

# Transportation Asset Management Webinar Series

## Webinar 14: Linking TAM Guidance to the Planning Process

Sponsored by FHWA and AASHTO

With support from the FHWA TAM Expert Task Group

**Submit questions and comments using the webinar's Q&A feature**



**Webinar 14 — February 11, 2015**

# FHWA-AASHTO Asset Management Webinar Series

- Sharing knowledge is a critical component of advancing asset management practice
- This is the fourteenth webinar in a series that has run since 2012
- Webinars are held every two months, on topics such as mitigating and adapting to climate change risks, developing transportation asset management plans, and more
- We welcome ideas for future webinar topics and presentations
- Submit your questions using the webinar's Q&A feature
- Next webinar: **Lessons Learned from Developing a Transportation Asset Management Plan – April 8, 2015 2:00 EST**

# Welcome

- FHWA is pleased to sponsor this webinar on Linking TAM Guidance to the Planning Process in cooperation with the AASHTO Sub-Committee on Asset Management and with support from the FHWA TAM Expert Task Group
- Since 2012, these webinars have provided an opportunity to connect with the asset management community and to bring people together around a series of important topics
- All of the webinars in the series can be accessed online at: <http://tam.transportation.org/Pages/Webinars.aspx>

# Linking Transportation Asset Management to the Planning Process

## Today's Agenda

- Introduction
  - Webinar Overview
  - Texas Example
- Performance-Based Planning and Programming in the Context of MAP-21
  - Egan Smith – FHWA
- Performance Based Planning and Transportation Asset Management Plan
  - Tamara Haas – New Mexico DOT
- The Caltrans SHOPP Pilot Project
  - Steve Guenther – Caltrans
- Wrap-Up and Q&A



# Linking Transportation Asset Management to the Planning Process

## Webinar Overview

- Explore transportation asset management (TAM) in the context of the performance based planning process (PBPP)
- 3 presentations by transportation practitioners
  - TAM & PBPP relationship
  - Benefits achieved
  - Addressing links between AASHTO TAM Guide & FHWA PBPP Guidebook



# Linking Transportation Asset Management to the Planning Process

MAP-21 requires State DOTs and MPOs to establish future targets for several metrics

- Congestion
- State of Good Repair
- Safety
- Air Quality
- MPO targets must be consistent with State DOT(s) & local transit agencies targets

The planning process is constrained to a realistic estimate of future revenues

- Forces a conversation between policy-makers and modal interests on what can realistically be accomplished



waco mpo



# Linking Transportation Asset Management to the Planning Process

## Planning process reflects local & statewide goals

- Policymaker & community input into priorities
- TAM commitments should be consistent with these priorities

## TAM process can help inform the planning process

- Show impact of policy decisions on project schedules
- Provide information on ability to reach future performance targets



# Real-World Policy Decision Example

## February, 2014 TIP amendment – Waco, TX

- Highway widening project
- Insufficient funds from ‘Mobility’ categories
- \$1 million from ‘Maintenance’ category
  - Existing pavements & structures to be rehabilitated

### Questions:

- Would we be doing the maintenance work if we weren't also widening the highway?
- Are we postponing rehab work on facilities in worse condition elsewhere in the region?
- How does this decision impact our ability to meet future targets for either state of good repair, safety or congestion?



waco mpo





# Performance-Based Planning and Programming in the Context of MAP-21

February 11, 2015

Egan Smith, P.E. PTOE PTP  
FHWA, Office of Planning, Environment, & Realty



U.S. Department of Transportation  
Federal Highway Administration

# What is Performance-based Planning and Programming (PBPP)?

- PBPP refers to the application of performance management within the planning and programming process to achieve desired performance outcomes for the multimodal transportation system.
- Includes a range of activities and products.
  - Development of long range transportation plans (LRTPs)
  - Federally-required plans and processes -- such as Strategic Highway Safety Plans (SHSPs), Asset Management Plans, the Congestion Management Process (CMP), Transit Agency Asset Management Plans, and Transit Agency Safety Plans
  - Other plans
  - Programming documents, including State and metropolitan Transportation Improvement Programs (STIPs and TIPs)



# Performance-Based Planning and Programming Guidebook

September 2013

 U.S. Department of Transportation  
Federal Highway Administration

Designed as a practical resource to help State DOTs, MPOs, and transit agencies understand

- What the key elements of a PBPP process are
- How they fit within existing planning and programming
- Highlights examples of effective practices

 U.S. Department of Transportation  
Federal Highway Administration

# Key Elements of Performance-Based Planning and Programming

- Goals and Objectives
- Performance Measures
- Identify Trends and Targets
- Identify Strategies and Analyze Alternatives
- Develop Investment Priorities
- Investment Plan
- Resource Allocation
- Program of Projects
- Monitoring, Evaluation, Reporting



**DATA  
PUBLIC INVOLVEMENT**

**PLANNING**

**Strategic Direction**

*Where do we want to go?*

Goals and Objectives

Performance Measures

**Analysis**

*How are we going to get there?*

Identify Trends and Targets

Identify Strategies and  
Analyze Alternatives

Develop Investment Priorities

Investment Plan

Resource Allocation

Program of Projects

**Programming**

*What will it take?*

Monitoring

Evaluation

Reporting

**Implementation and Evaluation**

*How did we do?*

**PERFORMANCED-BASED PLANNING AND PROGRAMMING**

# Programming – Developing Investment Priorities in the TIP/STIP

- Under a PBPP framework, programming of projects and strategies in the MPO and State Transportation Improvement Program (TIP/STIP) supports desired performance outcomes.
- The TIP/STIP communicate specifics of investments, funding sources, and how investments contribute to system performance improvements
- Linking the Long Range Transportation Plan (LRTP) and **other performance-based plans** with programming is challenging but a key a step



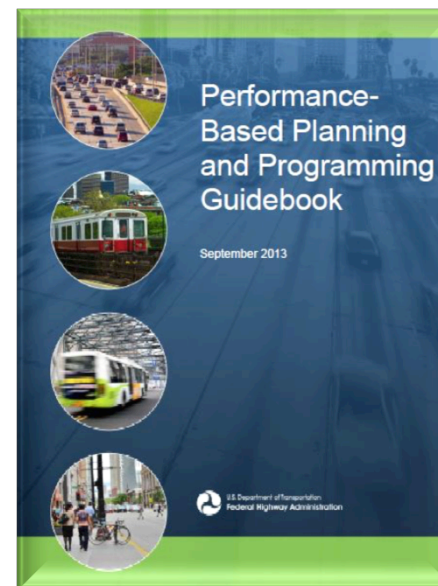
# Integrating Performance-Based Plans into the Planning Process

- Strategic Highway Safety Plans
- Transportation Asset Management Plans - Highway
- Congestion Management Process
- Transit Asset Management Plans
- Transit Safety Plans
- State Freight Plans



# Purpose of the Model Plan Guidebook

- ▶ Companion to the FHWA and FTA *Performance Based Planning and Programming Guidebook*
- ▶ Intended to provide detailed information about developing a performance-based statewide long-range or metropolitan transportation plan







MODEL LONG-RANGE  
TRANSPORTATION PLANS:  
*A Guide for Incorporating  
Performance-based  
Planning*

JUNE 2014

 U.S. Department of Transportation  
Federal Highway Administration

## Model Long-Range Transportation Plans: A Guide for Incorporating Performance- based Planning

- Identifies the key elements of a Performance Based Plan
- Aligns the Model Plan with other Performance Based plans
- Highlights examples of effective practices

# Key Elements of a Performance-based Plan

- ▶ Baseline information on the transportation system
- ▶ Goals and objectives
- ▶ ***Performance measures***
- ▶ ***Preferred trends and targets***
- ▶ ***System performance report***
- ▶ Forecasts of future conditions and needs
- ▶ Strategies and investments
- ▶ Financial plan

# Relationships Between LRTP and Other Performance-Based Plans

Performance Management Elements	Long Range Plan	Performance-Based Plans (SHSP, CMP, TAMP, etc.)
Goals/Objectives	Broad goals touching all areas	Drill down into the details of each goal, define meaningful objectives
Performance Measures	Limited number of high level measures	Additional measures to address objectives more thoroughly
Target Setting – Evaluate Programs, Projects & Strategies	Scenario analysis and tradeoff decisions across goals and measures	Identify & prioritize range of strategies. Define scenario bounds
Allocate Resources	Resource constrained targets and trends	Implementation plan (phasing and funding)
Measure, Evaluate and Report Results	Monitor and report system performance	Evaluate effectiveness for update cycle

# Questions or Comments?

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<http://www.fhwa.dot.gov/planning/pbp/>

[www.fhwa.dot.gov/map21](http://www.fhwa.dot.gov/map21)

[www.fhwa.dot.gov/tpm](http://www.fhwa.dot.gov/tpm)



U.S. Department of Transportation  
Federal Highway Administration



# **Performance Based Planning and Transportation Asset Management Plan New Mexico DOT**

**AASHTO/FHWA TAM Webinar #14:  
Linking TAM Guidance to the Planning Process  
February 11, 2015  
Tamara P. Haas, P.E.  
Asset Management & Planning Division Director**





# NMDOT Strategic Plan

## **Vision:**

*Set the standard for a safe, reliable and efficient transportation system*

## **Mission:**

*Provide for a safe and efficient transportation system for the traveling public, while promoting economic development and preserving the environment of New Mexico*





# Agency Goals

- + Preserve and Maintain the Infrastructure
- + Improve and Enhance Safety
- + Enhance Mobility
- + Enhance Economic Development and Customer Response



# TAM Implementation

- + Conduct TAM Self-assessment 12/2013 as part of NHI Course
- + Conduct TAM Gap Analysis through FHWA project
  - » Self-assessment survey
  - » Face to face interviews
  - » Implementation plan
- + Consultant contracts for TAMP & SLRP development





# Statewide Long Range Plan

## **Vision:**

*A safe and sustainable multimodal transportation system that supports a robust economy, fosters healthy communities, and protects New Mexico's resources and unique cultural heritage.*



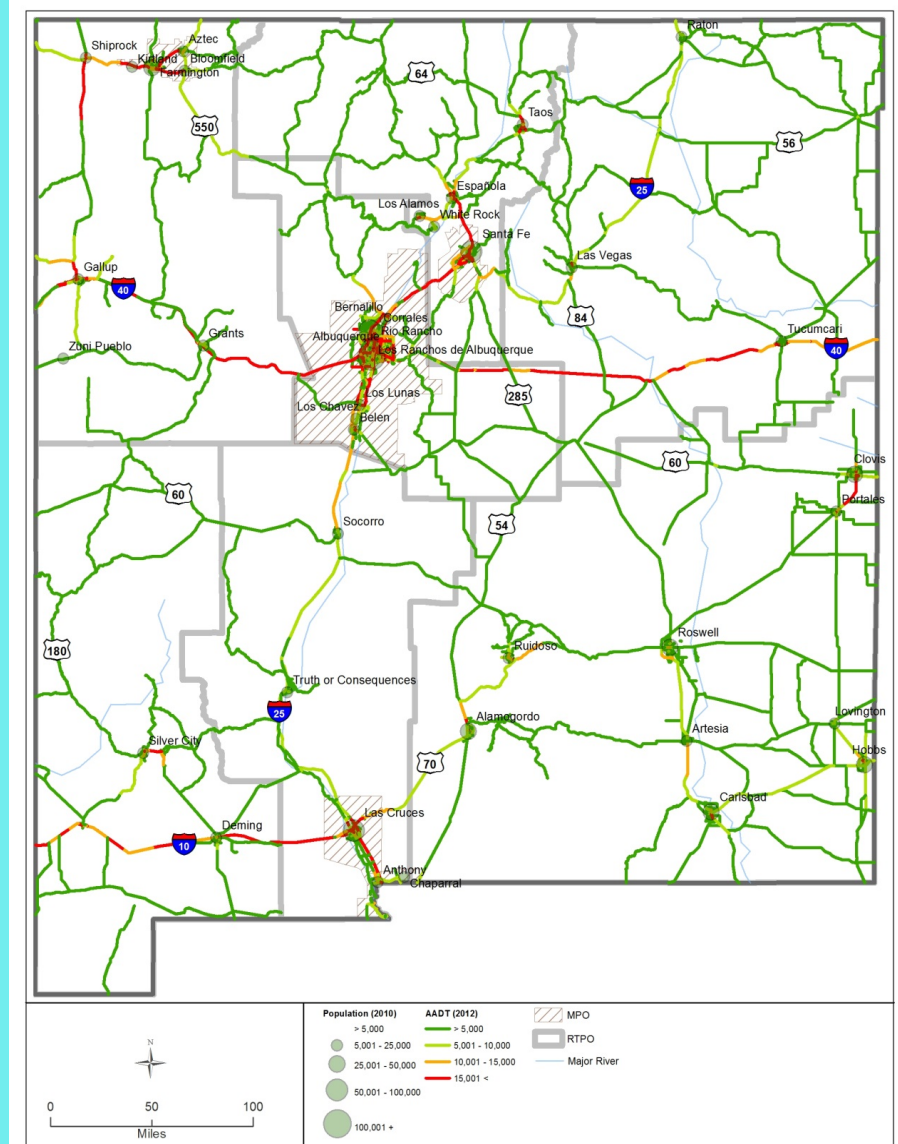


# Goal Framework



# Corridor Tiers

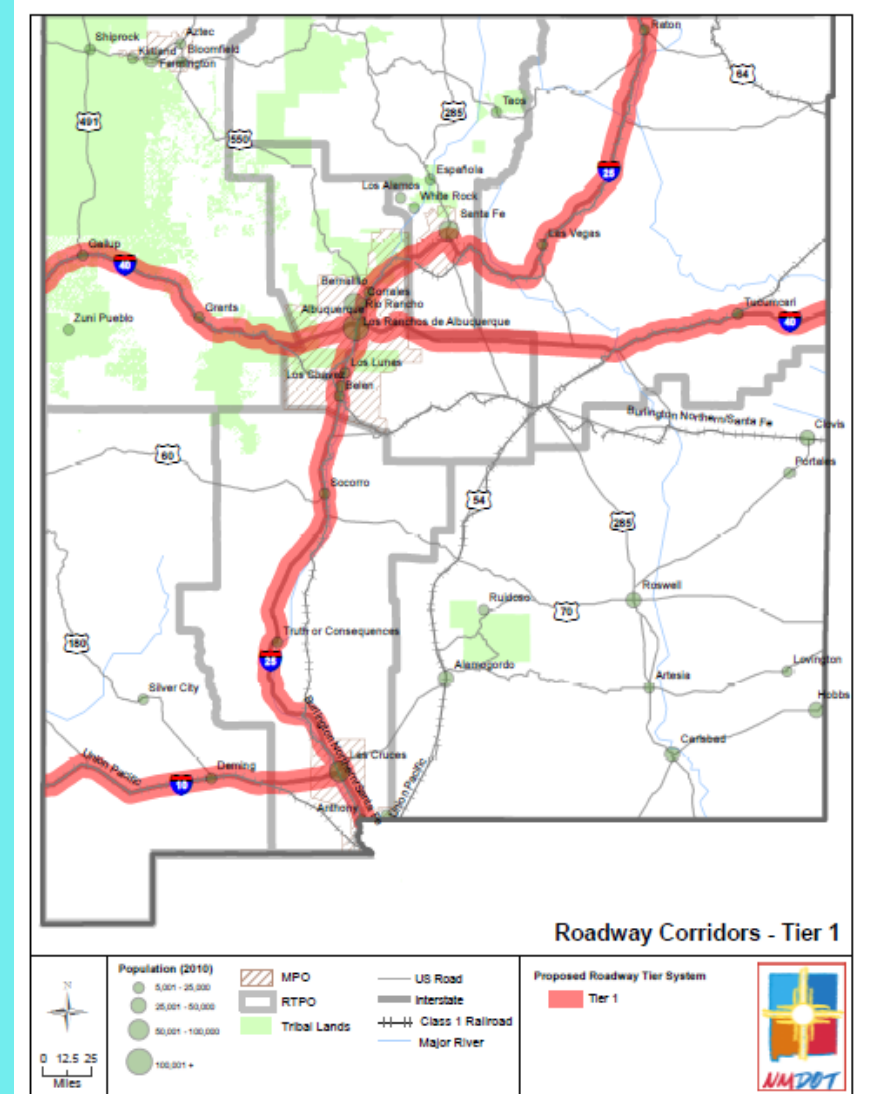
- ✦ Establish criteria for stratifying corridors
  - » Connectivity
  - » Travel demand
  - » Type of route
- ✦ Multimodal
  - » Highway,
  - » Rail – passenger and freight
  - » Air
- ✦ Define minimum performance standards
  - » By Tier
  - » By Mode





# Tier 1

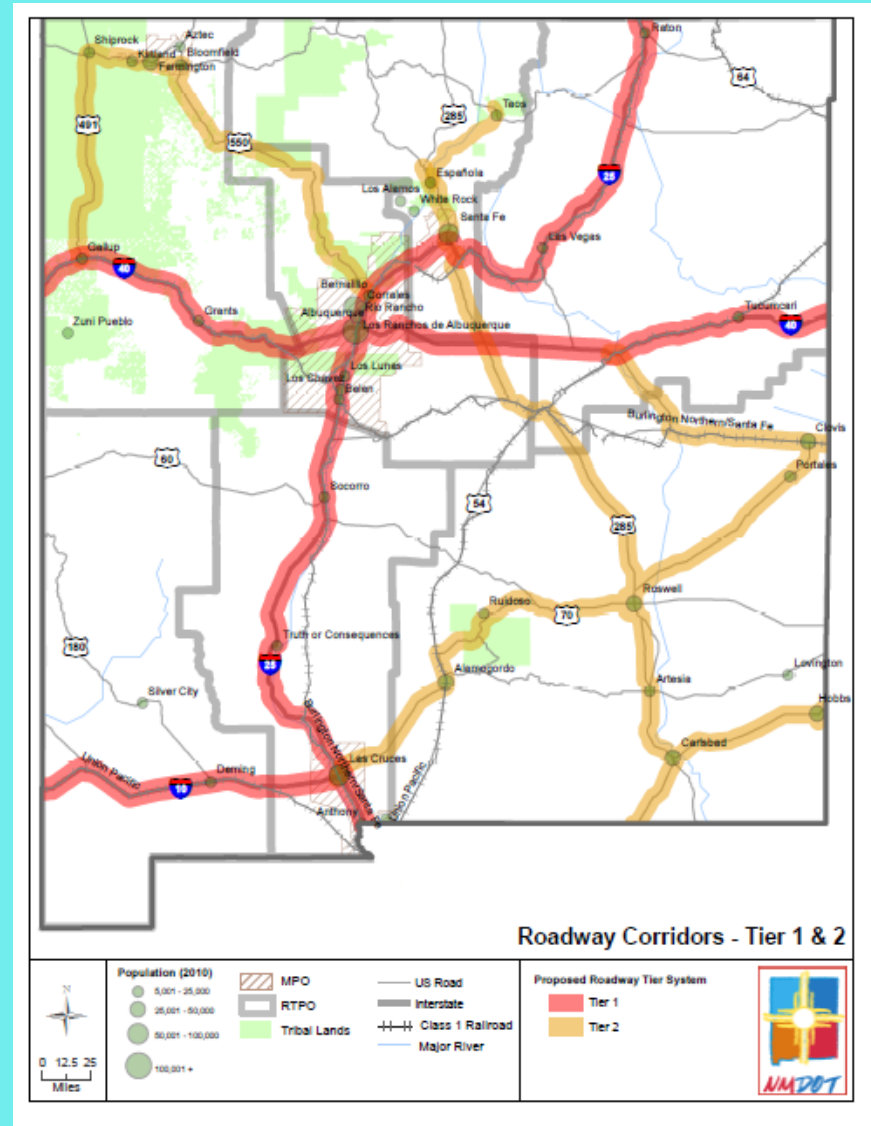
- ✦ Interstate and international connections
  - » Interstates
  - » Transcontinental railroads
  - » Sunport





# Tier 2

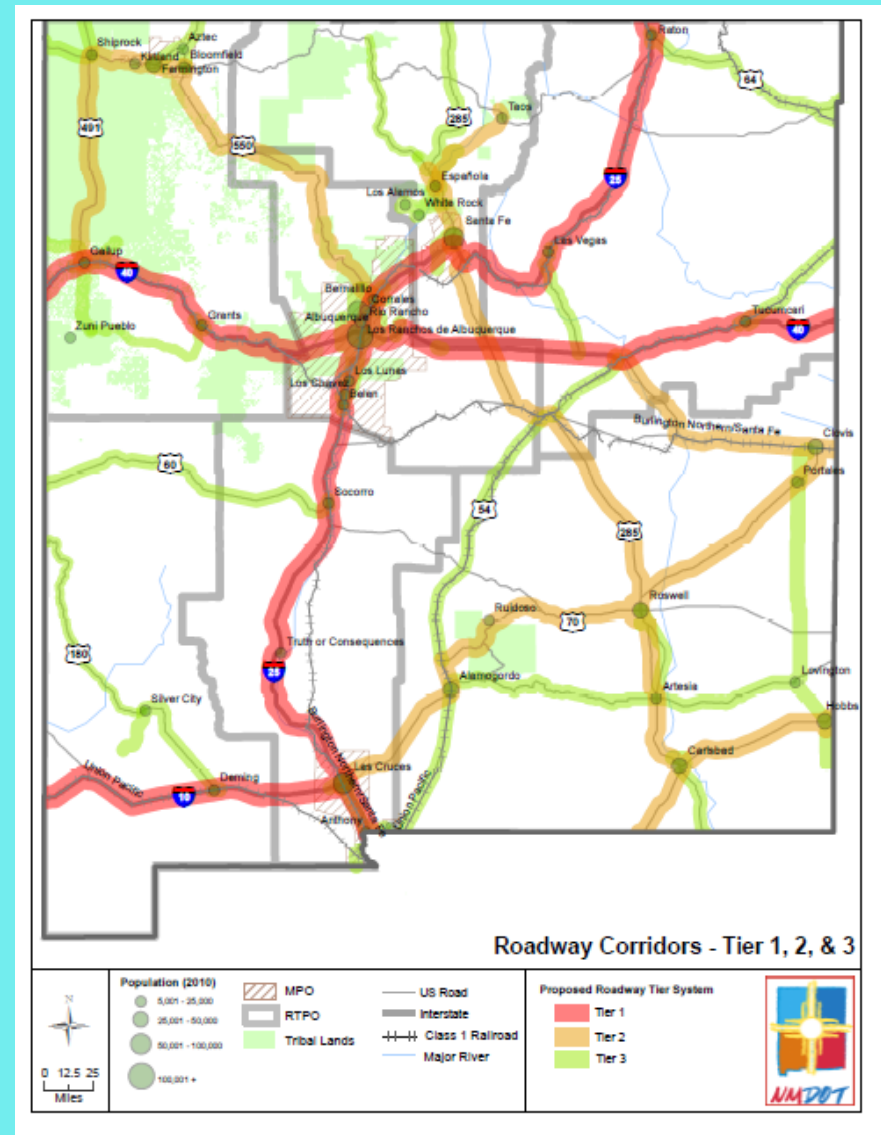
- + Connect cities of 20,000+
- + Average annual travel demand at least 10,000
- + Priority truck routes
- + Major tourist destinations





# Tier 3

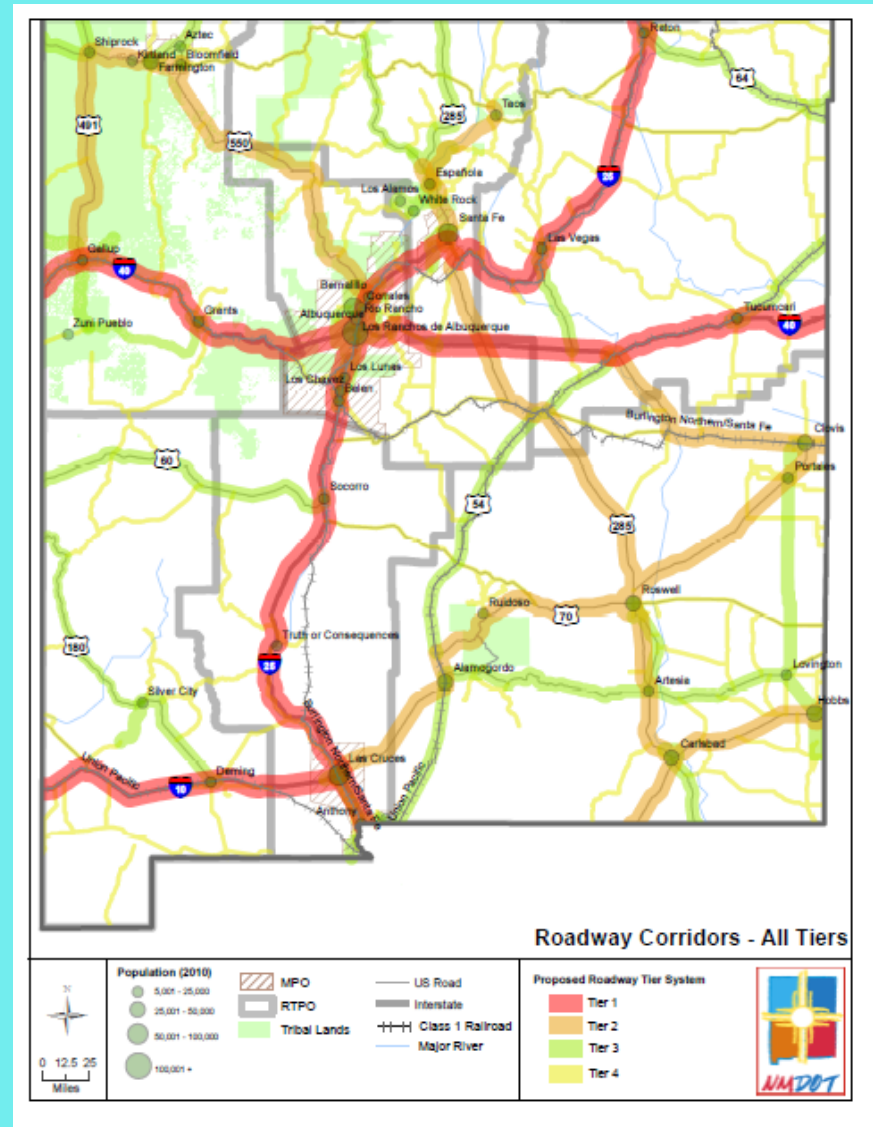
- + Connect cities of 10,000+
- + Average travel demand at least 5,000
- + Includes all remaining NHS roadways





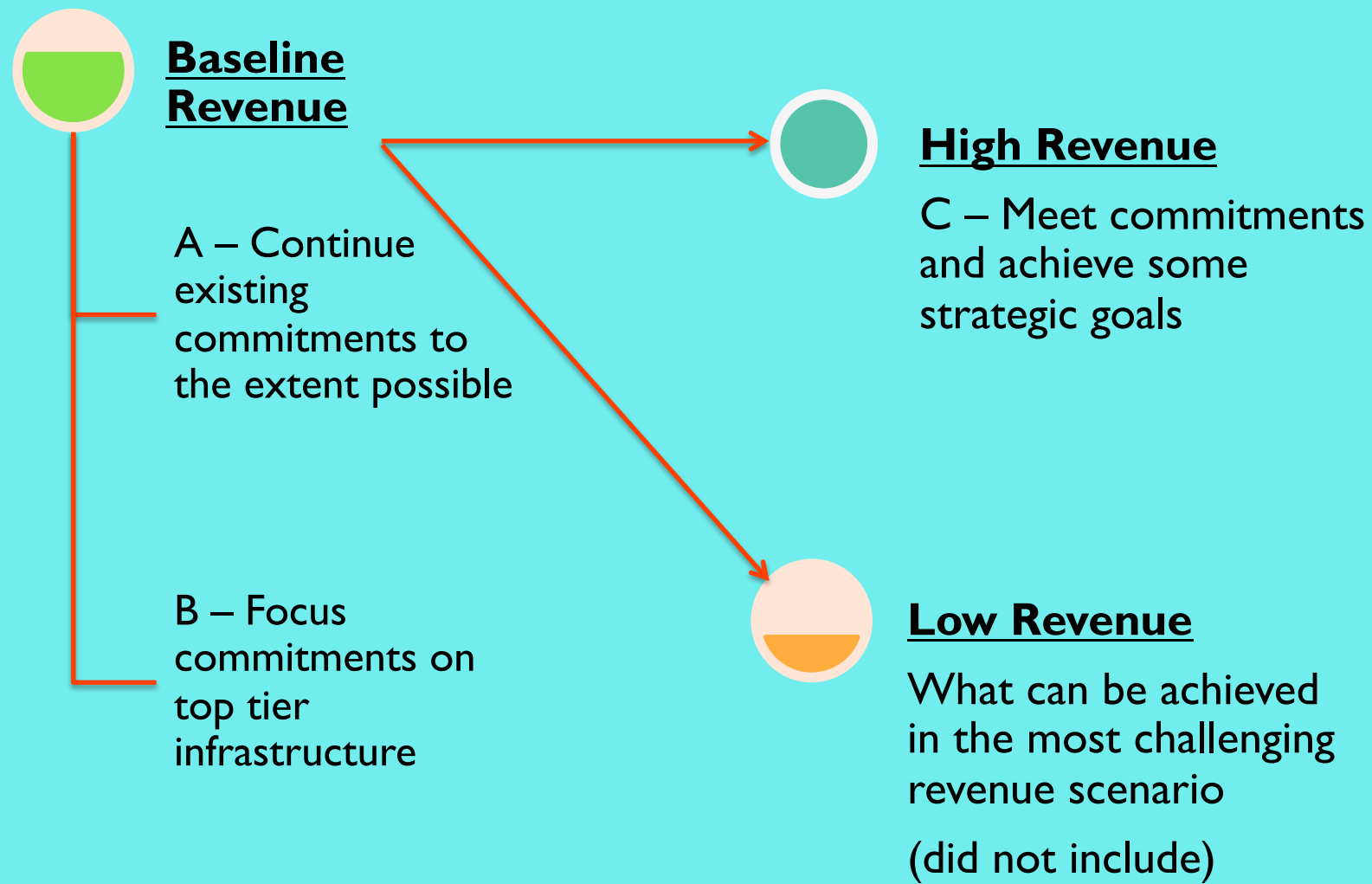
# Tier 4

+ All other roadways





# Introduction to Alternatives







# Overview of the Alternatives

- **Alternative “A”**
  - Trend Based on Current Practices
- **Alternative “B”**
  - Management + Focused Investment
- **Alternative “C”**
  - Aspirational Vision + New Revenues





# Alternative “A”

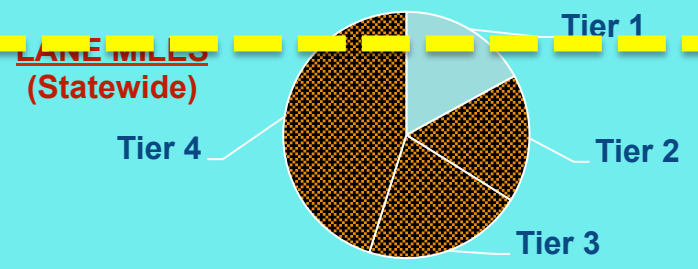
## Trend Based on Current Practices

Working to meet current commitments given revenue constraints

### NMDOT PRIORITIES

1. Safety:
  - ❖ Reduce fatalities and serious injuries through data-driven and innovative processes.
2. **State of Good Repair**: **Continue current level of investment to preserve and maintain highways and bridges in a state of good repair. Use historic approaches to identify needs and program funds.**

- ❖ Tier 1: “Silver” Standard
- ❖ Tier 2: “Bronze” Standard
- ❖ Tier 3: “Bronze” Standard
- ❖ Tier 4: “Bronze” Standard



3. Capital Investment in High-Demand Regions: Focus limited capital funds to address issues in regions with existing critical needs or experiencing the highest levels of demand (e.g., the border area, oil patch, etc.)





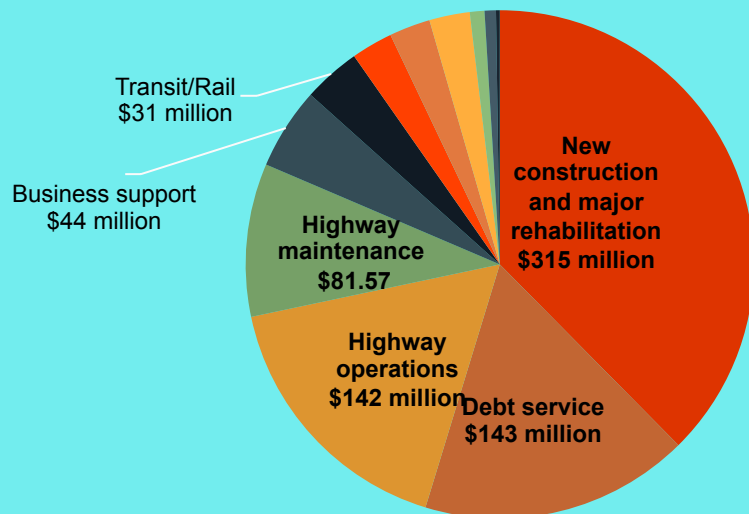
# Alternative "A"

## Trend Based on Current Practices

### Principal Advantages

1. Maintains existing commitments to the best of NMDOT's abilities given current practices.
2. Relies on tested and familiar approaches to funding, planning, and implementing projects.

Traffic Safety & Statistics = \$22 million  
 Local Government Road Fund = \$22 million  
 Programs and Infrastructure = \$22 million  
 Planning & Research = \$8 million  
 Aviation = \$6 million  
 Other = \$2 million



### Acknowledged Constraints

1. **May lead to deterioration in overall performance due to declining purchasing power of revenues (i.e., increasing costs).**
2. Does not address significant capacity deficiencies.
3. Minimal multimodal accommodation.
4. Limits flexibility to proactively address areas of strategic statewide need related to economic development, freight, safety, public health, etc.
5. Assumes no change in size, pay level, or composition of NMDOT work force to deliver current program more effectively.

**NMDOT's Current Budget**  
 (\$838 million per year)





# Alternative “B” Management + Focused Investment

*Improve management practices and prioritize investments in top tier corridors to enable greater focus on state of good repair, economic development and statewide priorities*

## NMDOT PRIORITIES

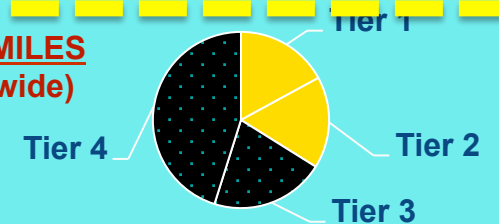
### 1. Safety and Public Health:

- ❖ Reduce fatalities and serious injuries through data-driven and innovative processes.
- ❖ Proactively address emerging transportation-related public health concerns (lack of physical activity and poor air quality) by increasing support for active transportation and transit.

### 2. State of Good Repair / Asset Management: Maintain highways and bridges in a state of good repair by applying a proactive, “preservation-first” asset management strategy.

- ❖ Tier 1: “Gold” Standard    Tier 3: ????
- ❖ Tier 2: “Gold” Standard    Tier 4: ????

LANE MILES  
(Statewide)



### 3. Enhance Capacity Through Better Operations and Demand Management:

Take an “operations and demand management first” approach to enhancing capacity instead of relying on scarce capital funds.

### 4. Strategic Investment in “Key” Corridors: Focus maintenance and capital improvement funds to support movement of people and freight (by car, bus, bicycle, foot, truck or train) along a limited number of “key” corridors (i.e., corridors with statewide, interstate, or international significance).

*Note: Studies indicate that applying proactive, preservation-first management strategies to assets provides significant reductions in life-cycle costs, allowing limited revenues to be redirected to other critical priorities.*





# Alternative “B”

## Management + Focused Investment

*Improve management practices and prioritize investments in top tier corridors to enable greater focus on state of good repair, economic development and statewide priorities*

### SUPPORTIVE POLICIES

- 1. Life-Cycle Cost Basis: NMDOT shall make all decisions regarding expenditure of capital funds based on analysis of the long-term, life-cycle cost of building, operating, and maintaining assets over time.**
- 2. “Operations and Demand Management First”: NMDOT shall exhaust all cost-effective operations and demand management strategies to address congestion prior to using capital funds to expand capacity.**
- 3. “Key Corridors First”: NMDOT shall prioritize expenditure of funds on key corridors (which shall be defined with respect to each mode of transportation).**

### BUDGET ASSUMPTIONS

- Transportation revenues remain flat, with purchasing power of dollars declining over time.*
- Asset management relieves some pressure on operating and maintenance budgets: Existing NMDOT programs continue to operate with current budget levels, but with somewhat more flexibility to respond to rising costs or address emerging needs.*
- Debt service commitment remains high through 2027: Debt service continues to average around \$142 million year, or approximately 17 percent of NMDOT’s annual budget (\$838 million).*
- Better management of operations provides some budgetary flexibility for additional discretionary spending.*
- Discretionary spending focuses on higher tier corridors and a more diverse set of transportation modes.*





# Alternative “C”

## Aspirational Vision + New Revenues

*Development of new revenue sources enables NMDOT to address strategic priorities without having to let go of current commitments*

1. Safety, Public Health, and Aging Population:

- ❖ Reduce fatalities and serious injuries through data-driven, innovative, and proactive processes.
- ❖ Prioritize safety improvements based on risk of potential future crashes, not just past crash history.
- ❖ Proactively address transportation-related public health concerns (lack of physical activity and poor air quality) by increasing support for active transportation and transit.
- ❖ Align transportation system more closely to serve the needs of New Mexico’s aging population.

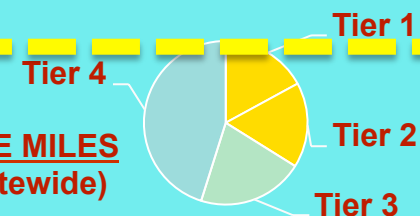
2. **State of Good Repair / Asset Management: Maintain all of NMDOT’s assets in a state of good repair by dedicating sufficient funds to achieve at least a “silver” standard for all roads, bridges, and other modal infrastructure and by applying a proactive, “preservation-first” asset management strategy.**

- ❖ Tier 1: “Gold” Standard    Tier 3: “Silver” Standard
- ❖ Tier 2: “Gold” Standard    Tier 4: “Silver” Standard

3. Enhance Capacity Through Better Operations and Demand Management:

Take an “operations and demand management first” approach to enhancing capacity instead of relying on scarce capital funds.

**LANE MILES (Statewide)**



4. Strategic Investment in “Key” Corridors: Focus capital improvement and maintenance funds to support movement of people and freight (by car, bus, truck or train) along a limited number of “key” corridors (i.e., corridors with regional, statewide, interstate, or international significance).

5. Strategic Investment in New Initiatives: Address proven statewide needs with new capital projects or programmatic initiatives using new revenue sources. (See list on the reverse side of this sheet for examples.)





# Alternative “C”

## Aspirational Vision + New Revenues

*Development of new revenue sources enables NMDOT to address strategic priorities without having to let go of current commitments*

### SUPPORTIVE POLICIES

**1. Life-Cycle Cost Basis: NMDOT shall make all decisions regarding expenditure of capital funds based on analysis of the long-term, life-cycle cost of building, operating, and maintaining assets over time.**

2. “Operations Management First”: NMDOT shall exhaust all cost-effective operations management strategies to address congestion prior to expanding capacity using capital funds.
3. “Key Corridors First”: NMDOT shall prioritize expenditure of funds on key corridors (which shall be defined with respect to each mode of transportation).
4. Require and respect local plans: NMDOT will target funds to support communities that develop local transportation plans and demonstrate the financial and administrative capacity to implement them successfully.

### BUDGET ASSUMPTIONS

- Transportation revenues increase based on one or more new sources of funds.*
- Operating budgets adjust to meet planning priorities. Existing programs continue to operate with augmented or redistributed funds to address new priorities successfully.*
- Better management of assets and operations/demand provides some budgetary flexibility.**
- Discretionary spending focuses on strategic investments across all transportation modes.*
- Debt service commitment remains high through 2027. Debt service continues to average around \$142 million per year or approximately 17 percent of NMDOT’s annual budget (\$838 million).*





# TAMP: Defining the Scope

## **Assets:**

Pavements

Bridges

## **Decision Making:**

Executive Steering  
Committee

TAM Working Group

## **Data Assessment & Infrastructure:**

PMS, MMS upgrade and integration





# TAM: Align the Organization

## + Team Alignment: Asset Management & Planning Division

- » Pavement Management & Design combined (PMS)
- » Data Management (HPMS)
  - Roadway Inventory Data
  - Crash Data
  - Traffic Count Data
- » GIS
- » Maintenance Management (MMS)
- » Planning
- » Research
- » Performance Management

## + Data Collection

- » Automated Data collection for pavement condition





# TAM: Align the Organization

✦ **Working Group** – responsible for assessing data, develop investment models, provide recommendations to ESC, TAM champions

- » Cross section of asset owners
- » District representatives
- » FHWA

✦ **Executive Steering Committee** – provide direction, final decision making, develop working group, executive champion

- » Deputy Secretary, Operations Director, Chief Engineer, AMP Division Director
- » FHWA





# TAM: The Future

Bridge &  
Pavement  
Modeling for  
Investment  
Choices

Preservation  
First

Life Cycle  
Cost Analysis

Data Driven  
Decision-  
Making

Financial  
Planning and  
Investment  
Analysis

MAP-21  
Compliant  
TAMP

Self-Service  
Data Portal





# QUESTIONS?

## + Contact Information



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# California Department of Transportation – SHOPP Pilot Project

FHWA/AASHTO TAM Webinar #14:  
Linking the TAM Guide to the Planning Process  
February 11, 2015

**Steve Guenther, California DOT**

# Overview

- Background and Driving Factors
- SHOPP Pilot Project
  - Improved and Transparent SHOPP Process
  - Decision Making Methodologies
  - Caltrans Pilot Approach

# Driving Factors for SHOPP Pilot Project

- MAP-21
- SSTI Report
- Caltrans Improvement Project (CIP)
- Caltrans Executive Board Committee on Asset Management
- California Senate Bill-486, “robust asset management plan to guide selection of projects...”

# PURPOSE OF PILOT PROJECT

Demonstrate how project selection ties into the new Mission/Vision/Goals/Objectives



- ✓ Enhance Accountability
- ✓ Enhance Transparency





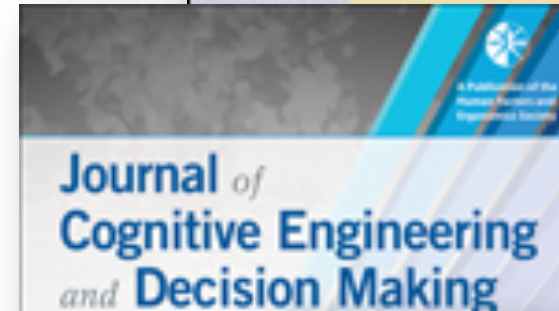
# Decision Analysis Software

The software interface is divided into several key sections:

- Sensitivity Analysis:** Allows users to adjust the weight of different criteria (e.g., Target Validation at 24.3%, Molecule Quality at 33.9%) to see how the overall ranking of alternatives changes.
- Alternatives Ranking:** Displays a horizontal bar chart where each bar represents a program (e.g., Program 8, Program 13) and its segments represent the contribution of different criteria to its total utility score.
- Results Comparison:** Uses a radar chart to compare multiple projects (Project 1-5) across three dimensions: Strategic value, Ease, and Cost.
- Test Project Results:** Shows a clear recommendation for 'Project C - 0.41' over other alternatives (B at 0.36, A at 0.23) for the 'Loren Turner' case study.
- Spreadsheet & Performance:** The main data table includes columns for Program Name, Performance, Budget, Safety, and Mobility. It also features a 'Recommended Resource Allocation' pie chart and a 'Set Performance Levels' table with columns for Goal, Vibe, and Pace.

# Decision Analysis

- *Decision Analysis* is an area of active study in operations research in business and management academic circles.
- A wide range of methods are employed by major companies to support business and financial decision making.
- Decision making tools can bring transparency to the project selection processes and maximize the value of a portfolio of projects.



# Multi-Criteria Decision Making Methods

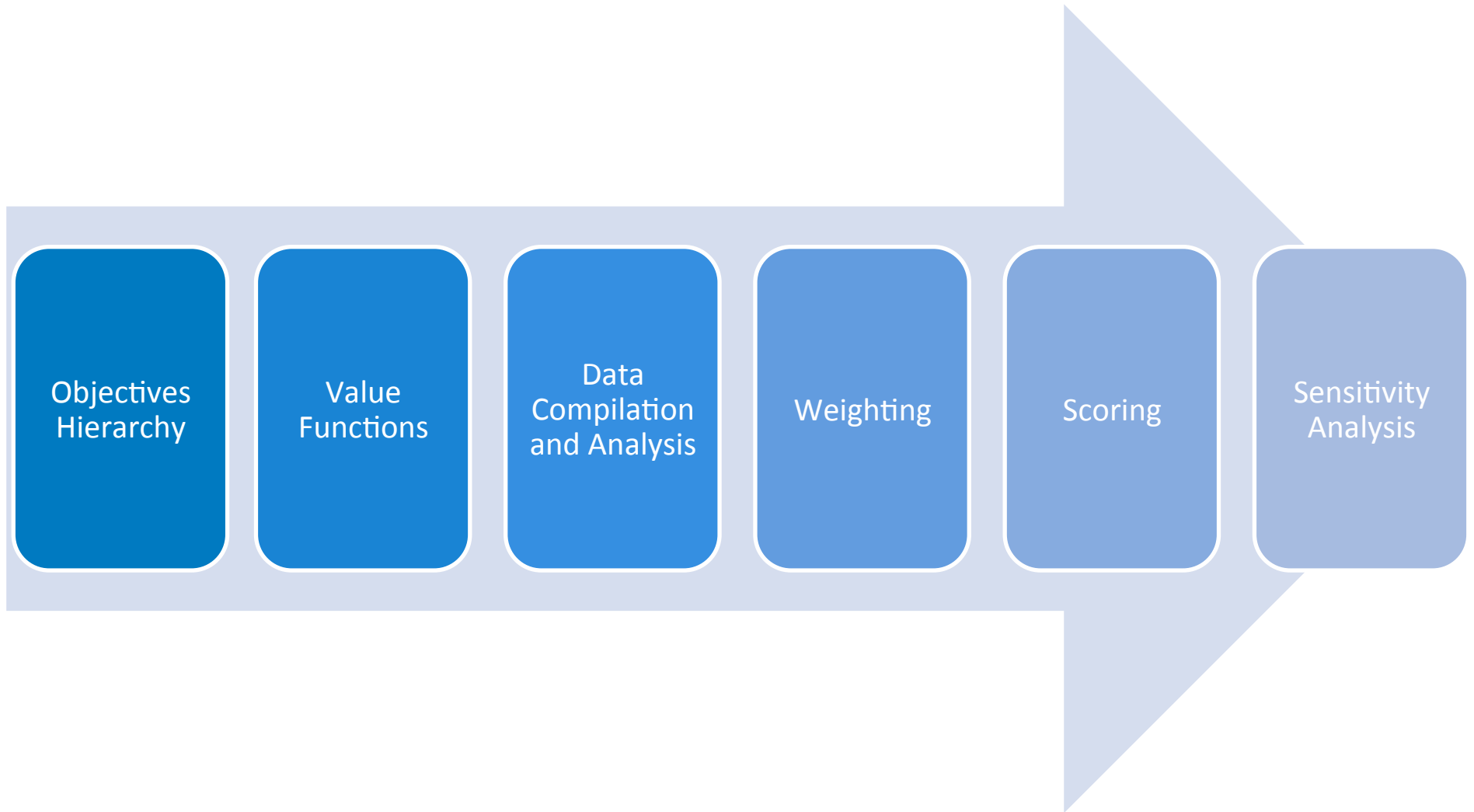
- Simple methods:
  - Equal Weighting
  - Weighted Sum Model (WSM)
  - Point Allocation
  - Direct Rating
  - Ranking
- Complex methods:
  - Multi-Objective Decision Analysis (MODA)
  - Aggregated Indices Randomization Method (AIRM)
  - Analytic Hierarchy Process (AHP)
  - Analytic Network Process (ANP)
  - Elimination and Choice Expressing Reality (ELECTRE)
  - Multi-Attribute Global Inference of Quality (MAGIQ)
  - Multi-Attribute Utility Theory (MAUT)
  - Potentially All Pair wise Rankings of All Possible Alternatives (PAPRIKA)
  - Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE)
  - Simple Multi-Attribute Rating Technique (SMART)

# SHOPP Pilot Project Timeline



- Core Team developed a pilot SHOPP project prioritization process using a Multi-Objective Decision Analysis (MODA) based framework.
- Initial guidance was provided by decision analysis experts (Consultation with Dr. Keeney, and Workshop with Dr. Merkhofer).

# MODA Framework



# Developing the Objectives Hierarchy and Value Functions; Identifying Data Sources

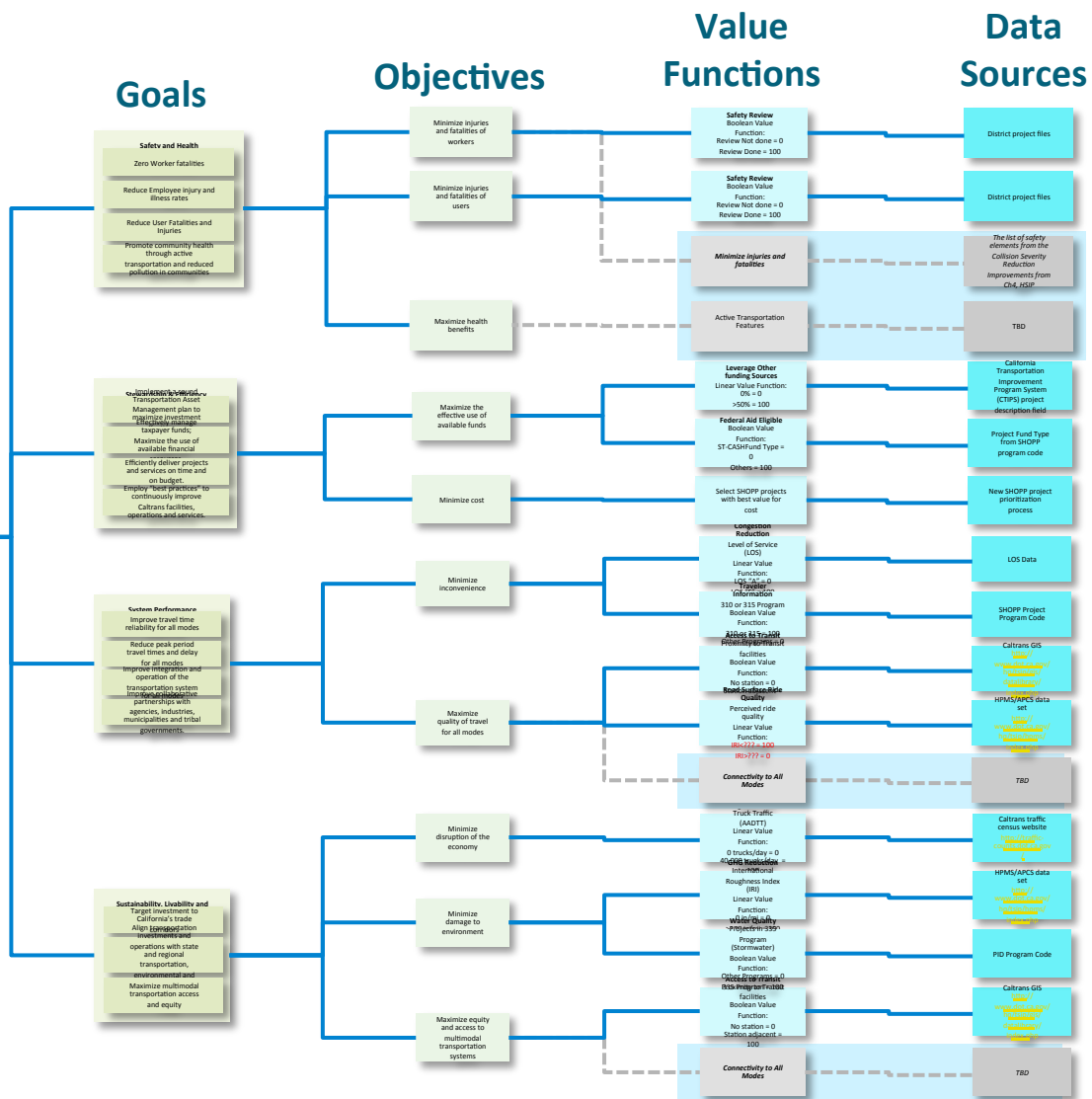
## Department Strategic Direction

### MISSION

Provide a safe, sustainable, integrated, and efficient transportation system to enhance California's economy and livability.

### VISION

A performance-driven, transparent, and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation and teamwork



# Next Steps

- Final Report (March 2015)
  - Recap Timeline
  - Decision Analysis Framework
  - Recommendations for moving forward
- Research Project
  - 12-18 months
  - Further in-depth analysis

# Thank you

[steve.guenther@dot.ca.gov](mailto:steve.guenther@dot.ca.gov)

California Department of  
Transportation

(916) 654-6076



# Questions?

- Submit your questions using the webinar's Q&A feature

# All webinars available online:

<http://tam.transportation.org/Pages/Webinars.aspx>

## Save the Dates!

A bimonthly webinar series, Wednesdays at 2:00 PM EST

### Webinar 15

**Lessons Learned from Developing a  
Transportation Asset Management Plan**

Wednesday, April 8, 2015 – 2:00 PM EST

### Webinar 16

**Transportation Asset Management Financial Plans: Part II**

Wednesday, June 10, 2015 – 2:00 PM EST



For more information or to register:  
<http://tam.transportation.org>