



Caltrans Division of Research,  
Innovation and System Information

# Research



# Results



Maintenance

## OCTOBER 2019

**Project Title:**

Evaluating Advanced,  
Innovative Mowers for Roadside  
Management

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## Evaluation of Remote Control Mowers for Roadside Management

Evaluate remote control mowers to enhance workers' safety in roadside vegetation control operations with an emphasis on steep sloped terrain.

### WHAT WAS THE NEED?

The California Department of Transportation (Caltrans) currently uses tractors and gang mowers to manage roadside grasses and vegetation. Proper vegetation control is needed to prevent or reduce the severity of roadside fires, provide sight distance, and provide pleasing aesthetics. In areas not accessible to mowers, workers on foot use string trimmers to complete the work, with associated risks from working on steep slopes with hand tools. Traditional vegetation control with tractors and gang mowers exposes employees to traffic and potential injury from mowing steep slopes due to rollovers. Reducing worker exposure to traffic and vehicle rollovers due to steep slope operations necessitates research into new, advanced technologies.

When new technology and equipment become available in various industries, Caltrans conducts reviews to determine if implementation could improve the safety and effectiveness in its operations. Confirming whether remote control mowing (RCM) equipment increases employee safety required further research and investigation. The Landscape Maintenance team plans to deploy remote control mowers to the districts, if the research findings show improvements of employees' safety.

### WHAT WAS OUR GOAL?

The goal of this research was to evaluate Caltrans-acquired RCM systems to determine their ability to improve worker safety in roadside vegetation control operations. Ultimately, the research strives to eliminate or reduce worker exposure to traffic and steep slopes, and workers' injury accidents while performing routine, roadside maintenance operations with the assistance of RCMs.



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

## WHAT DID WE DO?

The research evaluated remote control mower (RCM) systems to determine their ability to improve workers' safety in roadside vegetation control operations. The research team conducted a detailed literature search on current RCMs and relatable applications successfully employed by highway maintenance agencies and private industry contractors.

The Advanced Highway Maintenance and Construction Technology (AHMCT) research team observed Caltrans personnel test and use the Alamo Traxx RF RCM, the Green Climber LV600 RCM, the Aebi TT270 slope mower, and tractor-based mowers along the I-80, SR- 113, and I-5 freeways. The Spider ILD02 was observed mowing on levees. Operators and others were interviewed during observations and demonstrations.

The researchers developed methods to measure maneuverability, mowing ability on steep slopes, and effective remote control range. The researchers made mowing rate measurements based on RCM operations by others and also direct hands-on operation.

The researchers reviewed current mowing safe operating guidelines at the Caltrans Maintenance Equipment Training Academy (META), and provided additional points for recommended safe operation of RCMs.

Also, the researchers developed a cost/benefit analysis that includes an estimation of the benefits from the new RCM systems. The cost analysis compared basic costs to those of a conventional mower operation and string trimming operation.

## WHAT WAS THE OUTCOME?

The researchers identified substantial promise for Caltrans use of RCMs. There are clear conditions, e.g. slopes and confined areas, where RCMs will be far more effective than conventional mowers (CMs) or string trimming. The higher cost of the

RCM is an impediment to widespread use.

The following are significant conclusions:

- The effective mow rate of the RCMs tested is 0.25 to 0.5 acre/hr. It is more cost effective than string trimming operations and very much more efficient for brush cutting. In addition, the reduced hazard exposure of personnel justifies the use of the RCM instead of workers with string trimmers when possible.
- At slopes of 2:1 (27°) and higher, an RCM will disturb the soil, forcing an operator to slow the RCM and focus on operating smoothly to reduce erosion.
- On shallow slopes, the CM is significantly more cost-effective than the RCM due to lower equipment costs and wider cutting widths.
- Using an RCM to mow the steep, sloped area of the average interchange will increase the associated mowing cost of mowing an interchange by approximately 30%. However, regular use of an RCM to mow slopes will reduce tip-over accidents. Mowing the steepest slopes cannot be done with CMs, and operators may be tempted to mow at the tip over limits of the CM. If RCMs are used regularly, the CM operators will be less likely to operate at the limits of the CM. This will reduce tip-over accidents, which will reduce injuries and costs.

## WHAT IS THE BENEFIT?

Implementing remote mowing equipment would immediately benefit and support Caltrans in improving worker safety.

## LEARN MORE

To view the complete report:

<https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/final-reports/ca20-2730-finalreport-ally.pdf>

**IMAGES**

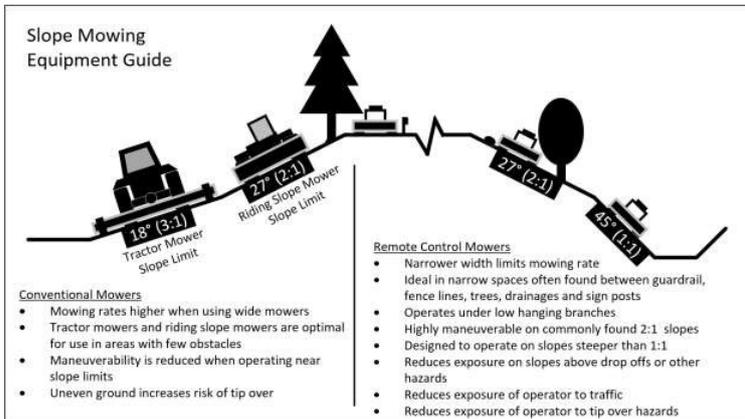


Figure 1: Guide showing slopes and conditions relevant to mower equipment selection



Figure 3: RCM mowing downward from top of 2:1 slope



Figure 2: Mowers on typical roadside slopes

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