Arizona State Freight Plan

(ADOT MPD 085-14)

Prepared for:

Arizona Department of Transportation

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Arizona Rural Transportation Summit

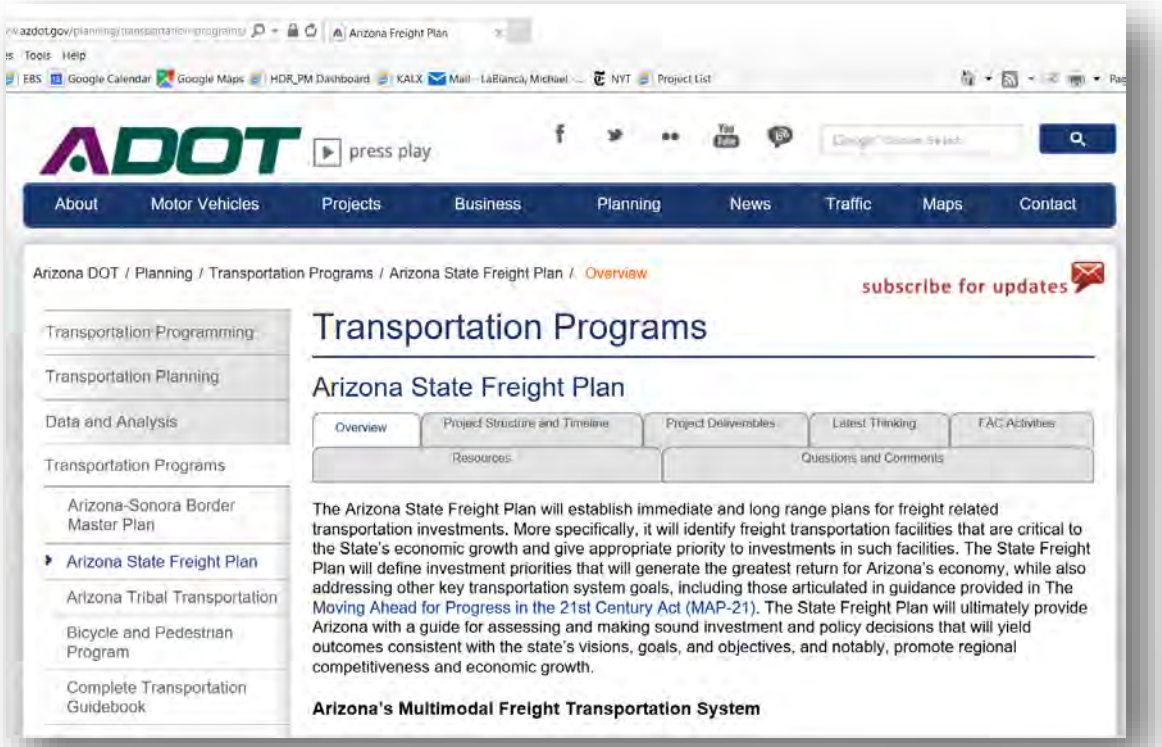
Arizona Freight Plan

January 19, 2017

HDR

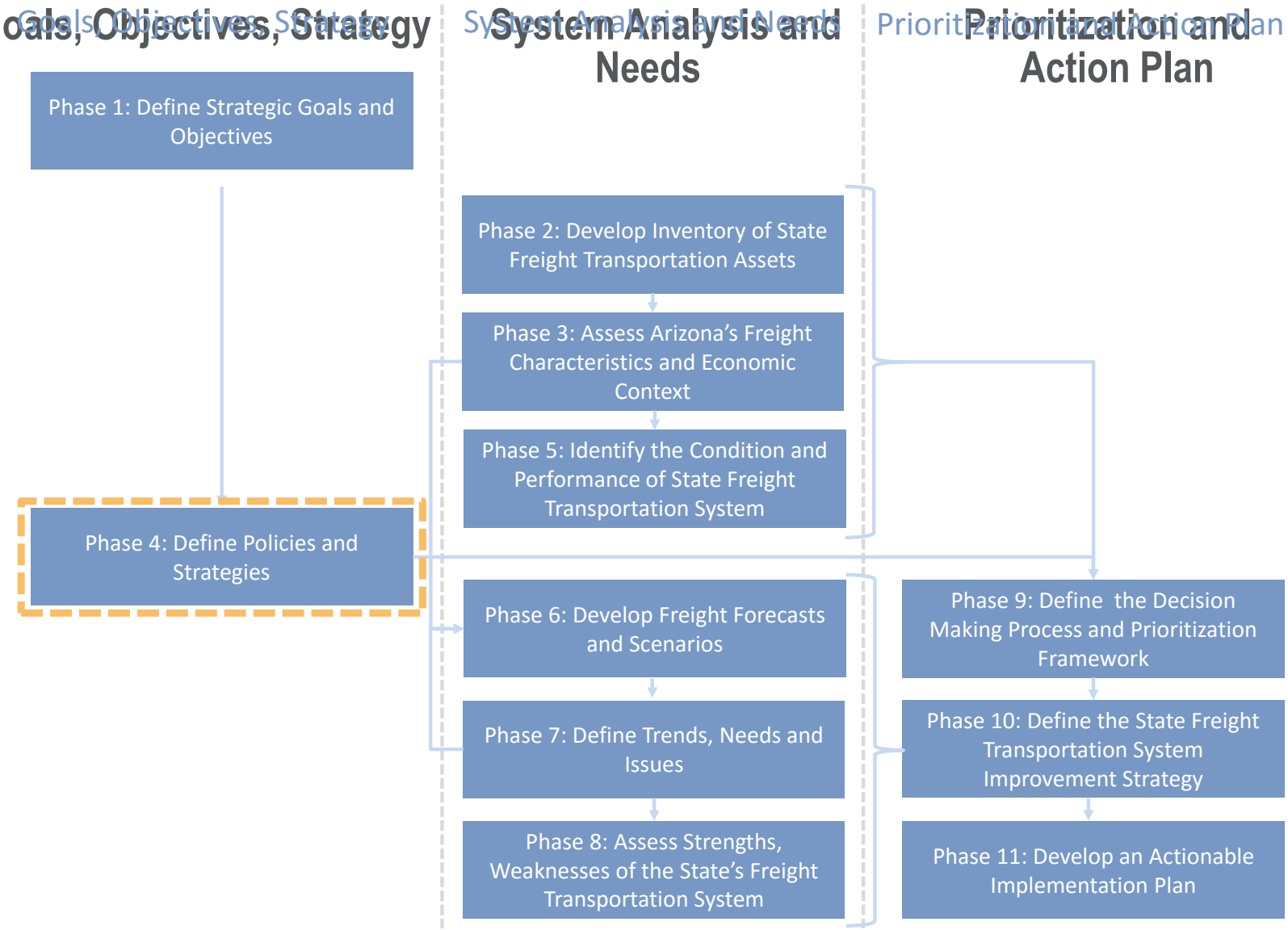
Overview

- The Planning Process
  - Vision and goals
  - Inventory and Assessment
  - Freight Sectors
  - Scenarios
  - Performance
  - Prioritization
  - Strategy



http://www.azdot.gov/freight

Stepped Approach to the Project



Freight Plan Vision

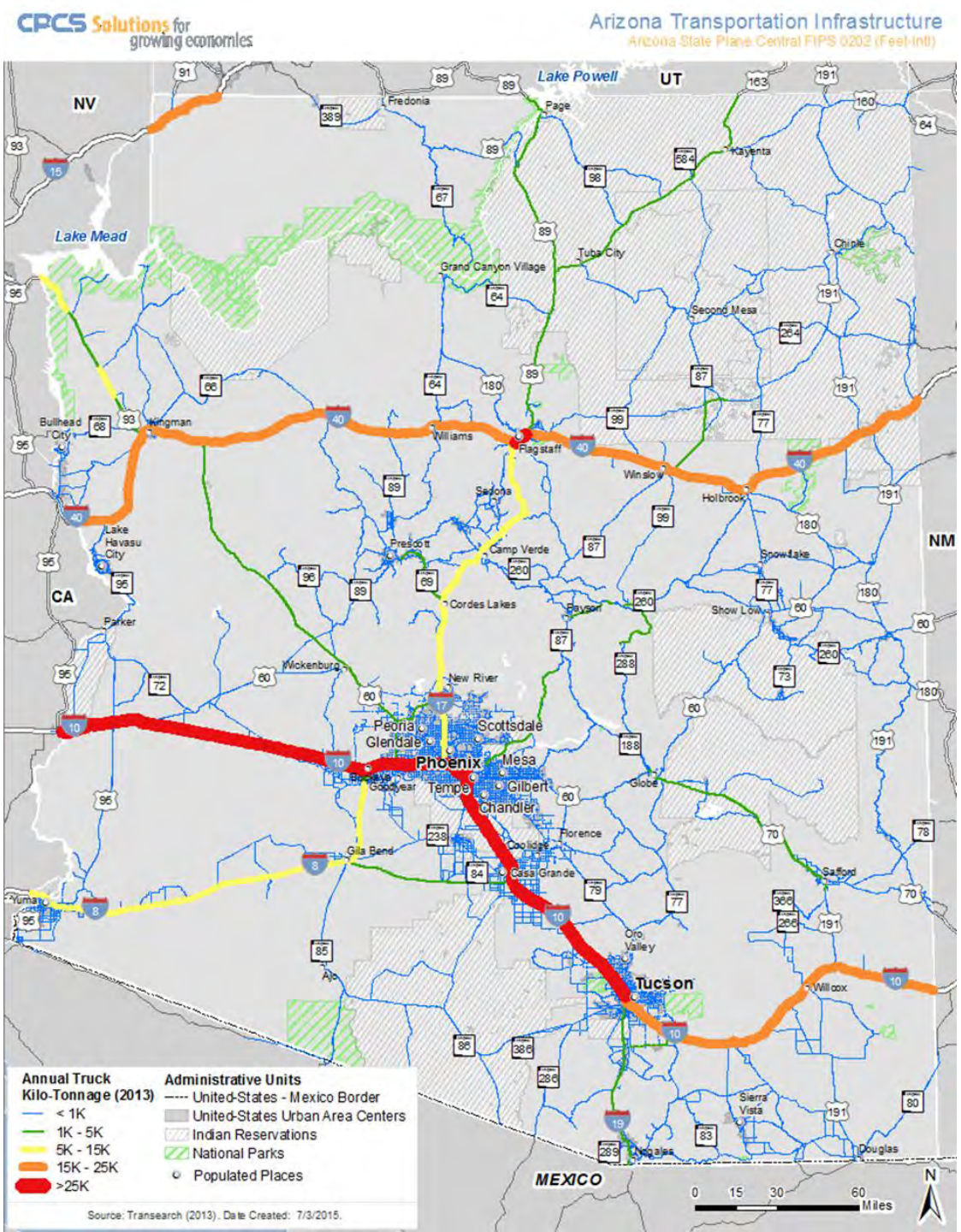
Arizona's freight transportation system enhances economic competitiveness and quality growth

Six strategies

Developed from policy to achieve goals and objectives of the freight plan

Inventory and Assessment

Highway Freight Volume



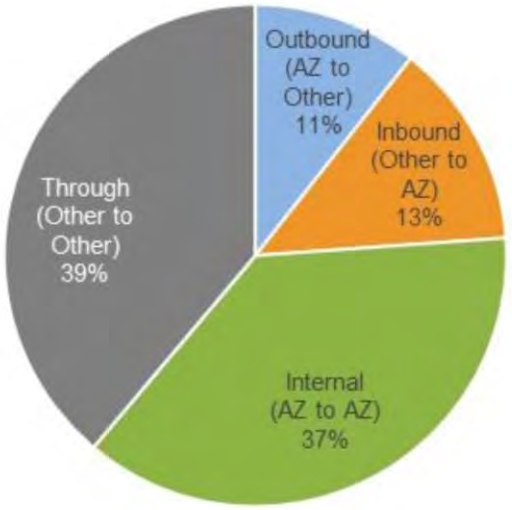
PHASE 2

Inventory and Assessment

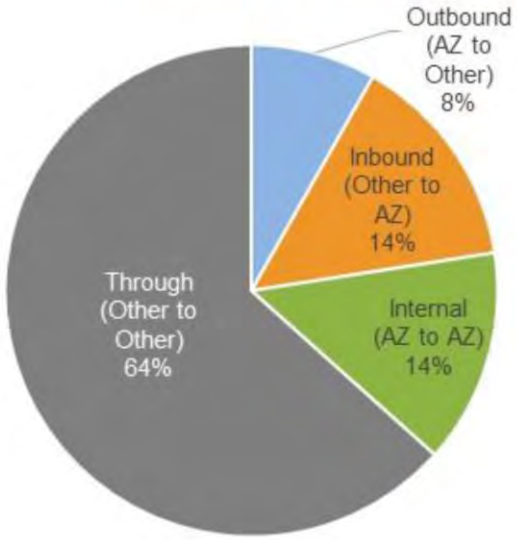
Annual Freight Flow by Volume and Value

Category	Outbound (AZ to Other)	Inbound (Other to AZ)	Internal (AZ to AZ)	Through (Other to Other)	Total
Tonnage (000's)	25,600	32,000	89,900	93,700	241,200
Value (Million $)	39,977	69,522	68,495	307,979	485,973

Annual Freight Flow by Tonnage



Annual Freight Flow by Value ($)



Source: Transearch (2013)

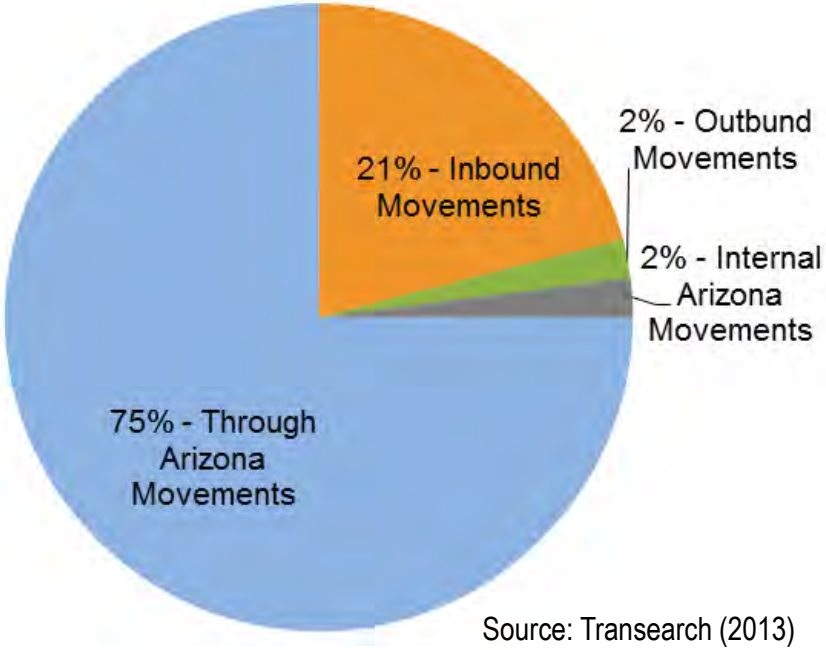
PHASE 2

Inventory and Assessment

Rail Freight

- At-grade crossings and the border crossing at Nogales were cited as other bottlenecks in the rail system
- Annual carloads for short line railroads are approximately 105,000 compared with the Class I railroads' total of 461,400 annual carloads

Majority through traffic



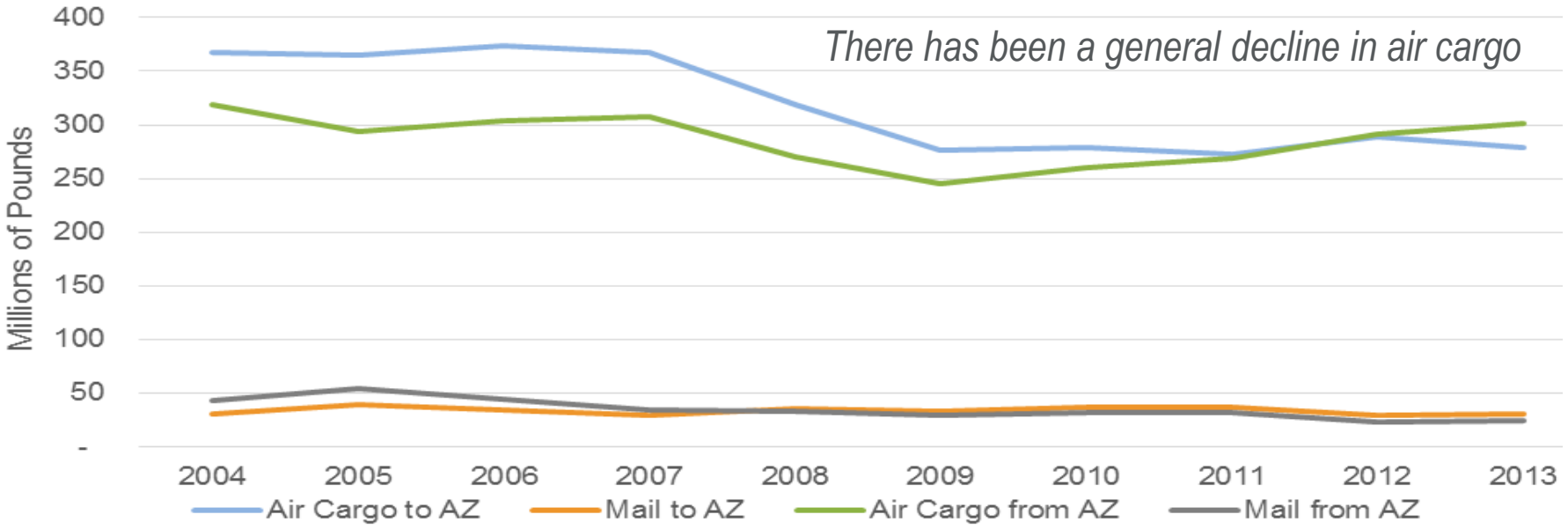
Source: Transearch (2013)

PHASE 2

Inventory and Assessment

Air Freight

- Phoenix Sky Harbor moves nearly 90 percent of all air cargo
- Tucson International Airport (TUS) handles nearly ten percent of the state's air cargo
- Estimates suggest no new on-airport cargo infrastructure will be needed until 2031
- Highway access to air cargo facilities at PHX will need to be addressed



P H A S E 2

Inventory and Assessment

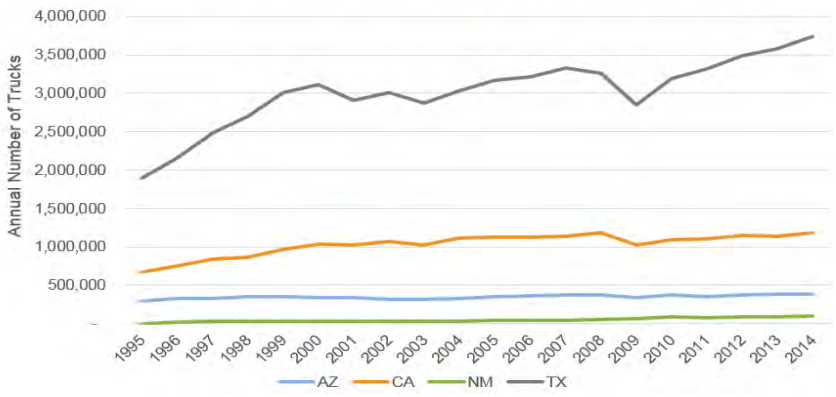
Border Crossings

- Over 85 percent of all exports and imports use Nogales
- All rail traffic uses Nogales
- Congestion due to limited Port of Entry capacity

Declining truck market share

- Increase in absolute number of trucks
- Decline in market share 1995-2014

Figure 43: Number of Northbound Trucks Crossing the U.S.-Mexico Border, by State



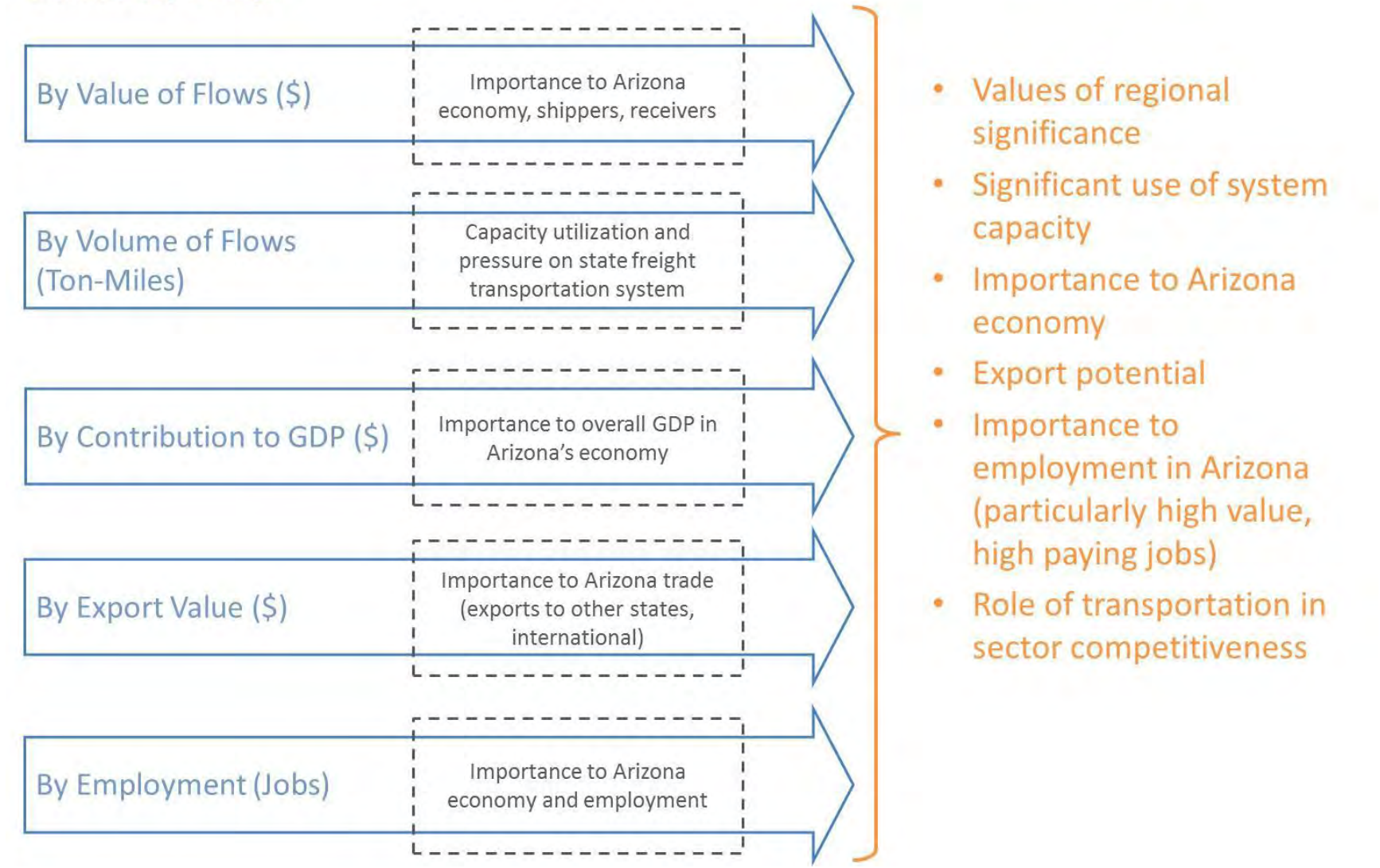
Increasing rail market share

- Increase in absolute number of trains
- Increase in market share 1995-2014

Figure 44: Number of Northbound Trains Crossing the U.S.-Mexico Border, by State

PHASE 2

Arizona's Top Freight Sectors



Arizona's Top Freight Sectors

Over $188 billion in freight flows are generated by Arizona's top 10 freight sectors

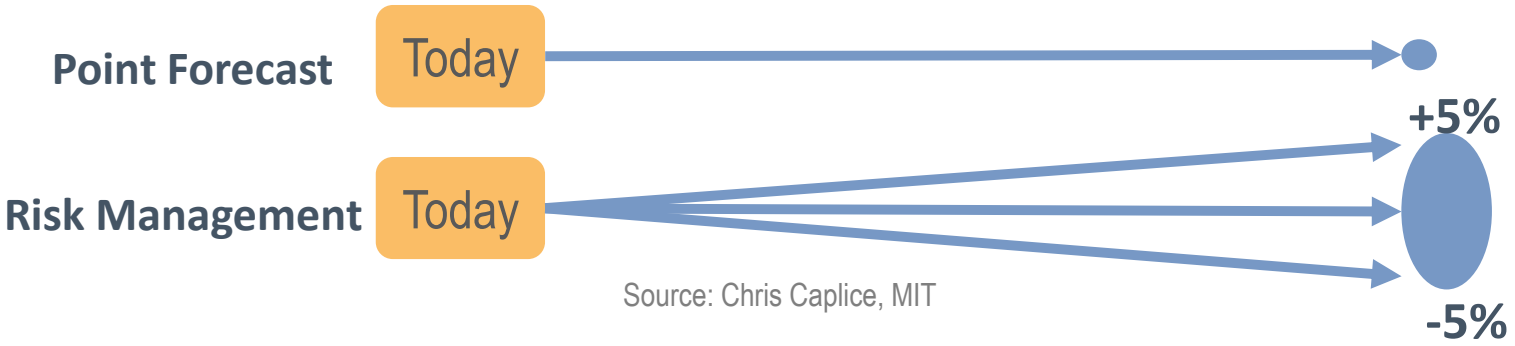
1. Wholesale and Retailers
2. Food and Beverage
3. High-Tech Manufacturing
4. General Manufacturing
5. Transportation Equipment Manufacturing (incl. aerospace)
6. Transportation and Logistics
7. Mining (except oil and gas)*
8. Energy (oil and gas)*
9. Agriculture*
10. Forestry*

*Also included are the focus sectors identified in MAP-21 and FHWA Guidance

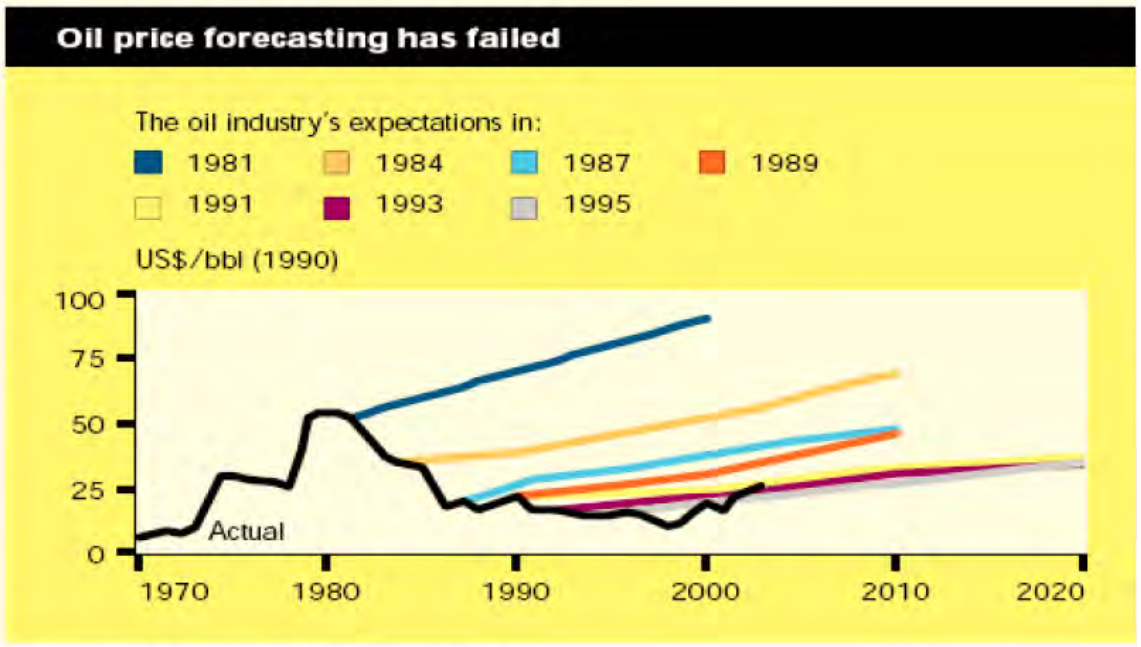
PHASE 3

Scenario Planning

Point forecasts are always wrong, and on their own an inadequate tool to plan for the future.



Source: Chris Caplice, MIT



Source: Scenarios: An Explorer's Guide, Shell International 2003.

Scenario Planning

Key lessons from TRB's NCHRP 750 project:

- Preparing for potential effects is more effective than predicting

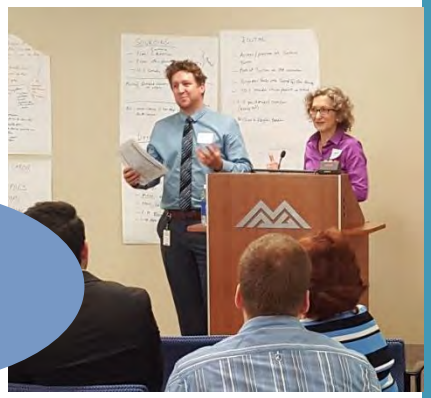
Backcasting to the Present

Today

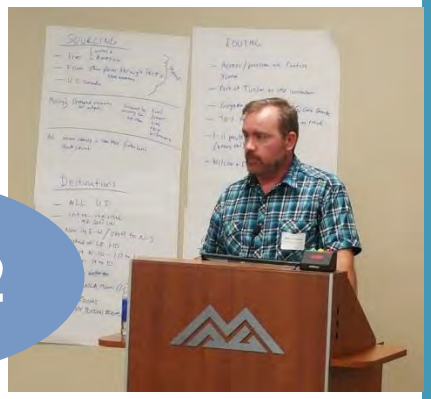
What future(s) should we be preparing for?

Source: Chris Caplice, MIT

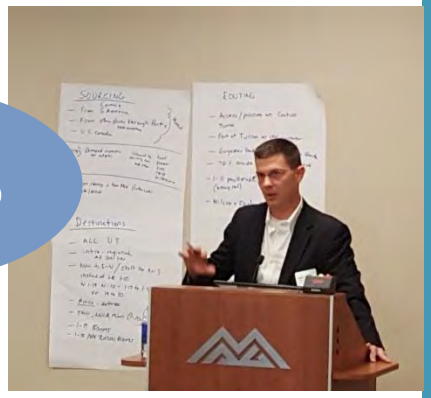
Future 1



Future 2



Future 3



PHASE 6 & 7

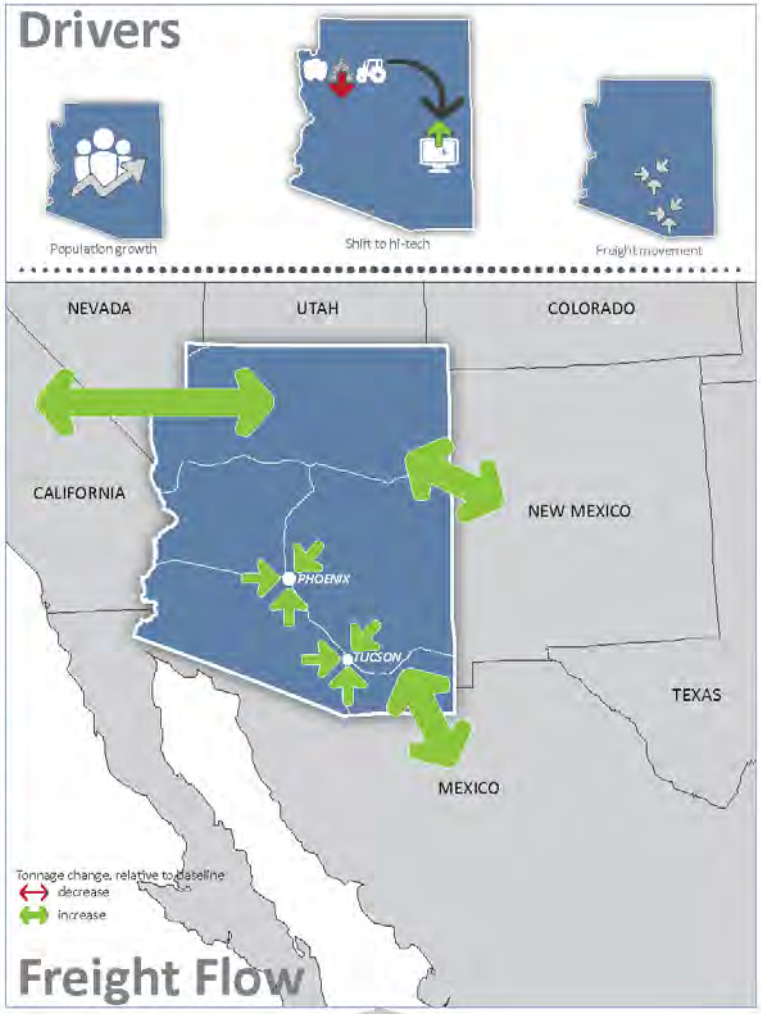
Scenario 2: *#urbanizona*

MAIN SCENARIO EVENT

Level of Impact Event	Main Scenario Event
High (quantified)	Increase in the populations of Phoenix and Tucson
	Growing disparity between urban vs. suburban/rural dwellers
Medium (quantified)	Arizona is growing in terms of GDP and exports; however, much of what is currently shipped has been replaced by new technologies, e.g., 3D printing
	Arizona manufacturing is shifting from raw resources and agriculture to more high-tech products.
Low (not quantified)	Freight modal split
	Full impacts from new technologies

FREIGHT IMPACT DRIVERS

Sector Group	Driver	
Consumer Goods	Arizona urban population	↑
	Mexican day workers	↑
	Arizona GDP	↑
	Light weight products	↓
	Living space	↓
Manufacturing	Arizona urban population	↑
	Arizona GDP	↑
	Lightweight products	↓
	Living space	↓
Natural Resources	Arizona urban population	↑
	Local manufacturing	↑
	Arizona GDP	↑
	Light weight products	↓
	Living space	↓
Transportation and Logistics	Arizona urban population	↑
	Arizona GDP	↑
	Light weight products	↓
	Cost of freight goods increase due to difficulty of delivering in urban core	↓
Other	No change from baseline	–



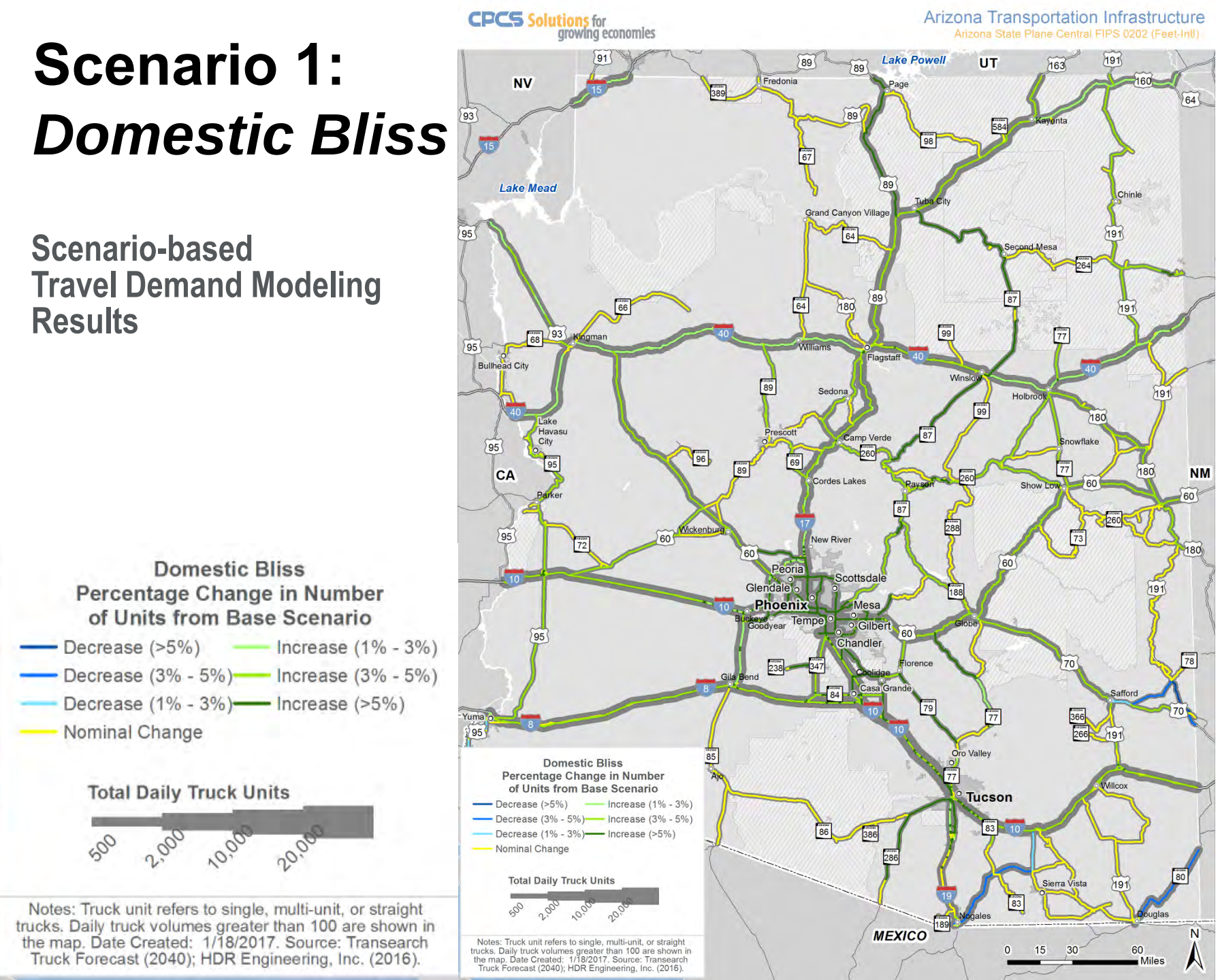
FREIGHT IMPACT BY INDUSTRY

Sector Group									
Consumer Goods		Manufacturing	Natural Resources				Transportation		Other
Food/Beverage	General	High-Tech	Agriculture	Forestry	Mining	Energy	Equipment	Logistics	
↑	↑	–	↑	↑	↑	↑	–	–	–

PHASE 6 & 7

Scenario 1: *Domestic Bliss*

Scenario-based Travel Demand Modeling Results



Domestic Bliss
Percentage Change in Number of Units from Base Scenario
Decrease (>5%)
Decrease (3% - 5%)
Decrease (1% - 3%)
Nominal Change
Increase (1% - 3%)
Increase (3% - 5%)
Increase (>5%)
Total Daily Truck Units
500
2,000
10,000
20,000
Notes: Truck unit refers to single, multi-unit, or straight trucks. Daily truck volumes greater than 100 are shown in the map. Date Created: 1/18/2017. Source: Transearch Truck Forecast (2040); HDR Engineering, Inc. (2016).

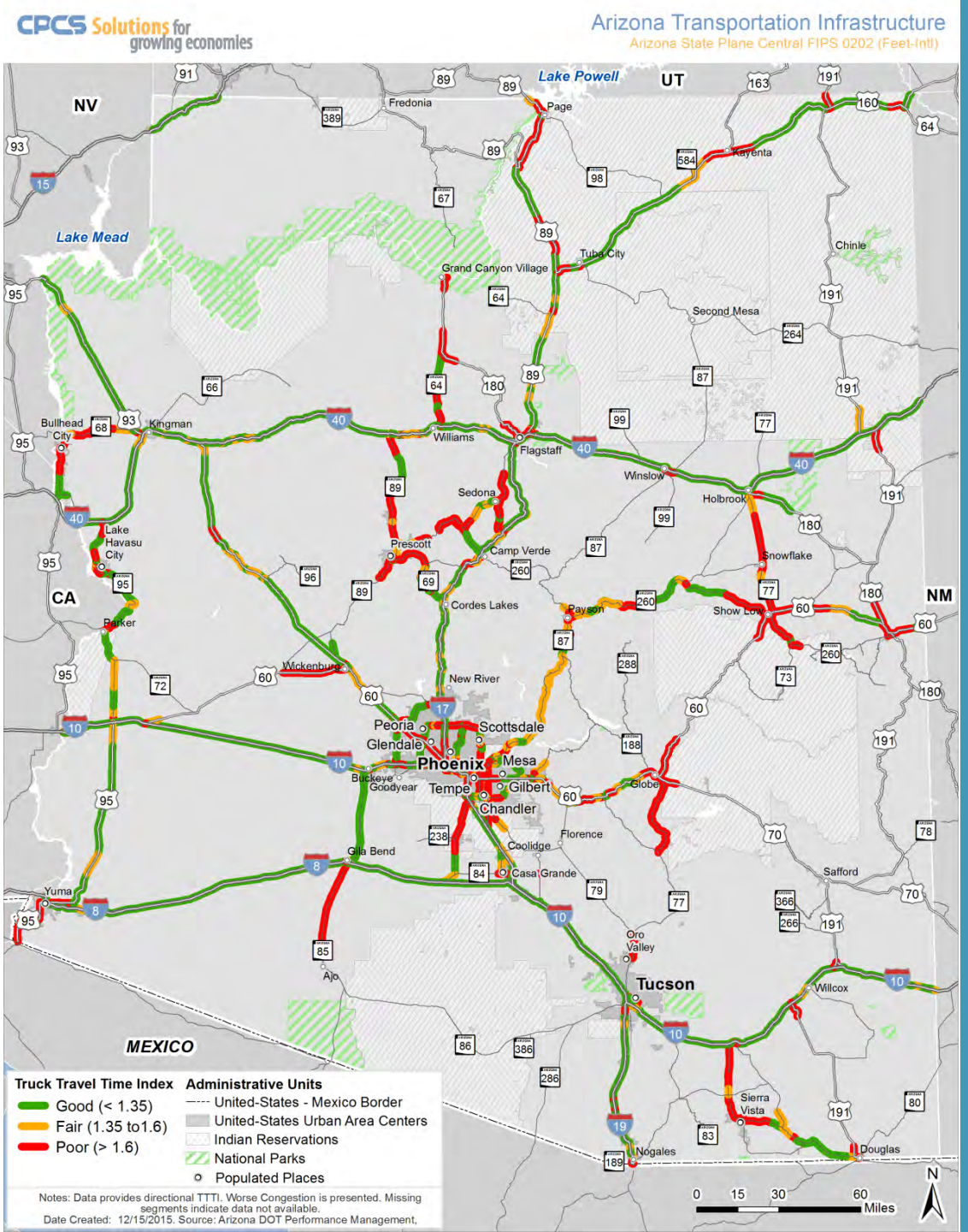
PHASE 6 & 7

Performance

Truck Travel Time Index (TTTI)

Does the Issue Hinder Mobility?

- measures recurring delay, primarily due to peak period congestion
- TTTI evaluates the difference in travel time between 'free flow' and congested flow conditions



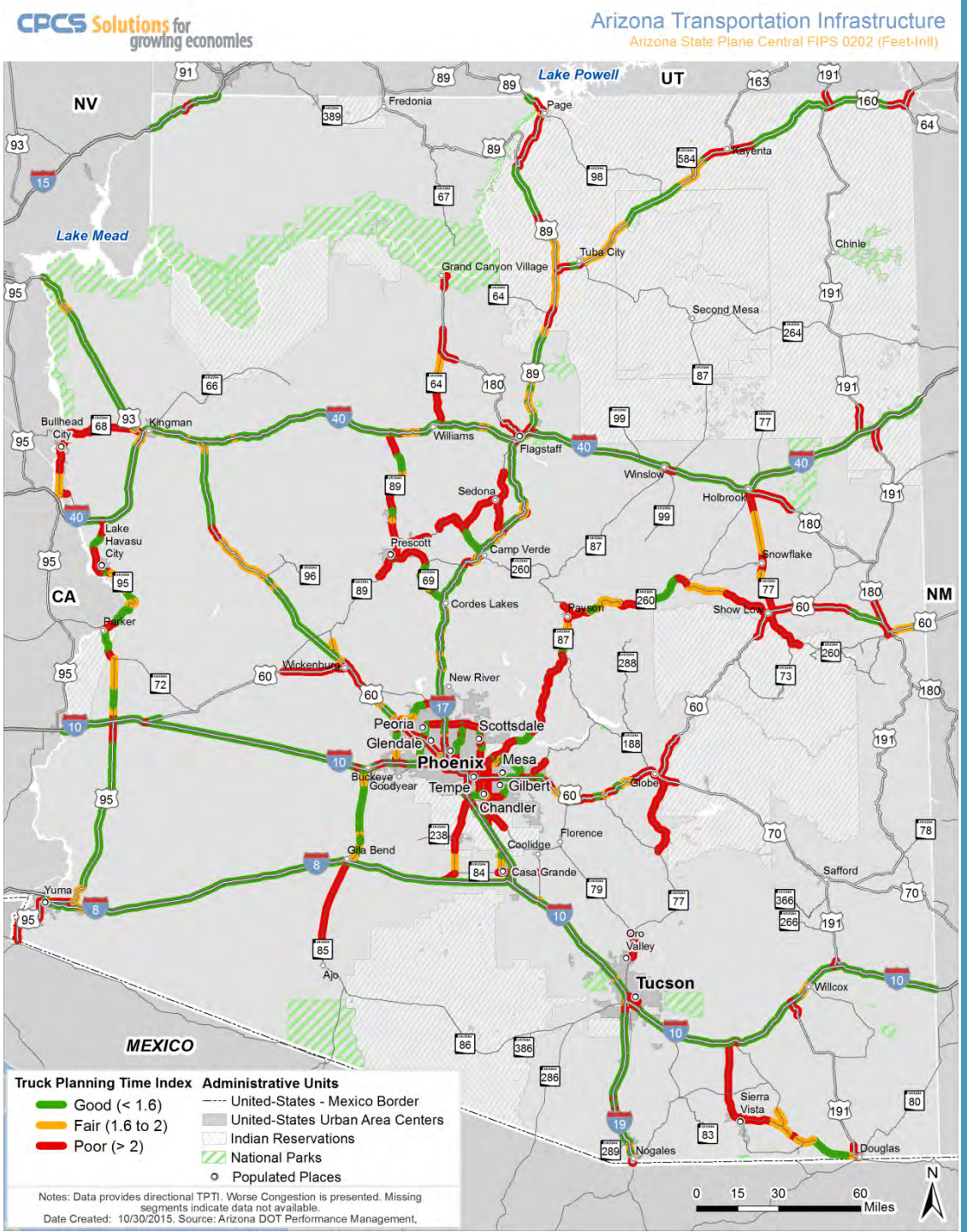
PHASE 5

Performance

Truck Planning Time Index (TPTI)

Does the Issue Hinder Freight Transportation System Reliability?

- TPTI measures non-recurring delay which refers to unexpected delay caused by closures or restrictions resulting from crashes, inclement weather, and construction activities



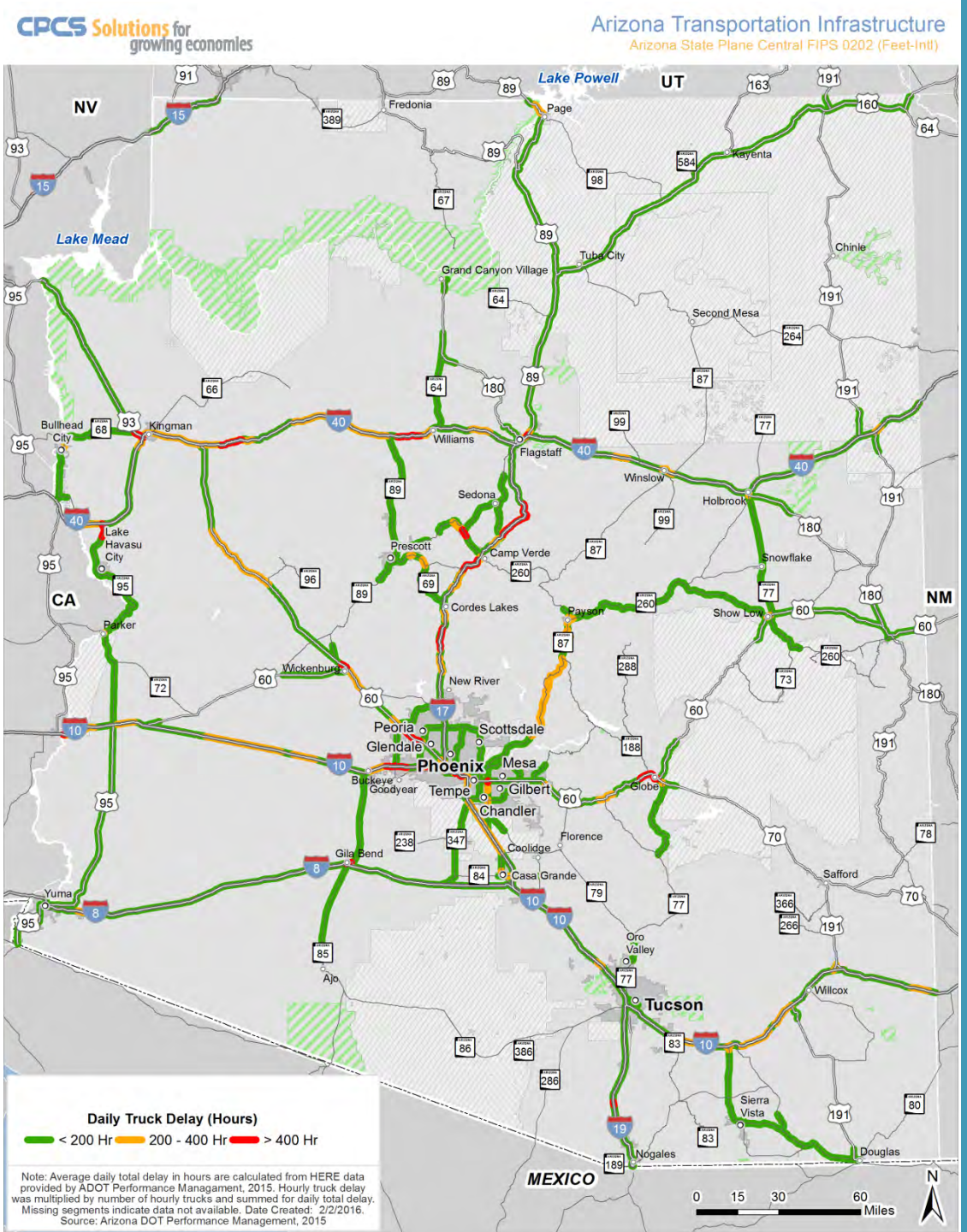
PHASE 5

Performance

Daily Truck Delay (hours)

Does the Issue Increase Transportation Costs of Freight Transportation?

- Cost was defined using hours of truck delay, which directly affects truck efficiency, reliability and ultimately cost



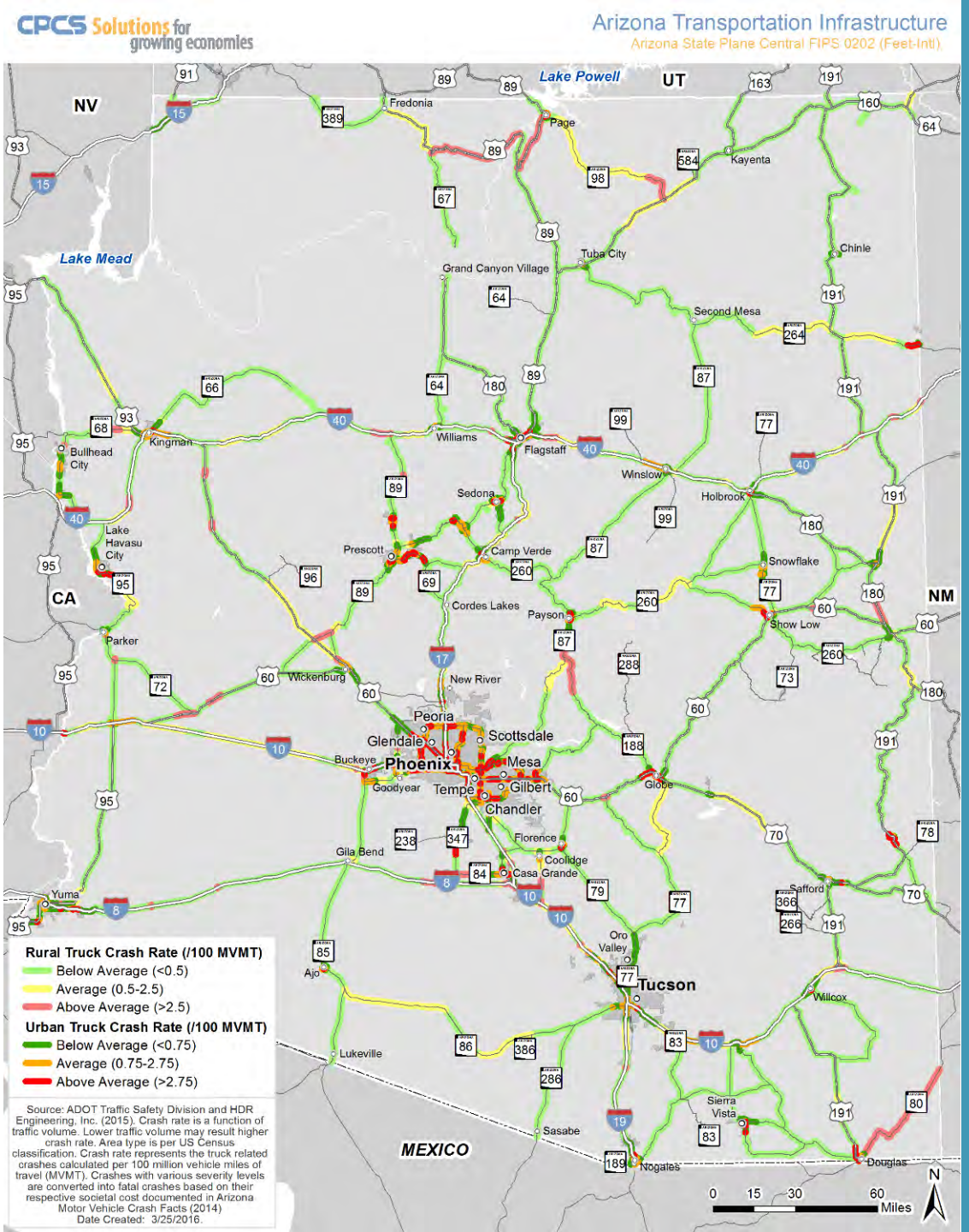
PHASE 5

Performance

Truck Crash Rate (/100MVMT)

Does the Issue Affect Transportation System Safety?

- Safety was defined using the number of crashes involving trucks per 100 million vehicle miles travelled (VMT) and their total societal cost



PHASE 5

A Long List of Issues… and then Projects

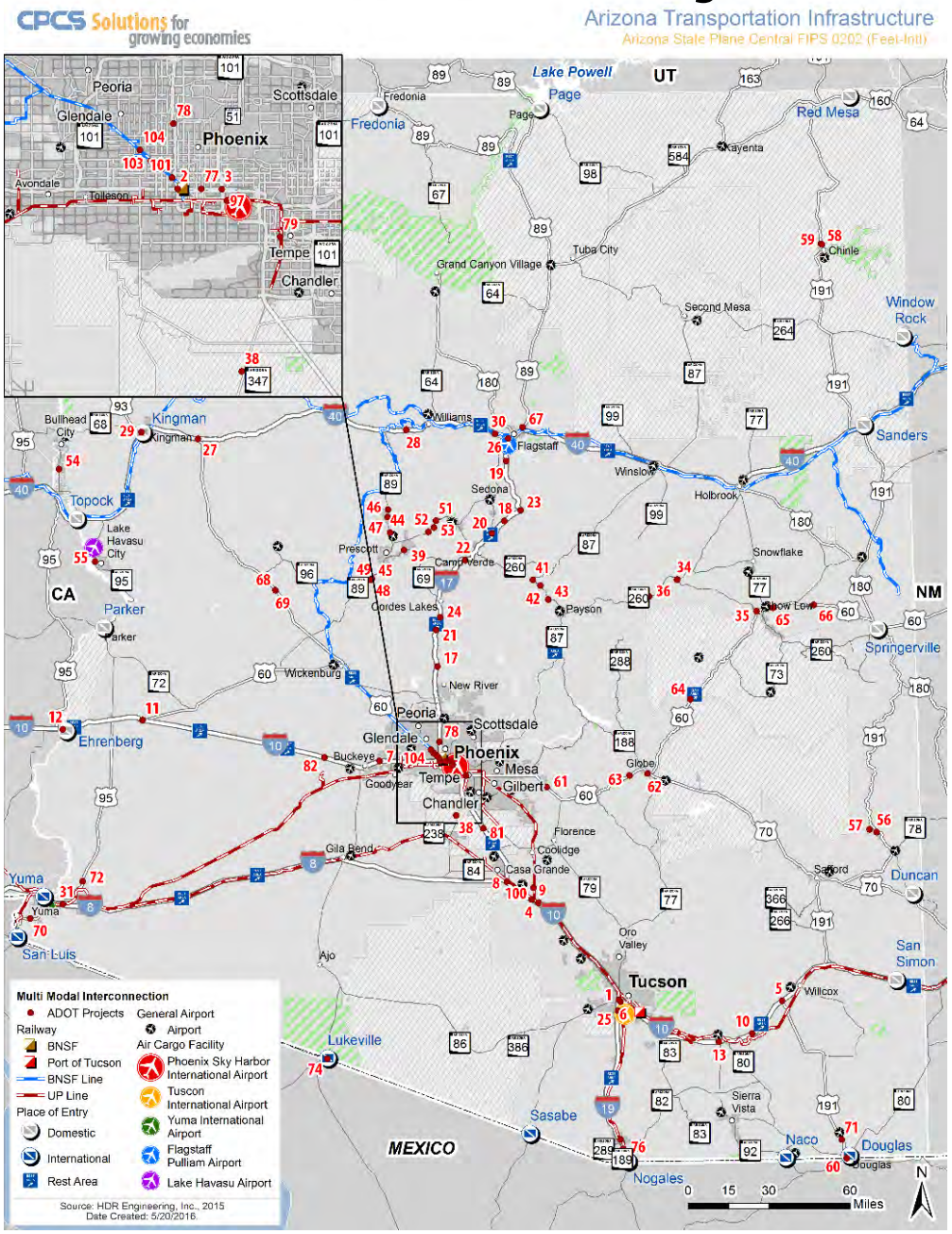
Freight Issues v. Projects – Screen issues then explore potential solutions

Freight Issues

- Issues are impediments to freight movement with many potential solutions
- 104 total issues
- Mapped (where possible)
- Starting point for screening

Freight Projects

- Projects are a specific approach to mitigating a freight issue



Strategic Framework for Decision Making Process, Prioritization

Long list of issues within ADOT's jurisdiction

Step 1 - Strategic Filter:

Qualitative assessment of issues against merit-based considerations

Short list of "strategic" issues

Step 2: Weighted Prioritization:

Quantitative assessment of priorities

Priority projects

PHASE 9

Step 1: Applying the Strategic Filter

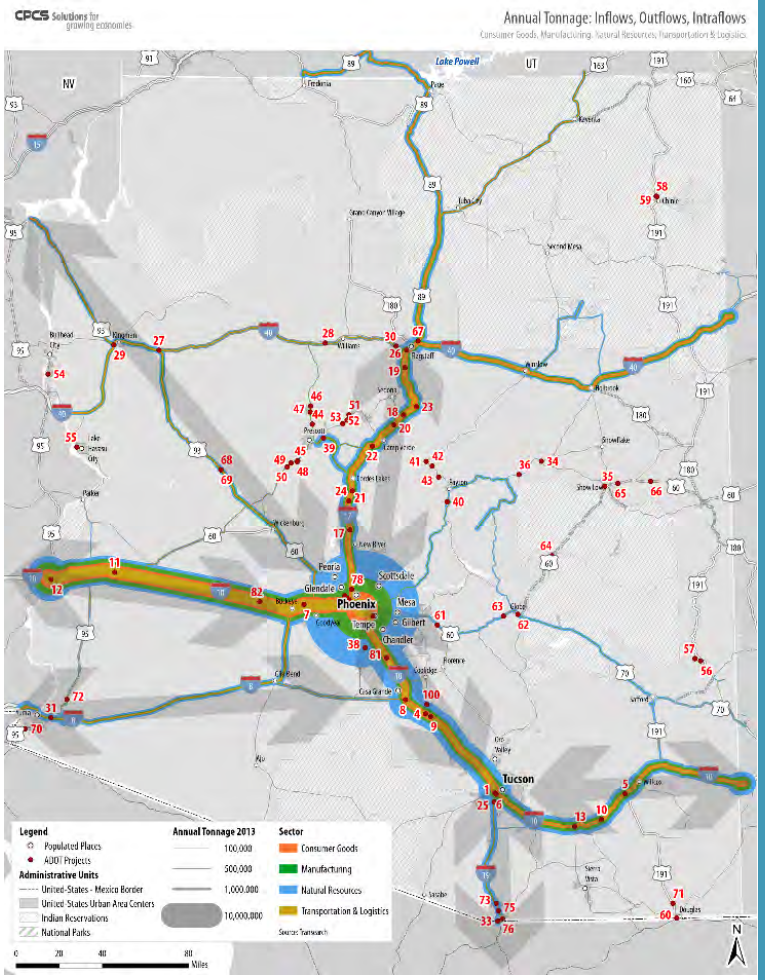
Merit-based considerations tied to goals, objectives, strategies
Simple Yes/No approach to assessing merit-based considerations

Goal 1 - Enhance Economic Competitiveness

- Is the issue on a Key Commerce Corridor (KCC)?
- Are the flows significant?
- Is the issue an impediment to trade?

Goal 2 – Increase System Performance

- Does the issue improve mobility?
- Does the issue increase reliability?
- Does the issue improve safety?
- Does the issue reduce transportation costs?
- Is the issue in a nonattainment or maintenance area?

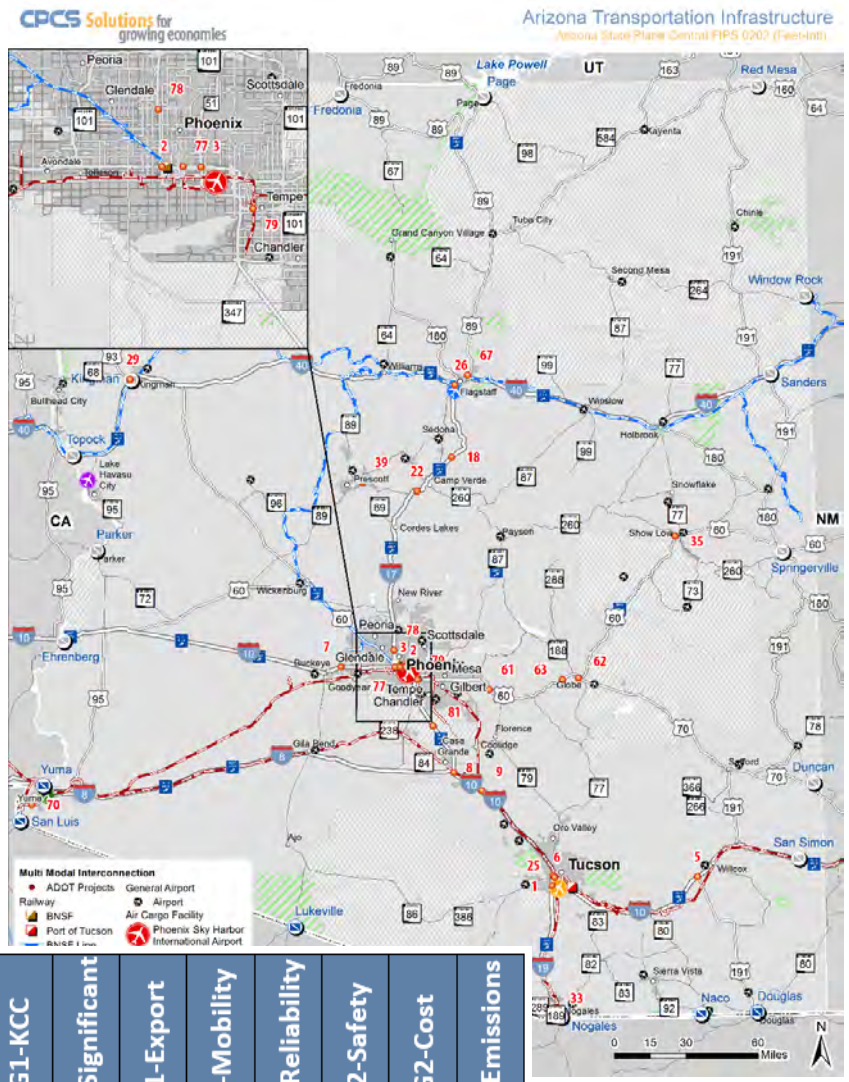


The Short List

Strategic filter results

30 total issues

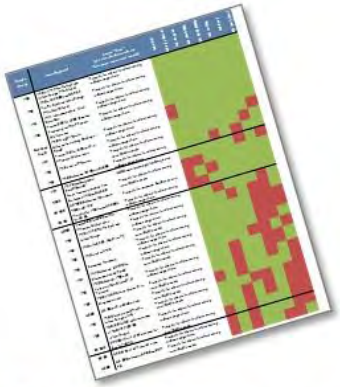
- Most issues had five “yes” values
- About 60% of issues relate to urban congestion
- About 1/3 of issues related to rural bottlenecks (most are direct ADOT jurisdiction)
- Balance are inadequate passing / climbing lanes and border access



Ref	Route (Area)	Issue Segment	Issues “Type” (per classification in Figure 2-2)	G1-KCC	G1-Significant	G1-Export	G2-Mobility	G2-Reliability	G2-Safety	G2-Cost	G2-Emissions
1	I-10	I-10 at I-19 Traffic System Interchange	Projects to alleviate re-occurring urban congestion								
2	I-10	I-10 at I-17 Traffic System Interchange (The Stack)	Projects to alleviate re-occurring urban congestion								
3	I-10	I-10 at SR 202L and SR 51 Traffic System Interchange (The Mini-Stack)	Projects to alleviate re-occurring urban congestion								

Step 2 Weighted Prioritization:

Quantitative Assessment



Shortlist of the 30 most strategic issues (per Step 1)

Step 2: Weighted Prioritization: Quantitative assessment of priorities

Prioritization of strategic *issues* against Goal 1 and Goal 2 criteria and associated weights

Put forward potential projects to address each priority strategic freight issue

Prioritization of *potential projects* against Goal 3 criteria and associated weights

Priority projects

Step 2: Quantitative Assessment

Issues and projects are evaluated against multiple criteria, corresponding to the goals and objectives of the Freight Plan.

- 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?
Are the Flows Impacted by the Issue Significant?
Do Future Scenarios Aggravate this Significance?
Is the Issue an Impediment to Trade?
Goal 2 - Increase System Performance
Does the Issue Hinder Mobility?
Does the Issue Hinder Freight Transportation System Reliability?
Does the Issue Increase Transportation Costs of Freight Transportation?
Does the Issue Affect Transportation System Safety?
Does the Issue Result in Negative Social/Environmental Impacts?

- Goal 3 Merit-Based Considerations to Identify Priority Projects

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

Top 20 Freight Projects

Route	Prioritization Rank / Issue Segment	Project Option(s)	Project Cost $ million
I-10	1. I-10 between SR 85 and L303	General Purpose Lane	61.3
I-10	2. From SR 202L to East of SR 387	I-10 GRIC Widening	189.0
I-10	3. I-10 at I-19 Traffic System Interchange	System Interchange Improvements	83.0
I-10	4. I-10 east of I-19	Tucson Area I-10 Widening Project	1,860.0
I-10	5. I-10 at US 191 (Cochise TI)	System Interchange Improvements (interim)	1.5
I-10	6. I-10 east of Phoenix	Picacho Area Roadway Widening	85.0
I-10	7. I-10 Mainline and Traffic Interchange at I-8	Widening and TI Improvements	40.0
I-19	8. I-19 between I-10 and Valencia Road	Widening and TI Improvements	625.0
US 89	9. US 89 Within Flagstaff, north of I-40	System Interchange Improvements	29.0
SR 69	10. SR 69, East of Prescott area	ITS Improvements	3.3
I-40	11. I-40 at US 93 Junction within Kingman area	System Interchange Improvements	86.5
I-10	12. I-10 at US 191 (Cochise TI)	System Interchange Improvements (and RR)	15.0
I-40	13. I-40 (system ramp at I-40/I-17/SR 89	System Interchange Improvements	82.0
US 60	14. US 60 within Globe area	Globe Area Freight Improvements	6.8
SR 189	15. SR-189 between Mariposa POE and I-19	Traffic Flow Improvements (interim)	70.0
SR 189	16. SR-189 between Mariposa POE and I-19	Traffic Flow Improvements (ultimate)	161.0
I-17	17. I-17 between AZ 179 to Stoneman Lake Road	Climbing Lane and ITS Improvements	23.1
SR 260	18. SR 260, West of Show Low to East of SR 73	Intersection Improvements	8.0
US 60	19. US 60 between SR 88 and SR 79	Access Controlled Freeway Extension	245.0
US 60	20. US 60 Passing Lane: Westbound	Passing Lane	5.1

Arizona freight improvement strategy

Strategic considerations:

- Align strategy with goals and objectives of Freight Plan
  - Strategy must also be FAST Act compliant
- Recognize and work within fiscal reality
  - $3.6 billion: Estimated cost of top 20 identified priority projects (excluding the priorities currently under study within MAG region)
- FAST Act freight funds have many potential uses
  - $117 million AZ apportioned funds not limited to capital projects
- Most “freight priorities” are not strictly freight projects
  - Passenger vehicles would in many cases disproportionately benefit
- ADOT prioritization process is freight criteria light

Arizona freight improvement strategy

Strategy 1: Implement priority freight projects with dedicated FAST ACT freight funds

Strategy 2: Implement smaller scale freight initiatives with share of FAST ACT funds

Strategy 3: Implement process to increase prominence of freight in ADOT planning and programming

Strategy 4: Coordinate freight improvement issues and projects falling within MPO jurisdiction

Next steps

- Develop full *Arizona Freight Plan Report*
  - 99 page Summary Report
  - 10 page Executive Summary
  - 2 page Brief Summary
- FAST Act Compliance
- Finalize Critical Urban and Critical Rural Freight Corridors
- Next FAC meeting planned for February 2017

Questions

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