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Working Paper

Arizona State Freight Plan

(ADOT MPD 085-14)

Strategic Framework for Decision Making Process, Prioritization

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Working Paper

The purpose of this working paper is to establish a prioritization framework and associated decision making process to identify priority freight transportation issues and projects in Arizona. It is provided for comment.

Acknowledgements

The CPCS team thanks the Arizona Department of Transportation (ADOT) for its guidance and input in developing this working paper, as well as the input and comments of those consulted in its development. Further input from the Technical Advisory Committee (TAC) and Freight Advisory Committee (FAC) is anticipated.

Opinions

Unless otherwise indicated, the opinions herein are those of the author and do not necessarily reflect the views of ADOT, the TAC, FAC, or the State of Arizona.

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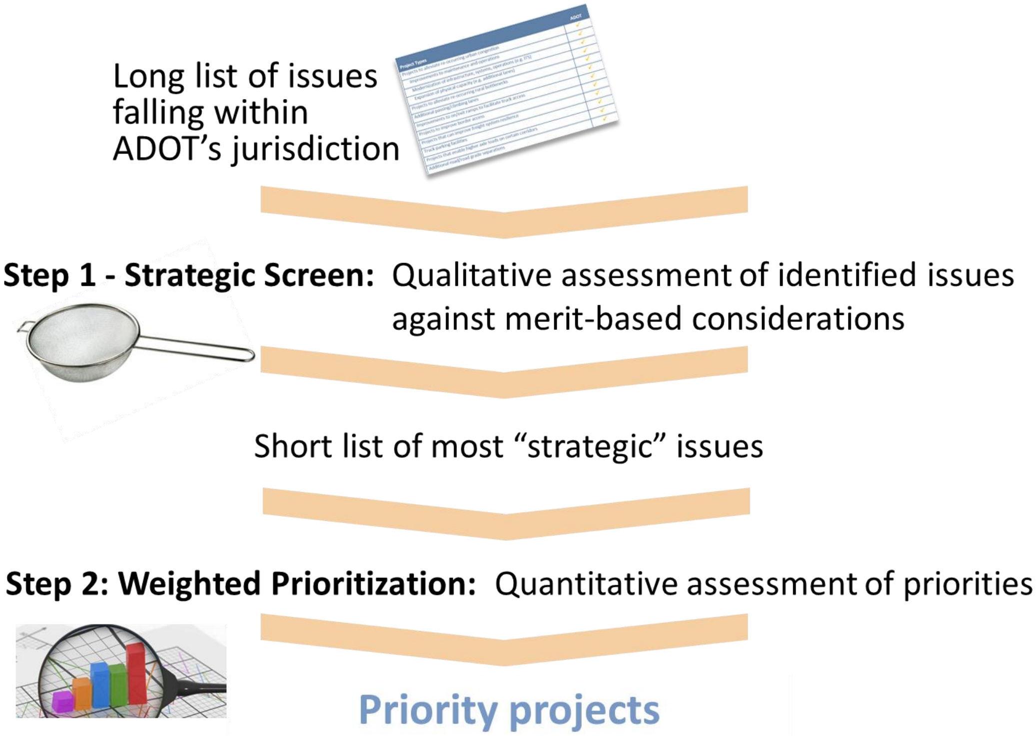
Executive Summary

A long list of over 100 freight transportation system issues were identified (the "Long List") in the development of the Freight Plan, ranging from recurring urban congestion, through inadequate passing/climbing lanes, to inadequate truck parking facilities.

The aim of this working paper is to establish a prioritization framework and an associated decision making process to distill this Long List of freight transportation issues into a set of priority projects that can best advance the goals and objectives of the Freight Plan. To do this, a two-step prioritization process was developed as summarized in the figure below.

Figure ES-1: Two-Step Prioritization Process



Strategic Screen: Process and Results
Step 1 seeks to identify those freight transportation *issues* of most strategic importance with respect to Goal 1 (Increase Economic Competitive) and Goal 2 (Increase System Performance) of the Freight Plan, along with their related objectives. Identified issues are assessed qualitatively with a "yes/no" answer against a set of merit-based considerations (below). This qualitative assessment is based on value judgments of the team and informed by a quantitative assessment and supporting maps.

Figure ES-2: Goal 1 and Goal 2 Merit-Based Considerations to Identify Most Strategic Issues

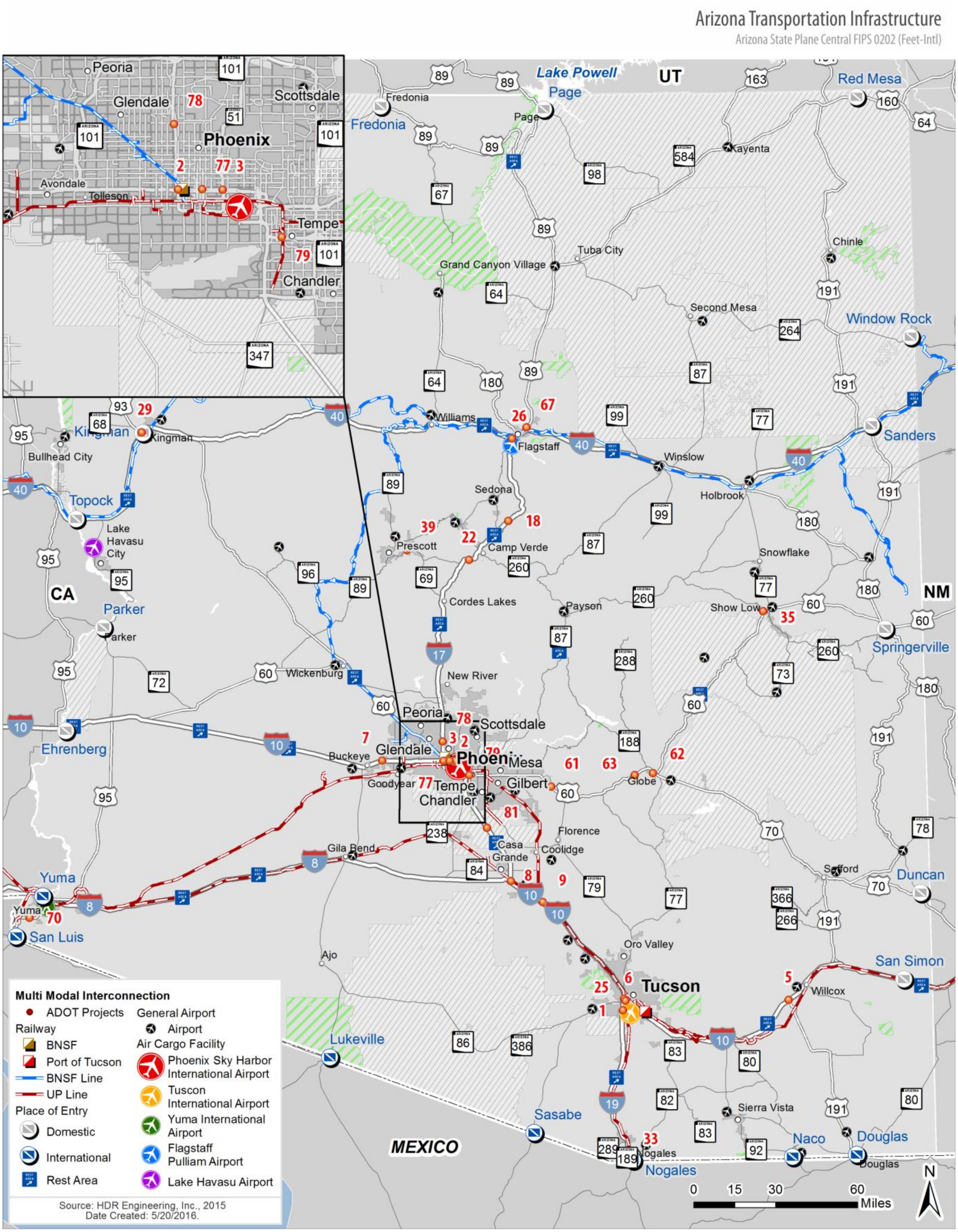
Goal 1 - Enhance Economic Competitiveness
Is the Issue on a Key Commerce Corridor? (G1-KCC)
Are the Flows Impacted by the Issue Significant? (G1-Significant)
Do Future Scenarios Aggravate this Significance? (G1-Significant/Scenarios)
Is the Issue an Impediment to Trade? (G1-Trade)
Goal 2 - Increase System Performance
Does the Issue Hinder Mobility? (G2-Mobility)
Does the Issue Hinder Freight Transportation System Reliability? (G2-Reliability)
Does the Issue Increase Transportation Costs of Freight Transportation? (G2-Cost)
Does the Issue Affect Transportation System Safety? (G2-Safety)
Does the Issue Result in Negative Social/Environmental Impacts? (G2-Emissions)

The Step 1 screen yielded a short list of the 28 most strategic freight transportation issues in Arizona. The majority (60 percent) of these issues relate to urban congestion.

Figure ES-3: Short List of Strategic Issues Resulting from Step 1 Screen

Ref	Route (Area)	Issue Segment	Issue "Type"	G1-KCC	G1-Significant	G1-Scenario	G1-Trade	G2-Mobility	G2-Reliability	G2-Safety	G2-Cost	G2-Emissions
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion									
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion									
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion									
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks									
6	I-10	I-10 east of I-19	Recurring urban congestion									
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion									
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks									
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks									
14	Buckeye Road	I-10 Freight Route Alternative along Buckeye Road	Recurring urban congestion									
15	I-10	Sonoran Freeway	Recurring urban congestion									
16	I-11	I-11: Intermountain West Corridor	Recurring urban congestion									
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks									
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion									
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion									
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks									
32	NSCS	New freeway connection between I-10 and US 60	Recurring rural bottlenecks									
33	SR 189	SR 189 between Mariposa POE and I-19	Border access									
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks									
37	SR 30	Parallel to I-10 from SR 202L to SR 85	Recurring urban congestion									
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion									
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks									
62	US 60	US 60 within Globe area	Recurring rural bottlenecks									
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes									
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion									
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion									
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion									
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion									
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion									

Figure ES-4: Short List of Strategic Issues Resulting from Step 1 Screen



Weighted Prioritization: Quantitative Assessment

As with Step 1, the Step 2 prioritization approach is anchored to the goals and objectives of the Freight Plan. Specifically, criteria relating to Goal 1 (Enhance Economic Competitiveness) and Goal 2 (Increase System Performance) and associated weights are used in Step 2 to prioritize and rank the identified short list of strategic freight *issues*. Subsequently, potential projects are put forward to address each of the priority strategic freight issues. These *potential projects* are then prioritized using Goal 3 (Improve System Management) criteria and associated weights to yield a ranking of priority projects for the Arizona State Freight Plan.

Figure ES-5: From Short List of Issues to Priority Projects: Conceptual Overview of Step 2 Process

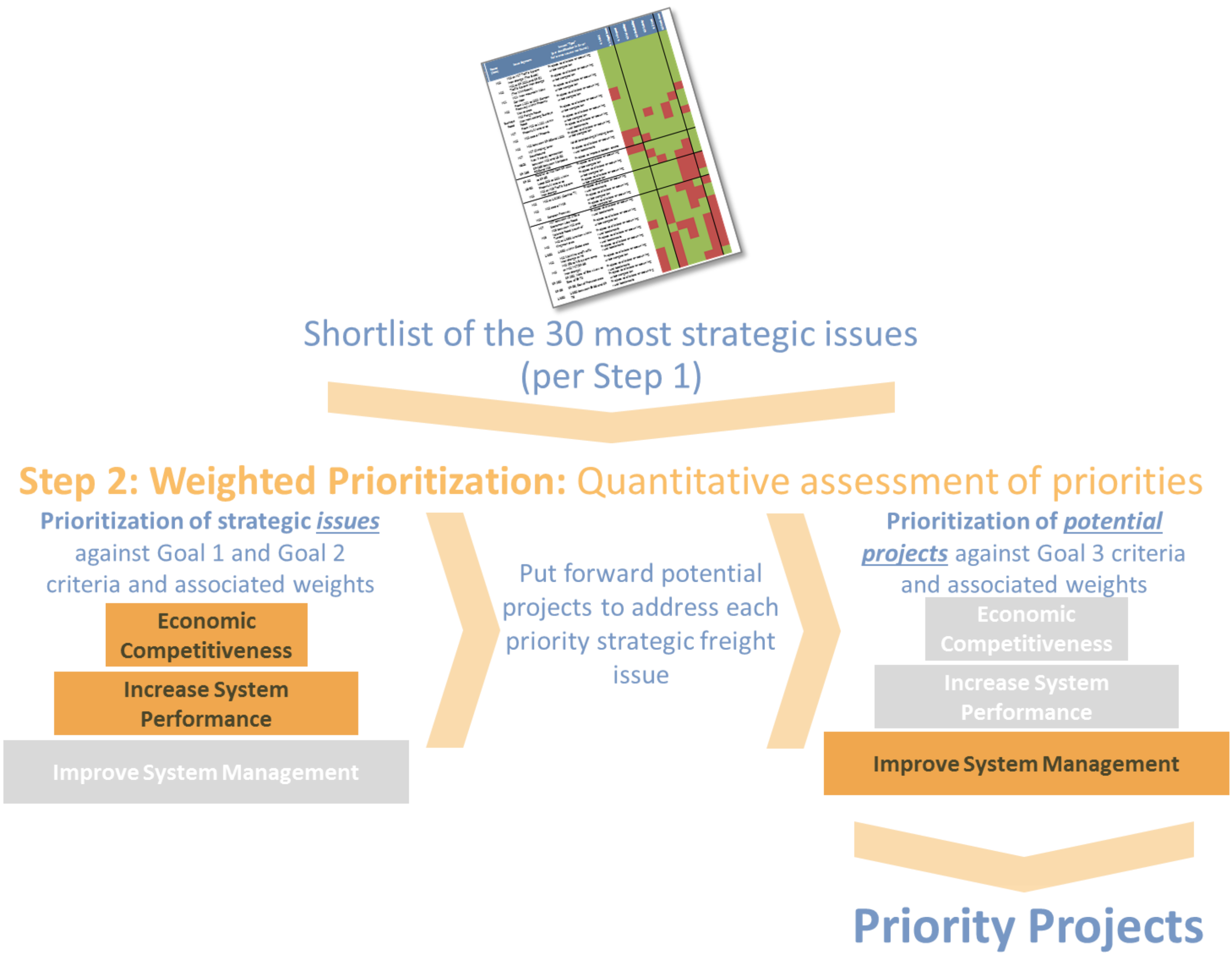


Figure ES-6: Goal 3 Merit-Based Criteria to Prioritize Potential Projects

Goal 3 - Improve System Management
Does the Project Prioritize Good Management of Assets? (G3 - Mgmt)
Is the Project Appropriately Linked to Local Land Use/Regional Plans? (G3-Land Use)
Would the Project be Expected to Receive Freight Stakeholder Support (G3-Stakeholder Support)
Would the Project be Likely to Attract Funding/Financing Partners? (G3-Funding/Financing)
Does the Project Have a Positive Benefit-Cost Analysis? (G3-BCA)

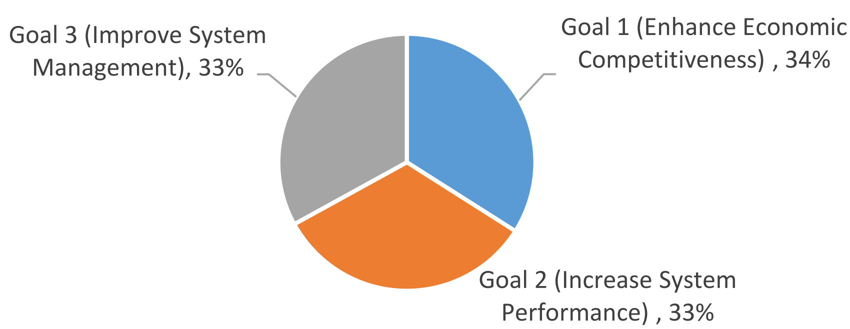
This Step 2 quantitative assessment is based on two factors:

1) **A multi-criteria analysis based on quantitative measures**: All issues/projects are assigned a value for each criterion, based on specific measures relevant to each criteria (e.g. average annualized daily truck traffic (AADTT) to measure significance of truck flows), to be combined into a cumulative score.

2) **The application of weights to each criteria**: Weights are applied to each criteria to emphasize or de-emphasize the importance of each criteria in prioritizing issues and projects. The initial weights for each criterion were developed by the consultant team, and are primarily based on the importance of each criteria with respect to achieving the goals and objectives of the Freight Plan.

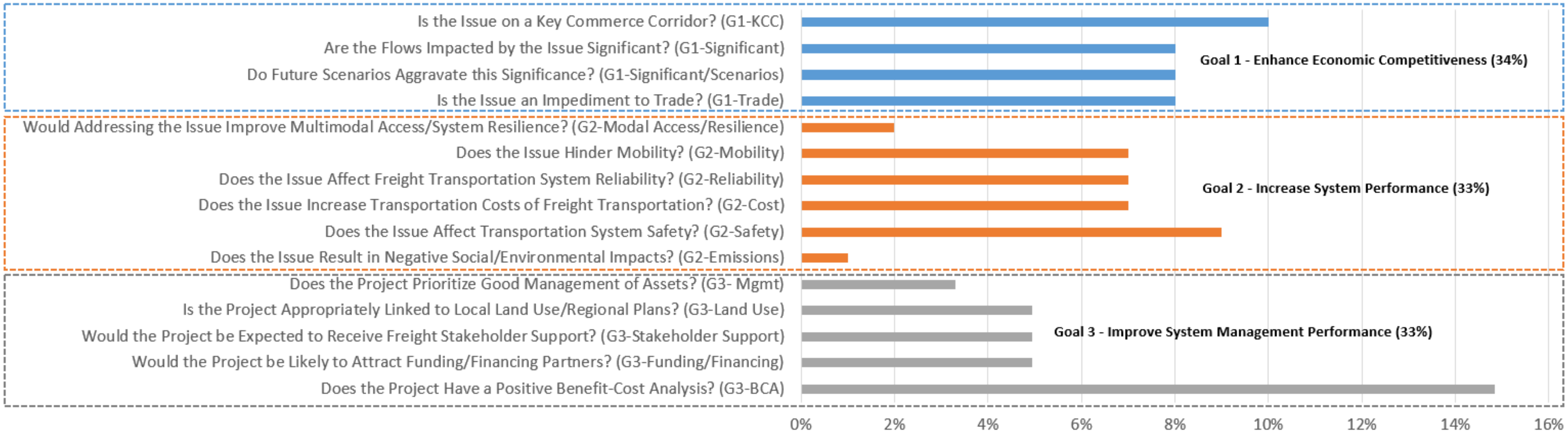
For simplicity, we have assumed similar weights to correspond to each of the three overarching goals of the Freight Plan, though the weighting differs by criteria relating to each goal.

Figure ES-7: Equal Weighting to Each Overarching Goal



The figure on the next page provides a summary of the Step 2 criteria and associated weights.

Figure ES-8: Summary of Step 2 Criteria (Left) and Associated Weights (Right)



Resulting Project Priorities and Supporting Discussion

Figure ES-9 lists the projects in priority order. The illustrative projects were not evaluated or prioritized and are included at the bottom of the Table.

Figure ES-9: Summary Evaluation Results Against Goal 3 Criteria

Ref	Route (Area)	Issue Segment	Project Option(s)	Planning Level Project Cost $ million	Goal 1 & 2 Criteria Cumulative Weighted Score (/67)	Goal 3 Criteria Cumulative Weighted Score (/33)	Combined Goal 1, 2, 3 Criteria Cumulative Weighted Score (/100)	Prioritization Rank
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	I-10 Phoenix Urban Area Improvements	$775.00	61.7	11.55	73.2	1
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	I-10/SR202L/SR 51 System Interchange Improvements	$300.00	57.3	10.52	67.9	2
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	The Stack System Interchange Improvements	$200.00	49.4	10.64	60.1	3
79	US 60	Loop 303 to L202 within Phoenix Metro area	US 60 Phoenix Urban Area Improvements	$425.00	40.1	13.51	53.6	4
7	I-10	I-10 between SR 85 and L303	I-10 West of Phoenix General Purpose Lane	$61.30	36.4	16.88	53.3	5
78	I-17	From I-10 to L101 within Phoenix Metro area	I-17 Phoenix Urban Area Improvements	$600.00	40.4	11.87	52.3	6
81	I-10	From SR 202L to East of SR 387	I-10 Gila River Indian Community Area Widening	$189.00	33.2	17.97	51.1	7
6	I-10	I-10 east of I-19	Tucson Area I-10 Widening Project	$1,860	35.9	9.68	45.6	8
5a	I-10	I-10 at US 191 (Cochise TI)	I-10/US 191 System Interchange Improvements (interim)	$1.50	21.4	23.00	44.4	9
9	I-10	I-10 east of Phoenix	I-10 Picacho Area Roadway Widening	$85.00	31.9	12.05	44.0	10
1	I-10	I-10 at I-19 Traffic System Interchange	I-10/I-19 System Interchange Improvements	$83.00	33.7	9.12	42.8	11
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Earley Road to I-8 Widening and TI Improvements on I-10	$40.00	27.4	13.81	41.2	12
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	I-19 Tucson Area Widening and TI Improvements	$625.00	27.4	9.87	37.3	13
67	US 89	US 89 Within Flagstaff, north of I-40	SR 89/I-40 System Interchange Improvements	$29.00	22.2	13.70	35.9	14
39	SR 69	SR 69, East of Prescott area	SR 69 East of Prescott ITS Improvements	$3.30	10.1	24.17	34.3	15
29	I-40	I-40 at US 93 Junction within Kingman area	I-40/US93 System Interchange Improvements	$86.50	24.3	9.67	33.9	16

Ref	Route (Area)	Issue Segment	Project Option(s)	Planning Level Project Cost $ million	Goal 1 & 2 Criteria Cumulative Weighted Score (/67)	Goal 3 Criteria Cumulative Weighted Score (/33)	Combined Goal 1, 2, 3 Criteria Cumulative Weighted Score (/100)	Prioritization Rank
5b	US 191	US 191/Cochise RR Overpass	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	$16.50	21.4	10.08	31.5	17
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	I-40/I-17 System Interchange Improvements	$82.00	22.6	8.50	31.1	18
62	US 60	US 60 within Globe area	Globe Area Freight Improvements	$6.80	9.9	18.09	28.0	19
33a	SR 189	SR 189 between Mariposa POE and I-19	SR 189 Traffic Flow Improvements (interim)	$70.00	12.7	12.93	25.7	20
33b	SR 189	SR 189 between Mariposa POE and I-19	SR 189 Traffic Flow Improvements (ultimate)	$161.00	12.7	12.17	24.9	21
18	I-17	I-17 between SR 179 to Stoneman Lake Road	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	$23.10	19.8	3.67	23.4	22
35	SR 260	SR 260, West of Show Low to East of SR 73	SR 260 Show Low Area Intersection Improvements	$8.00	11.4	10.32	21.7	23
61	US 60	US 60 between SR 88 and SR 79	US 60 Access Controlled Freeway Extension	$245.00	15.1	2.43	17.5	24
63	US 60	US 60 Passing Lane: Westbound	US 60 Passing Lane	$5.10	3.8	3.26	7.1	25
Illustrative Projects								
14	Buckeye Road	I-10 Freight Route Alternative along Buckeye Road		N/A	-	-	-	-
15	I-10	Sonoran Freeway		N/A	-	-	-	-
16	I-11	I-11: Intermountain West Corridor		N/A	-	-	-	-
32	NSCS	New freeway connecting between I-10 and US 60		N/A	-	-	-	-
37	SR 30	Parallel to I-10 from SR 202L to SR 85		N/A	-	-	-	-

Next Steps

The results of the prioritization process, criteria and associated weights outlined in this working paper have been developed in consultation with ADOT, the TAC, and FAC, with the aim of having broad buy-in before completing the prioritization evaluation.

This process has produced a short list of strategic projects which will form the basis of the development of the Improvement Strategy (Phase 10) and Implementation Plan (Phase 11).

Acronyms and Abbreviations

AADTT	AVERAGE ANNUALIZED DAILY TRUCK TRAFFIC
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
AZTDM2	ARIZONA TRAVEL DEMAND MODEL
BCA	BENEFIT-COST ANALYSIS
CAG	CENTRAL ARIZONA GOVERNMENTS
CYMPO	CENTRAL YAVAPAI METROPOLITAN PLANNING ORGANIZATION
EPA	ENVIRONMENTAL PROTECTION AGENCY
FAC	FREIGHT ADVISORY COMMITTEE
FMPO	FLAGSTAFF METROPOLITAN PLANNING ORGANIZATION
ITS	INTELLIGENT TRANSPORTATION SYSTEMS
KCC	KEY COMMERCE CORRIDOR
LRTP	ARIZONA’S LONG-RANGE TRANSPORTATION PLAN
MAG	MARICOPA ASSOCIATION OF GOVERNMENTS
MPD	MULTIMODAL PLANNING DIVISION
MVMT	MILLION VEHICLE MILES TRAVELLED
NACOG	NORTHERN ARIZONA COUNCIL OF GOVERNMENTS
P2P	PLANNING TO PROGRAMMING
PAG	PIMA ASSOCIATION OF GOVERNMENTS
PHX	PHOENIX SKY HARBOR INTERNATIONAL AIRPORT
SCMPO	SUN CORRIDOR METROPOLITAN PLANNING ORGANIZATION
SEAGO	SOUTH EASTERN ARIZONA GOVERNMENTS ORGANIZATION
TAC	TECHNICAL ADVISORY COMMITTEE
TPTI	TRUCK PLANNING TIME INDEX
TTTI	TRUCK TRAVEL TIME INDEX
VMT	VEHICLE MILES TRAVELLED

1 Introduction

Key Messages

The State Freight Plan will define immediate and long-range investment priorities and policies that will help enable Arizona's long term economic competitiveness and growth.

The purpose of this working paper is to establish a prioritization framework and associated decision making processes to identify priority freight transportation issues and projects in Arizona.

1.1 Introduction: Context

Arizona's economic potential is supported by the state's transportation infrastructure, which connects sources of production to markets.

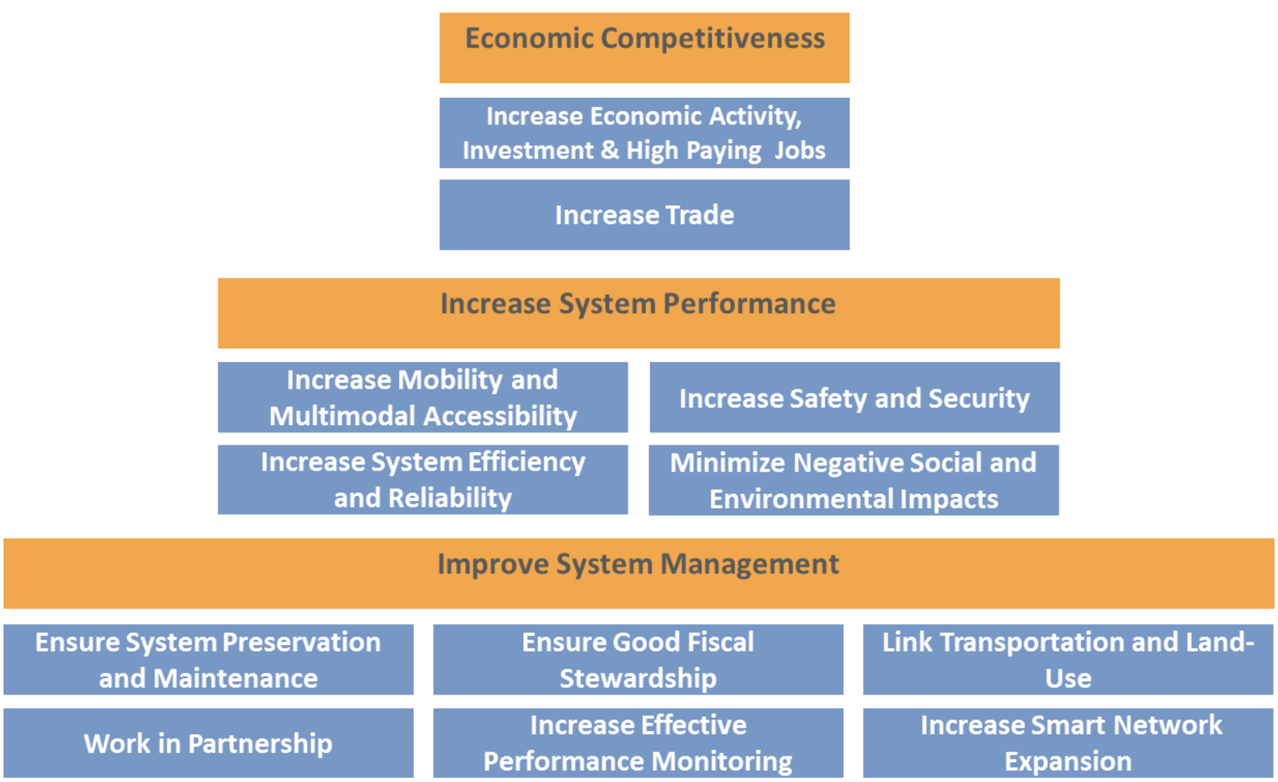
When transportation infrastructure and related services are efficiently designed and competitively positioned, businesses benefit from lower transport costs, faster and better transportation services, and increased reliability; which in turn contribute to their own competitiveness and growth, and that of the broader region.

Effective freight planning and programming can help achieve these ends. Yet, fiscal realities are such that Arizona's Department of Transportation (ADOT) cannot address all transportation system needs and constraints. Rather, it must be strategic in defining and prioritizing its investments and system improvements.

To this end, ADOT's Multimodal Planning Division (MPD), is developing Arizona's State Freight Plan (Freight Plan, or Plan) which will provide strategic guidance to achieve its vision, goals and objectives.

Vision: Arizona's freight transportation system enhances economic competitiveness and quality growth through effective system performance and management.

Figure 1-1: Arizona State Freight Plan Goals and Objectives



Source: CPCS

1.2 Project Objectives

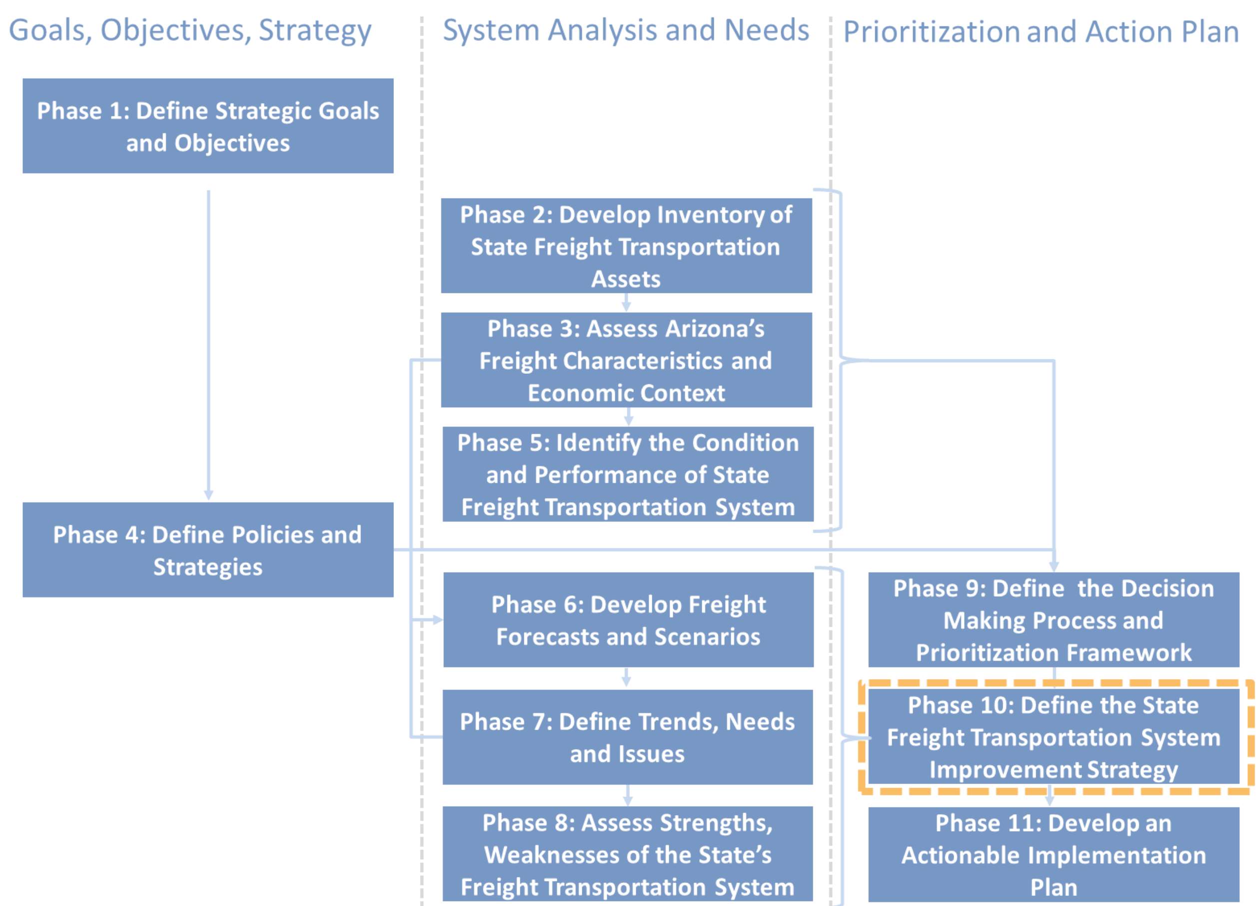
The State Freight Plan will define immediate and long-range investment priorities and policies that will generate the greatest return for Arizona's economy, while also advancing other key transportation system goals, including national goals outlined in the FAST Act. It will identify freight transportation facilities in Arizona that are critical to the State's economic growth and give appropriate priority to investments in such facilities.

The State Freight Plan will ultimately provide Arizona with a guide for assessing and making sound investment and policy decisions that will yield outcomes consistent with the State's visions, goals, and objectives, and notably, promote regional competitiveness and economic growth.

1.3 Freight Plan Development Phases

The State Freight Plan is being developed in 11 phases, organized under three overarching headings, as summarized in Figure 1-2. The present working paper is an output of Phase 9.

Figure 1-2: Phased Approach to the Development of Arizona's State Freight Plan



1.4 Purpose of this Working Paper

The aim of this working paper is to establish a prioritization framework and associated decision making process that can yield system improvements.

This working paper also presents a consolidated long list of over 100 freight transportation issues in Arizona ("Long List"). It then documents the results of the initial component of the prioritization process to identify the most strategic freight issues in Arizona and subsequent process for identifying the projects that should be prioritized in the Arizona State Freight Plan.

1.5 Methodology

The methodology used in identifying Arizona freight projects and improvement priorities is outlined in this document, and is not repeated in this section. It is nevertheless important to underscore that the prioritization framework is built upon the Arizona State Freight Plan goals and objectives, which serve as the foundation for the Freight Plan.

The Long List of Arizona freight transportation issues – the starting point in the prioritization process – was derived from previous phases of work in the development of the Arizona State Freight Plan, and existing ADOT studies and plans.

1.6 Limitations

The prioritization process was informed by a combination of qualitative and quantitative analysis, using the best information and data available to the team. In some cases, underlying information and data was imperfect. In any case, the prioritization process involved the best judgement of the members of the project team.

Readers should also recognize that the prioritization framework and process outlined herein is specific to the Arizona State Freight Plan. Identified project priorities are still subject to Arizona's Planning to Programming (P2P) prioritization process, which uses its own prioritization framework.

2 Long List of Freight Transportation Issues in Arizona

Key Messages

This chapter presents a consolidated long list of over 100 freight transportation system issues identified in previous phases in the development of the Arizona State Freight Plan, and in existing ADOT studies and plans.

Importantly, ADOT should focus policies, plans and investments on freight transportation system issues falling within its jurisdiction. Issues not falling directly within its jurisdiction require collaboration and/or engagement with the appropriate agencies or localities in question.

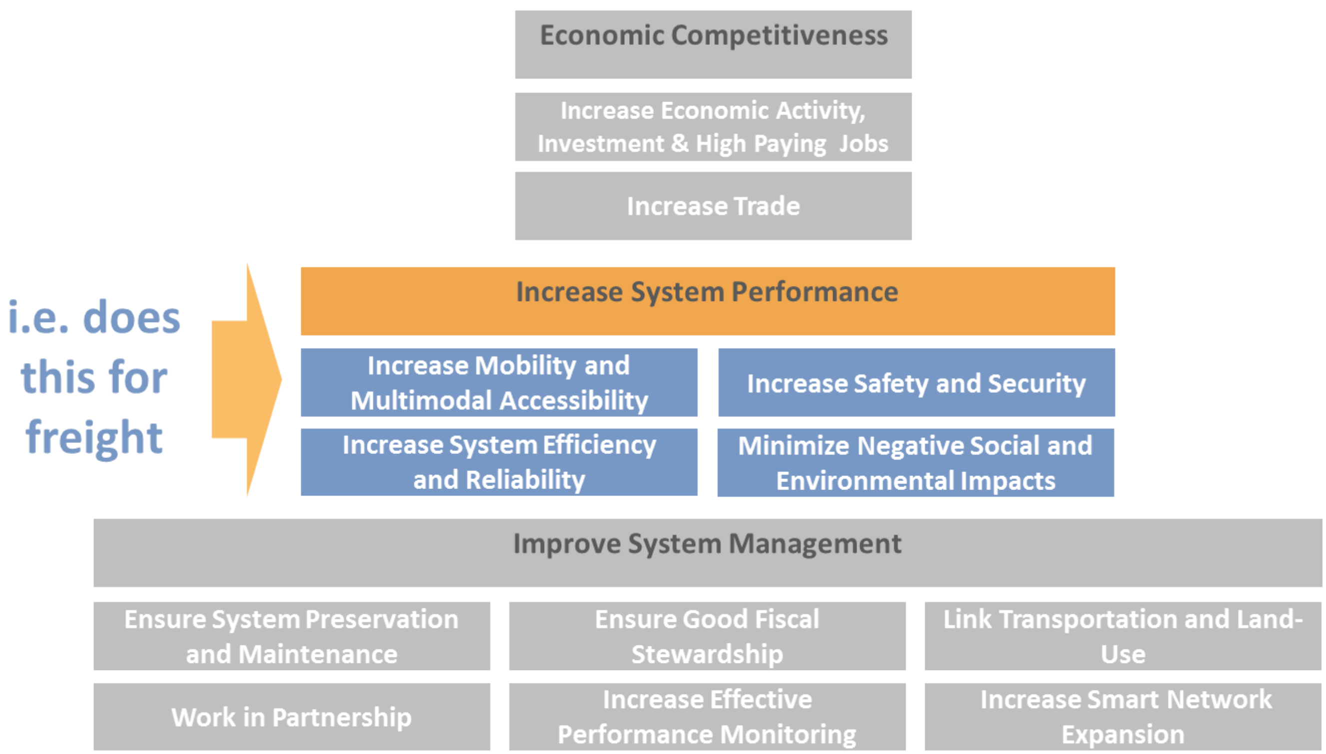
2.1 Prioritization Process: From Issues to Projects

Previous phases in the development of the Arizona State Freight Plan identified over 100 freight transportation system issues in the state. This consolidated Long List of issues is presented in section 2.2. These issues should not be misconstrued as "projects." Freight projects will be defined in this working paper, following an initial prioritization of the freight transportation issues.

2.1.1 What is a "Freight Project"?

Freight transportation system improvement projects (freight projects) should improve the efficiency, reliability, accessibility and social/environmental sustainability of **freight movement**. In other words, freight projects should increase system performance, and enable Arizona's economic competitiveness and growth, in line with the related goals and objectives of the Arizona State Freight Plan.

Figure 2-1: Freight Project to Increase System Performance



2.1.2 Typology of Freight Transportation Issues and Implications for ADOT

The following table provides a typology of freight transportation system issues in Arizona. Importantly, ADOT should focus policies, plans and investments on freight transportation system issues falling within its jurisdiction. Where it shares jurisdiction over issues with other stakeholders, policy, planning and investment responses should be closely coordinated and undertaken on a collaborative basis, as appropriate. Where ADOT has no direct jurisdiction – over rail infrastructure and service for example – it can most meaningfully respond by engaging regularly and coordinating action with the relevant stakeholders.

Figure 2-2: Types of Freight Issues by Jurisdiction and Possible ADOT Policy Response Levers

	Who's Jurisdiction?				
Issue Types	**ADOT**	**Federal**	**MPO/ Local**	**Private**	**ADOT Response Lever**
Recurring urban congestion	✓		✓		Planning, Operations, Investment
Improvements to maintenance and operations	✓		✓		Operations
Modernization of infrastructure, systems, operations (e.g. ITS)	✓		✓		Operations, Investment
Expansion of physical capacity (e.g. additional lanes)	✓		✓		Planning, Investment
Recurring rural bottlenecks	✓		✓		Planning, Investment
Inadequate passing/climbing lanes on the highway system	✓		✓		Planning, Investment
Inadequate highway on/exit ramps for truck access	✓				Planning, Investment
Border access	✓	✓	✓		Planning, Investment
Impediments to freight system resilience	✓	✓	✓	✓	Planning
Inadequate truck parking facilities	✓		✓	✓	Planning, Investment
Restrictive axle loads on certain corridors	✓	✓	✓		Regulations
Problematic at-grade rail crossings	✓		✓	✓	Engagement, Planning, Investment
Rail infrastructure/services				✓	Engagement
Inadequate pipeline system storage capacity				✓	Engagement
Inadequate international air service				✓	Engagement
Municipal by-laws that impede truck movements (off-peak noise, road geometry, etc.)			✓		Engagement
Inadequate supply of truck drivers				✓	Engagement

Source: CPCS

2.2 Consolidated Long List of Freight Transportation Issues

The following presents the consolidated Long List of Arizona freight transportation system issues, as identified in previous phases in the development of the Arizona State Freight Plan. In particular, this Long List draws from the Phase 5 Report on the Conditions and Performance of the State Freight Transportation System, the Phase 3 Report on the Economic Context of Freight Movement in Arizona (notably highlighting specific transportation issues identified by stakeholders representing Arizona's key economic sectors) and the Phase 7 Working Paper on Trends, Needs and Issues. Again, this list presents freight transportation *issues*, rather than projects. Projects will be defined later in this working paper.

Figure 2-3: Consolidated Long List of Arizona Freight Transportation System Issues[1]

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
1	I-10	I-10 at I-19 Traffic System Interchange	259	Heavy congestion causing truck delay; AM and PM peak congestion	Recurring urban congestion	Trucks experience delay on the On/Off ramp. In 2009, it ranked 78th among the worst freight bottlenecks in ATRI/FHWA study.
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	143	Heavy congestion causing truck delay; AM and PM peak congestion	Recurring urban congestion	AM (eastbound) and PM (westbound) peak congestion. Trucks experience heavy delay. In 2014, it ranked 60th among the worst freight bottlenecks in ATRI/FHWA study.
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	147	Heavy truck delay and congestion; Both AM (eastbound) and PM (westbound) peak congestion	Recurring urban congestion	Trucks experience heavy delay. In 2009, it ranked 86th among the worst freight bottlenecks in ATRI/FHWA study.
4	I-10	I-10 at Picacho	209 - 219	Dust storms result in significant delay due to reduced visibility and crashes	Recurring rural bottlenecks	Seasonal (summer and fall) dust storms cause severe multi-vehicle crashes resulting freeway closure for extended period.
5	I-10	I-10 at US 191 (Cochise TI)	331	Low clearance bridge without ramp-around capability	Recurring rural bottlenecks	Trucks traveling northbound to westbound on US 191 have to take exit at milepost 331 due to low clearance at the trumpet-style ramp traffic interchange on I-10 at Cochise. Trucks often use alternative routes along state and local routes to avoid the low clearance bridge.
6	I-10	I-10 east of I-19	260 - 263	Heavy congestion causing truck delay; AM and PM peak congestion	Recurring urban congestion	Westbound trucks experience delay. Traffic volume is about 102k with 13% trucks. PM peak congestion is the worst.
7	I-10	I-10 between SR 85 and L303	112-125	Heavy congestion causing truck delay; AM and PM peak congestion	Recurring urban congestion	High truck activity within Buckeye two-lanes in each direction. Approximately 70k daily traffic volumes with 17% trucks. Location of major warehouses and truck activity centers.

[1] Gaps in reference numbers (column 1) related to issues removed from the consolidated long list.

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
8	I-10	I-10 Mainline and Traffic Interchange at I-8	196 - 199	Bottleneck along I-10 (two-lanes in each direction)	Recurring rural bottlenecks	Bottleneck at I-10 between milepost 196 and 199, having two-lanes in each direction. Low clearance bridge is noted at this junction.
9	I-10	I-10 east of Phoenix	209 - 213	Bottleneck along I-10 (two-lanes in each direction)	Recurring rural bottlenecks	Traffic delay due to capacity constraint.
10	I-10	I-10 within Texas Canyon area	312-318	Grade creates issues for trucks	Recurring rural bottlenecks	Steep grade in westbound direction slows truck speed significantly causing a long traffic queue and safety concern.
11	I-10	I-10 at Brenda TI (US 60)	31	Low clearance bridge without ramp-around capability	Recurring rural bottlenecks	Bridge clearance is low (height) and trucks cannot ramp around.
12	I-10	I-10 at the Colorado River Crossing	0	Truck port of entry congestion	Recurring rural bottlenecks	Truck port of entry with heavy truck volumes. Slow speed due to inspection station results longer travel and planning time.
13	I-10	I-10 Climbing Lane: Westbound	302-306	Grade creates issues for trucks	Inadequate passing/climbing lanes	Steep grade slows truck speed significantly.
14	Buckeye Road	I-10 Freight Route Alternative along Buckeye Road	N/A	Alternative route to address urban congestion	Recurring urban congestion	Major freight clusters are located along I-10 in the Phoenix metropolitan area. An alternative designated freight corridor would support truck flows during emergency freeway closures. Buckeye Road could serve as a continuous east-west freight corridor supporting other major north-south arterials (75th and 99th Avenue for example). A Buckeye Road freight corridor feasibility analysis is recommended.
15	I-10	Sonoran Freeway	N/A	Alternative route to address urban congestion	Recurring urban congestion	New freeway connecting between I-10 and I-19 in Tucson area.
16	I-11	I-11: Intermountain West Corridor	N/A	New interstate linking Mexico with Nevada and points north	Recurring urban congestion	A Tier I Environmental Impact Statement is underway.
17	I-17	I-17, within Black Canyon City Area	232-242	Grade creates issues for trucks	Recurring rural bottlenecks	Steep grade slows truck speed significantly. Congestion is high during PM peak; Northbound directional slow speed due to grade.
18	I-17	I-17 between SR 179 to Stoneman Lake Road	298-306	Grade creates issues for trucks	Recurring rural bottlenecks	Steep southbound directional grade slows truck speeds at night. Multiple occurrences of roadway closures were reported due to snow-related weather condition. Congestion is worst during PM peak.
19	I-17	I-17, South of Flagstaff	329-331	Grade creates issues for trucks	Recurring rural bottlenecks	Steep northbound directional grade slows truck speeds at time. Multiple occurrences of roadway closures were reported due to snow-related weather condition. Mid-day congestion is the worst.
20	I-17	I-17 at McGuireville Traffic Interchange	296	Bridge is structurally deficient with low-clearance	Recurring rural bottlenecks	The McGuireville TI (MP 293) has been identified as structurally deficient, with low deck and superstructure ratings. This bridge provides less than 16' height clearance (truck impacts have resulted in superstructure issues). The structure cannot be easily by-passed due the ramp configuration. This structure was identified for replacement in the Final DCR, I-17/McGuireville TI (2002)(H4123).
21	I-17	I-17 Climbing Lane: Northbound	246-250	Grade creates issues for trucks	Inadequate passing/climbing lanes	Long incline, slow truck speeds. Roadside cliffs that may need to be cut.

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
22[2]	I-17	I-17 Climbing Lane: Southbound	281-285	Grade creates issues for trucks	Inadequate passing/climbing lanes	Downhill grade and very curvy. Roadside cliffs that may need to be cut.
23	I-17	I-17 Climbing Lane: Northbound	307-311	Grade creates issues for trucks	Inadequate passing/climbing lanes	Winding, long uphill climb.
24	I-17	I-17 Climbing Lane: Northbound	255-256	Grade creates issues for trucks	Inadequate passing/climbing lanes	Long incline, slow truck speeds. Roadside cliffs that may need to be cut.
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	95-102	Heavy congestion causing truck delay; AM and PM peak congestion	Recurring urban congestion	Heavy PM peak delay and congestion due to high traffic and truck volumes. High occurrence of crashes.
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	195	Heavy congestion causing truck delay; mid-day congestion	Recurring urban congestion	Heavy traffic and truck volume results delay and congestion.
27	I-40	I-40 at US 93 Junction	71	Heavy congestion causing truck delay; mid-day congestion; low clearance bridge	Recurring rural bottlenecks	Trucks to/from I-40 from/to US 93 experience delay and congestion. Low clearance bridge is noted.
28	I-40	I-40 Between SR 89 and SR 64	149-157	Grade creates issues for trucks	Recurring rural bottlenecks	Grade and heavy truck volumes result in delay and congestion in eastbound direction. Truck related crashes are higher than average (for similar operating environment). Low clearance bridge is noted at I-40 and SR 89 junction. Snow-related events caused roadway closure during winter.
29	I-40	I-40 at US 93 Junction within Kingman area	48	Heavy congestion causing truck delay; mid-day congestion	Recurring rural bottlenecks	Heavy traffic and truck volume as well as urban activity result delay and congestion.
30	I-40	I-40 Climbing Lane: Eastbound	188-190	Grade creates issues for trucks	Inadequate passing/climbing lanes	Grade and heavy truck volumes result delay and congestion.
31	I-8	I-8 within Yuma area	0-14	Heavy congestion causing truck delay; AM and PM peak congestion	Recurring urban congestion	Urban congestion in the Yuma area impacting freight movement including high volumes of freight traffic passing through and originating in Yuma. Congestion is reported during AM peak through evening. The 4th Street UPRR bridge at MP 0.58 has low clearance (15.33-ft). I-8/Araby Rd TI Reconstruction is planned to provide better highway access and congestion relief.
32	NSCS	North-South Corridor	N/A	New freeway connecting between I-10 and US 60	Recurring rural bottlenecks	New freeway connecting between I-10 (Eloy) and US 60 (Apache Junction).
33	SR 189	SR 189 between Mariposa POE and I-19	0-3	International port of entry congestion	Border access	Heavy truck volume, congestion and slower speed due to grade. Midday congestion gets worse as the cross-border activity increases.

[2] Reference Project #22, I-17 Climbing Lane: Southbound at milepost281-285 has been completed since the performance evaluation identified this as an issue, and references to this project going forward have been removed.

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
34	SR 260	SR 260 within Heber area	303-313	Heavy congestion causing truck delay; AM congestion; above average crashes	Recurring rural bottlenecks	Urban activity and high elevation-snow related event during winter. High occurrence of crashes. AM peak congestion is the worse. Major rural east-west corridor carrying forestry and agricultural products.
35	SR 260	SR 260, West of Show Low to East of SR 73	322-360	Heavy congestion causing truck delay; AM congestion; above average crashes	Recurring rural bottlenecks	Urban activity and high elevation-snow related event during winter. High occurrence of crashes. AM and mid-day peak congestion are the worse. Major rural east-west corridor carrying forestry and agricultural products.
36	SR 260	SR 260 Climbing Lane: Eastbound	288-289	Grade creates issues for trucks	Recurring rural bottlenecks	Gradual incline and limited passing. Major rural east-west corridor carrying forestry and agricultural products.
37	SR 30	Parallel to I-10 from SR 202L to SR 85	N/A	I-10 congestion reliever	Recurring urban congestion	New freeway connecting SR 85 and South Mountain Freeway. Provides alternate truck route to warehousing south of I-10.
38	SR 347	SR 347 between I-10 and Maricopa City	173-189	Heavy congestion causing truck delay; AM and PM peak congestion	Recurring urban congestion	Urban activity, heavy traffic volume, and traffic signals at multiple locations. Connector between I-10 and I-8, two AZ's major key commerce corridors.
39	SR 69	SR 69, East of Prescott area	280-295	Heavy truck volume and capacity constraint; mid-day congestion	Recurring urban congestion	Urban activity, heavy traffic volume cause delay and congestion.
40	SR 87	SR 87, South of Payson, northbound	239-254	Urban activity and heavy traffic and truck volume. High occurrence of crashes	Recurring rural bottlenecks	Connects Phoenix to Winslow via Payson. A freight alternative route in the event of I-17/I-40 closure due to weather or emergency event.
41	SR 87	SR 87 Passing Lane: Southbound	273-279	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low sight distance due to turns. No major constraints. Connects Phoenix to Winslow via Payson. A freight alternative route in the event of I-17/I-40 closure due to weather or emergency event.
42	SR 87	SR 87 Passing Lane: Southbound	264-271	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low sight distance due to turns and grade. Connects Phoenix to Winslow via Payson. A freight alternative route in the event of I-17/I-40 closure due to weather or emergency event.
43	SR 87	SR 87 Passing Lane: Northbound	262-272	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low sight distance due to turns and grade. No major constraints. Connects Phoenix to Winslow via Payson. A freight alternative route in the event of I-17/I-40 closure due to weather or emergency event.
44	SR 89	SR 89, Prescott area	319-337	Urban activity, heavy traffic volume, traffic signal at multiple locations	Recurring urban congestion	Urban activity, heavy traffic volume, and traffic signals at multiple locations. Connected to I-40, providing access to Prescott, Chino Valley area.
45	SR 89	SR 89 Passing Lane: Northbound	302-304	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low sight distance due to turns and grade. Rock formations on side of road and cliffs. Connected to I-40 and US 93, providing access to Prescott, Chino Valley area.
46	SR 89	SR 89 Passing Lane: Northbound	330-334	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	High volumes and crashes from passing in oncoming lane. Connected to I-40 and US 93, providing access to Prescott, Chino Valley area.
47	SR 89	SR 89 Passing Lane: Southbound	330-335	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	High volumes. Connected to I-40 and US 93, providing access to Prescott, Chino Valley area.
48	SR 89	SR 89 Passing Lane: Southbound	302-306	Low sight distance due to turns and grade. Many rock formations alongside of road	Inadequate passing/climbing lanes	Low sight distance due to turns and grade. Many rock formations alongside of road. Connected to I-40, providing access to Prescott, Chino Valley area.

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
49	SR 89	SR 89 Passing Lane: Northbound	295-302	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low sight distance due to turns and grade. Rock formations on side of road and cliffs. Connected to I-40 and US 93, providing access to Prescott, Chino Valley area.
50	SR 89	SR 89 Passing Lane: Southbound	295-302	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low sight distance due to turns and grade. Rock formations on side of road. Connected to I-40 and US 93, providing access to Prescott, Chino Valley area.
51	SR 89A	SR 89A Climbing Lane: Southbound	339-343	Grade creates issues for trucks	Inadequate passing/climbing lanes	Low sight distance due to turns and grade and high crash volume. Major rockslide cliffs against road. Connected to I-17, providing access to Prescott, Sedona area.
52	SR 89A	SR 89A Climbing Lane: Northbound	334-336	Grade creates issues for trucks	Inadequate passing/climbing lanes	Uphill, very curvy, high crashes. Steep shoulder drop off. Connected to I-17, providing access to Prescott, Sedona area.
53	SR 89A	SR 89A Passing Lane: Southbound	344-347	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low sight distance due to turns and grade. Rock formations on side of road and built up infrastructure. Connected to I-17, providing access to Prescott, Sedona area.
54	SR 95	SR 95, within Bullhead City area	234-249	Heavy congestion causing truck delay; mid-day peak congestions; above average crashes	Recurring urban congestion	Urban activity, heavy traffic volume, traffic signal at multiple locations. High occurrence of crashes. Connected to I-40.
55	SR 95	SR 95 Within Lake Havasu City area	177-189	Heavy congestion causing truck delay; mid-day peak congestions; above average crashes	Recurring urban congestion	Heavy traffic volume, traffic signal. Two lane roadway with narrow or no shoulder poses safety concern. Flood related events cause traffic flow interruption. High occurrence of crashes. High occurrence of crashes. Connected to I-40.
56	US 191	US 191 Climbing Lane: Northbound	168-171	Grade creates issues for trucks	Inadequate passing/climbing lanes	Minimal passing areas. Steep shoulder drop off. Proving access to major mining activity.
57	US 191	US 191 Climbing Lane: Southbound	167-169	Grade creates issues for trucks	Inadequate passing/climbing lanes	Minimal passing areas. Intersections, adjacent building. Proving access to major mining activity.
58	US 191	US 191 Passing Lane: Southbound	448-455	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low speed area. Proving access to major mining activity.
59	US 191	US 191 Passing Lane: Northbound	448-455	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Low speed area. Proving access to major mining activity.
60	US 191	Douglas LPOE		Expand the LPOE in Douglas to accommodate more trucks	Border access	Expand the land port of entry in Douglas to accommodate more trucks. Improve freight access to Arizona land port of entry.
61	US 60	US 60 between SR 88 and SR 79	200-204	Heavy congestion causing truck delay; PM peak congestion	Recurring rural bottlenecks	Urban activity, heavy traffic volumes, traffic signals at multiple locations, two-lanes in each direction. AM and mid-day peak congestion are the worse. US 60 carries mining, forestry and agricultural goods connecting mining facilities in Globe and Miami area.
62	US 60	US 60 within Globe area		Heavy congestion causing truck delay; mid-day peak congestion	Recurring rural bottlenecks	Urban and mining activity and traffic signals at multiple locations. US 60 carries mining, forestry and agricultural goods connecting mining facilities in Globe and Miami area.

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
63	US 60	US 60 Passing Lane: Westbound	245-348	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	High volumes limit passing. US 60 carries mining, forestry and agricultural goods connecting mining facilities in Globe and Miami area.
64	US 60	US 60 Passing Lane: Westbound	294-296	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	Minimal passing areas. The roadway is on the mountainside, requiring wall cuts. US 60 carries mining, forestry and agricultural goods connecting mining facilities in Globe and Miami area.
65	US 60	US 60 Passing Lane: Eastbound	345-348	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	High volumes. US 60 carries mining, forestry and agricultural goods connecting mining facilities in Globe and Miami area.
66	US 60	US 60 Passing Lane: Eastbound	357-360	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	US 60 carries mining, forestry and agricultural goods connecting mining facilities in Globe and Miami area.
67	US 89	US 89 Within Flagstaff, north of I-40	418-421	Heavy congestion causing truck delay; PM peak congestion	Recurring urban congestion	Urban activity, heavy traffic volume, traffic signals at multiple locations. Connected to I-40 and I-17.
68	US 93	US 93 Climbing Lane: Southbound	161-163	Grade creates issues for trucks	Inadequate passing/climbing lanes	Large number of trucks and traffic.
69	US 93	US 93 Passing Lane: Northbound	165-167	Limited passing ability results in truck delay and safety concern	Inadequate passing/climbing lanes	High volumes.
70[3]	US 95	US 95, San Luis POE to Yuma	0-33	International port of entry congestion	Recurring urban congestion	A major freight corridor connecting a land port of entry with I-8. High occurrence of crashes in the City of Yuma area.
71	US 191	US 191 between Douglas and I-10	0-65	International port of entry congestion; requires access management	Recurring rural bottlenecks	Widening and access management to accommodate truck volumes.
72	US 95	US 95 between Avenue 9E and Aberdeen Rd	31-47	Heavy congestion causing truck delay; mid-day peak congestion	Recurring urban congestion	The project to improve capacity and safety is being constructed in phases, with the first phase being the Fortuna Wash bridge. This new bridge would provide flood mitigation and other roadway improvements. The total estimated project cost for the bridge is $15 million. This freight corridor connects a land port of entry with I-8.
73	I-19	Between Tumacacori TI and SR 189	4-29	Heavy truck volume and capacity constraint; mid-day peak congestion	Recurring rural bottlenecks	Capacity Improvements.
74	SR 85	Lukeville LPOE	80	International port of entry congestion	Border access	Widen port of entry approach to 5 lanes. Improve better freight access to an Arizona Land Port of Entry.
75	I-19	I-19 Grand Ave (I-19 Business) Interchange	8	Heavy congestion causing truck delay; mid-day peak congestion	Border access	Capacity Improvements.
76	SR 82	SR 82 between Grand Ave and Thelma St	0-1	International port of entry congestion	Border access	Capacity Improvements.

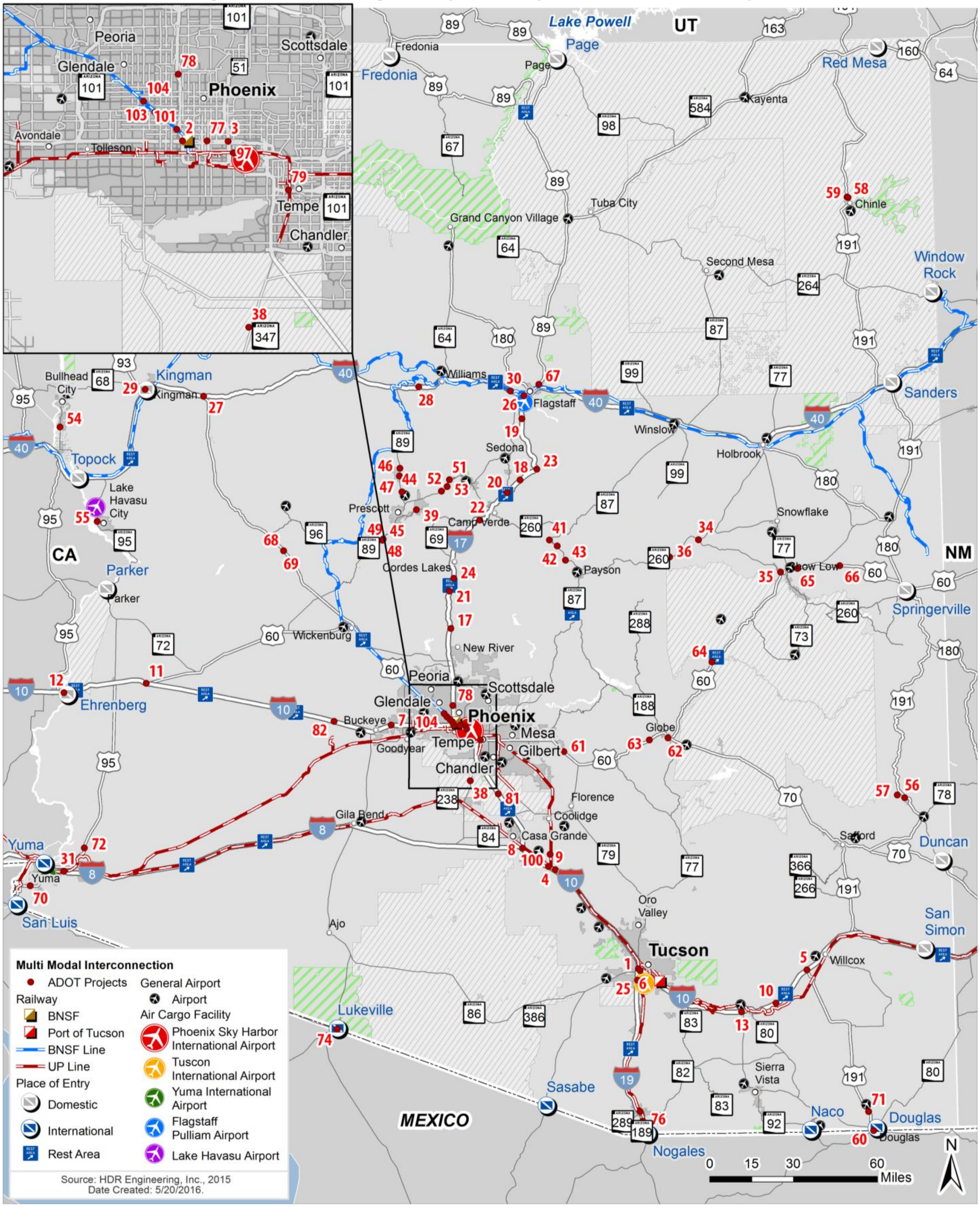
[3] Reference Project #70, US 95, San Luis POE to Yuma (milepost 0-33) is not necessary since AZ 195 addresses freight issues in the area, and references to this project going forward have been removed.

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	134-160	Heavy congestion causing truck delay in Phoenix metro-area; AM and PM peak congestion; above average crashes	Recurring urban congestion	High traffic and truck volume, peak period congestion, high occurrences of crashes, and long travel time.
78	I-17	From I-10 to L101 within Phoenix Metro area	200-215	Heavy congestion causing truck delay in Phoenix metro-area; AM and PM peak congestion; above average crashes	Recurring urban congestion	High traffic and truck volume, peak period congestion, high occurrences of crashes, and long travel time.
79	US 60	Loop 303 to L202 within Phoenix Metro area	138-190	Heavy congestion causing truck delay in Phoenix metro-area; AM and PM peak congestion; above average crashes	Recurring urban congestion	High traffic and truck volume, peak period congestion, high occurrences of crashes, and long travel time.
80	I-10	Phoenix to Tucson	160-275	Heavy congestion causing truck delay in Phoenix and Tucson metro-area; AM and PM peak congestion	Recurring urban congestion	Key commerce Corridor Study recommended widening I-10 to 4 lanes in each direction between Phoenix and Tucson. High traffic and truck volume, peak period congestion, high occurrences of crashes, long travel time.
81	I-10	From SR 202L to East of SR 387	160-187	Bottleneck along I-10 (two-lanes in each direction)	Recurring urban congestion	Preliminary engineering, including the completion of a NEPA document for the section of 1-10 from Loop 202 in Chandler Arizona to approximately SR387 in Casa Grande; specifically, from milepost 160 to milepost 187. Widening as a long-range transportation improvement project.
82	I-10	I-10, west of SR 85	100	Low clearance bridge without ramp-around capability	Recurring rural bottlenecks	Low clearance non-rampable bridge at milepost 100 (west of SR 85) results a barrier to high trucks along this high-truck volume corridor.
83	I-10	Between Tucson and Blythe, California	N/A	Lack of adequate, safe truck parking facilities - I-10 between Tucson and Blythe, California	Truck parking facilities	Carriers expect the truck parking access to deteriorate further once electronic logs go into full effect. Drivers in Arizona are reportedly already spending up to a half-hour to find parking each day.
84	I-17	Between Phoenix and Flagstaff	N/A	Lack of adequate, safe truck parking facilities - I-17 corridor between Phoenix and Flagstaff	Truck parking facilities	Carriers expect the truck parking access to deteriorate further once electronic logs go into full effect. Drivers in Arizona are reportedly already spending up to a half-hour to find parking each day.
85	Statewide	Statewide	N/A	Low axle loads on heavy haul corridors hinders competitiveness	Projects that enable higher axle loads on certain corridors	Several shippers noted that axle load restrictions in Arizona are low relative to other states that allow gross vehicles weights in excess of 80,000 lbs. This was most often cited as a top issue for natural resources sector stakeholders - particularly for mining and forestry sectors. Higher axle-loads would allow from greater economies of scale in moving product, which would drive down per ton cost, thereby increasing shipper competitiveness.
86	Rail Corridors	Major population centers, notably Phoenix and Tucson	N/A	Inadequate road/rail grade separations given traffic levels; causing road congestion; lower train speeds	Additional road/road grade separations	N/A

Ref	Route (Area)	Issue Segment	Mile post	Issue characteristics	Issues "Type" (per classification in Figure 2-2)	Comments
87	North-South	North-South CANAMEX	N/A	Additional rail infrastructure/services	Inadequate infrastructure/services	Some have noted that Arizona is lacking north-south rail infrastructure (notably along the CANMEX Corridor), intermodal facilities and connections to Arizona industrial sites.
89	Asia-Europe	PHX	N/A	Enhanced international air service	Inadequate international air service	Improving international air connections at Phoenix Sky Harbor International Airport (PHX), particularly to Asia and Europe, was the most frequently mentioned improvement need by manufacturing sectors (notably, the high tech sector).
90	PHX	PHX	N/A	Inadequate Customs services at the airport on weekends and during off hours	Inadequate international air service	Several manufacturers noted that Customs and Border Patrol (CBP) operations are lacking on the weekends and during off-hours and is otherwise oriented overwhelmingly to passenger operations.
91	Cities	Major population centers, notably Phoenix and Tucson	N/A	Initiatives to make municipal by-laws more truck friendly (off-peak noise, road geometry, etc.)	Initiatives to make municipal by-laws more truck friendly (off-peak noise, road geometry, etc.)	City ordinances related to noise were cited by retail sector companies as issues in certain areas of Tucson and Phoenix, which limits the ability of certain stores to be replenished outside of congested hours.
93	Statewide	Statewide	N/A	Initiatives to enable greater supply of truck drivers	Initiatives to enable greater supply of truck drivers	The trend towards automated truck transportation could also help alleviate the driver shortage, though this is unlikely in the short term.
97	24th St	24th St	N/A	Highway access to air cargo facilities at PHX, especially the South Air Cargo complex	Recurring urban congestion	Issues will likely become more acute with population growth in and around Phoenix and increasing trade and economic activity.
100	SR 87	SR 87	N/A	Improved access to Coolidge	Inadequate on/exit ramps to facilitate truck access	Turning and signals near Coolidge.
101	W Thomas Rd	At rail crossing near US 60	N/A	High accident count at rail grade crossing	Problematic at-grade rail crossing	High incidence of accidents.
102	N 35th Ave	At rail crossing near US 60	N/A	High accident count at rail grade crossing	Problematic at-grade rail crossing	High incidence of accidents.
103	N 43rd Ave	At rail crossing near US 60	N/A	High accident count at rail grade crossing	Problematic at-grade rail crossing	High incidence of accidents.
104	W Bethany Home Rd	At rail crossing near US 60	N/A	High accident count at rail grade crossing	Problematic at-grade rail crossing	High incidence of accidents.

The following map, provided for reference, shows the location of each issue on Arizona's multimodal freight transportation system, where relevant (i.e. a specific point that can be mapped). In general, issue segments are identified by their midpoints, and the numbering should not be construed as identifying specific locations of problems in the freight system.

Figure 2-4: Arizona Freight Transportation System Issues Reference Map



3 Prioritization Framework

Key Messages

The prioritization framework involves two steps:

Step 1 – Strategic Screen: Qualitative Assessment Against Merit-Based Considerations: This first step seeks to short list the most strategic Arizona freight transportation system issues using merit-based criteria and value judgements.

Step 2 – Weighted Prioritization: Quantitative Assessment: The second step prioritizes project options on the basis of a quantitative analysis of each project's merits vis-à-vis a weighted criteria corresponding to goal and objectives of the Arizona State Freight Plan.

One of the fundamental and currently unresolved policy questions of the Arizona State Freight Plan pertains to the process by which identified freight transportation system improvements will be prioritized for investment, pursuant to the P2P framework, which is independent of the prioritization framework described herein.

3.1 Prioritization Process

The prioritization process and framework is the result of previous phases of the Freight Plan, building upon the vision, goals and objectives developed in Phase 1 and the strategy of the Plan, as developed in Phase 4. Both the goals and objectives of the Plan as well as its strategies, have been vetted by the TAC and FAC.

Figure 3-1: From Vision, Goals and Objectives to Strategy and Priorities

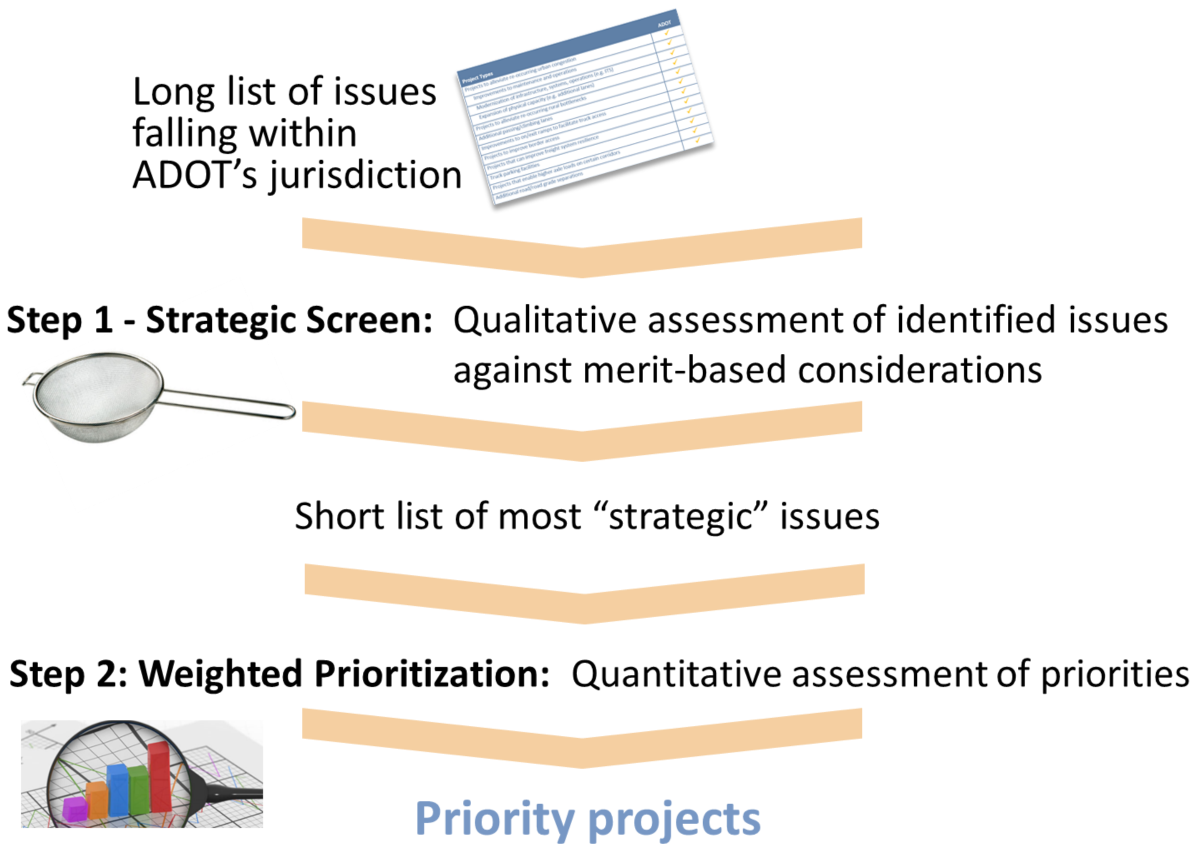
What remains unclear and critical is how the output of the freight project prioritization approach will relate to the Planning to Programming Link (P2P) prioritization process. One of the fundamental and currently unresolved policy questions of the Arizona State Freight Plan pertains to the process by which identified freight transportation system improvements will be prioritized for investment. The ADOT currently uses P2P to prioritize programs and projects and tying these to the Five-Year Facilities Construction Program. However, as currently structured, the P2P Link prioritization process uses largely non-freight evaluation criteria, and would therefore supersede investment priorities identified in the Arizona State Freight Plan.

ADOT does not currently have dedicated freight project prioritization and funding mechanism. Rather, freight projects are evaluated against other projects in the allocation of funding via the P2P Link process.

3.1.1 Two-Step Prioritization Process

The prioritization process for identifying freight improvement priorities follows a two-step process. Step 1 is based on a qualitative assessment of freight issues strategic merit - in effect, to screen-in issues which are strategically aligned with the goals and objectives of the freight plan (and screen-out issues which are not). Step 2 quantitatively assesses and prioritizes freight issues and projects based on a weighted criteria, also anchored to the goals and objectives of the Freight Plan.

Figure 3-2: Two-Step Prioritization Process



4 Strategic Screen: Qualitative Assessment against Merit-Based Considerations

Key Messages

The Step 1 screen yielded a short list of the 30 most strategic freight transportation issues in Arizona. The majority (60 percent) of these issues relate to urban congestion.

Addressing these issues will require close collaboration with other jurisdictions, and in particular, MAG and PAG. Close to one third of the issues are related to rural bottlenecks, in most cases falling under direct ADOT jurisdiction. The balance of the identified strategic issues related to Inadequate passing/climbing lanes (7 percent) and to border access issues.

4.1 Strategic Screen: Qualitative Assessment against Merit-Based Considerations

The Step 1 screen seeks to identify those issues of most strategic importance with respect to Goal 1 (Increase Economic Competitiveness) and Goal 2 (Increase System Performance), along with their related objectives.

The Identified Long List of issues are assessed qualitatively with a "yes/no" answer against a set of merit-based considerations, as outlined below. This qualitative assessment is based on value judgments, of the team and informed by a quantitative assessment, supported by a series of related maps (provided in section 4.2).

4.1.1 Goal 1 – Increase Economic Competitiveness

Goal 1 criteria assess issues with respect to the following questions:

- Is the issue on a Key Commerce Corridor (KCC)? (G1-KCC)
- Are the flows impacted by the issue significant? (G1-Significant)
- Do Future Scenarios Aggravate this Significance? (G1-Significant/Scenarios)
- Is the issue an impediment to trade? (G1-Trade)

4.1.2 Goal 2 – Increase System Performance

Goal 2 criteria assess issues with respect to the following questions:

- Does the issue hinder mobility? (G2-Mobility)
- Does the project increase freight transportation system reliability? (G2-Reliability)
- Does the project affect transportation system safety? (G2-Safety)
- Does the project increase transportation costs of freight transportation? (G2-Cost)
- Does the issue within an environmental nonattainment or maintenance area? (G2-Emissions)

4.2 Qualitative Assessment – Supporting Data and Maps

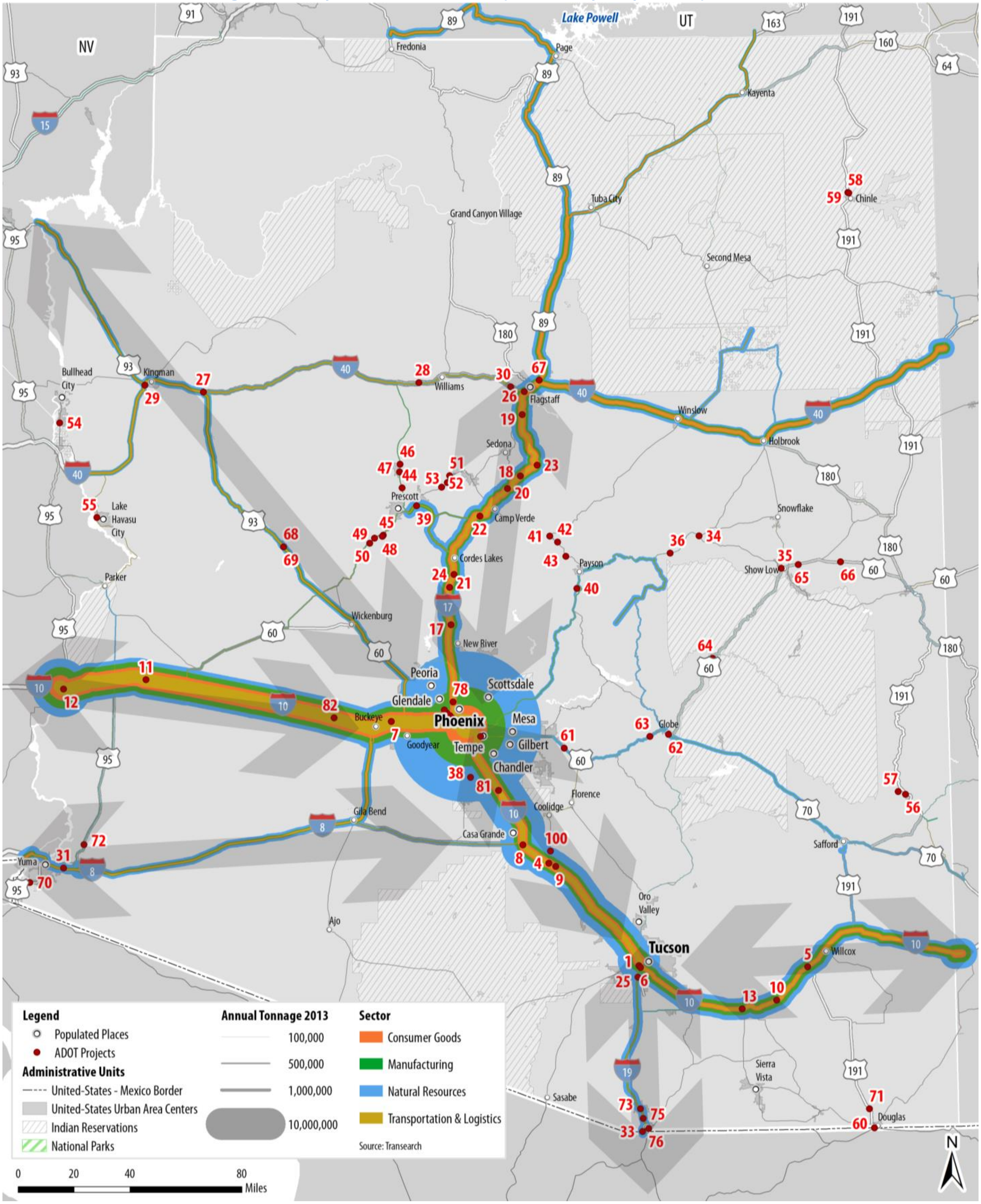
A series of maps were developed to help address Goal 1 and Goal 2 merit-based criteria. These maps were used as references points when answering the above noted criteria questions. The location of the issues are denoted on each map using the reference point in the first column of Figure 2-3 (Consolidated Long List of Arizona Freight Transportation System Issues).

4.2.1 Is the Issue on a Key Commerce Corridor? (G1-KCC)

ADOT has already identified KCCs "where improvements to the transportation infrastructure supports the greatest potential commercial and economic benefits."[4] The Arizona State Freight Plan should prioritize system improvements, including incremental improvements that will bolster the performance of the KCCs. Figure 4-1 identifies the location of the issue segments with respect to the KCCs (denoted by grey arrows). Issues on a KCC are assigned a *yes* value.

[4] Arizona Key Commerce Corridors, p. 1.

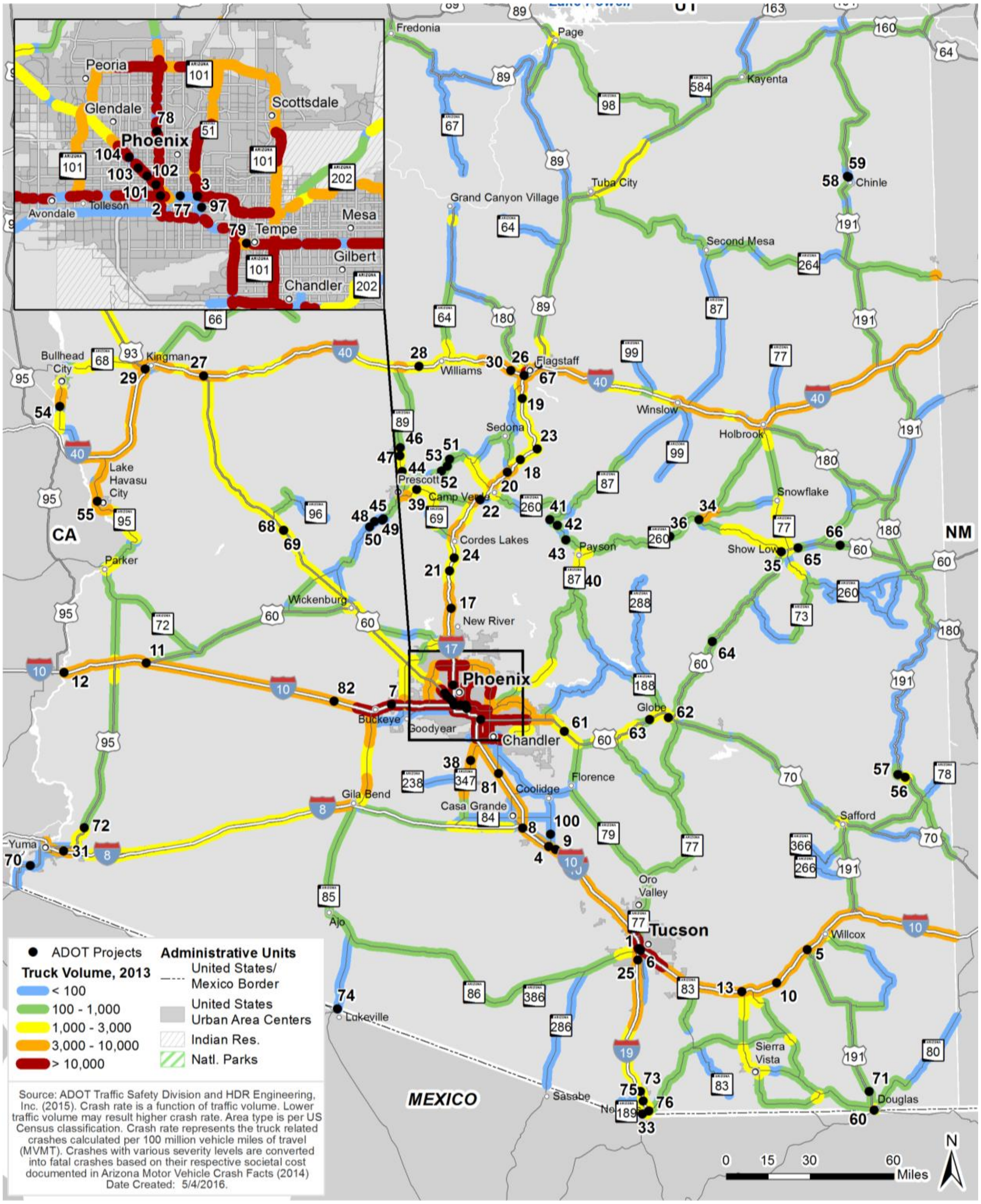
Figure 4-1: Key Commerce Corridors (Denoted by Grey Arrows)



4.2.2 Are the Flows Impacted by the Issue Significant? (G1-Significant)

Annualized Average Daily Truck Traffic (AADTT) likely represents the best proxy for the significance of freight flows in Arizona (volumes of flows are considered in subsequent sections). The issue segments are presented below in relation to AADTT. Issues with an AADTT over 1,000 trucks per day are assigned a *yes* value.

Figure 4-2: Annualized Average Daily Truck Traffic

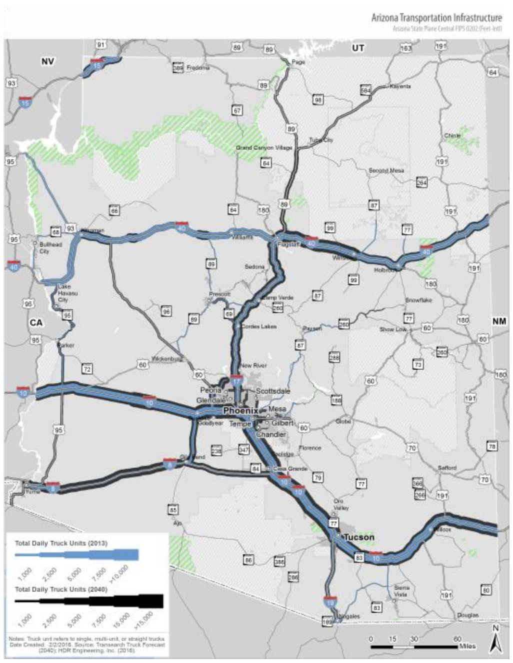


4.2.3 Do Future Scenarios Aggravate this Significance? (G1-Significant/Scenarios)

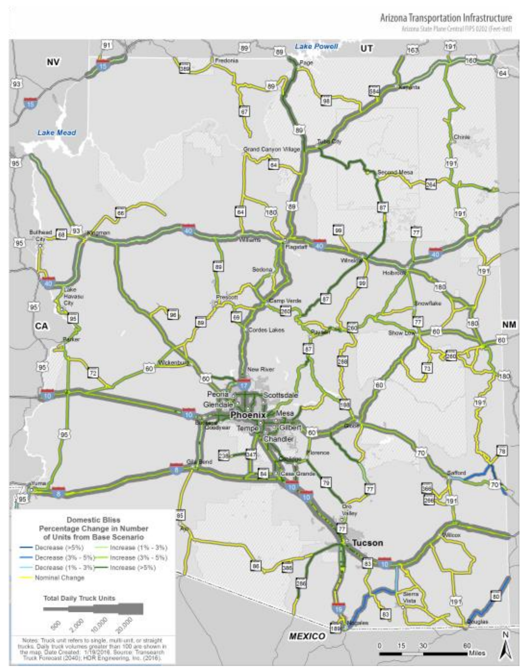
Base case truck traffic forecasts and three alternative future scenarios were developed in the preparation of the Arizona State Freight Plan. The intent of the scenario planning process was to help Arizona “prepare” for an unknown future (rather than try to “predict” the future). To this end, the Step 1 screen assigns a *yes* to issues which are likely to be aggravated given an expected continued significance of truck flows in all scenarios.

Figure 4-3: Changes in Truck Numbers, by Scenario (Reference Graphics)

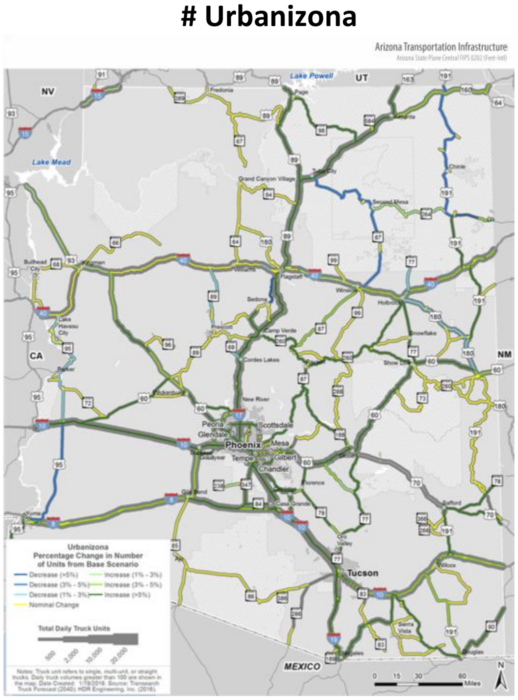
Base Case Scenario



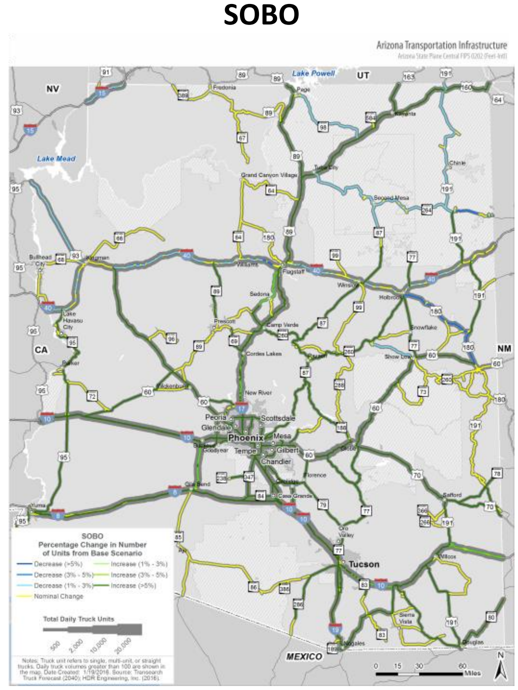
Domestic Bliss



 # Urbanizona



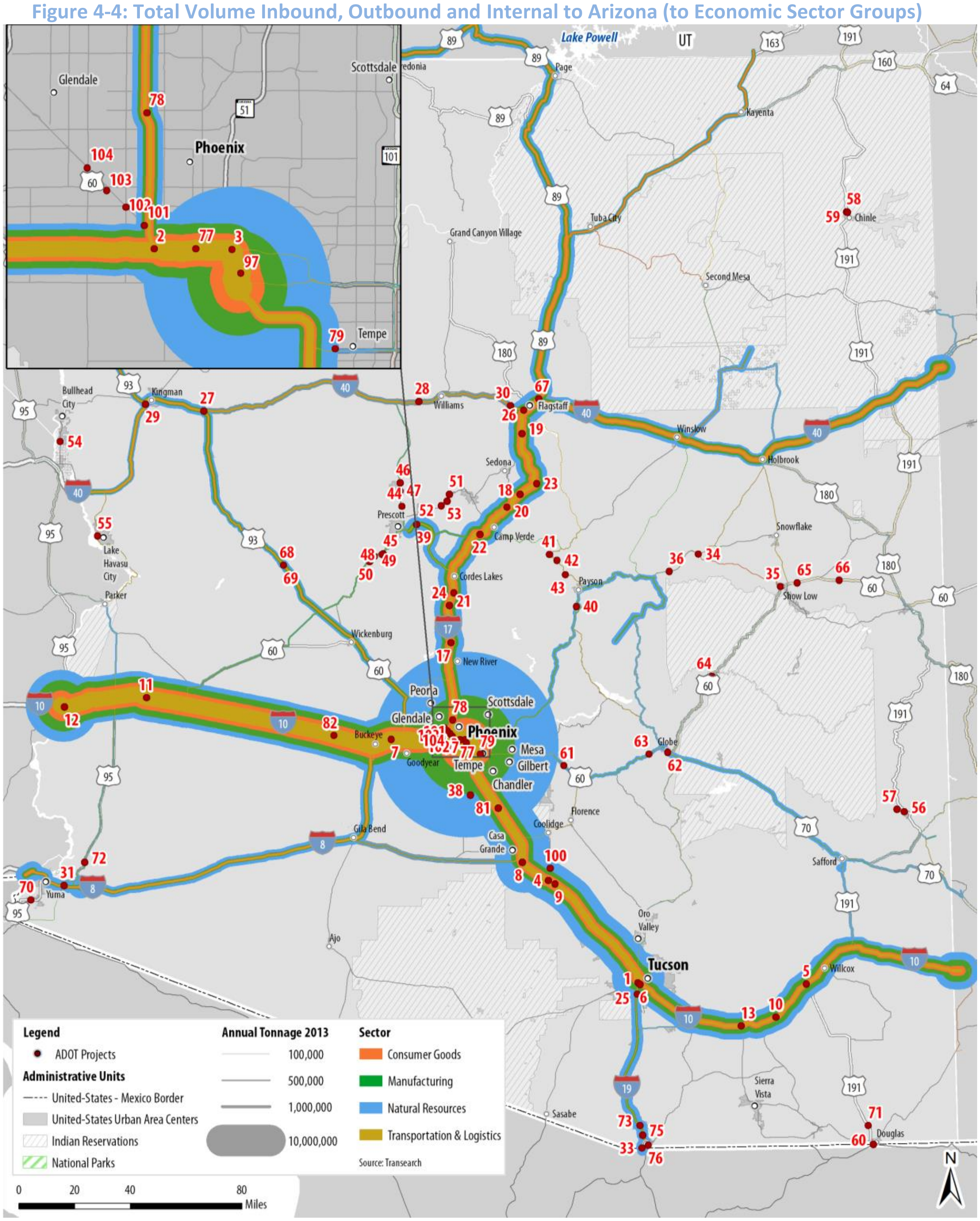
SOBO



4.2.4 Is the Issue an Impediment to Trade? (G1-Trade)

Since Arizona's top export sectors are manufacturing and natural resources sectors, issues that are an impediment to the flows of these sectors are considered strategically more important on the basis of this criteria. A particular focus is placed on manufacturing sector flows (green) which correlate to high paying jobs. Issues with tonnages in the top one third of all identified issues were assigned a *yes* value.

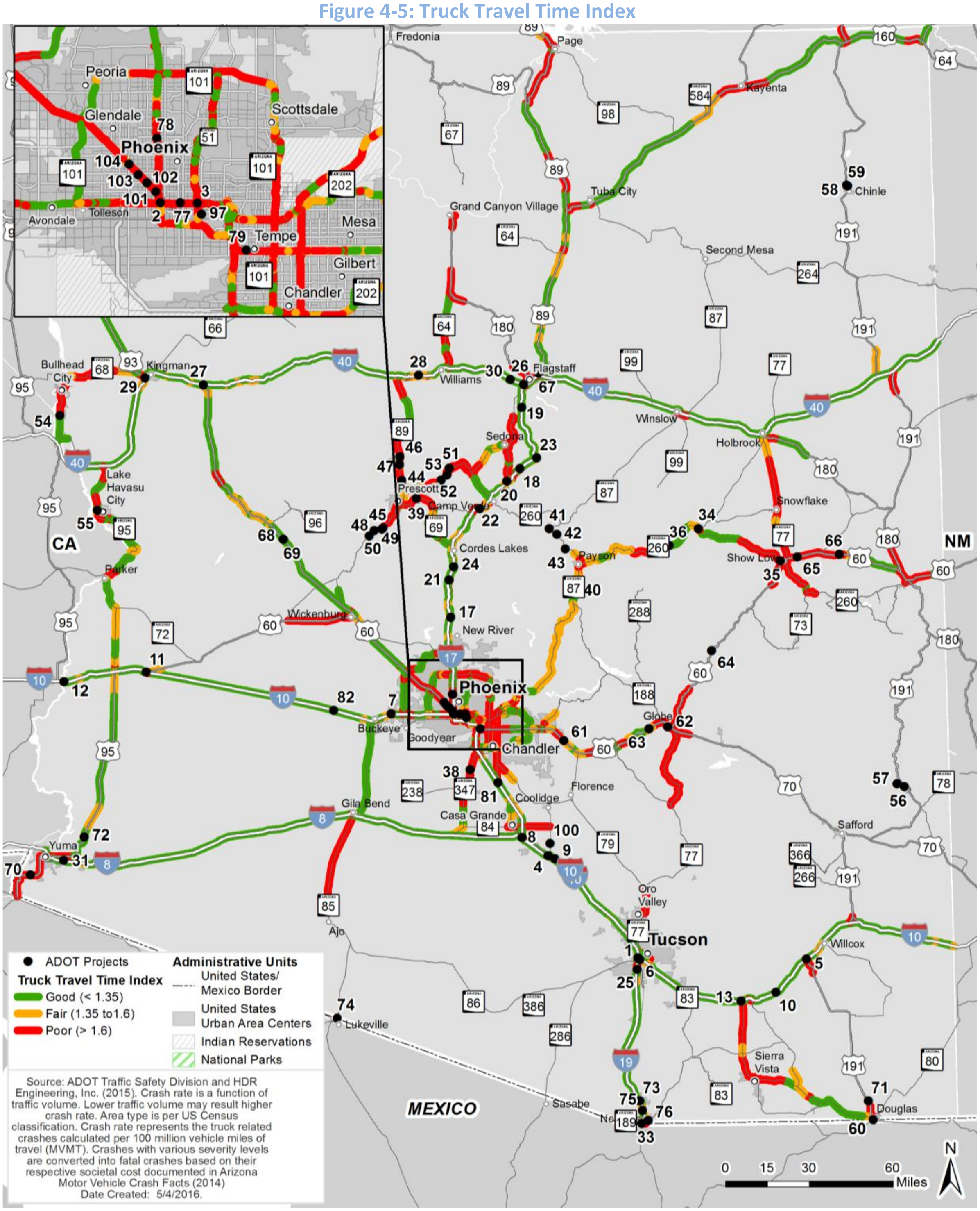
Figure 4-4: Total Volume Inbound, Outbound and Internal to Arizona (to Economic Sector Groups)



4.2.5 Does the Issue Hinder Mobility? (G2-Mobility)

Mobility was defined using the Truck Travel Time Index (TTTI), which measurers recurring delay primarily due to peak period congestion. TTTI evaluates the difference in travel time between 'free flow' and congested flow conditions. Issues were mapped and their location was compared to areas of good, fair and poor TTTI. Issues in areas showing a poor TTTI (>1.6) are assigned a *yes* value.

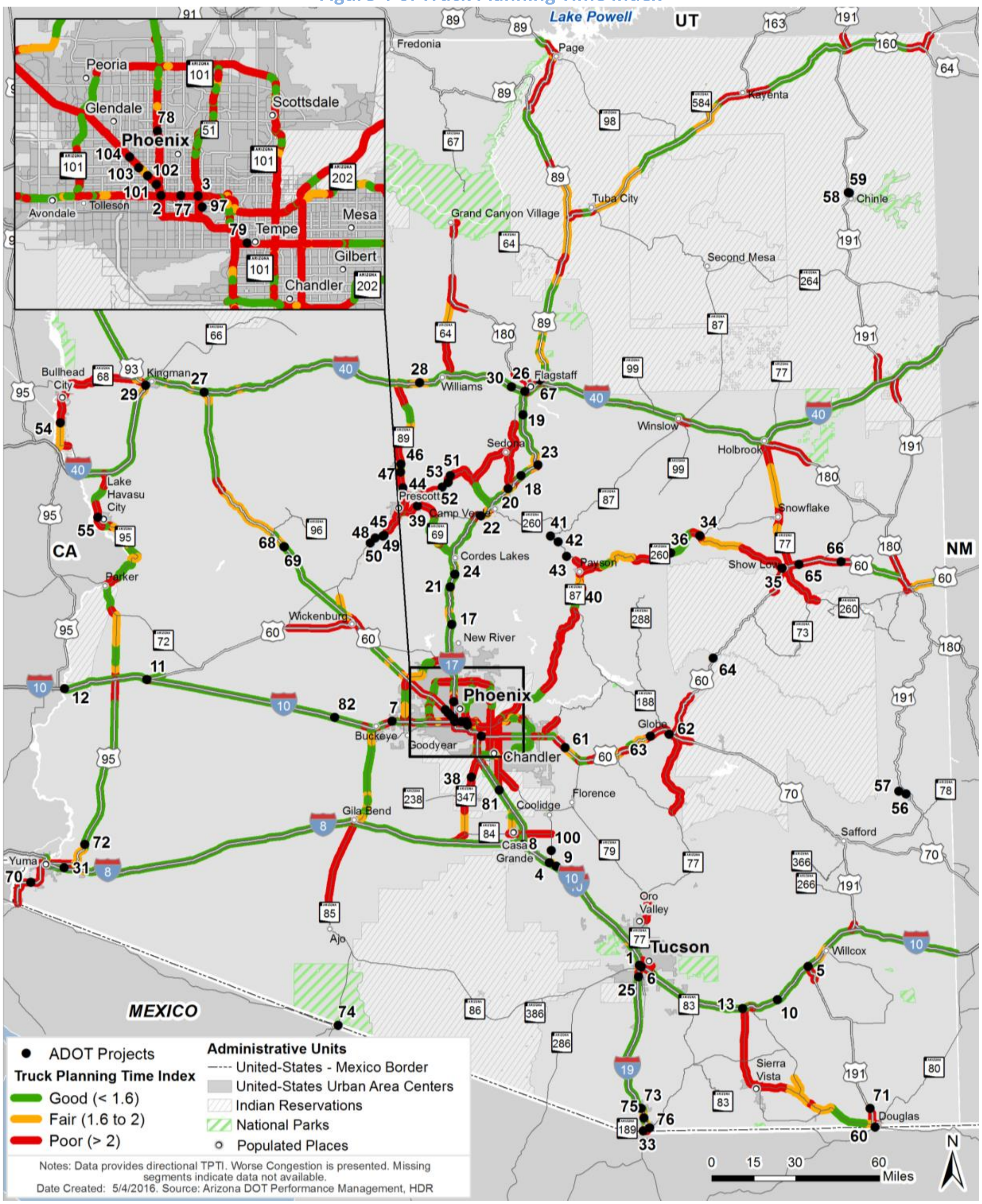
Figure 4-5: Truck Travel Time Index



4.2.6 Does the Issue Hinder Freight Transportation System Reliability? (G2-Reliability)

Reliability was defined using Truck Planning Time Index (TPTI). TPTI measures non-recurring delay which refers to unexpected delay caused by closures or restrictions resulting from crashes, inclement weather, and construction activities. Using the good, fair and poor definitions of TPTI, issues in areas showing a poor TPTI (>2) are assigned a *yes* value.

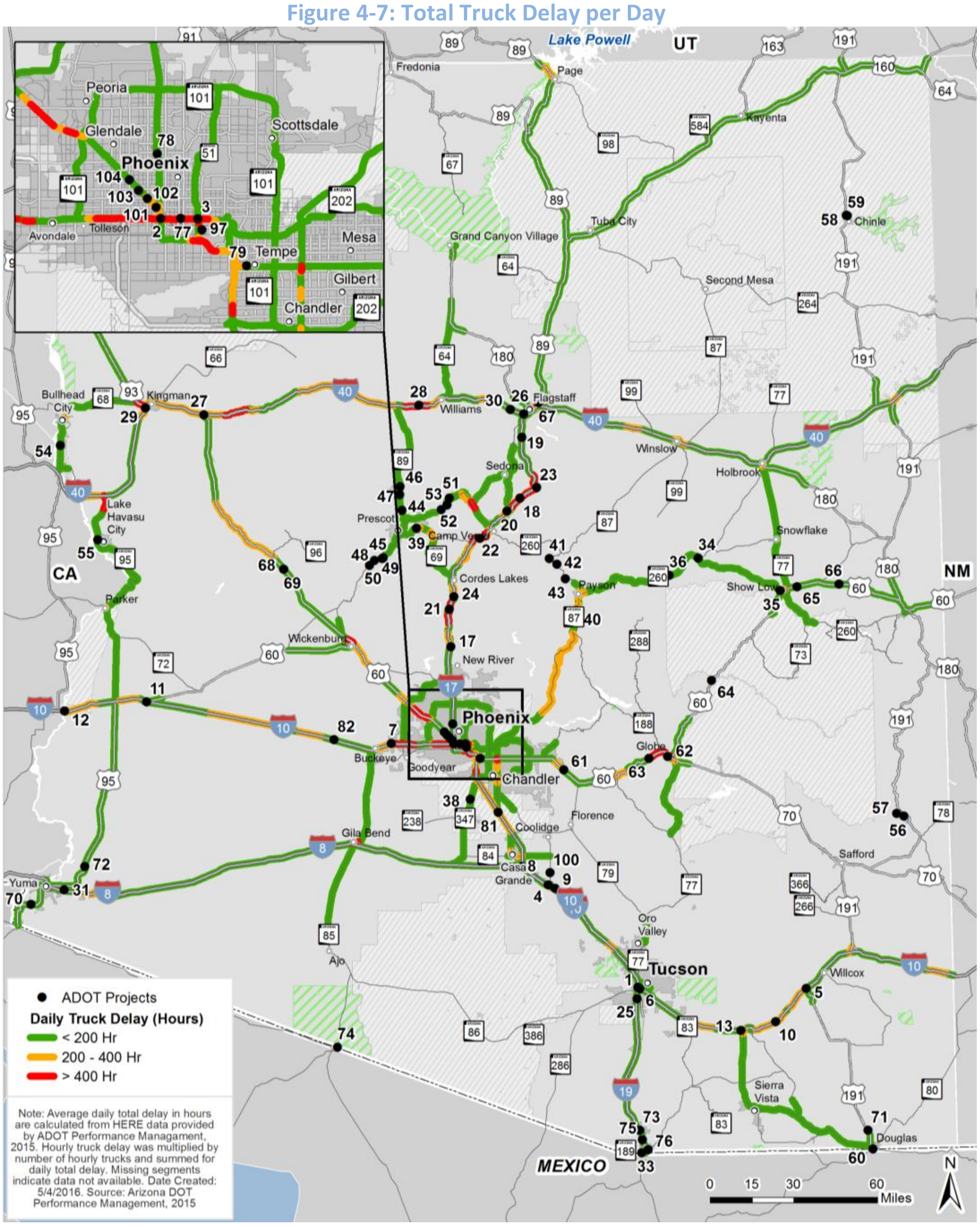
Figure 4-6: Truck Planning Time Index



4.2.7 Does the Issue Increase Transportation Costs of Freight Transportation? (G2-Cost)

Cost was defined using hours of truck delay, which directly affects truck efficiency, reliability and ultimately cost. Using the low, medium and high definitions of delay from the condition and performance report, we assign issues in areas showing a high amount of delay (>400hrs per day) a yes value. The delay is a function of daily truck volumes - a congested corridor with low truck volumes may end up having lower delay while comparing to a high truck volume corridor with moderate delay. For each issue segment, the maximum value of total daily cumulative hours of truck delay vary from 1,250 hours on I-10 between MC 85 and L303 in the urban area to as low as 100 hours in rural areas.

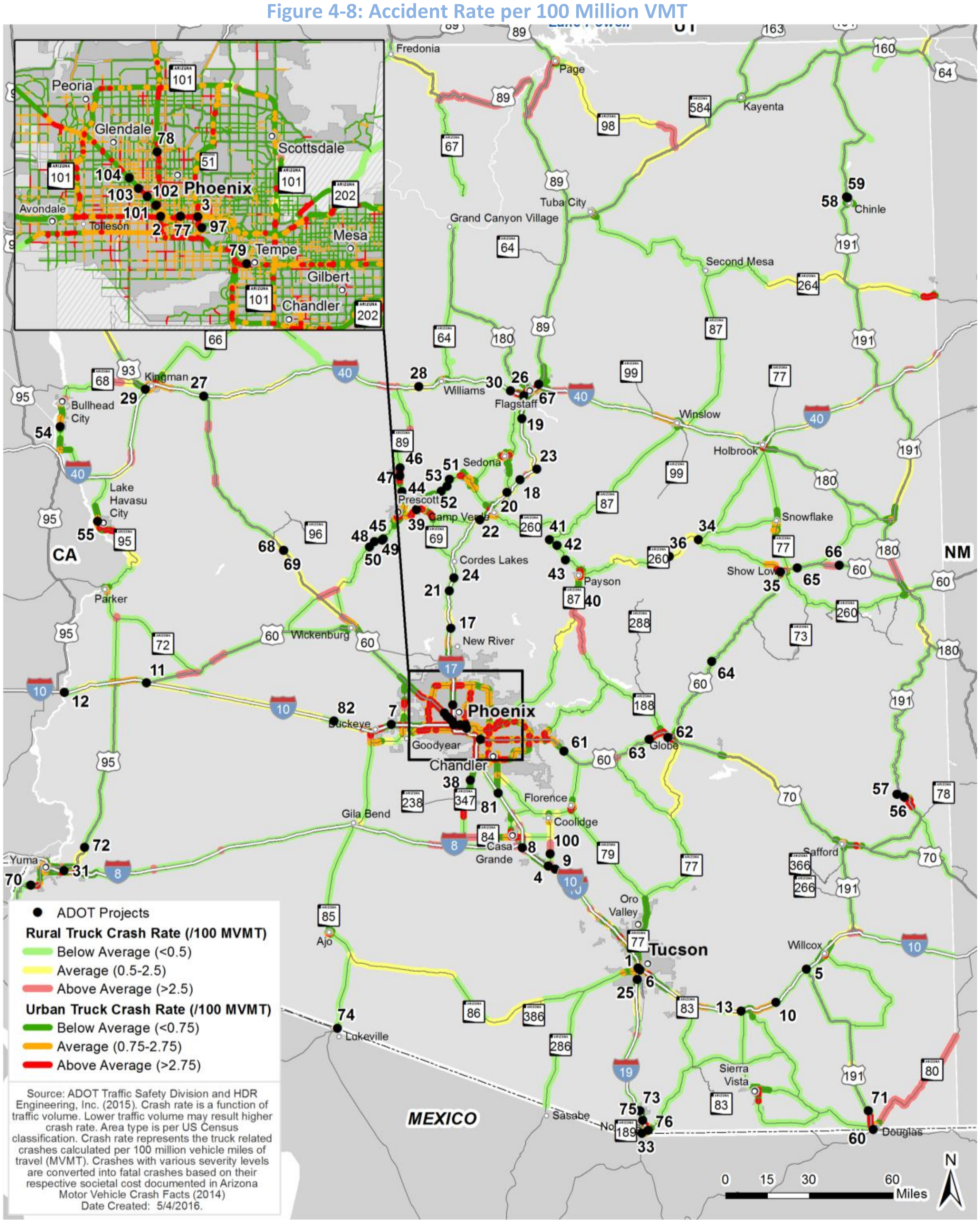
Figure 4-7: Total Truck Delay per Day



4.2.8 Does the Issue Affect Transportation System Safety? (G2-Safety)

Safety was defined using the number of crashes involving trucks per 100 million vehicle miles travelled (VMT) and their total societal cost. Truck involved crashes are converted into equivalent fatal crashes using the societal cost (as a proportion) and compared to VMT. Issues addressing a segment rated above average (>2.5 on rural segments and >2.75 on urban segments) received a *yes* value.

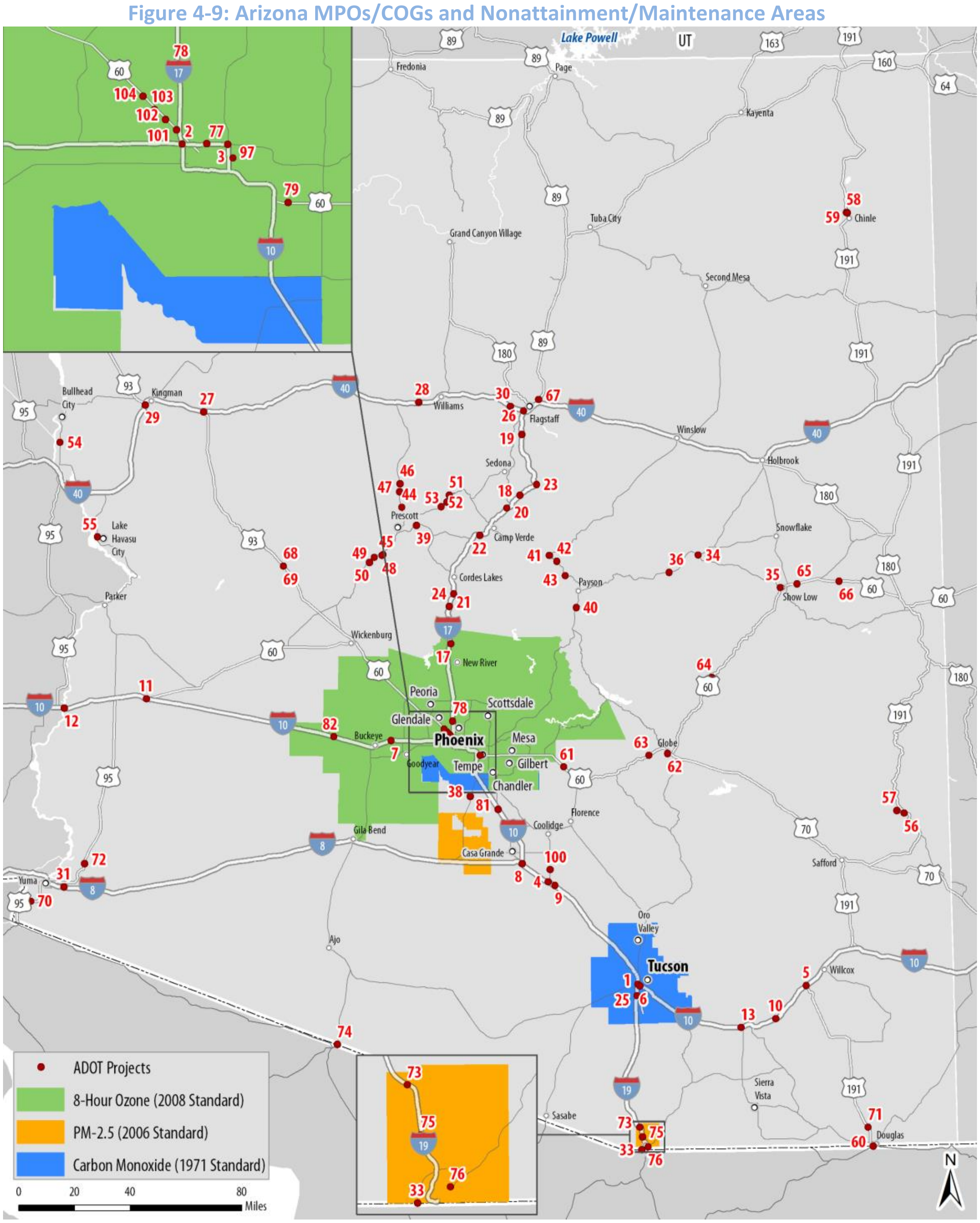
Figure 4-8: Accident Rate per 100 Million VMT



4.2.9 Is the Issue within an Environmental Nonattainment and Maintenance Areas? (G2-Emissions)

The U.S. Environmental Protection Agency (EPA) designates areas with high levels of common pollutants as attainment (meeting), nonattainment (not meeting), or maintenance (currently meeting standards, but previously was in nonattainment) of the air quality standards. As shown in the figure below, Arizona has nonattainment or maintenance areas throughout the state. Issues in nonattainment or maintenance areas for Carbon Monoxide, Ozone and PM 2.5 (pollutants most associated with trucking) are assigned a *yes* value.

Figure 4-9: Arizona MPOs/COGs and Nonattainment/Maintenance Areas



4.3 Results of the Strategic Screen

The results of the analysis in the previous section are summarized in the figure below. Cells highlighted in green denote "Yes" results and cells highlighted in red denote "No" results.

Figure 4-10: Results of Step 1 Screen

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	G1-KCC	G1-Significant	G1-Scenario	G1-Trade	G2-Mobility	G2-Reliability	G2-Safety	G2-Cost	G2-Emissions
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	I-10	I-10 at Picacho	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	No	No	Yes	No	No
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
6	I-10	I-10 east of I-19	Recurring urban congestion	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	No	No	Yes	No	No
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
10	I-10	I-10 within Texas Canyon area	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	No	No	No	No	No
11	I-10	I-10 at Brenda TI (US 60)	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	Yes	No	No	No	No
12	I-10	I-10 at the Colorado River Crossing	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	No	No	No	No	No
13	I-10	I-10 Climbing Lane: Westbound	Inadequate passing/climbing lanes	Yes	Yes	Yes	Yes	No	No	No	No	No
14	Buckeye Road	I-10 Freight Route Alternative along Buckeye Road	Recurring urban congestion	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	I-10	Sonoran Freeway	Recurring urban congestion	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes
16	I-11	I-11: Intermountain West Corridor	Recurring urban congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17	I-17	I-17, within Black Canyon City Area	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	No	No	No	No	Yes
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
19	I-17	I-17, South of Flagstaff	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	No	No	No	No	No
20	I-17	I-17 at McGuireville Traffic Interchange	Recurring rural bottlenecks	Yes	Yes	Yes	Yes	No	Yes	No	No	No
21	I-17	I-17 Climbing Lane: Northbound	Inadequate passing/climbing lanes	Yes	Yes	Yes	Yes	No	No	No	Yes	No
23	I-17	I-17 Climbing Lane: Northbound	Inadequate passing/climbing lanes	Yes	Yes	Yes	Yes	No	No	No	Yes	No
24	I-17	I-17 Climbing Lane: Northbound	Inadequate passing/climbing lanes	Yes	Yes	Yes	Yes	No	No	No	Yes	No
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	Yes	Yes	Yes	No	Yes	No	Yes	No	No
27	I-40	I-40 at US 93 Junction	Recurring rural bottlenecks	Yes	Yes	Yes	No	No	No	No	No	No

28	I-40	I-40 Between SR 89 and SR 64	Recurring rural bottlenecks
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks
30	I-40	I-40 Climbing Lane: Eastbound	Inadequate passing/climbing lanes
31	I-8	I-8 within Yuma area	Recurring urban congestion
32	NSCS	New freeway connecting between I-10 and US 60	Recurring rural bottlenecks
33	SR 189	SR 189 between Mariposa POE and I-19	Border access
34	SR 260	SR 260 within Heber area	Recurring rural bottlenecks
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks
36	SR 260	SR 260 Climbing Lane: Eastbound	Recurring rural bottlenecks
37	SR 30	Parallel to I-10 from SR 202L to SR 85	Recurring urban congestion
38	SR 347	SR 347 between I-10 and Maricopa City	Recurring urban congestion
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion
40	SR 87	SR 87, South of Payson, northbound	Recurring rural bottlenecks
41	SR 87	SR 87 Passing Lane: Southbound	Inadequate passing/climbing lanes
42	SR 87	SR 87 Passing Lane: Southbound	Inadequate passing/climbing lanes
43	SR 87	SR 87 Passing Lane: Northbound	Inadequate passing/climbing lanes
44	SR 89	SR 89, Prescott area	Recurring urban congestion
45	SR 89	SR 89 Passing Lane: Northbound	Inadequate passing/climbing lanes
46	SR 89	SR 89 Passing Lane: Northbound	Inadequate passing/climbing lanes
47	SR 89	SR 89 Passing Lane: Southbound	Inadequate passing/climbing lanes
48	SR 89	SR 89 Passing Lane: Southbound	Inadequate passing/climbing lanes
49	SR 89	SR 89 Passing Lane: Northbound	Inadequate passing/climbing lanes
50	SR 89	SR 89 Passing Lane: Southbound	Inadequate passing/climbing lanes
51	SR 89A	SR 89A Climbing Lane: Southbound	Inadequate passing/climbing lanes
52	SR 89A	SR 89A Climbing Lane: Northbound	Inadequate passing/climbing lanes
53	SR 89A	SR 89A Passing Lane: Southbound	Inadequate passing/climbing lanes
54	SR 95	SR 95, within Bullhead City area	Recurring urban congestion
55	SR 95	SR 95 Within Lake Havasu City area	Recurring urban congestion
56	US 191	US 191 Climbing Lane: Northbound	Inadequate passing/climbing lanes
57	US 191	US 191 Climbing Lane: Southbound	Inadequate passing/climbing lanes
58	US 191	US 191 Passing Lane: Southbound	Inadequate passing/climbing lanes
59	US 191	US 191 Passing Lane: Northbound	Inadequate passing/climbing lanes

60	US 191	Douglas LPOE	Border access
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks
62	US 60	US 60 within Globe area	Recurring rural bottlenecks
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes
64	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes
65	US 60	US 60 Passing Lane: Eastbound	Inadequate passing/climbing lanes
66	US 60	US 60 Passing Lane: Eastbound	Inadequate passing/climbing lanes
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion
68	US 93	US 93 Climbing Lane: Southbound	Inadequate passing/climbing lanes
69	US 93	US 93 Passing Lane: Northbound	Inadequate passing/climbing lanes
71	US 191	US 191 between Douglas and I-10	Recurring rural bottlenecks
72	US 95	US 95 between Avenue 9E and Aberdeen Rd	Recurring urban congestion
73	I-19	Between Tumacacori TI and SR 189	Recurring rural bottlenecks
74	SR 85	Lukeville LPOE	Border access
75	I-19	I-19 Grand Ave (I-19 Business) Interchange	Border access
76	SR 82	SR 82 between Grand Ave and Thelma St	Border access
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion
80	I-10	Phoenix to Tucson	Recurring urban congestion
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion
82	I-10	I-10, west of SR 85	Recurring rural bottlenecks
83	I-10	Between Tucson and Blythe, California	Truck parking facilities
84	I-17	Between Phoenix and Flagstaff	Truck parking facilities
85	N/A	Statewide	Restrictive axle loads on certain corridors
86	Rail Corridors	Major population centers, notably Phoenix and Tucson	Inadequate road/road grade separations
87	North / South	North-South CANAMEX	Inadequate rail infrastructure/services
89	Asia-Europe	PHX	Enhanced international air service
90	PHX	PHX	Enhanced international air service
91	Cities	Major population centers, notably Phoenix and Tucson	Initiatives to make municipal by-laws more truck friendly (off-peak noise, road geometry, etc.)
97	24th St	24th St	Recurring urban congestion
100	SR 87	SR 87 pavement structure	Inadequate on/exit ramps to facilitate truck access

101	Grade Crossing	W Thomas Rd	Problematic at-grade rail crossing									
102	Grade Crossing	N 35th Ave	Problematic at-grade rail crossing									
103	Grade Crossing	N 43rd Ave	Problematic at-grade rail crossing									
104	Grade Crossing	W Bethany Home Rd	Problematic at-grade rail crossing									

Source: CPCS and HDR

4.3.1 Short List of Strategic Issues Resulting from Step 1 Screen

The figure below presents the results of the application of the Step 1 Screen: a short list of the 28 most important Arizona freight issues.[5]

Figure 4-11: Short List of Strategic Issues Resulting from Step 1 Screen

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	G1-KCC	G1-Significant	G1-Scenario	G1-Trade	G2-Mobility	G2-Reliability	G2-Safety	G2-Cost	G2-Emissions
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion									
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion									
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion									
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks									
6	I-10	I-10 east of I-19	Recurring urban congestion									
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion									
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks									
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks									
14	Buckeye Road	I-10 Freight Route Alternative along Buckeye Road	Recurring urban congestion									
15	I-10	Sonoran Freeway	Recurring urban congestion									
16	I-11	I-11: Intermountain West Corridor	Recurring urban congestion									
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks									
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion									
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion									
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks									

[5] CPCS and HDR reviewed the long list of issues that passed the first screen (five or more yes values) to identify issues at the margin that should be elevated based on current use, future growth and project team knowledge of the segment. Issues with reference numbers 8, 26, 35, 39, 61, 63, 67, and 81 were advanced from the group of issues that received four yes values.

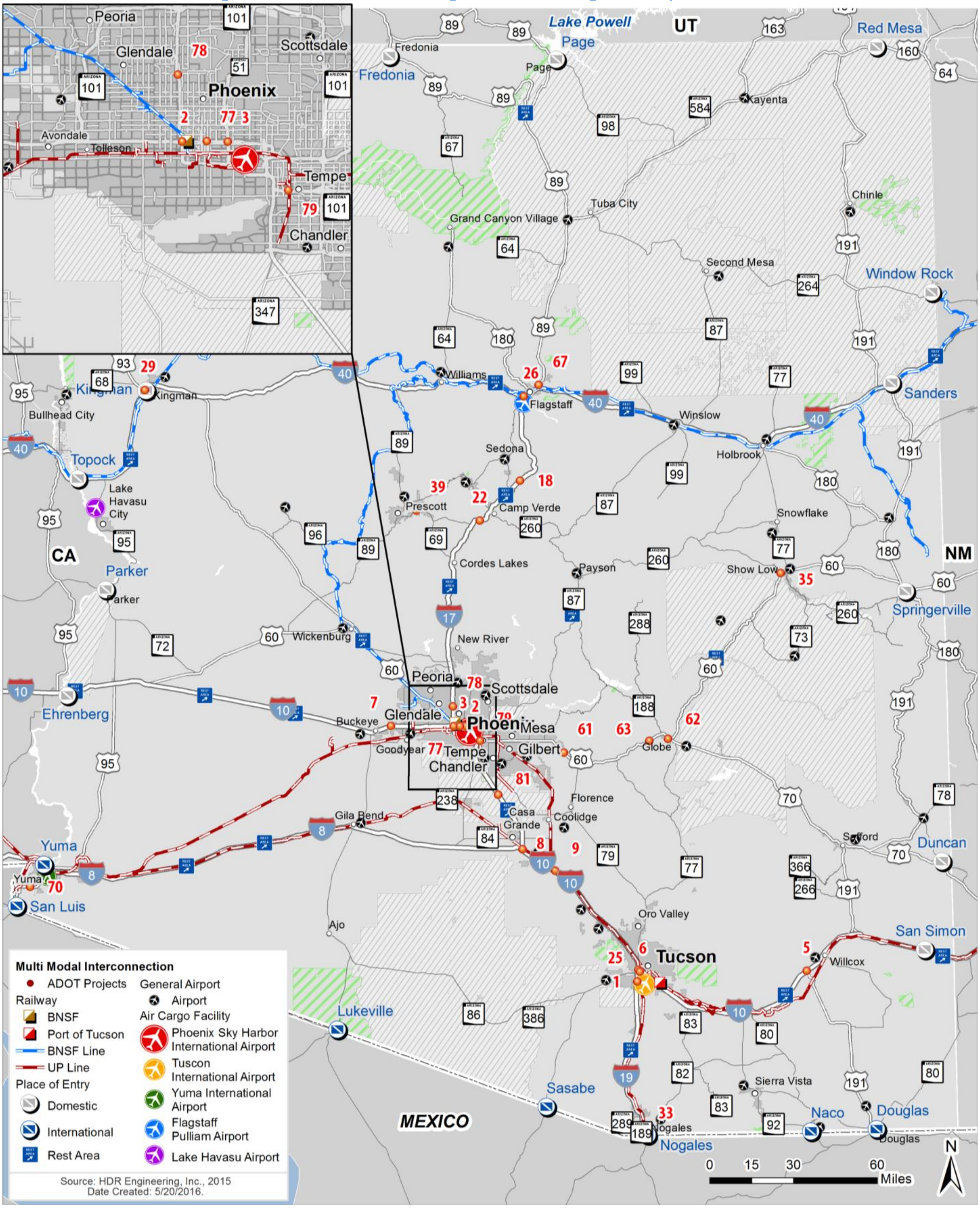
Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	G1-KCC	G1-Significant	G1-Scenario	G1-Trade	G2-Mobility	G2-Reliability	G2-Safety	G2-Cost	G2-Emissions
32	NSCS	New freeway connection between I-10 and US 60	Recurring rural bottlenecks									
33	SR 189	SR 189 between Mariposa POE and I-19	Border access									
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks									
37	SR 30	Parallel to I-10 from SR 202L to SR 85	Recurring urban congestion									
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion									
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks									
62	US 60	US 60 within Globe area	Recurring rural bottlenecks									
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes									
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion									
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion									
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion									
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion									
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion									

Five of the issues identified in the preceding table represent illustrative projects, all of which are the subject of ongoing studies by ADOT or others.

These issues will not be further evaluated through the Arizona Freight Plan, as the respective studies are developing purpose and need for each, and through that evaluation may make recommendations to carry forward. For the purposes of the Plan, these issues will be carried forward and documented as "Illustrative Projects" in the final list of recommendations. The list includes:

Reference	Description
14	Buckeye Road; I-10 Freight Route Alternative along Buckeye Road
15	I-10; Sonoran Freeway
16	I-11; I-11: Intermountain West Corridor
32	NSCS; New freeway connection between I-10 and US 60
37	SR 30; Parallel to I-10 from SR 202L to SR 85

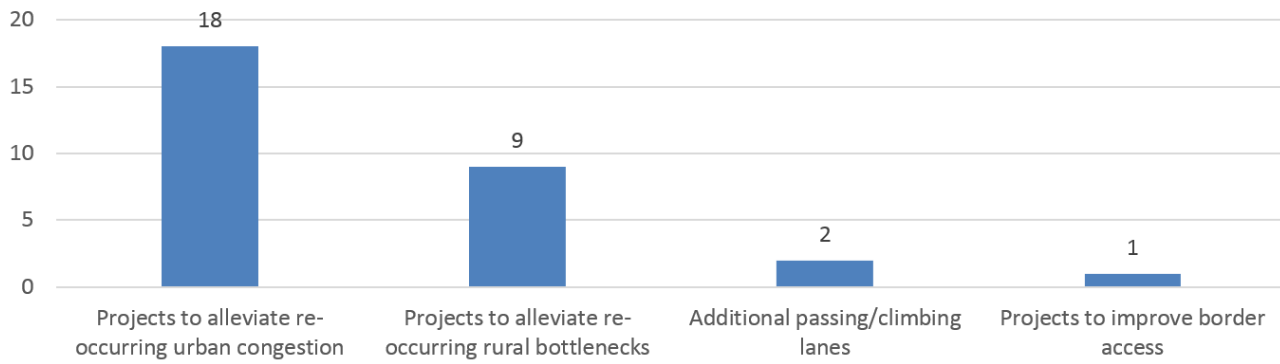
Figure 4-12: Short List of Strategic Issues Resulting from Step 1 Screen



4.3.2 Synthesis of Strategic Issues, by Type

The short list of identified strategic issues, pursuant to the application of the Step 1 screen, are largely (60 percent) urban congestion issues. Addressing these issues will require close collaboration with other jurisdictions, and in particular, Maricopa Association of Governments (MAG) and Pima Association of Governments (PAG). Close to one third of issues are related to rural bottlenecks, in most cases falling under direct ADOT jurisdiction. The balance of the identified strategic issues related to Inadequate passing/climbing lanes (7 percent) and to border access issues.

Figure 4-13: Short List of Strategic Issues, by Type



Source: CPCS analysis

5 Weighted Prioritization: Quantitative Assessment

Key Messages

As with Step 1, the Step 2 prioritization approach is anchored to the goals and objectives of the Freight Plan. Specifically, criteria relating to Goal 1 (Enhance Economic Competitiveness) and Goal 2 (Increase System Performance) and associated weights are used in Step 2 to prioritize and rank the identified short list of strategic freight *issues*. Subsequently, potential projects are put forward to address each of the priority strategic freight issues. These *potential projects* are then prioritized using Goal 3 (Improve System Management) criteria and associated weights to yield a ranking of priority projects for the Arizona State Freight Plan.

This Step 2 quantitative assessment is based on two inputs:

1) A multi-criteria analysis based on quantitative measure
2) The application of weights to each criteria

5.1 Weighted Prioritization: Quantitative Assessment

5.1.1 Overview

As with Step 1, the Step 2 prioritization approach is anchored to the goals and objectives of the Freight Plan. Specifically, criteria relating to Goal 1 (Enhance Economic Competitiveness) and Goal 2 (Increase System Performance) and associated weights are used in Step 2 to prioritize and rank the identified short list of strategic freight *issues*.

Subsequently, potential projects are put forward to address each of the priority strategic freight issues. These *potential projects* are then prioritized using Goal 3 (Improve System Management) criteria and associated weights to yield a ranking of priority projects for the Arizona State Freight Plan.

Figure 5-1: From Short List of Issues to Priority Projects: Conceptual Overview of Step 2 Process

5.1.2 Evaluation Methodology

Whereas Step 1 identified the most strategic freight transportation issues in Arizona qualitatively with a "yes/no" answer – informed using value judgments - against a set of merit-based considerations, Step 2 uses a quantitative approach to rank freight issues and associated projects.

This Step 2 quantitative assessment is based on two factors:

1) A multi-criteria analysis based on quantitative measures: Issues and projects are evaluated against multiple criteria, corresponding to the goals and objectives of the Freight Plan. For simplicity and consistency, the criteria relating to Goal 1 and Goal 2 are largely the same as those used in the Step 1 Screen (though assessed quantitatively in Step 2).

Figure 5-2: Goal 1 and Goal 2 Merit-Based Considerations to Identify Most Strategic Issues

Goal 1 - Enhance Economic Competitiveness
Is the Issue on a Key Commerce Corridor? (G1-KCC)
Are the Flows Impacted by the Issue Significant? (G1-Significant)
Do Future Scenarios Aggravate this Significance? (G1-Significant/Scenarios)
Is the Issue an Impediment to Trade? (G1-Trade)
Goal 2 - Increase System Performance
Does the Issue Hinder Mobility? (G2-Mobility)
Does the Issue Hinder Freight Transportation System Reliability? (G2-Reliability)
Does the Issue Increase Transportation Costs of Freight Transportation? (G2-Cost)
Does the Issue Affect Transportation System Safety? (G2-Safety)
Does the Issue Result in Negative Social/Environmental Impacts? (G2-Emissions)

Goal 3 criteria, which are used to evaluate project options, are directly aligned with the Improve System Management goal, and related objectives and strategy of the Freight Plan.

Figure 5-3: Goal 3 Merit-Based Considerations to Identify Priority Projects

Goal 3 - Improve System Management
Does the Project Prioritize Good Management of Assets? (G3 - Mgmt)
Is the Project Appropriately Linked to Local Land Use/Regional Plans? (G3-Land Use)
Would the Project be Expected to Receive Freight Stakeholder Support? (G3-Stakeholder Support)
Would the Project be Likely to Attract Funding/Financing Partners? (G3-Funding/Financing)
Does the Project Have a Positive Benefit-Cost Analysis? (G3-BCA)

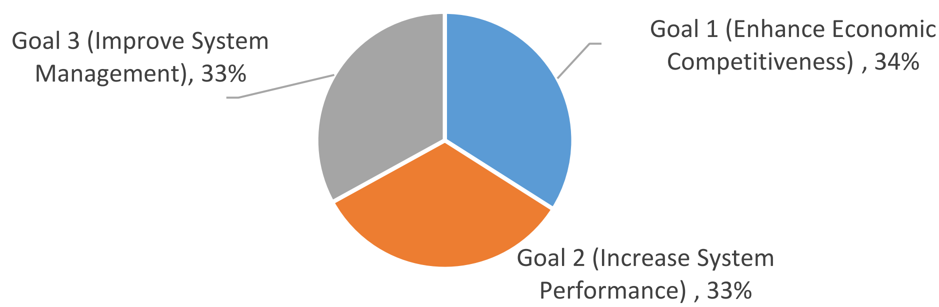
All projects are assigned a value for each criterion, based on information available, to be combined into a cumulative summary score. Related details of each criteria and associated measures are described later in sections 5.2 (Prioritization of Strategic Issues against Goal 1 and Goal 2 Criteria and Associated Weights) and 5.4 (Prioritization of Potential Projects against Goal 3 Criteria and Associated Weights).

Of note, because all criteria have their own scales and units of measurement, all criteria values are normalized to be between 0 and 1. For example, if values within a hypothetic criterion range between -10 and 100, the value of -10 is converted to 0 normalized, 100 becomes 1 normalized, and a value of 50 becomes $\frac{50-(-10)}{100-(-50)} = \frac{\$60}{\$110} = 0.55$ normalized. The use of the normalized values allows an easy addition and averaging of multiple criteria to come up with the weighted average score ultimately used for ranking all the projects.

2) The application of weights to each criteria: Weights are applied to each criteria to emphasize or de-emphasize the importance of each criteria in prioritizing issues and projects. The initial weights for each criterion were developed by the consultant team with input from the TAC and FAC, and are primarily based on the importance of each criteria with respect to achieving the goals and objectives of the Arizona State Freight Plan, as outlined in the Phase 1 Working Paper, Freight Vision Statement and Associated Goals and Objectives and the Phase 4 Working Paper on Policy and Strategies of the Arizona State Freight Plan.

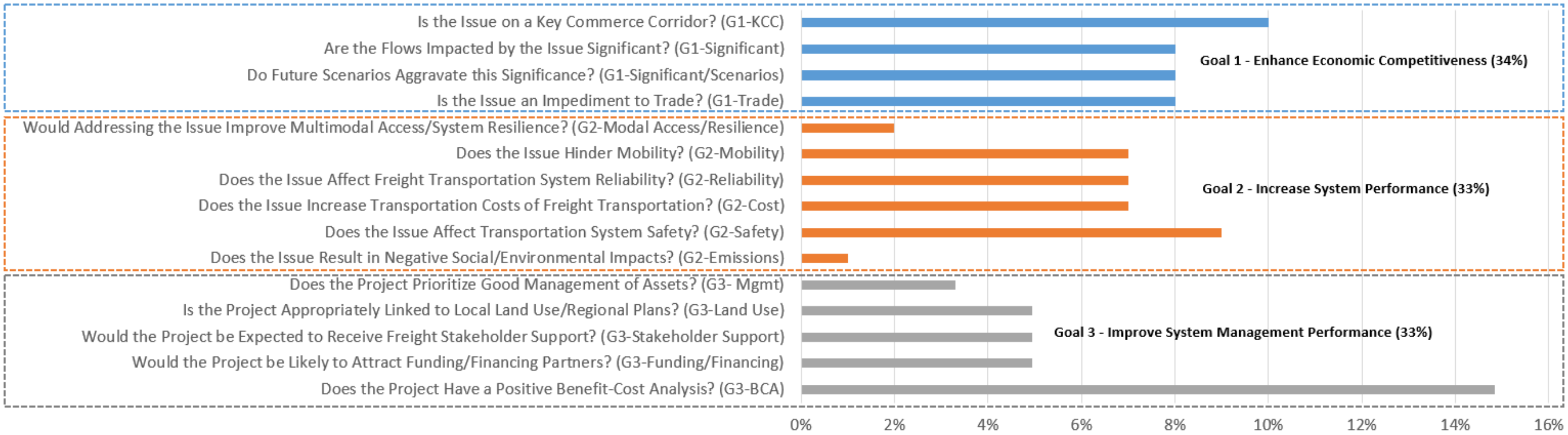
For simplicity, we have assumed similar weights to correspond to each of the three overarching goals of the Freight Plan, though the weighting differs by the related underlying criteria (related details provided in Figure 5-6 and Figure 5-9).

Figure 5-4: Equal Weighting to Each Overarching Goal



The figure on the next page provides a summary of the Step 2 criteria and associated weights for each individual Step 2 criteria. The allocated weights are discussed further, along with a supporting rationale, in the subsequent sections.

Figure 5-5: Summary of Step 2 Criteria Weights



5.2 Prioritization of Strategic Issues against Goal 1 and Goal 2 Criteria and Associated Weights

The following table provides an overview of Goal 1 (Enhance Economic Competitiveness) and Goal 2 (Increase System Performance) criteria and associated measures, value ranges, and weights to prioritize and rank the identified short list of strategic freight *issues*. Each criteria is further defined, along with the basis for normalizing related values after this table.

Figure 5-6: Goal 1 and Goal 2 Criteria and Associated Weights to Prioritize and Rank Strategic Freight Issues.

Goal 1 - Enhance Economic Competitiveness			
Criterion (Issue-Specific)	**Measure**	**Range Values**	**Weight (34%)**
Is the Issue on a Key Commerce Corridor? (G1-KCC)	Issue is either 'on'; 'directly connected to', or 'unrelated' to KCC	0-3	**10%** (29% of Goal 1 weight)
Are the Flows Impacted by the Issue Significant? (G1-Significant)	Truck volume (AADTT) through the issue segment	1,200 – 19,100	**8%** (24% of Goal 1 weight)
Do Future Scenarios Aggravate this Significance? (G1-Significant/Scenarios)	AADTT significance (over 1000) on each issue segment that are common in all future scenarios ('#urbanizona'; 'Domestic Bliss'; 'SoBo')	0 – 3	**8%** (24% of Goal 1 weight)
Is the Issue an Impediment to Trade? (G1-Trade)	Volumes of Arizona's commodity flows relating to manufacturing and natural resources (excluding aggregate intra Arizona flows).	0-20,000,000	**8%** (24% of Goal 1 weight)
Goal 2 - Increase System Performance			
Criterion (Issue-Specific)	**Measure**	**Range Values**	**Weight (33%)**
Would Addressing the Issue Improve Multimodal Access? (G2-Modal Access)	Is issue a barrier to modal connectivity (e.g. access to airport or rail intermodal terminal)?	0 – 1	**2%** (6% of Goal 1 weight)
Does the Issue Hinder Mobility? (G2-Mobility)	Truck Travel Time Index (TTTI)	1.2 – 9.0	**7%** (21% of Goal 1 weight)
Does the Issue Hinder Freight Transportation System Reliability? (G2-Reliability)	Issue segment's Truck Planning Time Index (TPTI)	1.2 – 15.7	**7%** (21% of Goal 1 weight)
Does the Issue Increase Transportation Costs of Freight Transportation? (G2-Cost)	Total truck delay per day (hours)	0-1250	**7%** (21% of Goal 1 weight)
Does the Issue Affect Transportation System Safety? (G2-Safety)	Truck related crashes per 100 MVMT	0.1 – 9.1	**9%** (27% of Goal 1 weight)
Does the Issue Result in Negative Social/Environmental Impacts? (G2-Emissions)	CO_2 emissions for a peak-hour volume of traffic	0.029 – 1.00	**1%** (3% of Goal 1 weight)

Note: percentages reported may not equal 100% due to rounding

5.2.1 Is the Issue on a Key Commerce Corridor? (G1-KCC)

This criterion gives greater prominence to strategic freight transportation issues which are on, or relate to a Key Commerce Corridor (KCC). Issues which are on a KCC are given a score of 3. Issues which are not on a KCC but provide a direct connection to a KCC are given a score of 1 to recognize that project in close proximity to a KCC may impact congestion and unreliability on the KCCs (i.e., within 10 miles). Issues which don't relate to a KCC, directly or indirectly, are evaluated with a score of zero. The possible normalized values for this criterion are 0 (for score 0), 0.33 (for score 1), and 1 (for score 3).

Criteria Weight (/100)	Weight Rationale
10	High criteria weight recognizes strategic focus on KCCs; ADOT policy emphasizes the strategic importance of KCCs to Arizona trade and the Arizona economy.

5.2.2 Are the Flows Impacted by the Issue Significant? (G1-Significant)

This criterion assesses the extent to which freight flows over each issue segment are significant. To do this, the overall truck volume over the issue segment in question was used, using the Average Annual Daily Truck Traffic (AADTT), as reported in the Phase 2 Working Paper (Inventory of State Freight Transportation Assets). Using average values for each of the issue segments, projects will get assigned a normalized value of 0 to 1, corresponding to the range of AADTT values for the issue segments, from lowest to highest, respectively. AADTT values for the issue segments range from a low of 1,200 to a high of 19,100.

Criteria Weight (/100)	Weight Rationale
8	High criteria weight seeks to emphasize importance of addressing issues on most heavily traveled truck segments.

5.2.3 Do Future Scenarios Aggravate this Significance? (G1-Significant/Scenarios)

Three alternative future scenarios were developed as part of the development of the Arizona State Freight Plan: Domestic Bliss, #urbanizona and South-of-the Border. The characteristics of each scenario and related expected implications for the Arizona freight transportation system are documented in the Phase 6 Working Paper on Potential Freight Scenarios and Implications.

These alternative scenarios are intended to help ADOT, through the Freight Plan, prepare for an unknown future (rather than try to predict it). To this end, this criteria assesses the extent to which issues identified are expected to become more aggravated, under one or more of the future scenarios, given anticipated truck traffic under different scenarios.

To do this, the Arizona Travel Demand Model (AZTDM2) was used to assess the freight operation under each of the three scenarios developed for the project and resulting implications of the issue segments.

Each congestion-related freight transportation issue will be assessed in the context of each future scenario. A score of (0) is assigned if there is no congestion over the issue segment in question under any of the scenarios; (1) if congestion aggravates the issue segment in only one scenario; (2) if congestion aggravates the issue segment in two scenarios; and (3) if congestion aggravates the issue segment in all three scenarios. The score will then be normalized to be between 0 and 1, with a score of 0 corresponding to a normalized value of 0 and a score of 3 corresponding to a normalized value of 1.

Criteria Weight (/100)	Weight Rationale
8	Although the future is not knowable, the high criteria weight seeks to prioritize those issues which will be common to all scenarios.

5.2.4 Is the Issue an Impediment to Trade? (G1-Trade)

This criterion assesses the extent to which the issue in question is a barrier to trade. For simplicity, the inbound, outbound and intra freight traffic flows of manufacturing and natural resources (excluding aggregate intra Arizona flows) are used as proxies for trade, given the importance and prominence of trade to these sectors.

The values for this criterion will be assigned on the basis of total tonnage relating to the manufacturing and natural resources sectors (excluding aggregate intra Arizona flows) that have a range of values of between 0 and 20,000,000 per year. Related values will be normalized.

Criteria Weight (/100)	Weight Rationale
8	High criteria weight emphasizes segments which are particularly important to support trade flows. To a large extent, these will be same segments on KCCs, though these may differ, hence separate trade-specific criteria.

5.2.5 Would Addressing the Issue Improve Multimodal Access/System Resilience (G2-Modal Access)

Issues will be given a value of 1 if they improve or provide direct access to a facility offering access to a different mode of transportation (such as an airport or intermodal rail facility), and a value of 0 if they do not.

Criteria Weight (/100)	Weight Rationale
2	Relatively lower criteria weight given infrequency of modal connectivity issues cited in consultations, and more arbitrary basis for evaluating this criteria.

5.2.6 Does the Issue Hinder Mobility? (G2-Mobility)

For this criterion, issues will be assessed based on the Truck Travel Time Index (TTTI), as reported in Phase 5. The average TTTI value for the issue segment will be calculated, and the highest value will be assigned a normalized value of 1 and the lowest value will be assigned a value of 0. TTTI values along the issue segments range from a low of 1.2 to a high value of 9.0.

Criteria Weight (/100)	Weight Rationale
7	High criteria weight given importance of mobility to performance of Arizona freight transportation system and impact of congestion on performance of freight sectors (as well as quality of life for Arizonans, more generally).

5.2.7 Does the Issue Hinder Freight Transportation System Reliability? (G2-Reliability)

For this criterion, issues will be assessed based on the Truck Planning Time Index (TPTI), as reported in Phase 5. The average TPTI value for the issue segment will be calculated, and the highest value will be assigned a normalized value of 1 and the lowest value will be assigned a value of 0. TPTI values along the issue segments range from a low of 1.2 to a high value of 15.7.

Criteria Weight (/100)	Weight Rationale
7	High criteria weight given importance of reliability to performance of Arizona freight transportation system. Lower reliability, for example, necessitates greater transportation buffer times, which lead to higher costs for freight sectors.

5.2.8 Does the Issue Increase Transportation Costs of Freight Transportation? (G2-Cost)

Total daily hours of truck delay serve as a reasonable proxy for truck transportation costs and are used to assess truck costs on issue segment. The range of annual hours of truck delay vary from 100 hours in rural areas to 1,250 hours on I-10 between MC 85 and L303 in the urban area. The related values for total daily hours of truck delay will be normalized to be between 0 and 1.

Criteria Weight (/100)	Weight Rationale
7	High criteria weight given importance of cost to Arizona shippers and transportation service providers.

5.2.9 Does the Issue Affect Transportation System Safety? (G2-Safety)

Truck related crashes were evaluated in Phase 5 (Working Paper on Conditions and Performance of Arizona's Freight Transportation System). This criteria assesses the extent to which the issue segment is prone to a high level of truck-involved equivalent fatal crashes. For the identified issue segments, the highest truck-involved equivalent fatal crash rate was located on I-10 in the Tucson area (9.1 crashes per 100 million vehicle miles travelled (MVMT)), with the lowest value calculated for many of the rural low volume corridors (0.1 crashes per 100 MVMT).

Criteria Weight (/100)	Weight Rationale
9	High criteria weight given importance of safety to the overall performance of the Arizona freight transportation system and transportation system more broadly. Note: safety is also central to ADOT's mission.

5.2.10 Does the Issue Result in Negative Social/Environmental Impacts? (G2-Emissions)

For this criterion, CO_2 emissions for a peak-hour volume of traffic for the most congested mile in the project area were estimated. EPA MOVES was used to estimate 2016 CO_2 emissions (in grams per vehicle-mile traveled) in multiple counties in Arizona for:

- each different speed;
- separately for Trucks and Passenger Vehicles; and,
- separately for four road types: Rural Unrestricted, Urban Unrestricted, Rural Restricted, and Urban Restricted.

Then issue-specific peak-hour current speeds, volumes, road types, and truck percentages were used to estimate peak-hour emissions for a representative congested mile in the project area. The normalized values for environmental impact criterion varied between 0 (least emissions) and 1 (most emissions).

Criteria Weight (/100)	Weight Rationale
1	Lower criteria weight creates difficulties in meaningfully assessing this criteria objectively. Criteria recognizes importance of reducing social/environmental impacts associated with freight transportation.

5.2.11 Summary Evaluation Results against Goal 1 and Goal 2 Criteria

The figure below presents the results if the evaluation of strategic issues against Goal 1 and Goal 2 evaluation criteria and associated weights.

Figure 5-7: Summary Evaluation Results Against Step 2 Goal 1 and Goal 2 Criteria

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	G1-KCC[1]	G1-Significant[2]	G1-Scenario[3]	G1-Trade[4]	G2-Modal[5]	G2-Mobility[6]	G2-Reliability[7]	G2-Cost[8]	G2-Safety[9]	G2-Emissions[10]	Goal 1 and Goal 2 Criteria Cumulative Weighted Score	Prioritization Rank
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	10.000	8.000	8.000	3.365	2.000	0.214	0.000	0.090	0.999	0.998	33.7	8
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	10.000	6.164	8.000	5.388	2.000	4.263	5.425	1.244	6.272	0.678	49.4	3
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	10.000	4.643	8.000	8.000	2.000	4.605	5.639	8.545	5.460	0.444	57.3	2
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	10.000	2.503	0.000	3.307	0.000	0.038	0.118	2.404	2.934	0.104	21.4	16
6	I-10	I-10 east of I-19	Recurring urban congestion	10.000	5.221	8.000	3.226	2.000	0.124	0.235	5.797	0.702	0.613	35.9	7
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	10.000	4.940	8.000	5.065	0.000	0.459	1.066	3.212	3.225	0.432	36.4	6
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	10.000	3.289	8.000	3.632	0.000	0.014	0.049	1.156	1.000	0.221	27.4	12
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	10.000	3.769	8.000	4.781	0.000	0.109	0.068	2.269	2.674	0.252	31.9	10
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	10.000	0.773	0.000	2.692	0.000	0.321	0.481	0.000	5.394	0.105	19.8	17
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	10.000	1.326	8.000	1.195	2.000	0.380	0.932	2.064	1.055	0.481	27.43	11
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	10.000	1.656	8.000	0.403	0.000	0.000	0.218	0.517	1.770	0.081	22.6	14
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	10.000	1.904	2.667	0.562	2.000	0.170	0.314	3.191	3.342	0.115	24.3	13
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	3.333	0.120	0.000	1.051	2.000	0.094	1.892	4.119	0.051	0.064	12.7	20
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	0.000	0.000	0.000	0.005	0.000	2.504	3.725	4.552	0.573	0.051	11.4	21
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	0.000	0.583	2.667	0.573	0.000	0.849	1.597	1.613	2.075	0.170	10.1	22
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	0.000	0.902	8.000	0.106	0.000	0.759	1.650	2.584	0.963	0.113	15.1	19
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	0.000	0.206	0.000	0.173	0.000	0.900	2.539	2.514	3.503	0.071	9.9	23

63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	0.000	0.001	0.000	0.017	0.000	0.971	2.551	0.298	0.000	0.000	3.8	24
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	3.333	0.510	8.000	1.027	0.000	1.041	1.790	3.148	3.228	0.110	22.2	15
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	10.000	4.955	8.000	8.000	2.000	7.000	7.000	8.513	5.209	1.000	61.7	1
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	10.000	3.876	8.000	2.604	2.000	2.403	3.797	4.957	1.912	0.896	40.4	4
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	3.333	3.160	8.000	0.115	2.000	4.699	6.432	9.000	2.695	0.696	40.1	5
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	10.000	3.281	8.000	5.390	0.000	0.229	0.866	2.817	2.252	0.333	33.2	9

Sources

[1]Arizona's Key Commerce Corridors, Arizona Department of Transportation, 2014
[2]Annual Average Daily Traffic, Arizona Department of Transportation, 2014
[3]CPCS and HDR Engineering, Inc., 2016
[4]TRANSEARCH, IHS Global Insight, 2015
[5]CPCS and HDR Engineering, Inc., 2016
[6]Performance Management Group, Arizona Department of Transportation, 2015
[7]Performance Management Group, Arizona Department of Transportation, 2015
[8]Performance Management Group, Arizona Department of Transportation, 2015
[9]Traffic Safety Division, Arizona Department of Transportation, 2015
[10]CPCS and HDR Engineering, Inc., 2016

Notes

1. Issues which are on a KCC are given a score of 3; provide direct connection to a KCC (within 10 miles) are given a score of 1; don't relate to a KCC are given a score of zero.
2. Average daily truck volumes along the segment is reported
3. Model results from three scenarios (Domestic Bliss, #Urbanizona, SOBO) were evaluated to calculate the value
4. Volumes of Arizona's commodity flows relating to manufacturing and natural resources (excluding aggregate intra Arizona flows).
5. Intermodal facility and major airport within 10-mile radius has been used
6. Highest average directional truck travel time index is summarized
7. Highest average directional truck planning time index is summarized
8. Highest average directional daily delay (hour) is reported

Truck related crashes per 100 MVMT were calculated using the crash data between January 1, 2010 and December 31, 2014

5.3 Development of Potential Projects to Address Each Priority Strategic Freight Issue

The issues prioritization process described in the previous section will yield a ranking of strategic freight *issues*. Next, potential projects will be put forward to address each of the priority strategic freight issues.

5.3.1 Project Definition

For each prioritized issue, the team will put forward one or more project options to address the issue in question. This will be done using the team's best judgement. In some instances, the solution to an issue may be straight forward, e.g., a steep grade with a single directional travel lane will benefit from the addition of a climbing or passing lane. In other cases, there may be multiple project options to address the issue in question.

It is not within the ability of the Freight Plan to address the myriad of scoping and coordination activities necessary to identify the entire range of possible, reasonable solutions to the issues identified and prioritized. Rather, the project option(s) to address each issue will be put forward, with a level of detail, sufficient to assess the anticipated benefits and costs of each project, at a relatively high level.

Alternative project options: While there may well be a multitude of approaches to addressing a specific issue, the number of projects developed to address the issues will be limited to the one or two alternatives project options that most effectively address the need based on the study team's understanding of the issue.

This assessment will provide an additional basis for assessing the merits of a project.

5.3.2 Project Types and Cost Determination

Once the projects are defined, planning level costs for each one of them will be developed. The planning level costs will be based on similar ADOT constructed projects. In each case, a unit cost will be developed. For this purpose, all projects have been divided into the following types:

- Passing Lanes
- Widening
- Traffic Interchange
- Intelligent transportation systems (ITS)

The unit costs represent a value range, with the low, average, and high costs defined by the complexity of the project. For example, a simple roadway widening project in the urbanized area (high cost) will have different right-of-way and construction costs than a similar widening project occurring in rural area (low cost), all other factors being equal. In the event of a widening project occurring in a rural area with difficult terrain, the unit cost would be above average cost for a rural widening project. The same logic is applied to the other project types, with supporting information. Costs at this level are difficult to assess without additional scoping, however, using unit costs (along a range) allow a reasonable comparison of project benefits and costs between projects.

For projects that are identified as future highway corridors (e.g., I-11), where a specific alternative has not yet been identified, it would be deemed pre-decisional to identify a preferred alternative for evaluation. This type of project still needs to advance through project scoping (and NEPA) and is not likely a candidate for near-term implementation. For such projects a benefit-cost analysis will not be conducted, nor can a quantitative assessment be made of the issue. These projects will undoubtedly have freight benefits by providing alternate routes, additional system capacity and system redundancy. For these reasons the projects are included and advanced in the Arizona Freight Plan as illustrative projects.

Figure 5-8: Project Options to Address Strategic Issues

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s) and Associated Characteristics	Planning Level Project Cost $ million
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements • Construct new System Interchange (new interchange with ramp improvements)	$83.0
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	The Stack System Interchange Improvements	$200.0
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	$300.0
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements • Construct Compact Diamond Interchange • Improve NB to WB access ramps to accommodate heavy trucks	$1.5
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	$16.5
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project • Construct new general purpose lane (14 mile general purpose lane at MP 260-274) • Reconstruct Interchanges	$1860.0
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane • Construct new general purpose lane (8 mile general purpose lane at MP 112-120)	$61.3
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10 • Construct new general purpose lane (3 mile general purpose land at MP 196-199) • Reconstruct Jimmie Kerr Boulevard TI	$40.0
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening • Construct new general purpose lane (4 mile general purpose lane at MP 209-213) • Widen bridges (construct new bridges one over mainline and one over UPRR) • Realign Roadway (realign mainline horizontal curves)	$85.0
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements • Construct new climbing lane (6 mile northbound climbing lane at MP 299-305) • Install new DMS with CCTV (MP 303.4)	$23.1
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements • Construct new general purpose lane (10 mile general purpose lane at MP 92-102) • Construct new traffic interchanges and bridges and reconstruct existing interchanges	$625.0
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements • Construct new system interchange • Improve Lone Tree TI • Widen mainline at bridge	$82.0

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s) and Associated Characteristics	Planning Level Project Cost $ million
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US 93 System Interchange Improvements • Signal Timing Optimization • Free-flow right turn • Striping modification • Improves/controls traffic flow from existing Beale St TI	$86.5
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements [Interim]	$70.0
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements [Ultimate]	$161.0
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements • Construct new roundabouts at US 60/SR 260 intersections	$8.0
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements • Signal Optimization and Progression Study • DMS Sign • Implement Various Speed Limits	$3.3
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension • Extend existing freeway east of Phoenix Urban Area (12 miles of freeway at MP 199-211)	$245.0
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements • Construct passing lanes (2 mile passing lanes eastbound and westbound) • Freight deceleration turn lanes	$6.8
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane • Construct new passing lane (3 mile westbound passing lane at MP 345-348)	$5.1
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	US 89/I-40 System Interchange Improvements • US 89 at Country Club and I-40 Interchange Improvements	$29.0
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	$775.0
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	$600.0
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	$425.0
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening • Construct new general purpose lane (27 mile general purpose lane at MP 160-187) • Construct new Gila River Bridge (MP 173)	$189.0
				Total (excludes Illustrative projects)	$5,820 - $5,911

Notes

1. The range of values is a result of project options (Reference Project #5 and #33); the low value sums the projects with the low cost options included and the high value sums the projects with the high cost options included.

5.4 Prioritization of Potential Projects against Goal 3 Criteria and Associated Weights

The following table provides an overview of Goal 3 (Improve System Management) criteria and associated weights to prioritize and rank the potential *projects*.

Each criteria is further defined, along with the basis for normalizing values for each criterion after this table.

Figure 5-9: Goal 3 Criteria and Associated Weights to Prioritize and Rank Potential Projects

Goal 3 - Improve System Management			
Criterion (Project-Specific)	**Measure**	**Range Values**	**Weight (33%)**
Does the Project Prioritize Good Management of Assets? (G3-Mgmt)	*Project* is characterized as preservation vs. modernization vs. expansion	0-2	**3%** (10% of Goal 1 weight)
Is the Project Appropriately Linked to Local Land Use/Regional Plans? (G3-Land Use)	*Project* is identified in BQAZ Statewide Transportation Framework Studies and or regional transportation plans	0 – 1	**5%** (15% of Goal 1 weight)
Would the Project be Expected to Receive Freight Stakeholder Support? (G3-Stakeholder Support)	Evaluate *project* with input from the Freight Advisory Committee	0 – 1	**5%** (15% of Goal 1 weight)
Would the Project be Likely to Attract Funding/Financing Partners? (G3-Funding/Financing)	*Project's* Potential to attract project funding	0 – 1	**5%** (15% of Goal 1 weight)
Does the Project Have a Positive Benefit-Cost Analysis? (G3-BCA)	Actual *project* benefit cost analysis (lite)	0 – 1	**15%** (45% of Goal 1 weight)

5.4.1 Does the Project Prioritize Good Management of Assets? (G3 - Mgmt)

Arizona's Long-Range Transportation Plan (LRTP) recommended investment choices emphasize infrastructure **preservation** and **modernization** before **expansion**. This measure seeks to recognize potentially lower-cost projects that emphasize preservation and modernization over expansion. To this end, projects that recommend expansion will be given a value of zero; whereas projects that identify preservation and or modernization will be given a value of one.

Criteria Weight (/100)	Weight Rationale
3	Criteria recognizes emphasis on system preservation and modernization before expansion, which is consistent with the Freight Plan strategy, and LRTP.

5.4.2 Is the Project Appropriately Linked to Local Land Use/Regional Plans? (G3-Land Use)

Projects that are explicitly incorporated into the State's BQAZ Statewide Transportation Framework Studies and or the regional transportation plans will receive a higher score in this indicator compared to projects that have not been previously included in these processes. The implicit assumption is that these projects are more likely to be linked to regional plans and local land use if already in these regional plans. Each project will receive a point for being incorporated in the following planning documents:

- BQAZ Statewide Transportation Framework Study;
- Regional transportation plans.

The maximum number of appearances will be assigned a normalized value of 1. Projects that are not identified in these documents will be assigned a normalized value of 0.

Criteria Weight (/100)	Weight Rationale
5	Criteria gives greater emphasis to projects which are consistent with regional freight plans (and by extension local land use). Moderate criteria weight given crude nature of this criteria.

5.4.3 Would the Project be Expected to Receive Freight Stakeholder Support? (G3-Stakeholder Support)

For this criterion, it is suggested that the ADOT Freight Advisory Committee be consulted. The intent of this criteria is to flag and discount project types which are likely to have less support amongst stakeholders. Project types which have the greatest support would be given the highest value, and with the minimum amount of support would be given 0 value. As with other criteria, results will be normalized so that values are between 0 and 1.

Criteria Weight (/100)	Weight Rationale
5	Criteria seeks to reward or penalize projects based on level of freight stakeholder support. Moderate criteria weight given crude nature of this criteria.

5.4.4 Would the Project be Likely to Attract Funding/Financing Partners? (G3-Funding/Financing)

The projects will be assessed on their potential to engage different partners to fund them, or otherwise to generate revenue from operations. A proxy for revenue potential will be continuous restricted access highways, which are generally better candidates for public-private partnerships.

Beyond public-private funding potential, we will also consider the likelihood that a project would have more than one funding partner. The more sources a project is able to attract the higher the score in this criterion. Sources of funding will include local/county funds, state funds, and federal funds. Each funding source will represent one point in the scale of this indicator, with the maximum number of sources being assigned a normalized value of 1 and the least number of sources being assigned a normalized value of 0.

Criteria Weight (/100)	Weight Rationale
5	This criteria seeks to give greater projects that are more likely to attract funding/financing. Moderate criteria weight given the speculative nature of the criteria and related measures.

5.4.5 Does the Project Have a Positive Benefit-Cost Analysis? (G3-BCA)

Because of the number of projects to be considered in Step 2, for the purposes of the Arizona Freight Plan project prioritization, a full Benefit-Cost-Analysis for each project is not feasible. The analysis conducted for project ranking will be reduced to capturing only the benefits from travel time savings and safety improvements, and expected project costs using the approach noted in section 5.3.2 (Project Types and Cost Determination). This simplification of the analysis potentially underestimates the benefits arising from projects that do address other issues (in addition to travel time and safety), therefore results below one do not indicate a net social loss. However, because the resulting value is normalized before it is combined with other criteria, any two projects may be compared between each other using the normalized scores, even if the results of the simplified BCA suggest that the projects themselves are not cost-efficient.

Criteria Weight (/100)	Weight Rationale
15	Highest weight given to this criteria as it is arguably the best measure of a project's overall value in relation to its cost. The BCA criteria also captures many of the benefits that are subject to other criteria (time savings, safety, etc.). The quantification of benefits and costs at this stage are high level in nature only.

5.4.6 Summary Evaluation Results against Goal 3 Criteria

The figure below presents the results if the evaluation of project options against Goal 3 evaluation criteria and associated weights.

Figure 5-10: Summary Evaluation Results Against Goal 3 Criteria

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	G3 -Mgmt	G3-Land Use	G3-Stkhldr Support*	G3-Funding/Financing.	G3-BCA	Goal 3 Criteria Cumulative Weighted Score	Prioritization Rank
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements	$83.0	0.0	0.0	5.00	3.33	0.79	9.12	21
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	The Stack System Interchange Improvements	$200.0	0.0	5.0	1.00	3.33	1.30	10.64	14
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	$300.0	0.0	5.0	1.00	3.33	1.19	10.52	15
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements	$1.5	3.0	0.0	5.00	0.00	15.00	23.00	2
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	$16.5	3.0	0.0	5.00	0.00	2.08	10.08	17
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project	$1860.0	0.0	5.0	1.00	3.33	0.35	9.68	19
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane	$61.3	0.0	5.0	1.00	5.00	5.88	16.88	5
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10	$40.0	0.0	5.0	5.00	3.33	0.47	13.81	6
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening	$85.0	0.0	5.0	1.00	5.00	1.05	12.05	11
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	$23.1	0.0	0.0	0.50	1.67	1.50	3.67	23
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements	$625.0	0.0	5.0	1.00	3.33	0.53	9.87	18
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements	$82.0	0.0	0.0	5.00	3.33	0.17	8.50	22
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US93 System Interchange Improvements	$86.5	3.0	0.0	5.00	1.67	0.00	9.67	20
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements	$70.0	3.0	5.0	1.50	1.67	1.76	12.93	9

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	G3 -Mgmt	G3-Land Use	G3-Stkhldr Support*	G3-Funding/Financing.	G3-BCA	Goal 3 Criteria Cumulative Weighted Score	Prioritization Rank
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements	$161.0	3.0	5.0	0.00	3.33	0.84	12.17	10
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements	$8.0	3.0	0.0	5.00	0.00	2.32	10.32	16
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements	$3.28	3.0	5.0	1.50	5.00	9.67	24.17	1
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension	$245	0.0	0.0	0.00	1.67	0.77	2.43	25
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements	$6.8	3.0	0.0	0.50	1.67	12.92	18.09	3
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane	$5.1	0.0	0.0	0.50	1.67	1.09	3.26	24
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	SR 89/I-40 System Interchange Improvements	$29.0	3.0	0.0	5.00	0.00	5.70	13.70	7
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	$775.0	0.0	5.0	1.00	5.00	0.55	11.55	13
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	$600.0	0.0	5.0	1.00	5.00	0.87	11.87	12
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	$425.0	0.0	5.0	5.00	3.33	0.17	13.51	8
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening	$189.0	0.0	5.0	1.00	3.33	8.64	17.97	4

5.5 Overall Result of Prioritization Process and Priority Projects

The following table combines the results of the evaluation of project issues against Goal 1 and Goal 2 weighted criteria, and the evaluation of related project options against Goal 3 weight criteria.

Figure 5-11: Summary Evaluation Results Against Goal 3 Criteria

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Goal 1 & 2 Criteria Cumulative Weighted Score (/67)	Goal 3 Criteria Cumulative Weighted Score (/33)	Goal 1, 2, 3 Criteria Cumulative Weighted Score (/100)
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements	$83.0	**33.7**	**9.12**	**42.8**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	The Stack System Interchange Improvements	$200.0	**49.4**	**10.64**	**60.1**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	$300.0	**57.3**	**10.52**	**67.9**
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements	$1.5	**21.4**	**23.00**	**44.4**
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	$16.5	**21.4**	**10.08**	**31.5**
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project	$1,860	**35.9**	**9.68**	**45.6**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane	$61.3	**36.4**	**16.88**	**53.3**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10	$40.0	**27.4**	**13.81**	**41.2**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening	$85.0	**31.9**	**12.05**	**44.0**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	$23.1	**19.8**	**3.67**	**23.4**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements	$625.0	**27.4**	**9.87**	**37.3**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements	$82.0	**22.6**	**8.50**	**31.1**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US93 System Interchange Improvements	$86.5	**24.3**	**9.67**	**33.9**
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements	$70.0	**12.7**	**12.93**	**25.7**
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements	$161.0	**12.7**	**12.17**	**24.9**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements	$8.0	**11.4**	**10.32**	**21.7**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements	$3.30	**10.1**	**24.17**	**34.3**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension	$245.0	**15.1**	**2.43**	**17.5**

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Goal 1 & 2 Criteria Cumulative Weighted Score (/67)	Goal 3 Criteria Cumulative Weighted Score (/33)	Goal 1, 2, 3 Criteria Cumulative Weighted Score (/100)
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements	$6.8	**9.9**	**18.09**	**28.0**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane	$5.1	**3.8**	**3.26**	**7.1**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	SR 89/I-40 System Interchange Improvements	$29.0	**22.2**	**13.70**	**35.9**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	$775.0	**61.7**	**11.55**	**73.2**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	$600.0	**40.4**	**11.87**	**52.3**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	$425.0	**40.1**	**13.51**	**53.6**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening	$189.0	**33.2**	**17.97**	**51.1**

5.5.1 Resulting Project Priorities and Supporting Discussion

Figure 5-12 lists the projects in priority order. The illustrative projects were not evaluated or prioritized and are included at the bottom of the Table.

Figure 5-12: Summary Evaluation Results Against Goal 3 Criteria

Ref	Route (Area)	Issue Segment	Project Option(s)	Planning Level Project Cost $ million	Goal 1 & 2 Criteria Cumulative Weighted Score (/67)	Goal 3 Criteria Cumulative Weighted Score (/33)	Combined Goal 1, 2, 3 Criteria Cumulative Weighted Score (/100)	Prioritization Rank
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	I-10 Phoenix Urban Area Improvements	$775	61.7	11.55	73.2	1
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	I-10/SR202L/SR 51 System Interchange Improvements	$300	57.3	10.52	67.9	2
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	The Stack System Interchange Improvements	$200	49.4	10.64	60.1	3
79	US 60	Loop 303 to L202 within Phoenix Metro area	US 60 Phoenix Urban Area Improvements	$425	40.1	13.51	53.6	4
7	I-10	I-10 between SR 85 and L303	I-10 West of Phoenix General Purpose Lane	$61.3	36.4	16.88	53.3	5
78	I-17	From I-10 to L101 within Phoenix Metro area	I-17 Phoenix Urban Area Improvements	$600	40.4	11.87	52.3	6
81	I-10	From SR 202L to East of SR 387	I-10 Gila River Indian Community Area Widening	$189	33.2	17.97	51.1	7
6	I-10	I-10 east of I-19	Tucson Area I-10 Widening Project	$1,860	35.9	9.68	45.6	8
5a	I-10	I-10 at US 191 (Cochise TI)	I-10/US 191 System Interchange Improvements (interim)	$1.5	21.4	23.00	44.4	9
9	I-10	I-10 east of Phoenix	I-10 Picacho Area Roadway Widening	$85	31.9	12.05	44.0	10
1	I-10	I-10 at I-19 Traffic System Interchange	I-10/I-19 System Interchange Improvements	$83	33.7	13.70	42.8	11
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Earley Road to I-8 Widening and TI Improvements on I-10	$40	27.4	13.81	41.2	12
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	I-19 Tucson Area Widening and TI Improvements	$625	27.4	9.87	37.3	13
67	US 89	US 89 Within Flagstaff, north of I-40	SR 89/I-40 System Interchange Improvements	$29	22.2	13.70	35.9	14

Ref	Route (Area)	Issue Segment	Project Option(s)	Planning Level Project Cost $ million	Goal 1 & 2 Criteria Cumulative Weighted Score (/67)	Goal 3 Criteria Cumulative Weighted Score (/33)	Combined Goal 1, 2, 3 Criteria Cumulative Weighted Score (/100)	Prioritization Rank
39	SR 69	SR 69, East of Prescott area	SR 69 East of Prescott ITS Improvements	$3.3	10.1	24.17	34.3	15
29	I-40	I-40 at US 93 Junction within Kingman area	I-40/US93 System Interchange Improvements	$86.5	24.3	9.67	33.9	16
5b	US 191	US 191/Cochise RR Overpass	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	$16.5	21.4	10.08	31.5	17
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	I-40/I-17 System Interchange Improvements	$82	22.6	8.50	31.1	18
62	US 60	US 60 within Globe area	Globe Area Freight Improvements	$6.8	9.9	18.09	28.0	19
33a	SR 189	SR 189 between Mariposa POE and I-19	SR 189 Traffic Flow Improvements (interim)	$70	12.7	12.93	25.7	20
33b	SR 189	SR 189 between Mariposa POE and I-19	SR 189 Traffic Flow Improvements (ultimate)	$161	12.7	12.17	24.9	21
18	I-17	I-17 between SR 179 to Stoneman Lake Road	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	$23.1	19.8	3.67	23.4	22
35	SR 260	SR 260, West of Show Low to East of SR 73	SR 260 Show Low Area Intersection Improvements	$8	11.4	10.32	21.7	23
61	US 60	US 60 between SR 88 and SR 79	US 60 Access Controlled Freeway Extension	$245	15.1	2.43	17.5	24
63	US 60	US 60 Passing Lane: Westbound	US 60 Passing Lane	$5.1	3.8	3.26	7.1	25
Illustrative Projects								
14	Buckeye Road	I-10 Freight Route Alternative along Buckeye Road		N/A	-	-	-	-
15	I-10	Sonoran Freeway		N/A	-	-	-	-
16	I-11	I-11: Intermountain West Corridor		N/A	-	-	-	-
32	NSCS	New freeway connecting between I-10 and US 60		N/A	-	-	-	-
37	SR 30	Parallel to I-10 from SR 202L to SR 85		N/A	-	-	-	-

Appendix A: Evaluation Results against Weighted Goal 1 and Goal 2 Criteria

Is the Issue on a Key Commerce Corridor? (G1-KCC)

Strategic freight transportation issues which are on, or relate to a Key Commerce Corridor (KCC) receive a higher score. Issues which are on a KCC are given a score of 3. Issues which are not on a KCC but provide a direct connection to a KCC are given a score of 1 (i.e., within 10 miles). Issues which don't relate to a KCC, directly or indirectly, are evaluated with a score of zero. The possible normalized values for this criterion are 0 (for score 0), 0.33 (for score 1), and 1 (for score 3).

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	3.000	1.000	**10.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	3.000	1.000	**10.000**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	3.000	1.000	**10.000**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	3.000	1.000	**10.000**
6	I-10	I-10 east of I-19	Recurring urban congestion	3.000	1.000	**10.000**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	3.000	1.000	**10.000**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	3.000	1.000	**10.000**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	3.000	1.000	**10.000**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	3.000	1.000	**10.000**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	3.000	1.000	**10.000**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	3.000	1.000	**10.000**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	3.000	1.000	**10.000**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	1.000	0.333	**3.333**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	0.000	0.000	**0.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	0.000	0.000	**0.000**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	0.000	0.000	**0.000**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	0.000	0.000	**0.000**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	0.000	0.000	**0.000**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	1.000	0.333	**3.333**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	3.000	1.000	**10.000**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	3.000	1.000	**10.000**

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	1.000	0.333	**3.333**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	3.000	1.000	**10.000**

Notes:

1. Weighted Value = Normalized Value x Weight
2. Weight = 10

Are the Flows Impacted by the Issue Significant? (G1-Significant)

The Average Annual Daily Truck Traffic (AADTT), as reported in the Phase 2 Working Paper (Inventory of State Freight Transportation Assets) was used to assess the significance of freight flows over each issue segment. Using average values for each of the issue segments, projects will get assigned a normalized value of 0 to 1, corresponding to the range of AADTT values for the issue segments, from lowest to highest, respectively.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	17,153	1.000	**8.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	13,491	0.770	**6.164**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	10,458	0.580	**4.643**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	6,190	0.313	**2.503**
6	I-10	I-10 east of I-19	Recurring urban congestion	11,611	0.653	**5.221**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	11,050	0.617	**4.940**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	7,758	0.411	**3.289**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	8,714	0.471	**3.769**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	2,740	0.097	**0.773**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	3,842	0.166	**1.326**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	4,501	0.207	**1.656**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	4,996	0.238	**1.904**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	1,437	0.015	**0.120**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	1,198	0.000	**0.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	2,360	0.073	**0.583**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	2,996	0.113	**0.902**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	1,609	0.026	**0.206**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	1,200	0.000	**0.001**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	2,216	0.064	**0.510**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	11,080	0.619	**4.955**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	8,928	0.484	**3.876**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	7,500	0.395	**3.160**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	7,741	0.410	**3.281**

Notes:
1. Weighted Value = Normalized Value x Weight
2. Weight = 8

Do Future Scenarios Aggravate this Significance? (G1-Significant/Scenarios)

The Arizona Travel Demand Model (AZTDM2) was used to assess the freight operation under each of the three scenarios developed for the project and resulting implications of the issue segments.

Each congestion-related freight transportation issue will be assessed in the context of each future scenario. A score of (0) is assigned if there is no congestion over the issue segment in question under any of the scenarios; (1) if congestion aggravates the issue segment in only one scenario; (2) if congestion aggravates the issue segment in two scenarios; and (3) if congestion aggravates the issue segment in all three scenarios. The score will then be normalized to be between 0 and 1, with a score of 0 corresponding to a normalized value of 0 and a score of 3 corresponding to a normalized value of 1.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	3	1.000	**8.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	3	1.000	**8.000**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	3	1.000	**8.000**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	0	0.000	**0.000**
6	I-10	I-10 east of I-19	Recurring urban congestion	3	1.000	**8.000**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	3	1.000	**8.000**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	3	1.000	**8.000**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	3	1.000	**8.000**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	0	0.000	**0.000**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	3	1.000	**8.000**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	3	1.000	**8.000**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	1	0.333	**2.667**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	0	0.000	**0.000**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	0	0.000	**0.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	1	0.333	**2.667**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	3	1.000	**8.000**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	0	0.000	**0.000**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	0	0.000	**0.000**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	3	1.000	**8.000**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	3	1.000	**8.000**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	3	1.000	**8.000**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	3	1.000	**8.000**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	3	1.000	**8.000**

Notes:
1. Weighted Value = Normalized Value x Weight
2. Weight = 8

Is the Issue an Impediment to Trade? (G1-Trade)

Inbound, outbound and through freight traffic flows of manufacturing and natural resources (excluding aggregate intra Arizona flows) were used as proxies for trade, given the importance and prominence of trade to these sectors.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	7,786,786	0.421	**3.365**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	12,457,835	0.674	**5.388**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	18,488,150	1.000	**8.000**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	7,653,377	0.413	**3.307**
6	I-10	I-10 east of I-19	Recurring urban congestion	7,466,880	0.403	**3.226**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	11,712,549	0.633	**5.065**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	8,403,973	0.454	**3.632**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	11,055,526	0.598	**4.781**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	6,233,747	0.337	**2.692**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	2,775,993	0.149	**1.195**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	949,399	0.050	**0.403**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	1,315,720	0.070	**0.562**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	2,445,119	0.131	**1.051**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	28,472	0.001	**0.005**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	1,341,535	0.072	**0.573**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	262,143	0.013	**0.106**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	417,854	0.022	**0.173**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	56,966	0.002	**0.017**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	2,390,080	0.128	**1.027**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	18,488,150	1.000	**8.000**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	6,030,315	0.326	**2.604**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	282,863	0.014	**0.115**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	12,462,657	0.674	**5.390**

Notes:
1. Weighted Value = Normalized Value x Weight
2. Weight = 8

Would Addressing the Issue Improve Multimodal Access? (G2-Modal Access)

Issues are given a value of 1 if they improve or provide direct access to a facility offering access to a different mode of transportation (such as an airport or intermodal rail facility), and a value of 0 if they do not.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	1	1.000	**2.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	1	1.000	**2.000**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	1	1.000	**2.000**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	0	0.000	**0.000**
6	I-10	I-10 east of I-19	Recurring urban congestion	1	1.000	**2.000**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	0	0.000	**0.000**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	0	0.000	**0.000**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	0	0.000	**0.000**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	0	0.000	**0.000**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	1	1.000	**2.000**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	0	0.000	**0.000**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	1	1.000	**2.000**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	1	1.000	**2.000**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	0	0.000	**0.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	0	0.000	**0.000**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	0	0.000	**0.000**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	0	0.000	**0.000**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	0	0.000	**0.000**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	0	0.000	**0.000**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	1	1.000	**2.000**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	1	1.000	**2.000**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	1	1.000	**2.000**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	0	0.000	**0.000**

Notes:
1. Weighted Value = Normalized Value x Weight
2. Weight = 2

Does the Issue Hinder Mobility? (G2-Mobility)

The Truck Travel Time Index (TTTI) for the issue segment was calculated, with the highest value assigned a normalized value of 1 and the lowest value assigned a value of 0.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	1.432	0.031	**0.214**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	5.889	0.609	**4.263**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	6.265	0.658	**4.605**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	1.239	0.005	**0.038**
6	I-10	I-10 east of I-19	Recurring urban congestion	1.333	0.018	**0.124**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	1.702	0.066	**0.459**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	1.212	0.002	**0.014**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	1.317	0.016	**0.109**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	1.550	0.046	**0.321**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	1.615	0.054	**0.380**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	1.197	0.000	**0.000**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	1.384	0.024	**0.170**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	1.300	0.013	**0.094**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	3.953	0.358	**2.504**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	2.131	0.121	**0.849**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	2.032	0.108	**0.759**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	2.187	0.129	**0.900**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	2.266	0.139	**0.971**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	2.342	0.149	**1.041**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	8.900	1.000	**7.000**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	3.841	0.343	**2.403**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	6.368	0.671	**4.699**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	1.449	0.033	**0.229**

*Truck travel time are estimated from AZTDM2 model.

Notes:

1. Weighted Value = Normalized Value x Weight
2. Weight = 7

Does the Issue Hinder Freight Transportation System Reliability? (G2-Reliability)

The Truck Planning Time Index (TPTI) for the issue segment was calculated, and the highest value was assigned a normalized value of 1 and the lowest value will be assigned a value of 0.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	1.266	0.000	**0.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	7.958	0.775	**5.425**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	8.221	0.806	**5.639**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	1.411	0.017	**0.118**
6	I-10	I-10 east of I-19	Recurring urban congestion	1.556	0.034	**0.235**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	2.580	0.152	**1.066**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	1.326	0.007	**0.049**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	1.350	0.010	**0.068**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	1.860	0.069	**0.481**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	2.416	0.133	**0.932**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	1.535	0.031	**0.218**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	1.653	0.045	**0.314**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	3.600	0.270	**1.892**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	5.861	0.532	**3.725**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	3.236	0.228	**1.597**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	3.301	0.236	**1.650**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	4.398	0.363	**2.539**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	4.413	0.364	**2.551**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	3.473	0.256	**1.790**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	9.900	1.000	**7.000**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	5.949	0.542	**3.797**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	9.200	0.919	**6.432**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	2.334	0.124	**0.866**

*Truck travel time are estimated from AZTDM2 model.

Notes:

1. Weighted Value = Normalized Value x Weight
2. Weight = 7

Does the Issue Increase Transportation Costs of Freight Transportation? (G2-Cost)

Total daily hours of truck delay were used to assess truck costs on each issue segment. The related values for total daily hours of truck delay will be normalized to be between 0 and 1.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	136.800	0.143	**0.999**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	743.240	0.896	**6.272**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	649.900	0.780	**5.460**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	359.400	0.419	**2.934**
6	I-10	I-10 east of I-19	Recurring urban congestion	102.600	0.100	**0.702**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	392.800	0.461	**3.225**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	136.869	0.143	**1.000**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	329.400	0.382	**2.674**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	642.300	0.771	**5.394**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	143.250	0.151	**1.055**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	225.500	0.253	**1.770**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	406.300	0.477	**3.342**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	27.800	0.007	**0.051**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	87.800	0.082	**0.573**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	260.500	0.296	**2.075**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	132.656	0.138	**0.963**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	424.800	0.500	**3.503**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	21.900	0.000	**0.000**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	393.110	0.461	**3.228**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	621.040	0.744	**5.209**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	241.800	0.273	**1.912**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	331.900	0.385	**2.695**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	280.900	0.322	**2.252**

*Truck delay are estimated from AZTDM2 model.

Notes:

1. Weighted Value = Normalized Value x Weight
2. Weight = 7

Does the Issue Affect Transportation System Safety? (G2-Safety)

Truck related crashes were used to assess the extent to which the issue segment is prone to a high level of truck-involved equivalent fatal crashes.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	0.101	0.010	**0.090**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	0.338	0.138	**1.244**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	1.837	0.949	**8.545**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	0.576	0.267	**2.404**
6	I-10	I-10 east of I-19	Recurring urban congestion	1.273	0.644	**5.797**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	0.742	0.357	**3.212**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	0.320	0.128	**1.156**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	0.548	0.252	**2.269**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	0.083	0.000	**0.000**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	0.506	0.229	**2.064**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	0.189	0.057	**0.517**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	0.738	0.355	**3.191**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	0.928	0.458	**4.119**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	1.017	0.506	**4.552**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	0.414	0.179	**1.613**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	0.613	0.287	**2.584**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	0.599	0.279	**2.514**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	0.144	0.033	**0.298**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	0.729	0.350	**3.148**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	1.830	0.946	**8.513**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	1.100	0.551	**4.957**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	1.930	1.000	**9.000**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	0.661	0.313	**2.817**

Notes:
1. Weighted Value = Normalized Value x Weight
2. Weight = 9

Does the Issue Result in Negative Social/Environmental Impacts? (G2-Emissions)

CO_2 emissions for a peak-hour volume of traffic for the most congested mile in the project area were estimated, then issue-specific peak-hour current speeds, volumes, road types, and truck percentages were used to estimate peak-hour emissions for a representative congested mile in the project area. The normalized values for environmental impact criterion varied between 0 (least emissions) and 1 (most emissions).

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	0.998	0.998	**0.998**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Recurring urban congestion	0.687	0.678	**0.678**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Recurring urban congestion	0.460	0.444	**0.444**
5	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	0.130	0.104	**0.104**
6	I-10	I-10 east of I-19	Recurring urban congestion	0.624	0.613	**0.613**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	0.448	0.432	**0.432**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	0.244	0.221	**0.221**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	0.274	0.252	**0.252**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	0.131	0.105	**0.105**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	0.496	0.481	**0.481**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	0.108	0.081	**0.081**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	0.141	0.115	**0.115**
33	SR 189	SR 189 between Mariposa POE and I-19	Border access	0.091	0.064	**0.064**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	0.079	0.051	**0.051**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	0.194	0.170	**0.170**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	0.139	0.113	**0.113**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	0.098	0.071	**0.071**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	0.029	0.000	**0.000**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	0.136	0.110	**0.110**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area	Recurring urban congestion	1.000	1.000	**1.000**
78	I-17	From I-10 to L101 within Phoenix Metro area	Recurring urban congestion	0.899	0.896	**0.896**
79	US 60	Loop 303 to L202 within Phoenix Metro area	Recurring urban congestion	0.705	0.696	**0.696**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	0.352	0.333	**0.333**

Notes:

1. Weighted Value = Normalized Value x Weight
2. Weight = 1

Appendix B: Basis for Development of Project Options and Associated Planning-Level Costs

For each of the strategic freight issues, potential projects were developed to address each of the priority strategic freight issues.

The development of projects started with reviewing proposed projects which have been identified through previous studies and plans and designs. In instances where the project is within a metropolitan planning organization's boundaries, efforts were made to coordinate the list of projects with these agencies to the greatest extent possible, so that the projects are consistent with the current planning for these regions.

Planning level costs for each project were developed using available information, either as published in design concept reports or available through other project scoping documents. Where detailed projects information was not available, the study team took advantage of established unit and or project costs from other similar project types.

For projects that are identified as future corridors (e.g., I-11), where a specific alternative has not yet been identified, project costs were not identified, and benefit-cost analysis was not conducted. These projects are included and advanced in the Arizona Freight Plan as illustrative projects.

The following project 'cut-sheets' provide information for each of the projects outlining the project specifics, coordination, overall estimated project cost and the anticipated project benefits for consideration in the benefit cost analysis.

Appendix C: Evaluation Results against Weighted Step 2 Goal 3 Criteria

Does the Project Prioritize Good Management of Assets? (G3 - Mgmt)

Arizona's Long-Range Transportation Plan (LRTP) recommended investment choices emphasize infrastructure preservation and modernization before expansion. This measure seeks to recognize potentially lower-cost projects that emphasize preservation and modernization over expansion. To this end, projects that recommend expansion will be given a value of zero; whereas projects that identify preservation and or modernization will be given a value of one.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements	83	0	0.000	**0.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack) [a]	Recurring urban congestion	The Stack System Interchange Improvements	200	0	0.000	**0.000**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack) [a]	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	300	0	0.000	**0.000**
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements	1.5	1	1.000	**3.000**
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	16.5	1	1.000	**3.000**
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project	1,860	0	0.000	**0.000**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane	61.3	0	0.000	**0.000**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10	40	0	0.000	**0.000**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening	85	0	0.000	**0.000**

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	23.05	0	0.000	**0.000**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements	625	0	0.000	**0.000**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements	82	0	0.000	**0.000**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US93 System Interchange Improvements	86.5	1	1.000	**3.000**
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (interim)	70	1	1.000	**3.000**
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (ultimate)	161.1	1	1.000	**3.000**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements	8	1	1.000	**3.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements	3.28	1	1.000	**3.000**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension	245	0	0.000	**0.000**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements	6.8	1	1.000	**3.000**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane	5.1	0	0.000	**0.000**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	SR 89/I-40 System Interchange Improvements	29	1	1.000	**3.000**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area [a]	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	775	0	0.000	**0.000**
78	I-17	From I-10 to L101 within Phoenix Metro area [a]	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	600	0	0.000	**0.000**
79	US 60	Loop 303 to L202 within Phoenix Metro area [a]	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	425	0	0.000	**0.000**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening	189	0	0.000	**0.000**

Notes:

1. Weighted Value = Normalized Value x Weight
2. Weight = 3
3. a: Projects are within MAG region and coordination is in progress.

Is the Project Appropriately Linked to Local Land Use/Regional Plans? (G3-Land Use)

Projects that are explicitly incorporated into the State's BQAZ Statewide Transportation Framework Studies and or the regional transportation plans will receive a higher score in this indicator compared to projects that have not been previously included in these processes. The implicit assumption is that these projects are more likely to be linked to regional plans and local land use if already in these regional plans. Each project will receive a point for being incorporated in the following planning documents:

- BQAZ Statewide Transportation Framework Study;
- Regional transportation plans.

The maximum number of appearances will be assigned a normalized value of 1. Projects that are not identified in these documents will be assigned a normalized value of 0.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements	83	0	0.000	**0.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack) [a]	Recurring urban congestion	The Stack System Interchange Improvements	200	1	0.000	**5.000**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack) [a]	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	300	1	0.000	**5.000**
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements	1.5	0	0.000	**0.000**
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	16.5	0	0.000	**0.000**
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project	1860	1	1.000	**5.000**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane	61.3	1	1.000	**5.000**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10	40	1	1.000	**5.000**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening	85	1	1.000	**5.000**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	23.05	0	0.000	**0.000**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements	625	1	1.000	**5.000**

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements	82	0	0.000	**0.000**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US93 System Interchange Improvements	86.5	0	0.000	**0.000**
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (interim)	70	1	1.000	**5.000**
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (ultimate)	161.1	1	1.000	**5.000**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements	8	0	0.000	**0.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements	3.28	1	1.000	**5.000**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension	245	0	0.000	**0.000**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements	6.8	0	0.000	**0.000**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane	5.1	0	0.000	**0.000**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	SR 89/I-40 System Interchange Improvements	29	0	0.000	**0.000**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area [a]	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	775	1	0.000	**5.000**
78	I-17	From I-10 to L101 within Phoenix Metro area [a]	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	600	1	0.000	**5.000**
79	US 60	Loop 303 to L202 within Phoenix Metro area [a]	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	425	1	0.000	**5.000**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening	189	1	1.000	**5.000**

Notes:
1. Weighted Value = Normalized Value x Weight
2. Weight = 5
3. a: Projects are within MAG region and coordination is in progress

Would the Project be Expected to Receive Freight Stakeholder Support? (G3-Stakeholder Support)

For this criterion, it is suggested that the ADOT Freight Advisory Committee be considered a proxy for stakeholders. The intent of this criteria is to flag and discount projects which are likely to lead to opposition or resistance. A 2 point value will be given to projects which have broad support (or non-objection), a 1 point value will be given to projects that have some opposition, and a 0 will be given to projects that have broad opposition. As with other criteria, results will be normalized so that values are between 0 and 1.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements	83	50.000	1.000	**5.000**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack) [a]	Recurring urban congestion	The Stack System Interchange Improvements	200	42.000	0.200	**1.000**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack) [a]	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	300	42.000	0.200	**1.000**
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements	1.5	50.000	1.000	**5.000**
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	16.5	50.000	1.000	**5.000**
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project	1860	42.000	0.200	**1.000**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane	61.3	42.000	0.200	**1.000**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10	40	50.000	1.000	**5.000**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening	85	42.000	0.200	**1.000**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	23.05	41.000	0.100	**0.500**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements	625	42.000	0.200	**1.000**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements	82	50.000	1.000	**5.000**
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US93 System Interchange Improvements	86.5	50.000	1.000	**5.000**
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (interim)	70	43.000	0.300	**1.500**

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (ultimate)	161.1	40.000	0.000	**0.000**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements	8	50.000	1.000	**5.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements	3.28	43.000	0.300	**1.500**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension	245	40.000	0.000	**0.000**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements	6.8	41.000	0.100	**0.500**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane	5.1	41.000	0.100	**0.500**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	SR 89/I-40 System Interchange Improvements	29	50.000	1.000	**5.000**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area [a]	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	775	42.000	0.200	**1.000**
78	I-17	From I-10 to L101 within Phoenix Metro area [a]	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	600	42.000	0.200	**1.000**
79	US 60	Loop 303 to L202 within Phoenix Metro area [a]	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	425	50.000	1.000	**5.000**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening	189	42.000	0.200	**1.000**

Notes:
1. Weighted Value = Normalized Value x Weight
2. Weight = 5
3. a: Projects are within MAG region and coordination is in progress.

Would the Project be Likely to Attract Funding/Financing Partners? (G3-Funding/Financing)

Projects were assessed on their potential to engage different partners to fund them, or otherwise to generate revenue from operations (e.g. through public-private partnerships). A proxy for revenue potential will be continuous restricted access highways. The likelihood that a project would have more than one funding partner was evaluated. A value of one was assigned for each of the following characteristics that applied to the project: whether it occurs within an MPO or COG; whether the County(s) within which it occurs have a transportation designated sales tax; whether a majority of it is within the incorporated area of a city or town; and whether it is a fully access controlled facility. The more sources a project is able to attract the higher the score in this criterion. Each funding source will represent one point in the scale of this indicator, with the maximum number of sources being assigned a normalized value of 1 and the least number of sources being assigned a normalized value of 0.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements	83	3.000	0.667	**3.333**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack) [a]	Recurring urban congestion	The Stack System Interchange Improvements	200	3.000	0.667	**3.333**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack) [a]	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	300	3.000	0.667	**3.333**
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements	1.5	1.000	0.000	**0.000**
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	16.5	1.000	0.000	**0.000**
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project	1860	3.000	0.667	**3.333**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane	61.3	4.000	1.000	**5.000**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10	40	3.000	0.667	**3.333**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening	85	4.000	1.000	**5.000**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	23.05	2.000	0.333	**1.667**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements	625	3.000	0.667	**3.333**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements	82	3.000	0.667	**3.333**

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US93 System Interchange Improvements	86.5	2.000	0.333	**1.667**
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (interim)	70	2.000	0.333	**1.667**
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (ultimate)	161.1	3.000	0.667	**3.333**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements	8	1.000	0.000	**0.000**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements	3.28	4.000	1.000	**5.000**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension	245	2.000	0.333	**1.667**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements	6.8	2.000	0.333	**1.667**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane	5.1	2.000	0.333	**1.667**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	SR 89/I-40 System Interchange Improvements	29	1.000	0.000	**0.000**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area [a]	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	775	4.000	1.000	**5.000**
78	I-17	From I-10 to L101 within Phoenix Metro area [a]	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	600	4.000	1.000	**5.000**
79	US 60	Loop 303 to L202 within Phoenix Metro area [a]	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	425	3.000	0.667	**3.333**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening	189	3.000	0.667	**3.333**

1. Weighted Value = Normalized Value x Weight
2. Weight = 5
3. a: Projects are within MAG region and coordination is in progress.

Does the Project Have a Positive Benefit-Cost Analysis? (G3-BCA)

Because of the number of projects to be considered in Step 2, for the purposes of the Arizona Freight Plan project prioritization, a full benefit cost analysis for each project is not feasible. The analysis conducted for project ranking was simplified to capture only the benefits from travel time savings and safety improvements, and expected project costs using the approach noted in section 5.3.2 (Project Types and Cost Determination). This simplification of the analysis potentially underestimates the benefits arising from projects that do address other issues (in addition to travel time and safety). However, because the resulting value is normalized before it is combined with other criteria, any two projects may be compared between each other using the normalized scores, even if the results of the simplified BCA suggest that the projects themselves are not cost-efficient.

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
1	I-10	I-10 at I-19 Traffic System Interchange	Recurring urban congestion	I-10/I-19 System Interchange Improvements	83	0.104	0.052	**0.785**
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack) [a]	Recurring urban congestion	The Stack System Interchange Improvements	200	0.170	0.087	**1.305**
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack) [a]	Recurring urban congestion	I-10/SR202L/SR 51 System Interchange Improvements	300	0.155	0.079	**1.187**
5a	I-10	I-10 at US 191 (Cochise TI)	Recurring rural bottlenecks	I-10/US 191 System Interchange Improvements	1.5	1.915	1.000	**15.000**
5b	US 191	US 191/Cochise RR Overpass	Recurring rural bottlenecks	Reconstruct the US 191/Cochise RR Overpass to accommodate oversize freight	16.5	0.269	0.139	**2.082**
6	I-10	I-10 east of I-19	Recurring urban congestion	Tucson Area I-10 Widening Project	1860	0.048	0.023	**0.349**
7	I-10	I-10 between SR 85 and L303	Recurring urban congestion	I-10 West of Phoenix General Purpose Lane	61.3	0.753	0.392	**5.877**
8	I-10	I-10 Mainline and Traffic Interchange at I-8	Recurring rural bottlenecks	Earley Road to I-8 Widening and TI Improvements on I-10	40	0.064	0.031	**0.472**
9	I-10	I-10 east of Phoenix	Recurring rural bottlenecks	I-10 Picacho Area Roadway Widening	85	0.138	0.070	**1.050**
18	I-17	I-17 between SR 179 to Stoneman Lake Road	Recurring rural bottlenecks	I-17 Stoneman Lake Area Climbing Lane and ITS Improvements	23.05	0.195	0.100	**1.500**
25	I-19	I-19 between I-10 and Valencia Road (south of Tucson)	Recurring urban congestion	I-19 Tucson Area Widening and TI Improvements	625	0.072	0.036	**0.535**
26	I-40	I-40 (EB to NB system ramp at I-40/I-17/SR 89 interchange)	Recurring urban congestion	I-40/I-17 System Interchange Improvements	82	0.025	0.011	**0.170**

Ref	Route (Area)	Issue Segment	Issues "Type" (per classification in Figure 2-2)	Project Option(s)	Planning Level Project Cost $ million	Measured Value	Normalized Value	Weighted Score
29	I-40	I-40 at US 93 Junction within Kingman area	Recurring rural bottlenecks	I-40/US93 System Interchange Improvements	86.5	0.004	0.000	**0.000**
33a	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (interim)	70	0.228	0.117	**1.762**
33b	SR 189	SR 189 between Mariposa POE and I-19	Border access	SR 189 Traffic Flow Improvements (ultimate)	161.1	0.111	0.056	**0.839**
35	SR 260	SR 260, West of Show Low to East of SR 73	Recurring rural bottlenecks	SR 260 Show Low Area Intersection Improvements	8	0.300	0.155	**2.322**
39	SR 69	SR 69, East of Prescott area	Recurring urban congestion	SR 69 East of Prescott ITS Improvements	3.28	1.235	0.645	**9.668**
61	US 60	US 60 between SR 88 and SR 79	Recurring rural bottlenecks	US 60 Access Controlled Freeway Extension	245	0.102	0.051	**0.768**
62	US 60	US 60 within Globe area	Recurring rural bottlenecks	Globe Area Freight Improvements	6.8	1.650	0.862	**12.923**
63	US 60	US 60 Passing Lane: Westbound	Inadequate passing/climbing lanes	US 60 Passing Lane	5.1	0.143	0.073	**1.092**
67	US 89	US 89 Within Flagstaff, north of I-40	Recurring urban congestion	SR 89/I-40 System Interchange Improvements	29	0.731	0.380	**5.705**
77	I-10	From L101 to L202 (Santan Freeway) within Phoenix Metro area [a]	Recurring urban congestion	I-10 Phoenix Urban Area Improvements	775	0.074	0.037	**0.551**
78	I-17	From I-10 to L101 within Phoenix Metro area [a]	Recurring urban congestion	I-17 Phoenix Urban Area Improvements	600	0.114	0.058	**0.865**
79	US 60	Loop 303 to L202 within Phoenix Metro area [a]	Recurring urban congestion	US 60 Phoenix Urban Area Improvements	425	0.026	0.012	**0.174**
81	I-10	From SR 202L to East of SR 387	Recurring urban congestion	I-10 Gila River Indian Community Area Widening	189	1.105	0.576	**8.640**

1. Weighted Value = Normalized Value x Weight
2. Weight = 15
3. a: Projects are within MAG region and coordination is in progress.

Appendix D: Potential Projects to address each of the priority strategic freight issues

The following pages provide background information for the potential projects proposed to address each of the priority strategic freight issues. This appendix includes additional information for the illustrative projects (e.g., I-11) and the Maricopa regional issue segments for which studies are currently in progress.

Project ID: 1

Project Name: New I-10/I-19 System Traffic Interchange
Route: Interstates 19 and I0 (I-19 and I-10)
Location: In Tucson area
Milepost: 259 on I-10
MPO: PAG
County: Pima

Source: Google Street View, August 2016

Description:
Construct new system traffic interchange at I-10 and I-19.

Current Issue:
I-10 and I-19 experience heavy freight. Traffic operation in the Tucson area is regularly congested. Freight originating in Mexico and joining I-10 in Tucson is affected by the congestion, resulting in longer truck travel time and poor freight reliability. In addition, the truck traffic merging into I-10 poses safety concerns due to the heavy traffic volume on I-10. Improvement of this system traffic interchange will improve truck safety concerns and freight bottlenecks. An ATRI study in coordination with FHWA (2009) ranked this system interchange among the 100 worst in the nation in terms of the fluidity of truck freight flows.

MPO Coordination:
The study team met with the PAG on August 8, 2016 to discuss the issues identified in the PAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving this section of I-10/I-19. PAG has not identified this as a potential project in 2045 Regional Mobility and Accessibility Plan. However, PAG concurred that improving this system TI will help improving the freight flow despite the projects high cost.

Potential Benefits:
The congested ramp speed may improve up to 7mph; speed on crossroad and arterials will improve. Crashes are anticipated to be reduced by 11 percent assuming multiple crash reduction factors[6] associated with ramp modifications, new traffic interchanges, and bridge widening.

Approach/Assumption:
The I-10 and L303 system TI cost is $83M (including new ramps, structures/bridges, improvements at local streets, improvements to the frontage roads, rubberized asphalt and pavement markings). A planning level assumption was made that this project provides a comparable planning level cost for this project.

Estimated Planning Level Project Cost:
$83M

References:
Phoenix Metropolitan Area Projects; Loop 303 / Interstate 10 Interchange.

[6] Crash modification factors for widening/modify ramps, widening bridges and new traffic interchanges are 0.21, 0.9 and 0.89, respectively

Project ID: 2

Project Name: I-10 at I-17 System Interchange (The Stack)
Route: Interstates 10 and 17 (I-10 and I-17)
Location: Phoenix metropolitan area
Milepost: I-10 at milepost 143 - 145
MPO: MAG
County: Maricopa

[local agency evaluation in progress]

Source: Google Street View, August 2016

Description:
Improve freight flow at the I-17/I-10 "Stack" interchange within the Phoenix metropolitan area.

Current Issue:
The "Stack" interchange ranked among the 100 worst in the nation for goods movement according to a study by ATRI in cooperation with the FHWA Office of Freight Management and Operations. The heavy traffic volumes including trucks are causing significant directional congestion during peak hours. Freight mobility gets impacted with safety concern and merging issues conflicting with urban activity in Phoenix Metro area.

MPO/DOT Coordination:
The study team met with MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving this traffic interchange to improve freight flow and alleviate traffic congestion.

Potential Benefits:
Proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay Average travel speed could be improved significantly.

Approach/Assumption:
MAG is currently conducting SPINE Study analyzing various alternatives to improve the traffic operation and safety.
The study will compare the alternatives and provided recommended solutions. Considering the complexity of this corridor, this study identified a need of this key commerce corridor, however, no mitigation action is recommended till the SPINE Study evaluates various alternatives.

Estimated Planning Level Project Cost:
n/a

References:
I-10/ I-17 Spine Corridor, Maricopa Association of Governments, 2016.

Project ID: 3

Project Name: I-10 at SR 51 System Interchange (Mini Stack)
Route: Interstates 10 and SR 51
Location: Phoenix metropolitan area
Milepost: I-10 at milepost 145 - 147
MPO: MAG
County: Maricopa

Source: Google Street View, August 2016

Description:
Improve freight flow within Phoenix metropolitan area.

Current Issue:
A study by the ATRI in cooperation with the FHWA Office of Freight Management and Operations indicates that Mini-Stack interchange ranked among the 100 worst in the nation specifically for goods movement. The heavy traffic volumes, including trucks, are causing significant directional congestion during peak hours. Freight mobility gets impacted with safety concern and merging issues conflicting with urban activity in Phoenix Metro area.

MPO/DOT Coordination:
The study team met with MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving the freight flow and alleviating traffic congestion. It is recognized that improvements to flow on I-10 at the Mini-Stack will help to alleviate the congestion which contributes to this issue (there are no plans at this time to address the actual Mini-Stack interchange configuration, nor the north leg to SR 51).

Potential Benefits:
The proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay by eliminating much of the weaving which occurs to the west and south of the Mini-Stack interchange. Average travel speed could be improved significantly.

Approach/Assumption:
MAG is currently conducting two studies the *Deck Park Study* (which is analyzing various alternatives to improve the traffic operation and safety of I-10 traffic east and west of the Deck Park Tunnel in central Phoenix) and the *Sky Harbor Airport Access Study* (which is analyzing various alternatives to improve the traffic operation and safety of I-10 traffic south of the Mini-Stack interchange).

Estimated Planning Level Project Cost: $300M ($200M for improvements along I-10 to the west of the Mini-Stack, and $100M for improvements along I-10 to the south of the Mini-Stack)

References:
Deck Park Study, Maricopa Association of Governments, 2017 (DRAFT); *Sky Harbor Access Study*, Maricopa Association of Governments, 2017 (DRAFT).

Project ID: 5(a) and 5(b)

Project Name: Cochise Traffic Interchange
Route: Interstate 10 and US 191
Location: In Cochise area
Milepost: 331 on I-10 and 63 on US 191
MPO: SEAGO
County: Cochise

Source: Google Street View, August 2016

Description:
Reconstruct the ramp into a “compact diamond” traffic interchange; thereby improving the northbound to westbound access ramp to accommodate large trucks.

Current Issue:
The US 191 northbound to westbound I-10 ramp is not conducive to trucks and oversize loads due to the tight turning radius. Additionally, the low clearance bridge at I-10 forces over-height trucks onto northbound US 191 to detour along adjacent County roads, resulting in delays and safety concerns for local traffic.

MPO/DOT Coordination:
This project was raised as an issue during discussions with the ADOT Southeast District during the Corridor Profile Studies meetings. The study team met with the SouthEastern Arizona Governments Organization (SEAGO) on September 1, 2016, to discuss the issues identified in the SEAGO region. The ADOT SR 80 and US 191 Oversize Load Study (2013) identified this and the Cochise UPRR structure as impacting freight flow along US 191 south of I-10. SEAGO suggested that in addition to the (a) Cochise traffic interchange project, an option to consider (b) both the Cochise traffic interchange and the Cochise UPRR structure be considered. There was general concurrence for evaluating these as two options.

Potential Benefits:
New westbound on-ramp replacing the tight trumpet ramp will improve freight safety and speed and eliminate an oversize truck detour due to low bridge clearance. Adjacent local roadways are anticipated to see safety and delay improvements[7].

Approach/Assumption:
(a) ADOT's Five-Year Transportation Facilities Construction Program (2016-2020). ADOT TRAC H853401C: I-10/US191 TI @MP 331 TI Improvements showed estimated project cost of $1.5M.
(b) ADOT SR 80 and US 191 Oversize Load Study identified the cost of improvements of the US 191/Cochise RR Overpass at $16.5M.

Estimated Planning Level Project Cost:
(a) $1.5M; (b) $16.5M.

References:
ADOT's Five-Year Transportation Facilities Construction Program (2016-2020), June 2015.
ADOT SR 80 and US 191 Oversize Load Study, 2013.

[7] Truck related CMF for a new diamond interchange is 0.89

Project ID: 6

Project Name: Tucson Area I-10 Widening Project
Route: Interstates 10 (I-10)
Location: In east Tucson area
Milepost: 260 to 274
MPO: PAG
County: Pima

Description:
Widening I-10 to 6 or 8-lane and reconstruct traffic interchanges as recommended in PAG's 2045 Regional Mobility and Accessibility Plan (2016).

Current Issue:
I-10 experiences heavy freight traffic. Heavy traffic volume, crashes and peak-hourly congestion reduce freight mobility. Several traffic interchanges are performing poorly due to older ramp configuration, shorter ramp length and speed differential between mainline and merging traffic. Several of the bridges require rehabilitation (some of which are currently programmed by ADOT).

MPO Coordination:
The study team met with the PAG on August 8, 2016 to discuss the issues identified in the PAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving this section of I-10/I-19. PAG identified this improvement as a potential project in 2045 Regional Mobility and Accessibility Plan.

Potential Benefits:
Congested ramp speeds may improve up to 25 mph; speeds on crossroad and arterials are also anticipated to improve significantly
Crashes anticipated to be reduced by 21 percent, assuming multiple crash reduction factors[8] associated with general purpose lane, ramp modifications, new traffic interchanges and bridge widening

Approach/Assumption:
PAG estimated total cost of $1.86B ($585M for Reserve Freeway Projects [I-10 East] plus $1.28B for I-10 East Freeway Projects, RMAP ID #488.08)

Estimated Planning Level Project Cost:
$1.86B**.**

References:
2045 Regional Mobility and Accessibility Plan, May 2016.

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[8] Crash modification factors for widening/modify ramps, widening bridges, new traffic interchanges and general purpose lane are 0.21, 0.9, 0.89 and 0.9, respectively

Project ID: 7

Project Name: I-10 West of Phoenix General Purpose Lane
Route: I-10
Location: Interstate 10 (I-10, Papago Freeway)
Milepost: 112 to 120
MPO: MAG
County: Maricopa

Source: Google Street View, August 2016

Description:
Add a general purpose lane in each direction between milepost 112 and 120.

Current Issue:
Currently this stretch of I-10 has two travel lanes in each direction which causes general congestion, resulting in freight delay, and lower truck planning time reliability. I-10 is a heavy truck travel corridor (percent trucks along this segment) and a Key-Commerce Corridor with high freight tonnage and value. Widening I-10 to a 6-lane facility will improve the freight flow.

MPO Coordination:
The study team met with MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving this section of I-10 beyond 2020 to improve freight flow and alleviate traffic congestion.

Potential Benefits:
The congested speed may improve up to 18mph.
Crashes are anticipated to be reduced by 10 percent[9].

Approach/Assumption:
Constructing new general purpose lane cost $3.83M per lane-mile[10] (ADOT's Corridor Profile Studies general planning level cost estimates). Total project cost for adding a general purpose lane in each direction between milepost 112 and 120 was calculated (eight miles x 2 directions x $3.83M/lane-mile).

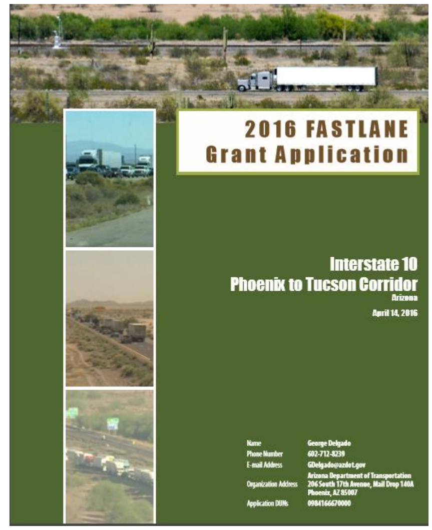
Estimated Planning Level Project Cost:
$61.3M

References:
ADOT Corridor Profile Studies

[9] Crash modification factor for adding a general purpose lane is 0.9
[10] This planning level cost does not include any right-of-way acquisition or major utility relocation cost, excludes bridges, and assumes generally at-grade facility with nominal sound walls and no major drainage improvements.

Project ID: 8

Project Name: I-10 Earley Road Widening
Route: Interstates 10 (I-10)
Location: Near Casa Grande
Milepost: 196 to 199
MPO: SCMPO
County: Pinal



Note: this project is advancing with ADOT funding and a USDOT FASTLANE Grant.

Description:
Widen I-10 between Earley Road and its junction with I-8. This project would widen I-10 to 3 lanes in each direction and would upgrade the ramps at the I-10 interchange with Jimmie Kerr Boulevard. The project would reconstruct the I-10 bridges over Jimmie Kerr Boulevard and the Union Pacific Railroad and would add auxiliary lanes between the I-10 and Jimmie Kerr Boulevard traffic interchange and the I-8 entrance and exit ramps.

Current Issue:
This segment is a major bottleneck to freight flow and good movements. The heavy freight volume, combined with vehicular traffic results in safety concerns. A crash in this area may close the freeway for hours, leaving motorists and truck drivers stranded with few options. Geometric deficiencies at Jimmie Kerr Boulevard cause capacity and safety issues due to insufficient merge length for the eastbound I-10 entrance ramp.

MPO/ADOT Coordination:
This project was an element of ADOT’s 2016 I-10 FASTLANE Grant Application (April 2016). The project was awarded funding to advance.

Potential Benefits:
The congested ramp may improve up to 30mph by widening the corridor.
Traffic crashes may reduce up to 33 percent with this improvement[11].

Approach/Assumption:
Total project cost estimated at $40M.

Estimated Planning Level Project Cost:
$40M.

References:
I-10, Earley Road to I-8 Construction Cost Estimate, ADOT, September 2014.

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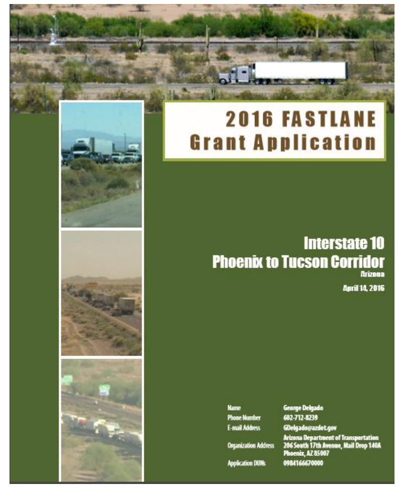
[11] Crash modification factors for widening/modify ramps, widening bridges, new traffic interchanges and general purpose lane are 0.21, 0.9, 0.89 and 0.9, respectively.

Project ID: 9

Project Name: Picacho Area Roadway Widening and Realignment
Route: Interstates 10 (I-10)
Location: Near Casa Grande
Milepost: 209 to 213
MPO: SCMPO
County: Pinal



Note: this project is advancing with ADOT funding and a USDOT FASTLANE Grant.

Description:
Realign I-10 in the Picacho area and reconstruct the I-10 and State Route (SR) 87 traffic interchange. This project involves a 4-mile-long realignment of I-10 through the area to eliminate roadway curve, improving safety consistent with AASHTO design criteria.

Current Issue:
The mainline horizontal curves at Picacho do not meet AASHTO criteria because of insufficient super-elevation or length of the curve; the Picacho exit at MP 211 has numerous deficiencies including narrow ramp width, short acceleration/deceleration lengths, and insufficient design speeds. This segment of roadway has seen approximately 200 crashed in the last 5 years. ADOT has final roadway design plans ready for construction and has also purchased all of the right of way needed to build this project.

MPO/ADOT Coordination:
This project was an element of ADOT's 2016 I-10 FASTLANE Grant Application (April 2016). The project was awarded funding to advance.

Potential Benefits:
Replace a nonconforming interchange layout with a conforming layout.
Cuts number of mainline and ramp crashes by half[12] .
Improves forecast pm peak travel speed by nearly 15 mph (30 percent) over no-build.
Results in nearly 40,000 less annual hours of delay through the segment.

Approach/Assumption:
Project got awarded FASTLANE Federal grant with total project cost of $85M

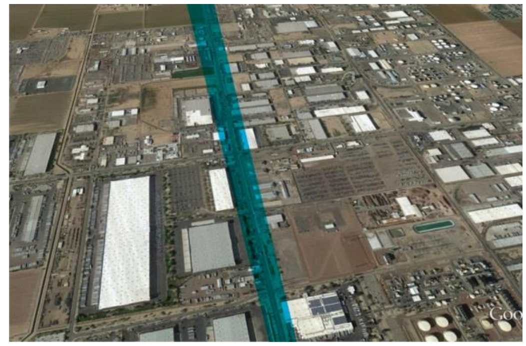
Estimated Planning Level Project Cost:
$85M

References:
Junction I-8 to Tangerine Road, Draft Environmental Assessment and Section 4(f) Evaluation, ADOT, Sep 2010
2016 FASTLANE Grant Application, ADOT, April 2016

[12] Crash modification factors for adding a lane and widening/modify ramps, roadway realignments are 0.9, 0.21 and 0.5, respectively

Project ID: 14

Project Name: I-10 Freight Alternative Improving Buckeye Road
Route: Not determined
Location: Phoenix metropolitan area
Milepost: n/a
MPO: MAG
County: Maricopa



Illustrative Project

Description:
Improve freight flow having a freight alternative of I-10. Any delay due to recurring and non-recurring events will help alleviating truck delay along I-10 using this freight alternative corridor.

Current Issue:
I-10 is a key commerce and heavy truck corridor. I-10 within the West Valley area (L303 to I-17) gets congested due to heavy traffic and truck volumes. Any crash related roadway closure causes noticeable delay. West Valley has numerous truck activities including truck rest area and intermodal facility within close proximity. Many local jurisdictions imposed truck access to major arterials. An alternation truck corridor will help freight goods movements tremendously to avoid congestion and delay along I-10 and truck movements to many activity locations within the vicinity.

MPO/DOT Coordination:
The study team met with MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving this alternative truck corridor to improve freight flow and alleviate traffic congestion.

Potential Benefits:
Proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay Average travel speed could be improved significantly.

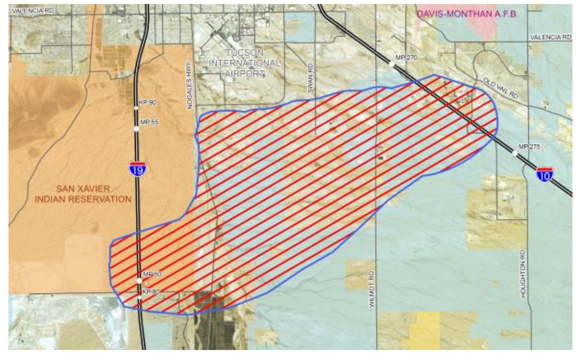
Approach/Assumption:
MAG is currently conducting a Freight Framework study that will recommend alternatives to improve the traffic operation and safety. Buckeye Road is a regional truck route, and it was agreed during a meeting with MAG that a project to improve freight movement along this route is recommended.

Estimated Planning Level Project Cost:
n/a

References:
None cited.

Project ID: 15

Project Name: Sonoran Freeway
Route: Not determined
Location: Tucson area between I-10 and I-19
Milepost: n/a
MPO: PAG
County: Pima



Illustrative Project

Description:
The Sonoran Corridor is a proposed new route that would connect interstates 10 and 19 south of Tucson International Airport.

Current Issue:
The planned Sonoran Corridor creates a number of opportunities/ including a high speed connection for freight headed from/to Mexico via Nogales while relieving congestion in the downtown area; a high speed commuter route connecting rapidly growing residential communities south and east of Tucson to major employment centers; creation of a logistics corridor that takes advantage of close proximity to Mexico, two railroads, two Interstates, air freight, and the state's only recognized international intermodal center at the Port of Tucson; and providing access to thousands of acres of undeveloped land south and southeast of Tucson International Airport.

MPO/DOT Coordination:
This FHWA and ADOT project is being conducted on behalf of Pima County and the Pima Association of Governments.

Potential Benefits:
Proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay Average travel speed could be improved significantly

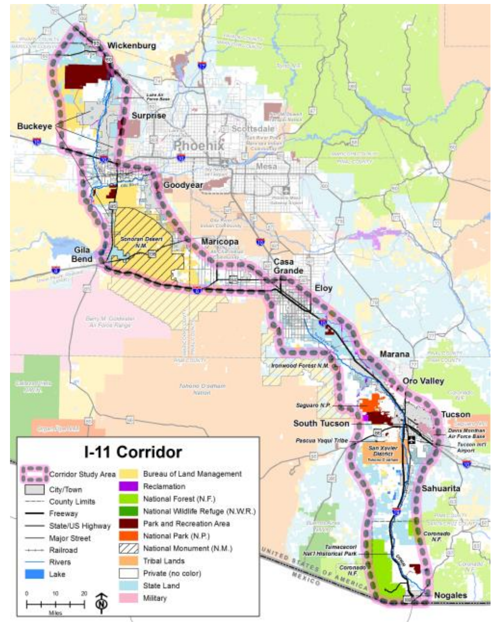
Approach/Assumption:
This project is underway and is designed to result in a Federal Highway Administration (FHWA) Tier 1 Environmental Impact Statement (EIS) and conceptual engineering that will be structured to select a Preferred Corridor Alignment (approximately 2,000 feet in width) and preferred modal/multi-use choice for accommodating future traffic needs in the Study Area.

Estimated Planning Level Project Cost:
n/a

References:
SR 410 Sonoran Corridor Tier I EIS Scope of Work, TRACS #: P9100 05P.

Project ID: 16

Project Name: I-11 Intermountain West Corridor
Route: Not determined
Location: Nogales to Arizona/Nevada Stateline
Milepost: n/a
MPO: Multiple
County/State: Statewide span



Source: Interstate 11 Corridor Tier I EIS Corridor Study

Illustrative Project

Description:
The I-11 Corridor is proposed to include an upgraded highway, but may be combined with rail and other major infrastructure components (e.g., energy and telecommunications).

Current Issue:
The CANAMEX corridor is comprised of numerous existing Interstate corridors and state highways, and is not a continuous route due to a gap in the designation between I-10 and US 93. Congress has designated I-11 as a future Interstate between Phoenix and Las Vegas, and recent studies indicate that sustained transportation investment in the region, particularly for north-south corridors, will be required.

MPO/DOT Coordination:
In March 2016, the FHWA and ADOT initiated the environmental review process for a large part of the Interstate 11 Corridor Study, specifically from Nogales to Wickenburg, Arizona. In 2014, the Arizona and Nevada Departments of Transportation completed the I-11 and Intermountain West Corridor Study. The study includes corridor planning of a possible interstate link between Phoenix and Las Vegas.

Potential Benefits:
Proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay Average travel speed could be improved significantly.

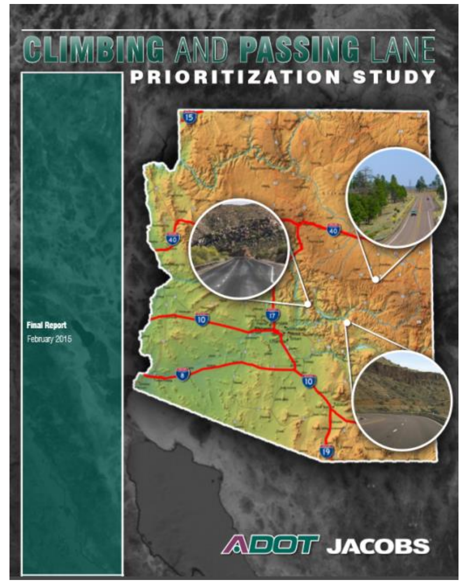
Approach/Assumption:
ADOT has launched a three-year environmental study to select a corridor alternative for a portion of the I-11 Corridor, specifically between Nogales and Wickenburg.

Estimated Planning Level Project Cost:
n/a

References:
I-11 and Intermountain West Corridor Study

Project ID: 18

Project Name: I-17 Stoneman Lake Area Climbing Lane
Route: Interstate 17 (I-17)
Location: South of Flagstaff area
Milepost: 299 to 305, Northbound direction
MPO: FMPO
County: Coconino



Description:
Construct northbound Hog Tank Climbing lane on I-17. Install new DMS at milepost 303.4 with CCTV.

Current Issue:
The northbound steep grade slows down the truck speed causing backup along the mainline. Having two directional lane on I-17, slower trucks block one lane and other traffic gets stranded behind that. Travel time, delay, safety and reliability are the concern.

MPO/DOT Coordination:
The study team coordinated with FMPO over the phone on met on August 19, 2016 to discuss the issue, regional plan and feasibility of this potential freight mitigation action. FMPO provided additional feedback, reviewed additional data provided by HDR and supported the idea moving this project forward.

Potential Benefits:
Proposed lane will improve the truck travel time and reliability, improve safety and reduce overall delay. Average travel speed could be improved to 6mph with 25 percent crash reduction[13].

Approach/Assumption:
Corridor Profile Study (I-17) estimated the cost of this improvement to be $23.1M.

Estimated Planning Level Project Cost:
$23.1M.

References:
ADOT Corridor Profile Studies.

[13] Crash reduction factors for constructing climbing lane and installing DMS signs are 0.75 and 1.0, respectively

Project ID: 25

Project Name: I-19 Tucson Area Widening and TI Improvements
Route: Interstates 19 (I-19)
Location: In Tucson area
Milepost: 92 to 102
MPO: PAG
County: Pima

Description:
Widening I-19 to 6 lanes; construct new traffic interchanges and bridges and reconstruct existing interchanges as recommended in PAG's 2045 Regional Mobility and Accessibility Plan (2016).

Current Issue:
I-19 experiences heavy freight traffic and is a Key Commerce Corridor. Heavy traffic volume, high number of crashes and peak hourly congestion impact goods movements and freight mobility. I-19 is also the primary route for goods traveling to and from Mexico through Arizona.

MPO Coordination:
The study team met with the PAG on August 8, 2016 to discuss the issues identified in the PAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. PAG identified this improvement as a potential project in 2045 Regional Mobility and Accessibility Plan. There was general concurrence for improving this section of I-10/I-19.

Potential Benefits:
The congested ramp speed may improve up to 12mph by widening the corridor.
Crashes are anticipated to be reduced by 20 percent[14] with widening and improvements of traffic interchanges.

Approach/Assumption:
PAG estimated cost of $625M (I-19, RMAP ID #236.08) in the 2045 Regional Mobility and Accessibility Plan (2016).

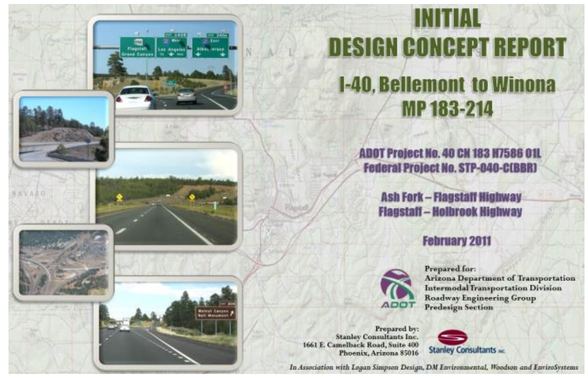
Estimated Planning Level Project Cost:
$625M.

References:
2045 Regional Mobility and Accessibility Plan, May 2016.

[14] Crash modification factors for widening/modify ramps, widening bridges, new traffic interchanges and general purpose lane are 0.21, 0.9, 0.89 and 0.9, respectively

Project ID: 26

Project Name: I-40/I-17 System TI Improvements
Route: Interstate 17 (I-17); Interstate 40 (I-40)
Location: Within Flagstaff area
Milepost: I-40 at milepost 195
MPO: Flagstaff Metropolitan Planning Organization (FMPO)
County: Coconino



Description:
Improve the traffic system interchange and I-40 mainline to alleviate freight congestion and improve safety. This project assumes reconstruction of I-40 from east of the I-17 bridges to west of the Rio de Flag bridges, including construction of the new Lone Tree traffic interchange. The construction will improve I-40 west to northbound traffic movement at the new Lone Tree TI and directing it to a westbound directional proposed I-40 frontage road. The existing I-40 west to northbound ramp would be replaced with the frontage road. I-40 mainline would be widened as part of the improvement

Current Issue:
I-40 and I-17 experience heavy freight flow; I-17 is the major truck route connecting Phoenix to the north. The Flagstaff region urban activity, heavy vehicle traffic and truck volumes and directional movement create a system bottleneck at the interchange location. Poor truck travel time, freight reliability and safety are the major issues.

MPO Coordination:
The study team discussed the issue with the FMPO on August 19, 2016. The regional plan and the feasibility of this potential freight mitigation action were discussed. General consensus supported the idea moving this project forward.

Potential Benefits:
The congested ramp speed may improve up to 12mph; speeds on crossroad and arterials are also anticipated to improve significantly.
Crashes are anticipated to be reduced by 50 percent assuming multiple crash reduction factors[15] associated with ramp modifications, new Lone Tree traffic interchange and mainline widening.

Approach/Assumption:
The I-40, Bellemont to Winona, Design Concept and environmental studies were reviewed. The alternative analysis of building a new traffic interchange and widening the I-40 mainline estimated the total project cost at $82M.

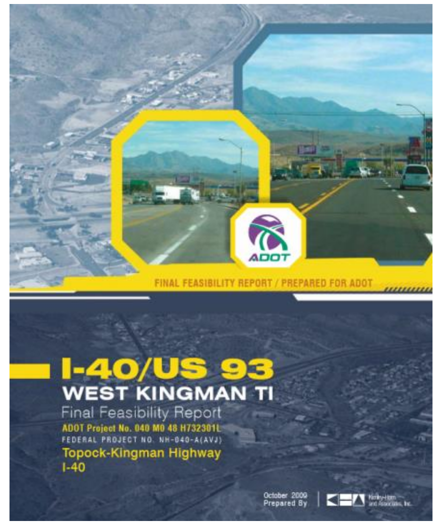
Estimated Planning Level Project Cost:
$82M

References:
I-40, Bellemont to Winona, Initial Design Concept and Environmental Studies, February 2011.

[15] Crash modification factors for adding a general purpose lane and widening/modify ramps, widening bridges are 0.9, 0.21 and 0.9, respectively

Project ID: 29

Project Name: I-40/US 93 System Interchange Improvements
Route: Interstates 40 (I-40) and US Route 93 (US 93)
Location: In Kingman area
Milepost: I-40 at milepost 48
MPO: WACOG
County: Mohave



Description:
The DCR considered interim improvements to mitigate congestion by: signal timing optimization; free-flow right turn improvements; striping modifications; improve traffic flow from existing Beale Street traffic interchange.

Current Issue:
The Kingman area is growing, resulting in increased traffic volumes. During peak demand periods, the existing traffic interchange at Beale Street cannot accommodate the predominant flow of traffic from westbound I-40 to northbound US 93; as a result traffic backs up on westbound I-40 ramp and mainline. The Beale Street interchange does not have the capacity to handle traffic volumes at peak periods. A direct access route between I-40 and US 93 would improve regional traffic flow efficiency and improve safety.

MPO Coordination:
The proposed improvements are identified in the I-40/US 93 West Kingman TI Final Feasibility Report

Potential Benefits:
The proposed improvements will relieve congestion, enhance regional traffic flow, promote local access
This bottleneck location is located along proposed I-11 corridor
Crashes are anticipated to be reduced by 50 percent[16] assuming the improvements of traffic interchanges.

Approach/Assumption:
The project cost is based on information published from the I-40/US 93 West Kingman System Interchange Public Meeting (September 26, 2013).
The construction is proposed in two phases: (1) Phoenix to Las Vegas, Nevada movements ($54.7M) and, (2) California to Las Vegas movements ($31.8M). Total project cost is estimated to be $86.5M.

Estimated Planning Level Project Cost:
$86.5M

References:
I-40/US 93 West Kingman TI Final Feasibility Report, ADOT, October 2009.

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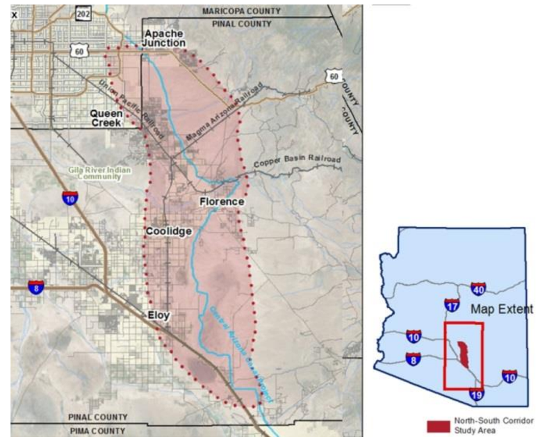
[16] Crash modification factors for widening/modify ramps, widening bridges are 0.21 and 0.9, respectively

Project ID: 32

Project Name: North-South Corridor
Route: Not determined
Location: US 60 in Apache Junction to I-10 in the Picacho area
Milepost: n/a
MPO: CAG, MAG, and SCMPO
County: Pinal



Illustrative Project

Description:
ADOT, in partnership with the FHWA, is proposing the construction and operation of an approximately 45-mile-long North-South Corridor in Pinal County.

Current Issue:
The study is proposed to improve connectivity and accessibility and to introduce additional roadway capacity to support projected population and employment growth in Pinal County and across the larger region.

MPO/DOT Coordination:
The need for a north-to-south transportation corridor has been under consideration at the local, regional, and State level for more than 15 years. ADOT and FHWA (lead agencies) are preparing an environmental evaluation of the corridor with local state, and federal agency, sovereign nations, and stakeholders' involvement.

Potential Benefits:
Proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay Average travel speed could be improved significantly

Approach/Assumption:
Recommended alternatives are being evaluated through a National Environmental Policy Act (NEPA) process that requires an EIS document that examines environmental impacts for each of the proposed route alternatives and recommends the preferred alternative.

Estimated Planning Level Project Cost:
n/a.

References:
North-South Corridor Study.

Project ID: 33 (a) and 33(b)

Project Name: SR 189 Traffic Flow Improvements
Route: State Route 189 (SR 189)
Location: In proximity of Mariposa Port of Entry in Nogales
Milepost: 0 to 3
MPO: SEAGO
County: Santa Cruz

Description:
To improve freight movement along SR 189 and improve the traffic flow at the traffic interchange at I-19.

Current Issue:
Intersections along SR 189 experience delays during the peak midday period; increased forecast traffic from the Mariposa Land Port of Entry expansion and growth in local traffic will further deteriorate traffic operations. SR 189 is a key link for the movement of freight arriving from and destined for Mexico. Maintaining acceptable traffic operations in the corridor is critical for the continued competitiveness of Nogales produce operations.

MPO Coordination:
The study team met with the SouthEastern Arizona Governments Organization (SEAGO) on September 1, 2016, to discuss the SEAGO region issues. There was general concurrence for improving SR 189; however, it was emphasized that the preferred action was the ultimate improvements identified in the SR 189 DCR.

Potential Benefits:
The proposed improvements will provide capacity for SR 189 to accommodate expansion of the Mariposa LPOE and access to industrial and commercial land use growth areas in the SR 189 corridor. Crashes are anticipated to be reduced by 50 percent[17].

Approach/Assumption:
As a result of discussions with SEAGO, it was recommended that two options be considered:
(a) Interim recommendation: raised median to improve access and through-traffic flow; widening; and right-in-right-out driveways. Interim improvements at the Mariposa TI will include an east-to-north flyover connecting eastbound SR 189 to northbound I-19.
(b) The estimate for constructing the Ultimate Condition is $161.1M. This includes $92.4M for construction, $5.6M for design, $15.1M for ICAP, and $48.0M for right-of-way. $2M has approved for environmental work in FY 2016 and $4M for design in FY 2018. Funding for construction is programmed in the 2020–2024 Development Program for $64M in FY 2021.

Estimated Planning Level Project Cost:
$70M till FY 2021 and (b) $161M for ultimate condition**.**

References:
Pre-Initial Design Concept Report, State Route 189, International Border to Grand Avenue, ADOT, May 2016.

[17] Crash modification factors for raised median, improving ramp access and grade separation are 0.83, 0.21 and 0.72, respectively

Project ID: 35

Project Name: SR 260 Show Low Area Intersection Improvements
Route: State Route 260 (SR 260)
Location: In Show Low area
Milepost: 339 to 342
MPO: NACOG
County: Navajo

Source: Google Street View, August 2016

Description:
To improve the intersections of US 60 (Deuce of Clubs) with SR 260 (Clark Road) and US 60 (Deuce of Clubs) with SR 260. The proposed improvements will replace the two noted signalized traffic intersections with roundabouts.

Current Issue:
SR 260 within the Show Low area experiences congestion and delay due to urban activity and unrestricted access control. Freight (consistently predominantly of forestry and mining products) are impacted as a result of slower operating speeds resulting in poor truck travel reliability. Safety is also a concern; occasional road closures cause long delay with no alternate routes. Improving these two major intersections will improve freight operations with nominal community impacts.

MPO Coordination:
None**.**

Potential Benefits:
Proposed improvements will help eliminate bottlenecks at the two major intersections along SR 260. Roundabouts provide more reliable traffic flow and improve safety by anticipated 50 percent crash reduction[18].

Approach/Assumption:
The ADOT Corridor Profile Studies estimated a unit cost of $4M to construct a dual-lane roundabout, removal of signal at 4-legged intersection; realignment of each leg for approx. 800 feet including paving, curbs, sidewalk, striping, lighting, and signing. Total planning level cost is $8M for constructing two roundabouts.

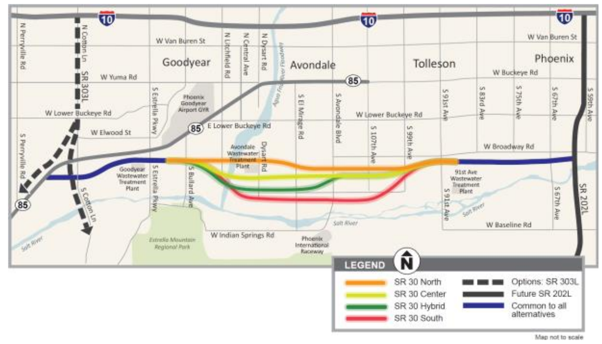
Estimated Planning Level Project Cost:
$8M**.**

References:
ADOT Corridor Profile Studies

[18] Crash modification factor for a double-lane roundabout is 0.40.

Project ID: 37

Project Name: Proposed State Route 30 (SR 30)
Route: Not determined
Location: South of I-10 in Avondale, Goodyear area
Milepost: n/a
MPO: MAG
County: Maricopa



Illustrative Project

Description:
ADOT is continuing to study State Route 30 (SR 30), a new transportation corridor that would provide relief to I-10. The project spans about 14 miles and passes through the cities of Goodyear, Avondale, and Phoenix and portions of unincorporated Maricopa County.

Current Issue:
SR 30, also known as I-10 reliever, is proposed to facilitate traffic avoiding congestions of I-10. I-10 within the West Valley area (L303 to I-17) experiences congestion due to heavy traffic and truck volumes. Crashes can cause significant delay, and impact local arterial routes. The West Valley has numerous freight activities (truck rest areas, warehousing and manufacturing). An alternation truck corridor will help freight goods movements and mitigate congestion and delay along I-10.

MPO/DOT Coordination:
ADOT is in the process of preparing an NEPA environmental assessment report that will recommend an alternative alignment.

Potential Benefits:
Proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay Average travel speed could be improved significantly.

Approach/Assumption:
ADOT continues to evaluate four potential alignments and no-build option for SR 30. After a recommended alternative decision has been made and after receiving environmental clearance, SR 30 will eventually move into design and then construction; construction is anticipated to begin in 2026, according to the current Regional Transportation Plan.

Estimated Planning Level Project Cost:
n/a.

References:
Phoenix Metro Area Projects: State Route 30

Project ID: 39

Project Name: SR 69 East of Prescott ITS Improvements
Route: State Route 69 (SR 69)
Location: Prescott area
Milepost: 287 to 290
MPO: CYMPO
County: Yavapai

Source: Google Street View, August 2016

Description:
Implement Intelligent Transportation System (ITS), signal optimization and progression, Install DMS sign, implement variable speed limits to address peak period congestion.

Current Issue:
SR 69 within the Prescott area experience congested peak hour traffic flow, longer delay at the intersections, unrestricted access and traffic turning causing freight issue, significant goods movement delay, poor reliability and safety concern.

MPO/DOT Coordination:
The study team is working to schedule a meeting with CYMPO [insert date] to discuss the issue, the regional plan and feasibility of this potential freight mitigation action.

Potential Benefits:
Proposed ITS will improve the truck travel time and reliability, improve safety and reduce overall delay. Average travel speed could be improved to 3mph with about 8 percent crash reduction[19].
Peak hour traffic flow to improve with ITS implementation and signal progression.

Approach/Assumption:
Corridor Profile Study estimated unit costs of DMS sign (@250k each) and variable speed feedback sign ($30k each). Multiple DMS, speed feedback signs, CCTVs, Adaptive signal control, peak period traffic counts and traffic signal progression study were included in this cost. Raised median approaching the key intersections are proposed. The planning level estimates came as $4.78M.

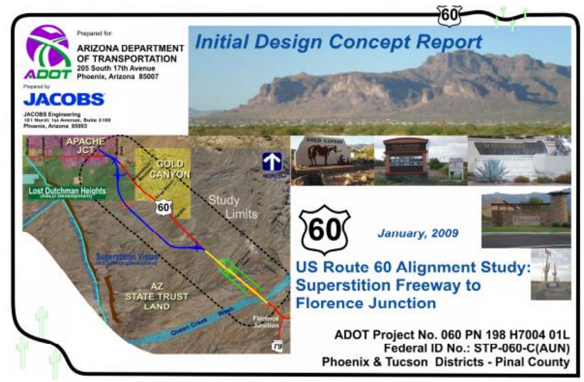
Estimated Planning Level Project Cost:
$3.28M.

References:
ADOT Corridor Profile Studies

[19] Crash modification factors of variable speed limit signs and adaptive signal control are 0.92 and 0.83, respectively

Project ID: 61

Project Name: US 60 Access Controlled Freeway Extension
Route: US Route 60 (US 60)
Location: Between State Route 88 (SR 88) and SR 79
Milepost: 198 to 211
MPO: CAG
County: Pinal



Description:
Construct a new, fully access controlled US 60 alignment as an extension of the Superstition Freeway, beginning at the east end of the Goldfield Road traffic interchange, and continuing generally southeast through the Gold Canyon area, and then rejoining the existing US 60 at MP 207. In addition, the extension of the Old West Highway from Goldfield Road to Mountain View Road would be constructed to maintain access to adjacent properties as well as providing a detour for the construction of the new mainline over Siphon Draw Wash.

Current Issue:
US 60 experiences heavy freight flow. The existing two lane directional roadway has multiple traffic signals that interrupt traffic flow. Projected growth of the area is anticipated to cause congested freight flow and safety concerns.

MPO/DOT Coordination:
ADOT completed Initial Design Concept Report and environmental clearance in coordination with the Federal Highway Administration (FHWA).

Potential Benefits:
The congested mainline speed may improve up to 13mph. The speed on crossroad and arterials are also anticipated to improve significantly.
Crashes are anticipated to be reduced by 50 percent assuming multiple crash reduction factors[20] associated with new traffic interchanges, realign roadway and access control.

Approach/Assumption:
ADOT estimated initial total project costs of $245M for the mainline and traffic interchange improvements

Estimated Planning Level Project Cost:
$245M.

References:
US Route 60 Alignment Study: Superstition Freeway to Florence Junction, January 2009.
ADOT Project No. 060 PN 198 H7004 01L.

[20] Crash modification factors for adding a lane and widening/modify ramps, roadway realignments are 0.9, 0.21 and 0.5, respectively

Project ID: 62

Project Name: Globe Area Freight Improvements
Route: US Route 60 (US 60)
Location: Between State Route 88 (SR 88) and SR 79
Milepost: 243 to 255
MPO: CAG
County: Gila

Source: Google Street View, August 2016

Description:
Construct 2 miles eastbound and 2 miles westbound passing lane and freight deceleration turn lanes.

Current Issue:
US 60 experiences heavy freight flow. Freight flow is interrupted along the existing two lane directional roadway with numerous full access driveways and intersections. Local mining operations in the area contribute additional truck activity, causing delays and safety concerns.

MPO/DOT Coordination:
The project idea was presented as a candidate solution for the ADOT Corridor Profile Studies during the ADOT Southeast District Meeting on August 19, 2016.

Potential Benefits:
The congested freight speed may improve up to 6mph through the urban area.
Crashes are anticipated to be reduced by 10 percent assuming multiple crash reduction factors[21] associated with new passing lane and truck turn lane.

Approach/Assumption:
Based on ADOT project H892401C, a unit construction cost of $1.7m/lane mile was used. Total project cost was estimated to be $6.8M ($1.7M x 2 mile length x 2 direction).

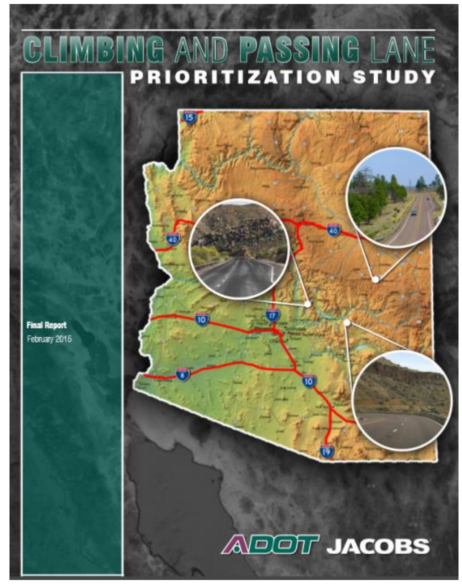
Estimated Planning Level Project Cost:
$6.8M.

References:
ADOT Corridor Profile Studies

[21] Crash modification factors for adding a new passing lane and truck turn lane are 0.9 and 0.86, respectively

Project ID: 63

Project Name: US 60 Passing Lane
Route: US Route 60 (US 60)
Location: North of Show Low
Milepost: 345 to 348
MPO: NACOG
County: Navajo



Description:
Construct 3 miles passing lane in westbound direction.

Current Issue:
Freight flow is interrupted along the existing one lane directional roadway due to numerous full access driveways and stop controlled intersections. Local mining operations within the area result in truck activity with heavy local traffic causing delays and safety concerns.

MPO/DOT Coordination:
None

Potential Benefits:
The congested freight average speed may improve up to 13mph.
Crashes are anticipated to be reduced by 25 percent assuming multiple crash reduction factors[22] associated with new passing lane.

Approach/Assumption:
This passing lane ranked first within the ADOT Southeast (Globe) District in ADOT's *Climbing and Passing Lane Prioritization Study* (ranked 6th statewide). Based on ADOT project H892401C, a unit construction cost of $1.7m/lane mile was used. Total project cost was estimated to be $5.1M ($1.7M x 3 mile length x 1 direction).

Estimated Planning Level Project Cost:
$5.1M

References:
Climbing and Passing Lane Prioritization Study, ADOT, February 2015.

[22] Crash modification factors for adding a lane and widening/modify ramps, roadway realignments are 0.9, 0.21 and 0.5, respectively

Project ID: 67

Project Name: US 89 Improvements at Flagstaff
Route: US Route 89 (US 89)
Location: Country Club Dr. to Townsend-Winona Rd.
Milepost: 418 to 421
MPO: Flagstaff Metropolitan Planning Organization (FMPO)
County: Coconino

Description:
Expand the I 40 WB on-ramp to two lanes and reconfigure the lane striping, yields and signals accordingly to facilitate westbound to southbound movement from US 89 to Country Club Drive; realign and widen the existing exit ramp and bridge at Country Club Drive traffic interchange at I-40; and, improve the two major intersections of Marketplace Drive and Winona-Townsend Drive on US 89 to improve multimodal accessibility.

Current Issue:
The southbound movement on US 89 to Country Club Drive experiences problems as the inside left turn lane is often 'starved' by the queues in the outside lane as traffic desires to head westbound on I-40 (observed poor lane utilization). This situation results in rapid queuing that can extend beyond the lights at Cummings and Marketplace. Local traffic and heavy freight result in bottlenecks and congestion.

MPO Coordination:
The study team discussed the issue with the FMPO on August 19, 2016. The regional plan and the feasibility of this potential freight mitigation action were discussed. General consensus supported the idea moving this project forward.

Potential Benefits:
The congested freight average speed may improve up to 9mph.
Crashes are anticipated to be reduced by 50 percent assuming multiple crash reduction factors[23] associated with ramp modifications, improvements of traffic interchange and bridge widening.

Approach/Assumption:
New traffic interchange ranges from $10 to $30M dollars (per ADOT's 2017-2021 STIP projects). Realigning southbound ramps and the left turn lane with I-40, plus intersection treatment at two locations. Assuming $20M for traffic interchange and $4M for ramps/left turn realignment and an additional $2.5M/intersection treatment = $20M + $4M + $5M = $29Million. The recommendations in the I-40 Bellemont to Winona, Initial Design Concept and Environmental Studies should be reviewed for detailed project improvement descriptions.

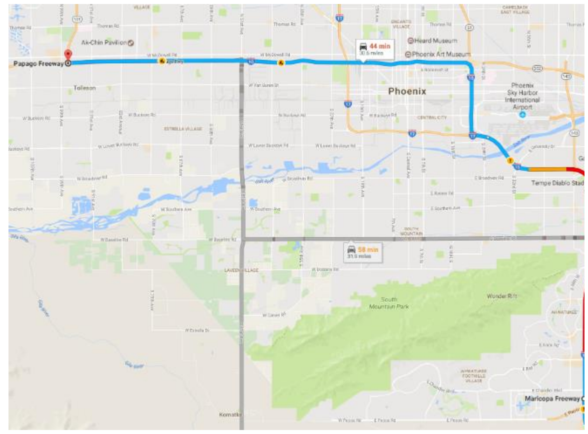
Estimated Planning Level Project Cost:
$29M

References:
I-40, Bellemont to Winona, Initial Design Concept and Environmental Studies, February 2011.

[23] Crash modification factors for adding a new traffic interchange, widening/modify ramps, widening bridges are 0.89, 0.21 and 0.9, respectively

Project ID: 77

Project Name: I-10 Improvements: L101 (Tolleson) to L202
Route: Interstate 10 (I-10)
Location: Phoenix metropolitan area
Milepost: 134 to 160
MPO: MAG
County: Maricopa



Description:
Improve freight flow along I-10/I-17 within Phoenix metropolitan area.

Current Issue:
I-10 experiences heavy traffic volumes including heavy freight movement, and relatively high crash rate. Numerous industrial and freight activities along the I-10 corridor require safe and efficient freight access. Major bottlenecks include the “Broadway curve”, the I-10 “Stack” (I-10 and I-17) and the I-10 “Mini-stack” (I-10, SR 51, and SR 202).

MPO/DOT Coordination:
The study team met with MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and ongoing studies to address congestion impacting freight were discussed. There was general agreement that the improvements recommended through the South Mountain Freeway (in construction) and the I-10/I-17 “Spine” Corridor Master Plan would alleviate traffic congestion and improve freight flow.

Potential Benefits:
The potential benefits of the project recommendations include improved truck travel time and reliability, improved travel speeds, and improved safety resulting in overall reduction in delay.

Approach/Assumption:
ADOT is currently constructing the South Mountain Freeway, a 22-mile freeway linking I-10 at the SR 202 Loop with I-10 at 59th Avenue; this project is assumed to address much of the congestion on the western leg of the corridor. MAG is currently conducting the SPINE Study which includes recommendations to improve the traffic operation and safety of the I-10 corridor from the I-17 Split to SR 202 Loop. Related projects (reference #2; #3) also contribute to addressing the issues along I-10.

Estimated Planning Level Project Cost: $775M

References:
I-10/ I-17 Spine Corridor, Maricopa Association of Governments, 2017 (Draft).

Project ID: 78

Project Name: I-17 Improvements: I-10 to L101
Route: Interstate 17 (I-17)
Location: Phoenix metropolitan area
Milepost: 194 to 215
MPO: MAG
County: Maricopa

Description:
Improve freight flow along I-17 within Phoenix metropolitan area.

Current Issue:
I-17 carries significantly heavy traffic volumes including large trucks. There are many industrial and freight activities along I-17 corridor that require safe and efficient freight access. Number of crashes is very high along I-17 as reported in the ADOT crash dataset. Current issues include general traffic operation, freight flow, and safety.

MPO/DOT Coordination:
The study team met with MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving this section of I-17 to improve freight flow and alleviate traffic congestion.

Potential Benefits:
Proposed improvement will improve the truck travel time and reliability, improve safety and reduce overall delay Average travel speed could be improved significantly.

Approach/Assumption:
The MAG SPINE Study recommends a major reconstruction of I-17 to improve the traffic operation and safety; recommended improvements include all pavement, bridges, and interchange and ramp upgrades to the latest standards. Additionally, the recommended project proposes one High-occupancy Vehicle (HOV) lane in each direction and auxiliary lanes.

Estimated Planning Level Project Cost: $600M

References:
I-10/ I-17 Spine Corridor, Maricopa Association of Governments, 2017 (Draft)

Project ID: 79

Project Name: US 60 Corridor Improvement
Route: US Route 60 (US 60)
Location: Phoenix metropolitan area
Milepost: 138 to 160
MPO: MAG
County: Maricopa

Description:
Improve freight flow along US 60 within Phoenix metropolitan area.

Current Issue:
US 60 (Grand Avenue) runs northwest connecting across the Phoenix metropolitan area from downtown Phoenix to West Valley cities including Glendale, Peoria, and Surprise. Several at-grade rail crossing intersections present safety concerns. Trucks may exit onto local routes to avoid bottlenecks. Access issues, at-grade railroad crossings, limited right-of-way availability, and potentially high project costs are elements to consider for improving traffic flow and freight mobility.

MPO/DOT Coordination:
The study team met with MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and ongoing studies to address congestion impacting freight were discussed. There was general agreement that the improvements recommended through the US 60/Grand Avenue COMPASS Framework Study would alleviate traffic congestion and improve freight flow.

Potential Benefits:
The potential benefits of the project recommendations include improved truck travel time and reliability, improved travel speeds, and improved safety resulting in overall reduction in delay.

Approach/Assumption:
MAG conducted the US 60/Grand Avenue COMPASS Framework Study analyzing various alternatives to improve the traffic operation and safety. At this time it is recommended that the Arizona Freight Study support the recommendations of the Compass Study, however, the Study recommended numerous improvements throughout the corridor which are beyond the scope of this effort to model, and not all have been locally adopted; therefore a conservative assumption was made regarding the benefit of the proposed improvements to freight.

Estimated Planning Level Project Cost: $425M (roadway improvements along US 60 from SR 101L to McDowell Road)

References:
US 60/Grand Avenue COMPASS Framework Study, Maricopa Association of Governments (2015).

Project ID: 81

Project Name: I-10 Widening at the Gila River
Route: Interstate 10 (I-10)
Location: Loop 202 to East of SR 387
Milepost: 160 to 187
MPO: MAG
County: Maricopa

Source: Google Street View, August 2016

Description:
Widen I-10 to 3 lanes in each direction (involves replacing the Gila River bridge).

Current Issue:
I-10 experiences heavy freight traffic and is a Key Commerce Corridor. The heavy traffic volumes along existing 2 directional travel lanes creates a major bottleneck, impacting freight traveling this corridor (including goods traveling north from Mexico to the Phoenix area). ADOT envisions the corridor as a continuous 3 lane directional route between Tucson and Phoenix, thereby eliminating existing two-lane directional bottlenecks. The area is within the Gila River Indian Community. The Gila River bridge is a functionally obsolete bridge, without shoulders. Periodic repairs to this bridge have resulted in I-10 directional closures.

MPO Coordination:
The study team met MAG on August 2, 2016 to discuss the issues identified in the MAG region. The regional plan and the feasibility of this potential freight mitigation action were discussed. There was general concurrence for improving this section of I-10.

Potential Benefits:
The congested freight average speed may improve up to 30mph.
Crashes are anticipated to be reduced by 19 percent assuming multiple crash reduction factors[24] associated with mainline and bridge widening.
The roadway closure and long detour could be avoided.

Approach/Assumption:
ADOT's Corridor Profile Studies prepared planning level cost estimate for constructing new general purpose lanes of approximately $3M per lane-mile. Adding a general purpose lane in each direction for 27-miles would cost approximately $164M; the cost of replacing the Gila River Bridge is estimated to be $25M.

Estimated Planning Level Project Cost:
$189M

References:
ADOT Corridor Profile Studies

[24] Crash modification factors for both adding a new general purpose lane and widening bridges are 0.9

Appendix E: State Freight Plan benefit cost analysis methodology

Introduction

The BCA scoring factor is one criterion used in the prioritization process for projects analyzed as part of the Arizona State Freight Plan. It is based on a high-level comparison of benefits related to travel time and safety and the life-cycle costs generated by a particular project. This criterion provides a broad indication of the social worth of a project.

Methodology Overview

The BCA scoring factor is calculated as the summation of travel time and safety benefits over the total number of years of analysis divided by the summation of project costs during the same period of analysis (including operation and maintenance costs). The steps used to calculate the benefits and costs are presented below.

Benefits Calculation

A full BCA model includes the monetization of multiple benefit categories generated by the project being analyzed. In the BCA scoring factor version used in this study, a total of four benefit types are monetized, consisting of two types of benefits (travel time savings and safety) for two vehicle types (cars and trucks[25]).

To calculate the four benefit types included in the BCA scoring factor, annual estimates of the benefits for each benefit type are calculated using methodologies consistent with USDOT guidance on each corresponding area. After annual benefits are generated for the entire period of analysis[26], these benefits are discounted according to the year in which they occur and added across benefit types to arrive at the total benefits of a project.

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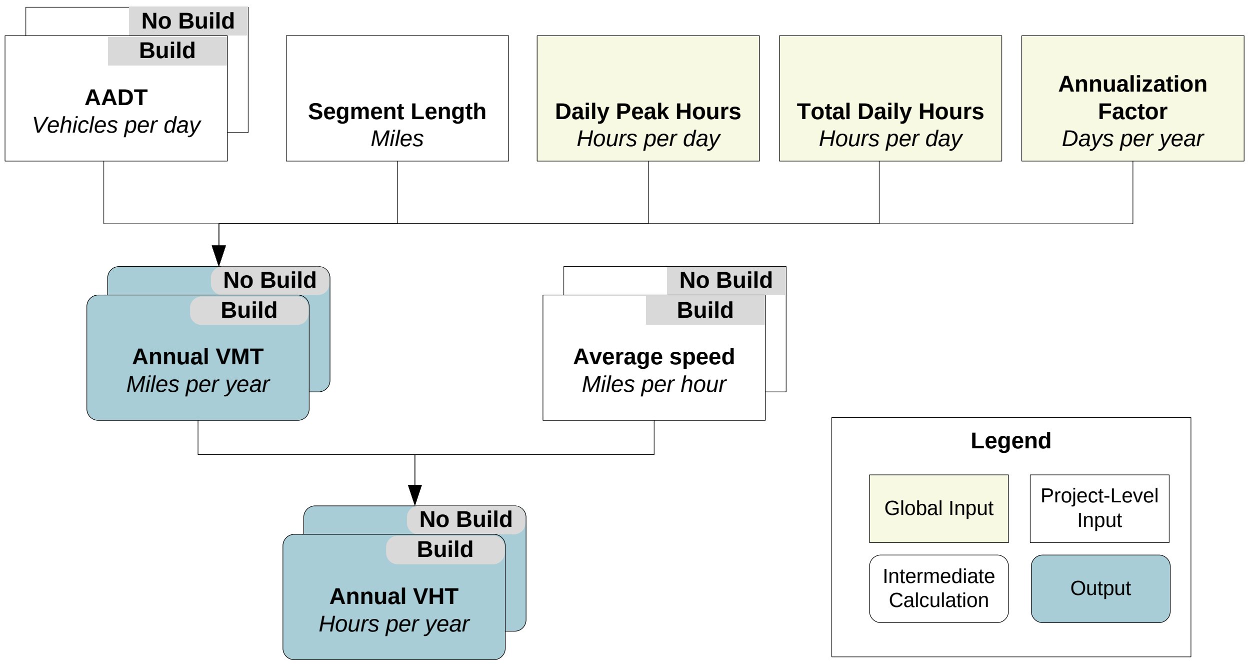
[25] The model inputs were simplified so that vehicular traffic for any particular project is categorized as either car or truck.

[26] Benefits begin to accrue only after a project has been completed and begins operations.

Annual VMT and annual VHT calculation



Annual VMT and Annual VHT Calculation

A key element in the estimation of benefits using the BCA lite methodology is the calculation of annual VMT and VHT associated to a project. In particular, the estimation of annual VMT and VHT is the first step in the calculation of benefits. The figure above provides an overview of this calculation.

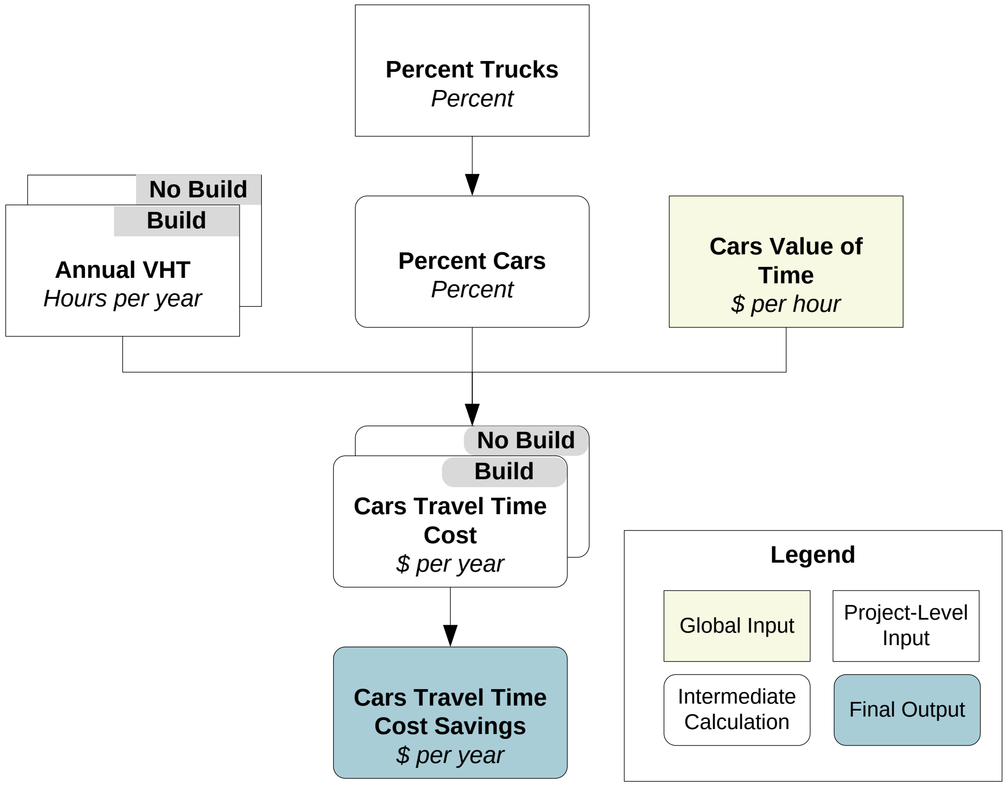
Annual VMT is based on the project-specific AADT (which is different for the Build and No-Build scenarios[27]) and segment length[28], adjusted for the number of peak hours in a day and multiplied by the annualization factor. To calculate annual VHT, annual VMT is divided by average speed (which is anticipated to be different for the Build and No-Build scenarios). The BCA lite uses a series of "global" inputs including the number of peak hours per day and the number of days in a year, that are assumed to be the same for all projects.

Travel Time Cost Savings for Cars – Annual Benefits Calculation

The annual VHT calculated in the previous step is used to calculate travel time cost savings. A brief description of the calculations is presented in below.

[27] The Build scenario considers the project under study is built and in operation; the No Build scenario considers the project is not built.
[28] Segment length is assumed to be at least one mile.

Annual benefits calculation for travel time cost savings for cars



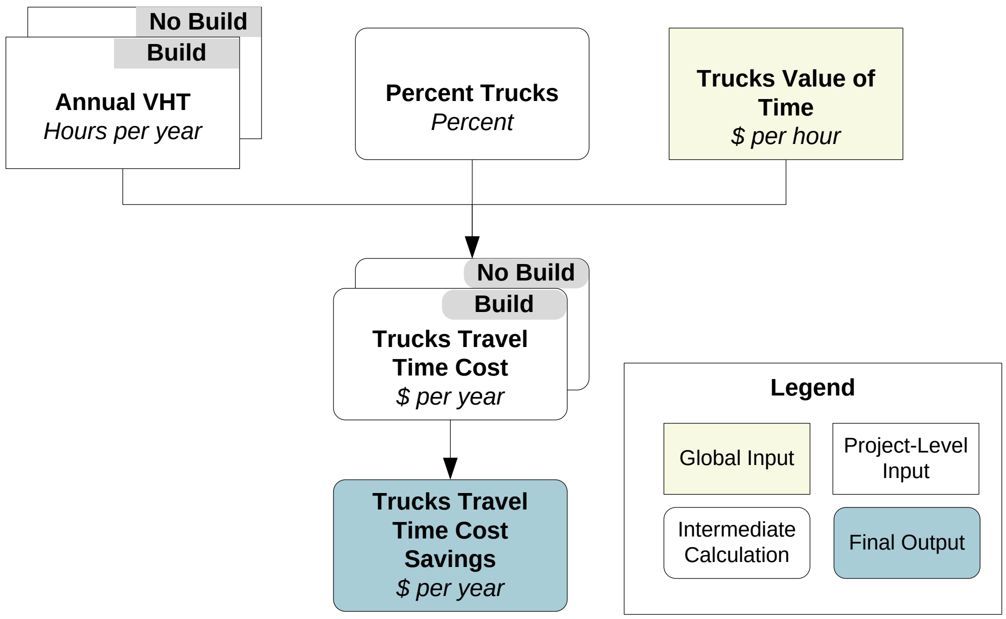
The figure above shows that travel time cost savings for cars is calculated as the difference between total travel time costs under the No Build and Build scenarios for any particular year. To calculate these costs, a "global" input corresponding to the value of time for cars[29] is multiplied by the annual VHT for cars under the Build and No Build scenarios. The share of annual VHT that corresponds to cars is calculated as the total annual VHT minus the share of annual VHT associated to trucks.[30]

Travel Time Cost Savings for Trucks – Annual Benefits Calculation

A similar methodology as the one used to calculate travel cost savings to cars was applied to calculate this benefit category for trucks. A brief summary is presented below.

[29] We use a conservative assumption that occupancy rate for both cars and trucks is one person per vehicle.
[30] The share of VHT associated to trucks in any particular year is estimated as the share of trucks in total traffic multiplied by annual VHT. For simplicity, truck and car speeds are assumed to be equal.

Annual benefits calculation for travel time cost savings for trucks



Travel time cost savings for trucks are calculated as the difference between total travel time costs in the No Build and Build scenarios for any particular year. The value of time for trucks[31] is multiplied by the annual VHT for trucks under the Build and No Build scenarios[32] to estimate the total travel costs under each situation. Annual truck VHT is calculated as the annual VHT times the share of trucks in the annual traffic for the project under analysis.

Crash Cost Savings for Cars and Trucks – Annual Benefits Calculation

To calculate the benefits from reduced crash rates due to a project, the BCA analysis team estimated crash rates for the Build and No Build scenarios for each project analyzed. These estimates are based on 5-year crash numbers categorized by severity of the crash and divided by the number of years and by VMT.

The figure below shows that for each crash category the crash rate is multiplied by VMT and the corresponding crash cost[33] to estimate the total crash cost under the Build and No Build scenarios. The difference in total crash costs (for all crash categories) between the No Build and Build scenarios corresponds to the crash savings. In order to allocate the benefits between cars and trucks, the percent of trucks and cars in the overall traffic for each project is used to split the total crash benefits.

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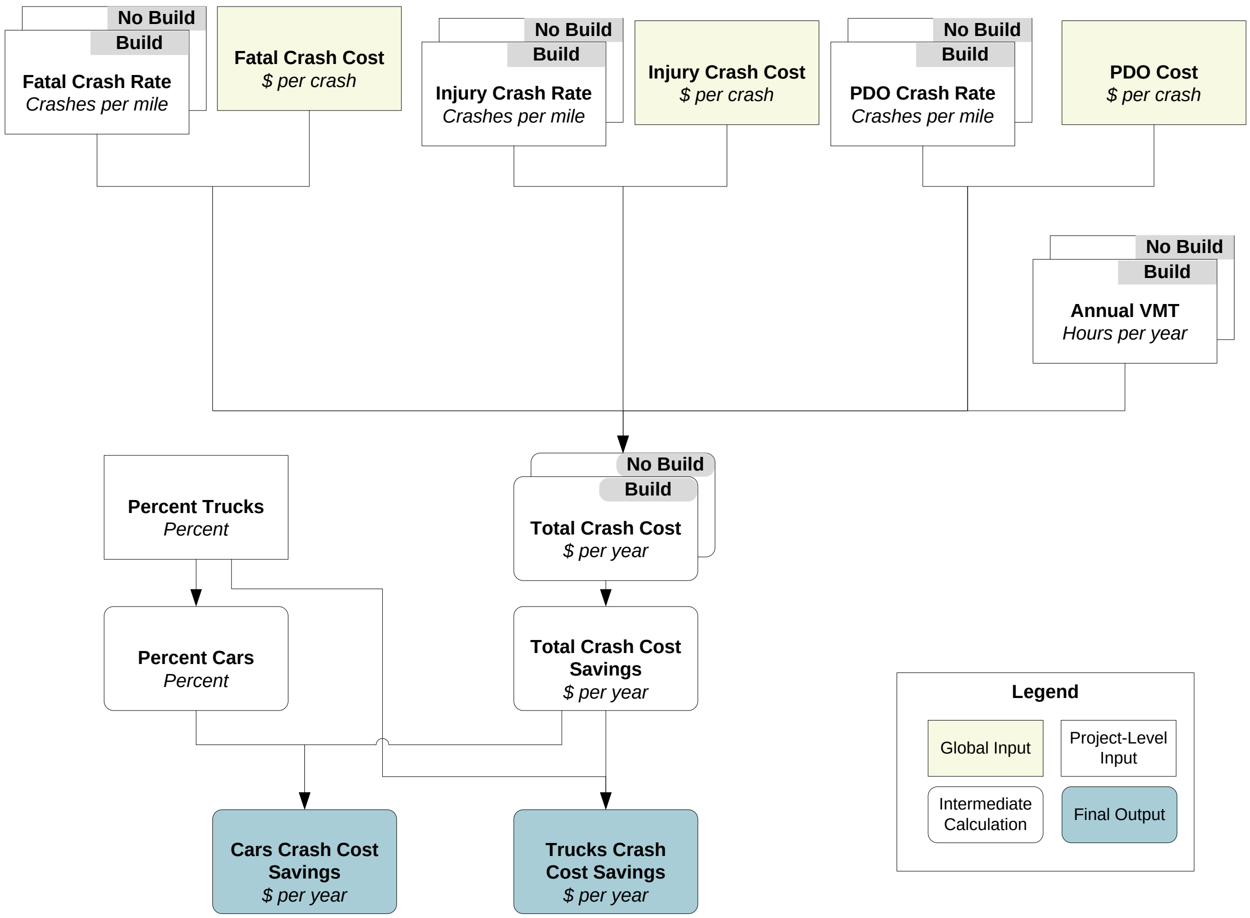
[31] Again, the simplifying assumption of one person per vehicle was used in this benefit type.

[32] For this calculation, truck and car speeds are assumed to be equal.

[33] The crash cost is expressed in a per crash basis. In other words, the methodology used implies that one person dies in a fatal crash, one person is injured in an injury crash, and one vehicle is damaged in a PDO crash.

Annual benefits calculation for crash cost savings for cars and trucks



Total Annual Benefits Calculation

Total benefits are calculated by summing up travel time cost savings for cars and trucks and crash cost savings for cars and trucks.

Total Benefits Calculation

The BCA lite methodology assumes that the full amount of the annual benefits generated by a project will be available the year after the construction is complete. Therefore, total benefits are estimated as the sum of all discounted benefits over the analysis period (30 years of operation of a project). A discount rate of 7 percent is used to put more weight on benefits that can be enjoyed in the earlier years and less weight on benefits created towards the end of the period of analysis. The BCA lite methodology assumed that all projects under analysis are completed by the end of 2018, so that the benefits start in 2019 and continue through the end of 2048.

Cost Calculation

Total cost for each project is comprised of capital cost and O&M cost (estimated using a per-mile approach). The capital portion of the cost is incurred in 2018 for all projects. Starting in 2019 (after a project is completed) $25,000 per mile per year are included as operation and maintenance cost for each project. Just like in the case of the benefits, all costs are also discounted using the discounting rate of 7 percent per year.

"Global" Inputs and Assumptions

The table below presents the main "global" inputs and assumptions used in the model.

Model inputs and assumptions

Description	Unit	Value[34]	Source
Beginning of Analysis	Year	2016	HDR Assumption
Benefit Years After Completion	Years	30	HDR Assumption
Discounting Rate	Percent per year	7%	HDR Assumption
Construction Start Year	Year	2018	HDR Assumption
Years of Construction	Years	1	HDR Assumption
Peak hours	Hours per day	4	HDR Assumption
Hours in a day	Hours per day	24	HDR Assumption
Annualization Factor	Days per year	260	HDR Assumption
Crash Data Years	Years	5	HDR Assumption
Annual O&M Cost per mile	$ per mile per year	$25,000	HDR Assumption
Vehicle Occupancy	Persons per vehicle	1	HDR Assumption
Value of Time (Cars)	$ per hour	$13.60	TIGER BCA Guidance
Value of Time (Trucks)	$ per hour	$26.98	TIGER BCA Guidance
Cost of Fatality Crash	$ per fatality	$9,600,000	TIGER BCA Guidance
Cost of Injury Crash	$ per injury	$110,081	TIGER BCA Guidance
Cost of PDO Crash	$ per vehicle	$4,198	TIGER BCA Guidance

[34] Dollar values are in 2016 dollars.