Arizona State Freight Plan: Update on Findings and Scenarios

Prepared for:
Arizona Freight Advisory Committee

February 17, 2016

Team led by: CPCS

In association with:

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Meeting Goals

- Update FAC on Arizona State Freight Plan
- Discuss FAST Act
- Input from FAC on strengths, weaknesses, and freight transportation system opportunities

Meeting Agenda

Time	Item	Presenter
1:30 – 1:40	Welcome and Introductions	Michael DeMers (ADOT)
1:40 – 2:00	Project Status Report	Donald Ludlow (CPCS)
2:00 – 2:20	Scenario Results and Discussion	Donald Ludlow (CPCS) Alejandro Solis (HDR) Michael LaBianca (HDR)
2:20 – 2:40	FAST Act Freight Overview	Donald Ludlow (CPCS)
2:40 – 2:55	Input from FAC on Strengths, Weaknesses, Opportunities	Donald Ludlow (CPCS)
2:55 – 3:00	Wrap Up and Next Steps	Michael DeMers (ADOT) Donald Ludlow (CPCS)
3:00 Adjourn		

Presentation Overview

Project Status Report

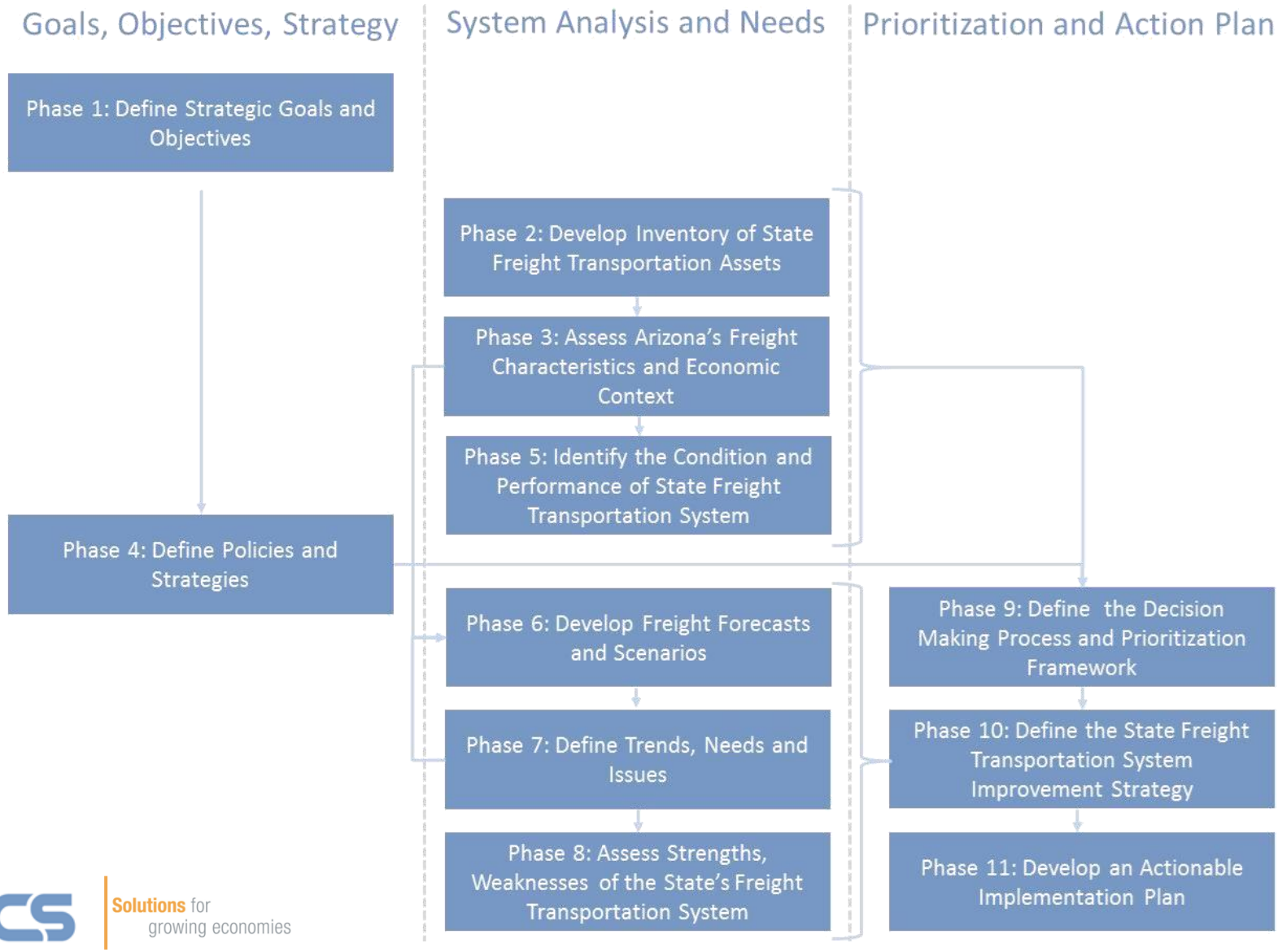
Presentation of Scenarios and Discussion

FAST Act Freight Overview

Input from Freight Advisory Committee

Future Meeting and Ongoing Tasks

Stepped Approach to the Project



Resources Available

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  - Arizona Smart Growth Scorecard
  - Arizona-Sonora Border Master Plan
  - Arizona State Freight Plan
  - Arizona Tribal Transportation
  - Bicycle and Pedestrian

Studies and Programs

Arizona State Freight Plan

Overview | Project Structure and Timeline | Project Deliverables | Latest Thinking | FAC Activities | Resources | Questions and Comments

Project Deliverables

Project deliverables, including working papers are outlined below. Hyperlinks to each deliverable will be added, as and when each deliverable is completed and released.

Project Inception

- Project Kick-Off Meeting Presentation

Phase 1: Define Strategic Goals and Objectives

- Freight Vision Statement, and Associated Goals and Objectives

Phase 2: Develop Inventory of State Freight Transportation Assets

- Inventory of State Freight Transportation System Assets, Nodes and Corridors

Phase 3: Assess Arizona's Freight Characteristics and Economic Context

Phase 1: Vision, Goals, Objectives

Each goal supported by set of objectives

Economic Competitiveness

- Increase Economic Activity, Investment and High Paying Jobs
- Increase Trade

Increase System Performance

- Increase Mobility and Multimodal Accessibility
- Increase Safety and Security
- Increase System Efficiency and Reliability
- Minimize Negative Social and Environmental Impacts

Improve System Management

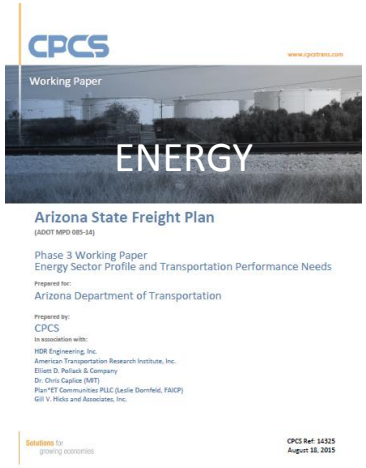
- Ensure System Preservation and Maintenance
- Ensure Good Fiscal Stewardship
- Link Transportation and Land-Use
- Work in Partnership
- Increase Effective Performance Monitoring
- Increase Smart Network Expansion

Arizona's transportation system generally supports efficient goods movement

- **Highway** congestion concentrated in Arizona's urbanized areas – notably Phoenix metro area
- **Rail** network is lacking in north – south infrastructure
  - At grade crossings and Nogales border crossing issues
  - Some limits to rail capacity, intermodal facilities, classification yards, and logistics centers
- **Air Cargo** using Phoenix Sky Harbor is affected by local congestion, limited international connections
- **Pipelines** lack storage capacity and redundancy to respond to system disruptions
- **Border Crossings** long waits, changing market share

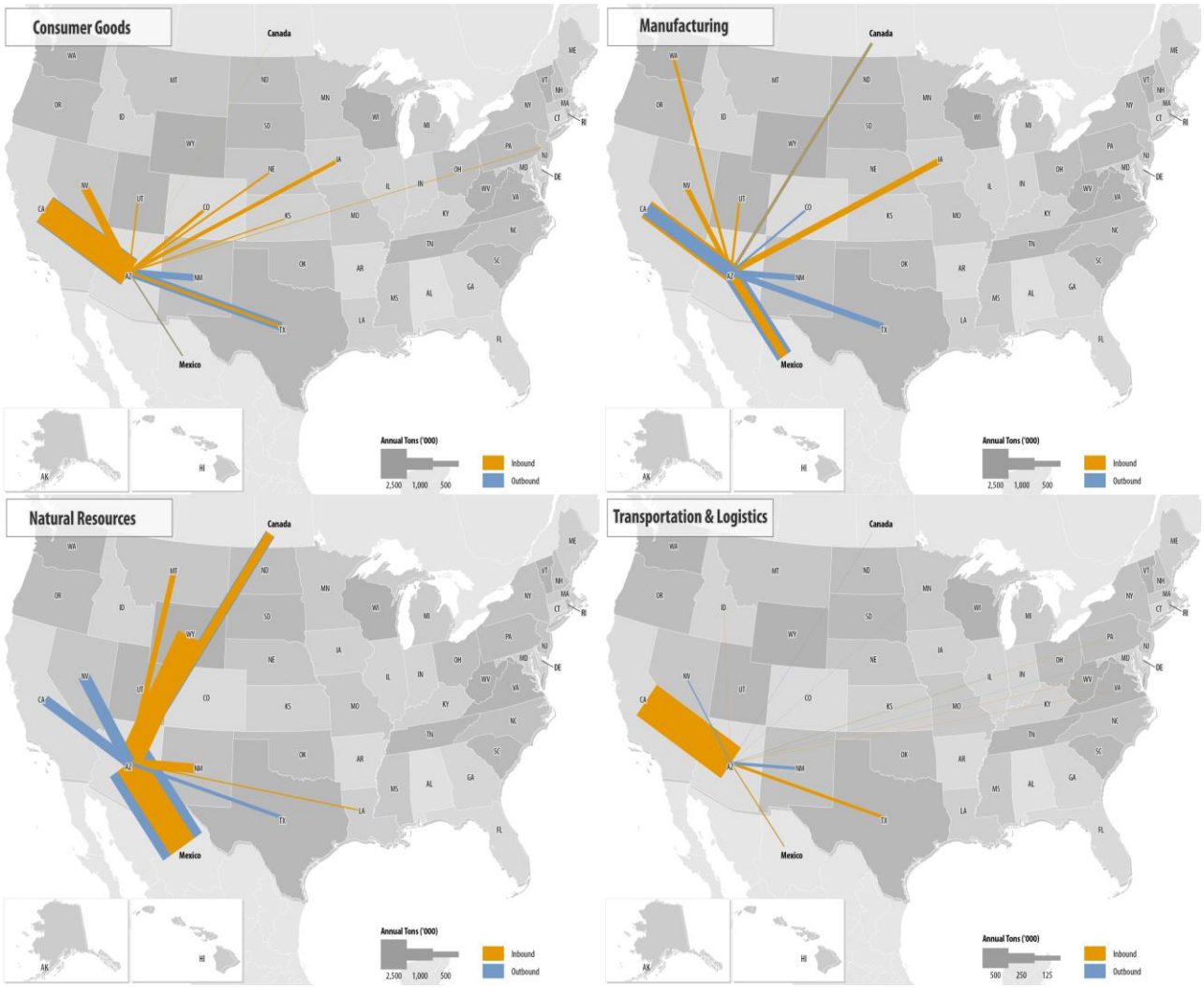
Phase 3: Industry Sector Analysis

Identified sector–based transportation needs and issues



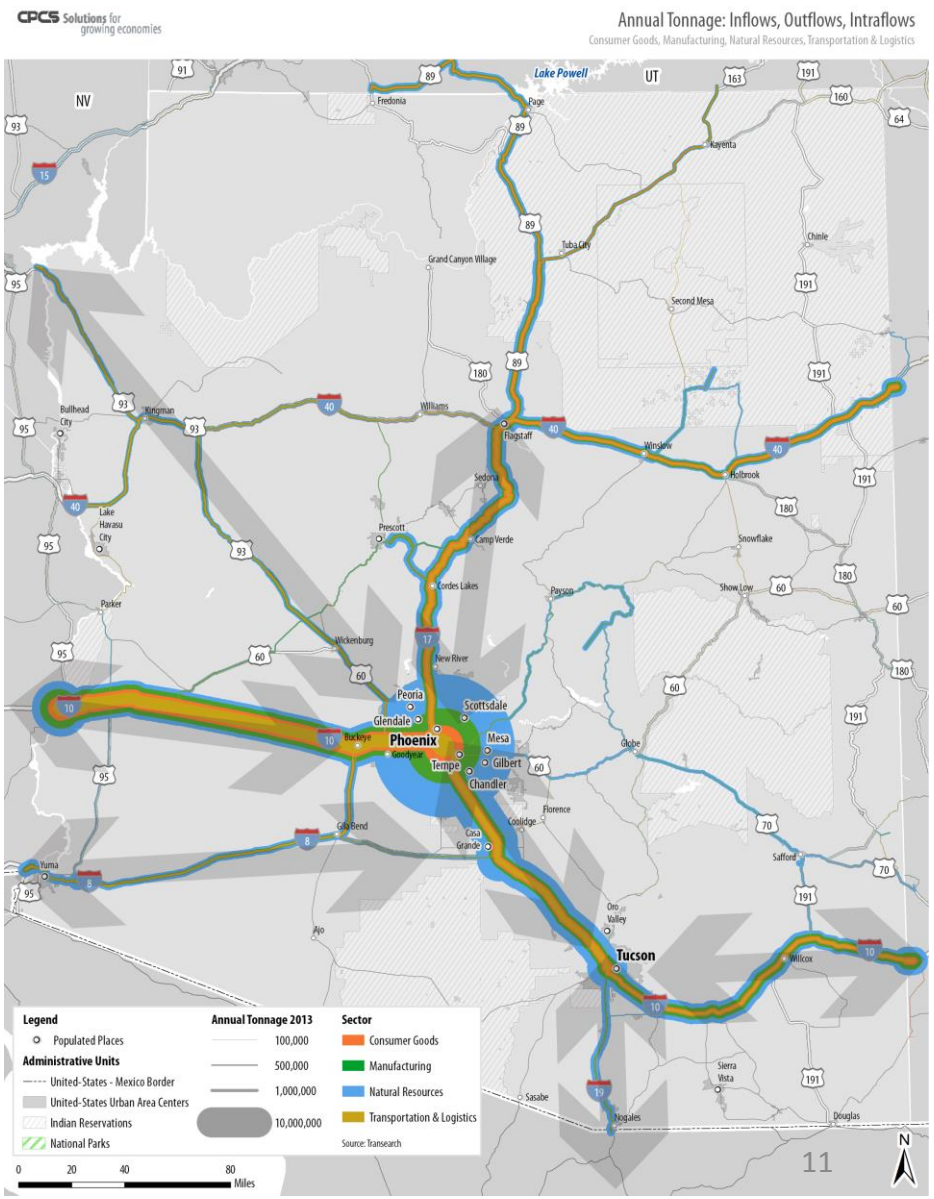
Phase 3: Report on Economic Context of Freight Movement in Arizona – Trade Flows

- California, Texas, and Mexico are the predominant inbound and outbound freight markets, by volume
- I-10 is Arizona's most heavily used freight corridor



Phase 3: Report on Economic Context of Freight Movement in Arizona – Issues Affecting Sectors

- Recurring congestion and bottlenecks in and around urban centers, particularly Phoenix
- Non-recurring congestion and bottlenecks
- Axle-load restrictions
- Truck driver shortage
- Funding constraints impacting future quality
- Other issues differ by sector



CPCS Solutions for growing economies

Phase 4: Policies and Strategies

Policy

Increase Prominence of Freight in ADOT Planning and Programming
to better reflect the role of freight in enhancing the competitiveness and growth of Arizona's economy

Strategies

1 **Merit-Based Prioritization**
Freight transportation system improvements to be prioritized on the basis of merit, in line with the goals and objectives of the Arizona State Freight Plan

2 **Preservation, Modernization, Expansion**
Freight transportation system investments to prioritize asset preservation first, modernization to optimize the existing system second, and network expansion third

3 **Key Commerce Corridors**
Freight transportation system improvements to bolster the performance of Key Commerce Corridors

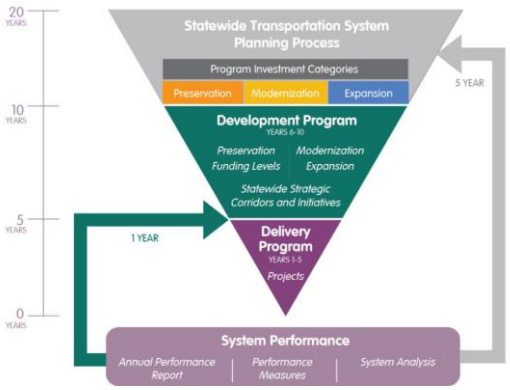
4 **Improve Freight Information**
Freight transportation system management to be informed on the basis of solid research, data and system performance monitoring

5 **Coordination, Partnerships, Communication**
System planning and improvements to be coordinated with all stakeholders that have a role in enabling the goals and objectives of the Arizona State Freight Plan

6 **Sustainable Freight Funding**
Priority freight projects to have access to a dedicated and sustainable source of funding and seek to leverage partner funding and private capital, where appropriate

Phase 4: Policies and Strategies

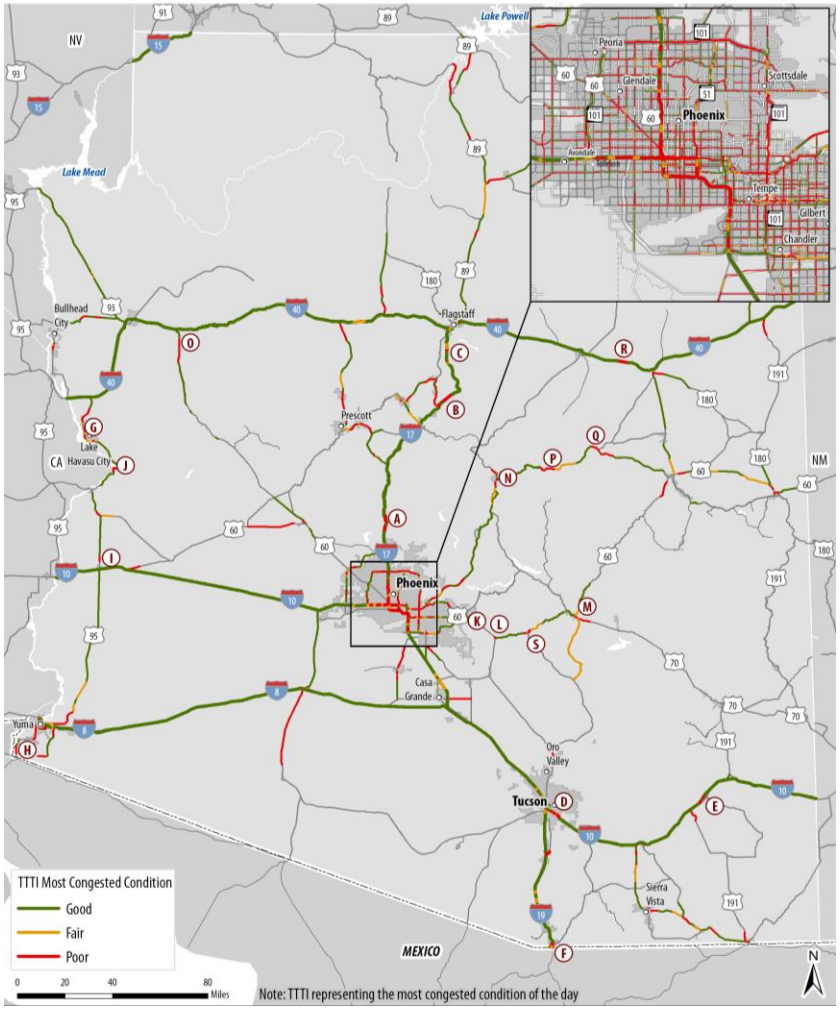
- Central issue for consideration
  - How will Freight Plan priorities fit into ongoing project evaluation and prioritization efforts within ADOT (i.e. P2P)?



Phase 5: Performance Measures, Data and Approaches

Fewer performance measures, but tied to objectives

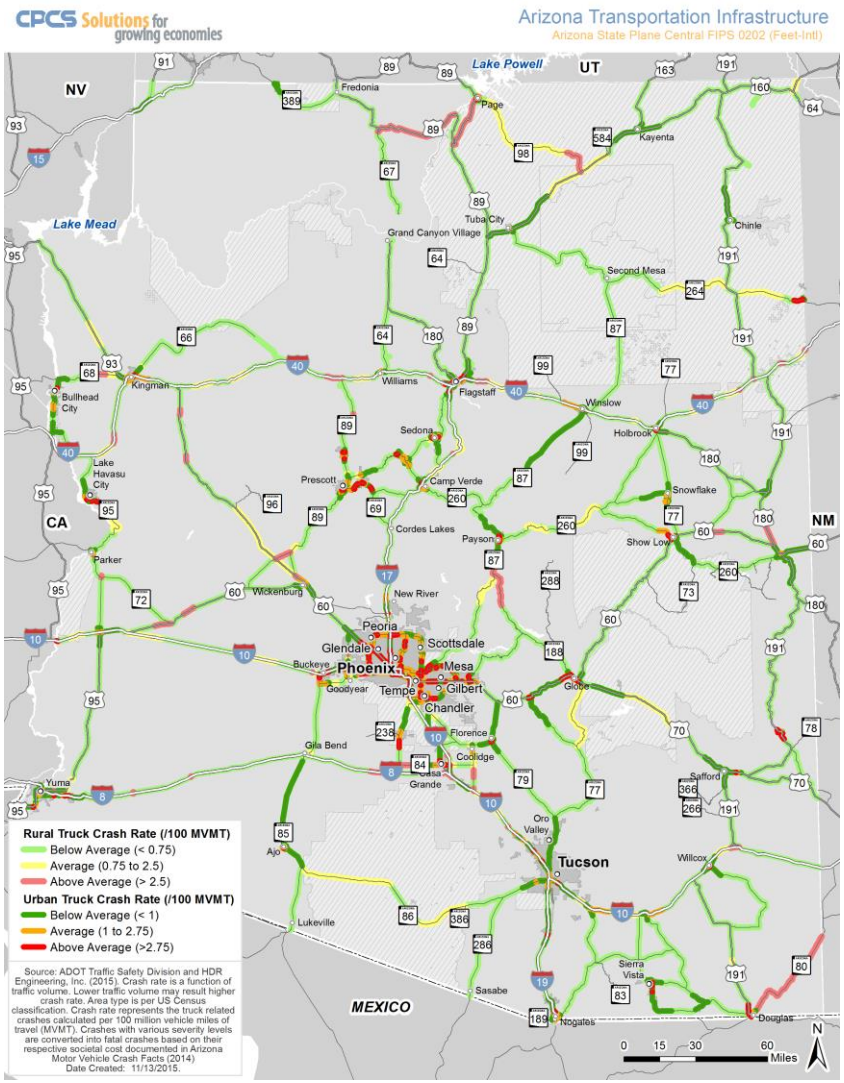
- Increase mobility
  - Truck Travel Time Index (TTTI)
- Increase system efficiency
  - Annual Hours of Truck Delay
- Increase system reliability
  - Truck Planning Time Index (TPTI)
- Increase safety
  - Accident rate per 100 million VMT
  - Total societal cost of accidents
- Value judgement indicators



Phase 5: Performance and Condition

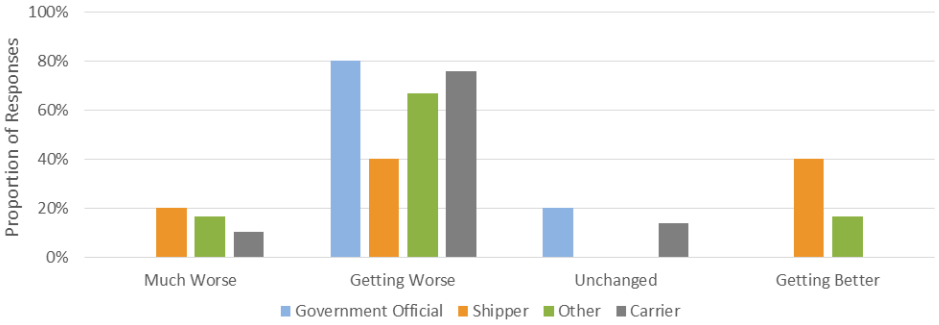
Applying performance measure to assess conditions

- Provide a benchmark for future comparisons
- Overall system performance is good, but specific locations may have issues
  - 86% of KCCs travel time rated good
  - 85% of KCCs reliability rated good
- Urban areas display poor performance

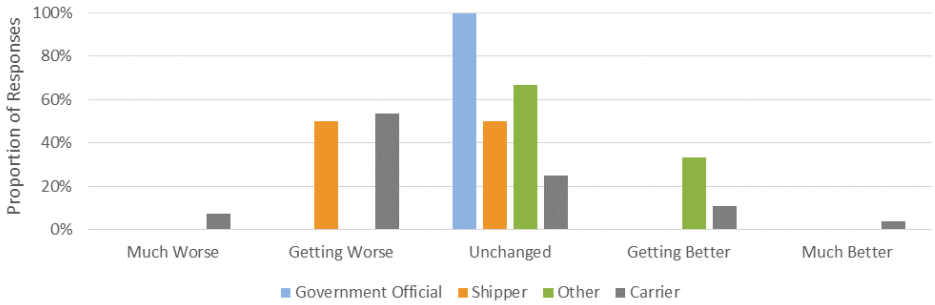


Phase 5: Value Judgement Indicators

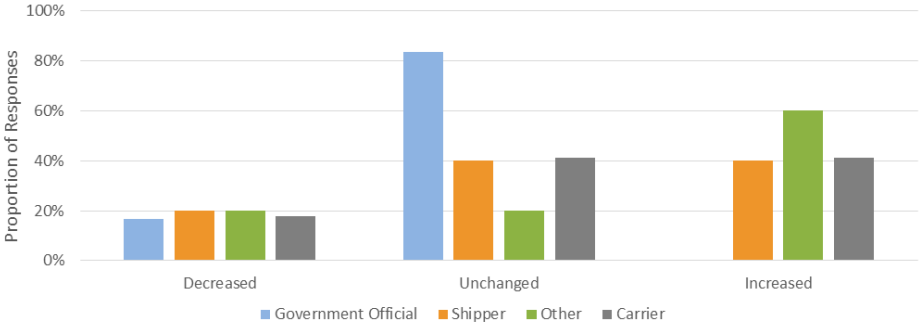
How have freight travel times changed in the last five years?



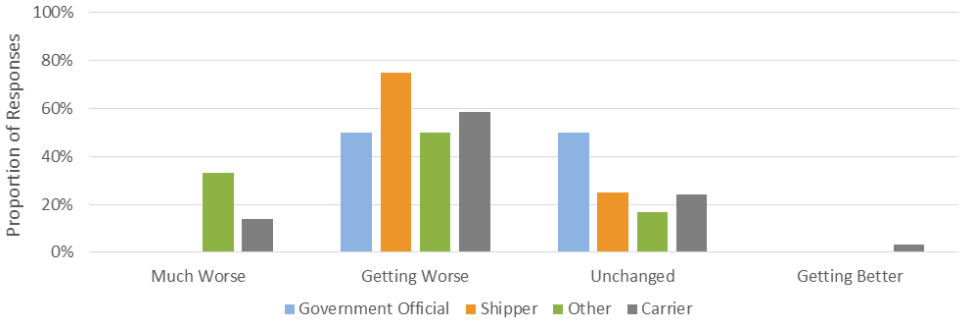
How have incidents and close calls changed in the last five years?



How have multimodal options (ability to ship by truck, rail, air) changed relative to five years ago?



How have logistics costs due to system inefficiencies changed in the last five years?



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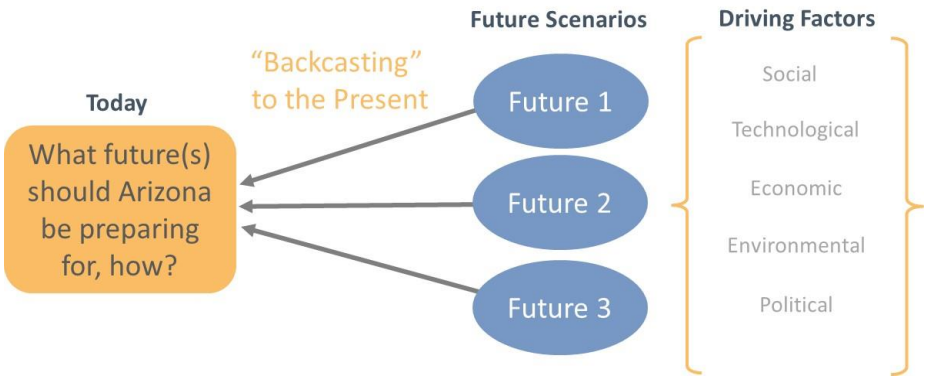
Future Meeting and Ongoing Tasks

Phase 6: Freight Forecasting

- Scenario planning workshop
  - November 5, 2015
  - 50 + attendees from private and public sector
  - What factors do you think will have the biggest impact on the future of freight transportation in Arizona?



  - Developed three alternative scenarios for the future

Scenario Planning Workshop

Top STEEP Drivers Identified by Participants

Social: urbanization, shared economy, labor shortage, immigration

Technological: internet of things, alternative fuels, autonomous trucks, flexible/automated manufacturing

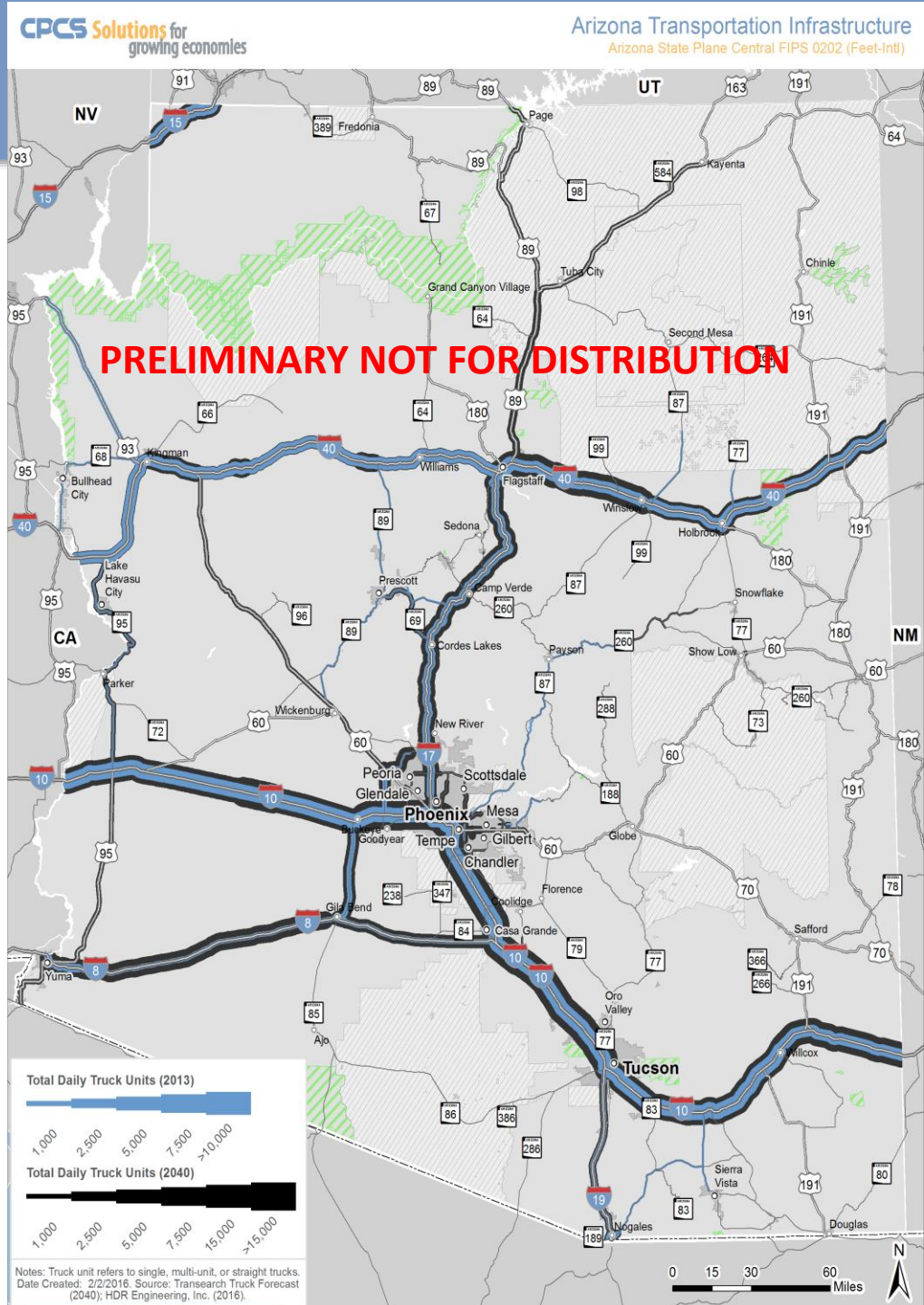
Environmental: water demand/supply, extreme weather events, new environmental regulations

Economic: National conditions, Canamex, opening of Mexican ports, fuel price volatility

Political: Funding (more or less), competition with neighboring states, land use regulations, shifting to user fees instead of taxes

Base Case

- 2010 to 2040
  - Change in truck volumes
- AZTDM2 Model
  - Assignment of truck flows (Transearch)
  - Assignment of passenger flows



CPCS Solutions for growing economies

Scenario 1 – Domestic Bliss

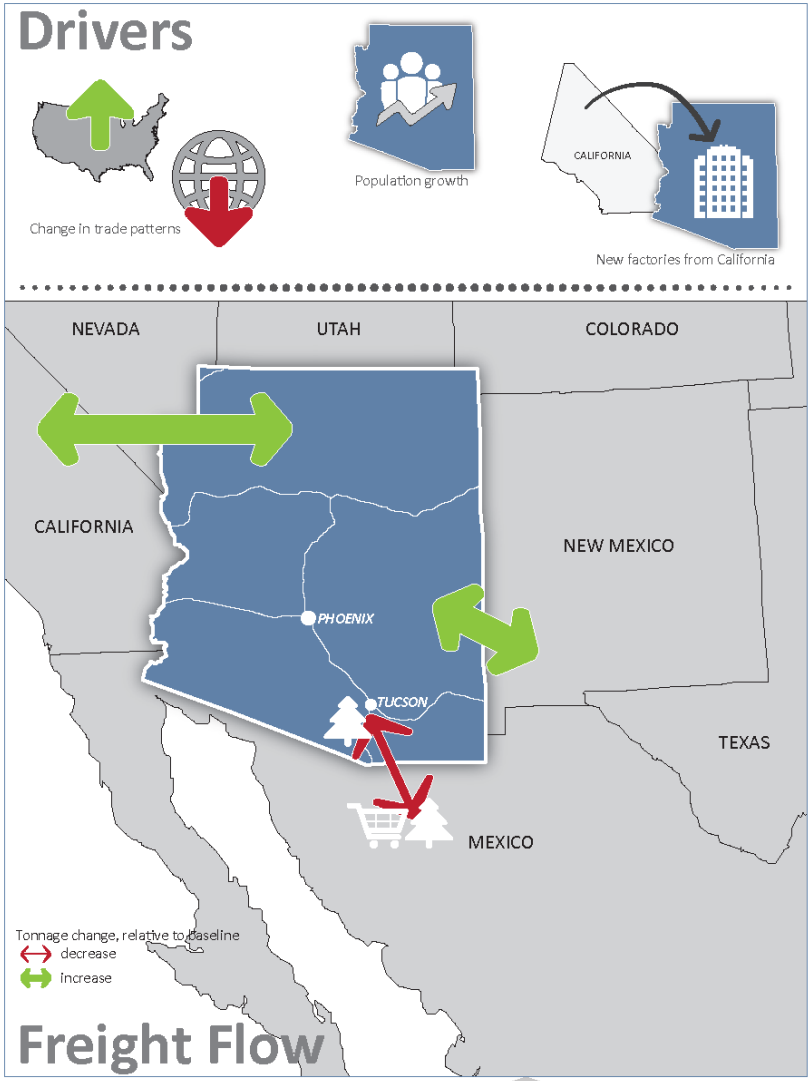
Domestic Bliss: government and social forces dominate market influences

- International factors
  - Weak international trade, including Mexico
- Domestic factors
  - Migration of firms from California to Arizona due to regulations
  - Population growth in Arizona, primarily retirees
  - Increasing US trade in dairy farming, agriculture, mining and other resource intensive industries

Scenario 1: DOMESTIC BLISS

MAIN SCENARIO EVENT

Level of Impact Event	Main Scenario Event
High (quantified)	Reduced international trade
	Increased domestic trade
	Population growth
	Growth in consumer goods tied to population growth
	Growth in western/southwestern Arizona to serve the Californian market
Medium (quantified)	
Low (not quantified)	Labor shortage in healthcare
	More complicated delivery in urban areas
	Freight modal split
	Water shortage has led to a shift in higher value agriculture and crops requiring less water
	Aggregate and other construction-related resources continue to be focused on urban clusters in Sun Corridor
	Distribution centers (DCs) and warehouses in Arizona shift from Phoenix centric to a mix of smaller and medium DCs and warehouses throughout the Sun Corridor. There is also a growing cluster of DCs and warehouses along I-10 near the California border



FREIGHT IMPACT DRIVERS

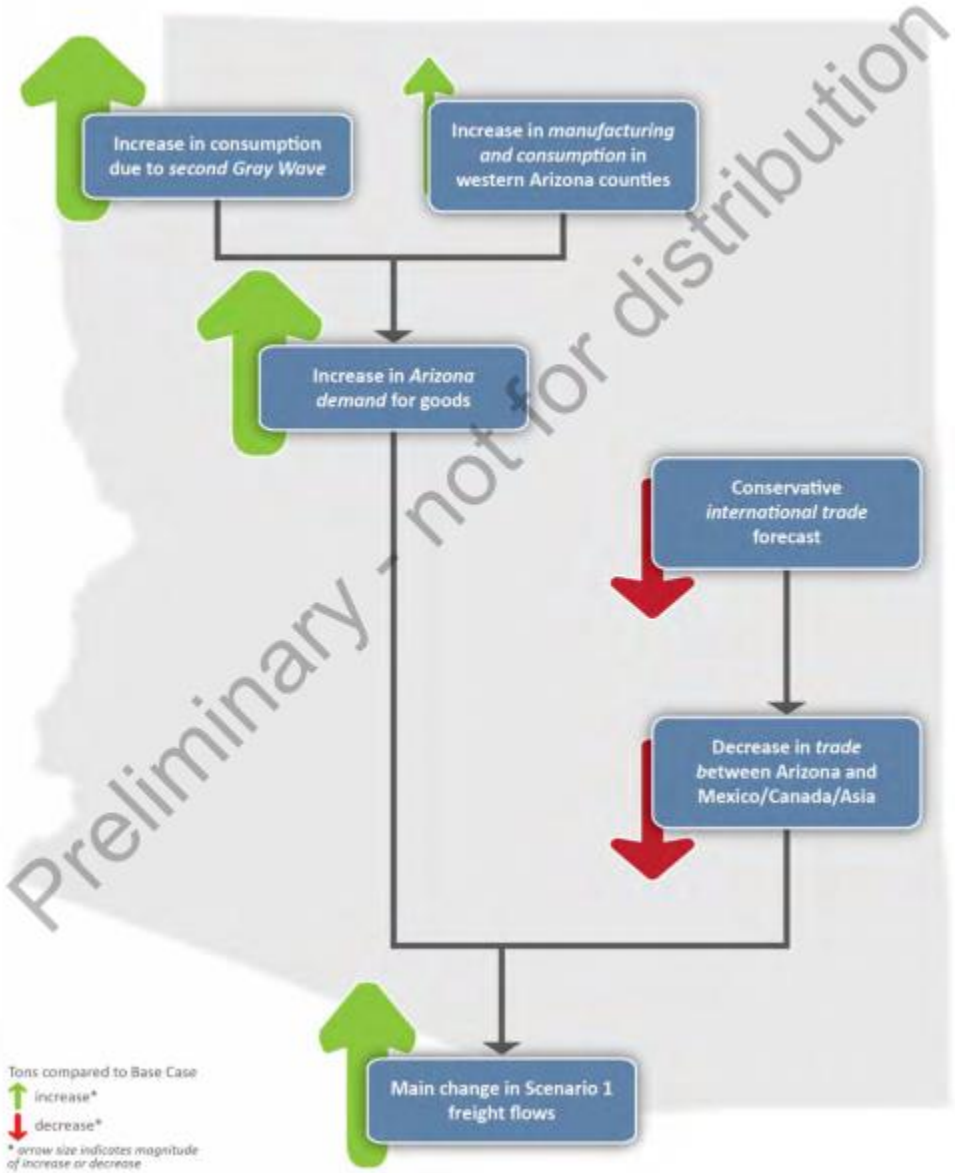
Sector Group	Driver	
Consumer Goods	Population growth driving increase in consumer goods	↑
Manufacturing	Number of firms relocating from California to Arizona	↑
Natural Resources	Mining exports due to protectionism	↓
	Natural resources (except mining) due to effects from population growth being greater than the effects of protectionism	↑
Transportation and Logistics	No change from baseline	–
Other	No change from baseline	–

FREIGHT IMPACT BY INDUSTRY

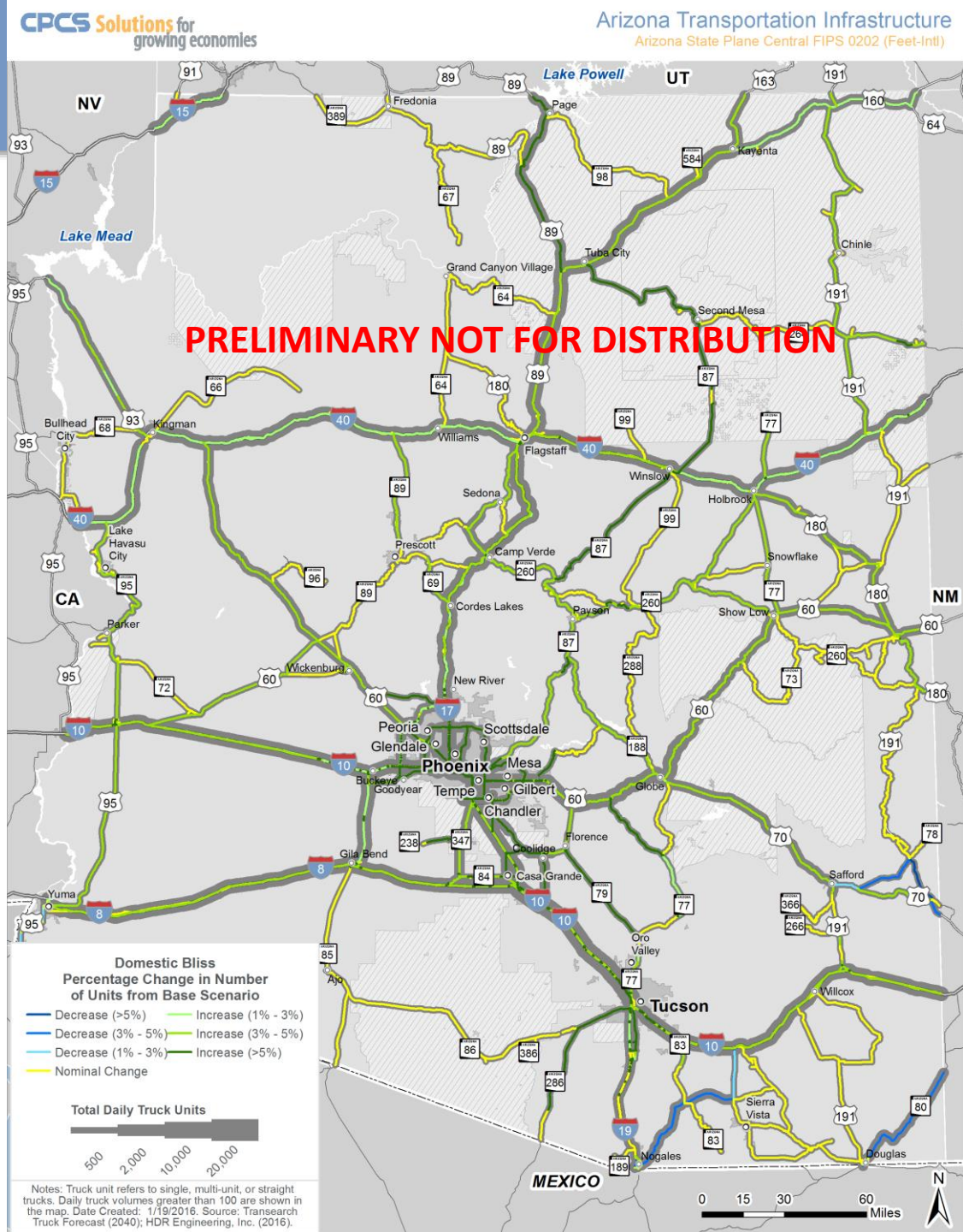
Sector Group									
Consumer Goods		Manufacturing	Natural Resources				Transportation		Other
Food/Beverage	General	High-Tech	Agriculture	Forestry	Mining	Energy	Equipment	Logistics	
↑	↑	↑	↑	↑	↓	↑	↑	↑	–

Scenario 1 – Domestic Bliss

- Second Gray Wave matches optimistic population growth for State
- Migration of firms to AZ proportional to optimistic population growth in SW counties
- Domestic trade with mid-western US states replaces international trade
  - Proportional to differences between trade forecasts



Scenario 1 – Domestic Bliss



CPCS Solutions for growing economies

Scenario 2 - #urbanizona

#urbanizonia: market and social forces dominate governmental control and influence.

- Domestic factors
  - Urban population increase in Phoenix and Tucson, primarily young and well educated
  - Shared economy and automation fully functioning, decreasing vehicle use
  - Growing high-tech/bio sectors

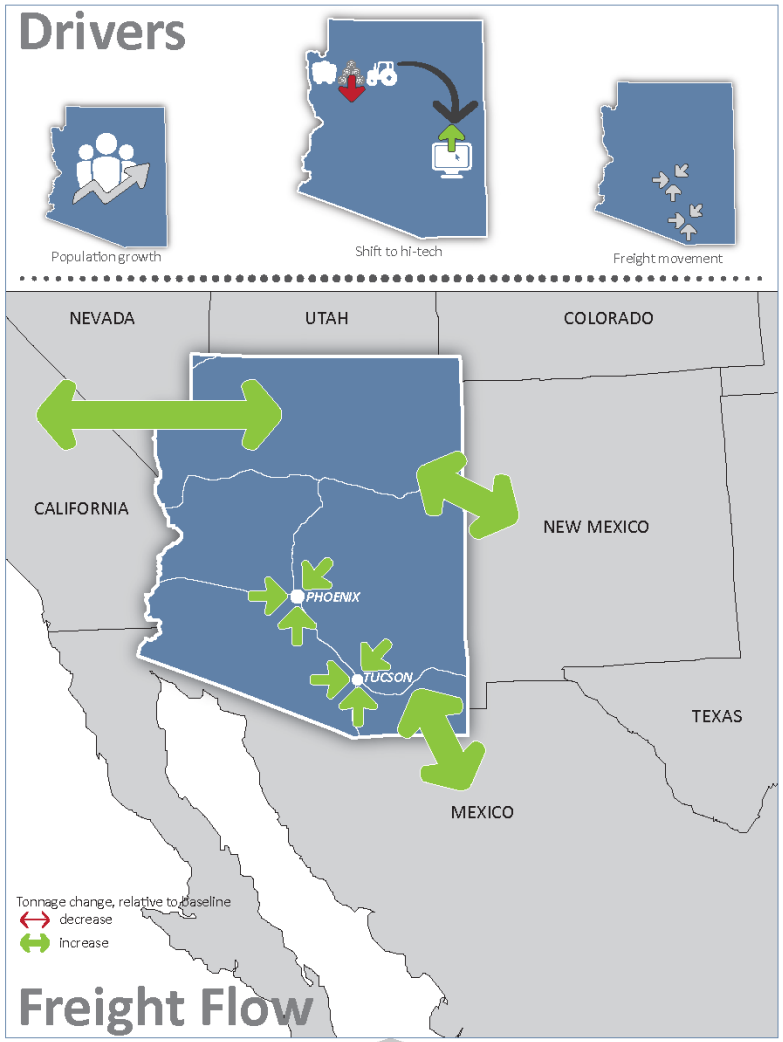
Scenario 2: #URBANIZONA

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	—

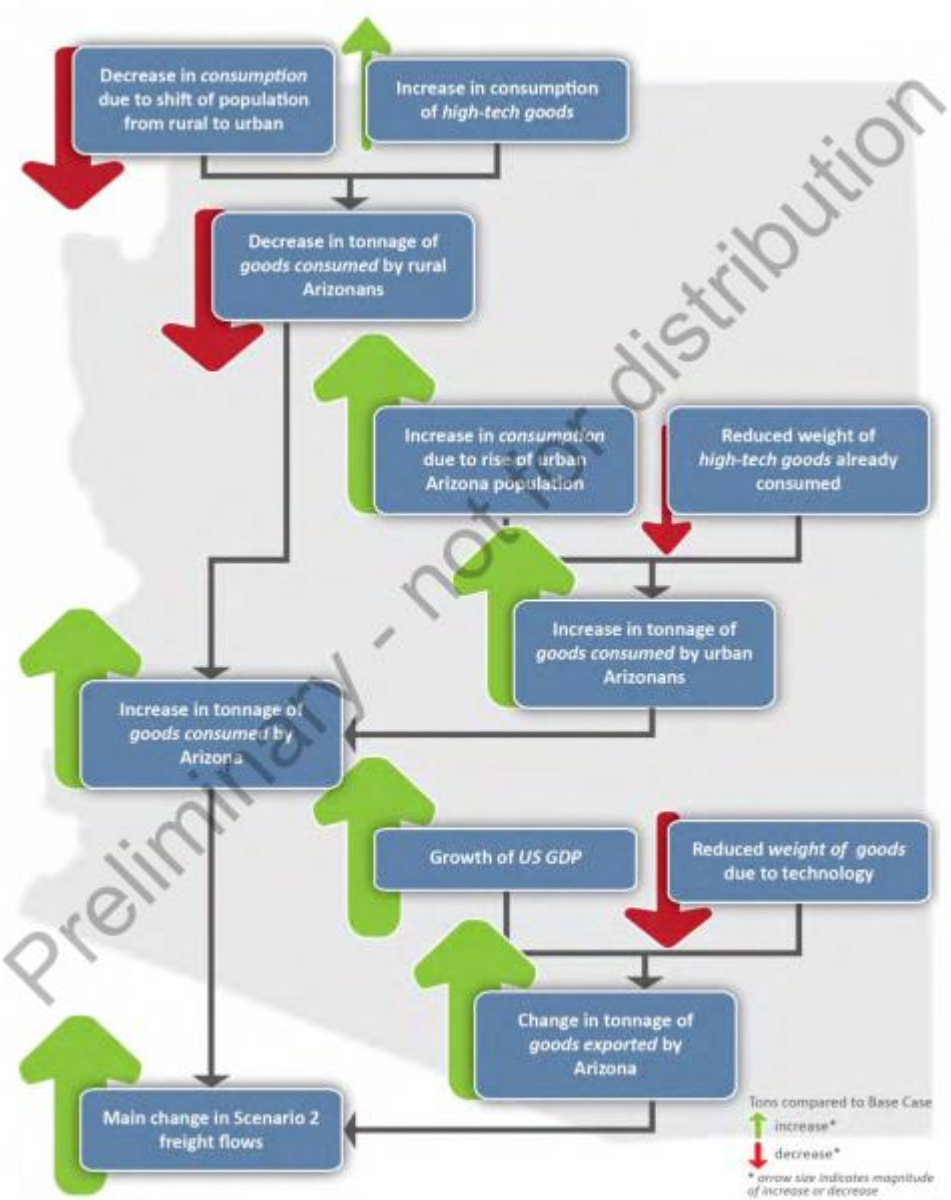


FREIGHT IMPACT BY INDUSTRY

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

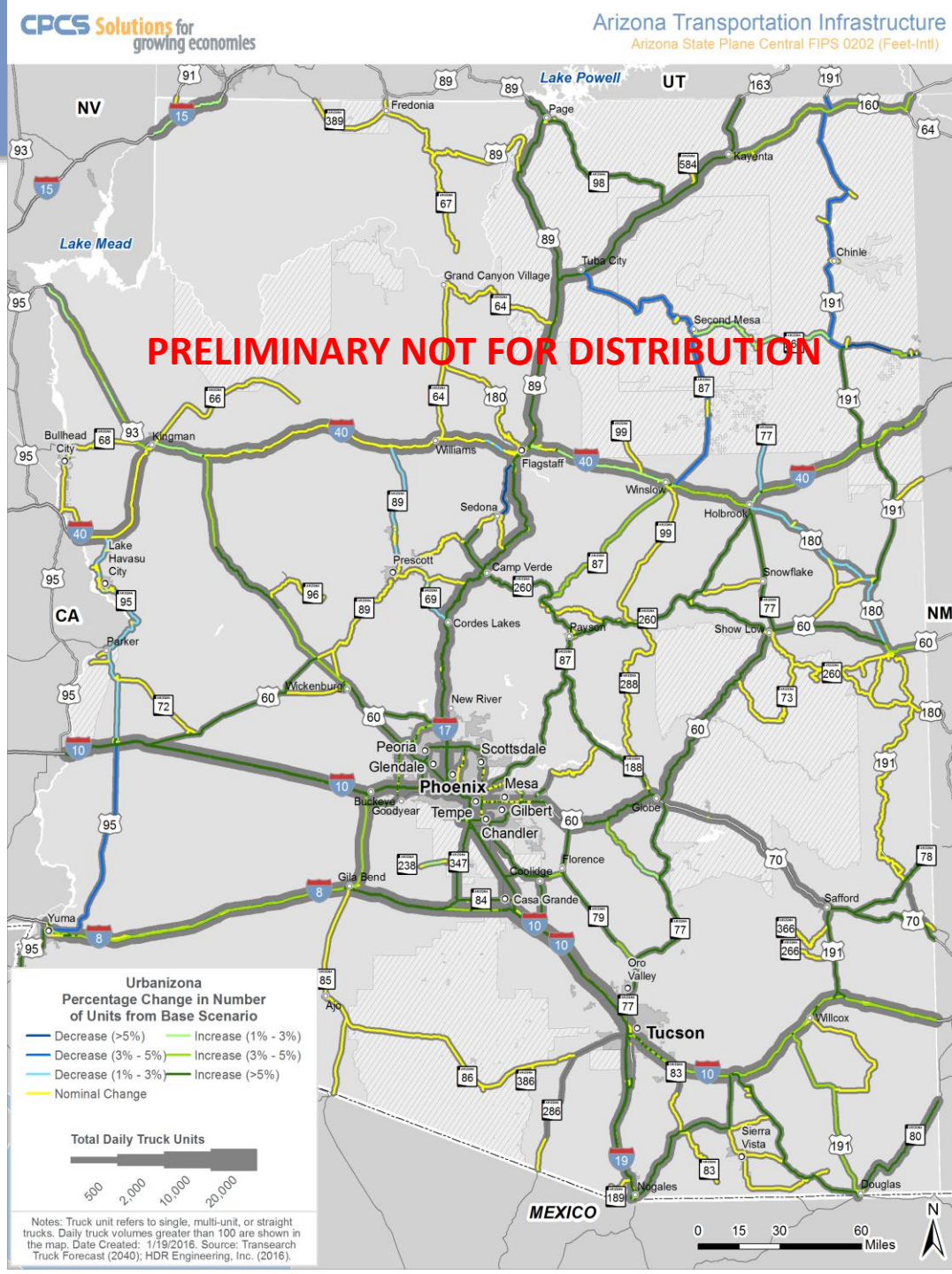
Scenario 2 – #urbanizona

- Urban population increases at a faster rate than rural population
  - Urban centers demand for goods increases significantly
- Export growth
  - Optimistic forecast for international trade
- Slight decrease in freight tonnage moved due to use of technological advances



CPCS Solutions for growing economies

Scenario 2 – #urbanizona



CPCS Solutions for growing economies

Scenario 3 – SOBO – South of the Border

SOBO: market and government forces dominate social influence.

- International factors
  - Increased trade with Mexico, replacing China
  - Mexican port development and expansion
  - Border crossings are expanded and immigration reformed
- Domestic factors
  - Arizona transports, assembles and customizes Mexican goods
  - Suburban growth patterns

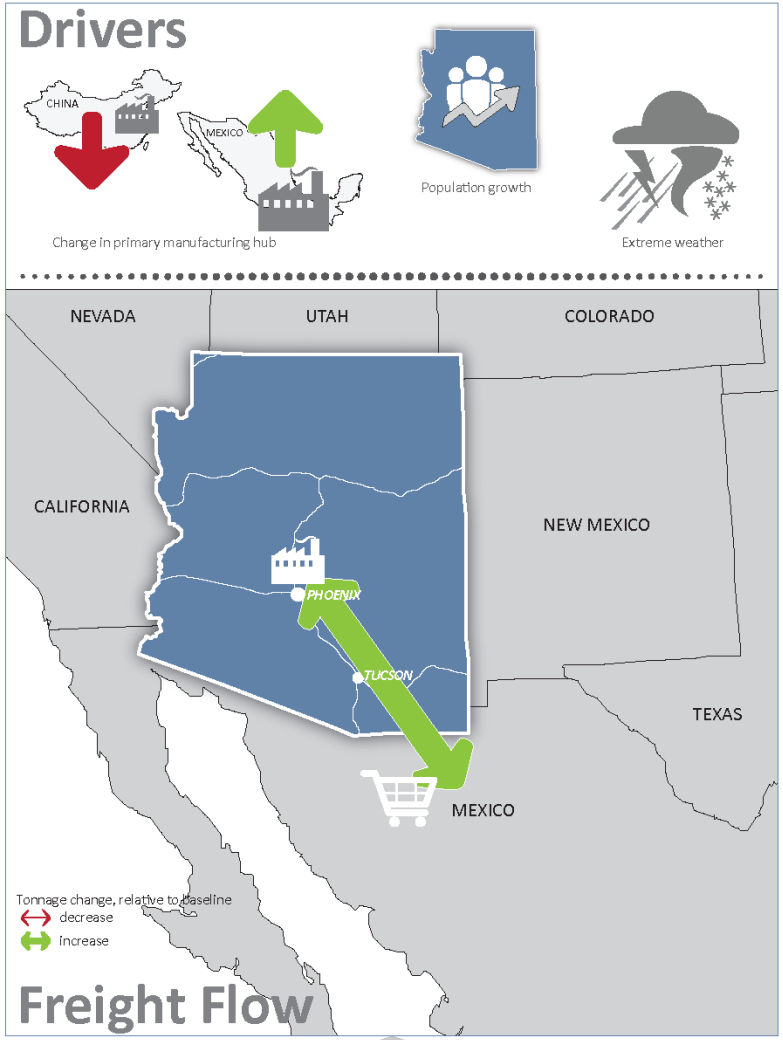
Scenario 3: SOUTH OF THE BORDER

MAIN SCENARIO EVENT

Level of Impact Event	Main Scenario Event
High (quantified)	Mexico has replaced China as the primary manufacturing hub for North America
	Population is growing in the Tucson/Nogales area
	Shift of agricultural sourcing from domestic sources to Mexico
Medium (quantified)	Increase in exports to Mexico; however, Arizona competes with Texas
Low (not quantified)	Increase in extreme weather events
	Social demands for increased environmental regulations are not passing in the state or nationally

FREIGHT IMPACT DRIVERS

Sector Group	Driver	
Consumer Goods	Growth in Arizona consumption primarily served by Mexican imports	↑
Manufacturing	Exports to Mexico, based on Mexican growth	↑
Natural Resources	Growth in Arizona consumption primarily served by Mexican imports	↑
Transportation and Logistics	Exports to Mexico, based on Mexican growth	↑
Other	Growth in Arizona consumption primarily served by Mexican imports and increase in exports to Mexico, based on Mexican growth	↑

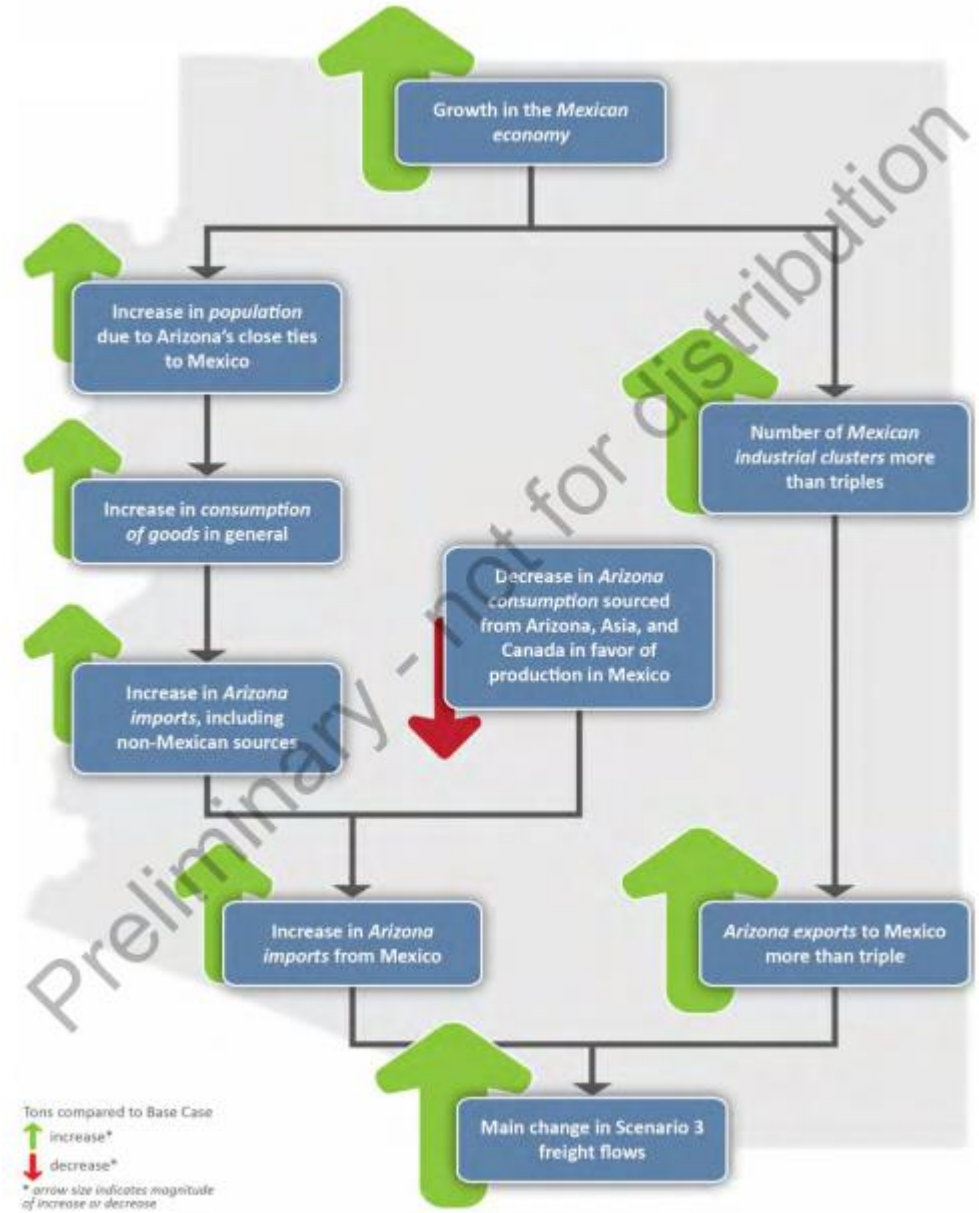


FREIGHT IMPACT BY INDUSTRY

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

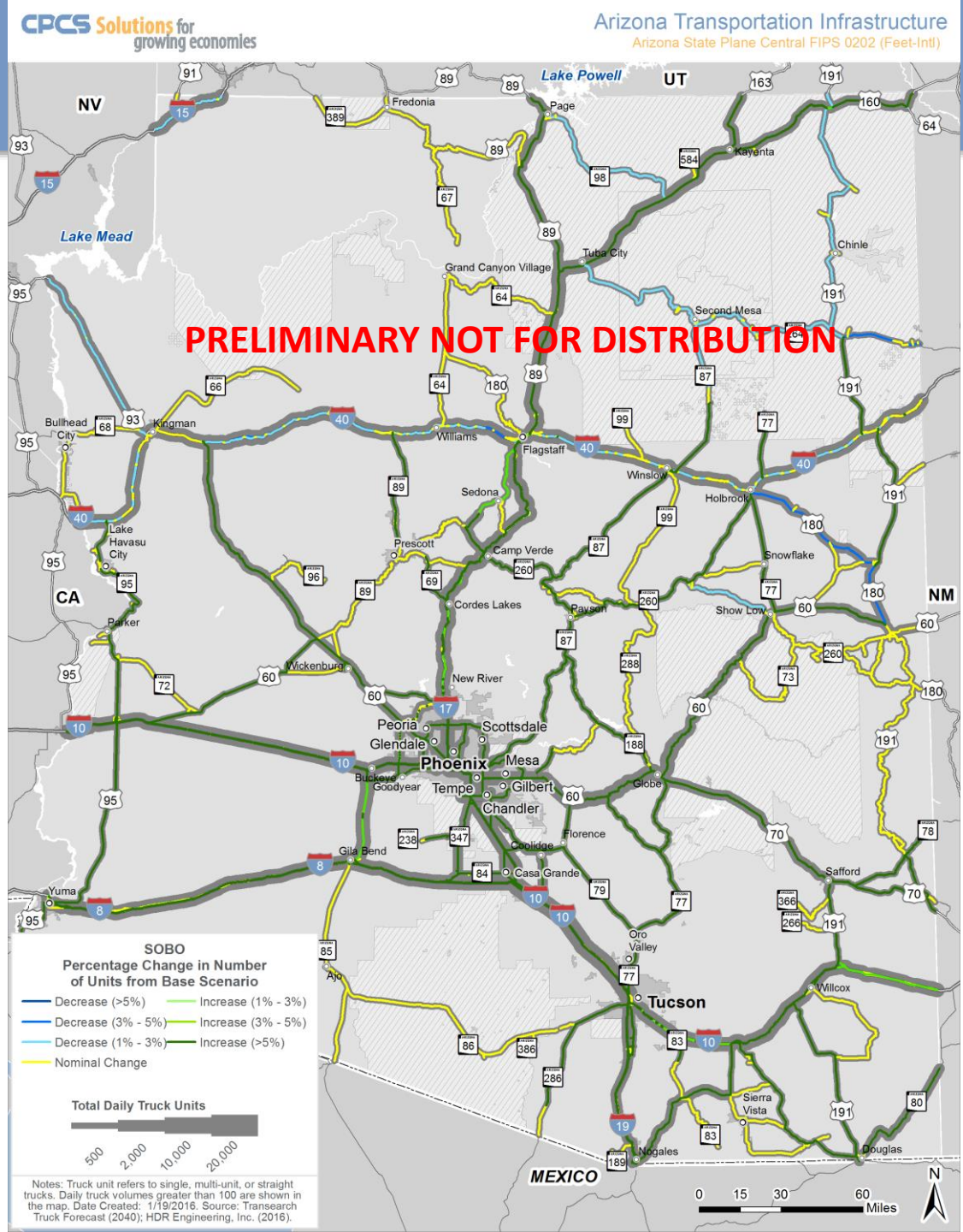
Scenario 3 – SOBO – South of the Border

- Significant increase in trade with Mexico in response to elevated growth in Mexican economy
  - Mexican imports and exports expected to growth by over three times by 2040
- Optimistic population growth for urban and rural counties as a result of ties with Mexico
- All Arizona counties importing from Mexico according to statewide county averages
- Outsourcing of Agricultural and Food/Beverage production in favor of other industries



Preliminary - not for distribution

Scenario 3 – SOBO South of the Border



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Future Meeting and Ongoing Tasks

FAST Act Freight Overview

Fixing America's Surface Transportation (FAST) Act

- **National Multimodal Freight Policy with national goals to guide decision-making**
- **$4.5B discretionary and competitive freight-focused grant program over 5 years**
  - Eligibility: States, Metropolitan Planning Organizations (MPOs), local governments, tribal governments, special purpose districts and public authorities (including port authorities), and other parties
  - Projects that improve safety, eliminate freight bottlenecks, and improve critical movements
- **$6.3B National Highway Freight Program**
  - Formula funds over 5 years allocated to states
  - Eligible projects includes freight projects on the National Highway Freight Network
  - Up to 10 percent of these funds may be used for intermodal project
- **New authority/requirements improve project delivery and facilitate innovative finance**
  - Provisions to reduce the time it takes to break ground on new freight transportation projects, including by promoting best contracting practices and innovating financing and funding opportunities
  - Reduced uncertainty and delays with respect to environmental reviews and permitting

FAST Act Freight Overview

Freight Networks

- National Multimodal Freight Network (NMFN)
  - National Highway Freight Network
    - Interstate Highways
    - 41,000 primary freight network highway miles identified under MAP-21
    - State-identified highway segments
  - Multimodal critical rural freight facilities and corridors designated within the State under section 70103 of this title
  - Critical rural and urban freight corridors designated within the State under section 167 of title 23

FAST Act Freight Overview

State Freight Planning Considerations

- State Freight Plan required every 5 years
  - Project investment plan, prioritized and financially constrained
  - Address reliability and resiliency of system
  - Performance based planning
- State Freight Advisory Committees
  - Membership representative of state freight stakeholders

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Future Meeting and Ongoing Tasks

Input from FAC on ongoing work – Existing and Future Strengths and Weaknesses

- **Generally speaking, the performance of the freight system in Arizona is looking good** and at this point the focus is on operations, policies, and targeted capital improvements. Is this the right focus?

- **FAST ACT requires Freight Plans to put forward specific projects** –it's our intent to do this, yet the primary focus is preservation, modernization, and as a last resort expansion

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Future Meetings and Ongoing Tasks

Recent and Upcoming Activities

- Southern Arizona Stakeholders Meeting
- Mid-May FAC Meeting (May 18th target)
  - Projects and prioritization approaches
  - Define Drivers of private industry efficiency and performance
- Deliverables available before next meeting
  - Phase 5: Initial freight performance of the freight transportation system
  - Phase 6: Freight Forecasts
  - Phase 7: Trends and Needs
  - Phase 8 : Strengths, Weaknesses, Opportunities

Questions and Discussion

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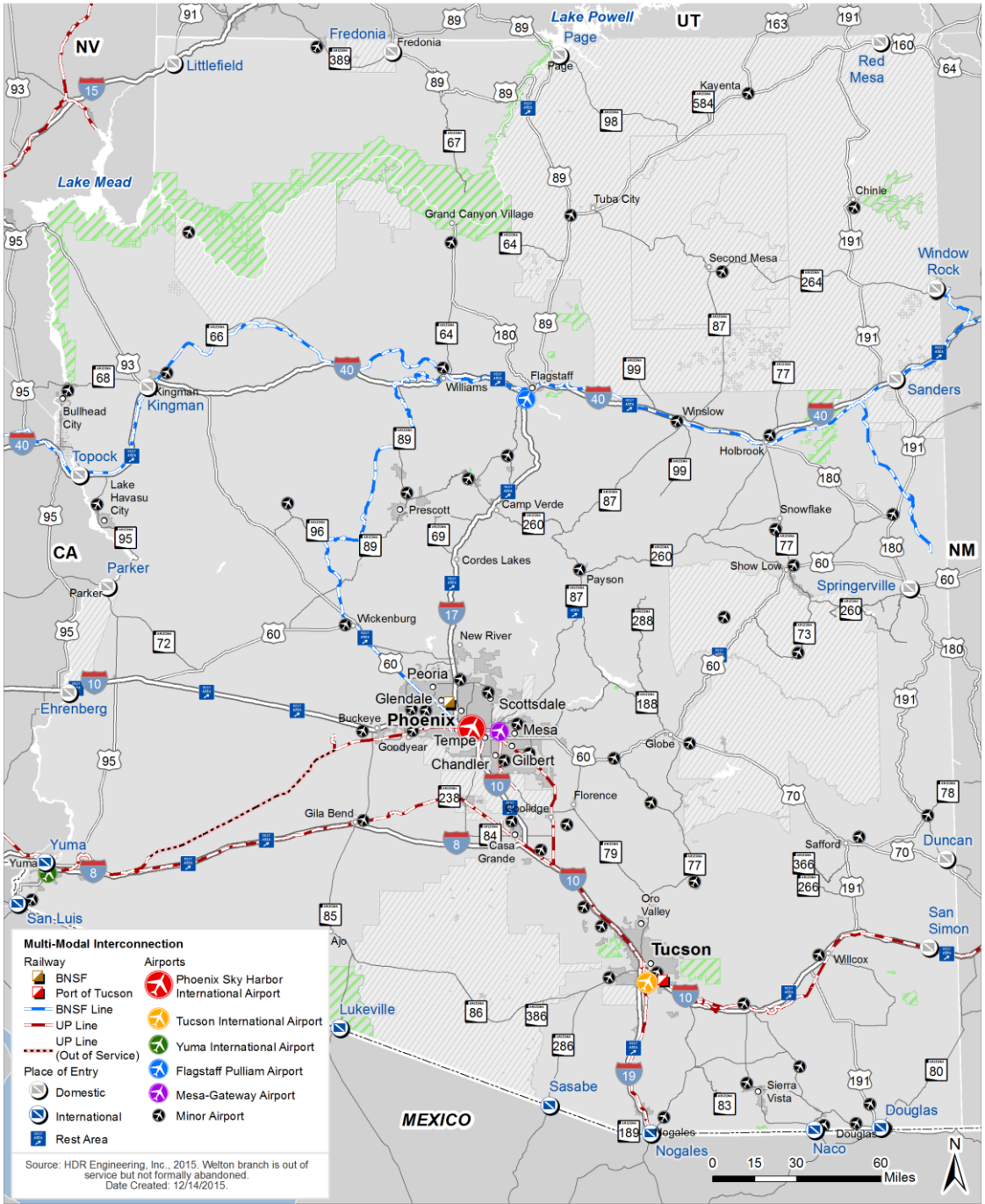
Arizona Transportation Infrastructure

Arizona State Plane Central FIPS 0202 (Feet-Intl)



Work Plan Addresses High Level Key Questions

Goals, Objectives, Strategy	• What vision, strategic goals and objectives should underpin Arizona's State Freight Plan for freight transportation investment? **(Phase 1)** • Which policies and strategies will enable Arizona to improve the competitiveness of its transportation system and the economic vitality of the State? **(Phase 4)**
System Analysis and Needs	• Which facilities comprise Arizona's freight transportation system and how well are these assets performing? **(Phase 2)** • What types of commodities do Arizona's freight-dependent businesses move over the transportation system and what contribution do freight–dependent businesses make to the Arizona economy? **(Phase 3)** • Which performance measures should guide investment decisions in Arizona's freight transportation system? **(Phase 5)** • What trends and changes should Arizona anticipate as the state develops plans to meet future challenges and opportunities? **(Phase 6)** • Which trends, needs and issues are likely to affect Arizona's freight movement system? **(Phase 7)** • What are the strengths and weaknesses of the state's freight transportation system? **(Phase 8)**
Prioritization and Action Plan	• How should the state make decisions to prioritize freight investments? **(Phase 9)** • What freight improvement strategies will guide the development of the freight plan? **(Phase 10)** • How should Arizona implement the strategies outlined in the Arizona State Freight Plan? **(Phase 11)**

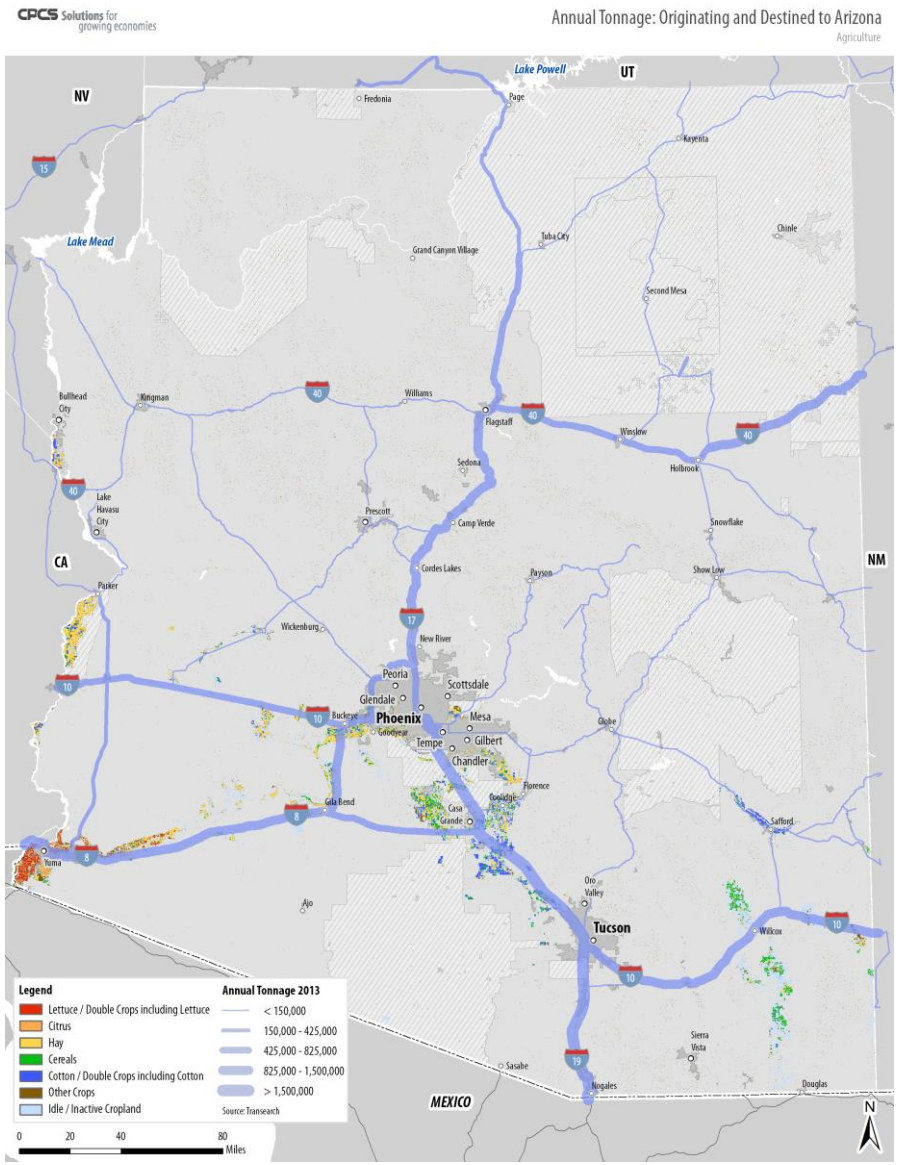
Phase 3: Industry Sector Analysis - Agriculture

Sector Summary

- $1.5 billion (0.6%) of state GDP
- Employs over 25,000 (1%) total employment

Transportation Summary

- Supply chain relies on travel time and reliability
- Many stakeholders reported good roadway performance
- Weight restrictions and border crossings are barrier to efficiency
- Other issues include I-10, SR-189, I-17, I-40, border crossings, roadways in Mexico



CPCS Solutions for growing economies

Freight Sector Groups

Figure 3-2: Freight Sector Group Segment Charateristics

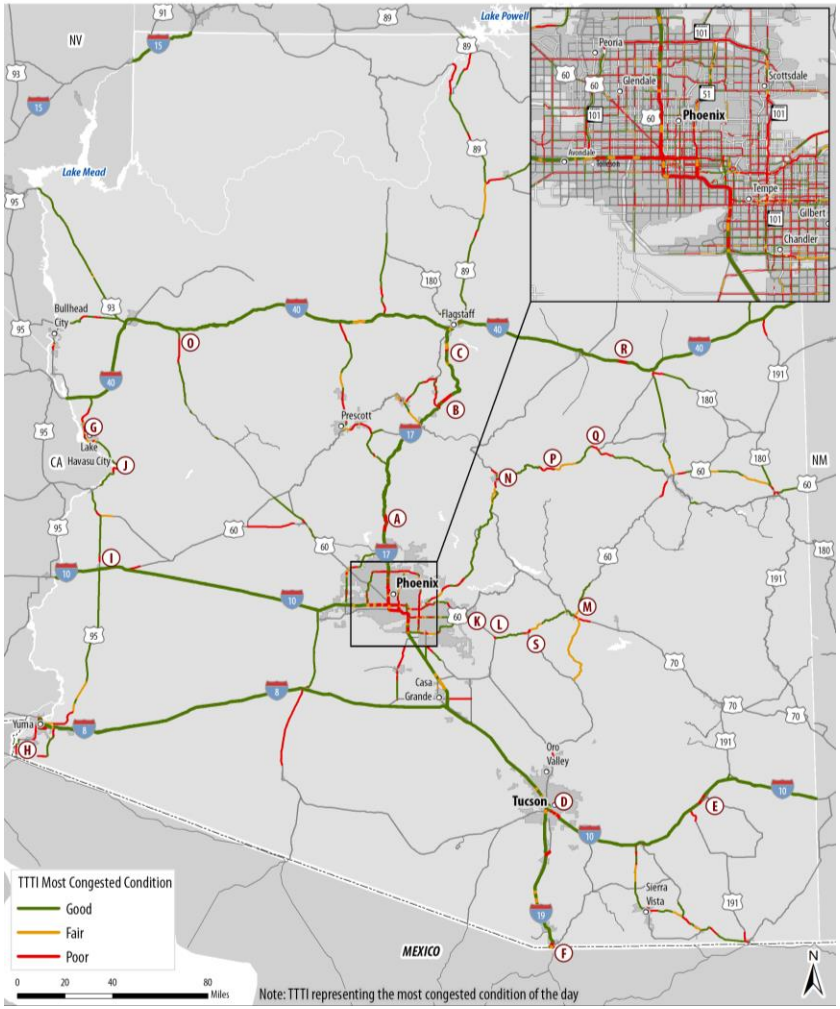
Sector Groups	Top 10 Sector	Market Demand	Sourcing and Production	Competition	Role of Transportation
Consumer Goods *(Orange)*	• Wholesalers and Retailers • Food and Beverage	Predominantly tied to local consumption	Varied – Local to global	Predominantly for the Arizona market (end consumers)	Varied, depending on nature of products
Manufacturing *(Green)*	• High-Tech • General • Transportation Equipment	Important focus outside Arizona, incl. global	Arizona, though supply chains extend beyond	• Arizona • US • Global	• Market access • Supply chain integration
Natural Resources *(Blue)*	• Mining • Agriculture • Forestry • Energy	Important focus outside Arizona, incl. global	• Arizona • US (Energy)	Price takers, driven by commodities prices	• Market access • Focus on low cost
Transportation and Logistics *(Brown)*	• Transportation and Logistics	Predominantly tied to Arizona freight sectors' needs	Local	Predominantly for the Arizona market (shippers)	Service

Source: CPCS

Performance Measures, Data and Approaches

Fewer performance measures, but tied to objectives

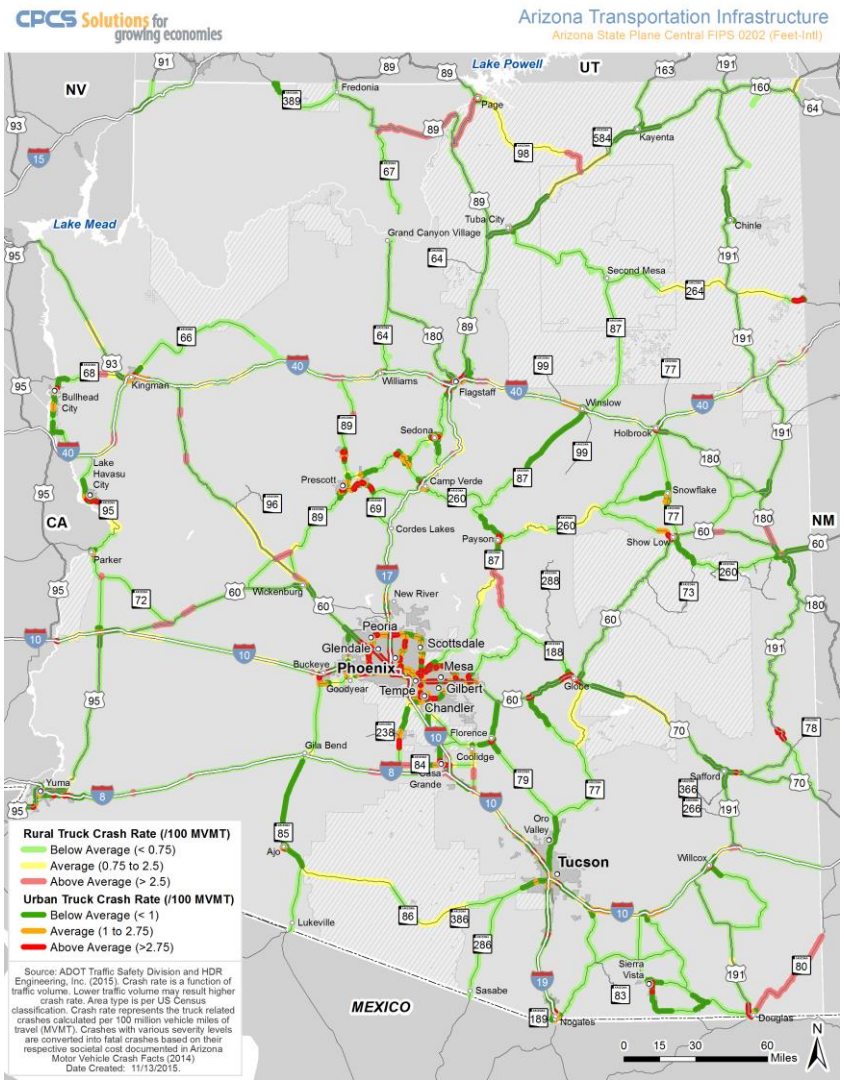
- Increase mobility
  - Truck Travel Time Index (TTTI)
- Increase system efficiency
  - Annual Hours of Truck Delay
- Increase system reliability
  - Truck Planning Time Index (TPTI)
- Increase safety
  - Accident rate per 100 million VMT
  - Total societal cost of accidents
- Value judgement indicators



Performance and Condition

Applying performance measure to assess conditions

- Provide a benchmark for future comparisons
- Overall system performance is good, but specific locations may have issues
  - 86% of KCCs travel time rated good
  - 85% of KCCs reliability rated good
- Urban areas display poor performance



Critical Issues

- What trends (U.S. or Mexico) are having the greatest impact on freight volumes, modes or trade patterns?
- What are the most critical transportation issues affecting your business or region?
- What infrastructure constraints are most detrimental to freight movements between Arizona and Mexico?
- What actions could ADOT take to improve to improve goods movement statewide?