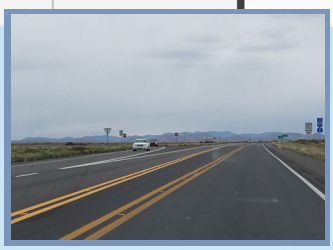
U.S. 70, Safford to New Mexico State Line
Interstate Detour Needs Study

Final Report

December 2019

ADOT Contract # 17-171965
Task # MPD 00018-19



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Acronyms & Abbreviations

AADT	Average Annual Daily Traffic
ADOT	Arizona Department of Transportation
AZDPS	Arizona Department of Public Safety
COG	Council of Government
CR	Cracking Rating
EB	Eastbound
IRI	International Roughness Index
ITS	Intelligent Transportation Systems
LOS	Level of Service
MP	Milepost
MPD	Multimodal Planning Division
MPO	Metropolitan Planning Organization
NMDOT	New Mexico Department of Transportation
NMSP	New Mexico State Police
P2P	Planning to Programming
PARA	Planning Assistance for Rural Areas
PDI	Pavement Distress Index
PIO	Public Information Officer
PSR	Pavement Serviceability Rating
RCB	Reinforced Concrete Box Culvert
RIC	Greater Arizona Recommended Investment Choice
ROW	Right-of-Way
SEAGO	Southeastern Arizona Governments Organization
SR	State Route
TAC	Technical Advisory Committee
V/C	Volume to Capacity
WB	Westbound
WMYA	What Moves You Arizona, Long-Range Plan
U.S.	United States Highway

Appendix

Appendix A: Stakeholder Questionnaire

1.0 Study Purpose and Need

1.1 Introduction

I-10 is a key interstate for travel and commerce. When I-10 closes due to weather conditions or a large-scale crash, I-10 traffic is rerouted to a 107-mile detour along U.S. 191 and U.S. 70.

The U.S. 70 Route Detour Study considers the ADOT MPD Planning to Programming (P2P) Process framework (**Figure 1**) for project scoring and prioritization. Study working papers include the Existing and Future Conditions and Evaluation Criteria Report and the Recommended Improvements Report.

The Existing and Future Conditions and Evaluation Criteria Report examined existing and future corridor assets and operational issues identified by the study team and the Technical Advisory Committee (TAC). The report also identified current inter-agency communication protocols, and physical infrastructure deficiencies impacting the U.S. 70 corridor during I-10 closure and non-closure conditions. Finally, the report outlined infrastructure conditions in four performance areas including Mobility, Safety, Pavement, Bridges, and RCB Culverts.

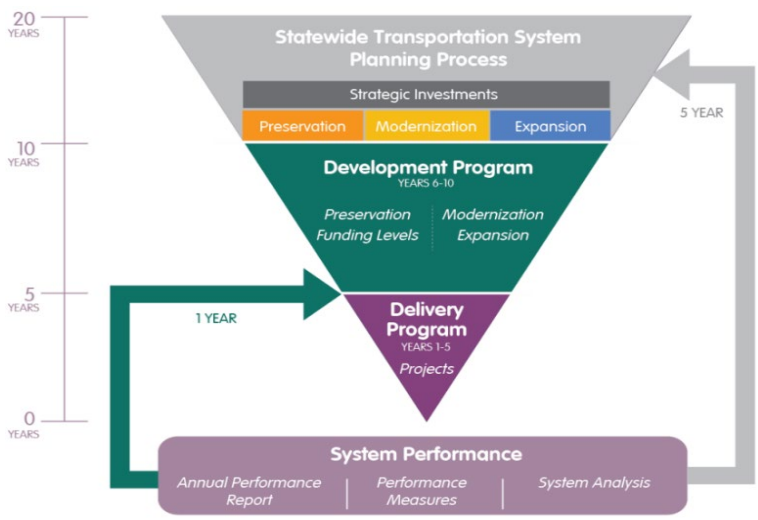


Figure 1: ADOT Performance-Based Planning Process

Interviews were conducted with agency stakeholders affected by the I-10 closure. Inter-agency collaboration improvements with the potential to decrease congestion and improve safety during I-10 detour events were discussed and vetted with the TAC. Inter-agency communication protocol improvements identified as part of this Study are policy based and don't require programming of significant funding, therefore they are not reflected in Study scoring and prioritization processes.

The Recommended Improvements Report identified solutions to address deficiencies in the four main performance areas. Solutions were identified in five-mile segments, and include planning-level cost estimates for design, right-of-way (ROW) acquisition estimates if applicable, and construction costs.

The Final Report intent is to summarize findings of the Existing and Future Conditions and Evaluation Criteria Report in addition to Recommended Improvements Report solutions. The Final Report summarizes study team and TAC consensus reached through the study process, and identifies next steps regarding recommended solutions implementation.

Developing Study solutions included assessing recommendations from previously completed studies. Part of the prioritization process included categorizing recommended infrastructure improvements into two ADOT Long Range Transportation Plan (LRTP) and P2P compliant investment categories (**Figure 2**). Policy evaluation criteria developed by this Study were considered alongside statewide P2P evaluation criteria for prioritization of projects into near, mid, and long-term implementation timeframes. No ADOT Expansion investment category projects were identified by the study process.

Figure 2: U.S. 70 Study P2P Process

Project cost was considered when prioritizing projects by timeframe. Categorization of projects by investment category ensures all infrastructure improvement recommendations are included within the appropriate ADOT P2P investment category when considered for inclusion in the ADOT Five Year Construction Program.

During development of the Existing and Future Conditions and Evaluation Criteria Report, and the Recommended Improvements Report, the study team identified deficiencies along U.S. 70 that led to development of recommended infrastructure improvement solutions. Potential improvements were categorized as infrastructure and inter-agency coordination improvements. Key study team considerations are listed in **Table 1** , and mapped in **Figure 3** and **Figure 4**. All non-detour operational concerns are made significantly worse by detour conditions.

Table 1: Identified Issues (non-closure & closure conditions)

U.S. 70 (Non – Detour Conditions)	U.S. 70 (Detour Conditions)
Poor pavement index	No dynamic messages signs
Low passing visibility	No permanent signage for U.S. 70 reroute
No centerline rumble strips	No shoulders or narrow shoulders not adequate for emergency response teams
Narrow shoulders with rock cuts adjacent to pavement	Bridge and RCB culverts too narrow for emergency response vehicles
Low visibility railroad crossing	U.S. 70 and SR 75 intersection gridlock
Low visibility striping	

Figure 3: Summary of Corridor Issues (Non-Closure Conditions)

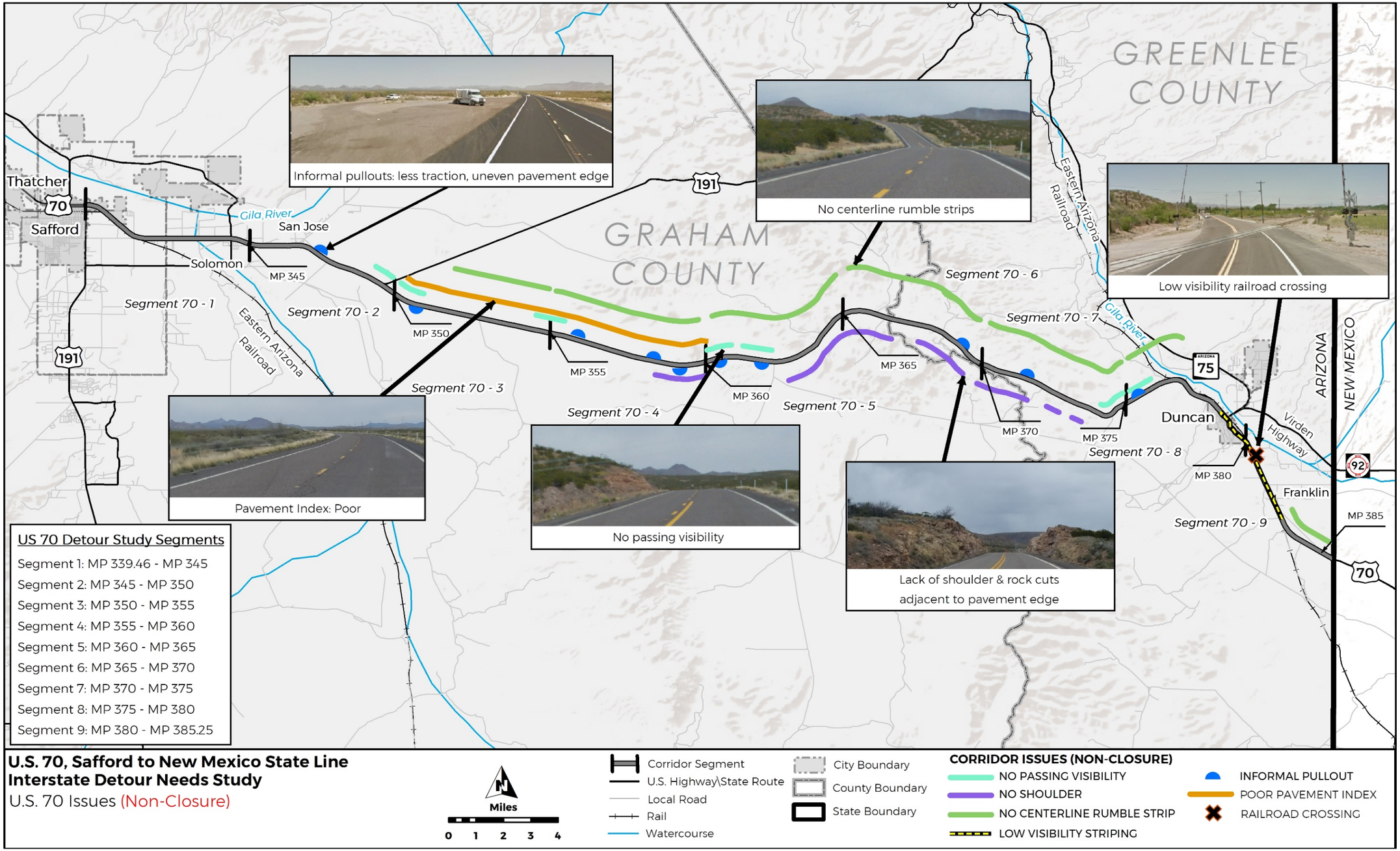
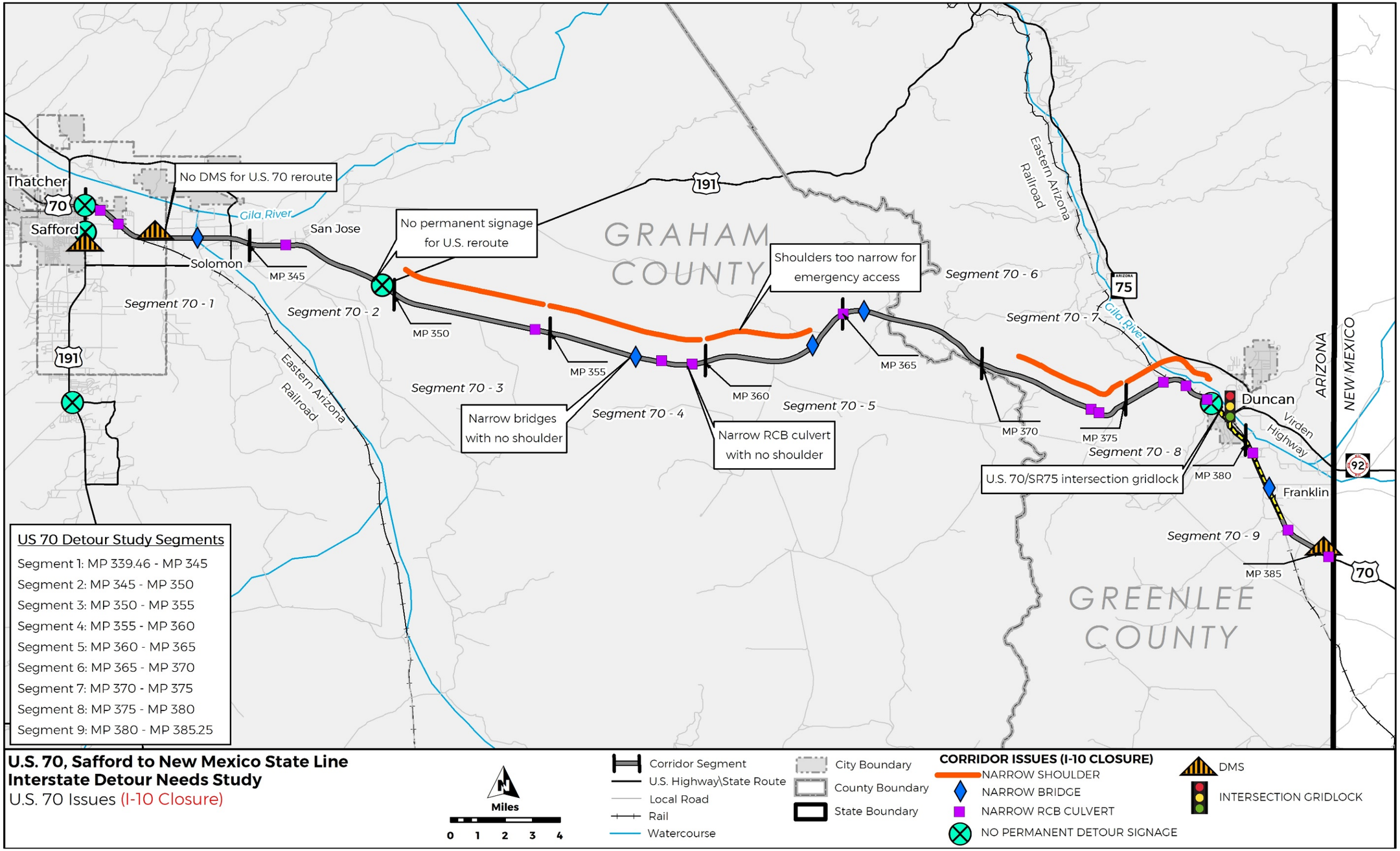


Figure 4: Summary of Corridor Issues (I-10 Closure Conditions)



1.2 Corridor Overview

Location

The study area is in Southeastern Arizona between the City of Safford and the Town of Duncan (**Figure 5**), ending at the New Mexico Stateline (**Figure 6**). The corridor is within two Arizona counties including Graham County and Greenlee County.

Figure 5: Town of Duncan, AZ

The western terminus of the 107-mile I-10 detour starts approximately 3 hours (165 miles) east of Phoenix and 2 hours (130 miles) northeast of Tucson. The detour route includes U.S. 191 travelling northward from the interchange at I-10 milepost (MP) 352 in Arizona to the intersection of U.S. 70/U.S. 191 in Safford, U.S. 70 between Safford and the New Mexico State Line, and the portion of U.S. 70 in New Mexico between the Arizona-New Mexico State Line and Lordsburg, New Mexico (2016 Population 2,463). The U.S. 70 Study focuses on the detour route portion travelling eastward from Safford (2016 Population 9,604) through Graham County, Arizona, Greenlee County, Arizona, and the town of Duncan, Arizona (2016 Population 806) before terminating at the New Mexico State Line.

History: "The Old West Highway"

U.S. Route 70 has been referred to as "The Old West Highway". This name emphasizes the region's history including ranching, mining, and Native American heritage. U.S. Route 70 was commissioned as part of the United States Highway System In 1926 and served as a coast-to-coast route from North Carolina, through Arizona and New Mexico, to Los Angeles, California. In the mid 1960's the western terminus of U.S. Route 70 was extended westward to the California-Arizona border in Ehrenberg, Arizona; However, to eliminate overlap with U.S. Route 60, the western terminus was updated in 1969 and designated in Globe, Arizona.

Figure 6: New Mexico State Line Welcome Sign

U.S. 70 Segment Description

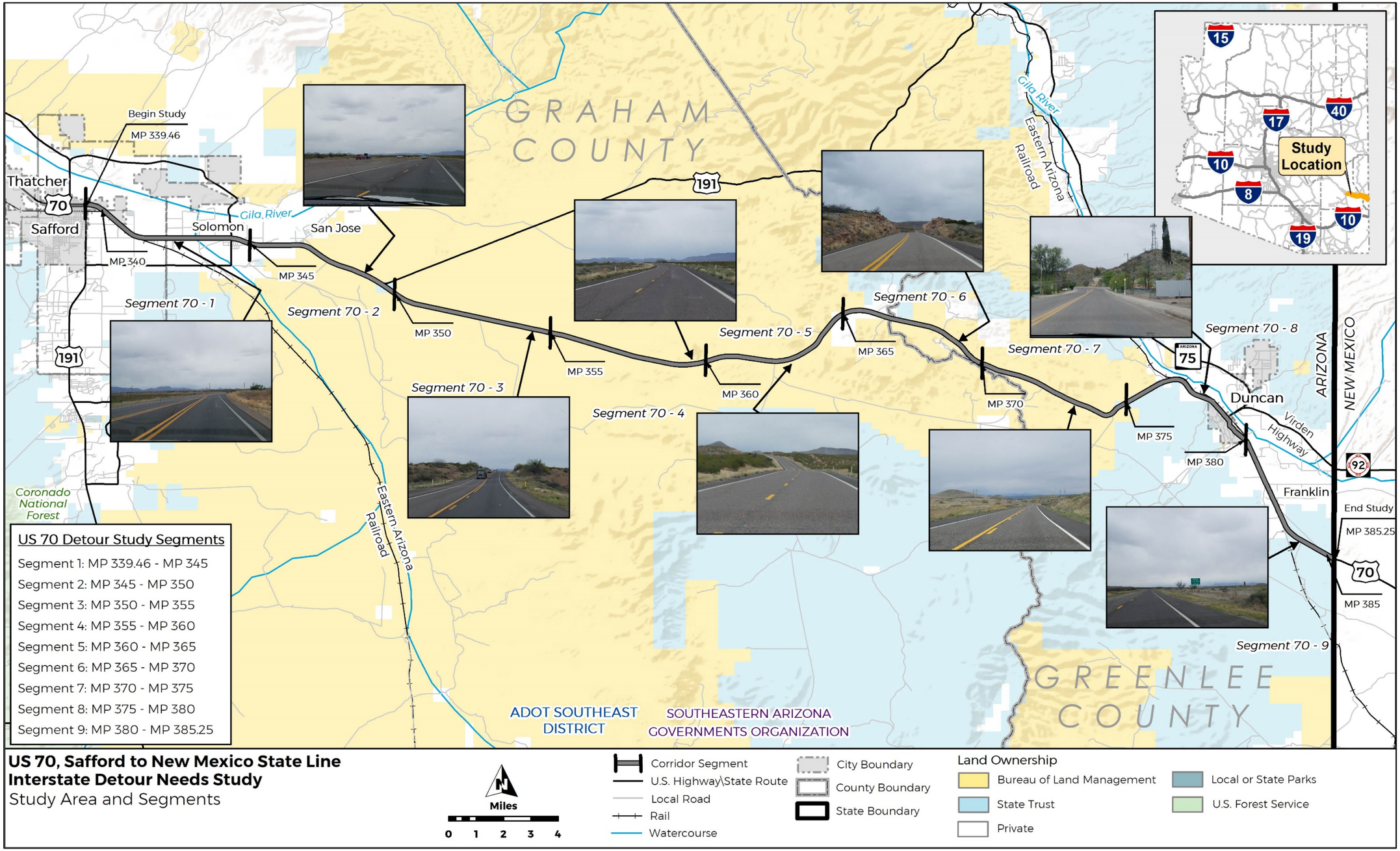
The current 107-mile I-10 detour route includes U.S. 191 from the I-10/U.S. 191 traffic interchange (TI) at milepost 352 (MP) to the U.S. 70/U.S. 191 TI in Safford, AZ, U.S. 70 between Safford and the New Mexico State Line, and the portion of U.S. 70 between the Arizona-New Mexico State Line and Lordsburg, New Mexico.

The study team broke the corridor into nine five-mile segments (**Figure 7**). Breaking the corridor into segments allows for more concise descriptions and in-depth analyses of localized roadway characteristics. **Table 2**: Corridor Segment Descriptions provides a brief description of corridor conditions by segment.

Table 2: Corridor Segment Descriptions

Segment	Description
70-1	• Segment starts at the junction of U.S. 70 and U.S. 191 and heads eastward to MP 345. The first half-mile has two all-purpose lanes per direction then drops to one lane per direction • The surroundings along this segment of U.S. 70 include: - agricultural lands - Solomon and San Jose, Arizona • Residential neighborhoods, and subdivided properties
70-2 **70-3** **70-4**	• Segment begins just east of Solomon, AZ, and ends near the northern edge of State Trust Land-south of U.S. 70 • Within segment, U.S. 191 diverges from U.S. 70 heading north to Clifton, AZ • Segment is surrounded by flat, undeveloped public land managed by the Bureau of Land Management (BLM)
70-5	• Segment is rocky with narrow shoulders, steep embankments, and rock cuts adjacent to the edge of pavement - Shoat Tank Wash Bridge (MP 363.5) and Slick Rock Wash Bridge (MP 365.7) are smaller bridges without shoulders • Includes a 3 percent grade increase with various curves in the roadway alignment
70-6	• Enters Greenlee County, AZ with a down-grade east toward the Gila River
70-7	• A large northeast curve at MP 374 limits horizontal sight distance • Undivided highway with oncoming traffic and no guardrail safety concerns • After a tight curve at MP 377, the corridor travels through a narrow section between a steep hill and private properties adjacent to the Gila River
70-8	• Roadway enters the Town of Duncan, AZ passing schools, local restaurants, retail, residential properties, and local street access points • 30 MPH posted speed limit • U.S. 70 is the primary corridor through the Town of Duncan, AZ, and serves as the town's main street • The intersection of Arizona State Route (SR) 75 and U.S. 70 is in the center of Duncan, AZ
70-9	• Includes Arizona Eastern Railway Clifton Subdivision at-grade rail crossing just east of the town of Duncan, AZ • Includes unincorporated community of Franklin, AZ • Segment crosses Arizona State Trust Land for approximately 3 miles before terminating at the New Mexico State Line

Figure 7: Study Area and Segments



1.3 I-10 Detour and Regional Impact

I-10 traffic detour events impacting Southeast Arizona and Southwest New Mexico adversely burden the traveling public and the regional economy. The detour results in people, goods, and services requiring more time and a greater expenditure of resources to reach their destinations after travelling the 107-mile route. During I-10 road closure and detour events, drivers are exposed to risks and inconveniences, including major losses of time, safety risks due to overloading infrastructure that is inadequate to carry interstate traffic volumes, and a diminished user experience resulting from driving an unfamiliar route that may be disorienting to some users. These factors provoke feelings of driver frustration throughout the detour that may lead to inattentive and sometimes aggressive driving behaviors, further worsening operational conditions. Additionally, truck volumes of up to ten times higher than normal on U.S. 70 pose significant risks to operations and safety along the detour route.

The regional impact of the U.S. 70 and U.S. 191 Interstate Detour directly affects the following ADOT districts, state police agencies, and jurisdictions when I-10 closes:

- Greenlee County, AZ
- Hidalgo County, NM
- City of Safford, AZ
- Town of Duncan, AZ
- City of Lordsburg, NM
- ADOT Southeast District
- New Mexico Department of Transportation (NMDOT) District 1
- Arizona Department of Public Safety (AZDPS)
- New Mexico State Police (NMSP)
- Graham County, AZ

These entities in both Arizona and New Mexico are at the forefront of deciding to close I-10 and reroute traffic to the U.S. 70 and U.S. 191 detour. They are also integral to decision-making associated with deciding to reopen I-10 once unfavorable weather and crash induced less than desirable conditions subside. These agencies play a key role in keeping traffic flowing when I-10 needs to close due to collisions, dust storms or criminal activities. Communities further downstream from I-10 closure points in Arizona and New Mexico also feel the effect of interstate detour events as drivers and freight vehicles aware of negative detour impacts may choose to park and wait rather than utilize the 107-mile detour. Commerce and passenger traffic flows on the vital I-10 link between the primary economic markets of Texas and California are severely hampered during I-10 closures and detour events. For these reasons, detour events negatively impact the local Arizona economy in addition to the broader regional and national economies.

1.4 Detour Alternatives

Considering alternative routes and operational practices to the current I-10 detour was an important first step to determine whether capital infrastructure improvements to U.S. 70 would be necessary, or if an alternate detour route would better serve agency needs and the travelling public. If traffic were to be detoured on another route, there would be little need to prioritize improvements on U.S. 70 and U.S. 191. Additionally, selecting a new detour route for I-10 traffic would relieve strain on the affected communities on the current route. Using an alternative detour route would also preserve U.S. 70 and U.S. 191 infrastructure by reducing wear and tear from detour traffic. The qualitative evaluation matrix (**Table 3**) compares the current detour route with three alternatives. A map of detour alternatives is shown in **Figure 8** which includes:

- Current Detour Route - 107 Miles (U.S. 70/191)
- Alternative B: Southern Detour - 188 Miles (NM SR 146/9/80 | AZ SR 80/U.S. 191)
- Alternative C: North/South Combination Detour - 107/188 Miles (U.S. 70/191) & (NM SR 146/9/80 | AZ SR 80/U.S. 191)
- Alternative D: I-10 Complete Closure, No Traffic Movement

Current Detour Route

The current detour route is a 107-mile route utilizing U.S. 70 and U.S. 191 starting 11 miles east of Willcox at the I-10/U.S. 191 junction travelling through Safford, AZ and Duncan, AZ before returning to I-10 in Lordsburg, NM. Out of all alternatives considered, this is the shortest route. The institutional knowledge of affected agency and jurisdiction personnel and the community awareness of I-10 detours supports the case for using the current detour route as the preferred alternative to continue traffic flow in the event of a prolonged temporary closure of I-10.

Alternative B: Southern Detour

Alternative B is a detour to the south of I-10 starting at the I-10/U.S. 191 junction at MP 331.5. This alternative continues south for 69 miles through the towns of Cochise, AZ, Elfrida, AZ, McNeal, AZ and Douglas, AZ on the Mexican Border. The route then traverses the rural and rugged terrain of Arizona SR 80 to the Arizona-New Mexico State Line. In New Mexico, this alternative passes through the towns of Rodeo, Animas, and Hachita, utilizing SR 80 and SR 9. Finally, Alternative B heads north on SR 146 to rejoin I-10, 28 miles east of Lordsburg, NM. This detour alternative is 188 miles, 81 miles longer than the Current Detour Route. Major downsides to Alternative B include the longer detour distance, the geographical dispersion of police and personnel resources, lack of affected community awareness, and potential conflicts with U.S. Customs and Border Protection operations. Additionally, NMDOT deems SR 80 to be insufficient for handling interstate volumes, therefore it should not be considered a detour alternative.

Alternative C: North/South Combination Detour

Alternative C is a combination of the current detour route and Alternative B. The potential benefit is that traffic could disperse between the two detour routes in this scenario. However, it is logical that most drivers would opt for the shorter 107-mile route on U.S. 70 and U.S. 191. Apart from reducing detour congestion, Alternative C includes all the negative aspects of the first two detour alternatives.

Alternative D: I-10 Complete Closure, No Traffic Movement

Alternative D is a complete closure of I-10 that includes halting traffic on the Interstate 10 mainline with no detour until the interstate is safe to reopen. In this scenario, I-10 would be closed in Arizona at the junction of I-10/U.S. 191, 11 miles east of Willcox and in Lordsburg, NM. While Alternative D would preserve infrastructure along all detour alternatives, traffic would have to sit parked on I-10 for the closure duration. This could lead to drivers potentially waiting for up to 12 hours on the highway in a queue. Once I-10 reopens, traffic would need additional time to resume normal traffic conditions at and adjacent to closure locations on I-10. There would be a huge need for personnel to monitor the traffic until it clears.

Table 3: I-10 Detour Alternatives Qualitative Evaluation Matrix

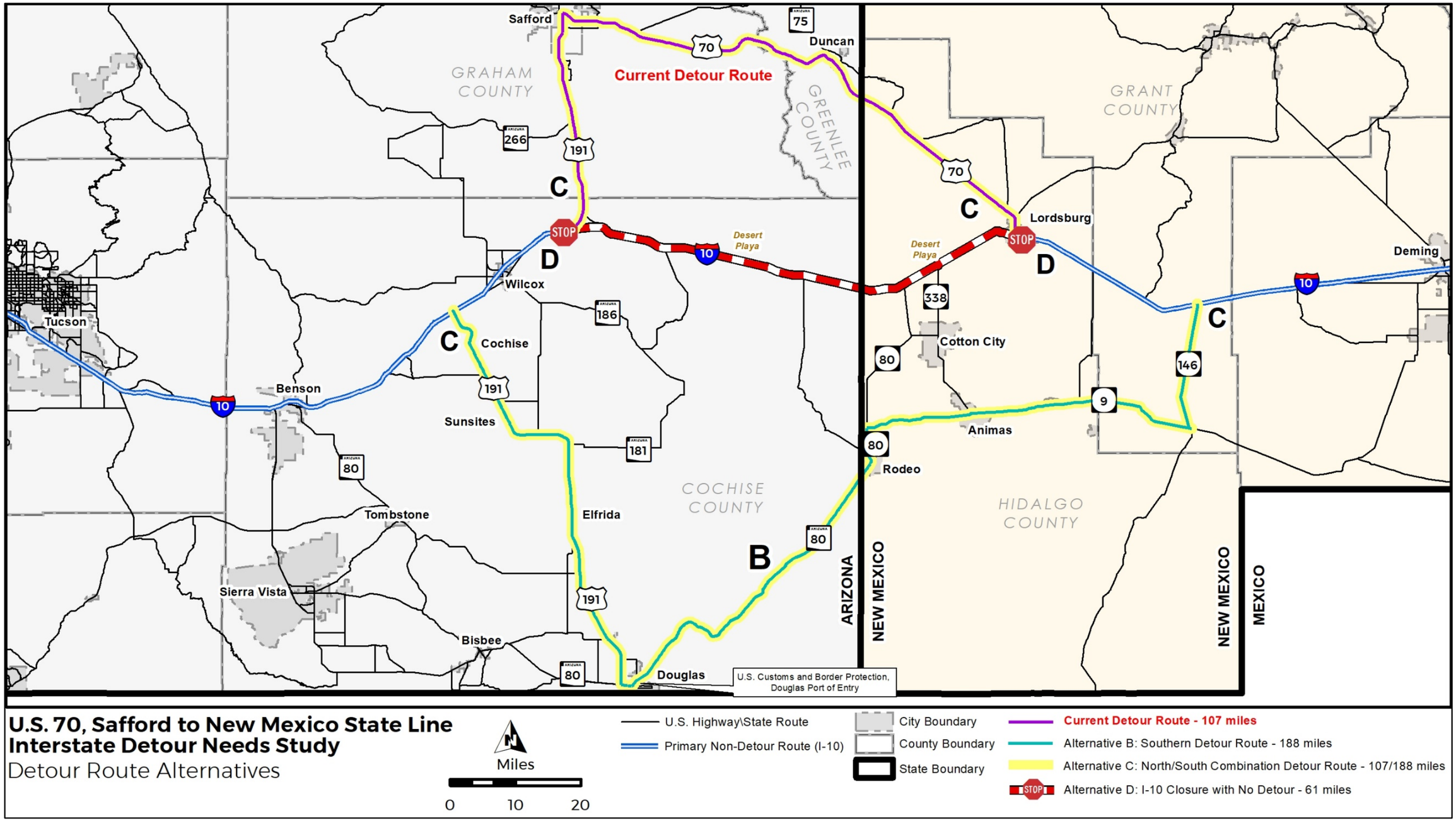
Detour Suitability Metrics	Current Detour Route - 107 Miles (U.S. 70/191)	Alternative B: Southern Detour - 188 Miles (NM SR-146/9/80 | AZ SR-80/U.S. 191)
Agency Resource Coordination	- Impacted Agency Institutional Knowledge - Formal Communication Protocol	- Resources Deployed over Large Distances - No Impacted Agency Institutional Knowledge of Detour - New Mexico Deems SR-80 Insufficient Detour Traffic
Safety	- Detour Traffic Often Moving at Slower Speeds without Serious Crashes, Leading to a Reduction in Crash Severity	- No Services in Extreme Rural Portions - Long Emergency Response Times
Mobility/Congestion	- Traffic Congestion on U.S. 70/191 - Interstate Detour Traffic Still Flows during I-10 Closure	- Traffic Congestion on Arizona and New Mexico Highways - Interstate Detour Traffic Still Flows During I-10 Closure
Infrastructure	- U.S. 70/191 Infrastructure Wears More Quickly	- Infrastructure Wears More Quickly
Distance/Time	- Shortest Detour Route Alternative (107 miles)	- Longest Detour Route Alternative (188 miles)
Local Impact	- Community Awareness of Detour - Least Amount of Local Populations Impacted (18,003)	- Lack of Community Awareness of Detour - Larger Amount of Local Populations Impacted (23,978) - U.S. Customs and Border Protection Operations in Douglas, AZ
Detour Suitability Metrics	**Alternative C: North/South Combination Detour - 107/188 Miles (U.S. 70/191) & (NM SR-146/9/80 | AZ SR-80/U.S. 191)**	**Alternative D: I-10 Closure with No Detour - 61 Miles (I-10 Closed)**
Agency Resource Coordination	- Resources Deployed over Large Distances - No Impacted Agency Institutional Knowledge of Detour - New Mexico Deems SR-80 Insufficient Detour Traffic	- Resources Deployed Only on I-10 - Communication Coordination Last Longer Until Interstate Traffic Reaches Free Flows
Safety	- No Services in Extreme Rural Portions - Long Emergency Response Times	- Cars Parked on I-10 for Long Durations Could Lead to Secondary Crash Incidents
Mobility/Congestion	- Traffic Dispersed over Northern and Southern Alternatives - Interstate Detour Traffic Still Flows during I-10 Closure	- I-10 Remains Congested for Significant Time after Reopening to Clear Traffic Backup - Interstate Traffic Does Not Flow
Infrastructure	- Infrastructure Wears More Quickly, but Last Longer than Northern or Southern Detours Alone	- Infrastructure on Detour Alternatives is Maintained More Easily, and Will Degrade Less Rapidly
Distance/Time	- Includes Both Shortest and Longest Alternatives - Traffic May Congest Northern Alternative Since it is 77 Miles Shorter	- No Extra Distance Traveled - Drivers Waiting on I-10 Tend to Become More Restless than if They Were Moving on a Detour
Local Impact	- Lack of Community Awareness of Detour - Larger Amount of Local Populations Impacted (41,981) - U.S. Customs and Border Protection Operations in Douglas, AZ	- Upstream Communities from I-10 Closure Point (Benson, AZ; Willcox, AZ; Lordsburg, NM; Deming, NM) Could Experience More Traffic Waiting Out Closure

Minimal Impact | Medium Impact | High Impact

Conclusion

The current detour route performs the best in four of the six Detour Suitability Metrics compared to the Alternatives B, C, and D. Only in the Mobility/Congestion and Infrastructure qualitative metrics does it not come out on top. In none of the metrics does it score the worst. Benefits of the current detour route are continuation of I-10 traffic flow, the shortest distance of all detour alternatives, the familiarity of impacted agencies in coordinating a detour onto U.S. 70 and U.S. 191, and the local community awareness of detour operations. Together, these factors confirm the current detour route is the superior alternative for keeping traffic flowing in the event of a temporary I-10 closure.

Figure 8: I-10 Detour Alternatives



2.0 Overview of Approach and Findings

2.1 Data Sources

Summary of Previous Studies

Several studies (**Figure 9**) including regional planning studies, Planning Assistance for Rural Areas (PARA) program studies, and statewide framework studies have been conducted either within the corridor limits of this Study, or on a regional or statewide basis that are applicable to the study area. These studies and reports were used to develop a baseline of information for recommended solutions identified in this Study. A summary of key findings and additional details from the studies can be found in the *Existing and Future Conditions and Evaluation Criteria Report*. The findings were considered for recommended solutions project scope development and inclusion in the *Recommended Improvements Report* completed after the Existing and Future Conditions and Evaluation Criteria Report. The Recommended Improvements Report organized recommendations into ADOT LRTP and P2P investment categories including Preservation, Modernization, and Expansion.

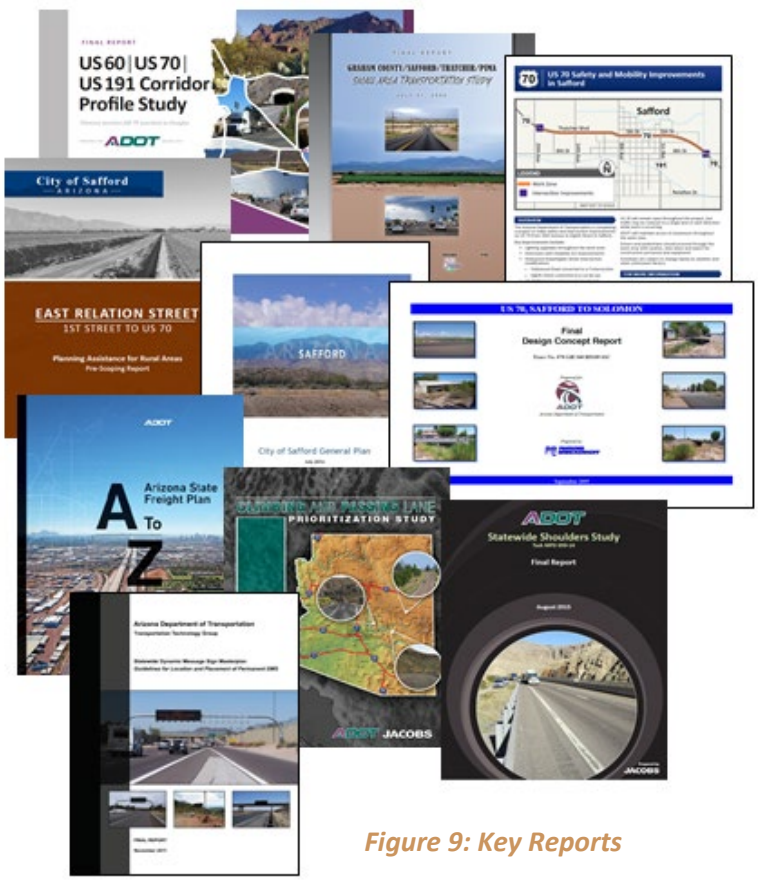


Figure 9: Key Reports

GIS Mapping: Pavement, Bridge, Mobility, Safety, Freight Data

The existing (2017) and future (2035) data for I-10 closure and non-closure conditions came from the Arizona Statewide Travel Demand Model. Crash data is from the ADOT ALISS Crash Database. Pavement and bridge data was taken from ADOT Pavement Management System and ADOT Bridge Inventory databases. Additional assets data including recommendations from previous studies and regional dynamic message signs were digitized using Google Maps.

Field Review

A field review was conducted on Friday, April 12, 2019 to assess the current infrastructure needs of U.S. 70 in four performance areas. The review indicated infrastructure is adequate under normal operating conditions. When considering an I-10 closure, the study team identified several concerns along the corridor that could pose a safety risk. Key findings included a lack of adequate shoulders and guardrails in areas of steep embankments, rock faces adjacent to the edge of pavement, poor sight-distance due to mountainous terrain and curves, and high densities of direct access points on U.S. 70 near the City of Safford, AZ and the Town of Duncan, AZ. A recent pavement project on U.S. 70 was observed from Safford, AZ to MP 350, overriding pavement data received from ADOT. The field review also took note of the intersection of U.S. 70/SR 75 in Duncan, AZ which is key to the town's traffic flow.

2.2 Key Stakeholder and Study Team Findings

Summary of Corridor Performance Analysis

The Existing and Future Conditions and Evaluation Criteria Report analyzed current and future infrastructure performance under normal conditions and during I-10 detour events that lead to traffic being diverted onto U.S. 70 between Safford, AZ and the New Mexico State Line. The four performance analysis areas include Mobility, Safety, Pavement, and Bridge and RCB Culverts.

Mobility

Findings from the Existing and Future Conditions and Evaluation Criteria report indicate U.S. 70 congestion during current and future year 2035 conditions is minimal with Level of Service (LOS) A or B under normal operating (**Figure 10**) conditions. Rerouting of interstate traffic to U.S. 70 during detour events plummets mobility to "Poor" and "Fair" in terms of Mobility Index metrics. Local mobility through the two municipalities of Safford, AZ and Duncan, AZ is especially disrupted under detour conditions.

Figure 10: Non-Detour Conditions, and Access Point Density East of Safford

Mobility performance is the driving analytic metric of the U.S. 70 Interstate Detour Study. Using average annual daily traffic (AADT) data for U.S. 70, Existing volume-to-capacity (V/C) ratios were calculated for both the eastbound (EB) and westbound (WB) directions to derive the LOS for each of the nine segments. Additionally, using projected 2035 AADT data, a Future V/C calculation determined the future LOS for the individual nine segments. Various physical elements of the roadway were considered for each segment of the corridor, and segments in mountainous and rolling terrain have less capacity. For non-closure traffic conditions in existing and future scenarios, performance of U.S. 70

was rated Good (LOS A or B) as seen in **Figure 11.** When I-10 closures cause traffic to reroute to U.S. 70, the 45-mile corridor experiences traffic congestion in both directions because the two-lane undivided roadway configuration does not have capacity to handle detour related traffic volumes. Future V/C during a detour event was calculated by combining 2035 I-10 AADT to projected 2035 U.S. 70 AADT. Projected 2035 U.S. 70 mobility performance is rated LOS D (or less) for all nine Study segments.

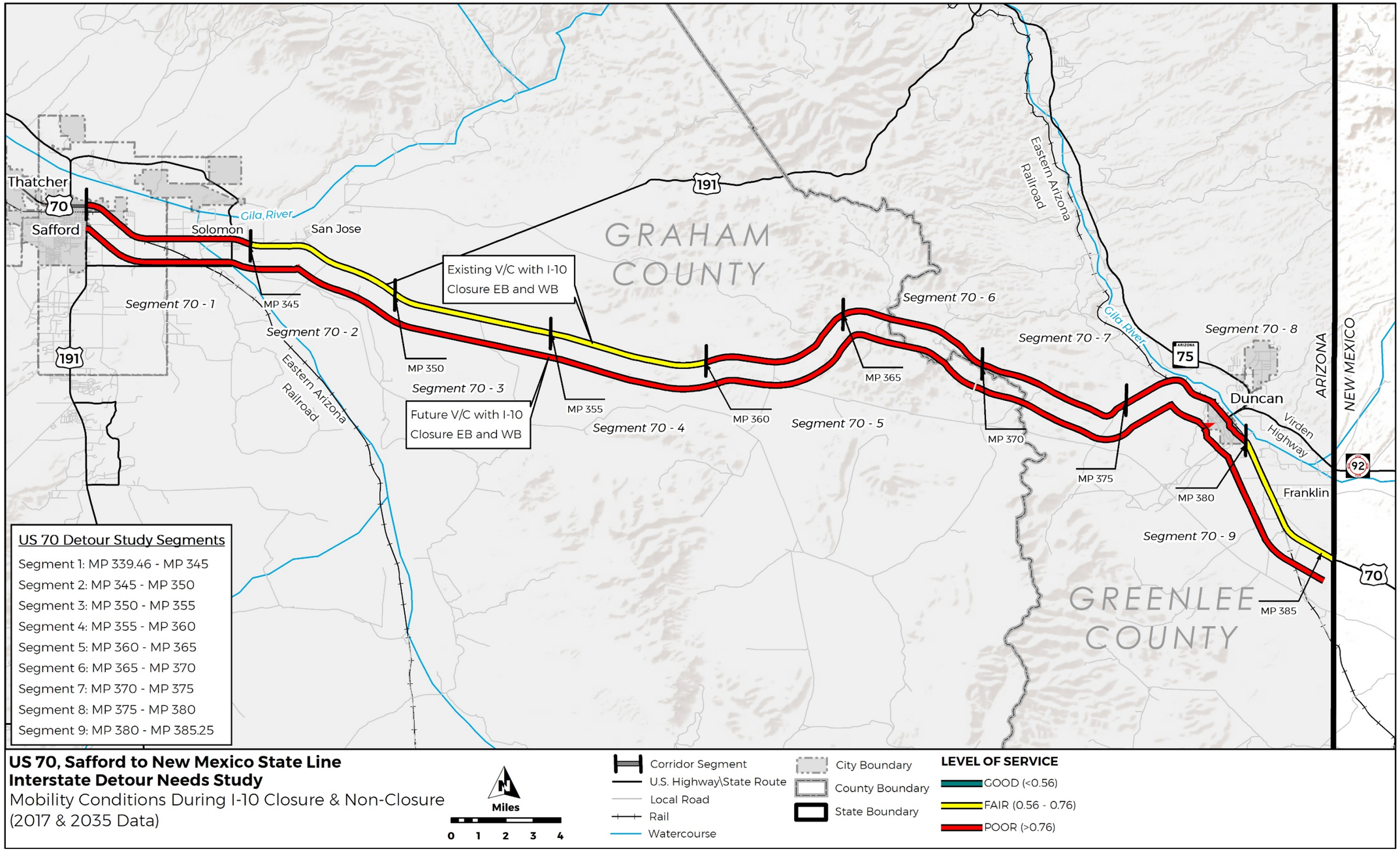
I-10 closure related congestion limits direct access to U.S. 70, and limits turning queues at the intersection of U.S.70/U.S. 191 in Safford, AZ, and U.S 70/SR 75 in Duncan, AZ. Local travel access is limited and daily traffic flow is disrupted when I-10 traffic is rerouted to U.S. 70.

Dynamic Message Signs: During I-10 closures, ADOT and NMDOT utilize DMS to inform drivers of route restriction and the U.S. 70/U.S. 191 Detour Route alternative. Within the region, there are eight DMS along I-10 to inform drivers approaching the U.S. 70/U.S. 191 Detour Route. DMS in **Table 4** are a critical part of informing I-10 users of the freeway closure.

Table 4: I-10 DMS Locations

Westbound DMS	Eastbound DMS
MP 22 in Lordsburg, NM	MP 280.5 at the I-10/SR 83 junction
MP 81.7 in Deming, NM	MP 300.5 west of Benson, AZ
MP 137 west of Las Cruces, NM	MP 321.9 between Benson, AZ and Willcox, AZ
MP 147.8 southeast of Las Cruces, NM	MP 348 just east of Willcox, AZ

Figure 11: Summary of Mobility Performance During Normal Conditions and Detour Events



Safety

Safety needs of the U.S. 70 Study Corridor are concentrated in the rolling, mountainous terrain of segments 70-5, 70-6, and 70-7 from MP 360-375. In these locations, 64 vehicle collisions (**Figure 16**) with roadway embankments, wild animals, and sideswipe or head on collisions between vehicles have occurred with high frequency compared to the rest of the corridor. Additionally, the lack of roadside pull-out areas in mountainous terrain of this section exacerbates already long rural emergency response times to collisions and other safety incidents.

Figure 12: Limited Sight Distance

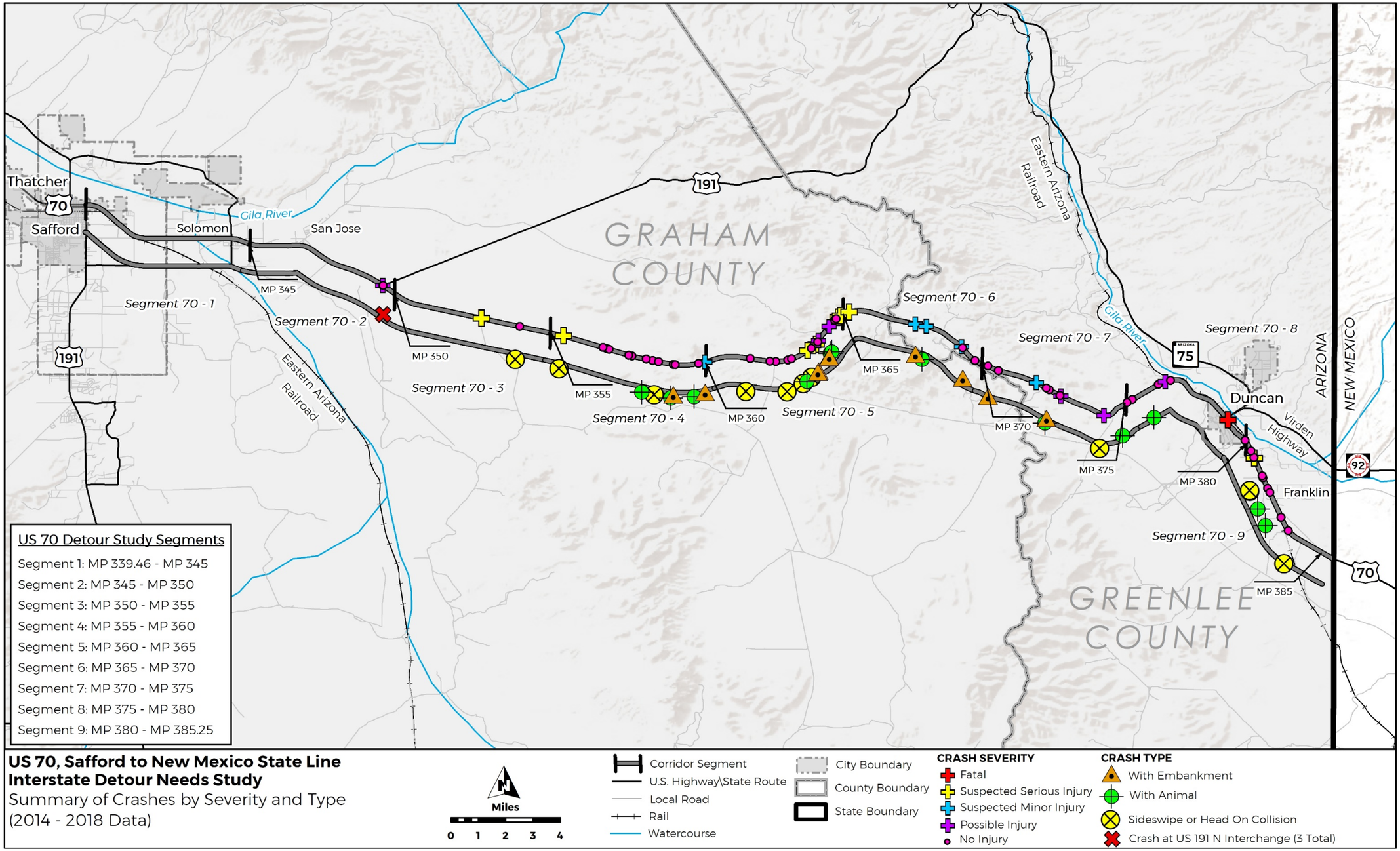
The two-lane undivided roadway configuration of U.S. 70 does not have the capacity to handle I-10 detour traffic volumes. This raises safety concerns, specifically for emergency access and response times between Safford, AZ and the New Mexico State Line. During detours, traffic volumes increase on the corridor and speeds are reduced. The identified safety concerns and highlights along the corridor include poor sight-distance (**Figure 12**) in mountainous areas, animal-related crashes due to open range, rock cuts, and embankments directly adjacent to the edge of pavement (**Figure 13**). All embankment crashes occurred between mileposts 358 and 372 in segments 70-5 and 70-6. Furthermore, the existing, unofficial pull-out areas (**Figure 14**) are utilized for emergency stopping, driver rest periods, and law enforcement staging. During an I-10 detour, rock cuts (**Figure 15**) and embankments also pose a barrier to emergency response vehicles and services that must pass stalled traffic. A lack of shoulders, steep drop-offs, and guardrail between MP 360-375 also limits pull-out areas for vehicles. These factors limit emergency vehicle access in the event of an emergency during an I-10 detour.

Figure 13: Steep Embankment with No Guardrail Protection

Figure 14: Safety Pull-Out Area

Figure 15: Rock Cuts Adjacent to Edge of Pavement

Figure 16: Summary of Crashes by Severity and Type



Pavement

Pavement is in an overall good condition on U.S. 70 between Safford, AZ and the New Mexico State Line, except for the ten-mile section of segments 70-3 and 70-4 from MP 350-360 (**Figure 17**). The pavement between these mileposts is in poor condition and is the location of the greatest pavement rehabilitation need. There are also specific hot spots of pavement in poor condition from MP 351-358 in both directions, further necessitating rehabilitation improvements.

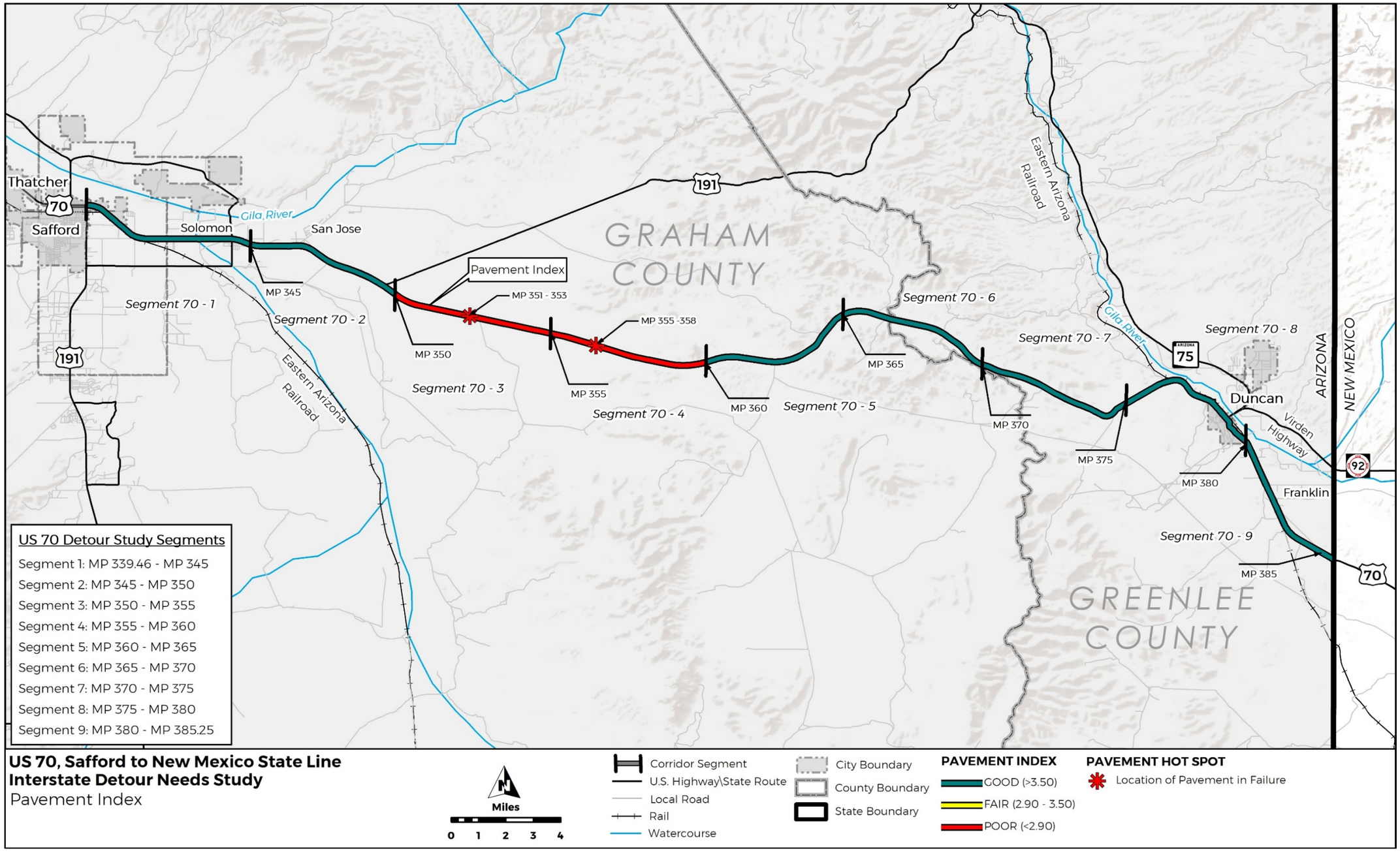
The Pavement Index provides a high-level assessment of corridor pavement conditions by five-mile segment. The Pavement Index is calculated using two pavement condition ratings: Pavement Serviceability Rating (PSR)[1] and the Pavement Distress Index (PDI). The study team performed a thorough Pavement Index analysis and determined most of the corridor was performing at a "fair" status. **Table 5** highlights pavement conditions.

Table 5: Pavement Conditions by Segment

Segment	Conditions
70-3 **70-4**	- Pavement is in "poor" condition - "fair" Directional PSR EB/WB - "fair" for % Pavement Area Failure ratings - Hot spots at MP 351-353 EB/WB, and at MP 355-358 EB/WB
70-6, 70-7, 70-9	- "fair" Directional PSR in just the WB direction

[1] The PSR is extracted from the International Roughness Index (IRI), a measurement of pavement roughness based on field-measured longitudinal roadway profiles. The PDI is extracted from the Cracking Rating (CR), a field-measured sample from each mile of highway.
Three secondary measures (Directional Pavement Serviceability, Pavement Failure, Pavement Hot Spots) provide more detailed information to assess pavement performance. The Directional Pavement Serviceability is a weighted average (based on number of lanes) of the PSR for the pavement in each direction of travel, while Pavement Failure is the percentage of pavement area rated above failure thresholds for IRI or cracking. A Pavement "hot spot" exists where a given one-mile section of roadway rates as being in "poor" condition.

Figure 17: Summary of Pavement Performance



Bridges and RCB Culverts

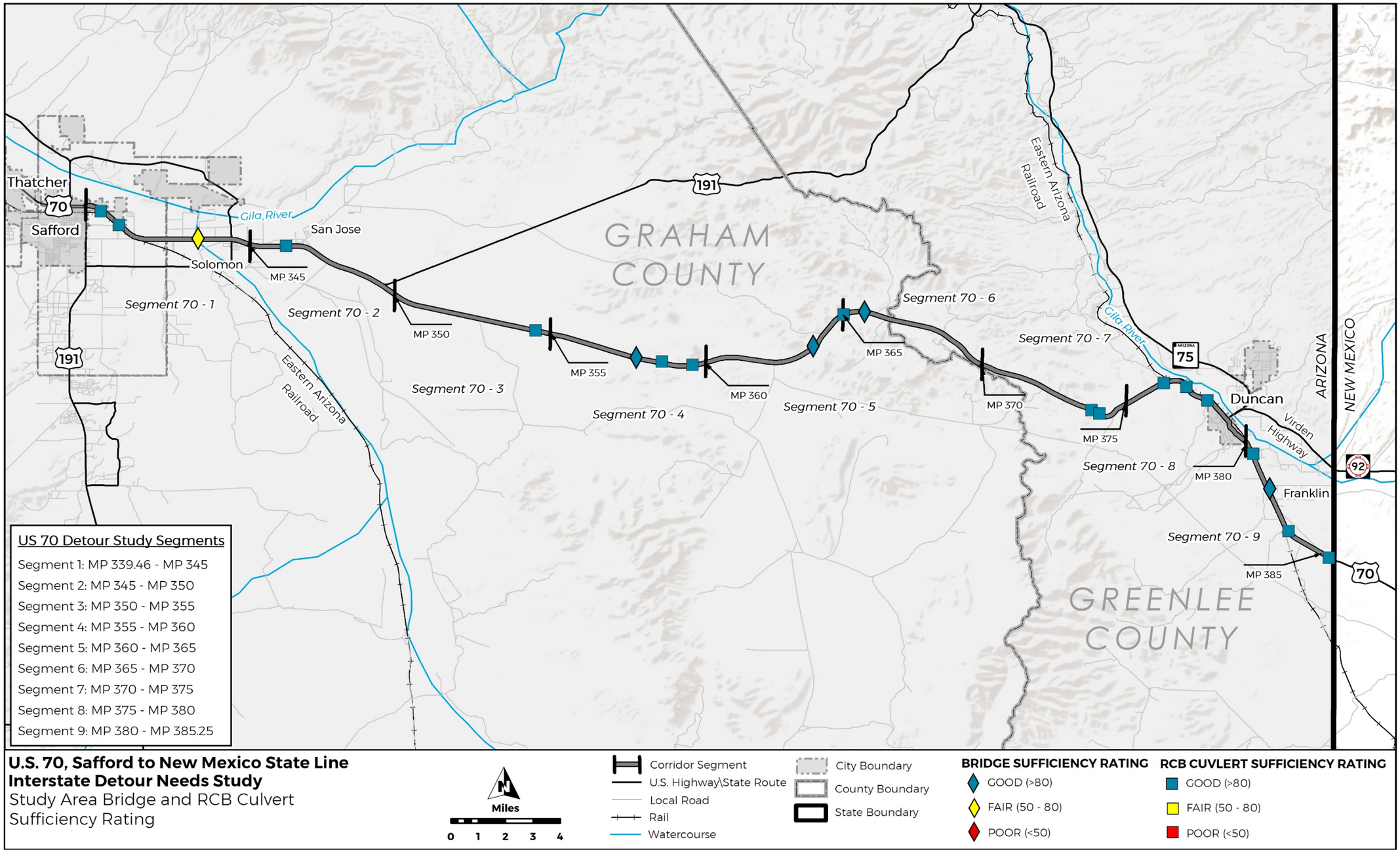
The 5 bridges and 15 RCB culverts on the U.S. 70 Study Corridor (**Figure 20**) are sufficient to handle increased vehicular and freight traffic resulting from detours due to closures on I-10. However, Slick Rock Wash Bridge #1, Shoat Tank Wash Bridge, and Slick Rock Wash Bridge #2 all have operating ratings that indicate Class C oversized load trucks will need ADOT compliance clearance in the foreseeable future if bridge maintenance activities are not complete. Bridges along the U.S. 70 Study Corridor are not built and maintained to the same standards as bridges along interstate routes, therefore maintaining bridges in an acceptable state of good repair is very important for accommodating increased traffic and heavier than usual freight loads during detour events.

Figure 18: Shoat Tank Wash Bridge WB

The study area includes 5 bridges and 15 reinforced concrete box culverts (RCB)s, constructed as early as 1923. The Bridge and RCB Sufficiency Rating is a multi-part rating that includes structural adequacy and safety factors in addition to functional aspects such as traffic volume and detour lengths. The rating also considers the structural and functional sufficiency of each bridge on a 100-point scale. The only structure falling below a good rating and scoring a fair condition is the San Simon River Bridge located at MP 343.37. Per an infrastructure inventory rating analysis, all bridges are sufficient to handle increased vehicular and freight traffic during I-10 detours. Three bridges have an operating rating just above the minimum threshold of 40, and the two remaining bridges and all RCBs have an operating rating far greater than 40 based on current conditions. The higher the rating, the more weight the bridge can handle. If a structure has an operating rating of 40 or greater, then ADOT will issue a Heavy Haul Class C Permit without running any sort of compliance analysis. This assumes the axle weights meet the requirements in the ADOT Class C Permit Code that covers Class C trucks up to 250,000 pounds of gross vehicle weight. Slick Rock Wash Bridge #1 and Shoat Tank Wash Bridge (**Figure 18**) and the Slick Rock Wash Bridge #2 (**Figure 19**) located at MP 365.7 all have operating ratings of 41, 41, and 42 respectively.

Figure 19: Slick Rock Wash Bridge #2

Figure 20: Summary of Bridge and RCB Culvert Performance



Inter-Agency Communications Protocols

If conditions within New Mexico warrant an I-10 closure, NMSP field officers make the closure decision and initiate the chain of closure communication through NMSP Dispatch in Las Cruces, NM. NMSP Dispatch then communicates directly with NMDOT District 1; Hidalgo County, NM Sheriff; Greenlee County, AZ Sheriff; Graham County, AZ Sheriff; AZDPS; and back to the field to activate NMSP officers for detouring interstate traffic onto U.S. 70 in Lordsburg, NM via Motel Drive. Long message relay times between dispatchers and field officers are a significant barrier to communication of I-10 closure and traffic detours onto U.S. 70. The NMSP public information officer coordinates the public messaging effort through social media platforms such as Facebook.

There is no official chain of communication documented for how the ADOT TOC receives notification of an interstate detour onto U.S. 70 and U.S. 191 through Safford, AZ and Duncan, AZ that New Mexico authorities initiate. This can result in immense delays in or absence of DMS messaging of the interstate closure for eastbound traffic on I-10 coming from Phoenix, AZ and Tucson, AZ.

Once an I-10 closure message has been received, NMDOT District 1 activates the westbound DMS on I-10 between the Texas State Line and Lordsburg, NM to inform travelers and freight operators of the interstate detour onto U.S. 70 between New Mexico and Arizona. The District works directly with cities, towns, counties, and law enforcement agencies impacted by I-10 closures to assure there is proper staff in place for redirecting traffic to the detour route. The Hidalgo County, NM Sheriff deploys officers, if available, to assist the effort to maintain smooth operations during detour events. Depending on resource availability, Hidalgo County also makes reverse 911 calls to its residents informing them of local traffic impacts.

Proposed I-10 Closure Protocol

To streamline communication and prevent gaps in information transmittal among affected agencies, this Study documents a new official communication protocol for I-10 closures and subsequent traffic detours onto U.S. 70 and U.S. 191. Per **Figure 21,** incident commanders from AZDPS and NMSP share closure initiator roles after both agencies agree to close I-10 and detour traffic onto U.S. 70 through Safford, AZ and Duncan, AZ due to events within either Arizona or New Mexico. The name and badge number of the initial incident commander must be identified through all interagency communication.

Furthermore, it is recommended that communication is organized by state jurisdiction. AZDPS will only directly inform the ADOT TOC of the I-10 closure and detour, and the NMSP will only directly inform NMSP Dispatch in Las Cruces, NM. ADOT TOC will then initiate DMS messaging for drivers on I-10 in Arizona and will take on the role of contacting the following affected Arizona agencies through an email blast:

- ADOT Southeast District
- Graham County, AZ Sheriff
- Greenlee County, AZ Sheriff
- Cochise County, AZ Sheriff
- Safford, AZ Police Department
- City of Safford, AZ
- Town of Duncan, AZ
- City of Willcox, AZ
- Safford Unified School District
- Duncan Unified School District

The ADOT Southeast District's three affected maintenance districts including the Safford, Three Way, and Willcox maintenance offices receive notification of the interstate detour onto U.S. 191 and U.S. 70 from the ADOT TOC.

Similarly, the NMSP Dispatch in Las Cruces, NM will take on the role of contacting the following affected New Mexico agencies through an email blast during a closure of I-10 and a detour onto U.S. 70:

- NMDOT District 1
- NMDOT District 1 Maintenance
- Lordsburg Patrol Yard Boundary
- Hidalgo County, NM Sheriff
- City of Lordsburg, NM
- Lordsburg Municipal Schools

Proposed I-10 Reopening Protocol

As **Figure 22** shows, the decision to reopen I-10 begins with AZDPS and NMSP incident commanders confirming conditions are operationally safe to reopen I-10 to traffic, ending the detour. It is also recommended the two state law enforcement agencies communicate their decision to reopen I-10 to their respective state DOT agencies at this step. From here, the communication protocol is the same as the proposed closure protocol. AZDPS and NMSP agree to reopen I-10 and inform ADOT TOC and NMSP Dispatch in Las Cruces, NM, respectively. As in the closure protocol, ADOT TOC only contacts Arizona agencies, and NMSP Dispatch only contacts New Mexico agencies.

Figure 21: Proposed I-10 Closure Communication Protocol

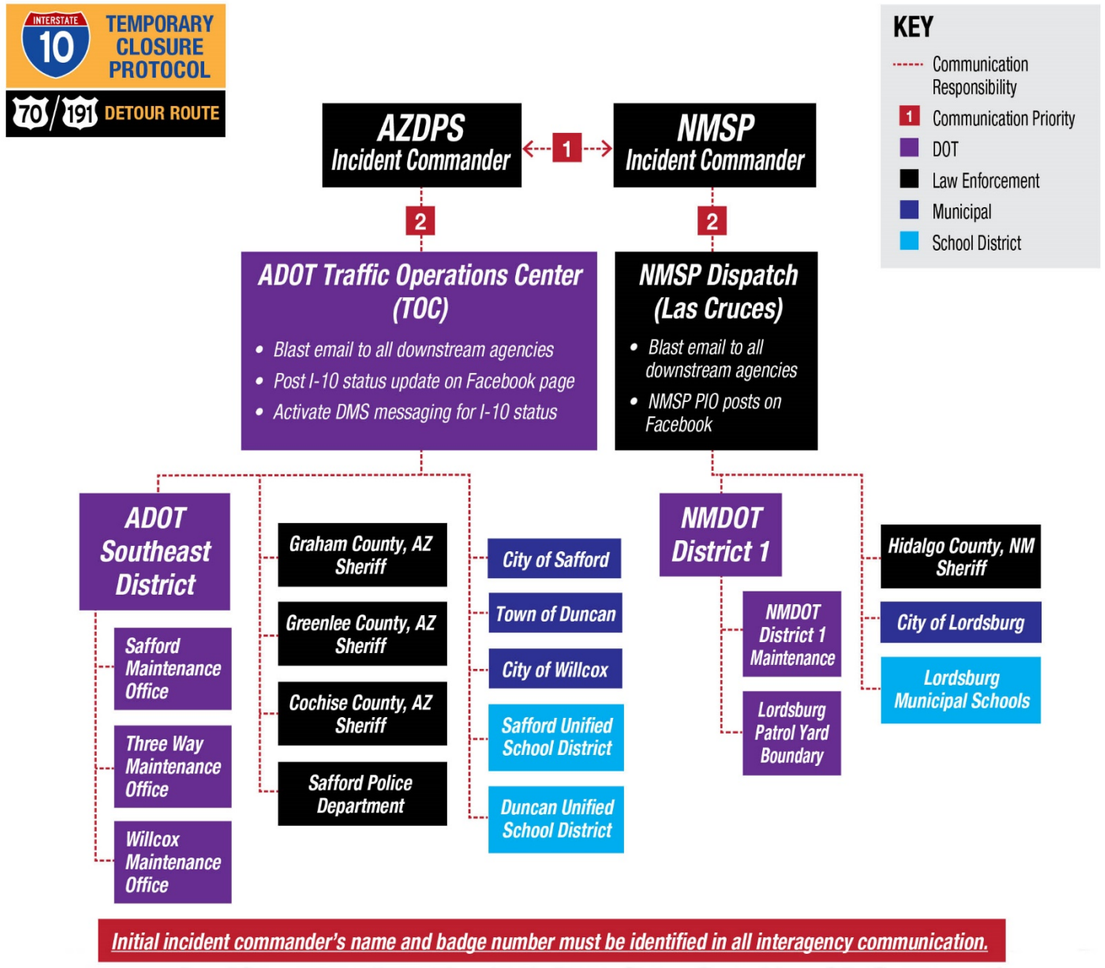
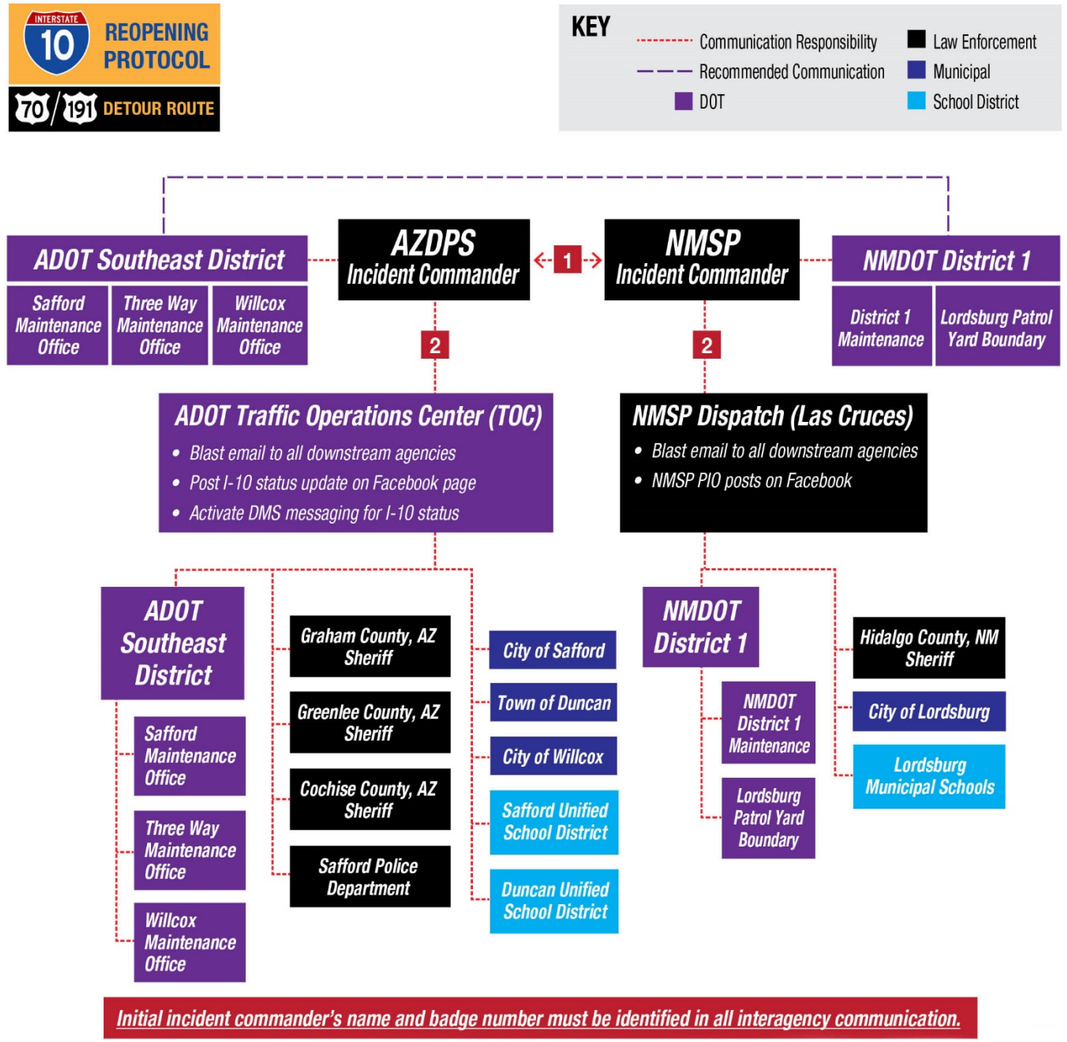


Figure 22: Proposed I-10 Reopening Communication Protocol



Summary of Agencies Interviewed

The study team conducted a series of stakeholder interviews to understand the communication structure between ADOT, NMDOT, Greenlee County, Graham County, local municipalities, and Southeast Arizona and Southwest New Mexico law enforcement. The interview process included a thorough review of maps from the Existing and Future Conditions report, and an in-depth questionnaire (**Appendix A**) designed to facilitate a discussion about agency specific operating procedures during I-10 closures. **Table 6** provides a summary of agency staff interviewed, and their primary responses to a questionnaire developed by the study team regarding agency specific operating procedures during an I-10 closure. The questionnaire can be found in Appendix A of this report.

Table 6: Interview Summaries

AGENCY	INTERVIEW SUMMARY
ADOT Southeast District Interviewed: Brian Jevas, Assistant District Engineer	• The U.S. 191 and I-10 interchange experiences major congestion during detour events. • The U.S. 191 and U.S. 70 signal in Safford has been upgraded with a switch that allows ADOT Southeast District staff to modify signal timing during detour events. This has been very beneficial. • Switch controlled signal timing changes include lengthened right-turn and left-turn green arrows for north to east movements and west to south movements between U.S. 191 and U.S. 70. • The U.S. 191 and U.S. 70 intersection in Safford has been upgraded to facilitate large freight vehicles. Additional ROW would need to be acquired if the intersection needed further expansion. • Coordination of New Mexico DMS signs usage and activation is coordinated between AZDPS dispatch and NMSP dispatch. Police agencies coordinate with the ADOT Southeast District and NMDOT District 1 to communicate with centralized TOCs in each state. When district staff are not present during detours, law enforcement agencies communicate with centralized TOCs in each state. • Incidents that occur at night or on the weekend tend to be more problematic, primarily due to ADOT Southeast District staff and NMDOT District 1 staff not being present. In the event a closure at night, the TOCs handle detour coordination. The TOCs also have a Public Information Officer (PIO). • The ADOT Southeast District is often the first to be contacted by AZDPS, but ideally the TOC would be contacted directly by AZDPS, alleviating some of the ADOT Southeast District coordination responsibilities. The ADOT Southeast District prefers that all inter-agency coordination goes through the TOC. • Recommended improving roadside pull-down signs to include information on the detour length. It is generally felt there is a lack of awareness related to how long the detour route is. • The idea of adding and utilizing a DMS sign just east of Safford with travel times along the U.S. 191 to I-10 route for westbound travel as opposed to traffic travelling straight and taking U.S. 70 to U.S. 60 through Globe for westbound travel to Phoenix is an idea worth exploring, however, there has been some negative reactions to placing travel times on rural state routes in the past. • It was generally agreed the main area of concern beyond the U.S. 191 and U.S. 70 interchange in Safford is the area around U.S. 70 MPs 360 – MP 375 where rock cuts are adjacent to the edge of pavement, and steep embankments pose safety risks. • In general, safety has not been a major issue during detours in the past. It is assumed the safety issues have not been as prevalent as expected due to low speeds during detour events. • Roadway users running out of gas is a concern. People often don't realize how long the detour route is, and they don't get gas in Safford or Lordsburg, therefore they run out of gas along the detour route due to the extremely remote nature of the corridor and area. • The ADOT Southeast district will provide a sketch-up of the District communication hierarchy for documentation in the Final Report.
ADOT Traffic Operations Center (TOC) Interviewed: James Minton, TOC Supervisor Kevin Duby, Emergency Manager	• The TOC ensures that ADOT and AZDPS are aware of current traffic conditions throughout Arizona. • Regarding I-10 closures and detour events, the TOC activates DMS as far west as Eloy at the I-10/I-8 junction to alert drivers heading east, allowing them to decide to continue or wait out the closure. • For closures of unknown length (usually related to dust storms), the TOC has activated DMS further west into the Phoenix Metro Area. • The TOC is explicit in its messaging during closures, informing roadway users they need to refuel in Willcox since there are not any large-scale services along the detour until Lordsburg, New Mexico. • The TOC is amenable to messaging suggestions, however, there is a limit of 3 Lines of 18 Characters. Additional requirements are FHWA's 8-second maximum for message cycling and ADOT's stipulation that messages are limited to only 2 panels. • The TOC sees an added benefit to new DMS to the east of Safford on U.S. 70 to sort westbound traffic back to I-10 or on U.S. 70/60 through Globe.
AGENCY	**INTERVIEW SUMMARY**
Arizona Department of Public Safety (AZDPS) Interviewed: Roland (Stewart) Shupe, Sergeant	• U.S. 70 access point issues are not pervasive throughout the entire corridor, due to slow speeds frustration is mainly present in Safford and Duncan. • Slower traffic resulting from detours is good for safety; 1 or 2 collisions in detour; same gridlock happens on U.S. 191, U.S. 191 bottlenecks from divided 4 lane highway to undivided 2 lanes at AZ-266. • School bus movements in Safford and Duncan are difficult, AZDPS has escorted school busses in the past due to gridlock. • DMS are extremely effective along I-10, and there may be significant value in adding DMS signs along the U.S. 191/U.S. 70 detour route. • DMS signs in Benson and Willcox are used for messaging related to detours, but not sure how far west DMS signs are currently used. Extending use of DMS signs west of Tucson is a potentially beneficial improvement allowing roadway users to make decisions associated with stopping in Tucson or Benson to wait out closures. • AZDPS dispatchers coordinate with NMSP for activation of their DMS signs along I-10 from the Arizona State Line to the Texas State Line. • U.S. 191 South of Safford is an issue area. The area near MP 110 experiences access issues, congestion, and conflicts with school bus operations.

	• AZDPS initiates all communication associated with closures, AZDPS utilizes a list of all agencies involved including the ADOT Southeast District, ADOT Southeast District coordinates directly with ADOT TOC for public messaging and activation of DMS signs along I-10. • If the closure is on the New Mexico side of the state line, NMSP contacts AZDPS for coordination with Arizona impacted state and local agencies. • Communication usually includes where the roadway is closed, reason it is closed, and potential closure timeline/duration. • The Sergeant is responsible for initial communication of closure information. • A barrier to communication includes dispatchers not always having all the details they need or they don't communicate thoroughly. • There is difficulty working across agencies, AZDPS only uses PIO on Twitter or Facebook, email blasts are sent from Michelle Nahar at ADOT Southeast District. • AZDPS posts closure information on Facebook and email blasts are sent from the ADOT Southeast District. • Closure times vary quite a bit depending on the reason for a closure, accidents including fatal incidents usually clear relatively quickly, it is the dust storms that are unpredictable and can last a very long time. It is also difficult to determine when dust storm closure conditions have cleared to a point where reopening doesn't pose a threat to the travelling public. AZDPS usually drives the entire closure segment prior to reopening the roadway. • Longest closure is between 7-8 hours, typically 4-6 hours for crash closure. • AZDPS will let traffic backup with no re-route if there is only a simple collision. • AZDPS provides lighting for nighttime closures. • Closures usually occur at I-10 Milepost 352 at the interchange with U.S. 191. • Key AZDPS staff responsible for coordination of detour activities include Roland Shupe, Sergeant, Steven McBride, Sergeant, Dean Chase, Captain for areas north of I-10, dispatchers and two troopers positioned in Duncan and Safford. A supervisor is sent to New Mexico for New Mexico closures. More troopers would be a beneficial improvement, sometimes staffing is limited and troopers have many responsibilities. • Agencies and law enforcement contacted by AZDPS include ADOT Southeast District, Willcox Sheriff, Cochise County Sheriff, Safford Police Department, Graham County Sheriff, and the Greenlee County Sheriff. • AZDPS shifts troopers down I-10 during detours (2 troopers to Duncan, 1 trooper (or 2 or 3 more) in Safford-Duncan, 1 trooper in Safford – I-10 (via U.S. 191), 1 trooper at U.S. 191/I-10 interchange, 1 trooper in New Mexico. • There are communication deficiencies talking to NMSP. • Emergency response is a concern near U.S. 70 mileposts 360-375 due to a lack of shoulders and mountainous terrain. • Next services signs should be considered at key decision points along the corridor. Roadway users running out of gas is a primary concern due a lack of places to fuel up, and a lack of familiarity with the sparsely populated larger region. • During closures, all wide and oversized loads are stopped and staged at the I-10/U.S. 191 interchange due to roadway geometric limits, and to protect the U.S. 191 and U.S. 70 corridors from increased wear and tear associated with heavy vehicles.
AGENCY	**INTERVIEW SUMMARY**
New Mexico State Police (NMSP) Interviewed: Brett Jensen, Sergeant	• During New Mexico closures, closures usually occur at I-10 Exit 20 in Lordsburg. West Motel Drive is utilized to connect roadway users to U.S. 70 during the rerouting of traffic. • Dust events tend to be the main cause for closure and are unpredictable in nature, during closures additional patrols occur. • NMSP operations coordinate out of the Las Cruces dispatch facilities that communicates directly with Hidalgo County, AZDPS, and Greenlee County. • Communication usually flows from officers in the field to dispatchers, then from dispatchers back to officers in the field. • A barrier to effective communication is the long relay time it takes for messages to be communicated between dispatchers and officers in the field. • DMS are activated from the Arizona state line to the Texas state line along I-10, the local signs in Deming and Lordsburg are activated. • Reverse 911 calls are made to residents of Hidalgo County. • Public service announcements are made on regional radio stations. • Social media including Facebook is utilized, and the NMSP PIO coordinates public messaging efforts. • Weekend and night closures are difficult due to Department of Transportation staff on the Arizona side and New Mexico sides of the state line not being available or working. • NMSP coordination usually filters down through a supervisor, two lieutenants and a captain. • Staff from Hidalgo County assists with detours, and NMDOT move traffic by Motel Drive in Lordsburg to U.S. 70 to begin the detour. • A major concern is that there is not an alternative reroute available, so if something happens along the detour route or Motel Drive, response times need to be quick. • The bridge at MP 382 on the Arizona side is narrow. • Mt. Graham, Deming, and Lordsburg hospitals are not communicated with. It may be beneficial to communicate with them more to devise a plan for emergency responses during detour events, including efficient use of their helicopters and air evacuation practices.

City of Safford Interviewed: Lance Henrie, Public Works Director Randy Petty, City Engineer	• Since the U.S. 70 Study Area Location is within city limits for only a half-mile, the City of Safford Public Works Department attention focused on the intersection of U.S. 70 and U.S. 191- for issues pertaining to this project. • Department concerned with queue length and efficient turning movements at the intersection during detour events. • ADOT Southeast District controls the traffic signal at this intersection. • The City of Safford would like the same information that AZDPS and NMSP obtain which they can relay to the local public through a Facebook page. • There is a new electronic DMS in front of and owned the Chamber of Commerce that can be used for real-time messaging. • Operationally, the Public Works Department does not receive any official communication in the event of a detour. • Safford Police assist in traffic control if needed. • The residents of Safford treat this recurring congestion from detours as an inconvenience.
Safford Unified School District Interviewed: Jonna Best, Transportation Assistant	• The Safford District provides bus service to Artesia Road on U.S. 191 South of Safford. The area south of Safford is a problem area for bussing. children to and from school during I-10 detour events. The highest concentration of school bus routes is in this area, therefore the Study should look at identifying and providing solutions in the vicinity. • Most of the bus delays are in the evening hours because dust storms and closures tend to occur in the late afternoon or early evening hours. • The main mitigation strategy from the Safford District's perspective is training bus drivers to be patient during detour events. The District works directly with drivers to inform them and prepare them for I-10 detour related delays. • Most bus stops are not directly on U.S. 70, or buses pull off the roadway due to safety concerns. This alleviates some of the safety issues during detour events. • There are a lot of instances where drivers don't obey bus stop arms. There has been a lot of rear-end crashes associated with closure traffic, and many near misses have been witnessed due to driver impatience. • Communication with City of Safford Police Department, AZDPS, and the ADOT Southeast District has been inconsistent. Primary Safford District contacts including Phillip Nelson, Transportation Director, (Cell) 928-651-0999 and Jonna Best, Transportation Assistant, (Cell) 928-432-9371 should be added to the AZDPS, ADOT Southeast District, ADOT TOC, and any other pertinent contact lists.
Graham County Interviewed: Preston (PJ) Allred, Graham County Sheriff	• Coordination with Graham County could be improved, but first-hand experience with closure situations is lacking due to trying to stay home during closure events to avoid negative impacts. • There is a general concern about the lack of shoulders or narrow shoulders leading to safety concerns and a lack of access for emergency vehicles, some culverts built to old standards with no shoulders and should be upgraded. • Once grid lock occurs, there is no access other than air ambulance, vehicles cannot pull over. The study team should explore coordinating with local hospitals related to notifying them of an increased potential for needing helicopter emergency response support. • Rumble strips on center lines and outside lines may go a long way to mitigate head-on crossover crashes and run off the road crashes. • The Highway Safety Improvement Program (HSIP) or funding through the Southeastern Arizona Governments Organization (SEAGO) would be beneficial to develop and deliver targeted safety projects along U.S. 70 and U.S. 191. • Metropolitan Planning Organizations (MPO) and Council of Governments (COG) can coordinate with ADOT for funding application. • Emergency response is difficult in an extremely rural area. Notifications should be limited to avoid "crying wolf". Add more helicopter support (consider examples like Snow Bowl with 1 lane road access). • Many of the improvements will not need a full reconstruction of existing infrastructure, simple improvements like shoulder and center line rumble strips are potential cost-effective solutions. • An important factor that will lead to success implementing improvements will be to raise awareness of the issue with the State Transportation Board. • The addition of clear zones associated with rock cuts near the edge of pavement has the potential to be very beneficial from a safety standpoint.

2.3 Infrastructure Project Prioritization Approach

Application of P2P Process

For this Study, the team considered the federally mandated ADOT P2P performance-based planning and project programming process[2]. This process aligns with the guidelines and performance measures developed by ADOT in accordance with Fixing America's Surface Transportation (FAST) act. The P2P process was designed to create a logical, understandable, defensible, and reproducible project prioritization process. All infrastructure solutions recommended in this report will need to be prioritized by application of P2P state system project evaluation criteria administered by various ADOT technical groups.

The performance-based and multifaceted nature of the P2P process helps identify projects for implementation in the right location at the appropriate time, because projects implemented under P2P have a direct influence on transportation system performance. This prioritization categorizes candidate projects into appropriate investment categories for assignment of funding.

Investment Categories

- **Preservation – Pavement Projects**

Pavement preservation projects consist of activities that preserve pavement infrastructure by sustaining pavement condition in a state of good repair, and extend service life. Pavement preservation projects resulting from this study include pavement overlays in areas where the Pavement Index metric and percentage area failure indicates pavement displays fair and/or poor conditions. The latest ADOT Long-Range Transportation Plan "What Moves You Arizona 2040" Greater Arizona Recommended Investment Choice (RIC) allocates $320 million annually or 78% of all revenues to preservation projects. Funding allocated to the preservation investment category is shared with funding allocated to bridge and RCB culvert preservation projects. Prioritization of statewide solutions that encompass both pavement, bridge, and RCB culverts projects are prioritized based on system performance and benefits determined by ADOT MPD's P2Pprocess.

- **Preservation – Bridge and RCB Culvert Projects**

Bridge preservation projects preserve bridge infrastructure by sustaining bridge and culvert conditions in a state of good repair, extending service life. The latest ADOT Long-Range Plan What Moves You Arizona (WMYA) Greater Arizona Recommended Investment Choice (RIC) allocates $320 million annually or 78% of all revenues to preservation projects. Funding allocated to bridges and RCB culverts are included in the P2P preservation investment category and shared with funding allocated to pavement preservation projects. Prioritization of statewide solutions encompassing bridges, RCB culverts, and pavement

[2] P2P was developed in June of 2014 via the P2P Link study, which aligned with the principles and guidance from the FAST Act has up to 17 identified performance measures that ADOT must identify, track, and report to the Federal Highway Administration.

preservation projects are prioritized based on system performance and benefits determined by the ADOT P2P process.

- **Modernization Projects**

Modernization projects are highway improvements that upgrade efficiency, functionality, and safety without adding roadway capacity. Modernization project recommendations resulting from this Study include widened roadway shoulders, removal of rock cuts near edges of pavement, guard rail applications, re-striping of passing lanes, paving of safety pullouts, and additional detour informational signage including detour distance signs and DMS. The latest ADOT WMYA Greater Arizona RIC allocates $91 million annually or 22% of overall revenues to Modernization projects. All recommendations from this Study will need to compete with statewide Modernization investment category needs for improvements funding through ADOT MPD's P2P process.

- **Expansion Projects**

Expansion projects include improvements that add transportation capacity through the addition of new facilities and/or services. This Study did not identify any expansion improvements. Due to the U.S. 70 corridor performing well under normal conditions, relatively expensive expansion projects were not identified as top priorities. Study recommendations focus on maximizing the safety and functionality of existing infrastructure, and improving operations through improved inter-agency coordination improvements. Statewide, expansion funding is minimal, with the latest WMYA long-range transportation plan RIC identifying no funding for Expansion projects, therefore any Expansion projects that may have resulted from this study would have likely not received construction funding.

Evaluation Criteria for Capital Improvement Project Categorization and Compatibility

The P2P process has criteria for two types of scores; a *Technical* score[3] and a *Policy*-based score. For this Study, P2P policy-based criteria were utilized to score the solutions, and the Technical score will be completed by ADOT technical groups following the completion of the Study. For this Study, the P2P policy-based criteria and associated points are listed in **Table 7.**

Table 7: P2P Policy-Based Criteria

	P2P Criteria	Points
✓	Percentage of freight traffic	3
✓	Functional classification	3
✓	Local funding contributions	N/A

[3] The *Technical* evaluation of each project will be performed by the ADOT technical groups including the Bridge, Geohazard Management, Environmental Planning, Pavement Management, and Traffic Safety Section.

These Policy-based scoring criteria supplement the MPD P2P Technical scoring criteria. To ensure a thorough evaluation of recommended solutions, the team developed additional Study specific policy scoring criteria. Additional Policy criteria applied to all performance areas are listed in **Table 8**.

Table 8: Study Policy Based Criteria

	New Universal Criteria	Points
✓	Distance to MP 365	4
✓	NEPA Consultation	5
✓	Formal Design Required	5
✓	Project Cost	5-20

Milepost 365 was identified as an important location within the study area. This area is significant due to being in an area with the greatest safety and operational concerns resulting from rugged terrain and challenging roadway characteristics. All solutions were scored based on their distance from MP 365. The closer the solution is to this location, the more points it received. NEPA consultation criteria was added because transportation projects programmed through ADOT are generally federally funded, which requires some level of NEPA consultation. For this reason, it is anticipated all solutions will require NEPA consultation or at a minimum a Categorical Exclusion.

The universal and Study performance area scoring criteria were developed to focus on safety and performance of the corrido during I-10 closures. Criteria also focused on prioritizing diverse improvements that would maintain infrastructure in a state of good repair.

Each solution was scored on a 100-point scale using Policy and Universal criteria specific to each Study performance area as noted in **Section 2** of this report. The criteria were applied and a preliminary list of prioritized and scored projects was developed. In addition, all Study recommendations will be prioritized by the appropriate ADOT technical groups for consideration to be included in the ADOT 5 Year Construction Program.

Mobility Solutions Prioritization

Table 9 includes Mobility performance area evaluation criteria and weights. Mobility evaluation criteria and associated weights were developed to score and prioritize projects within the Mobility performance area. All Mobility evaluation criteria were presented to the Study TAC at the Existing and Future Conditions and Evaluation Criteria TAC meeting.

Mobility criteria were developed with improving U.S. 70 corridor operations, safety, and travelling public user experiences under normal and detour operating conditions in mind. In addition, application of the criteria is intended to prioritize a mix of improvements that maintain infrastructure in a state of good repair. Finally, the evaluation criteria consider project delivery and cost to prioritize low-cost, practical, and relatively easy to implement solutions that have the greatest potential to receive funding through the ADOT statewide P2P process.

Table 9: Mobility Evaluation Scoring Criteria

Scoring Criteria	
Mobility Solutions	Points
The solution improves multimodal accessibility and travel times for users on the U.S. 191 and U.S. 70 detour route during emergency closures on I-10	18
The solution includes technological improvements that will inform users of expected travel conditions and enable a user to prepare or reroute	15
The solution includes or supports inter-agency communication protocols designed to improve traffic control and efficiently reroute traffic during detours	13
The solution will improve U.S. 70 roadway accessibility by preserving traffic flow under acceptable levels of service	8
The solution will support projected future travel demands on U.S. 70 under regular traffic conditions and during emergency closures on I-10	3
The solution will improve freight accessibility and mobility within the Southeastern Arizona and Southwestern New Mexico regions	3
Percentage of freight traffic within traffic volume	3
Functional classification of roadway	3
Distance between solution and the baseline MP 365	4
Does the solution require NEPA consultation?	5
Does solution require formal design?	5
What is the estimated solution cost?	
<= $100K	20
$100K-$500K	15
$500K-1.0M	10
>$1.0M	5
External Funding Contribution	Not Applicable
	TOTAL **100**

Safety Solutions Prioritization

Increased detour traffic places increased stress on U.S. 70 between Safford, AZ and the New Mexico State Line. Although route detours increase congestion, the frequency of crashes and crash severity decreases due to lower vehicle speeds. There are safety concerns along the corridor including a lack of adequate shoulders and guardrails in areas of steep embankments, rock faces adjacent to the edge of pavement, and poor sight distance due to mountainous terrain and curves**. Table 10** highlights evaluation criteria designed to prioritize proposed solutions that will alleviate some of these safety concerns.

Criteria were developed with a focus on improving emergency response times and improving the user experience from a safety standpoint. These criteria assign points to infrastructure solutions that improve emergency responses or create a safe buffer from traffic during an emergency. Safety criterion also focus on how solutions may modify the physical landscape to improve safety. These criteria prioritize solutions that include mitigating dangers posed by rock-cuts and unprotected embankments. Lastly, criterion have been applied that assess solution deliverability and solution costs, further prioritizing projects that have the highest likelihood of being prioritized through the ADOT P2P process for inclusion in the ADOT Five Year Construction Program.

Table 10: Safety Evaluation Scoring Criteria

Scoring Criteria	
Safety Solutions	Points
The solution will utilize inter-agency coordination and infrastructure solutions to improve response times for law enforcement and medical first responders	11
Solution will reduce the number of head-on lane departure crashes	11
Solution will reduce the number of single-vehicle run off the road crashes	7
Solution will reduce the number of crashes with wildlife and livestock	14
Solution will reduce rock-cuts and unprotected embankments adjacent to pavement	8
Solution will widen shoulders for emergency pull-overs or emergency vehicle access	7
Solution will formalize or improve roadside pull-out areas for emergency parking, truck parking, and law enforcement and first responder staging.	1
Solution will reduce the number of crashes associated with intersections	1
Percentage of freight traffic within traffic volume	3
Functional classification of roadway	3
Distance between solution and the baseline MP 365	4
Does the solution require NEPA consultation?	5
Does solution require formal design?	5
What is the estimated solution cost?	
<= $100K	20
$100K-$500K	15
$500K-1.0M	10
>$1.0M	5
External Funding Contribution	Not Applicable
	TOTAL **100**

Pavement Solutions Prioritization

Two Study segments are recommended for pavement rehabilitation treatments based on the Pavement Index which is calculated using two pavement condition ratings: Pavement Serviceability Rating (PSR) and Pavement Distress Index (PDI). The PSR is extracted from the International Roughness Index (IRI), a measurement of pavement roughness based on field-measures of the longitudinal roadway profile. The PDI is extracted from the Cracking Rating (CR), a field-measured sample from each mile of highway. Pavement Failure ratings determine the percentage of pavement area rated above failure thresholds for IRI or Cracking.

For the Pavement performance area, criteria were developed that are specific to recommended infrastructure (**Table 11**). Additional custom criteria used to score pavement solutions were designed to focus on performance of the pavement solution over time. These measures include how pavement solution's application will impact the surrounding landscape, and if a solution will improve existing environmental factors like drainage. Other key criteria include pavement solution performance status and maintenance needs over time.

Table 11: Pavement Evaluation Scoring Criteria

Scoring Criteria	
Pavement Solutions	Points
Solution will place pavement in a state of good repair	20
The solution will include the proactive application of interim pavement treatments between overlays	15
The solution will ensure roadway striping is in a state of good repair for visibility	13
The solution will improve drainage to mitigate premature pavement degradation	8
The solution considers paving roadside pull-out areas	6
Percentage of freight traffic within traffic volume	3
Functional classification of roadway	3
Distance between solution and the baseline MP 365	2
Does the solution require NEPA consultation?	5
Does solution require formal design?	5
What is the estimated solution cost?	
<= $100K	20
$100K-$500K	15
$500K-1.0M	10
>$1.0M	5
External Funding Contribution	Not Applicable
	TOTAL **100**

Bridges and RCB Culverts Solutions Prioritization

Increased detour traffic places additional stress on the corridor segment between Safford, AZ and the New Mexico State Line, and specifically on bridges and RCB culverts. Increases in passenger and heavy freight vehicle traffic make it imperative that all bridge and culvert structures are maintained to standards that facilitate the safe movement of people and goods throughout the U.S. 70 Corridor. The addition of widened paved shoulders for safety purposes will require bridge and culvert widening to accommodate the recommended pavement width. To accommodate widening of shoulders by between 2-3 feet, most bridges will need to be widened about 5 feet to accommodate bridge barriers.

For the Bridge and RCB Culvert performance area, study-specific criteria were applied (**Table 12**). Criteria were developed with a focus on longevity of recommended infrastructure and the ability to support oversized loads, emergency vehicle responses, and future traffic conditions. Other criteria include the sufficiency rating which is a measure of the ability of the bridge to stay in service.

Table 12: Bridge & RCB Culvert Evaluation Scoring Criteria

Scoring Criteria	
Bridge and RCB Culvert Solutions	Points
Solution will place the bridge and culverts in a state of good repair while keeping the bridge above an operating rating of 40	35
Solution will widen bridge and culvert infrastructure to accommodate oversized loads and improve emergency response vehicle/law enforcement accessibility	10
Percentage of freight traffic within traffic volume	3
Functional classification of roadway	3
Distance between solution and the baseline MP 365	4
Does the solution require NEPA consultation?	5
Does the solution require formal design?	5
Is the sufficiency rating of the solution above 80?	10
Is the solution dependent on the completion of additional solutions?	5
What is the estimated solution cost?	
<= $100K	20
$100K-$500K	15
$500K-1.0M	10
>$1.0M	5
External Funding Contribution	Not Applicable
	TOTAL **100**

3.0 Summary of Recommended Improvements

Per **Figure 23,** the Study recommended a total 90 infrastructure solutions to address concerns identified along the U.S. 70 corridor under closure and non-closure conditions. The total cost of all recommended projects is $64.3 million. Over $56 million worth of projects are safety related. Safety projects make up over 50 percent of the overall solutions. The remaining categories including Mobility, Pavement, and Bridge and RCB Culverts split approximately $8 million in recommended projects. Solutions were identified based on a needs and gaps analysis using existing performance data, field review results, and stakeholder input. The study team reviewed the solutions with project stakeholders, then evaluated, scored, ranked, and organized all solutions by investment category and potential funding terms. Below is a summary breakdown of the recommended projects.

Figure 23: Summary of Projects

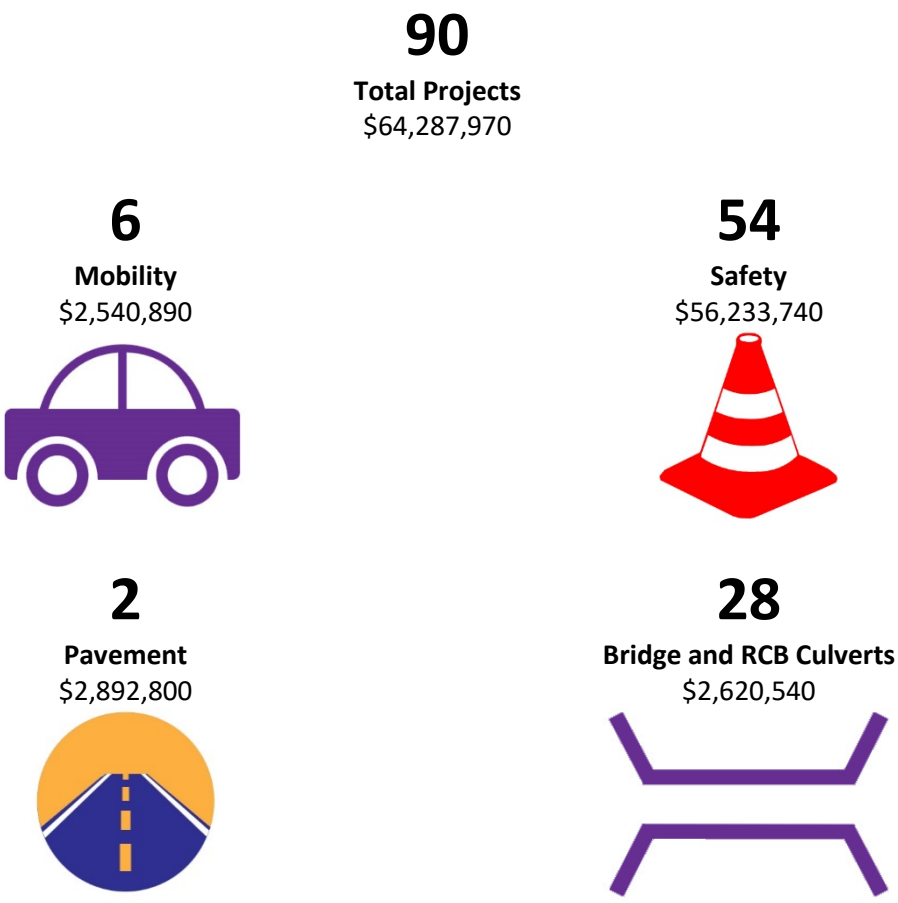
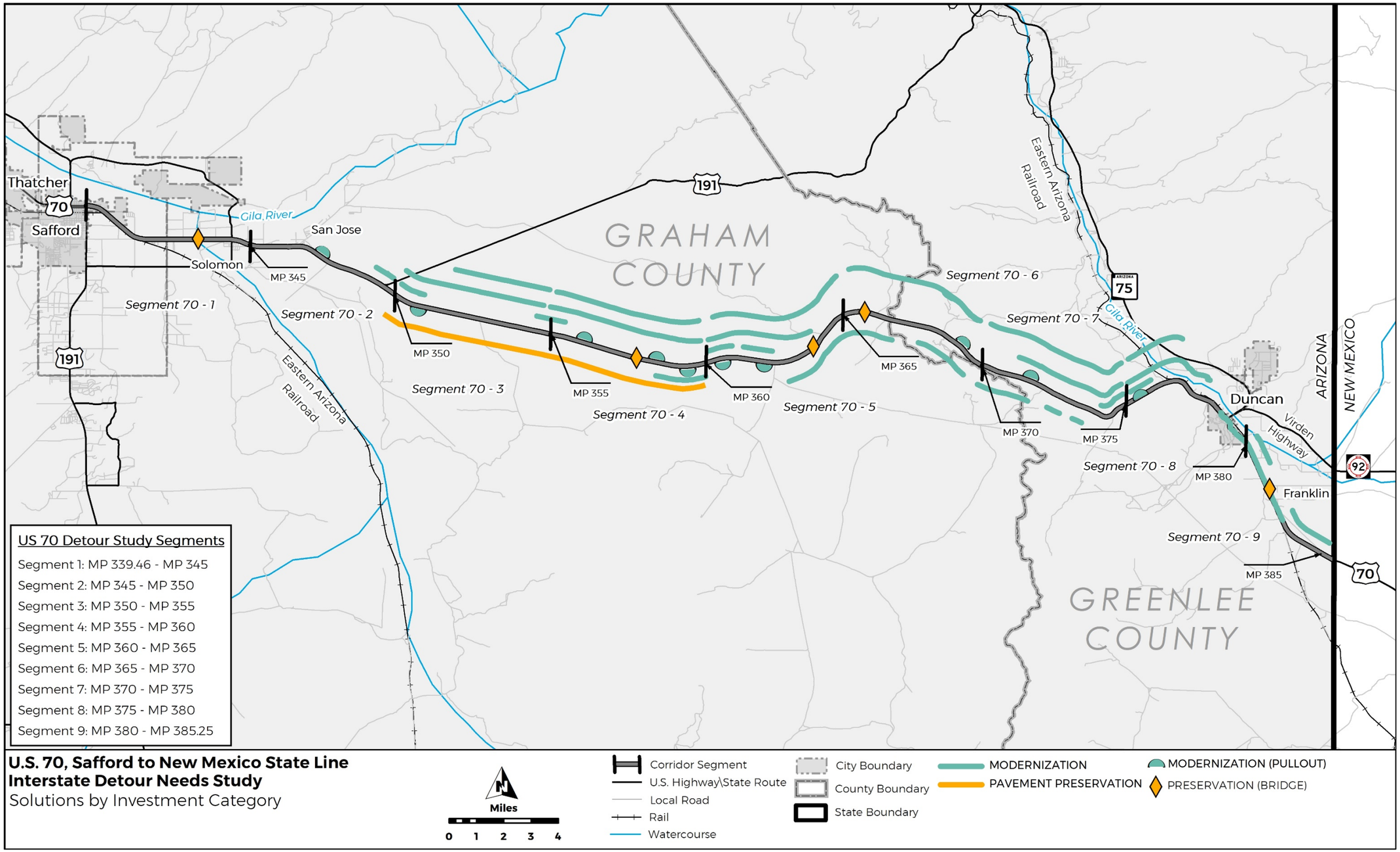


Table 13 summarizes the recommended solutions by type and quantity within each performance category. Most of the recommended solutions are spot improvements, equaling 87 in total. All the Mobility solutions and the Bridge and RCB Culvert solutions are spot improvements. Furthermore, for the Safety solutions, the lay back slope, formalize pull-out, and upgrade railroad crossing solutions are also spot improvements. The remaining are linear projects and include almost 70 miles of Safety and Pavement performance area solutions.

Table 13: Summary of Projects by Performance Area

Mobility	
Traffic signal (US 70 and SR 75)	1
DMS installation	4
Detour signage	1
Safety	
Passing lanes	7 Miles
Widen shoulders	21 Miles
Centerline rumble strip	27 Miles
Lay back slopes (Minor)	5
Lay back slopes (Medium)	10
Lay back slopes (Major)	8
Formalize pull-out	10
Upgrade railroad crossing	1
New striping	4.5 Miles
Pavement	
Pavement rehabilitation (EB and WB)	10 Miles
Bridge and RCB Culverts	
Bridge widening	4
Bridge widening with deck rehab or replacement	1
Bridge deck concrete repair	1
Bridge substructure concrete repair	2
Bridge compression joint replacement	1
Bridge approach roadway improvements	1
Bridge rail upgrade	3
RCB Culvert Widening	15

Figure 24: Location of Recommended Solutions by Investment Category



3.1 Mobility Solutions

Based on the study area performance metrics and stakeholder input regarding mobility, the study team focused on identifying solutions that address mobility concerns during I-10 closures**.** The solutions recommended to improve mobility along the U.S. 70 corridor, particularly during I-10 closures are listed in **Table 14** and illustrated in **Figure 28.**

Table 14: Summary of Mobility Features

Mobility	
Traffic signal (US 70 and SR 75)	$376,200
DMS installation	$2,034,000
Detour signage	$130,690

U.S. 70/SR 75 Intersection Traffic Signal

To alleviate detour congestion at the intersection of U.S. Route 70 and SR 75 (**Figure 25**), the study team recommends installation of a traffic signal with railroad pre-emption. This signal type would be programmed to manually or automatically transition to a flashing yellow light for U.S. 70 traffic to proceed with caution, and a blinking red light for SR 75 traffic to yield to U.S 70 traffic during non-closure periods. To efficiently implement this alternative, the signal must be warranted.

The *Arizona Supplement to the Manual on Uniform Traffic Control Devices, 2009* (MUTCD) establishes warrant criteria to determine the necessity of a traffic signal at candidate intersections. "Warrant 9: Intersection Near a Grade Crossing" was investigated under detour conditions and subsequent traffic volumes to determine if a signal is justified at the junction of U.S. 70/SR 75 since the intersection is located 50 feet southwest from the Eastern Arizona Railway tracks.

Figure 25: Intersection of U.S. 70 and SR 75

Warrant 9 criteria considers hourly traffic count thresholds for both U.S. 70 and SR 75 as they approach the intersection, and considers the distance from the intersection to the railroad at grade crossing. For the U.S. 70/SR 75 intersection, minimum thresholds are 200 vehicles per hour on U.S. 70 and 25 vehicles per hour on SR 75 because the intersection is 50 feet away from the at grade railway crossing. Since hourly traffic counts have not been collected at the U.S. 70/SR 75 intersection during a detour event, hourly ADOT count factors were used to derive hourly volumes from AADTs on both U.S. 70 and SR 75. During a detour event, AADT on U.S. 70 is 17,392 vehicles, and AADT on SR 75 is 2,353 vehicles. Based on ADOT's hourly count factors for these two highways during detour events, U.S. 70 has an hourly volume of 1,391

vehicles, and SR 75 has an hourly volume of 212 vehicles. Due to the Eastern Arizona Railway tracks existing 50 feet away from the intersection, and both highways' hourly traffic volumes being higher than the minimum thresholds to satisfy Warrant 9's criteria during detour events, a traffic signal is warranted at the U.S. 70/SR 75 intersection. By satisfying Warrant 9 for traffic signal installation, this Study recommends installing a permanent traffic signal at the U.S. 70/SR 75 intersection.

Once the signal is warranted, ADOT must coordinate public outreach to notify residents of the proposed change, and coordinate resolutions with the Arizona Eastern Railroad for railroad pre-emption, utility and Right-of-way constraints. This includes overhead power, overhead communications, drainage, buildings, and trees.

The traffic signal would help create gaps in traffic on U.S. 70 so that traffic from SR 75 could enter the U.S. 70 mainline when needed. Since traffic volumes at the intersection during non-detour events are relatively low, the permanent traffic signal only needs to be fully operational during detours. A potential option would be to flash a yellow light to traffic on U.S. 70, and a red light to traffic on SR 75 during normal operations. This would maintain current intersection operations, with traffic on SR 75 yielding to U.S. 70. During a detour event, the signal would switch to a typical operation, and alternate right-of-way between the two corridors. This transition could occur manually or automatically, depending on preference. In the manual scenario, the signal control cabinet could be equipped with a switch that, when flipped, would cycle between normal or flashing operations. To have this transition occur automatically, vehicle detection could be utilized to track the presence and speed of passing vehicles. Once a pre-determined relationship between volume and speed occurs, the signal would automatically transition to the flashing operation. The permanent traffic signal would potentially alleviate the need for law enforcement personnel to maintain traffic operations of the intersection. Key considerations and potential challenges associated with deploying the permanent signal include:

- Coordination with Eastern Arizona Railway for railroad pre-emption;
- Coordination with utilities including overhead power, overhead communications, and drainage;
- Coordination with the messaging of nearby DMS;
- There appear to be drainage features in all four corners of the intersection, which could create difficulty in locating traffic signal poles and equipment;
- Right-of-way constraints or conflicts with existing infrastructure;
- There are buildings, large trees, and permanent shade structures close to the intersection corners leaving minimal space for signal equipment and potentially requiring new right-of-way;
- Public outreach to notify residents of the proposed change.

Dynamic Message Signs (DMS)

In conjunction with the *Statewide DMS Masterplan (2011),* the Study team recommends installing DMS (**Figure 26**) at four locations listed in **Table 15**.

Table 15: DMS Locations

Direction	U.S. Route	Milepost
WB	70	342
WB	70	385
NB	191	119.1
SB	191	90

Figure 26: DMS

The electronic signs would display illuminated messages to inform, warn, or guide roadway users of traffic and roadway conditions by providing up-to-date information to drivers at key decision points or junctions along this route. Due to the rural nature of this corridor, establishing power service to remote/rural sites and ensuring wireless communication capabilities at the DMS site will be required due to potential difficulties and costs.

Permanently Signed Detour Route Designation

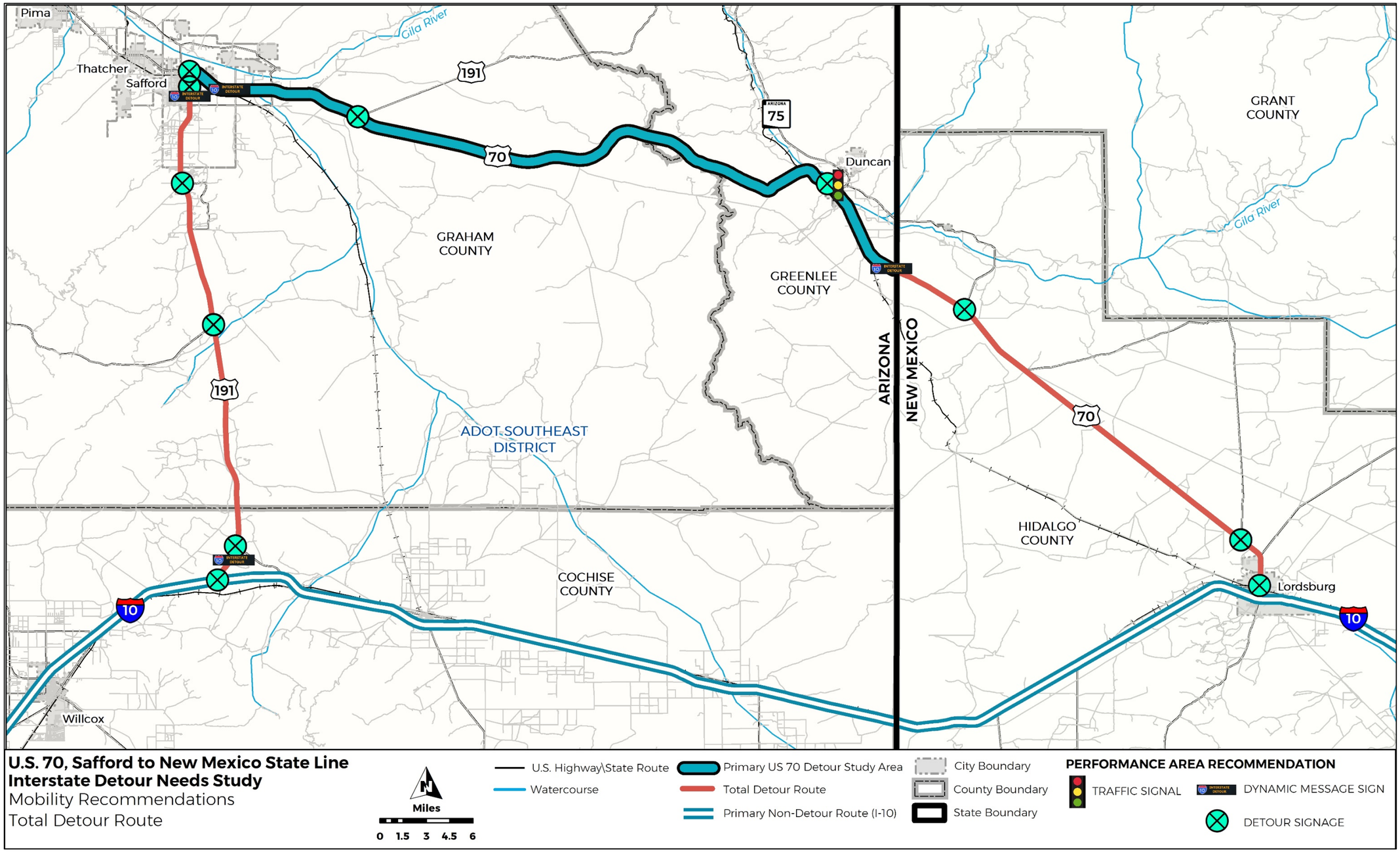
As an incident management tool for traffic diversion, the study team recommends designating U.S. Route 70 as a permanently signed detour route during I-10 closures. Per ADOT Traffic Engineering Guidelines and Processes, this includes installing "detour" signs along the entire length of the detour including I-10, U.S. 191 and U.S. 70, like the example in **Figure 27.** Since the study area is within various agency jurisdictions, ADOT shall obtain agency permission and coordinate sign installation.

Figure 27: Sample Route Detour Signs

Policy Option

A beneficial policy option includes designation of official detour routes throughout Arizona, and an adjustment to the ADOT P2P Process to reflect the official designation. With an additional scoring metric, projects proposed on officially designated detour routes could obtain additional points that would improve the chance of proposed projects on designated corridors being added to the ADOT Five Year Construction Program for project development and construction funding.

Figure 28: Mobility Solutions



3.2 Safety Solutions

Increased traffic resulting from rerouting of I-10 traffic on to U.S. 70 places increased safety strains on the corridor segment between Safford, AZ and the New Mexico State Line. Although route detours increase congestion and the frequency of crashes, crash severity decreases due to lower vehicle speeds. There are safety concerns along the corridor including a lack of adequate shoulders and guardrails in areas of steep embankments, rock faces adjacent to the edge of pavement, and poor sight distance due to mountainous terrain and curves**.** The proposed solutions are illustrated in **Figure 33**, and listed in **Table 16** with cost estimates**. Table 17** lists the recommendations and their associated locations.

Table 16: Summary of Safety Solution Features

Safety	
Passing lanes	$26,103,000
Widen shoulders	$18,689,600
Centerline rumble strip	$183,100
Lay back slopes (Minor)	$155,600
Lay back slopes (Medium)	$1,921,000
Lay back slopes (Major)	$7,062,500
Formalize pull-out	$1,821,140
Upgrade railroad crossing	$282,500
New striping	$15,300

Table 17: Safety Recommendations & Milepost Locations

Recommendation	Location (MP)
Passing Lanes	- EB 349-350, WB 350-351, EB 354.5-355.5, WB 360-361, EB 361-362, EB 374-375, WB 375-376
Shoulder Widening	- 350-364, 375-378
Centerline Rumble-Strips	- 352-377, 382-385
Elimination/reduction of Rock-Cuts/Slope-Laybacks	- Minor: 358.4-358.5, 359.5-359.6, 365.8-365.9, 370.5-370.6, 670.7-370.85 - Medium: 359.0-359.2, 359.8-359.9, 362.7-362.8, 364.8-365.0, 365.1-365.3, 366.5-366.8, 367.7-367.8, 368.8-369.0, 371.3-371.4, 372.8-373.0 - Major: 363.1-363.2, 363.3-363.4, 6.7-363.8, 364.0-364.4, 368.3-368.4, 369.5-369.6, 370.0-370.2, 373.7-373.9
Converting 10 informal pullouts to Formal Paved-Pullouts	- 347, 351, 356, 358, 359, 360, 361, 368, 371, 375
Upgrade Railroad Crossing in Duncan with a cantilevered structure	- 380
New Striping within two segments, totaling to 4.5 miles in Duncan	- 378.5-380, 380-383

Passing Lanes

The U.S. 70 Corridor has various areas dedicated for passing. Under I-10 closure conditions, U.S. 70 detour congestion limits the ability to pass. The team looked for relatively flat and straight areas along the corridor with no driveways or intersecting roadways to identify potential passing area locations. The analysis indicated seven total miles of passing lane opportunities. Due to a low need for additional passing lanes under non-closure conditions and a high construction cost, the recommended passing lanes are considered lower in priority.

Widened Shoulders

The study team recommends widening shoulders in a few areas. The team analyzed the corridor and identified areas where existing shoulders do not meet the suggested 8-foot width for driver self-correction, emergency vehicle access, or emergency pull-overs. These findings can be found in **Figure 16** of Section 2.2.

Centerline Rumble Strips

The study team recommended 27 miles of new center line rumble strips (**Figure 29**). Centerline rumble strips are an effective way to mitigate drivers crossing into oncoming traffic lanes causing head-on collisions and run-off the road crashes.

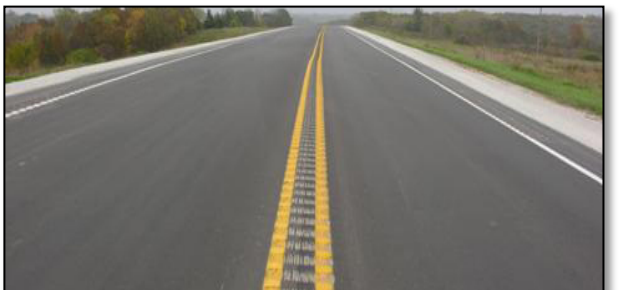


Figure 29: Centerline Rumble Strips

Rock Cuts/Slope Laybacks

The study team recommended 23 locations for rock cuts/slope laybacks. Total roadway length of these cuts equals 3.5 miles, and they are categorized as minor, medium, and major (**Figure 30**). These improvements mitigate vehicle impacts with rock faces and slopes which can increase the likelihood of serious injuries and fatal accidents.

The combination of shoulder widening, rock blasting, and moving rock cuts/slope laybacks further from the edge of pavement may reduce the risk of serious and fatal injuries resulting from run off the road accidents.

Figure 30: Rock Cuts/Slope Laybacks

Minor: only one side of road with low slope

Medium/Major: higher slope/rock cut

Formalized Paved Pullouts

The study team identified ten informal roadside pullouts (**Figure 31**) within the study area to be considered for formal pullout construction. This would require over 23,000 square yards of pavement. Formal paved pullouts would reduce airborne dust, improve tire traction during ingress and egress, and eliminate drop offs or ledges. This improvement would assist with facilitation of law enforcement activities, provide a safe place for drivers to rest or perform emergency vehicle maintenance, perform emergency turn-arounds, and provide additional emergency vehicle access including medical air support.

Figure 31: Unpaved Pullout

Upgraded Railroad Crossing in Duncan

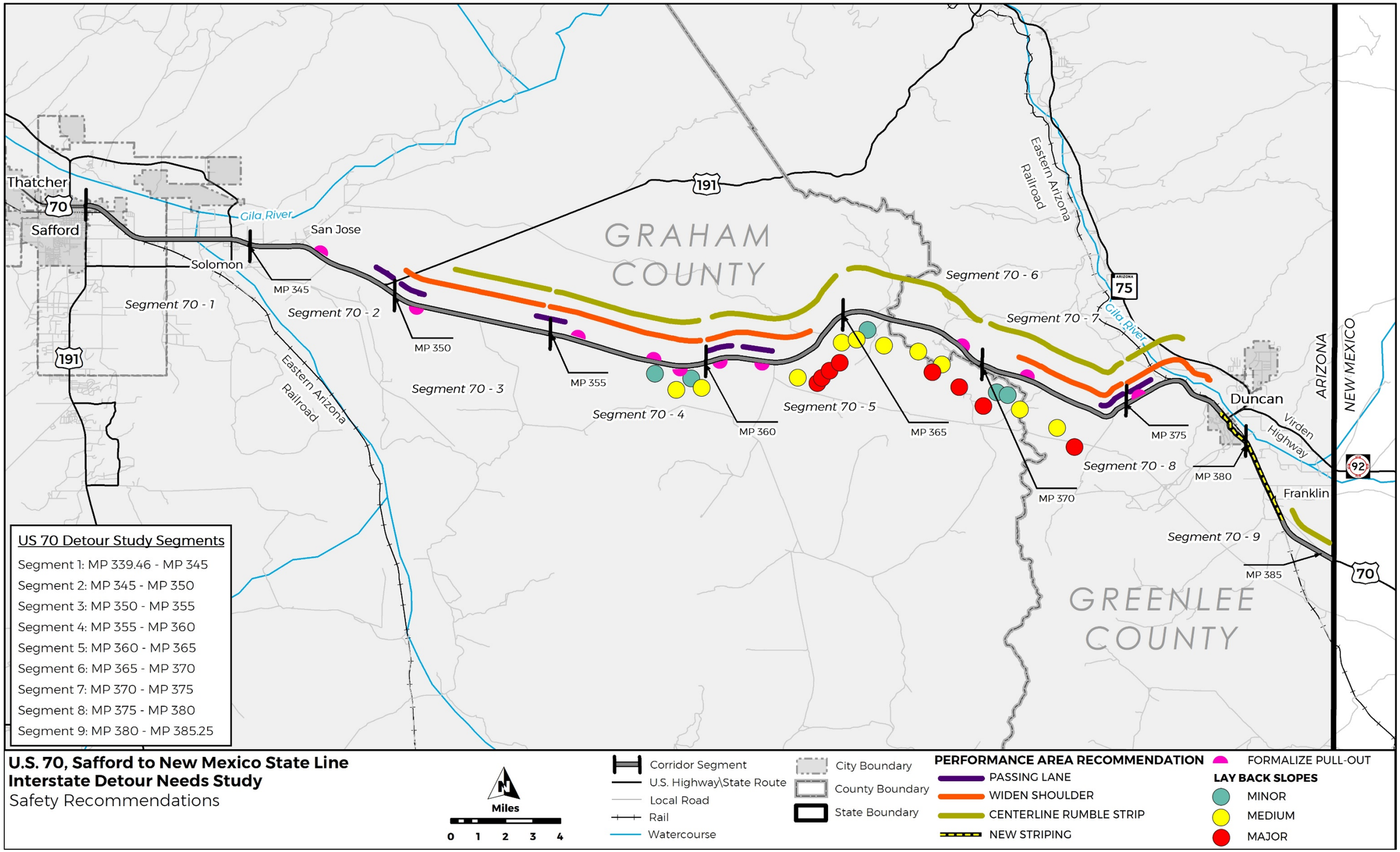
A field study conducted by the study team determined the existing railroad crossing near Duncan does not have a cantilevered signal or yellow sand-filled fitch barriers, which poses a threat to drivers during detour events because heavy congestion may force drivers to stop on the tracks, placing them at a higher risk of being struck by a train. The study team recommended upgrading the railroad crossing with a cantilevered structure like the crossing shown in **Figure 32**. The cantilevered signal structure would increase driver visibility and improve driver awareness of the railroad crossing to protect the cantilevered signal structure and crossing gate from damage due to driver error. Increased visibility will allow drivers to make informed decisions about where it is safe to stop their vehicles by allowing them the visibility to anticipate, plan, and avoid stopping on the train tracks.

Figure 32: Proposed Cantilevered Railroad Crossing

New Striping East of Duncan

To improve lane visibility during all weather conditions, application of new thermoplastic paint along portions of the corridor is recommended. This improvement would result in 4.5 miles of new centerline striping.

Figure 33: Safety Solutions



3.3 Pavement Solutions

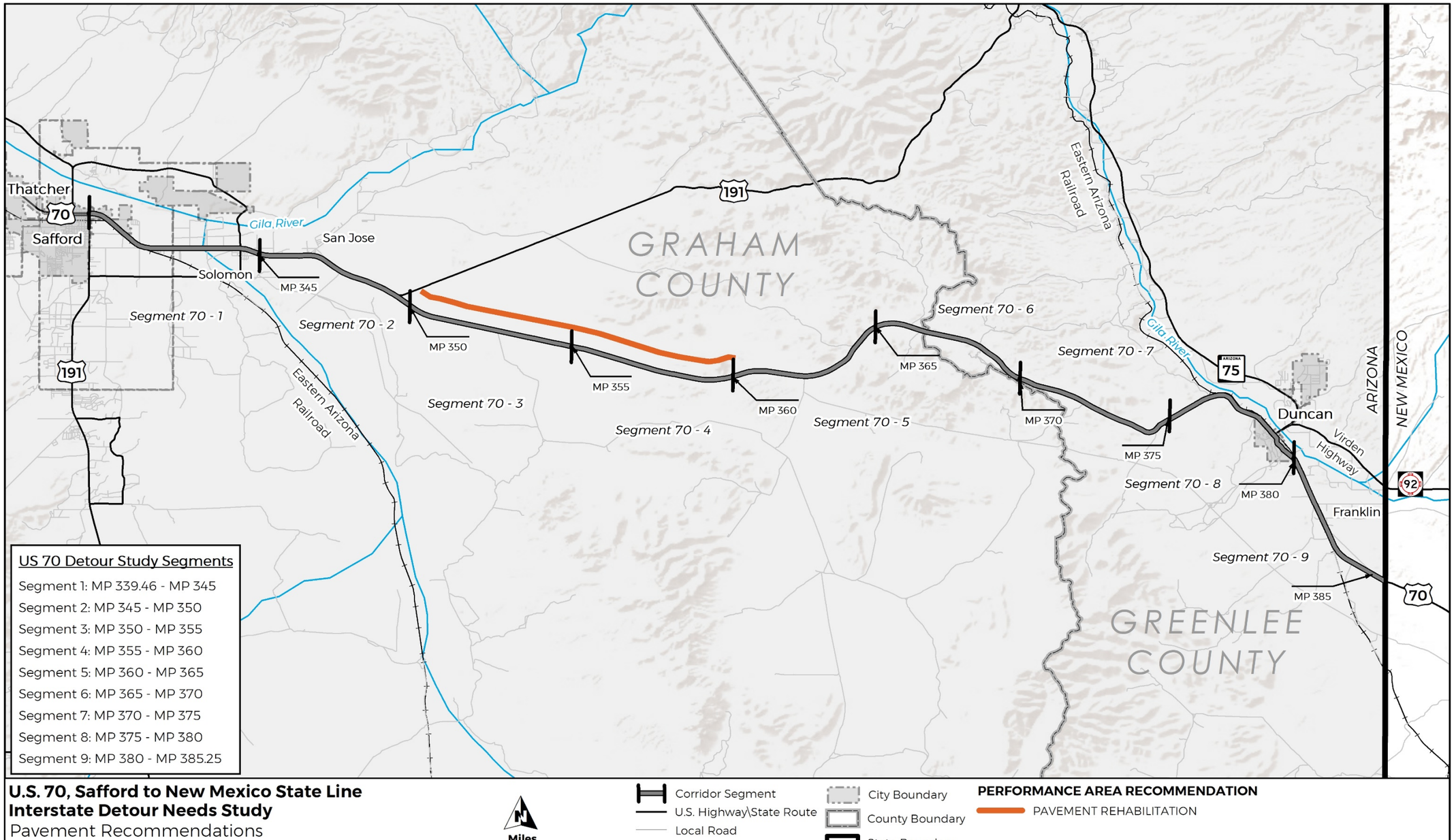
Two Study segments are recommended for pavement rehabilitation treatments based on the Pavement Index which is calculated using two pavement condition ratings: Pavement Serviceability Rating (PSR) and Pavement Distress Index (PDI). The PSR is extracted from the International Roughness Index (IRI), a measurement of pavement roughness based on field-measures of the longitudinal roadway profile. The PDI is extracted from the Cracking Rating (CR), a field-measured sample from each mile of highway. Pavement Failure ratings determine the percentage of pavement area rated above failure thresholds for IRI or Cracking.

According to the Pavement Index, pavement is in in "good" condition except for in segments 70-3 and 70-4, which are in poor condition. Segments 70-3 and 70-4 also score "fair" for Directional PSR in both the eastbound and westbound directions. To improve pavement conditions in Segment 70-3 between mileposts 350-355 and Segment 70-4 between mileposts 355-360, it is recommended to mill and replace 1" to 3" of AC pavement for the entire 36-ft. roadway width. The cost estimate in **Table 18** includes pavement, striping, delineators, raised pavement markings, and centerline and shoulder rumble strips for the 10-mile segment. The overall 10 miles of improvements are broken into two projects due to the total length of proposed rehabilitation treatments extending into two Study 5-mile segments as illustrated in **Figure 34**.

Table 18: Pavement Recommendations

Pavement	
Pavement rehabilitation (EB and WB)	$2,892,800

Figure 34: Pavement Solutions



3.4 Bridge and RCB Culvert Solutions

Increased traffic resulting from detouring of I-10 traffic on to U.S. 70 between Safford, AZ and the New Mexico State Line increases strain, wear, and tear on bridges and RCB culverts. Increases in passenger and heavy freight vehicle traffic make it imperative that all bridge and culvert structures are maintained to standards that facilitate the safe movement of people and goods throughout the U.S. 70 Corridor. Addition of widened paved shoulders for safety purposes will also require widening of bridges and culverts to accommodate additional pavement width.

To accommodate widening of shoulders between 2 feet and 3 feet, most bridges will need to be widened about 5 feet to accommodate bridge barriers. **Table 19** shows the estimated $2,621,000 in recommended sustainable bridge improvements the study team has developed. Many of the lower cost recommendations include rail upgrades, and structural replacements or repairs. Under the condition that the corridor is widened, the bridges would require widening. The San Simon Bridge was identified by the team to require widening and deck rehabilitation or replacement. Additional details related to recommended bridge improvements are listed in **Table 20**. Refer to **Figure 35** for a detailed layout of Bridge and RCB Culvert recommendations**.**

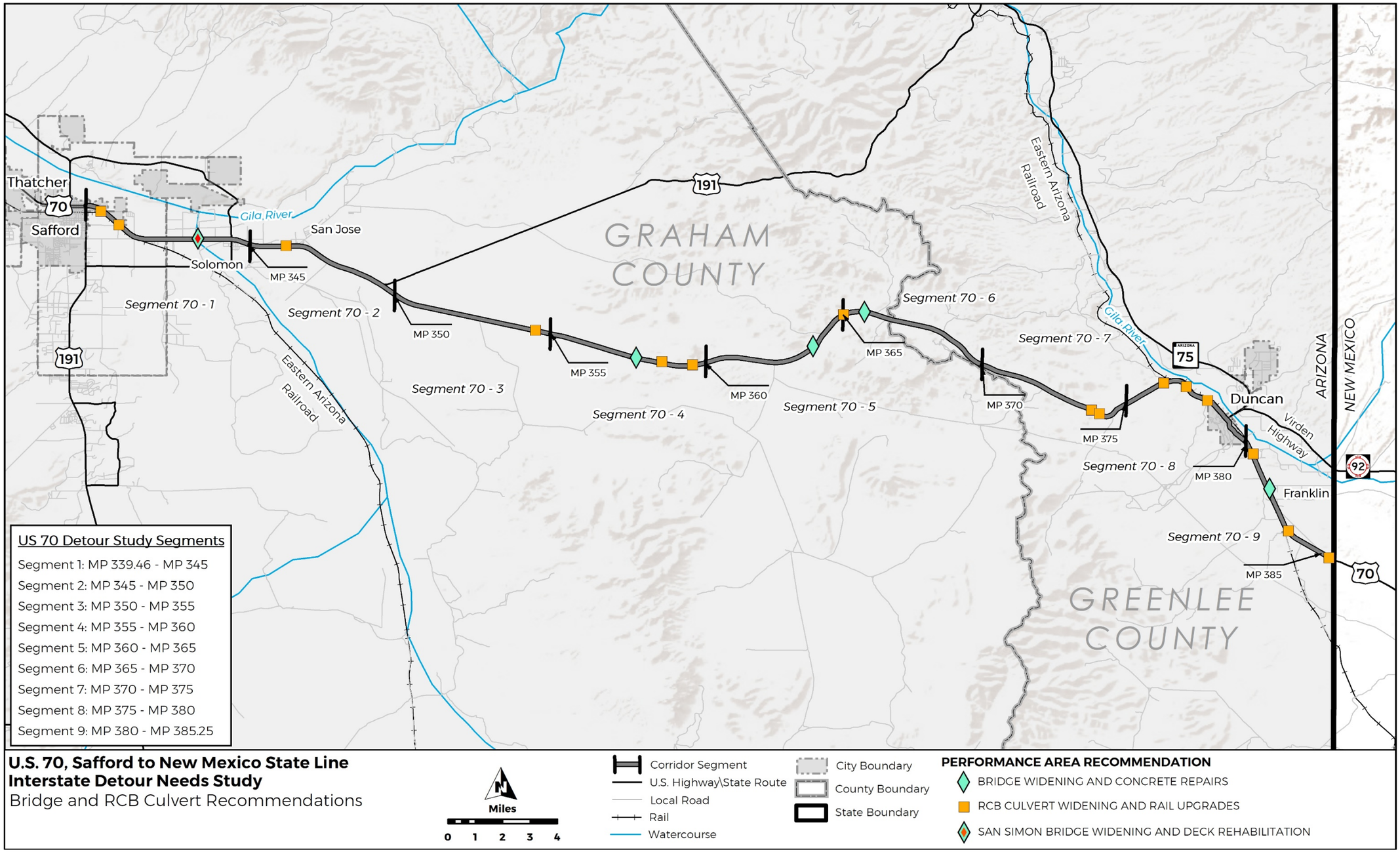
Table 19: Summary of Bridge and RCB Culvert Recommendations

Bridge	
Bridge widening	$868,150
Bridge widening with deck rehab or replacement	$456,500
Bridge deck concrete repair	$2,310
Bridge substructure concrete repair	$2,600
Bridge compression joint replacement	$9,780
Bridge approach roadway improvements	$78,000
Bridge rail upgrade	$36,200
RCB Culvert Widening	$1,167,000

Table 20: Bridge and RCB Culvert Recommendations

Recommendation	Visual
San Simon River Bridge Per bridge and culvert inspection reports, the San Simon River Bridge warrants rehabilitation including a deck replacement, and bridge widening to accommodate the recommended roadway widening.	
Slick Rock Wash and Shoat Tank Wash Bridges Both bridge structures will require widening to accommodate the recommended shoulder widening in this study. The Slick Rock Wash Bridge will also require substructure concrete repairs, and the Shoat Tank Wash Bridge will require deck concrete repairs.	
Railroad Wash Bridge Railroad Wash Bridge will require widening to accommodate the recommended shoulder widening in this study. AASHTO compliant guardrail is also recommended for this structure.	
RCB Culverts Existing special steel curb mounted guardrails do not meet current AASHTO geometric and structural requirements for all 15 corridor RBC box culverts. It is also recommended all corridor culverts be widened to accommodate additional shoulder width. Additional recommendations include a 34-inch F-Shape barrier on the Graveyard Wash RCB and the Stockton Wash RCB.	

Figure 35: Bridge and RCB Culvert Solutions



3.5 Alternative Detour Corridors for Consideration

The study team, in conjunction with the TAC, identified the U.S. 70/U.S. 191 intersection in Safford as a pinch point when U.S. 70 is used as a detour route during I-10 closures. ADOT strives to keep regional traffic on state highways and has made improvements to minimize the pinch point effect. It remains prudent to identify U.S. 70/U.S. 191 intersection detour route alternatives that will be able to handle the projected traffic volumes associated with these detour events or if the U.S. 70/U.S. 191 intersection becomes impassable. Three potential alternatives were identified as a back-up to routing detour traffic through the U.S. 70/U.S. 191 intersection that include by priority: (1) East Relation Street, (2) Solomon Road/Bowie Avenue, and (3) Lone Star Road. Currently, all three alternatives are insufficient to carry detour traffic volumes and would require significant investment by the local jurisdiction to upgrade them.

East Relation Street

The present alignment for this alternative is a two-lane path and narrow farm road which farmers use to access their fields. In 2018, a Pre-Scoping report was completed for the City of Safford to identify scoping elements and planning level costs to extend Relation Street approximately one mile, from 1st Street/U.S. 191 to U.S. 70. Implementation is planned to be completed in two phases. Phase I will construct a paved road with two 12-ft. lanes and a 6-ft. sidewalk with curb and gutter. Phase II will widen the facility to the ultimate roadway configuration in conformance with the City of Safford's arterial divided roadway cross-section. When completed, East Relation Street will provide a critical east-west connection between U.S. 191 and U.S. 70 in the City of Safford.

Solomon Road/Bowie Ave

This alternative is a paved two-lane county facility beginning at the U.S. 191/Solomon Road intersection over 2 miles south of the U.S. 70/U.S. 191 intersection pinch point. The alternative then travels east for 4.5 miles and then turns north on Bowie Avenue for 1 mile until the intersection with U.S. 70 in Solomon. Much of the route is through agricultural fields. It is signalized at U.S. 191 on its west end with stop control at U.S. 70 on its eastern terminus.

Lone Star Road

Currently, the alignment is a paved two-lane county facility that is 24 feet wide and 1.7 miles in length. The roadway passes through many residential lots on the east end and agricultural properties on the west end. Lone Star Road intersects U.S. 191 on the west end and U.S. 70 on the east end at unsignalized intersections. Recommended improvements to Lone Star Road include:

- Widening the U.S. 191/Lone Star Road intersection from 24 feet to 42 feet to accommodate freight truck turning movements
- Drainage improvements installing a 24-inch diameter drain pipe covered by new curb and gutter
- Relocation of three utility poles near the U.S. 191/Lone Star Road intersection
- Roadway edge replacement pavement overlay.
- Agency coordination for an official to be stationed at the Lone Star Road/U.S. 70 intersection during detour events for guiding traffic through the restrained turning movements of the intersection and to directing traffic to remain on U.S. if a train were approaching.

4.0 Conclusion and Implementation

ADOT P2P Investment Category assignments for this study include preservation and modernization. In addition to investment category placement, the recommended solutions were scored on a 100-point scale developed through application of performance area evaluation criteria below. The evaluation and scoring process for this study is compatible with the ADOT MPD P2P project prioritization process for all statewide investment category-specific needs.

Performance Area Evaluation Criteria
Mobility | Safety | Pavement | Bridges and RCB Culvert

The study team reviewed the costs of all recommended solutions (excluding Lone Star Road) and determined that it would cost ADOT approximately $59,173,050 to program all solutions. The delivery timeframe of each solution was based on total score and total solution cost. Budget allocations for the Near-Term, Mid-Term, and Long-Term timeframes were derived by dividing the total cost of all projects by 3. This calculation defined approximately $19,724,350 per timeframe.

One of the evaluation criteria placed increased value on low-cost projects. **Table 21** shows the breakdown of how each project earned "cost" points based on the actual cost of the project. Since more than half of the recommended solutions cost less than $1,000,000.00, and many of those projects cost less than $500,000.00, a large portion of projects earned 15 or 20 points.

Table 21: Cost Scoring Criteria

Project Cost	Points
<= $100K	20
$100K-$500K	15
$500K-1.0M	10
>$1.0M	5

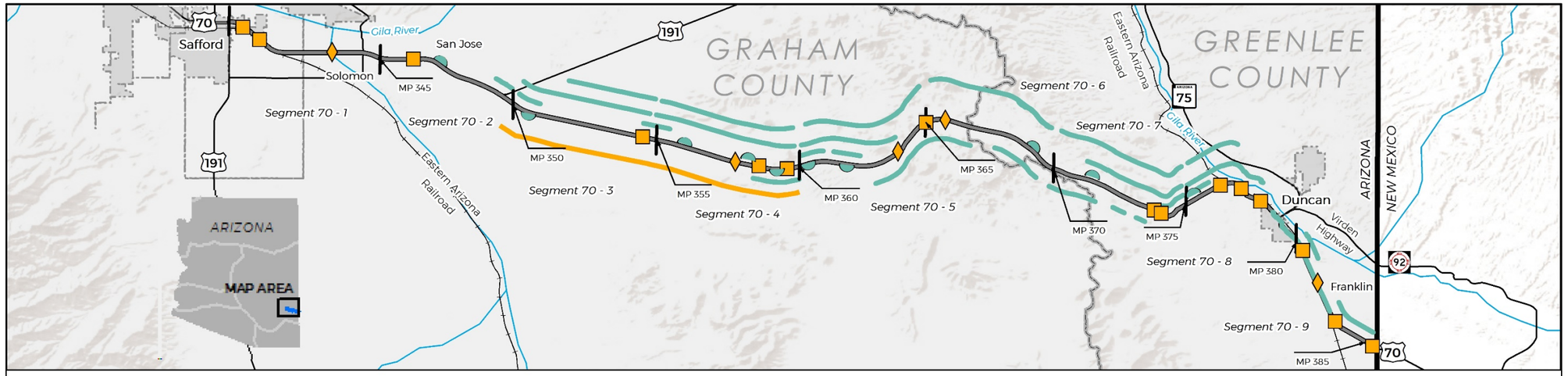
90 solutions are recommended by the study team are illustrated in **Figure 37** by modernization and preservation investment categories, and timeline of delivery application.

The project allocation in **Table 22** aligns with the Study's primary goals and objectives of improving mobility and safety along the corridor. **Figure 36** also includes the study team's policy-oriented recommendations that focus on proposed interagency coordination efforts thoroughly vetted by all agencies involved. **Table 23, Table 26,** and **Table 28** provide a detailed list of all projects prioritized by score, investment category, timeline, and cost.

Table 22: Project Timelines

Timeline	# of Projects
Near-Term	51
Mid-Term	28
Long-Term	11

Figure 36: Recommended Solutions by Investment Category and Timeline



MODERNIZATION

MOBILITY

- Traffic signal (US 70 and SR 75) MP 378.92
- DMS U.S. 191 MP 119.1, 90 and U.S. 70 MP 342, 385
- Detour signage along U.S. 191 and U.S. 70

SAFETY

- Passing lane EB MP 349-350, 354.5-355.5, 361-362, 374-376
- Passing lane WB MP 350-351, 360-361
- Widen shoulder EB and WB MP 350-364, 371-378
- Centerline rumble strip MP 352-377, 383-385
- Lay back slopes (Minor) MP 358.4-.58.5, 359.5-359.6, 365.8-365.9, 370.5-370.85
- Lay back slopes (Medium) MP 359.8-359.9, 362.7-362.8, 364.8-365.3, 366.5-366.8, 367.7-367.8, 368.8-369, 371.3-371.4, 372.8-373.4
- Lay back slopes (Major) MP 363.1-363.2, 363.3-363.8, 364-364.4, 368.3-368.4, 369.5-.69.6, 370-370.2, 373.7-373.9
- Formalize pull-out MP 348.3, 351, 356.4, 358.5, 359.1, 360.3, 361.5, 368.7, 371.2, 375.2
- Upgrade railroad crossing MP 380
- New striping MP 378.5-383

PRESERVATION

PAVEMENT

- Pavement rehabilitation MP 350-360

BRIDGE AND RCB CULVERTS

- Bridge widen MP 357.84, 363.54, 365.7
- Rail upgrade MP 340, 340.68, 381.85
- Bridge compression joint replacement MP 343.37
- Bridge deck concrete repair MP 363.54
- Bridge substructure concrete repair MP 365.7 and 365.84
- Bridge widen with deck rehab or replacement 343.37
- Approach roadway improvements MP 343.37
- RCB widen MP 340, 340.68, 346.17, 354.53, 358.62, 359.59, 365.04, 373.74, 373.97, 376.43, 377.21, 378.04, 380.5, 383.52, 385.18

POLICY RECOMMENDATIONS

Inter-Agency Coordination

Document inter-agency communication protocols and develop a coordinated protocol improvement plan to:

- improve detour awareness
- improve mobility during detour
- improve school bus access in Safford and Duncan
- improve law enforcement/emergency vehicle response times
- establish streamlined process
- efficiently deploy staff to the field and maximize limited resources

U.S. 70, Safford to New Mexico State Line
Interstate Detour Needs Study
Recommendations Summary by Investment Category

Miles
0 1 2 3 4

Corridor Segment
U.S. Highway\State Route
Local Road
Rail
Watercourse
City Boundary
County Boundary
State Boundary
MODERNIZATION
PAVEMENT PRESERVATION
MODERNIZATION (PULLOUT)
PRESERVATION (BRIDGE)
PRESERVATION (RCB)
NEAR-TERM
MID-TERM
LONG-TERM

Table 23: Near-Term Solutions

Rank	Raw Score (out of 100)	Project Count	Solution #	Investment Category	Scope	Segment	Mileposts	Total Cost
1	89	1	S.15	M	Install Center Line Rumble Strip	70-5	360-365	$33,900
1	89	2	S.18	M	Install Center Line Rumble Strip	70-8	375-377	$13,600
3	88	3	S.13	M	Install Center Line Rumble Strip	70-3	352-355	$20,300
3	88	4	S.16	M	Install Center Line Rumble Strip	70-6	365-370	$33,900
5	87	5	S.14	M	Install Center Line Rumble Strip	70-4	355-360	$33,900
5	87	6	S.17	M	Install Center Line Rumble Strip	70-7	370-375	$33,900
7	86	7	S.19	M	Install Center Line Rumble Strip	70-9	383-385	$13,600
8	85	8	B.2	M	San Simon Bridge Approach Roadway Improvements	70-1	343.37	$78,000
9	83	9	M.2	M	Traffic Signal Installation at U.S. 70 and SR 75 in Duncan	70-8	378.92	$376,200
10	78	10	M.1	M	U.S. 70 WB DMS Installation	70-1	342	$508,500
10	78	11	M.6	M	Detour Signage Installation	*(U.S. 70, U.S. 191)*	Throughout Detour in Arizona and New Mexico on U.S. 70 and U.S. 191	$130,690
10	78	12	M.5	M	U.S. 191 NB DMS Installation	*(U.S. 191)*	119.1	$508,500
10	78	13	M.4	M	U.S. 191 SB DMS Installation	*(U.S. 191)*	90	$508,500
14	77	14	M.3	M	U.S. 70 WB DMS Installation	70-9	385	$508,500
14	77	15	S.42	M	Lay Back Slopes – Medium	70-6	366.5-366.8	$339,000
14	77	16	S.35	M	Lay Back Slopes – Minor	70-7	370.5-370.6	$28,300
14	77	17	S.36	M	Lay Back Slopes – Minor	70-7	370.7-370.85	$42,400
14	77	18	S.38	M	Lay Back Slopes – Medium	70-4	359.8-359.9	$113,000
14	77	19	S.47	M	Lay Back Slopes – Major	70-5	363.1-363.2	$565,000

Table 24: Near-Term Solutions (Continued)

Rank	Raw Score (out of 100)	Project Count	Solution #	Investment Category	Scope	Segment	Mileposts	Total Cost
14	77	20	S.46	M	Lay Back Slopes – Medium	70-7	372.8-373.0	$226,000
21	76	21	S.34	M	Lay Back Slopes – Minor	70-6	365.8-365.9	$28,300
21	76	22	S.39	M	Lay Back Slopes – Medium	70-5	362.7-362.8	$113,000
21	76	23	S.40	M	Lay Back Slopes – Medium	70-5	364.8-365.0	$226,000
21	76	24	S.32	M	Lay Back Slopes – Minor	70-4	358.4-358.5	$28,300
21	76	25	S.33	M	Lay Back Slopes – Minor	70-4	359.5-359.6	$28,300
21	76	26	S.48	M	Lay Back Slopes – Major	70-5	363.3-363.4	$565,000
27	75	27	B.3	P	San Simon Bridge Compression Joint Replacement	70-1	343.37	$9,780
27	75	28	B.1	M	San Simon Bridge Widening and Deck Rehabilitation	70-1	343.37	$456,500
27	75	29	B.27	M	Graveyard Wash RCB Rail Upgrade	70-1	340	$6,600
27	75	30	B.28	M	Stockton Wash RCB Rail Upgrade	70-1	340.68	$10,200
27	75	31	S.45	M	Lay Back Slopes – Medium	70-7	371.3-371.4	$113,000
32	74	32	S.41	M	Lay Back Slopes – Medium	70-6	365.1-365.3	$226,000
32	74	33	S.43	M	Lay Back Slopes – Medium	70-6	367.7-367.8	$113,000
32	74	34	B.11	M	Railroad Wash Bridge Rail Upgrade	70-9	381.85	$19,400
32	74	35	S.44	M	Lay Back Slopes – Medium	70-6	368.8-369.0	$226,000
32	74	36	S.37	M	Lay Back Slopes – Medium	70-4	359.0-359.2	$226,000
37	73	37	B.18	M	RCB (Structure #4323) Widening	70-6	365.04	$41,550
38	72	38	B.16	M	RCB (Structure #4321) Widening	70-5	358.62	$63,300
38	72	39	B.17	M	RCB (Structure #4322) Widening	70-5	359.59	$57,350
38	72	40	B.19	M	RCB (Structure #4324) Widening	70-7	373.74	$75,200
38	72	41	S.53	M	Lay Back Slopes – Major	70-7	370.0-370.2	$847,500
42	71	42	B.15	M	RCB (Structure #4320) Widening	70-3	354.53	$63,300
42	71	43	B.23	M	Blackfield Canyon RCB Widening	70-8	378.04	$63,300
42	71	44	S.11	M	Widen Shoulder (EB and WB)	70-7	371-375	$3,559,900
42	71	45	S.8	M	Widen Shoulder (EB and WB)	70-3	350-355	$4,449,900

Table 25: Near-Term Solutions (Continued)

Rank	Raw Score (out of 100)	Project Count	Solution #	Investment Category	Scope	Segment	Mileposts	Total Cost
42	71	46	S.49	M	Lay Back Slopes – Major	70-5	363.7-363.8	42
42	71	47	S.50	M	Lay Back Slopes – Major	70-5	364.0-364.4	42
42	71	48	S.51	M	Lay Back Slopes – Major	70-6	368.3-368.4	42
42	71	49	S.52	M	Lay Back Slopes – Major	70-6	369.5-369.6	42
42	71	50	S.10	M	Widen Shoulder (EB and WB)	70-5	360-364	$3,559,900

Table 26: Mid-Term Solutions

Rank	Raw Score (out of 100)	Project Count	Solution #	Investment Category	Scope	Segment	Mileposts	Total Cost
1	71	51	S.54	M	Lay Back Slopes – Major	70-7	373.7-373.9	$1,130,000
2	70	52	B.12	M	Graveyard Wash RCB Widening	70-1	340	$57,350
2	70	53	B.13	M	Stockton Wash RCB Widening	70-1	340.68	$89,050
4	69	54	S.9	M	Widen Shoulder (EB and WB)	70-4	355-360	$4,449,900
4	69	55	S.12	M	Widen Shoulder (EB and WB)	70-8	375-378	$2,670,000
4	69	56	B.14	M	San Jose Canyon RCB Widening	70-2	346.17	$49,450
4	69	57	B.24	M	Rainville Wash RCB Widening	70-9	380.5	$96,950
4	69	58	B.25	M	RCB (Structure #4330) Widening	70-9	383.52	$85,050
4	69	59	B.26	M	RCB (Structure #6932) Widening	70-9	385.18	$94,900
10	68	60	B.5	M	Shoat Tank Wash Bridge Widening	70-5	363.54	$249,200
10	68	61	B.6	M	Slick Rock Wash Bridge #2 Widening	70-6	365.7	$150,300
10	68	62	B.9	P	Shoat Tank Wash Bridge Deck Concrete Repair	70-5	363.54	$2,310
10	68	63	B.10	P	Slick Rock Wash Bridge #2 Substructure Concrete Repair	70-6	365.7	$1,300
14	67	64	B.4	M	Slick Rock Wash Bridge #1 Widening	70-4	357.84	$298,550
14	67	65	B.8	P	Slick Rock Wash Bridge #1 Substructure Concrete Repair	70-4	357.84	$1,300
14	67	66	B.20	M	RCB (Structure #4325) Widening	70-7	373.97	$106,800
17	66	67	B.21	M	RCB (Structure #4326) Widening	70-8	376.43	$106,800
17	66	68	B.22	M	Woods Canyon RCB Widening	70-8	377.21	$116,650
19	64	69	B.7	M	Railroad Wash Bridge Widening	70-9	381.85	$170,100

Table 27: Mid-Term Solutions (Continued)

Rank	Raw Score (out of 100)	Project Count	Solution #	Investment Category	Scope	Segment	Mileposts	Total Cost
20	60	70	S.23	M	Formalize Pull-Out Area	70-5	351	$71,200
20	60	71	S.27	M	Formalize Pull-Out Area	70-5	360.3	$71,200
20	60	72	S.28	M	Formalize Pull-Out Area	70-5	361.5	$71,200
23	59	73	P.1	P	Pavement Rehabilitation	70-3	350-355	$1,446,400
24	58	74	S.25	M	Formalize Pull-Out Area	70-4	358.5	$175,840
24	58	75	S.26	M	Formalize Pull-Out Area	70-4	359.1	$181,900
24	58	76	P.2	P	Pavement Rehabilitation	70-4	355-360	$1,446,400
27	55	77	S.24	M	Formalize Pull-Out Area	70-4	356.4	$379,700
28	53	78	S.22	M	Formalize Pull-Out Area	70-2	347.3	$530,000
29	52	79	S.21	M	Upgrade Railroad Crossing	70-9	380	$282,500
30	46	80	S.30	M	Formalize Pull-Out Area	70-7	371.2	$87,000
31	45	81	S.1	M	Construct EB Passing Lane	70-2	349-350	$3,729,000
32	42	82	S.2	M	Construct WB Passing Lane	70-3	350-351	$3,729,000

Table 28: Long-Term Solutions

Rank	Raw Score (out of 100)	Project Count	Solution #	Investment Category	Scope	Segment	Mileposts	Total Cost
1	42	83	S.29	M	Formalize Pull-Out Area	70-6	368.7	$110,700
2	37	84	S.31	M	Formalize Pull-Out Area	70-8	375.2	$142,400
3	30	85	S.20	M	New Striping in Duncan	70-7—70-8	378.5-383	$15,300
3	30	86	S.3	M	Construct EB Passing Lane	70-3	354.5-355.5	$3,729,000
3	30	87	S.6	M	Construct EB Passing Lane	70-7	374-375	$3,729,000
6	29	88	S.4	M	Construct WB Passing Lane	70-5	360-361	$3,729,000
7	28	89	S.7	M	Construct EB Passing Lane	70-8	375-376	$3,729,000
7	28	90	S.5	M	Construct EB Passing Lane	70-5	361-362	$3,729,000

Appendix A: Stakeholder Questionnaire

ADOT US 70 ROUTE DETOUR STUDY AGENCY OPERATIONS QUESTIONNAIRE

Date: _____

Agency Interviewed: _____ Agency Staff/Title: _____

Current Inter-Agency Coordination Protocols

1. The US 70 Route Detour Study is primarily focusing on the segment of US 70 between Safford and the New Mexico State Line. Do you think there are other areas experiencing bottlenecks and safety issues in the 100+ mile detour route? If so, where are they?

2. What agency usually initiates communication related to I-10 closures and rerouting of traffic?

3. When the need for an I-10 closure occurs, what is the first step your agency takes? What are major barriers to effective communication within your agency or with other agencies?

4. What technologies are used to notify the general-public of I-10 closures and detours (agency websites including Arizona 511, text messages, email blasts, road signs/DMS etc.)?

5. How often is I-10 partially closed as opposed to a full closure? In the event of partial closures, are inter-agency coordination procedures different than during a full-closure?

6. Based on the range of travel delay times due to emergency closures, would it be beneficial to produce a methodology that anticipates the length of time a closure is anticipated to be implemented when a partial or full closure is enforced (e.g. fatal accident vs. property damage accident, hazardous materials spill, criminal activity, weather related events, etc.)?

7. Does the time of day of an enforced closure have an impact on how your agency and partner agencies react to I-10 closures?

8. Who are the key people within your agency that are responsible for inter-agency coordination? Please provide their names and professional titles.

9. Are staff members from your agency deployed to the field during closures to assist with barricading, routing traffic, responding to emergencies, etc.?

10. When agency staff are deployed to the field, do they have a clear picture of their roles and responsibilities as defined in existing documented protocols and procedures?

11. Is there a current documented process in place that supports notifications and alerts to the public and other agencies?

12. What is the main method of communication (email, telephone, two-way radios, etc.) for your agency? Does your agency use different methods and tools for communicating internally versus externally to other agencies?

13. Are secondary crashes associated with increased traffic on the detour route a primary concern for your agency? If yes, are there areas where crashes tend to reoccur?

14. What do you see as barriers to emergency response, and accident clearance times?

US 70 Detour Negative Impacts Mitigation Strategies

15. How can Intelligent Transportation Systems (ITS) including use of Dynamic Messaging Signs (DMS) help inform drivers that may be impacted by I-10 closures at a broad regional level? In order to make informed decisions about whether or not to proceed or reroute, would it be beneficial to notify drivers as far as Tucson, Benson, and Lordsburg? Is there a benefit in utilizing DMS signs to communicate the location of truck parking areas along US 70? Would improvements, including paving, be beneficial to these roadside parking areas?

16. In areas where shoulders are limited, are emergency response efforts limited or blocked due to traffic backups and a lack of room to get around stopped vehicles? Is shoulder widening in select locations a viable mitigation strategy?

17. Are there key intersections within Safford and Duncan or at the intersection of primary state routes that are of primary concern? What are the current procedures to control traffic at these intersections (presence of officers to direct traffic and override typical non-closure signal timing, restricted turning movements, use of barricades, etc.)? What are some potential mitigation measures?

18. Is inadequate bridge and culvert width a concern for emergency vehicle access, and increased truck loads at specific locations?

19. Are there intersections where roadway geometry limits freight mobility?

20. Are there other agencies or groups we should be interviewing including school districts in Safford and Duncan, and mining operations? Would rerouting of school bus routes or mining truck operations during closures have a beneficial impact on operations?

21. Is increased communication with first responders and area hospitals a potential beneficial practice due to the heightened potential for secondary crashes and medical emergencies in a remote area?

22. Would documented protocols for communicating with regional hospitals and potential staging of first-responders lead to improved accident response times?

General Notes: