

Transportation  
Safety and  
Mobility

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**Project Title:**

Performance Measures for  
Roadside Features

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## Research to Develop Performance Measures for Maintenance of Roadside Features

This research study developed performance metrics, for difficulty and risk of a collision in performing maintenance operations on roadside features.

### WHAT WAS THE NEED?

Highway maintenance operations can expose California Department of Transportation (Caltrans) workers to live traffic, increasing their safety risks. Furthermore, the maintenance of certain roadside features can be more difficult, requiring more time and increasing the exposure time of workers to traffic and roadway hazards.

Currently there is no quantitative method for assessing the difficulty and safety risks of such operations. There was a need to develop a risk index for comparing operational safety risks for different relevant maintenance functions based on associated parameters, such as time of operation, location, road geometry, traffic counts, and type of operation. Such metrics or index can then be used to plan, prioritize, and schedule maintenance operations to increase efficiency, and improve the safety of highway workers and traveling public.

### WHAT WAS OUR GOAL?

The goal of this project was to enable Caltrans maintenance personnel to prioritize certain classes of maintenance operations based on their difficulty and injury or hazard risks from live traffic to the workers performing such operations.

### WHAT DID WE DO?

Maintenance activities associated with roadside features are classified and Difficulty Index and Collision Risk Index are developed. These two indices can be computed for each work order based on parameters that were identified after considering a large dataset as well as results of a survey from relevant Caltrans personnel.



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

## WHAT WAS THE OUTCOME?

This research study developed performance indices, or metrics, for difficulty as well as risk of a collision in performing maintenance operations associated with roadside features. This will help improve efficiency of maintenance operations and improve the safety of highway workers and traveling public.

## WHAT IS THE BENEFIT?

The project results can enable Caltrans personnel to use objective data and measures for decision-making in planning and scheduling of maintenance operations. The project results can also be used in allocating resources in terms of personnel and equipment, considering additional safety measures, and deciding if and what type of lane closure is necessary to help reduce the risk of collision and injury to highway workers.

## LEARN MORE

<https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/final-reports/ca21-3289-finalreport.pdf>

## IMAGES

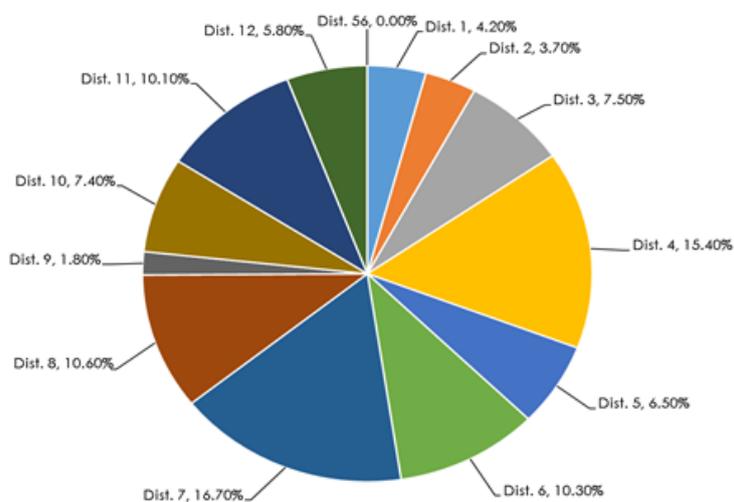


Figure 1. Distribution of roadside maintenance work orders among districts 2013-2018

Top 10 activities with the highest proportion of lane closure		Top 10 activities with the largest crew size per work order		Top 10 activities with the highest access difficulty score		Top 10 activities with the longest average duration		Top 10 activities with the longest average mile-length	
Activity	Description	Activity	Description	Activity	Description	Activity	Description	Activity	Description
C95040	Test/sample manhole	M94020	Pre-op emergency equipment	C20010	Mechanical control	S31040	Rock scaling	F60030	Remove Acid/removal oversight
F20050	Maintenance site corrective measure	G10010	Facility repair roadside rest	UB0010	Fixed satcom - repair/replace	F40050	Snow hauling (stormwater)	C20010	Mechanical control
F50003	Eval/develop de-icing criteria	J20040	Maintenance tunnels & tubes	F80001	Oversight of construct contract	A30010	Dig out flex pavement	F80002	Drainage contract
F80201	Oversight drain clean contract	G21040	Grounds maintenance vista point	C93050	Clean cattleguard	J70040	Maintenance toll plaza	K20120	Night inspection sign lighting
F80003	Sampling and testing contract	G41040	Grounds maintenance park & ride	F40150	Slide material hauling	F40210	Snow hauling (stormwater)	F50005	Veg mgmt. & chem usage plans
F80002	Drainage contract	G11040	Grounds maintenance roadside rest	F90103	Closure of existing site	A21010	Profile grinding flex pavement	C30020	Tree inspection
B30010	Sub seal/jack slab rigid pavement	G15040	Winter Treatment, Maint., roadside rest	S31010	Repair/replace rock fall protection	W52056	Legal tort cases - dconvy. rpt.	F10007	Employee specialized training
YD0000	Work for others d family	M93010	Repair/replace escape ramp	R91000	Avalanche control	A20010	Overlay/leveling flex pavement	M10120	Night inspection striping
F30220	Construction compliance inspection	G40010	Facility repair park & ride	R30110	Repair/replace fixed hardware	M30010	Repair/replace pavement markers	K10120	Night inspection HWY lighting
YA0000	Work for others a family	G16000	Spec program admin. roadside rest	R10000	Snow removal	B31010	Slab replacement rigid pavement	M20120	Night inspection markings

Figure 2. Top 10 activities based on different scores

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