I-10 EAST CORRIDOR PROFILE STUDY

STATE ROUTE 202L TO NEW MEXICO STATE LINE

ADOT WORK TASK NO. MPD-031-16
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DRAFT WORKING PAPER 6: SOLUTION EVALUATION AND PRIORITIZATION

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ACRONYMNS AND ABBREVIATIONS

ABBREVIATION	NAME
AC	Asphaltic Concrete
ADOT	Arizona Department of Transportation
CCTV	Closed Circuit Television
CMF	Crash Modification Factor
CPS	Corridor Profile Study
DMS	Dynamic Message Sign
EB	Eastbound
FHWA	Federal Highway Administration
HOV	High-occupancy vehicle
HSM	Highway Safety Manual
I	Interstate
IRI	International Roughness Index
ITS	Intelligent Transportation System
LCCA	Life-Cycle Cost Analysis
LED	Light-emitting diode
LF	Linear Foot
MP	Milepost
MPD	Multimodal Planning Division
mph	Miles per hour
NPV	Net Present Value
OP	Overpass
P2P	Planning-to-Programming
PCCP	Portland cement concrete pavement
PES	Performance Effectiveness Score
PTI	Planning Time Index
RCBC	Reinforced concrete box culvert
RWIS	Road Weather Information System
PTI	Planning Time Index
RCBC	Reinforced concrete box culvert
RWIS	Road Weather Information System
SF	Square foot
SR	State Route
TI	Traffic Interchange
TPTI	Truck Planning Time Index
TTI	Travel Time Index
TTTI	Truck Travel Time Index
TWLTL	Two-way left turn lane
UP	Underpass
VMT	Vehicle-Miles Travelled
vpd	Vehicles per day
WB	Westbound

1.0 INTRODUCTION

The Arizona Department of Transportation (ADOT) is the lead agency for this Corridor Profile Study (CPS) of Interstate 10 (I-10) between State Route (SR) 202L (Santan Freeway) and the New Mexico State Line (I-10 East). This study examines key performance measures relative to the I-10 East 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 11 CPSs in three separate group.

The first three studies (Round 1) began in the spring of 2014, and encompass:

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

The second round (Round 2) of studies, initiated in the spring of 2015, includes:

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

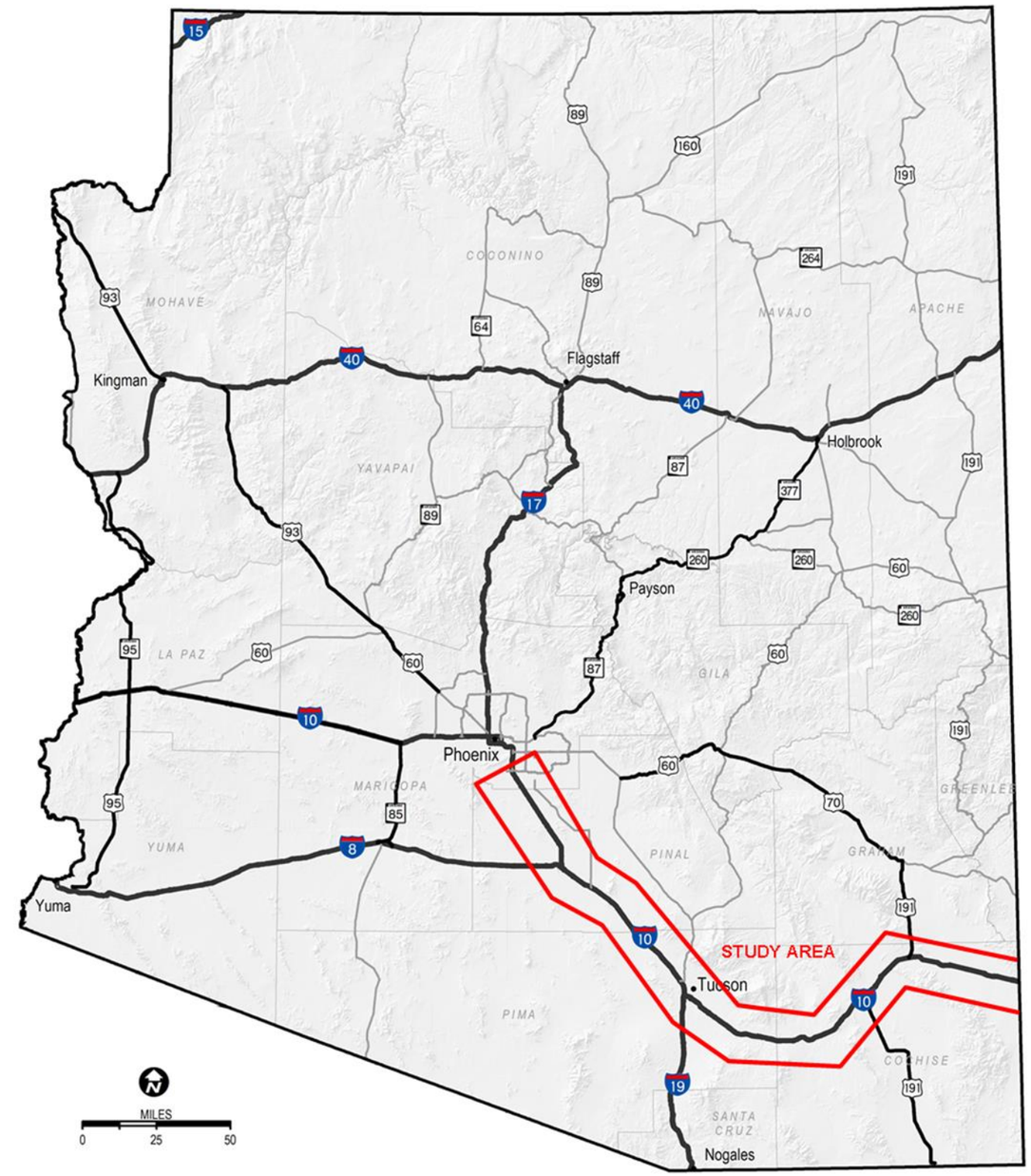
The third round (Round 3) of studies, initiated in the fall of 2015, includes:

- I-10: California State Line to SR 85 and SR 85: I-10 to I-8
- I-10: SR 202L to the 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 identifies candidate solutions for consideration in the Multimodal Planning Division's (MPD's) P2P project prioritization process, providing information to guide corridor-specific project selection and programming decisions.

The I-10 East corridor, depicted in **Figure 1**, is one of the strategic statewide corridors 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 strategic solutions for consideration in future construction programs, derived from a transparent, defensible, logical, and replicable process. The I-10 East 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 East 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 Working Paper 6 Overview

The objective of Working Paper 6 is to document the evaluation of the strategic solutions identified in Working Paper 5 for the I-10 East corridor. Pavement and Bridge solutions are evaluated using a Life-Cycle Cost Analysis (LCCA). In addition, this evaluation includes a risk-based Performance Effectiveness Evaluation of each solution to determine the amount of benefit that each solution would produce, thereby influencing the performance score. The result of this evaluation is a prioritized list of recommendations for the I-10 East corridor.

1.4 Corridor Overview and Location

The I-10 East corridor is a major east-to-west all-weather transcontinental highway that connects California (Santa Monica) with Florida (Jacksonville). I-10 is a major transportation artery route for freight and passenger vehicular traffic, connecting major metropolitan cities throughout the southern part of the United States. I-10 plays a key role in the transportation infrastructure of southern Arizona, contributing to its economic success.

I-10 provides the most direct link between the greater Phoenix and Tucson metropolitan areas in Arizona and Los Angeles, California, to the west, and major Texas and Florida cities to the east. I-10 provides a principal road link for freight traffic from the ports of California. This study builds on earlier planning efforts in developing and applying a performance-based process for prioritizing improvements to meet the corridor's present and future needs.

1.5 Corridor Segments

The I-10 corridor is being studied in two separate CPSs. One study extends from the California State Line to SR 85, and this study extends from SR 202L to the New Mexico State Line. For the purposes of this CPS, the portion from SR 202L to New Mexico State Line is referred to as I-10 East.

The I-10 East corridor is 232 miles long, from SR 202L (milepost [MP] 160) to the Arizona-New Mexico State Line (MP 392). The I-10 East corridor is located in three ADOT Districts (Central, South Central, and Southeast), four planning areas (Maricopa Association of Governments, Sun Corridor Metropolitan Planning Organization, Pima Association of Governments, and Southeastern Arizona Governments Organization), and four counties (Maricopa, Pinal, Pima, and Cochise).

The I-10 East corridor has been divided into 16 segments to allow for an appropriate level of detailed needs analysis, performance evaluation, and comparison between different segments of the corridor. These corridor segments are described in **Table 1** and shown in **Figure 2**.

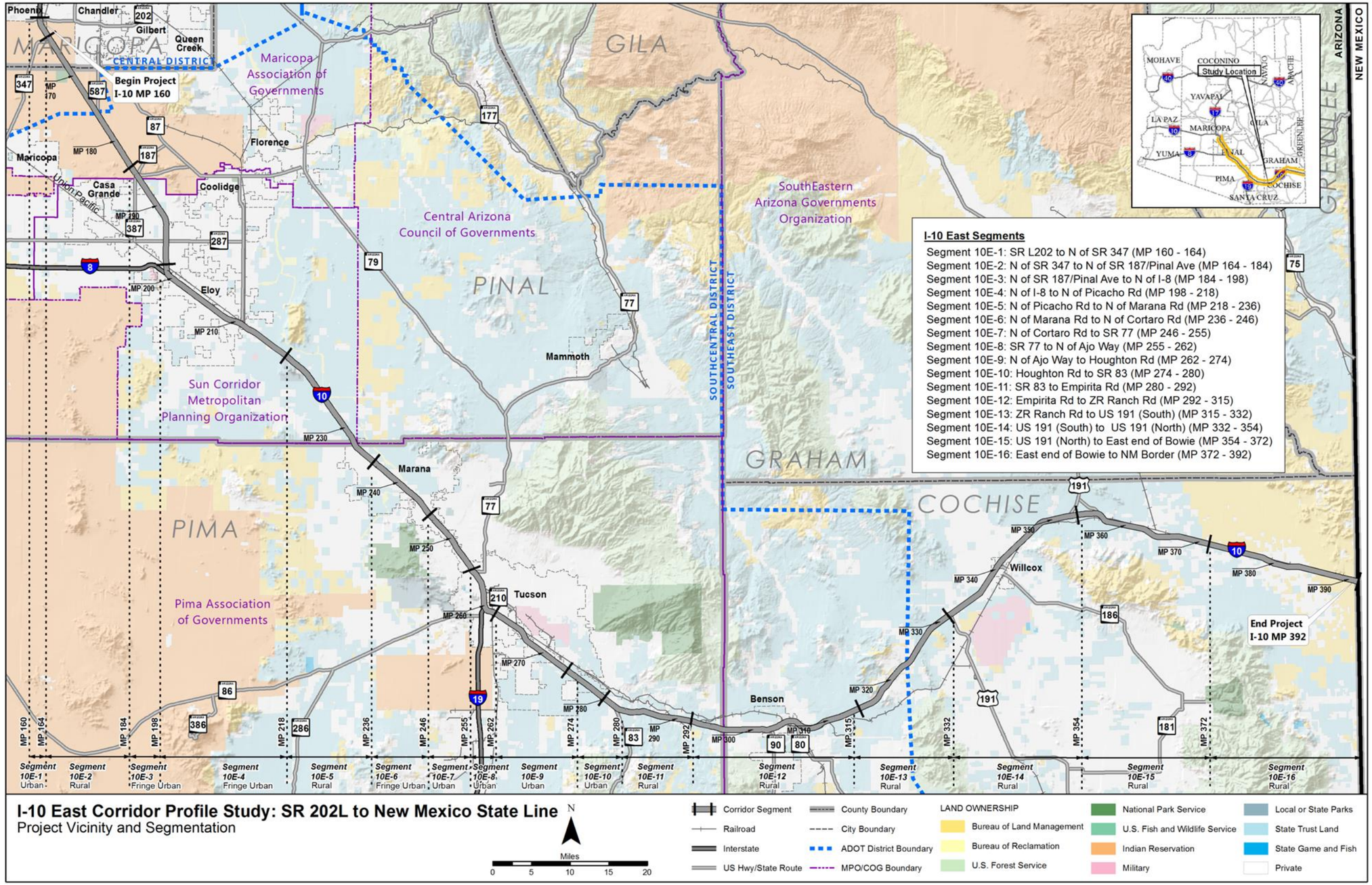
Table 1: I-10 East Corridor Segments

Segment #	Begin	End	Approx. Begin Milepost	Approx. End Milepost	Approx. Length (miles)	Typical Through Lanes (EB, WB)	2014 Average Annual Daily Traffic Volume (vpd)	Character Description
10E-1	SR 202L	North of SR 347	160	164	4	2–3,2–3	95,000	Begins at SR 202L (Santan Freeway) system traffic interchange, posted speed is 65 miles per hour (mph), characterized at "Urban Freeway." A lane drop occurs at about MP 162.5. South of Pecos Road, this segment leaves the Phoenix metropolitan area and traverses the Gila River Indian Community.
10E-2	North of SR 347	North of SR 187/ Pinal Avenue	164	184	20	2,2	51,800	Most of this segment is characterized as "Rural 4-Lane Freeway"; posted speed limit is 75 mph. Rest areas are at MP 182 (eastbound [EB]) and MP 183 (westbound [WB]). This segment is entirely within the Gila River Indian Community. Rising grade east of Gila River bridge crossing (MP 173) to end of segment.
10E-3	North of SR 187/ Pinal Avenue	North of I-8	184	198	14	2–3,2–3	40,300	Most of this segment is characterized as "Urban or Rural 6-Lane Freeway"; widens to three lanes in each direction at MP 187; drops to two lanes at MP 197. Adjacent to urbanizing area of Casa Grande.
10E-4	North of I-8	North of Picacho Road	198	218	20	2–3,2–3	38,800	This segment encompasses several different operation environments ("Rural 4-Lane," "Urban 4-Lane," and "Urban or Rural 6-Lane Freeway"). The I-8 system interchange is at MP 199. Portions of the segment are two lanes in each direction (west of MP 200 and between MPs 210 and 212.5). Adjacent to Eloy.
10E-5	North of Picacho Road	North of Marana	218	236	18	3,3	41,900	Characterized as "Urban or Rural 6-Lane Freeway"; three lanes in each direction; posted speed limit of 75 mph. Area is largely rural, undeveloped desert; Union Pacific Railroad runs parallel on northern side of this segment, continuing to Tucson.
10E-6	North of Marana	North of Cortaro Road	236	246	10	3,3	61,200	Characterized at "Urban or Rural 6-Lane Freeway"; three lanes in each direction; posted speed limit of 75 mph. Traverses Marana as freeway enters the Tucson urbanized area.
10E-7	North of Cortaro Road	SR 77	246	255	9	3,3	108,500	Characterized at "Urban or Rural 6-Lane Freeway;" three lanes in each direction; posted speed decreases at MP 246 to 65 mph through Tucson.
10E-8	SR 77	North of Ajo Way	255	262	7	3–4,3–4	117,600	Most of this segment is characterized as "Urban >6-Lane Freeway"; widens to four lanes in each direction at MP 255, before dropping a lane at MP 259 (I-19). This segment includes the system traffic interchange with I-19 and serves the urbanized Tucson area.
10E-9	North of Ajo Way	Houghton Road	262	274	12	2–3,2–3	59,500	Characterized as "Urban 4-Lane Freeway;" drops to two lanes in each direction at MP 263; posted speed limit increases to 75 mph at MP 271. The segment ends at Houghton Road, which is considered the eastern extent of the Tucson urbanized area; generally rural to the east.
10E-10	Houghton Road	SR 83	274	280	6	2,2	34,200	Characterized as "Urban 4-Lane Freeway." The area is largely rural, with the exception of Vail (unincorporated place) at the SR 83 junction.
10E-11	SR 83	Empirita Road	280	292	12	2,2	26,700	Characterized as "Rural 4-Lane Freeway >25K"; posted speed limit remains at 75 mph. Exit 292 (Empirita Road) has an unconventional "folded diamond" interchange type.
10E-12	Empirita Road	ZR Ranch Road	292	315	23	2,2	21,100	Characterized as "Rural 4-Lane Freeway < 25K." This segment traverses Benson.
10E-13	ZR Ranch Road	US 191 (South)	315	332	17	2,2	16,700	Characterized as "Rural 4-Lane Freeway < 25K." This segment has steep grades EB (as high as 6 percent) and WB (as high as 4 percent), causing considerable truck slowing; highest point on I-10 is at MP 321 (4,937 feet).

Table 1: I-10 East Corridor Segments

Segment #	Begin	End	Approx. Begin Milepost	Approx. End Milepost	Approx. Length (miles)	Typical Through Lanes (EB, WB)	2014 Average Annual Daily Traffic Volume (vpd)	Character Description
10E-14	US 191 (South)	US 191 (North)	332	354	22	2,2	15,400	Characterized as a “Rural 4-Lane Freeway < 25K”; traverses Willcox. US 191 is coincident with this segment.
10E-15	US 191 (North)	Eastern end of Bowie	354	372	18	2,2	14,100	Characterized as “Rural 4-Lane Freeway < 25K.” At MP 362, the freeway makes a wide sweeping curve around Bowie, an unincorporated census-designated place.
10E-16	Eastern end of Bowie	New Mexico State Line	372	392	20	2,2	12,200	Characterized as a “Rural 4-Lane Freeway < 25K.” At MP 378, the freeway makes a wide sweeping curve around San Simon, an unincorporated census-designated place. The San Simon commercial vehicle port of entry is at MP 383, and a rest area is at MP 388.

Figure 2: Corridor Location and Segments



2.0 CANDIDATE SOLUTION EVALUATION PROCESS

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 3** and described more fully below.

2.1 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.

2.2 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.

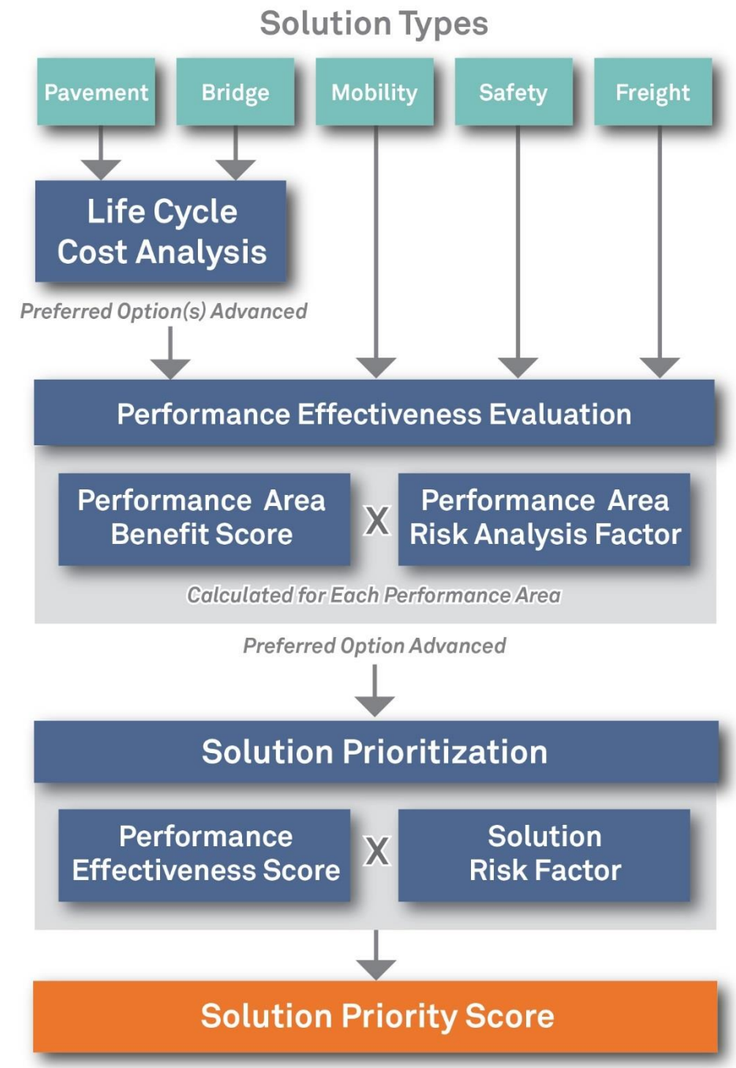
2.3 Solution Risk Analysis

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 the performance failure.

2.4 Candidate Solution Prioritization

The PES, weighted risk factor, and average segment 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 3: Candidate Solution Evaluation Process



3.0 SOLUTION EVALUATION AND PRIORITIZATION

3.1 Candidate 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. 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, or expansion.

The performance system and performance needs previously documented in Working Papers 2 and 4, respectively, serve as a foundation for developing candidate solutions for corridor preservation, modernization, and expansion.

Candidate solutions are not intended to recreate or replace results from normal programming processes. However, they should address elevated levels (High or Medium) of need and focus on investments in modernization projects to optimize current infrastructure. Ideally, strategic solutions should address overlapping needs and reduce costly repetitive maintenance. In addition, they should provide a measurable benefit.

Candidate solutions were developed after considering information from previous reports, field reviews, ADOT staff input, observable trends in the performance data, current standards, national and local best practices, and engineering judgment. **Table 2** identifies each strategic location that has been assigned a candidate solution with a number (CS10E.1, CS10E.2, etc.). Each candidate solution consists of one or more components to address the identified needs. Cost estimates for each candidate solution are provided in **Appendix A**.

Following the distribution of Draft Working Paper 5, candidate solutions were reviewed based on location, solution characteristics, and length. The following considerations were also made:

- Solutions that affect a specific subset of crashes (for example, lighting, wildlife crossing or fencing) should be separated from other solutions and considered by themselves.
- Solutions that have an elevated crash modification factor (for example, <0.50) should be separated from other solutions and considered by themselves (for example, mainline realignment, parallel entry/exit ramps).
- Solutions should be packaged together by location/geography to the extent possible.

This analysis may have resulted in the combination or modification of the solutions presented in Working Paper 5.

Table 2: Candidate Solutions

Candidate Solution #	Segment	Location #	Beginning Milepost	Ending Milepost	Candidate Solution Name	Option*	Scope	Investment Category (Preservation [P], Modernization [M], Expansion [E])
CS10E.1	10E-1	L1/L6	163	176	Wild Horse Pass to SR 587 Lighting Improvements	—	Install Lighting	M
CS10E.2	10E-2	L5	167	184	Riggs Rd to Casa Grande General Purpose Lane	—	Construct New General Purpose Lane	E
CS10E.3	10E-2	L7	169.85	169.85	Goodyear Road Underpass (UP) (#1149) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.4	10E-2	L8	174.63	174.63	Nelson Road UP (#1213) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.5	10E-2	L9	175.81	175.81	Casa Blanca Traffic Interchange (TI) UP (#1214) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.6	10E-2	L10	177.76	177.76	Gas Line Road UP (#1215) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.7	10E-2	L11	179.37	179.37	Seed Farm Road UP (#1216) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.8	10E-2	L6	183	184	Casa Grande EB Shoulder Widening Improvements	—	Widen Left Shoulder	M
CS10E.9	10E-2 and 10E-3	L6/L15	183	190	Casa Grande Lighting Improvements	—	Install Lighting	M
CS10E.10	10E-3	L6/L15	184	190	Casa Grande Safety Improvements	—	Enhance Delineation (delineators, high-visibility edge line striping) Install Safety Edge Install Speed Feedback Signs Install Dynamic Message Sign (DMS)	M
CS10E.11	10E-3	L16	188.20	188.20	Val Vista Boulevard UP (#1151) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M

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

Table 2: Candidate Solutions (continued)

Candidate Solution #	Segment	Location #	Beginning Milepost	Ending Milepost	Candidate Solution Name	Option*	Scope	Investment Category (Preservation [P], Modernization [M], Expansion [E])
CS10E.12	10E-3	L17	193.88	193.88	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.13	10E-4	L28	205.45	205.45	Battaglia Road UP (#943) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.14	10E-4	L29	207.71	207.17	Alsdorf Road UP (#944) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.15	10E-4	L21	209.85	209.85	Drain Channel Bridge WB Overpass (OP) (#1104) Bridge Project	A	Rehabilitate Bridge	P
						B	Replace Bridge	M
CS10E.16	10E-5	L30	226.45	226.45	Red Rock TI UP (#592) Bridge Project	A	Rehabilitate Bridge	P
						B	Replace Bridge	M
CS10E.17	10E-5	L32	232.02	232.02	Pinal Air Park TI OP (#771) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.18	10E-6	L33	237	242	Marana Safety Improvements	—	Enhance Delineation (delineators, high-visibility edge line striping) Install Safety Edge Install Speed Feedback Signs Install DMS	M
CS10E.19	10E-6	L33	237	242	Marana Lighting Improvements	—	Install Lighting	M
CS10E.20	10E-6	L33	237	242	Marana Pedestrian Improvements	—	Install Access Barrier Fence Construct Pedestrian Bridge	M
CS10E.21	10E-7 and 10E-8	L44/L45/ L46/L47/ L49/L51	248	258	Tucson Mobility, Safety, and Freight Improvements	A	Construct General Purpose Lane (MP 248–252)	E
						B	Construct Auxiliary Lane (MP 248–252)	E
						C	Implement Ramp Metering on all on ramps at the nine TIs within project limits	M
CS10E.22	10E-8	L50	257	258	Tucson Pedestrian Safety Improvements	—	Install Access Barrier Fence Construct Pedestrian Bridge	M
CS10E.23	10E-9	L70	262	264	East Tucson Pedestrian Safety Improvements	—	Install Access Barrier Fence Construct Pedestrian Bridge	M

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

Table 2: Candidate Solutions (continued)

Candidate Solution #	Segment	Location #	Beginning Milepost	Ending Milepost	Candidate Solution Name	Option*	Scope	Investment Category (Preservation [P], Modernization [M], Expansion [E])
CS10E.24	10E-9	L69/L70/L71	262	274	East Tucson Mobility, Safety, and Freight Improvements	A	Construct General Purpose Lane(MP 263–270)	E
						B	Construct Auxiliary Lane (MP 263–270)	E
						C	Implement Ramp Metering on all on ramps at the ten TIs within project limits Widen Left Shoulder Install Speed Feedback Signs Install DMS	M
CS10E.25	10E-9	L52	262.44	262.44	Ajo Way OP EB (#1107) Bridge Project	A	Rehabilitate Bridge	P
						B	Replace Bridge	M
CS10E.26	10E-9	L53	262.44	262.44	Ajo Way OP WB (#1108) Bridge Project	A	Rehabilitate Bridge	P
						B	Replace Bridge	M
CS10E.27	10E-9	L70	263	274	East Tucson Lighting Improvements	—	Install Lighting	M
CS10E.28	10E-10 and 10E-11	L74/L77/L78	274	286	Vail Mobility and Safety Improvements	A	Construct General Purpose Lane (MP 274–279)	E
						B	Widen Left Shoulder Enhance Delineation (delineators, high-visibility edge line striping) Install Safety Edge Install Speed Feedback Signs	M
CS10E.29	10E-10	L74/L78	275	279	Vail Lighting Improvements	—	Install Lighting at all three exits within project limits	M
CS10E.30	10E-12	L81/L82	293	296	Mescal EB Climbing Lane	—	Construct Climbing Lane	E
CS10E.31	10E-12	L81/L82	293	299	Mescal Shoulder Widening	—	Widen Left Shoulder	M
CS10E.32	10E-12	L81/L82	296	299	Mescal WB Climbing Lane	—	Construct Climbing Lane	E
CS10E.33	10E-13	L85	317	318	Dragoon Safety Improvements	—	Enhance delineation (delineators, high-visibility edge line striping) Install Safety Edge Install Speed Feedback Signs Install DMS	M
CS10E.34	10E-13	L85	317	318	Dragoon EB Climbing Lane	—	Construct Climbing Lane	E
CS10E.35	10E-13	L85	318	318	Exit 318 Lighting Improvements	—	Install Lighting at exit	M
CS10E.36	10E-14	L87	339.46	339.46	Airport Road UP (#1114) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M

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

Table 2: Candidate Solutions (continued)

Candidate Solution #	Segment	Location #	Beginning Milepost	Ending Milepost	Candidate Solution Name	Option*	Scope	Investment Category (Preservation [P], Modernization [M], Expansion [E])
CS10E.37	10E-15	L93	354	358	Page Ranch Road Safety Improvements	—	Enhance Delineation (delineators, high visibility edge line striping) Install Safety Edge Install Speed Feedback Signs Install DMS	M
CS10E.38	10E-15	L93	355	355	Exit 355 Lighting Improvements	—	Install Lighting at exit	M
CS10E.39	10E-16	L94	378.93	378.93	West San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M
CS10E.40	10E-16	L95	383.35	383.35	East San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	A	Replace Bridge	M
						B	Construct Entry/Exit Ramps	M
						C	Reprofile Mainline	M

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

3.2 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 that 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 is discounted at 3 percent and all dollar amounts are in 2015 dollars.
- If the LCCA evaluation recommends rehabilitation or repair, the solutions is not considered strategic and the rehabilitation or repair will be addressed by normal programming processes.
- Because this LCCA is conducted at a planning level because of variables in costs and improvement strategies, the LCCA net present value results that are within 15 percent should be considered equally: in such a case, the project 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 2**, LCCA was conducted on four bridges on the I-10 East corridor. A summary of this analysis is shown in **Table 3**. Additional information regarding the LCCA is included in **Appendix B**.

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 addresses only 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 is discounted at 3 percent 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 because of variables in costs and improvement strategies, the LCCA net present value results that are within 15 percent should be considered equally; in such a case, the project should be carried forward as a strategic replacement project—more detailed scoping will confirm whether replacement or rehabilitation is needed

Based on the candidate solutions presented in **Table 2**, LCCA was not conducted on any pavement projects on the I-10 East corridor. A summary of this analysis is shown in **Table 4**. Additional information regarding the LCCA is contained in **Appendix B**.

As shown in **Table 3** and **Table 4**, the following conclusions were determined based on the LCCA:

- Repair was determined to be the most effective approach for all four bridges. The Ajo Way replacement will be carried forward as part of CS10E.28a and CS10E.28b.

Table 3: Bridge 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
	Replace	Rehabilitate	Repair	Replace	Rehabilitate	Repair		
Drain Channel Bridge WB (CS10E.15, MP 209.85)	$1,170,000	$1,010,000	$820,000	1.43	1.24	1.00	No	Not strategic as stand-alone solution and no other needs—no further evaluation
Red Rock TI Bridge (CS10E.16, MP 226.45)	$1,470,000	$1,430,000	$1,110,000	1.32	1.29	1.00	No	Not strategic as stand-alone solution and no other needs—no further evaluation
Ajo Way TI Bridge EB (CS10E.25, MP 262.44)	$4,680,000	$4,220,000	3,260,000	1.44	1.30	1.00	Yes	Not strategic as a stand-alone solution; carry forward for further evaluation with other needs
Ajo Way TI Bridge WB (CS10E.26, MP 262.44)	$4,680,000	$4,180,000	$3,240,000	1.45	1.29	1.00	Yes	Not strategic as a stand-alone solution; carry forward for further evaluation with other needs

Table 4: 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		
No LCCA conducted for any pavement candidate solutions on the I-10 East corridor										

3.3 Performance Effectiveness Evaluation

The results of the Performance Effectiveness Evaluation are combined with the results of a Performance Area Risk Analysis to determine a 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 differentiate between similar solutions
- Apply to each performance area that is affected by the candidate solution
- Accounts 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 International Roughness Index (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 (for example, 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 Travel Time Index (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 Planning Time Index (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 (CMFs) were developed that would be applied to estimate the reduction in crashes (for additional information see **Appendix C**).
- 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 Truck Planning Time Index (TPTI) secondary measure.
  - Changes in the Mobility Index (due to increased capacity) would have a direct effect on the Truck Travel Time Index (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 D**.

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 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-, 20-, 30-, or 75-year benefit stream, or the net present value (NPV) factor (F_{NPV}). A 3 percent 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 generally reflects a preservation solution; this would include pavement and bridge preservation solutions that would likely have a 10-year stream of benefits; for these solutions, an F_{NPV} of 8.8 is used in the PES calculation.

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

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 5**. Additional information regarding the calculation of the PES is contained in **Appendix E**.

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 other options (for example, more than twice the PES value and a difference in magnitude of at least 20 points), the other options should be eliminated from further consideration. If multiple options have similar PES values, those options should all be advanced to the prioritization process. On the I-10 East corridor, the following candidate solutions have options to address Mobility, Safety, or Freight needs:

- CS10E.21 (a, b, and c) – Tucson Mobility, Safety, and Freight Improvements
- CS10E.24 (a, b, and c) – East Tucson Mobility, Safety, and Freight Improvements
- CS10E.28 (a and b) – Vail Mobility and Safety Improvements

Based on a review of the PES values for solution CS10E-21c, CS10E.24c, and CS10E.28b, was the only candidate solution options that were advanced to the candidate solution prioritization process.

As was previously mentioned, repair was determined to be the most effective approach for the candidate solutions listed below that were subjected to LCCA so these candidate solutions were dropped from further consideration. No PES values were calculated for these solutions and do not appear in **Table 5**:

- Drain Channel Bridge WB OP (#1104) Bridge Project (CS10E.15, MP 209.85)
- Red Rock TI UP (#592) Bridge Project (CS10E.16, MP 226.45)
- Ajo Way OP EB (#1107) Bridge Project (CS10E.25, MP 262.44)
- Ajo Way OP WB (#1108) Bridge Project (CS10E.26, MP 262.44)

Table 5: Performance Effectiveness Scores

Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost* (in millions)	Risk Factored Benefit Score					Risk Factored Emphasis Area Scores			Total Factored Benefit Score	F_{VMT}	F_{NPV}	Performance Effectiveness Score
					Pavement	Bridge	Mobility	Safety	Freight	Mobility	Safety	Freight				
CS10E.1	10E-1	Wild Horse Pass to SR 587 Lighting Improvements	163-164	0.674	0.000	0.000	0.097	0.064	0.064	0.002	0.000	0.001	0.227	3.53	15.3	18.2
CS10E.1	10E-2	Wild Horse Pass to SR 587 Lighting Improvements	164-176	8.048	0.000	0.000	0.781	0.019	0.008	0.056	0.000	0.021	0.885	5.00	15.3	8.4
CS10E.2	10E-2	Riggs Rd to Casa Grande General Purpose Lane	167-184	202.8	2.962	4.047	0.959	7.542	0.020	0.077	0.442	0.077	16.126	5.00	20.2	8.0
CS10E.3a	10E-2	Goodyear Road UP (#1149) Bridge Vertical Clearance Mitigation	169.85	3.009	0.000	0.616	0.028	0.002	1.003	0.002	0.000	0.001	1.652	0.85	30.6	14.8
CS10E.3b	10E-2	Goodyear Road UP (#1149) Bridge Vertical Clearance Mitigation	169.85	7.270	0.000	0.000	0.028	0.002	1.003	0.002	0.000	0.001	1.036	0.85	20.2	2.5
CS10E.3c	10E-2	Goodyear Road UP (#1149) Bridge Vertical Clearance Mitigation	169.85	1.243	0.000	0.000	0.153	0.004	0.806	0.011	0.000	0.004	0.978	0.85	15.3	10.6
CS10E.4a	10E-2	Nelson Road UP (#1213) Bridge Vertical Clearance Mitigation	174.63	2.951	0.000	0.620	0.004	0.000	1.003	0.000	0.000	0.001	1.629	0.85	30.6	14.9
CS10E.4b	10E-2	Nelson Road UP (#1213) Bridge Vertical Clearance Mitigation	174.63	7.270	0.000	0.000	-0.008	0.000	1.003	-0.001	0.000	0.001	0.996	0.85	20.2	2.4
CS10E.4c	10E-2	Nelson Road UP (#1213) Bridge Vertical Clearance Mitigation	174.63	1.210	0.000	0.000	0.016	0.002	0.927	0.001	0.000	0.001	0.948	0.85	15.3	10.6
CS10E.5a	10E-2	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.317	0.000	0.870	0.004	0.000	1.003	0.000	0.000	0.001	1.878	0.85	30.6	15.3
CS10E.5b	10E-2	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.640	0.000	0.000	0.000	0.000	1.003	0.000	0.000	0.001	1.004	0.85	20.2	4.9
CS10E.5c	10E-2	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	1.210	0.000	0.000	0.016	0.002	0.905	0.001	0.000	0.001	0.925	0.85	15.3	11.8
CS10E.6a	10E-2	Gas Line Road UP (#1215) Bridge Vertical Clearance Mitigation	177.76	4.431	0.000	1.102	0.004	0.000	1.003	0.000	0.000	0.001	2.111	0.85	30.6	14.2
CS10E.6b	10E-2	Gas Line Road UP (#1215) Bridge Vertical Clearance Mitigation	177.76	7.270	0.000	0.000	-0.006	0.000	1.003	-0.001	0.000	0.001	0.998	0.85	20.2	2.7

Note: Negative scores indicate a solution with a CMF > 1
*: See Table 6 for total construction costs

Table 5: Performance Effectiveness Scores (continued)

Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost* (in millions)	Risk Factored Benefit Score					Risk Factored Emphasis Area Scores			Total Factored Benefit Score	F_{VMT}	F_{NPV}	Performance Effectiveness Score
					Pavement	Bridge	Mobility	Safety	Freight	Mobility	Safety	Freight				
CS10E.6c	10E-2	Gas Line Road UP (#1215) Bridge Vertical Clearance Mitigation	177.76	1.210	0.000	0.000	0.006	0.000	0.950	0.000	0.000	0.001	0.957	0.85	15.3	11.8
CS10E.7a	10E-2	Seed Farm Road UP (#1216) Bridge Vertical Clearance Mitigation	179.37	2.891	0.000	0.991	0.028	0.002	1.003	0.002	0.000	0.001	2.027	0.85	30.6	18.9
CS10E.7b	10E-2	Seed Farm Road UP (#1216) Bridge Vertical Clearance Mitigation	179.37	7.270	0.000	0.000	-0.052	0.000	1.000	-0.004	0.000	0.001	0.946	0.85	20.2	2.3
CS10E.7c	10E-2	Seed Farm Road UP (#1216) Bridge Vertical Clearance Mitigation	179.37	1.210	0.000	0.000	0.165	0.004	0.806	0.012	0.000	0.004	0.991	0.85	15.3	11.0
CS10E.8	10E-2	Casa Grande EB Shoulder Widening	183-184	0.613	0.000	0.000	0.642	0.004	0.005	0.045	0.000	0.009	0.706	1.56	15.3	27.4
CS10E.9	10E-2	Casa Grande Lighting Improvements	183-184	0.674	0.000	0.000	0.175	0.004	0.000	0.012	0.000	0.004	0.196	2.63	15.3	11.7
CS10E.9	10E-3	Casa Grande Lighting Improvements	184-190	4.034	0.000	0.000	0.373	0.006	0.002	0.028	0.000	0.008	0.418	4.90	15.3	7.8
CS10E.10	10E-3	Casa Grande Safety Improvements	184-190	3.029	0.000	0.000	1.866	0.038	0.021	0.141	0.000	0.039	2.105	4.90	15.3	52.1
CS10E.11a	10E-3	Val Vista Boulevard UP (#1151) Bridge Vertical Clearance Mitigation	188.20	3.236	0.000	0.824	0.000	0.000	1.034	0.000	0.000	0.000	1.857	0.74	30.6	13.7
CS10E.11b	10E-3	Val Vista Boulevard UP (#1151) Bridge Vertical Clearance Mitigation	188.20	7.270	0.000	0.000	0.000	0.000	1.034	0.000	0.000	0.000	1.034	0.74	20.2	2.2
CS10E.11c	10E-3	Val Vista Boulevard UP (#1151) Bridge Vertical Clearance Mitigation	188.20	1.210	0.000	0.000	0.000	0.000	0.969	0.000	0.000	0.000	0.969	0.74	15.3	9.4
CS10E.12a	10E-3	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	2.474	0.000	0.386	0.032	0.000	1.034	0.002	0.000	0.000	1.454	0.74	30.6	13.4
CS10E.12b	10E-3	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	7.270	0.000	0.000	-0.063	-0.002	1.031	-0.005	0.000	0.000	0.961	0.74	20.2	2.0
CS10E.12c	10E-3	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	1.645	0.000	0.000	0.210	0.002	0.360	0.016	0.000	0.005	0.592	0.74	15.3	4.1

Note: Negative scores indicate a solution with a CMF > 1
*: See Table 6 for total construction costs

Table 5: Performance Effectiveness Scores (continued)

Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost* (in millions)	Risk Factored Benefit Score					Risk Factored Emphasis Area Scores			Total Factored Benefit Score	F_{VMT}	F_{NPV}	Performance Effectiveness Score
					Pavement	Bridge	Mobility	Safety	Freight	Mobility	Safety	Freight				
CS10E.13a	10E-4	Battaglia Road UP (#943) Bridge Vertical Clearance Mitigation	205.45	4.192	0.000	0.994	0.000	0.000	1.029	0.000	0.000	0.001	2.023	0.65	30.6	10.6
CS10E.13b	10E-4	Battaglia Road UP (#943) Bridge Vertical Clearance Mitigation	205.45	7.270	0.000	0.000	0.000	0.000	1.029	0.000	0.000	0.001	1.030	0.65	20.2	2.1
CS10E.13c	10E-4	Battaglia Road UP (#943) Bridge Vertical Clearance Mitigation	205.45	1.306	0.000	0.000	0.000	0.000	0.748	0.000	0.000	0.001	0.749	0.65	15.3	6.3
CS10E.14a	10E-4	Alsdorf Road UP (#944) Bridge Vertical Clearance Mitigation	207.17	4.201	0.000	0.731	0.000	0.000	1.029	0.000	0.000	0.001	1.761	0.65	30.6	9.2
CS10E.14b	10E-4	Alsdorf Road UP (#944) Bridge Vertical Clearance Mitigation	207.17	7.270	0.000	0.000	0.000	0.000	1.029	0.000	0.000	0.001	1.030	0.65	20.2	2.1
CS10E.14c	10E-4	Alsdorf Road UP (#944) Bridge Vertical Clearance Mitigation	207.17	1.358	0.000	0.000	0.000	0.000	0.682	0.000	0.000	0.001	0.683	0.65	15.3	5.5
CS10E.17a	10E-5	Pinal Air Park TI OP (#771) Bridge Vertical Clearance Mitigation	232.02	2.780	0.000	5.638	0.063	0.000	0.775	0.002	0.000	0.000	6.479	0.69	30.6	49.0
CS10E.17b	10E-5	Pinal Air Park TI OP (#771) Bridge Vertical Clearance Mitigation	232.02	3.640	0.000	0.000	0.000	0.000	0.772	0.000	0.000	0.000	0.773	0.69	20.2	2.9
CS10E.17c	10E-5	Pinal Air Park TI OP (#771) Bridge Vertical Clearance Mitigation	232.02	1.210	0.000	0.000	0.389	0.004	0.770	0.015	0.000	0.008	1.185	0.69	15.3	10.3
CS10E.18	10E-6	Marana Safety Improvements	237-242	2.661	0.000	0.000	2.446	0.046	0.194	0.111	0.000	0.038	2.836	4.89	15.3	79.8
CS10E.19	10E-6	Marana Lighting Improvements	237-242	6.710	0.000	0.000	1.588	0.034	0.135	0.077	0.000	0.026	1.860	4.89	15.3	20.8
CS10E.20	10E-6	Marana Pedestrian Safety Improvements	237-242	1.962	0.000	0.000	0.938	0.022	0.088	0.050	0.000	0.016	1.114	4.89	15.3	42.5
CS10E.21a	10E-7	Tucson Mobility, Safety, and Freight Improvements	248-252	100.9	0.000	3.511	0.147	7.440	1.355	0.015	0.294	0.035	12.796	5.00	20.2	12.8
CS10E.21b	10E-7	Tucson Mobility, Safety, and Freight Improvements	248-252	64.61	0.000	1.542	0.324	4.410	1.619	0.033	0.545	0.041	8.514	5.00	20.2	13.3
CS10E.21c	10E-7	Tucson Mobility, Safety, and Freight Improvements	248-255	5.220	0.000	0.000	0.012	5.255	0.606	0.002	0.204	0.017	6.095	5.00	15.3	89.3

Note: Negative scores indicate a solution with a CMF > 1
*: See Table 6 for total construction costs

Table 5: Performance Effectiveness Scores (continued)

Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost* (in millions)	Risk Factored Benefit Score					Risk Factored Emphasis Area Scores			Total Factored Benefit Score	F_{VMT}	F_{NPV}	Performance Effectiveness Score
					Pavement	Bridge	Mobility	Safety	Freight	Mobility	Safety	Freight				
CS10E.21c	10E-8	Tucson Mobility, Safety, and Freight Improvements	255-258	5.220	0.000	0.000	0.193	6.336	0.119	0.029	0.176	0.010	6.862	5.00	15.3	100.6
CS10E.22	10E-8	Tucson Pedestrian Safety Improvements	257-258	2.618	0.000	0.000	0.552	0.698	2.065	0.109	0.000	0.053	3.477	2.79	15.3	56.6
CS10E.23	10E-9	East Tucson Pedestrian Safety Improvements	262-264	2.407	0.000	0.000	0.391	0.147	1.819	0.080	0.000	0.056	2.493	4.02	15.3	63.7
CS10E.24a	10E-9	East Tucson Mobility, Safety, and Freight Improvements	262-274	175.4	0.000	3.970	0.185	4.998	2.658	0.040	0.447	0.083	12.381	5.00	20.2	7.1
CS10E.24b	10E-9	East Tucson Mobility, Safety, and Freight Improvements	262-274	90.99	0.000	1.723	0.416	4.406	3.008	0.088	0.274	0.091	10.007	5.00	20.2	11.1
CS10E.24c	10E-9	East Tucson Mobility, Safety, and Freight Improvements	262-274	17.02	0.000	0.000	0.947	2.446	4.849	0.180	0.063	0.135	8.621	5.00	15.3	38.7
CS10E.27	10E-9	East Tucson Lighting Improvements	263-274	14.77	0.000	0.000	0.221	0.084	0.983	0.047	0.000	0.031	1.365	5.00	15.3	7.1
CS10E.28a	10E-10	Vail Mobility and Safety Improvements	274-286	41.55	0.000	1.714	2.122	0.583	0.084	0.067	0.169	0.032	4.771	4.78	20.2	11.1
CS10E.28b	10E-10	Vail Mobility and Safety Improvements	274-280	8.163	0.000	0.000	8.548	0.151	0.243	0.271	0.000	0.042	9.255	4.78	15.3	83.0
CS10E.28b	10E-11	Vail Mobility and Safety Improvements	280-286	8.163	0.000	0.000	3.172	0.753	0.232	0.182	0.000	0.058	4.397	4.48	15.3	36.9
CS10E.29	10E-10	Vail Lighting Improvements	275-279	0.628	0.000	0.000	0.082	0.000	0.003	0.003	0.000	0.000	0.088	4.39	15.3	9.4
CS10E.30	10E-12	Mescal EB Climbing Lane	293-296	13.47	0.098	0.000	0.267	0.306	0.006	0.101	0.000	0.041	0.818	4.09	20.2	5.0
CS10E.31	10E-12	Mescal Shoulder Widening	293-299	7.636	0.000	0.000	0.817	0.157	0.017	0.033	0.077	0.009	1.111	1.74	15.3	3.9
CS10E.32	10E-12	Mescal WB Climbing Lane	296-299	13.47	0.195	0.000	0.121	0.303	0.003	0.015	0.063	0.006	0.707	1.74	20.2	1.8
CS10E.33	10E-13	Dragoon Safety Improvements	317-318	0.598	0.000	0.000	0.185	0.147	0.038	0.059	0.000	0.029	0.457	1.01	15.3	11.8
CS10E.34	10E-13	Dragoon EB Climbing Lane	317-318	6.360	0.000	0.000	0.149	0.089	0.032	0.046	0.000	0.012	0.330	1.01	20.2	1.1
CS10E.35	10E-13	Exit 318 Lighting Improvements	318	0.304	0.000	0.000	0.035	0.040	0.032	0.013	0.000	0.007	0.128	1.01	15.3	6.5
CS10E.36a	10E-14	Airport Road UP (#1114) Bridge Vertical Clearance Mitigation	339.46	3.436	0.000	2.004	0.000	0.002	1.157	0.000	0.000	0.000	3.163	0.24	30.6	7.1
CS10E.36b	10E-14	Airport Road UP (#1114) Bridge Vertical Clearance Mitigation	339.46	7.270	0.000	0.000	-0.019	-0.046	1.101	0.000	0.000	0.001	1.037	0.24	20.2	0.7

Note: Negative scores indicate a solution with a CMF > 1
*: See Table 6 for total construction costs

Table 5: Performance Effectiveness Scores (continued)

Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Estimated Cost* (in millions)	Risk Factored Benefit Score					Risk Factored Emphasis Area Scores			Total Factored Benefit Score	F_{VMT}	F_{NPV}	Performance Effectiveness Score
					Pavement	Bridge	Mobility	Safety	Freight	Mobility	Safety	Freight				
CS10E.36c	10E-14	Airport Road UP (#1114) Bridge Vertical Clearance Mitigation	339.46	1.497	0.000	0.000	0.065	0.087	0.688	0.000	0.000	0.023	0.862	0.24	15.3	2.2
CS10E.37	10E-15	Page Ranch Road Safety Improvements	354-358	2.053	0.000	0.000	1.988	0.051	0.137	0.147	0.000	0.065	2.387	0.76	15.3	13.6
CS10E.38	10E-15	Exit 355 Lighting Improvements	355	0.208	0.000	0.000	0.219	0.003	0.021	0.023	0.000	0.010	0.276	0.76	15.3	15.5
CS10E.39a	10E-16	West San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.475	0.000	0.548	0.000	0.000	1.608	0.000	0.000	0.002	2.157	0.22	30.6	4.3
CS10E.39b	10E-16	West San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.640	0.000	0.000	0.000	0.000	1.608	0.000	0.000	0.002	1.610	0.22	20.2	2.0
CS10E.39c	10E-16	West San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	1.210	0.000	0.000	0.000	0.000	1.371	0.000	0.000	0.002	1.373	0.22	15.3	3.9
CS10E.40a	10E-16	East San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.266	0.000	0.416	0.000	0.000	1.608	0.000	0.000	0.002	2.026	0.22	30.6	4.3
CS10E.40b	10E-16	East San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.640	0.000	0.000	0.000	0.000	1.608	0.000	0.000	0.002	1.610	0.22	20.2	2.0
CS10E.40c	10E-16	East San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	1.306	0.000	0.000	0.000	0.000	1.105	0.000	0.000	0.002	1.106	0.22	15.3	2.9

Note: Negative scores indicate a solution with a CMF > 1
*: See Table 6 for total construction costs

3.4 Solution Risk Analysis

Following the calculation of the PES, an additional step is taken to develop a 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 4** shows the risk matrix used to develop the risk weighting factors.

Figure 4: 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 4**, numeric values were assigned to each category of frequency and severity. The higher the risk, the higher the numeric factor that was 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 5**.

Figure 5: 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 5**, risk weighting factors were calculated for each of the following four risk categories: low, moderate, major, and severe. These values are simply the average of the values in **Figure 5** 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 the bridges; a 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 was assigned the Low (1.14) risk weighing 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 percent of its benefit in Safety and 50 percent of its benefit in Mobility has a weighted risk factor of 1.57 (0.50 x 1.78 + 0.50 x 1.36 = 1.57).

3.5 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 5***

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 average need score as shown in Working Paper 4

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. The prioritized list of candidate solutions is provided in the subsequent section. See **Appendix F** for additional information on the prioritization process.

4.0 SUMMARY OF CORRIDOR RECOMMENDATIONS

4.1 Prioritized Candidate Solution Recommendations

Table 6 and **Figure 6** show the prioritized candidate solutions recommended for the I-10 East corridor. Implementation of these solutions is anticipated to improve performance of the I-10 East 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 Tucson area (MP 248–258).

4.2 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 East corridor:

- Implement corridor monitoring through the urban areas of Phoenix and Tucson to help alleviate drug/alcohol involved crashes.
- Install Dynamic Dust Warning Signs at various locations I-10 where there are common instances of blowing dust causing visibility issues.
- When I-10 closures occur in the area of the New Mexico border or farther east, oversize vehicles traveling eastbound past the US 191 exit are unable to turn around because of height restrictions of the TIs; a solution would be to raise the height of the Cavot Road underpass to accommodate oversize vehicles, giving them access to mainline detour routes (current posted clearance is less than 14 feet).

4.3 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 SR 87/SR 260/SR 377, 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 CPSs:

- 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, 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.

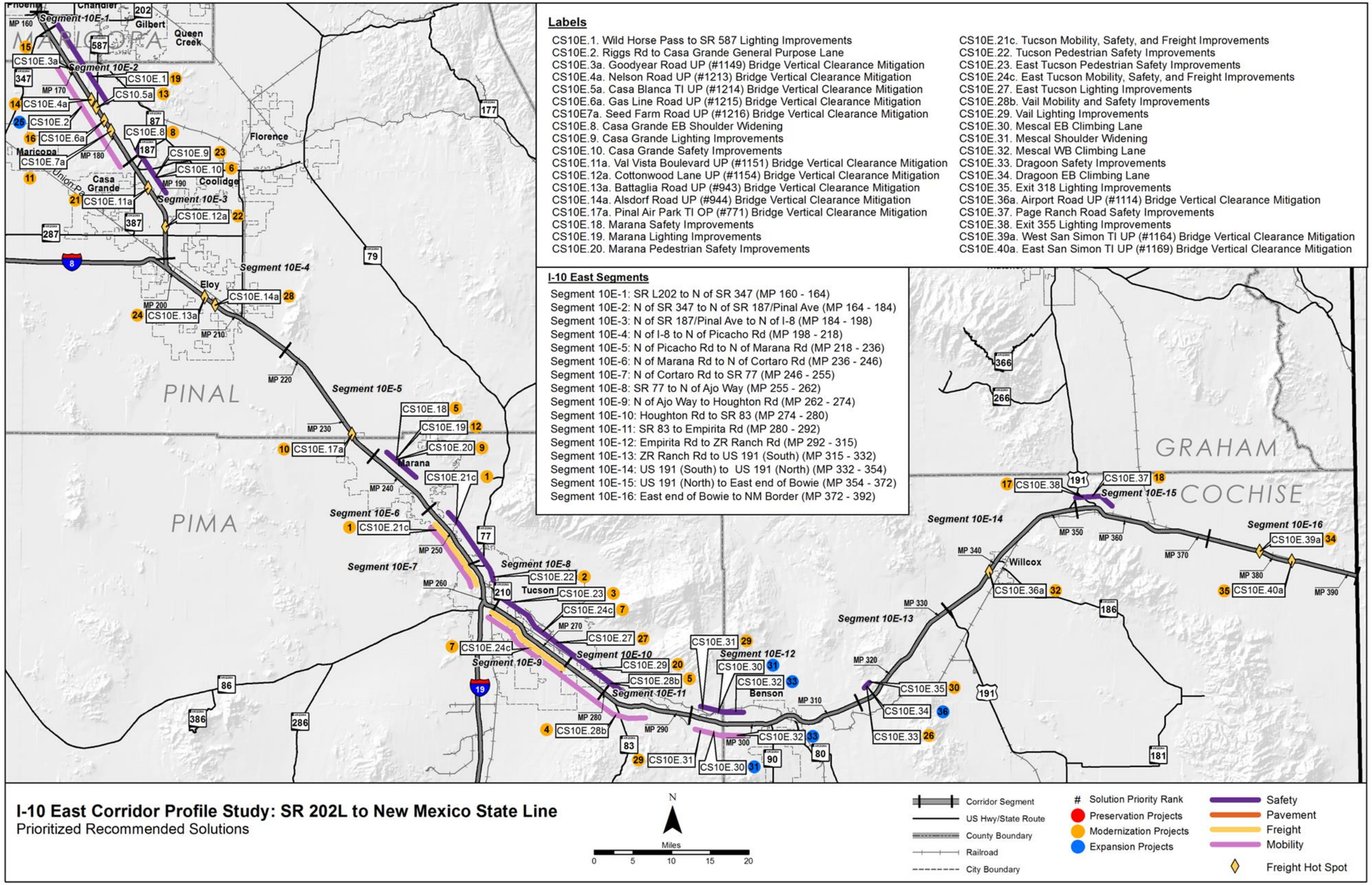
Table 6: Prioritized Recommended Solutions

Rank	Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Investment Category [P] Preservation [M] Modernization [E]Expansion	Estimated Cost (in millions)	Performance Effectiveness Score	Weighted Risk Factor	Segment Need	Prioritization Score	Percentage by which Solution Reduces Performance Area Needs				
											Pavement	Bridge	Mobility	Safety	Freight
1	CS10E.21c	10E-7 and 10E-8	Tucson Mobility, Safety, and Freight Improvements	248–258	10.4	94.9	1.37	1.76	228.7	M	0%	0%	22%	6%	3%
2	CS10E.22	10E-8	Tucson Pedestrian Safety Improvements	257–258	2.6	56.6	1.44	1.92	156.8	M	0%	0%	3%	25%	13%
3	CS10E.23	10E-9	East Tucson Pedestrian Safety Improvements	262–264	2.4	63.7	1.44	1.69	155.2	M	0%	0%	2%	19%	11%
4	CS10E.28b	10E-10	Vail Mobility and Safety Improvements	274–286	16.3	63.7	1.73	1.39	153.0	M	0%	0%	7%	50%	15%
5	CS10E.18	10E-6	Marana Safety Improvements	237–242	3.3	79.8	1.74	1.08	149.4	M	0%	0%	2%	36%	18%
6	CS10E.10	10E-3	Casa Grande Safety Improvements	184–190	3.7	52.1	1.76	1.08	98.7	M	0%	0%	2%	25%	1%
7	CS10E.24c	10E-9	East Tucson Mobility, Safety, and Freight Improvements	262–274	17.0	38.7	1.42	1.69	92.7	M	0%	15%	31%	45%	28%
8	CS10E.8	10E-2	Casa Grande EB Shoulder Widening	183–184	0.6	27.4	1.77	1.69	82.0	M	0%	0%	0%	19%	0%
9	CS10E.20	10E-6	Marana Pedestrian Improvements	237–242	2.0	42.5	1.73	1.08	79.3	M	0%	0%	1%	14%	8%
10	CS10E.17a	10E-5	Pinal Air Park TI UP (#771) Bridge Vertical Clearance Mitigation	232.02	2.8	49.0	1.50	0.77	56.3	M	0%	100%	0%	2%	48%
11	CS10E.7a	10E-2	Seed Farm Road UP (#1216) Bridge Vertical Clearance Mitigation	179.37	2.9	18.9	1.44	1.69	46.1	M	0%	27%	0%	1%	58%
12	CS10E.19	10E-6	Marana Lighting Improvements	237–242	6.7	20.8	1.74	1.08	38.8	M	0%	0%	1%	23%	12%
13	CS10E.5a	10E-2	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.3	15.3	1.43	1.69	37.0	M	0%	24%	0%	0%	58%
14	CS10E.4a	10E-2	Nelson Road UP (#1213) Bridge Vertical Clearance Mitigation	174.63	3.0	14.9	1.42	1.69	35.7	M	0%	21%	0%	0%	58%
15	CS10E.3a	10E-2	Goodyear Road UP (#1149) Bridge Vertical Clearance Mitigation	169.85	3.0	14.8	1.42	1.69	35.6	M	0%	19%	0%	1%	58%
16	CS10E.6a	10E-2	Gas Line Road UP (#1215) Bridge Vertical Clearance Mitigation	177.76	4.4	14.2	1.44	1.69	34.5	M	0%	30%	0%	0%	58%
17	CS10E.38	10E-15	Exit 355 Lighting Improvements	355	0.2	15.5	1.73	1.23	33.1	M	0%	0%	1%	6%	2%
18	CS10E.37	10E-15	Page Ranch Road Safety Improvements	354–358	3.3	13.6	1.74	1.23	29.0	M	100%	0%	5%	52%	10%

Table 6: Prioritized Recommended Solutions (continued)

Rank	Candidate Solution #	Segment #	Candidate Solution Name	Milepost Location	Investment Category [P] Preservation [M] Modernization [E]Expansion	Estimated Cost (in millions)	Performance Effectiveness Score	Weighted Risk Factor	Segment Need	Prioritization Score	Percentage by which Solution Reduces Performance Area Needs				
											Pavement	Bridge	Mobility	Safety	Freight
19	CS10E.1	10E-1 and 10E-2	Wild Horse Pass to SR 587 Lighting Improvements	163–176	8.7	9.8	1.71	1.70	28.4	M	0%	0%	0%	7%	0%
20	CS10E.29	10E-10	Vail Lighting Improvements	275–279	0.6	9.4	1.77	1.46	24.2	M	0%	0%	0%	1%	0%
21	CS10E.11a	10E-3	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.20	3.2	13.7	1.43	1.08	21.0	M	0%	54%	0%	0%	60%
22	CS10E.12a	10E-3	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	2.5	13.4	1.41	1.08	20.3	M	0%	42%	0%	0%	60%
23	CS10E.9	10E-2 and 10E-3	Casa Grande Lighting Improvements	183–190	4.7	9.9	1.76	1.16	20.3	M	0%	0%	0%	5%	0%
24	CS10E.13a	10E-4	Battaglia Road UP (#943) Bridge Vertical Clearance Mitigation	205.45	4.2	10.6	1.43	1.23	18.8	M	0%	37%	0%	0%	43%
25	CS10E.2	10E-2	Riggs Road to Casa Grande General Purpose Lane	167–184	202.8	8.0	1.38	1.69	18.8	E	87%	82%	71%	29%	1%
26	CS10E.33	10E-13	Dragoon Safety Improvements	317–318	1.2	11.8	1.58	0.92	17.3	M	0%	0%	10%	7%	4%
27	CS10E.27	10E-9	East Tucson Lighting Improvements	263–274	14.8	7.1	1.44	1.69	17.3	M	0%	0%	1%	11%	6%
28	CS10E.14a	10E-4	Alsdorf Road UP (#944) Bridge Vertical Clearance Mitigation	207.17	4.2	9.2	1.42	1.23	16.2	M	0%	27%	0%	0%	43%
29	CS10E.31	10E-12	Mescal Shoulder Widening	293–299	7.6	3.9	1.70	1.54	13.1	M	0%	0%	4%	16%	1%
30	CS10E.35	10E-13	Exit 318 Lighting Improvements	318	0.3	6.5	1.52	0.92	9.2	M	0%	0%	3%	1%	4%
31	CS10E.30	10E-12	Mescal EB Climbing Lane	293–296	13.5	5.0	1.49	1.54	8.9	E	25%	0%	9%	5%	0%
32	CS10E.36a	10E-14	Airport Road UP (#1114) Bridge Vertical Clearance	339.46	3.4	7.1	1.46	0.85	8.7	M	0%	65%	0%	0%	39%
33	CS10E.32	10E-12	Mescal WB Climbing Lane	296–299	13.5	1.8	1.38	1.54	3.9	E	51%	0%	9%	2%	0%
34	CS10E.39a	10E-16	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.5	4.3	1.40	0.62	3.7	M	0%	64%	0%	0%	37%
35	CS10E.40a	10E-16	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.3	4.3	1.39	0.62	3.7	M	0%	49%	0%	0%	37%
36	CS10E.34	10E-13	Dragoon EB Climbing Lane	317-318	6.4	1.1	1.61	0.92	1.6	E	0%	0%	6%	5%	4%

Figure 6: Prioritized Recommended Solutions



4.4 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 East 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 recommendations 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.

The concluding step in the CPS will be to produce a final report that summarizes Working Papers 1 through 6.

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: CANDIDATE SOLUTION COST ESTIMATES

Candidate #	Name	Scope	BMP	EMP	Unit	Quantity	Factored Construction Unit Cost	Preliminary Engineering Cost	Design Cost	Right-of-Way Cost (assuming $12/sf)	Construction Cost	Total Cost
CS10E.1	Wild Horse Pass to SR 587 Lighting Improvements	Install Lighting	163	164	Mile	1	$594,000	$20,000	$60,000	$0	$594,000	$674,000
			164	176	Mile	12	$594,000	$210,000	$710,000	$0	$7,128,000	$8,048,000
							Solution Total	**$230,000**	**$770,000**	**$0**	**$7,722,000**	**$8,722,000**
CS10E.2	Riggs Road to Casa Grande General Purpose Lane	Construct General Purpose Lane	167	184	Mile	34	$3,830,000	$3,910,000	$13,020,000	$25,850,880	$130,220,000	$173,000,880
		Replace Gila River EB Bridge	173.12	173.12	SF	47062	$280	$400,000	$1,320,000	$0	$13,177,360	$14,897,360
		Replace Gila River WB Bridge	173.12	173.12	SF	47062	$280	$400,000	$1,320,000	$0	$13,177,360	$14,897,360
							Solution Total	**$4,710,000**	**$15,660,000**	**$25,850,880**	**$156,574,720**	**$202,795,600**
CS10E.3	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	Replace Bridge	169.85	169.85	SF	9391	$280	$80,000	$300,000	$0	$2,629,480	$3,009,480
							Option A: Solution Total	**$80,000**	**$300,000**	**$0**	**$2,629,480**	**$3,009,480**
		Construct Entry/Exit Ramp	169.85	169.85	Each	4	$1,610,000	$190,000	$650,000	$0	$6,440,000	$7,240,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	169.85	169.85	Mile	0.52	$2,140,000	$30,000	$100,000	$0	$556,400	$656,400
							Option C: Solution Total	**$30,000**	**$100,000**	**$0**	**$1,112,800**	**$1,242,800**
CS10E.4	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	Replace Bridge	174.63	174.63	SF	9110	$280	$80,000	$300,000	$0	$2,550,800	$2,950,800
							Option A: Solution Total	**$80,000**	**$300,000**	**$0**	**$2,550,800**	**$2,950,800**
		Construct Entry/Exit Ramp	174.63	174.63	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	174.63	174.63	Mile	0.5	$2,140,000	$30,000	$110,000	$0	$1,070,00	$1,210,000
							Option C: Solution Total	**$30,000**	**$110,000**	**$0**	**$1,070,000**	**$1,210,000**
CS10E.5	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	Replace Bridge	175.81	175.81	SF	10490	$280	$90,000	$290,000	$0	$2,937,200	$3,337,200
							Option A: Solution Total	**$90,000**	**$290,000**	**$0**	**$2,937,200**	**$3,317,200**
		Construct Entry/Exit Ramp	175.81	175.81	Each	2	$1,610,000	$100,000	$320,000	$0	$3,220,000	$3,640,000
							Option B: Solution Total	**$100,000**	**$320,000**	**$0**	**$3,220,000**	**$3,640,000**
		Reprofile Mainline	175.81	175.81	Mile	0.5	$2,140,000	$30,000	$110,000	$0	$1,070,00	$1,210,000
							Option C: Solution Total	**$30,000**	**$110,000**	**$0**	**$1,070,000**	**$1,210,000**
CS10E.6	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	Replace Bridge	177.76	177.76	SF	14040	$280	$120,000	$390,000	$0	$3,931,200	$4,431,200
							Option A: Solution Total	**$120,000**	**$390,000**	**$0**	**$3,931,200**	**$4,431,200**
		Construct Entry/Exit Ramp	177.76	177.76	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	177.76	177.76	Mile	0.5	$2,140,000	$30,000	$110,000	$0	$1,070,00	$1,210,000
							Option C: Solution Total	**$30,000**	**$110,000**	**$0**	**$1,070,000**	**$1,210,000**
CS10E.7	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	Replace Bridge	179.37	179.37	SF	9110	$280	$80,000	$280,000	$0	$2,550,800	$2,890,800
							Option A: Solution Total	**$80,000**	**$280,000**	**$0**	**$2,550,800**	**$2,890,800**
		Construct Entry/Exit Ramp	179.37	179.37	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	179.37	179.37	Mile	0.5	$2,140,000	$30,000	$110,000	$0	$1,070,00	$1,210,000
							Option C: Solution Total	**$30,000**	**$110,000**	**$0**	**$1,070,000**	**$1,210,000**

Candidate #	Name	Scope	BMP	EMP	Unit	Quantity	Factored Construction Unit Cost	Preliminary Engineering Cost	Design Cost	Right-of-Way Cost (assuming $12/sf)	Construction Cost	Total Cost
CS10E.8	Casa Grande EB Shoulder Widening	Widen Left Shoulder	183	184	Mile	1	$563,000	$20,000	$60,000	$0	$563,000	$613,000
							Solution Total	**$20,000**	**$60,000**	**$0**	**$563,000**	**$613,000**
CS10E.9	Casa Grande Lighting Improvements	Install Lighting	183	184	Mile	1	$594,000	$20,000	$60,000	$0	$594,000	$674,000
			184	190	Mile	6	$594,000	$110,000	$360,000	$0	$3,564,000	$4,034,000
							Solution Total	**$130,000**	**$420,000**	**$0**	**$4,158,000**	**$4,708,000**
CS10E.10	Casa Grande Safety Improvements	Install High-Visibility Edge Line Striping	184	190	Mile	12	$23,800	$10,000	$30,000	$0	$285,600	$325,600
		Install High-Visibility Delineators	184	190	Mile	12	$14,300	$10,000	$20,000	$0	$171,600	$201,600
		Install Safety Edge	184	190	Mile	12	$176,000	$60,000	$210,000	$0	$2,112,000	$2,382,000
		Install Speed Feedback Signs	184	190	Each	2	$55,000	$0	$10,000	$0	$110,000	$120,000
		Install DMS	190	190	Each	1	$550,000	$20,000	$60,000	$0	$550,000	$630,000
							Solution Total	**$100,000**	**$330,000**	**$0**	**$3,229,200**	**$3,659,200**
CS10E.11	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	Replace Bridge	188.2	188.2	SF	10126	$280	$90,000	$280,000	$0	$2,835,280	$3,205,280
							Option A: Solution Total	**$90,000**	**$280,000**	**$0**	**$2,835,280**	**$3,205,280**
		Construct Entry/Exit Ramp	188.2	188.2	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	188.2	188.2	Mile	0.5	$2,140,000	$30,000	$110,000	$0	$1,070,000	$1,210,000
							Option C: Solution Total	**$30,000**	**$110,000**	**$0**	**$1,070,000**	**$1,210,000**
CS10E.12	Cottonwood Ln UP (#1154) Bridge Vertical Clearance Mitigation	Replace Bridge	193.88	193.88	SF	7800	$280	$700,000	$220,000	$0	$2,184,000	$2,474,000
							Option A: Solution Total	**$700,000**	**$220,000**	**$0**	**$2,184,000**	**$2,474,000**
		Construct Entry/Exit Ramp	193.88	193.88	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	193.88	193.88	Mile	0.68	$2,140,000	$40,000	$150,000	$0	$1,455,200	$1,645,200
							Option C: Solution Total	**$40,000**	**$150,000**	**$0**	**$1,455,200**	**$1,645,200**
CS10E.13	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	Replace Bridge	205.45	205.45	SF	13260	$280	$110,000	$370,000	$0	$3,712,800	$4,192,800
							Option A: Solution Total	**$110,000**	**$370,000**	**$0**	**$3,712,800**	**$4,192,800**
		Construct Entry/Exit Ramp	205.45	205.45	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	205.45	205.45	Mile	0.54	$2,140,000	$40,000	$120,000	$0	$1,155,600	$1,305,600
							Option C: Solution Total	**$40,000**	**$120,000**	**$0**	**$1,155,600**	**$1,305,300**
CS10E.14	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	Replace Bridge	207.17	207.17	SF	13291	$280	$110,000	$370,000	$0	$3,721,480	$4,201,480
							Option A: Solution Total	**$110,000**	**$370,000**	**$0**	**$3,721,480**	**$4,201,480**
		Construct Entry/Exit Ramp	207.17	207.17	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
							Option B: Solution Total	**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	207.17	207.17	Mile	0.56	$2,140,000	$40,000	$120,000	$0	$1,198,400	$1,358,400
							Option C: Solution Total	**$40,000**	**$120,000**	**$0**	**$1,198,400**	**$1,358,400**

Candidate #	Name	Scope	BMP	EMP	Unit	Quantity	Factored Construction Unit Cost	Preliminary Engineering Cost	Design Cost	Right-of-Way Cost (assuming $12/sf)	Construction Cost	Total Cost
CS10E.17	Pinal Air Park TI UP (#771) Bridge Vertical Clearance Mitigation	Replace Bridge	232.02	232.02	SF	8785	$280	$70,000	$250,000	$0	$2,459,800	$2,779,800
		Option A: Solution Total						**$70,000**	**$250,000**	**$0**	**$2,459,800**	**$2,779,800**
		Construct Entry/Exit Ramp	232.02	232.02	Each	2	$1,610,000	$100,000	$320,000	$0	$3,220,000	$3,640,000
		Option B: Solution Total						**$100,000**	**$320,000**	**$0**	**$3,220,000**	**$3,640,000**
		Reprofile Mainline	232.02	232.02	Mile	0.19	$2,140,000	$30,000	$110,000	$0	$1,070,000	$1,210,000
		Option C: Solution Total						**$30,000**	**$110,000**	**$0**	**$1,070,000**	**$1,210,000**
CS10E.18	Marana Safety Improvements	Install High-Visibility Edge Line Striping	237	242	Mile	10	$23,800	$10,000	$20,000	$0	$238,000	$268,000
		Install High-Visibility Delineators	237	242	Mile	10	$14,300	$0	$10,000	$0	$143,000	$153,000
		Install Safety Edge	237	242	Mile	10	$176,000	$50,000	$180,000	$0	$1,760,000	$1,990,000
		Install Speed Feedback Signs	237	242	Each	4	$55,000	$10,000	$10,000	$0	$220,000	$250,000
		Install DMS	240	240	Each	1	$550,000	$20,000	$60,000	$0	$550,000	$630,000
		Solution Total						**$80,000**	**$280,000**	**$0**	**$2,911,000**	**$3,291,000**
CS10E.19	Marana Lighting Improvements	Install Lighting	237	242	Mile	10	$594,000	$180,000	$590,000	$0	$5,940,000	$6,710,000
		Solution Total						**$180,000**	**$590,000**	**$0**	**$5,940,000**	**$6,710,000**
CS10E.20	Marana Pedestrian Improvements	Install Access Barrier Fence	237	242	LF	52800	$33	$50,000	$170,000	$0	$1,742,400	$1,962,400
		Solution Total						**$50,000**	**$170,000**	**$0**	**$1,742,400**	**$1,962,400**
CS10E.21	Tucson Mobility, Safety, and Freight Improvements	Construct General Purpose Lane	248	252	Mile	8	$2,640,000	$630,000	$2,110,000	$6,082,560	$21,120,000	$29,902,560
		Widen Ina Rd EB Bridge	248.72	248.72	SF	10540	$390	$120,000	$410,000	$0	$4,110,600	$4,610,600
		Widen Ina Rd WB Bridge	248.72	248.72	SF	10540	$390	$120,000	$410,000	$0	$4,110,600	$4,610,600
		Widen Canada Del Oro Br EB Bridge	249.49	249.49	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Widen Canada Del Oro Br WB Bridge	249.49	249.49	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Widen Orange Grove EB Bridge	250.04	250.04	SF	8428	$390	$100,000	$330,000	$0	$3,286,920	$3,716,920
		Widen Orange Grove WB Bridge	250.04	250.04	SF	8368	$390	$100,000	$330,000	$0	$3,263,520	$3,693,520
		Widen Rillito Creek Br EB Bridge	250.66	250.66	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Widen Rillito Creek Br WB Bridge	250.66	250.66	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Widen Sunset Rd EB Bridge	251.18	251.18	SF	7645	$390	$90,000	$300,000	$0	$2,981,550	$3,371,550
		Widen Sunset Rd WB Bridge	251.18	251.18	SF	7645	$390	$90,000	$300,000	$0	$2,981,550	$3,371,550
		Repair Canada Del Oro WB Bridge	249.49	249.49	SF	20992	$140	$90,000	$290,000	$0	$2,938,880	$3,318,880
		Repair Orange Grove EB Bridge	250.04	250.04	SF	8428	$140	$40,000	$120,000	$0	$1,179,920	$1,339,920
		Repair Orange Grove WB Bridge	250.04	250.04	SF	8368	$140	$40,000	$120,000	$0	$1,171,520	$1,331,520
		Repair Rillito Creek EB Bridge	250.66	250.66	SF	20992	$140	$90,000	$290,000	$0	$2,938,880	$3,318,880
		Repair Sunset Rd EB Bridge	251.18	251.18	SF	7645	$140	$30,000	$110,000	$0	$1,070,300	$1,210,300
		Option A: Solution Total						**$2,540,000**	**$8,400,000**	**$6,082,560**	**$83,901,760**	**$100,924,320**

Candidate #	Name	Scope	BMP	EMP	Unit	Quantity	Factored Construction Unit Cost	Preliminary Engineering Cost	Design Cost	Right-of-Way Cost (assuming $12/sf)	Construction Cost	Total Cost
CS10E.21	Tucson Mobility, Safety, and Freight Improvements	Construct Auxiliary Lane	248	252	Mile	8	$2,011,000	$480,000	$1,610,000	$6,082,560	$16,088,000	$24,260,560
		Widen Canada Del Oro Br EB Bridge	249.49	249.49	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Widen Canada Del Oro Br WB Bridge	249.49	249.49	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Widen Rillito Creek Br EB Bridge	250.66	250.66	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Widen Rillito Creek Br WB Bridge	250.66	250.66	SF	20992	$390	$250,000	$820,000	$0	$8,186,880	$9,256,880
		Repair Canada Del Oro WB Bridge	249.49	249.49	SF	20992	$140	$90,000	$320,000	$0	$2,938,880	$3,318,880
		Option B: Solution Total						**$1,570,000**	**$5,180,000**	**$6,082,560**	**$51,774,400**	**$64,606,960**
		Implement Ramp Metering	248	255	Each	14	$330,000	$140,000	$460,000	$0	$4,620,000	$5,220,000
		Implement Ramp Metering	255	262	Each	14	$330,000	$140,000	$460,000	$0	$4,620,000	$5,220,000
		Option C: Solution Total						**$280,000**	**$920,000**	**$0**	**$9,240,000**	**$10,440,000**
S10E.22	Tucson Pedestrian Improvements	Install Access Barrier Fence	257	258	Mile	10560	$33	$190,000	$640,000	$0	$348,480	$998,480
		Install Pedestrian Bridge	258	258	SF	4800	$300	$50,000	$180,000	$0	$1,440,000	$1,620,000
		Solution Total						**$240,000**	**$820,000**	**$0**	**$1,788,480**	**$2,618,480**
CS10E.23	East Tucson Pedestrian Improvements	Install Access Barrier Fence	262	264	Mile	21120	$33	$20,000	$70,000	$0	$696,960	$786,960
		Install Pedestrian Bridge	262	262	SF	4800	$300	$40,000	$140,000	$0	$1,440,000	$1,620,000
		Solution Total						**$60,000**	**$210,000**	**$0**	**$2,136,960**	**$2,406,960**
CS10E.24	East Tucson Mobility, Safety, and Freight Improvements	Construct General Purpose Lane	262	274	Mile	24	$2,640,000	$1,900,000	$6,340,000	$18,247,680	$63,360,000	$89,807,680
		Ajo Way EB Bridge Replacement	262.44	262.44	SF	11275	$280	$90,000	$320,000	$0	$3,157,000	$3,567,000
		Ajo Way WB Bridge Replacement	262.44	262.44	SF	11275	$280	$90,000	$320,000	$0	$3,157,000	$3,567,000
		Widen Diversion Channel EB Bridge	262.82	262.82	SF	6156	$390	$70,000	$240,000	$0	$2,400,840	$2,710,840
		Widen Diversion Channel WB Bridge	262.82	262.82	SF	4887	$390	$60,000	$190,000	$0	$1,905,930	$2,215,930
		Widen Country Club EB Bridge	263.82	263.82	SF	6450	$390	$80,000	$250,000	$0	$2,515,500	$2,845,500
		Widen Country Club WB Bridge	263.82	263.82	SF	6450	$390	$80,000	$250,000	$0	$2,515,500	$2,845,500
		Widen Irvington Rd EB Bridge	264.27	264.27	SF	12267	$390	$140,000	$480,000	$0	$4,784,130	$5,404,130
		Widen Irvington Rd WB Bridge	264.27	264.27	SF	12267	$390	$140,000	$480,000	$0	$4,784,130	$5,404,130
		Widen Palo Verde EB Bridge	264.37	264.37	SF	9165	$390	$110,000	$360,000	$0	$3,574,350	$4,044,350
		Widen Palo Verde WB Bridge	264.37	264.37	SF	9165	$390	$110,000	$360,000	$0	$3,574,350	$4,044,350
		Widen Alvernon Way EB Bridge	265.02	265.02	SF	13588	$390	$160,000	$530,000	$0	$5,299,320	$5,989,320
		Widen Alvernon Way WB Bridge	265.02	265.02	SF	13588	$390	$160,000	$530,000	$0	$5,299,320	$5,989,320
		Widen Drexel Rd EB Bridge	266	266	SF	6091	$390	$70,000	$240,000	$0	$2,375,490	$2,685,490
		Widen Drexel Rd WB Bridge	266	266	SF	6091	$390	$70,000	$240,000	$0	$2,375,490	$2,685,490
		Widen Valencia Rd EB Bridge	267.1	267.1	SF	7906	$390	$90,000	$310,000	$0	$3,083,340	$3,483,340
		Widen Valencia Rd WB Bridge	267.1	267.1	SF	8638	$390	$100,000	$340,000	$0	$3,368,820	$3,808,820
		Widen Earp Wash Trib EB Bridge	267.65	267.65	SF	4879	$390	$60,000	$190,000	$0	$1,902,810	$2,152,810
		Widen Earp Wash Trib WB Bridge	267.65	267.65	SF	4879	$390	$60,000	$190,000	$0	$1,902,810	$2,152,810
		Widen Craycroft EB Bridge	268.08	268.08	SF	7700	$390	$90,000	$300,000	$0	$3,003,000	$3,393,000
		Widen Craycroft WB Bridge	268.08	268.08	SF	7700	$390	$90,000	$300,000	$0	$3,003,000	$3,393,000
		Widen Wilmot Rd EB Bridge	269.36	269.36	SF	7700	$390	$90,000	$300,000	$0	$3,003,000	$3,393,000

Candidate #	Name	Scope	BMP	EMP	Unit	Quantity	Factored Construction Unit Cost	Preliminary Engineering Cost	Design Cost	Right-of-Way Cost (assuming $12/sf)	Construction Cost	Total Cost
CS10E.24	East Tucson Mobility, Safety, and Freight Improvements	Widen Wilmot Rd WB Bridge	269.36	269.36	SF	7700	$390	$90,000	$300,000	$0	$3,003,000	$3,933,000
		Rehab Earp Wash Trib EB Bridge	267.65	267.65	SF	4879	$140	$20,000	$70,000	$0	$683,060	$773,060
		Rehab Earp Wash Trib WB Bridge	267.65	267.65	SF	4879	$140	$20,000	$70,000	$0	$683,060	$773,060
		Rehab Craycroft EB Bridge	268.08	268.08	SF	7700	$140	$30,000	$110,000	$0	$1,078,000	$1,218,000
		Rehab Craycroft WB Bridge	268.08	268.08	SF	7700	$140	$30,000	$110,000	$0	$1,078,000	$1,218,000
		Rehab Wilmot Rd EB Bridge	269.36	269.36	SF	7700	$140	$30,000	$110,000	$0	$1,078,000	$1,218,000
		Rehab Wilmot Rd WB Bridge	269.36	269.36	SF	7700	$140	$30,000	$110,000	$0	$1,078,000	$1,218,000
		Option A: Solution Total						**$4,160,000**	**$13,940,000**	**$18,247,680**	**$139,026,250**	**$175,373,930**
		Construct Auxiliary Lane	262	274	Mile	24	$2,011,000	$1,450,000	$4,830,000	$18,247,680	$48,264,000	$72,791,680
		Ajo Way EB Bridge Replacement	262.44	262.44	SF	11275	$280	$90,000	$320,000	$0	$3,157,000	$3,567,000
		Ajo Way WB Bridge Replacement	262.44	262.44	SF	11275	$280	$90,000	$320,000	$0	$3,157,000	$3,567,000
		Widen Country Club EB Bridge	263.82	263.82	SF	6450	$390	$80,000	$250,000	$0	$2,515,500	$2,845,500
		Widen Country Club WB Bridge	263.82	263.82	SF	6450	$390	$80,000	$250,000	$0	$2,515,500	$2,845,500
		Widen Drexel Rd EB Bridge	266	266	SF	6091	$390	$70,000	$240,000	$0	$2,375,490	$2,685,490
		Widen Drexel Rd WB Bridge	266	266	SF	6091	$390	$70,000	$240,000	$0	$2,375,490	$2,685,490
		Option B: Solution Total						**$1,930,000**	**$6,450,000**	**$18,247,680**	**$64,359,980**	**$90,987,660**
		Implement Ramp Metering	262	274	Each	16	$55,000	$30,000	$90,000	$0	$880,000	$1,000,000
		Widen Left Shoulder	262	274	Mile	24	$563,000	$410,000	$1,350,000	$0	$13,512,000	$15,272,00
		Install Speed Feedback Signs	262	274	Each	2	$55,000	$0	$10,000	$0	$220,000	$120,000
		Install DMS	266	266	Each	1	$550,000	$20,000	$60,000	$0	$3,157,000	$630,000
		Option C: Solution Total						**$460,000**	**$1,510,000**	**$0**	**$15,052,000**	**$17,022,000**
CS10E.27	East Tucson Lighting Improvements	Install Lighting	263	274	Mile	22	$594,000	$390,000	$1,310,000	$0	$13,068,000	$14,768,000
		Solution Total						**$390,000**	**$1,310,000**	**$0**	**$13,068,000**	**$14,768,000**
CS10E.28	Vail Mobility and Safety Improvements	Construct General Purpose Lane	274	279	Mile	10	$2,640,000	$790,000	$2,640,000	$7,603,200	$26,400,000	$37,433,200
		Widen Wash EB Bridge	277.46	277.46	SF	3873	$390	$50,000	$150,000	$0	$1,510,470	$1,710,470
		Widen Wash WB Bridge	277.9	277.9	SF	4061	$390	$50,000	$160,000	$0	$1,583,790	$1,793,790
		Rehab Wash EB Bridge	277.46	277.46	SF	3873	$140	$20,000	$50,000	$0	$542,220	$612,220
		Option A: Solution Total						**$910,000**	**$3,000,000**	**$7,603,200**	**$30,036,480**	**$41,549,680**
		Widen Left Shoulder	274	280	Mile	12	$563,000	$200,000	$680,000	$0	$6,756,000	$7,636,000
		Widen Left Shoulder	280	286	Mile	12	$563,000	$200,000	$680,000	$0	$6,756,000	$7,636,000
		Install High-Visibility Edge Line Striping	274	280	Mile	12	$23,800	$10,000	$30,000	$0	$285,600	$325,600
		Install High-Visibility Edge Line Striping	280	286	Mile	12	$23,800	$10,000	$30,000	$0	$285,600	$325,600
		Install High-Visibility Delineators	274	280	Mile	12	$14,300	$10,000	$20,000	$0	$171,600	$201,600
		Install High-Visibility Delineators	280	286	Mile	12	$14,300	$10,000	$20,000	$0	$171,600	$201,600
		Segment 10: Solution Total						**$220,000**	**$730,000**	**$0**	**$7,213,200**	**$8,163,200**

Candidate #	Name	Scope	BMP	EMP	Unit	Quantity	Factored Construction Unit Cost	Preliminary Engineering Cost	Design Cost	Right-of-Way Cost (assuming $12/sf)	Construction Cost	Total Cost
CS10E.28	Vail Mobility and Safety Improvements	**Segment 11: Solution Total**						**$220,000**	**$730,000**	**$0**	**$7,213,200**	**$8,163,200**
		Option B: Solution Total						**$440,000**	**$1,460,000**	**$0**	**$16,326,400**	**$16,326,400**
CS10E.29	Vail Lighting Improvements	Install Decision Point Lighting	275	279	Pole	24	$22,000	$0	$100,000	$0	$528,000	$628,000
		Solution Total						**$0**	**$100,000**	**$0**	**$528,000**	**$628,000**
CS10E.30	Mescal EB Climbing Lane	Construct Climbing Lane	293	296	Mile	3	$3,300,000	$300,000	$990,000	$2,280,960	$9,900,000	$13,470,960
		Solution Total						**$300,000**	**$990,000**	**$2,280,960**	**$9,900,000**	**$13,470,960**
CS10E.31	Mescal Shoulder Widening	Widen Shoulder	293	299	Mile	12	$563,000	$200,000	$680,000	$0	$6,756,000	$7,636,000
		Solution Total						**$200,000**	**$680,000**	**$0**	**$6,756,000**	**$7,363,000**
CS10E.32	Mescal WB Climbing Lane	Construct Climbing Lane	296	299	Mile	3	$3,300,000	$300,000	$990,000	$2,280,960	$9,900,000	$13,470,960
		Solution Total						**$300,000**	**$990,000**	**$2,280,960**	**$9,900,000**	**$13,470,960**
CS10E.33	Dragoon Safety Improvements	Install High-Visibility Edge Line Striping	317	318	Mile	2	$23,800	$0	$0	$0	$47,600	$47,600
		Install High-Visibility Delineators	317	318	Mile	2	$14,300	$0	$0	$0	$28,600	$28,600
		Install Safety Edge	317	318	Mile	2	$176,000	$10,000	$40,000	$0	$352,000	$402,000
		Install Speed Feedback Signs	317	318	Each	2	$55,000	$0	$10,000	$0	$110,000	$120,000
		Install DMS	317	317	Each	1	$550,000	$20,000	$60,000	$0	$550,000	$630,000
		Solution Total						**$30,000**	**$110,000**	**$0**	**$1,088,200**	**$1,228,200**
CS10E.34	Dragoon EB Climbing Lane	Construct Climbing Lane	317	318	Mile	1	$4,950,000	$150,000	$500,000	$760,320	$4,950,000	$6,360,320
		Solution Total						**$150,000**	**$500,000**	**$760,320**	**$4,950,000**	**$6,360,320**
CS10E.35	Exit 318 Lighting Improvements	Install Decision Point Lighting	318	318	Pole	12	$22,000	$10,000	$30,000	$0	$264,000	$304,000
		Solution Total						**$10,000**	**$30,000**	**$0**	**$264,000**	**$304,000**
CS10E.36	Airport Road UP (#1114) Bridge Vertical Clearance Mitigation	Replace Bridge	339.46	339.46	SF	10877	$280	$90,000	$300,000	$0	$3,045,560	$3,435,560
		Option A: Solution Total						**$90,000**	**$300,000**	**$0**	**$3,045,560**	**$3,435,560**
		Construct Entry/Exit Ramp	339.46	339.46	Each	4	$1,610,000	$190,000	$640,000	$0	$6,440,000	$7,270,000
		Option B: Solution Total						**$190,000**	**$640,000**	**$0**	**$6,440,000**	**$7,270,000**
		Reprofile Mainline	339.46	339.46	Mile	0.62	$2,140,000	$40,000	$130,000	$0	$1,326,800	$1,496,800
		Option C: Solution Total						**$40,000**	**$130,000**	**$0**	**$1,326,800**	**$1,496,800**
CS10E.37	Page Ranch Road Safety Improvements	Install High-Visibility Edge Line Striping	354	358	Mile	8	$23,800	$10,000	$20,000	$0	$190,400	$220,400
		Install High-Visibility Delineators	354	358	Mile	8	$14,300	$0	$10,000	$0	$114,400	$124,400
		Install Safety Edge	354	358	Mile	8	$176,000	$40,000	$140,000	$0	$1,408,000	$1,588,000
		Install Speed Feedback Signs	354	358	Each	2	$55,000	$0	$10,000	$0	$110,000	$120,000
		Install DMS	356	356	Each	2	$550,000	$30,000	$110,000	$0	$1,100,000	$1,240,000
		Solution Total						**$80,000**	**$290,000**	**$0**	**$2,922,800**	**$3,292,800**
CS10E.38	Exit 355 Lighting Improvements	Install Decision Point Lighting	355	355	Pole	9	$22,000	$10,000	$0	$0	$198,000	$208,000
		Solution Total						**$10,000**	**$0**	**$0**	**$198,000**	**$208,000**

Candidate #	Name	Scope	BMP	EMP	Unit	Quantity	Factored Construction Unit Cost	Preliminary Engineering Cost	Design Cost	Right-of-Way Cost (assuming $12/sf)	Construction Cost	Total Cost
CS10E.39	West San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	Replace Bridge	373.93	373.93	SF	10982	$280	$90,000	$310,000	$0	$3,074,960	$3,474,960
		Option A: Solution Total						**$90,000**	**$310,000**	**$0**	**$3,074,960**	**$3,474,960**
		Construct Entry/Exit Ramp	373.93	373.93	Each	2	$1,610,000	$100,000	$320,000	$0	$3,220,000	$3,640,000
		Option B: Solution Total						**$100,000**	**$320,000**	**$0**	**$3,220,000**	**$3,640,000**
		Reprofile Mainline	373.93	373.93	Mile	0.5	$2,140,000	$30,000	$110,000	$0	$1,070,000	$1,210,000
		Option C: Solution Total						**$30,000**	**$110,000**	**$0**	**$1,070,000**	**$1,210,000**
CS10E.40	East San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	Replace Bridge	383.35	383.35	SF	10306	$280	$90,000	$290,000	$0	$2,885,680	$3,265,680
		Option A: Solution Total						**$90,000**	**$290,000**	**$0**	**$2,885,680**	**$3,265,680**
		Construct Entry/Exit Ramp	383.35	383.35	Each	2	$1,610,000	$100,000	$320,000	$0	$3,220,000	$3,640,000
		Option B: Solution Total						**$100,000**	**$320,000**	**$0**	**$3,220,000**	**$3,640,000**
		Reprofile Mainline	383.35	383.35	Mile	0.54	$2,140,000	$30,000	$120,000	$0	$1,155,600	$1,305,600
		Option C: Solution Total						**$30,000**	**$120,000**	**$0**	**$1,155,600**	**$1,305,600**

APPENDIX B: LIFE-CYCLE COST ANALYSIS

ADOT I-10 EAST BRIDGE LCCA

1.1 Introduction

This section presents the results of a LCCA for selected bridges on I-10 East. The LCCA is used to assess the potential for bridges to advance as strategic projects in the set of corridor recommendation, either on their own as a bridge-only strategic project, or combined with other needs associated with the roadway segment within which the bridge is located.

The format of this section is as follows.

- how bridge improvements work now
- what is a LCCA and why is it performed
- I-10 East bridges identified for LCCA (and why)
- the I-10 East corridor bridge profile LCCA model
- results of I-10 East LCCA and how used in the CPS
- next steps

1.2 How Bridges Are Cared For Now

ADOT's essential objective is to keep each bridge in working order (rating of 4 or higher) in an economical manner. Key considerations involved in achieving this objective include the traffic volumes and role of the roadway facility for which the bridge is a feature, the rate of deterioration of the bridge and its major components or subsystems, the user impact of restrictions or detours should the bridge not perform adequately, and the total funding available for bridge maintenance, repair, rehabilitation, and replacement over a time period. Bridges have a long design life (typically 75 years), so they are seldom completely replaced unless a larger improvement project on the associated roadway is required to add capacity or make other operational or safety improvements.

In a perfect world with adequate funding, ADOT's bridge managers would apply "optimal" or most cost-effective (that is, economical) corrective actions to maintain a bridge's condition at 4 or higher out of 9. In the less than perfect real world with funding often in short supply, less expensive but sometimes less economical actions are applied to keep the bridges in service due to overall funding limitations. This approach tends to minimize ADOT costs in the short term but can contribute to increased costs in the longer term. If occasional short term funding limitations are followed by adequate funding levels, this adverse consequence can generally be remedied. But if funding limitations become the norm then the avoidable future cost increases can become a serious liability for the agency. The bridge LCCA has been proposed as part of this CPS to identify cases where spending more money sooner may provide a more economical strategy over time to keeping a bridge in working order. It also provides an opportunity to consider whether other non-bridge needs on the associated roadway may be combined with bridge needs to develop a solution strategy that accomplishes multiple objectives with reduced interruption to the traveling public.

1.3 Life Cycle Cost Analysis – What and Why

LCCA is an economic study that compares the cost stream over time of a set of improvement actions from different alternatives and presents the results in a common measure, the present value of all future costs. The alternatives are focused on achieving the same or very similar objectives from three different strategic approaches. These three strategies are Option 1 – Replace immediately, Option 2 – Rehabilitate immediately then replacement at 75 years old, and Option – 3 Continue ongoing repairs until replacement at 75 years old. 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 this bridge LCCA the costs are focused on agency (ADOT) costs for corrective actions to meet the objective of keeping a bridge serviceable over a long period of time. LCCA often also includes user costs (that is, benefits) but those were omitted for this initial analysis except in a qualitative manner. The focus has remained on ADOT agency costs.

The reason for performing LCCA is to provide a more complete holistic perspective on asset condition, performance, and agency costs over the life of an investment stream. This approach helps ADOT look beyond initial and short term costs that often dominate the considerations in transportation investment decision making and programming, especially under severe financial constraints.

In this bridge LCCA, three basic strategies are analyzed that differ in timing and scale of improvement actions to maintain the selected bridges. These strategies are immediate bridge replacement (large up-front cost but small ongoing costs afterwards), immediate rehabilitation until replacement (moderate up-front costs then small to moderate ongoing costs until replacement), and ongoing repairs until replacement (low up front and ongoing costs until replacement).

1.4 Bridges Selected for I-10 East Life-Cycle Cost Analysis

Four bridges were selected for LCCA for I-10 East. The criteria for selection included where bridge ratings indicate a score of 4 or multiple scores of 5 for substructure, superstructure, or deck rating and the bridge

has a high level of historical investment. The bridges selected for LCCA analysis are listed below along with the bridge number and the year ending their typical 75-year life.

a. Drain Channel Bridge WB - #1104 (2040) – carries I-10 East over drainage channel
b. Red Rock TI UP - #592 (2040) – carries traffic over I-10 East mainline
c. Ajo Way OP EB - #1107 (2040) – carries I-10 East over Ajo Way
d. Ajo Way OP WB - #1108 (2040) – carries I-10 East over Ajo Way

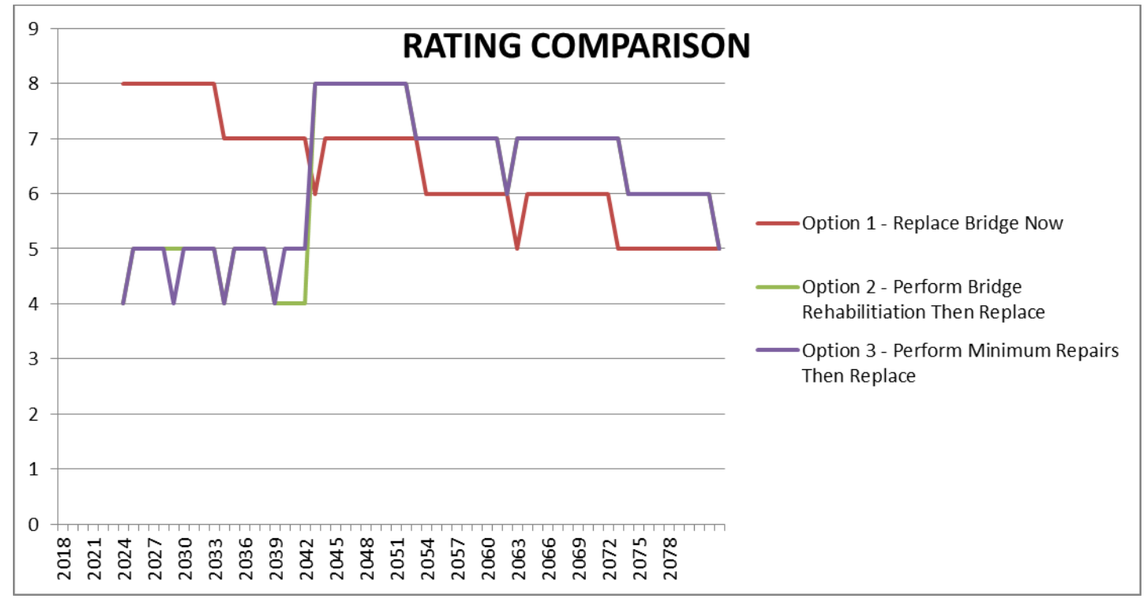
The four bridges above have a 75-year end of life occurring in 2040. It was decided after making the LCCA selections that bridges aging out before 2030 need replacement soon enough to be identified for a strategic bridge replacement without further LCCA efforts. They should be checked, however, for possible deck area increases during that replacement to meet current standards and to accommodate any mobility widenings (adding lanes) or lengthening (widen roadway underneath) that may be driven by other needs on the roadway segment.

1.5 The Corridor Profile Study Bridge Life-Cycle Cost Analysis Model Overview

The bridge LCCA model for the CPS reviews the characteristics of the selected bridges including bridge ratings and deterioration rates to develop three economic improvement strategies as outlined earlier: 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 effect on the bridge condition over time for each strategy is shown on **Figure 1** for illustration from one of the I-10 East bridges, the Ajo Way WB bridge that carries the I-10 East mainline over that roadway. That chart shows the bridge rating in each year over the analysis period by improvement strategy. Similar charts were generated for other I-10 East LCCA bridges.

Figure 1: Bridge Condition Rating for I-10 East Ajo Way WB Bridge by Year by Improvement Strategy



Source: HDR, Inc., 2016

This bridge hits the 75-year replacement limit in 2040. The three strategies have a very close *average* rating over the analysis period—in the range of 6.23 to 6.45—although they differ year to year.

The costs of the set of improvement actions in each strategy that resulted in the Ajo Way WB bridge ratings chart above is shown in **Table 1**. Agency costs are shown in total $1,000s undiscounted and discounted (present value at 3%) 2015 dollars over the 65-year analysis period ending in 2080.

Table 1: Cost of Future Improvement Strategies for Ajo Way WB Bridge

Cost of Strategy: 2021–2080, 2015 $1,000		
OPTION	**Undiscounted**	**Present Value 3%**
Option 1 (Replace)	$5,948	$4,679
Option 2 (Rehabilitate)	$7,755	$4,177
Option 3 (Repair)	$6,524	$3,238

In this case the Option 1 full replacement immediately is the lowest cost in undiscounted dollars, but the Option 3 repair strategy (followed by replacement when the bridge life hits 75 years) is the lowest cost in discounted dollars, which is a better metric to use. Similar calculations were completed for the other I-10 East LCCA bridges. In this case there would not be a strategic bridge project (full replacement) at least from a bridge-only perspective without regard to other needs on the associated roadway.

The next section of this chapter shows how the results are used in identifying candidate strategic bridge projects from the set of bridges selected for LCCA, first looking at the bridges alone, then afterwards looking at the bridges in the context of the other needs on its associated roadway.

1.6 Life Cycle Cost Results

This section reviews the life cycle cost results from several perspectives. These are:

- undiscounted total ADOT costs over the analysis period
- discounted total ADOT costs over the analysis period
- how close the various strategies are
- combining bridge LCCA results with other needs on the connecting roadway

1.6.1 ADOT Future Costs by Bridge Strategy– Undiscounted

Table 2 summarizes the bridge life cycle cost results for the four I-10 East bridges selected for this analysis for the three improvement strategies. The results are all in undiscounted 2015 dollars—that is, no time value of money. The colors indicate the rank order of the costs with green as the lowest, yellow as second, and red as highest.

Table 2: Total Costs by Strategy by Bridge - Undiscounted 2015$

I-10 East Bridge			ADOT Future Costs: 2021–2080		
			2015 $1,000 Undiscounted		
Item	Name	Number	1-Replace	2-Rehabilitate	3-Repair
1	Drain Channel	1104	$1,480	$1,892	$1,706
2	Red Rock	592	$1,870	$2,398	$2,014
3	Ajo Way EB	1107	$5,948	$8,196	$6,816
4	Ajo Way WB	1108	$5,948	$7,755	$6,524

Three of the four bridges in all improvement strategy cases kept the bridge rating above 4 in an economical manner in all years. Ajo Way EB had the ratings dropping to 3 with the option to repair until replacement.

The total cost of mitigation strategies for these four bridges range from a low of $1.5 million to a high of $8.2 million over the analysis period. Full bridge replacement as soon as possible is the lowest cost strategy to keep all four bridges at rating of 4 or higher over the analysis period in an economical manner. Full replacement immediately introduces a major corrective action up front followed by minimal minor repair actions over the remaining years of the analysis period. The Option 3 minimum repair strategy (until required end of life replacement) is the lowest for cost strategy for all four bridges.

1.6.2 ADOT Future Costs by Bridge Strategy – Present Value Costs (at 3% discount rate)

The time value of money was not considered in the previous section but is an important consideration. This section describes how discounting future investments affects the comparative results of the different bridge improvement strategies.

Table 3 shows the total cost for the same corrective actions as in Table 2 except that the future expenditures are discounted to present value costs at a 3% annual rate. As with Table 2 the color indicates the rank order of the strategies.

Table 3: Total Costs by Strategy by Bridge - Discounted 2015$

I-10 East Bridge			ADOT Future Costs: 2021-2080		
			2015 $1,000 PV 3%		
Item	Name	Number	1-Replace	2-Rehabilitate	3-Repair
1	Drain Channel	1104	$1,172	$1,014	$818
2	Red Rock	592	$1,471	$1,431	$1,110
3	Ajo Way EB	1107	$4,679	$4,224	$3,255
4	Ajo Way WB	1108	$4,679	$4,177	$3,237

In this discounted perspective, Option 3 is the lowest-cost strategy for all four bridges. The Option 1 replace strategy is the highest cost for all bridges. Again the average bridge condition rating over the analysis period is similar in all three cases. These results reinforce the experience of ADOT Bridge Group staff that replacing a bridge is a very rare event unless a related mobility or other need creates a larger project within which a full bridge replacement is called for, something that will be examined later in this chapter.

1.6.3 Future Costs Present Value – Tolerance Band around Lowest Cost Strategy

While the previous section looked at the LCCA present value results in pure rank order, this section examines “how close” the results and rankings are to see whether there are differences among strategies

that are small enough to be assumed a tie and thus possibly modify the interpretation of results. This test acknowledges the high degree of uncertainty in the LCCA at the level of the CPS.

A “tolerance” of 15 percent of the difference between strategies was established as a tie. This tolerance suggests that if the second lowest cost strategy is within 15 percent of the lowest cost and the second lowest cost is a more aggressive strategy than the lowest cost strategy, then the two strategies are essentially tied, and the designation for lowest cost goes to the more aggressive strategy.

Table 4 shows the same color ranking as the previous table for discounted total costs. For the second highest cost (yellow shading) and highest cost strategy (red shading), the percentage value shown is the percent that that strategy is *above* the next lower strategy (yellow to green, and red to yellow). If the value shown in yellow is 15 percent or less then it is tied with the green and the more aggressive strategy of the two is considered lowest cost. If the red value is 15 percent or less then the red strategy is considered a tie with the yellow strategy which may come into play in the “other needs” consideration presented later in this section. Finally, the fourth percentage column on the right is the percent that the highest cost strategy (red shading) is above the lowest cost strategy (green shading). If this percentage is less than or equal to 15 percent *and* the highest cost strategy is more aggressive than both the lowest or second cost strategy (that is, full replacement), then the revised designation of lowest cost strategy goes to the most aggressive strategy—full replacement.

Table 4: Percent Cost above Next Lower Cost Strategy

I-10 East Bridge			% Above Next Lower Value Present Value 3%			% High to Low
Item	Name	Number	1-Replace	2-Rehabilitate	3-Repair	Red/Green
1	Drain Channel	1104	15.6%	24.0%	0%	43.3%
2	Red Rock	592	3.8%	28.9%	0%	32.5%
	Ajo Way EB	1107	10.8%	29.8%	0%	43.7%
	Ajo Way WB	1108	12.0%	29.0%	0%	44.5%

For I-10 East, the lowest cost (green) was always Option 3 Repair. The second lowest cost strategy (yellow shading) was never within 15 percent of the lowest cost or green strategy. So the tolerance test does not affect the outcomes of any of the bridges. The replacement of the Ajo Way bridge will be assessed as a part of other strategic solutions along the corridor.

1.6.4 Other Considerations Combined with Life Cycle Cost Analysis

Other considerations in the reassessment of the LCCA results are focused on non-LCCA results that may still identify a bridge for replacement because of a mobility need for widening (or lengthening over another roadway being widened) to add a travel lane to increase roadway capacity. Other non-mobility needs that do not directly affect widening or lengthening may be considered as well. These include pavement, safety, and freight.

The Drain Channel and Red Rock bridges had Option – 3 Repair as its lowest present value cost strategy. There is no mobility need that would widen either of these bridges to add capacity to I-10 East. Also, there are no freight or pavement needs on I-10 East near these bridges. Thus, there is still no strategic bridge replacement recommendation for this bridge and it defaults to the non-strategic rehabilitation until replacement.

The Ajo Way EB and WB bridges had Option 3 – Repair as the lowest present value cost strategies. There is a mobility need associated with these bridges that would widen it to add capacity to I-10 East. There are also safety and freight needs associated with this segment of I-10 East. Thus, there may be a strategic bridge replacement recommendation for this bridge if it is found to be strategic to widen I-10 East through this segment.

Table 5 summarizes the results of the two bridges that entered the LCCA. All bridges default to the usual repair or rehabilitation unless a larger project comes along that includes the bridge replacement.

Table 5: Summary of I-10 East Bridge LCCA Results

Item	Bridge Name	Bridge #	75th Year	Carries	Over	LCCA Results	Reason for Replacement
1	Drain Channel	1104	2040	I-10 East	Channel	Repair	Not applicable
2	Red Rock	592	2040	Red Rock	I-10 East	Repair	Not applicable
3	Ajo Way EB	1107	2040	I-10 East	Ajo Way	Repair	I-10 East Widening Project
4	Ajo Way WB	1108	2040	I-10 East	Ajo Way	Repair	I-10 East Widening Project

DRAIN CHANNEL BR WB OP (#1104) / ROUTE / MP 209.85

Bridge Information	
Bridge Deck Area (A225)	3542 SF
Year Built (N27)	1965
Exp Service Life	75 YR
Total Bridge Length (N49)	82 LF
Number of Spans (N45+N46)	3
Skew Angle (N34)	16 DEG
Average Elevation	1592 FT
Max Pier Height	33 FT
* Amount of Widening for Bridge	0 FT
Revised Deck Area (Bridge Replace)	3542 FT
**Scour Critical Rating (N113)	3

Deterioration Slope				
Item	Deterioration Line Equation			Year
	Slope =	Days	Years	Drop
Substr	y =	-0.000242x	-0.088x	11.32
Superstr	y =	-0.000603x	-0.220x	4.54
Deck	y =	-0.000399x	-0.146x	6.87

***Input 0 if no widening. Input should include widening on both sides of bridge if applicable.**
****If scour critical rating is 3 or lower, Option 2 should consider the implementation of scour countermeasures.**

Notes:
1. Widening is intended only to correct lane and/or shoulder width deficiencies. It is not intended for adding traffic capacity (i.e. adding general purpose lanes).

Cost Multipliers		
Elevation > 4000ft	1592	1.00
Pier Height > 30ft	33	1.10
Length to # span ratio	27.33	1.25
Skew > 30degrees	16.00	1.00
Project Cost Multiplier	All Options	2.20

L to # Span Multiplier	
L/ # Span Ratio	Multiplier
=>100	1.00
=>60	1.10
<60	1.25

Skew Multiplier	
Skew	Multiplier
<30	1.00
=>30	1.10

Adjusted Bridge Replace Cost	
Base Bridge Replacement Cost (Per SF)	$125.00
Bridge Replacement Cost w/ Multipliers (Per SF)	$171.88

Elevation Multiplier	
Elev	Multiplier
<4000	1.00
=>4000	1.25

Pier H Multiplier	
Pier H	Multiplier
<30	1.00
=>30	1.10

User input cell
Only manipulate cell value after consulting with team

Bridge History (Inspections/As-builts)

Description	Category	Year
Bridge was originally built in 1965 I-10-4(41).		1965
Repaired damage at thrie beam at NW corner.	Repair (Supr - Stl)	2010
Rehabed deck	Repair (Deck)	2010
Rehab top deck	Rehab (Deck Epoxy Overlay)	2014
Numerous transverse hairline to medium sized longitudinal and random cracks with delamination spots. The		2014
There are several longitudinal hairline to narrow sized cracks in soffit, the slab fascia has hairline vertical cracks in span #2, the construction joint in the middle of the soffit has light efflorescence, and the edge of the North soffit in span #2 has minor spalls		2014
Minor hairline cracks on abutment backwalls and wide cracks beneath abutments slope paving with some voids beneath.		2014
The waterway upstream has light vegetation, and flat; the downstream channel is narrow with short vegetated banks. The channel under the bridge is a low point, and the ground under the bridge is humid and soft. There is no bank protection along the channel.		2014

Replace / Rehab / Repair Information

BRIDGE DECK				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Deck)	Full Deck Replacement	$85.94	25	Rating = 8
Rehab (Deck Concrete Overlay)	Overlay (Concrete)	$10.00	15	+ 2
Rehab (Deck Epoxy Overlay)	Overlay (Epoxy)	$5.00	10	+ 1
Repair (Deck)	Patch Spalls / Seal Cracks	$3.00	See Deterioration Slope	+ 0
Replace (Bridge)	Full Bridge Replacement	$171.88	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 0
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 0

SUPERSTRUCTURE - STEEL				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Supr - Stl)	Full SuperStr Replacement	$85.94	50	Rating = 8
Rehab (Supr - Stl)	Weld New Structural Components	$42.97	15	+ 2
Repair (Supr - Stl)	Weld Repair / Crack Relief	$5.00	See Deterioration Slope	+ 1

SUPERSTRUCTURE - CONCRETE				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Supr - Conc)	Full SuperStr Replacement	$85.94	50	Rating = 8
Rehab (Supr - Conc)	Replace Structural Component	$42.97	15	+ 2
Repair (Supr - Conc)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1
Replace (Bridge)	Full Bridge Replacement	$171.88	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 1
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 1

SUBSTRUCTURE - STRUCTURAL				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Substr)	Full SubStr Replacement	$85.94	75	Rating = 8
Rehab (Substr)	Replace Structural Component	$42.97	50	+ 2
Repair (Substr)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1

SUBSTRUCTURE - SCOUR				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Rehab (Substr - Scour)	Add scour protection slabs	$42.97	50	+ 2
Repair (Substr - Scour)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1
Replace (Bridge)	Full Bridge Replacement	$171.88	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 1
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 1

	Substructure						Superstructure						Deck						Summary			
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	7	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	7						5						5									
2017	7						4						5									
2018	7						4						5									
2019	7						4						4									
2020	7						4						4									
2021	8	Replace (Bridge)	$171.88	$608,798.96	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$608,798.96	$509,859.54	$405,668.45
2022	8						8						8						8			
2023	8						8						8						8			
2024	8						8						8						8			
2025	8						8						8						8			
2026	8						8						8						8			
2027	8						8						8						8			
2028	8						8						8						8			
2029	8						8						8						8			
2030	8						8						8						8			
2031	7						7						7						7			
2032	7						7						7						7			
2033	7						7						7						7			
2034	7						7						7						7			
2035	7						7						7						7			
2036	7						7						7						7			
2037	7						7						7						7			
2038	7						7						7						7			
2039	7						7						7						7			
2040	6						6						6						6			
2041	7	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 0	7	$31,878.00	$14,781.66	$5,489.25
2042	7						7						7						7			
2043	7						7						7						7			
2044	7						7						7						7			
2045	7						7						7						7			
2046	7						7						7						7			
2047	7						7						7						7			
2048	7						7						7						7			
2049	7						7						7						7			
2050	7						7						7						7			
2051	6						6						6						6			
2052	6						6						6						6			
2053	6						6						6						6			
2054	6						6						6						6			
2055	6						6						6						6			
2056	6						6						6						6			
2057	6						6						6						6			
2058	6						6						6						6			
2059	6						6						6						6			
2060	5						5						5						5			
2061	6	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 0	6	$31,878.00	$8,184.25	$1,418.53
2062	6						6						6						6			
2063	6						6						6						6			
2064	6						6						6						6			
2065	6						6						6						6			
2066	6						6						6						6			
2067	6						6						6						6			
2068	6						6						6						6			
2069	6						6						6						6			
2070	5						5						5						5			
2071	5						5						5						5			
2072	5						5						5						5			
2073	5						5						5						5			
2074	5						5						5						5			
2075	5						5						5						5			
2076	5						5						5						5			
2077	5						5						5						5			
2078	5						5						5						5			
2079	5						5						5						5			
2080	5						5						5						5			
																			Total Cost =	**$672,554.96**	**$532,825.45**	**$412,576.23**

	Substructure						*Superstructure*						*Deck*						*Summary*			
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	7	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	7						5						5									
2017	7						4						5									
2018	7						4						5									
2019	7						4						4									
2020	7						4						4									
2021	6						6	Rehab (Supr - Stl)	$42.97	$152,199.74	15	+ 2	6	Rehab (Deck Concrete Overlay)	$10.00	$35,420.00	15	+ 2	6	$187,619.74	$157,128.58	$125,018.95
2022	6						6						6						6			
2023	6						6						6						6			
2024	6						6						6						6			
2025	6						6						6						6			
2026	6						6						6						6			
2027	6						6						6						6			
2028	6						6						6						6			
2029	6						6						6						6			
2030	6						6						6						6			
2031	6						6						6						6			
2032	6						6						6						6			
2033	5						6						6						5			
2034	5						6						6						5			
2035	5						6						6						5			
2036	5						5						5						5			
2037	5						5						5						5			
2038	5						5						5						5			
2039	5						5						5						5			
2040	8	Replace (Bridge)	$171.88	$608,798.96	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$608,798.96	$290,765.77	$112,170.71
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	8						8						8						8			
2045	8						8						8						8			
2046	8						8						8						8			
2047	8						8						8						8			
2048	8						8						8						8			
2049	8						8						8						8			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	7						7						7						7			
2054	7						7						7						7			
2055	7						7						7						7			
2056	7						7						7						7			
2057	7						7						7						7			
2058	7						7						7						7			
2059	7						7						7						7			
2060	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 0	7	$31,878.00	$8,429.77	$1,517.82
2061	8						8						7						7			
2062	8						8						7						7			
2063	8						8						7						7			
2064	8						8						7						7			
2065	8						8						7						7			
2066	8						8						7						7			
2067	8						8						7						7			
2068	8						8						7						7			
2069	8						8						7						7			
2070	7						7						7						7			
2071	7						7						6						6			
2072	7						7						6						6			
2073	7						7						6						6			
2074	7						7						6						6			
2075	7						7						6						6			
2076	7						7						6						6			
2077	7						7						6						6			
2078	7						7						6						6			
2079	7						7						6						6			
2080	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 0	6	$31,878.00	$4,667.36	$392.23
																			Total Cost =	**$860,174.70**	**$460,991.49**	**$239,099.72**

	Substructure						Superstructure						Deck							Summary		
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	7	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	7						5						5									
2017	7						4						5									
2018	7						4						5									
2019	7						4						4									
2020	7						4						4									
2021	6						5	Repair (Supr - Stl)	$5.00	$17,710.00	5	+ 1	5	Repair (Deck)	$3.00	$10,626.00	7	+ 0	5	$28,336.00	$23,730.95	$18,881.47
2022	6						5						5						5			
2023	6						5						5						5			
2024	6						5						5						5			
2025	6						5						5						5			
2026	6						4						5						4			
2027	6						5	Repair (Supr - Stl)	$5.00	$17,710.00	5	+ 1	5						5	$17,710.00	$12,421.44	$7,863.45
2028	6						5						4						4			
2029	6						5						5	Repair (Deck)	$3.00	$10,626.00	7	+ 0	5	$10,626.00	$7,025.04	$4,120.95
2030	6						5						5						5			
2031	6						5						5						5			
2032	6						4						5						4			
2033	5						5	Repair (Supr - Stl)	$5.00	$17,710.00	5	+ 1	5						5	$17,710.00	$10,402.76	$5,239.75
2034	5						5						5						5			
2035	5						5						5						5			
2036	5						5						4						4			
2037	5						5						5	Repair (Deck)	$3.00	$10,626.00	7	+ 0	5	$10,626.00	$5,545.63	$2,398.43
2038	5						4						5						4			
2039	5						5	Repair (Supr - Stl)	$5.00	$17,710.00	5	+ 1	5						5	$17,710.00	$8,712.15	$3,491.47
2040	8	Replace (Bridge)	$171.88	$608,798.96	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$608,798.96	$290,765.77	$112,170.71
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	8						8						8						8			
2045	8						8						8						8			
2046	8						8						8						8			
2047	8						8						8						8			
2048	8						8						8						8			
2049	8						8						8						8			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	7						7						7						7			
2054	7						7						7						7			
2055	7						7						7						7			
2056	7						7						7						7			
2057	7						7						7						7			
2058	7						7						7						7			
2059	7						7						7						7			
2060	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 0	7	$31,878.00	$8,429.77	$1,517.82
2061	8						8						7						7			
2062	8						8						7						7			
2063	8						8						7						7			
2064	8						8						7						7			
2065	8						8						7						7			
2066	8						8						7						7			
2067	8						8						7						7			
2068	8						8						7						7			
2069	8						8						7						7			
2070	7						7						7						7			
2071	7						7						6						6			
2072	7						7						6						6			
2073	7						7						6						6			
2074	7						7						6						6			
2075	7						7						6						6			
2076	7						7						6						6			
2077	7						7						6						6			
2078	7						7						6						6			
2079	7						7						6						6			
2080	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$10,626.00	20	+ 0	6	$31,878.00	$4,667.36	$392.23
																			Total Cost =	**$775,272.96**	**$371,700.87**	**$156,076.28**

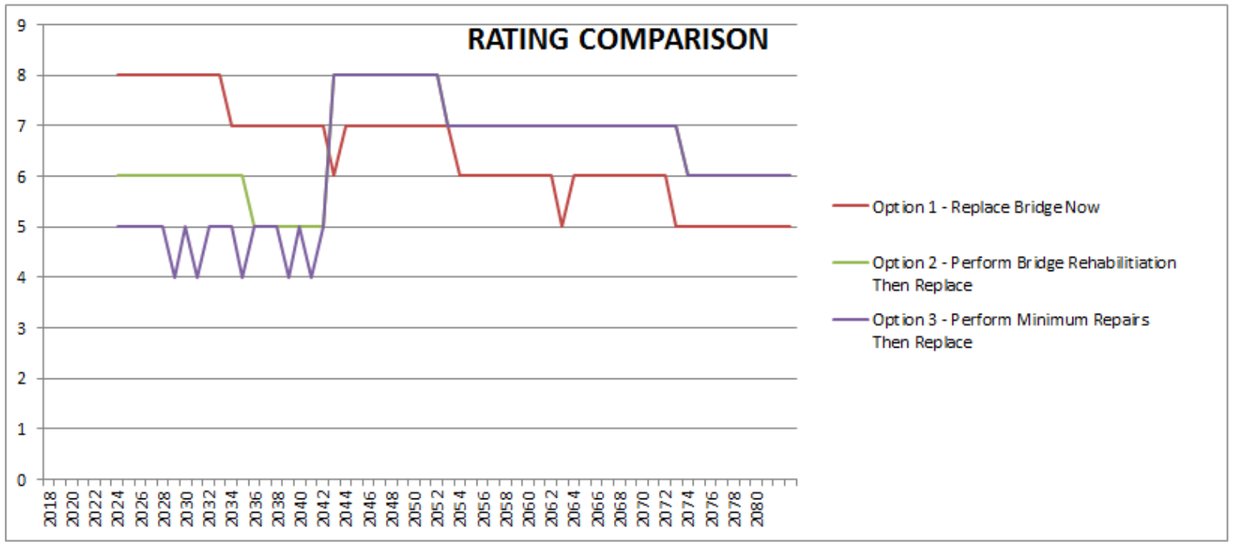
DRAIN CHANNEL BR WB OP (#1104) / ROUTE / MP 209.85

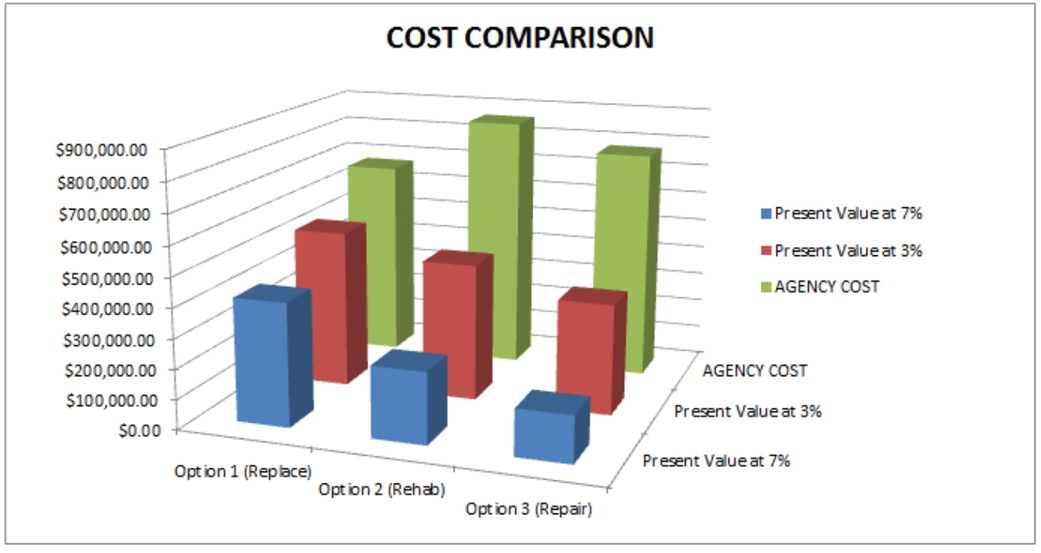
COST COMPARISON Present Value 2015 Dollars - Raw Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$ 672,554.96	$532,825.45	$412,576.23
Option 2 (Rehab)	$ 860,174.70	$460,991.49	$239,099.72
Option 3 (Repair)	$ 775,272.96	$371,700.87	$156,076.28

Comparison to Replacement			
Option	Agency Cost	3%	7%
2 (Rehab)	78.19%	115.58%	172.55%
3 (Repair)	86.75%	143.35%	264.34%

COST COMPARISON Present Value 2015 Dollars - Fully Loaded Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$1,479,621	$1,172,216	$907,668
Option 2 (Rehab)	$1,892,384	$1,014,181	$526,019
Option 3 (Repair)	$1,705,601	$817,742	$343,368

Bridge Ratings Per Option		
OPTION	AVG RATING	END RATING
Option 1 (Replace)	6.45	5
Option 2 (Rehab)	6.57	6
Option 3 (Repair)	6.28	6





RED ROCK TI UP (#592) / ROUTE / MP 226.45

Bridge Information	
Bridge Deck Area (A225)	5022 SF
Year Built (N27)	1959
Exp Service Life	75 YR
Total Bridge Length (N49)	162 LF
Number of Spans (N45+N46)	2
Skew Angle (N34)	0 DEG
Average Elevation	1894 FT
Max Pier Height	31 FT
* Amount of Widening for Bridge	0 FT
Revised Deck Area (Bridge Replace)	5022 FT
**Scour Critical Rating (N113)	N

Deterioration Slope				
Item	Deterioration Line Equation			Year Drop
	Slope =	Days	Years	
Substr	y =	-0.000194x	-0.071x	14.12
Superstr	y =	-0.000407x	-0.149x	6.73
Deck	y =	-0.000324x	-0.118x	8.46

***Input 0 if no widening. Input should include widening on both sides of bridge if applicable.**
****If scour critical rating is 3 or lower, Option 2 should consider the implementation of scour countermeasures.**

Notes:
1. Widening is intended only to correct lane and/or shoulder width deficiencies. It is not intended for adding traffic capacity (i.e. adding general purpose lanes).

Cost Multipliers		
Elevation > 4000ft	1894	1.00
Pier Height > 30ft	31	1.10
Length to # span ratio	81.00	1.1
Skew > 30degrees	0.00	1.00
Project Cost Multiplier	All Options	2.20

L to # Span Multiplier	
L/ # Span Ratio	Multiplier
=>100	1.00
=>60	1.10
<60	1.25

Skew Multiplier	
Skew	Multiplier
<30	1.00
=>30	1.10

Adjusted Bridge Replace Cost	
Base Bridge Replacement Cost (Per SF)	$125.00
Bridge Replacement Cost w/ Multipliers (Per SF)	$151.25

Elevation Multiplier	
Elev	Multiplier
<4000	1.00
=>4000	1.25

Pier H Multiplier	
Pier H	Multiplier
<30	1.00
=>30	1.10

User input cell
Only manipulate cell value after consulting with team

Bridge History (Inspections/As-builts)

Description	Category	Year
Bridge was originally built in 1959 (I002-4(10)).		1959
Repaired impact damage over EB and WB lanes	Repair (Deck)	2008
Deck surface has approximately 12 shallow spalls (max size 2sf, 20sf total) with no exposed rebar. Hairline to medium map cracking (medium density) is also present. Spalling is concentrated in SB lane. Mild abrasion/aggregate polishing in wheel lines, the deck joint measurement at 85 degrees F, minor shallow linear spalling exists along the joints and the sliding plate joints are filled with moderate debris, the gutter lines are rough along the original H-1-1 curb/barrier construction joints.		2014
Abutment walls have light density, hairline sized vertical & map cracks, wingwalls have minor hairline, vertical & diagonal cracks, and water leakage through the joints is evident along the wall-type abutments.		2014
The soffit has extensive scrape marks due to over height vehicle impacts, the box girder fascias have hairline diagonal cracks near the abutments and a few hairline vertical cracks near midspan, and multiple impact spalls exist at the east soffit edge over the WB lanes and at the west soffit edge over the EB lanes. The spalls are more severe, deeper over the WB lanes - a few with exposed rebar.		2014
Exit/Merge ramps are nearby at the east approach. The east approach asphalt is in good condition, the west approach generally has 10-20' spaced transverse, wide sealed cracks. Approach pavement settlement up to 3/4" is evident along the west abutment, the embankment fills have minor (<1' deep) erosion gullies at both approaches, and minimum vertical clearances are 16.13' and 16.32' for WB & EB I-10 traffic, respectively. The 15'-9" posted vertical clearance is adequate per current ADOT signing policy.		2014

Replace / Rehab / Repair Information

BRIDGE DECK				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Deck)	Full Deck Replacement	$75.63	25	Rating = 8
Rehab (Deck Concrete Overlay)	Overlay (Concrete)	$10.00	15	+ 2
Rehab (Deck Epoxy Overlay)	Overlay (Epoxy)	$5.00	10	+ 1
Repair (Deck)	Patch Spalls / Seal Cracks	$3.00	See Deterioration Slope	+ 0
Replace (Bridge)	Full Bridge Replacement	$151.25	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 0
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 0

SUPERSTRUCTURE - STEEL				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Supr - Stl)	Full SuperStr Replacement	$75.63	50	Rating = 8
Rehab (Supr - Stl)	Weld New Structural Components	$37.81	15	+ 2
Repair (Supr - Stl)	Weld Repair / Crack Relief	$5.00	See Deterioration Slope	+ 1

SUPERSTRUCTURE - CONCRETE				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Supr - Conc)	Full SuperStr Replacement	$75.63	50	Rating = 8
Rehab (Supr - Conc)	Replace Structural Component	$37.81	15	+ 2
Repair (Supr - Conc)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1
Replace (Bridge)	Full Bridge Replacement	$151.25	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 1
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 1

SUBSTRUCTURE - STRUCTURAL				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Substr)	Full SubStr Replacement	$75.63	75	Rating = 8
Rehab (Substr)	Replace Structural Component	$37.81	50	+ 2
Repair (Substr)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1

SUBSTRUCTURE - SCOUR				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Rehab (Substr - Scour)	Add scour protection slabs	$37.81	50	+ 2
Repair (Substr - Scour)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1
Replace (Bridge)	Full Bridge Replacement	$151.25	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 1
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 1

	Substructure						Superstructure						Deck						Summary			
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	7	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	7						5						5									
2017	7						5						5									
2018	7						5						5									
2019	7						4						5									
2020	7						4						5									
2021	8	Replace (Bridge)	$151.25	$759,577.50	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$759,577.50	$636,134.20	$506,138.56
2022	8						8						8						8			
2023	8						8						8						8			
2024	8						8						8						8			
2025	8						8						8						8			
2026	8						8						8						8			
2027	8						8						8						8			
2028	8						8						8						8			
2029	8						8						8						8			
2030	8						8						8						8			
2031	7						7						7						7			
2032	7						7						7						7			
2033	7						7						7						7			
2034	7						7						7						7			
2035	7						7						7						7			
2036	7						7						7						7			
2037	7						7						7						7			
2038	7						7						7						7			
2039	7						7						7						7			
2040	6						6						6						6			
2041	7	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 0	6	$45,198.00	$20,958.07	$7,782.89
2042	7						7						6						6			
2043	7						7						6						6			
2044	7						7						6						6			
2045	7						7						6						6			
2046	7						7						6						6			
2047	7						7						6						6			
2048	7						7						6						6			
2049	7						7						6						6			
2050	7						7						6						6			
2051	6						6						5						5			
2052	6						6						5						5			
2053	6						6						5						5			
2054	6						6						5						5			
2055	6						6						5						5			
2056	6						6						5						5			
2057	6						6						5						5			
2058	6						6						5						5			
2059	6						6						5						5			
2060	5						5						5						5			
2061	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	5	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 0	5	$45,198.00	$11,603.98	$2,011.25
2062	6						6						5						5			
2063	6						6						5						5			
2064	6						6						5						5			
2065	6						6						5						5			
2066	6						6						5						5			
2067	6						6						5						5			
2068	6						6						5						5			
2069	6						6						5						5			
2070	5						5						4						4			
2071	5						5						4						4			
2072	5						5						4						4			
2073	5						5						4						4			
2074	5						5						4						4			
2075	5						5						4						4			
2076	5						5						4						4			
2077	5						5						4						4			
2078	5						5						4						4			
2079	5						5						4						4			
2080	5						5						4						4			
																			Total Cost =	$849,973.50	$668,696.25	$515,932.70

	Substructure						Superstructure						Deck						Summary			
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	7	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	7						5						5									
2017	7						5						5									
2018	7						5						5									
2019	7						4						5									
2020	7						4						5									
2021	7						6	Rehab (Supr - Stl)	$37.81	$189,894.38	15	+ 2	5						5	$189,894.38	$159,033.55	$126,534.64
2022	7						6						5						5			
2023	7						6						5						5			
2024	7						6						5						5			
2025	7						6						4						4			
2026	7						6						6	Rehab (Deck Concrete Overlay)	$10.00	$50,220.00	15	+ 2	6	$50,220.00	$36,280.00	$23,859.16
2027	6						6						6						6			
2028	6						6						6						6			
2029	6						6						6						6			
2030	6						6						6						6			
2031	6						6						6						6			
2032	6						6						6						6			
2033	6						6						6						6			
2034	8	Replace (Bridge)	$151.25	$759,577.50	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$759,577.50	$433,176.43	$210,029.51
2035	8						8						8						8			
2036	8						8						8						8			
2037	8						8						8						8			
2038	8						8						8						8			
2039	8						8						8						8			
2040	8						8						8						8			
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	7						7						7						7			
2045	7						7						7						7			
2046	7						7						7						7			
2047	7						7						7						7			
2048	7						7						7						7			
2049	7						7						7						7			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	6						6						6						6			
2054	7	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 0	6	$45,198.00	$14,271.43	$3,229.62
2055	7						7						6						6			
2056	7						7						6						6			
2057	7						7						6						6			
2058	7						7						6						6			
2059	7						7						6						6			
2060	7						7						6						6			
2061	7						7						6						6			
2062	7						7						6						6			
2063	7						7						6						6			
2064	6						6						5						5			
2065	6						6						5						5			
2066	6						6						5						5			
2067	6						6						5						5			
2068	6						6						5						5			
2069	6						6						5						5			
2070	6						6						5						5			
2071	6						6						5						5			
2072	6						6						5						5			
2073	5						5						5						5			
2074	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	5	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 0	5	$45,198.00	$7,901.74	$834.60
2075	6						6						5						5			
2076	6						6						5						5			
2077	6						6						5						5			
2078	6						6						5						5			
2079	6						6						5						5			
2080	6						6						5						5			
																			Total Cost =	**$1,090,087.88**	**$650,663.15**	**$364,487.53**

	Substructure						Superstructure						Deck						Summary			
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	7	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	7						5						5									
2017	7						5						5									
2018	7						5						5									
2019	7						4						5									
2020	7						4						5									
2021	7						5	Repair (Supr - Stl)	$5.00	$25,110.00	7	+ 1	5						5	$25,110.00	$21,029.23	$16,731.85
2022	7						5						5						5			
2023	7						5						5						5			
2024	7						5						5						5			
2025	7						5						5	Repair (Deck)	$3.00	$15,066.00	8	+ 0	5	$15,066.00	$11,210.52	$7,658.79
2026	7						5						5						5			
2027	6						4						5						4			
2028	6						5	Repair (Supr - Stl)	$5.00	$25,110.00	7	+ 1	5						5	$25,110.00	$17,098.69	$10,419.76
2029	6						5						5						5			
2030	6						5						5						5			
2031	6						5						5						5			
2032	6						5						5						5			
2033	6						5						4						4			
2034	8	Replace (Bridge)	$151.25	$759,577.50	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$759,577.50	$433,176.43	$210,029.51
2035	8						8						8						8			
2036	8						8						8						8			
2037	8						8						8						8			
2038	8						8						8						8			
2039	8						8						8						8			
2040	8						8						8						8			
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	7						7						7						7			
2045	7						7						7						7			
2046	7						7						7						7			
2047	7						7						7						7			
2048	7						7						7						7			
2049	7						7						7						7			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	6						6						6						6			
2054	7	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 0	6	$45,198.00	$14,271.43	$3,229.62
2055	7						7						6						6			
2056	7						7						6						6			
2057	7						7						6						6			
2058	7						7						6						6			
2059	7						7						6						6			
2060	7						7						6						6			
2061	7						7						6						6			
2062	7						7						6						6			
2063	7						7						6						6			
2064	6						6						5						5			
2065	6						6						5						5			
2066	6						6						5						5			
2067	6						6						5						5			
2068	6						6						5						5			
2069	6						6						5						5			
2070	6						6						5						5			
2071	6						6						5						5			
2072	6						6						5						5			
2073	5						5						5						5			
2074	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 1	5	Repair (After Bridge Replace)	$3.00	$15,066.00	20	+ 0	5	$45,198.00	$7,901.74	$834.60
2075	6						6						5						5			
2076	6						6						5						5			
2077	6						6						5						5			
2078	6						6						5						5			
2079	6						6						5						5			
2080	6						6						5						5			
																			Total Cost =	**$915,259.50**	**$504,688.04**	**$248,904.13**

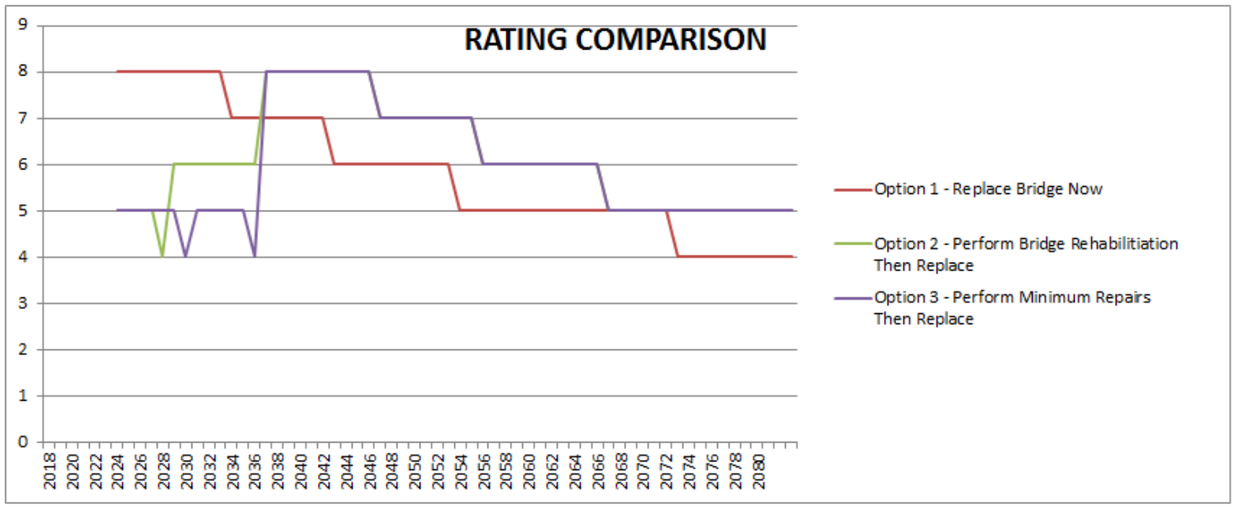
RED ROCK TI UP (#592) / ROUTE / MP 226.45

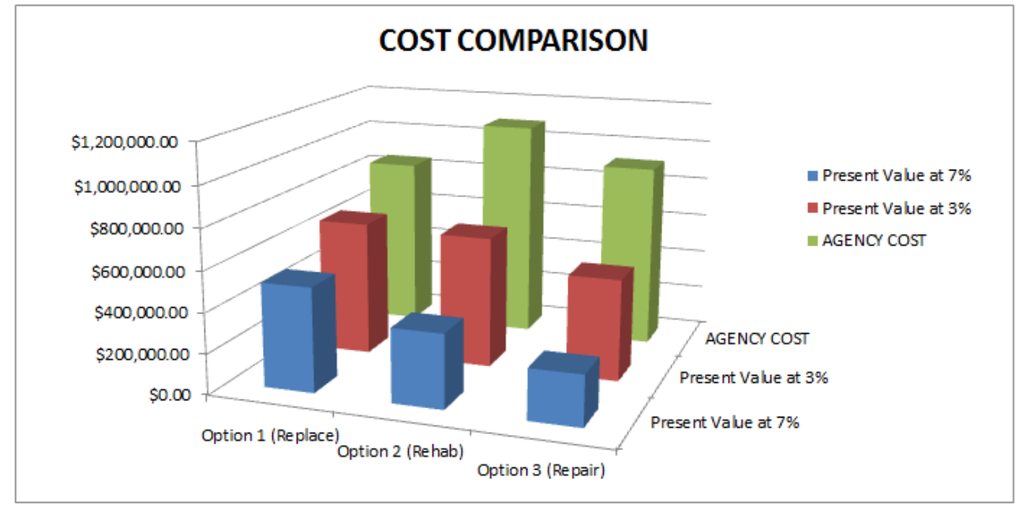
COST COMPARISON Present Value 2015 Dollars - Raw Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$ 849,973.50	$668,696.25	$515,932.70
Option 2 (Rehab)	$ 1,090,087.88	$650,663.15	$364,487.53
Option 3 (Repair)	$ 915,259.50	$504,688.04	$248,904.13

Comparison to Replacement			
Option	Agency Cost	3%	7%
2 (Rehab)	77.97%	102.77%	141.55%
3 (Repair)	92.87%	132.50%	207.28%

COST COMPARISON Present Value 2015 Dollars - Fully Loaded Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$1,869,942	$1,471,132	$1,135,052
Option 2 (Rehab)	$2,398,193	$1,431,459	$801,873
Option 3 (Repair)	$2,013,571	$1,110,314	$547,589

Bridge Ratings Per Option		
OPTION	AVG RATING	END RATING
Option 1 (Replace)	5.80	4
Option 2 (Rehab)	6.10	5
Option 3 (Repair)	5.95	5





AJO WAY OP EB (#1107) / ROUTE / MP 262.44

Bridge Information	
Bridge Deck Area (A225)	11275 SF
Year Built (N27)	1965
Exp Service Life	75 YR
Total Bridge Length (N49)	261 LF
Number of Spans (N45+N46)	4
Skew Angle (N34)	56 DEG
Average Elevation	2506 FT
Max Pier Height	15 FT
* Amount of Widening for Bridge	18 FT
Revised Deck Area (Bridge Replace)	15973 FT
**Scour Critical Rating (N113)	N

Deterioration Slope				
Item	Deterioration Line Equation			Year
	Slope =	Days	Years	Drop
Substr	y =	-0.000277x	-0.101x	9.89
Superstr	y =	-0.000584x	-0.213x	4.69
Deck	y =	-0.000587x	-0.214x	4.67

***Input 0 if no widening. Input should include widening on both sides of bridge if applicable.**
****If scour critical rating is 3 or lower, Option 2 should consider the implementation of scour countermeasures.**

Notes:
1. Widening is intended only to correct lane and/or shoulder width deficiencies. It is not intended for adding traffic capacity (i.e. adding general purpose lanes).

Cost Multipliers		
Elevation > 4000ft	2506	1.00
Pier Height > 30ft	15	1.00
Length to # span ratio	65.25	1.1
Skew > 30degrees	56.00	1.10
Project Cost Multiplier	All Options	2.20

L to # Span Multiplier	
L/ # Span Ratio	Multiplier
=>100	1.00
=>60	1.10
<60	1.25

Skew Multiplier	
Skew	Multiplier
<30	1.00
=>30	1.10

Adjusted Bridge Replace Cost	
Base Bridge Replacement Cost (Per SF)	$125.00
Bridge Replacement Cost w/ Multipliers (Per SF)	$151.25

Elevation Multiplier	
Elev	Multiplier
<4000	1.00
=>4000	1.25

Pier H Multiplier	
Pier H	Multiplier
<30	1.00
=>30	1.10

User input cell
Only manipulate cell value after consulting with team

Bridge History (Inspections/As-builts)

Description	Category	Year
Bridge was originally built I-10-5 (16).		1965
Bridge girder was repaired I-10-5-910.	Repair (Substr)	1976
Bridge beam was repaired I-10-5(42).	Repair (Deck)	1983
AC overlay over full width. AC is smooth and in good condition, deck underside has hairline transverse and random cracks with efflorescence, beam at bridge on south side at midspan has minor impact damage, deck joints are paved over with AC, opening measured in concrete parapet at 95 degrees F		2014
Girder damage throughout bridge. Impact damage resulted in 6" long weld crack. Bottom flange is bent 3/4", has upward bow and torn due to collision damage.		2014
Abutments have hairline vertical and random cracks in bearing seats and in backwalls.		2014

	Substructure						Superstructure						Deck							Summary	
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%
2015	6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					4	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.							
2016	6						4						4								
2017	6						4						4								
2018	6						4						4								
2019	6						4						4								
2020	6						3						4								
2021	8	Replace (Bridge)	$151.25	$2,415,916.25	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$2,415,916.25	$2,023,291.82
2022	8						8						8						8		
2023	8						8						8						8		
2024	8						8						8						8		
2025	8						8						8						8		
2026	8						8						8						8		
2027	8						8						8						8		
2028	8						8						8						8		
2029	8						8						8						8		
2030	8						8						8						8		
2031	7						7						7						7		
2032	7						7						7						7		
2033	7						7						7						7		
2034	7						7						7						7		
2035	7						7						7						7		
2036	7						7						7						7		
2037	7						7						7						7		
2038	7						7						7						7		
2039	7						7						7						7		
2040	6						6						6						6		
2041	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	6	$143,757.00	$66,659.36
2042	7						7						6						6		
2043	7						7						6						6		
2044	7						7						6						6		
2045	7						7						6						6		
2046	7						7						6						6		
2047	7						7						6						6		
2048	7						7						6						6		
2049	7						7						6						6		
2050	7						7						6						6		
2051	6						6						5						5		
2052	6						6						5						5		
2053	6						6						5						5		
2054	6						6						5						5		
2055	6						6						5						5		
2056	6						6						5						5		
2057	6						6						5						5		
2058	6						6						5						5		
2059	6						6						5						5		
2060	5						5						5						5		
2061	6	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	5	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	5	$143,757.00	$36,907.67
2062	6						6						5						5		
2063	6						6						5						5		
2064	6						6						5						5		
2065	6						6						5						5		
2066	6						6						5						5		
2067	6						6						5						5		
2068	6						6						5						5		
2069	6						6						5						5		
2070	5						5						4						4		
2071	5						5						4						4		
2072	5						5						4						4		
2073	5						5						4						4		
2074	5						5						4						4		
2075	5						5						4						4		
2076	5						5						4						4		
2077	5						5						4						4		
2078	5						5						4						4		
2079	5						5						4						4		
2080	5						5						4						4		
																			Total Cost =	**$2,703,430.25**	**$2,126,858.86**

	Substructure						Superstructure						Deck							Summary		
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					4	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	6						4						4									
2017	6						4						4									
2018	6						4						4									
2019	6						4						4									
2020	6						3						4									
2021	6						5	Rehab (Supr - Stl)	$37.81	$426,335.94	15	+ 2	6	Rehab (Deck Concrete Overlay)	$10.00	$112,750.00	15	+ 2	5	$539,085.94	$451,475.99	$359,215.72
2022	5						5						6						5			
2023	5						5						6						5			
2024	5						5						6						5			
2025	5						5						6						5			
2026	5						5						6						5			
2027	5						5						6						5			
2028	5						5						6						5			
2029	5						5						6						5			
2030	5						5						6						5			
2031	5						5						6						5			
2032	4						5						6						4			
2033	5	Repair (Substr)	$5.00	$56,375.00	10	+ 1	5						6						5	$56,375.00	$33,114.37	$16,679.33
2034	5						5						6						5			
2035	5						5						6						5			
2036	5						4						5						4			
2037	5						6	Rehab (Supr - Stl)	$37.81	$426,335.94	15	+ 2	5						5	$426,335.94	$222,501.53	$96,229.63
2038	5						6						5						5			
2039	5						6						5						5			
2040	8	Replace (Bridge)	$151.25	$2,415,916.25	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$2,415,916.25	$1,153,855.06	$445,130.58
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	8						8						8						8			
2045	8						8						8						8			
2046	8						8						8						8			
2047	8						8						8						8			
2048	8						8						8						8			
2049	8						8						8						8			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	7						7						7						7			
2054	7						7						7						7			
2055	7						7						7						7			
2056	7						7						7						7			
2057	7						7						7						7			
2058	7						7						7						7			
2059	7						7						7						7			
2060	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	7	$143,757.00	$38,014.90	$6,844.77
2061	8						8						6						6			
2062	8						8						6						6			
2063	8						8						6						6			
2064	8						8						6						6			
2065	8						8						6						6			
2066	8						8						6						6			
2067	8						8						6						6			
2068	8						8						6						6			
2069	8						8						6						6			
2070	7						7						6						6			
2071	7						7						5						5			
2072	7						7						5						5			
2073	7						7						5						5			
2074	7						7						5						5			
2075	7						7						5						5			
2076	7						7						5						5			
2077	7						7						5						5			
2078	7						7						5						5			
2079	7						7						5						5			
2080	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	5	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	5	$143,757.00	$21,047.93	$1,768.82
																			Total Cost =	**$3,725,227.13**	**$1,920,009.77**	**$925,868.86**

	Substructure						Superstructure						Deck						Summary			
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	6						4						5									
2016	6						4						4									
2017	6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					4	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					4	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2018	6						4						4									
2019	6						4						4									
2020	6						3						4									
2021	6						4	Repair (Supr - Stl)	$5.00	$56,375.00	5	+ 1	5	Repair (Deck)	$3.00	$33,825.00	5	+ 0	4	$90,200.00	$75,541.08	$60,104.07
2022	5						4						5						4			
2023	5						4						5						4			
2024	5						4						5						4			
2025	5						3						5	Repair (Deck)	$3.00	$33,825.00	5	+ 0	3	$33,825.00	$25,168.98	$17,194.91
2026	5						4	Repair (Supr - Stl)	$5.00	$56,375.00	5	+ 1	5						4	$56,375.00	$40,726.50	$26,783.36
2027	5						4						5						4			
2028	5						4						5						4			
2029	5						4						5	Repair (Deck)	$3.00	$33,825.00	5	+ 0	4	$33,825.00	$22,362.31	$13,117.92
2030	5						3						5						3			
2031	5						4	Repair (Supr - Stl)	$5.00	$56,375.00	5	+ 1	5						4	$56,375.00	$35,131.04	$19,096.16
2032	4						4						5						4			
2033	5						4						5	Repair (Deck)	$3.00	$33,825.00	5	+ 0	4	$33,825.00	$19,868.62	$10,007.60
2034	5						4						5						4			
2035	5						3						5						3			
2036	5						4	Repair (Supr - Stl)	$5.00	$56,375.00	5	+ 1	5						4	$56,375.00	$30,304.34	$13,615.30
2037	5						4						5	Repair (Deck)	$3.00	$33,825.00	5	+ 0	4	$33,825.00	$17,653.01	$7,634.75
2038	5						4						5						4			
2039	5						4						5						4			
2040	8	Replace (Bridge)	$151.25	$2,415,916.25	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$2,415,916.25	$1,153,855.06	$445,130.58
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	8						8						8						8			
2045	8						8						8						8			
2046	8						8						8						8			
2047	8						8						8						8			
2048	8						8						8						8			
2049	8						8						8						8			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	7						7						7						7			
2054	7						7						7						7			
2055	7						7						7						7			
2056	7						7						7						7			
2057	7						7						7						7			
2058	7						7						7						7			
2059	7						7						7						7			
2060	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	7	$143,757.00	$38,014.90	$6,844.77
2061	8						8						6						6			
2062	8						8						6						6			
2063	8						8						6						6			
2064	8						8						6						6			
2065	8						8						6						6			
2066	8						8						6						6			
2067	8						8						6						6			
2068	8						8						6						6			
2069	8						8						6						6			
2070	7						7						6						6			
2071	7						7						5						5			
2072	7						7						5						5			
2073	7						7						5						5			
2074	7						7						5						5			
2075	7						7						5						5			
2076	7						7						5						5			
2077	7						7						5						5			
2078	7						7						5						5			
2079	7						7						5						5			
2080	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	8	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	5	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	5	$143,757.00	$21,047.93	$1,768.82
																			Total Cost =	**$3,098,055.25**	**$1,479,673.77**	**$621,298.24**

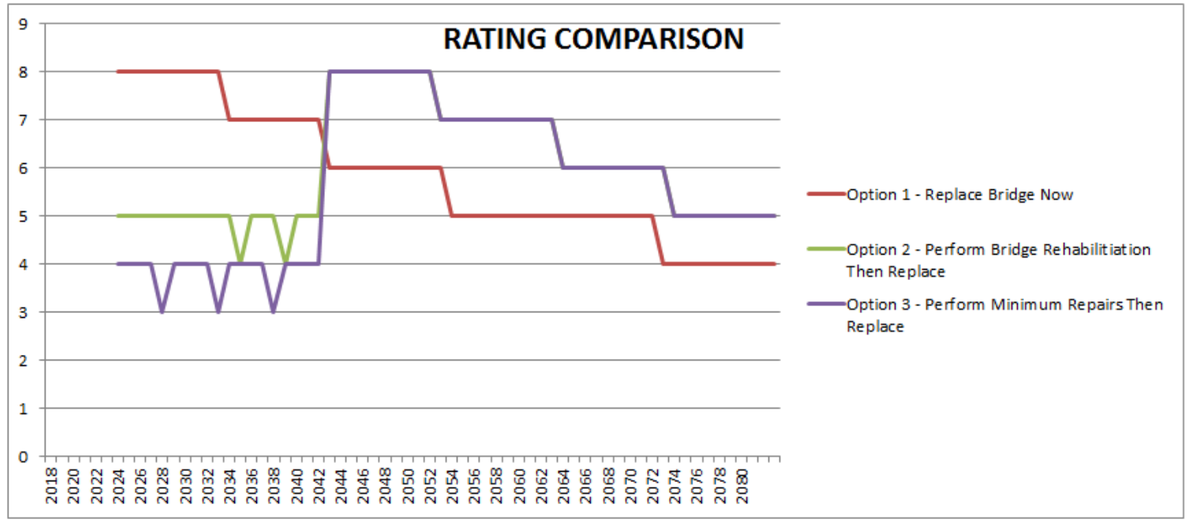
AJO WAY OP EB (#1107) / ROUTE / MP 262.44

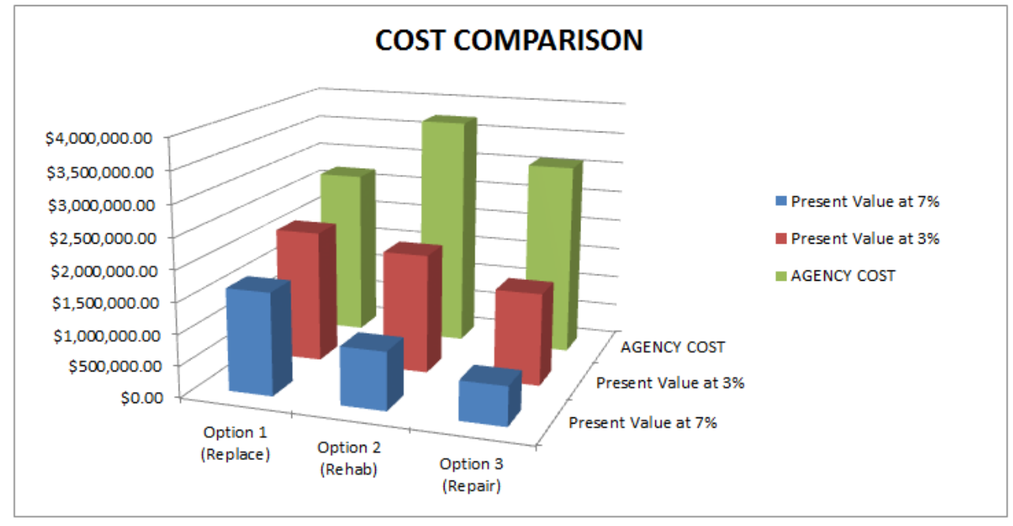
COST COMPARISON Present Value 2015 Dollars - Raw Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$ 2,703,430.25	$2,126,858.86	$1,640,978.30
Option 2 (Rehab)	$ 3,725,227.13	$1,920,009.77	$925,868.86
Option 3 (Repair)	$ 3,098,055.25	$1,479,673.77	$621,298.24

Comparison to Replacement			
Option	Agency Cost	3%	7%
2 (Rehab)	72.57%	110.77%	177.24%
3 (Repair)	87.26%	143.74%	264.12%

COST COMPARISON Present Value 2015 Dollars - Fully Loaded Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$5,947,547	$4,679,089	$3,610,152
Option 2 (Rehab)	$8,195,500	$4,224,022	$2,036,911
Option 3 (Repair)	$6,815,722	$3,255,282	$1,366,856

Bridge Ratings Per Option		
OPTION	AVG RATING	END RATING
Option 1 (Replace)	5.80	4
Option 2 (Rehab)	6.00	5
Option 3 (Repair)	5.67	5





AJO WAY OP WB (#1108) / ROUTE / MP 262.44

Bridge Information	
Bridge Deck Area (A225)	11275 SF
Year Built (N27)	1965
Exp Service Life	75 YR
Total Bridge Length (N49)	261 LF
Number of Spans (N45+N46)	4
Skew Angle (N34)	56 DEG
Average Elevation	2506 FT
Max Pier Height	16 FT
* Amount of Widening for Bridge	18 FT
Revised Deck Area (Bridge Replace)	15973 FT
**Scour Critical Rating (N113)	N

Deterioration Slope				
Item	Deterioration Line Equation			Year
	Slope =	Days	Years	Drop
Substr	y =	-0.000276x	-0.101x	9.93
Superstr	y =	-0.000572x	-0.209x	4.79
Deck	y =	-0.000276x	-0.101x	9.93

***Input 0 if no widening. Input should include widening on both sides of bridge if applicable.**
****If scour critical rating is 3 or lower, Option 2 should consider the implementation of scour countermeasures.**

Notes:
1. Widening is intended only to correct lane and/or shoulder width deficiencies. It is not intended for adding traffic capacity (i.e. adding general purpose lanes).

Cost Multipliers		
Elevation > 4000ft	2506	1.00
Pier Height > 30ft	16	1.00
Length to # span ratio	65.25	1.1
Skew > 30degrees	56.00	1.10
Project Cost Multiplier	All Options	2.20

L to # Span Multiplier	
L/ # Span Ratio	Multiplier
=>100	1.00
=>60	1.10
<60	1.25

Skew Multiplier	
Skew	Multiplier
<30	1.00
=>30	1.10

Adjusted Bridge Replace Cost	
Base Bridge Replacement Cost (Per SF)	$125.00
Bridge Replacement Cost w/ Multipliers (Per SF)	$151.25

Elevation Multiplier	
Elev	Multiplier
<4000	1.00
=>4000	1.25

Pier H Multiplier	
Pier H	Multiplier
<30	1.00
=>30	1.10

User input cell
Only manipulate cell value after consulting with team

Bridge History (Inspections/As-builts)

Description	Category	Year
Bridge was built I-10-5(16)		1965
Beam Retrofit I-10-5 (42)	Rehab (Substr)	1983
Concrete deck has AC overlay full width. AC is smooth and in good condition. Reflective cracks at end of deck and approach panels. Deck underside has hariline transverse and random cracks with light efflorescence. There is minor damage to bridge rail along right shoulder. Minor impact scrape and minor deflection on thrie rail on north side of bridge over Pier #2. Deck joints are paved over.		2014
Cracked welds exist at the following locations: 5 ¾" between diaphragm and vertical stiffener and ½" between the vertical stiffener and girder web at the base of the vertical stiffener - diaphragm #2, Girder #1 south face in Span 2, 1" crack near top of vertical weld between diaphragm and vertical stiffener and 1 ½" crack at bottom of stiffener between stiffener and top of girder bottom flange propagated ½" since 2010, 17 ¼" crack in weld between diaphragm and vertical stiffener, 2" crack in weld between diaphragm and vertical stiffener, impact damage exists on the bottom flange of the main girders, and impact damage exists on the diaphragms		2014
Abutments have hairline vertical cracks in backwall and seats, abutments have staining from joint leakage, columns have hairline sized vertical and map cracks, there are 3 large spalls at column #5 pier 3. There is a collision spall (6"x11"x1" deep) at column #2 in pier 3, several collision damage spalls in the bent cap which have been repaired, pier caps have hairline sized transverse and vertical cracks throughout, slope protection has hairline sized to medium random cracks, repaired spall at Pier #1.		2014

Replace / Rehab / Repair Information

BRIDGE DECK				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Deck)	Full Deck Replacement	$75.63	25	Rating = 8
Rehab (Deck Concrete Overlay)	Overlay (Concrete)	$10.00	15	+ 2
Rehab (Deck Epoxy Overlay)	Overlay (Epoxy)	$5.00	10	+ 1
Repair (Deck)	Patch Spalls / Seal Cracks	$3.00	See Deterioration Slope	+ 0
Replace (Bridge)	Full Bridge Replacement	$151.25	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 0
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 0

SUPERSTRUCTURE - STEEL				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Supr - Stl)	Full SuperStr Replacement	$75.63	50	Rating = 8
Rehab (Supr - Stl)	Weld New Structural Components	$37.81	15	+ 2
Repair (Supr - Stl)	Weld Repair / Crack Relief	$5.00	See Deterioration Slope	+ 1

SUPERSTRUCTURE - CONCRETE				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Supr - Conc)	Full SuperStr Replacement	$75.63	50	Rating = 8
Rehab (Supr - Conc)	Replace Structural Component	$37.81	15	+ 2
Repair (Supr - Conc)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1
Replace (Bridge)	Full Bridge Replacement	$151.25	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 1
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 1

SUBSTRUCTURE - STRUCTURAL				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Replace (Substr)	Full SubStr Replacement	$75.63	75	Rating = 8
Rehab (Substr)	Replace Structural Component	$37.81	50	+ 2
Repair (Substr)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1

SUBSTRUCTURE - SCOUR				
ITEM	**DESCRIPTION**	**UNIT COST (Per SF)**	**LIFE (YRS)**	**RATING BENEFIT**
Rehab (Substr - Scour)	Add scour protection slabs	$37.81	50	+ 2
Repair (Substr - Scour)	Patch Spalls / Seal Cracks	$5.00	See Deterioration Slope	+ 1
Replace (Bridge)	Full Bridge Replacement	$151.25	75	Rating = 8
Repair (After Bridge Replace)	Patch Spalls / Seal Cracks	$3.00	20	+ 1
Repair (After Rehab)	Patch Spalls / Seal Cracks	$3.00	10	+ 1

	Substructure						Superstructure						Deck							Summary		
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					4	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	6						4						5									
2017	6						4						5									
2018	6						3						5									
2019	6						3						5									
2020	6						3						5									
2021	8	Replace (Bridge)	$151.25	$2,415,916.25	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$2,415,916.25	$2,023,291.82	$1,609,827.01
2022	8						8						8						8			
2023	8						8						8						8			
2024	8						8						8						8			
2025	8						8						8						8			
2026	8						8						8						8			
2027	8						8						8						8			
2028	8						8						8						8			
2029	8						8						8						8			
2030	8						8						8						8			
2031	7						7						7						7			
2032	7						7						7						7			
2033	7						7						7						7			
2034	7						7						7						7			
2035	7						7						7						7			
2036	7						7						7						7			
2037	7						7						7						7			
2038	7						7						7						7			
2039	7						7						7						7			
2040	6						6						6						6			
2041	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	7	$143,757.00	$66,659.36	$24,754.31
2042	7						7						7						7			
2043	7						7						7						7			
2044	7						7						7						7			
2045	7						7						7						7			
2046	7						7						7						7			
2047	7						7						7						7			
2048	7						7						7						7			
2049	7						7						7						7			
2050	7						7						7						7			
2051	6						6						6						6			
2052	6						6						6						6			
2053	6						6						6						6			
2054	6						6						6						6			
2055	6						6						6						6			
2056	6						6						6						6			
2057	6						6						6						6			
2058	6						6						6						6			
2059	6						6						6						6			
2060	5						5						5						5			
2061	6	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	6	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	6	$143,757.00	$36,907.67	$6,396.98
2062	6						6						6						6			
2063	6						6						6						6			
2064	6						6						6						6			
2065	6						6						6						6			
2066	6						6						6						6			
2067	6						6						6						6			
2068	6						6						6						6			
2069	6						6						6						6			
2070	5						5						5						5			
2071	5						5						5						5			
2072	5						5						5						5			
2073	5						5						5						5			
2074	5						5						5						5			
2075	5						5						5						5			
2076	5						5						5						5			
2077	5						5						5						5			
2078	5						5						5						5			
2079	5						5						5						5			
2080	5						5						5						5			
																			Total Cost =	**$2,703,430.25**	**$2,126,858.86**	**$1,640,978.30**

	Substructure						*Superstructure*						*Deck*						*Summary*			
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					4	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	6						4						5									
2017	6						4						5									
2018	6						3						5									
2019	6						3						5									
2020	6						3						5									
2021	5						5	Rehab (Supr - Stl)	$37.81	$426,335.94	15	+ 2	4						4	$426,335.94	$357,049.64	$284,085.64
2022	5						5						6	Rehab (Deck Concrete Overlay)	$10.00	$112,750.00	15	+ 2	5	$112,750.00	$91,676.07	$70,215.03
2023	5						5						6						5			
2024	5						5						6						5			
2025	5						5						6						5			
2026	5						5						6						5			
2027	5						5						6						5			
2028	5						5						6						5			
2029	5						5						6						5			
2030	5						5						6						5			
2031	4						5						6						4			
2032	6	Rehab (Substr)	$37.81	$426,335.94	50	+ 2	5						6						5	$426,335.94	$257,940.25	$134,967.04
2033	6						5						6						5			
2034	6						5						6						5			
2035	6						5						6						5			
2036	6						4						6						4			
2037	6						4						5						4			
2038	6						4						5						4			
2039	6						4						5						4			
2040	8	Replace (Bridge)	$151.25	$2,415,916.25	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$2,415,916.25	$1,153,855.06	$445,130.58
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	8						8						8						8			
2045	8						8						8						8			
2046	8						8						8						8			
2047	8						8						8						8			
2048	8						8						8						8			
2049	8						8						8						8			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	7						7						7						7			
2054	7						7						7						7			
2055	7						7						7						7			
2056	7						7						7						7			
2057	7						7						7						7			
2058	7						7						7						7			
2059	6						6						6						6			
2060	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	7	$143,757.00	$38,014.90	$6,844.77
2061	7						7						7						7			
2062	7						7						7						7			
2063	7						7						7						7			
2064	7						7						7						7			
2065	7						7						7						7			
2066	7						7						7						7			
2067	7						7						7						7			
2068	7						7						7						7			
2069	7						7						7						7			
2070	7						7						7						7			
2071	6						6						6						6			
2072	6						6						6						6			
2073	6						6						6						6			
2074	6						6						6						6			
2075	6						6						6						6			
2076	6						6						6						6			
2077	6						6						6						6			
2078	6						6						6						6			
2079	6						6						6						6			
2080	5						5						5						5			
																			Total Cost =	**$3,525,095.13**	**$1,898,535.92**	**$941,243.06**

	Substructure						Superstructure						Deck							Summary		
Year	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Rating	Item	Cost (Per SF)	Cost (Total)	Service Life	Rating Increase	Minimum Rating	Total Cost Per Year (2015 $ raw costs)	Present Value at 3%	Present Value at 7%
2015	6	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					4	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.					5	No Rehab/Repair Work Can Be Done. Not Yet In 5-Year Program.								
2016	6						4						5									
2017	6						4						5									
2018	6						3						5									
2019	6						3						5									
2020	6						3						5									
2021	5						4	Repair (Supr - Conc)	$5.00	$56,375.00	5	+ 1	5	Repair (Deck)	$3.00	$33,825.00	10	+ 0	4	$90,200.00	$75,541.08	$60,104.07
2022	5						5	Repair (Supr - Conc)	$5.00	$56,375.00	5	+ 1	5						5	$56,375.00	$45,838.03	$35,107.52
2023	5						5						5						5			
2024	5						5						5						5			
2025	5						5						5						5			
2026	5						4						5						4			
2027	5						5	Repair (Supr - Stl)	$5.00	$56,375.00	5	+ 1	5						5	$56,375.00	$39,540.29	$25,031.17
2028	5						5						5						5			
2029	5						5						5						5			
2030	5						5						5						5			
2031	4						4						4						4			
2032	5	Repair (Substr)	$5.00	$56,375.00	10	+ 1	5	Repair (Supr - Stl)	$5.00	$56,375.00	5	+ 1	5	Repair (Deck)	$3.00	$33,825.00	10	+ 0	5	$146,575.00	$88,680.29	$46,401.89
2033	5						5						5						5			
2034	5						5						5						5			
2035	5						5						5						5			
2036	5						4	Repair (Supr - Stl)	$5.00	$56,375.00	5	+ 1	5						4	$56,375.00	$30,304.34	$13,615.30
2037	5						5						5						5			
2038	5						5						5						5			
2039	5						5						5						5			
2040	8	Replace (Bridge)	$151.25	$2,415,916.25	75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	Replace (Bridge)			75	Rating = 8	8	$2,415,916.25	$1,153,855.06	$445,130.58
2041	8						8						8						8			
2042	8						8						8						8			
2043	8						8						8						8			
2044	8						8						8						8			
2045	8						8						8						8			
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2047	8						8						8						8			
2048	8						8						8						8			
2049	8						8						8						8			
2050	7						7						7						7			
2051	7						7						7						7			
2052	7						7						7						7			
2053	7						7						7						7			
2054	7						7						7						7			
2055	7						7						7						7			
2056	7						7						7						7			
2057	7						7						7						7			
2058	7						7						7						7			
2059	6						6						6						6			
2060	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 1	7	Repair (After Bridge Replace)	$3.00	$47,919.00	20	+ 0	7	$143,757.00	$38,014.90	$6,844.77
2061	7						7						7						7			
2062	7						7						7						7			
2063	7						7						7						7			
2064	7						7						7						7			
2065	7						7						7						7			
2066	7						7						7						7			
2067	7						7						7						7			
2068	7						7						7						7			
2069	7						7						7						7			
2070	7						7						7						7			
2071	6						6						6						6			
2072	6						6						6						6			
2073	6						6						6						6			
2074	6						6						6						6			
2075	6						6						6						6			
2076	6						6						6						6			
2077	6						6						6						6			
2078	6						6						6						6			
2079	6						6						6						6			
2080	5						5						5						5			
																			Total Cost =	$2,965,573.25	$1,471,773.99	$632,235.31

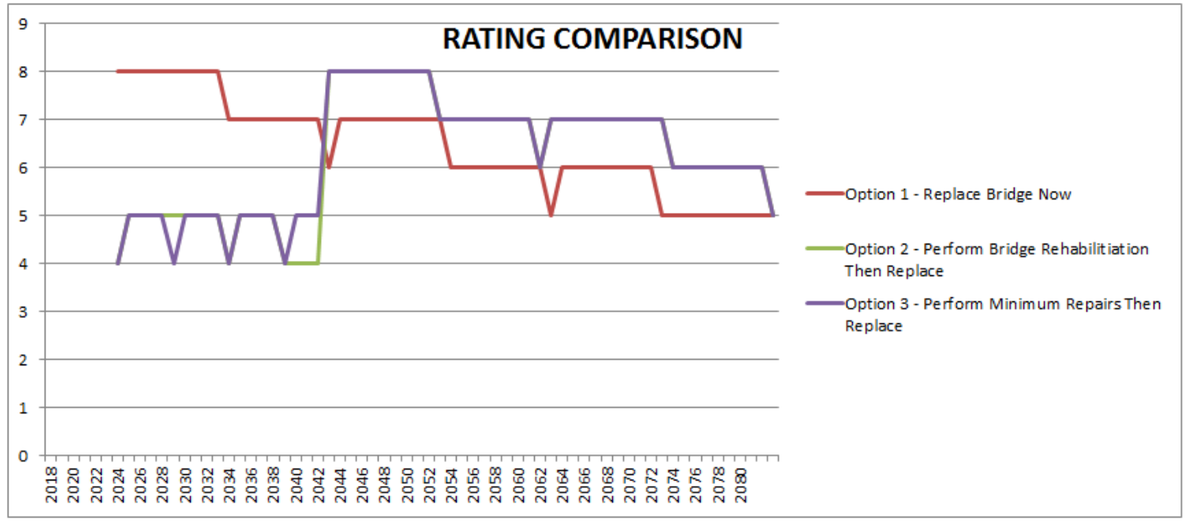
AJO WAY OP WB (#1108) / ROUTE / MP 262.44

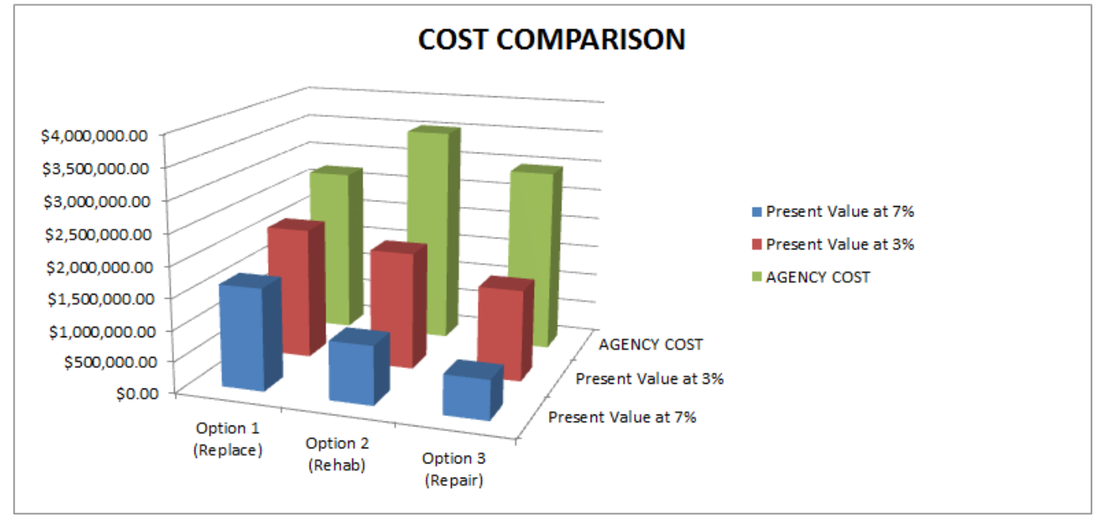
COST COMPARISON Present Value 2015 Dollars - Raw Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$ 2,703,430.25	$2,126,858.86	$1,640,978.30
Option 2 (Rehab)	$ 3,525,095.13	$1,898,535.92	$941,243.06
Option 3 (Repair)	$ 2,965,573.25	$1,471,773.99	$632,235.31

Comparison to Replacement			
Option	Agency Cost	3%	7%
2 (Rehab)	76.69%	112.03%	174.34%
3 (Repair)	91.16%	144.51%	259.55%

COST COMPARISON Present Value 2015 Dollars - Fully Loaded Costs			
OPTION	AGENCY COST	3%	7%
Option 1 (Replace)	$5,947,547	$4,679,089	$3,610,152
Option 2 (Rehab)	$7,755,209	$4,176,779	$2,070,735
Option 3 (Repair)	$6,524,261	$3,237,903	$1,390,918

Bridge Ratings Per Option		
OPTION	AVG RATING	END RATING
Option 1 (Replace)	6.45	5
Option 2 (Rehab)	6.23	5
Option 3 (Repair)	6.27	5





APPENDIX C: CRASH MODIFICATION FACTORS AND FACTORED CONSTRUCTION UNIT COSTS

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.
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 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 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 Entry/Exit Ramp	$730,000	Each	2.20	$1,610,000	Cost per ramp; includes pavement, striping, signing, RPMs,	1.09	Average of 16 values on clearinghouse; for

SOLUTION	CONSTRUCTION UNIT COST	UNIT	FACTOR^	FACTORED CONSTRUCTION UNIT COST	DESCRIPTION	CMF for Corridor Profile Studies	CMF Notes
					lighting, typical earthwork & drainage; does not include any major structures or improvements on crossroad		adding a ramp not reconstructing
Construct Turn Lanes	$170,000	Each	2.20	$374,000	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
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)
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	$125	SF	2.20	$280	Based on deck area; bridge only - no other costs included	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	0.25 (wildlife)	Assumed
Install Wildlife Crossing Over Roadway	$1,140,000	Each	2.20	$2,508,000	Includes cost of structure for wildlife crossing over roadway	0.25 (wildlife)	Assumed
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
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
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
Install Center Turn Lane	$450,000	Mile	2.20	$990,000	Assumes widening (AC) of undivided facility to provide directional left-turn lane or two-way left-turn lane with associated transitions, signage and markings and standard shoulders; includes all costs except bridges; for generally at-grade facility with minimal walls and no major drainage improvements	0.86	Average of 2 values from CMF Clearinghouse
OPERATIONAL IMPROVEMENT							
Implement Variable Speed Limits (Wireless, Overhead)	$718,900	Mile	2.20	$1,580,000	In one direction; includes 2 signs per mile (foundations and structures), 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

SOLUTION	CONSTRUCTION UNIT COST	UNIT	FACTOR^	FACTORED CONSTRUCTION UNIT COST	DESCRIPTION	CMF for Corridor Profile Studies	CMF Notes
Implement Variable Speed Limits (Wireless, Solar, Overhead)	$502,300	Mile	2.20	$1,110,000	In one direction; includes 2 signs per mile (foundations and structures), 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
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 conductors 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
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, 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, 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, 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 Safety Edge	$80,000	Mile	2.20	$176,000		0.87	Average of 12 values on clearinghouse
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	Removing trees that shade the roadway to allow sunlight to help melt snow and ice	0.72 (snow/ice)	Average of 3 values on clearinghouse for snow/ice

SOLUTION	CONSTRUCTION UNIT COST	UNIT	FACTOR^	FACTORED CONSTRUCTION UNIT COST	DESCRIPTION	CMF for Corridor Profile Studies	CMF Notes
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 Access Barrier Fence	$15	LF	2.20	$33	8' fencing along residential section of roadway	0.1 (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)	$7,400	Each	2.20	$16,000	Includes paving and advanced signage	0.80	Assumed
Formalize Pullout (Medium)	$27,400	Each	2.20	$60,000	Includes paving and advanced signage	0.80	Assumed
Formalize Pullout (Large)	$77,900	Each	2.20	$171,400	Includes paving and advanced signage	0.80	Assumed
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
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.
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		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.
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
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
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,

SOLUTION	CONSTRUCTION UNIT COST	UNIT	FACTOR^	FACTORED CONSTRUCTION UNIT COST	DESCRIPTION	CMF for Corridor Profile Studies	CMF Notes
							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
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 installing pavement condition warning signs
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
Install Chevrons	$18,400	Mile	2.20	$40,500	On one side of road - includes signs, posts, and foundations	0.79	Average of 11 values on clearinghouse
Install Curve Warning Signs	$2,500	Each	2.20	$5,500	Includes 2 signs, posts, and foundations	0.83	Average of 4 clearinghouse values
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
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
Install Wildlife Warning System	$162,000	Each	2.20	$356,400	Includes wildlife detection system, flashing warning signs (assumes solar power), advance signing, CCTV (solar and wireless), and fencing for approximately 2 miles in each direction	0.50 (wildlife)	Assumed
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 Installing Flashing Beacons as Advance Warning
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
DATA COLLECTION							

SOLUTION	CONSTRUCTION UNIT COST	UNIT	FACTOR^	FACTORED CONSTRUCTION UNIT COST	DESCRIPTION	CMF for Corridor Profile Studies	CMF Notes
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	0.70	Assumed to be slightly lower than converting from a 4-lane to a 5-lane highway
Convert a 4-lane undivided highway to a 5-lane highway	$1,053,000	Mile	2.20	$2,316,600	For expanding a 4-lane undivided highway to a 5-lane highway (4 through lanes with TWLTL), includes standard shoulder widths but no curb, gutter, or sidewalk	0.75	From FHWA Desktop Reference for CRFs, 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

SOLUTION	CONSTRUCTION UNIT COST	UNIT	FACTOR^	FACTORED CONSTRUCTION UNIT COST	DESCRIPTION	CMF for Corridor Profile Studies	CMF Notes
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 D: 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 Mainling 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
1_1	88,220	1		1,000				12,351	N	3.57	2.62	1	N	10	N
1_2	53,644	12		1,000				7,510	N	0.08	0.14	1	N	9.4	N
2	53,644	17	1	1,000	8	Y	16.06	7,510	N	0.08	0.14	1	N	9.4	N
3a	53,644	1	4	1,000	8	N	16.06	7,510	N	0.08	0.14	2.5	N	9.4	N
3b	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
3c	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
4a	53,644	1	3	1,000	8	N	16.15	7,510	N	0.08	0.14	2.5	N	9.4	N
4b	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
4c	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
5a	53,644	1	6	1,000	8	N	16.12	7,510	N	0.08	0.14	2.5	N	9.4	N
5b	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
5c	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
6a	53,644	1	6	1,000	9	N	16.18	7,510	N	0.08	0.14	2.5	N	9.4	N
6b	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
6c	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
7a	53,644	1	6	1,000	9	N	16.09	7,510	N	0.08	0.14	2.5	N	9.4	N
7b	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
7c	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
8	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
9_2	53,644	1		1,000				7,510	N	0.08	0.14	2.5	N	9.4	N
9_3	46,328	6		1,000				5,559	N	0.10	0.14	2.5	N	11.1	N
10	43,328	6		1,000				5,559	N	0.10	0.14	2.5	N	11.1	N
11a	46,328	1	10	1,000	9	N	16.16	5,559	N	0.10	0.14	2.5	N	11.1	N
11b	46,328	1		1,000				5,559	N	0.10	0.14	2.5	N	11.1	N
11c	46,328	1		1,000				5,559	N	0.10	0.14	2.5	N	11.1	N
12a	46,328	1	2	1,000	9	N	15.86	5,559	N	0.10	0.14	2.5	N	11.1	N
12b	46,328	1		1,000				5,559	N	0.10	0.14	2.5	N	11.1	N
12c	46,328	1		1,000				5,559	N	0.10	0.14	2.5	N	11.1	N
13a	39,982	1	2	1,000	9	N	16.04	8,396	N	0.11	0.18	2.5	N	10.6	N
13b	39,982	1		1,000				8,396	N	0.11	0.18	2.5	N	10.6	N
13c	39,982	1		1,000				8,396	N	0.11	0.18	2.5	N	10.6	N
14a	39,982	1	2	1,000	9	N	16.02	8,396	N	0.11	0.18	2.5	N	10.6	N
14b	39,982	1		1,000				8,396	N	0.11	0.18	2.5	N	10.6	N
14c	39,982	1		1,000				8,396	N	0.11	0.18	2.5	N	10.6	N
17a	42,524	1	12	1,000	9	N	16.24	8,930	N	0.12	0.16	2.5	N	11.2	N
17b	42,524	1		1,000				8,930	N	0.12	0.16	2.5	N	11.2	N
17c	42,524	1		1,000				8,930	N	0.12	0.16	2.5	N	11.2	N
18	55,535	5		1,000				8,330	N	0.08	0.13	2.5	N	10	N
19	55,535	5		1,000				8,330	N	0.08	0.13	2.5	N	10	N
20	55,535	5		1,000				8,330	N	0.08	0.13	2.5	N	10	N
21a	102,618	4	1	1,000	7	Y	16.25	12,314	N	0.55	0.56	3	N	10.8	N
21b	102,618	4	1	1,000	7	Y	16.25	12,314	N	0.55	0.56	3	N	10.8	N
21c_7	102,618	7		1,000				12,314	N	0.55	0.56	3	N	10.8	N

Solution Number	Mainline Traffic Vol (vpd) (2-way)	Solution Length (miles)	Bridge Detour Length (miles) (N19)	Elevation (ft)	Scour Critical Rating (0-9)	Carries Mainling 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
21c_8	130,474	3		5,000				15,657	N	0.77	0.67	3	N	10.9	N
22	130,474	1		5,000				15,657	N	0.77	0.67	3	N	10.9	N
23	58,609	2		1,000				8,971	N	0.54	0.20	2.5	N	9.8	N
24a	58,609	12	2	5,000	8	Y	16.13	8,791	N	0.54	0.20	3	N	9.8	N
24b	58,609	12	2	5,000	8	Y	16.13	8,791	N	0.54	0.20	3	N	9.8	N
24c	58,609	12		5,000				8,791	N	0.54	0.20	3	N	9.8	N
27	58,609	11		1,000				8,791	N	0.54	0.20	3	N	9.8	N
28a	37,715	5	8	1,000	7	Y	16.15	7,166	N	0.11	0.18	4.5	N	9.8	N
28b_10	37,715	6		1,000				7,166	N	0.11	0.18	4.5	N	9.8	N
28b_11	27,197	6		1,000				5,711	N	0.20	0.34	4.5	N	9.7	N
29	37,715	4		1,000				7,166	N	0.11	0.18	3.5	N	9.8	N
30	20,465	3		1,000				6,140	N	0.17	0.26	3	N	10.1	N
31	20,465	6		1,000				6,140	N	0.17	0.26	3	N	10.1	N
32	20,465	3		1,000				6,140	N	0.17	0.26	3	N	10.1	N
33	16,218	1		1,000				6,325	N	0.19	0.28	5	N	10	N
34	16,218	1		5,000				6,325	N	0.19	0.28	5	N	10	N
35	16,218	1		5,000				6,325	N	0.19	0.28	5	N	10	N
36a	14,328	1	15	5,000	9	N	15.94	5,301	N	0.23	0.29	5	N	10	N
36b	14,328	1		5,000				5,301	N	0.23	0.29	4.5	N	10	N
36c	14,328	1		5,000				5,301	N	0.23	0.29	4.5	N	10	N
37	11,930	4		1,000				4,533	N	0.08	0.12	4	N	9.9	N
38	11,930	1		1,000				4,533	Y	0.08	0.12	4	N	9.9	N
39a	12,730	1	1	1,000	9	N	16.09	4,965	Y	0.13	0.21	4	N	9.8	N
39b	12,730	1		1,000				4,965	Y	0.13	0.21	4	N	9.8	N
39c	12,730	1		1,000				4,965	Y	0.13	0.21	4	N	9.8	N
40a	12,730	1	1	1,000	9	N	16.04	4,965	Y	0.13	0.21	3	N	9.8	N
40b	12,730	1		1,000				4,965	Y	0.13	0.21	3	N	9.8	N
40c	12,730	1		1,000				4,965	Y	0.13	0.21	3	N	9.8	N

Solution Number	Bridge	Pavement	Mobility	Safety	Freight	Risk Score (0 to 10)				
						Bridge	Pavement	Mobility	Safety	Freight
1_1	N	N	Y	Y	Y	0.00	0.00	4.27	1.93	4.89
1_2	N	N	Y	Y	Y	0.00	0.00	3.20	1.99	2.52
2	Y	Y	Y	Y	Y	3.29	5.74	3.20	1.99	2.52
3a	Y	N	Y	Y	Y	2.12	0.00	2.01	1.99	2.52
3b	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
3c	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
4a	Y	N	Y	Y	Y	1.96	0.00	2.01	1.99	2.52
4b	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
4c	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
5a	Y	N	Y	Y	Y	2.46	0.00	2.01	1.99	2.52
5b	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
5c	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
6a	Y	N	Y	Y	Y	2.46	0.00	2.01	1.99	2.52
6b	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
6c	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
7a	Y	N	Y	Y	Y	2.46	0.00	2.01	1.99	2.52
7b	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
7c	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
8	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
9_2	N	N	Y	Y	Y	0.00	0.00	2.01	1.99	2.52
9_3	N	N	Y	Y	Y	0.00	0.00	3.15	1.67	2.38
10	N	N	Y	Y	Y	0.00	0.00	3.15	1.67	2.38
11a	Y	N	Y	Y	Y	3.05	0.00	1.89	1.67	2.38
11b	N	N	Y	Y	Y	0.00	0.00	1.89	1.67	2.38
11c	N	N	Y	Y	Y	0.00	0.00	1.89	1.67	2.38
12a	Y	N	Y	Y	Y	1.84	0.00	1.89	1.67	2.38
12b	N	N	Y	Y	Y	0.00	0.00	1.89	1.67	2.38
12c	N	N	Y	Y	Y	0.00	0.00	1.89	1.67	2.38
13a	Y	N	Y	Y	Y	1.64	0.00	1.97	1.57	2.75
13b	N	N	Y	Y	Y	0.00	0.00	1.97	1.57	2.75
13c	N	N	Y	Y	Y	0.00	0.00	1.97	1.57	2.75
14a	Y	N	Y	Y	Y	1.64	0.00	1.97	1.57	2.75
14b	N	N	Y	Y	Y	0.00	0.00	1.97	1.57	2.75
14c	N	N	Y	Y	Y	0.00	0.00	1.97	1.57	2.75
17a	Y	N	Y	Y	Y	3.01	0.00	1.91	1.61	2.84
17b	N	N	Y	Y	Y	0.00	0.00	1.91	1.61	2.84
17c	N	N	Y	Y	Y	0.00	0.00	1.91	1.61	2.84
18	N	N	Y	Y	Y	0.00	0.00	3.10	1.77	2.59
19	N	N	Y	Y	Y	5.47	6.45	5.00	1.96	4.89
20	N	N	Y	Y	Y	0.00	0.00	5.00	1.96	4.89
21a	Y	Y	Y	Y	Y	0.00	0.00	4.99	1.99	4.95
21b	Y	Y	Y	Y	Y	0.00	0.00	4.59	1.99	4.95

Solution Number	Bridge	Pavement	Mobility	Safety	Freight	Risk Score (0 to 10)				
						Bridge	Pavement	Mobility	Safety	Freight
21c_7	N	N	Y	Y	Y	0.00	0.00	3.01	1.87	4.73
21c_8	N	N	Y	Y	Y	4.99	5.95	3.50	1.87	4.73
22	N	N	Y	Y	Y	4.99	5.95	3.50	1.87	4.73
23	N	N	Y	Y	Y	0.00	0.00	3.50	1.87	4.73
24a	Y	Y	Y	Y	Y	0.00	0.00	3.50	1.87	4.73
24b	Y	Y	Y	Y	Y	6.28	5.34	3.29	2.51	2.64
24c	N	N	Y	Y	Y	0.00	0.00	3.29	2.51	2.64
27	N	N	Y	Y	Y	0.00	0.00	3.94	2.32	2.91
28a	Y	Y	Y	Y	Y	0.00	0.00	3.09	1.91	2.64
28b_10	N	N	Y	Y	Y	0.00	4.44	2.73	1.09	2.82
28b_11	N	N	Y	Y	Y	0.00	0.00	3.35	1.09	2.82
29	N	N	Y	Y	Y	0.00	4.44	2.73	1.09	2.82
30	N	Y	Y	Y	Y	0.00	0.00	1.90	2.53	2.94
31	N	N	Y	Y	Y	0.00	4.87	1.90	2.53	2.94
32	N	Y	Y	Y	Y	0.00	0.00	1.90	2.53	2.94
33	N	N	Y	Y	Y	2.76	0.00	1.90	2.45	2.99
34	N	Y	Y	Y	Y	0.00	0.00	1.90	2.15	2.99
35	N	N	Y	Y	Y	0.00	0.00	1.90	2.15	2.99
36a	Y	N	Y	Y	Y	0.00	0.00	1.81	1.38	2.10
36b	N	N	Y	Y	Y	0.00	0.00	0.98	1.38	2.10
36c	N	N	Y	Y	Y	0.81	0.00	3.96	1.46	4.93
37	N	N	Y	Y	Y	0.00	0.00	3.96	1.46	4.93
38	N	N	Y	Y	Y	0.00	0.00	3.96	0.86	4.93
39a	Y	N	Y	Y	Y	0.81	0.00	3.96	0.86	4.93
39b	N	N	Y	Y	Y	0.00	0.00	3.96	0.86	4.93
39c	N	N	Y	Y	Y	0.00	0.00	3.96	0.86	4.93
40a	Y	N	Y	Y	Y	5.47	6.45	5.00	1.96	4.89
40b	N	N	Y	Y	Y	0.00	0.00	5.00	1.96	4.89
40c	N	N	Y	Y	Y	0.00	0.00	4.99	1.99	4.95

APPENDIX E: PERFORMANCE EFFECTIVENESS 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 #	10E.1	10E.1	10E.2	10E.3a	10E.3b	10E.3c	10E.4a	10E.4b	10E.4c	10E.5a
			Description	Lighting Improvements	Lighting Improvements	General Purpose Lane	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance
			Project Beg MP	163	164	167	169.85	169.85	169.85	174.63	174.63	174.63	175.81
			Project End MP	164	176	184	169.85	169.85	169.85	174.63	174.63	174.63	175.81
			Project Length (miles)	1	12	17	0	0	0	0	0	0	0
			Segment Beg MP	160	164	164	164	164	164	164	164	164	164
			Segment End MP	164	184	184	184	184	184	184	184	184	184
			Segment Length (miles)	4	20	20	20	20	20	20	20	20	20
			Segment #	1	2	2	2	2	2	2	2	2	2
			Current # of Lanes (both directions)	6	4	4	4	4	4	4	4	4	4
			Project Type (one-way or two-way)	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way
			Additional Lanes (one-way)	0	0	1	0	0	0	0	0	0	0
			Pro-Rated # of Lanes	6.00	4.00	5.70	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		Notes and Directions	**Description**										
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (direction 1)	1.710	1.091	1.091	1.091	1.091	1.091	1.091	1.091	1.091	1.091
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (direction 1)	3	10	10	10	10	10	10	10	10	10
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (direction 1)	3	22	22	22	22	22	22	22	22	22
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (direction 1)	0	2	8	1	1	1	0	0	0	0
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (direction 1)	2	6	16	0	0	0	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (direction 1)(lowest CMF)	0.75	0.75	0.95	0.95	1.09	0.7	0.95	1.09	0.7	0.95
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 3 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 4 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (direction 1)	0.750	0.750	0.950	0.950	1.090	0.700	0.950	1.090	0.700	0.950
		Calculated Value (direction 1)	Fatal Crash reduction (direction 1)	0.000	0.500	0.400	0.050	-0.090	0.300	0.000	0.000	0.000	0.000
		Calculated Value (direction 1)	Incap Crash reduction (direction 1)	0.500	1.500	0.800	0.000	0.000	0.000	0.050	-0.090	0.300	0.050
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (direction 1)	3.000	9.500	9.600	9.950	10.090	9.700	10.000	10.000	10.000	10.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (direction 1)	2.500	20.500	21.200	22.000	22.000	22.000	21.950	22.090	21.700	21.950
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	1.692	1.034	1.048	1.086	1.086	1.063	1.091	1.092	1.089	1.091
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	1.692	1.034	1.048	1.086	1.086	1.063	1.091	1.092	1.089	1.091
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (direction 2)	1.458	0.964	0.964	0.964	0.964	0.964	0.964	0.964	0.964	0.964
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (direction 2)	2	8	8	8	8	8	8	8	8	8
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (direction 2)	10	31	31	31	31	31	31	31	31	31
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (direction 2)	0	3	4	0	0	0	0	0	0	0
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (direction 2)	1	7	21	0	0	0	1	1	1	0
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (direction 2)(lowest CMF)	0.75	0.75	0.95	0.95	1.09	0.7	0.95	1.09	0.7	0.95
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 3 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 4 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (direction 2)	0.750	0.750	0.950	0.950	1.090	0.700	0.950	1.090	0.700	0.950
		Calculated Value (direction 2)	Fatal Crash reduction (direction 2)	0.000	0.750	0.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (direction 2)	Incap Crash reduction (direction 2)	0.250	1.750	1.050	0.000	0.000	0.000	0.050	-0.090	0.300	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (direction 2)	2.000	7.250	7.800	8.000	8.000	8.000	8.000	8.000	8.000	8.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (direction 2)	9.750	29.250	29.950	31.000	31.000	31.000	30.950	31.090	30.700	31.000
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	1.449	0.881	0.938	0.964	0.964	0.964	0.963	0.964	0.962	0.964
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	1.449	0.881	0.938	0.964	0.964	0.964	0.963	0.964	0.962	0.964
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	1.584	1.027	1.027	1.028	1.028	1.028	1.028	1.028	1.028	1.028
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	1.571	0.958	0.993	1.025	1.025	1.014	1.027	1.028	1.026	1.027
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	4.384	1.685	1.685	1.685	1.685	1.685	1.685	1.685	1.685	1.685
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	4.334	1.292	1.203	1.671	1.671	1.608	1.683	1.689	1.677	1.683

MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.840	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
		Enter in Mobility Index Spreadsheet to determine new segment level Mobility Index	Post-Project # of Lanes (both directions)	6.00	4.00	5.70	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	0.84	0.80	0.56	0.80	0.80	0.80	0.80	0.80	0.80	0.80
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.840	0.800	0.560	0.800	0.800	0.800	0.800	0.800	0.800	0.800
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.850	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.850	0.940	0.660	0.940	0.940	0.940	0.940	0.940	0.940	0.940
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.850	0.940	0.660	0.940	0.940	0.940	0.940	0.940	0.940	0.940
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (direction 1)	0.630	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (direction 2)	0.630	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560
		***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	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (direction 1)	0.630	0.570	0.40	0.57	0.57	0.57	0.57	0.57	0.57	0.57
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (direction 2)	0.630	0.560	0.39	0.56	0.56	0.56	0.56	0.56	0.56	0.56
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 1)	0.630	0.570	0.400	0.570	0.570	0.570	0.570	0.570	0.570	0.570
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 2)	0.630	0.560	0.390	0.560	0.560	0.560	0.560	0.560	0.560	0.560
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	0.992	0.932	0.967	0.998	0.998	0.986	1.000	1.000	0.998	1.000
		Calculated Value (both directions)	Safety Reduction	0.008	0.068	0.033	0.002	0.002	0.014	0.000	0.000	0.002	0.000
		Calculated Value (both directions)	Mobility Reduction Factor	1.000	1.000	0.700	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Calculated Value (both directions)	Mobility Reduction	0.000	0.000	0.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (direction 1)	1.196	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093
		Input current value from performance system (direction 1)	Original Directional Segment PTI (direction 1)	3.254	1.222	1.222	1.222	1.222	1.222	1.222	1.222	1.222	1.222
		Input current value from performance system (direction 2)	Original Directional Segment TTI (direction 2)	1.243	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076
		Input current value from performance system (direction 2)	Original Directional Segment PTI (direction 2)	3.863	1.217	1.217	1.217	1.217	1.217	1.217	1.217	1.217	1.217
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.000	0.000	0.090	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.003	0.020	0.070	0.001	0.001	0.004	0.000	0.000	0.001	0.000
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (direction 1)	1.196	1.093	1.047	1.093	1.093	1.093	1.093	1.093	1.093	1.093
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (direction 1)	3.246	1.197	1.136	1.221	1.221	1.217	1.222	1.222	1.221	1.222
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTI (direction 2)	1.243	1.076	1.038	1.076	1.076	1.076	1.076	1.076	1.076	1.076
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment PTI (direction 2)	3.853	1.192	1.132	1.216	1.216	1.212	1.217	1.217	1.216	1.217
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (direction 1)	0.650	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (direction 2)	0.050	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
		Input value from HCRS	Segment Closures with fatalities/injuries	9	21	21	21	21	21	21	21	21	21
		Input value from HCRS	Total Segment Closures	12	35	35	35	35	35	35	35	35	35
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.75	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
		Calculated Value (both directions)	Closure Reduction	0.006	0.041	0.020	0.001	0.001	0.008	0.000	0.000	0.001	0.000
		Calculated Value (both directions)	Closure Reduction Factor	0.994	0.959	0.980	0.999	0.999	0.992	1.000	1.000	0.999	1.000
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (direction 1)	0.646	0.341	0.348	0.354	0.354	0.352	0.355	0.355	0.355	0.355
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (direction 2)	0.050	0.124	0.126	0.129	0.129	0.128	0.129	0.129	0.129	0.129
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	91.0%	100.0%	100.0%	100.0%	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 (%)	91.0%	100.0%	100.0%	100.0%	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 (%)	91.0%	100.0%	100.0%	100.0%	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	5.905	3.309	3.309	3.309	3.309	3.309	3.309	3.309	3.309	3.309
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	5.890	3.303	0.952	3.308	3.308	3.307	3.309	3.309	3.308	3.309

FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (direction 1)	1.177	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (direction 1)	3.449	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (direction 2)	1.268	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (direction 2)	4.840	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.000	0.000	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.001	0.010	0.035	0.000	0.000	0.002	0.000	0.000	0.000	0.000
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (direction 1)	1.177	1.055	1.008	1.055	1.055	1.055	1.055	1.055	1.055	1.055
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (direction 1)	3.445	1.120	1.092	1.132	1.132	1.130	1.132	1.132	1.132	1.132
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (direction 2)	1.268	1.056	1.008	1.056	1.056	1.056	1.056	1.056	1.056	1.056
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (direction 2)	4.834	1.121	1.093	1.133	1.133	1.131	1.133	1.133	1.133	1.133
	FREIGHT INDEX	Value from above	Original Segment TPTI (direction 1)	3.449	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132
		Value from above	Original Segment TPTI (direction 2)	4.840	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133
		Calculated Value	Original Segment Freight Index	0.241	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883
		Calculated Value	Post-Project Segment TPTI (direction 1)	3.445	1.120	1.092	1.132	1.132	1.130	1.132	1.132	1.132	1.132
		Calculated Value	Post-Project Segment TPTI (direction 2)	4.834	1.121	1.093	1.133	1.133	1.131	1.133	1.133	1.133	1.133
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.242	0.892	0.915	0.883	0.883	0.885	0.883	0.883	0.883	0.883
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	185.890	69.814	69.814	69.814	69.814	69.814	69.814	69.814	69.814	69.814
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	10.650	31.556	31.556	31.556	31.556	31.556	31.556	31.556	31.556	31.556
		Calculated Value	Segment Closures with fatalities	9	21	21	21	21	21	21	21	21	21
		Calculated Value	Total Segment Closures	12	35	35	35	35	35	35	35	35	35
		Calculated Value	% Closures with Fatality	0.75	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
		Calculated Value	Closure Reduction	0.006	0.041	0.020	0.001	0.001	0.008	0.000	0.000	0.001	0.000
		Calculated Value	Closure Reduction Factor	0.994	0.959	0.980	0.999	0.999	0.992	1.000	1.000	0.999	1.000
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (direction 1)	184.706	66.967	68.415	69.712	69.712	69.243	69.794	69.834	69.732	69.794
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (direction 2)	10.582	30.269	30.924	31.510	31.510	31.298	31.547	31.565	31.519	31.547
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	16.84	15.95	15.95	15.92	15.92	15.92	15.92	15.92	15.92	15.92
		Input current value from performance system	Original vertical clearance for specific bridge				16.06	16.06	16.06	16.15	16.15	16.15	16.12
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge				16.50	16.50	16.75	16.50	16.50	16.40	16.50
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.84	15.95	15.95	16.50	16.50	16.31	16.50	16.50	16.40	16.50
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.84	15.95	15.95	16.50	16.50	16.31	16.50	16.50	16.40	16.50
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	8.008	0.689	0.689	0.689	0.689	0.689	0.689	0.689	0.689	0.689
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	7.995	0.686	0.681	0.291	0.291	0.369	0.291	0.291	0.321	0.291

BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	7.00	5.00	5.63	5.64	5.64	5.64	5.64	5.64	5.64	5.64
		Input current value from performance system	Original lowest rating for specific bridge				6	6	6	6	6	6	6
		Input post-project value (For repair +1, rehab +2, replace=8)	Post-Project lowest rating for specific bridge				8	6	6	8	6	6	8
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project lowest rating for specific bridge	0	0	0	8	6	6	8	6	6	8
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	7	5	7.07	5.73	5.64	5.64	5.73	5.64	5.64	5.74
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	7.00	5.00	7.07	5.73	5.64	5.64	5.73	5.64	5.64	5.74
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	92.31	82.49	82.49	82.49	82.49	82.49	82.49	82.49	82.49	82.49
		Input current value from performance system	Original Sufficiency Rating for specific bridge				96.00	96.00	96.00	93.00	93.00	93.00	79.70
		Input post-project value (For repair +10, rehab +20, replace=98)	Post-Project Sufficiency Rating for specific bridge				98.00	96.00	96.00	98.00	93.00	93.00	98.00
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project Sufficiency Rating for specific bridge	0.00	0.00	0.00	98.00	96.00	96.00	98.00	93.00	93.00	98.00
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	92.31	82.49	92.69	82.59	82.49	82.49	82.72	82.49	82.49	83.47
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	92.31	82.49	92.69	82.59	82.49	82.49	82.72	82.49	82.49	83.47
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	7	5	5	5	5	5	5	5	5	5
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	7	5	8	8	5	5	8	5	5	8
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	7	5	8	8	5	5	8	5	5	8
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	32.11%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	32.11%	34.00%	34.00%	34.00%	34.00%	34.00%	29.36%	34.00%	34.00%	28.66%
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	32.11%	34.00%	34.00%	34.00%	34.00%	34.00%	29.36%	34.00%	34.00%	28.66%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	0.156	1.497	1.497	1.497	1.497	1.497	1.497	1.497	1.497	1.497
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	0.156	1.497	0.267	1.207	1.497	1.497	1.18	1.497	1.497	1.143
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index	3.87	3.69	3.69							
		Input current value from performance system	Original Segment IRI in project limits			82.41							
		Input current value from performance system	Original Segment Cracking in project limits			5.95							
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits			40.14							
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	40.14	0	0	0	0	0	0	0
		Input post-project value (Lower to 0 for rehab or replace)	Post-Project Cracking in project limits			0.2							
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project Cracking in project limits	0	0	0.2	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet	Post-Project Segment Pavement Index			4.5							
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	4.5	0	0	0	0	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (direction 1)			3.79							
		Input current value from performance system (direction 2)	Original Segment Directional PSR (direction 2)			3.53							
		Value from above	Original Segment IRI in project limits	0	0	82.41	0	0	0	0	0	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	40.14	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (direction 1)			4.32							
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (direction 2)			4.3							
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 1)	0	0	4.32	0	0	0	0	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 2)	0	0	4.3	0	0	0	0	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure			17.5%							
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure			7.5%							
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	7.5%	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	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0	0.591	0.075	0.591	0.591	0.591	0.591	0.591	0.591	0.591

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 #	10E.5b	10E.5c	10E.6a	10E.6b	10E.6c	10E.7a	10E.7b	10E.7c	10E.8	10E.9
			Description	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Shoulder Widening	Lighting Improvements
			Project Beg MP	175.81	175.81	177.76	177.76	177.76	179.37	179.37	179.37	183	183
			Project End MP	175.81	175.81	177.76	177.76	177.76	179.37	179.37	179.37	184	184
			Project Length (miles)	0	0	0	0	0	0	0	0	1	1
			Segment Beg MP	164	164	164	164	164	164	164	164	164	164
			Segment End MP	184	184	184	184	184	184	184	184	184	184
			Segment Length (miles)	20	20	20	20	20	20	20	20	20	20
			Segment #	2	2	2	2	2	2	2	2	2	2
			Current # of Lanes (both directions)	4	4	4	4	4	4	4	4	4	4
			Project Type (one-way or two-way)	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	one-way	two-way
			Additional Lanes (one-way)	0	0	0	0	0	0	0	0	0	0
			Pro-Rated # of Lanes	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		Notes and Directions	**Description**										
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (direction 1)	1.091	1.091	1.091	1.091	1.091	1.091	1.091	1.091	1.091	1.091
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (direction 1)	10	10	10	10	10	10	10	10	10	10
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (direction 1)	22	22	22	22	22	22	22	22	22	22
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (direction 1)	0	0	0	0	0	1	1	1	3	1
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (direction 1)	1	1	0	0	0	0	0	0	5	3
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (direction 1)(lowest CMF)	1	0.7	0.95	1.09	0.7	0.95	1.09	0.7	0.64	0.75
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 3 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 4 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (direction 1)	1.000	0.700	0.950	1.090	0.700	0.950	1.090	0.700	0.640	0.750
		Calculated Value (direction 1)	Fatal Crash reduction (direction 1)	0.000	0.000	0.000	0.000	0.000	0.050	-0.090	0.300	1.080	0.250
		Calculated Value (direction 1)	Incap Crash reduction (direction 1)	0.000	0.300	0.000	0.000	0.000	0.000	0.000	0.000	1.800	0.750
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (direction 1)	10.000	10.000	10.000	10.000	10.000	9.950	10.090	9.700	8.920	9.750
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (direction 1)	22.000	21.700	22.000	22.000	22.000	22.000	22.000	22.000	20.200	21.250
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	1.091	1.089	1.091	1.091	1.091	1.086	1.100	1.063	0.977	1.062
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	1.091	1.089	1.091	1.091	1.091	1.086	1.100	1.063	0.977	1.062
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (direction 2)	0.964	0.964	0.964	0.964	0.964	0.964	0.964	0.964	0.964	0.964
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (direction 2)	8	8	8	8	8	8	8	8	8	8
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (direction 2)	31	31	31	31	31	31	31	31	31	31
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (direction 2)	0	0	0	0	0	0	0	0	1	0
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (direction 2)	0	0	1	1	1	1	1	1	3	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (direction 2)(lowest CMF)	1	0.7	0.95	1.09	0.7	0.95	1.09	0.7	1	0.75
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 3 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 4 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (direction 2)	1.000	0.700	0.950	1.090	0.700	0.950	1.090	0.700	1.000	0.750
		Calculated Value (direction 2)	Fatal Crash reduction (direction 2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (direction 2)	Incap Crash reduction (direction 2)	0.000	0.000	0.050	-0.090	0.300	0.050	-0.090	0.300	0.000	0.250
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (direction 2)	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (direction 2)	31.000	31.000	30.950	31.090	30.700	30.950	31.090	30.700	31.000	30.750
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.964	0.964	0.963	0.964	0.962	0.963	0.964	0.962	0.964	0.962
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.964	0.964	0.963	0.964	0.962	0.963	0.964	0.962	0.964	0.962
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.027
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	1.028	1.026	1.027	1.028	1.027	1.025	1.032	1.013	0.971	1.012
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	1.685	1.685	1.685	1.685	1.685	1.685	1.685	1.685	1.685	1.685
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	1.685	1.677	1.683	1.688	1.682	1.671	1.711	1.602	1.362	1.597

MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
		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	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (direction 1)	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (direction 2)	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560
		***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	4.00	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (direction 1)	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (direction 2)	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 1)	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 2)	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	1.000	0.999	1.000	1.000	0.999	0.997	1.004	0.985	0.945	0.985
		Calculated Value (both directions)	Safety Reduction	0.000	0.001	0.000	0.000	0.001	0.003	-0.004	0.015	0.055	0.015
		Calculated Value (both directions)	Mobility Reduction Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Calculated Value (both directions)	Mobility Reduction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (direction 1)	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093
		Input current value from performance system (direction 1)	Original Directional Segment PTI (direction 1)	1.222	1.222	1.222	1.222	1.222	1.222	1.222	1.222	1.222	1.222
		Input current value from performance system (direction 2)	Original Directional Segment TTI (direction 2)	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076
		Input current value from performance system (direction 2)	Original Directional Segment PTI (direction 2)	1.217	1.217	1.217	1.217	1.217	1.217	1.217	1.217	1.217	1.217
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.000	0.000	0.000	0.000	0.000	0.001	-0.001	0.004	0.017	0.004
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (direction 1)	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093	1.093
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (direction 1)	1.222	1.221	1.222	1.222	1.222	1.221	1.224	1.217	1.202	1.217
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTI (direction 2)	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076	1.076
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment PTI (direction 2)	1.217	1.216	1.217	1.217	1.217	1.216	1.219	1.212	1.217	1.212
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (direction 1)	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (direction 2)	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
		Input value from HCRS	Segment Closures with fatalities/injuries	21	21	21	21	21	21	21	21	21	21
		Input value from HCRS	Total Segment Closures	35	35	35	35	35	35	35	35	35	35
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
		Calculated Value (both directions)	Closure Reduction	0.000	0.001	0.000	0.000	0.001	0.002	-0.003	0.009	0.033	0.009
		Calculated Value (both directions)	Closure Reduction Factor	1.000	0.999	1.000	1.000	0.999	0.998	1.003	0.991	0.967	0.991
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (direction 1)	0.355	0.355	0.355	0.355	0.355	0.354	0.356	0.352	0.343	0.352
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (direction 2)	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.128	0.129	0.128
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	100.0%	100.0%	100.0%	100.0%	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%	100.0%	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%	100.0%	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	3.309	3.309	3.309	3.309	3.309	3.309	3.309	3.309	3.309	3.309
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	3.309	3.308	3.309	3.309	3.309	3.308	3.309	3.307	3.307	3.307

FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (direction 1)	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (direction 1)	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (direction 2)	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (direction 2)	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	0.002	0.008	0.002
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (direction 1)	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (direction 1)	1.132	1.132	1.132	1.132	1.132	1.132	1.133	1.130	1.123	1.129
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (direction 2)	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056	1.056
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (direction 2)	1.133	1.133	1.133	1.133	1.133	1.133	1.134	1.131	1.133	1.130
	FREIGHT INDEX	Value from above	Original Segment TPTI (direction 1)	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132	1.132
		Value from above	Original Segment TPTI (direction 2)	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133	1.133
		Calculated Value	Original Segment Freight Index	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883
		Calculated Value	Post-Project Segment TPTI (direction 1)	1.132	1.132	1.132	1.132	1.132	1.132	1.133	1.130	1.123	1.129
		Calculated Value	Post-Project Segment TPTI (direction 2)	1.133	1.133	1.133	1.133	1.133	1.133	1.134	1.131	1.133	1.130
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.883	0.883	0.883	0.883	0.883	0.883	0.882	0.885	0.887	0.885
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	69.814	69.814	69.814	69.814	69.814	69.814	69.814	69.814	69.814	69.814
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	31.556	31.556	31.556	31.556	31.556	31.556	31.556	31.556	31.556	31.556
		Calculated Value	Segment Closures with fatalities	21	21	21	21	21	21	21	21	21	21
		Calculated Value	Total Segment Closures	35	35	35	35	35	35	35	35	35	35
		Calculated Value	% Closures with Fatality	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
		Calculated Value	Closure Reduction	0.000	0.001	0.000	0.000	0.001	0.002	-0.003	0.009	0.033	0.009
		Calculated Value	Closure Reduction Factor	1.000	0.999	1.000	1.000	0.999	0.998	1.003	0.991	0.967	0.991
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (direction 1)	69.814	69.753	69.794	69.814	69.773	69.692	69.997	69.202	67.490	69.189
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (direction 2)	31.556	31.528	31.547	31.556	31.538	31.501	31.639	31.280	31.556	31.274
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	15.92	15.92	15.92	15.92	15.92	15.92	15.92	15.92	15.92	15.95
		Input current value from performance system	Original vertical clearance for specific bridge	16.12	16.12	16.18	16.18	16.18	16.06	16.06	16.06		
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge	16.50	16.37	16.50	16.50	16.43	16.50	16.50	16.31		
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.50	16.37	16.50	16.50	16.43	16.50	16.50	16.31	15.92	15.95
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.50	16.37	16.50	16.50	16.43	16.50	16.50	16.31	15.92	15.95
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	0.689	0.689	0.689	0.689	0.689	0.689	0.689	0.689	0.689	0.689
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	0.291	0.330	0.291	0.291	0.312	0.291	0.292	0.369	0.687	0.689

BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.00	5.00
		Input current value from performance system	Original lowest rating for specific bridge	6	6	6	6	6	5	5	5		
		Input post-project value (For repair +1, rehab +2, replace=8)	Post-Project lowest rating for specific bridge	6	6	8	6	6	8	5	5		
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project lowest rating for specific bridge	6	6	8	6	6	8	5	5	0	0
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	5.64	5.64	5.78	5.64	5.64	5.77			5.00	
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	5.64	5.64	5.78	5.64	5.64	5.77	0.00	0.00	5.00	0.00
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	82.49	82.49	82.49	82.49	82.49	82.49	82.49	82.49	82.49	82.49
		Input current value from performance system	Original Sufficiency Rating for specific bridge	79.70	79.70	93.80	93.80	93.80	83.00	83.00	83.00		
		Input post-project value (For repair +10, rehab +20, replace=98)	Post-Project Sufficiency Rating for specific bridge	79.70	79.70	98.00	93.80	93.80	98.00	83.00	83.00		
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project Sufficiency Rating for specific bridge	79.70	79.70	98.00	93.80	93.80	98.00	83.00	83.00	0.00	0.00
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	82.49	82.49	82.79	82.49	82.49	83.19	82.46	82.49	82.49	82.49
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	82.49	82.49	82.79	82.49	82.49	83.19	82.46	82.49	82.49	82.49
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	5	5	5	5	5	5	5	5	5	5
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	5	5	8	5	5	8	5	5	5	5
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	5	5	8	5	5	8	5	5	5	5
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%	34.00%
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	34.00%	34.00%	26.85%	34.00%	34.00%	29.36%	34.00%	34.00%	34.00%	34.00%
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	34.00%	34.00%	26.85%	34.00%	34.00%	29.36%	34.00%	34.00%	34.00%	34.00%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	1.497	1.497	1.497	1.497	1.497	1.497	1.497	1.497	1.497	1.497
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	1.497	1.497	1.049	1.497	1.497	1.094	1.497	1.497	1.497	1.497
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index										
		Input current value from performance system	Original Segment IRI in project limits										
		Input current value from performance system	Original Segment Cracking in project limits										
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits										
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	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										
		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										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	0	0	0	0	0	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (direction 1)										
		Input current value from performance system (direction 2)	Original Segment Directional PSR (direction 2)										
		Value from above	Original Segment IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (direction 1)										
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (direction 2)										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 1)	0	0	0	0	0	0	0	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 2)	0	0	0	0	0	0	0	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure										
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	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	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591	0.591

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 #	10E.9	10E.10	10E.11a	10E.11b	10E.11c	10E.12a	10E.12b	10E.12c	10E.13a	10E.13b
			Description	Lighting Improvements	Safety Improvements	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance
			Project Beg MP	184	184	188.2	188.2	188.2	193.88	193.88	193.88	205.45	205.45
			Project End MP	190	190	188.2	188.2	188.2	193.88	193.88	193.88	205.45	205.45
			Project Length (miles)	6	6	0	0	0	0	0	0	0	0
			Segment Beg MP	184	184	184	184	184	184	184	184	198	198
			Segment End MP	198	198	198	198	198	198	198	198	218	218
			Segment Length (miles)	14	14	14	14	14	14	14	14	20	20
			Segment #	3	3	3	3	3	3	3	3	4	4
			Current # of Lanes (both directions)	6	6	6	6	6	6	6	6	6	6
			Project Type (one-way or two-way)	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way
			Additional Lanes (one-way)	0	0	0	0	0	0	0	0	0	0
			Pro-Rated # of Lanes	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
		Notes and Directions	**Description**										
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (direction 1)	2.596	2.596	2.596	2.596	2.596	2.596	2.596	2.596	0.783	0.783
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (direction 1)	11	11	11	11	11	11	11	11	4	4
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (direction 1)	12	12	12	12	12	12	12	12	12	12
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (direction 1)	2	7	0	0	0	1	1	1	0	0
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (direction 1)	1	5	0	0	0	0	0	0	0	0
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (direction 1)(lowest CMF)	0.75	0.77	0.95	1.09	0.7	0.95	1.09	0.7	0.95	1.09
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (direction 1)	1	0.87	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 3 (direction 1)	1	0.94	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 4 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (direction 1)	0.750	0.698	0.950	1.090	0.700	0.950	1.090	0.700	0.950	1.090
		Calculated Value (direction 1)	Fatal Crash reduction (direction 1)	0.500	2.112	0.000	0.000	0.000	0.050	-0.090	0.300	0.000	0.000
		Calculated Value (direction 1)	Incap Crash reduction (direction 1)	0.250	1.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (direction 1)	10.500	8.888	11.000	11.000	11.000	10.950	11.090	10.700	4.000	4.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (direction 1)	11.750	10.492	12.000	12.000	12.000	12.000	12.000	12.000	12.000	12.000
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	2.482	2.089	2.596	2.596	2.596	2.585	2.615	2.530	0.783	0.783
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	2.482	2.089	2.596	2.596	2.596	2.585	2.615	2.530	0.783	0.783
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (direction 2)	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	1.422	1.422
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (direction 2)	3	3	3	3	3	3	3	3	8	8
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (direction 2)	6	6	6	6	6	6	6	6	11	11
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (direction 2)	0	1	0	0	0	0	0	0	0	0
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (direction 2)	1	6	0	0	0	0	0	0	0	0
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (direction 2)(lowest CMF)	0.75	0.77	0.95	1.09	0.7	0.95	1.09	0.7	0.95	1.09
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (direction 2)	1	0.87	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 3 (direction 2)	1	0.94	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 4 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (direction 2)	0.750	0.698	0.950	1.090	0.700	0.950	1.090	0.700	0.950	1.090
		Calculated Value (direction 2)	Fatal Crash reduction (direction 2)	0.000	0.302	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (direction 2)	Incap Crash reduction (direction 2)	0.250	1.810	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (direction 2)	3.000	2.698	3.000	3.000	3.000	3.000	3.000	3.000	8.000	8.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (direction 2)	5.750	4.190	6.000	6.000	6.000	6.000	6.000	6.000	11.000	11.000
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.746	0.664	0.750	0.750	0.750	0.750	0.750	0.750	1.422	1.422
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.746	0.656	0.750	0.750	0.750	0.750	0.750	0.750	1.422	1.424
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	1.673	1.673	1.673	1.673	1.673	1.673	1.673	1.673	1.103	1.103
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	1.614	1.373	1.673	1.673	1.673	1.668	1.683	1.640	1.103	1.104
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	4.488	4.488	4.488	4.488	4.488	4.488	4.488	4.488	2.507	2.507
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	4.264	3.368	4.488	4.488	4.488	4.469	4.526	4.362	2.507	2.507

MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.520	0.520	0.520	0.520	0.520	0.520	0.520	0.520	0.440	0.440
		Enter in Mobility Index Spreadsheet to determine new segment level Mobility Index	Post-Project # of Lanes (both directions)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Mobility Index	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.44	0.44
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.520	0.520	0.520	0.520	0.520	0.520	0.520	0.520	0.440	0.440
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.520	0.520
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.520	0.520
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.520	0.520
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (direction 1)	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.810	0.810
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (direction 2)	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.810	0.810
		***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	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (direction 1)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.79	0.79
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (direction 2)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.79	0.79
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 1)	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.790	0.790
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 2)	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.360	0.790	0.790
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	0.965	0.820	1.000	1.000	1.000	0.997	1.006	0.980	1.000	1.001
		Calculated Value (both directions)	Safety Reduction	0.035	0.180	0.000	0.000	0.000	0.003	-0.006	0.020	0.000	-0.001
		Calculated Value (both directions)	Mobility Reduction Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Calculated Value (both directions)	Mobility Reduction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (direction 1)	1.066	1.066	1.066	1.066	1.066	1.066	1.066	1.066	1.077	1.077
		Input current value from performance system (direction 1)	Original Directional Segment PTI (direction 1)	1.201	1.201	1.201	1.201	1.201	1.201	1.201	1.201	1.241	1.241
		Input current value from performance system (direction 2)	Original Directional Segment TTI (direction 2)	1.081	1.081	1.081	1.081	1.081	1.081	1.081	1.081	1.092	1.092
		Input current value from performance system (direction 2)	Original Directional Segment PTI (direction 2)	1.223	1.223	1.223	1.223	1.223	1.223	1.223	1.223	1.275	1.275
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.011	0.054	0.000	0.000	0.000	0.001	-0.002	0.006	0.000	0.000
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (direction 1)	1.066	1.066	1.066	1.066	1.066	1.066	1.066	1.066	1.077	1.077
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (direction 1)	1.188	1.136	1.201	1.201	1.201	1.200	1.203	1.194	1.241	1.241
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTI (direction 2)	1.081	1.081	1.081	1.081	1.081	1.081	1.081	1.081	1.092	1.092
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment PTI (direction 2)	1.210	1.157	1.223	1.223	1.223	1.222	1.225	1.216	1.275	1.275
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (direction 1)	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.309	0.309
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (direction 2)	0.319	0.319	0.319	0.319	0.319	0.319	0.319	0.319	0.118	0.118
		Input value from HCRS	Segment Closures with fatalities/injuries	20	20	20	20	20	20	20	20	17	17
		Input value from HCRS	Total Segment Closures	33	33	33	33	33	33	33	33	28	28
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
		Calculated Value (both directions)	Closure Reduction	0.021	0.109	0.000	0.000	0.000	0.002	-0.003	0.012	0.000	-0.001
		Calculated Value (both directions)	Closure Reduction Factor	0.979	0.891	1.000	1.000	1.000	0.998	1.003	0.988	1.000	1.001
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (direction 1)	0.157	0.143	0.160	0.160	0.160	0.160	0.161	0.158	0.309	0.309
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (direction 2)	0.312	0.284	0.319	0.319	0.319	0.318	0.320	0.315	0.118	0.118
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.0%	99.0%
		Input current value from performance system	Orig Segment Outside Shoulder width	10	10	10	10	10	10	10	10	11	11
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Outside Shoulder width	10	10	10	10	10	10	10	10	11	11
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Bicycle Accomodation (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.0%	99.0%
		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%	100.0%	100.0%	100.0%	100.0%	99.0%	99.0%
	Needs	User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Mobility Need	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.640	0.640
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	0.708	0.698	0.710	0.710	0.710	0.710	0.711	0.709	0.640	0.640

FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (direction 1)	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.046	1.046
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (direction 1)	1.148	1.148	1.148	1.148	1.148	1.148	1.148	1.148	1.152	1.152
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (direction 2)	1.047	1.047	1.047	1.047	1.047	1.047	1.047	1.047	1.042	1.042
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (direction 2)	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.150	1.150
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.005	0.027	0.000	0.000	0.000	0.000	-0.001	0.003	0.000	0.000
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (direction 1)	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.046	1.046
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (direction 1)	1.142	1.117	1.148	1.148	1.148	1.147	1.149	1.145	1.152	1.152
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (direction 2)	1.047	1.047	1.047	1.047	1.047	1.047	1.047	1.047	1.042	1.042
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (direction 2)	1.137	1.112	1.143	1.143	1.143	1.142	1.144	1.140	1.150	1.150
	FREIGHT INDEX	Value from above	Original Segment TPTI (direction 1)	1.148	1.148	1.148	1.148	1.148	1.148	1.148	1.148	1.152	1.152
		Value from above	Original Segment TPTI (direction 2)	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.150	1.150
		Calculated Value	Original Segment Freight Index	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.873	0.869	0.869
		Calculated Value	Post-Project Segment TPTI (direction 1)	1.142	1.117	1.148	1.148	1.148	1.147	1.149	1.145	1.152	1.152
		Calculated Value	Post-Project Segment TPTI (direction 2)	1.137	1.112	1.143	1.143	1.143	1.142	1.144	1.140	1.150	1.150
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.878	0.897	0.873	0.873	0.873	0.873	0.872	0.876	0.869	0.869
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	37.094	37.094	37.094	37.094	37.094	37.094	37.094	37.094	156.812	156.812
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	59.323	59.323	59.323	59.323	59.323	59.323	59.323	59.323	25.304	25.304
		Calculated Value	Segment Closures with fatalities	20	20	20	20	20	20	20	20	17	17
		Calculated Value	Total Segment Closures	33	33	33	33	33	33	33	33	28	28
		Calculated Value	% Closures with Fatality	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
		Calculated Value	Closure Reduction	0.021	0.109	0.000	0.000	0.000	0.002	-0.003	0.012	0.000	-0.001
		Calculated Value	Closure Reduction Factor	0.979	0.891	1.000	1.000	1.000	0.998	1.003	0.988	1.000	1.001
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (direction 1)	36.301	33.056	37.094	37.094	37.094	37.020	37.222	36.651	156.812	156.898
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (direction 2)	58.055	52.865	59.323	59.323	59.323	59.205	59.527	58.614	25.304	25.318
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	15.86	15.86	15.86	15.86	15.86	15.86	15.86	15.86	15.92	15.92
		Input current value from performance system	Original vertical clearance for specific bridge			16.16	16.16	16.16	15.86	15.86	15.86	16.04	16.04
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge			16.50	16.50	16.41	16.50	16.50	16.11	16.50	16.50
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	15.86	15.86	16.50	16.50	16.41	16.50	16.50	16.11	16.50	16.50
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	15.86	15.86	16.50	16.50	16.41	16.50	16.50	16.11	16.50	16.50
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	0.722	0.722	0.722	0.722	0.722	0.722	0.722	0.722	0.872	0.872
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	0.721	0.713	0.288	0.288	0.315	0.288	0.289	0.571	0.498	0.498

BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.60	5.60
		Input current value from performance system	Original lowest rating for specific bridge			6	6	6	6	6	6	5	5
		Input post-project value (For repair +1, rehab +2, replace=8)	Post-Project lowest rating for specific bridge			8	6	6	8	6	6	8	5
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project lowest rating for specific bridge	0	0	8	6	6	8	6	6	8	5
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	6.00	6.00	6.27	6.00	6.00	6.21	6.00	6.00	5.83	5.60
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	6.00	6.00	6.27	6.00	6.00	6.21	6.00	6.00	5.83	5.60
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	90.37	90.37	90.37	90.37	90.37	90.37	90.37	90.37	86.87	86.87
		Input current value from performance system	Original Sufficiency Rating for specific bridge			95.60	95.60	95.60	96.00	96.00	96.00	88.70	88.70
		Input post-project value (For repair +10, rehab +20, replace=98)	Post-Project Sufficiency Rating for specific bridge			98.00	95.60	95.60	98.00	96.00	96.00	98.00	88.70
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project Sufficiency Rating for specific bridge	0.00	0.00	98.00	95.60	95.60	98.00	96.00	96.00	98.00	88.70
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	90.37	90.37	90.69	90.37	90.37	90.57	90.37	90.37	87.59	86.87
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	90.37	90.37	90.69	90.37	90.37	90.57	90.37	90.37	87.59	86.87
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	6	6	6	6	6	6	6	6	5	5
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	6	6	8	6	6	8	6	6	8	5
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	6	6	8	6	6	8	6	6	8	5
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	48.16%	48.16%
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.36%	48.16%
		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%	40.36%	48.16%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.648	1.648
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	0.5	0.5	0.23	0.5	0.5	0.29	0.5	0.5	1.042	1.648
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index										
		Input current value from performance system	Original Segment IRI in project limits										
		Input current value from performance system	Original Segment Cracking in project limits										
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits										
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	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										
		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										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	0	0	0	0	0	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (direction 1)										
		Input current value from performance system (direction 2)	Original Segment Directional PSR (direction 2)										
		Value from above	Original Segment IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (direction 1)										
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (direction 2)										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 1)	0	0	0	0	0	0	0	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 2)	0	0	0	0	0	0	0	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure										
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	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	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.036	0.036
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.036	0.036

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 #	10E.13c	10E.14a	10E.14b	10E.14c	10E.17a	10E.17b	10E.17c	10E.18	10E.19	10E.20
			Description	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Safety Improvements	Lighting Improvements	Pedestrian Safety
			Project Beg MP	205.45	207.17	207.17	207.17	232.02	232.02	232.02	237	237	237
			Project End MP	205.45	207.17	207.17	207.17	232.02	232.02	232.02	242	242	242
			Project Length (miles)	0	0	0	0	0	0	0	5	5	5
			Segment Beg MP	198	198	198	198	218	218	218	236	236	236
			Segment End MP	218	218	218	218	236	236	236	246	246	246
			Segment Length (miles)	20	20	20	20	18	18	18	10	10	10
			Segment #	4	4	4	4	5	5	5	6	6	6
			Current # of Lanes (both directions)	6	6	6	6	6	6	6	6	6	6
			Project Type (one-way or two-way)	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way
			Additional Lanes (one-way)	0	0	0	0	0	0	0	0	0	0
			Pro-Rated # of Lanes	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
		Notes and Directions	**Description**										
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (direction 1)	0.783	0.783	0.783	0.783	1.000	1.000	1.000	1.733	1.733	1.733
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (direction 1)	4	4	4	4	5	5	5	6	6	6
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (direction 1)	12	12	12	12	9	9	9	5	5	5
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (direction 1)	0	0	0	0	0	0	0	5	4	1
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (direction 1)	0	0	0	0	0	0	0	5	2	2
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (direction 1)(lowest CMF)	0.7	0.95	1.09	0.7	0.95	1	0.7	0.77	0.75	0.1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (direction 1)	1	1	1	1	1	1	1	0.87	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 3 (direction 1)	1	1	1	1	1	1	1	0.94	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 4 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (direction 1)	0.700	0.950	1.090	0.700	0.950	1.000	0.700	0.698	0.750	0.100
		Calculated Value (direction 1)	Fatal Crash reduction (direction 1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.508	1.000	0.900
		Calculated Value (direction 1)	Incap Crash reduction (direction 1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.508	0.500	1.800
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (direction 1)	4.000	4.000	4.000	4.000	5.000	5.000	5.000	4.492	5.000	5.100
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (direction 1)	12.000	12.000	12.000	12.000	9.000	9.000	9.000	3.492	4.500	3.200
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	0.783	0.783	0.783	0.783	1.000	1.000	1.000	1.293	1.451	1.454
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	0.783	0.783	0.783	0.783	1.000	1.000	1.000	1.293	1.451	1.454
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (direction 2)	1.422	1.422	1.422	1.422	1.115	1.115	1.115	1.187	1.187	1.187
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (direction 2)	8	8	8	8	6	6	6	4	4	4
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (direction 2)	11	11	11	11	3	3	3	4	4	4
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (direction 2)	0	0	0	0	1	1	1	2	2	0
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (direction 2)	0	0	0	0	0	0	0	3	2	0
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (direction 2)(lowest CMF)	0.7	0.95	1.09	0.7	0.95	1	0.7	0.77	0.75	0.1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (direction 2)	1	1	1	1	1	1	1	0.87	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 3 (direction 2)	1	1	1	1	1	1	1	0.94	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 4 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (direction 2)	0.700	0.950	1.090	0.700	0.950	1.000	0.700	0.698	0.750	0.100
		Calculated Value (direction 2)	Fatal Crash reduction (direction 2)	0.000	0.000	0.000	0.000	0.050	0.000	0.300	0.603	0.500	0.000
		Calculated Value (direction 2)	Incap Crash reduction (direction 2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.905	0.500	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (direction 2)	8.000	8.000	8.000	8.000	5.950	6.000	5.700	3.397	3.500	4.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (direction 2)	11.000	11.000	11.000	11.000	3.000	3.000	3.000	3.095	3.500	4.000
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	1.422	1.422	1.422	1.422	1.106	1.115	1.061	1.002	1.038	1.187
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	1.422	1.422	1.422	1.422	1.106	1.115	1.061	1.002	1.038	1.187
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	1.103	1.103	1.103	1.103	1.058	1.058	1.058	1.460	1.460	1.460
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	1.103	1.103	1.103	1.103	1.053	1.058	1.031	1.148	1.245	1.321
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	2.507	2.507	2.507	2.507	2.25	2.25	2.25	3.9	3.9	3.9
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	2.507	2.519	2.519	2.519	2.211	2.25	2.009	2.515	3.001	3.369

MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.560	0.560	0.560
		Enter in Mobility Index Spreadsheet to determine new segment level Mobility Index	Post-Project # of Lanes (both directions)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Mobility Index	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.560
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.560	0.560	0.560
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.520	0.520	0.520	0.520	0.510	0.510	0.510	0.660	0.660	
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.520	0.520	0.520	0.520	0.510	0.510	0.510	0.660	0.660	
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.520	0.520	0.520	0.520	0.510	0.510	0.510	0.660	0.660	0.000
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (direction 1)	0.810	0.810	0.810	0.810	0.870	0.870	0.870	0.420	0.420	0.420
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (direction 2)	0.810	0.810	0.810	0.810	0.870	0.870	0.870	0.390	0.390	0.390
		***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	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (direction 1)	0.79	0.79	0.79	0.79	0.86	0.86	0.86	0.42	0.42	0.420
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (direction 2)	0.79	0.79	0.79	0.79	0.86	0.86	0.86	0.39	0.39	0.390
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 1)	0.790	0.790	0.790	0.790	0.860	0.860	0.860	0.420	0.420	0.420
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 2)	0.790	0.790	0.790	0.790	0.860	0.860	0.860	0.390	0.390	0.390
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	1.000	1.000	1.000	1.000	0.996	1.000	0.974	0.786	0.852	0.904
		Calculated Value (both directions)	Safety Reduction	0.000	0.000	0.000	0.000	0.004	0.000	0.026	0.214	0.148	0.096
		Calculated Value (both directions)	Mobility Reduction Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Calculated Value (both directions)	Mobility Reduction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (direction 1)	1.077	1.077	1.077	1.077	1.050	1.050	1.050	1.069	1.069	1.069
		Input current value from performance system (direction 1)	Original Directional Segment PTI (direction 1)	1.241	1.241	1.241	1.241	1.209	1.209	1.209	1.202	1.202	1.202
		Input current value from performance system (direction 2)	Original Directional Segment TTI (direction 2)	1.092	1.092	1.092	1.092	1.230	1.230	1.230	1.087	1.087	1.087
		Input current value from performance system (direction 2)	Original Directional Segment PTI (direction 2)	1.275	1.275	1.275	1.275	1.230	1.230	1.230	1.205	1.205	1.205
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.000	0.000	0.000	0.000	0.001	0.000	0.008	0.064	0.044	0.029
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (direction 1)	1.077	1.077	1.077	1.077	1.050	1.050	1.050	1.069	1.069	1.069
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (direction 1)	1.241	1.241	1.241	1.241	1.207	1.209	1.200	1.125	1.149	1.168
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTI (direction 2)	1.092	1.092	1.092	1.092	1.230	1.230	1.230	1.087	1.087	1.087
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment PTI (direction 2)	1.275	1.275	1.275	1.275	1.228	1.230	1.221	1.128	1.152	1.170
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (direction 1)	0.309	0.309	0.309	0.309	0.159	0.159	0.159	0.332	0.332	0.332
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (direction 2)	0.118	0.118	0.118	0.118	0.178	0.178	0.178	0.280	0.280	0.280
		Input value from HCRS	Segment Closures with fatalities/injuries	17	17	17	17	17	17	17	12	12	12
		Input value from HCRS	Total Segment Closures	28	28	28	28	21	21	21	24	24	24
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.61	0.61	0.61	0.61	0.81	0.81	0.81	0.50	0.50	0.50
		Calculated Value (both directions)	Closure Reduction	0.000	0.000	0.000	0.000	0.003	0.000	0.021	0.107	0.074	0.048
		Calculated Value (both directions)	Closure Reduction Factor	1.000	1.000	1.000	1.000	0.997	1.000	0.979	0.893	0.926	0.952
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (direction 1)	0.309	0.309	0.309	0.309	0.158	0.159	0.156	0.296	0.307	0.316
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (direction 2)	0.118	0.118	0.118	0.118	0.177	0.178	0.174	0.250	0.259	0.267
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	100.0%	100.0%	100.0%
		Input current value from performance system	Orig Segment Outside Shoulder width	11	11	11	11	11	11	11	10	10	10
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Outside Shoulder width	11	11	11	11	11	11	11	10	10	10
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Bicycle Accomodation (%)	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	100.0%	100.0%	100.0%
		Enter in Mobiity Needs spreadsheet to calculate new segment level Mobility Need	Post-Project Segment Bicycle Accomodation (%)	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	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	0.640	0.640	0.640	0.640	0.713	0.713	0.713	0.766	0.766	0.766
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	0.640	0.640	0.640	0.640	0.713	0.713	0.711	0.751	0.755	0.759

FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (direction 1)	1.046	1.046	1.046	1.046	1.041	1.041	1.041	1.037	1.037	1.037
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (direction 1)	1.152	1.152	1.152	1.152	1.158	1.158	1.158	1.107	1.107	1.107
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (direction 2)	1.042	1.042	1.042	1.042	1.037	1.037	1.037	1.035	1.035	1.035
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (direction 2)	1.150	1.150	1.150	1.150	1.105	1.105	1.105	1.110	1.110	1.110
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.000	0.000	0.000	0.000	0.001	0.000	0.004	0.032	0.022	0.014
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (direction 1)	1.046	1.046	1.046	1.046	1.041	1.041	1.041	1.037	1.037	1.037
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (direction 1)	1.152	1.152	1.152	1.152	1.157	1.158	1.154	1.071	1.082	1.091
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (direction 2)	1.042	1.042	1.042	1.042	1.037	1.037	1.037	1.035	1.035	1.035
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (direction 2)	1.150	1.150	1.150	1.150	1.104	1.105	1.101	1.074	1.085	1.094
	FREIGHT INDEX	Value from above	Original Segment TPTI (direction 1)	1.152	1.152	1.152	1.152	1.158	1.158	1.158	1.107	1.107	1.107
		Value from above	Original Segment TPTI (direction 2)	1.150	1.150	1.150	1.150	1.105	1.105	1.105	1.110	1.110	1.110
		Calculated Value	Original Segment Freight Index	0.869	0.869	0.869	0.869	0.884	0.884	0.884	0.902	0.902	0.902
		Calculated Value	Post-Project Segment TPTI (direction 1)	1.152	1.152	1.152	1.152	1.157	1.158	1.154	1.071	1.082	1.091
		Calculated Value	Post-Project Segment TPTI (direction 2)	1.150	1.150	1.150	1.150	1.104	1.105	1.101	1.074	1.085	1.094
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.869	0.869	0.869	0.869	0.884	0.884	0.887	0.932	0.923	0.915
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	156.812	156.812	156.812	156.812	69.101	69.101	69.101	91.932	91.932	91.932
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	25.304	25.304	25.304	25.304	48.867	48.867	48.867	91.180	91.180	91.180
		Calculated Value	Segment Closures with fatalities	17	17	17	17	17	17	17	12	12	12
		Calculated Value	Total Segment Closures	28	28	28	28	21	21	21	24	24	24
		Calculated Value	% Closures with Fatality	0.61	0.61	0.61	0.61	0.81	0.81	0.81	0.50	0.50	0.50
		Calculated Value	Closure Reduction	0.000	0.000	0.000	0.000	0.003	0.000	0.021	0.107	0.074	0.048
		Calculated Value	Closure Reduction Factor	1.000	1.000	1.000	1.000	0.997	1.000	0.979	0.893	0.926	0.952
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (direction 1)	156.812	156.812	156.812	156.812	68.863	69.101	67.673	82.093	85.147	87.540
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (direction 2)	25.304	25.304	25.304	25.304	48.699	48.867	47.857	81.422	84.451	86.824
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	15.92	15.92	15.92	15.92	16.13	16.13	16.13	17.41	17.41	17.41
		Input current value from performance system	Original vertical clearance for specific bridge	16.04	16.02	16.02	16.02	16.24	16.24	16.24			
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge	16.29	16.50	16.50	16.27	16.50	16.50	16.49			
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.29	16.50	16.50	16.27	16.50	16.50	16.49	17.41	17.41	17.41
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.29	16.50	16.50	16.27	16.50	16.50	16.49	17.41	17.41	17.41
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	0.872	0.872	0.872	0.872	0.574	0.574	0.574	0.419	0.419	0.419
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	0.600	0.498	0.498	0.624	0.301	0.302	0.303	0.344	0.367	0.385

BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	5.60	5.60	5.60	5.60	5.43	5.43	5.43	6.81	6.81	6.81
		Input current value from performance system	Original lowest rating for specific bridge	5	6	6	6	4	4	4			
		Input post-project value (For repair +1, rehab +2, replace=8)	Post-Project lowest rating for specific bridge	5	8	6	6	8	4	4			
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project lowest rating for specific bridge	5	8	6	6	8	4	4	0	0	0
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	5.60	5.75	5.60	5.60	6.71	5.43	5.43	6.81	6.81	6.81
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	5.60	5.75	5.60	5.60	6.71	5.43	5.43	6.81	6.81	6.81
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	86.87	86.87	86.87	86.87	88.92	88.92	88.92	94.56	94.56	94.56
		Input current value from performance system	Original Sufficiency Rating for specific bridge	88.70	95.00	95.00	95.00	79.40	79.40	79.40			
		Input post-project value (For repair +10, rehab +20, replace=98)	Post-Project Sufficiency Rating for specific bridge	88.70	98.00	95.00	95.00	98.00	79.40	79.40			
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project Sufficiency Rating for specific bridge	88.70	98.00	95.00	95.00	98.00	79.40	79.40	0.00	0.00	0.00
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	86.87	87.10	86.87	86.87	94.86	88.92	88.92	94.56	94.56	94.56
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	86.87	87.10	86.87	86.87	94.86	88.92	88.92	94.56	94.56	94.56
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	5	5	5	5	4	4	4	5	5	5
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	5	8	5	5	8	4	4	5	5	5
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	5	8	5	5	8	4	4	5	5	5
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	48.16%	48.16%	48.16%	48.16%	0.00%	0.00%	0.00%	13.02%	13.02%	13.02%
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	48.16%	40.35%	48.16%	48.16%	0.00%	0.00%	0.00%	13.02%	13.02%	13.02%
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	48.16%	40.35%	48.16%	48.16%	0.00%	0.00%	0.00%	13.02%	13.02%	13.02%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	1.648	1.648	1.648	1.648	1.873	1.873	1.873	0.131	0.131	0.131
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	1.648	1.202	1.648	1.648	0	1.873	1.873	0.131	0.131	0.131
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index										
		Input current value from performance system	Original Segment IRI in project limits										
		Input current value from performance system	Original Segment Cracking in project limits										
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits										
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	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										
		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										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	0	0	0	0	0	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (direction 1)										
		Input current value from performance system (direction 2)	Original Segment Directional PSR (direction 2)										
		Value from above	Original Segment IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (direction 1)										
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (direction 2)										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 1)	0	0	0	0	0	0	0	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 2)	0	0	0	0	0	0	0	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure										
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	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	0.036	0.036	0.036	0.036	0	0	0	0	0	0
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0.036	0.036	0.036	0.036	0	0	0	0	0	0

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 #	10E.21a	10E.21b	10E.21c	10E.21c	10E.22	10E.23	10E.24a	10E.24b	10E.24c	10E.27
			Description	General Purpose Lane	Auxiliary Lane	Ramp Metering	Ramp Metering	Pedestrian Safety	Pedestrian Safety	General Purpose Lane	Auxilary Lane	Ramp Metering and Shoulder Widening	Lighting Improvements
			Project Beg MP	248	248	248	255	257	262	262	262	262	263
			Project End MP	252	252	255	258	258	264	274	274	274	274
			Project Length (miles)	4	4	7	3	1	2	12	12	12	11
			Segment Beg MP	246	246	246	255	255	262	262	262	262	262
			Segment End MP	255	255	255	262	262	274	274	274	274	274
			Segment Length (miles)	9	9	9	7	7	12	12	12	12	12
			Segment #	7	7	7	8	8	9	9	9	9	9
			Current # of Lanes (both directions)	6	6	6	8	8	4	4	4	4	4
			Project Type (one-way or two-way)	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way
			Additional Lanes (one-way)	1	0.5	0	0	0	0	1	0.5	0	0
			Pro-Rated # of Lanes	6.89	6.44	6.00	8.00	8.00	4.00	6.00	5.00	4.00	4.00
		Notes and Directions	**Description**										
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (direction 1)	1.095	1.095	1.095	0.881	0.881	0.136	0.136	0.136	0.136	0.136
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (direction 1)	4	4	4	4	4	0	0	0	0	0
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (direction 1)	10	10	10	3	3	10	10	10	10	10
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (direction 1)	3	3	0	0	1	0	0	0	0	0
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Original Incap Crashes in project limits (direction 1)	7	7	1	0	0	0	10	10	10	2
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (direction 1)(lowest CMF)	0.9	0.78	0.64	0.64	0.1	0.1	0.9	0.78	0.64	0.75
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (direction 1)	1	1	1	1	1	1	1	1	0.77	1
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 1) - If no CMF enter 1.0	CMF 3 (direction 1)	1	1	1	1	1	1	1	1	0.94	1
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 1) - If no CMF enter 1.0	CMF 4 (direction 1)	1	1	1	1	1	1	1	1	1	1
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (direction 1)	1	1	1	1	1	1	1	1	1	1
SAFETY	DIRECTIONAL SAFETY	Calculated Value (direction 1)	Total CMF (direction 1)	0.900	0.780	0.640	0.640	0.100	0.100	0.900	0.780	0.549	0.750
SAFETY	DIRECTIONAL SAFETY	Calculated Value (direction 1)	Fatal Crash reduction (direction 1)	0.300	0.660	0.000	0.000	0.900	0.000	0.000	0.000	0.000	0.000
SAFETY	DIRECTIONAL SAFETY	Calculated Value (direction 1)	Incap Crash reduction (direction 1)	0.700	1.540	0.360	0.000	0.000	0.000	1.000	2.200	4.506	0.500
SAFETY	DIRECTIONAL SAFETY	Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (direction 1)	3.700	3.340	4.000	4.000	3.100	0.000	0.000	0.000	0.000	0.000
SAFETY	DIRECTIONAL SAFETY	Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (direction 1)	9.300	8.460	9.640	3.000	3.000	10.000	9.000	7.800	5.494	9.500
SAFETY	DIRECTIONAL SAFETY	Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	1.014	0.916	1.089	0.881	0.692	0.136	0.122	0.106	0.075	0.129
SAFETY	DIRECTIONAL SAFETY	Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	1.014	0.916	1.089	0.881	0.692	0.136	0.122	0.106	0.075	0.129
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (direction 2)	0.176	0.176	0.176	0.759	0.759	1.630	1.630	1.630	1.630	1.630
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (direction 2)	0	0	0	3	3	8	8	8	8	8
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (direction 2)	11	11	11	9	9	5	5	5	5	5
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (direction 2)	0	0	0	0	2	2	8	8	8	4
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 2)	Original Incap Crashes in project limits (direction 2)	2	2	1	1	0	0	5	5	5	1
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (direction 2)(lowest CMF)	0.9	0.78	0.64	0.64	0.1	0.1	0.9	0.78	0.64	0.75
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (direction 2)	1	1	1	1	1	1	1	1	0.77	1
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 2) - If no CMF enter 1.0	CMF 3 (direction 2)	1	1	1	1	1	1	1	1	0.94	1
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 2) - If no CMF enter 1.0	CMF 4 (direction 2)	1	1	1	1	1	1	1	1	1	1
SAFETY	DIRECTIONAL SAFETY	Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (direction 2)	1	1	1	1	1	1	1	1	1	1
SAFETY	DIRECTIONAL SAFETY	Calculated Value (direction 2)	Total CMF (direction 2)	0.900	0.780	0.640	0.640	0.100	0.100	0.900	0.780	0.549	0.750
SAFETY	DIRECTIONAL SAFETY	Calculated Value (direction 2)	Fatal Crash reduction (direction 2)	0.000	0.000	0.000	0.000	1.800	1.800	0.800	1.760	3.605	1.000
SAFETY	DIRECTIONAL SAFETY	Calculated Value (direction 2)	Incap Crash reduction (direction 2)	0.200	0.440	0.360	0.360	0.000	0.000	0.500	1.100	2.253	0.250
SAFETY	DIRECTIONAL SAFETY	Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (direction 2)	0.000	0.000	0.000	3.000	1.200	6.200	7.200	6.240	4.395	7.000
SAFETY	DIRECTIONAL SAFETY	Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (direction 2)	10.800	10.560	10.640	8.640	9.000	5.000	4.500	3.900	2.747	4.750
SAFETY	DIRECTIONAL SAFETY	Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.173	0.169	0.170	0.753	0.381	1.276	1.465	1.269	0.894	1.429
SAFETY	DIRECTIONAL SAFETY	Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.173	0.169	0.170	0.753	0.381	1.276	1.465	1.269	0.894	1.429
SAFETY	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	0.636	0.636	0.636	0.820	0.820	0.883	0.883	0.883	0.894	0.883
SAFETY	SAFETY INDEX	Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	0.594	0.543	0.630	0.817	0.537	0.706	0.794	0.688	0.485	0.779
SAFETY	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	0.612	0.612	0.612	1.124	1.124	1.119	1.119	1.119	1.119	1.119
SAFETY	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	0.537	0.447	0.606	1.027	0.846	0.910	1.020	0.897	0.613	1.001

MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	1.000	1.000	1.000	1.110	1.110	0.820	0.820	0.820	0.820	0.820
		Enter in Mobility Index Spreadsheet to determine new segment level Mobility Index	Post-Project # of Lanes (both directions)	6.89	6.44	6.00	8.00	8.00	4.00	6.00	5.00	4.00	4.00
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Mobility Index	0.87	0.93	0.91	1.010	1.11	0.82	0.57	0.69	0.79	0.82
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.870	0.930	0.910	1.010	1.110	0.820	0.570	0.690	0.790	0.820
	FUT V/C	Input current value from performance system	Original Segment Future V/C	1.150	1.150	1.150	1.310	1.310	0.950	0.950	0.950	0.950	0.950
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	1.010	1.080	1.050	1.190	1.310	0.950	0.660	0.800	0.910	0.950
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	1.010	1.080	1.050	1.190	1.310	0.950	0.660	0.800	0.910	0.950
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (direction 1)	0.810	0.810	0.810	0.870	0.870	0.610	0.610	0.610	0.610	0.610
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (direction 2)	0.790	0.790	0.790	0.860	0.860	0.640	0.640	0.640	0.640	0.640
		***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	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (direction 1)	0.71	0.76	0.74	0.790	0.870	0.47	0.43	0.51	0.58	0.47
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (direction 2)	0.69	0.74	0.72	0.780	0.860	0.49	0.44	0.53	0.61	0.49
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 1)	0.710	0.760	0.740	0.790	0.870	0.470	0.430	0.510	0.580	0.470
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 2)	0.690	0.740	0.720	0.780	0.860	0.490	0.440	0.530	0.610	0.490
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	0.934	0.854	0.991	0.996	0.654	0.800	0.899	0.779	0.542	0.882
		Calculated Value (both directions)	Safety Reduction	0.066	0.146	0.009	0.004	0.346	0.200	0.101	0.221	0.458	0.118
		Calculated Value (both directions)	Mobility Reduction Factor	0.870	0.930	0.910	0.910	1.000	1.000	0.695	0.841	0.963	1.000
		Calculated Value (both directions)	Mobility Reduction	0.130	0.070	0.090	0.090	0.000	0.000	0.305	0.159	0.037	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (direction 1)	1.064	1.064	1.064	1.064	1.064	1.050	1.050	1.050	1.050	1.050
		Input current value from performance system (direction 1)	Original Directional Segment PTI (direction 1)	1.626	1.626	1.626	1.267	1.267	1.230	1.230	1.230	1.230	1.230
		Input current value from performance system (direction 2)	Original Directional Segment TTI (direction 2)	1.036	1.036	1.036	1.072	1.072	1.035	1.035	1.035	1.035	1.035
		Input current value from performance system (direction 2)	Original Directional Segment PTI (direction 2)	1.260	1.260	1.260	1.737	1.737	1.240	1.240	1.240	1.240	1.240
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.039	0.021	0.027	0.027	0.000	0.000	0.091	0.048	0.011	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.046	0.058	0.021	0.019	0.104	0.060	0.091	0.098	0.145	0.035
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (direction 1)	1.023	1.042	1.035	1.035	1.064	1.050	1.025	1.000	1.038	1.050
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (direction 1)	1.551	1.532	1.592	1.243	1.136	1.156	1.118	1.109	1.052	1.187
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTI (direction 2)	1.018	1.014	1.008	1.043	1.072	1.035	1.018	1.018	1.024	1.035
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment PTI (direction 2)	1.202	1.187	1.234	1.704	1.557	1.165	1.127	1.118	1.061	1.196
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (direction 1)	0.347	0.347	0.347	0.286	0.286	0.518	0.518	0.518	0.518	0.518
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (direction 2)	0.111	0.111	0.111	0.229	0.229	0.033	0.033	0.033	0.033	0.033
		Input value from HCRS	Segment Closures with fatalities/injuries	9	9	9	9	9	20	20	20	20	20
		Input value from HCRS	Total Segment Closures	19	19	19	18	18	29	29	29	29	29
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.47	0.47	0.47	0.50	0.50	0.69	0.69	0.69	0.69	0.69
		Calculated Value (both directions)	Closure Reduction	0.031	0.069	0.004	0.002	0.173	0.138	0.070	0.153	0.316	0.081
		Calculated Value (both directions)	Closure Reduction Factor	0.969	0.931	0.996	0.998	0.827	0.862	0.930	0.847	0.684	0.919
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (direction 1)	0.336	0.323	0.345	0.285	0.237	0.446	0.482	0.439	0.354	0.476
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (direction 2)	0.108	0.103	0.111	0.229	0.189	0.028	0.031	0.028	0.023	0.030
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	100.0%	100.0%	100.0%	100.0%	100.0%	99.0%	99.0%	99.0%	99.0%	99.0%
		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%	100.0%	100.0%	99.0%	99.0%	99.0%	99.0%	99.0%
		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%	100.0%	99.0%	99.0%	99.0%	99.0%	99.0%
	Needs	User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Mobility Need	4.442	4.442	4.442	5.877	5.877	2.262	2.262	2.262	2.262	2.262
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	2.954	3.560	3.391	4.607	5.725	2.213	0.834	1.003	1.563	2.238

FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (direction 1)	1.111	1.111	1.111	1.110	1.110	1.117	1.117	1.117	1.117	1.117
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (direction 1)	1.658	1.658	1.658	1.319	1.319	1.501	1.501	1.501	1.501	1.501
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (direction 2)	1.084	1.084	1.084	1.122	1.122	1.105	1.105	1.105	1.105	1.105
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (direction 2)	1.285	1.285	1.285	1.890	1.890	1.649	1.649	1.649	1.649	1.649
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.020	0.011	0.014	0.014	0.000	0.000	0.046	0.024	0.005	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.023	0.029	0.010	0.010	0.052	0.030	0.046	0.049	0.072	0.018
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (direction 1)	1.089	1.099	1.096	1.095	1.110	1.117	1.066	1.090	1.111	1.117
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (direction 1)	1.620	1.610	1.641	1.306	1.251	1.456	1.432	1.427	1.392	1.474
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (direction 2)	1.063	1.073	1.069	1.107	1.122	1.105	1.054	1.079	1.099	1.105
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (direction 2)	1.256	1.248	1.272	1.872	1.792	1.599	1.574	1.568	1.530	1.620
	FREIGHT INDEX	Value from above	Original Segment TPTI (direction 1)	1.658	1.658	1.658	1.319	1.319	1.501	1.501	1.501	1.501	1.501
		Value from above	Original Segment TPTI (direction 2)	1.285	1.285	1.285	1.890	1.890	1.649	1.649	1.649	1.649	1.649
		Calculated Value	Original Segment Freight Index	0.680	0.680	0.680	0.623	0.623	0.635	0.635	0.635	0.635	0.635
		Calculated Value	Post-Project Segment TPTI (direction 1)	1.620	1.610	1.641	1.306	1.251	1.456	1.432	1.427	1.392	1.474
		Calculated Value	Post-Project Segment TPTI (direction 2)	1.256	1.248	1.272	1.872	1.792	1.599	1.574	1.568	1.530	1.620
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.696	0.700	0.687	0.629	0.657	0.655	0.665	0.668	0.684	0.646
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	54.751	54.751	54.751	46.743	46.743	115.345	115.345	115.345	115.345	115.345
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	16.822	16.822	16.822	37.286	37.286	5.117	5.117	5.117	5.117	5.117
		Calculated Value	Segment Closures with fatalities	9	9	9	9	9	20	20	20	20	20
		Calculated Value	Total Segment Closures	19	19	19	18	18	29	29	29	29	29
		Calculated Value	% Closures with Fatality	0.47	0.47	0.47	0.50	0.50	0.69	0.69	0.69	0.69	0.69
		Calculated Value	Closure Reduction	0.031	0.069	0.004	0.002	0.173	0.138	0.070	0.153	0.316	0.081
		Calculated Value	Closure Reduction Factor	0.969	0.931	0.996	0.998	0.827	0.862	0.930	0.847	0.684	0.919
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (direction 1)	53.037	50.956	54.506	46.657	38.663	99.399	107.282	97.733	78.908	105.976
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (direction 2)	16.295	15.656	16.747	37.218	30.841	4.410	4.759	4.336	3.501	4.701
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	16.97	16.97	16.97	16.32	16.32	16.13	16.13	16.13	16.13	16.13
		Input current value from performance system	Original vertical clearance for specific bridge										
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge										
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.97	16.97	16.97	16.32	16.32	16.13	16.13	16.13	16.13	16.13
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.97	16.97	16.97	16.32	16.32	16.13	16.13	16.13	16.13	16.13
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	2.361	2.361	2.361	3.334	3.334	3.621	3.621	3.621	3.621	3.621
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	2.084	2.030	2.237	3.310	2.917	3.236	3.059	2.985	2.595	3.413

BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	5.61	5.61	5.61	6.56	6.56	4.99	4.99	4.99	4.99	4.99
		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	0
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	5.93	5.75	5.61	6.56	7	4.99	5.64	5.33	5.33	4.99
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	5.93	5.75	5.61	6.56	6.56	4.99	5.64	5.33	5.33	4.99
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	86.16	86.16	86.16	90.48	90.48	81.89	81.89	81.89	81.89	81.89
		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	0.00
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	89.43	87.58	86.16	90.48	90.48	81.89	86.30	85.56	85.56	81.89
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	89.43	87.58	86.16	90.48	90.48	81.89	86.30	85.56	85.56	81.89
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	4	4	4	5	5	4	4	4	4	4
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	4	4	4	5	5	4	4	4	4	4
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	4	4	4	5	5	4	4	4	4	4
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	21.76%	21.76%	21.76%	0.00%	0.00%	13.88%	13.88%	13.88%	13.88%	13.88%
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	21.76%	21.76%	21.76%	0.00%	0.00%	13.88%	13.88%	13.88%	13.88%	13.88%
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	21.76%	21.76%	21.76%	0.00%	0.00%	13.88%	13.88%	13.88%	13.88%	13.88%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	1.64	1.64	1.64	0.1	0.1	2.348	2.348	2.348	2.348	2.348
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	0.998	1.358	1.64	0.1	0.1	2.348	1.553	2.003	2.003	2.348
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index										
		Input current value from performance system	Original Segment IRI in project limits										
		Input current value from performance system	Original Segment Cracking in project limits										
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits										
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	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										
		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										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	0	0	0	0	0	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (direction 1)										
		Input current value from performance system (direction 2)	Original Segment Directional PSR (direction 2)										
		Value from above	Original Segment IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (direction 1)										
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (direction 2)										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 1)	0	0	0	0	0	0	0	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 2)	0	0	0	0	0	0	0	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure										
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure										
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	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	0	0	0.48	0.48	0	0	0	0	0
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0	0	0	0.48	0.48	0	0	0	0	0

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 #	10E.28a	10E.28b	10E.28b	10E.29	10E.30	10E.31	10E.32	10E.33	10E.34	10E.35
			Description	General Purpose Lane	Safety Improvements	Safety Improvements	Lighting Improvements	Climbing Lane	Shoulder Widening	Climbing Lane	Safety Improvements	Climbing Lane	Lighting Improvements
			Project Beg MP	274	274	280	275	293	293	296	317	317	318
			Project End MP	279	280	286	279	296	299	299	318	318	318
			Project Length (miles)	5	6	6	4	3	6	3	1	1	0
			Segment Beg MP	274	274	280	274	292	292	292	315	315	315
			Segment End MP	280	280	292	280	315	315	315	332	332	332
			Segment Length (miles)	6	6	12	6	23	23	23	17	17	17
			Segment #	10	10	11	10	12	12	12	13	13	13
			Current # of Lanes (both directions)	4	4	4	4	4	4	4	4	4	4
			Project Type (one-way or two-way)	two-way	two-way	two-way	two-way	one-way	two-way	one-way	two-way	one-way	two-way
			Additional Lanes (one-way)	1	0	0	0	1	0	1	0	1	0
			Pro-Rated # of Lanes	5.67	4.00	4.00	4.00	4.13	4.00	4.13	4.00	4.06	4.00
		Notes and Directions	**Description**										
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (direction 1)	2.392	2.392	1.839	2.392	1.344	1.344	1.344	1.252	1.252	1.252
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (direction 1)	5	5	8	5	5	5	5	3	3	3
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (direction 1)	3	3	9	3	12	12	12	8	8	8
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (direction 1)	5	5	5	0	2	2	0	1	1	0
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (direction 1)	3	3	6	2	4	8	4	3	3	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (direction 1)(lowest CMF)	0.9	0.64	0.64	0.75	0.75	0.64	1	0.77	0.75	0.75
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (direction 1)	1	1	1	1	1	1	1	0.87	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 3 (direction 1)	1	1	1	1	1	1	1	0.94	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 4 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (direction 1)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (direction 1)	0.900	0.640	0.640	0.750	0.750	0.640	1.000	0.698	0.750	0.750
		Calculated Value (direction 1)	Fatal Crash reduction (direction 1)	0.500	1.800	1.800	0.000	0.500	0.720	0.000	0.302	0.250	0.000
		Calculated Value (direction 1)	Incap Crash reduction (direction 1)	0.300	1.080	2.160	0.500	1.000	2.880	0.000	0.905	0.750	0.250
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (direction 1)	4.500	3.200	6.200	5.000	4.500	4.280	5.000	2.698	2.750	3.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (direction 1)	2.700	1.920	6.840	2.500	11.000	9.120	12.000	7.095	7.250	7.750
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	2.153	1.531	1.423	2.376	1.212	1.132	1.344	1.123	1.145	1.233
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	2.153	1.531	1.423	2.376	1.212	1.132	1.344	1.123	1.145	1.233
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (direction 2)	2.035	2.035	0.589	2.035	2.491	2.491	2.491	0.171	0.171	0.171
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (direction 2)	4	4	2	4	10	10	10	0	0	0
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (direction 2)	6	6	11	6	10	10	10	7	7	7
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (direction 2)	4	4	2	0	1	2	1	0	0	0
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (direction 2)	6	6	7	1	2	3	0	1	1	2
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (direction 2)(lowest CMF)	0.9	0.64	0.64	0.75	1	0.64	0.75	0.77	1	0.75
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (direction 2)	1	0.77	0.77	1	1	1	1	0.87	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 3 (direction 2)	1	1	1	1	1	1	1	0.94	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 4 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (direction 2)	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (direction 2)	0.900	0.566	0.566	0.750	1.000	0.640	0.750	0.698	1.000	0.750
		Calculated Value (direction 2)	Fatal Crash reduction (direction 2)	0.400	1.734	0.867	0.000	0.000	0.720	0.250	0.000	0.000	0.000
		Calculated Value (direction 2)	Incap Crash reduction (direction 2)	0.600	2.602	3.035	0.250	0.000	1.080	0.000	0.302	0.000	0.500
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (direction 2)	3.600	2.266	1.133	4.000	10.000	9.280	9.750	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (direction 2)	5.400	3.398	7.965	5.750	10.000	8.920	10.000	6.698	7.000	6.500
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	1.831	1.153	0.359	2.027	2.491	2.306	2.432	0.164	0.171	0.159
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	1.831	1.153	0.359	2.027	2.491	2.306	2.432	0.164	0.171	0.159
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	2.214	2.214	1.214	2.214	1.918	1.918	1.918	0.712	0.712	0.712
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	1.992	1.342	0.891	2.202	1.852	1.719	1.888	0.644	0.658	0.696
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	6.794	6.794	2.647	6.794	4.787	4.787	4.787	1.095	1.095	1.095
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	5.95	3.394	1.280	6.751	4.543	4.039	4.676	1.022	1.036	1.081

MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.580	0.580	0.690	0.580	0.630	0.630	0.630	0.380	0.380	0.380
		Enter in Mobility Index Spreadsheet to determine new segment level Mobility Index	Post-Project # of Lanes (both directions)	5.67	4.00	4.00	4.00	4.13	4.00	4.13	4.00	4.06	4.00
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Mobility Index	0.41	0.58	0.69	0.58	0.61	0.63	0.61	0.38	0.38	0.38
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.410	0.580	0.690	0.580	0.610	0.630	0.610	0.380	0.380	0.380
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.680	0.680	0.830	0.680	0.770	0.770	0.770	0.470	0.470	0.470
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.480	0.680	0.830	0.680	0.740	0.770	0.740	0.470	0.470	0.470
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.480	0.680	0.830	0.680	0.740	0.770	0.740	0.470	0.470	0.470
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (direction 1)	0.380	0.380	0.470	0.380	0.430	0.430	0.430	0.250	0.250	0.250
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (direction 2)	0.380	0.380	0.470	0.380	0.390	0.390	0.390	0.240	0.240	0.240
		***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	4.26	N/A	4.26	N/A	4.12	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (direction 1)	0.27	0.38	0.47	0.38	0.40	0.43	0.43	0.25	0.24	0.25
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (direction 2)	0.27	0.38	0.47	0.38	0.39	0.39	0.37	0.24	0.24	0.24
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 1)	0.270	0.380	0.470	0.380	0.400	0.430	0.430	0.250	0.240	0.250
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 2)	0.270	0.380	0.470	0.380	0.390	0.390	0.370	0.240	0.240	0.240
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	0.900	0.606	0.734	0.995	0.966	0.896	0.985	0.904	0.925	0.978
		Calculated Value (both directions)	Safety Reduction	0.100	0.394	0.266	0.005	0.034	0.104	0.015	0.096	0.075	0.022
		Calculated Value (both directions)	Mobility Reduction Factor	0.707	1.000	1.000	1.000	0.968	1.000	0.968	1.000	1.000	1.000
		Calculated Value (both directions)	Mobility Reduction	0.293	0.000	0.000	0.000	0.032	0.000	0.032	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (direction 1)	1.092	1.092	1.147	1.092	1.096	1.096	1.096	1.156	1.156	1.156
		Input current value from performance system (direction 1)	Original Directional Segment PTI (direction 1)	1.241	1.241	1.484	1.241	1.294	1.294	1.294	1.433	1.433	1.433
		Input current value from performance system (direction 2)	Original Directional Segment TTI (direction 2)	1.073	1.073	1.066	1.073	1.134	1.134	1.134	1.119	1.119	1.119
		Input current value from performance system (direction 2)	Original Directional Segment PTI (direction 2)	1.250	1.250	1.234	1.250	1.395	1.395	1.395	1.376	1.376	1.376
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.088	0.000	0.000	0.000	0.010	0.000	0.010	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.089	0.118	0.080	0.002	0.017	0.031	0.011	0.029	0.023	0.007
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (direction 1)	1.046	1.092	1.147	1.092	1.086	1.096	1.086	1.156	1.156	1.156
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (direction 1)	1.131	1.094	1.366	1.239	1.272	1.254	1.280	1.392	1.401	1.424
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTI (direction 2)	1.037	1.073	1.066	1.073	1.134	1.134	1.134	1.119	1.119	1.119
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment PTI (direction 2)	1.139	1.102	1.136	1.248	1.395	1.352	1.395	1.337	1.376	1.37
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (direction 1)	0.367	0.367	0.200	0.367	0.190	0.190	0.190	0.059	0.059	0.059
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (direction 2)	0.333	0.333	0.407	0.333	0.113	0.113	0.113	0.153	0.153	0.153
		Input value from HCRS	Segment Closures with fatalities/injuries	15	15	20	15	20	20	20	12	12	12
		Input value from HCRS	Total Segment Closures	21	21	27	21	31	31	31	18	18	18
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.71	0.71	0.74	0.71	0.65	0.65	0.65	0.67	0.67	0.67
		Calculated Value (both directions)	Closure Reduction	0.071	0.281	0.197	0.004	0.022	0.067	0.010	0.064	0.050	0.015
		Calculated Value (both directions)	Closure Reduction Factor	0.929	0.719	0.803	0.996	0.978	0.933	0.990	0.936	0.950	0.985
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (direction 1)	0.341	0.264	0.161	0.366	0.186	0.177	0.188	0.055	0.056	0.058
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (direction 2)	0.309	0.239	0.327	0.332	0.113	0.105	0.113	0.143	0.153	0.151
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	98.0%	98.0%	94.0%	98.0%	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 (%)	98.0%	98.0%	94.0%	98.0%	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 (%)	98.0%	98.0%	94.0%	98.0%	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	0.810	0.810	2.504	0.810	1.305	1.305	1.305	0.753	0.753	0.753
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	0.633	0.764	2.313	0.810	1.193	1.258	1.194	0.676	0.706	0.732

FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (direction 1)	1.042	1.042	1.086	1.042	1.045	1.045	1.045	1.077	1.077	1.077
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (direction 1)	1.124	1.124	1.283	1.124	1.156	1.156	1.156	1.272	1.272	1.272
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (direction 2)	1.031	1.031	1.043	1.031	1.076	1.076	1.076	1.048	1.048	1.048
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (direction 2)	1.137	1.137	1.172	1.137	1.242	1.242	1.242	1.222	1.222	1.222
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.044	0.000	0.000	0.000	0.005	0.000	0.005	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.044	0.059	0.040	0.001	0.008	0.016	0.005	0.014	0.011	0.003
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (direction 1)	1.019	1.042	1.086	1.042	1.040	1.045	1.040	1.077	1.077	1.077
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (direction 1)	1.074	1.058	1.232	1.123	1.146	1.138	1.150	1.254	1.258	1.268
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (direction 2)	1.016	1.031	1.043	1.031	1.076	1.076	1.076	1.048	1.048	1.048
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (direction 2)	1.087	1.070	1.125	1.136	1.242	1.223	1.242	1.204	1.222	1.218
	FREIGHT INDEX	Value from above	Original Segment TPTI (direction 1)	1.124	1.124	1.283	1.124	1.156	1.156	1.156	1.272	1.272	1.272
		Value from above	Original Segment TPTI (direction 2)	1.137	1.137	1.172	1.137	1.242	1.242	1.242	1.222	1.222	1.222
		Calculated Value	Original Segment Freight Index	0.885	0.885	0.815	0.885	0.834	0.834	0.834	0.802	0.802	0.802
		Calculated Value	Post-Project Segment TPTI (direction 1)	1.074	1.058	1.232	1.123	1.146	1.138	1.150	1.254	1.258	1.268
		Calculated Value	Post-Project Segment TPTI (direction 2)	1.087	1.070	1.125	1.136	1.242	1.223	1.242	1.204	1.222	1.218
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.926	0.940	0.849	0.885	0.837	0.847	0.836	0.814	0.807	0.805
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	90.333	90.333	36.150	90.333	50.427	50.427	50.427	13.435	13.435	13.435
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	57.233	57.233	97.406	57.233	29.522	29.522	29.522	30.318	30.318	30.318
		Calculated Value	Segment Closures with fatalities	15	15	20	15	20	20	20	12	12	12
		Calculated Value	Total Segment Closures	21	21	27	21	31	31	31	18	18	18
		Calculated Value	% Closures with Fatality	0.71	0.71	0.74	0.71	0.65	0.65	0.65	0.67	0.67	0.67
		Calculated Value	Closure Reduction	0.071	0.281	0.197	0.004	0.022	0.067	0.010	0.064	0.050	0.015
		Calculated Value	Closure Reduction Factor	0.929	0.719	0.803	0.996	0.978	0.933	0.990	0.936	0.950	0.985
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (direction 1)	83.876	64.929	29.025	89.983	49.307	47.059	49.926	12.579	12.762	13.240
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (direction 2)	53.142	41.137	78.209	57.011	29.522	27.550	29.522	28.386	30.318	29.878
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	16.15	16.15	16.26	16.15	16.20	16.20	16.20	16.42	16.42	16.42
		Input current value from performance system	Original vertical clearance for specific bridge										
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge										
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.15	16.15	16.26	16.15	16.20	16.20	16.20	16.42	16.42	16.42
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.15	16.15	16.26	16.15	16.20	16.20	16.20	16.42	16.42	16.42
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	0.64	0.64	0.539	0.64	0.492	0.492	0.492	0.294	0.294	0.294
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	0.608	0.548	0.459	0.639	0.49	0.486	0.491	0.281	0.283	0.283

BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	5.65	5.65	6.56	5.65	5.63	5.63	5.63	5.35	5.35	5.35
		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	0
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	5.79	5.65	6.56	5.65	5.63	5.63	5.63	5.35	5.35	5.35
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	5.79	5.65	6.56	5.65	5.63	5.63	5.63	5.35	5.35	5.35
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	84.98	84.98	91.55	84.98	94.48	94.48	94.48	80.93	80.93	80.93
		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	0.00
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	86.39	84.98	91.55	84.98	94.48	94.48	94.48	80.93	80.93	80.93
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	86.39	84.98	91.55	84.98	94.48	94.48	94.48	80.93	80.93	80.93
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	5	5	5	5	4	4	4	5	5	5
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	5	5	5	5	4	4	4	5	5	5
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	5	5	5	5	4	4	4	5	5	5
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	71.08%	71.08%	11.66%	71.08%	8.19%	8.19%	8.19%	72.17%	72.17%	72.17%
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	71.08%	71.08%	11.66%	71.08%	8.19%	8.19%	8.19%	72.17%	72.17%	72.17%
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	71.08%	71.08%	11.66%	71.08%	8.19%	8.19%	8.19%	72.17%	72.17%	72.17%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	1.666	1.666	0.128	1.666	1.564	1.564	1.564	2.125	2.125	2.125
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	1.393	1.666	0.128	1.666	1.564	1.564	1.564	2.125	2.125	2.125
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index					4.06		4.06			
		Input current value from performance system	Original Segment IRI in project limits					58.73		86.62			
		Input current value from performance system	Original Segment Cracking in project limits					6.333		7.6667			
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits					30		30			
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	0	0	30	0	30	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					4.17		4.22			
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	0	0	4.17	0	4.22	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (direction 1)					3.94		3.94			
		Input current value from performance system (direction 2)	Original Segment Directional PSR (direction 2)					3.99		3.99			
		Value from above	Original Segment IRI in project limits	0	0	0	0	58.73	0	86.62	0	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	0	0	30	0	30	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (direction 1)					4.01		4.04			
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (direction 2)					4.04		4.11			
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 1)	0	0	0	0	4.01	0	4.04	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 2)	0	0	0	0	4.04	0	4.11	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure					8.7%		8.7%			
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure					6.5%		4.3%			
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	0.0%	0.0%	6.5%	0.0%	4.3%	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	0	0	0	0.087	0.087	0.087	0	0	0
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0	0	0	0	0.065	0.087	0.043	0	0	0

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 #	10E.36a	10E.36b	10E.36c	10E.37	10E.38	10E.39a	10E.39b	10E.39c	10E.40a	10E.40b	10E.40c
			Description	Vertical Clearance	Vertical Clearance	Vertical Clearance	Safety Improvements	Lighting Improvements	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance	Vertical Clearance
			Project Beg MP	339.46	339.46	339.46	354	355	378.93	378.93	378.93	383.35	383.35	383.35
			Project End MP	339.46	339.46	339.46	358	355	378.93	378.93	378.93	383.35	383.35	383.35
			Project Length (miles)	0	0	0	4	0	0	0	0	0	0	0
			Segment Beg MP	332	332	332	354	354	372	372	372	372	372	372
			Segment End MP	354	354	354	372	372	392	392	392	392	392	392
			Segment Length (miles)	22	22	22	18	18	20	20	20	20	20	20
			Segment #	14	14	14	15	15	16	16	16	16	16	16
			Current # of Lanes (both directions)	4	4	4	4	4	4	4	4	4	4	4
			Project Type (one-way or two-way)	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way	two-way
			Additional Lanes (one-way)	0	0	0	0	0	0	0	0	0	0	0
			Pro-Rated # of Lanes	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		Notes and Directions	**Description**											
SAFETY	DIRECTIONAL SAFETY	Input current value from performance system (direction 1)	Orig Segment Directional Safety Index (direction 1)	0.679	0.679	0.679	1.993	1.993	1.137	1.137	1.137	1.137	1.137	1.137
		Input current value from performance system (direction 1)	Orig Segment Directional Fatal Crashes (direction 1)	2	2	2	5	5	3	3	3	3	3	3
		Input current value from performance system (direction 1)	Orig Segment Directional Incap Crashes (direction 1)	6	6	6	4	4	6	6	6	6	6	6
		Input current value from performance system (direction 1)	Original Fatal Crashes in project limits (direction 1)	0	0	0	4	1	0	0	0	0	0	0
		Input current value from performance system (direction 1)	Original Incap Crashes in project limits (direction 1)	0	0	0	0	0	0	0	0	0	0	0
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 1 (direction 1)(lowest CMF)	0.95	1.09	0.7	0.77	0.75	0.95	1	0.7	0.95	1	0.7
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 2 (direction 1)	1	1	1	0.87	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 3 (direction 1)	1	1	1	0.94	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 4 (direction 1)	1	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 1) - If no CMF enter 1.0	CMF 5 (direction 1)	1	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 1)	Total CMF (direction 1)	0.950	1.090	0.700	0.698	0.750	0.950	1.000	0.700	0.950	1.000	0.700
		Calculated Value (direction 1)	Fatal Crash reduction (direction 1)	0.000	0.000	0.000	1.207	0.250	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (direction 1)	Incap Crash reduction (direction 1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Fatal Crashes (direction 1)	2.000	2.000	2.000	3.793	4.750	3.000	3.000	3.000	3.000	3.000	3.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 1)	Post-Project Segment Directional Incap Crashes (direction 1)	6.000	6.000	6.000	4.000	4.000	6.000	6.000	6.000	6.000	6.000	6.000
		Input value from updated Safety Index spreadsheet (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	0.679	0.679	0.679	1.537	1.899	1.137	1.137	1.137	1.137	1.137	1.137
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 1)	Post-Project Segment Directional Safety Index (direction 1)	0.679	0.679	0.679	1.537	1.899	1.137	1.137	1.137	1.137	1.137	1.137
		Input current value from performance system (direction 2)	Orig Segment Directional Safety Index (direction 2)	0.773	0.773	0.773	0.428	0.428	0.070	0.070	0.070	0.070	0.070	0.070
		Input current value from performance system (direction 2)	Orig Segment Directional Fatal Crashes (direction 2)	2	2	2	1	1	0	0	0	0	0	0
		Input current value from performance system (direction 2)	Orig Segment Directional Incap Crashes (direction 2)	8	8	8	1	1	3	3	3	3	3	3
		Input current value from performance system (direction 2)	Original Fatal Crashes in project limits (direction 2)	0	0	0	1	0	0	0	0	0	0	0
		Input current value from performance system (direction 2)	Original Incap Crashes in project limits (direction 2)	0	0	0	1	0	0	0	0	0	0	0
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 1 (direction 2)(lowest CMF)	0.95	1.09	0.7	0.77	0.75	0.95	1	0.7	0.95	1	0.7
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 2 (direction 2)	1	1	1	0.87	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 3 (direction 2)	1	1	1	0.94	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 4 (direction 2)	1	1	1	1	1	1	1	1	1	1	1
		Input CMF value (direction 2) - If no CMF enter 1.0	CMF 5 (direction 2)	1	1	1	1	1	1	1	1	1	1	1
		Calculated Value (direction 2)	Total CMF (direction 2)	0.950	1.090	0.700	0.698	0.750	0.950	1.000	0.700	0.950	1.000	0.700
		Calculated Value (direction 2)	Fatal Crash reduction (direction 2)	0.000	0.000	0.000	0.302	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (direction 2)	Incap Crash reduction (direction 2)	0.000	0.000	0.000	0.302	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Fatal Crashes (direction 2)	2.000	2.000	2.000	0.698	1.000	0.000	0.000	0.000	0.000	0.000	0.000
		Enter in Safety Index spreadsheet to calculate new Safety Index (direction 2)	Post-Project Segment Directional Incap Crashes (direction 2)	8.000	8.000	8.000	0.698	1.000	3.000	3.000	3.000	3.000	3.000	3.000
		Input value from updated Safety Index spreadsheet (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.773	0.800	0.682	0.299	0.428	0.070	0.070	0.070	0.070	0.070	0.070
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need (direction 2)	Post-Project Segment Directional Safety Index (direction 2)	0.773	0.800	0.682	0.299	0.428	0.070	0.070	0.070	0.070	0.070	0.070
	SAFETY INDEX	Calculated Value - verify that it matches current performance system	Current Safety Index	0.726	0.726	0.726	1.211	1.211	0.604	0.604	0.604	0.604	0.604	0.604
		Enter in Safety Needs spreadsheet to calculate new segment level Safety Need	Post-Project Safety Index	0.726	0.740	0.681	0.918	1.164	0.604	0.604	0.604	0.604	0.604	0.604
	Needs	User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Safety Need	0.979	0.979	0.979	2.781	2.781	0.798	0.798	0.798	0.798	0.798	0.798
		User entered value from Safety Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Safety Need	0.979	0.988	0.949	1.339	2.622	0.798	0.798	0.798	0.798	0.798	0.798

MOBILITY	MOBILITY INDEX	Input current value from performance system	Original Segment Mobility Index	0.330	0.330	0.330	0.280	0.280	0.460	0.460	0.460	0.460	0.460	0.460
		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	4.00
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Mobility Index	0.33	0.33	0.33	0.28	0.28	0.46	0.46	0.46	0.46	0.46	0.46
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Mobility Index	0.330	0.330	0.330	0.280	0.280	0.460	0.460	0.460	0.460	0.460	0.460
	FUT V/C	Input current value from performance system	Original Segment Future V/C	0.410	0.410	0.410	0.350	0.350	0.570	0.570	0.570	0.570	0.570	0.570
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Future V/C	0.410	0.410	0.410	0.350	0.350	0.570	0.570	0.570	0.570	0.570	0.570
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Future V/C	0.410	0.410	0.410	0.350	0.350	0.570	0.570	0.570	0.570	0.570	0.570
	PEAK HOUR V/C	Input current value from performance system (direction 1)	Original Segment Peak Hour V/C (direction 1)	0.250	0.250	0.250	0.250	0.250	0.380	0.380	0.380	0.380	0.380	0.380
		Input current value from performance system (direction 2)	Original Segment Peak Hour V/C (direction 2)	0.250	0.250	0.250	0.200	0.200	0.330	0.330	0.330	0.330	0.330	0.330
		***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	N/A	N/A
		Input value from updated Mobility Index spreadsheet (direction 1)	Post-Project Segement Peak Hr V/C (direction 1)	0.25	0.25	0.25	0.25	0.25	0.38	0.38	0.38	0.38	0.38	0.38
		Input value from updated Mobility Index spreadsheet (direction 2)	Post-Project Segement Peak Hr V/C (direction 2)	0.25	0.25	0.25	0.20	0.20	0.33	0.33	0.33	0.33	0.33	0.33
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 1)	0.250	0.250	0.250	0.250	0.250	0.380	0.380	0.380	0.380	0.380	0.380
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need	Post-Project Segment Peak Hr V/C (direction 2)	0.250	0.250	0.250	0.200	0.200	0.330	0.330	0.330	0.330	0.330	0.330
	TTI AND PTI	Calculated Value (both directions)	Safety Reduction Factor	1.000	1.019	0.937	0.758	0.961	1.000	1.000	1.000	1.000	1.000	1.000
		Calculated Value (both directions)	Safety Reduction	0.000	-0.019	0.063	0.242	0.039	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Mobility Reduction Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Calculated Value (both directions)	Mobility Reduction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Input current value from performance system (direction 1)	Original Directional Segment TTI (direction 1)	1.092	1.092	1.092	1.076	1.076	1.108	1.108	1.108	1.108	1.108	1.108
		Input current value from performance system (direction 1)	Original Directional Segment PTI (direction 1)	1.368	1.368	1.368	1.195	1.195	1.316	1.316	1.316	1.316	1.316	1.316
		Input current value from performance system (direction 2)	Original Directional Segment TTI (direction 2)	1.107	1.107	1.107	1.091	1.091	1.101	1.101	1.101	1.101	1.101	1.101
		Input current value from performance system (direction 2)	Original Directional Segment PTI (direction 2)	1.396	1.396	1.396	1.214	1.214	1.277	1.277	1.277	1.277	1.277	1.277
		Calculated Value (both directions)	Reduction Factor for Segment TTI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment PTI	0.000	-0.006	0.019	0.072	0.012	0.000	0.000	0.000	0.000	0.000	0.000
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment TTI (direction 1)	1.092	1.092	1.092	1.076	1.076	1.108	1.108	1.108	1.108	1.108	1.108
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Directional Segment PTI (direction 1)	1.368	1.376	1.342	1.108	1.181	1.316	1.316	1.316	1.316	1.316	1.316
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment TTI (direction 2)	1.107	1.107	1.107	1.091	1.091	1.101	1.101	1.101	1.101	1.101	1.101
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Directional Segment PTI (direction 2)	1.396	1.404	1.370	1.126	1.200	1.277	1.277	1.277	1.277	1.277	1.277
	CLOSURE EXTENT	Input current value from performance system (direction 1)	Orig Segment Directional Closure Extent (direction 1)	0.250	0.250	0.250	0.311	0.311	0.211	0.211	0.211	0.211	0.211	0.211
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Extent (direction 2)	0.210	0.210	0.210	0.033	0.033	0.070	0.070	0.070	0.070	0.070	0.070
		Input value from HCRS	Segment Closures with fatalities/injuries	12	12	12	10	10	7	7	7	7	7	7
		Input value from HCRS	Total Segment Closures	14	14	14	15	15	10	10	10	10	10	10
		Calculated Value (both directions)	% Closures with Fatality/Injury	0.86	0.86	0.86	0.67	0.67	0.70	0.70	0.70	0.70	0.70	0.70
		Calculated Value (both directions)	Closure Reduction	0.000	-0.016	0.054	0.161	0.026	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Closure Reduction Factor	1.000	1.016	0.946	0.839	0.974	1.000	1.000	1.000	1.000	1.000	1.000
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 1)	Post-Project Segment Directional Closure Extent (direction 1)	0.250	0.254	0.237	0.261	0.303	0.211	0.211	0.211	0.211	0.211	0.211
		Enter in Mobility Needs spreadsheet to update segment level Mobility Need (direction 2)	Post-Project Segment Directional Closure Extent (direction 2)	0.210	0.213	0.199	0.028	0.032	0.070	0.070	0.070	0.070	0.070	0.070
	BICYCLE ACCOM	Input current value from performance system	Orig Segment Bicycle Accomodation %	100.0%	100.0%	100.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
		Input current value from performance system	Orig Segment Outside Shoulder width	10	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	10
		Input value from updated Mobility Index spreadsheet	Post-Project Segment Bicycle Accomodation (%)	100.0%	100.0%	100.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
		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%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
	Needs	User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Mobility Need	0.668	0.668	0.668	0.547	0.547	0.746	0.746	0.746	0.746	0.746	0.746
		User entered value from Mobility Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Mobility Need	0.667	0.692	0.622	0.519	0.544	0.746	0.746	0.746	0.746	0.746	0.746

FREIGHT	TTTI AND TPTI	Input current value from performance system (direction 1)	Original Directional Segment TTTI (direction 1)	1.051	1.051	1.051	1.023	1.023	1.044	1.044	1.044	1.044	1.044	1.044
		Input current value from performance system (direction 1)	Original Directional Segment TPTI (direction 1)	1.273	1.273	1.273	1.093	1.093	1.178	1.178	1.178	1.178	1.178	1.178
		Input current value from performance system (direction 2)	Original Directional Segment TTTI (direction 2)	1.070	1.070	1.070	1.031	1.031	1.036	1.036	1.036	1.036	1.036	1.036
		Input current value from performance system (direction 2)	Original Directional Segment TPTI (direction 2)	1.305	1.305	1.305	1.115	1.115	1.137	1.137	1.137	1.137	1.137	1.137
		Calculated Value (both directions)	Reduction Factor for Segment TTTI (both directions)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value (both directions)	Reduction Factor for Segment TPTI (both directions)	0.000	-0.003	0.009	0.036	0.006	0.000	0.000	0.000	0.000	0.000	0.000
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TTTI (direction 1)	1.051	1.051	1.051	1.023	1.023	1.044	1.044	1.044	1.044	1.044	1.044
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Directional Segment TPTI (direction 1)	1.273	1.277	1.261	1.053	1.087	1.178	1.178	1.178	1.178	1.178	1.178
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TTTI (direction 2)	1.070	1.070	1.070	1.031	1.031	1.036	1.036	1.036	1.036	1.036	1.036
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Directional Segment TPTI (direction 2)	1.305	1.309	1.293	1.075	1.109	1.137	1.137	1.137	1.137	1.137	1.137
	FREIGHT INDEX	Value from above	Original Segment TPTI (direction 1)	1.273	1.273	1.273	1.093	1.093	1.178	1.178	1.178	1.178	1.178	1.178
		Value from above	Original Segment TPTI (direction 2)	1.305	1.305	1.305	1.115	1.115	1.137	1.137	1.137	1.137	1.137	1.137
		Calculated Value	Original Segment Freight Index	0.776	0.776	0.776	0.906	0.906	0.864	0.864	0.864	0.864	0.864	0.864
		Calculated Value	Post-Project Segment TPTI (direction 1)	1.273	1.277	1.261	1.053	1.087	1.178	1.178	1.178	1.178	1.178	1.178
		Calculated Value	Post-Project Segment TPTI (direction 2)	1.305	1.309	1.293	1.075	1.109	1.137	1.137	1.137	1.137	1.137	1.137
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Freight Index	0.776	0.774	0.783	0.940	0.911	0.864	0.864	0.864	0.864	0.864	0.864
	CLOSURE DURATION	Input current value from performance system (direction 1)	Orig Segment Directional Closure Duration (dir 1)	25.809	25.809	25.809	200.267	200.267	186.166	186.166	186.166	186.166	186.166	186.166
		Input current value from performance system (direction 2)	Orig Segment Directional Closure Duration (dir 2)	104.973	104.973	104.973	8.544	8.544	13.340	13.340	13.340	13.340	13.340	13.340
		Calculated Value	Segment Closures with fatalities	12	12	12	10	10	7	7	7	7	7	7
		Calculated Value	Total Segment Closures	14	14	14	15	15	10	10	10	10	10	10
		Calculated Value	% Closures with Fatality	0.86	0.86	0.86	0.67	0.67	0.70	0.70	0.70	0.70	0.70	0.70
		Calculated Value	Closure Reduction	0.000	-0.016	0.054	0.161	0.026	0.000	0.000	0.000	0.000	0.000	0.000
		Calculated Value	Closure Reduction Factor	1.000	1.016	0.946	0.839	0.974	1.000	1.000	1.000	1.000	1.000	1.000
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 1)	Post-Project Segment Directional Closure Duration (direction 1)	25.809	26.220	24.423	168.006	195.083	186.166	186.166	186.166	186.166	186.166	186.166
		Enter in Freight Needs spreadsheet to update segment level Freight Need (direction 2)	Post-Project Segment Directional Closure Duration (direction 2)	104.973	106.646	99.334	7.168	8.323	13.340	13.340	13.340	13.340	13.340	13.340
	VERT CLR	Input current value from performance system	Original Segment Vertical Clearance	15.94	15.94	15.94	16.31	16.31	16.04	16.04	16.04	16.04	16.04	16.04
		Input current value from performance system	Original vertical clearance for specific bridge	15.94	15.94	15.94			16.09	16.09	16.09	16.04	16.04	16.04
		Input post-project value (depends on solution)	Post-Project vertical clearance for specific bridge	16.50	16.50	16.19			16.50	16.50	16.34	16.50	16.50	16.29
		Input post-project value (depends on solution)(force segment clearance to equal this specific bridge)	Post-Project Segment Vertical Clearance	16.50	16.50	16.19	16.31	16.31	16.50	16.50	16.34	16.50	16.50	16.29
		Enter in Freight Needs spreadsheet to update segment level Freight Need	Post-Project Segment Vertical Clearance	16.50	16.50	16.19	16.31	16.31	16.50	16.50	16.34	16.50	16.50	16.29
	Needs	User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Freight Need	1.005	1.005	1.005	0.64	0.64	0.87	0.87	0.87	0.87	0.87	0.87
		User entered value from Freight Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Freight Need	0.618	0.637	0.775	0.575	0.63	0.544	0.544	0.592	0.544	0.544	0.646

BRIDGE	BRIDGE INDEX	Input current value from performance system	Original Segment Bridge Index	5.85	5.85	5.85	5.71	5.71	5.86	5.86	5.86	5.86	5.86	5.86
		Input current value from performance system	Original lowest rating for specific bridge	5	5	5			6	6	6	7	7	7
		Input post-project value (For repair +1, rehab +2, replace=8)	Post-Project lowest rating for specific bridge	8	5	5			8	6	6	8	7	7
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project lowest rating for specific bridge	8	5	5	0	0	8	6	6	8	7	7
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Index	6.25	5.85	5.85	5.71	5.71	6.17	5.86	5.86	6.01	5.86	5.86
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Index	6.25	5.85	5.85	5.71	5.71	6.17	5.86	5.86	6.01	5.86	5.86
	SUFF RATING	Input current value from performance system	Original Segment Sufficiency Rating	89.81	89.81	89.81	91.19	91.19	90.50	90.50	90.50	90.50	90.50	90.50
		Input current value from performance system	Original Sufficiency Rating for specific bridge	74.30	74.30	74.30			90.80	90.80	90.80	95.80	95.80	95.80
		Input post-project value (For repair +10, rehab +20, replace=98)	Post-Project Sufficiency Rating for specific bridge	98.00	74.30	74.30			98.00	90.80	90.80	98.00	95.80	95.80
		Enter in Bridge Index spreadsheet to calculate new Bridge Index	Post-Project Sufficiency Rating for specific bridge	98.00	74.30	74.30	0.00	0.00	98.00	90.80	90.80	98.00	95.80	95.80
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Sufficiency Rating	92.98	89.81	89.81	91.19	91.19	91.62	90.50	90.50	90.82	90.50	90.50
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Sufficiency Rating	92.98	89.81	89.81	91.19	91.19	91.62	90.50	90.50	90.82	90.50	90.50
	BR RTNG	Input current value from performance system	Original Segment Bridge Rating	5	5	5	5	5	5	5	5	5	5	5
		Input updated segment value from updated Bridge Index spreadsheet	Post-Project Segment Bridge Rating	8	5	5	5	5	8	5	5	8	5	5
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment Bridge Rating	8	5	5	5	5	8	5	5	8	5	5
	% FUN OB	Input current value from performance system	Original Segment % Functionally Obsolete	43.47%	43.47%	43.47%	20.53%	20.53%	35.62%	35.62%	35.62%	35.62%	35.62%	35.62%
		Input updated value from updated Bridge Index spreadsheet (only remove bridge from FO if replace or rehab)	Post-Project Segment % Functionally Obsolete	30.10%	43.47%	43.47%	20.53%	20.53%	19.99%	35.62%	35.62%	20.95%	35.62%	35.62%
		Enter in Bridge Needs spreadsheet to update segment level Bridge Need	Post-Project Segment % Functionally Obsolete	30.10%	43.47%	43.47%	20.53%	20.53%	19.99%	35.62%	35.62%	20.95%	35.62%	35.62%
	Needs	User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Original Segment Bridge Need	1.117	1.117	1.117	1.231	1.231	1.054	1.054	1.054	1.054	1.054	1.054
		User entered value from Bridge Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Bridge Need	0.391	1.117	1.117	1.231	1.231	0.378	1.054	1.054	0.54	1.054	1.054
PAVEMENT	PAVEMENT INDEX	Input current value from performance system	Original Segment Pavement Index											
		Input current value from performance system	Original Segment IRI in project limits											
		Input current value from performance system	Original Segment Cracking in project limits											
		Input post-project value (For rehab, increase to 45; for replace increase to 30)	Post-Project IRI in project limits											
		Enter in Pavement Index spreadsheet to calculate new Pavement Index	Post-Project IRI in project limits	0	0	0	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											
		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	0
		Input updated segment value from updated Pavement Index spreadsheet	Post-Project Segment Pavement Index											
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Pavement Index	0	0	0	0	0	0	0	0	0	0	0
	DIRECTION PSR	Input current value from performance system (direction 1)	Original Segment Directional PSR (direction 1)											
		Input current value from performance system (direction 2)	Original Segment Directional PSR (direction 2)											
		Value from above	Original Segment IRI in project limits	0	0	0	0	0	0	0	0	0	0	0
		Value from above	Post-Project directional IRI in project limits	0	0	0	0	0	0	0	0	0	0	0
		Input updated segment value from updated Pavement Index spreadsheet (direction 1)	Post-Project Segment Directional PSR (direction 1)											
		Input updated segment value from updated Pavement Index spreadsheet (direction 2)	Post-Project Segment Directional PSR (direction 2)											
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 1)	0	0	0	0	0	0	0	0	0	0	0
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment Directional PSR (direction 2)	0	0	0	0	0	0	0	0	0	0	0
	% FAIL	Input current value from performance system	Original Segment % Failure											
		Input value from updated Pavement Index spreadsheet	Post-Project Segment % Failure											
		Enter in Pavement Needs spreadsheet to update segment level Pavement Need	Post-Project Segment % Failure	0.0%	0.0%	0.0%	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	0	0	0.028	0.028	0	0	0	0	0	0
		User entered value from Pavement Needs spreadsheet and for use in Performance Effectiveness spreadsheet	Post-Project Segment Pavement Need	0	0	0	0	0	0	0	0	0	0	0

Performance Area Scoring

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Pavement					Bridge					Safety					Mobility					Freight					Total Risk Factored Performance Area Benefit
				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	
CS10E.1	Wild Horse Pass to SR 587 Lighting Improvements	163-176	8.722	0.591	0.591	0.000	0.00	0.000	1.653	1.653	0.000	0.00	0.000	6.069	5.626	0.443	1.98	0.878	9.214	9.193	0.021	3.96	0.083	8.697	8.681	0.016	4.44	0.071	1.032
CS10E.1_1	Wild Horse Pass to SR 587 Lighting Improvements	163-164	0.674	0.000	0.000	0.000	0.00	0.000	0.156	0.156	0.000	0.00	0.000	4.384	4.334	0.050	1.93	0.097	5.905	5.890	0.015	4.27	0.064	8.008	7.995	0.013	4.89	0.064	0.224
CS10E.1_2	Wild Horse Pass to SR 587 Lighting Improvements	164-176	8.048	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.292	0.393	1.99	0.781	3.309	3.303	0.006	3.20	0.019	0.689	0.686	0.003	2.52	0.008	0.808
CS10E.2	Riggs Rd to Casa Grande General Purpose Lane	167-184	202.796	0.591	0.075	0.516	5.74	2.962	1.497	0.267	1.230	3.29	4.047	1.685	1.203	0.482	1.99	0.959	3.309	0.952	2.357	3.20	7.542	0.689	0.681	0.008	2.52	0.020	15.530
CS10E.3a	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	3.009	0.591	0.591	0.000	0.00	0.000	1.497	1.207	0.290	2.12	0.616	1.685	1.671	0.014	1.99	0.028	3.309	3.308	0.001	2.01	0.002	0.689	0.291	0.398	2.52	1.003	1.649
CS10E.3b	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	7.270	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.671	0.014	1.99	0.028	3.309	3.308	0.001	2.01	0.002	0.689	0.291	0.398	2.52	1.003	1.033
CS10E.3c	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	1.243	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.608	0.077	1.99	0.153	3.309	3.307	0.002	2.01	0.004	0.689	0.369	0.320	2.52	0.806	0.964
CS10E.4a	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	2.951	0.591	0.591	0.000	0.00	0.000	1.497	1.180	0.317	1.96	0.620	1.685	1.683	0.002	1.99	0.004	3.309	3.309	0.000	2.01	0.000	0.689	0.291	0.398	2.52	1.003	1.627
CS10E.4b	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	7.27	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.689	-0.004	1.99	-0.008	3.309	3.309	0.000	2.01	0.000	0.689	0.291	0.398	2.52	1.003	0.995
CS10E.4c	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	1.21	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.677	0.008	1.99	0.016	3.309	3.308	0.001	2.01	0.002	0.689	0.321	0.368	2.52	0.927	0.945
CS10E.5a	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.317	0.591	0.591	0.000	0.00	0.000	1.497	1.143	0.354	2.46	0.870	1.685	1.683	0.002	1.99	0.004	3.309	3.309	0.000	2.01	0.000	0.689	0.291	0.398	2.52	1.003	1.877
CS10E.5b	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.640	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.685	0.000	1.99	0.000	3.309	3.309	0.000	2.01	0.000	0.689	0.291	0.398	2.52	1.003	1.003
CS10E.5c	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	1.21	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.677	0.008	1.99	0.016	3.309	3.308	0.001	2.01	0.002	0.689	0.330	0.359	2.52	0.905	0.923
CS10E.6a	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	4.431	0.591	0.591	0.000	0.00	0.000	1.497	1.049	0.448	2.46	1.102	1.685	1.683	0.002	1.99	0.004	3.309	3.309	0.000	2.01	0.000	0.689	0.291	0.398	2.52	1.003	2.109
CS10E.6b	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	7.270	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.688	-0.003	1.99	-0.006	3.309	3.309	0.000	2.01	0.000	0.689	0.291	0.398	2.52	1.003	0.997

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CS10E.6c	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	1.21	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.682	0.003	1.99	0.006	3.309	3.309	0.000	2.01	0.000	0.689	0.312	0.377	2.52	0.950	0.956
CS10E.7a	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	2.891	0.591	0.591	0.000	0.00	0.000	1.497	1.094	0.403	2.46	0.991	1.685	1.671	0.014	1.99	0.028	3.309	3.308	0.001	2.01	0.002	0.689	0.291	0.398	2.52	1.003	2.024
CS10E.7b	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	7.270	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.711	-0.026	1.99	-0.052	3.309	3.309	0.000	2.01	0.000	0.689	0.292	0.397	2.52	1.000	0.949
CS10E.7c	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	1.21	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.602	0.083	1.99	0.165	3.309	3.307	0.002	2.01	0.004	0.689	0.369	0.320	2.52	0.806	0.975
CS10E.8	Casa Grande EB Shoulder Widening	183-184	0.613	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.362	0.323	1.99	0.642	3.309	3.307	0.002	2.01	0.004	0.689	0.687	0.002	2.52	0.005	0.651
CS10E.9	Casa Grande Lighting Improvements	183-190	4.708	0.672	0.672	0.000	0.00	0.000	1.997	1.997	0.000	0.00	0.000	6.173	5.861	0.312	1.76	0.548	4.019	4.015	0.004	2.58	0.010	1.411	1.410	0.001	2.38	0.002	0.561
CS10E.9_2	Casa Grande Lighting Improvements	183-184	0.674	0.591	0.591	0.000	0.00	0.000	1.497	1.497	0.000	0.00	0.000	1.685	1.597	0.088	1.99	0.175	3.309	3.307	0.002	2.01	0.004	0.689	0.689	0.000	2.52	0.000	0.179
CS10E.9_3	Casa Grande Lighting Improvements	184-190	4.034	0.081	0.081	0.000	0.00	0.000	0.500	0.500	0.000	0.00	0.000	4.488	4.264	0.224	1.67	0.373	0.710	0.708	0.002	3.15	0.006	0.722	0.721	0.001	2.38	0.002	0.382
CS10E.10	Casa Grande Safety Improvements	184-190	3.029	0.081	0.081	0.000	0.00	0.000	0.500	0.500	0.000	0.00	0.000	4.488	3.368	1.120	1.67	1.866	0.710	0.698	0.012	3.15	0.038	0.722	0.713	0.009	2.38	0.021	1.925
CS10E.11a	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	3.206	0.081	0.081	0.000	0.00	0.000	0.500	0.230	0.270	3.05	0.824	4.488	4.488	0.000	1.67	0.000	0.710	0.710	0.000	1.89	0.000	0.722	0.288	0.434	2.38	1.034	1.857
CS10E.11b	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	7.240	0.081	0.081	0.000	0.00	0.000	0.500	0.500	0.000	0.00	0.000	4.488	4.488	0.000	1.67	0.000	0.710	0.710	0.000	1.89	0.000	0.722	0.288	0.434	2.38	1.034	1.034
CS10E.11c	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	1.21	0.081	0.081	0.000	0.00	0.000	0.500	0.500	0.000	0.00	0.000	4.488	4.488	0.000	1.67	0.000	0.710	0.710	0.000	1.89	0.000	0.722	0.315	0.407	2.38	0.969	0.969
CS10E.12a	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	2.474	0.081	0.081	0.000	0.00	0.000	0.500	0.290	0.210	1.84	0.386	4.488	4.469	0.019	1.67	0.032	0.710	0.710	0.000	1.89	0.000	0.722	0.288	0.434	2.38	1.034	1.452
CS10E.12b	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	7.270	0.081	0.081	0.000	5.95	0.000	0.500	0.500	0.000	0.00	0.000	4.488	4.526	-0.038	1.67	-0.063	0.710	0.711	-0.001	1.89	-0.002	0.722	0.289	0.433	2.38	1.031	0.966
CS10E.12c	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	1.645	0.081	0.081	0.000	5.95	0.000	0.500	0.500	0.000	0.00	0.000	4.488	4.362	0.126	1.67	0.210	0.710	0.709	0.001	1.89	0.002	0.722	0.571	0.151	2.38	0.360	0.571

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CS10E.13a	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	4.192	0.036	0.036	0.000	0.00	0.000	1.648	1.042	0.606	1.64	0.994	2.507	2.507	0.000	1.57	0.000	0.640	0.640	0.000	1.97	0.000	0.872	0.498	0.374	2.75	1.029	2.022
CS10E.13b	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	7.270	0.036	0.036	0.000	0.00	0.000	1.648	1.648	0.000	0.00	0.000	2.507	2.507	0.000	1.57	0.000	0.640	0.640	0.000	1.97	0.000	0.872	0.498	0.374	2.75	1.029	1.029
CS10E.13c	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	1.306	0.036	0.036	0.000	0.00	0.000	1.648	1.648	0.000	0.00	0.000	2.507	2.507	0.000	1.57	0.000	0.640	0.640	0.000	1.97	0.000	0.872	0.600	0.272	2.75	0.748	0.748
CS10E.14a	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	4.201	0.036	0.036	0.000	0.00	0.000	1.648	1.202	0.446	1.64	0.731	2.507	2.507	0.000	1.57	0.000	0.640	0.640	0.000	1.97	0.000	0.872	0.498	0.374	2.75	1.029	1.760
CS10E.14b	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	7.270	0.036	0.036	0.000	0.00	0.000	1.648	1.648	0.000	0.00	0.000	2.507	2.507	0.000	1.57	0.000	0.640	0.640	0.000	1.97	0.000	0.872	0.498	0.374	2.75	1.029	1.029
CS10E.14c	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	1.358	0.036	0.036	0.000	0.00	0.000	1.648	1.648	0.000	0.00	0.000	2.507	2.507	0.000	1.57	0.000	0.640	0.640	0.000	1.97	0.000	0.872	0.624	0.248	2.75	0.682	0.682
CS10E.17a	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	2.780	0.000	0.000	0.000	0.00	0.000	1.873	0.000	1.873	3.01	5.638	2.250	2.211	0.039	1.61	0.063	0.713	0.713	0.000	1.91	0.000	0.574	0.301	0.273	2.84	0.775	6.476
CS10E.17b	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	3.640	0.000	0.000	0.000	0.00	0.000	1.873	1.873	0.000	0.00	0.000	2.250	2.250	0.000	1.61	0.000	0.713	0.713	0.000	1.91	0.000	0.574	0.302	0.272	2.84	0.772	0.772
CS10E.17c	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	1.21	0.000	0.000	0.000	0.00	0.000	1.873	1.873	0.000	0.00	0.000	2.250	2.009	0.241	1.61	0.389	0.713	0.711	0.002	1.91	0.004	0.574	0.303	0.271	2.84	0.770	1.162
CS10E.18	Marana Safety Improvements	237-242	2.661	0.000	0.000	0.000	0.00	0.000	0.131	0.131	0.000	0.00	0.000	3.900	2.515	1.385	1.77	2.446	0.766	0.751	0.015	3.10	0.046	0.419	0.344	0.075	2.59	0.194	2.687
CS10E.19	Marana Lighting Improvements	237-242	6.710	0.000	0.000	0.000	0.00	0.000	0.131	0.131	0.000	0.00	0.000	3.900	3.001	0.899	1.77	1.588	0.766	0.755	0.011	3.10	0.034	0.419	0.367	0.052	2.59	0.135	1.756
CS10E.20	Marana Pedestrian Improvements	237-242	1.962	0.000	0.000	0.000	0.00	0.000	0.131	0.131	0.000	0.00	0.000	3.900	3.369	0.531	1.77	0.938	0.766	0.759	0.007	3.10	0.022	0.419	0.385	0.034	2.59	0.088	1.048
CS10E.21a	Tucson Mobility, Safety, and Freight Improvements	248-252	100.924	0.000	0.000	0.000	6.45	0.000	1.640	0.998	0.642	5.47	3.511	0.612	0.537	0.075	1.96	0.147	4.442	2.954	1.488	5.00	7.440	2.361	2.084	0.277	4.89	1.355	12.452
CS10E.21b	Tucson Mobility, Safety, and Freight Improvements	248-252	64.606	0.000	0.000	0.000	6.45	0.000	1.640	1.358	0.282	5.47	1.542	0.612	0.447	0.165	1.96	0.324	4.442	3.560	0.882	5.00	4.410	2.361	2.030	0.331	4.89	1.619	7.894
CS10E.21c	Tucson Mobility, Safety, and Freight Improvements	248-262	10.440	0.480	0.480	0.000	0.00	0.000	1.740	1.740	0.000	0.00	0.000	1.736	1.633	0.103	1.99	0.205	10.319	7.998	2.321	4.99	11.591	5.695	5.547	0.148	4.90	0.725	12.520

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CS10E.21c_7	Tucson Mobility, Safety, and Freight Improvements	248-255	5.220	0.000	0.000	0.000	0.00	0.000	1.640	1.640	0.000	0.00	0.000	0.612	0.606	0.006	1.96	0.012	4.442	3.391	1.051	5.00	5.255	2.361	2.237	0.124	4.89	0.606	5.873
CS10E.21c_8	Tucson Mobility, Safety, and Freight Improvements	255-262	5.220	0.480	0.480	0.000	0.00	0.000	0.100	0.100	0.000	0.00	0.000	1.124	1.027	0.097	1.99	0.193	5.877	4.607	1.270	4.99	6.336	3.334	3.310	0.024	4.95	0.119	6.648
CS10E.22	Tuscon Pedestrian Safety Improvements	257-258	2.618	0.480	0.480	0.000	0.00	0.000	0.100	0.100	0.000	0.00	0.000	1.124	0.846	0.278	1.99	0.552	5.877	5.725	0.152	4.59	0.698	3.334	2.917	0.417	4.95	2.065	3.315
CS10E.23	East Tuscon Pedestrian Safety Improvements	262-264	2.407	0.000	0.000	0.000	0.00	0.000	2.348	2.348	0.000	0.00	0.000	1.119	0.910	0.209	1.87	0.391	2.262	2.213	0.049	3.01	0.147	3.621	3.236	0.385	4.73	1.819	2.358
CS10E.24a	East Tucson Mobility, Safety, and Freight Improvements	262-274	175.373	0.000	0.000	0.000	5.95	0.000	2.348	1.553	0.795	4.99	3.970	1.119	1.020	0.099	1.87	0.185	2.262	0.834	1.428	3.50	4.998	3.621	3.059	0.562	4.73	2.658	11.811
CS10E.24b	East Tucson Mobility, Safety, and Freight Improvements	262-274	90.988	0.000	0.000	0.000	5.95	0.000	2.348	2.003	0.345	4.99	1.723	1.119	0.897	0.222	1.87	0.416	2.262	1.003	1.259	3.50	4.406	3.621	2.985	0.636	4.73	3.008	9.553
CS10E.24c	East Tucson Mobility, Safety, and Freight Improvements	262-274	17.022	0.000	0.000	0.000	0.00	0.000	2.348	2.003	0.345	0.00	0.000	1.119	0.613	0.506	1.87	0.947	2.262	1.563	0.699	3.50	2.446	3.621	2.595	1.026	4.73	4.849	8.242
CS10E.27	East Tucson Lighting Improvements	263-274	14.768	0.000	0.000	0.000	0.00	0.000	2.348	2.348	0.000	0.00	0.000	1.119	1.001	0.118	1.87	0.221	2.262	2.238	0.024	3.50	0.084	3.621	3.413	0.208	4.73	0.983	1.288
CS10E.28a	Vail Mobility and Safety Improvements	274-279	41.550	0.000	0.000	0.000	5.34	0.000	1.666	1.393	0.273	6.28	1.714	6.794	5.950	0.844	2.51	2.122	0.810	0.633	0.177	3.29	0.583	0.640	0.608	0.032	2.64	0.084	4.503
CS10E.28b	Vail Mobility and Safety Improvements	274-286	16.326	0.000	0.000	0.000	0.00	0.000	1.794	1.794	0.000	0.00	0.000	9.441	4.674	4.767	2.46	11.720	3.314	3.077	0.237	3.81	0.904	1.179	1.007	0.172	2.76	0.475	13.099
CS10E.28b_10	Vail Mobility and Safety Improvements	274-280	8.163	0.000	0.000	0.000	0.00	0.000	1.666	1.666	0.000	0.00	0.000	6.794	3.394	3.400	2.51	8.548	0.810	0.764	0.046	3.29	0.151	0.640	0.548	0.092	2.64	0.243	8.942
CS10E.28b_11	Vail Mobility and Safety Improvements	280-286	8.163	0.000	0.000	0.000	0.00	0.000	0.128	0.128	0.000	0.00	0.000	2.647	1.280	1.367	2.32	3.172	2.504	2.313	0.191	3.94	0.753	0.539	0.459	0.080	2.91	0.232	4.157
CS10E.29	Vail Lighting Improvements	275-279	0.628	0.000	0.000	0.000	0.00	0.000	1.666	1.666	0.000	0.00	0.000	6.794	6.751	0.043	1.91	0.082	0.810	0.810	0.000	3.09	0.000	0.640	0.639	0.001	2.64	0.003	0.085
CS10E.30	Mescal EB Climbing Lane	293-296	13.471	0.087	0.065	0.022	4.44	0.098	1.564	1.564	0.000	0.00	0.000	4.787	4.543	0.244	1.09	0.267	1.305	1.193	0.112	2.73	0.306	0.492	0.490	0.002	2.82	0.006	0.676
CS10E.31	Mescal Shoulder Widening	293-299	7.636	0.087	0.087	0.000	0.00	0.000	1.564	1.564	0.000	0.00	0.000	4.787	4.039	0.748	1.09	0.817	1.305	1.258	0.047	3.35	0.157	0.492	0.486	0.006	2.82	0.017	0.992

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Pavement					Bridge					Safety					Mobility					Freight					Total Risk Factored Performance Area Benefit
				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	
CS10E.32	Mescal WB Climbing Lane	296-299	13.471	0.087	0.043	0.044	4.44	0.195	1.564	1.564	0.000	0.00	0.000	4.787	4.676	0.111	1.09	0.121	1.305	1.194	0.111	2.73	0.303	0.492	0.491	0.001	2.82	0.003	0.623
CS10E.33	Dragoon Safety Improvements	317-318	0.598	0.000	0.000	0.000	0.00	0.000	2.125	2.125	0.000	0.00	0.000	1.095	1.022	0.073	2.53	0.185	0.753	0.676	0.077	1.90	0.147	0.294	0.281	0.013	2.94	0.038	0.370
CS10E.34	Dragoon EB Climbing Lane	317-318	6.360	0.000	0.000	0.000	4.87	0.000	2.125	2.125	0.000	0.00	0.000	1.095	1.036	0.059	2.53	0.149	0.753	0.706	0.047	1.90	0.089	0.294	0.283	0.011	2.94	0.032	0.271
CS10E.35	Exit 318 Lighting Improvements	318	0.304	0.000	0.000	0.000	0.00	0.000	2.125	2.125	0.000	0.00	0.000	1.095	1.081	0.014	2.53	0.035	0.753	0.732	0.021	1.90	0.040	0.294	0.283	0.011	2.94	0.032	0.108
CS10E.36a	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	3.436	0.000	0.000	0.000	0.00	0.000	1.117	0.391	0.726	2.76	2.004	0.979	0.979	0.000	2.45	0.000	0.668	0.667	0.001	1.90	0.002	1.005	0.618	0.387	2.99	1.157	3.163
CS10E.36b	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	7.270	0.000	0.000	0.000	0.00	0.000	1.117	1.117	0.000	0.00	0.000	0.979	0.988	-0.009	2.15	-0.019	0.668	0.692	-0.024	1.90	-0.046	1.005	0.637	0.368	2.99	1.101	1.036
CS10E.36c	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	1.497	0.000	0.000	0.000	0.00	0.000	1.117	1.117	0.000	0.00	0.000	0.979	0.949	0.030	2.15	0.065	0.668	0.622	0.046	1.90	0.087	1.005	0.775	0.230	2.99	0.688	0.840
CS10E.37	Page Ranch Rd Safety Improvements	354-358	2.053	0.028	0.000	0.028	0.00	0.000	1.231	1.231	0.000	0.00	0.000	2.781	1.339	1.442	1.38	1.988	0.547	0.519	0.028	1.81	0.051	0.640	0.575	0.065	2.10	0.137	2.175
CS10E.38	Exit 355 Lighting Improvements	355	0.208	0.028	0.028	0.000	0.00	0.000	1.231	1.231	0.000	0.00	0.000	2.781	2.622	0.159	1.38	0.219	0.547	0.544	0.003	0.98	0.003	0.640	0.630	0.010	2.10	0.021	0.243
CS10E.39a	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.475	0.000	0.000	0.000	0.00	0.000	1.054	0.378	0.676	0.81	0.548	0.798	0.798	0.000	1.46	0.000	0.746	0.746	0.000	3.96	0.000	0.870	0.544	0.326	4.93	1.608	2.156
CS10E.39b	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.640	0.000	0.000	0.000	0.00	0.000	1.054	1.054	0.000	0.00	0.000	0.798	0.798	0.000	1.46	0.000	0.746	0.746	0.000	3.96	0.000	0.870	0.544	0.326	4.93	1.608	1.608
CS10E.39c	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	1.21	0.000	0.000	0.000	0.00	0.000	1.054	1.054	0.000	0.00	0.000	0.798	0.798	0.000	0.86	0.000	0.746	0.746	0.000	3.96	0.000	0.870	0.592	0.278	4.93	1.371	1.371
CS10E.40a	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.266	0.000	0.000	0.000	0.00	0.000	1.054	0.540	0.514	0.81	0.416	0.798	0.798	0.000	0.86	0.000	0.746	0.746	0.000	3.96	0.000	0.870	0.544	0.326	4.93	1.608	2.024
CS10E.40b	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.640	0.000	0.000	0.000	0.00	0.000	1.054	1.054	0.000	0.00	0.000	0.798	0.798	0.000	0.86	0.000	0.746	0.746	0.000	3.96	0.000	0.870	0.544	0.326	4.93	1.608	1.608
CS10E.40c	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	1.306	0.000	0.000	0.000	0.00	0.000	1.054	1.054	0.000	0.00	0.000	0.798	0.798	0.000	0.86	0.000	0.746	0.746	0.000	3.96	0.000	0.870	0.646	0.224	4.93	1.105	1.105

Emphasis Area Scoring

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Safety Emphasis Area						Mobility Emphasis Area						Frieght Emphasis Area					
				Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score
CS10E.1	Wild Horse Pass to SR 587 Lighting Improvements	163-176	8.722	4.329	4.310	0.019	1.99	1.50	0.058	1.166	1.166	0.000	0.00	1.50	0.000	0.779	0.773	0.006	2.56	1.50	0.022
CS10E.1_1	Wild Horse Pass to SR 587 Lighting Improvements	163-164	0.674	2.165	2.164	0.001	1.93	1.50	0.002	0.583	0.583	0.000	4.27	1.50	0.000	0.389	0.389	0.000	4.89	1.50	0.001
CS10E.1_2	Wild Horse Pass to SR 587 Lighting Improvements	164-176	8.048	2.165	2.146	0.019	1.99	1.50	0.056	0.583	0.583	0.000	3.20	1.50	0.000	0.389	0.384	0.006	2.52	1.50	0.021
CS10E.2	Riggs Rd to Casa Grande General Purpose Lane	167-184	202.796	2.165	2.139	0.026	1.99	1.50	0.077	0.583	0.491	0.092	3.20	1.50	0.442	0.389	0.369	0.020	2.52	1.50	0.077
CS10E.3a	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	3.009	2.165	2.164	0.001	1.99	1.50	0.002	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.3b	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	7.27	2.165	2.164	0.001	1.99	1.50	0.002	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.3c	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	1.243	2.165	2.161	0.004	1.99	1.50	0.011	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.388	0.001	2.52	1.50	0.004
CS10E.4a	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	2.951	2.165	2.165	0.000	1.99	1.50	0.000	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.4b	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	7.27	2.165	2.165	0.000	1.99	1.50	-0.001	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.4c	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	1.21	2.165	2.164	0.000	1.99	1.50	0.001	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.5a	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.317	2.165	2.165	0.000	1.99	1.50	0.000	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.5b	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.64	2.165	2.165	0.000	1.99	1.50	0.000	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.5c	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	1.21	2.165	2.164	0.000	1.99	1.50	0.001	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.6a	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	4.431	2.165	2.165	0.000	1.99	1.50	0.000	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.6b	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	7.27	2.165	2.165	0.000	1.99	1.50	-0.001	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Safety Emphasis Area						Mobility Emphasis Area						Frieght Emphasis Area					
				Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score
CS10E.6c	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	1.21	2.165	2.165	0.000	1.99	1.50	0.000	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.7a	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	2.891	2.165	2.164	0.001	1.99	1.50	0.002	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.7b	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	7.27	2.165	2.166	-0.001	1.99	1.50	-0.004	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.389	0.000	2.52	1.50	0.001
CS10E.7c	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	1.21	2.165	2.161	0.004	1.99	1.50	0.012	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.388	0.001	2.52	1.50	0.004
CS10E.8	Casa Grande EB Shoulder Widening	183-184	0.613	2.165	2.149	0.015	1.99	1.50	0.045	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.387	0.002	2.52	1.50	0.009
CS10E.9	Casa Grande Lighting Improvements	183-190	4.708	2.165	-	0.015	1.75	1.50	0.040	0.583	-	0.000	0.00	1.50	0.000	0.389	-	0.003	2.43	1.50	0.012
CS10E.9_2	Casa Grande Lighting Improvements	183-184	0.674	2.165	2.161	0.004	1.99	1.50	0.012	0.583	0.583	0.000	2.01	1.50	0.000	0.389	0.388	0.001	2.52	1.50	0.004
CS10E.9_3	Casa Grande Lighting Improvements	184-190	4.034	2.165	2.154	0.011	1.67	1.50	0.028	0.583	0.583	0.000	3.15	1.50	0.000	0.389	0.387	0.002	2.38	1.50	0.008
CS10E.10	Casa Grande Safety Improvements	184-190	3.029	2.165	2.108	0.057	1.67	1.50	0.141	0.583	0.583	0.000	3.15	1.50	0.000	0.389	0.379	0.011	2.38	1.50	0.039
CS10E.11a	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	3.206	2.165	2.165	0.000	1.67	1.50	0.000	0.583	0.583	0.000	1.89	1.50	0.000	0.389	0.389	0.000	2.38	1.50	0.000
CS10E.11b	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	7.24	2.165	2.165	0.000	1.67	1.50	0.000	0.583	0.583	0.000	1.89	1.50	0.000	0.389	0.389	0.000	2.38	1.50	0.000
CS10E.11c	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	1.21	2.165	2.165	0.000	1.67	1.50	0.000	0.583	0.583	0.000	1.89	1.50	0.000	0.389	0.389	0.000	2.38	1.50	0.000
CS10E.12a	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	2.474	2.165	2.164	0.001	1.67	1.50	0.002	0.583	0.583	0.000	1.89	1.50	0.000	0.389	0.389	0.000	2.38	1.50	0.000
CS10E.12b	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	7.27	2.165	2.167	-0.002	1.67	1.50	-0.005	0.583	0.583	0.000	1.89	1.50	0.000	0.389	0.389	0.000	2.38	1.50	0.000
CS10E.12c	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	1.645	2.165	2.158	0.006	1.67	1.50	0.016	0.583	0.583	0.000	1.89	1.50	0.000	0.389	0.388	0.001	2.38	1.50	0.005

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Safety Emphasis Area						Mobility Emphasis Area						Frieght Emphasis Area					
				Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score
CS10E.13a	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	4.192	2.165	2.165	0.000	1.57	1.50	0.000	0.583	0.583	0.000	1.97	1.50	0.000	0.389	0.389	0.000	2.75	1.50	0.001
CS10E.13b	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	7.27	2.165	2.165	0.000	1.57	1.50	0.000	0.583	0.583	0.000	1.97	1.50	0.000	0.389	0.389	0.000	2.75	1.50	0.001
CS10E.13c	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	1.306	2.165	2.165	0.000	1.57	1.50	0.000	0.583	0.583	0.000	1.97	1.50	0.000	0.389	0.389	0.000	2.75	1.50	0.001
CS10E.14a	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	4.201	2.165	2.165	0.000	1.57	1.50	0.000	0.583	0.583	0.000	1.97	1.50	0.000	0.389	0.389	0.000	2.75	1.50	0.001
CS10E.14b	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	7.27	2.165	2.165	0.000	1.57	1.50	0.000	0.583	0.583	0.000	1.97	1.50	0.000	0.389	0.389	0.000	2.75	1.50	0.001
CS10E.14c	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	1.358	2.165	2.165	0.000	1.57	1.50	0.000	0.583	0.583	0.000	1.97	1.50	0.000	0.389	0.389	0.000	2.75	1.50	0.001
CS10E.17a	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	2.78	2.165	2.164	0.001	1.61	1.50	0.002	0.583	0.583	0.000	1.91	1.50	0.000	0.389	0.389	0.000	2.84	1.50	0.000
CS10E.17b	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	3.64	2.165	2.165	0.000	1.61	1.50	0.000	0.583	0.583	0.000	1.91	1.50	0.000	0.389	0.389	0.000	2.84	1.50	0.000
CS10E.17c	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	1.21	2.165	2.158	0.006	1.61	1.50	0.015	0.583	0.583	0.000	1.91	1.50	0.000	0.389	0.388	0.002	2.84	1.50	0.008
CS10E.18	Marana Safety Improvements	237-242	2.661	2.165	2.123	0.042	1.77	1.50	0.111	0.583	0.583	0.000	3.10	1.50	0.000	0.389	0.380	0.010	2.59	1.50	0.038
CS10E.19	Marana Lighting Improvements	237-242	6.71	2.165	2.136	0.029	1.77	1.50	0.077	0.583	0.583	0.000	3.10	1.50	0.000	0.389	0.383	0.007	2.59	1.50	0.026
CS10E.20	Marana Pedestrian Improvements	237-242	1.962	2.165	2.146	0.019	1.77	1.50	0.050	0.583	0.583	0.000	3.10	1.50	0.000	0.389	0.385	0.004	2.59	1.50	0.016
CS10E.21a	Tucson Mobility, Safety, and Freight Improvements	248-252	100.924	2.165	2.160	0.005	1.96	1.50	0.015	0.583	0.544	0.039	5.00	1.50	0.294	0.389	0.385	0.005	4.89	1.50	0.035
CS10E.21b	Tucson Mobility, Safety, and Freight Improvements	248-252	64.606	2.165	2.153	0.011	1.96	1.50	0.033	0.583	0.510	0.073	5.00	1.50	0.545	0.389	0.384	0.006	4.89	1.50	0.041
CS10E.21c	Tucson Mobility, Safety, and Freight Improvements	248-262	10.44	4.329	4.319	0.010	1.99	1.50	0.031	1.166	1.116	0.051	0.00	1.50	0.379	0.779	0.775	0.004	4.91	1.50	0.027

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Safety Emphasis Area						Mobility Emphasis Area						Frieght Emphasis Area					
				Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score
CS10E.21c_7	Tucson Mobility, Safety, and Freight Improvements	248-255	5.22	2.165	2.164	0.001	1.96	1.50	0.002	0.583	0.556	0.027	5.00	1.50	0.204	0.389	0.387	0.002	4.89	1.50	0.017
CS10E.21c_8	Tucson Mobility, Safety, and Freight Improvements	255-262	5.22	2.165	2.155	0.010	1.99	1.50	0.029	0.583	0.560	0.023	4.99	1.50	0.176	0.389	0.388	0.001	4.95	1.50	0.010
CS10E.22	Tuscon Pedestrian Safety Improvements	257-258	2.618	2.165	2.128	0.037	1.99	1.50	0.109	0.583	0.583	0.000	4.59	1.50	0.000	0.389	0.382	0.007	4.95	1.50	0.053
CS10E.23	East Tuscon Pedestrian Safety Improvements	262-264	2.407	2.165	2.136	0.028	1.87	1.50	0.080	0.583	0.583	0.000	3.01	1.50	0.000	0.389	0.381	0.008	4.73	1.50	0.056
CS10E.24a	East Tucson Mobility, Safety, and Freight Improvements	262-274	175.373	2.165	2.151	0.014	1.87	1.50	0.040	0.583	0.498	0.085	3.50	1.50	0.447	0.389	0.378	0.012	4.73	1.50	0.083
CS10E.24b	East Tucson Mobility, Safety, and Freight Improvements	262-274	90.988	2.165	2.133	0.031	1.87	1.50	0.088	0.583	0.531	0.052	3.50	1.50	0.274	0.389	0.376	0.013	4.73	1.50	0.091
CS10E.24c	East Tucson Mobility, Safety, and Freight Improvements	262-274	17.022	2.165	2.101	0.064	1.87	1.50	0.180	0.583	0.571	0.012	3.50	1.50	0.063	0.389	0.370	0.019	4.73	1.50	0.135
CS10E.27	East Tucson Lighting Improvements	263-274	14.768	2.165	2.148	0.017	1.87	1.50	0.047	0.583	0.583	0.000	3.50	1.50	0.000	0.389	0.385	0.004	4.73	1.50	0.031
CS10E.28a	Vail Mobility and Safety Improvements	274-279	41.55	2.165	2.147	0.018	2.51	1.50	0.067	0.583	0.549	0.034	3.29	1.50	0.169	0.389	0.381	0.008	2.64	1.50	0.032
CS10E.28b	Vail Mobility and Safety Improvements	274-286	16.326	4.329	4.205	0.124	2.43	1.50	0.453	1.166	1.166	0.000	0.00	1.50	0.000	0.779	0.755	0.024	2.79	1.50	0.101
CS10E.28b_10	Vail Mobility and Safety Improvements	274-280	8.163	2.165	2.093	0.072	2.51	1.50	0.271	0.583	0.583	0.000	3.29	1.50	0.000	0.389	0.379	0.011	2.64	1.50	0.042
CS10E.28b_11	Vail Mobility and Safety Improvements	280-286	8.163	2.165	2.112	0.052	2.32	1.50	0.182	0.583	0.583	0.000	3.94	1.50	0.000	0.389	0.376	0.013	2.91	1.50	0.058
CS10E.29	Vail Lighting Improvements	275-279	0.628	2.165	2.164	0.001	1.91	1.50	0.003	0.583	0.583	0.000	3.09	1.50	0.000	0.389	0.389	0.000	2.64	1.50	0.000
CS10E.30	Mescal EB Climbing Lane	293-296	13.471	2.165	2.103	0.061	1.09	1.50	0.101	0.583	0.583	0.000	2.73	1.50	0.000	0.389	0.380	0.010	2.82	1.50	0.041
CS10E.31	Mescal Shoulder Widening	293-299	7.636	2.165	2.144	0.020	1.09	1.50	0.033	0.583	0.568	0.015	3.35	1.50	0.077	0.389	0.387	0.002	2.82	1.50	0.009

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Safety Emphasis Area						Mobility Emphasis Area						Frieght Emphasis Area					
				Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score	Existing Corridor Need	Post-Solution Corridor Need	Raw Score	Risk Factor	Emphasis Factor	Factored Score
CS10E.32	Mescal WB Climbing Lane	296-299	13.471	2.165	2.156	0.009	1.09	1.50	0.015	0.583	0.568	0.015	2.73	1.50	0.063	0.389	0.388	0.001	2.82	1.50	0.006
CS10E.33	Dragoon Safety Improvements	317-318	0.598	2.165	2.149	0.015	2.53	1.50	0.059	0.583	0.583	0.000	1.90	1.50	0.000	0.389	0.383	0.007	2.94	1.50	0.029
CS10E.34	Dragoon EB Climbing Lane	317-318	6.36	2.165	2.152	0.012	2.53	1.50	0.046	0.583	0.583	0.000	1.90	1.50	0.000	0.389	0.387	0.003	2.94	1.50	0.012
CS10E.35	Exit 318 Lighting Improvements	318	0.304	2.165	2.161	0.004	2.53	1.50	0.013	0.583	0.583	0.000	1.90	1.50	0.000	0.389	0.388	0.002	2.94	1.50	0.007
CS10E.36a	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	3.436	2.165	2.165	0.000	2.45	1.50	0.000	0.583	0.583	0.000	1.90	1.50	0.000	0.389	0.389	0.000	2.99	1.50	0.000
CS10E.36b	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	7.27	2.165	2.165	0.000	2.15	1.50	0.000	0.583	0.583	0.000	1.90	1.50	0.000	0.389	0.389	0.000	2.99	1.50	0.001
CS10E.36c	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	1.497	2.165	2.165	0.000	2.15	1.50	0.000	0.583	0.583	0.000	1.90	1.50	0.000	0.389	0.384	0.005	2.99	1.50	0.023
CS10E.37	Page Ranch Rd Safety Improvements	354-358	2.053	2.165	2.094	0.071	1.38	1.50	0.147	0.583	0.583	0.000	1.81	1.50	0.000	0.389	0.369	0.021	2.10	1.50	0.065
CS10E.38	Exit 355 Lighting Improvements	355	0.208	2.165	2.153	0.011	1.38	1.50	0.023	0.583	0.583	0.000	0.98	1.50	0.000	0.389	0.386	0.003	2.10	1.50	0.010
CS10E.39a	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.475	2.165	2.165	0.000	1.46	1.50	0.000	0.583	0.583	0.000	3.96	1.50	0.000	0.389	0.389	0.000	4.93	1.50	0.002
CS10E.39b	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.64	2.165	2.165	0.000	1.46	1.50	0.000	0.583	0.583	0.000	3.96	1.50	0.000	0.389	0.389	0.000	4.93	1.50	0.002
CS10E.39c	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	1.21	2.165	2.165	0.000	0.86	1.50	0.000	0.583	0.583	0.000	3.96	1.50	0.000	0.389	0.389	0.000	4.93	1.50	0.002
CS10E.40a	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.266	2.165	2.165	0.000	0.86	1.50	0.000	0.583	0.583	0.000	3.96	1.50	0.000	0.389	0.389	0.000	4.93	1.50	0.002
CS10E.40b	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.64	2.165	2.165	0.000	0.86	1.50	0.000	0.583	0.583	0.000	3.96	1.50	0.000	0.389	0.389	0.000	4.93	1.50	0.002
CS10E.40c	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	1.306	2.165	2.165	0.000	0.86	1.50	0.000	0.583	0.583	0.000	3.96	1.50	0.000	0.389	0.389	0.000	4.93	1.50	0.002

Performance Effectiveness Scoring

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Total Factored Benefit	VMT Factor	NPV Factor	Performance Effectiveness Score	miles	2014 ADT	1-way or 2-way	VMT
CS10E.1	Wild Horse Pass to SR 587 Lighting Improvements	163-176	8.722	1.112	5.00	15.3	9.8	13.00	141864	2	731948.00
CS10E.1_1	Wild Horse Pass to SR 587 Lighting Improvements	163-164	0.674	0.227	3.53	15.3	18.2	1.00	88220	2	88220
CS10E.1_2	Wild Horse Pass to SR 587 Lighting Improvements	164-176	8.048	0.885	5.00	15.3	8.4	12.00	53644	2	643728
CS10E.2	Riggs Rd to Casa Grande General Purpose Lane	167-184	202.796	16.126	5.00	20.2	8.0	17.00	53644	2	911948
CS10E.3a	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	3.009	1.652	0.88	30.6	14.8	0.26	53644	2	13947.44
CS10E.3b	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	7.27	1.036	0.88	20.2	2.5	0.26	53644	2	13947.44
CS10E.3c	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	1.243	0.978	0.88	15.3	10.6	0.26	53644	2	13947.44
CS10E.4a	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	2.951	1.629	0.88	30.6	14.9	0.26	53644	2	13947.44
CS10E.4b	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	7.27	0.996	0.88	20.2	2.4	0.26	53644	2	13947.44
CS10E.4c	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	1.21	0.948	0.88	15.3	10.6	0.26	53644	2	13947.44
CS10E.5a	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.317	1.878	0.88	30.6	15.3	0.26	53644	2	13947.44
CS10E.5b	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.64	1.004	0.88	20.2	4.9	0.26	53644	2	13947.44
CS10E.5c	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	1.21	0.925	0.88	15.3	10.3	0.26	53644	2	13947.44
CS10E.6a	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	4.431	2.111	0.97	30.6	14.2	0.29	53644	2	15556.76
CS10E.6b	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	7.27	0.998	0.97	20.2	2.7	0.29	53644	2	15556.76

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Total Factored Benefit	VMT Factor	NPV Factor	Performance Effectiveness Score	miles	2014 ADT	1-way or 2-way	VMT
CS10E.6c	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	1.21	0.957	0.97	15.3	11.8	0.29	53644	2	15556.76
CS10E.7a	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	2.891	2.027	0.88	30.6	18.9	0.26	53644	2	13947.44
CS10E.7b	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	7.27	0.946	0.88	20.2	2.3	0.26	53644	2	13947.44
CS10E.7c	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	1.21	0.991	0.88	15.3	11.0	0.26	53644	2	13947.44
CS10E.8	Casa Grande EB Shoulder Widening	183-184	0.613	0.706	1.56	15.3	27.4	1.00	53644	1	26822
CS10E.9	Casa Grande Lighting Improvements	183-190	4.708	0.613	4.95	15.3	9.9	7.00	99972	2	331612
CS10E.9_2	Casa Grande Lighting Improvements	183-184	0.674	0.196	2.63	15.3	11.7	1.00	53644	2	53644
CS10E.9_3	Casa Grande Lighting Improvements	184-190	4.034	0.418	4.90	15.3	7.8	6.00	46328	2	277968
CS10E.10	Casa Grande Safety Improvements	184-190	3.029	2.105	4.90	15.3	52.1	6.00	46328	2	277968
CS10E.11a	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	3.206	1.857	0.77	30.6	13.7	0.26	46328	2	12045.28
CS10E.11b	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	7.24	1.034	0.77	20.2	2.2	0.26	46328	2	12045.28
CS10E.11c	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	1.21	0.969	0.77	15.3	9.4	0.26	46328	2	12045.28
CS10E.12a	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	2.474	1.454	0.74	30.6	13.4	0.25	46328	2	11582
CS10E.12b	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	7.27	0.961	0.74	20.2	2.0	0.25	46328	2	11582
CS10E.12c	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	1.645	0.592	0.74	15.3	4.1	0.25	46328	2	11582

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Total Factored Benefit	VMT Factor	NPV Factor	Performance Effectiveness Score	miles	2014 ADT	1-way or 2-way	VMT
CS10E.13a	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	4.192	2.023	0.72	30.6	10.6	0.28	39982	2	11194.96
CS10E.13b	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	7.27	1.030	0.72	20.2	2.1	0.28	39982	2	11194.96
CS10E.13c	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	1.306	0.749	0.72	15.3	6.3	0.28	39982	2	11194.96
CS10E.14a	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	4.201	1.761	0.72	30.6	9.2	0.28	39982	2	11194.96
CS10E.14b	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	7.27	1.030	0.72	20.2	2.1	0.28	39982	2	11194.96
CS10E.14c	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	1.358	0.683	0.72	15.3	5.5	0.28	39982	2	11194.96
CS10E.17a	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	2.78	6.479	0.69	30.6	49.0	0.25	42524	2	10631
CS10E.17b	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	3.64	0.773	0.69	20.2	2.9	0.25	42524	2	10631
CS10E.17c	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	1.21	1.185	0.69	15.3	10.3	0.25	42524	2	10631
CS10E.18	Marana Safety Improvements	237-242	2.661	2.836	4.89	15.3	79.8	5.00	55535	2	277675
CS10E.19	Marana Lighting Improvements	237-242	6.71	1.860	4.89	15.3	20.8	5.00	55535	2	277675
CS10E.20	Marana Pedestrian Improvements	237-242	1.962	1.114	4.89	15.3	42.5	5.00	55535	2	277675
CS10E.21a	Tucson Mobility, Safety, and Freight Improvements	248-252	100.924	12.796	5.00	20.2	12.8	7.00	102618	2	718326
CS10E.21b	Tucson Mobility, Safety, and Freight Improvements	248-252	64.606	8.514	5.00	20.2	13.3	7.00	102618	2	718326
CS10E.21c	Tucson Mobility, Safety, and Freight Improvements	248-262	10.44	12.957	5.00	15.3	94.9	14.00	116546	2	1631644

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Total Factored Benefit	VMT Factor	NPV Factor	Performance Effectiveness Score	miles	2014 ADT	1-way or 2-way	VMT
CS10E.21c_7	Tucson Mobility, Safety, and Freight Improvements	248-255	5.22	6.095	5.00	15.3	89.3	7.00	102618	2	718326
CS10E.21c_8	Tucson Mobility, Safety, and Freight Improvements	255-262	5.22	6.862	5.00	15.3	100.6	7.00	130474	2	913318
CS10E.22	Tuscon Pedestrian Safety Improvements	257-258	2.618	3.477	2.79	15.3	56.6	1.00	58609	2	58609
CS10E.23	East Tuscon Pedestrian Safety Improvements	262-264	2.407	2.493	4.02	15.3	63.7	2.00	58609	2	117218
CS10E.24a	East Tucson Mobility, Safety, and Freight Improvements	262-274	175.373	12.381	5.00	20.2	7.1	12.00	58609	2	703308
CS10E.24b	East Tucson Mobility, Safety, and Freight Improvements	262-274	90.988	10.007	5.00	20.2	11.1	12.00	58609	2	703308
CS10E.24c	East Tucson Mobility, Safety, and Freight Improvements	262-274	17.022	8.621	5.00	15.3	38.7	12.00	58609	2	703308
CS10E.27	East Tucson Lighting Improvements	263-274	14.768	1.365	5.00	15.3	7.1	11.00	58609	2	644699
CS10E.28a	Vail Mobility and Safety Improvements	274-279	41.55	4.771	4.78	20.2	11.1	6.00	37715	2	226290
CS10E.28b	Vail Mobility and Safety Improvements	274-286	16.326	13.653	4.98	15.3	63.7	12.00	32456	2	389472
CS10E.28b_10	Vail Mobility and Safety Improvements	274-280	8.163	9.255	4.78	15.3	83.0	6.00	37715	2	226290
CS10E.28b_11	Vail Mobility and Safety Improvements	280-286	8.163	4.397	4.48	15.3	36.9	6.00	27197	2	163182
CS10E.29	Vail Lighting Improvements	275-279	0.628	0.088	4.39	15.3	9.4	4.00	37715	2	150860
CS10E.30	Mescal EB Climbing Lane	293-296	13.471	0.818	4.09	20.2	5.0	6.00	20465	2	122790
CS10E.31	Mescal Shoulder Widening	293-299	7.636	1.111	1.74	15.3	3.9	3.00	20465	1	30697.5

Candidate Solution #	Candidate Solution Name	Milepost Location	Estimated Cost ($ millions)	Total Factored Benefit	VMT Factor	NPV Factor	Performance Effectiveness Score	miles	2014 ADT	1-way or 2-way	VMT
CS10E.32	Mescal WB Climbing Lane	296-299	13.471	0.707	1.74	20.2	1.8	3.00	20465	1	30697.5
CS10E.33	Dragoon Safety Improvements	317-318	0.598	0.457	1.01	15.3	11.8	1.00	16218	2	16218
CS10E.34	Dragoon EB Climbing Lane	317-318	6.36	0.330	1.01	20.2	1.1	1.00	16218	2	16218
CS10E.35	Exit 318 Lighting Improvements	318	0.304	0.128	1.01	15.3	6.5	1.00	16218	2	16218
CS10E.36a	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	3.436	3.163	0.25	30.6	7.1	0.26	14328	2	3725.28
CS10E.36b	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	7.27	1.037	0.25	20.2	0.7	0.26	14328	2	3725.28
CS10E.36c	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	1.497	0.862	0.25	15.3	2.2	0.26	14328	2	3725.28
CS10E.37	Page Ranch Rd Safety Improvements	354-358	2.053	2.387	0.76	15.3	13.6	1.00	11930	2	11930
CS10E.38	Exit 355 Lighting Improvements	355	0.208	0.276	0.76	15.3	15.5	1.00	11930	2	11930
CS10E.39a	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.475	2.157	0.22	30.6	4.3	0.26	12730	2	3309.8
CS10E.39b	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.64	1.610	0.22	20.2	2.0	0.26	12730	2	3309.8
CS10E.39c	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	1.21	1.373	0.22	15.3	3.9	0.26	12730	2	3309.8
CS10E.40a	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.266	2.026	0.22	30.6	4.3	0.26	12730	2	3309.8
CS10E.40b	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.64	1.610	0.22	20.2	2.0	0.26	12730	2	3309.8
CS10E.40c	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	1.306	1.106	0.22	15.3	2.9	0.26	12730	2	3309.8

APPENDIX F: 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			
CS10E.1	Wild Horse Pass to SR 587 Lighting Improvements	163-176	8.722	0.000	0.0%	0.000	0.0%	0.936	84.1%	0.083	7.5%	0.093	8.4%	1.112	1.14	1.51	1.78	1.36	1.36	1.713	1.70	**28.4**
CS10E.1_1	Wild Horse Pass to SR 587 Lighting Improvements	163-164	0.674	0.000	0.0%	0.000	0.0%	0.099	43.5%	0.064	28.2%	0.064	28.3%	0.227	1.14	1.51	1.78	1.36	1.36	1.543	1.77	**49.7**
CS10E.1_2	Wild Horse Pass to SR 587 Lighting Improvements	164-176	8.048	0.000	0.0%	0.000	0.0%	0.837	94.6%	0.019	2.2%	0.029	3.3%	0.885	1.14	1.51	1.78	1.36	1.36	1.757	1.69	**25.0**
CS10E.2	Riggs Rd to Casa Grande General Purpose Lane	167-184	202.796	2.962	18.4%	4.047	25.1%	1.036	6.4%	7.985	49.5%	0.097	0.6%	16.126	1.14	1.51	1.78	1.36	1.36	1.384	1.69	**18.8**
CS10E.3a	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	3.009	0.000	0.0%	0.616	37.3%	0.030	1.8%	0.002	0.1%	1.004	60.8%	1.652	1.14	1.51	1.78	1.36	1.36	1.423	1.69	**35.6**
CS10E.3b	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	7.27	0.000	0.0%	0.000	0.0%	0.030	2.9%	0.002	0.2%	1.004	96.9%	1.036	1.14	1.51	1.78	1.36	1.36	1.372	1.69	**5.9**
CS10E.3c	Goodyear Rd UP (#1149) Bridge Vertical Clearance Mitigation	169.85	1.243	0.000	0.0%	0.000	0.0%	0.164	16.7%	0.004	0.4%	0.811	82.8%	0.978	1.14	1.51	1.78	1.36	1.36	1.430	1.69	**25.7**
CS10E.4a	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	2.951	0.000	0.0%	0.620	38.1%	0.004	0.3%	0.000	0.0%	1.004	61.7%	1.629	1.14	1.51	1.78	1.36	1.36	1.418	1.69	**35.7**
CS10E.4b	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	7.27	0.000	0.0%	0.000	0.0%	-0.009	-0.9%	0.000	0.0%	1.004	100.9%	0.996	1.14	1.51	1.78	1.36	1.36	1.356	1.69	**5.6**
CS10E.4c	Nelson Rd UP (#1213) Bridge Vertical Clearance Mitigation	174.63	1.21	0.000	0.0%	0.000	0.0%	0.017	1.8%	0.002	0.2%	0.929	98.0%	0.948	1.14	1.51	1.78	1.36	1.36	1.368	1.69	**24.4**
CS10E.5a	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.317	0.000	0.0%	0.870	46.3%	0.004	0.2%	0.000	0.0%	1.004	53.5%	1.878	1.14	1.51	1.78	1.36	1.36	1.430	1.69	**37.0**
CS10E.5b	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	3.64	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.004	100.0%	1.004	1.14	1.51	1.78	1.36	1.36	1.360	1.69	**11.3**
CS10E.5c	Casa Blanca TI UP (#1214) Bridge Vertical Clearance Mitigation	175.81	1.21	0.000	0.0%	0.000	0.0%	0.017	1.8%	0.002	0.2%	0.906	97.9%	0.925	1.14	1.51	1.78	1.36	1.36	1.368	1.69	**23.8**
CS10E.6a	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	4.431	0.000	0.0%	1.102	52.2%	0.004	0.2%	0.000	0.0%	1.004	47.6%	2.111	1.14	1.51	1.78	1.36	1.36	1.439	1.69	**34.5**
CS10E.6b	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	7.27	0.000	0.0%	0.000	0.0%	-0.007	-0.7%	0.000	0.0%	1.004	100.7%	0.998	1.14	1.51	1.78	1.36	1.36	1.357	1.69	**6.2**

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			
CS10E.6c	Gas Line Rd UP (#1215) Bridge Vertical Clearance Mitigation	177.76	1.21	0.000	0.0%	0.000	0.0%	0.006	0.6%	0.000	0.0%	0.951	99.4%	0.957	1.14	1.51	1.78	1.36	1.36	1.363	1.69	**27.1**
CS10E.7a	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	2.891	0.000	0.0%	0.991	48.9%	0.030	1.5%	0.002	0.1%	1.004	49.5%	2.027	1.14	1.51	1.78	1.36	1.36	1.440	1.69	**46.1**
CS10E.7b	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	7.27	0.000	0.0%	0.000	0.0%	-0.055	-5.9%	0.000	0.0%	1.002	105.9%	0.946	1.14	1.51	1.78	1.36	1.36	1.335	1.69	**5.2**
CS10E.7c	Seed Farm Rd UP (#1216) Bridge Vertical Clearance Mitigation	179.37	1.21	0.000	0.0%	0.000	0.0%	0.177	17.8%	0.004	0.4%	0.811	81.8%	0.991	1.14	1.51	1.78	1.36	1.36	1.435	1.69	**26.8**
CS10E.8	Casa Grande EB Shoulder Widening	183-184	0.613	0.000	0.0%	0.000	0.0%	0.687	97.4%	0.004	0.6%	0.014	2.0%	0.706	1.14	1.51	1.78	1.36	1.36	1.769	1.69	**82.0**
CS10E.9	Casa Grande Lighting Improvements	183-190	4.708	0.000	0.0%	0.000	0.0%	0.588	95.9%	0.010	1.7%	0.015	2.4%	0.613	1.14	1.51	1.78	1.36	1.36	1.763	1.16	**20.3**
CS10E.9_2	Casa Grande Lighting Improvements	183-184	0.674	0.000	0.0%	0.000	0.0%	0.187	95.8%	0.004	2.1%	0.004	2.2%	0.196	1.14	1.51	1.78	1.36	1.36	1.762	1.69	**34.8**
CS10E.9_3	Casa Grande Lighting Improvements	184-190	4.034	0.000	0.0%	0.000	0.0%	0.401	96.0%	0.006	1.5%	0.010	2.5%	0.418	1.14	1.51	1.78	1.36	1.36	1.763	1.08	**14.7**
CS10E.10	Casa Grande Safety Improvements	184-190	3.029	0.000	0.0%	0.000	0.0%	2.007	95.4%	0.038	1.8%	0.060	2.9%	2.105	1.14	1.51	1.78	1.36	1.36	1.760	1.08	**98.7**
CS10E.11a	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	3.206	0.000	0.0%	0.824	44.3%	0.000	0.0%	0.000	0.0%	1.034	55.7%	1.857	1.14	1.51	1.78	1.36	1.36	1.427	1.08	**21.0**
CS10E.11b	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	7.24	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.034	100.0%	1.034	1.14	1.51	1.78	1.36	1.36	1.360	1.08	**3.3**
CS10E.11c	Val Vista Blvd UP (#1151) Bridge Vertical Clearance Mitigation	188.2	1.21	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.969	100.0%	0.969	1.14	1.51	1.78	1.36	1.36	1.360	1.08	**13.8**
CS10E.12a	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	2.474	0.000	0.0%	0.386	26.6%	0.034	2.3%	0.000	0.0%	1.034	71.1%	1.454	1.14	1.51	1.78	1.36	1.36	1.410	1.08	**20.3**
CS10E.12b	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	7.27	0.000	0.0%	0.000	0.0%	-0.068	-7.1%	-0.002	-0.2%	1.031	107.3%	0.961	1.14	1.51	1.78	1.36	1.36	1.330	1.08	**2.8**
CS10E.12c	Cottonwood Lane UP (#1154) Bridge Vertical Clearance Mitigation	193.88	1.645	0.000	0.0%	0.000	0.0%	0.225	38.1%	0.002	0.3%	0.364	61.6%	0.592	1.14	1.51	1.78	1.36	1.36	1.520	1.08	**6.7**

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			
CS10E.13a	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	4.192	0.000	0.0%	0.994	49.1%	0.000	0.0%	0.000	0.0%	1.030	50.9%	2.023	1.14	1.51	1.78	1.36	1.36	1.434	1.23	**18.8**
CS10E.13b	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	7.27	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.030	100.0%	1.030	1.14	1.51	1.78	1.36	1.36	1.360	1.23	**3.5**
CS10E.13c	Battaglia Rd UP (#943) Bridge Vertical Clearance Mitigation	205.45	1.306	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.749	100.0%	0.749	1.14	1.51	1.78	1.36	1.36	1.360	1.23	**10.6**
CS10E.14a	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	4.201	0.000	0.0%	0.731	41.5%	0.000	0.0%	0.000	0.0%	1.030	58.5%	1.761	1.14	1.51	1.78	1.36	1.36	1.422	1.23	**16.2**
CS10E.14b	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	7.27	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.030	100.0%	1.030	1.14	1.51	1.78	1.36	1.36	1.360	1.23	**3.5**
CS10E.14c	Alsdorf Rd UP (#944) Bridge Vertical Clearance Mitigation	207.17	1.358	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.683	100.0%	0.683	1.14	1.51	1.78	1.36	1.36	1.360	1.23	**9.3**
CS10E.17a	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	2.78	0.000	0.0%	5.638	87.0%	0.065	1.0%	0.000	0.0%	0.776	12.0%	6.479	1.14	1.51	1.78	1.36	1.36	1.495	0.77	**56.3**
CS10E.17b	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	3.64	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.773	100.0%	0.773	1.14	1.51	1.78	1.36	1.36	1.360	0.77	**3.1**
CS10E.17c	Pinal Air Park UP (#771) Bridge Vertical Clearance Mitigation	232.02	1.21	0.000	0.0%	0.000	0.0%	0.404	34.1%	0.004	0.3%	0.777	65.6%	1.185	1.14	1.51	1.78	1.36	1.36	1.503	0.77	**11.9**
CS10E.18	Marana Safety Improvements	237-242	2.661	0.000	0.0%	0.000	0.0%	2.557	90.2%	0.046	1.6%	0.232	8.2%	2.836	1.14	1.51	1.78	1.36	1.36	1.739	1.08	**149.4**
CS10E.19	Marana Lighting Improvements	237-242	6.71	0.000	0.0%	0.000	0.0%	1.664	89.5%	0.034	1.8%	0.161	8.7%	1.860	1.14	1.51	1.78	1.36	1.36	1.736	1.08	**38.8**
CS10E.20	Marana Pedestrian Improvements	237-242	1.962	0.000	0.0%	0.000	0.0%	0.987	88.7%	0.022	1.9%	0.105	9.4%	1.114	1.14	1.51	1.78	1.36	1.36	1.732	1.08	**79.3**
CS10E.21a	Tucson Mobility, Safety, and Freight Improvements	248-252	100.924	0.000	0.0%	3.511	27.4%	0.162	1.3%	7.734	60.4%	1.389	10.9%	12.796	1.14	1.51	1.78	1.36	1.36	1.406	1.69	**30.5**
CS10E.21b	Tucson Mobility, Safety, and Freight Improvements	248-252	64.606	0.000	0.0%	1.542	18.1%	0.357	4.2%	4.955	58.2%	1.660	19.5%	8.514	1.14	1.51	1.78	1.36	1.36	1.405	1.69	**31.6**
CS10E.21c	Tucson Mobility, Safety, and Freight Improvements	248-262	10.44	0.000	0.0%	0.000	0.0%	0.235	1.8%	11.970	92.4%	0.752	5.8%	12.957	1.14	1.51	1.78	1.36	1.36	1.368	1.76	**228.7**

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			
CS10E.21c_7	Tucson Mobility, Safety, and Freight Improvements	248-255	5.22	0.000	0.0%	0.000	0.0%	0.014	0.2%	5.458	89.6%	0.623	10.2%	6.095	1.14	1.51	1.78	1.36	1.36	1.361	1.69	**205.7**
CS10E.21c_8	Tucson Mobility, Safety, and Freight Improvements	255-262	5.22	0.000	0.0%	0.000	0.0%	0.222	3.2%	6.512	94.9%	0.129	1.9%	6.862	1.14	1.51	1.78	1.36	1.36	1.374	1.92	**265.6**
CS10E.22	Tuscon Pedestrian Safety Improvements	257-258	2.618	0.000	0.0%	0.000	0.0%	0.661	19.0%	0.698	20.1%	2.118	60.9%	3.477	1.14	1.51	1.78	1.36	1.36	1.440	1.92	**156.8**
CS10E.23	East Tuscon Pedestrian Safety Improvements	262-264	2.407	0.000	0.0%	0.000	0.0%	0.471	18.9%	0.147	5.9%	1.875	75.2%	2.493	1.14	1.51	1.78	1.36	1.36	1.439	1.69	**155.2**
CS10E.24a	East Tucson Mobility, Safety, and Freight Improvements	262-274	175.373	0.000	0.0%	3.970	32.1%	0.225	1.8%	5.445	44.0%	2.741	22.1%	12.381	1.14	1.51	1.78	1.36	1.36	1.416	1.69	**17.1**
CS10E.24b	East Tucson Mobility, Safety, and Freight Improvements	262-274	90.988	0.000	0.0%	1.723	17.2%	0.503	5.0%	4.681	46.8%	3.100	31.0%	10.007	1.14	1.51	1.78	1.36	1.36	1.407	1.69	**26.4**
CS10E.24c	East Tucson Mobility, Safety, and Freight Improvements	262-274	17.022	0.000	0.0%	0.000	0.0%	1.127	13.1%	2.510	29.1%	4.984	57.8%	8.621	1.14	1.51	1.78	1.36	1.36	1.415	1.69	**92.7**
CS10E.27	East Tucson Lighting Improvements	263-274	14.768	0.000	0.0%	0.000	0.0%	0.267	19.6%	0.084	6.2%	1.014	74.3%	1.365	1.14	1.51	1.78	1.36	1.36	1.442	1.69	**17.3**
CS10E.28a	Vail Mobility and Safety Improvements	274-279	41.55	0.000	0.0%	1.714	35.9%	2.189	45.9%	0.751	15.8%	0.116	2.4%	4.771	1.14	1.51	1.78	1.36	1.36	1.607	1.46	**26.1**
CS10E.28b	Vail Mobility and Safety Improvements	274-286	16.326	0.000	0.0%	0.000	0.0%	12.173	89.2%	0.904	6.6%	0.576	4.2%	13.653	1.14	1.51	1.78	1.36	1.36	1.734	1.39	**153.0**
CS10E.28b_10	Vail Mobility and Safety Improvements	274-280	8.163	0.000	0.0%	0.000	0.0%	8.819	95.3%	0.151	1.6%	0.285	3.1%	9.255	1.14	1.51	1.78	1.36	1.36	1.760	1.46	**213.6**
CS10E.28b_11	Vail Mobility and Safety Improvements	280-286	8.163	0.000	0.0%	0.000	0.0%	3.354	76.3%	0.753	17.1%	0.291	6.6%	4.397	1.14	1.51	1.78	1.36	1.36	1.680	1.31	**81.2**
CS10E.29	Vail Lighting Improvements	275-279	0.628	0.000	0.0%	0.000	0.0%	0.085	96.8%	0.000	0.0%	0.003	3.2%	0.088	1.14	1.51	1.78	1.36	1.36	1.767	1.46	**24.2**
CS10E.30	Mescal EB Climbing Lane	293-296	13.471	0.098	12.3%	0.000	0.0%	0.300	37.7%	0.384	48.2%	0.015	1.9%	0.796	1.14	1.51	1.78	1.36	1.36	1.491	1.54	**8.9**
CS10E.31	Mescal Shoulder Widening	293-299	7.636	0.000	0.0%	0.000	0.0%	0.918	81.0%	0.157	13.9%	0.058	5.1%	1.133	1.14	1.51	1.78	1.36	1.36	1.700	1.54	**13.1**

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			
CS10E.32	Mescal WB Climbing Lane	296-299	13.471	0.195	27.6%	0.000	0.0%	0.136	19.2%	0.367	51.8%	0.009	1.3%	0.707	1.14	1.51	1.78	1.36	1.36	1.380	1.54	**3.9**
CS10E.33	Dragoon Safety Improvements	317-318	0.598	0.000	0.0%	0.000	0.0%	0.243	53.2%	0.147	32.1%	0.067	14.7%	0.457	1.14	1.51	1.78	1.36	1.36	1.583	0.92	**17.3**
CS10E.34	Dragoon EB Climbing Lane	317-318	6.36	0.000	0.0%	0.000	0.0%	0.196	59.3%	0.089	27.1%	0.045	13.5%	0.330	1.14	1.51	1.78	1.36	1.36	1.609	0.92	**1.6**
CS10E.35	Exit 318 Lighting Improvements	318	0.304	0.000	0.0%	0.000	0.0%	0.049	37.9%	0.040	31.1%	0.040	30.9%	0.128	1.14	1.51	1.78	1.36	1.36	1.519	0.92	**9.2**
CS10E.36a	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	3.436	0.000	0.0%	2.004	63.3%	0.000	0.0%	0.002	0.1%	1.158	36.6%	3.163	1.14	1.51	1.78	1.36	1.36	1.455	0.85	**8.7**
CS10E.36b	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	7.27	0.000	0.0%	0.000	0.0%	-0.019	-1.9%	-0.046	-4.4%	1.102	106.3%	1.037	1.14	1.51	1.78	1.36	1.36	1.352	0.85	**0.8**
CS10E.36c	Airport Rd UP (#1114) Bridge Vertical Clearance Mitigation	339.46	1.497	0.000	0.0%	0.000	0.0%	0.065	7.5%	0.087	10.1%	0.710	82.4%	0.862	1.14	1.51	1.78	1.36	1.36	1.391	0.85	**2.6**
CS10E.37	Page Ranch Rd Safety Improvements	354-358	2.053	0.000	0.0%	0.000	0.0%	2.135	89.4%	0.051	2.1%	0.201	8.4%	2.387	1.14	1.51	1.78	1.36	1.36	1.736	1.23	**29.0**
CS10E.38	Exit 355 Lighting Improvements	355	0.208	0.000	0.0%	0.000	0.0%	0.243	87.8%	0.003	1.1%	0.031	11.2%	0.276	1.14	1.51	1.78	1.36	1.36	1.729	1.23	**33.1**
CS10E.39a	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.475	0.000	0.0%	0.548	25.4%	0.000	0.0%	0.000	0.0%	1.610	74.6%	2.157	1.14	1.51	1.78	1.36	1.36	1.398	0.62	**3.7**
CS10E.39b	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	3.64	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.610	100.0%	1.610	1.14	1.51	1.78	1.36	1.36	1.360	0.62	**1.7**
CS10E.39c	W San Simon TI UP (#1164) Bridge Vertical Clearance Mitigation	378.93	1.21	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.373	100.0%	1.373	1.14	1.51	1.78	1.36	1.36	1.360	0.62	**3.3**
CS10E.40a	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.266	0.000	0.0%	0.416	20.6%	0.000	0.0%	0.000	0.0%	1.610	79.4%	2.026	1.14	1.51	1.78	1.36	1.36	1.391	0.62	**3.7**
CS10E.40b	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	3.64	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.610	100.0%	1.610	1.14	1.51	1.78	1.36	1.36	1.360	0.62	**1.7**
CS10E.40c	E San Simon TI UP (#1169) Bridge Vertical Clearance Mitigation	383.35	1.306	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.0%	1.106	100.0%	1.106	1.14	1.51	1.78	1.36	1.36	1.360	0.62	**2.4**