



**SHRP 2 Project L38 Pre-Kickoff Webinar**

# **Pilot Testing of SHRP 2 Reliability Data and Analytical Products**

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**Approach to Pilot  
Testing in Southern  
California**

**March 13, 2013**

## Background

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- The SHRP 2 Reliability projects have researched methods to help public agencies:
  - Collect and analyze data on the variability of travel time
  - Diagnose problems
  - Propose actions or alternative mitigation strategies
  - Test the impacts of solutions
- These products have the potential to fill a void
- Operational strategies are critical to improving mobility and travel time reliability
  - Implemented faster
  - Cost less than large expansion projects
- Traditional tools (including micro-simulation) cannot estimate the benefits of reliability projects
- It is time to test SHRP 2 products against real corridors, complex data sets, and even more complex political processes

# General Approach for Testing in Southern California

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- Practical, yet critical evaluation of products and concepts developed to date
- We are testing in conjunction with two public agencies:
  - Southern California Association of Governments (SCAG)
  - California Department of Transportation (Caltrans)
- Both agencies are already interested in and actively involved in analyzing travel time reliability
- By working with “advanced users,” we can test two aspects of the SHRP 2 products:
  - **Technical functionality** – How easy are the products to use? How consistent are they with each other and prior work?
  - **Practical use** – Do they help Southern California select and prioritize projects? Do decision-makers understand the reliability analyses and find the results credible?

# Caltrans is committed to system management

## Issue Areas

- Focusing on operational strategies
- Coordinating traffic operations with system planning
- Measuring benefits of operational strategies
- Developing corridor “playbooks”



# SCAG has adopted reliability as a performance measure for its Regional Transportation Plan (RTP)

## Background

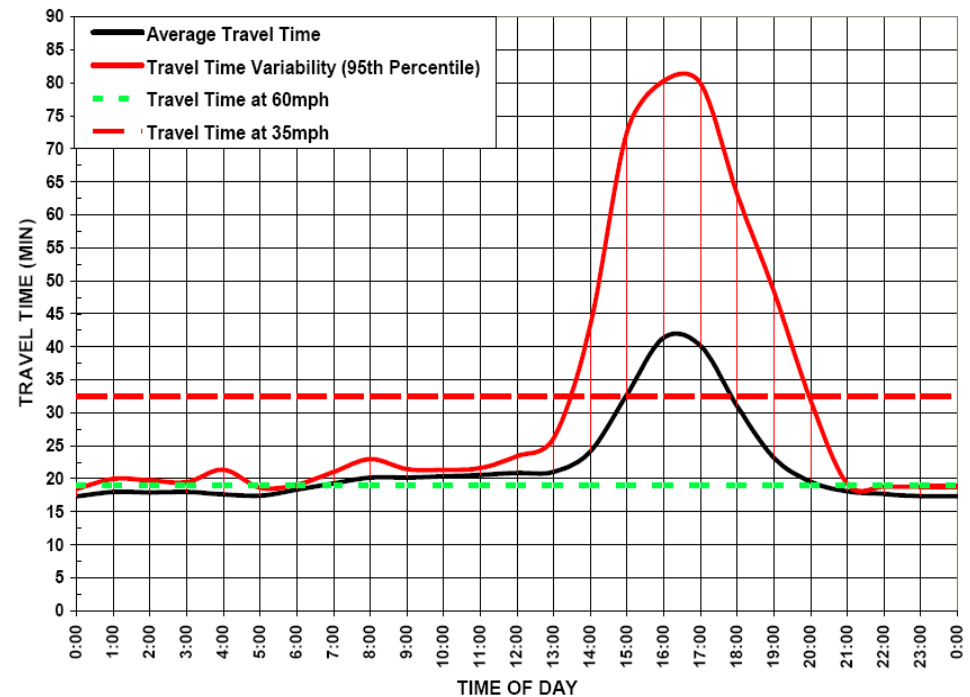
- Long history of performance-based transportation planning
- Recognition of importance of operational strategies
- 2012-35 RTP includes reliability goal with 10-percent improvement benchmark
- SCAG Board directed staff to work on further quantification of performance measures

### RTP Goals

- Align the plan investments and policies with improving regional economic development and competitiveness
- Maximize mobility and accessibility for all people and goods in the region
- Ensure travel safety and reliability for all people and goods in the region
- Preserve and ensure a sustainable regional transportation system
- Maximize the productivity of our transportation system
- Protect the environment and health for our residents by improving air quality and encouraging active transportation (non-motorized transportation, such as bicycling and walking)
- Actively encourage and create incentives for energy efficiency, where possible
- Encourage land use and growth patterns that facilitate transit and non-motorized transportation
- Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies

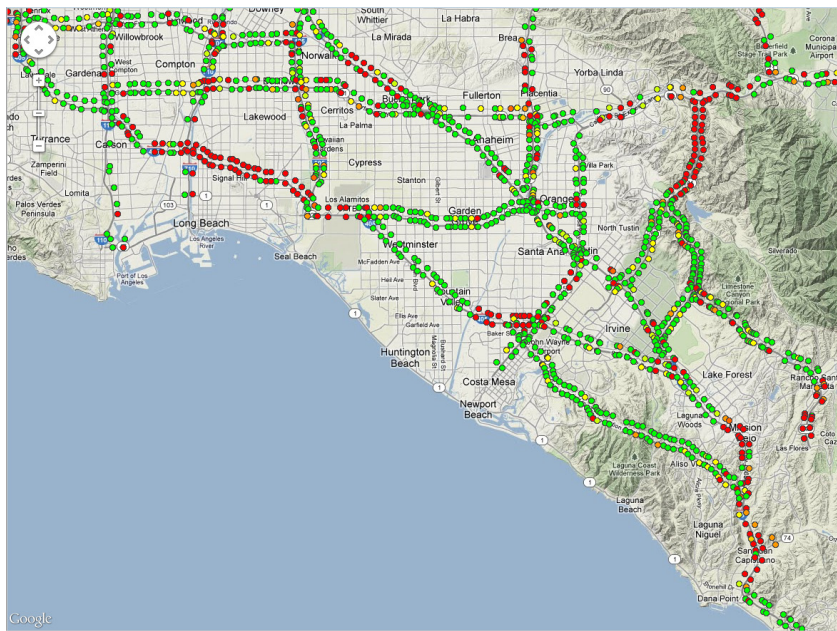
## Both agencies have invested significance resources into Corridor System Management Plans (CSMPs)

- Comprehensive performance assessments (includes baseline reliability)
- Corridor micro-simulation models
- Testing of capacity projects and operational strategies
- Benefit-cost assessments



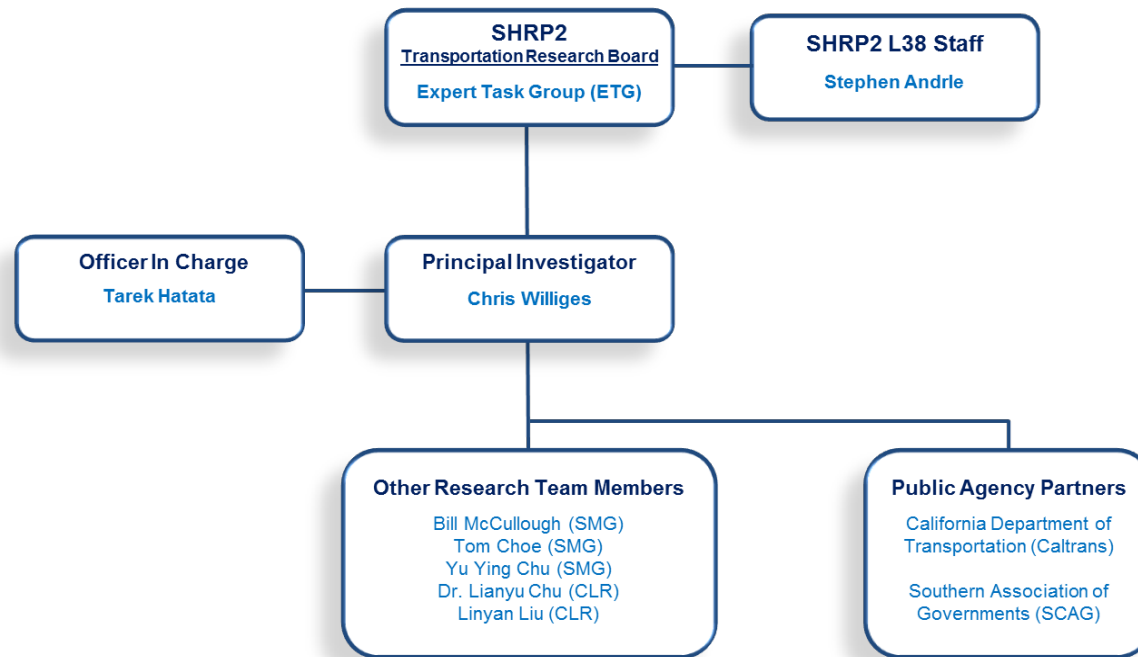
# Southern California Pilot Site

- Most congested region in the country
- Extensive detection coverage (PeMS)



- Complex organizational relationships and decentralized decision-making
  - 25/75 percent funding split between Caltrans and regional agencies
  - Self-help counties (e.g., Los Angeles county has 1.5% sales tax dedicated to transportation)
- Existing SCAG policy and technical committees to help facilitate feedback

# Pilot Site Project Team



- SMG and CLR Analytics will conduct much of the technical and analytical work
- We will work closely with our public agency partners
- As a planning and programming agency, SCAG will provide extensive input and feedback



## SCAG is playing a critical role in the testing

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- Helping to select corridors for the pilot test
- Reviewing work products and providing feedback as potential user of tools
- Coordinating/facilitating input from the larger stakeholders group using SCAG's existing policy and technical committee structure
  - Caltrans district offices
  - County transportation commissions
  - Elected officials

## General Steps for Pilot Test




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- Review corridors with existing CSMPs
- Compare corridor reliability, understand causes, and select one to two most promising corridors for reliability improvement
- Use SHRP 2 tools to develop more detailed, robust analyses of travel time reliability
- Leverage available micro-simulation models, travel demand models, detection, and automated sensor data collection
- Test recently programmed/planned projects and potential operational strategies
- Present results to SCAG policy and technical committees

**In the end, we hope to have better CSMPs and quantification of reliability for benefit-cost analysis and goal setting**

# Project Steps

Task #	Task Description	FY 12/13						FY 13/14									
		2013												2014			
		J	F	M	A	M	J	J	A	S	O	N	D	J	F		
1	<b>Attend One-Day Briefing (Kickoff)</b>																
	Attend a one-day briefing in Washington, D.C.																
2	<b>Prepare Revised Research Plan</b>																
	Revised Research Plan																
3	<b>Describe and Execute Data Compilation and Integration</b>																
	Data Compilation and Integration																
4	<b>Analyze Baseline Reliability and Alternative Strategies</b>																
4A	Prepare Analysis of Existing Conditions																
4B	Identify Alternative Strategies to Test																
4C	Analyze Impacts of Alternative Strategies																
4D	Conduct Benefit-Cost Analysis of Strategies																
5	<b>Prepare Interim Report</b>																
	Interim Report																
6	<b>Incorporate in Decision-Making Process</b>																
	Funding for Mitigating Strategies																
7	<b>Evaluate Functionality of Products and Outcomes</b>																
	Functionality of Products and Outcomes																
8	<b>Prepare Draft Final Report</b>																
	Draft Final Report																
9	<b>Revise Draft Final Report</b>																
	Final Report																
	<b>Progress Reports</b>																
	Progress Reports																

-  - Meeting
-  - Milestone/Deliverable
-  - Work Task

# Our initial work will be to select corridors for pilot testing from corridors with CSMPs



... and develop a better understanding of reliability

## **But, the majority of our effort will be spent on Task 4**

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Our approach is modeled on a use case (AE4 Assist in Planning and Programming Decisions) from the Project L02 Guidebook and is similar to the CSMP process

- Subtask 4A: Prepare Analysis of Existing Conditions
  - Travel Time Reliability Calculation
  - Data Imputation
  - Influencing Factor Analysis
  - Origin-Destination (OD) Perspective
  - Baseline Condition Estimation in SHRP 2 Tools
- Subtask 4B: Identify Alternative Strategies to Test
- Subtask 4C: Analyze Impacts of Alternative Strategies
- Subtask 4D: Conduct Benefit-Cost Analysis of Strategies

## **We have selected SHRP 2 products most applicable to corridor management planning in California**

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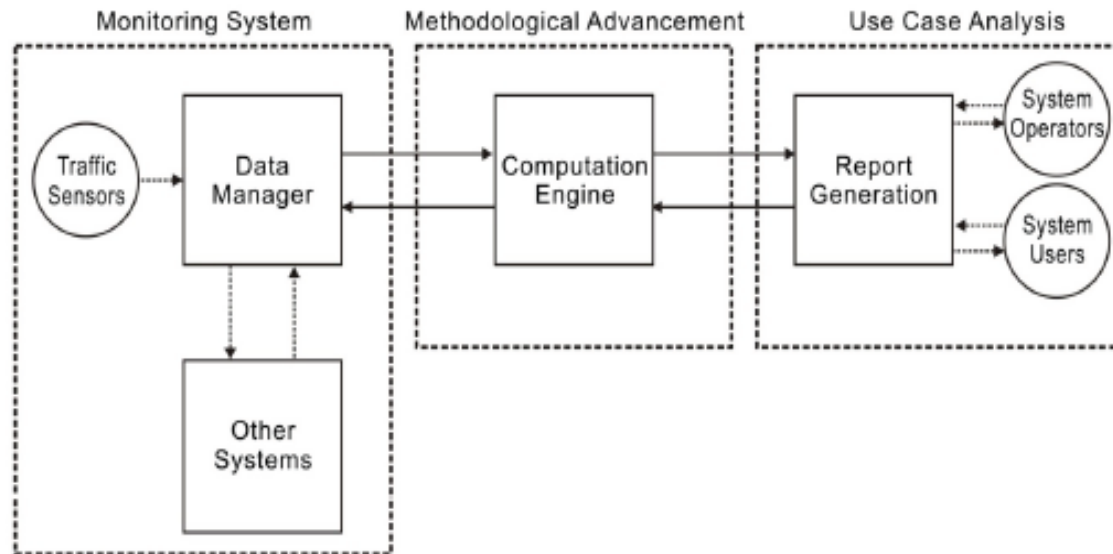
California planning activities that may be improved by SHRP 2 products:

- Development of CSMPs and operating “playbooks”
- Expansion of benefit-cost analysis (BCA) capabilities
- Goal setting for the Caltrans State Highway Operations and Protection Program (SHOPP) and SCAG RTP

## We plan to use products from several SHRP 2 projects

Type of Product	L02	L05	L07	L08	C11
Methods for Describing Reliability and Contributing Factors	✓				
Suggested Alternative Strategies and Design Features		✓	✓		
Tools for Forecasting Reliability and Estimating Impacts			✓	✓	✓
Benefit Estimates			✓		✓
Guidelines for Goal Setting		✓			

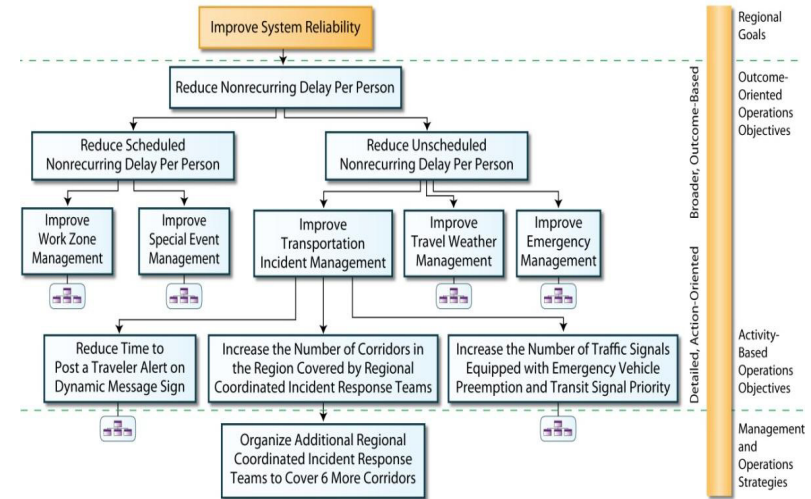
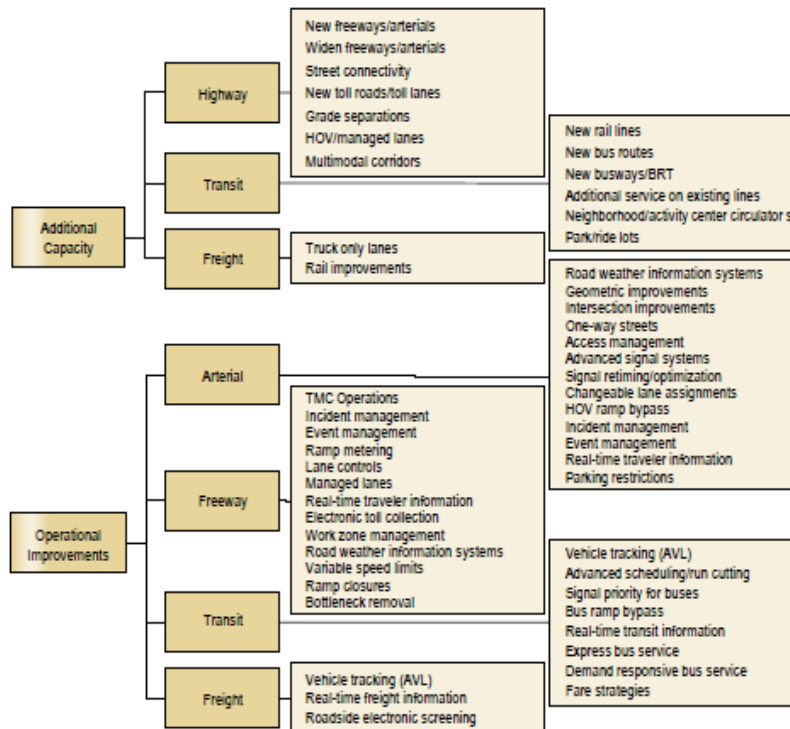
## Project L02 Procedures and Use Cases



Questions: Do the procedures and use cases help us identify the contributions of factors to reliability and better describe reliability conditions for a corridor?

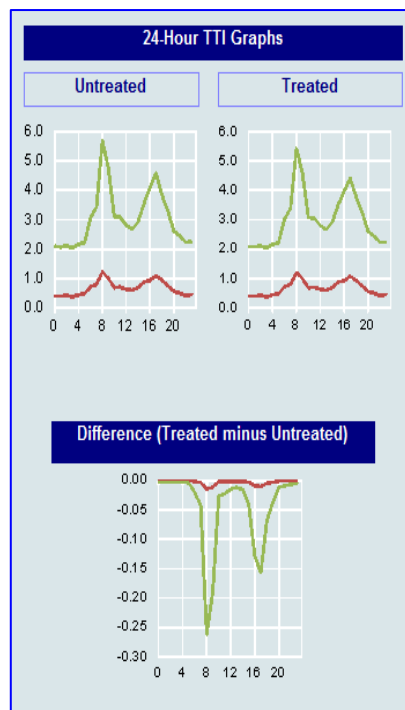


# Project L05 Strategy Identification and Goal Setting



Questions: Are the guidelines found in L05 helpful in choosing goals, setting benchmarks, and picking strategies?

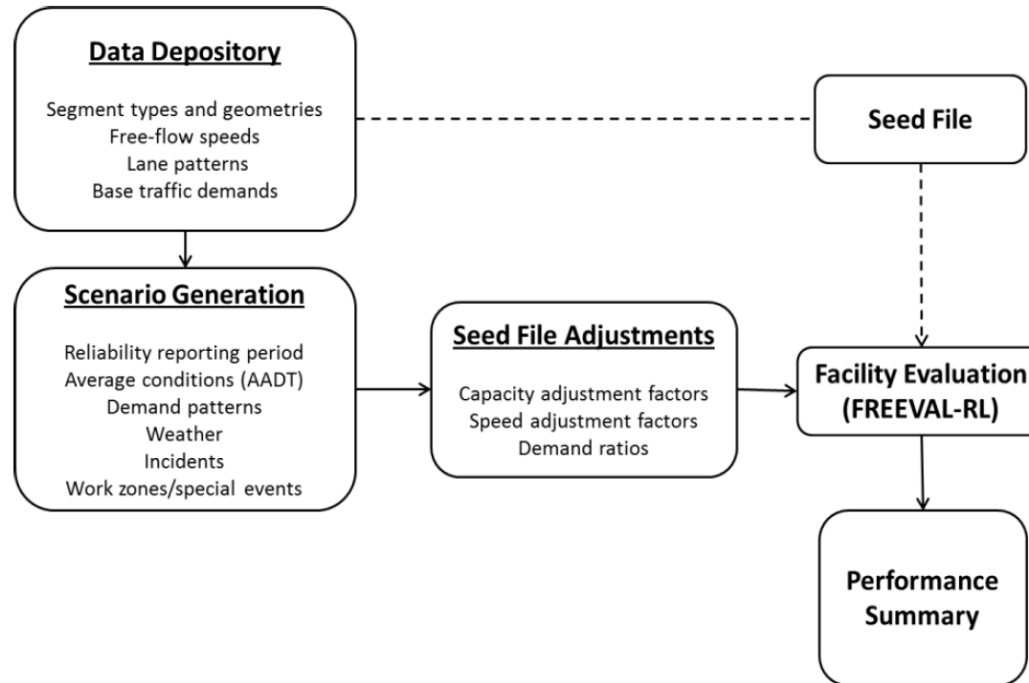
# Project L07 Spreadsheet Tool – Reliability Forecasting and Benefit Estimation



<b>Cost-Effectiveness</b>	
<b>Under Construction</b>	
Annual Delay Reduction, veh-hr	xxx
Standard Dev. Change Indicator	xxx
Annual Operational Benefit (AOB), \$	
VOT Component	\$xxx
VOR Component	\$xxx
Total	\$xxx
Annual Safety Benefit (ASB), \$	
Fatal/Inj Redux - Congestion	\$xxx
PDO Redux - Congestion	\$xxx
Fatal/Inj Redux - Treatment	\$xxx
PDO Redux - Treatment	\$xxx
Total	\$xxx
Total Benefit, \$	\$xxx
B/C Ratio	x.xx
Net Present Benefit	\$xxx

Questions: Is the tool easy to use? Does it produce meaningful results? How do the results compare to the baseline, micro-simulation models, and other SHRP 2 tools? Does the tool help Caltrans engineers pick effective design strategies as operations investments?

# Project L08 Highway Capacity Manual (HCM) Procedures



Questions: How well does the “data rich” FREEVAL-RL freeway methodology predict future reliability? Do the methods capture the benefits of operational projects likely to be tested in California? How do the results compare to the baseline, micro-simulation models, and other SHRP 2 tools?

# Project C11 Reliability Forecasting and Benefit Estimation

Compare with  
base conditions  
and simulations

Result Summary				
Current year - 2012	Baseline	Scenario 1	Scenario 2	Scenario 3
Overall mean TTI	1.24	1.50	2.41	2.01
TTI <sub>45</sub>	1.45	2.01	4.34	2.98
TTI <sub>30</sub>	1.38	1.75	3.21	2.42
TTI <sub>15</sub>	1.29	1.64	2.99	2.21
Pct. trips less than 45 mph	11%	12%	91%	86%
Pct. trips less than 30 mph	60%	6%	46%	37%
<b>Passenger</b>				
Recurring delay	2.58E-06	2.58E-06	2.58E-06	2.58E-06
Incident delay	3.85E-07	3.85E-07	3.85E-07	3.85E-07
Total equivalent delay	0.15	407.13	4757.96	1537.04
Recurring delay cost	\$3,664.15	\$3,664.15	\$42,821.67	\$13,833.34
Total delay cost	\$3,664.15	\$3,664.15	\$42,821.67	\$13,833.34
Reliability cost	\$3,664.15	\$3,664.15	\$42,821.67	\$13,833.34
<b>Commercial</b>				
Recurring delay	2.58E-06	2.58E-06	2.58E-06	2.58E-06
Incident delay	3.85E-07	3.85E-07	3.85E-07	3.85E-07
Total equivalent delay	0.15	407.13	4757.96	1537.04
Recurring delay cost	\$3,664.15	\$3,664.15	\$42,821.67	\$13,833.34
Total delay cost	\$3,664.15	\$3,664.15	\$42,821.67	\$13,833.34
Reliability cost	\$3,664.15	\$3,664.15	\$42,821.67	\$13,833.34
<b>Total</b>				
Recurring delay	5.16E-06	5.16E-06	5.16E-06	5.16E-06
Incident delay	7.70E-07	7.70E-07	7.70E-07	7.70E-07
Total equivalent delay	0.29	814.25	9515.93	3074.08
Recurring delay cost	7328.29	7328.29	85643.35	27666.68
Total delay cost	7328.29	7328.29	85643.35	27666.68
Reliability cost	7328.29	7328.29	85643.35	27666.68
Future year - 2022	Baseline	Scenario 1	Scenario 2	Scenario 3
Overall mean TTI	1.24	1.50	2.41	2.01
TTI <sub>45</sub>	1.45	2.01	4.34	2.98
TTI <sub>30</sub>	1.38	1.75	3.21	2.42
TTI <sub>15</sub>	1.29	1.64	2.99	2.21
Pct. trips less than 45 mph	11%	12%	91%	86%
Pct. trips less than 30 mph	60%	6%	46%	37%

Questions: Do the reliability results seem reasonable? Are they consistent with the predictions of micro-simulation models and other SHRP 2 tools? Can the tool be incorporated with existing Caltrans tools for benefit-cost analysis? Can other reliability estimates be substituted easily into the model?

## The final evaluation will focus on implementation

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### ➤ Technical Functionality

- Do the tools already developed provide reasonable results for a variety of improvement strategies focused on operations?
- Which tools were easier to use?
- What tools provided more reasonable results?
- What problems did the research team and agencies have using the different tools?
- What changes would we recommend for the tools and why?

### ➤ Practical Use

- How well does the work completed to date help SCAG and Caltrans better understand the causes of baseline reliability?
- How did technical staff at SCAG and Caltrans react to the work? Did it make sense to them? Was it too complicated to duplicate internally?
- How did the policy members react to the results? Would the results have changed project priorities? How willing were they to incorporate them into programming decisions in the near future?