

# DRISI

CALTRANS DIVISION OF RESEARCH,  
INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

# Research

# Notes

Rural

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Project Title:  
SpaceX Starlink Satellite Broadband  
Communications for ITS Pilot

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Task Manager:  
Sean Campbell  
Senior Transportation Engineer  
Electrical (Specialist)  
sean.campbell@dot.ca.gov

## SpaceX Starlink Satellite Broadband Communications for ITS Pilot

Providing broadband to rural ITS field equipment

### WHAT IS THE NEED?

Reliable high-bandwidth rural communications have been a significant challenge since early deployments of Intelligent Transportation Systems (ITS) at Caltrans. While there is an effort to install fiber-optic broadband services on select rural highways throughout the state, the effort will take years before it's useable, won't be installed on every rural state highway, and will be located in areas highly susceptible to damage from wildfire, floods and landslides. Reliable communications are critical to the perceived reliability of ITS Elements for the traveling public. ITS Elements cease to function as intended when communications systems fail. This poses a problem in rural areas where ITS Elements are deployed to mitigate the effects of non-reoccurring congestion due to snow, fire, floods, and other major incidents. Caltrans needs to find an alternative reliable high-bandwidth wireless communications option that is less susceptible to weather induced incidents.

### WHAT ARE WE DOING?

We are proposing to procure, install, operate, and evaluate four SpaceX Starlink satellite broadband communication services for various ITS Elements in District 2. Most rural Caltrans field sites selected have been impacted by the lack of available high-bandwidth communications options. These ITS field sites include infrastructure related to changeable message signs, video sites, and roadside weather information systems. This project will evaluate the procurement, construction, installation, integration, operation, and maintenance of four selected sites in rural regions of the state.

### WHAT IS OUR GOAL?

To provide a reliable, cost-effective broadband communications solutions to field sites located in remote rural areas of the State.



DRISI provides solutions and  
knowledge that improves  
California's transportation system

## WHAT IS THE BENEFIT?

As heavy snow, wildfires, floods, and other major incidents continue to impact terrestrial infrastructure, having an alternative high bandwidth communications option in rural areas will be crucial. Satellite broadband satellite services link to fixed, low earth orbit satellites. Satellite services do not rely on terrestrial infrastructure, providing immunity to the incidents described above. With throughputs of up to 20 Gbps, satellite broadband offers enough bandwidth for the most bandwidth intensive TMS applications.

## WHAT IS THE PROGRESS TO DATE?

- The research team has contracted with Advanced Highway Maintenance and Construction Technology (AHMCT) to provide research on the SpaceX Starlink system. The contract was executed in Fall 2022.
- District 2 has selected three hub locations and 10 field locations. Based on Starlink availability, the project team will eventually select one hub location and four field locations.
- The research team created an “issues and features” document providing insight on various Starlink kits, equipment, and features, as well as documenting known issues with equipment.
- The research team made site visits to the selected hub site and two field sites to test Starlink equipment procured to date and to determine what additional mounting equipment would be necessary. The team's uplink / downlink test results were very promising at each site.
- The team has procured mounting equipment and lightning suppression equipment that will be used to mount the dish to the CCTV poles / communication towers. Testing has begun on the interface of the lightning suppression and the Starlink cabling to see what impact the additional equipment has on the Starlink equipment.
- Discussions with the Caltrans SatCom team about how we are using Starlink are ongoing.

- Due to a very large snowpack, some sites are still not accessible to have equipment installed at this time.

## IMAGES



Image 1: Image shows researcher determining best orientation for satellite dish while testing equipment at a field site – Source: Caltrans



Image 2: Image show researcher connecting satellite equipment to field site for testing – Source: Caltrans

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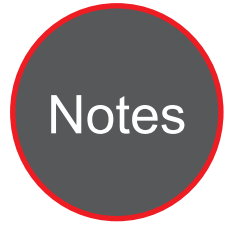


Image 3: Field Testing - Source: Caltrans