Risk Management Workshop Summary
DRAFT

California Department of Transportation

Transportation Asset Management Plan Project

Event Date: April 19, 2017

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1. Overview

This document details the results of the California Department of Transportation (Caltrans) Transportation Asset Management (TAM) Risk Management Workshop held on April 19, 2017, at the Caltrans Batavia Maintenance Training Facility in Orange, CA. The workshop was held as part of the effort to develop a Transportation Asset Management Plan (TAMP) for California.

California TAMP project stakeholders participated in the workshop to further develop the initial risk register and risk mitigation strategies for California. As part of the workshop, attendees analyzed the preliminary risk register and identified potential risk mitigation strategies and actions. This interactive workshop resulted in an improved understanding of California's TAM risks and a revised risk register with prioritized risks, strategies, and actions.

2. Workshop Presentations and Discussions

The workshop was kicked off with remarks by Mike Johnson, Caltrans Asset Management Engineer. The workshop's first presentation was an overview of risk management led by Bill Robert, followed by an overview of resources for risk management led by Nate Lyday and Hyun-A Park.

After the introductory session, Bill Robert presented the preliminary California risk register. Workshop participants then divided into small groups and engaged in an exercise to review, supplement, and analyze the preliminary risk register. After completing the exercise, groups reported their results to the workshop.

The workshop's third session was focused on risk mitigation. Bill Robert presented an overview of risk mitigation and examples of risk mitigation programs and parallel efforts. The group discussed challenges in managing risks, given the large number of National Highway System (NHS) owners in California, and also discussed underlying assumptions concerning risk mitigation strategies. Workshop participants then participated in a large group exercise to identify responses to risks and potential mitigation strategies and actions. Participants voted on the highest priority risks, strategies, and actions to explore further for the TAMP.

The workshop ended with a summary of workshop results and a discussion of next steps. The workshop presentation is available in Appendix B and the revised risk register is included in Appendix D.

2.1 Summary of Workshop Discussions

Below is a summary of major discussion points from the workshop, organized by agenda item. Following each major agenda item, the group discussed various issues raised during the presentation and exercises.

Introduction

Mike Johnson welcomed the group and walked attendees through the process and timeline of developing the California TAMP. Mike mentioned the first workshop, which focused on Goals and Objectives, was held in December 2016, and that the next workshop, focusing on the financial plan and investment strategies, would be help in June in Oakland. The final workshop, focusing on TAMP building, will be held at the end of the summer 2017. The TAMP should be submitted to the California Transportation Commission (Commission) by March 2018 to meet the Federal Highway Administration's (FHWA) April 2018 guideline.

Risk Management Overview

Bill Robert summarized requirements for risk management for TAMPs and detailed basic risk management concepts. Risk management is defined by Moving Ahead for Progress in the 21st Century Act (MAP-21) as "the processes and framework for managing potential risks, including identifying, analyzing, evaluating and addressing the risks to assets and system performance." The contents of this presentation are available in Appendix B – Workshop Presentation.

Bill explained that maximizing performance and minimizing risk is an objective for public agencies and a motivation for including risk in the TAMP. MAP-21 also requires risk management as part of the TAMP, specifically:

- 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

After a discussion of challenges in evaluating risks, Bill presented the seven California TAMP risk categories:

- Asset Performance

- Highway Safety
- External Threats
- Finances
- Information and Decision Making
- Business Operations
- Project and Program Management

Following the presentation of the California TAMP risk categories, Nate Lyday presented Caltrans' risk management resources and Caltrans' enterprise risk management approach. Hyun-A Park described existing Caltrans programs for mitigating specific types of risks. The contents of this presentation are available in Appendix B – Workshop Presentation. Hyun-A Park asked what other regional agencies are doing about risk.

- San Diego Association of Governments (SANDAG)
    - Dawn Vettese noted that staff are participating in asset management discussions.
    - According to Jerome Torres, SANDAG is performing a cyber liability audit and next year expects to implement an enterprise risk process. Project risk management is of particular importance given SANDAG is largely a project management agency.
- Southern California Association of Governments (SCAG)
    - Daniel Tran described the development of high-level policies for planning. He identified two new planning factors: a focus on resiliency and reliability of transportation system. SCAG helps its agencies through stakeholder collaboration and development of high-level policy. As part of the Regional Transportation Plan (RTP), SCAG is beginning to make financial assumptions regarding risk management. Different agencies are at different levels of maturity: some are advanced, while others just beginning to address risk management.
- Security and Resiliency
    - Jerome Torres of SANDAG responded that terrorism is an important risk. Jerome shared that sea level rise is a big issue in San Diego County–all construction within a certain distance of the ocean needs to address this. California Coastal Commission is the driver for this, requiring consideration of sea level rise for projects and environmental reviews.
    - Matt Friedman of Caltrans noted FEMA has a framework for emergency response. Advanced training is available for incident response. Local jurisdictions handle a lot of this. Darren Grossi

confirmed this is important for his agency and its partners. Recently local partners used these materials for addressing the Rim fire. Also, regarding terrorism, a big issue is intentionally-set forest fires. Matt mentioned schools are also active in addressing terrorism risks, e.g., risk of an active shooter. Darren noted that in addition to thinking about emergency response, agencies also need to think about the aftermath. While many agencies do great with emergency response, their problem is rebuilding when the event is over.

Risk Register

Bill Robert presented an overview of the risk register, defining the term and explaining the origin of the preliminary California TAMP risk register. The preliminary risk register is the result of prior enterprise risk assessment efforts comprising over 500 statements. With Caltrans' help those 500+ statements were distilled into 53 risks. Bill presented the list of risks and showed an example of a risk likelihood/consequence matrix. The contents of this presentation are available in Appendix B – Workshop Presentation.

Exercise 1: Risk Register Review & Analysis

This portion of the workshop was devoted to a small group exercise. The exercise was designed to review the initial risk register; supplement the list of risks; and assess likelihood, consequence, and priority for the risks.

Workshop attendees were split into seven groups, with each group assigned one of the risk categories previously defined by Caltrans (provided in Table 1 below).

Table 1: California Transportation Risk Categories

Risk	Category Description	Elements of Risk Management
Asset Performance	Risks associated with asset failure (whether acute and complete or incremental). Areas of failure can include: • Structural • Capacity or utilization • Reliability or performance • Obsolescence • Maintenance or Operation	• Regular, 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 Cat.	Category Description	Elements of Risk Management
Highway Safety	Risks to highway safety related to the asset management program: • Highway crash rates, factors and countermeasures • Safety performance of assets, maintenance and rehabilitation treatment options • Safety in project selection, coordination and delivery	• Safety focused asset management programs (e.g., pavement friction program) • Network screening for safety hotspots for consideration within asset maintenance, rehabilitation and upgrade programs • Consideration of safety benefits/costs in asset management decision making (e.g., safety cost of repeated lane closures for maintenance) • Safety related product evaluation (e.g., National Cooperative Highway Research Program (NCHRP)-350/Manual for Assessing Safety Hardware (MASH) product evaluation/approval program)
External Threats	External threats include both human-induced and naturally occurring threats, such as: • Climatic or seismic events (e.g., extreme weather, flooding, earthquakes, slope failures and rock falls, lightning strikes • Climate change • Terrorism or accidents • Paradigm shifting technologies (e.g., automated vehicles)	• Incorporate potential impacts of climate change and new technologies into long term planning (sea level rise, extreme weather events, changing asset needs to support automated and connected vehicles etc.) • Identify and inventory external risks to existing infrastructure (e.g., seismic evaluations, security assessments, bridge scour programs) • Infrastructure inspection, replacement or retrofit programs to mitigate risks (e.g., slope stabilization, alarms to deter copper theft, operational changes to reduce wind loading) • Implement operational and emergency response programs to minimize impacts of asset failures due to external threats (e.g., staff training and planning, staging resources for response) • Programs to review and evaluate construction standards to ensure reasonable incorporation of resiliency to external threats

Risk Cat.	Category Description	Elements of Risk Management
Finances	Risks to the long term financial stability of the asset management programs, including: • Unmet needs in long-term budgets • Funding stability • Exposure to financial losses	• Programs to forecast changes in revenue and costs (e.g., impacts of fuel efficient vehicles, flat tax structure, etc. on gas tax revenue) • Programs to maximize available fund sources for asset management (e.g., federalization of program) • Exploration of innovative financing opportunities for asset management programs (such as public-private partnerships, tolling, Energy Savings Contracts, etc.) • Exploration of innovative technologies to reduce maintenance and operational costs (e.g., LED lighting)
Information and Decision	Risks related to the asset management program include: • Lack of critical asset information • Quality of data, modeling or forecasting tools for decision making • Security of information systems	• 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)
Business Operations	Risks due to internal business functions associated with asset management programs, such as: • Employee safety and health • Inventory control • Purchasing and contracting	• "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
Project and Program 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

Attendees worked in small groups to determine possible additions to and deletions from the initial risk register. For each risk, the group was asked to determine likelihood, determine consequence, and score the risk. Groups were then asked to discuss key information needed to more accurately assess risks. Additionally, attendees considered whether any of the risks were addressed through existing programs or processes.

A handout was provided to each group area providing a list of the risks in that area. The handout also provided a structured format for updating the list of risks, as well as an input form for analysis of the risks. Each group was asked to assign a scribe to note the group's decisions and report the results to the full workshop.

The revised risk register developed in the workshop is included in Appendix D.

Risk Mitigation

Following completion of the first exercise, the Spy Pond Partners project team gave a presentation defining risk mitigation strategies and led a brief discussion of mitigation approaches. Risk mitigation strategies were delineated into four categories:

1. **Avoid:** Eliminate the threat entirely. An example of this category of risk mitigation strategy would be to design bridges without joints to eliminate the risk of bridge joint deterioration.
2. **Transfer:** Shift ownership and impact of a risk to another party. An example of this category of risk mitigation strategy would be to relinquish a route to transfer the risk of future maintenance/rehabilitation to another agency.
3. **Mitigate:** Take actions to reduce risk likelihood and/or consequence. An example of this category of risk mitigation strategy would be to increase inspection to reduce the likelihood of seismic damage.
4. **Accept:** Acknowledge risk but take no action.

The presentation set the stage for the second group exercise, which was focused on risk mitigation. The presentation is available in Appendix B – Workshop Presentation.

Exercise 2: Identifying Priority TAM Improvements

A large group exercise was conducted to develop and prioritize risk mitigation strategies for the California TAMP. Attendees determined the preferred course of action for high-priority risks: *treat*, *tolerate*, *terminate*, *transfer*, or *take advantage* of it. Attendees then identified potential mitigation actions and reported back to the larger group. Finally, participants established the priority of various risks and

actions for California to explore further in developing its TAMP and results were incorporated into the Risk Register.

Priority was categorized at three general levels, with assignment based on a poll of workshop attendees.

1. **Low:** no additional funding or action recommended
2. **Medium:** no additional funding, however action recommended within related program area using existing funds
3. **High**: additional funding should be identified to related program area to implement mitigation strategy

High priority items are documented in Table 2 on the following page. Mitigation actions are presented for most of the high priority risks. The risks are listed in order of priority, which was established through a workshop voting process. Participants used stickers to vote for the three actions they felt should receive highest priority (three points for a 1st place vote, two points for a 2nd place vote, and one point for a 3rd place vote). Workshop participants also voted on which high priority risks were "low-hanging fruit", i.e., risks for which improvements could make a substantial impact in the short-term. The risks in Table 2 are presented in descending order of vote scoring.

Table 2: High Priority Risks and Mitigation Actions

Risk	Mitigation Actions	"Low-Hanging Fruit"
If the Commission, who has statutory authority to develop programmatic guidelines for new and existing programs subject to SB 1, does not issue timely guidelines, the Department and the regional partners may not be able to use the funding to deliver the intent of SB 1. Corollary to this is that the Department must update its internal operations and manuals to comply with SB 1.	• Don't focus on individual interests • Focus on system-wide needs • Interim guidelines	✓
If we don't modernize accident reporting for California Highway Patrol (CHP) to Caltrans, then we delay safety improvements by the duration of delay timer.	• Collaborate with CHP to improve the timeliness of reporting	
If new dollars are not spent quick enough, then the dollars could be redirected and go to the General Fund or other needs.	• Ramp up project delivery through various means	✓
If projects do not federalize and use state only funds, then we may lose federal dollars and may lose our redistribution.	• Innovative contracting • Increase staffing levels • Develop better narrative to educate/communicate with legislature	
If we don't plan for extreme weather events, then bridge, roadway, and structures will be damaged.	• Accelerate recommended actions • Plan for addressing identified vulnerabilities • Get data compiled and model • Culvert cleaning (combine with other efforts)	✓
If money is spent on the four core assets (bridge, pavement, culverts, ITS) most in need, there may not be money for assets		

Risk	Mitigation Actions	"Low-Hanging Fruit"
later down the road and there may not be enough money to "maintain."		
If the Department and regions are unable to use innovative project delivery tools with the new funding, there may not be a leveraging of these innovative tools to deliver projects faster and on budget.	• Utilize innovative delivery methods such as CMGC design build, etc.	✓
If we don't train and mentor employees, then we will have large knowledge gaps in the workforce	• Continue to do training • Improve knowledge transfer	✓
If we make projects more complex (by the addition of multiple assets) and involve complete streets, project delivery may be delayed.	• At project planning, consider all issues and set more realistic timeframes (reliability of schedule targets)	✓
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 pavement to place new culvert)	• Multi-Objective projects • Funding program structure that supports multi-asset wrork	✓
If we don't conduct succession planning and knowledge transfer, then Caltrans will lose efficiency and have greater exposure to error.	• Train broader set of staff and accelerate training • Improve mentorship opportunities • Find other organizations addressing succession and knowledge transfer	✓
If we do not have reliable asset performance models (including reliable decay rates and reasonable goals), then investment decisions will not be optimal.	• Build history of condition/performance models to feedback into plans to improve decisions	

Risk	Mitigation Actions	"Low-Hanging Fruit"
If the $5B does not cover our needs, then we still will have some deferred maintenance and operations' needs.		
If we don't incorporate climate change into system planning models, assets may be permanently damaged.		
If we don't include ITS elements into roadway planning, then we may experience increased congestion and reduced freight mobility.	• Raise awareness • Involve more entities/stakeholders • Align IT with ITS risks • Coordinate info better • Coordinate projects better	
If the State Highway Operation and Protection Program (SHOPP) is not modified to better reflect impact of congestion, then projects that improve mobility may receive less funding.		
If we do not respond to Level of Service requests in a timely manner and create a maintenance work order, then Caltrans risks tort liability.	• Improvements for Level of Service requests	✓

Workshop Wrap-Up

Over the course of the workshop, participants reviewed risk management concepts, reviewed and supplemented a working risk register, analyzed the listed risks, determined potential mitigation actions, and determined the highest priority risks and mitigation actions, shown above in Table 3. The workshop exercises helped revise the initial risk register, included as Appendix D.

Mike Johnson concluded by thanking participants for attending the workshop, and emphasizing the need to continue the discussion between Caltrans and local agencies and partners as TAMP development proceeds.

3. Workshop Attendees

Table 3 lists the workshop attendees. As documented in the table, participants included staff from the Commission, Caltrans, MPOs, Regional Transportation Planning Agencies (RTPAs), and FHWA.

Table 3. TAM Risk Management Workshop Attendees

Name	Organization
Kristina Assouri	California Transportation Commission
Rick Guevel	California Transportation Commission
Stephen Maller	California Transportation Commission
Julia Biggar	Caltrans
John Bulinski	Caltrans
Nieves Castro	Caltrans
Ryan Chamberlain	Caltrans
Jennifer Duran	Caltrans
Richard Estrada	Caltrans
Matt Friedman	Caltrans
John Gillis	Caltrans
Mike Johnson	Caltrans
Parviz Lashai	Caltrans
Nate Lyday	Caltrans
Dillon Miner	Caltrans
Norma Ortega	Caltrans
James Pinachio	Caltrans
Tom Pyle	Caltrans
Hamid Sadraie	Caltrans
Karla Sutliff	Caltrans
Phil Stolarski	Caltrans
Melissa Thompson	Caltrans
Marquis Williams	Caltrans
Ray Zhang	Caltrans
Luis Topete	City of Bakersfield
Mark Steuer	City of Riverside
Lang Yu	FCOG - Fresno Council of Governments
Tay Dam	Federal Highway Administration
James Sookne	MCOG - Mendocino Council of Governments
Jerome Torres	SANDAG - San Diego Association of Governments
Dawn Vettese	SANDAG - San Diego Association of Governments
Daniel Tran	SCAG - Southern California Assoc. of Governments
Darrin Grossi	Tuolumne County Transportation Council
Hyun-A Park	Spy Pond Partners
Bill Robert	Spy Pond Partners

4. Workshop Background

4.1 Federal Requirements

FHWA recently released a series of rules initiated by MAP-21. The TAMP rule is most relevant to the current project. Finalized on October 24, 2016, it requires that state Departments of Transportation (DOT) develop TAMPs detailing their asset inventory, current conditions, and predicted future conditions over a ten-year period (using performance measures detailed in the pavement and bridge performance management rules, respectively).[1] Also, the TAMP should describe the agency's investment plan, address life cycle policies used to manage an agency's assets, and discuss how risk is managed. The plan should include pavement and bridges on the NHS at a minimum, but may include additional assets and/or systems.

FHWA now requires risk management analysis as part of TAMP development. The following is an overview of the new requirements.

- 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
- A mitigation plan for addressing the highest-priority risks
- An approach for monitoring the highest-priority risks
- A summary of the evaluations of facilities repeatedly damaged by emergency events

Example risks from the Rule (23 CFR § 515.7) include:

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

[1] Federal Rule Making for Asset Management Plans, https://www.regulations.gov/document?D=FHWA-2013-0052-0064

4.2 State Requirements

Caltrans is required by California state law Senate Bill 486 (SB 486) to develop a TAMP, and to establish goals and performance measures for the State Highway System (SHS). Specifically, the law mandates Caltrans, in consultation with the Commission, prepare a "robust asset management plan" to guide selection of projects for the SHS. This asset management plan must be consistent with federal law and adopted by the Commission.

For purposes of this requirement, asset management projects are limited to maintenance, safety, operation, and rehabilitation of state highways and bridges that do not add a new traffic lane to the system.

4.3 Scope of the California TAMP

Based on the above federal and state legislative requirements, California's TAMP must include the full NHS (including local NHS routes) as well as the complete SHS. Specifically, Caltrans has determined the TAMP will include:

- State-owned pavement, as well as other pavement on the NHS
- State-owned bridges, as well as other bridges on the NHS
- State-owned culverts
- State-owned Intelligent Transportation System (ITS) assets

The NHS consists of roadways important to the nation's economy, defense, and mobility. It includes the Interstate Highway System as well as other roads serving major airports, ports, rail or truck terminals, railway stations, pipeline terminals and other strategic transport facilities. The NHS was developed by the US Department of Transportation in cooperation with states, local officials, and metropolitan planning organizations (MPOs).

The California SHS is a network of highways owned and maintained by Caltrans.

Appendix A – Workshop Agenda

Appendix B – Workshop Presentation

Appendix C – Workshop Handouts

The workshop flyer was sent to workshop participants prior to the workshop and was also provided at the workshop.

In Exercise 1, each group received unique exercise handouts that included a table of the risks in their risk category.

Appendix D – Revised Risk Register

This initial risk register was developed for discussion during the workshop group exercises; it has been updated based on workshop participants' input on potential mitigation strategies, actions, and priorities.