

2022 California Transportation Asset
Management Plan

Risk Management Workshop – Day 1

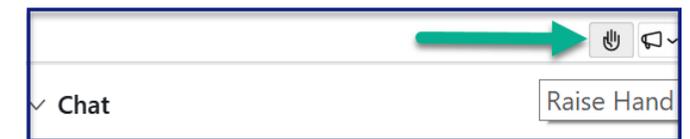
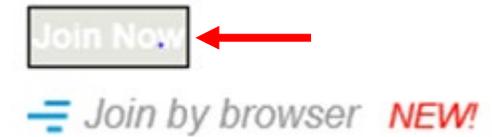
June 23, 2021

Michael B. Johnson
State Asset Management Engineer
Caltrans, HQ Asset Management



Workshop Quick-Guide

- When joining the workshop, if you clicked on the new “Join by browser” **you will not have sound**. You will need to re-join the webinar by clicking on “Join Now”
- The workshop will be recorded and posted on the Caltrans Asset Management webpage
- Use the Chat to “Everyone” feature to submit questions. We will respond to questions during the workshop as well as a Q&A at the end of the presentation
- Use the “Raise Hand” feature if you would like to communicate with Host. Click the hand again to “Lower Hand”
- If you need technical assistance with the workshop or have questions later, you can submit questions via email to: CT-TAM@dot.ca.gov



Agenda – Day 1

- 1:00 P.M. Welcome & Overview
- 1:10 P.M. Understanding TAMP Risk Management
- 1:35 P.M. Risk Identification & Assessment
- 2:35 PM Risk Management through the 5 T's
- 2:55 P.M. Closing Remarks
- 3:00 P.M. Informal Time for Additional Questions



2022 TAMP Workshop Series

We are Here!

Kick-Off
the 2022 TAMP
(April)

TAMP Fundamentals
Workshop #1
(April)

Financial Planning
Workshop #2
(May)

Risk Management
Workshop #3
(June)

Investment Strategies
Workshop #4
(July)

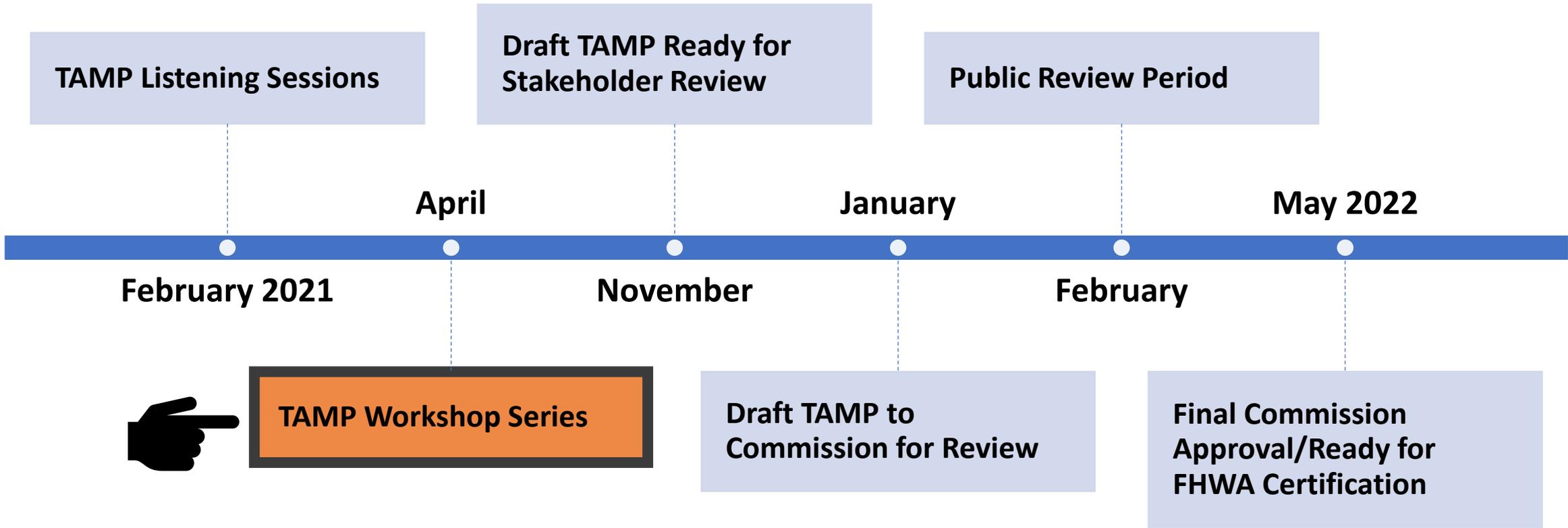
Revisiting Performance
Targets
Workshop #5
(August)

Process Improvements
Workshop #6
(September)

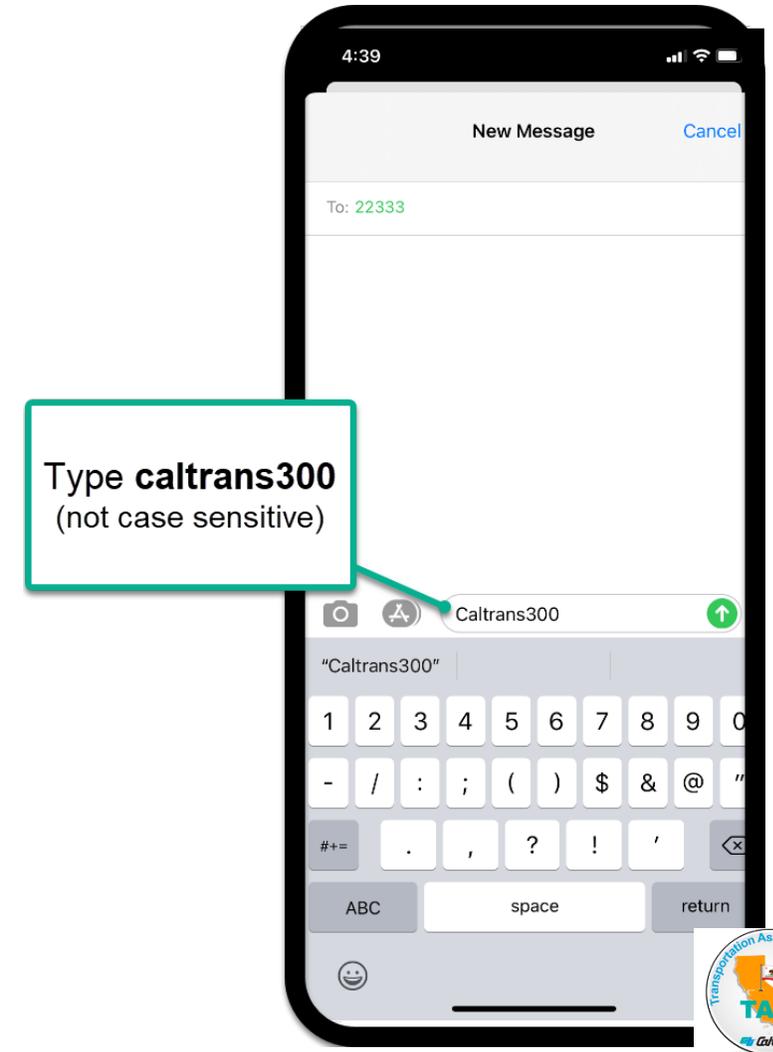
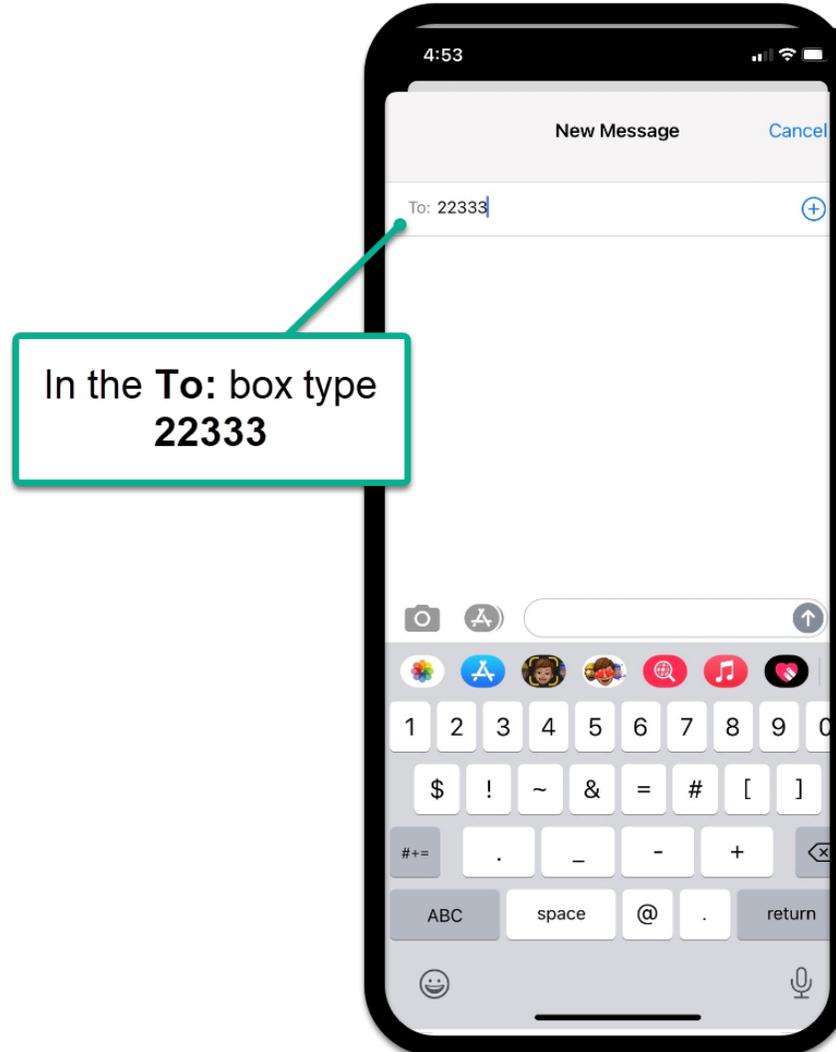
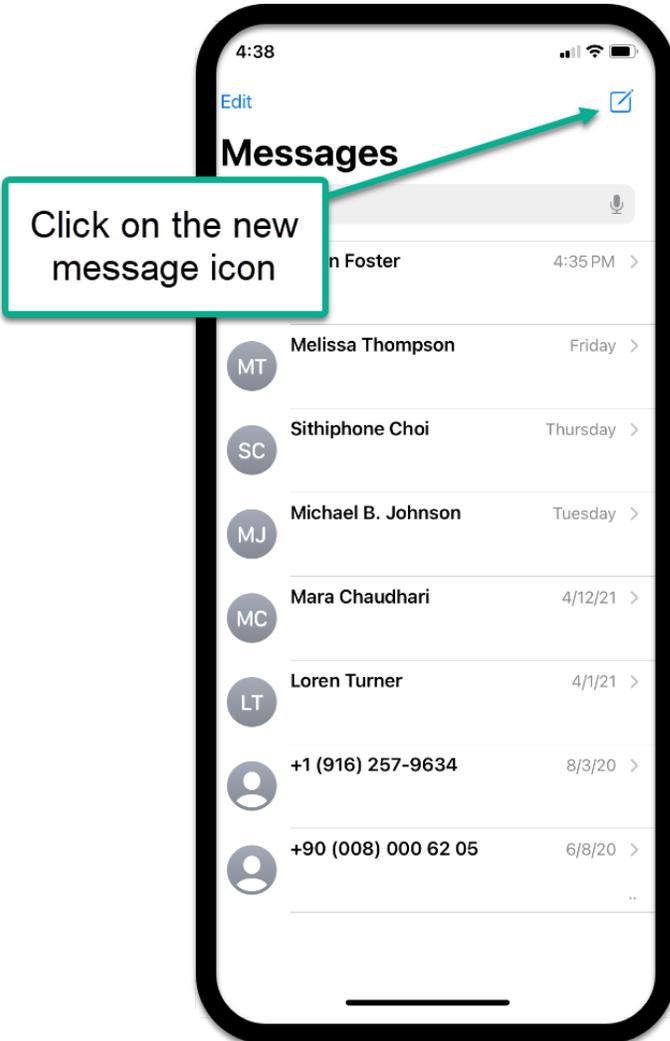
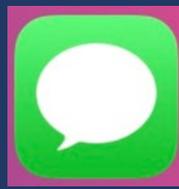
Draft TAMP Completed
(November/December)



2022 TAMP Schedule



Poll Instructions





Risk Management Overview

Michael B. Johnson

State Asset Management Engineer

HQ Office of Asset Management, Caltrans

Defining Risk Management

(in the context of transportation asset management)



RISK MANAGEMENT

“The processes and framework for managing potential risks, including identifying, analyzing, evaluating, and addressing the risks to assets and system performance.”

23 CFR § 515.6

Defining Risk Management

(in the context of transportation asset management)

Components:

- Likelihood
- Consequence
- Type/nature of risk

RISK

“Possibility of loss or injury.”

Merriam-Webster Dictionary



Why Consider Risks in a TAMP?

- Stuff happens
 - Wide variety of risks
 - The future is uncertain
- Public agencies are necessarily risk-averse
 - Not simply trying to maximize performance
- Considering risks results in more realistic plans



Source: David Royal
– Monterrey Herald



Source: REUTERS/
Kim Kyung-Hoon



Source: FHWA

Required Risk Management Process

- Identification of risks that can affect condition of NHS pavements and bridges and the performance of the NHS
- Assessment of the identified risks in terms of the likelihood of their occurrence and their impact and consequence if they do occur
- Evaluation and prioritization of the identified risks
- Mitigation plan for addressing the top priority risks
- Approach for monitoring the top priority risks
- Summary of the evaluations of facilities repeatedly damaged by emergency events

Example Risks from the Rule (23 CFR § 515.7)

- Risks associated with current and future environmental conditions, including but not limited to:
 - Extreme weather and climate change
 - Seismic activity
 - Risk related to recurring damage based on separate analysis
- Financial risks such as budget uncertainty
- Operational risks such as asset failure
- Strategic risks such as environmental compliance

Additional Notes

****Risk assessment should be considered in developing the TAMP financial plan and investment strategies**



Risk Mitigation Strategies

- Treat (Mitigate):
 - take actions to reduce risk likelihood and/or consequence
- Tolerate (or Accept):
 - acknowledge risk but take no action
- Terminate (or Avoid):
 - eliminate the threat entirely
- Transfer (Ownership Change):
 - shift ownership and impact of a risk to another party
- Take Advantage (Opportunity):
 - positive effect if risk materializes



Risk Management Requirements 23 CFR 667

- A separate analysis is required of facilities damaged repeatedly due to emergency events
- This analysis should inform the risk management process
- It goes beyond the TAMP and includes separate evaluation of projects programmed in the STIP
- TAMP must include NHS locations. Non-NHS is optional
- Must use reasonable efforts to obtain data to identify repeatedly damaged facilities
- Caltrans evaluated projects funded by federal Emergency Relief dollars from years 2006 to 2020 on both State and Local system

Challenges in Evaluating Risk

- Numerous factors impacting how we perceive risks
 - Immediacy of effect
 - Degree of control over the risk
 - Chronic-catastrophic (size of population exposed to the risk)
 - Common-dread (emotional response to the risk)
- And a number of factors tend to introduce bias
 - Availability
 - Overconfidence
 - Desire for certainty

• Source: Adapted from Slovic, et.al., "Facts and Fears: Understanding Perceived Risk," in *Societal Risk Assessment*, 1980



Levels at Which Risks are Identified

Enterprise

Enterprise: Risks to the organization's strategic objectives, or which involve multiple levels.

Responsibility: Senior executives, policy makers.

Program

Program: Risks that are common to groups of projects that achieve strategic goals.

Responsibility: Program managers.

Project

Project: Risks that are specific to individual projects.

Responsibility: Project managers.

Activity

Activity: Risks that are specific ongoing functions that support programs or projects.

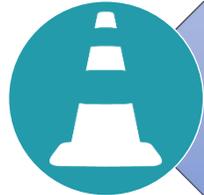
Responsibility: Activity managers.



California TAMP Risk Categories



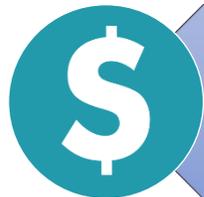
Asset
Performance



Highway Safety



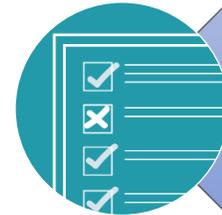
External Threats



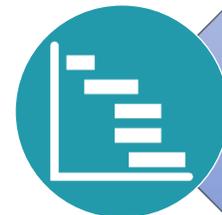
Finances



Information and
Decision Making



Business Operations



Project and Program
Management



Description	Elements of Risk Management
<p>Risks associated with asset failure, which can include:</p> <ul style="list-style-type: none">• Structural• Capacity or Utilization• Reliability or Performance• Obsolescence• Maintenance or Operation	<ul style="list-style-type: none">➤ Consistently documented inspection programs➤ Documented allocation of funding for repair and maintenance➤ Documentation of competing resource demands➤ Determined intervention levels➤ Prioritization actions and documented reasoning

Risk Category 2: Highway Safety



Description	Elements of Risk Management
<p>Risks to highway safety related to the asset management program:</p> <ul style="list-style-type: none">• Highway crash rates, factors and countermeasures• Safety performance of assets, maintenance and rehabilitation treatment options• Safety in project selection, coordination and delivery	<ul style="list-style-type: none">➤ Safety focused asset management programs➤ Network screening for safety hotspots for consideration within asset maintenance, rehabilitation or upgrade programs➤ Consideration of safety benefits/costs in asset management decision making➤ Safety related product evaluation Prioritization actions and documented reasoning

Risk Category 3: External Threats



Description	Elements of Risk Management
<p>External threats include both human-induced and naturally occurring threats, such as:</p> <ul style="list-style-type: none">• Climate change• Extreme weather• Seismic events• Terrorism or accidents• Paradigm shifting technologies	<ul style="list-style-type: none">➤ Incorporate potential impacts of environmental conditions and new technologies into long term planning➤ Identify and inventory external risks to existing infrastructure➤ Infrastructure inspection, replacement or retrofit programs to mitigate risks➤ Operational and emergency response programs➤ Processes to incorporate resiliency into design standards

Risk Category 4: Finances



Description	Elements of Risk Management
<p>Risks to the long term financial stability of the asset management programs, including:</p> <ul style="list-style-type: none">• Unmet needs in long-term budgets• Funding stability• Exposure to financial losses	<ul style="list-style-type: none">➤ Programs to forecast changes in revenue and costs➤ Programs to maximize available fund sources for asset management➤ Exploration of innovative financing opportunities for asset management programs➤ Exploration of innovative technologies to reduce maintenance and operational costs

Risk Category 5: Information and Decision



Description	Elements of Risk Management
<p>Risks related to the asset management program include:</p> <ul style="list-style-type: none">• Lack of critical asset information• Quality of data, modeling or forecasting tools for decision making• Security of information systems	<ul style="list-style-type: none">➤ Enterprise data management programs and strategies➤ Robust information technology solutions emphasizing risk prevention, preparedness and recovery➤ Programs to address model risks (e.g. premature failure of pavement due to underestimation of truck loading)

Risk Category 6: Business and Operations



Description	Elements of Risk Management
<p>Risks due to internal business functions associated with asset management programs, such as:</p> <ul style="list-style-type: none">• Employee safety and health• Inventory control• Purchasing and contracting	<ul style="list-style-type: none">➤ “Safety first” culture within asset management programs – routine safety meetings, documented safety and standard operating procedures, workforce training, etc.➤ Robust systems and tools for work force, equipment, inventory, and contract management to reduce risks of theft, misuse, unnecessary storage or inaccurate estimates of program costs

Risk Category 7: Project and Program Management



Description	Elements of Risk Management
Project and program management is a very mature area in U.S. transportation sector	➤ Many programs and products exist here – extensive discussion of these risks and related programs, policy and procedure is likely not necessary

Assessing NHS Risks: Getting Started

- There are well defined approaches for quantifying and assessing risk, but...
- Formal approaches tend to be time-intensive and data hungry
- State of the practice is to
 - Establish formal programs for addressing common risks
 - Develop a risk register identifying risks to the NHS outside of existing programs
 - Assess risks based on expert judgment
 - Define mitigation strategies for risks deemed to be of highest priority



Risk Management Process & Documentation

Dawn Foster
TAMP Manager
HQ Office of Asset Management, Caltrans

ISO 3100 Risk Management Process



Source: NCHRP Project 20-24(74) Research Report, 2011

Risk Register Overview

- A risk register is a document that list risks with information on each, including
 - Identifying information
 - Risk statements
 - Likelihood and consequence
 - Potential mitigation actions
- The register can include threats and opportunities but we are primarily concerned with threats
 - Threats trigger mitigation needs

Risk Register Continued

- A risk register is a simple spreadsheet or matrix that summarizes an organization's risks, how they are analyzed, and records how they will be managed.
- Risk registers can be customized for any organization. The risk register also can include a summary of how the risks will be managed, and by whom.
- The California TAM risk register uses a simple table format to capture risks, illustrate their estimated likelihood and impact, and record risk mitigation strategies and actions.

Constructing Risk Statements

- If “X” then “Y”
- “X” should be a specific event
- “Y” should be an impact that may result in California not meeting the objectives of the TAMP
- Example:
 - If allowable truck weights increase, then we may need to divert funds to strengthening bridges.
 - X = “allowable truck weights increase”
 - Y = “we may need to divert funds to strengthening bridges”

Example Risk Register

Risk Identification

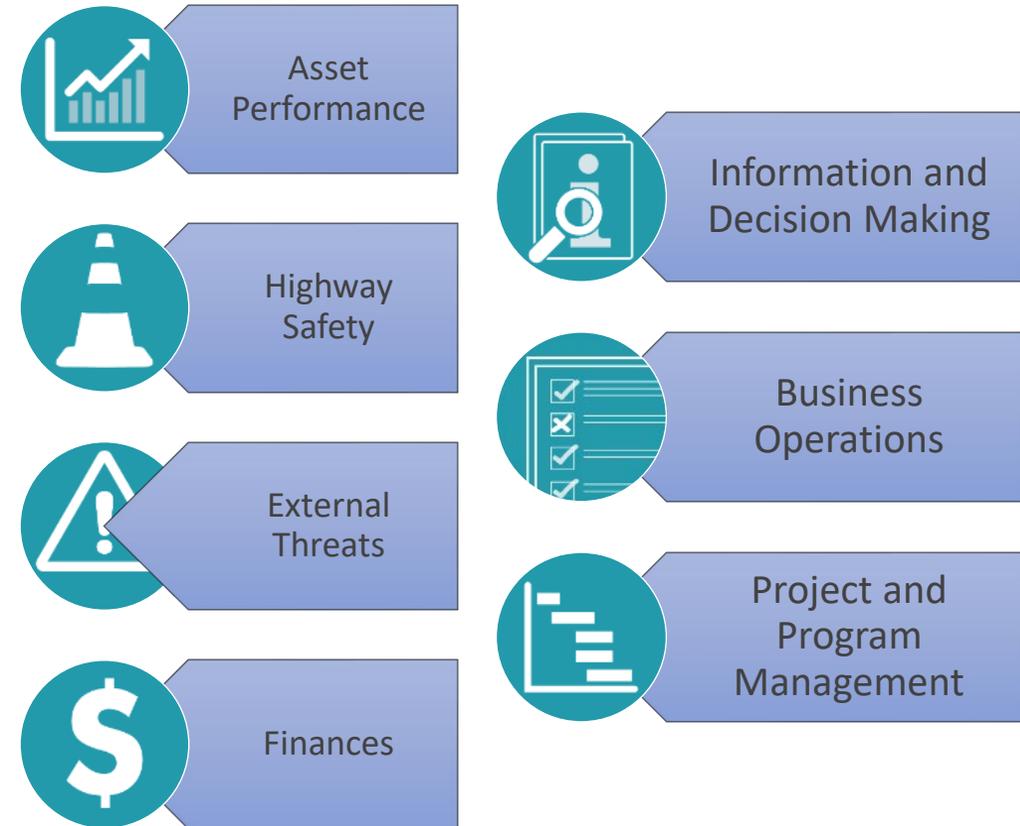
Analysis Results

Mitigation Actions

Identify					Analyze			Respond and Monitor			
ID	Category	Sub Category	Risk Statement	Current Controls	Likelihood	Impact	Score	Mitigation Potential	Mitigation Strategy	Mitigation Action	Priority
1	Asset Performance	Congestion	If SHOPP is not modified to better reflect impact of congestion, then projects that improve mobility may receive less funding.								
2	Asset Performance	Congestion	If we don't take substantive steps to improve degraded HOV lanes, then we may be sanctioned by FHWA.								
3	Asset Performance	Technology	If pavement technology were embraced such as pre-cast panels then we may minimize the impact to traffic, and save money in long range because of lessened traffic delays.								
4	Business Operations	Program Management	If we continue to have outdated or inconsistent guidance material that does not address quality, then we may lack uniformity in administering contracts, increase construction costs, contribute to inefficient operations, and foster a nonstandard application of policy.								
5	Business Operations	Program Management	If we do not respond to Level of Service service requests in a timely manner and create a maintenance work order, then the department is at risk of potential tort liability.								
6	Business Operations	Technology	If IT security is unable to modify current controls to allow access to innovative technology, then Caltrans may be unable to meet customer and stakeholder expectations.								
7	External Threats	Regulations	If legislation on environmental GHG reduction, MAP 21, local bylaws, etc continue to be implemented, then may see better use of roads that is fair for everyone.								

Process for Identifying Risks

- Prior to Workshop, Initial TAMP Risks were reviewed to determine if they are still relevant today
- Risks will be presented by the 7 risk categories for Initial TAMP risks
- For Risks not identified prior to Workshop, we will capture live during workshop
- Conduct a risk assessment on all identified risks





Risk Assessment Overview

Michael B. Johnson

State Asset Management Engineer

HQ Office of Asset Management, Caltrans



Where Are We?



Source: NCHRP Project 20-24(74) Research Report, 2011

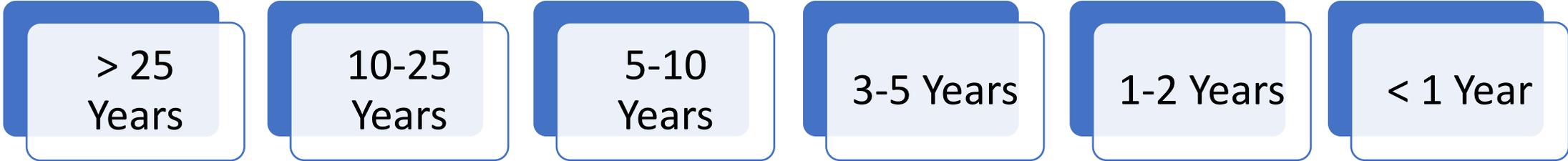
Risk Assessment

A key tool for conducting a risk assessment is the risk consequence matrix

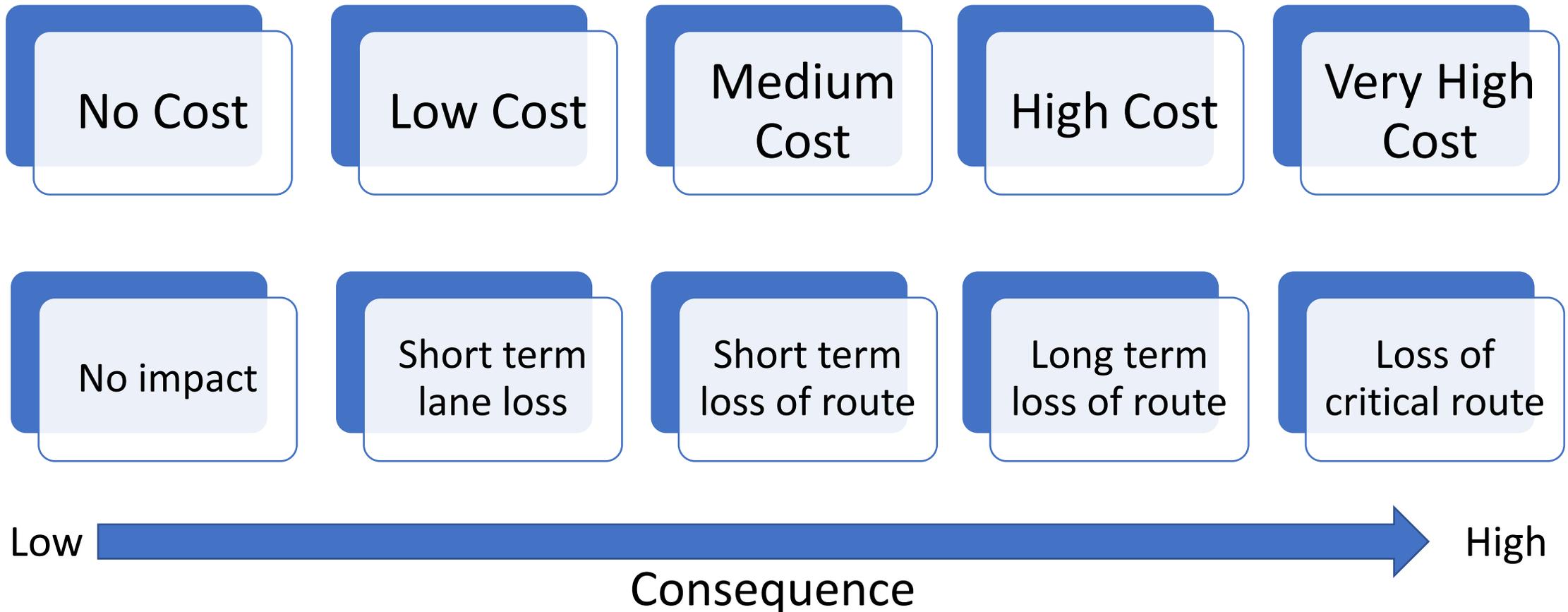
- Provides a common scale by which different groups can assess likelihood and impact of different risks
- A risk's consequence is the product of its likelihood that it will occur times its impact.

Likelihood of Occurrence	< 1 yr	Med-Low	Medium	Med-High	High	High
	1-2 Yrs	Med-Low	Medium	Med-High	High	High
	2-5 Yrs	Low	Med-Low	Medium	Med-High	High
	5-10 Yrs	Low	Med-Low	Medium	Med-High	High
	10-25 Yrs	Low	Low	Med-Low	Medium	Med-High
	> 25 Yrs	Low	Low	Med-Low	Medium	Med-High
		No Impact or Cost	Short Term Lane Loss or Cost	Short Term Loss of Route or Medium Cost Impact	Long Term Loss of Route or High Cost	Loss of Critical Route or Very High Cost
	Consequence					

Likelihood that a Risk will Occur (in time)



Consequence or Impact to the Transportation System (Options for Consequence)





Risk Assessment – Likelihood & Consequence

Dawn Foster

TAMP Manager

HQ Office of Asset Management, Caltrans

Review of Each Risk Statement

- **R** relevance: is this risk relevant to your agency today?
- **I** influence: do you think the TAMP should be influenced by this risk?
 - It would impact the financial plan and investment strategies
- **S** statement: do you think the risk statement is accurately represented?
 - You will have opportunity to include additional risks during workshop
- **K** keep in mind: a risk statement is formed by an “IF-THEN” statement

Asset Performance Risks



- Risk 1: If we make projects more complex (by the addition of multiple assets) and involve complete streets, project delivery may be delayed.
- Risk 2: If we do not coordinate the needs of each asset class or project work, we may not be as efficient as possible (e.g., may be removing new pavements to place new culvert).
- Risk 3: If we don't include ITS elements into roadway planning, then we may experience increased congestion and reduced freight mobility.
- Risk 4: If SHOPP is not inclusive of congestion relief benefits then mobility projects may receive less SHOPP funding

Highway Safety Risks



- Risk 5: If accident reporting is not modernized, we may not accelerate some factors of safety improvements.

External Threats



- Risk 6: If we don't plan for extreme weather events, then bridges, roadways, and structures will be damaged.

Financial Risks



- ~~Risk 7: If new dollars are not spent quick enough, then the dollars could be redirected and go to the General Fund or other needs.~~
- Risk 8: If projects do not federalize and use state only funds, then we may lose federal dollars and may lose our redistribution.
- Risk 9: If money is spent on the four core assets (bridge, pavement, culverts, ITS) that are in the most need, then there may not be money for assets later down the road and there may not be enough money to "maintain".
- Risk 10: If the available funding does not cover our needs, then we will still have some deferred maintenance and operation's needs.

Information and Decision Risks



- Risk 11: If we don't conduct succession planning and knowledge transfer, then Caltrans will lose efficiency and have greater exposure to error.
- Risk 12: If we do not have reliable asset performance models (including reliable decay rates and reasonable goals, then investment decisions will not be optimal.
- Risk 13: If we don't incorporate climate change into system planning models, assets may be permanently damaged.

Business & Operation Risks



- Risk 14: If we don't train and mentor employees, then we will have large knowledge gaps in the workforce.

Project/Program Management Risks



- Risk 15: If the Department and regions are unable to use innovative project delivery tools with the new funding, then it may take longer to deliver needed transportation work.

Any Additional TAMP Risks?

Use “**Chat Box**”
to identify
additional risks

Risks need to be
in the form of a
risk statement

Example:

If allowable truck weights increase, then we may need to divert funds to strengthening bridges.

If “X” then “Y”

X = “allowable truck weights increase”

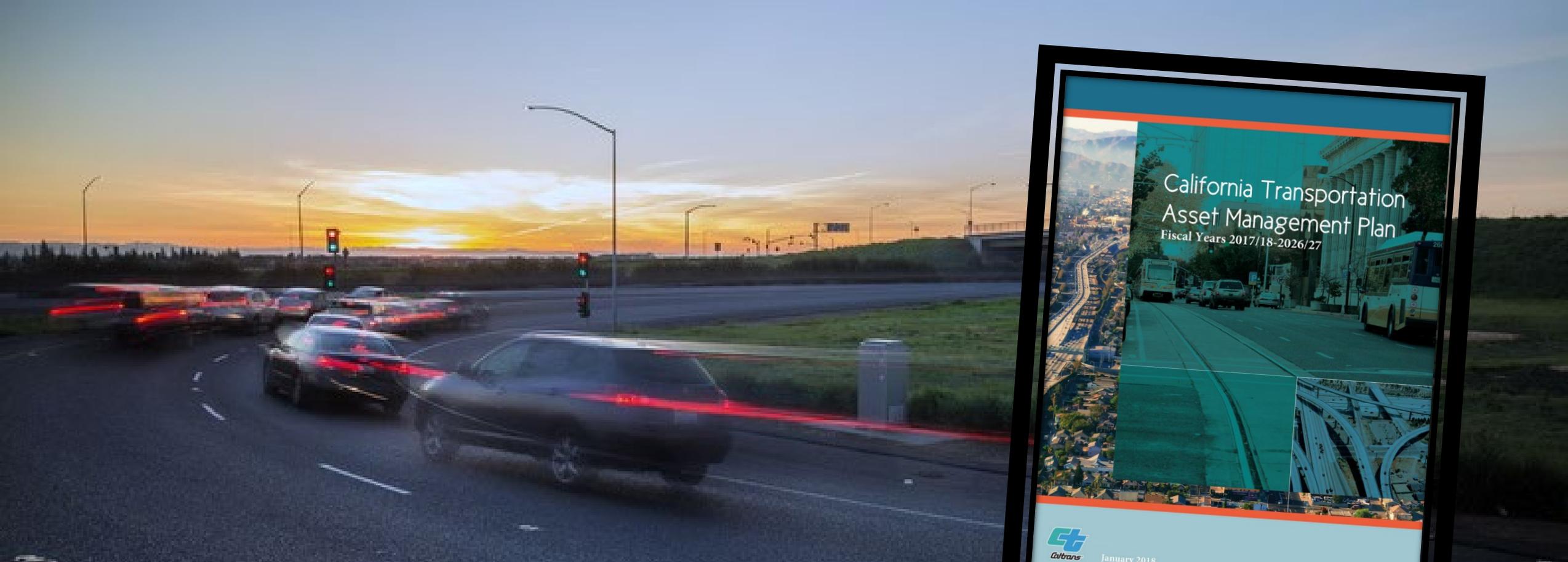
Y = “we may need to divert funds to strengthening bridges”

Newly Identified Risks

- A1:
- A2:
- A3:
- A4:
- A5:

Additional Identified Risks

- A6:
- A7:
- A8:
- A9:
- A10:



Introduction to Risk Mitigation

Michael B. Johnson

State Asset Management Engineer

HQ Office of Asset Management, Caltrans

ISO 3100 Risk Management Process



Source: NCHRP Project 20-24(74) Research Report, 2011

Risk Mitigation Strategies

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Should Risk be included in the TAMP?

Risk Categories	Can it be Anticipated	TAMP Treatment	Within TAMP or Elsewhere?
Succession Planning	Yes	Mitigate	Elsewhere
Continuity of operation	Yes	Mitigate	Elsewhere
Changes in policy or priorities	No	Accept	N/A
Tort Liability	Yes	Mitigate & Accept	TAMP
Sudden Change in Funding	No	Accept	N/A
Gradual Funding Loss - Fed Tax paradox	Yes	Accept & Mitigate	TAMP
Changing legislation	No	Accept	N/A
Scour Vulnerabilities	Yes	Mitigate	TAMP
Seismic Vulnerabilities	Yes	Mitigate	TAMP
Geotechnical Vulnerabilities	Yes	Mitigate	TAMP
Climate Vulnerabilities	Yes	Mitigate	TAMP

Example of Risk Mitigation Approaches

Risk Statement:

If we don't plan for extreme weather events, then pavement and bridges will be damaged

- **Risk Mitigation Approach:** Develop Vulnerability Assessments and Adaptation Plans. Develop priority risks within Agency, Region, District, State and use to prioritize funding/projects
- **Monitoring Approach:** Assign resources and develop implementation plan that includes scope, projects, timeline, costs, etc



Closing Remarks

Michael B. Johnson

State Asset Management Engineer

HQ Office of Asset Management, Caltrans

Next Steps – Day 2 of Risk Management

- Reconvene on Wednesday, June 30th at 1 PM
- Recap Results from Day 1 of the Workshop
- Strategies for Managing Risks through the 5 “T”s
- Will identify Mitigation Strategies/Actions for High Priority Risks
- Discuss more regarding identification and verification of Repeatedly Damaged Assets with focus on local NHS





Thank You

California Transportation
Asset Management Plan
Fiscal Years 2017/18-2026/27



January 2018

Informal Question and Answer Session

- For those of you who have additional questions and time, Caltrans will continue to be available for 1-hour after each Workshop for an informal question and answer session
 - Provides more time to gather feedback from stakeholders
 - Provides opportunity for anyone to participate and talk
 - Provides 6 additional hours of collaboration

****Please stay connected to Webex for this additional opportunity****

