

DRISI

CALTRANS DIVISION OF RESEARCH,
INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research

Notes

Design

FEBRUARY 2023

Project Title:
Evaluate Zero-Emission Vehicle
Charging Station at Caltrans Facilities

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Evaluate Zero-Emission Vehicle Charging Stations at Caltrans Facilities

Research Direct Current Fast Charging (DCFC) installation cost, challenges, and opportunities for process improvements for future installations.

WHAT IS THE NEED?

Governor's Executive Order B-16-2012 mandates to reduce greenhouse gas emission. Electric vehicles (EV) offer a clean fuel alternative to meet above mandate. However, range anxiety and charging frequency and gaps between existing charging stations challenges adoption.

California Department of Transportation (Caltrans) is deploying charging stations to fill in gaps between existing charging stations. This effort will provide the data needed for planning process improvement for future installment.

WHAT ARE WE DOING?

The research team will:

1. Identify the types of data to be collected, including usage patterns, vandalism, concerns by the public, non-recoverable electricity costs, maintenance and operations costs.
2. Monitor the usage monthly and collect and summarize data of the charging stations for a period of two years after construction.

WHAT IS OUR GOAL?

This research will collect data on the implementation, maintenance, and utilization of new charging facilities being deployed to increase the charging coverage throughout California. This information will assist Caltrans to develop policy and procedures regarding the deployment of future charging stations.



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

WHAT IS THE BENEFIT?

This project will measure the use of the charger stations and help identify user needs. The demonstrated user demand will validate continued infill of EV service gaps and reduce inconvenience to highway system users. With the information obtained, encouraging movement towards EV infrastructure will provide business opportunity for future providers of charging stations and services.

One of the limitations of zero-emission vehicles is the time required to charge them. Expanded EV infrastructure featuring DCFCs will make EV a practical option for long-distance travel and encourage consumers to move away from internal combustion engines. Usage patterns revealed in this study will help direct future development of facilities in convenient locations, improving the availability of services and quality of travel for EV users.

WHAT IS THE PROGRESS TO DATE?

Task 1: Project Launch and Construction Phase Evaluation

University of California, Davis (UCD), Institute of Transportation Studies (ITS) team is evaluating the progress of the California Department of Transportation (Caltrans) DC Fast Charger project construction and launch. All the sites have finished the construction and project launch phase. However, some rest areas have planned closures for maintenance and repairs such as the John "Chuck" Erreca Safety Roadside Rest Areas (SRRAs) in Merced and Camp Roberts SRRAs in Monterey. The charging stations shared in red appear to need repair to the best of our knowledge. Table 1 below is a summary of the status of each of the sites. Sites Under maintenance/ planned closure or in need of attention are highlighted in blue.

Image 1: Status of the sites as of 08/01/2022

Shading Color Codes

Green: Completed sites or almost completed
Blue: Under maintenance/ planned closure
Red: EVSE Equipment needs attention.

Location	Caltrans District	County	Route	Description	Number of DCFC Stations	Status
1	01	Lake	20	Clear Lake Oaks Maintenance Station	1	Completed on 9/29/20. Charger is operating slower than rated capacity
2	01	Humboldt	96	Willow Creek Maintenance Station	1	Completed 12/31/20
3	02	Siskiyou	5	Randall Collier Safety Roadside Rest Area	1	Completed in October 2020
4	02	Trinity	299	Moan Lim Lee Safety Roadside Rest Area	1	Completed in November 2020
5	03	Glenn	5	Willows Safety Roadside Rest Area (Northbound)	1	Completed. But currently closed for construction.
6	03	Glenn	5	Willows Safety Roadside Rest Area (Southbound)	1	Completed. But currently closed for construction.
7	03	Colusa	5	Maxwell Safety Roadside Rest Area (Northbound)	1	Completed and operational
8	03	Colusa	5	Maxwell Safety Roadside Rest Area (Southbound)	1	Completed and operational
9	03	Nevada	80	Donner Summit Safety Roadside Rest Area (Eastbound)	1	Completed. But currently in need of repairs.
10	03	Nevada	80	Donner Summit Safety Roadside Rest Area (Westbound)	1	Completed. Currently in need of repairs.
11	05	Monterey	101	Camp Roberts Safety Roadside Rest Area (Northbound)	1	Completed. But rest area is under repairs.
12	05	Monterey	101	Camp Roberts Safety Roadside Rest Area (Southbound)	1	Completed. But rest area is under repairs.
13	05	San Luis Obispo	46	Shandon Safety Roadside Rest Area	1	Completed. But equipment maybe in need of repair.
14	06	Madera	99	Madera Maintenance Station	2	Completed
15	06	Fresno	99	Caltrans District 6 District Office	4	Completed. Possible equipment damage
16	06	Kings	5	Kettleman City Maintenance Station	2	Completed. Possible equipment malfunction
17	06	Tulare	99	C.H. Warlow Safety Roadside Rest Area	2	Completed
18	06	Tulare	99	Philip S. Raine Safety Roadside Rest Area (Northbound)	2	Completed
19	06	Tulare	99	Philip S. Raine Safety Roadside Rest Area (Southbound)	2	Completed
20	06	Kern	99	Delano Maintenance Station	2	Completed
21	06	Kern	58	Route 58/184 Park & Ride	2	Completed. Possible equipment damage
22	06	Kern	5	El Tejon Safety Roadside Rest Area (Southbound)	2	Completed. One of more EVSE units maybe damaged.
23	06	Kern	5	El Tejon Safety Roadside Rest Area (Southbound)	2	Completed. One of more EVSE units maybe damaged.
24	08	San Bernardino	15	Clyde V. Kane Safety Roadside Rest Area (Northbound)	1	Completed
25	08	San Bernardino	15	Clyde V. Kane Safety Roadside Rest Area (Southbound)	1	Completed
26	08	San Bernardino	15	Valley Wells Safety Roadside Rest Area (Northbound)	1	Completed
27	08	San Bernardino	15	Valley Wells Safety Roadside Rest Area (Southbound)	1	Completed
28	09	Kern	58	Boron Safety Roadside Rest Area (Eastbound)	1	Completed
29	09	Kern	58	Boron Safety Roadside Rest Area (Westbound)	1	Completed
30	09	Inyo	395	Coso Junction Safety Roadside Rest Area	1	Completed
31	09	Inyo	395	Division Creek Safety Roadside Rest Area	1	Completed
32	09	Inyo	395	Caltrans District 9 District Office - Bishop	1	Completed
33	10	Stanislaus	5	Westley Safety Roadside Rest Area (Northbound)	1	Completed
34	10	Stanislaus	5	Westley Safety Roadside Rest Area (Southbound)	1	Completed
35	10	Merced	5	John "Chuck" Erreca Safety Roadside Rest Area (Northbound)	1	Completed in December 2021, but rest area closed from April 4, 2022
36	10	Merced	5	John "Chuck" Erreca Safety Roadside Rest Area (Southbound)	1	Completed in December 2021, but rest area closed from April 4, 2022
37	10	San Joaquin	99	Lodi Park & Ride	1	Completed

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Image 2: Zen 30_30 Project Timeline:



Task 2: Charger Operation Data and Analysis

UC Davis ITS team is receiving charger usage data Caltrans every few months. The latest dataset we received contains charger usage data until mid-July 2022. ITS team is in the process of organizing the information and analyzing the usage session data to better understand and study the infrastructure performance including down time, power performance, energy dispensed, charging profiles, etc.

Task 3: Maintenance and Operation Phase

We identify the need for repairs and maintenance at the following charging station locations. One or more equipment is damaged and/or there is damage to the charging capable. The usage data confirms that damage to equipment has made the chargers inoperable.

A no-cost extension for 3 months has been filed for this task for researchers to complete the evaluation of data and prepare a final report.

Image 3: List of Stations Needing Repairs

Location	Caltrans District	County	Route	Description	Number of DCFC Stations	Status
9	03	Nevada	80	Donner Summit Safety Roadside Rest Area (Eastbound)	1	Completed. But currently in need of repairs.
10	03	Nevada	80	Donner Summit Safety Roadside Rest Area (Westbound)	1	Completed. Currently in need of repairs.
13	05	San Luis Obispo	46	Shandon Safety Roadside Rest Area	1	Completed. But equipment maybe in need of repair.
16	06	Kings	5	Kettleman City Maintenance Station	2	Completed. Possible equipment malfunction
15	06	Fresno	99	Caltrans District 6 District Office	4	Completed. Possible equipment damage
21	06	Kern	58	Route 58/184 Park & Ride	2	Completed. Possible equipment damage
22	06	Kern	5	El Tejon Safety Roadside Rest Area (Southbound)	2	Completed. One of more EVSE units maybe damaged.
23	06	Kern	5	El Tejon Safety Roadside Rest Area (Southbound)	2	Completed. One of more EVSE units maybe damaged.

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