California
Road Charge

Public Private Roads Project

APPENDIX
A

Independent Evaluation

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California Road Charge Public/Private Roads Project

Independent Evaluation

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Prepared By:
The Highlands Consulting Group

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ACRONYMS AND TERMS

Acronym / Term	Definition
CCPA	California Consumer Privacy Act
Caltrans	California Department of Transportation
ConOps	Concept of Operations
DNAC	District Native American Coordinator
DMV	Department of Motor Vehicles
EI&E	Energy, Installations and Environment
FIPS	Federal Information Processing Standard
GPS	Global Positioning System
ICD	Interface Control Document
IEC	International Electrotechnical Commission
IFTA	International Fuel Tax Association
ISO	International Organization for Standardization
KPI	Key Performance Indicator
NAHC	Native American Heritage Commission
OBD	On-Board Diagnostics
PCI-DSS	Payment Card Industry Data Security Standards
PII	Personally Identifiable Information
PPRP	Public/Private Roads Project
QR	Quick Response
RMF	Risk Management Framework
SB	Senate Bill
SRS	System Requirements Specification
STSFA	Surface Transportation System Funding Alternatives
TAC	Technical Advisory Committee
TCA	Transportation Corridor Agencies
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VIN	Vehicle Identification Number

1 INTRODUCTION

Caltrans conducted the California Road Charge Public/Private Roads Project (the project) from July 2022 to November 2023. The project included several research efforts and a six-month pilot which engaged motorists across rural, tribal, and urban communities to explore how they may be impacted by a road charge program. The six-month pilot was conducted from April 2023 through September 2023 and focused on testing the viability of geolocation technology to differentiate between public and private roads. As part of this project, Caltrans contracted with WSP to conduct the pilot and WSP contracted with The Highlands Consulting Group LLC (Highlands Consulting) to conduct an independent evaluation. This evaluation assesses the performance of the project by a comprehensive set of criteria and measures selected to address project goals and objectives established by Caltrans.

The *Evaluation Strategy Plan* completed by Highlands Consulting in December 2022 provided detailed information on the independent evaluation tasks, identifying resources, activities to complete each task, and operational approaches used in gathering data, conducting the analysis, and reporting on the results. As part of that plan, Highlands developed the *Evaluation Criteria Matrix* located in **Appendix A,** which guided the structure and analytical methods used in this evaluation.

1.1 ROAD CHARGE PILOT AND PROJECT OVERVIEW

California has been a leader in exploring the possibility to fund transportation infrastructure with a road charge, an alternative to fuel taxes that charges motorists by the mile driven, rather than by the gallons of fuel purchased. As vehicles become more fuel-efficient and as electric and hybrid vehicles become more prevalent, the revenue generated by the fuel tax will not keep up with the maintenance needs on California's roads because less tax will be collected per mile of travel.

The California Road Charge Public/Private Roads Project (the project) is the next step in California's efforts to study the viability of a Road Charge program in the State. Prior to this project, California led two successful pilots and, as a result of their findings, made a concerted effort to focus this project and pilot on two distinct populations of the State: rural and tribal communities. The project and pilot were designed to:

- Demonstrate the technical, budgetary, and political viability of road charge differentiation of public versus private roadways, including privacy concerns and equity considerations.
- Demonstrate the process and viability of road charge administered by a California tolling entity, serving as a commercial account manager.
- Conduct and analyze public attitude research to assess rural and tribal communities' awareness surrounding road charge, their unique impacts, and their priorities in finding solutions.
- Enhance the Platform for Road charge Innovation and Mobility Evolution (PRIME) clearinghouse functionality for interregional interoperation.

The project was conducted in two phases, as shown in Table 1.

Table 1: Project and Pilot Timeline

Pilot and Project Activities	Timeline
Communications Research and Community Engagement	July 2022 – November 2023
Pilot Operations	April 2023 – September 2023

1.1.1 PROJECT-SPECIFIC GOALS

This report evaluates the performance of the California Road Charge Public/Private Roads Project, which pursued the following purpose and goals.

- **Goal 1:** Demonstrate the viability of current GPS technology in differentiating between public and private roads.
- **Goal 2:** Engage rural communities and more fully understand how road charge uniquely impacts them and what their priorities are in finding solutions. If possible, engage the Native American tribes in the state.
- **Goal: 3** Examine the current state process for refunding gas tax payments for miles on private roads and determine what elements of the organizational design could be used or need to be changed for a road charge system.
- **Goal 4:** Continue to build and monitor public awareness of road charge in California.

2 PURPOSES OF THIS EVALUATION

A project evaluation measures how well the project met its objectives by collecting and analyzing quantitative and qualitative data, evaluating the performance of the project and its significant participants, and reporting conclusions.

This is an independent evaluation conducted by Highlands Consulting, which was not involved in implementing or operating the California Road Charge Demonstration. The evaluation does not make recommendations; rather, it is a compilation of data and analysis related to the performance of the demonstration, designed to illustrate efforts and achievements directed at the demonstration's objectives and goals.

2.1 OVERALL PILOT OBJECTIVES

In addition to each of the project-specific goals above, Caltrans defined objectives for this independent evaluation. These objectives serve as the basis for this evaluation of the Public/Private Roads Pilot Project:

- Assess the functionality of GPS technology to differentiate between public and private roads.
- Provide recommendations regarding GPS technology's ability to differentiate between public and private roads.
- Conduct outreach to increase public awareness of the need for alternative funding sources.
- Minimize the administrative cost of any potential user-based revenue mechanisms and associated collection of fees.
- Address potential implementation and public acceptance hurdles to adoption.
- Identify potential implications of road charges for rural and Native American communities.
- Ensure user privacy protection.
- Ensure data security.
- Utilize third-party business partners to administer or operate system(s).
- Identify equity concerns across rural and Native American communities.
- Ensure ease of user compliance.
- Ensure technology reliability and security.

To the extent possible, the project was evaluated to determine if it achieved each of these objectives. To aid in organizing the evaluation, the evaluation team grouped these objectives into six evaluation categories, as depicted in Table 2.

Table 2: Evaluation Categories and Objectives

Evaluation Category	Evaluation Objectives
Technological Feasibility	• Assess the functionality of GPS technology to differentiate between public and private roads. • Provide recommendations regarding GPS technology's ability to differentiate between public and private roads.
Cost	• Minimize the administrative cost of any potential user-based revenue mechanisms and associated collection of fees.
Operations and Compliance	• Utilize third-party business partner(s) to administer or operate system(s). • Ensure ease of user compliance.
User Privacy	• Ensure user privacy protection.
Data and Systems Security	• Ensure data security. • Ensure technology reliability and security.
Communications	• Conduct outreach to increase public awareness of the need for alternative funding sources. • Address potential implementation and public acceptance hurdles to adoption.

Evaluation Category	Evaluation Objectives
	• Identify potential implications of road charges for rural and Native American communities. • Identify equity concerns across rural and Native American communities.

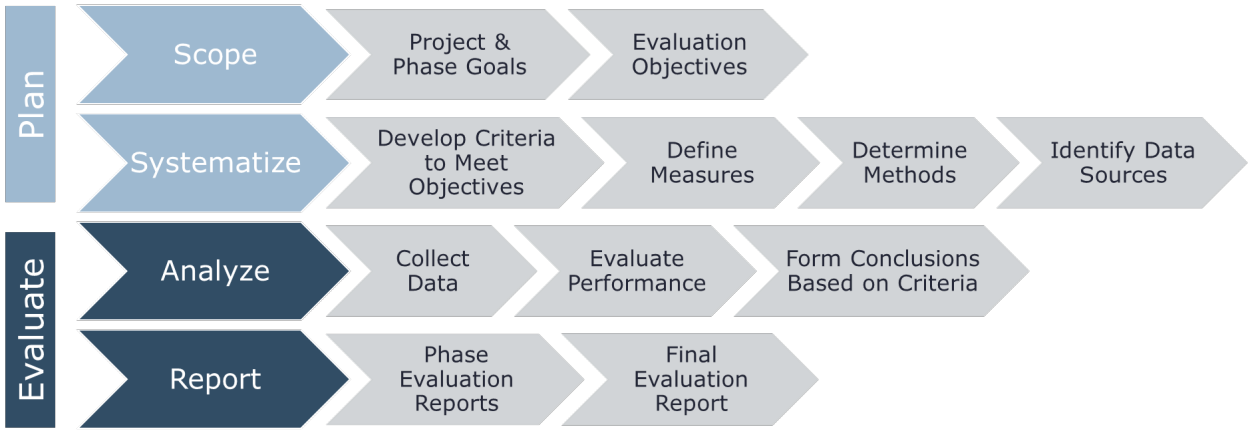
2.2 EVALUATION STRATEGY PLAN

This evaluation was guided by the *California Road Charge Public/Private Roads Project Evaluation Strategy Plan* and uses the objectives above and detailed criteria linked to those objectives to assess how well the project met its objectives. Those criteria, with their associated measures and analytical methods are included in this document as **Appendix A. Evaluation Criteria Matrix**, and each section of the Evaluation Criteria Matrix has corresponding sections in this evaluation report.

3 EVALUATION PROCESS

Highlands Consulting followed a structured process to plan for and then conduct the evaluation. Figure 1 summarizes the process, followed by a narrative description of each major step.

Figure 1: Road Charge Demonstration Evaluation Process



3.1 PLAN

Evaluation planning began by understanding the scope of the evaluation – reviewing the goals and objectives established by Caltrans for the overall project and pilot. To make these goals and objectives actionable and measurable, the evaluation team created a systematic structure for the evaluation: creating evaluation criteria for each objective, defining measures for each criterion,

determining the analytical methods to develop each measure, and identifying data sources. Each of these elements is described below:

- Criteria are concepts used to judge whether an objective has been achieved.
- Measures are specific numerical or qualitative statements that determine how well the criteria are satisfied.
- Methods describe how the evaluation team obtained its measures – for example, from interviews and data analysis.
- Data sources identify where information was found for each measure – for example, specific reports produced by the project delivery team or reports of survey data.

Highlands Consulting developed the *Evaluation Strategy Plan* (Task 7.a.1) using these scoping and systematizing activities. The Plan was accepted and finalized by Caltrans on December 6, 2022.

3.2 EVALUATE

The active evaluation began with analyzing data and documentation collected and reported by the project delivery team and from interviews, surveys, polls, and other sources. The team evaluated the summaries of the collected data to determine whether the project was meeting criteria established in the *Evaluation Strategy Plan.* The team then made conclusions that form the basis of this *Evaluation Report*.

This evaluation is based on the seven information-gathering and analysis methods used to assess the project. More detailed descriptions of each of these are included in the *Evaluation Strategy Plan.*

- **Data analysis:** Review quantitative and qualitative data from periodic operational reports, surveys, polls, focus groups, and ad hoc data provided by the operational team.
- **Documentation review:** Review foundational project documents, including authorizing legislation, grant applications, contracts, operational and communications plans, participant instructions, email and other communications to participants, and other descriptive documents created during the demonstration.
- **Independent security audit:** Review business partners' compliance with standards for data and system security and reliability, conducted by an independent unit within WSP.
- **Interviews:** Conduct structured interviews with business partners, consultants, and Caltrans staff to probe questions about pilot and project performance, successes, and challenges.
- **Focus groups:** Observe focus groups with drivers from various regions of the state and review reports on the focus group findings.
- **Participant surveys:** Review survey reports that involved pilot participants, conducted before starting and at the conclusion of their participation.

- **Public opinion polls:** Review findings from polls conducted with the general public, rural residents, and tribal members from December 2022 to April 2023, gauging California residents' opinions on road charge concepts and other related transportation issues.

4 EVALUATION OF THE PUBLIC/PRIVATE ROADS PROJECT

This evaluation report provides a summary of the findings for the Public/Private Roads Project including important facts and analyses organized by evaluation objectives and criteria, with information on how well the project achieved each of the established objectives.

4.1 PROJECT OVERVIEW

The California Road Charge Public/Private Roads Pilot (the pilot) was a six-month pilot running from April 2023 through September 2023. The pilot focused on the delineation between public and private lands through a range of rural, tribal, and urban geographic locations.

The pilot consisted of 283 participants segmented into three cohorts: rural, tribal, and customers of the Transportation Corridor Agency (TCA). The TCA cohort was considered a sub-pilot and was used to test the feasibility of a tolling agency acting as a road charge system account manager.

The pilot technology partners collected travel data from participating vehicles and users, processed the collected data into transactions, applied the appropriate road charge rate and fuel tax credit, and then calculated the net road charges due. All charges were simulated during the pilot, with no real monies collected from participants.

The onboarding process involved participants creating accounts, installing plug-in devices, and engaging in a pre-pilot survey. Throughout the pilot, incentives for participation activities were provided, with potential earnings of up to $250 for full participation in the required pilot activities.

During pilot operations, participants drove normally, and their data was collected for monthly simulated statements. Dispute resolution was facilitated through a customer support system, and offboarding activities include closing accounts, returning devices, and completing a post-pilot survey.

The device used by pilot participants was provided by Danlaw, a manufacturer of automotive electronics, including connected-car devices. The plug-in device recorded individual trip information and mileage driven, using GPS location data.

The System Administrator built, maintained, and operated the PRIME system, which stands for Platform for Road charge Innovation and Mobility Evolution. PRIME is a data clearinghouse subsystem that provides a central data repository to collect and manage California Road Charge Pilot data. PRIME allows for secure upload, transformation, processing, and reporting of pilot data. The interactions between PRIME and the business partner's subsystems demonstrate how a partnership between the State and commercial account managers could be structured.

5 FINDINGS

The findings presented in this section are organized by the objectives, criteria, and measures described in the *Evaluation Strategy Plan.* **Appendix A** contains the full Road Charge Pilot Evaluation Criteria Matrix that illustrates which criteria relate to each phase. All findings contained in this *Evaluation Report* are descriptive in nature, linking the results of the demonstration to the project's goals, criteria, objectives, and performance measures.

Highlands Consulting independently conducted this evaluation. The System Administrator, WSP, implemented and operated the California Road Charge Public/Private Roads Project and Pilot without the assistance of the evaluation team. This evaluation presents a neutral view of the activities that took place during the California Road Charge Public/Private Roads Project. This evaluation does not make recommendations regarding future implementation of a road charge or additional demonstration projects as those policy prescriptions will be included in the *California Road Charge Public/Private Roads Final Report (Final Report,* Task 8.b.6).

5.1 ASSESS THE FUNCTIONALITY OF GPS TECHNOLOGY TO DIFFERENTIATE BETWEEN PUBLIC AND PRIVATE ROADS

This evaluation category assesses whether the demonstrated technologies help improve road charge implementation by differentiating between public and private roads. This could allow exemption of miles traveled on private roads, similar to fuel tax exemptions or refunds for agricultural use. The following criteria are used to assess the achievement of this objective:

- Ability of systems to measure distance traveled on public and private roads.
- Ability of systems to identify private roads as distinct from public roads.

5.1.1 ABILITY OF SYSTEMS TO MEASURE DISTANCE TRAVELED ON PUBLIC AND PRIVATE ROADS

This pilot is part of a series of projects around the country that have shown success in measuring distance traveled by using off-the-shelf GPS-enabled devices that plug into a vehicle's OBD II (on-board diagnostics, second generation) port. Through the six-month pilot, participants logged just over 1.5 million miles through this system.

In interviews with the System Administrator, TCA, and Caltrans, the system was generally considered effective at recording mileage, with minor errors that were resolved promptly. However, there is no way to verify that all participant miles were reported, since there was no comparison to actual odometer readings from the start and finish of the pilot to verify the completeness of the mileage collected. In addition, some challenges with the devices were noted in the *Plug-In Device and Geolocation Analysis* report (Task 6.b.1). These challenges included:

- Errors reporting odometer readings when devices are first connected and at trip starts.
- Odometer gaps between consecutive trips.
- Reporting of zero-mile trips.

- Missing trip-end messages.

Some of these challenges were caused by the devices communicating with User Datagram Protocol (UDP), which is a streamlined method for wireless communication that does not ensure a firm connection with the recipient server before sending data. Occasionally, this led to lost data messages. The System Administrator recommends that future road charge programs use a more secure data communication protocol, such as Transmission Control Protocol (TCP), which would resolve many of these issues. Other issues related to missing odometer values revealed inherent limitations in vehicles' ability to support requests for odometer values from an OBD II device.

In post-pilot surveys, participants were asked, "How confident are you that your mileage was being reported accurately?" They provided generally positive responses, with a plurality saying they were extremely confident, but as shown in Table 3, some were less confident, particularly among the tribal and TCA groups.

Table 3: User Confidence in Mileage Reporting

	Percent of Responses							
Group	Not confident at all 1	2	3	4	5	6	Extremely confident 7	Mean Score
Rural	2%	2%	3%	8%	10%	22%	51%	5.9
Tribal	0%	0%	7%	21%	14%	21%	36%	5.6
TCA	10%	0%	6%	3%	3%	26%	52%	5.7

5.1.2 ABILITY OF SYSTEMS TO IDENTIFY PRIVATE ROADS AS DISTINCT FROM PUBLIC ROADS

To assess the accuracy of public/private/tribal road differentiation, the evaluation team conducted interviews with business partners and Caltrans, reviewed surveys of participants, and reviewed the *Plug-In Device and Geolocation Analysis* report (Task 6.b.1).

Interviews showed general satisfaction with the differentiation of roads once some challenges were resolved. One challenge was that a change in the map-set used in May 2023 resulted in more than 3,000 miles being undifferentiable – about 1,200 GPS waypoints recorded during those trips could not be reconciled with the map's data. The map-set was updated, and then the number of undifferentiable waypoints declined dramatically.

Additionally, the System Administrator became aware that the GPS device vendor had set the devices to capture locations every five seconds, while the project had specified an interval of one second. The vendor spent 60 days reconfiguring and testing the devices at the new one-second interval, and for the final two months of the pilot, the devices used the new interval. This likely also boosted location reliability, and undifferentiable miles fell to near zero in August and zero in September. Overall, the total undifferentiable mileage was only 0.2% of all miles recorded in the pilot.

In post-pilot surveys, participants were asked, "How confident are you that the device you installed in your car accurately identified the miles you drove on public roads versus private roads?" Their responses were mixed, with a plurality extremely confident but significant numbers expressing less confidence, especially among tribal participants. Table 4 displays these results.

Table 4: User Confidence in Mileage Differentiation

Group	Percent of Responses							Mean Score
	Not confident at all 1	2	3	4	5	6	Extremely confident 7	
Rural	4%	3%	8%	11%	14%	21%	40%	5.5
Tribal	0%	7%	0%	21%	21%	14%	36%	5.4
TCA	6%	3%	3%	13%	6%	29%	39%	5.5

Together, these data on participant and operator opinions, plus the information on undifferentiated miles, form the measures for evaluating the achievement of this criterion. The pilot was not structured to provide independent technical verification of whether GPS locations identified as public or private were accurate.

5.1.3 EVALUATION OUTCOMES: GPS TECHOLOGY

The level or degree of achievement for this objective, according to the criteria, is shown by the icons displayed in Table 5.

Table 5: Evaluation Outcomes – GPS Technology's Ability

Objective	Criteria	Outcomes
5.1 Assess the functionality of GPS technology to differentiate between public and private roads	• Ability of systems to measure distance traveled on public and private roads	✓ Fully Achieved
	• Ability of systems to identify private roads as distinct from public roads	✓ Fully Achieved

Although some challenges arose with the GPS devices, the project team was able to make corrections and develop a robust collection of data on total and differentiated mileage.

5.2 PROVIDE RECOMMENDATIONS REGARDING GPS TECHNOLOGY'S ABILITY TO DIFFERENTIATE BETWEEN PUBLIC AND PRIVATE ROADS

This objective seeks to describe whether the overall pilot led to specific road charge recommendations related to the GPS technology's ability to accurately differentiate between public and private roads.

The following criterion is used to assess the achievement of this objective:

- Ability of pilot to generate recommendations.

5.2.1 ABILITY OF PILOT TO GENERATE RECOMMENDATIONS

The pilot provided key insights related to the capabilities of the technology used, some potential implications of using GPS-enabled OBD-II devices at a larger scale, and potential challenges likely with future road charge programs or pilots. These insights and recommendations were noted by the evaluation team from the *Plug-In Device and Geolocation Analysis* report (Task 6.b.1) and the *Final Report* (Task 8.b.6). The most significant recommendations include the following:

- Collaborate with OBD-II device vendors to tailor the device functionality and message set to the unique distance-critical needs of the road-charge application.
- Test mileage and odometer readings from the devices against actual vehicle odometers and work with device manufacturers to improve the accuracy of odometer values obtained from the devices.
- Resolve incomplete communication from devices by using TCP instead of UDP data transfer protocol.
- Reduce incomplete trip data by reconfiguring the system's response to trip-end messages.
- Include periodic odometer checks to "true up" mileage totals, either through physical inspection or upload of odometer photos.
- Monitor the frequency of GPS waypoints failing the location/differentiation (public/private/tribal roads) process as an indicator of the need to correct map-sets.
- Conduct further research on the optimal GPS waypoint frequency to optimize accuracy while considering data transmission and storage costs.
- Consider providing trip mapping only as an additional paid service, due to additional technical and processing requirements to make mapping user friendly and to handle expected customer service needs.
- Consider offsetting the costs of devices and their management by allowing account managers to charge for additional services or charging users for use of the device.
- Due to the costs of purchasing and servicing GPS-enabled OBD II devices and the low benefits to taxpayers (because the proportion of miles driven on private and tribal roads is low), consider simpler alternatives like simply prorating the mileage driven by rural or

tribal taxpayers, based on a predetermined percentage miles assumed to be on non-public roads.

5.2.2 EVALUATION OUTCOMES: RECOMMENDATIONS

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 6.

Table 6: Evaluation Outcomes – Recommendations

Objective	Criterion	Outcomes
5.2 Provide recommendations regarding GPS technology's ability to differentiate between public and private roads	• Ability of pilot to generate recommendations	✓ Fully Achieved

The project team succeeded in providing an extensive set of recommendations. Thus, while progress in using these technologies was made, further enhancements are needed to ensure accurate differentiation between road types in future applications.

5.3 MINIMIZE THE ADMINISTRATIVE COST OF ANY POTENTIAL USER-BASED REVENUE MECHANISMS AND ASSOCIATED COLLECTION OF FEES

This objective assesses the cost associated with administering and collecting road charges from the perspective of both the state agency and a potential business partner. This objective also explores the potential costs associated with data storage, processing, and other cloud services. The following criterion is used to assess the achievement of this objective:

- Ability to estimate potential collect costs of pilot methods at a larger scale.

5.3.1 ABILITY TO ESTIMATE POTENTIAL COLLECTION COSTS OF PILOT METHODS AT A LARGER SCALE

The *Evaluation Strategy Plan* proposed measuring this criterion by the projected range of costs for a future mandatory road charge program and the viability of methods used to reduce operating costs at-scale.

Upon completion of the California Public/Private Roads Pilot, the evaluation team interviewed WSP and TCA. The interviews included questions regarding estimated collection costs and the potential financial impacts associated with implementing a full-scale road charge program.

Due to the small size of this pilot, estimating collection costs of a large-scale road charge program was not feasible. However, the project team identified several strategies to reduce collection costs including, but not limited to, leveraging existing business models, utilizing

existing state systems, and adding to existing tolling agency collection systems to administer a road charge.

The project team provided estimates related to the various costs associated with the OBD-II plug in device used to differentiate mileage and assess road charge costs in this pilot. The cost estimates for this pilot can be grouped as the following:

- **Device Costs:** The one-time purchase price for the physical device itself, together with the provisioning of a cellular data plan for the device.
- **Infrastructure Costs:** The one-time setup and recurring fees paid to Danlaw, for the use of its BitBrew gateway server to serve as the collection endpoint for device messages; the data storage costs associated with the pilot's front-end cache of raw incoming device messages, stored in an Amazon S3 server; the storage costs for the processed data used for pilot operations and reporting, stored in the Snowflake database; and the "compute time" processing costs associated with the aggregation of trip data, differentiation of mileage, and calculation of road charges within Snowflake.
- **Logistical Costs:** The costs associated with getting the device to the participant on the front-end of the pilot, as well as retrieving the device from the participant at pilot closeout.

For further details on costs associated with this pilot, as well as those that might be anticipated for future road charge programs using a plug-in device as a mileage reporting option, refer to the *Plug-In Device and Geolocation Report* (Task 6.b.1). The costs for the pilot are broken down per device in Table 7, cumulating in a calculated total monthly per-device cost of $36.92 for this pilot, or about $221.50 per-device cost for six months[1].

[1] California Road Charge Public/Private Roads Pilot Operations Plan and Closeout Results

Table 7: Summary of Pilot Costs per Device

Cost Category	Amount per device per transaction *(283 devices)*	No. of Transactions	Amount per device
Device purchase	$95.00	1x	$95.00
Wireless data plan	$0.90	6x	$5.40
Gateway (Danlaw)	$9.26	6x	$55.56
Hosting – raw data (Amazon S3)	$0.01	6x	$0.05
Hosting – processed data (Snowflake)	$0.01	6x	$0.06
Data processing compute time (Snowflake)	$8.83	6x	$52.98
Packaging for shipment	$0.24	3x	$0.71
Collateral (install instructions)	$0.25	1x	$0.25
Shipping labels	$0.03	3x	$0.10
Shipping fee	$3.80	3x	$11.40
		Total per-device cost for six months	$221.50
		Total monthly cost per device	**$36.92**

To summarize, it was not possible to estimate exact costs in this small pilot, and definitive collection costs associated with the methods used in this pilot are likely high but remain unknown.

5.3.2 EVALUATION OUTCOMES: COLLECTION COST ESTIMATES

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 8.

Table 8: Collection Cost Estimates

Objective	Criterion	Outcomes
5.3 Minimize the administrative cost of any potential user-based revenue mechanisms and associated collection of fees	• Ability to estimate potential collection costs of pilot methods at a larger scale	– Partially Achieved

The achievement of this criterion is rated as partially achieved because the size of this pilot was too small to create a realistic estimate of collection costs. In addition, the project team explained that the nature of existing state systems does not permit significant changes to be made for small

pilot programs, and therefore, estimating the costs of existing state systems to collect a road charge is not feasible.

To obtain comprehensive estimates of administrative or collection costs, further analysis is necessary. Therefore, this pilot partially achieves this objective – it identified per-device costs and provided potential strategies to reduce collection costs.

5.4 UTILIZE THIRD-PARTY BUSINESS PARTNER(S) TO ADMINISTER OR OPERATE SYSTEM(S)

This objective assesses whether the pilot made use of third-party business partners in the operation and administration of road charge systems. The following criteria are used to assess the achievement of this objective:

- Number of third-party business partners to administer or operate systems.
- Description of third-party business partners used.

5.4.1 USE OF THIRD-PARTY BUSINESS PARTNERS TO ADMINISTER OR OPERATE SYSTEM(S)

The California Public/Private Road Charge Pilot met the objective of using third-party business partners to administer or operate system(s). See the *Final Report* (Task 8.b.6) for more details on business partners.

- **WSP USA Inc:** Caltrans contracted with business partner, WSP, to manage operations, provide data collection, transaction processing, and account management services and systems.
- **Transportation Corridor Association (TCA):** Caltrans partnered with TCA, who was responsible for providing account management services for the 50-person tolling agency sub-pilot.
- **Danlaw:** WSP contracted with business partner, Danlaw, to provide onboard diagnostics (OBD-II) plug-in devices for the data collection of GPS way points and odometer readings.

For the duration of the pilot, the contract between Caltrans and WSP with the use of subcontracted business partners illustrates that existing technologies operated by firms and agencies with experience in transportation operations may play a key role in the future administration and collection of a statewide road charge program.

5.4.2 EVALUATION OUTCOMES – THIRD PARTY BUSINESS PARTNERS

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 9.

Table 9: Third Party Business Partners

Objective	Criteria	Outcomes
5.4 Utilize third-party business partner(s) to administer or operate system(s)	• Use of third-party business partners to administer or operate systems	✓ Fully Achieved

The project team fully achieved this objective because third-party business partners were an integral part of the live pilot demonstration and project.

5.5 ENSURE EASE OF USER COMPLIANCE

This operational objective describes the participants' ease of compliance with the method of mileage collection and their perceived accuracy of road usage data. The achievement of this objective is measured by the following criteria:

- Effectiveness of methods for encouraging voluntary compliance.
- Resistance of methods to tampering and fraud.
- Users' ease of recording and reporting mileage.
- Users' ease of differentiating between public and private road mileage.
- Quality and accuracy of road use data reported.

5.5.1 EFFECTIVENESS OF METHODS FOR ENCOURAGING VOLUNTARY COMPLIANCE

To measure the rate of voluntary compliance by participants, the evaluation team interviewed the System Administrator, business partners, project team members, and reviewed survey and interview results, as well as analyzed monthly progress reports. Since the participants signed up voluntarily and were paid incentives to complete enrollment and engage in various pilot activities including surveys, device installation, and mileage reporting, the rates of compliance were expected to be much higher than they might be if road charge were a mandatory program.

Significant findings gathered from interviews with the project team, participant survey results, and other relevant pilot reports are summarized below.

- **OBD-II Plug-in Device:** The mechanics of using a plug-in device to report each vehicle's mileage based on data collected from the vehicle avoided potential non-compliance issues with reporting mileage. In addition, the nature of the plug-in device allowed most participants to easily adopt a "set-it-and-forget-it" mentality. Overall, participant survey results indicate that pilot participants were generally satisfied with the OBD-II plug-in device, with a mean rating of 6.1 throughout the duration of the pilot where 1 indicated very unsatisfied and 7 indicated very satisfied.

Customer support documentation indicates that 17 percent of all participant inquiries were related to plug-in devices. The vast majority of inquiries related to plug-in devices were due to absent mileage calculations in the myMiles web portal and were quickly resolved by simply re-setting the OBD-II device.

- **Participant Portal:** The myMiles web platform allowed participants to access their individual account portals via any web-enabled device. Participants used the myMiles portal to view information on participation, their account, vehicles, travel, monthly statements, and incentives. The portal also had a support feature that enabled participants to ask questions and request support via email. The TCA cohort utilized TCA's own account portal, which provided similar information but did not visually display trip routes on a map.

  Participant survey results indicate that the myMiles web platform was perceived moderately positively by participants throughout the pilot, with mean rating of 5.25 on a scale where 1 indicated very unsatisfied and 7 indicated very satisfied.

- **Incentive Program:** For each of the pilot participants eligible for incentives, Caltrans, through the project team, paid up to $250 for their time in participating in the pilot. Incentives were paid based on completion of certain activities (including surveys, mileage reporting device installation and active reporting, driving, simulated road charge payments, and account closeout).

  Incentives play a critical role in ensuring voluntary compliance during the duration of the pilot. However, in a future mandatory program, paying incentives to all California drivers participating in a road charge program is not feasible. To ensure high rates of compliance, California will need to implement a form of enforcement for those who do not comply with program requirements. To date, no road charge pilot project in California has tested any type of enforcement for participants who fail to comply with the requirements of their plug-in device or make simulated payments.

Reviewing the experiences of this pilot, the common factors that could easily diminish voluntary compliance are the use of processes or technologies that can easily be disconnected, ignored, or unused, and the lack of an enforcement mechanism.

5.5.2 RESISTANCE OF METHODS TO TAMPERING AND FRAUD

As expected in a pilot based on volunteers, the System Administrator and business partners reported no instances of fraud or evidence of tampering. Due to the low financial stakes of this conceptual pilot, there is no reason to assume participants would intentionally commit fraud or tamper with their device to avoid paying a road charge.

Additional observations from business partner interviews and participant survey results are provided below.

- **GPS Device Disconnections:** Over the course of the live demonstration's six-month period, the pilot platform collected over 92.4 million discrete messages from the devices installed in the 283 participants' vehicles. Of these messages, 1,172 were categorized as "Disconnect" messages. There are two main reasons a device would report a "Disconnect" message, including inadvertent disconnects and intentional disconnection.

As is the case with every pilot utilizing an OBD-II port, there will be times that a participant intentionally unplugs the device. For example, routine vehicle maintenance could require the technician to unplug the device to access the vehicle's computer for diagnostics via the OBD-II port. Due to the location of some vehicles' OBD-II port, other instances of disconnection could include the user accidentally "knocking out" the device from the port or unintentionally kicking the device. Each one of these disconnect messages is potentially a trigger for a mileage verification or true-up being required in a future mandatory road charge program or pilot.

Findings from interviews highlight the shared belief of both the System Administrator, business partners, and Caltrans regarding the crucial necessity for any future road charge pilot or program to include a mechanism for mileage verification. This could mitigate the risk and temptation of fraud. One proposed method involves conducting mileage verification or a true-up during emissions testing appointments. Alternatively, users could submit photos of their odometer at the conclusion of specific time intervals to ensure the accuracy of their reported mileage.

- **Participant Perceptions of Fraud:** Overall, survey results indicate respondents in all three cohorts registered moderate concern about the potential for cheating. Unlike prior pilot demonstrations in California, the majority of participants' concern for cheating decreased over the duration of the pilot. Nevertheless, responses suggest that while the overall concern regarding cheating decreased, there remains a prevailing belief among participants that regardless of the system or safeguards implemented, individuals will inevitably seek ways to manipulate the system to avoid paying.

  Rural Cohort: Pre-pilot results indicate 35 percent of Rural participants were either concerned or very concerned that this type of reporting system would allow people to cheat. Similar to the tribal cohort, their level of concern declined toward the end of the pilot, from a mean rating of 4.8 at the start to a mean rating of 4.4 at the conclusion on a scale where 1 indicated not at all concerned and 7 indicated very concerned about the ability to cheat.

  Tribal Cohort: Pre-pilot survey results indicate 72 percent of Tribal participants were either concerned or very concerned that this type of mileage reporting system would allow people to cheat. However, their level of concern declined toward the end of the pilot from a mean rating of 6.0 at the start to a mean rating of 4.4 at the conclusion on a scale where 1 indicated not at all concerned and 7 indicated very concerned about the ability to cheat.

  TCA Cohort: Although the TCA cohort was a small sub-pilot of the larger group, their level of concern for people being able to cheat this type of reporting system remained constant over the duration of the pilot, with a mean rating of 4.6 on a scale where 1 indicated not at all concerned and 7 indicated very concerned about the ability to cheat.

To summarize, this pilot yielded no instances of intentional tampering or attempted fraud, given its low financial stakes. While GPS device disconnections were noted during the live demonstration, these were likely attributed to routine maintenance or accidental circumstances rather than intentional manipulation. However, the nature of the plug-in device technology used

could lead to fraud in a future operational program if precautionary and enforcement measures are not implemented.

5.5.3 USERS' EASE OF RECORDING AND REPORTING MILEAGE

To measure the level of achievement for this criterion, the evaluation team reviewed the reported level of participant satisfaction, as measured by participant survey results. To gauge the ease with which participants could engage in this pilot, participation surveys asked how easy it was to report their mileage and to what degree were participants satisfied with the mileage reporting process. Table 10 in Section 5.5.6 summarizes each cohorts' survey results. A summary of each cohort's significant findings is provided below.

- **Rural:** When asked how easy it was to report their mileage, the rural cohort results indicate a mean rating of 6.6 on a scale of 1 – 7, with 7 signifying extremely easy. Despite the high level of satisfaction, a few participants reported some concerns related to their mileage reporting device, and whether their milage was accurately reflected in their online account. Additional survey results indicate that respondents in the rural cohort experienced minimal difficulties when reporting their mileage, with 78 percent indicating they had "no difficulties" throughout the duration of the pilot.
- **Tribal:** Participants in the tribal cohort were also asked how easy it was to report their mileage. Respondents in this cohort recorded a mean rating of 6.1 on a scale of 1 – 7, with 7 signifying extremely easy. Additional survey results indicate that respondents in this cohort experienced minimal difficulties when reporting their mileage, with 57 percent indicating they had "no difficulties" throughout the duration of the pilot.
- **TCA:** When asked how easy it was to record their mileage, the TCA cohort responded extremely positively, with a mean rating of 6.3 on a scale of 1 -7, with 7 signifying extremely easy. Additionally, 77 percent of TCA respondents indicated that it was "extremely easy" to report their mileage, and 74 percent were "very satisfied" with the milage reporting process overall.

Generally, participants in each cohort felt the mileage reporting process utilized in this pilot was easy to use and were satisfied with how easy it was to record their mileage. Several open-ended comments from survey results suggest using the OBD-II device to report mileage is "straight forward" and "very simple to use." See Table 10 in Section 5.5.6 for more details about the survey results.

5.5.4 USERS' EASE OF DIFFERENTIATING BETWEEN PUBLIC AND PRIVATE ROAD MILEAGE

To measure the level of achievement for this criterion, the evaluation team analyzed survey results, GPS device data, reported errors, and customer service logs. Data about GPS accuracy, differentiation, and instances of errors were obtained primarily through the System Administrator's monthly progress reports, interviews, *Plug-In Device and Geolocation Location Report* (Task 6.b.1) and the *Final Report* (Task 8.b.6).

To gauge the ease with which participants could differentiate between public and private road mileage, participation surveys asked respondents how easy it was to identify their miles traveled

on private versus public roads, and their confidence level of the plug-in device to accurately record miles driven on public versus private roads.

Highlights of findings regarding users' ease of differentiating between public and private roads are provided below.

- **Rural:** When asked how easy it was to differentiate between public and private roads, respondents from the rural cohort indicated it was fairly easy, with a mean rating of 5.6 on a scale of 1 – 7, with 7 signifying it was extremely easy.

  Although most rural respondents found it fairly easy to differentiate mileage on public versus private roads, some participants raised concerns regarding mileage-related issues. These reports include inaccurate mileage records, glitches, gaps in the GPS mapping, and instances where trips did not populate in the myMiles portal. Additionally, feedback from participants highlighted usability issues with the myMiles portal; however, the majority of rural respondents acknowledged its accuracy in recording miles, with trip maps being described as "spot on."

- **Tribal:** The tribal cohorts' participation survey results revealed similar sentiment when asked about how easy it was to tell the difference between private or tribal roads and public roads, with a mean rating of 5.0, on scale of 1-7, with 7 signifying extremely easy.

  In contrast to the rural cohort, the tribal cohort's open-ended comments support their positive rating with all respondents indicating that they had no issues in differentiating between public and private roads.

- **TCA**: When asked about the ease of differentiating the miles driven on public versus private roads, the TCA cohort expressed greater difficultly compared to the other cohorts, with a mean rating of 4.8, on a scale where 7 indicated it was extremely easy. Further findings reveal that about 20 percent of survey respondents felt this task was not easy at all. Nevertheless, it is crucial to note that only 32 participants responded to the survey, and a larger sample size may have yielded comparable satisfaction levels to those of rural and tribal cohorts.

  During an interview with TCA business partners who also were pilot participants, they expressed very positive feedback about their ease in differentiating between miles traveled on public versus private roads. TCA participants received mock road charge invoices, similar to the invoices you would receive in the mail or by email after passing through a toll road or bridge. Respondents indicated they were very satisfied with the format of the invoice and that it was easy to review their miles traveled and decipher what type of roads they used.

Overall, while there were some concerns and challenges identified in each cohort, the majority of pilot participants found it relatively easy to differentiate between public and private road mileage. Continued efforts to address reported issues, particularly with GPS accuracy and usability, will likely further improve user satisfaction and ease of differentiation in the future.

5.5.5 QUALITY/ACCURACY OF ROAD USE DATA REPORTED

To measure the level of achievement for this criterion, the evaluation team analyzed data and errors reported by each of the systems and technology platforms. Data about operations and instances of errors were obtained primarily through the System Administrator's monthly progress reports and interviews with the System Administrator. Several interviews with the project team and participant surveys also provided insight on data quality and errors. Highlights of findings regarding data quality and accuracy are provided below.

- **Rural:** The rural cohort expressed high levels of confidence in data quality and accuracy. When asked "how confident are you that your road charge invoice was being calculated accurately," 78 percent of respondents indicated that they are either confident or extremely confident in the accuracy of their road charge invoices.
- **Tribal:** Survey results indicate respondents from the tribal cohort were moderately confident their road charge invoices were accurate. When asked "how confident are you that your road charge invoice was being calculated accurately," 71 percent of tribal respondents indicated they were either confident or extremely confident their road charge invoices were accurate.
- **TCA:** Although the TCA portion of the pilot was smaller compared to the rural cohort, similar findings of data quality and accuracy are evident. When asked "how confident are you that your road charge invoice was being calculated accurately," 80 percent of respondents indicated they were either confident or extremely confident their road charge invoices were accurate.

In addition to these findings, see the systems, integration, and acceptance testing described in later sections for information about the business partners' adherence to technical standards that promoted high quality data collection. For more details on GPS accuracy and pilot findings, see the *Plug-In Device and Geolocation Location Report* (Task 6.b.1).

5.5.6 SURVEY DATA: ENSURE USERS' EASE OF COMPLIANCE

As described earlier, participant surveys and various interviews provided a useful assessment of how well the pilot met the objective of ensuring ease of user compliance, including the ease of reporting, and differentiating mileage and the quality and accuracy of road use data. These data are reported for both the rural, tribal, and TCA cohorts of the pilot.

Table 10: Survey Data – Users' Ease of Compliance

Pilot Category	Pre-Pilot	Post-Pilot
Question: Please rate how satisfied you were regarding your experience with the plug-in device you used for mileage reporting? (1 = very unsatisfied, 7 = very satisfied)		
Rural	6.2	6.2
Tribal	6.4	5.6
TCA	5.8	6.5

Pilot Category	Pre-Pilot	Post-Pilot
Question: Please rate how satisfied you were regarding your experience with the process of reporting your mileage? (1 = very unsatisfied, 7 = very satisfied)		
Rural	n/a	6.2
Tribal	n/a	5.9
TCA	n/a	6.4
Question: Please rate how satisfied you were regarding your experience with the myMiles participant portal? (1 = very unsatisfied, 7 = very satisfied)		
Rural	5.5	5.3
Tribal	4.8	5.4
TCA	n/a	n/a
Question: If a road charge were to replace the gas tax, how concerned would you be that the reporting system you are using would allow people to cheat? (1 = not at all concerned, 7 = very concerned)		
Rural	4.8	4.4
Tribal	6.0	4.4
TCA	4.6	4.6
Question: How easy was it to report your mileage? (1 = not easy at all, 7 = extremely easy)		
Rural	n/a	6.6
Tribal	n/a	6.1
TCA	n/a	6.3
Question: How easy was it to differentiate between public roads and private roads? (1 = not easy at all, 7 = very easy)		
Rural	n/a	5.6
Tribal	n/a	5.0
TCA	n/a	4.8

5.5.7 EVALUATION OUTCOMES: USERS' EASE OF COMPLIANCE

Table 11 summarizes the outcomes of this evaluation for each of the criteria used to measure how well the pilot ensured ease of user compliance.

Table 11: Users' Ease of Compliance

Objective	Criteria	Outcomes
5.5 User's ease of compliance	• Effectiveness of methods for encouraging voluntary compliance	✓ Fully Achieved
	• Resistance of methods to tampering and fraud	– Partially Achieved
	• Users' ease of recording and reporting mileage	✓ Fully Achieved
	• User's ease of differentiating between public and private road mileage	✓ Fully Achieved
	• Quality and accuracy of road use data reported	✓ Fully Achieved

The project team fully achieved most criteria related to ensuring the ease of user compliance. Overall, the pilot demonstrated strong user compliance, with participants generally satisfied with the mileage reporting process and the effectiveness of the OBD-II device in recording and differentiating between public and private roads. However, resistance of methods to tampering and fraud is rated as partially achieved, because the plug-in devices would be easy to disconnect if a user had a financial incentive to do so. With no actual payments as part of this pilot, participants had no incentive to attempt noncompliance. Continued efforts to address reported issues, particularly regarding GPS accuracy and usability, could further increase levels of user satisfaction and compliance in future pilots or programs.

5.6 ENSURE USER PRIVACY PROTECTION

This objective assesses user privacy protection during the pilot measured by the following criteria:

- User perception of privacy protections.
- Protection of privacy (including PII), including implementation and operation of industry standard procedures.
- Public perception of road charge privacy protections.

Each participant in the six-month live pilot demonstration was provided a participant agreement and privacy policy during enrollment. The policy described privacy concepts in the demonstration, including:

- Personally identifiable information (PII) would not be shared with Caltrans or State employees.
- Details about the types of information that were collected by the business partner.

- Information needed to complete participation surveys.
- A pledge that third parties who need participant information for the demonstration would also abide by this privacy policy.
- Information about how to inspect their information collected for the demonstration.
- A commitment that PII would be destroyed within 30 days of the end of the demonstration.

5.6.1 USER PERCEPTION OF PRIVACY

Concerns about privacy and personal data continue to be the most significant challenge for road charge programs and pilots across the nation, especially those employing devices that report on mileage and/or locations. The concept of using GPS technology to record mileage leads to suspicion about whether public agencies could track drivers' whereabouts or use their data without consent. California road charge pilots continue to address privacy concerns when GPS technology is being used by having third-party account managers collect location data, with the pledge that the State will never have access to the data collected by those parties, other than chargeable miles traveled.

Table 12 provides data on participants' confidence in the pilot's privacy protections and on their reception of information regarding the privacy protections used to safeguard their data. Overall, privacy ratings among participants were moderately positive, with all three cohorts rating their level of confidence in the pilot's privacy protections above 5.0, on scale of 1-7, with 7 signifying very confident.

Additional survey results indicate the majority of respondents across all three cohorts had little to no concern about their personal information or data being compromised, as a result of participating in the pilot. When questioned about their concerns regarding privacy protection or data security, the average response across all survey respondents indicates that 66 percent were not concerned about privacy or data security issues.

5.6.2 SURVEY DATA: USER PERCEPTIONS ON PRIVACY PROTECTIONS

Table 12: Survey Data – Privacy Perceptions

Pilot Category	Pre-Pilot	Post-Pilot
Question: How confident are you in the privacy protections that were provided during the pilot? (1 = not confident at all, 7 = very confident)		
Rural	5.3	5.6
Tribal	4.7	5.2
TCA	5.6	5.7

Pilot Category	Pre-Pilot	Post-Pilot
Question: How satisfied were you with the protection of your personal data? (1 = not satisfied at all, 7 = very satisfied)		
Rural	5.3	5.7
Tribal	4.7	5.2
TCA	5.4	5.8

5.6.3 PROTECTION OF PRIVACY (INCLUDING PII), INCLUDING IMPLEMENTATION AND OPERATION OF INDUSTRY STANDARD PROCEDURES

To evaluate whether the pilot satisfied this objective, according to the criteria, the evaluation team reviewed compliance of the business partner and technology systems with requirements based on standards identical or similar to ISO 27001 or PCI DSS 4.0. The next section describes the results of compliance testing and a security audit, as those efforts were more related to data security, although they did provide some benefits regarding privacy protection.

Per the *Business Requirements Document* for the Public and Private Roads Road Charge Pilot, all business partners were required to "comply with all applicable State of California laws and regulations regarding data protection and retention including but not limited to the CCPA [California Consumer Privacy Act]."[2] Additionally, this document included a reporting requirement that each business partner must purge any and all pilot data and reports containing personally identifiable information (PII) no later than one calendar month following completion of the final month of the demonstration operations period. Each business partner has attested to the System Administrator that they deleted PII in accordance with this contract provision.

5.6.4 PUBLIC PERCEPTION OF ROAD CHARGE PRIVACY PROTECTIONS.

Separate from the pilot activities themselves, EMC research conducted three separate public polls and four waves of focus groups with resident drivers across California. In addition, EMC conducted in-depth interviews with tribal community members from across the State.

The general public polls focused on the messaging surrounding the road charge program, the technical feasibility of a mileage-reporting device, and related potential privacy concerns among California drivers. The public polls indicate California drivers are generally very concerned about the privacy implications of a plug-in device collecting location information to report mileage. In total, 73 percent of the general population respondents are either concerned or very concerned about collecting vehicle location information to automatically report mileage.

While rural and tribal poll respondents expressed favorable views towards the concept of a road charge being more equitable than the current gas tax, findings for these demographic segments

Refer to the full California Consumer Privacy Act (CCPA) text here: https://oag.ca.gov/privacy/ccpa.

indicate higher levels of privacy concern regarding the collection of vehicle location information for reporting mileage, especially rural residents. In total, 82 percent of rural respondents and 74 percent of tribal respondents are either concerned or very concerned about collecting vehicle location information to automatically report mileage.

Overall, compared to the general population, rural and tribal respondents hold more negative impressions around the mechanics, personal privacy, and data security of the road charge mechanism. In addition, the mileage reporting option of installing a device in one's vehicle to record the number of miles driven damages the positive impressions of the need and fairness around the road charge concept. Due to privacy concerns, the majority of residents across all audiences indicate they would prefer not to install a mileage recording device in their vehicle.

While this assessment shows significant efforts are still needed to further understand the public's perception of privacy protections, this pilot was not designed to specifically change public opinion. It included methods to understand public opinion to aid in future road charge efforts. Accordingly, the evaluation team considers this criterion to show full achievement of the objective.

5.6.5 EVALUATION OUTCOMES: PRIVACY PERCEPTIONS

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 13.

Table 13: Ensure User Privacy Protection

Objective	Criteria	Outcomes
5.6 Ensure User Privacy Protection	• User perceptions of privacy protections	✓ Fully Achieved
	• Protection of privacy (including PII), including implementation and operation of industry standard procedures	✓ Fully Achieved
	• Public perception of road charge privacy protections	✓ Fully Achieved

The pilot fully achieved each criterion related to ensuring user privacy protections. No privacy policy violations or breaches occurred during the pilot and industry standard procedures were adopted and followed, resulting in fully achieved ratings for protection of privacy. Public perception of privacy does face some challenges, but the pilot was not intended to broadly change public opinion, and in gaining a greater understanding of public concerns for in rural and tribal demographic segments, the project team achieved their objective.

5.7 ENSURE DATA SECURITY

This objective addresses the security of the data collected from participants and transmitted, stored, analyzed, or otherwise used in the pilot, using the following criteria:

- Ability of system to withstand breaches or attacks.
- Business partner compliance with data security requirements and operation of industry standard procedures.

5.7.1 ABILITY OF SYSTEM TO WITHSTAND BREACHES OR ATTACKS

To measure the ability of the pilot systems to withstand breaches or attacks, the evaluation team explored whether any data security breaches occurred. The team interviewed business partners, reviewed events reports, and interviewed the System Administrator. No breaches or concerns with data security were reported.

5.7.2 BUSINESS PARTNER COMPLIANCE WITH DATA SECURITY REQUIREMENTS AND OPERATION OF INDUSTRY STANDARD PROCEDURES

To confirm business partner compliance with all business and system requirements, the System Administrator oversaw initial compliance testing for all business, system, and interface requirements. The business partner planned to complete testing in four stages, where the successful completion of one stage served as the exit criteria for the next. Compliance tests are categorized as Unit Testing, Integration Testing, Acceptance Testing, and Pilot Dry Run defined as follows.

- **Unit Testing:** Detailed testing of each system and application component to ensure the components meet all requirements.
- **Integration Testing:** Validates that components work together and communicate with each other and the system.
- **Acceptance Testing:** A short, simulated real-world test to verify that all individual components and interfaces interact properly with one another as expected and as defined in the requirements.
- **Pilot Dry Run:** Comprehensive, end-to-end verification of the pilot system; the dry run consists of a pre-operational trial with no less than 4 and up to 10 individual vehicles and accounts.

The business partner conducted system compliance testing after the pilot had launched. The order in which testing was done does not match industry best practices or the accepted testing schedule and their order of operations. Compliance testing should have been conducted in the order that was established by the Pre-Pilot Test Plan and Execution Checklist.[3] Additionally, shortcomings in compliance testing included the business partner conducting unit testing only; no additional tests in the planned categories above were executed. However, no requirements in the unit testing phase were deemed "non-compliant." Also, it is important to note that several requirements in the unit testing phase were waived by the project team and the business partner

[3] California Public/Private Roads Pre-Pilot Test Plan and Execution Checklist.

for reasons including certain requirements were determined not applicable, system modifications, and other changes in requirements made by the project team and business partner.

Once the pilot went live, the System Administrator oversaw the development of the Data Security Assessment Report for each pilot system, to ensure "that Personally Identifiable Information (PII) is protected, data is encrypted and secure both in transit and at rest, and that the integrity of data is being upheld through the entire process."[4] The report assessed the component subsystems of the pilot for data security and described the processes, findings, and recommendations related to each technology subsystem.

5.7.2.1 Data Security Assessment Report

The System Administrator oversaw the data security assessment on the pilot demonstration's subsystems using an independent unit from the company to assess security measures and make recommendations. The audit focused on ensuring that Personally Identifiable Information was protected, encrypted, and integrity confirmed through the entire process of operating the demonstration. The assessment approach was informed by project reference documents, including the Concept of Operations, Pilot Technical and Operational Parameters, System Requirements Specifications, Interface Control Document, System Architecture Diagrams, and the Business Requirements Document.

The assessment reviewed all systems listed below and rated them as moderate or low impact according to the starting impact rating of Energy, Installations and Environment (EI&E) Risk Management Framework (RMF) Facility Related Control System Master List,[5] and Federal Information Processing Standard (FIPS) 199, Standards for Security Categorization of Federal Information and Information Systems.[6]

- Platform Network
- Data Collection (DC) Subsystem
- Transaction Processing (TP) Subsystem
- Account Management (AM) Subsystem
- Administration (AD) Subsystem
- Data Clearing House (CH) Subsystem or PRIME

The assessment cited a wide range of industry best practices and measures to reduce risks. However, as the California Public/Private Roads Pilot was a small operation with a limited set of participants, the information in the audit has been recommended as a guide for a future, fully operational program, rather than a set of changes that were to be currently implemented.

[4] CA-PPRP Data Security Assessment Report
[5] For additional information, refer to the EI&E RMF FRCS Master List webpage: https://www.serdp-estcp.org/serdp-estcp/Tools-and-Training/Installation-Energy-and-Water/Cybersecurity/Resources-Tools-and-Publications/Resources-and-Tools-Files/EI-E-RMF-FRCS-Master-List-Current.
[6] For additional information, refer to the NIST FIPS 199 webpage: https://www.nist.gov/privacy-framework/fips-199.

5.7.2.2 ISO/IEC 27001 Compliance

The international standard for information security, ISO/IEC 27001, describes the requirements for "establishing, implementing, monitoring, and continually improving"[7] an organization's information security management system. The ISO/IEC 27001 standard helps organizations improve the security of the information they have access to. Organizations can opt to apply for certification through an accredited certification body, which requires the organization to successfully pass an independent audit.

For this pilot, Caltrans required the business partner, WSP, to document compliance with system requirements based on ISO 27001 standards (even though they are not officially ISO/IEC certified). The business partner successfully provided documentation of this compliance.

5.7.2.3 PCI DSS 3.2.2 Compliance

The Payment Card Industry Data Security Standard (PCI DSS) consists of standards for information security relating to cardholder data and reducing credit card fraud. The PCI DSS is required by all major card brands and administered by PCI Security Standards Council. At a high level, the PCI DSS identifies 12 requirements for compliance, which are organized into the following six categories:

1. Build and maintain a secure network and systems
2. Protect cardholder data
3. Maintain a vulnerability management program
4. Implement strong access control measures
5. Regularly monitor and test networks
6. Maintain an information security policy

Based on all the measures described above and the data made available to the evaluation team, the business partner and demonstration sub-systems were in alignment with the industry standard procedures in data security and operations.

5.7.3 EVALUATION OUTCOMES: DATA SECURITY

The level or degree of achievement for this objective, according to the evaluation criteria is shown in Table 14.

Table 14: Evaluation Outcomes - Data Security

Objective	Criteria	Outcomes
5.7 Ensure Data Security	• Ability of systems to withstand breaches or attacks	✓ Fully Achieved

[7] From ISO/IEC 27001 – 2013: https://www.iso.org/standard/54534.html.

Objective	Criteria	Outcomes
	• Business partner compliance with data security requirements and operation of industry standard procedures	– Partially Achieved

Despite some deviations from industry best practices in compliance testing order and execution, the project was able to partially achieve its data security objectives through assessments and adherence to industry standards. The System Administrator oversaw compliance testing for the business partner and demonstration sub-systems, ensuring alignment with industry-standard procedures in data security and operations. While there were shortcomings in compliance testing, including the completion of only unit testing and waiving certain requirements, subsequent data security assessments and compliance documentation confirmed adherence to international standards such as ISO/IEC 27001 and PCI DSS 3.2.2. The project demonstrated alignment with industry-standard procedures in data security and operations, ensuring the protection, encryption, and integrity of Personally Identifiable Information (PII) throughout the project's operations.

5.8 ENSURE TECHNOLOGY RELIABILITY AND SECURITY

This objective seeks to assess the reliability and security of the technologies used during the pilot by the following criteria:

- Reliability of road charge systems.
- Availability of road charge systems.
- Security of road charge systems.

5.8.1 RELIABILITY OF ROAD CHARGE SYSTEMS

The System Administrator provided Tier 1 customer service. Participants contacted Tier 1 Customer Support through a toll-free customer support hotline, a dedicated email address and a participant portal.

Tier 2 inquiries signify a handoff of a service request to the business partner in the event that Tier 1 services could not resolve the issue. The customer service report provided by the System Administrator does not differentiate between inquiries from rural or tribal participants. The number of customer service inquiries and their resolution status are provided in Table 15.

Table 15: Customer Service Inquiries

Month	Tier 1 Phone Contacts	Tier 1 Email/Online Contacts	Total Tier 1 Customer Inquiries	Inquiries Resolved within 3 Business Days	Inquiries Resolved within 4+ Business Days	Inquiries Escalated (to Business Partner or Caltrans)
April 2023	1	56	49	33	12	4
May 2023	26	130	81	69	5	7
June 2023	7	104	53	38	11	4
July 2023	25	193	47	40	7	0
August 2023	10	195	51	15	36	0
September 2023	11	134	47	23	24	0
October 2023	--	--	--	--	--	--
Total	**80***	**812***	**328**	**218**	**95**	**15**

* Note that Total Tier 1 Customer Inquiries may include multiple contacts for a single issue or inquiry.

Regarding the average time to resolve technical issues, most participant customer service tickets opened from March 2023 to October 2023 were resolved within 3 business days, which aligns with key performance indicators (KPIs) set by Caltrans. However, during August and September, the closing months of live pilot demonstration, 60 inquiries took up to four or more days to resolve. The increase in resolution time is likely a result of participant closeout questions and information on how to receive the final incentive payment of $55.00. For all three cohorts, most issues escalated to the business partner were related to the myMiles account and trip data, OBD-II device issues, and incentive payments.

Pilot progress reports indicate there were significantly more concerns about incentive payments and account access issues than any other participant customer service inquiries. See Table 16 for more details about the total number and type of participant customer service issues.

Table 16: Total Customer Service Inquiries by Type

Customer Service Inquiry Type	Total
Account	85
Device	52
Enrollment	29
General	5
Incentives	94
Statements	18
Survey	6
Trips	30
Other	9
Total	**328**

For all three cohorts, survey results indicate participants had similar issues throughout the pilot. Additional survey results reveal that some of these issues, especially account access problems, were never resolved.

- **Rural:** When asked if participants experienced any unresolved issues during the pilot, 21 percent of respondents reported that their issues were never resolved. Among these issues, 48 percent were related to incentives.
- **Tribal:** For the tribal cohort, 14 percent of respondents reported that their issues were never resolved, and 100 percent of these unresolved issues were related to the myMiles app or access to the online portal.
- **TCA:** Although the TCA portion of the pilot was only 35 people, the majority of their issues were also related to account portal issues and incentives. When asked if participants experienced any unresolved issues during the pilot, 19 percent of respondents reported that their issues were never resolved. Among these issues, 66 percent were related to incentives and their account portal.

To summarize, while most participant technical issues were resolved within the expected timeframe, there was a notable uptick in inquiries taking longer than three days to resolve toward the end of the pilot, largely due to questions about final incentive payments. Escalated issues, primarily concerning myMiles accounts, OBD-II devices, and incentives, were prevalent throughout the pilot. Survey data highlights persistent concerns, especially regarding incentives and account access, across all cohorts. Despite successful handling of Tier 1 inquiries and proper escalation of Tier 2 issues, some participant-reported problems persisted, indicating room for enhancement in the myMiles portal.

5.8.2 AVAILABILITY OF ROAD CHARGE SYSTEMS

This criterion is measured by the percentage up-time for the pilot's system and user account management features. The System Administrator reported up-time percentages on a monthly basis for the duration of the pilot. Table 17 displays data from the System Administrator's final monthly progress report, which includes the uptime for the duration of pilot operations.

Table 17: System Uptime

KPI / Metric	APR	MAY	JUN	JUL	AUG	SEP	AVERAGE
(Percent) of System uptime:	100%	100%	100%	100%	100%	--	100%
(Percent) of System uptime less than 99.9percent:	0.0%	0.0%	0.0%	0.0%	0.0%	--	0.0%
Justification if not in compliance with KPI	**APR:** N/A – no downtime **MAY:** N/A – no downtime **JUN:** N/A – no downtime **JUL:** N/A – no downtime **AUG:** N/A – no downtime **SEP:** N/A – no downtime						

Based on the metrics above, the pilot met the criterion for availability of Road Charge systems during duration of the live pilot.

5.8.3 SECURITY OF ROAD CHARGE SYSTEMS

The measures used to assess this criterion include:

- Number of instances of participant data being compromised, if any
- Description of data compromising events, if any
- Percentage of participants satisfied with data security

The information on data compromising events, if any, was to be provided through ad-hoc communications, events reports, and interviews. As of the completion of the pilot operations, no data compromising events were reported.

5.8.4 SURVEY DATA: RELIABLE AND SECURE TECHONOLOGY

In both surveys, respondents were asked about their level of satisfaction with the security of the data being collected. Table 18 represents the survey results related to the pilot participants perceived level of data security for the duration of the pilot.

Table 18: Survey Data – Participant Satisfaction with Data Security

Pilot Group	Pre-Pilot	Post-Pilot
Question: How confident are you in the data security of the pilot? (1 = not confident at all, 7 = very confident)		
Rural	5.2	4.6
Tribal	4.7	4.8
TCA	5.6	4.2
Question: How satisfied are you with the security of the data that was collected? (1 = not satisfied at all, 7 = very satisfied)		
Rural	5.3	5.8
Tribal	4.7	5.6
TCA	5.4	5.8

In participant surveys, perceived satisfaction with the security of the data being collected was generally positive over the course of the pilot. When it came to data security, the rural and TCA cohort had the greatest level of satisfaction, while other respondents from the tribal cohort were also positive.

5.8.5 EVALUATION OUTCOMES: RELIABLE AND SECURE TECHNOLOGY

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 19.

Table 19: Evaluation Outcomes – Reliable and Secure Technology

Objective	Criteria	Outcomes
5.8 Ensure Technology Reliability and Security	• Reliability of road charge systems	✓ Fully Achieved
	• Availability of road charge systems	✓ Fully Achieved
	• Security of road charge systems	✓ Fully Achieved

Over the course of the pilot, most technical issues were resolved within the expected three-day timeframe. However, there was a notable increase in resolution time toward the end of the pilot, mainly due to inquiries about final incentive payments. Escalated customer service issues, particularly concerning myMiles accounts, OBD-II devices, and incentives, were prevalent throughout the pilot. Despite successful handling of Tier 1 inquiries and proper escalation of Tier 2 issues, some participant-reported issues persisted, suggesting room for improvement in the myMiles portal.

The overall availability of road charge systems met the criterion, with no reported downtime during live pilot operations. Regarding the security of road charge systems, no instances of participant data being compromised were reported, and participant surveys generally indicated positive perceptions of data security, with the majority expressing satisfaction. Overall, while there are areas for improvement, the systems and technology demonstrated a generally reliable performance with satisfactory security measures in place, resulting in a rating of full achievement for this objective.

5.9 CONDUCT OUTREACH TO INCREASE PUBLIC AWARENESS OF NEED FOR ALTERNATIVE FUNDING SOURCES

This communications objective describes the number of opportunities for the general public to provide feedback, the number of individuals who have provided feedback, and information about their feedback. Achievement of this objective is measured by the following criteria:

- Opportunities for general public feedback.
- Public messaging on the need for road charge.

5.9.1 OPPORTUNITIES FOR GENERAL PUBLIC FEEDBACK

Over the course of the project, the general public had opportunities to participate, provide feedback, and engage with the program through several methods including:

- California Road Charge website (www.caroadcharge.com).
- Three public opinion polls with California adult drivers across the State.
- Four waves of focus groups with California drivers from rural communities.
- One-on-one interviews with tribal community leaders and members.

The California Road Charge website provides key information about the Public and Private Roads pilot and provides various ways for the public to engage and participate in the project. When accessing the website, the engagement tab provides multiple links to sign up for the project's newsletter, read recent project news, learn about FAQs, and a "contact us" form that enables the public to ask questions or input ideas and comments about road charge policy.

The first two public polls contained information about the basic attitudes about road charge, the issue environment, and perceptions of fairness and privacy concerns. Both public polls were conducted in March 2023, which included 600 respondents from the general population and 500 respondents living in rural areas of California. The third public poll focused on tribal communities, with 42 respondents living in or associated with various tribal nations across the

State. Due to low participation rates from the tribal community, the interview and poll results cannot be considered a representative sample.

The focus groups comprised four waves, each involving approximately six to seven participants. All sessions took place in November 2023 and included respondents from various rural areas of the State, sharing similar driving behaviors. The focus groups were segmented into four sub-groups based on geography and driving habits.

- **Group 1:** Northern California drivers who drive less than 100 miles per week.
- **Group 2:** Northern California drivers who drive more than 100 miles per week.
- **Group 3:** Central Coast/ Central Valley drivers who drive less than 100 miles per week.
- **Group 4:** Central Coast/Central Valley drivers who drive more than 100 miles per week.

During the focus groups, participants discussed various road charge-related issues, including driving habits, road conditions, gas tax awareness, shortcomings of the state gas tax, perceptions of community impact, private road funding, and the use of plug-in devices for automatic mileage tracking.

5.9.2 PUBLIC MESSAGING ON THE NEED FOR ROAD CHARGE

The project utilized three main channels devoted to public messaging including media and publications, in-person outreach and engagement activities, and a user-friendly website. All methods included a wide range of descriptive information on transportation funding mechanisms, project history, national road charge progress, how fuel taxes compare to “user pays” system, and other road charge related information.

To engage the public on the need for road charge and raise awareness in the targeted populations, the project team leveraged popular publications in rural and tribal communities to raise awareness and spread recent road charge news. In total, the project team developed and distributed six newsletters from April 2022 to February 2024. The general public was able to sign up to receive newsletters via the California Road Charge website. Each newsletter provided key project information and consisted of multiple sections to inform the reader of upcoming public meetings and encourage participation, comments, and a form for the public to ask any road charge related questions.

Over the course of the project, the team worked with the Caltrans Office of Public Affairs in Sacramento and within relevant districts to identify opportunities for engagement in rural and tribal communities. These media-focused outreach efforts included discussions with editorial boards, TV interviews, pod casts, and other local news resources. Other materials distributed to the public included posters, flyers, and fact sheets with QR codes leading to surveys and other news on the California Road Charge website. While a definitive number of materials reaching the public is not feasible, a total of 1,702 interested parties in the pilot suggests the project team’s recruitment and public outreach efforts were successful.

The California Road Charge website uses a user-friendly platform that is simple and easy to navigate. The website and the various postings served as a core channel for information distribution throughout the duration of the project. The educational content on the website presents and answers many frequently asked questions, with several sections dedicated to road

charge history, project news, and other road charge policy information. In addition, the website contains an entire section devoted to public engagement, commonly asked questions, a public comment form, and a simulated road charge calculation tool that allows individuals to calculate their vehicle's road charge in comparison to fuel taxes.

5.9.3 EVALUATION OUTCOMES: OUTREACH TO INCREASE PUBLIC AWARENESS

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 20.

Table 20: Evaluation Outcomes – Outreach to Increase Public Awareness

Objective	Criteria	Outcomes
5.9 Conduct outreach to increase public awareness of the need for alternative funding sources	• Opportunities for general public feedback	✓ Fully Achieved
	• Public messaging on the need for road charge	✓ Fully Achieved

These public outreach objectives, not specific to any cohort, were fully achieved for the entire project. The project team implemented a comprehensive outreach strategy to increase public awareness of the necessity for alternative funding sources, notably road charge. Through diverse methods such as opinion polls, focus groups, interviews with tribal leaders, and media outreach, the project team successfully engaged various demographics and encouraged public feedback. Additionally, the user-friendly California Road Charge website served as a central platform for disseminating information and fostering interactive engagement. A total of 1,702 interested parties in the pilot indicates the success of the outreach efforts in raising awareness and promoting public participation. Overall, the project's multi-channel approach and transparent communication effectively fulfilled its objective of increasing public awareness regarding alternative funding sources for transportation infrastructure.

5.10 ADDRESS POTENTIAL IMPLEMENTATION AND PUBLIC ACCEPTANCE HURDLES TO ADOPTION

This communications objective describes potential hurdles to implementation and public acceptance of a large-scale California Road Charge program. Achievement of this objective is measured by the following criteria:

- User acceptance of mileage and location recording method.
- Opportunities for participant feedback.
- Participant satisfaction with interactions and feedback opportunities.

- Understanding of potential risks and roadblocks to implementation of a road charge in California.

5.10.1 USER ACCEPTANCE OF MILEAGE AND LOCATION RECORDING METHOD

Issues of user acceptance were discussed in Section 5.1 and Section 5.5, reviewing participant satisfaction with the overall experience, the process of recording and reporting mileage, users' ease of differentiating between public and private roads, and users' perception of the accuracy of mileage recording and differentiation of road types.

To briefly summarize sentiment about the overall pilot experience, rural and TCA participants were quite satisfied with the plug-in devices and the overall process, while tribal participants provided positive but lower ratings. Experience with the myMiles portal was less positive, but still rated on the positive end of the scale. For more detail, see Section 5.5.

Regarding the users' perceived accuracy of mileage recording, responses tended toward positive, though they were more confident in the accuracy of total miles recorded than in the ability to differentiate between public and private or tribal roads. For more detail, see Section 5.1.

5.10.2 OPPORTUNITIES FOR PARTICIPANT FEEDBACK

For participants in each of the pilot groups, opportunities for participant feedback included two participant surveys, a toll-free customer service number, and for rural and tribal participants, a "contact us" form in the participant portal (TCA participants did not use the myMiles portal but had their own web portal used for their tolling accounts).

Participants were eligible for incentives for completing the pilot surveys, and the participation rates were strong, as shown in Table 21.

Table 21: Survey Participation Rates

Group	Participant Count	Pre-Pilot Survey Respondents	Response Rate	Post-Pilot Survey Respondents	Response Rate
Rural	234	205	88%	215	92%
Tribal	15	11	73%	14	93%
TCA	34	32	94%	31	91%

Participants also provided feedback through customer support requests. The System Administrator received 80 customer support phone calls and 812 emails during the operation of the pilot. More information is provided on these activities in Section 5.8.1 of this report.

5.10.3 PARTICIPANT SATISFACTION WITH INTERACTIONS AND FEEDBACK OPPORTUNITIES

In participant surveys, each pilot group was asked to "please rate how satisfied you were regarding your experience with the number and quality of opportunities you've had for feedback on your participation in the pilot." Participants rated this topic in both the pre-pilot survey and the post-pilot survey, since they had interactions with the pilot team during the recruitment and enrollment process. Table 22 provides their responses.

Table 22: Participant Satisfaction with Interactions and Feedback Opportunities

Group	Percent of Responses							Mean Score
	Very unsatisfied 1	2	3	4	5	6	Very satisfied 7	
Rural Pre-pilot	2%	1%	4%	21%	17%	16%	38%	5.5
Rural Post-pilot	3%	2%	4%	11%	12%	23%	45%	5.7
Tribal Pre-pilot	0%	0%	9%	9%	9%	27%	45%	5.9
Tribal Post-pilot	0%	0%	0%	21%	21%	29%	29%	5.6
TCA Pre-pilot	3%	3%	6%	22%	13%	13%	41%	5.4
TCA Post-pilot	3%	3%	3%	13%	6%	16%	55%	5.8

A plurality of participants was "very satisfied," but some dissatisfaction is shown in the results. Notably, tribal participants showed less satisfaction at the end of the pilot, while the other groups gave improved ratings at the conclusion.

5.10.4 UNDERSTANDING OF POTENTIAL RISKS AND ROADBLOCKS TO IMPLEMENTATION OF A ROAD CHARGE IN CALIFORNIA

In addition to participant surveys, polls were conducted with the general public, rural, and tribal audiences, four focus groups with rural residents, and in-depth interviews with members of tribal communities. Each of these research efforts explored attitudes regarding transportation funding, the condition of roads and highways, and specific concerns or issues related to road usage charging. The findings that are specific to rural and tribal communities are described in sections 5.11 and 5.12 of this report.

The general public survey provided these significant insights:

- Californians give low ratings to road and highway quality and understand the need for additional funding for road repair. Among the general public, 64% see some need or a great need for additional funding, and 72% believe it is important to find more stable funding than the gas tax.
- First impressions of a road charge are divided, but after hearing additional information about it, more tend to agree that it could be more fair than current fuel taxes. However, when mileage-reporting devices are described, the resulting privacy concerns tilt the responses to a majority negative opinion.
- A slight majority of respondents believe they will pay more under a road charge than with the gas tax, and they are particularly concerned about its fairness for low-income and rural drivers.
- Significant concerns about road charge include the complexity of implementing a new system, privacy, data security, and billing/payment issues.

These findings illustrate risks and potential roadblocks for road charge implementation that the state will need to address in any future road charge program. Other risks and hurdles include technological challenges described in Section 5.1 and 5.2 of this report.

5.10.5 EVALUATION OUTCOMES: POTENTIAL HURDLES

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 23.

Table 23: Evaluation Outcomes – Potential Hurdles

Objective	Criteria	Outcomes
5.10 Address potential implementation and public acceptance hurdles to adoption	• User acceptance of mileage and location recording method	✓ Fully Achieved
	• Opportunities for participant feedback	✓ Fully Achieved
	• Participant satisfaction with interactions and feedback opportunities	✓ Fully Achieved
	• Understanding of potential risks and roadblocks to implementation of a road charge in California	✓ Fully Achieved

The project team fully achieved each criterion related to the communication objective of addressing potential implementation and public acceptance hurdles. Overall, the project made notable progress in better understanding the potential risks and roadblocks associated with the concept of a future mandatory road charge program. In addition to understanding public perceptions regarding road charge, the project team's focused research efforts in rural and tribal

communities provides comprehensive findings that can help inform future state and national road charge initiatives.

5.11 IDENTIFY POTENTIAL IMPLICATIONS OF ROAD CHARGES FOR RURAL AND NATIVE AMERICAN COMMUNITIES

This objective seeks to assess the project's ability to identify potential hurdles for rural and tribal communities in a future mandatory road charge program. Additionally, this objective seeks to evaluate the pilot's ability to recruit a representative sample of rural and Native American drivers. The following criteria are used to assess the achievement of this objective:

- Project's ability to identify technical, political, social, and other hurdles for these communities.
- Pilot's ability to recruit a representative sample of rural and Native American drivers to fully understand their challenges and issues.

5.11.1 PROJECT'S ABILITY TO IDENTIFY TECHNICAL, POLITICAL, SOCIAL, AND OTHER HURDLES FOR THESE COMMUNITIES

To assess these hurdles, the project included public surveys of rural residents and tribal members, in-depth interviews with tribal members, interviews with a group of tribal leaders, and four focus groups with rural residents from different regions of the state. These research efforts revealed significant technical, political, and social challenges for acceptance of a road charge. Major findings of this research include:

- More than two-thirds of rural residents feel the state is on the "wrong track", which likely influences their skepticism of road charge and government in general. This is significantly higher than the general population, 53 percent of whom gave the "wrong-track" rating.
- Rural and tribal residents are more strongly negative than the general population in their assessment of the condition of roads and highways.
- Rural residents are less likely to believe that more funding will be needed for road maintenance, while tribal members are more likely to endorse more funding.
- Rural and tribal respondents express more negative initial views of road charge than the general public, and the negative sentiment is only slightly reduced after more information is provided about problems with the gas tax. When informed about devices that can track mileage, both rural and tribal respondents have even stronger negative impressions about road charge.
- Both rural and tribal populations express greater concern about privacy with location-aware devices.
- Many rural and tribal residents believe problems with funding road maintenance are due to government misspending, rather than insufficient revenue.

- Rural drivers see a mileage charge as a type of penalty for driving and are concerned that they would be unfairly burdened because of their longer trips and would be incentivized to drive less, reducing their quality of life. They also worry that it could reduce tourism in their regions.
- Rural drivers generally felt that using location tracking to enable exemption of private roads did not seem worth the privacy problems associated with tracking devices.

5.11.2 PILOT'S ABILITY TO RECRUIT A REPRESENTATIVE SAMPLE OF RURAL AND NATIVE AMERICAN DRIVERS TO FULLY UNDERSTAND THEIR CHALLENGES AND ISSUES

Recruiting active participants from rural and tribal communities for this pilot was considered essential for gathering information from the targeted communities regarding their use of public and private roadways. To ensure the pilot achieved this recruitment objective, the project team launched a public outreach campaign to engage with rural and tribal communities about road charge. The campaign prioritized two-way communication to share about this pilot, and to listen and document the rural and tribal communities' voice and opinions on the road charge concept and associated issues.

Over the course of the 7-month outreach campaign, the project team provided 17 informational presentations in various settings including associated meetings, conferences, webinars, and other events. In addition to raising awareness in-person, the project team hosted information booths at conferences across the State, where technical experts from the project team were made available to answer the public's questions, distribute handouts, and recruit pilot participants. Other outreach efforts included several hundreds of phone calls, emails, and written correspondence to key leaders and organizations in the tribal and rural communities. See the *Pilot Participant Recruitment Plan* for more details on the project team's recruitment efforts and pilot participation requirements.

Pilot participants for both rural and tribal cohorts were recruited based on several requirements including residency, age, driver status, vehicle specifications, geographical classifications, frequency of travel across private or tribal roadways, and internet access. The project team utilized a top-down approach to connect with key leaders of community organizations and entities. Overall, recruitment efforts generated significant interest among potential pilot participants – more than 1,700 people expressed their interest in participating. However, due to several challenges associated with recruiting in these hard-to-reach populations and specific participant requirements, the pilot was not able to enroll all interested persons. The information below provides more details on recruiting efforts for each cohort.

- **Rural Recruitment:** The interest from rural communities was robust. The goal set at the beginning of the rural recruitment effort was 350 rural participants – by the time of pilot launch, more than 1,200 people expressed interest in participating in the rural pilot (though many didn't live in rural areas). Rural recruitment efforts included several in-person meetings and conversations with statewide entities including Rural County Representatives of California, the California State Association of Counties, the League of California Cities, the Rural Community Assistance Corporation, the California Cattlemen's Association, and the California Farm Bureau Federation.

The pilot successfully enrolled 237 participants for the rural cohort. Even though the pilot did not reach its goal of 350 participants, results indicate the rural recruitment efforts were still successful in effectively reaching and engaging a representative sample of rural drivers. In addition, this level of interest may suggest that Californians as a whole are becoming more aware of the State's efforts to find a more sustainable revenue source alternative to the fuel tax.

During the evaluation team's interviews, the project team noted that Caltrans' presence and outreach efforts in rural communities was critical to recruiting a representative sample. Caltrans' willingness to engage with rural residents to discuss and raise awareness about road charges was crucial to overcome challenges.

- **Tribal Recruitment:** The tribal outreach efforts for the project spanned a seven-month period and involved multiple contacts with key tribal members and entities across the State. Recognizing potential shortfalls in recruitment goals, the Communications team implemented incentive payments and bring-a-friend programs. Initial outreach included emails and follow-up calls facilitated by the Native American Heritage Commission (NAHC). Out of 214 listed tribal contacts, 177 were reached, resulting in enrollment of 16 participants from tribal communities, with ten from Northern California, three from Central California, and three from Southern California. However, due to low interest, the project team shifted its strategy to engage tribal members directly in their communities, utilizing Caltrans District Native American Coordinators (DNACs) for support.

  Challenges arose from the amount (110) of federally recognized tribes in California, compounded by cultural norms, historical distrust of government, and geographical diversity. The absence of a comprehensive database for tribal members and their contact information hindered outreach. As a result, the project team focused their efforts on reaching key tribal leaders. Despite significant efforts, only 16 tribal participants enrolled, falling short of the 100-participant goal, indicating the sample for tribal participants does not provide sufficient representation. Interview results indicate the timing of outreach is crucial, requiring dedicated time to build relationships and engage tribal members effectively.

  Other interview and focus group findings underscore the need for sustained efforts in building trust and relationships with tribal leaders and organizations, emphasizing early and frequent engagement in future road charge programs. Involvement of tribal communities in discussions and follow-up to address their needs were deemed vital for ensuring equitable representation and successful implementation for future road charge initiatives.

- **Transportation Corridor Agency (TCA) Recruitment:** The project team worked in coordination with the Transportation Corridor Agencies (TCA) to recruit participants for the TCA sub-pilot, based on a set of active users of the TCA toll program, branded as "The Toll Roads".

  Pilot participant recruitment with TCA was a coordinated effort between TCA and the project team to define appropriate criteria, sub-pilot eligibility requirements, desired participant goals, and recruit participants through TCA's existing channels with its customers. In total, 50 TCA customers were recruited to take part in the TCA sub-pilot,

with 35 of them fully enrolled in the pilot. While the TCA sub-pilot participants were not the main focus of this pilot, their level of participation is considered to be a representative sample and play a key part in assessing the feasibility of administering a road charge through proven business models and existing technology systems.

5.11.3 EVALUATION OUTCOMES: POTENTIAL IMPLICATIONS

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 24.

Table 24: Evaluation Outcomes – Potential Implications

Objective	Criteria	Outcomes
5.11 Identify potential implications of road charges for rural and Native American communities.	• Project's ability to identify technical, political, social, and other hurdles for these communities	✓ Fully Achieved
	• Pilot's ability to recruit a representative sample of rural and Native American drivers to fully understand their challenges and issues	– Partially Achieved

Because the objective was to identify potential hurdles, rather than solve them, this pilot was successful in developing a more complete understanding of the concerns emanating from these communities and why they exist. However, due to the hurdles identified above, the pilot was unsuccessful in recruiting a representative sample of tribal drivers.

5.12 IDENTIFY EQUITY CONCERNS ACROSS RURAL AND NATIVE AMERICAN COMMUNITIES

This evaluation category assesses the pilot participants' perceptions of the fairness of a road charge as well as current public perspectives on road charge fairness. Achievement of this objective is measure by the following criteria:

- User and public perception of road charge fairness for rural drivers.
- User and public perception of road charge fairness for Native American drivers.
- Project's ability to describe a robust set of equity concerns for these drivers.

5.12.1 USER AND PUBLIC PERCEPTION OF ROAD CHARGE FAIRNESS FOR RURAL DRIVERS

The project used several key methods to gauge perceptions of fairness. Participant surveys have been cited extensively in earlier sections of this report, and this section will focus on findings related to equity for rural drivers. Similarly, public opinion regarding equity from the public polls, focus groups, and interviews is also included. Major findings from this research include:

- Rural residents agree with the concept that a road charge would more fairly include electric vehicle drivers in funding road maintenance, but they also feel that a road charge would unfairly burden rural drivers more than others. They also felt it would be less fair for low-income drivers and those who must drive long distances for work.
- In focus groups, even when participants considered that rural drivers currently pay more in fuel taxes, they still felt that explicitly taxing mileage would be more unfair.
- After participating in the pilot, rural drivers felt more positive about the fairness of road charge across all categories of drivers, but their average ratings were only moderately positive.
- Tribal members who participated in the pilot rated fairness very low for drivers in rural or remote areas.
- Participants in the TCA pilot also felt that fairness for rural drivers was lower than for urban drivers.
- Surveys of the general public, rural residents, and tribal members all reached similar conclusions about fairness – that a road charge would be most fair for urban drivers and least fair for rural and lower-income drivers.

By using several in-depth methods to research opinions about fairness, the project succeeded in assessing these opinions, and these conclusions will be important to consider in any future effort to implement a road charge program.

5.12.2 USER AND PUBLIC PERCEPTION OF ROAD CHARGE FAIRNESS FOR NATIVE AMERICAN DRIVERS

Interviews, focus groups, and surveys with tribal members provided significant insights into their perspectives on the fairness of a road charge. Their opinion of the road charge concept is more negative than other groups, with some factors in common with other rural residents, some unique perspectives, and a greater level of concern overall. Major findings include:

- Because tribal communities are even more remote than other rural communities, the longer distances they drive for basic supplies and services make paying for mileage seem more onerous. They emphasized that they would be paying more for something over which they have no choice.
- Tribal representatives felt that existing road funding practices treat them unfairly, with the roads they use being in poorer condition than those in other locations.
- They felt that a major reason for road charge is the growth of electric vehicles, which tribal members are much less likely to use, and it would be unfair if this change in funding sources disadvantaged them as a result.
- Because tribes sometimes invest their own funds in road maintenance, some felt that paying a road charge would be “double dipping” by the state.

- Paying fuel taxes is already considered unfair for tribal members because they need vehicles that are less fuel efficient (like pickup trucks) and therefore pay more in gas tax than others. Road charge was seen as adding to or perpetuating that inequity.
- Tribal members who participated in the pilot provided the most negative responses when asked about road charge fairness for all groups, especially those in rural or remote areas and who drive long distances.

Similar to the assessment of fairness for rural drivers, the project team used several in-depth methods to research opinions about fairness. The project succeeded in assessing these opinions, and these conclusions will be important to consider in any future effort to implement a road charge program.

5.12.3 PROJECT'S ABILITY TO DESCRIBE A ROBUST SET OF EQUITY CONCERNS FOR THESE DRIVERS

The sections above provide wide-ranging details on the equity concerns expressed by the general public, rural drivers and pilot participants, tribal drivers and participants, and tribal leaders. The project team spent significant time and resources performing this research and succeeded in describing these equity concerns.

5.12.4 EVALUATION OUTCOMES: EQUITY CONCERNS

The level or degree of achievement for this objective, according to the evaluation criteria, is shown in Table 25.

Table 25: Evaluation Outcomes – Equity Concerns

Objective	Criteria	Outcomes
5.12 Identify equity concerns across rural and Native American communities	• User and public perception of road charge fairness for rural drivers	✓ Fully Achieved
	• User and public perception of road charge fairness for Native American drivers	✓ Fully Achieved
	• Project's ability to describe a robust set of equity concerns for these drivers	✓ Fully Achieved

Because the objective was to identify equity concerns, rather than to solve them, this pilot was successful in developing a more complete understanding of rural and tribal communities' concerns and why they exist.

6 SUMMARY AND CONCLUSIONS

The California Public/Private Roads Road Charge Pilot provided insight and information that will be useful in developing future road charge programs. This evaluation report discusses significant findings, data, and experiences organized by the objectives and criteria established in the *Evaluation Strategy Plan*. The tables below show whether each objective was achieved, partially achieved, or not achieved for the pilot, according to each evaluation criterion.

None of the ratings show inadequate outcomes – all objectives were either achieved or partially achieved. Reasons for all objective achievement ratings are explained in their respective sections with a summary following each table below.

Overall, the California Public/Private Roads Road Charge Pilot fully satisfied 25 of 29 evaluation criteria (represented by a green circle with check mark) and partially satisfied 4 of 29 (represented by an orange circle with a dash in Tables 26 through 31).

Table 26: Achievement of Technological Feasibility Objectives

Objective	Criteria	Outcomes
5.1 Assess the functionality of GPS technology to differentiate between public and private roads	• Ability of systems to measure distance traveled on public and private roads	✓ Fully Achieved
	• Ability of systems to identify private roads as distinct from public roads	✓ Fully Achieved
5.2 Provide recommendations regarding GPS technology's ability to differentiate between public and private roads	• Ability of pilot to generate recommendations	✓ Fully Achieved

All of the project's technological feasibility objectives were fully achieved. Although some challenges arose with the GPS devices, the project team was able to make corrections and develop a robust collection of data on total and differentiated mileage. The project team also succeeded in providing an extensive set of recommendations. While progress in using these technologies was made, further enhancements are needed to ensure accurate differentiation between road types in future applications.

Table 27: Achievement of Collection Cost Objective

Objective	Criterion	Outcomes
5.3 Minimize the administrative cost of any potential user-based revenue mechanisms and associated collection of fees	• Ability to estimate potential collection costs of pilot methods at a larger scale	– Partially Achieved

The achievement of this criterion is rated as partially achieved because the size of this pilot was too small to create a realistic estimate of collection costs. In addition, the project team explained that the nature of existing state systems does not permit significant changes to be made for small pilot programs, and therefore, estimating the costs of existing state systems to collect a road charge is not feasible.

To obtain comprehensive estimates of administrative or collection costs, further analysis is necessary. Therefore, this pilot partially achieves this objective – it identified per-device costs and provided potential strategies to reduce collection costs.

Table 28: Achievement of Operations and Compliance Objectives

Objective	Criteria	Outcomes
5.4 Utilize third-party business partner(s) to administer or operate system(s)	• Use of third-party business partners to administer or operate systems	✓ Fully Achieved
5.5 User's ease of compliance	• Effectiveness of methods for encouraging voluntary compliance	✓ Fully Achieved
	• Resistance of methods to tampering and fraud	– Partially Achieved
	• Users' ease of recording and reporting mileage	✓ Fully Achieved
	• User's ease of differentiating between public and private road mileage	✓ Fully Achieved
	• Quality and accuracy of road use data reported	✓ Fully Achieved

Third-party business partners were an integral part of the live pilot demonstration and project, fulfilling that objective. Overall, the pilot demonstrated strong user compliance, with participants generally satisfied with the mileage reporting process and the effectiveness of the OBD-II device in recording and differentiating between public and private roads. However, resistance of methods to tampering and fraud is rated as partially achieved, because the plug-in devices would be easy to disconnect if a user had a financial incentive to do so. With no actual payments as part of this pilot, participants had no incentive to attempt noncompliance. Continued efforts to

address reported issues, particularly regarding GPS accuracy and usability, could further increase levels of user satisfaction and compliance in future pilots or programs.

Table 29: Achievement of User Privacy Objective

Objective	Criteria	Outcomes
5.6 Ensure User Privacy Protection	• User perceptions of privacy protections	✓ Fully Achieved
	• Protection of privacy (including PII), including implementation and operation of industry standard procedures	✓ Fully Achieved
	• Public perception of road charge privacy protections	✓ Fully Achieved

The project team fully achieved each criterion related to ensuring user privacy protections. No privacy policy violations or breaches occurred during the pilot and industry standard procedures were adopted and followed, resulting in fully achieved ratings for protection of privacy. Public perception of privacy does face some challenges, but the pilot was not intended to broadly change public opinion, and in gaining a greater understanding of public concerns for rural and tribal demographic segments, the project team achieved their objective.

Table 30: Achievement of Data and Systems Security Objectives

Objective	Criteria	Outcomes
5.7 Ensure Data Security	• Ability of systems to withstand breaches or attacks	✓ Fully Achieved
	• Business partner compliance with data security requirements and operation of industry standard procedures	– Partially Achieved
5.8 Ensure Technology Reliability and Security	• Reliability of road charge systems	✓ Fully Achieved
	• Availability of road charge systems	✓ Fully Achieved
	• Security of road charge systems	✓ Fully Achieved

Despite some deviations from industry best practices in compliance testing order and execution, the project was able to partially achieve its data security objectives through assessments and adherence to industry standards. While there were shortcomings in compliance testing, including

the completion of only unit testing and waiving certain requirements, subsequent data security assessments and compliance documentation confirmed adherence to international standards such as ISO/IEC 27001 and PCI DSS 3.2.2. Despite recommendations for improvement, the project demonstrated alignment with industry-standard procedures in data security and operations, ensuring the protection, encryption, and integrity of Personally Identifiable Information (PII) throughout the project's operations.

Over the course of the pilot, most technical issues were resolved within the expected three-day timeframe. However, there was a notable increase in resolution time toward the end of the pilot, mainly due to inquiries about final incentive payments. Escalated customer service issues, particularly concerning myMiles accounts, OBD-II devices, and incentives, were prevalent throughout the pilot. Despite successful handling of Tier 1 inquiries and proper escalation of Tier 2 issues, some participant-reported issues persisted, suggesting room for improvement in the myMiles portal.

The overall availability of road charge systems met the criterion, with no reported downtime during live pilot operations. Regarding the security of road charge systems, no instances of participant data being compromised were reported, and participant surveys generally indicated positive perceptions of data security, with the majority expressing satisfaction. Overall, while there are areas for improvement, the systems and technology demonstrated a generally reliable performance with satisfactory security measures in place, resulting in a rating of full achievement for this objective.

Table 31: Achievement of Communications Objectives

Objective	Criteria	Outcomes
5.9 Conduct outreach to increase public awareness of the need for alternative funding sources	• Opportunities for general public feedback	✓ Fully Achieved
	• Public messaging on the need for road charge	✓ Fully Achieved
5.10 Address potential implementation and public acceptance hurdles to adoption	• User acceptance of mileage and location recording method	✓ Fully Achieved
	• Opportunities for participant feedback	✓ Fully Achieved
	• Participant satisfaction with interactions and feedback opportunities	✓ Fully Achieved
	• Understanding of potential risks and roadblocks to implementation of a road charge in California	✓ Fully Achieved

Objective	Criteria	Outcomes
5.11 Identify potential implications of road charges for rural and Native American communities.	• Project's ability to identify technical, political, social, and other hurdles for these communities	✓ Fully Achieved
	• Pilot's ability to recruit a representative sample of rural and Native American drivers to fully understand their challenges and issues	– Partially Achieved
5.12 Identify equity concerns across rural and Native American communities	• User and public perception of road charge fairness for rural drivers	✓ Fully Achieved
	• User and public perception of road charge fairness for Native American drivers	✓ Fully Achieved
	• Project's ability to describe a robust set of equity concerns for these drivers	✓ Fully Achieved

Through diverse methods such as the California Road Charge website, opinion polls, focus groups, interviews with tribal leaders, and media outreach, the project team successfully conducted public outreach and obtained feedback on the need for alternative transportation funding sources. The project also fully achieved each criterion related to addressing potential implementation and public acceptance hurdles, making notable progress in better understanding the potential risks and roadblocks associated with the concept of a future mandatory road charge program. In addition to understanding public perceptions regarding road charge, the focused research efforts in rural and tribal communities can help inform future state and national road charge initiatives.

Because the objective was to identify potential hurdles and equity concerns, rather than solve them, this pilot was successful in developing a more complete understanding of the concerns emanating from rural and tribal communities and why they exist. However, due to some of the hurdles in engaging tribal communities, the pilot was unsuccessful in recruiting a representative sample of tribal drivers, earning partial achievement for identifying potential implications of road charge for rural and Native American communities.

APPENDIX A. EVALUATION CRITERIA MATRIX

The following tables provide an overview of the approach to this evaluation. The objectives were specified in Caltrans' application for STSFA funding and in project contract documents. Evaluation criteria are concepts that define how achievement of the objectives will be determined, while the measures provide specific details on how the satisfaction of the criteria will be judged. Methods describe the activities that will be utilized to obtain data and information.

Technological Feasibility Evaluation Objectives

#	Objectives	Criteria	Measures	Methods
T-1	Assess the functionality of GPS technology to differentiate between public and private roads	• Ability of systems to measure distance traveled on public and private roads	• Mileage recorded on private roads • Mileage recorded on public roads • Total miles driven by participants from odometer readings or other comparison methods	• Data analysis • Documentation review • Survey results • Interviews
		• Ability of systems to identify private roads as distinct from public roads	• Proportion of total recorded mileage identified correctly as public or private roadways • Summary of issues identified by project team regarding challenges with accuracy	• Data analysis • Documentation review • Survey results • Interviews
T-2	Provide recommendations regarding GPS technology's ability to differentiate between public and private roads	• Ability of pilot to generate recommendations	• Summary of recommendations made in final report	• Documentation review • Interviews

Cost Evaluation Objectives

#	Objectives	Criteria	Measures	Methods
C-1	Minimize the administrative cost of any potential user-based revenue mechanisms and associated collection of fees	• Ability to estimate potential collection costs of pilot methods at a larger scale	• Projected range of costs based on interviews with business partners and system administrator • Description of methods to reduce operating costs at scale	• Interviews • Documentation review

Operations and Compliance Evaluation Objectives

#	Objectives	Criteria	Measures	Methods
O-1	Utilize third-party business partner(s) to administer or operate system(s)	• Use of third-party business partners to administer or operate systems	• Number of business partners used • Description of business partners used	• Documentation review
O-2	Ensure ease of user compliance	• Effectiveness of methods for encouraging voluntary compliance	• Business partner and system administrator perceptions of effectiveness •	• Interviews • Participant surveys • Data analysis
		• Resistance of methods to tampering and fraud	• Number and description of detected instances of attempted tampering or fraud • Number of instances and duration of GPS device disconnection • Business partner and system administrator perceptions of fraud risks • Participant perceptions of fraud risks	• Interviews • Data analysis • Participant surveys
		• Users' ease of recording and reporting mileage	• Percentage of participants satisfied with reporting method	• Participant surveys

#	Objectives	Criteria	Measures	Methods
		• Users' ease of differentiating between public and private road mileage	• Number of participant complaints or comments about perceived errors • Participant perceptions of the accuracy of mileage differentiation • Business partner perceptions of GPS accuracy and differentiation of public/private roads	• Customer service logs • Participant surveys • Interviews
		• Quality/accuracy of road use data reported	• Analysis of data and errors reported	• Data analysis

User Privacy Evaluation Objectives

#	Objectives	Criteria	Measures	Methods
P-1	Ensure user privacy protection	• User perception of privacy protections	• Percentage of participants who are satisfied with privacy protections in the pilot • Description of privacy concerns expressed by participants	• Documentation review • Participant surveys • Interviews
		• Protection of privacy (including PII), including implementation and operation of industry standard procedures	• Compliance with requirements based on standards identical or similar to the most recent ISO 27001 standards and PCI DSS 4.0	• Data analysis • Independent Security Audit
		• Public perception of road charge privacy protections	• Percentage of public who believe that a road charge program could keep their data secure and confidential • Description of privacy concerns expressed by poll respondents and	• Public opinion polls • Focus groups

#	Objectives	Criteria	Measures	Methods
			focus group participants	

Data and Systems Security Evaluation Objectives

#	Objectives	Criteria	Measures	Methods
DSS-1	Ensure data security	• Ability of system to withstand breaches or attacks	• Number of instances and characterization of instances of data security breaches	• Documentation review • Interviews
		• Business partner compliance with data security requirements and operation of industry standard procedures	• Compliance with relevant requirements as listed in the business, system, and interface requirements documents defined for the pilot • Compliance with requirements based on standards identical or similar to the most recent ISO 27001 standards and PCI DSS 4.0	• Documentation review • Independent Security Audit
DSS-2	Ensure technology reliability and security	• Reliability of road charge systems	• Number of instances of technical support • Average time to resolve technical issues • Description of technical support instances	• Data analysis • Participant surveys • Interviews
		• Availability of road charge systems	• Percentage up-time of all pilot subsystems and user account management features	• Interviews • Data Analysis
		• Security of road charge systems	• Number of instances of participant data being compromised if any • Description of data compromising events if any	• Documentation review • Interviews • Participant surveys

#	Objectives	Criteria	Measures	Methods
			• Percentage of participants satisfied with data security	

Communications Evaluation Objectives

#	Objectives	Criteria	Measures	Methods
CO-1	Conduct outreach to increase public awareness of need for alternative funding sources	• Opportunities for general public feedback	• Number of opportunities for general public to provide feedback • Number of members of the general public providing feedback	• Interviews • Data analysis • Public opinion polls • Focus groups
		• Public messaging on the need for road charge	• Number of email newsletters on road charge topics distributed to public audience • Number of visits to website pages and YouTube videos describing the need for road charge	• Documentation review
CO-2	Address potential implementation and public acceptance hurdles to adoption	• User acceptance of mileage and location recording method	• Percentage of participants satisfied with method	• Participant surveys
		• Opportunities for participant feedback	• Number of opportunities for participants to provide feedback, including evaluation surveys • Number and percentage of participants providing feedback	• Participant surveys • Documentation review

#	Objectives	Criteria	Measures	Methods
		• Participant satisfaction with interactions and feedback opportunities	• Percentage of participants satisfied with quality of feedback opportunities • Reasons for satisfaction or dissatisfaction with feedback opportunities	• Participant surveys
		• Understanding of potential risks and roadblocks to implementation of a road charge in California	• Favorable vs negative public sentiment on road charge feasibility • Describe identified technological, administrative, financial, or other hurdles to adopting a statewide road charge	• Public opinion polls • Focus groups • Documentation review • Data analysis • Interviews
CO-3	Identify potential implications of road charges for rural and Native American communities	• Project's ability to identify technical, political, social, and other hurdles for these communities	• List of identified challenges/hurdles for rural communities • List of identified challenges/hurdles for Native American communities	• Interviews • Participant surveys • Focus groups • Public opinion polls • Documentation review
		• Pilot's ability to recruit a representative sample of rural and Native American drivers to fully understand their challenges and issues	• Comparison of participant demographic and geographic profiles with Census or other data on rural and Native American residents	• Documentation review

#	Objectives	Criteria	Measures	Methods
CO-4	Identify equity concerns across rural and Native American communities	• User and public perception of road charge fairness for rural drivers	• Proportion of participants viewing a road charge as more or less fair than current transportation taxes for rural drivers • Proportion of public viewing a road charge as more or less fair than current transportation taxes for rural drivers	• Participant surveys • Focus groups • Public opinion polls
		• User and public perception of road charge fairness for Native American drivers	• Proportion of participants viewing a road charge as more or less fair than current transportation taxes for Native American drivers • Proportion of public viewing a road charge as more or less fair than current transportation taxes for Native American drivers	• Participant surveys • Focus groups • Public opinion polls
		• Project's ability to describe a robust set of equity concerns for these drivers	• List of equity concerns identified for rural drivers • List of equity concerns identified for Native American drivers	• Participant surveys • Focus groups • Public opinion polls