashes were fatal	13 Crashes were fatal	9 Crashes were fatal	6 Crashes were fatal	15 Crashes were fatal	12 Crashes were fatal	6 Crashes were fatal	2 Crashes were fatal	1 Crashes were fatal	0 Crashes were fatal	0 Crashes were fatal	0 Crashes were fatal	73 Crashes were fatal
	8 Crashes had incapacitating injuries	3 Crashes had incapacitating injuries	10 Crashes had incapacitating injuries	24 Crashes had incapacitating injuries	17 Crashes had incapacitating injuries	12 Crashes had incapacitating injuries	10 Crashes had incapacitating injuries	14 Crashes had incapacitating injuries	9 Crashes had incapacitating injuries	0 Crashes had incapacitating injuries	2 Crashes had incapacitating injuries	1 Crashes had incapacitating injuries	2 Crashes had incapacitating injuries	0 Crashes had incapacitating injuries	112 Crashes had incapacitating injuries
	1 Crashes involve trucks	1 Crashes involve trucks	2 Crashes involve trucks	4 Crashes involve trucks	9 Crashes involve trucks	3 Crashes involve trucks	5 Crashes involve trucks	5 Crashes involve trucks	2 Crashes involve trucks	0 Crashes involve trucks	0 Crashes involve trucks	0 Crashes involve trucks	0 Crashes involve trucks	0 Crashes involve trucks	32 Crashes involve trucks
	2 Crashes involve Motorcycles	0 Crashes involve Motorcycles	1 Crashes involve Motorcycles	0 Crashes involve Motorcycles	2 Crashes involve Motorcycles	1 Crashes involve Motorcycles	2 Crashes involve Motorcycles	2 Crashes involve Motorcycles	0 Crashes involve Motorcycles	0 Crashes involve Motorcycles	0 Crashes involve Motorcycles	0 Crashes involve Motorcycles	0 Crashes involve Motorcycles	0 Crashes involve Motorcycles	10 Crashes involve Motorcycles
Segment Crash Summaries (Fatal and Serious Injury Crashes): First Harmful Event Type	50% Involve Collision with Motor Vehicle	60% Involve Collision with Motor Vehicle	54% Involve Overturning	57% Involve Overturning	46% Involve Overturning	72% Involve Overturning	54% Involve Overturning	55% Involve Overturning	87% Involve Collision with Motor Vehicle	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	47% Involve Overturning
	25% Involve Collision with Fixed Object	20% Involve Overturning	38% Involve Collision with Motor Vehicle	22% Involve Collision with Motor Vehicle	35% Involve Collision with Motor Vehicle	22% Involve Collision with Motor Vehicle	17% Involve Collision with Motor Vehicle	30% Involve Collision with Motor Vehicle	13% Involve Overturning						34% Involve Collision with Motor Vehicle
	17% Involve Other Non-Collision	20% Involve Collision with Non-Fixed Object	8% Involve Other Non-Collision	14% Involve Collision with Fixed Object	12% Involve Collision with Fixed Object	6% Involve Collision with Non-Fixed Object	13% Involve Collision with Fixed Object	10% Involve Collision with Fixed Object							10% Involve Collision with Fixed Object
Collision Type	42% Involve Single Vehicle	60% Involve Rear End	61% Involve Single Vehicle	76% Involve Single Vehicle	62% Involve Single Vehicle	72% Involve Single Vehicle	67% Involve Single Vehicle	65% Involve Single Vehicle	73% Involve Angle	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	61% Involve Single Vehicle
	25% Involve Rear End	20% Involve Single Vehicle	15% Involve Rear End	24% Involve Rear End	27% Involve Rear End	22% Involve Rear End	17% Involve Other	20% Involve Rear End	13% Involve Single Vehicle						18% Involve Rear End
	25% Involve Sideswipe (same)	20% Involve Angle	15% Involve Sideswipe (same)		8% Involve Sideswipe (same)	6% Involve Head On	8% Involve Sideswipe (same)	10% Involve Other	7% Involve Left Turn						7% Involve Angle
Violation or Behavior	33% Involve Inattention/ Distraction	40% Involve Failure to Keep in Proper Lane	54% Involve Speed too Fast for Conditions	57% Involve Speed too Fast for Conditions	46% Involve Speed too Fast for Conditions	22% Involve No Improper Action	29% Involve No Improper Action	45% Involve Speed too Fast for Conditions	40% Involve Ran Stop Sign	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	35% Involve Speed too Fast for Conditions
	17% Involve No Improper Action	20% Involve No Improper Action	15% Involve Inattention/Distraction	14% Involve Unknown	15% Involve No Improper Action	22% Involve Inattention/Distraction	29% Involve Speed too Fast for Conditions	20% Involve No Improper Action	27% Involve Failure to Yield Right-of-Way						15% Involve No Improper Action
	8% Involve Speed too Fast for Conditions	20% Involve Speed too Fast for Conditions	8% Involve No Improper Action	8% Involve No Improper Action	12% Involve Inattention/Distraction	17% Involve Speed too Fast for Conditions	17% Involve Unknown	15% Involve Unknown	13% Involve Unknown						12% Involve Inattention/Distraction
Lighting Conditions	75% Occur in Daylight Conditions	80% Occur in Daylight Conditions	69% Occur in Daylight Conditions	51% Occur in Daylight Conditions	46% Occur in Daylight Conditions	61% Occur in Daylight Conditions	58% Occur in Daylight Conditions	65% Occur in Daylight Conditions	60% Occur in Daylight Conditions	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	57% Occur in Daylight Conditions
	25% Occur in Dark-Unlighted Conditions	20% Occur in Dark-Unlighted Conditions	23% Occur in Dark-Unlighted Conditions	35% Occur in Dark-Unlighted Conditions	38% Occur in Dark-Unlighted Conditions	33% Occur in Dark-Unlighted Conditions	29% Occur in Dark-Unlighted Conditions	30% Occur in Dark-Unlighted Conditions	40% Occur in Dark-Unlighted Conditions						34% Occur in Dark-Unlighted Conditions

Segment Number	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	85-9	85-10	85-11	85-12	85-13	85-14	Corridor-Wide Crash Characteristics
Segment Length (miles)	16	6	10	22	17	11	16	15	6	11	15	3	2	3	
Segment Milepost (MP)	0-16	16-22	22-32	32-54	54-71	71-82	82-98	98-113	155-149	149-138	138-123	123-120	120-118	120-123	
Final Need	Low	Low	Medium	High	High	High	High	Low	High	Low	None	None	None	None	
		0% Occur in Dawn Conditions	8% Occur in Dawn Conditions	11% Occur in Dawn Conditions	8% Occur in Dawn Conditions	6% Occur in Dawn Conditions	8% Occur in Dawn Conditions	5% Occur in Dawn Conditions							7% Occur in Dawn Conditions
Surface Conditions	100% Involve Dry Conditions	100% Involve Dry Conditions 0% Involve Wet Conditions 0% Involve Snow Conditions	85% Involve Dry Conditions 15% Involve Wet Conditions 0% Involve Snow Conditions	100% Involve Dry Conditions	100% Involve Dry Conditions	100% Involve Dry Conditions	96% Involve Dry Conditions 4% Involve Unknown Conditions	100% Involve Dry Conditions	87% Involve Dry Conditions 13% Involve Wet Conditions	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	96% Involve Dry Conditions 4% Involve Wet Conditions 1% Involve Unknown Conditions
First Unit Event	50% Involve a first unit event of Motor Vehicle in Transport 33% Involve a first unit event of Ran Off the Road (Left) 8% Involve a first unit event of Collision with Fixed Object	60% Involve a first unit event of Motor Vehicle in Transport 20% Involve a first unit event of Ran Off the Road (Left) 20% Involve a first unit event of Ran Off the Road (Right)	38% Involve a first unit event of Ran Off the Road (Left) 23% Involve a first unit event of Motor Vehicle in Transport 15% Involve a first unit event of Ran Off the Road (Right)	30% Involve a first unit event of Ran Off the Road (Left) 30% Involve a first unit event of Ran Off the Road (Right) 19% Involve a first unit event of Motor Vehicle in Transport	31% Involve a first unit event of Motor Vehicle in Transport 27% Involve a first unit event of Equipment Failure 23% Involve a first unit event of Ran Off the Road (Left)	39% Involve a first unit event of Ran Off the Road (Left) 33% Involve a first unit event of Equipment Failure 22% Involve a first unit event of Motor Vehicle in Transport	33% Involve a first unit event of Ran Off the Road (Left) 21% Involve a first unit event of Equipment Failure 13% Involve a first unit event of Ran Off the Road (Right)	30% Involve a first unit event of Ran Off the Road (Left) 30% Involve a first unit event of Motor Vehicle in Transport 20% Involve a first unit event of Equipment Failure	80% Involve a first unit event of Motor Vehicle in Transport 7% Involve a first unit event of Ran Off the Road (Left) 7% Involve a first unit event of Ran Off the Road (Right)	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	30% Involve a first unit event of Ran Off the Road (Left) 30% Involve a first unit event of Motor Vehicle in Transport 17% Involve a first unit event of Equipment Failure
Driver Physical Condition	42% No Apparent Influence 33% Unknown 17% Fatigued/Fell Asleep	60% Unknown 20% Under the Influence of Drugs or Alcohol 20% Fatigued/Fell Asleep	69% No Apparent Influence 23% Unknown 8% Under the Influence of Drugs or Alcohol	51% No Apparent Influence 24% Fatigued/Fell Asleep 11% Under the Influence of Drugs or Alcohol	50% No Apparent Influence 27% Unknown 15% Fatigued/Fell Asleep	39% No Apparent Influence 39% Unknown 11% Under the Influence of Drugs or Alcohol	50% Unknown 33% No Apparent Influence 8% Under the Influence of Drugs or Alcohol	60% No Apparent Influence 25% Unknown 10% Under the Influence of Drugs or Alcohol	47% No Apparent Influence 40% Unknown 7% Under the Influence of Drugs or Alcohol	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	46% No Apparent Influence 30% Unknown 12% Fatigued/Fell Asleep
Safety Device Usage	50% Shoulder And Lap Belt Used 25% Air Bag Deployed/Shoulder-Lap Belt 17% Helmet Used	40% Air Bag Deployed/Shoulder-Lap Belt 20% Shoulder And Lap Belt Used 20% None Used	54% Shoulder And Lap Belt Used 23% None Used 8% Helmet Used	68% Shoulder And Lap Belt Used 19% None Used 14% Air Bag Deployed/Shoulder-Lap Belt	69% Shoulder And Lap Belt Used 15% None Used 8% Helmet Used	72% Shoulder And Lap Belt Used 11% None Used 6% Helmet Used	71% Shoulder And Lap Belt Used 13% None Used 8% Helmet Used	70% Shoulder And Lap Belt Used 20% None Used 5% Helmet Used	60% Shoulder And Lap Belt Used 40% None Used	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	N/A - Sample size too small	65% Shoulder And Lap Belt Used 16% None Used 8% Air Bag Deployed/Shoulder-Lap Belt

Freight Performance Area - Needs Analysis Step 1

Segment	Facility Operations	Segment Mileposts (MP)	Segment Length (miles)	Freight Index			Directional TTI (trucks only)					Directional PTI (trucks only)				
				Performance Score	Performance Objective	Level of Need	Performance Score		Performance Objective	Level of Need		Performance Score		Performance Objective	Level of Need	
							NB/WB	EB/SB		NB/WB	EB/SB	NB/WB	EB/SB		NB/WB	EB/SB
10-1	Uninterrupted	0-16	16	0.71	Fair or Better	Low	1.14	1.19	Fair or Better	None	None	1.36	1.46	Fair or Better	None	Medium
10-2	Uninterrupted	16-22	6	0.89	Fair or Better	None	1.05	1.04	Fair or Better	None	None	1.13	1.11	Fair or Better	None	None
10-3	Uninterrupted	22-32	10	0.89	Fair or Better	None	1.05	1.04	Fair or Better	None	None	1.14	1.10	Fair or Better	None	None
10-4	Uninterrupted	32-54	22	0.90	Fair or Better	None	1.04	1.05	Fair or Better	None	None	1.09	1.12	Fair or Better	None	None
10-5	Uninterrupted	54-71	17	0.87	Fair or Better	None	1.06	1.06	Fair or Better	None	None	1.17	1.13	Fair or Better	None	None
10-6	Uninterrupted	71-82	11	0.90	Fair or Better	None	1.06	1.05	Fair or Better	None	None	1.11	1.12	Fair or Better	None	None
10-7	Uninterrupted	82-98	16	0.88	Fair or Better	None	1.05	1.06	Fair or Better	None	None	1.13	1.15	Fair or Better	None	None
10-8	Uninterrupted	98-113	15	0.90	Fair or Better	None	1.04	1.04	Fair or Better	None	None	1.11	1.12	Fair or Better	None	None
85-9	Uninterrupted	155-149	6	0.66	Fair or Better	Medium	1.00	1.07	Fair or Better	None	None	1.40	1.64	Fair or Better	Low	High
85-10	Uninterrupted	149-138	11	0.73	Fair or Better	Low	1.11	1.00	Fair or Better	None	None	1.71	1.03	Fair or Better	High	None
85-11	Uninterrupted	138-123	15	0.65	Fair or Better	Medium	1.06	1.15	Fair or Better	None	None	1.15	1.94	Fair or Better	None	High
85-12	Interrupted	123-120	3	0.60	Fair or Better	None	1.00	1.19	Fair or Better	None	None	1.00	2.35	Fair or Better	None	None
85-13	Interrupted	120-118	2	0.14	Fair or Better	Medium	2.17	1.47	Fair or Better	Medium	None	12.08	2.59	Fair or Better	High	None
85-14	Interrupted	120-123	3	0.17	Fair or Better	Medium	1.27	1.91	Fair or Better	None	Medium	8.04	3.82	Fair or Better	High	None

Segment	Facility Operations	Segment Mileposts (MP)	Segment Length (miles)	Closure Duration (minutes/mile/year)					Bridge Clearance (feet)			Initial Need
				Performance Score		Performance Objective	Level of Need		Performance Score	Performance Objective	Level of Need	
				NB/WB	EB/SB		NB/WB	EB/SB				
10-1	Uninterrupted	0-16	16	50.47	25.03	Fair or Better	None	None	16.11	Fair or Better	Medium	Medium
10-2	Uninterrupted	16-22	6	43.57	4.80	Fair or Better	None	None	15.96	Fair or Better	Medium	Low
10-3	Uninterrupted	22-32	10	8.78	60.66	Fair or Better	None	None	16.14	Fair or Better	Medium	Low
10-4	Uninterrupted	32-54	22	35.48	136.64	Fair or Better	None	Medium	15.90	Fair or Better	Medium	Low
10-5	Uninterrupted	54-71	17	42.00	59.85	Fair or Better	None	None	16.25	Fair or Better	Low	Low
10-6	Uninterrupted	71-82	11	100.12	97.78	Fair or Better	Medium	Low	16.00	Fair or Better	Medium	Low
10-7	Uninterrupted	82-98	16	197.56	36.99	Fair or Better	High	None	16.58	Fair or Better	None	Low
10-8	Uninterrupted	98-113	15	44.39	31.35	Fair or Better	None	None	15.92	Fair or Better	Medium	Low
85-9	Uninterrupted	155-149	6	17.87	187.62	Fair or Better	None	High	No UP	Fair or Better	None	High
85-10	Uninterrupted	149-138	11	93.75	0.00	Fair or Better	Low	None	No UP	Fair or Better	None	Low
85-11	Uninterrupted	138-123	15	21.20	4.17	Fair or Better	None	None	No UP	Fair or Better	None	Medium
85-12	Interrupted	123-120	3	30.67	5.33	Fair or Better	None	None	No UP	Fair or Better	None	None
85-13	Interrupted	120-118	2	*No Data*	*No Data*	Fair or Better	N/A	N/A	16.63	Fair or Better	None	High
85-14	Interrupted	120-123	3	*No Data*	*No Data*	Fair or Better	N/A	N/A	No UP	Fair or Better	None	High

Freight Performance Area - Needs Analysis Step 2

Segment	Segment Length (miles)	Segment Mileposts (MP)	Initial Need	Truck Height Restriction Hot Spots (Clearance < 16.25')	Relevant Recently Completed or Under Construction Projects (which supersede performance data)*	Final Need	Comments (may include tentatively programmed projects with potential to address needs or other relevant issues identified in previous reports)
10-1	16	0-16	Medium	None	Ehrenberg POE Improvements under construction	Medium	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study
10-2	6	16-22	Low	None	None	Low	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study
10-3	10	22-32	Low	None	None	Low	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study
10-4	22	32-54	Low	Ramsey Mine Rd UP, #1202, MP 33.78	None	Low	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study
10-5	17	54-71	Low	None	None	Low	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study
10-6	11	71-82	Low	None	None	Low	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study
10-7	16	82-98	Low	None	None	Low	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors
10-8	15	98-113	Low	355th Ave UP, #1647, MP 101.4	None	Low	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors
85-9	6	155-149	High	None	None	High	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP NB/SB DMS (MP 152/153) - AZ Statewide DMS Plan
85-10	11	149-138	Low	None	None	Low	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP
85-11	15	138-123	Medium	None	None	Medium	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP
85-12	3	123-120	None	None	None	None	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP SB DMS (MP 120) - AZ Statewide DMS Plan
85-13	2	120-118	High	None	None	High	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors
85-14	3	120-123	High	None	None	High	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors

Freight Performance Area - Needs Analysis Step 3

Segment	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Roadway Variables								Traffic Variables					Relevant Freight Related Existing Infrastructure
				Functional Classification	Environmental Type (Urban/Rural)	Terrain	# of Lanes/ Direction	Speed Limit	Aux Lanes	Divided/ Non-Divided	% No Passing	Existing LOS	Future 2035 LOS	% Trucks	NB/EB Buffer Index (TPTI-TTTI)	SB/WB Buffer Index (TPTI-TTTI)	
10-1	0-16	16	Medium	Interstate	Rural	Level	2	72.2	No	Divided	0%	A-C	A-C	26%	0.22	0.27	Ehrenberg Port of Entry on I-10, DMS MP 15.60, Weigh-in-Motion MP 2.30
10-2	16-22	6	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A-C	A-C	26%	0.08	0.07	None
10-3	22-32	10	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A-C	A-C	26%	0.09	0.06	None
10-4	32-54	22	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A-C	A-C	26%	0.05	0.07	DMS MP 49.40
10-5	54-71	17	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A-C	A-C	26%	0.11	0.07	None
10-6	71-82	11	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A-C	A-C	26%	0.05	0.07	None
10-7	82-98	16	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A-C	A-C	26%	0.08	0.09	None
10-8	98-113	15	Low	Interstate	Rural	Level	2	75	No	Divided	0%	A-C	A-C	26%	0.07	0.08	DMS MP 110.30
85-9	155-149	6	High	State Highway	Fringe Urban	Level	2	52.7	No	Divided	0%	A-C	D	19%	0.40	0.57	None
85-10	149-138	11	Low	State Highway	Rural	Level	2	65	No	Divided	0%	A-C	A-C	21%	0.60	0.03	None
85-11	138-123	15	Medium	State Highway	Rural	Level	2	65	No	Divided	0%	A-C	A-C	26%	0.09	0.79	None
85-12	123-120	3	None	State Highway	Rural	Level	1	43.2	No	Divided	50%	A-C	A-C	22%	0.00	1.16	None
85-13	120-118	2	High	State Highway	Fringe Urban	Level	2	35	No	Divided	0%	A-C	A-C	7%	9.91	1.12	None
85-14	120-123	3	High	State Highway	Fringe Urban	Level	1	49.5	No	Divided	10%	A-C	A-C	15%	6.77	1.91	None

Freight Performance Area - Needs Analysis Step 3 (Continued)

Segment	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Closure Extent							Non-Actionable Conditions	Programmed and Planned Projects or Issues from Previous Documents Relevant to Final Need	Contributing Factors
				Total Number of Closures	# Incidents/ Accidents	% Incidents/ Accidents	# Obstructions/ Hazards	% Obstructions/ Hazards	# Weather Related	% Weather Related			
10-1	0-16	16	Medium	14	14	100%	0	0%	0	0%	None	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study	- Ehrenberg Weigh-in-motion station slows traffic as all trucks must merge in and out - Elevated TPTI scores result in elevated needs - Elevated number of closures in the WB direction
10-2	16-22	6	Low	6	6	100%	0	0%	0	0%	None	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study	- 100% of closures were related to incidents/accidents
10-3	22-32	10	Low	10	13	100%	0	0%	0	0%	None	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study	- 100% of closures were related to incidents/accidents
10-4	32-54	22	Low	22	25	100%	0	0%	0	0%	None	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study	-Ramsey Mine Rd UP cannot ramp around
10-5	54-71	17	Low	17	19	100%	0	0%	0	0%	None	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study	- 100% of closures were related to incidents/accidents
10-6	71-82	11	Low	11	16	100%	0	0%	0	0%	None	Planned: Widen mainline to six lanes - I-10 Multimodal Corridor Proflie Study	- 100% of closures were related to incidents/accidents
10-7	82-98	16	Low	16	25	100%	0	0%	0	0%	None	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors	- 100% of closures were related to incidents/accidents
10-8	98-113	15	Low	15	17	100%	0	0%	0	0%	None	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors	-355th Ave UP, #1647, MP 101.4
85-9	155-149	6	High	6	24	100%	0	0%	0	0%	None	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP NB/SB DMS (MP 152/153) - AZ Statewide DMS Plan	- Grade on the I-10 ramp at the junction slows trucks - Elevated TPTI values result in high need
85-10	149-138	11	Low	11	4	100%	0	0%	0	0%	None	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP	- 100% of closures were related to incidents/accidents
85-11	138-123	15	Medium	15	3	100%	0	0%	0	0%	None	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP	- 100% of closures were related to incidents/accidents - Elevated TPTI values result in high need
85-12	123-120	3	None	3	4	100%	0	0%	0	0%	None	Planned: Widen SR 85 to six lane freeway - MAG 2035 RTP SB DMS (MP 120) - AZ Statewide DMS Plan	- 100% of closures were related to incidents/accidents
85-13	120-118	2	High	15	0	0%	0	0%	0	0%	None	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors	-Elevated TPTI and TTTI values result in high need
85-14	120-123	3	High	3	0	0%	0	0%	0	0%	None	Planned: Widen mainline to eight lanes plus HOV - Key Commerce Corridors	- Elevated NB TPTI result in high need. May be attributed to construction activity.

Appendix E: Life-Cycle Cost Analysis and Benefit Cost Analysis

APPENDIX E: LIFE-CYCLE COST ANALYSIS

Pavement Life-Cycle Cost Analysis Worksheet

Project Details

Project title	Life-Cycle Cost Analysis for I-10 Corridor Profile Study: MP9-MP16
Route	WB I-10, Segment CS10W.1
Milepost begin	9
Milepost end	16

Existing Roadway Characteristics

Surface type (Asphalt or Concrete)	=	Asphalt	*<<Select from Pull-down List>>*
# of directions of travel (1 = one-way; 2 = two-way)	=	1	
# of lanes (in one direction)	=	2	
Width of typical lane (ft)	=	12	
Left shoulder width (ft)	=	4	
Right shoulder width (ft)	=	10	
Total roadway analysis segment length (centerline miles)	=	7	
Current year	=	2016	
Elevation (> 4,000 ft or < 4,000 ft)?	=	< 4,000 ft	*<<Select from Pull-down List>>*
Roadway width (ft) [each direction lanes & shoulders]	=	38	
Total lane-miles [total traffic direction lanes & shoulders]	=	22.2	
Total square feet [total traffic direction lanes & shoulders]	=	1,404,480	
Total square yards [total traffic direction lanes & shoulders]	=	156,053	

LCCA Parameters

Analysis period (years)	=	40
Year of net present value	=	2017
First year of improvements	=	2021
Discount rate (%) - low	=	3%
Discount rate (%) - high	=	7%

Design Alternatives (DA)

Characteristics			Pavement Material Cost ($)		
Treatment Type	*Pavement Thickness*	*Typical Service Life (years)*	*Lane-miles*	*Square Feet*	*Square Yards*
Concrete Reconstruction	8"-12"	30-34	$350,000	$5.5	$50
Asphalt Reconstruction	8"-12"	26-30	$280,000	$4.4	$40
Concrete Medium Rehab	1"-3"	24-28	$75,000	$1.2	$11
Concrete Light Rehab	<1"	18-22	$50,000	$0.8	$7
Asphalt Medium Rehab	3"-8"	20-24	$105,000	$1.7	$15
Asphalt Light Rehab	<3"	14-18	$70,000	$1.1	$10

Reconstruction: Other Materials Cost Factor
1.60

Rehab: Other Materials Cost Factor
1.20

Total Cost Factor (e.g., includes design, mobilization, traffic control, contingency, etc.)
2.44

			Total Unit Cost ($) [includes material costs and indirect costs]			Total Bi-Directional Cost ($)
Treatment Type	Pavement Thickness	Typical Service Life (years)	Lane-miles	Square Feet	Square Yards	Total Cost
Concrete Reconstruction	8"-12"	30-34	$1,366,400	$21.6	$194	$30,288,533
Asphalt Reconstruction	8"-12"	26-30	$1,093,120	$17.3	$155	$24,230,827
Concrete Medium Rehab	1"-3"	24-28	$219,600	$3.5	$31	$4,867,800
Concrete Light Rehab	<1"	18-22	$146,400	$2.3	$21	$3,245,200
Asphalt Medium Rehab	3"-8"	20-24	$307,440	$4.9	$44	$6,814,920
Asphalt Light Rehab	<3"	14-18	$204,960	$3.2	$29	$4,543,280

Pavement Improvement Project History

WB I-10, Segment CS10W.1 MP 9 - MP 16

Year	Project Number	Tracs No.	Direction of Improvement	Treatment Type	Improvement Description	Thickness (inches)	Beg. MP	End MP	Length (miles)
1963	I-10-1(15)		WB	Asphalt Reconstruction	New Construction of EB lanes	3	12	16	4
1964	I-10-1(20)		WB	Asphalt Reconstruction	New Construction of EB lanes	3	6	12	6
1978	I10-1-54		Both	Asphalt Light Rehab	1.3"AC,0,5"ARACFC	1.8	1.75	20	18.25
1985	IR-10-1(62)		Both	Asphalt Light Rehab	outside lane 2.5"mill,2"AC,0,5"ARACFC	2.5	9	10	1
1989	ACIR-10-1(70)	h0018 04c	Both	Asphalt Medium Rehab	outside lane 3" mill, 2.5"AC,0.5"ARACFC	3	9	16	7
1995	IM-10-1(86)		Both	Asphalt Medium Rehab	3.5"mill,3"AC,0,5"ARACFC	3.5	2	12	10
1999	IM-10-1(87)	h04045 01c	Both	Asphalt Reconstruction	outside lane 5"mill, 7.5"AC,0.5"ARACFC, inside lane 3"mill,5.5"AC,0.5"ARACFC	8	11.7	24	12.3
2006	AC/IM-010-A(005)N		WB	Asphalt Medium Rehab	outside lane 5" mill,5"AC,0.5"ARACFC, inside lane 3" mill,3"AC,0.5"ARACFC	5.5	9	12	3
2008	NONE		Both	Asphalt Light Rehab	Fog Coat	0.1	1	12	11
2011	IM-999-A(205)A		Both	Asphalt Light Rehab	Crack Seal	0.1	1	32	31
									0

Interval between Improvements in Years	Treatment Type Options	Estimated Historical Interval Value between Improvements in Years	
1	Concrete Reconstruction		
14	Asphalt Reconstruction	35	
7	Concrete Medium Rehab		
4	Concrete Light Rehab		
6	Asphalt Medium Rehab	6	math based on mp range changes(mp9-12 & mp12-16)
4	Asphalt Light Rehab	4.666666667	dropped 89-78 for mp12-16 as it is 11 years
7			
2			
3			

Pavement Service Life, Intervals, and Sequence of Improvements

WB I-10, Segment CS10W.1 MP 9 - MP 16

Design Alternative	Typical Service Life Value	Typical Service Life Range	Average Historical Interval Value	Interval to Use in LCCA Before Reconstruction	Interval to Use in LCCA After Reconstruction
Concrete Reconstruction	32	30-34	0	-	16
Asphalt Reconstruction	28	26-30	35	-	14
Concrete Medium Rehab	26	24-28	0	13	13
Concrete Light Rehab	20	18-22	0	10	10
Asphalt Medium Rehab	22	20-24	6	6	11
Asphalt Light Rehab	16	14-18	4.666666667	4	8
None	0	0	-	-	-

Note: The typical service life values and ranges are determined based on the elevation of the roadway segment using the reference tables below. The typical service life values should be used as the intervals between improvements in the design alternatives except when historical frequency values are available based on the frequency and type of improvements in the past at this location. Historical frequency values should only be used if they are lower than the typical values and only up until reconstruction is implemented, after which typical service life values should be used.

Elevation Below 4000' (Desert Environment)

Design Alternative	Typical Service Life Value	Typical Service Life Range
Concrete Reconstruction	32	30-34
Asphalt Reconstruction	28	26-30
Concrete Medium Rehab	26	24-28
Concrete Light Rehab	20	18-22
Asphalt Medium Rehab	22	20-24
Asphalt Light Rehab	16	14-18
None	0	0

Assumed LCCA Sequence of Improvements Based on the Initial Design Alternative Improvement	
Concrete Reconstruction (CR):	CR, CLR, CMR, CLR, CR, CLR, CMR. . .
Asphalt Reconstruction (AR):	AR, ALR, AMR, ALR, AR, ALR, AMR. . .
Concrete Medium Rehab (CMR):	CMR, CLR, CR, CLR, CMR, CLR, CR. . .
Concrete Light Rehab (CLR):	CLR, CR, CLR, CMR, CLR, CR, CLR. . .
Asphalt Medium Rehab (AMR):	AMR, ALR, AR, ALR, AMR, ALR, AR. . .
Asphalt Light Rehab (ALR):	ALR, AR, ALR, AMR, ALR, AR, ALR. . .

Elevation Above 4000' (Mountain Environment)

Design Alternative	Typical Service Life Value	Typical Service Life Range
Concrete Reconstruction	28	26-30
Asphalt Reconstruction	24	22-26
Concrete Medium Rehab	22	20-24
Concrete Light Rehab	16	14-18
Asphalt Medium Rehab	18	16-20
Asphalt Light Rehab	12	10-14
None	0	0

Design Alternative # 1 - Concrete Reconstruction

WB I-10, Segment CS10W.1 MP 9 - MP 16

Enter Name of Design Alternative

Number of Years	Year	Concrete Reconstruction	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Concrete Reconstruction	$30,288,533	$26,910,970	$23,106,977
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	None	$0	$0	$0
10	2026	None	$0	$0	$0
11	2027	None	$0	$0	$0
12	2028	None	$0	$0	$0
13	2029	None	$0	$0	$0
14	2030	None	$0	$0	$0
15	2031	None	$0	$0	$0
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	None	$0	$0	$0
20	2036	None	$0	$0	$0
21	2037	Concrete Light Rehab	$3,245,200	$1,796,789	$838,621
22	2038	None	$0	$0	$0
23	2039	None	$0	$0	$0
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	None	$0	$0	$0
28	2044	None	$0	$0	$0
29	2045	None	$0	$0	$0
30	2046	None	$0	$0	$0
31	2047	Concrete Medium Rehab	$4,867,800	$2,005,469	$639,469
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	None	$0	$0	$0
36	2052	None	$0	$0	$0
37	2053	None	$0	$0	$0
38	2054	None	$0	$0	$0
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	None	$0	$0	$0
43	2059	None	$0	$0	$0
44	2060	Concrete Light Rehab	$3,245,200	$910,418	$176,905
45	2061	None	$0	$0	$0
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Concrete Light Rehab	$3,082,940	$839,706	$157,065
Enter Year of Last Used DA Improvement ››		2060	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$30,783,939	$24,604,907
AGENCY COST	$38,563,793	

Design Alternative # 2 - Asphalt Reconstruction

WB I-10, Segment CS10W.1 MP 9 - MP 16

Enter Name of Design Alternative

Number of Years	Year	Asphalt Reconstruction	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Asphalt Reconstruction	$24,230,827	$21,528,776	$18,485,582
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	None	$0	$0	$0
10	2026	None	$0	$0	$0
11	2027	None	$0	$0	$0
12	2028	None	$0	$0	$0
13	2029	None	$0	$0	$0
14	2030	None	$0	$0	$0
15	2031	None	$0	$0	$0
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	Asphalt Light Rehab	$4,543,280	$2,668,698	$1,344,193
20	2036	None	$0	$0	$0
21	2037	None	$0	$0	$0
22	2038	None	$0	$0	$0
23	2039	None	$0	$0	$0
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	Asphalt Medium Rehab	$6,814,920	$3,160,042	$1,173,499
28	2044	None	$0	$0	$0
29	2045	None	$0	$0	$0
30	2046	None	$0	$0	$0
31	2047	None	$0	$0	$0
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	None	$0	$0	$0
36	2052	None	$0	$0	$0
37	2053	None	$0	$0	$0
38	2054	Asphalt Light Rehab	$4,543,280	$1,521,921	$371,680
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	None	$0	$0	$0
43	2059	None	$0	$0	$0
44	2060	None	$0	$0	$0
45	2061	None	$0	$0	$0
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Asphalt Light Rehab	$2,555,595	$696,072	$130,198
Enter Year of Last Used DA Improvement ››		2054	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$28,183,366	$21,244,755
AGENCY COST	$37,576,712	

Design Alternative # 3 - Asphalt Medium Rehab

WB I-10, Segment CS10W.1 MP 9 - MP 16

Enter Name of Design Alternative

Number of Years	Year	Asphalt Medium Rehab Focus	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Asphalt Medium Rehab	$6,814,920	$6,054,968	$5,199,070
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	None	$0	$0	$0
10	2026	None	$0	$0	$0
11	2027	Asphalt Light Rehab	$4,543,280	$3,380,627	$2,309,573
12	2028	None	$0	$0	$0
13	2029	None	$0	$0	$0
14	2030	None	$0	$0	$0
15	2031	Asphalt Reconstruction	$24,230,827	$16,019,431	$9,397,132
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	None	$0	$0	$0
20	2036	None	$0	$0	$0
21	2037	None	$0	$0	$0
22	2038	None	$0	$0	$0
23	2039	None	$0	$0	$0
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	None	$0	$0	$0
28	2044	None	$0	$0	$0
29	2045	Asphalt Light Rehab	$4,543,280	$1,985,762	$683,319
30	2046	None	$0	$0	$0
31	2047	None	$0	$0	$0
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	None	$0	$0	$0
36	2052	None	$0	$0	$0
37	2053	Asphalt Medium Rehab	$6,814,920	$2,351,368	$596,547
38	2054	None	$0	$0	$0
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	None	$0	$0	$0
43	2059	None	$0	$0	$0
44	2060	None	$0	$0	$0
45	2061	None	$0	$0	$0
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Asphalt Medium Rehab	$4,336,767	$1,181,213	$220,943
Enter Year of Last Used DA Improvement ››		2053	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$28,610,944	$17,964,699
AGENCY COST	$42,610,459	

Design Alternative # 4 - Asphalt Light Rehab

WB I-10, Segment CS10W.1 MP 9 - MP 16

Enter Name of Design Alternative

Number of Years	Year	Asphalt Light Rehab Focus	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Asphalt Light Rehab	$4,543,280	$4,036,645	$3,466,047
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	Asphalt Reconstruction	$24,230,827	$19,128,038	$14,102,562
10	2026	None	$0	$0	$0
11	2027	None	$0	$0	$0
12	2028	None	$0	$0	$0
13	2029	None	$0	$0	$0
14	2030	None	$0	$0	$0
15	2031	None	$0	$0	$0
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	None	$0	$0	$0
20	2036	None	$0	$0	$0
21	2037	None	$0	$0	$0
22	2038	None	$0	$0	$0
23	2039	Asphalt Light Rehab	$4,543,280	$2,371,104	$1,025,478
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	None	$0	$0	$0
28	2044	None	$0	$0	$0
29	2045	None	$0	$0	$0
30	2046	None	$0	$0	$0
31	2047	Asphalt Medium Rehab	$6,814,920	$2,807,657	$895,256
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	None	$0	$0	$0
36	2052	None	$0	$0	$0
37	2053	None	$0	$0	$0
38	2054	None	$0	$0	$0
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	Asphalt Light Rehab	$4,543,280	$1,352,207	$283,553
43	2059	None	$0	$0	$0
44	2060	None	$0	$0	$0
45	2061	None	$0	$0	$0
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Asphalt Light Rehab	$3,691,415	$1,005,437	$188,064
Enter Year of Last Used DA Improvement ››		2058	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$28,690,214	$19,584,832
AGENCY COST	$40,984,172	

Summary of LCCA Results

WB I-10, Segment CS10W.1 MP 9 - MP 16

	Concrete Reconstruction	Asphalt Reconstruction	Asphalt Medium Rehab Focus	Asphalt Light Rehab Focus
Net Present Value - 3%	$30,783,939	$28,183,366	$28,610,944	$28,690,214
Net Present Value - 7%	$24,604,907	$21,244,755	$17,964,699	$19,584,832
Agency Cost	$38,563,793	$37,576,712	$42,610,459	$40,984,172

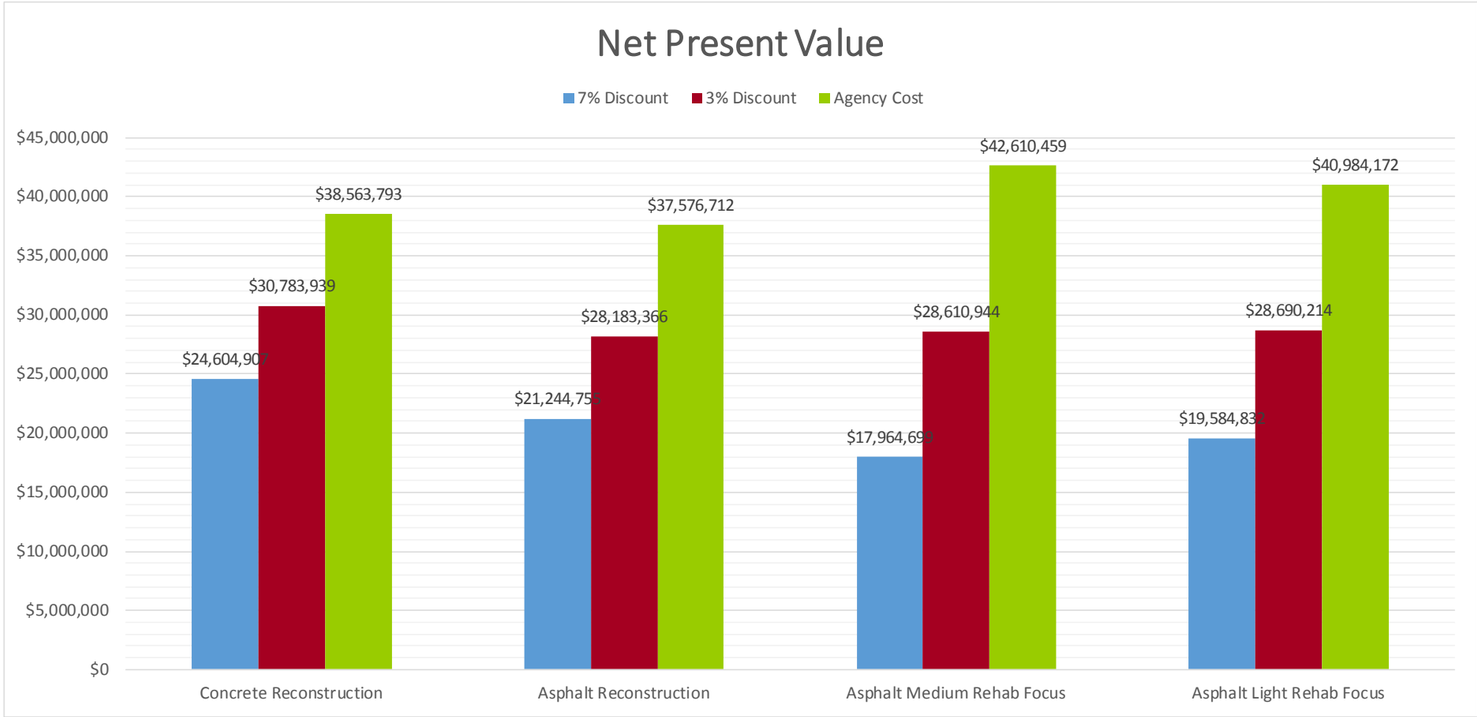
Cost Ratio at 3% Discount Rate

1.08 Ratio of Concrete Reconstruction to Lowest Cost Rehab
0.99 Ratio of Asphalt Reconstruction to Lowest Cost Rehab

Cost Ratio at 7% Discount Rate

1.37 Ratio of Concrete Reconstruction to Lowest Cost Rehab
1.18 Ratio of Asphalt Reconstruction to Lowest Cost Rehab

Note: A cost ratio < 1.15 means the Net Present Value (NPV) of reconstruction is within 15% of the NPV of the lowest cost rehab so reconstruction should likely be the initial improvement solution. A cost ratio > 1.15 means the NPV of reconstruction is more than 15% of the NPV of the lowest cost rehab so rehab should likely be the initial improvement solution.



Pavement Life-Cycle Cost Analysis Worksheet

Project Details		
Project title	Life-Cycle Cost Analysis for I-10 Corridor Profile Study: MP12-MP16	
Route	EB I-10, Segment CS10W.2	
Milepost begin	12	
Milepost end	16	

Existing Roadway Characteristics			
Surface type (Asphalt or Concrete)	=	Asphalt	*<<Select from Pull-down List>>*
# of directions of travel (1 = one-way; 2 = two-way)	=	1	
# of lanes (in one direction)	=	2	
Width of typical lane (ft)	=	12	
Left shoulder width (ft)	=	4	
Right shoulder width (ft)	=	10	
Total roadway analysis segment length (centerline miles)	=	4	
Current year	=	2016	
Elevation (> 4,000 ft or < 4,000 ft)?	=	< 4,000 ft	*<<Select from Pull-down List>>*
Roadway width (ft) [each direction lanes & shoulders]	=	38	
Total lane-miles [total traffic direction lanes & shoulders]	=	12.7	
Total square feet [total traffic direction lanes & shoulders]	=	802,560	
Total square yards [total traffic direction lanes & shoulders]	=	89,173	

LCCA Parameters		
Analysis period (years)	=	40
Year of net present value	=	2017
First year of improvements	=	2021
Discount rate (%) - low	=	3%
Discount rate (%) - high	=	7%

Design Alternatives (DA)

	Characteristics		Pavement Material Cost ($)		
Treatment Type	*Pavement Thickness*	*Typical Service Life (years)*	*Lane-miles*	*Square Feet*	*Square Yards*
Concrete Reconstruction	8"-12"	30-34	$350,000	$5.5	$50
Asphalt Reconstruction	8"-12"	26-30	$280,000	$4.4	$40
Concrete Medium Rehab	1"-3"	24-28	$75,000	$1.2	$11
Concrete Light Rehab	<1"	18-22	$50,000	$0.8	$7
Asphalt Medium Rehab	3"-8"	20-24	$105,000	$1.7	$15
Asphalt Light Rehab	<3"	14-18	$70,000	$1.1	$10

Reconstruction: Other Materials Cost Factor
1.60

Rehab: Other Materials Cost Factor
1.20

Total Cost Factor (e.g., includes design, mobilization, traffic control, contingency, etc.)
2.44

			Total Unit Cost ($) [includes material costs and indirect costs]			Total Bi-Directional Cost ($)
Treatment Type	Pavement Thickness	Typical Service Life (years)	Lane-miles	Square Feet	Square Yards	Total Cost
Concrete Reconstruction	8"-12"	30-34	$1,366,400	$21.6	$194	$17,307,733
Asphalt Reconstruction	8"-12"	26-30	$1,093,120	$17.3	$155	$13,846,187
Concrete Medium Rehab	1"-3"	24-28	$219,600	$3.5	$31	$2,781,600
Concrete Light Rehab	<1"	18-22	$146,400	$2.3	$21	$1,854,400
Asphalt Medium Rehab	3"-8"	20-24	$307,440	$4.9	$44	$3,894,240
Asphalt Light Rehab	<3"	14-18	$204,960	$3.2	$29	$2,596,160

Pavement Improvement Project History

EB I-10, Segment CS10W.2 MP 12 - MP 16

Year	Project Number	Tracs No.	Direction of Improvement	Treatment Type	Improvement Description	Thickness (inches)	Beg. MP	End MP	Length (miles)
1954	FI-98(20)		EB	Asphalt Reconstruction	New Construction of EB lanes	2.5	11	16	5
1965	I-10-1(37)		EB	Asphalt Light Rehab	1.5" AC Overlay + 0.5" finish course	2	12	16	4
1969	I10-1-903		EB	Asphalt Light Rehab	Fog Coat	0.1	10	20	10
1978	I10-1-54		Both	Asphalt Light Rehab	1.3"AC,0,5"ARACFC	1.8	1.75	20	18.25
1989	ACIR-10-1(70)	h0018 04c	Both	Asphalt Medium Rehab	outside lane 3" mill, 2.5"AC,0.5"ARACFC	3	9	16	7
1999	IM-10-1(87)	h04045 01c	Both	Asphalt Reconstruction	outside lane 5"mill, 7.5"AC,0.5"ARACFC,inside lane 3"mill,5.5"AC,0.5"ARACFC	8	11.7	24	12.3
2011	IM-999-A(205)A		Both	Asphalt Light Rehab	Crack Seal	0.1	1	32	31
									0
									0
									0
									0

Interval between Improvements in Years	Treatment Type Options	Estimated Historical Interval Value between Improvements in Years
11	Concrete Reconstruction	
4	Asphalt Reconstruction	45
9	Concrete Medium Rehab	
11	Concrete Light Rehab	
10	Asphalt Medium Rehab	10
12	Asphalt Light Rehab	8

Pavement Service Life, Intervals, and Sequence of Improvements

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Design Alternative	Typical Service Life Value	Typical Service Life Range	Average Historical Interval Value	Interval to Use in LCCA Before Reconstruction	Interval to Use in LCCA After Reconstruction
Concrete Reconstruction	32	30-34	0	-	16
Asphalt Reconstruction	28	26-30	45	-	14
Concrete Medium Rehab	26	24-28	0	13	13
Concrete Light Rehab	20	18-22	0	10	10
Asphalt Medium Rehab	22	20-24	10	10	11
Asphalt Light Rehab	16	14-18	8	8	8
None	0	0	-	-	-

Note: The typical service life values and ranges are determined based on the elevation of the roadway segment using the reference tables below. The typical service life values should be used as the intervals between improvements in the design alternatives except when historical frequency values are available based on the frequency and type of improvements in the past at this location. Historical frequency values should only be used if they are lower than the typical values and only up until reconstruction is implemented, after which typical service life values should be used.

Elevation Below 4000' (Desert Environment)

Design Alternative	Typical Service Life Value	Typical Service Life Range
Concrete Reconstruction	32	30-34
Asphalt Reconstruction	28	26-30
Concrete Medium Rehab	26	24-28
Concrete Light Rehab	20	18-22
Asphalt Medium Rehab	22	20-24
Asphalt Light Rehab	16	14-18
None	0	0

Assumed LCCA Sequence of Improvements Based on the Initial Design Alternative Improvement	
Concrete Reconstruction (CR):	CR, CLR, CMR, CLR, CR, CLR, CMR. . .
Asphalt Reconstruction (AR):	AR, ALR, AMR, ALR, AR, ALR, AMR. . .
Concrete Medium Rehab (CMR):	CMR, CLR, CR, CLR, CMR, CLR, CR. . .
Concrete Light Rehab (CLR):	CLR, CR, CLR, CMR, CLR, CR, CLR. . .
Asphalt Medium Rehab (AMR):	AMR, ALR, AR, ALR, AMR, ALR, AR. . .
Asphalt Light Rehab (ALR):	ALR, AR, ALR, AMR, ALR, AR, ALR. . .

Elevation Above 4000' (Mountain Environment)

Design Alternative	Typical Service Life Value	Typical Service Life Range
Concrete Reconstruction	28	26-30
Asphalt Reconstruction	24	22-26
Concrete Medium Rehab	22	20-24
Concrete Light Rehab	16	14-18
Asphalt Medium Rehab	18	16-20
Asphalt Light Rehab	12	10-14
None	0	0

Design Alternative # 1 - Concrete Reconstruction

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Enter Name of Design Alternative

Number of Years	Year	Concrete Reconstruction	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Concrete Reconstruction	$17,307,733	$15,377,697	$13,203,987
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	None	$0	$0	$0
10	2026	None	$0	$0	$0
11	2027	None	$0	$0	$0
12	2028	None	$0	$0	$0
13	2029	None	$0	$0	$0
14	2030	None	$0	$0	$0
15	2031	None	$0	$0	$0
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	None	$0	$0	$0
20	2036	None	$0	$0	$0
21	2037	Concrete Light Rehab	$1,854,400	$1,026,736	$479,212
22	2038	None	$0	$0	$0
23	2039	None	$0	$0	$0
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	None	$0	$0	$0
28	2044	None	$0	$0	$0
29	2045	None	$0	$0	$0
30	2046	None	$0	$0	$0
31	2047	Concrete Medium Rehab	$2,781,600	$1,145,982	$365,411
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	None	$0	$0	$0
36	2052	None	$0	$0	$0
37	2053	None	$0	$0	$0
38	2054	None	$0	$0	$0
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	None	$0	$0	$0
43	2059	None	$0	$0	$0
44	2060	Concrete Light Rehab	$1,854,400	$520,239	$101,088
45	2061	None	$0	$0	$0
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Concrete Light Rehab	$1,761,680	$479,832	$89,751
Enter Year of Last Used DA Improvement ››		2060	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$17,590,822	$14,059,947
AGENCY COST	$22,036,453	

Design Alternative # 2 - Asphalt Reconstruction

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Enter Name of Design Alternative

Number of Years	Year	Asphalt Reconstruction	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Asphalt Reconstruction	$13,846,187	$12,302,158	$10,563,190
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	None	$0	$0	$0
10	2026	None	$0	$0	$0
11	2027	None	$0	$0	$0
12	2028	None	$0	$0	$0
13	2029	None	$0	$0	$0
14	2030	None	$0	$0	$0
15	2031	None	$0	$0	$0
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	Asphalt Light Rehab	$2,596,160	$1,524,970	$768,110
20	2036	None	$0	$0	$0
21	2037	None	$0	$0	$0
22	2038	None	$0	$0	$0
23	2039	None	$0	$0	$0
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	Asphalt Medium Rehab	$3,894,240	$1,805,739	$670,571
28	2044	None	$0	$0	$0
29	2045	None	$0	$0	$0
30	2046	None	$0	$0	$0
31	2047	None	$0	$0	$0
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	None	$0	$0	$0
36	2052	None	$0	$0	$0
37	2053	None	$0	$0	$0
38	2054	Asphalt Light Rehab	$2,596,160	$869,669	$212,389
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	None	$0	$0	$0
43	2059	None	$0	$0	$0
44	2060	None	$0	$0	$0
45	2061	None	$0	$0	$0
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Asphalt Light Rehab	$1,460,340	$397,755	$74,399
Enter Year of Last Used DA Improvement ››		2054	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$16,104,780	$12,139,860
AGENCY COST	$21,472,407	

Design Alternative # 3 - Asphalt Medium Rehab

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Enter Name of Design Alternative

Number of Years	Year	Asphalt Medium Rehab Focus	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Asphalt Medium Rehab	$3,894,240	$3,459,982	$2,970,897
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	None	$0	$0	$0
10	2026	None	$0	$0	$0
11	2027	None	$0	$0	$0
12	2028	None	$0	$0	$0
13	2029	None	$0	$0	$0
14	2030	None	$0	$0	$0
15	2031	Asphalt Light Rehab	$2,596,160	$1,716,368	$1,006,836
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	None	$0	$0	$0
20	2036	None	$0	$0	$0
21	2037	None	$0	$0	$0
22	2038	None	$0	$0	$0
23	2039	Asphalt Reconstruction	$13,846,187	$7,226,221	$3,125,267
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	None	$0	$0	$0
28	2044	None	$0	$0	$0
29	2045	None	$0	$0	$0
30	2046	None	$0	$0	$0
31	2047	None	$0	$0	$0
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	None	$0	$0	$0
36	2052	None	$0	$0	$0
37	2053	Asphalt Light Rehab	$2,596,160	$895,759	$227,256
38	2054	None	$0	$0	$0
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	None	$0	$0	$0
43	2059	None	$0	$0	$0
44	2060	None	$0	$0	$0
45	2061	Asphalt Medium Rehab	$3,894,240	$1,060,681	$198,398
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Asphalt Medium Rehab	$3,894,240	$1,060,681	$198,398
Enter Year of Last Used DA Improvement ››		2061	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$13,298,330	$7,330,255
AGENCY COST	$22,932,747	

Design Alternative # 4 - Asphalt Light Rehab

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Enter Name of Design Alternative

Number of Years	Year	Asphalt Light Rehab Focus	Agency Cost ($)	Net Present Value @ 3%	Net Present Value @ 7%
0	2016	None	$0	$0	$0
1	2017	None	$0	$0	$0
2	2018	None	$0	$0	$0
3	2019	None	$0	$0	$0
4	2020	None	$0	$0	$0
5	2021	Asphalt Light Rehab	$2,596,160	$2,306,655	$1,980,598
6	2022	None	$0	$0	$0
7	2023	None	$0	$0	$0
8	2024	None	$0	$0	$0
9	2025	None	$0	$0	$0
10	2026	None	$0	$0	$0
11	2027	None	$0	$0	$0
12	2028	None	$0	$0	$0
13	2029	Asphalt Reconstruction	$13,846,187	$9,711,437	$6,147,872
14	2030	None	$0	$0	$0
15	2031	None	$0	$0	$0
16	2032	None	$0	$0	$0
17	2033	None	$0	$0	$0
18	2034	None	$0	$0	$0
19	2035	None	$0	$0	$0
20	2036	None	$0	$0	$0
21	2037	None	$0	$0	$0
22	2038	None	$0	$0	$0
23	2039	None	$0	$0	$0
24	2040	None	$0	$0	$0
25	2041	None	$0	$0	$0
26	2042	None	$0	$0	$0
27	2043	Asphalt Light Rehab	$2,596,160	$1,203,826	$447,047
28	2044	None	$0	$0	$0
29	2045	None	$0	$0	$0
30	2046	None	$0	$0	$0
31	2047	None	$0	$0	$0
32	2048	None	$0	$0	$0
33	2049	None	$0	$0	$0
34	2050	None	$0	$0	$0
35	2051	Asphalt Medium Rehab	$3,894,240	$1,425,467	$390,278
36	2052	None	$0	$0	$0
37	2053	None	$0	$0	$0
38	2054	None	$0	$0	$0
39	2055	None	$0	$0	$0
40	2056	None	$0	$0	$0
41	2057	None	$0	$0	$0
42	2058	None	$0	$0	$0
43	2059	None	$0	$0	$0
44	2060	None	$0	$0	$0
45	2061	None	$0	$0	$0
Pick Last Used DA treatment type to calculate Remaining Service Life ››		Asphalt Medium Rehab	$2,124,131	$578,553	$108,217
Enter Year of Last Used DA Improvement ››		2051	Remaining Service Life Cost ^^		

	Net Present Value ($) @ 3%	Net Present Value ($) @ 7%
NET PRESENT VALUE	$14,068,830	$8,857,579
AGENCY COST	$20,808,616	

Appendix F: Crash Modification Factors

SOLUTION	CONSTRUCTION UNIT COST	UNIT	FACTOR^	FACTORED CONSTRUCTION UNIT COST	DESCRIPTION	CMF FOR CORRIDOR PROFILE STUDIES	CMF NOTES
REHABILITATION							
Rehabilitate Pavement (AC)	$276,500	Mile	2.20	$610,000	Mill and replace 1"-3" AC pvmt; accounts for 38' width; for one direction of travel on two lane roadway; includes pavement, striping, delineators, RPMs, rumble strips	0.70	Combination of rehabilitate pavement (0.92), striping, delineators, RPMs (0.77 for combination), and rumble strips (0.89) = 0.70
Rehabilitate Bridge	$65	SF	2.20	$140	Based on deck area; bridge only - no other costs included	0.95	Assumed - should have a minor effect on crashes at the bridge
GEOMETRIC IMPROVEMENT							
Re-profile Roadway	$974,500	Mile	2.20	$2,140,000	Includes excavation of approximately 3", pavement replacement (AC), striping, delineators, RPMs, rumble strips, for one direction of travel of 2-lane roadway (38' width)	0.70	Assumed - this is similar to rehab pavement. This solution is intended to address vertical clearance at bridge, not profile issue; factor the cost as a ratio of needed depth to 3".
Realign Roadway	$2,960,000	Mile	2.20	$6,510,000	All costs per direction except bridges; applicable to areas with small or moderate fills and cuts, minimal retaining walls	0.50	Based on CalTrans and NC DOT
Improve Skid Resistance	$675,000	Mile	2.20	$1,490,000	Average cost of pvmt replacement and variable depth paving to increase super-elevation; for one direction of travel on two lane roadway; includes pavement, striping, delineators, RPMs, rumble strips	0.66	Combination of avg of 5 values from clearinghouse (0.77) and calculated value from HSM (0.87) for skid resistance; striping, delineators, RPMs (0.77 for combination), and rumble strips (0.89) = 0.66
INFRASTRUCTURE IMPROVEMENT							
Reconstruct to Urban Section	$1,000,000	Mile	2.20	$2,200,000	Includes widening by 16' total (AC = 12'+2'+2') to provide median, curb & gutter along both side of roadway, single curb for median, striping (doesn't include widening for additional travel lane).	0.88	From HSM
Construct Auxiliary Lanes (AC)	$914,000	Mile	2.20	$2,011,000	For addition of aux lane (AC) in one direction of travel; includes all costs except bridges; for generally at-grade facility with minimal walls and no major drainage improvements	0.78	Average of 4 values from clearinghouse
Construct Climbing Lane (High)	$3,000,000	Mile	2.20	$6,600,000	In one direction; all costs except bridges; applicable to areas with large fills and cuts, retaining walls, rock blasting, steep slopes on both sides of road	0.75	From HSM

Construct Climbing Lane (Medium)	$2,250,000	Mile	2.20	$4,950,000	In one direction; all costs except bridges; applicable to areas with medium or large fills and cuts, retaining walls, rock blasting, steep slopes on one side of road	0.75	From HSM
Construct Climbing Lane (Low)	$1,500,000	Mile	2.20	$3,300,000	In one direction; all costs except bridges; applicable to areas with small or moderate fills and cuts, minimal retaining walls	0.75	From HSM
Construct Reversible Lane (Low)	$2,400,000	Lane-Mile	2.20	$5,280,000	All costs except bridges; applicable to areas with small or moderate fills and cuts, minimal retaining walls	0.73 for uphill and 0.88 for downhill	Based on proposed conditions on I-17 with 2 reversible lanes and a conc barrier
Construct Reversible Lane (High)	$4,800,000	Lane-Mile	2.20	$10,560,000	All costs except bridges; applicable to areas with large fills and cuts, retaining walls, rock blasting, mountainous terrain	0.73 for uphill and 0.88 for downhill	Based on proposed conditions on I-17 with 2 reversible lanes and a conc barrier
Construct Passing Lane	$1,500,000	Mile	2.20	$3,300,000	In one direction; all costs except bridges; applicable to areas with small or moderate fills and cuts, minimal retaining walls	0.63	Average of 3 values from clearinghouse
Construct Entry/Exit Ramp	$730,000	Each	2.20	$1,610,000	Cost per ramp; includes pavement, striping, signing, RPMs, lighting, typical earthwork & drainage; does not include any major structures or improvements on crossroad	1.09	Average of 16 values on clearinghouse; for adding a ramp not reconstructing. CMF applied to crashes 0.25 miles upstream/downstream from the gore.
Relocate Entry/Exit Ramp	$765,000	Each	2.20	$1,680,000	Cost per ramp; includes pavement, striping, signing, RPMs, lighting, typical earthwork , drainage and demolition of existing ramp; does not include any major structures or improvements on crossroad	1.00	Assumed to not add any crashes since the ramp is simply moving and not being added. CMF applied to crashes 0.25 miles upstream/downstream from the gore.
Construct Turn Lanes	$42,500	Each	2.20	$93,500	Includes 14' roadway widening (AC) for one additional turn lane (250' long) on one leg of an intersection; includes AC pavement, curb & gutter, sidewalk, ramps, striping, and minor signal modifications	0.81	Avg of 7 values from HSM; CMF applied to intersection related crashes; this solution also applies when installing a deceleration lane
Modify Entry/Exit Ramp	$445,000	Each	2.20	$979,000	Cost per ramp; includes pavement, striping, signing, RPMs, lighting, minor earthwork, & drainage; For converting existing ramp to parallel-type configuration	0.21	Average of 4 values from clearinghouse (for exit ramps) and equation from HSM (for entrance ramp). CMF applied to crashes within 1/8 mile upstream/downstream from the gore.
Widen & Modify Entry/Exit Ramp	$619,000	Each	2.20	$1,361,800	Cost per ramp; includes pavement, striping, signing, RPMs, lighting, minor earthwork, & drainage; For converting 1-lane ramp to 2-lane ramp and converting to parallel-type ramp	0.21	Will be same as "Modify Ramp"

Replace Pavement (AC) (with overexcavation)	$1,446,500	Mile	2.20	$3,180,000	Accounts for 38' width; for one direction of travel on two lane roadway; includes pavement, overexcavation, striping, delineators, RPMs, rumble strips	0.70	Same as rehab
Replace Pavement (PCCP) (with overexcavation)	$1,736,500	Mile	2.20	$3,820,000	Accounts for 38' width; for one direction of travel on two lane roadway; includes pavement, overexcavation, striping, delineators, RPMs, rumble strips	0.70	Same as rehab
Replace Bridge (Short)	$125	SF	2.20	$280	Based on deck area; bridge only - no other costs included; cost developed generally applies to bridges crossing small washes	0.95	Assumed - should have a minor effect on crashes at the bridge
Replace Bridge (Medium)	$160	SF	2.20	$350	Based on deck area; bridge only - no other costs included; cost developed generally applies to bridges crossing over the mainline freeway, crossroads, or large washes	0.95	Assumed - should have a minor effect on crashes at the bridge
Replace Bridge (Long)	$180	SF	2.20	$400	Based on deck area; bridge only - no other costs included; cost developed generally applies to bridges crossing large rivers or canyons	0.95	Assumed - should have a minor effect on crashes at the bridge
Widen Bridge	$175	SF	2.20	$390	Based on deck area; bridge only - no other costs included	0.90	Assumed - should have a minor effect on crashes at the bridge
Install Pedestrian Bridge	$135	SF	2.20	$300	Includes cost to construct bridge based on linear feet of the bridge. This costs includes and assumes ramps and sidewalks leading to the structure.	0.1 (ped only)	Assumed direct access on both sides of structure
Implement Automated Bridge De-icing	$115	SF	2.20	$250	Includes cost to replace bridge deck and install system	0.72 (snow/ice)	Average of 3 values on clearinghouse for snow/ice
Install Wildlife Crossing Under Roadway	$650,000	Each	2.20	$1,430,000	Includes cost of structure for wildlife crossing under roadway and 1 mile of fencing in each direction that is centered on the wildlife crossing	0.25 (wildlife)	Assumed; CMF applies to wildlife-related crashes within 0.5 miles both upstream and downstream of the wildlife crossing in both directions
Install Wildlife Crossing Over Roadway	$1,140,000	Each	2.20	$2,508,000	Includes cost of structure for wildlife crossing over roadway and 1 mile of fencing in each direction that is centered on the wildlife crossing	0.25 (wildlife)	Assumed; CMF applies to wildlife-related crashes within 0.5 miles both upstream and downstream of the wildlife crossing in both directions
Construct Drainage Structure - Minor	$280,000	Each	2.20	$616,000	Includes 3-36" pipes and roadway reconstruction (approx. 1,000 ft) to install pipes	0.70	Same as rehab; CMF applied to crashes 1/8 mile upstream/downstream of the structure
Construct Drainage Structure - Intermediate	$540,000	Each	2.20	$1,188,000	Includes 5 barrel 8'x6' RCBC and roadway reconstruction (approx. 1,000 ft) to install RCBC	0.70	Same as rehab; CMF applied to crashes 1/8 mile upstream/downstream of the structure

Construct Drainage Structure - Major	$8,000	LF	2.20	$17,600	Includes bridge that is 40' wide and reconstruction of approx. 500' on each approach	0.70	Same as rehab; CMF applied to crashes 1/8 mile upstream/downstream of the structure
Install Acceleration Lane	$127,500	Each	2.20	$280,500	For addition of an acceleration lane (AC) on one leg of an intersection that is 1,000' long plus a taper; includes all costs except bridges; for generally at-grade facility with minimal walls and no major drainage improvements	0.85	Average of 6 values from the FHWA Desktop Reference for Crash Reduction Factors
OPERATIONAL IMPROVEMENT							
Implement Variable Speed Limits (Wireless, Overhead)	$718,900	Mile	2.20	$1,580,000	In one direction; includes 1 sign assembly per mile (foundation and structure), wireless communication, detectors	0.92	From 1 value from clearinghouse
Implement Variable Speed Limits (Wireless, Ground-mount)	$169,700	Mile	2.20	$373,300	In one direction; includes 2 signs per mile (foundations and posts), wireless communication, detectors	0.92	From 1 value from clearinghouse
Implement Variable Speed Limits (Wireless, Solar, Overhead)	$502,300	Mile	2.20	$1,110,000	In one direction; includes 1 sign assembly per mile (foundation and structure), wireless communication, detectors, solar power	0.92	From 1 value from clearinghouse
Implement Variable Speed Limits (Wireless, Solar, Ground-mount)	$88,400	Mile	2.20	$194,500	In one direction; includes 2 signs per mile (foundations and posts), wireless communication, detectors, solar power	0.92	From 1 value from clearinghouse
Implement Ramp Metering (Low)	$25,000	Each	2.20	$55,000	For each entry ramp location; urban area with existing ITS backbone infrastructure; includes signals, poles, timer, pull boxes, etc	0.64	From 1 value from clearinghouse; CMF applied to crashes 0.25 miles after gore
Implement Ramp Metering (High)	$150,000	Mile	2.20	$330,000	Area without existing ITS backbone infrastructure; in addition to ramp meters, also includes conduit, fiber optic lines, and power	0.64	From 1 value from clearinghouse
Implement Signal Coordination	$140,000	Mile	2.20	$308,000	Includes conduit, conductors, and controllers for 4 intersections that span a total of approximately 2 miles	0.90	Assumed
Implement Left-Turn Phasing	$7,500	Each	2.20	$16,500	Includes four new signal heads (two in each direction) and associated onductors for one intersection	0.88 (protected) 0.98 (perm/prot or prot/perm)	From HSM; CMF = 0.94 for each protected approach and 0.99 for each perm/prot or prot/perm approach. CMFs of different approaches should be multiplied together. CMF applied to crashes within intersection
ROADSIDE DESIGN							
Install Guardrail	$130,000	Mile	2.20	$286,000	One side of road	0.62 (ROR)	0.62 is avg of 2 values from clearinghouse

Install Cable Barrier	$80,000	Mile	2.20	$176,000	In median	0.81	0.81 is average of 5 values from clearinghouse
Widen Shoulder (AC)	$256,000	Mile	2.20	$563,000	Assumes 10' of existing shoulder (combined left and right), includes widening shoulder by a total of 4'; new pavement for 4' width and mill and replace existing 10' width; includes pavement, minor earthwork, striping edge lines, RPMs, high-visibility delineators, safety edge, and rumble strips	0.68 (1-4') 0.64 (>= 4')	0.86 is avg of 5 values from clearing house for widening shoulder 1-4'. 0.76 is calculated from HSM for widening shoulder >= 4'. (Cost needs to be updated if dimension of existing and widened shoulder differ from Description.)
Rehabilitate Shoulder (AC)	$113,000	Mile	2.20	$249,000	One direction of travel (14' total shldr width-4' left and 10' right); includes paving (mill and replace), striping, high-visibility delineators, RPMs, safety edge, and rumble strips for both shoulders	0.72	0.98 is average of 34 values on clearinghouse for shldr rehab/replace; include striping, delineators, RPMs (0.77 combined CMF), and rumble strips (0.89). (Cost needs to be updated if dimension of existing shoulder differs from Description.)
Replace Shoulder (AC)	$364,000	Mile	2.20	$801,000	One direction of travel (14' total shldr width-4' left and 10' right); includes paving (full reconstruction), striping, high-visibility delineators, RPMs, safety edge, and rumble strips for both shoulders	0.72	0.98 is average of 34 values on clearinghouse for shldr rehab/replace; include striping, delineators, RPMs (0.77 combined CMF), and rumble strips (0.89). (Cost needs to be updated if dimension of existing shoulder differs from Description.)
Install Rumble Strip	$5,500	Mile	2.20	$12,000	Both edges - one direction of travel; includes only rumble strip; no shoulder rehab or paving or striping	0.89	Average of 75 values on clearinghouse and consistent with HSM
Install Centerline Rumble Strip	$2,800	Mile	2.20	$6,000	Includes rumble strip only; no pavement rehab or striping	0.85	From HSM
Install Wildlife Fencing	$340,000	Mile	2.20	$748,000	Fencing only plus jump outs for 1 mile (both directions)	0.50 (wildlife)	Assumed
Remove Tree/Vegetation	$200,000	Mile	2.20	$440,000	Intended for removing trees that shade the roadway to allow sunlight to help melt snow and ice (see Increase Clear Zone CMF for general tree/vegetation removal in clear zone)	0.72 (snow/ice)	Average of 3 values on clearinghouse for snow/ice
Increase Clear Zone	$59,000	Mile	2.20	$130,000	In one direction; includes widening the clear zone by 10' to a depth of 3'	0.71	Median of 14 values from FHWA Desktop Reference for Crash Reduction Values
Install Access Barrier Fence	$15	LF	2.20	$33	8' fencing along residential section of roadway	0.10 (ped only)	Equal to ped overpass
Install Rock-Fall Mitigation - Wire Mesh	$1,320,000	Mile	2.20	$2,904,000	Includes wire mesh and rock stabilization (one direction)	0.75 (debris)	Assumed
Install Rock-Fall Mitigation - Containment Fence & Barrier	$2,112,000	Mile	2.20	$4,646,000	Includes containment fencing, concrete barrier, and rock stabilization (one direction)	0.75 (debris)	Assumed

Install Raised Concrete Barrier in Median	$650,000	Mile	2.20	$1,430,000	Includes concrete barrier with associated striping and reflective markings; excludes lighting in barrier (one direction)	0.90 (Cross-median and head on crashes eliminated completely)	All cross median and head-on fatal or incapacitating injury crashes are eliminated completely; all remaining crashes have 0.90 applied
Formalize Pullout (Small)	$7,500	Each	2.20	$17,000	Includes paving and signage (signs, posts, and foundations) - approximately 4,200 sf	0.97	Assumed - similar to Install Other General Warning Signs; CMF applied to crashes within 0.25 miles after sign
Formalize Pullout (Medium)	$27,500	Each	2.20	$61,000	Includes paving and signage (signs, posts, and foundations) - approximately 22,500 sf	0.97	Assumed - similar to Install Other General Warning Signs; CMF applied to crashes within 0.25 miles after sign
Formalize Pullout (Large)	$80,500	Each	2.20	$177,100	Includes paving and signage (signs, posts, and foundations) - approximately 70,000 sf	0.97	Assumed - similar to Install Other General Warning Signs; CMF applied to crashes within 0.25 miles after sign
INTERSECTION IMPROVEMENTS							
Construct Traffic Signal	$150,000	Each	2.20	$330,000	4-legged intersection; includes poles, foundations, conduit, controller, heads, luminaires, mast arms, etc.	0.95	From HSM; CMF applied to crashes within intersection only
Improve Signal Visibility	$35,000	Each	2.20	$77,000	4-legged intersection; signal head size upgrade, installation of new back-plates, and installation of additional signal heads on new poles.	0.85	Avg of 7 values from clearinghouse; CMF applied to crashes within intersection only
Install Raised Median	$360,000	Mile	2.20	$792,000	Includes removal of 14' wide pavement and construction of curb & gutter; does not include cost to widen roadway to accommodate the median; if the roadway needs to be widened, include cost from New General Purpose Lane	0.83	Avg from HSM
Install Transverse Rumble Strip/Pavement Markings	$3,000	Each	2.20	$7,000	Includes ped markings and rumble strips only across a 30' wide travelway; no pavement rehab or other striping	0.95	Avg of 17 values from clearinghouse; CMF applied to crashes within 0.5 miles after the rumble strips and markings
Construct Single-Lane Roundabout	$1,500,000	Each	2.20	$3,300,000	Removal of signal at 4-legged intersection; realignment of each leg for approx. 800 feet including paving, curbs, sidewalk, striping, lighting, signing	0.22	From HSM; CMF applied to crashes within intersection only
Construct Double-Lane Roundabout	$1,800,000	Each	2.20	$3,960,000	Removal of signal at 4-legged intersection; realignment of each leg for approx. 800 feet including paving, curbs, sidewalk, striping, lighting, signing	0.40	From HSM; CMF applied to crashes within intersection only

ROADWAY DELINEATION							
Install High-Visibility Edge Line Striping	$10,800	Mile	2.20	$23,800	2 edge lines and lane line - one direction of travel	0.77	Avg of 3 values from clearinghouse. Assumes package of striping, delineators, and RPMs. (If implemented separately, CMF will be higher.)
Install High-Visibility Delineators	$6,500	Mile	2.20	$14,300	Both edges - one direction of travel		Avg of 3 values from clearinghouse. Assumes package of striping, delineators, and RPMs. (If implemented separately, CMF will be higher.)
Install Raised Pavement Markers	$2,000	Mile	2.20	$4,400	Both edges - one direction of travel		Avg of 3 values from clearinghouse. Assumes package of striping, delineators, and RPMs. (If implemented separately, CMF will be higher.)
Install In-Lane Route Markings	$6,000	Each	2.20	$13,200	Installation of a series of three in-lane route markings in one lane	0.95	Assumed; CMF applied to crashes within 1.0 mile before the gore
IMPROVED VISIBILITY							
Cut Side Slopes	$80	LF	2.20	$200	For small grading to correct sight distance issues; not major grading	0.85	Intent of this solution is to improve sight distance. Most CMF's are associated with vehicles traveling on slope. Recommended CMF is based on FDOT and NCDOT but is more conservative.
Install Lighting (connect to existing power)	$270,000	Mile	2.20	$594,000	One side of road only; offset lighting, not high-mast; does not include power supply; includes poles, luminaire, pull boxes, conduit, conductor	0.75 (night)	Average of 3 values on clearinghouse & consistent with HSM
Install Lighting (solar powered LED)	$10,000	Pole	2.20	$22,000	Offset lighting, not high-mast; solar power LED; includes poles, luminaire, solar panel	0.75 (night)	Average of 3 values on clearinghouse & consistent with HSM
DRIVER INFORMATION/WARNING							
Install Dynamic Message Sign (DMS)	$250,000	Each	2.20	$550,000	Includes sign, overhead structure, and foundations; wireless communication; does not include power supply	1.00	Not expected to reduce crashes
Install Dynamic Weather Warning Beacons	$40,000	Each	2.20	$88,000	Assumes solar operation and wireless communication or connection to existing power and communication; ground mounted; includes posts, foundations, solar panel, and dynamic sign	0.80 (weather related)	Avg of 3 values from from FHWA Desktop Reference for Crash Reduction Factors; CMF applies to crashes within 0.25 miles after a sign

Install Dynamic Speed Feedback Signs	$25,000	Each	2.20	$55,000	Assumes solar operation and no communication; ground mounted; includes regulatory sign, posts, foundations, solar panel, and dynamic sign	0.94	Average of 2 clearinghouse values; CMF applies to crashes within 0.50 miles after a sign
Install Chevrons	$18,400	Mile	2.20	$40,500	On one side of road - includes signs, posts, and foundations	0.79	Average of 11 clearinghouse values
Install Curve Warning Signs	$2,500	Each	2.20	$5,500	Includes 2 signs, posts, and foundations	0.83	Average of 4 clearinghouse values; CMF applies to crashes within 0.25 miles after a sign
Install Traffic Control Device Warning Signs (e.g., stop sign ahead, signal ahead, etc.)	$2,500	Each	2.20	$5,500	Includes 2 signs, posts, and foundations	0.85	FHWA Desktop Reference for Crash Reduction Factors; CMF applies to crashes within 0.25 miles after a sign
Install Other General Warning Signs (e.g., intersection ahead, wildlife in area, slow vehicles, etc.)	$2,500	Each	2.20	$5,500	Includes 2 signs, posts, and foundations	0.97	Assumed; CMF applies to crashes within 0.25 miles after a sign
Install Wildlife Warning System	$162,000	Each	2.20	$356,400	Includes wildlife detection system at a designated wildlife crossing, flashing warning signs (assumes solar power), advance signing, CCTV (solar and wireless), game fencing for approximately 0.25 miles in each direction - centered on the wildlife crossing, and regular fencing for 1.0 mile in each direction - centered on the wildlife crossing.	0.50 (wildlife)	Assumed; CMF applies to wildlife-related crashes within 0.5 miles both upstream and downstream of the wildlife crossing in both directions
Install Warning Sign with Beacons	$15,000	Each	2.20	$33,000	In both directions; includes warning sign, post, and foundation, and flashing beacons (assumes solar power) at one location	0.75	FHWA Desktop Reference for Crash Reduction Factors for Installing Flashing Beacons as Advance Warning; CMF applies to crashes within 0.25 miles after a sign
Install Larger Stop Sign with Beacons	$10,000	Each	2.20	$22,000	In one direction; includes large stop sign, post, and foundation, and flashing beacons (assumes solar power) at one location	0.85/0.81	Use 0.85 for adding beacons to an existing sign; 0.81 for installing a larger sign with flashing beacons; CMF applies to intersection related crashes
DATA COLLECTION							
Install Roadside Weather Information System (RWIS)	$60,000	Each	2.20	$132,000	Assumes wireless communication and solar power, or connection to existing power and communications	1.00	Not expected to reduce crashes
Install Closed Circuit Television (CCTV) Camera	$25,000	Each	2.20	$55,000	Assumes connection to existing ITS backbone or wireless communication; does not include fiber-optic backbone infrastructure; includes pole, camera, etc	1.00	Not expected to reduce crashes
Install Vehicle Detection Stations	$15,000	Each	2.20	$33,000	Assumes wireless communication and solar power, or connection to existing power and communications	1.00	Not expected to reduce crashes
Install Flood Sensors (Activation)	$15,000	Each	2.20	$33,000	Sensors with activation cabinet to alert through texting (agency)	1.00	Not expected to reduce crashes
Install Flood Sensors (Gates)	$100,000	Each	2.20	$220,000	Sensors with activation cabinet to alert through texting (agency) and beacons (public) plus gates	1.00	Not expected to reduce crashes

WIDEN CORRIDOR							
Construct New General Purpose Lane (PCCP)	$1,740,000	Mile	2.20	$3,830,000	For addition of 1 GP lane (PCCP) in one direction; includes all costs except bridges; for generally at-grade facility with minimal walls and no major drainage improvements	0.90	North Carolina DOT uses 0.90 and Florida DOT uses 0.87
Construct New General Purpose Lane (AC)	$1,200,000	Mile	2.20	$2,640,000	For addition of 1 GP lane (AC) in one direction; includes all costs except bridges; for generally at-grade facility with minimal walls and no major drainage improvements	0.90	North Carolina DOT uses 0.90 and Florida DOT uses 0.88
Convert a 2-Lane undivided highway to a 5-Lane highway	$1,576,000	Mile	2.20	$3,467,200	For expanding a 2-lane undivided highway to a 5-lane highway (4 through lanes with TWLTL), includes standard shoulder widths but no curb, gutter, or sidewalks	0.60	Assumed to be slightly lower than converting from a 4-lane to a 5-lane highway
Install Center Turn Lane	$1,053,000	Mile	2.20	$2,316,600	For adding a center turn lane (i.e., TWLTL); assumes symmetrical widening on both sides of the road; includes standard shoulder widths but no curb, gutter, or sidewalk	0.75	From FHWA Desktop Reference for Crash Reduction Factors, CMF Clearinghouse, and SR 87 CPS comparison
Construct 4-Lane Divided Highway (Using Existing 2-Lane Road for one direction)	$3,000,000	Mile	2.20	$6,600,000	In both directions; one direction uses existing 2-lane road; other direction assumes addition of 2 new lanes (AC) with standard shoulders; includes all costs except bridges	0.67	Assumed
Construct 4-Lane Divided Highway (No Use of Existing Roads)	$6,000,000	Mile	2.20	$13,200,000	In both directions; assumes addition of 2 new lanes (AC) with standard shoulders in each direction; includes all costs except bridges	0.67	Assumed
Construct Bridge over At-Grade Railroad Crossing	$10,000,000	Each	2.20	$22,000,000	Assumes bridge width of 4 lanes (AC) with standard shoulders; includes abutments and bridge approaches; assumes vertical clearance of 23'4" + 6'8" superstructure	0.72 (All train-related crashes eliminated)	Removes all train-related crashes at at-grade crossing; all other crashes CMF = 0.72
Construct Underpass at At-Grade Railroad Crossing	$15,000,000	Each	2.20	$33,000,000	Assumes underpass width of 4 lanes (AC) with standard shoulders; includes railroad bridge with abutments and underpass approaches; assumes vertical clearance of 16'6" + 6'6" superstructure	0.72 (All train-related crashes eliminated)	Removes all train-related crashes at at-grade crossing; all other crashes CMF = 0.72
Construct High-Occupancy Vehicle (HOV) Lane	$900,000	Mile	2.20	$1,980,000	For addition of 1 HOV lane (AC) in one direction with associated signage and markings; includes all costs except bridges; for generally at-grade facility with minimal walls and no major drainage improvements	0.95	Similar to general purpose lane

ALTERNATE ROUTE							
Construct Frontage Roads	$2,400,000	Mile	2.20	$5,280,000	For 2-lane AC frontage road; includes all costs except bridges; for generally at-grade facility with minimal walls	0.90	Assumed - similar to new general purpose lane
Construct 2-Lane Undivided Highway	$3,000,000	Mile	2.20	$6,600,000	In both directions; assumes addition of 2 new lanes (AC) with standard shoulders in each direction; includes all costs except bridges	0.90	Assuming new alignment for a bypass

Appendix G: Performance Area Risk Factors

Appendix G Performance Area Risk Factors

Pavement Performance Area

- Mainline Daily Traffic Volume
- Mainline Daily Truck Volume
- Elevation
- Interrupted Flow

Elevation

Variance above 4000' divided by 1000; (Elev-4000)/1000

Score	Condition
0	< 4000’
0-5	4000’- 9000’
5	> 9000’

Mainline Daily Traffic Volume

Exponential equation; score = $5-(5*e^{(ADT*-0.000039)})$

Score	Condition
0	< 6,000
0-5	6,000 – 160,000
5	>160,000

Mainline Daily Truck Volume

Exponential equation; score = $5-(5*e^{(ADT*-0.00025)})$

Score	Condition
0	<900
0-5	900-25,000
5	>25,000

Interrupted Flow

Score	Condition
0	Not interrupted flow
5	Interrupted Flow

Bridge Performance Area

- Mainline Daily Traffic Volume
- Detour Length
- Elevation
- Scour Critical Rating
- Carries Mainline Traffic
- Vertical Clearance

Mainline Daily Traffic Volume

Exponential equation; score = $5-(5*e^{(ADT*-0.000039)})$

Score	Condition
0	<6,000
0-5	6,000-160,000
5	>160,000

Elevation

Variance above 4000' divided by 1000; (Elev-4000)/1000

Score	Condition
0	< 4000’
0-5	4000’- 9000’
5	> 9000’

Carries Mainline

Score	Condition
0	Does not carry mainline traffic
5	Carries mainline traffic

Detour Scale

Divides detour length by 10 and multiplies by 2.5

Score	Condition
0	0 miles
0-5	0-20 miles
5	> 20 miles

Scour

Variance below 8

Score	Condition
0	Rating > 8
0-5	Rating 8 - 3
5	Rating < 3

Vertical Clearance

Variance below 16’ x 2.5; (16 –Clearance) x 2.5

Score	Condition
0	>16’
0-5	16’-14’
5	<14’

Mobility Performance Area

- Mainline VMT
- Detour Length
- Buffer Index (PTI-TTI)
- Shoulder Width

Mainline VMT

Exponential equation; score = $5-(5*e^{(ADT*-0.0000139)})$

Score	Condition
0	<16,000
0-5	16,000-400,000
5	>400,000

Buffer Index

Buffer Index x 10

Score	Condition
0	Buffer Index = 0.00
0-5	Buffer Index 0.00-0.50
5	Buffer Index > 0.50

Detour Length

Score	Condition
0	Detour < 10 miles
5	Detour > 10 miles

Shoulder Width

Variance below 10', if only 1 lane in each direction

Score	Condition
0	10' or above or >1 lane in each direction
0-5	10'-5' and 1 lane in each direction
5	5' or less and 1 lane in each direction

Safety Performance Area

- Mainline Daily Traffic Volume
- Vertical Grade
- Shoulder width (Right)
- Elevation
- Interrupted Flow

Mainline Daily Traffic Volume

Exponential equation; score = $5-(5*e^{(ADT*-0.000039)})$

Score	Condition
0	<6,000
0-5	6,000-160,000
5	>160,000

Interrupted Flow

Score	Condition
0	Not interrupted flow
5	Interrupted Flow

Elevation

Variance above 4000' divided by 1000; (Elev-4000)/1000

Score	Condition
0	< 4000'
0-5	4000'- 9000'
5	> 9000'

Shoulder Right side)

Variance below 10'

Score	Condition
0	10' or above
0-5	10' - 5'
5	5' or less

Grade

Variance above 3% x 1.5

Score	Condition
0	< 3%
0-5	3% - 6.33%
5	>6.33%

Freight Performance Area

- Mainline Daily Truck Volume
- Detour Length
- Truck Buffer Index (TPTI-TTTI)
- Shoulder Width

Mainline Daily Truck Volume

Exponential equation; score = $5-(5*e^{(ADT*-0.00025)})$

Score	Condition
0	<900
0-5	900-25,000
5	>25,000

Detour Length

Score	Condition
0	Detour < 10 miles
5	Detour > 10 miles

Truck Buffer Index

Truck Buffer Index x 10

Score	Condition
0	Buffer Index = 0.00
0-5	Buffer Index 0.00-0.50
5	Buffer Index > 0.50

Shoulder Width

Variance below 10', if only 1 lane in each direction

Score	Condition
0	10' or above or >1 lane in each direction
0-5	10'-5' and 1 lane in each direction
5	5' or less and 1 lane in each direction

Solution Number	Mainline Traffic Vol (vpd) (2-way)	Solution Length (miles)	Bridge Detour Length (miles) (N19)	Elevation (ft)	Scour Critical Rating (0-9)	Carries Mainline Traffic (Y/N)	Bridge Vert. Clear (ft)	Mainline Truck Vol (vpd) (2-way)	Detour Length > 10 miles (Y/N)	Truck Buffer Index	Non-Truck Buffer Index	Grade (%)	Interrupted Flow (Y/N)	Outside/ Right Shoulder Width (ft)	1-lane each direction
10.01	18,624	7		2,000				4,842	n	0.27	0.37	2	n	9.83	n
10.03	18,558	4		2,000				4,825	y	0.09	0.19	2	n	9.58	n
10.04	18,558	0.5		2,000				4,825	y	0.09	0.19	2	n	9.58	n
10.05	20,849	18		2,000				5,212	y	0.07	0.14	2	n	9.9	n
10.06	20,849	0.5		2,000				5,212	y	0.07	0.14	2	n	9.9	n
10.07	19,112	17		2,000				4,969	y	0.11	0.16	2	n	9.92	n
10.08-5	19,112	1		2,000				4,969	y	0.11	0.16	2	n	9.92	n
10.08-6	19,118	0.5		2,000				4,970	y	0.07	0.14	2	n	9.91	n
10.08-8	27,699	1		2,000				7,202	n	0.08	0.15	2	n	10	n
10.09-7	21,126	16		2,000				5,493	y	0.09	0.14	2	n	9.67	n
10.09-8	27,699	14		2,000				7,202	n	0.08	0.15	2	n	10	n
10.10	27,699	0.2		2,000				7,202	n	0.08	0.15	2	n	10	n
10.11	27,699	0.5		2,000				7,202	n	0.08	0.15	2	n	10	n
85.12a	13,979	1		2,000				2,656	n	0.57	0.71	2	n	8.83	n
85.12b	13,979	2.25		2,000				2,656	n	0.57	0.71	2	n	8.83	n
85.13	10,825	3		2,000				2,382	y	1.16	2.00	2	y	6	y
85.14a	12,101	3		2,000				1,815	n	1.91	2.36	2	y	5.32	y
85.14b	12,101	3		2,000				1,815	n	1.91	2.36	2	y	5.32	y

Solution Number	Bridge	Pavement	Mobility	Safety	Freight	Risk Score (0 to 10)				
						Bridge	Pavement	Mobility	Safety	Freight
10.01	n	y	y	y	y	0.00	4.06	3.94	1.09	3.11
10.03	n	n	y	y	y	0.00	0.00	5.06	1.19	4.71
10.04	n	n	y	y	y	0.00	0.00	3.75	1.19	4.71
10.05	n	n	y	y	y	0.00	0.00	5.69	1.15	4.68
10.06	n	n	y	y	y	0.00	0.00	3.54	1.15	4.68
10.07	n	n	y	y	y	0.00	0.00	5.77	1.08	4.83
10.08-5	n	n	y	y	y	0.00	0.00	3.88	1.08	4.83
10.08-6	n	n	y	y	y	0.00	0.00	3.51	1.08	4.63
10.08-8	n	n	y	y	y	0.00	0.00	1.55	1.31	2.49
10.09-7	n	n	y	y	y	0.00	0.00	5.68	1.25	4.82
10.09-8	n	n	y	y	y	0.00	0.00	3.24	1.31	2.49
10.1	n	y	y	y	y	0.00	4.98	0.94	1.31	2.49
10.11	n	n	y	y	y	0.00	0.00	1.19	1.31	2.49
85.12a	n	n	y	y	y	0.00	0.00	2.94	1.30	3.72
85.12b	n	n	y	y	y	0.00	0.00	3.38	1.30	3.72
85.13	n	y	y	y	y	0.00	2.64	6.18	4.28	6.07
85.14a	n	y	y	y	y	0.00	2.47	4.24	4.62	3.99
85.14b	n	y	y	y	y	0.00	2.47	4.24	4.62	3.99

Appendix H: Candidate Solution Cost Estimates

Appendix H Candidate Solution Cost Estimates

I-10/SR 85 Corridor Solution Cost Estimates (Draft) - TOTAL COSTS												PE	Design	ROW	Total
CS #	Project Name	Solution	BMP	EMP	Length*	Each	Sq Ft	Unit	Unit Cost	Total Construction Cost		0.03	0.10		
10W.1	Ehrenberg Pavement Westbound	Option A - Rehabilitate Pavement	9	16	7		na	mile	$ 610,000	$ 4,270,000		$ 228,000	$ 427,000	$ -	**$ 4,825,000**
		Option B - Replace Pavement (AC)	9	16	7		na	mile	$ 3,180,000	$ 22,260,000		$ 668,000	$ 2,226,000		**$ 25,154,000**
10W.3	US 60 TI Safety Improvements	Install dynamic speed feedback sign WB MP 31 at approach to curve	31.0	31	0	1	na	each	$ 55,000	$ 55,000		$ 2,000	$ 6,000	$ -	$ 63,000
		Install dynamic speed feedback sign EB MP 27 to approach to curve	27.0	27	0	1	na	each	$ 5,000	$ 55,000		$ 2,000	$ 6,000		$ 63,000
		Install Chevrons on curves EB MP 28 to 29.5	28.0	29.5	1.5		na	mile	$ 0,500	$ 61,000		$ 2,000	$ 6,000	$ -	$ 69,000
		Install Chevrons on curves WB MP 29.5 to 28	29.5	28	1.5		na	mile	$ 40,500	$ 61,000		$ 2,000	$ 6,000	$ -	$ 69,000
		Improve skid resistance WB MP 31 to MP 27	31.0	27	4		na	mile	$ 1,490,000	$ 5,960,000		$ 179,000	$ 596,000	$ -	$ 6,735,000
		Improve skid resistance EB MP 27 to MP 31	27.0	31	4		na	mile	$ 1,490,000	$ 5,960,000		$ 179,000	$ 596,000	$ -	$ 6,735,000
									Solution Total	**$ 12,152,000**		**$ 366,000**	**$ 1,216,000**	**$ -**	**$ 13,734,000**
10W.4	US 60 TI Ramp Improvements	Modify entry/exit ramps to parallel configuration	31.0	31.0	na	4	na	each	$ 79,000	$ 3,916,000		$117,000	$ 392,000	$ -	$ 4,425,000
									Solution Total	**$ 3,916,000**		**$117,000**	**$ 392,000**	**$ -**	**$ 4,425,000**
10W.5	Vicksburg Safety Improvements	Rehabilitate Shoulder EB	32	50	18		na	mile	$ 249,000	$ 4,482,000		$ 134,000	$ 448,000	$ -	$ 5,064,000
		Rehabilitate Shoulder WB	32	50	18		na		$ 249,000	$ 4,482,000		134,000	$ 448,000	$ -	$ 5,064,000
		Install CCTV cameras at EB DMS MP 49.4	49.4	49.4	na	1	na	each	$ 55,000	$ 55,000		2,000	$ 6,000	$ -	$ 63,000
		Install CCTV cameras at WB DMS MP 49.4	49.4	49.4	na	1	na	each	$ 55,000	$ 55,000		2,000	$ 6,000	$ -	$ 63,000
									Solution Total	**$ 9,074,000**		**$ 272,000**	**$ 908,000**	**$ -**	**$ 10,254,000**
10W.6	Bouse Wash Rest Area Ramp Improvements	Modify entry/exit ramps to parallel configuration	52.5	52.5	na	4	na	each	$ 979,000	$ 3,916,000		$ 117,000	$ 392,000	$ -	$ 4,425,000
									Solution Total	**$ 3,916,000**		**$ 117,000**	**$ 392,000**	**$ -**	**$ 4,425,000**
10W.7	Centennial Safety Improvements	Install Dynamic Weather Warning Beacons (MP 66, 68, 70, 76, 78, 80)	66	80	na	12	na	each	$ 88,000	$ 1,056,000		$ 32,000	$ 106,000	$ -	$ 1,194,000
		Install RWIS (MP 70 and 77)	70	77	na	4	na	each	$ 32,000	$ 528,000		$ 16,000	$ 53,000	$ -	$ 597,000
		Widen Shoulder WB	54	71	17	na	na	mile	$ 563,000	$ 9,571,000		$ 287,000	$ 957,000	$ -	$ 10,815,000
		Widen Shoulder EB	54	71	17	na	na	mile	$ 563,000	$ 9,571,000		$ 287,000	$ 957,000	$ -	$ 10,815,000
									Solution Total	**$ 20,726,000**		**$ 622,000**	**$ 2,073,000**	**$ -**	**$ 23,421,000**
10W.8	Vicksburg to Palo Verde Lighting Improvements	Install lighting at Harquahala Rd TI Merge Point	54	54	na	20	na	each	$ 22,000	$ 440,000		$ 13,000	$ 44,000	$ -	$ 497,000
		Install ighting at Avenue 75 E TI Merge Point	70	70	na	20	na	each	$ 22,000	$ 440,000		$ 13,000	$ 44,000	$ -	$ 497,000
		Install lighting at Salome Rd TI Merge Point	81	81	na	20	na	each	$ 22,000	$ 440,000		$ 13,000	$ 44,000	$ -	$ 497,000
		Install lighting at N Wintersburg Rd TI Merge Point	98	98	na	20	na	each	$ 22,000	$ 440,000		$ 13,000	$ 44,000	$ -	$ 497,000
		Install lighting at Hassayampa Rd TI Merge Point	103	103	na	20	na	each	$ 22,000	$ 440,000		$ 13,000	$ 44,000	$ -	$ 497,000
									Solution Total	**$ 2,200,000**		**$ 65,000**	**$ 220,000**	**$ -**	**$ 2,485,000**
10W.9	Tonopah to Palo Verde Safety Improvements	Install CCTV cameras at EB DMS MP 110	110	110	na	1	na	each	$ 55,000	$ 55,000		$ 2,000	$ 6,000	$ -	$ 63,000
		Install dynamic speed feedback signs EB MP 85 and WB MP 110	85	110	na	2	na	each	$ 55,000	$ 110,000		$ 3,000	$ 11,000	$ -	$ 124,000
		Widen Shoulder EB	82	112	30	na	na	mile	$ 563,000	$ 16,890,000		$ 507,000	$ 1,689,000	$ -	$ 19,086,000
		Widen Shoulder WB	82	112	30	na	na	mile	$ 563,000	$ 16,890,000		$ 507,000	$ 1,689,000	$ -	$ 19,086,000

I-10/SR 85 Corridor Solution Cost Estimates (Draft) - TOTAL COSTS												PE	Design	ROW	Total
CS #	Project Name	Solution	BMP	EMP	Length*	Each	Sq Ft	Unit	Unit Cost	Total Construction Cost		0.03	0.10		
									Solution Total	**$ 33,945,000**		**$ 1,019,000**	**$ 3,395,000**	**$ -**	**$ 38,359,000**
10W.10	355th AVE UP Vertical Clearance	Re-profile mainline	101.4	101.4	0.2	na	na	mile	$ 2,140,000	$ 428,000		$ 13,000	$ 43,000	$ -	$ 484,000
									Solution Total	**$ 428,000**		**$ 13,000**	**$ 43,000**	**$ -**	**$ 484,000**
10W.11	I-10/SR 85 Jct. Ramp Improvements	Modify all 4 entry/exit ramps at I-10/SR 85 Jct. to parallel configuration	113	113	na	4	na	each	$ 979,000	$ 3,916,000		$ 117,000	$ 392,000	$ -	$ 4,425,000
									Solution Total	**$ 3,916,000**		**$ 117,000**	**$ 392,000**	**$ -**	**$ 4,425,000**
85.12a	Buckeye Safety Improvements	Install chevrons on the I-10 SR 85 interchange ramps	112.0	112.0	1.5	na	na	mile	$ 40,500	$ 61,000		$ 2,000	$ 6,000	$ -	$ 69,000
		Install Intersection warning beacons on SR 85 at Broadway, Southern, and Baseline (both directions)			na	6	na	each	$ 33,000	$ 198,000		$ 6,000	$ 20,000	$ -	$ 224,000
		Install larger stop signs with beacons at Broadway, Southern, and Baseline (both directions)	153.0	151.0	na	6	na	each	$ 22,000	$ 132,000		$ 4,000	$ 13,000	$ -	$ 149,000
		Add acceleration and deceleration lanes for cross-traffic merging at Southern SB	152.0	152.0	na	1	na	eacg	$ 374,000	$ 374,000		$ 11,000	$ 37,000		$ 422,000
		Add acceleration and deceleration lanes for cross-traffic merging at Southern NB	152.0	152.0	na	1	na	each	$ 374,000	$ 374,000		$ 11,000	$ 37,000	$ -	$ 422,000
		Add acceleration and deceleration lanes for cross-traffic merging at Broadway SB	153.0	153.0	na	1	na	each	$ 374,000	$ 374,000		$ 11,000	$ 37,000	$ -	$ 422,000
		Add acceleration and deceleration lanes for cross-traffic merging at Broadway NB	153.0	153.0	na	1	na	each	$ 374,000	$ 374,000		$ 11,000	$ 37,000		$ 422,000
									Solution Total	**$ 1,513,000**		**$ 45,000**	**$ 150,000**		**$,130,000**
85.12b	Buckeye Safety Improvements	Construct grade separations at Baseline/UPRR				1			$ 2,000,000	$ 22,000,000		$ 660,000	$ 2,200,000	$ -	$ 24,860,000
		Construct grade separations at Broadway, Southern, and MC-85				2			$ 6,800,000	$ 33,600,000		$ 1,008,000	$ 3,360,000	$ -	$ 37,968,000
									Solution Total	**$ 33,600,000**		**$ 1,008,000**	**$ 3,360,000**		**$ 62,828,000**
85.13	North Gila Bend SB GP Lanes	Construct 4-lane Divided Highway (Using Existing 2-lane Road for one direction)	123	120	3	na	na	mile	$ 6,600,000	$ 19,800,000		$ 594,000	$ 1,980,000	#########	$ 80,074,000
									Solution Total	**$ 19,800,000**		**$ 594,000**	**$ 1,980,000**		**$ 0,074,000**
85.14a	Butterfield Trail Mobility Improvements	Widen to two lanes in each direction w/center left turn lane	120.0	123.0	3.0	na	na	mile	$ 3,467,200	$ 10,402,000		$ 312,000	$ 1,040,000	$ -	$ 1,754,000
									Solution Total	**$ 10,402,000**		**$ 312,000**	**$ 1,040,000**		**$ 1,754,000**
85.14b	Butterfield Trail Mobility Improvements	Widen to add center left turn lane	120.0	123.0	3.0			mile	$ 2,316,600	$ 6,950,000		$ 209,000	$ 695,000	$ -	$,854,000
						na	na	mile		$ -		$ -	$ -	$ -	$ -
						na	na	mile		$ -		$ -	$ -	$ -	$ -
									Solution Total	**$ 6,950,000**		**$ 209,000**	**$ 695,000**		**$ 7,854,000**

Appendix I: Performance Effectiveness Scores

Appendix I Performance Effectiveness Scores

Post-Project Performance Scores

LEGEND:

- user entered value
- calculated value for reference only
- calculated value for entry/use in other spreadsheet
- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	10W.1	10W.3	10W.4	10W.5	10W.6	10W.7	10W.8-5	10W.8-6	10W.8-8
			Description	Ehrenberg Pavement WB	US 60 TI Safety	US 60 TI Ramp	Vicksburg Safety	Bouse Wash Rest Area Ramp	Centennial Safety	o Verde Safety	Lighting	Lighting
			Project Beg MP	9	27	31	32	52.5	54	54	71	98
			Project End MP	16	31	31	50	52.5	71	71	82	103
			Project Length (miles)	7	4	0	18	0	17	17	11	5
			Segment Beg MP	0	22	22	32	32	54	54	71	98
			Segment End MP	16	32	32	54	54	71	71	82	113
			Segment Length (miles)	16	10	10	22	22	17	17	11	15
			Segment #	1	3	3	4	4	5	5	6	8
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (NB/WB)	1.095	0.870	0.870	1.650	1.650	1.120	1.120	0.700	0.710
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (NB/WB)	3	1	1	6	6	3	3	1	4
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (NB/WB)	4	8	8	11	11	8	8	6	5
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (NB/WB)	2	0	0	6	0	3	1	0	0
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (NB/WB)	3	4	0	9	1	8	1	0	0
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (NB/WB)(lowest CMF)	0.7	0.66	0.21	0.72	0.21	0.68	0.75	0.75	0.75
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (NB/WB)	1	0.79	1	1	1	0.8	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.1	CMF 3 (NB/WB)	1	0.94	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.2	CMF 4 (NB/WB)	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (NB/WB)	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (NB/WB)	0.700	0.573	0.210	0.720	0.210	0.612	0.750	0.750	0.750
		Calculated Value (direction 1)	Fatal Crash reduction (NB/WB)	0.600	0.000	0.000	1.680	0.000	1.164	0.250	0.000	0.000
		Calculated Value (direction 1)	Incap Crash reduction (NB/WB)	0.900	1.708	0.000	2.520	0.790	3.104	0.250	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (NB/WB)	2.400	1.000	1.000	4.320	6.000	1.836	2.750	1.000	4.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (NB/WB)	3.100	6.292	8.000	8.480	10.210	4.896	7.750	6.000	5.000
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (NB/WB)	0.870	0.800	0.870	1.190	1.630	0.680	1.030	0.680	0.700
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (NB/WB)	0.870	0.800	0.870	1.190	1.630	0.680	1.030	0.680	0.700
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (SB/EB)	0.425	1.200	1.200	1.920	1.920	2.080	2.080	2.620	1.390
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (SB/EB)	1	2	2	7	7	6	6	5	8
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (SB/EB)	4	2	2	13	13	9	9	6	9
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (SB/EB)	0	1	1	7	0	6	2	1	1
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (SB/EB)	0	2	0	11	2	9	1	1	0
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (SB/EB)(lowest CMF)	1	0.66	0.21	0.72	0.21	0.68	0.75	0.75	0.75
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (SB/EB)	1	0.79	1	1	1	0.8	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.1	CMF 3 (SB/EB)	1	0.94	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.2	CMF 4 (SB/EB)	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (SB/EB)	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (SB/EB)	1.000	0.573	0.210	0.720	0.210	0.612	0.750	0.750	0.750
		Calculated Value (direction 2)	Fatal Crash reduction (SB/EB)	0.000	0.427	0.790	1.960	0.000	2.328	0.500	0.250	0.250
		Calculated Value (direction 2)	Incap Crash reduction (SB/EB)	0.000	0.854	0.000	3.080	1.580	3.492	0.250	0.250	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (SB/EB)	1.000	1.573	1.210	5.040	7.000	3.672	5.500	4.750	7.750
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (SB/EB)	4.000	1.146	2.000	9.920	11.420	5.508	8.750	5.750	9.000
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (SB/EB)	0.425	0.920	0.750	1.400	1.910	1.280	1.920	2.550	1.360
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (SB/EB)	0.425	0.920	0.750	1.400	1.910	1.280	1.920	2.550	1.360
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	0.760	1.035	1.035	1.785	1.785	1.600	1.600	1.660	1.050
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	0.64755	0.860	0.810	1.295	1.770	0.980	1.475	1.615	1.030
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	1.094	1.795	1.795	4.594	4.594	4.086	4.086	4.628	2.119
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	**0.927**	**0.972**	**0.934**	**2.783**	**4.521**	**1.629**	**3.596**	**4.462**	**2.016**

LEGEND:

- user entered value
- calculated value for reference only
- calculated value for entry/use in other spreadsheet
- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	**10W.9-7**	**10W.9-8**	**10W.10**	**10W.11**	**85.12(A)**	**85.12(B)**	**85.13**	**85.14(A)**	**85.14(B)**
			Description	Tonopah Safety	Tonopah Safety	355th Vertical Clearance	I-10/SR85 Ramps	Buckeye Safety	Buckeye Safety	North Gila Bend GP	Butterfield Trail	Butterfield Trail
			Project Beg MP	82	98	101.4	112	149	149	120	120	120
			Project End MP	98	112	101.4	113	155	155	123	123	123
			Project Length (miles)	16	14	0	1	6	6	3	3	3
			Segment Beg MP	82	98	98	98	149	149	120	120	120
			Segment End MP	98	113	113	113	155	155	123	123	123
			Segment Length (miles)	16	15	15	15	6	6	3	3	3
			Segment #	7	8	8	8	9	9	12	14	14
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (NB/WB)	3.720	0.710	0.710	0.710	3.200	3.200	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (NB/WB)	11	4	4	4	3	3	0	0	0
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (NB/WB)	3	5	5	5	6	6	1	0	0
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (NB/WB)	11	4	0	1	3	3	0	0	0
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (NB/WB)	3	5	0	4	5	5	1	0	0
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (NB/WB)(lowest CMF)	0.68	0.68	0.7	0.21	0.75	0.43	0.9	0.6	0.75
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (NB/WB)	1	1	1	1	0.85	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.1	CMF 3 (NB/WB)	0.94	0.94	1	1	0.85	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.2	CMF 4 (NB/WB)	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (NB/WB)	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (NB/WB)	0.660	0.660	0.700	0.210	0.642	0.430	0.900	0.600	0.750
		Calculated Value (direction 1)	Fatal Crash reduction (NB/WB)	3.744	1.362	0.000	0.790	1.075	1.710	0.000	0.000	0.000
		Calculated Value (direction 1)	Incap Crash reduction (NB/WB)	1.021	1.702	0.000	3.160	1.791	2.850	0.100	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (NB/WB)	7.256	2.638	4.000	3.210	1.925	1.290	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (NB/WB)	1.979	3.298	5.000	1.840	4.209	3.150	0.900	0.000	0.000
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (NB/WB)	2.440	0.460	0.700	0.540	2.070	1.410	0.200	NA	NA
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (NB/WB)	2.440	0.460	0.700	0.540	2.070	1.410	0.200	NA	NA
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (SB/EB)	1.480	1.390	1.390	1.390	3.050	3.050	0.000	0.000	0.000
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (SB/EB)	4	8	8	8	3	3	0	0	0
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (SB/EB)	7	9	9	9	3	3	0	0	0
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (SB/EB)	4	8	0	1	3	3	0	0	0
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (SB/EB)	7	9	0	4	3	3	0	0	0
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (SB/EB)(lowest CMF)	0.68	0.68	0.7	0.21	0.75	0.43	0.9	0.6	0.75
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (SB/EB)	1	1	1	1	0.85	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.1	CMF 3 (SB/EB)	0.94	0.94	1	1	0.85	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.2	CMF 4 (SB/EB)	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (SB/EB)	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (SB/EB)	0.660	0.660	0.700	0.210	0.642	0.430	0.900	0.600	0.750
		Calculated Value (direction 2)	Fatal Crash reduction (SB/EB)	1.362	2.723	0.000	0.790	1.075	1.710	0.000	0.000	0.000
		Calculated Value (direction 2)	Incap Crash reduction (SB/EB)	2.383	3.064	0.000	3.160	1.075	1.710	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (SB/EB)	2.638	5.277	8.000	7.210	1.925	1.290	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (SB/EB)	4.617	5.936	9.000	5.840	1.925	1.290	0.000	0.000	0.000
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (SB/EB)	0.980	0.920	1.400	1.240	1.960	1.310	0.000	NA	NA
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (SB/EB)	0.980	0.920	1.400	1.240	1.960	1.310	0.000	NA	NA
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	2.600	1.050	1.050	1.050	3.125	3.125	1.000	1.000	1.000
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	1.710	0.690	1.050	0.890	2.015	1.360	0.100	1.000	1.000
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	7.889	2.119	2.119	2.119	9.643	9.643	0.17	NA	NA
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	**4.481**	**1.078**	**2.119**	**1.31**	**5.423**	**2.922**	**0.061**	NA	NA

LEGEND:

- user entered value
- calculated value for reference only
- calculated value for entry/use in other spreadsheet
- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	10W.1	10W.2	10W.3	10W.4	10W.5	10W.6	10W.7	10W.8-5	10W.8-6	10W.8-8
			Description	Ehrenberg Pavement WB	Ehrenberg Pavement EB	US 60 TI Safety	US 60 TI Ramp	Vicksburg Safety	Bouse Wash Rest Area Ramp	Centennial Safety	lo Verde Safety	Lighting	Lighting
			Project Beg MP	9	12	27	31	32	52.5	54	54	71	98
			Project End MP	16	16	31	31	50	52.5	71	71	82	103
			Project Length (miles)	7	4	4	0	18	0	17	17	11	5
			Segment Beg MP	0	0	22	22	32	32	54	54	71	98
			Segment End MP	16	16	32	32	54	54	71	71	82	113
			Segment Length (miles)	16	16	10	10	22	22	17	17	11	15
			Segment #	1	1	3	3	4	4	5	5	6	8
MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.270	0.270	0.270	0.270	0.310	0.310	0.290	0.290	0.290	0.530
		Enter in Mobility Index Spreadsheet to determine new segment level Mobility Index	Post-Project # of Lanes (both directions)	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Mobility Index	0.27	0.27	0.27	0.25	0.31	0.28	0.29	0.29	0.29	0.53
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.270	0.270	0.270	0.250	0.310	0.280	0.290	0.290	0.290	0.530
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.300	0.300	0.290	0.290	0.340	0.340	0.320	0.320	0.320	0.700
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.300	0.300	0.290	0.270	0.340	0.310	0.320	0.320	0.320	0.700
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.300	0.300	0.290	0.270	0.340	0.310	0.320	0.320	0.320	0.700
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (NB/WB)	0.280	0.280	0.280	0.280	0.340	0.340	0.290	0.290	0.310	0.350
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (SB/EB)	0.280	0.280	0.280	0.280	0.340	0.340	0.290	0.290	0.270	0.340
		***If One-Way project**, enter in Mobility Index Spreadsheet to determine new segment level Peak Hour V/C. **If Two-Way project,** disregard	Adjusted total # of Lanes for use in directional peak hr	4.00	4.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (NB/WB)	0.280	0.280	0.28	0.25	0.34	0.31	0.29	0.29	0.31	0.35
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (SB/EB)	0.280	0.280	0.28	0.25	0.34	0.31	0.29	0.29	0.27	0.34
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (NB/WB)	0.280	0.280	0.280	0.250	0.340	0.310	0.290	0.290	0.310	0.350
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (SB/EB)	0.280	0.280	0.280	0.250	0.340	0.310	0.290	0.290	0.270	0.340
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	0.852	0.992	0.831	0.783	0.725	0.992	0.613	0.922	0.973	0.981
		Calculated Value (both directions)	Safety Reduction	0.148	0.008	0.169	0.217	0.275	0.008	0.388	0.078	0.027	0.019
		Calculated Value (both directions)	Mobility Reduction Factor	1.000	1.000	1.000	0.926	1.000	0.903	1.000	1.000	1.000	1.000
		Calculated Value (both directions)	Mobility Reduction	0.000	0.000	0.000	0.074	0.000	0.097	0.000	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (NB/WB)	1.200	1.170	1.150	1.150	1.110	1.110	1.110	1.110	1.100	1.110
		Input current value from performance system (direction 1)	Original Directional Segment PTI (NB/WB)	1.570	1.540	1.340	1.340	1.240	1.240	1.270	1.270	1.210	1.250
		Input current value from performance system (direction 2)	Original Directional Segment TTI (SB/EB)	1.170	1.200	1.100	1.100	1.090	1.090	1.080	1.080	1.090	1.100
		Input current value from performance system (direction 2)	Original Directional Segment PTI (SB/EB)	1.540	1.570	1.240	1.240	1.230	1.230	1.200	1.200	1.230	1.250
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.000	0.000	0.000	0.022	0.000	0.029	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.044	0.002	0.051	0.080	0.082	0.022	0.116	0.023	0.008	0.006
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (NB/WB)	1.200	1.170	1.150	1.124	1.110	1.078	1.110	1.110	1.100	1.110
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (NB/WB)	1.500	1.536	1.272	1.233	1.138	1.213	1.122	1.240	1.200	1.243
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTTI (SB/EB)	1.170	1.200	1.100	1.076	1.090	1.058	1.080	1.080	1.090	1.100
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TPTI (SB/EB)	1.540	1.570	1.177	1.141	1.129	1.203	1.061	1.172	1.220	1.243
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (NB/WB)	0.300	0.050	0.080	0.080	0.140	0.140	0.130	0.130	0.240	0.120
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (SB/EB)	0.050	0.300	0.180	0.180	0.110	0.110	0.280	0.280	0.360	0.110
		Input value from HCRS	Segment Closures with fatalities/injuries	9	9	**6**	**6**	**16**	**16**	**11**	**11**	**14**	**14**
		Input value from HCRS	Total Segment Closures	14	14	**13**	**13**	**25**	**25**	**19**	**19**	**16**	**17**
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.64	0.64	0.46	0.46	0.64	0.64	0.58	0.58	0.88	0.82
		Calculated Value (both directions)	Closure Reduction	0.095	0.005	0.078	0.100	0.176	0.005	0.224	0.045	0.024	0.016
		Calculated Value (both directions)	Closure Reduction Factor	0.905	0.995	0.922	0.900	0.824	0.995	0.776	0.955	0.976	0.984
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (NB/WB)	0.271	0.04975	0.074	0.072	0.115	0.139	0.101	0.124	0.234	0.118
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (SB/EB)	0.050	0.300	0.166	0.162	0.091	0.109	0.217	0.267	0.351	0.108
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	100.0%	100.0%	99.0%	99.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Input current value from performance system	Orig Segment Outside Shoulder width	10	10	10	10	10	10	10	10	10	10
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Outside Shoulder width	10	10	10	10	10	10	10	10	10	10
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Bicycle Accomodation (%)	100.0%	100.0%	100.0%	99.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Enter in Mobiity Needs spreadsheet to calculate new segment level Mobility Need	Post-Project Segment Bicycle Accomodation (%)	100.0%	100.0%	100.0%	99.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Needs	User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Mobility Need	0.938	0.938	0.537	0.537	0.573	0.573	0.568	0.568	0.597	1.003
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	**0.882**	0.935	**0.523**	**0.500**	**0.559**	**0.534**	**0.544**	**0.563**	**0.591**	**1.002**

LEGEND:

- user entered value
- calculated value for reference only
- calculated value for entry/use in other spreadsheet
- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	**10W.9-7**	**10W.9-8**	**10W.10**	**10W.11**	**85.12(A)**	**85.12(B)**	**85.13**	**85.14(A)**	**85.14(B)**
			Description	Tonopah Safety	Tonopah Safety	355th Vertical Clearance	I-10/SR85 Ramps	Buckeye Safety	Buckeye Safety	North Gila Bend GP	Butterfield Trail	Butterfield Trail
			Project Beg MP	82	98	101.4	112	149	149	120	120	120
			Project End MP	98	112	101.4	113	155	155	123	123	123
			Project Length (miles)	16	14	0	1	6	6	3	3	3
			Segment Beg MP	82	98	98	98	149	149	120	120	120
			Segment End MP	98	113	113	113	155	155	123	123	123
			Segment Length (miles)	16	15	15	15	6	6	3	3	3
			Segment #	7	8	8	8	9	9	12	14	14
MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.320	0.530	0.530	0.530	0.300	0.300	0.920	1.010	1.010
		Enter in Mobility Index Spreadsheet to determine new segment level Mobility Index	Post-Project # of Lanes (both directions)	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.25	2.25
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Mobility Index	0.32	0.53	0.53	0.49	0.27	0.27	0.25	0.47	0.90
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.320	0.530	0.530	0.490	0.270	0.270	0.250	0.470	0.900
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.360	0.700	0.700	0.700	0.390	0.390	1.110	1.240	1.240
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.360	0.700	0.700	0.640	0.350	0.350	0.300	0.580	1.100
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.360	0.700	0.700	0.640	0.350	0.350	0.300	0.580	1.100
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (NB/WB)	0.340	0.350	0.350	0.350	0.180	0.180	0.560	0.670	0.670
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (SB/EB)	0.290	0.340	0.340	0.340	0.180	0.180	0.560	0.660	0.660
		***If One-Way project**, enter in Mobility Index Spreadsheet to determine new segment level Peak Hour V/C. **If Two-Way project,** disregard	Adjusted total # of Lanes for use in directional peak hr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (NB/WB)	0.34	0.35	0.35	0.32	0.16	0.16	0.15	0.32	0.60
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (SB/EB)	0.29	0.34	0.34	0.31	0.16	0.16	0.15	0.31	0.59
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (NB/WB)	0.340	0.350	0.350	0.320	0.160	0.160	0.150	0.320	0.600
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (SB/EB)	0.290	0.340	0.340	0.310	0.160	0.160	0.150	0.310	0.590
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	0.658	0.657	1.000	0.848	0.645	0.435	0.100	1.000	1.000
		Calculated Value (both directions)	Safety Reduction	0.342	0.343	0.000	0.152	0.355	0.565	0.900	0.000	0.000
		Calculated Value (both directions)	Mobility Reduction Factor	1.000	1.000	1.000	0.925	0.900	0.900	0.272	0.465	0.891
		Calculated Value (both directions)	Mobility Reduction	0.000	0.000	0.000	0.075	0.100	0.100	0.728	0.535	0.109
		Input current value from performance system (direction 1)	Original Directional Segment TTI (NB/WB)	1.100	1.110	1.110	1.110	1.000	1.000	1.000	1.280	1.280
		Input current value from performance system (direction 1)	Original Directional Segment PTI (NB/WB)	1.240	1.250	1.250	1.250	1.320	1.320	1.000	9.050	9.050
		Input current value from performance system (direction 2)	Original Directional Segment TTI (SB/EB)	1.100	1.100	1.100	1.100	1.050	1.050	1.190	1.890	1.890
		Input current value from performance system (direction 2)	Original Directional Segment PTI (SB/EB)	1.230	1.250	1.250	1.250	1.760	1.760	3.190	4.250	4.250
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.000	0.000	0.000	0.023	0.030	0.030	0.218	0.160	0.033
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.103	0.103	0.000	0.061	0.127	0.189	0.416	0.107	0.022
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (NB/WB)	1.100	1.110	1.110	1.085	1.000	1.000	1.000	1.075	1.238
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (NB/WB)	1.113	1.121	1.250	1.174	1.153	1.070	1.000	8.082	8.853
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTTI (SB/EB)	1.100	1.100	1.100	1.075	1.019	1.019	1.095	1.587	1.828
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TPTI (SB/EB)	1.104	1.12	1.25	1.174	1.537	1.427	1.864	3.796	4.157
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (NB/WB)	0.400	0.120	0.120	0.120	0.070	0.070	0.270	0.000	0.000
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (SB/EB)	0.110	0.110	0.110	0.110	0.770	0.770	0.070	0.000	0.000
		Input value from HCRS	Segment Closures with fatalities/injuries	**12**	**14**	**14**	**14**	**18**	**18**	**0**	**0**	**0**
		Input value from HCRS	Total Segment Closures	**25**	**17**	**17**	**17**	**23**	**23**	**4**	**0**	**0**
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.48	0.82	0.82	0.82	0.78	0.78	0.00	#DIV/0!	#DIV/0!
		Calculated Value (both directions)	Closure Reduction	0.164	0.282	0.000	0.125	0.278	0.442	0.000	#DIV/0!	#DIV/0!
		Calculated Value (both directions)	Closure Reduction Factor	0.836	0.718	1.000	0.875	0.722	0.558	1.000	#DIV/0!	#DIV/0!
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (NB/WB)	0.334	0.086	0.120	0.105	0.051	0.039	0.270	#DIV/0!	#DIV/0!
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (SB/EB)	0.092	0.079	0.110	0.096	0.556	0.430	0.070	#DIV/0!	#DIV/0!
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	100.0%	100.0%	100.0%	100.0%	88.0%	88.0%	32.0%	7.0%	7.0%
		Input current value from performance system	Orig Segment Outside Shoulder width	10	10	10	10	9	9	7	6	6
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Outside Shoulder width	10	10	10	10	9	9	9	10	10
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Bicycle Accomodation (%)	100.0%	100.0%	100.0%	100.0%	88.0%	88.0%	100.0%	100.0%	100.0%
		Enter in Mobiity Needs spreadsheet to calculate new segment level Mobility Need	Post-Project Segment Bicycle Accomodation (%)	100.0%	100.0%	100.0%	100.0%	88.0%	88.0%	100.0%	100.0%	100.0%
	Needs	User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Mobility Need	0.645	1.003	1.003	1.003	1.124	1.124	4.957	5.213	5.213
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	**0.595**	**0.985**	**1.003**	**0.785**	**0.839**	**0.679**	**0.424**	**0.881**	**3.501**

LEGEND:

- user entered value
- calculated value for reference only
- calculated value for entry/use in other spreadsheet
- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	10W.1	10W.2	10W.3	10W.4	10W.5	10W.6	10W.7	10W.8-5	10W.8-6	10W.8-8
			Description	Ehrenberg Pavement WB	Ehrenberg Pavement EB	US 60 TI Safety	US 60 TI Ramp	Vicksburg Safety	Bouse Wash Rest Area Ramp	Centennial Safety	lo Verde Safety	Lighting	Lighting
			Project Beg MP	9	12	27	31	32	52.5	54	54	71	98
			Project End MP	16	16	31	31	50	52.5	71	71	82	103
			Project Length (miles)	7	4	4	0	18	0	17	17	11	5
			Segment Beg MP	0	0	22	22	32	32	54	54	71	98
			Segment End MP	16	16	32	32	54	54	71	71	82	113
			Segment Length (miles)	16	16	10	10	22	22	17	17	11	15
			Segment #	1	1	3	3	4	4	5	5	6	8
FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (NB/WB)	1.135	1.191	1.050	1.050	1.040	1.040	1.060	1.060	1.060	1.040
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (NB/WB)	1.357	1.456	1.140	1.140	1.090	1.090	1.170	1.170	1.110	1.110
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (SB/EB)	1.191	1.135	1.040	1.040	1.050	1.050	1.060	1.060	1.050	1.040
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (SB/EB)	1.456	1.357	1.100	1.100	1.120	1.120	1.130	1.130	1.120	1.120
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.000	0.000	0.000	0.011	0.000	0.015	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.022	0.001	0.025	0.040	0.041	0.011	0.058	0.012	0.004	0.003
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (NB/WB)	1.135	1.19080	1.050	1.038	1.040	1.025	1.060	1.060	1.060	1.040
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (NB/WB)	1.327	1.45468	1.111	1.094	1.045	1.078	1.102	1.156	1.105	1.107
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (SB/EB)	1.191	1.13530	1.040	1.028	1.050	1.035	1.060	1.060	1.050	1.040
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (SB/EB)	1.456	1.35670	1.072	1.056	1.074	1.108	1.064	1.117	1.115	1.117
	FREIGHT INDEX	Value from above	Original Segment TPTI (NB/WB)	1.357	1.456	1.140	1.140	1.090	1.090	1.170	1.170	1.110	1.110
		Value from above	Original Segment TPTI (SB/EB)	1.456	1.357	1.100	1.100	1.120	1.120	1.130	1.130	1.120	1.120
		Calculated Value	Original Segment Freight Index	0.7110	0.7110	0.893	0.893	0.905	0.905	0.870	0.870	0.897	0.897
		Calculated Value	Post-Project Segment TPTI (NB/WB)	1.327	1.455	1.111	1.094	1.045	1.078	1.102	1.156	1.105	1.107
		Calculated Value	Post-Project Segment TPTI (SB/EB)	1.456	1.357	1.072	1.056	1.074	1.108	1.064	1.117	1.115	1.117
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.718667	0.71139	0.916	0.930	0.944	0.915	0.923	0.880	0.901	0.899
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	50.470	25.030	8.780	8.780	35.480	35.480	42.000	42.000	100.120	44.390
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	25.030	50.470	60.660	60.660	136.640	136.640	59.850	59.850	97.780	31.350
		Calculated Value	Segment Closures with fatalities	9	9	6	6	16	16	11	11	14	14
		Calculated Value	Total Segment Closures	14	14	13	13	25	25	19	19	16	17
		Calculated Value	% Closures with Fatality	0.64	0.64	0.46	0.46	0.64	0.64	0.58	0.58	0.88	0.82
		Calculated Value	Closure Reduction	0.095	0.005	0.078	0.100	0.176	0.005	0.224	0.045	0.024	0.016
		Calculated Value	Closure Reduction Factor	0.905	0.995	0.922	0.900	0.824	0.995	0.776	0.955	0.976	0.984
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (NB/WB)	45.660	24.904	8.095	7.899	29.247	35.289	32.578	40.100	97.745	43.694
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (SB/EB)	25.030	50.470	55.926	54.574	112.634	135.905	46.423	57.143	95.461	30.858
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	16.11	16.11	16.14	16.14	15.90	15.90	16.25	16.25	16.00	15.92
		Input current value from performance system	Original vertical clearance for specific bridge	16.11	16.11	16.14	16.14	15.90	15.90	16.25	16.25	16.00	15.92
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge	16.11	16.11	16.14	16.14	15.90	15.90	16.25	16.25	16.00	15.92
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.11	16.11	16.14	16.14	15.90	15.90	16.25	16.25	16.00	15.92
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.11	16.11	16.14	16.14	15.90	15.90	16.25	16.25	16.00	15.92
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	1.972	1.975	0.533	0.533	0.874	0.874	0.443	0.443	0.872	0.669
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	**1.735**	1.957	**0.527**	**0.524**	**0.822**	**0.870**	**0.422**	**0.439**	**0.858**	**0.668**

LEGEND:

- user entered value
- calculated value for reference only
- calculated value for entry/use in other spreadsheet
- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	**10W.9-7**	**10W.9-8**	**10W.10**	**10W.11**	**85.12(A)**	**85.12(B)**	**85.13**	**85.14(A)**	**85.14(B)**
			Description	Tonopah Safety	Tonopah Safety	355th Vertical Clearance	I-10/SR85 Ramps	Buckeye Safety	Buckeye Safety	North Gila Bend GP	Butterfield Trail	Butterfield Trail
			Project Beg MP	82	98	101.4	112	149	149	120	120	120
			Project End MP	98	112	101.4	113	155	155	123	123	123
			Project Length (miles)	16	14	0	1	6	6	3	3	3
			Segment Beg MP	82	98	98	98	149	149	120	120	120
			Segment End MP	98	113	113	113	155	155	123	123	123
			Segment Length (miles)	16	15	15	15	6	6	3	3	3
			Segment #	7	8	8	8	9	9	12	14	14
FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (NB/WB)	1.050	1.040	1.040	1.040	1.070	1.070	1.190	1.270	1.270
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (NB/WB)	1.130	1.110	1.110	1.110	1.640	1.640	2.350	8.040	8.040
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (SB/EB)	1.060	1.040	1.040	1.040	1.000	1.000	1.000	1.910	1.910
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (SB/EB)	1.150	1.120	1.120	1.120	1.400	1.400	1.000	3.820	3.820
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.000	0.000	0.000	0.011	0.015	0.015	0.109	0.080	0.016
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.051	0.051	0.000	0.030	0.063	0.095	0.208	0.053	0.011
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (NB/WB)	1.050	1.040	1.040	1.028	1.054	1.054	1.060	1.168	1.249
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (NB/WB)	1.072	1.053	1.110	1.076	1.536	1.485	1.862	7.610	7.952
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (SB/EB)	1.060	1.040	1.040	1.028	1.000	1.000	1.000	1.757	1.879
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (SB/EB)	1.091	1.062	1.120	1.086	1.311	1.267	1.000	3.616	3.778
	FREIGHT INDEX	Value from above	Original Segment TPTI (NB/WB)	1.130	1.110	1.110	1.110	1.640	1.640	2.350	8.040	8.040
		Value from above	Original Segment TPTI (SB/EB)	1.150	1.120	1.120	1.120	1.400	1.400	1.000	3.820	3.820
		Calculated Value	Original Segment Freight Index	0.877	0.897	0.897	0.897	0.658	0.658	0.597	0.169	0.169
		Calculated Value	Post-Project Segment TPTI (NB/WB)	1.072	1.053	1.110	1.076	1.536	1.485	1.862	7.610	7.952
		Calculated Value	Post-Project Segment TPTI (SB/EB)	1.091	1.062	1.120	1.086	1.311	1.267	1.000	3.616	3.778
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.925	0.945	0.897	0.925	0.702	0.727	0.699	0.178	0.170
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	197.560	44.390	44.390	44.390	17.870	17.870	30.670	0.000	0.000
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	36.990	31.350	31.350	31.350	187.620	187.620	5.330	0.000	0.000
		Calculated Value	Segment Closures with fatalities	12	14	14	14	18	18	0	0	0
		Calculated Value	Total Segment Closures	25	17	17	17	23	23	4	0	0
		Calculated Value	% Closures with Fatality	0.48	0.82	0.82	0.82	0.78	0.78	0.00	#DIV/0!	#DIV/0!
		Calculated Value	Closure Reduction	0.164	0.282	0.000	0.125	0.278	0.442	0.000	#DIV/0!	#DIV/0!
		Calculated Value	Closure Reduction Factor	0.836	0.718	1.000	0.875	0.722	0.558	1.000	#DIV/0!	#DIV/0!
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (NB/WB)	165.099	31.856	44.390	38.819	12.902	9.971	30.670	#DIV/0!	#DIV/0!
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (SB/EB)	30.912	22.498	31.350	27.416	135.465	104.689	5.330	#DIV/0!	#DIV/0!
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	16.58	15.92	15.92	15.92	17.00	17.00	17.00	17.00	17.00
		Input current value from performance system	Original vertical clearance for specific bridge	16.58	15.92	15.92	15.92	17.00	17.00	17.00	17.00	17.00
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge	16.58	15.92	16.25	15.92	17.00	17.00	17.00	17.00	17.00
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.58	15.92	16.25	15.92	17.00	17.00	17.00	17.00	17.00
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.58	15.92	16.25	15.92	17.00	17.00	17.00	17.00	17.00
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	0.558	0.669	0.669	0.669	2.989	2.989	0.139	2.5	2.5
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	**0.489**	**0.65**	**0.417**	**0.659**	**2.109**	**1.279**	**0.128**	**2.4**	**2.4**

LEGEND:

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- assumed values (do not modify)

			Solution #	**10W.1**	**10W.2**	**10W.3**	**10W.4**	**10W.5**	**10W.6**	**10W.7**	**10W.8-5**	**10W.8-6**	**10W.8-8**
			Description	Ehrenberg Pavement WB	Ehrenberg Pavement EB	US 60 TI Safety	US 60 TI Ramp	Vicksburg Safety	Bouse Wash Rest Area Ramp	Centennial Safety	o Verde Safety	Lighting	Lighting
			Project Beg MP	9	12	27	31	32	52.5	54	54	71	98
			Project End MP	16	16	31	31	50	52.5	71	71	82	103
			Project Length (miles)	7	4	4	0	18	0	17	17	11	5
			Segment Beg MP	0	0	22	22	32	32	54	54	71	98
			Segment End MP	16	16	32	32	54	54	71	71	82	113
			Segment Length (miles)	16	16	10	10	22	22	17	17	11	15
			Segment #	1	1	3	3	4	4	5	5	6	8
BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	NA	NA								
		Input current value from performance system	Original lowest rating for specific bridge	NA	NA								
		Input post-project value (For repair +1, rehab +2, replace=8)	Post-Project lowest rating for specific bridge	NA	NA								
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project lowest rating for specific bridge	NA	NA	0	0	0	0	0	0	0	0
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	NA	NA								
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	NA	NA								
		Input current value from performance system	Original Sufficiency Rating for specific bridge	NA	NA								
		Input post-project value (For repair +10, rehab +20, replace=98)	Post-Project Sufficiency Rating for specific bridge	NA	NA								
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project Sufficiency Rating for specific bridge	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	NA	NA								
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	NA	NA								
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	NA	NA								
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	NA	NA	0	0	0	0	0	0	0	0
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	NA	NA								
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	NA	NA								
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	NA	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	2.159	2.159								
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	2.159	2.159								

LEGEND:

- user entered value
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- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	**10W.9-7**	**10W.9-8**	**10W.10**	**10W.11**	**85.12(A)**	**85.12(B)**	**85.13**	**85.14(A)**	**85.14(B)**
			Description	Tonopah Safety	Tonopah Safety	355th Vertical Clearance	I-10/SR85 Ramps	Buckeye Safety	Buckeye Safety	North Gila Bend GP	Butterfield Trail	Butterfield Trail
			Project Beg MP	82	98	101.4	112	149	149	120	120	120
			Project End MP	98	112	101.4	113	155	155	123	123	123
			Project Length (miles)	16	14	0	1	6	6	3	3	3
			Segment Beg MP	82	98	98	98	149	149	120	120	120
			Segment End MP	98	113	113	113	155	155	123	123	123
			Segment Length (miles)	16	15	15	15	6	6	3	3	3
			Segment #	7	8	8	8	9	9	12	14	14
BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index									
		Input current value from performance system	Original lowest rating for specific bridge									
		Input post-project value (For repair +1, rehab +2, replace=8)	Post-Project lowest rating for specific bridge									
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project lowest rating for specific bridge	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index									
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating									
		Input current value from performance system	Original Sufficiency Rating for specific bridge									
		Input post-project value (For repair +10, rehab +20, replace=98)	Post-Project Sufficiency Rating for specific bridge									
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project Sufficiency Rating for specific bridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating									
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating									
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating									
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	0	0	0	0	0	0	0	0	0
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete									
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete									
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need									
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need									

LEGEND:

- user entered value
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- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	**10W.1**	**10W.2**	**10W.3**	**10W.4**	**10W.5**	**10W.6**	**10W.7**	**10W.8-5**	**10W.8-6**	**10W.8-8**
			Description	Ehrenberg Pavement WB	Ehrenberg Pavement EB	US 60 TI Safety	US 60 TI Ramp	Vicksburg Safety	Bouse Wash Rest Area Ramp	Centennial Safety	lo Verde Safety	Lighting	Lighting
			Project Beg MP	9	12	27	31	32	52.5	54	54	71	98
			Project End MP	16	16	31	31	50	52.5	71	71	82	103
			Project Length (miles)	7	4	4	0	18	0	17	17	11	5
			Segment Beg MP	0	0	22	22	32	32	54	54	71	98
			Segment End MP	16	16	32	32	54	54	71	71	82	113
			Segment Length (miles)	16	16	10	10	22	22	17	17	11	15
			Segment #	1	1	3	3	4	4	5	5	6	8
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index	3.76	3.76								
		Input current value from performance system	Original Segment IRI in project limits	107.5	61.75								
		Input current value from performance system	Original Segment Cracking in project limits	20	22								
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits	45	45								
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	45	45	0	0	0	0	0	0	0	0
		Input post-project value (Lower to 0 for rehab or replace)	Post-Project Cracking in project limits	0	0								
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project Cracking in project limits	0	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet	Post-Project Segment Pavement Index	4.04	3.92								
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	4.04	3.92	0	0	0	0	0	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (NB/WB)	3.93	3.96								
		Input current value from performance system (direction 2)	Original Segment Directional PSR (SB/EB)	3.96	3.93								
		Value from above	Original Segment IRI in project limits	107.5	61.75	0	0	0	0	0	0	0	0
		Value from above	Post-Project directional IRI in project limits	45	45	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (NB/WB)	4.13	4.03								
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (SB/EB)	3.96	3.93								
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (NB/WB)	4.13	4.03	0	0	0	0	0	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (SB/EB)	3.96	3.93	0	0	0	0	0	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure	12.5%	12.5%								
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure	3.1%	9.4%								
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	3.1%	9.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Needs	User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Pavement Need	0.22	0.22								
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0.031	0.094								

LEGEND:

- user entered value
- calculated value for reference only
- calculated value for entry/use in other spreadsheet
- for input into Performance Effectiveness Score spreadsheet
- assumed values (do not modify)

			Solution #	**10W.9-7**	**10W.9-8**	**10W.10**	**10W.11**	**85.12(A)**	**85.12(B)**	**85.13**	**85.14(A)**	**85.14(B)**
			Description	Tonopah Safety	Tonopah Safety	355th Vertical Clearance	I-10/SR85 Ramps	Buckeye Safety	Buckeye Safety	North Gila Bend GP	Butterfield Trail	Butterfield Trail
			Project Beg MP	82	98	101.4	112	149	149	120	120	120
			Project End MP	98	112	101.4	113	155	155	123	123	123
			Project Length (miles)	16	14	0	1	6	6	3	3	3
			Segment Beg MP	82	98	98	98	149	149	120	120	120
			Segment End MP	98	113	113	113	155	155	123	123	123
			Segment Length (miles)	16	15	15	15	6	6	3	3	3
			Segment #	7	8	8	8	9	9	12	14	14
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index			3.95			4.01	3.32		
		Input current value from performance system	Original Segment IRI in project limits			70			120	134		
		Input current value from performance system	Original Segment Cracking in project limits			2			7	12		
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits			45			30	30		
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	45	0	0	30	30	0	0
		Input post-project value (Lower to 0 for rehab or replace)	Post-Project Cracking in project limits			0			0	0		
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project Cracking in project limits	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet	Post-Project Segment Pavement Index			4.05			4.29	3.77		
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	4.05	0	0	4.29	3.77	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (NB/WB)			3.8			3.63	3.21		
		Input current value from performance system (direction 2)	Original Segment Directional PSR (SB/EB)			3.67			3.85	3.42		
		Value from above	Original Segment IRI in project limits	0	0	70	0	0	120	134	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	45	0	0	30	30	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (NB/WB)			3.91			4.04	3.21		
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (SB/EB)			3.76			4.21	4.46		
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (NB/WB)	0	0	3.91	0	0	4.04	3.21	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (SB/EB)	0	0	3.76	0	0	4.21	4.46	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure			13.0%			0.0%	16.7%		
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure			13.0%			0.0%	16.7%		
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	13.0%	0.0%	0.0%	0.0%	16.7%	0.0%	0.0%
	Needs	User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Pavement Need			0.244			0	0.905	0	0
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need			0.22			0	**0.435**	0	0

Performance Area Scoring

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Pavement					Bridge					Safety					Mobility					Freight				
				Existing Segment Need	Post-Solution Segment Need	Raw Score	Risk Factor	Factored Score	Existing Segment Need	Post-Solution Segment Need	Raw Score	Risk Factor	Factored Score	Existing Segment Need	Post-Solution Segment Need	Raw Score	Risk Factor	Factored Score	Existing Segment Need	Post-Solution Segment Need	Raw Score	Risk Factor	Factored Score	Existing Segment Need	Post-Solution Segment Need	Raw Score	Risk Factor	Factored Score
10W.1	Ehrenberg Pavement WB	9 to 16	25.154	0.220	0.031	0.189	4.06	0.767	1.000	1.000	0.000	0.00	0.000	1.094	0.927	0.167	1.09	0.182	0.938	0.882	0.056	3.94	0.221	1.972	1.735	0.237	3.11	0.737
10W.3	US 60 TI Safety	27 to 31	13.734	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	1.795	0.972	0.823	1.19	0.981	0.537	0.523	0.014	5.06	0.071	0.533	0.527	0.006	4.71	0.028
10W.4	US 60 TI Ramp	31	4.425	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	1.795	0.934	0.861	1.19	1.026	0.537	0.500	0.037	3.75	0.139	0.533	0.524	0.009	4.71	0.042
10W.5	Vicksburg Safety	32 to 50	10.128	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	4.594	2.783	1.811	1.15	2.076	0.573	0.559	0.014	5.69	0.080	0.874	0.822	0.052	4.68	0.243
10W.6	Bouse Wash Rest Area Ramp	52.5	4.425	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	4.594	4.521	0.073	1.15	0.084	0.573	0.534	0.039	3.54	0.138	0.874	0.870	0.004	4.68	0.019
10W.7	Centennial Safety	54 to 71	22.824	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	4.086	1.629	2.457	1.08	2.654	0.568	0.544	0.024	5.77	0.138	0.443	0.422	0.021	4.83	0.101
10W.08	Vicksburg to PV Lighting	54 to 103	2.485	3.000	3.000	0.000	0.00	0.000	3.000	3.000	0.000	0.00	0.000	10.833	10.074	0.759		0.843	2.168	2.156	0.012		0.042	1.984	1.965	0.019		0.087
10W.8-1	Vicksburg to PV Lighting	54 to 103	0.994	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	4.086	3.596	0.490	1.08	0.529	0.568	0.563	0.005	3.88	0.019	0.443	0.439	0.004	4.83	0.019
10W.8-2	Vicksburg to PV Lighting	54 to 103	0.497	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	4.628	4.462	0.166	1.08	0.179	0.597	0.591	0.006	3.51	0.021	0.872	0.858	0.014	4.63	0.065
10W.8-3	Vicksburg to PV Lighting	54 to 103	0.994	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	2.119	2.016	0.103	1.31	0.135	1.003	1.002	0.001	1.55	0.002	0.669	0.668	0.001	2.49	0.002
10W0.9	Tonopah to PV Safety	82 to 112	38.30	2.000	2.000	0.000		0.000	2.000	2.000	0.000		0.000	10.008	5.559	4.449		5.624	1.648	1.580	0.068		0.342	1.227	1.139	0.088		0.380
10W.9-1	Tonopah to PV Safet	82 to 112	19.15	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	7.889	4.481	3.408	1.25	4.260	0.645	0.595	0.050	5.68	0.284	0.558	0.489	0.069	4.82	0.333
10W.9-2	Tonopah to PV Safet	82 to 112	19.15	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	2.119	1.078	1.041	1.31	1.364	1.003	0.985	0.018	3.24	0.058	0.669	0.650	0.019	2.49	0.047
10W.10	355th Ave Vertical Clearance	101.4	0.48	0.244	0.220	0.024	4.98	0.120	1.000	1.000	0.000	0.00	0.000	2.119	2.119	0.000	1.31	0.000	1.003	1.003	0.000	0.94	0.000	0.669	0.417	0.252	2.49	0.627
10W.11	I-10/SR85 Jct. Ramps	112 to 113	4.425	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	2.119	1.310	0.809	1.31	1.060	1.003	0.785	0.218	1.19	0.259	0.669	0.659	0.010	2.49	0.025
85.12A	Buckeye Safety	154 to 149	2.13	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	9.643	5.423	4.220	1.30	5.486	1.124	0.839	0.285	2.94	0.838	2.989	2.109	0.880	3.72	3.274
85.12B	Buckeye Grade Separations	154 to 149	62.83	1.000	1.000	0.000	0.00	0.000	1.000	1.000	0.000	0.00	0.000	9.643	2.922	6.721	1.30	8.737	1.124	0.679	0.445	3.38	1.504	2.989	1.279	1.710	3.72	6.361
85.13	N Gila Bend GP Lanes	120 to 123	30.074	0.905	0.435	0.470	2.64	1.241	1.000	1.000	0.000	0.00	0.000	0.170	0.061	0.109	4.28	0.467	4.957	0.424	4.533	6.18	28.014	0.139	0.128	0.011	6.07	0.067
85.14A	Butterfield Trail Widening	120 to 123	11.754	1.000	1.000	0.000	2.47	0.000	1.000	1.000	0.000	0.00	0.000	0.000	0.000	0.000	4.62	0.000	5.213	0.881	4.332	4.24	18.368	2.500	2.400	0.100	3.99	0.399
85.14B	Butterfield Trail CLTL	120 to 123	7.854	1.000	1.000	0.000	2.47	0.000	1.000	1.000	0.000	0.00	0.000	0.000	0.000	0.000	4.62	0.000	5.213	3.501	1.712	4.24	7.259	2.500	2.400	0.100	3.99	0.399

Performance Effectiveness Scoring Results

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Risk Factored Benefit Score					Risk Factored Emphasis Area Score			Total Factored Benefit Score	F_{VMT}	F_{NPV}	Performance Effectiveness Score
				Pavement	Bridge	Mobility	Safety	Freight	Safety	Mobility	Freight				
10W.1	Ehrenberg Pavement WB	9 to 16	25.154	0.767	0.000	0.221	0.182	0.737	0.085	0.000	0.019	1.907	0.938	0.882	0.056
10W.3	US 60 TI Safety	27 to 31	13.734	0.000	0.000	0.071	0.981	0.028	0.089	0.000	0.078	1.080	0.537	0.523	0.014
10W.4	US 60 TI Ramp	31	4.425	0.000	0.000	0.139	1.026	0.042	0.107	0.011	0.120	1.207	0.537	0.500	0.037
10W.5	Vicksburg Safety	32 to 50	10.128	0.000	0.000	0.080	2.076	0.243	0.402	0.000	0.295	2.399	0.573	0.559	0.014
10W.6	Bouse Wash Rest Area Ramp	52.5	4.425	0.000	0.000	0.138	0.084	0.019	0.041	0.027	0.077	0.240	0.573	0.534	0.039
10W.7	Centennial Safety	54 to 71	22.824	0.000	0.000	0.138	2.654	0.101	0.368	0.000	0.297	2.894	0.568	0.544	0.024
10W.08	**Vicksburg to PV Lighting**	54 to 103	2.485	0.000	0.000	0.042	0.843	0.087	0.177	0.000	0.057	0.972	2.168	2.156	0.012
10W.8-1	Vicksburg to PV Lighting	54 to 103	0.994	0.000	0.000	0.019	0.529	0.019	0.096	0.000	0.043	0.568	0.568	0.563	0.005
10W.8-2	Vicksburg to PV Lighting	54 to 103	0.497	0.000	0.000	0.021	0.179	0.065	0.041	0.000	0.014	0.265	0.597	0.591	0.006
10W.8-3	Vicksburg to PV Lighting	54 to 103	0.994	0.000	0.000	0.002	0.135	0.002	0.041	0.000	0.000	0.139	1.003	1.002	0.001
10W0.9	**Tonopah to PV Safety**	82 to 112	38.30	0.000	0.000	0.342	5.624	0.380	0.810	0.000	0.391	6.346	1.648	1.580	0.068
10W.9-1	Tonopah to PV Safet	82 to 112	19.15	0.000	0.000	0.284	4.260	0.333	0.561	0.000	0.268	4.877	0.645	0.595	0.050
10W.9-2	Tonopah to PV Safet	82 to 112	19.15	0.000	0.000	0.058	1.364	0.047	0.250	0.000	0.123	1.469	1.003	0.985	0.018
10W.10	355th Ave Vertical Clearance	101.4	0.48	0.120	0.000	0.000	0.000	0.627	0.029	0.000	0.000	0.747	1.003	1.003	0.000
10W.11	I-10/SR85 Jct. Ramps	112 to 113	4.425	0.000	0.000	0.259	1.060	0.025	0.130	0.007	0.071	1.344	1.003	0.785	0.218
85.12A	Buckeye Safety	154 to 149	2.13	0.000	0.000	0.838	5.486	3.274	0.296	0.004	0.067	9.598	1.124	0.839	0.285
85.12B	Buckeye Grade Separations	154 to 149	62.83	0.000	0.000	1.504	8.737	6.361	0.445	0.005	0.112	16.603	1.124	0.679	0.445
85.13	N Gila Bend GP Lanes	120 to 123	30.074	1.241	0.000	28.014	0.467	0.067	0.051	0.121	0.137	29.788	4.957	0.424	4.533
85.14A	Butterfield Trail Widening	120 to 123	11.754	0.000	0.000	18.368	0.000	0.399	0.104	0.070	0.012	18.767	5.213	0.881	4.332
85.14B	Butterfield Trail CLTL	120 to 123	7.854	0.000	0.000	7.259	0.000	0.399	0.104	0.013	0.000	7.658	5.213	3.501	1.712

Appendix J: Project Prioritization Scores

Appendix J Solution Prioritization Scores

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Pavement		Bridge		Safety		Mobility		Freight		Total Factored Score	Risk Factors					Weighted Risk Factor	Segment Need	Prioritization Score
				Score	%	Score	%	Score	%	Score	%	Score	%		Pavement	Bridge	Safety	Mobility	Freight			
10W.1	Ehrenberg Pavement WB	9 to 16	25.154	0.767	38.2%	0.000	0.0%	0.267	13.3%	0.221	11.0%	0.756	37.6%	2.011	1.14	1.51	1.78	1.36	1.36	1.332	1.38	**4**
10W.3	US 60 TI Safety	27 to 31	13.734	0.000	0.0%	0.000	0.0%	1.070	85.8%	0.071	5.7%	0.106	8.5%	1.247	1.14	1.51	1.78	1.36	1.36	1.720	0.85	**7**
10W.4	US 60 TI Ramp	31	4.425	0.000	0.0%	0.000	0.0%	1.133	78.4%	0.150	10.4%	0.162	11.2%	1.445	1.14	1.51	1.78	1.36	1.36	1.689	0.85	**4**
10W.5	Vicksburg Safety	32 to 50	10.128	0.000	0.0%	0.000	0.0%	2.478	80.1%	0.080	2.6%	0.538	17.4%	3.095	1.14	1.51	1.78	1.36	1.36	1.696	1.23	**49**
10W.6	Bouse Wash Rest Area Ramp	52.5	4.425	0.000	0.0%	0.000	0.0%	0.125	32.4%	0.165	42.7%	0.096	24.9%	0.385	1.14	1.51	1.78	1.36	1.36	1.496	1.23	**2**
10W.7	Centennial Safety	54 to 71	22.824	0.000	0.0%	0.000	0.0%	3.021	84.9%	0.138	3.9%	0.399	11.2%	3.559	1.14	1.51	1.78	1.36	1.36	1.717	0.92	**19**
10W.08	Vicksburg to PV Lighting	54 to 103	2.485	0.000	0.0%	0.000	0.0%	1.021	84.6%	0.042	3.5%	0.144	11.9%	1.207	1.14	1.51	1.78	1.36	1.36	1.715	0.97	**34**
10W.8-1	Vicksburg to PV Lighting	54 to 103	0.994	0.000	0.0%	0.000	0.0%	0.625	88.4%	0.019	2.7%	0.063	8.9%	0.707	1.14	1.51	1.78	1.36	1.36	1.731	0.92	
10W.8-2	Vicksburg to PV Lighting	54 to 103	0.497	0.000	0.0%	0.000	0.0%	0.220	68.8%	0.021	6.6%	0.079	24.6%	0.320	1.14	1.51	1.78	1.36	1.36	1.649	1.31	
10W.8-3	Vicksburg to PV Lighting	54 to 103	0.994	0.000	0.0%	0.000	0.0%	0.176	97.8%	0.002	0.9%	0.002	1.4%	0.180	1.14	1.51	1.78	1.36	1.36	1.771	0.85	
10W0.9	Tonopah to PV Safety	82 to 112	38.296	0.000	0.0%	0.000	0.0%	6.434	85.3%	0.342	4.5%	0.771	10.2%	7.547	1.14	1.51	1.78	1.36	1.36	1.718	1.01	**26**
10W.9-1	Tonopah to PV Safet	82 to 112	19.148	0.000	0.0%	0.000	0.0%	4.821	84.5%	0.284	5.0%	0.600	10.5%	5.705	1.14	1.51	1.78	1.36	1.36	1.715	1.15	
10W.9-2	Tonopah to PV Safet	82 to 112	19.148	0.000	0.0%	0.000	0.0%	1.613	87.6%	0.058	3.2%	0.171	9.3%	1.842	1.14	1.51	1.78	1.36	1.36	1.728	0.85	
10W.10	355th Ave Vertical Clearance	101.4	0.484	0.120	15.4%	0.000	0.0%	0.029	3.8%	0.000	0.0%	0.627	80.8%	0.776	1.14	1.51	1.78	1.36	1.36	1.342	0.85	**14**
10W.11	I-10/SR85 Jct. Ramps	112 to 113	4.425	0.000	0.0%	0.000	0.0%	1.189	76.6%	0.267	17.2%	0.096	6.2%	1.552	1.14	1.51	1.78	1.36	1.36	1.682	0.85	**7**
85.12A	Buckeye Safety	154 to 149	2.13	0.000	0.0%	0.000	0.0%	5.782	58.0%	0.842	8.5%	3.341	33.5%	9.965	1.14	1.51	1.78	1.36	1.36	1.604	1.62	**164**
85.12B	Buckeye Grade Separations	154 to 149	62.83	0.000	0.0%	0.000	0.0%	9.182	53.5%	1.509	8.8%	6.473	37.7%	17.164	1.14	1.51	1.78	1.36	1.36	1.585	1.62	**25**
85.13	N Gila Bend GP Lanes	120 to 123	30.074	1.241	4.1%	0.000	0.0%	0.518	1.7%	28.134	93.5%	0.203	0.7%	30.096	1.14	1.51	1.78	1.36	1.36	1.358	1.30	**65**
85.14A	Butterfield Trail Widening	120 to 123	11.754	0.000	0.0%	0.000	0.0%	0.104	0.5%	18.438	97.3%	0.411	2.2%	18.953	1.14	1.51	1.78	1.36	1.36	1.362	1.80	**158**
85.14B	Butterfield Trail CLTL	120 to 123	7.854	0.000	0.0%	0.000	0.0%	0.104	1.3%	7.272	93.5%	0.399	5.1%	7.775	1.14	1.51	1.78	1.36	1.36	1.366	1.80	**74**

Appendix K: Preliminary Scoping Reports for Prioritized Solutions

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Ehrenberg Pavement WB	
City/Town Name: Ehrenberg, AZ	County: La Paz
Primary Route/Street: I-10	
Beginning Limit: MP 9	
End Limit: MP 16	
Project Length: 7 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
This segment of I-10 has deteriorating pavement and pavement hot spots in the westbound direction between MP 9 and MP 16.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☒	Modernization ☐	Expansion ☐
This section of I-10 has experienced a high level of historical investment in past. After a life-cycle cost analysis was complete, it was determined that replacement of this section of pavement was more cost effective than a more traditional pavement rehabilitation approach.			

PROJECT TYPE		
Pavement Preservation ☒	Roadway Widening ☐	System Enhancement ☐
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes and lack of alternate route.*	

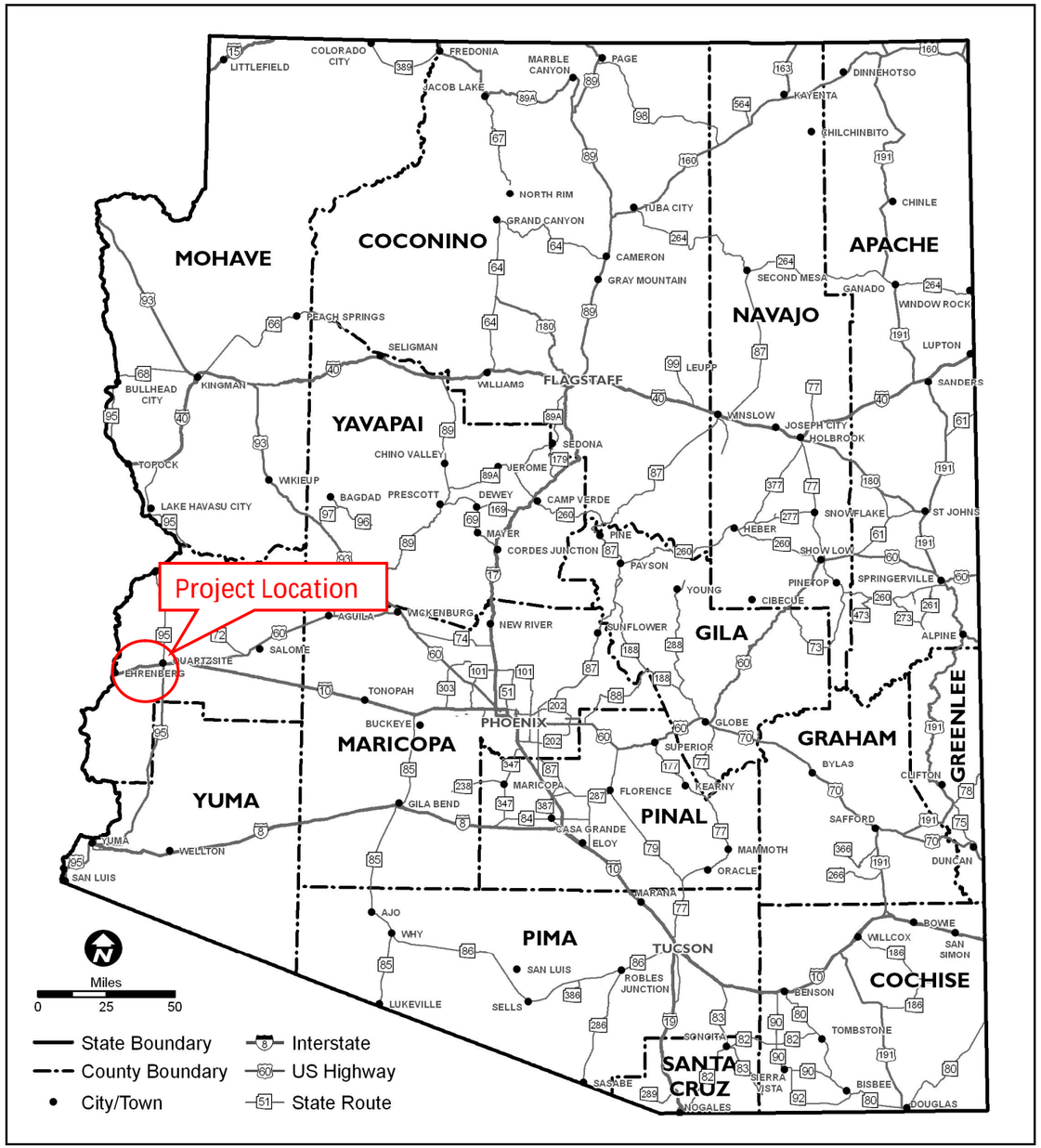
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 668,000	$ 2,226,000	$0	$22,260,000	$ 25,154,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Replace westbound pavement MP 9 – MP 16 · Includes pavement, over excavation, striping, delineators, raised pavement markers, and rumble strips

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: US 60 Interchange Safety Improvements	
City/Town Name: Quartzsite, AZ	County: La Paz
Primary Route/Street: I-10	
Beginning Limit: MP 27	
End Limit: MP 31	
Project Length: 4 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Safety hot spots were identified throughout the section of I-10 near MP 25 – MP 31. Crash trends show overturning and speed too fast for conditions related to the curve between MP 28 and MP 30 along I-10. In addition, safety related accidents have occurred in wet conditions also related to the curve location.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this project will be to warn drivers of the curve location and improve the pavement condition throughout the curve to keep drivers on the road.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒

ADOT PRELIMINARY SCOPING REPORT

Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐
Other ☒ :		

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes and lack of alternate route.*	

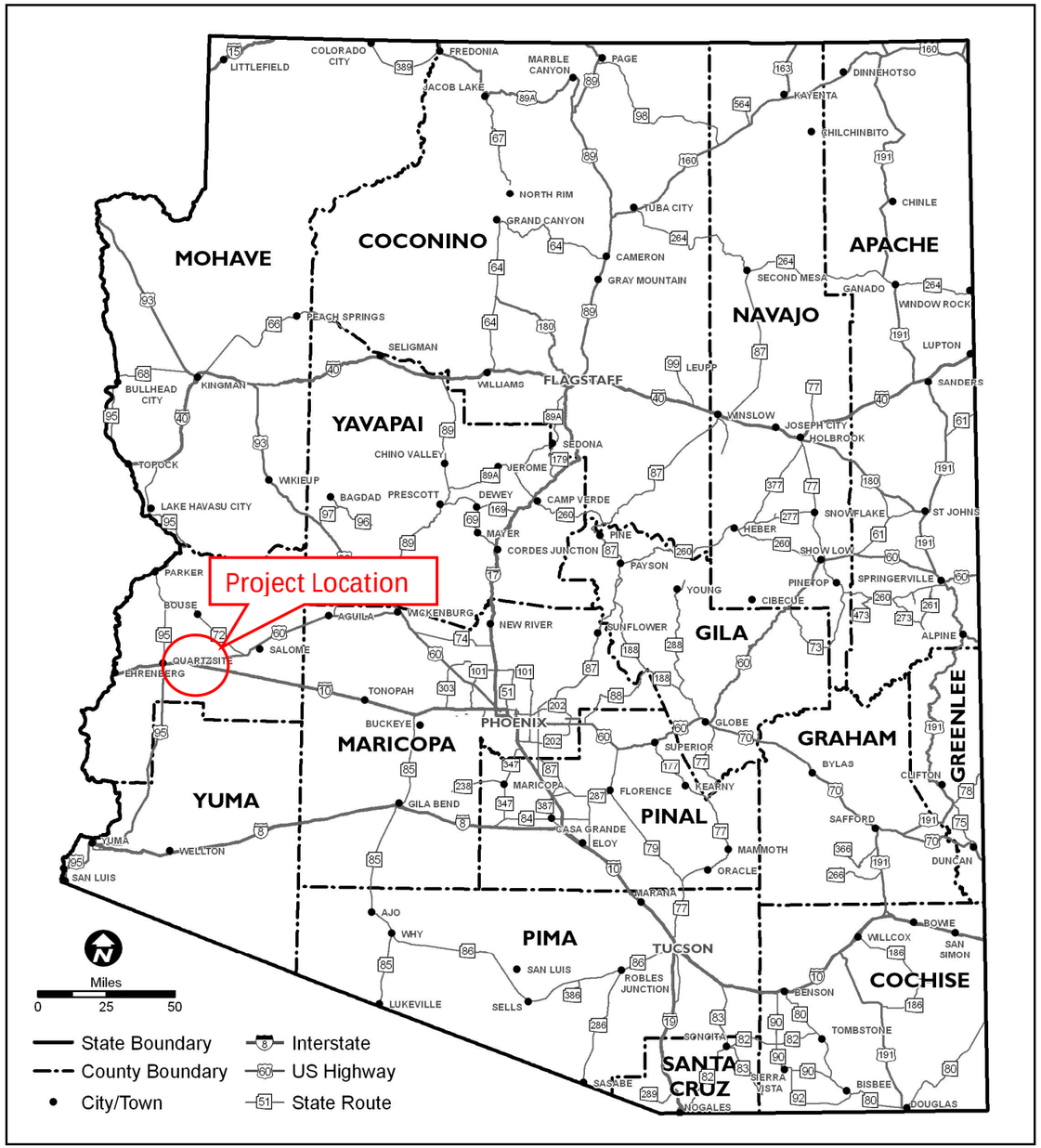
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 366,000	$ 1,216,000	$0	$12,152,000	$ 13,734,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Install speed feedback sign WB MP 31 at approach to curve · Install speed feedback sign EB MP 27 at approach to curve · Install chevrons on curve WB MP 29.5 to MP 28 · Install chevrons on curve EB MP 28 to MP 29.5 · Improve skid resistance WB MP 31 to MP 27 · Improve skid resistance EB MP 27 to MP 31 · As part of skid resistance improvements, install raised pavement markings, high-visibility delineators, and high-visibility edge line striping

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: US 60 Interchange Ramp Improvements	
City/Town Name: Quartzsite, AZ	County: La Paz
Primary Route/Street: I-10	
Beginning Limit: MP 31	
End Limit: MP 31	
Project Length: < 1 mile	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Safety hot spots were identified throughout the section of I-10 near MP 25 – MP 31. Crash trends show merging conflicts at the US 60 ramp location.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this project will be to modify the configuration of the US 60 TI to allow a safer merge movement between I-10 and US 60.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes and lack of alternate route.*	

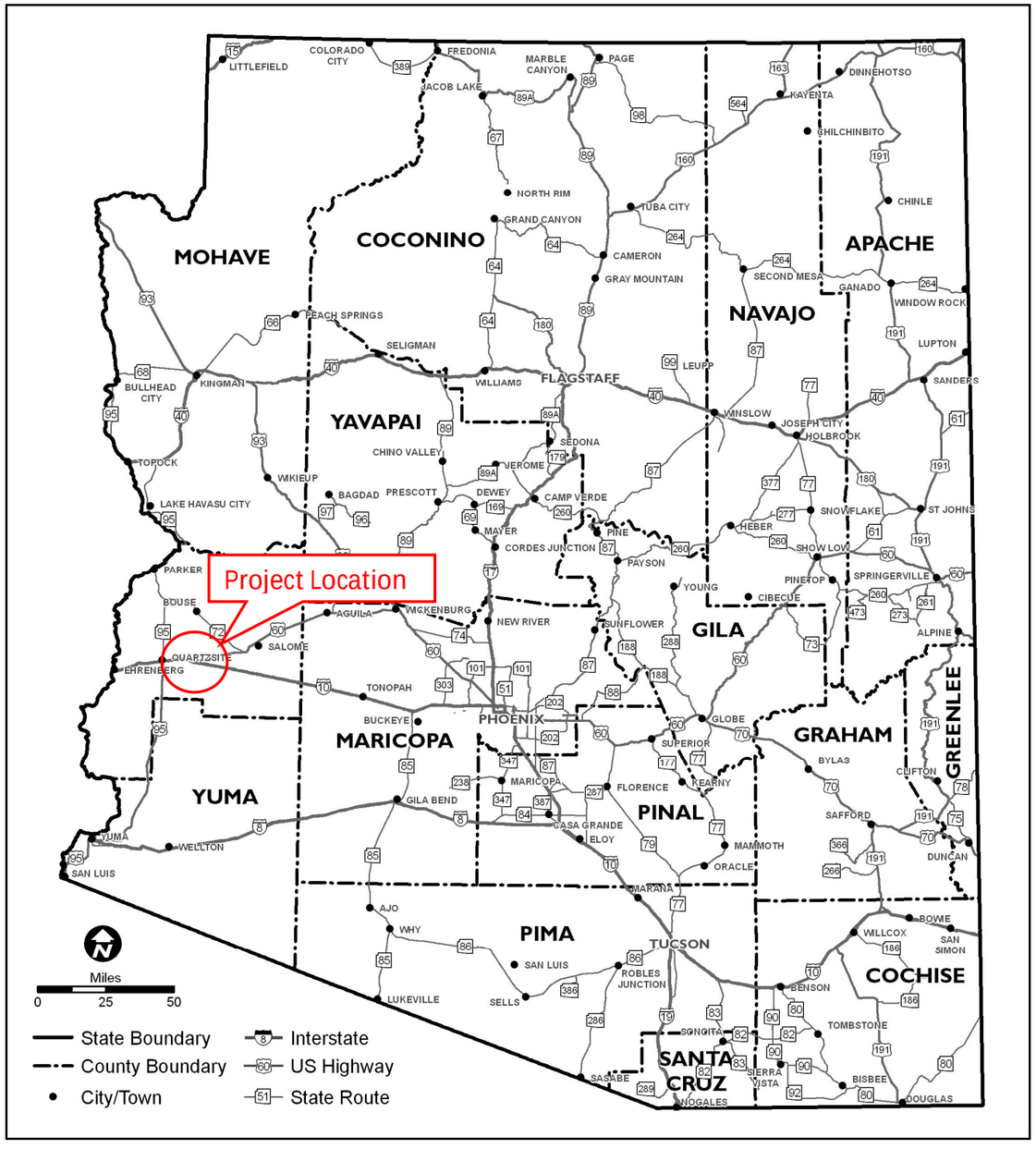
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 117,000	$ 392,000	$0	$3,916,000	$ 4,425,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Modify entry/exit ramps at I-10 and US 60 TI to a parallel configuration

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Vicksburg Safety Improvements	
City/Town Name: Vicksburg, AZ	County: La Paz
Primary Route/Street: I-10	
Beginning Limit: MP 32	
End Limit: MP 50	
Project Length: 18 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Safety hot spots were identified throughout the section of I-10 near MP 35 to MP 49. Crash trends show overturning, collisions with other vehicles, and speed too fast for conditions.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this project will be to warn drivers of excessive speed and rehabilitate the shoulders to allow for easier corrective action if vehicles drive off the road.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes and lack of alternate route.*	

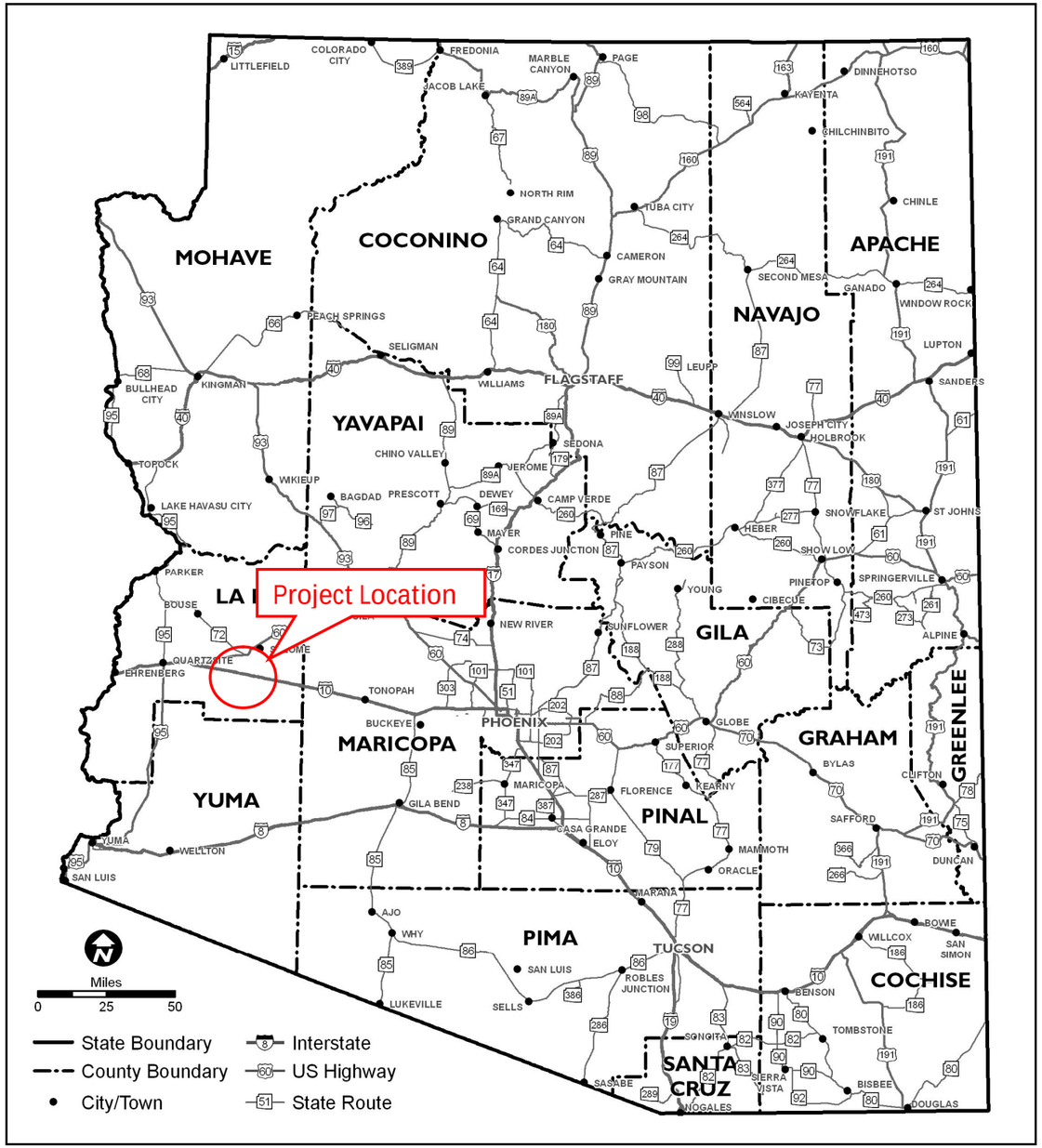
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 272,000	$ 908,000	$0	$9,074,000	$ 10,254,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Rehabilitate shoulder in EB direction between MP 32 and MP 50 · Rehabilitate shoulder in WB direction between MP 50 and MP 32 · Install CCTV cameras at EB DMS near MP 49.4 · Install CCTV cameras at WB DMS near MP 49.4 · Shoulder rehab to include installation of raised pavement markings, high-visibility delineators, and high-visibility edge line striping

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Bouse Wash Rest Area Ramp Improvements	
City/Town Name: Salome, AZ	County: La Paz
Primary Route/Street: I-10	
Beginning Limit: MP 52.5	
End Limit: MP 52.5	
Project Length: < 1 mile	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Safety hot spots were identified throughout the section of I-10 near MP 49 – MP 52. Crash trends show some merging conflicts at the Bouse Wash Rest Area ramp location.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this project will be to modify the configuration of the Bouse Wash Rest Area TI to allow a safer merge movement on and off from I-10.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes and lack of alternate route.*	

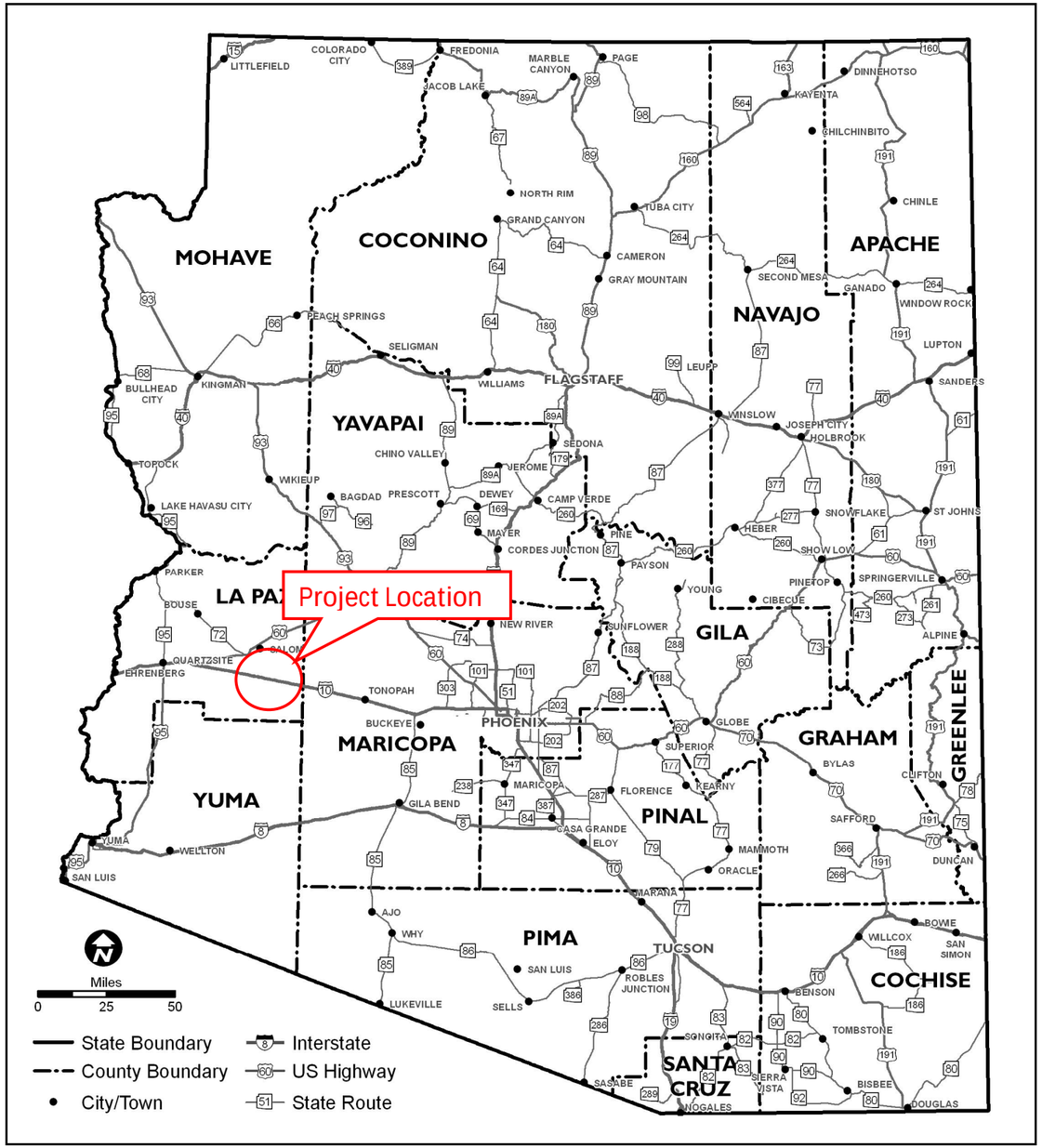
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 117,000	$ 392,000	$0	$3,916,000	$ 4,425,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Modify entry/exit ramps at Bouse Wash Rest Area TI to a parallel configuration

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Centennial Safety Improvements	
City/Town Name: Centennial, AZ	County: La Paz
Primary Route/Street: I-10	
Beginning Limit: MP 54	
End Limit: MP 71	
Project Length: 17 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
High Safety need and hot spots were identified throughout the section of I-10 near MP 54 to MP 71. Crash trends show collisions with other vehicles, rear-end collisions, and speed too fast for conditions.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this project will be to warn drivers of blowing dust and weather conditions and widen the shoulders to allow for more room and easier corrective action if vehicles drive off the road.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes and lack of alternate route.*	

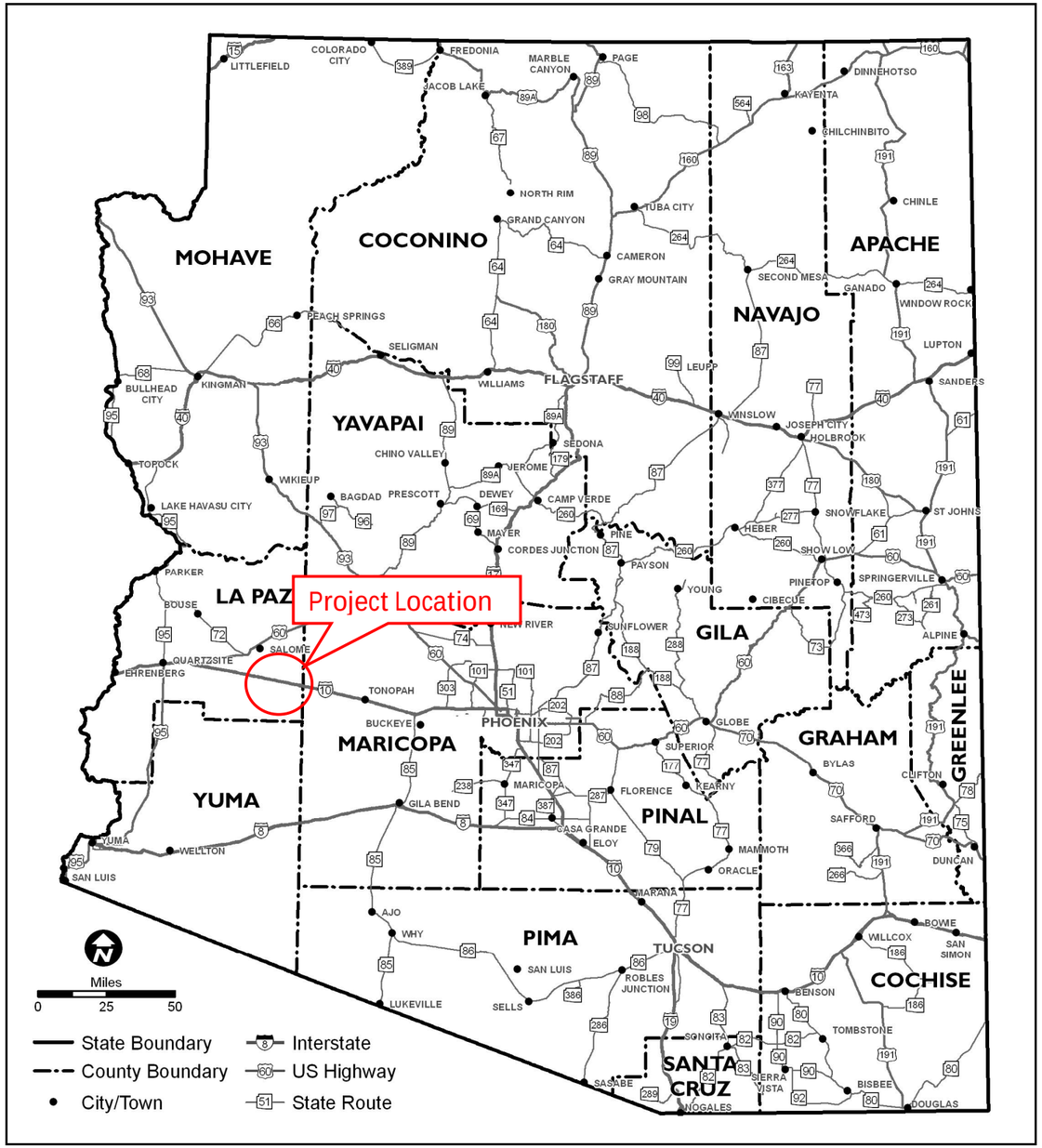
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 622,000	$ 2,073,000	$0	$20,726,000	$ 23,421,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Widen shoulder in EB direction between MP 54 and MP 71 · Widen shoulder in WB direction between MP 54 and MP 71 · Install RWIS at MP 70 · Install RWIS at MP 77 · Install dynamic weather warning beacons at MP 66, 68, 70, 76, 78, 80 · Shoulder widening to include installation of raised pavement markings, high-visibility delineators, and high-visibility edge line striping

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Vicksburg to Palo Verde Lighting Improvements	
City/Town Name: Vicksburg to Palo Verde, AZ	County: La Paz and Maricopa
Primary Route/Street: I-10	
Beginning Limit: MP 54	
End Limit: MP 103	
Project Length: 49 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
High Safety need and hot spots were identified throughout the section of I-10 near MP 54 to MP 113. Crash trends show events occurring in dark conditions.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents in dark conditions. The purpose of this project will be to provide improved lighting at select interchanges located throughout this section of I-10.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes.*	

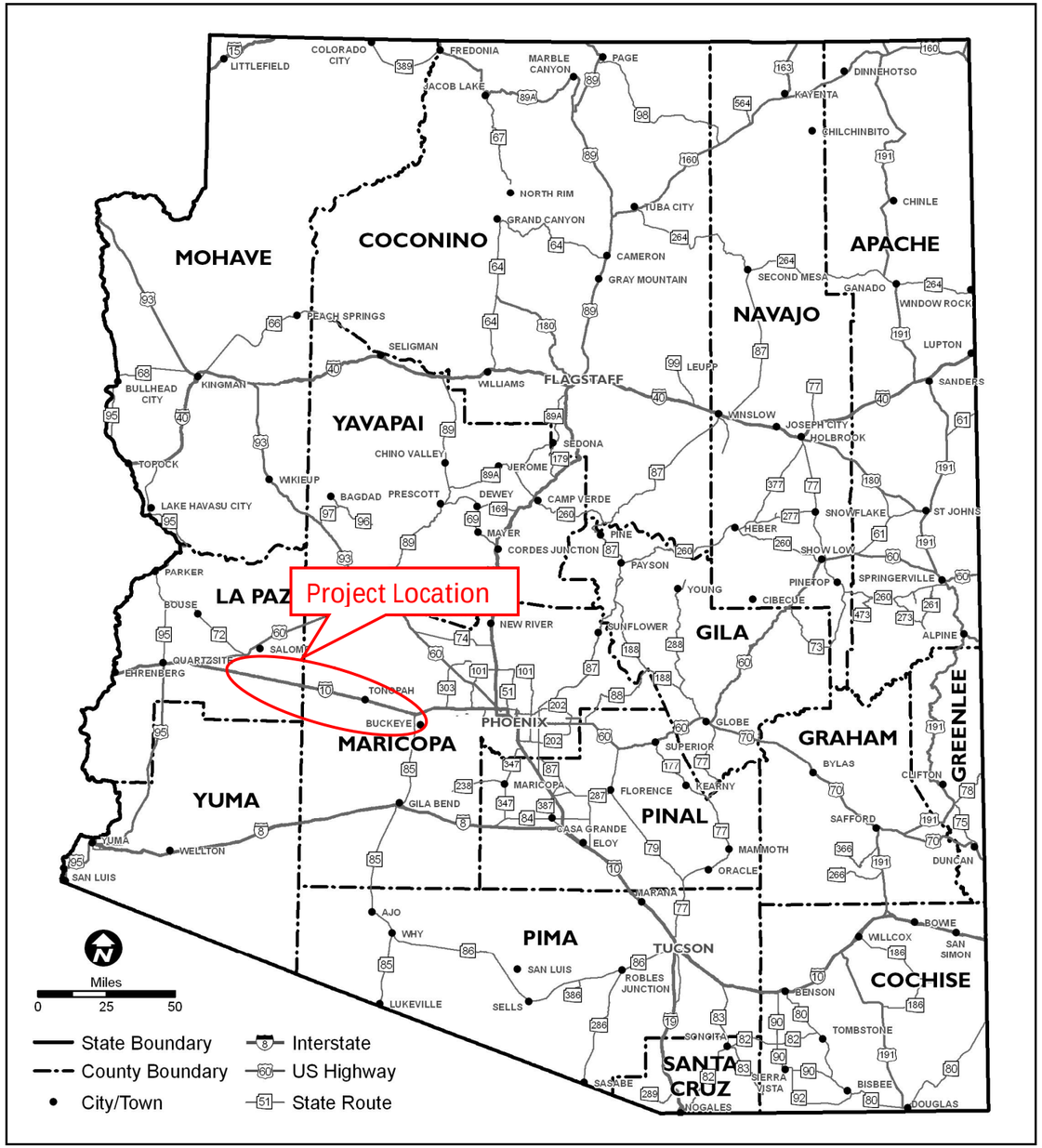
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 65,000	$ 220,000	$0	$2,200,000	$ 2,485,000

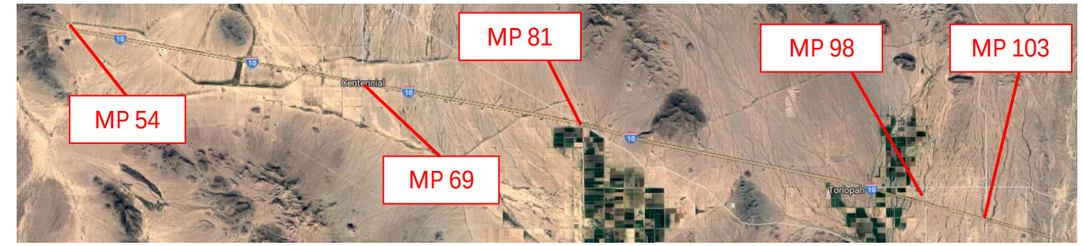
PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP



ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Install lighting at interchange merge points MP 54, 69, 81, 98, 103

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Tonopah to Palo Verde Safety Improvements	
City/Town Name: Tonopah to Palo Verde, AZ	County: Maricopa
Primary Route/Street: I-10	
Beginning Limit: MP 82	
End Limit: MP 112	
Project Length: 30 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
High Safety need and hot spots were identified throughout the section of I-10 near MP 82 to MP 112. Crash trends show overturned vehicles, speed to fast for conditions, and single vehicle accidents.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this solution will be to widen the shoulder in order to provide more room for corrective action and inform drivers of excessive speed.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes.*	

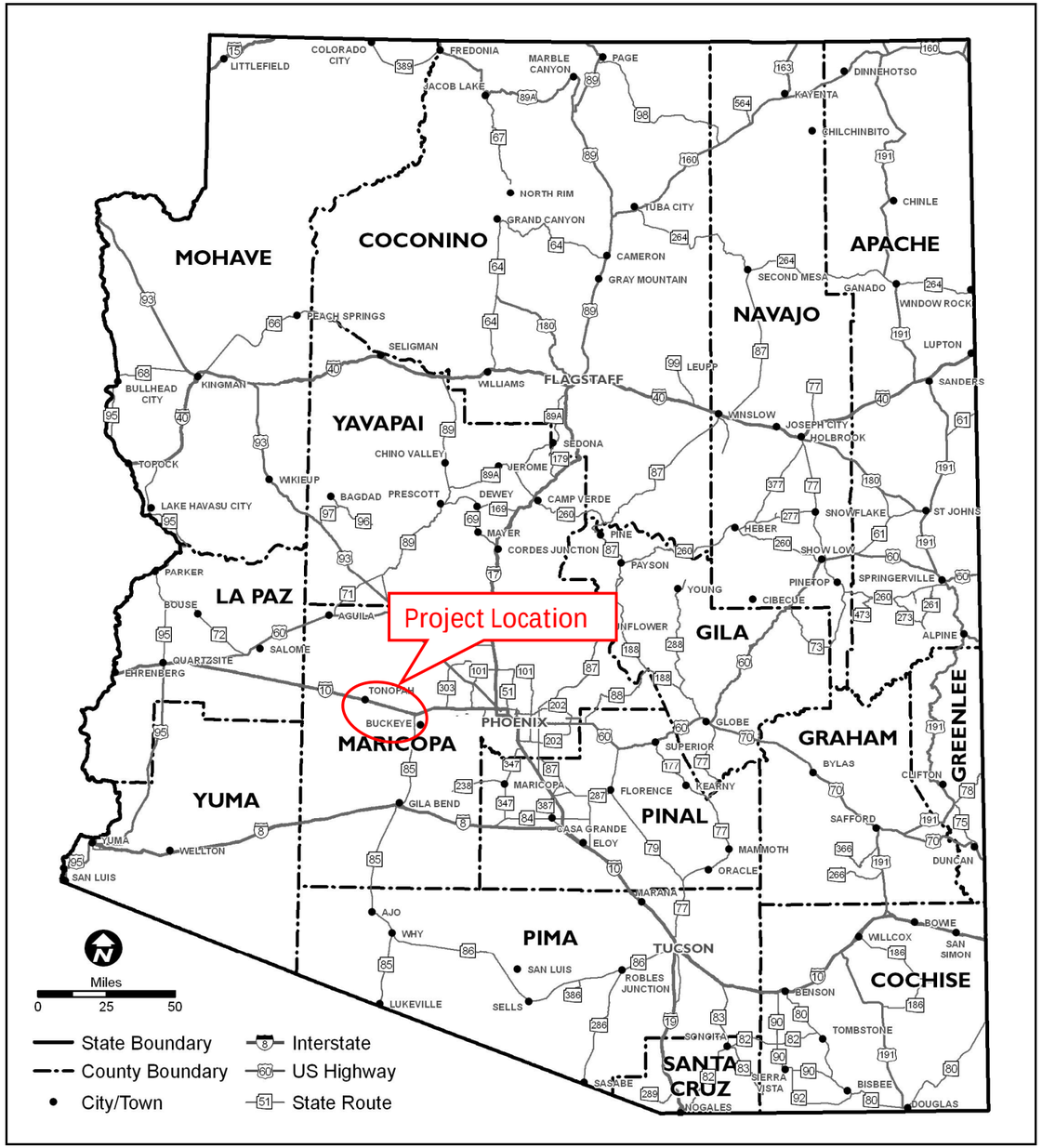
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 1,019,000	$ 3,395,000	$0	$33,945,000	$ 38,359,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Widen shoulder EB MP 82 to MP 113 · Widen shoulder WB MP 113 to MP 82 · Install CCTV cameras at EB DMS MP 110 · Install dynamic speed feedback sign EB MP 85 · Install dynamic speed feedback sign WB MP110 · Widen shoulders to include the installation of raised pavement markings, high-visibility delineators, and high-visibility edge line striping

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: 355th Avenue Underpass Vertical Clearance	
City/Town Name: Tonopah, AZ	County: Maricopa
Primary Route/Street: I-10	
Beginning Limit: MP 101.4	
End Limit: MP 101.4	
Project Length: < 1 mile	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
The vertical clearance at the 355th Avenue Underpass is less than 16 feet and has no option to ramp around for oversized vehicles.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
Increase the vertical clearance at this location to allow for oversized vehicles to pass without detour.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐
Other ☒ :		

ADOT PRELIMINARY SCOPING REPORT

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes.*	

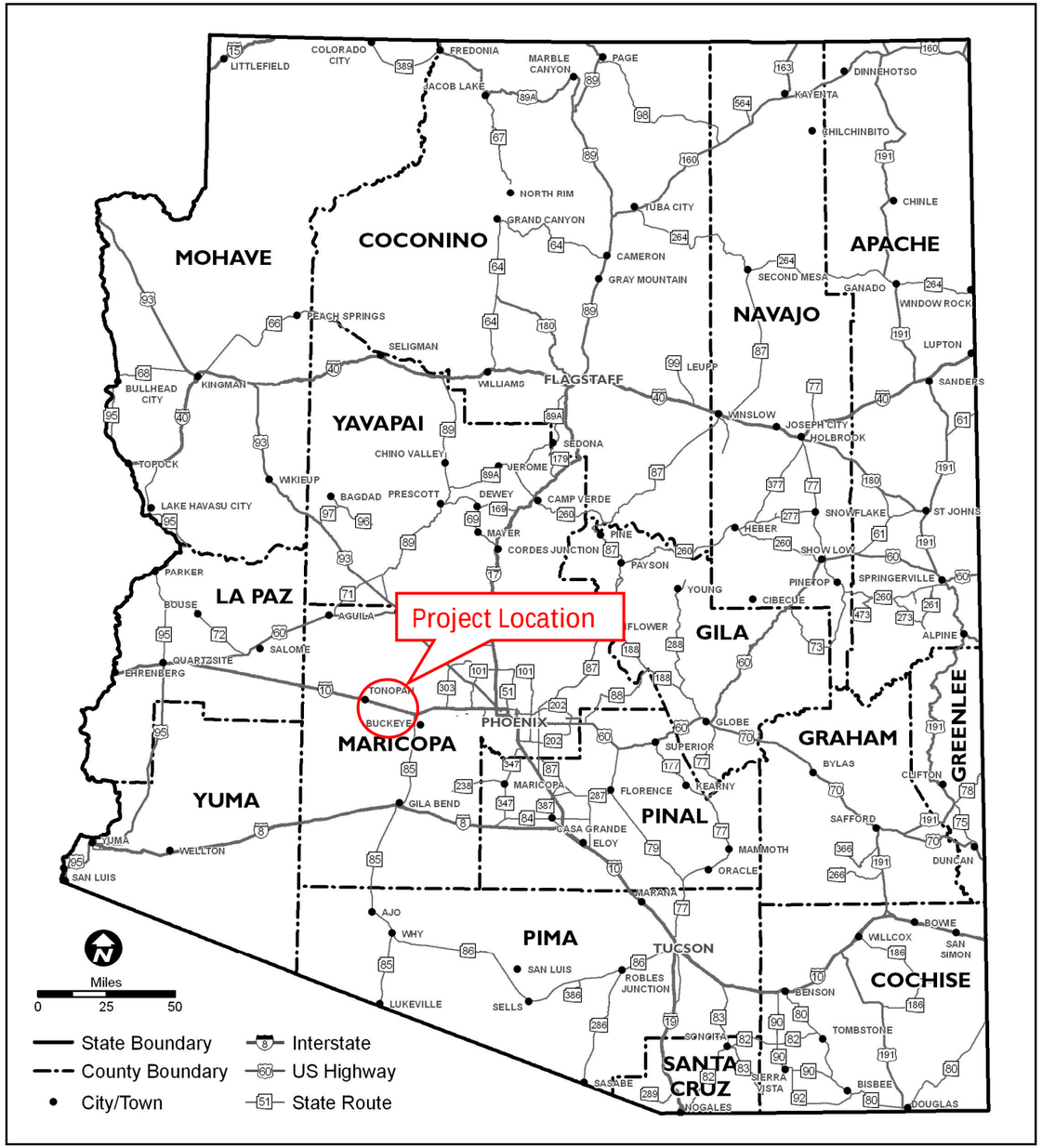
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 13,000	$ 43,000	$0	$428,000	$ 484,000

PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP

ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Re-profile mainline I-10 to increase vertical clearance under 355th Avenue.

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: I-10/SR 85 Junction Ramp Improvements	
City/Town Name: Buckeye, AZ	County: Maricopa
Primary Route/Street: I-10	
Beginning Limit: MP 112	
End Limit: MP 113	
Project Length: 1 mile	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Safety hot spots were identified throughout the section of I-10 near MP 112 - 113. Crash trends show some merging conflicts at the I-10 and SR 85 ramp locations.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
The section of I-10 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this project will be to modify the configuration of the I-10/SR 85 junction to allow a safer merge movement between I-10 and SR 85.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along I-10 due to the traffic volumes and lack of alternate route.*	

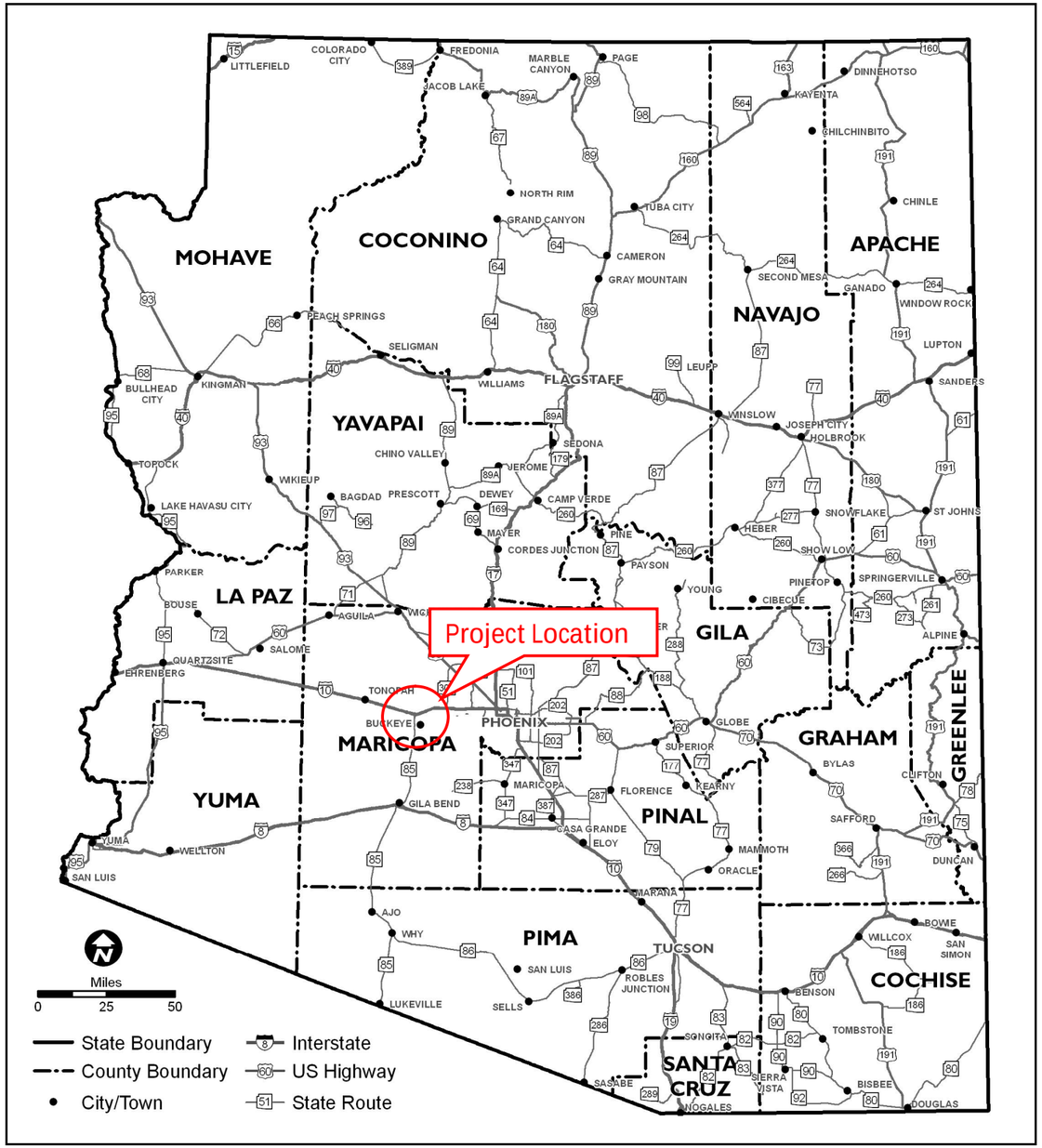
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$ 117,000	$ 392,000	$0	$3,916,000	$ 4,425,000

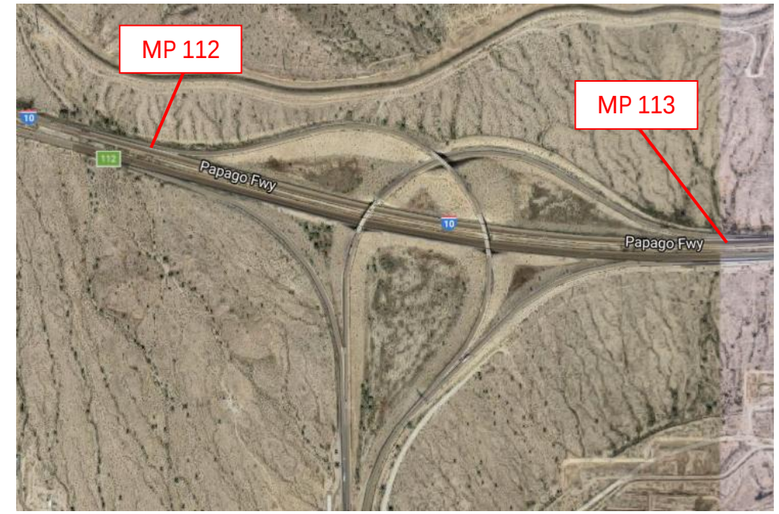
PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP



ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Modify I-10/SR 85 junction ramps to a parallel configuration

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Buckeye Safety Improvements	
City/Town Name: Buckeye, AZ	County: Maricopa
Primary Route/Street: SR 85	
Beginning Limit: MP 149	
End Limit: MP 154	
Project Length: 5 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Safety hot spots were identified throughout the section of SR 85 near the intersections of Broadway, Southern, and Baseline Roads. Crash trends show conflicts at the intersection points.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
This section of SR 85 has experienced an elevated number of fatal and incapacitating injury accidents. The purpose of this project will be to warn drivers of upcoming at-grade intersections and provide additional acceleration and deceleration room for vehicles turning on or off SR 85 to cross streets.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☐	System Enhancement ☒
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along SR 85 due to the traffic volumes and lack of alternate route.*	

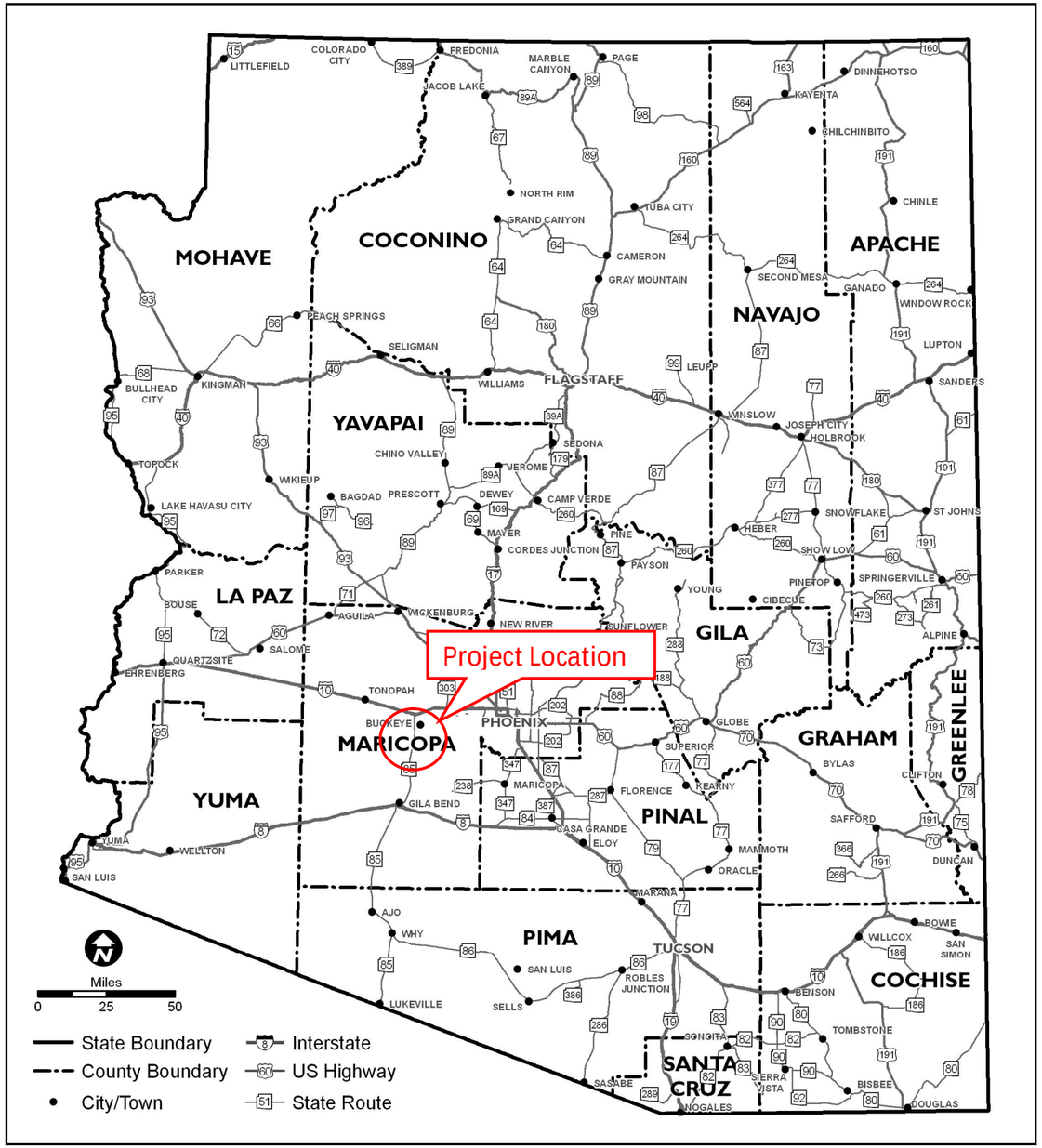
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
Opt A – $45,000 Opt B – $1,008,000	Opt A - $150,000 Opt B - $3,360,000	Opt A - $0 Opt B - $0	Opt A - $1,513,000 Opt B - $33,600,000	Opt A – $2,130,000 Opt B - $62,828,000

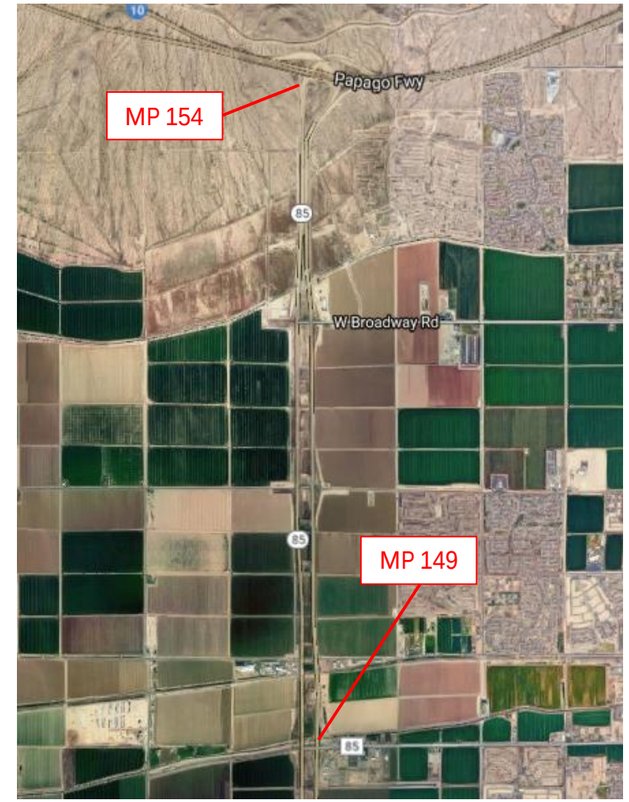
PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP



ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
Option A – Safety Intersection Improvements · Install chevrons on the I-10/SR 85 interchange ramps · Install dynamic warning signs on SR 85 at intersection approaches to Broadway, Southern, and Baseline Roads · Increase the size and visibility of stop signs along Broadway, Southern, and Baseline Roads · Add warning beacons to stops signs at Broadway, Southern, and Baseline Roads · Add acceleration and deceleration lanes for cross traffic merging at Broadway and Southern Roads Option B – Grade Separations · Along SR 85, construct grade separations at Broadway, Southern, and Baseline Roads

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: North Gila Bend GP Lanes	
City/Town Name: Gila Bend, AZ	County: Maricopa
Primary Route/Street: SR 85	
Beginning Limit: MP 120	
End Limit: MP 123	
Project Length: 3 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Mobility needs associated with elevated current and future V/C levels.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☐	Expansion ☒
This section of SR 85 has experienced elevated existing and future V/C levels. The purpose of this project will be to increase capacity between MP 120 and MP 123 by creating a divided highway that is consistent with the rest of the corridor.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☒	System Enhancement ☐
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☒ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along SR 85 due to the traffic volumes and lack of alternate route. Right of way needs to be acquired for new southbound GP lanes.*	

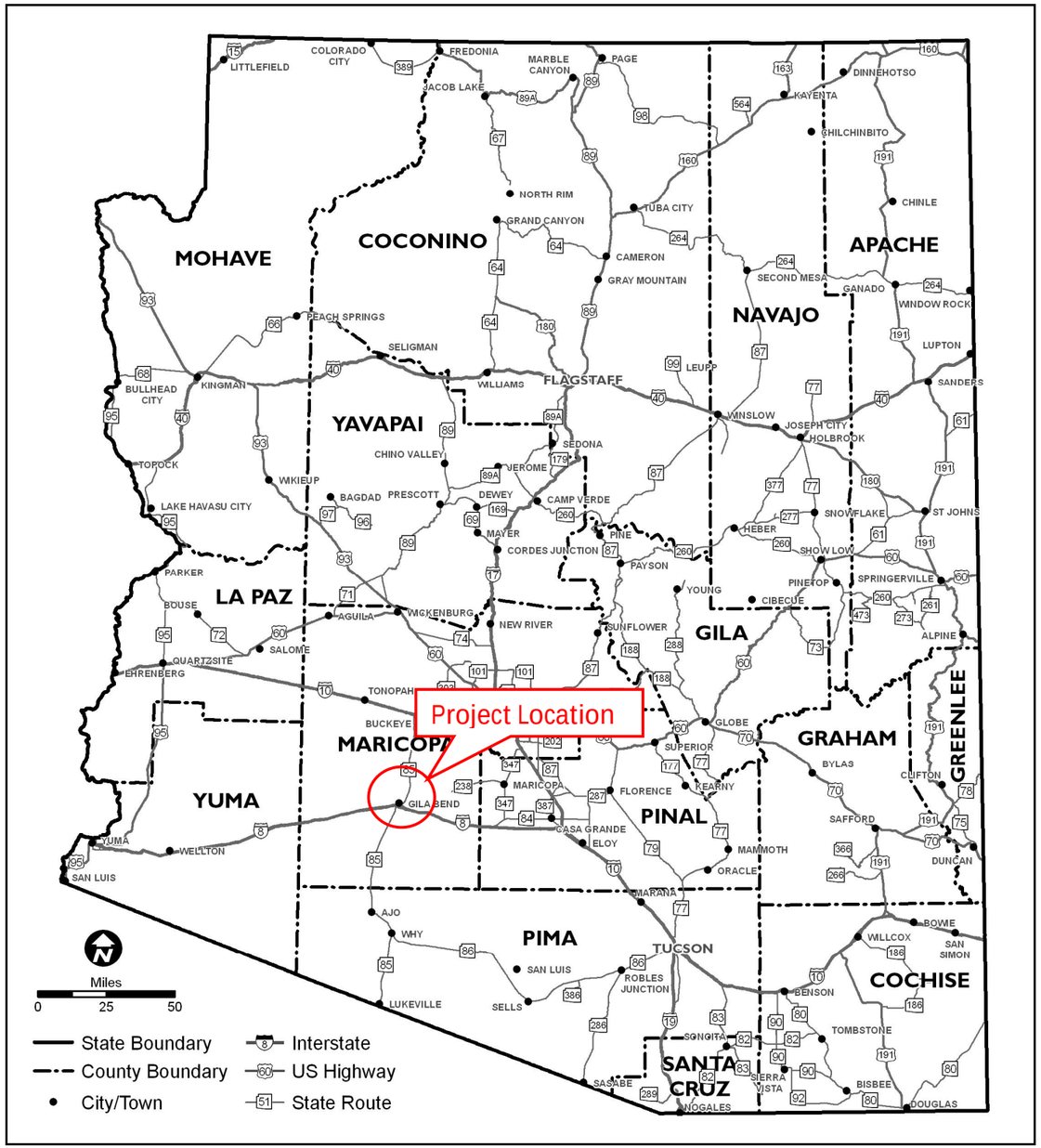
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
$594,000	$1,980,000	$7,700,000	$19,800,000	$30,074,000

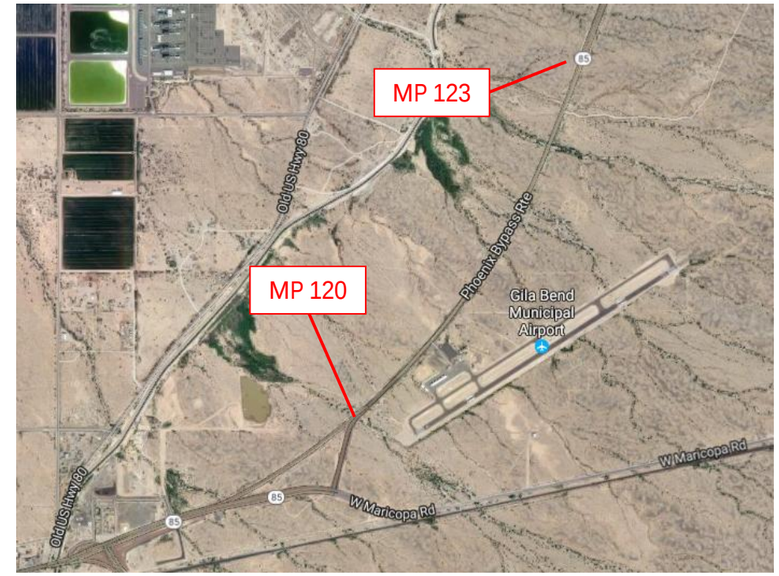
PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP



ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
· Construct 2 SB general purpose lanes west of the existing SR 85 alignment to create a 4-lane divided highway between MP 123 and Maricopa Rd (MP 120). The existing alignment will become 2 NB general purpose lanes · As part of this project, access to Gila Bend Airport will need to be addressed from the SB direction.

GENERAL PROJECT INFORMATION	
Date: January 31, 2017	ADOT Project Manager:
Project Name: Butterfield Trail Mobility Improvements	
City/Town Name: Gila Bend, AZ	County: Maricopa
Primary Route/Street: B-8/Butterfield Trail	
Beginning Limit: MP 120	
End Limit: MP 123	
Project Length: 3 miles	
Right-of-Way Ownership(s) (where proposed project construction would occur): *(Check all that apply)* ☐ City/Town; ☐ County; ☒ ADOT ; ☐ Private ; ☐ Federal; ☐ Tribal; ☐ Other:	
Adjacent Land Ownership(s): *(Check all that apply)* ☐ City/Town; ☐ County; ☐ ADOT; ☒ Private; ☒ Federal; ☐ Tribal; ☐ Other: State Trust Land *http://gis.azland.gov/webapps/parcel/*	

LOCAL PUBLIC AGENCY (LPA) or TRIBAL GOVERNMENT INFORMATION *(If applicable)*	
LPA/Tribal Name:	
LPA/Tribal Contact:	
Email Address:	Phone Number:
Administration: ☐ ADOT Administered ☐ Self-Administered ☐ Certification Acceptance	

PROJECT NEED
Mobility needs primarily associated with elevated current and future V/C values, and elevated TTI and PTI scores. Freight needs associated with elevated TPTI and TTTI values.

PROJECT PURPOSE			
What is the Primary Purpose of the Project?	Preservation ☐	Modernization ☒	Expansion ☐
This section of B-8/Butterfield Trail is 1 lane each direction with several direct access points on both sides of the roadway. The purpose of this project will be to add capacity in addition to providing passing options to reduce delay in both directions.			

PROJECT TYPE		
Pavement Preservation ☐	Roadway Widening ☒	System Enhancement ☐
Bridge Scour/Rehab ☐	Bridge Replacement ☐	Sign Replacement ☐

ADOT PRELIMINARY SCOPING REPORT

Other ☒ :

PROJECT RISKS	
Check any risks identified that may impact the project's scope, schedule, or budget:	
☒ Access / Traffic Control / Detour Issues	☐ Right-of-Way
☒ Constructability / Construction Window Issues	☐ Environmental
☐ Stakeholder Issues	☐ Utilities
☐ Structures & Geotech	☐ Other:
Risk Description: *(If a box is checked above, briefly explain the risk)* *Traffic control, detours, and constructability will be an issue along B-8 due to the traffic volumes and lack of alternate route.*	

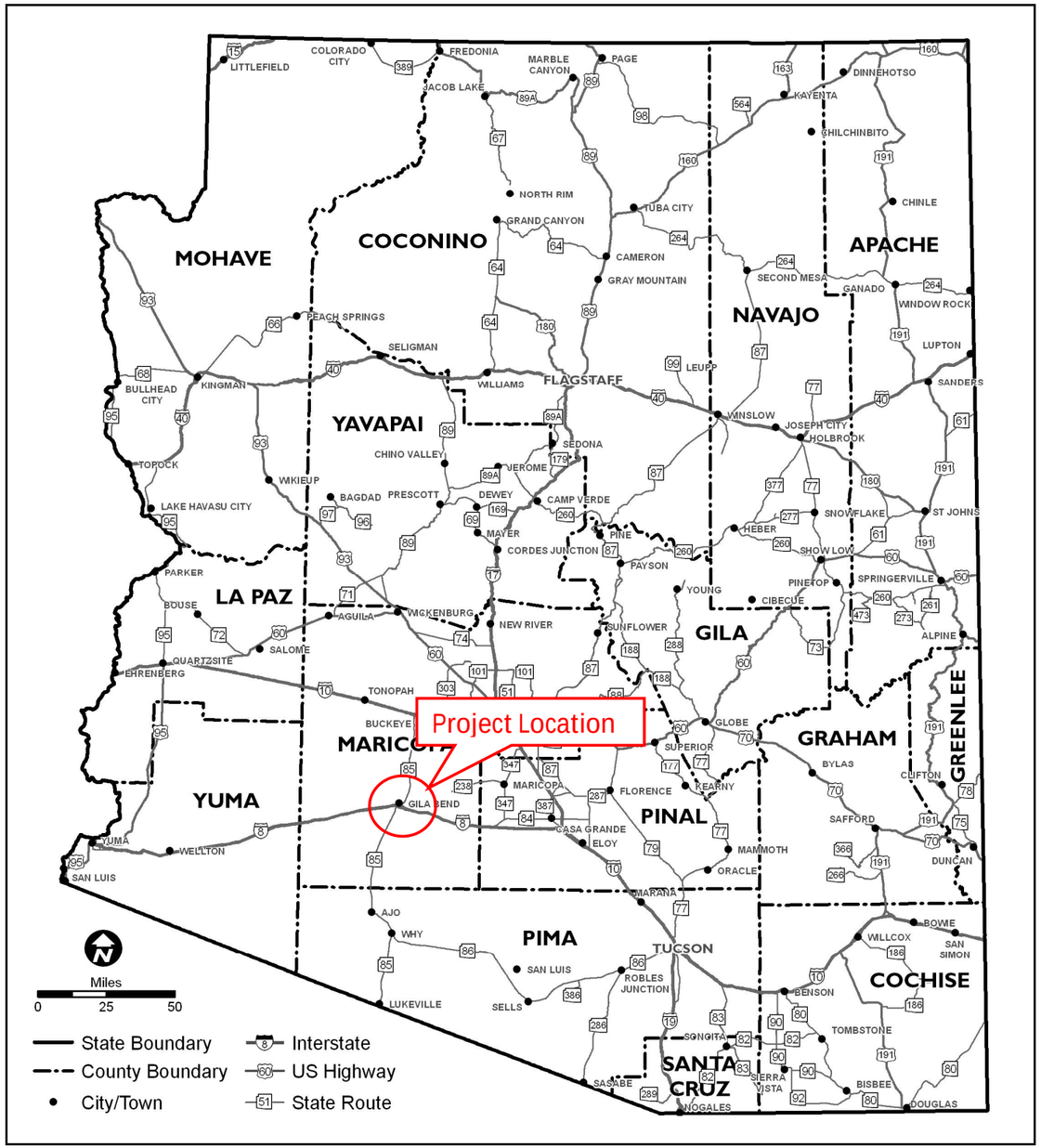
FUNDING SOURCE(S)				
Anticipated Project Design/Construction Funding Type: *(Check all that apply)*	☐ STP	☐ TAP	☐ HSIP	☐ State
	☐ Local	☐ Private	☐ Other:	

COST ESTIMATE				
Preliminary Engineering	Design	Right-of-Way	Construction	Total
Opt A – $312,000 Opt B – $209,000	Opt A - $1,040,000 Opt B - $695,000	Opt A - $0 Opt B - $0	Opt A - $10,402,000 Opt B - $6,950,000	Opt A - $11,754,000 Opt B - $7,854,000

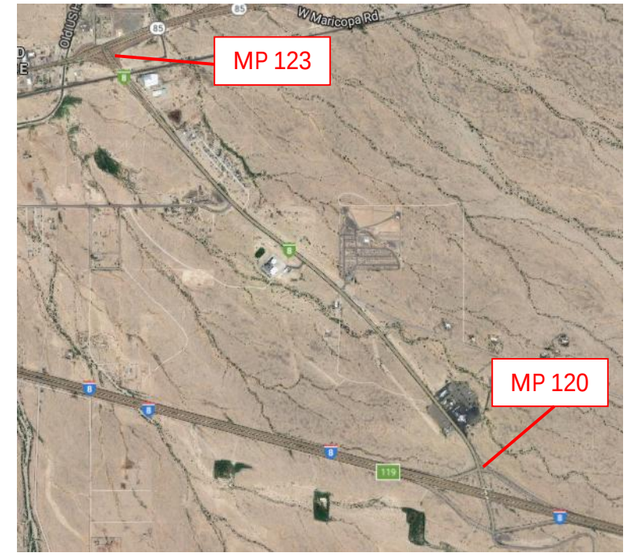
PROJECT DELIVERY
Delivery: ☐ Design-Bid-Build ☐ Design-Build ☐ Other:
Design Program Year: FY
Construction Program Year: FY

ATTACHMENTS
1) State Location Map 2) Project Vicinity Map 3) Project Scope of Work 4) Project Schedule 5) Itemized Cost Estimate 6) 15% Design Plan Sheets (as needed)

ATTACHMENT 1 – STATE LOCATION MAP



ATTACHMENT 2 – PROJECT VICINITY MAP



ATTACHMENT 3 – SCOPE OF WORK

SCOPE OF WORK
Option A – Butterfield Trail Widening · Widen to 2 lanes in each direction · Install Center Left Turn Lane · Widening to include shoulder widening and rehabilitation Option B – Butterfield Trail Center Left Turn Lane · Widen to add Center Left Turn Lane · Widening to include shoulder widening and rehabilitation