California
Road Charge

Public/Private Roads Project

FINAL REPORT | **OCTOBER 2024**

California Road Charge

Acknowledgements

The California Department of Transportation would like to thank the following partners for their commitment and continued collaboration on the California Public/Private Roads Project:

- The Federal Highway Administration
- The California State Transportation Agency
- The California Transportation Commission
- The Road Charge Technical Advisory Committee
- The Transportation Corridor Agencies (TCA, The Toll Roads)

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Executive Summary

As Californians switch to more fuel-efficient and zero-emission vehicles, funding the State's highway and road repairs with a tax on fuel is increasingly unviable. Coupled with California's plans to ban the sale of gas-powered vehicles in 2035, the State will need to replace the fuel tax with a funding system that better supports its transportation future. A Road Charge program, in which drivers would support road maintenance based on how many miles they drive, instead of how many gallons of fuel they purchase, represents one such alternative funding mechanism.

The **2023 California Road Charge Public/Private Roads Project** (the Project) represents Caltrans' most recent initiative in its series of ongoing efforts to study the viability of a Road Charge program in the state. The Project focused upon the perspectives of two distinct populations of the state: rural and tribal communities. The primary objective was to engage participants from rural and tribal communities and bring their voice to the table, gather information regarding their use of public and private roadways, and investigate the unique impacts that a future Road Charge program might have upon these specific communities.

The travel patterns of residents of rural communities differ significantly from those of urban drivers. They typically drive longer distances to get to work and essential services. They also have limited transit alternatives, and often need larger, less fuel-efficient vehicles, whether to support their livelihood or travel safely in rough and remote areas.

The 110 Federally Recognized Native American Tribes located within California state boundaries share in these issues, as many of their tribal members live in rural areas. They also have additional priorities and issues to take into consideration, including their status as sovereign nations. It was therefore a priority of the Project to gain understanding of how a potential Road Charge program might impact these unique communities.

Members of the rural community are more likely to travel frequently on privately maintained roads, as are tribal community members on roads located on tribal lands. Given that taxes should not be assessed in either of these scenarios, each of these communities has a heightened interest in the State's ability to only charge them for their mileage driven on publicly maintained roads. They are also less likely to want to share their location information, which such precise charging requires. To explore these concerns, the Project recruited members of rural and tribal communities to participate in a six-month live pilot, to specifically test the extent to which GPS-enabled OBD-II plug-in technology could be leveraged to reliably distinguish between their in-state mileage that was driven on public roadways, private roads, or roads traversing federally recognized tribal land, and whether they felt it brought them value while adequately protecting their privacy.

Finally, to investigate the potential for leveraging existing infrastructure and resources in the administration of a Road Charge program, Caltrans partnered with California's Transportation Corridor Agencies (TCA, The Toll Roads) to also incorporate within this larger pilot a small, 35-participant sub pilot demonstration. This sub pilot assessed the viability of a tolling agency serving as a third-party commercial account manager in a road charge system, by exploring ways in which TCA's existing toll transaction processing, account management, and financial reporting systems could be leveraged to support a more economical and familiar way to report, assess, and collect a road charge.

Community Feedback Findings

RURAL COMMUNITY PREFERENCES

Examining the perspectives of rural communities in the state revealed that satisfaction with the condition of local roads is extremely low among rural California residents. While many rural residents acknowledge the need for some additional funding for road repairs, project research showed a generalized mistrust of government that leads many rural residents to believe that the problem is not necessarily a lack of revenue, but government misspending. That said, rural residents agree that it is important to replace the gas tax with a sustainable revenue stream, and that EVs and hybrids should pay their fair share into road repairs and maintenance. Rural leaders understand there is a problem and want to be at the table helping the state find solutions.

Privacy or Lower Taxes?

Knowing that the rural areas of the state tend to set high value on both paying lower amounts in taxes and privacy, this pilot tested which would be their priority if they had to choose between the two. The general answer appears to be privacy. Rural residents conveyed their sense that they would not personally benefit from not having to pay for the miles they drive on private roads and that they would end up worse off by sharing their location data.

It is important to restate that the sharing of location information is not necessary for the implementation of a statewide road charge program and would never be required. The preference for privacy over location sharing in rural communities is a key understanding discovered in this pilot. However, variation in preferences does exist in rural communities as well, reinforcing the importance of providing multiple options for reporting miles in a potential future program so that individual taxpayers can make the choice that works best for them.

EV Only Preference

In general, rural communities expressed a strong preference for a split system whereby hybrid and electric vehicles pay a road charge, and others continue paying a gas tax, even though it would cost them more to continue paying a gas tax.

Experience Still Translates to Support

Despite these perceptions and reactions among the rural community at large, those who actually participated in the Project and had first-hand experience with the road charge and the mileage-reporting device reported a significantly more positive overall experience. Further, 75 percent found road charge as a fair funding option for California that the state should continue to explore. Given the state's experience seeing this phenomenon happen across multiple pilots in multiple states, it seems practicable that should a road charge system be implemented in the state, many Californians would adapt to and accept it, even in rural areas.

TRIBAL COMMUNITY PREFERENCES

When analyzing the preferences of tribal communities in the state, it should be noted that the Project team had more limited ability to draw conclusions from the tribal communities research conducted as part of this Project. Despite multiple outreach methods having been utilized during a relatively lengthy period of time, a relatively small number of community members participated in the research, meaning statistically significant conclusions cannot be drawn.

With that caveat, the research suggested that tribal residents were very dissatisfied with the condition of roads in their areas. Awareness around the gas tax tended to be high among this audience, and research hinted at a belief that the government collects enough revenue for road repairs, but the funds are distributed in an unfair way that disadvantaged their communities. Consequently, many perceived replacing the gas tax with a road charge as unnecessary, and while many agreed that electric vehicles should contribute to road maintenance, they believed road charge would be unfair to their own communities.

Leadership Opposed

The Northern and Southern Chairmens' Associations are both strongly opposed to the imposition of a road charge on their members. They view it as a potential threat to tribal sovereignty, and expressed willingness to pursue court action if necessary. They challenge the government of California to engage with them early on this topic and in good faith.

Concerns Over Impact to Gas Stations

The impact on tribal gas station revenue was also a key point of concern. Not all tribes own gas stations, but Caltrans estimates there are around 40 tribally owned gas stations within California. As sovereign nations, they do not collect state fuel taxes. Consequently, the tribal gas stations currently have a competitive advantage over other non-tribally owned gas stations in the area, which drives business to their locations. The revenue from these stations does not just fund tribal transportation needs, but many critical government services for these tribes. Thus, the potential repeal of the state gas tax, which would take place upon the implementation of a full road charge program, causes significant concern. For this reason, tribes would generally prefer an EV-only road charge program, which would keep the gas tax in place for gas-powered vehicles.

Important Issue for the Federal Pilot

Securing reliable revenue to support their communities' needs is an important consideration for tribal leadership. Not all tribes have casinos or gas stations or other independent sources of revenue, making them reliant on often insufficient revenues received from the federal government. As the U.S. Department of Transportation embarks on a federal road charge pilot authorized by the Bipartisan Infrastructure Law, California encourages the consideration of tribal sovereignty and revenue matters to be a priority as this policy is explored at the federal level.

Technical and Administrative Findings

GPS TECHNOLOGY WORKS

The six-month live pilot demonstrated that an OBD-II plug-in device enabled with GPS technology most definitely can be used to successfully facilitate the accurate differentiation of public versus non-public roads. The distance traveled reported by the device using its own internal algorithm is extremely precise and serves as a reliable source of mileage on behalf of road charge applications. Furthermore, the GPS locational information collected and reported by the device can support highly accurate differentiation by road and land types, subject to the granularity and accuracy of the map-sets and shapefiles being referenced by the differentiation process. To safeguard the ongoing accuracy of the differentiation process, it is imperative that a reliable source of up-to-date map-sets and GIS shapefiles is identified relative to road networks and land ownership, and that a process is adopted for periodically updating such map-sets and shapefiles throughout the course of the program.

While not the only reporting technology that can be paired with GPS location sharing capabilities, this pilot utilized plug-in devices. These devices are generally very reliable, but do have some technical considerations that will hopefully be addressed through future design upgrades and policy changes.

BUT IS IT WORTH IT?

A detailed breakdown of all device-related pilot costs revealed that a significant share of these costs was attributable directly to the collection, storage, and processing of GPS waypoints in support of the differentiation process. Pilot results showed that even for those who self-identified as relatively frequent drivers on private roads, the share of their overall mileage that took place on private roads was negligible (1.2%), and their resulting overall monetary savings realized by opting into location-tracking was diminutive (a tax reduction of a mere $.18 per month for each taxpayer). This was a much lower usage of private roads than hypothesized by the Project team. While a greater share of mileage might be traversed on private roads in other areas of the country, at least in the State of California, it potentially could be much more cost-effective for the Road Charge program to simply assume that any participant residing in a rural-designated area will generally drive a certain percentage of their mileage on private roads. This assumed percentage might then be applied accordingly to adjust the rural participant's mileage that is subjected to a road charge fee, thereby avoiding altogether both the cost and privacy concerns associated with location-tracking and road type differentiation. However, it should be noted that the issue of private, tribal, and out-of-state miles likely affects states differently, particularly between the East Coast and West Coast. As states look forward to future interoperability, these issues need to be considered carefully.

In contrast to rural drivers and private roads, this Project determined that for those who self-identify as frequent drivers on tribal land, the share of their overall mileage on such lands was larger (11.9%), though so few tribal members participated, this number is not statistically reliable.

ADMINISTRATIVE COSTS FOR PLUG-INS

As outlined in the report, there are numerous administrative program costs that are unique to the plug-in data collection option. Most of these costs are larger for a small-scale pilot than they would be with the economies of scale possible with a full program, with the possible exception of data processing costs. These unique and incremental overhead costs need to be weighed against the advantages offered by the plug-in data collection method. The data collected from the vehicle through the OBD-II plug-in is standardized and normalized across the broadest spectrum of vehicle years, makes and models, relative to other reporting options. Furthermore, the OBD-II plug-in reporting option provides locational data in support of differentiation at a frequency higher than any other data collection method. Given the market size of California, a statewide program would likely incentive the private sector to develop devices specifically for charging purposes, potentially addressing current limitations and lowering costs.

Technology will continue to advance as the state debates whether a road charge is the best tool to replace the gas tax. Thus the plug-in device of today may not look the same by the time California implements a potential program. As the implementing agency, the Department of Motor Vehicles will have the ongoing responsibility of assessing current technologies to find the best range of reporting options to serve California's taxpayers. The cost/benefit question really centers around the sharing of location data and the data costs it entails, given the privacy concerns of many, the small amount of private or out-of-state miles actually driven as identified in this pilot, and implications for future interoperability with other states.

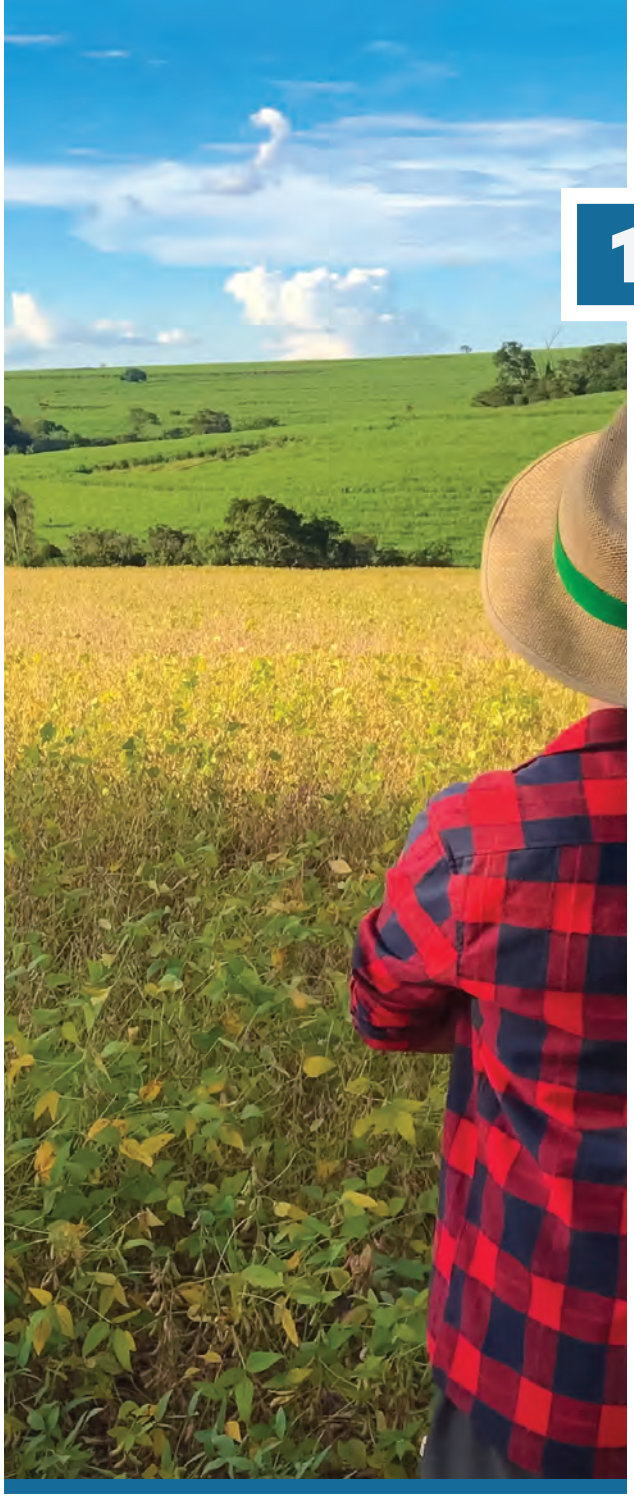
All of these technology findings underscore the importance of developing a road charge system that can adapt to changing technologies in reporting methods, ensuring that Californians have a range of reporting options that are reliable, accurate, cost-effective, and secure.

Tolling Agency Findings

The sub pilot demonstrated that there is indeed a great deal of promise in the notion of California's existing tolling agency serving as a Commercial Account Manager for its Road Charge program. TCA officials reported that in support of the sub pilot, "it was relatively easy to update our system to accommodate road charge transactions, and to simply supplement the tolling transactions on existing TCA statements with road charge transactions." Once the sub pilot technical teams had finalized the interface that would be used to facilitate the transfer of road charge transactions to their system, officials noted "no subsequent technical involvement was required thereafter ... it was very incremental to what we were already doing."

In summarizing their experience with the sub pilot, TCA officials offered their viewpoint that "partnering with a tolling organization is a great approach for mitigating costs in the deployment of a Road Charge program, while also leveraging experience on the public sector side ... it represents a true win-win." From the participants' perspective, overall, TCA account holders expressed extremely high levels of satisfaction with their experience.

Having a tolling agency serve as a commercial account manager for a road charge system would enable the state's drivers to interact with a single entity to easily pay all fees associated with travel on California roads on a single, unified monthly statement, whether such travel takes place on a designated toll road or on any in-state public roadway.



California Road Charge

1 Introduction and Background

As Californians switch to more fuel-efficient and zero emission vehicles, funding California's highway and road repairs based on the gas tax is increasingly unviable. California will need to replace the gas tax with a funding system that supports our state's transportation future.

In the past 15 years, average real-world fuel economy has increased by 32 percent, as noted by the Environmental Protection Agency's *2022 Automotive Trends Report*. Although great for the environment and drivers' household expenditures, better fuel economy not only reduces the amount of tax revenue available to fix our roads, but it also contributes more per-mile to wear and tear on the roads. Coupled with the State's plans to ban the sale of gas-powered vehicles in 2035, California has a need to plan ahead, so the State does not end up in a situation where it is unable to maintain the roads it has, let alone reshape them for 21st Century needs.

A road charge could serve as the gas tax replacement. Road charge is an alternative funding mechanism that allows drivers to support road maintenance based on how many miles they drive, instead of how many gallons of gas they buy and use. Caltrans is leading the U.S. on new ways to resolve the gas tax issue, establishing the Road Charge Program to develop and evaluate different aspects of a road charge system before it is potentially considered by the State Legislature.

Overview of a Road Charge System

A road charge system provides a more sustainable and flexible transportation funding model that maintains the user-pay principle of the motor fuel tax. With a road charge, motorists are charged based on the number of miles they drive instead of a tax on the number of gallons of fuel they purchase for their vehicles. This evolution to a direct road-usage-based model provides enhanced sustainability and fairness in paying for State roads and bridges, especially as vehicles continue to become more fuel efficient and shift to ZEV models that require no fossil fuels.

Through multiple pilot programs, California and other states have explored structures to achieve administrative efficiency, protect taxpayer privacy, and maintain the flexibility needed to continue to adapt to the newest technological advances of the future.

Specifically, states have found the use of third-party commercial account manager models to be the best structure. In a road charge system using this model, a state agency oversees the third-party commercial account manager, which administers the day-to-day interaction with the taxpayer.

In its pilots, Caltrans has offered a variety of methods to participants for reporting the miles they drive, which include manual systems and various automated systems, with or without location-based services. Providing different mileage-reporting options to taxpayers is key to allowing individuals to control their data and privacy in the ways that are best for them, as well as managing a vehicle fleet with a wide age range and allowing for differing levels of access to technology (Figure 1-1).

FIGURE 1-1 **Third-party Commercial Account Manager (CAM)**

Brief History of California's Road Charge Exploration

Beginning in the early 2010s, Caltrans has actively explored, developed, tested, and documented the road charge concept as a realistic alternative to the gas tax. California's exploratory journey of the road charge involves key legislation, which has enabled and influenced the programmatic design, as well as concerted efforts to test various aspects of road charge viability through pilot projects.

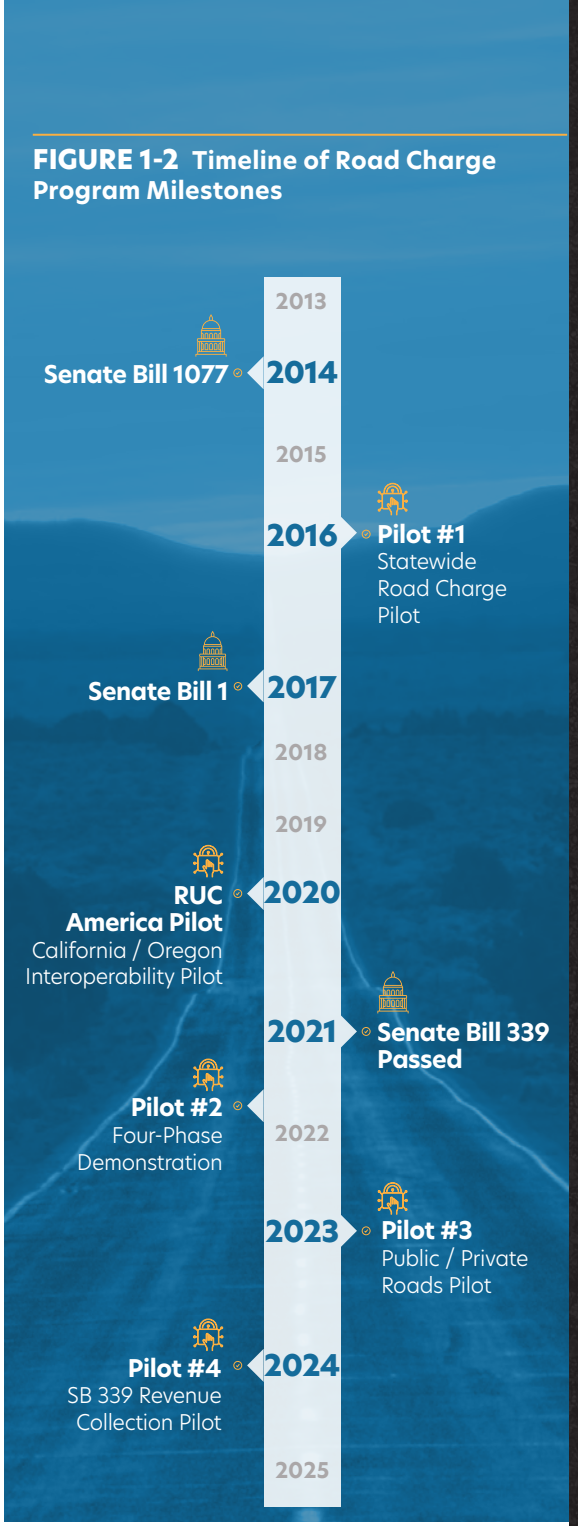
In 2014, the California State Legislature passed SB 1077 (DeSaulnier, 2014), which acknowledged the need to identify a long-term funding solution for the State's transportation system. SB 1077 directed the chair of the California Transportation Commission (CTC), in consultation with the Secretary of the California State Transportation Agency (CalSTA), to create a 15-member Technical Advisory Committee (TAC) to study road charge as a potential alternative to the gas tax, make recommendations to the CalSTA Secretary on a road charge pilot design, implement a pilot by January 2017, and evaluate its findings in a report to the Legislature by June 2018 (Figure 1-2).

Based on the TAC's recommendations, the **2017 Road Charge Pilot** concluded in 2017 with 5,129 participating vehicles. Participants reported their vehicle miles traveled and took part in a simulated road charge payment through one of several mileage collection options (through partnerships with third-party vendors) and provided feedback on their participation. The success of the 2017 Pilot was measured against the TAC's eight criteria of: revenue, cost, operations, participant experience, privacy, data security, equity, and communications. The pilot successfully demonstrated the feasibility of a road charge system, and also made recommendations for areas of further study, including studying ease of user experience and effects on rural drivers. The 2017 Road Charge Pilot results can be found in its Final Report.

In response to the recommendations from the 2017 Road Charge Pilot report, the **2021 Four-Phase Demonstration** explored how the collection of a road charge could be paired with various technologies and business models, studying how to achieve an easy taxpayer experience as well as lower administrative costs. Caltrans tested a pay-at-the-pump/charge point, through ridesharing and usage-based insurance, and with autonomous vehicles, and the State found that leveraging existing business models provides ease and familiarity for the taxpayer, as well as lower costs for the State. The Four-Phase Demonstration was held January through June 2021, and the full results are in its Final Report.

In 2021, the California State Legislature passed SB 339 (Wiener, 2021), which directed CalSTA to implement a pilot expressly designed to collect actual road charge revenue from participants in order to test the revenue collection process. The pilot will also explore different rate structures, and it is projected to take place in 2024. All of Caltrans' research to date can be found at www.caroadcharge.com.

FIGURE 1-2 Timeline of Road Charge Program Milestones



California Road Charge

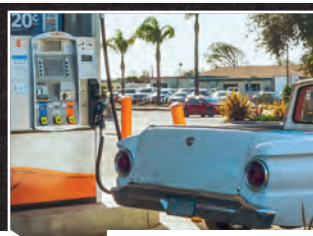
2 The Project

This **2023 Road Charge Public/Private Roads Project** is the next step in Caltrans' research effort evaluating the feasibility of a statewide Road Charge program, and the Project focused on the unique impacts and priorities across rural and tribal communities. The Project came from a recommendation in the **2017 Road Charge Pilot** Final Report to further explore the impacts of the shift to a road charge system on rural communities, since the 2017 pilot had difficulty recruiting participants in this category.

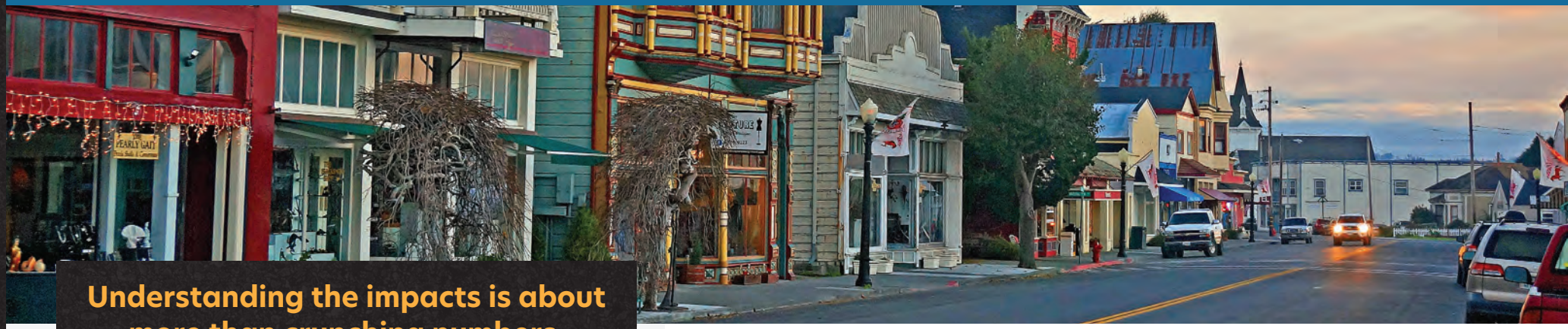
Why Rural and Tribal Communities?

Whether introducing the road charge idea to a general member of the public or an informed transportation policy expert, one of the first questions that always comes up is, "What impact does this have on rural drivers?". People inherently recognize that the issues that those who live in rural areas face are different. They have to drive long distances to get to work or see the doctor, they do not have reasonable transit alternatives, and they often need larger, less fuel-efficient vehicles, whether to support their livelihood or travel safely in rough and remote areas. For this reason, many states, including California, have done extensive research on the cost impacts of a switch from the gas tax to a road charge for rural drivers[1].

The story uncovered here is counterintuitive, in that on average rural drivers would pay less in road charges than they currently do under the gas tax system because they tend to drive less fuel-efficient vehicles.



[1] RUC America Update and Expansion of Financial Impacts of RUC on Urban and Rural Households Study. https://caroadcharge.com/media/vktncxgu/rucamerica_urbrur_finalreport_2022-09-16.pdf



Understanding the impacts is about more than crunching numbers.

As rural communities can have different priorities, issues, and concerns than those from other types of areas in the state, it is critical to engage their perspectives and understand the realities of their ways of life as the state shapes a potential road charge system that works for all Californians.

As many of their members live in rural areas, the 110 Native American tribes located within California state boundaries share in these considerations. However, they also potentially have additional priorities and issues to explore, not the least of which is their status as sovereign nations.

The primary objective of this Project therefore was to engage rural and tribal communities about the State's research into road charges and bring their voice to the table. This included a six-month live pilot conducted from April to September 2023 in order to provide rural and tribal residents the opportunity to experience a road charge system firsthand and give feedback, as well as polling and focus groups across the state from these targeted communities, and engagement with tribal leadership and rural-focused organizations.

Why Public/Private Roads?

Members of the rural community are also more likely to travel frequently on privately maintained roads, as are tribal community members over roads located on tribal lands. As taxes should not be assessed in either of these scenarios, each of these communities could potentially have a heightened interest in the State's ability to only charge them for their mileage driven on publicly maintained roads. Currently, when a driver is on a private road, the driver still pays the gas tax even though no public money goes to the maintenance or improvement of that private road.

This Project presented the opportunity to test the current state of GPS technology, particularly in remote areas, to report the miles traveled by vehicles and assess the technology's reliability in determining taxes due. Another item to note is that rural communities tend to put a higher priority on privacy and could be wary of using GPS systems to report mileage for road charge assessments. The Project provided the opportunity to test rural drivers' priorities on these issues and explore initially whether rural residents would decide whether the identification of their location is worth the tax savings, or if privacy is more important to them. Information on aspects of administrative costs could also be gathered to inform state decision-making.

Why Tolling Agency Involvement?

Previous pilot projects have demonstrated the value of leveraging existing business models for the administration of a road charge system in California. This approach keeps administrative costs down, provides a familiar system with which the taxpayer can easily engage, and expands market access for the existing business(es) currently implementing their business models. One existing business model that has the potential to serve as an effective account manager in a road charge system is that of California's toll agencies.

To test the feasibility of a tolling agency acting as a road charge system account manager, Caltrans partnered with the Transportation Corridor Agencies (TCA) for a small sub pilot as part of this Project.

This sub pilot explored ways the TCA's existing toll transaction processing, account management, and financial reporting systems could be leveraged to support a more economical and familiar way to report, assess, and collect a road charge, as well as see what value this crossover might bring to the tolling agencies.

Caltrans collaborated with the TCA to recruit existing TCA customers as participants for this sub pilot within this Project from existing TCA customers, which have grown to more than 2.3 million FasTrak® account holders with The Toll Roads. Recruiting emails were sent to existing customers, and TCA employees oversaw recruiting and operations.

The TCA was formed in the 1980s to improve regional mobility and enhance quality of life. It consists of two agencies – the San Joaquin Hills Transportation Corridor Agency and the Foothill/Eastern Transportation Corridor Agency that oversee and operate four Toll Roads. Together, The TCA offers 265,000 daily drivers 420 lane miles that provide an alternative to congested freeways and arterials, and the agency has experience with processing toll payments, managing customer accounts and financial-reporting systems. In fiscal year 2023, TCA processed more than 89 million transactions across its four Toll Roads, resulting in $332.5 million of toll revenue.

Communications Research, Outreach, and Recruitment

Caltrans launched a stakeholder outreach effort to engage with rural and tribal communities about road charge, using this Project as a platform to educate, listen, and document the rural and tribal voice through various methods on the idea. This stakeholder outreach effort sought specifically to engage rural and tribal communities in conversations about their priorities in connection with a potential road charge system to ensure their often-marginalized perspectives could help shape a potential program while in development. This effort included organizational engagement, presentations, surveying, focus groups, and pilot recruitment.

This section describes the methodology employed to connect with communities across California through these paths to share information about the road charge concept and this Project. The feedback heard through this effort is explored in Sections 4 and 5.

COMMUNICATIONS RESEARCH

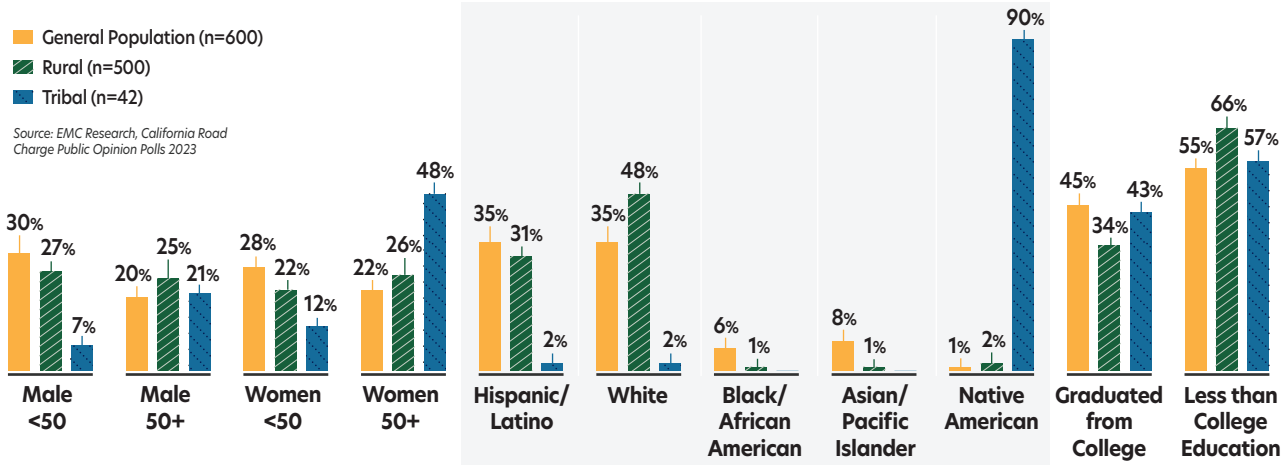
For the communications research efforts, the following were conducted: one survey among the general population; one survey and four focus groups among rural communities; and one survey and ten one-on-one interviews among Native American communities.

Public Opinion Surveys

The communications research included quantitative opinion surveys of the general public, rural communities, and Native American communities. The survey questionnaires were developed collaboratively between Caltrans and the consulting team and contained a significant amount of overlap in questions to allow a comparison between the attitudes of the general public with those of the targeted rural and tribal communities, as well as for a measurement of attitudinal changes with the public surveys conducted in 2021 as part of the Four-Phase Demonstration pilot. The survey questions included topics such as perceptions of the condition of California roads and highways, awareness of transportation funding challenges, and awareness of and support for a road charge in California. The survey questionnaires also contained a set of demographic questions to ensure that respondent pools were representative of the broader research populations, as well as enable cross-tabular analysis to look for differences in attitudes and opinions by key subgroups.

The three public opinion surveys were administered using a mix of online and telephone interviewing; respondents either heard questions read by an interviewer and gave verbal answers or read and responded to the questions themselves in an online survey tool (Figure 2-1). Participants were offered the option to take the survey in Spanish in all modes. The average survey length was approximately 15 minutes. The surveys were conducted using standardized best practices in survey research, with thorough quality controls, professional telephone interviewing staff, and daily monitoring of interviewing data collection progress and response quality. Please see Public Polling Results, Appendix I for in-depth information on methodology and results.

FIGURE 2-1 Respondent Demographic Profile



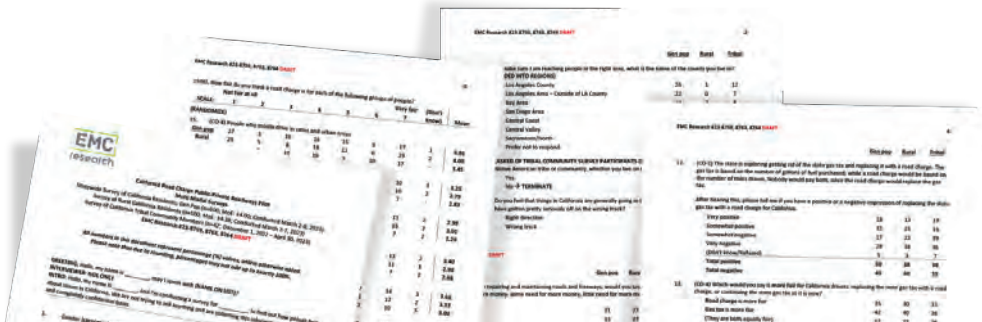
Tribal Communities Survey

The Native American communities survey was conducted from December 1, 2022, through April 20, 2023, with 42 Californians who self-identify as Native American. This survey was kept open for a longer time to maximize responses from this hard-to-reach population. Given the extreme difficulty in engaging this population, the methods used to reach tribal communities were a mix of random and non-random methodologies, which means it was not possible to compute a margin of sampling error as can be done with random sampling strategies.

The research team implemented a combination of several of the following strategies to maximize the survey's sample size and reach.

- Sending individualized survey links to participants directly.
- Conducting a live telephone survey, either on its own or as an additional component to the online survey.
- Emailing a static survey link to contact persons, asking them to distribute the link to their community; anyone using the same link would be able to go to the link and complete the survey.

Reaching these tribal communities required specialized outreach due to the fact that there is no single comprehensive list of Native American peoples in California that includes non-federally recognized individuals. The Native American Heritage Commission maintains a contact list of tribal entities that were contacted for tribal consultation. Entities on the list have asked to be on the list, and thus have self-selected and are engaged in their cultural history. Due to small sample size, the Native American communities survey should not be considered as representative, but the results should be interpreted through a more qualitative lens.



Focus Groups with Rural Communities

The communications research also included four focus groups in November of 2023 with individuals who live in rural and remote areas to allow for in-depth exploration of attitudes and concerns about transportation funding and the road charge concept. The topics covered in these focus groups included discussion of driver habits and behaviors, awareness of and opinion on transportation and road funding mechanisms and road charge, as well as reactions to additional information about road charge, gas tax, public/private roads, and potential implementation strategies.

The focus groups were split by geographic region of the state and by prospective participants' typical driving habits. Each group was comprised of around eight people. All four focus groups were moderated by trained, professional moderators. The sessions were held online, to allow for recruiting from a range of rural areas without necessitating a lot of travel for group participants. Group participants were paid an honorarium for their participation in a group, and their identities were kept anonymous.

One-on-One Interviews with Members of Tribal Communities

While focus groups were originally planned for tribal community members in California as part of the communications research efforts, due to resistance from tribal leadership, it was incredibly difficult to find interested participants. Consequently, one-on-one interviews were conducted with ten California Native American community members in November 2023, which gave those who were interviewed the opportunity to share their specific concerns and questions in an open-ended fashion which quantitative research does not allow. These interviews helped the team understand how members of tribal communities viewed the road charge concept; learn more about concerns and questions they had; and probe on the topics they brought up. The Project team also held a small group discussion with members of the Caltrans Native American Advisory Council, who are more involved with tribal transportation policy.

OUTREACH AND ENGAGEMENT EFFORTS

Targeted Organization Meetings and Presentations

In-person outreach was conducted wherever possible, and when logistics could not support in-person connection for meetings and presentations, virtual engagement was employed using Zoom to share more information and identify potential Project participants. As the rural and tribal communities in California are some of the most difficult-to-recruit members of the public in the State, Caltrans staff and consultant team understood relationship-based approaches were required for successful engagement efforts.

With all target audiences, Caltrans staff pursued opportunities to present information on road charge and gather input. Whether through presentations at association meetings or conferences, webinars to members or inclusion in organization and member newsletters, Caltrans staff were able to provide informational presentations in 21 rural counties (Figure 2-2) and to key tribal leaders and community members during the five-month engagement effort. Most of these presentations were made in person, bringing the policymaking process of Sacramento directly to rural and tribal community members for public comment.

To help identify interested groups across California's vast rural landscape, Caltrans connected with established statewide organizations such as the 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. These groups represent the interests of rural residents and businesses and Caltrans engaged with these groups to inform them of the six-month Project and recruit participants, but more importantly to hear about their unique situations and how a road charge could affect the daily lives of their members and constituents. Caltrans gave direct presentations to the leadership of these rural organizations and information about the pilot was shared with their members through their existing communications channels (e.g. print advertising and email campaigns).

FIGURE 2-2 Map of Outreach Events

Many direct presentations in rural communities primarily occurred at local meetings held by County Boards of Supervisors and County Transportation Commissions. One key to this successful public outreach, which was expressed with appreciation to Caltrans, was the willingness of Caltrans to attend these local meetings in person.

Tribal Engagement Efforts

Caltrans began its tribal outreach efforts for the project with its own Native American Advisory Council, which meets quarterly with Caltrans leadership to ensure tribal priorities have a place in the State's transportation projects and policymaking. The advice of the council was sought on how best to share information about the Project and engage tribal leadership. In addition, there was extensive brainstorming on outside-the-box avenues to connect with tribal members, both governmental and non-governmental. Outreach through a variety of channels was deployed, from attending California's 55th Annual Native American Day at the State Capitol, to collaborating with the National Indian Justice Center to create and share email information with its membership, as well as communicating through cultural publications, formal notifications, and follow-up phone calls to all tribes on the Native American Heritage Commission list. A key recommendation from the Native American Advisory Council was to present to the three Chairmen's Associations in the state, as the buy-in of leadership was particularly important. Engagement with Native American Advisory Council is ongoing to ensure the tribes are continually updated on policy developments and may continue to express their priorities and concerns.

OUTREACH TO TRIBAL COMMUNITIES INCLUDED:

- Attendance at the 55th Annual California Native American Day
- Presentation to California Assembly Member James Ramos (Dem - 45), Select Committee on Native American Affairs (Chair)
- Inclusion in the California Indian Basketweavers' Association Newsletter
- Presentation to the California North Coast Tribal Transportation Commission
- Presentations to the member associations (Northern, Central, Southern) of the California Tribal Chairpersons Association
- Presentation to Caltrans Tribal Relations staff, including District Native American Coordinators (DNACs), District Native American Liaisons (DNALs), and the 36 tribes that are members of the Caltrans statewide Cultural Studies Subcommittee
- Inclusion in the Governor's Office of Tribal Affairs Newsletter
- Presentation to Indian Health Services (IHS) within the U.S. Department of Health and Human Services
- Attendance with Exhibitor Booth at the National Congress of American Indians 79th Annual Convention & Marketplace
- Presentation to the National Indian Justice Center (NIJC)
- Inclusion in Native American Magazine
- Attendance at the 2023 Annual Meeting of the Society for California Archaeology (SCA)
- Survey of Tribal Respondents
- Presentation to Woodfords Community Council, Washoe Tribe of Nevada and California
- Letters mailed to Chairs of 110 Federally Recognized Tribes in California and to 215 California Native American Heritage Commission (NAHC) contacts in the State

Findings and Lessons Learned on Engagement Efforts

Rural and tribal communities are often overlooked for in-person visits, and community members appreciated the Caltrans physical presence and the time taken to provide road charge concept information, pilot details, and answers to their questions, despite their skepticism about the road charge concept. Given the sheer size of California, government officials based in the State Capital do not often travel to remote rural and tribal areas of the State, and this level of engagement and face-to-face interaction built significant goodwill and helped convey that rural and tribal voices are critically important in California as the State considers this potential policy.

RURAL COMMUNITIES

The number of rural-focused groups and organizations in California that were open to learn more about the road charge concept and wanted Caltrans to deliver presentations was immediately encouraging. Typically, these organizations conduct significant advance planning for their annual meetings and conferences, and any outside organization interested in participating or presenting is required to give a minimum of one year's notice. This was a limiting factor, and Caltrans would have liked to pursue even more grassroots-level meetings and community outreach if timing had allowed. A good example of timing constraints is Caltrans' intention to host a booth at various spring farms shows, which would have been great recruitment and education opportunities. The timing of the Project launch and organization of the public outreach campaign meant this particular type of seasonal-event outreach activity was not something Caltrans could include in its larger calendar of outreach efforts. County fairs were another potential opportunity which was missed due to timing issues. In addition, some organizations did not have interest in face-to-face contact with their members, which meant only virtual outreach was made possible. It should be noted Caltrans had staffing and time constraints to manage as well.

NATIVE AMERICAN COMMUNITIES

It is understood tribal communities in California present unique engagement and project recruitment challenges, including geographic isolation, different perspectives across 110 federally recognized tribes, distrust of government agencies, limited time and resources, and varying cultural norms. Caltrans anticipated lack of interest in recruitment efforts in these communities, and pursued standard and innovative channels to engage, connect, and recruit Project participants from this important community. From contacting tribal communities early and often, to registering their expressed desires to be involved in discussions, to ensuring tribal communities receive adequate follow-up to affirm their needs are heard and addressed, Caltrans staff did everything they could think of at every step to deliver effective outreach to tribal communities. Tribal leadership deeply influences their members' willingness to participate in road charge efforts. Caltrans is authentically invested in continuing to connect with tribal leadership to explore their communities' unique needs and concerns associated with road charge, as well as helping to make certain their voices and priorities are documented.

RECRUITMENT EFFORTS

Rural and tribal communities are the most difficult groups in California to convince to participate in a pilot. These challenges are why further engagement with rural and tribal communities was recommended in the 2017 Road Charge Pilot Final Report. With this in mind, Caltrans significantly increased the pilot incentive amount to $250 and employed different outreach strategies than previous pilots.

As outlined in Appendix C, Pilot Recruitment Plan with Results, three distinct pools, or cohorts, of participants were targeted for participation in the Project's six-month live pilot demonstration: (1) members of California's rural communities (Rural Cohort), (2) members of the state's tribal communities (Tribal Cohort), and (3) existing TCA account holders (TCA Cohort). All participants were required to be a California resident at least 18 years of age, be a licensed driver in the state and have access to the internet.

The Caltrans pilot team worked with the Caltrans Office of Public Affairs in Sacramento and within relevant Caltrans districts to identify small-scale opportunities for engagement. These opportunities included discussions with local editorial boards, TV interviews, podcast opportunities, and involvement with other local news resources. Large media was not pursued.

At targeted conferences and events, Caltrans staff set up a booth in vendor areas and had staff available to answer questions. There were handouts available for those who wanted additional information, as well as a QR code for them to follow up if they wanted more details about the road-charge concept or to sign-up as a Project participant. A paper sign-up sheet was also available for those that had lower comfort with technology.

While 8 percent of the participants who completed the pre-test survey noted that the $250 incentive was the main factor that motivated them to sign-up to participate, overall, it was observed that this amount was not sufficient to overcome the reluctance of many in rural and tribal communities to participate. Other pilots looking to engage these communities may wish to consider higher amounts for incentive-eligible activities.

Traditional broad-based recruitment efforts are insufficient. Significant and sincere staff effort was required to meaningfully engage the cohorts for this Project. An overview of cohort-specific efforts is below and comprehensive information on the recruitment plan and results is available for review in Appendix C.

Targeted Participant Characteristics by Cohort

Each of the respective cohorts specifically targeted participants exhibiting these characteristics.

Cohort #1 | RURAL

- Live in U.S. Census tract designated as a rural community

AND

- Anticipate driving on private roads an average of at least once per week during the pilot

Cohort #2 | TRIBAL

- Self-identify as a member of a federally recognized tribe

AND

- Anticipate driving on tribal land an average of at least once per month during the pilot

Cohort #3 | TCA

- Active TCA "The Toll Roads" account holder

Rural Approach and Results

GOAL: **350 rural pilot participants**

RESULT: **234 rural pilot participants**

Caltrans employed a top-down, membership-driven approach to recruiting drivers from rural areas. Connecting with statewide entities, which are discussed in the Outreach Section, Caltrans provided Project presentations to rural organization leadership or shared key messaging that was subsequently disseminated out further through their various communications channels. This sharing of road-charge concept and Project information helped educate key leaders representing rural communities and generated interest for additional local presentations.

While Caltrans would have welcomed more local-level engagement with these memberships, presentations primarily occurred at local government meetings held by County Boards of Supervisors and County Transportation Commissions. Caltrans' presence at these meetings allowed the road charge message to be delivered directly to community members. The willingness of Caltrans leadership to attend these meetings personally, to present information about the Project, and answer difficult and negative questions from community members helped to encourage rural residents' participation in the Project. This strategy helped rural communities better understand the issue facing California of the decline in fuel tax revenues, mitigated some initial concerns about the road charge concept, and conveyed the message that rural communities are an important part of finding a solution. Traveling to these remote communities built significant goodwill, despite skepticism from community members about the road charge concept. In addition, the physical presence of Caltrans leadership at many of these public meetings led to one-on-one meetings and conversations with county leadership. Overall, the northern part of the state was more open to information sharing and presentations than the southern region.

Tribal Approach and Results

GOAL: **100 tribal pilot participants**

RESULT: **15 tribal pilot participants**

If rural drivers are difficult to recruit, tribal members are even harder. California does have several established formal methods of communication with the 110 federally recognized tribes, as well as non-recognized tribes. The pathways Caltrans engaged are also shared above in the Outreach Section.

Outreach through existing formal notification channels consisted of several communications efforts from Project team members:

- Initial emails were sent to tribal email addresses provided by the Native American Heritage Commission .
- Several days after emails were sent, follow-up phone calls were made to tribal phone numbers provided by the commission.
- Emails were re-sent, and more follow-up calls were made based on added information gathered during initial calls (e.g., if the Native American Heritage Commission list contained an incorrect tribal email address, or a tribal chairperson was replaced by a new chairperson).

It was immediately evident that communication through Native American Heritage Commission formal notification channels was not going to be enough for this Project's public outreach and recruitment efforts among tribal communities. In seeking Native American Advisory Committee guidance on what beyond the existing formal channels would be best, committee members recommended Caltrans staff meet with the three tribal Chairmen's Associations in the state and partner with the National Indian Justice Center to spread word about the Project.

Caltrans staff reached out to the Chairmen's Associations as recommended and were able to present to two of the three associations. The Southern California Tribal Chairmen's Association

expressed strong opposition to the road charge concept and any participation of their members in the Project. The Northern Chairmen's Association had skepticism and concerns about the road charge concept, though they also shared that they appreciated being informed, and some chairmen indicated they would share the Project information with their members. Caltrans staff attended or requested to attend events, which included an event recommended by the National Indian Justice Center, the National Congress of American Indians in Sacramento. Caltrans also requested information be shared about the Project to tribal email lists.

Beyond this, further brainstorming took place to think of outside-the-box ways to reach members of tribes about the opportunity to participate in the Project. These included placing articles and paid ads in culturally focused publications such as *Native American Magazine* and partnering with federal tribally focused agencies to leave flyers in Indian Health Centers, though that was not accomplished. Caltrans also launched a "Bring-a-Friend" program, in which tribal participants were able to refer up to five friends to participate in the Project for an added incentive. These were unsuccessful in attracting participants but demonstrate the extent of the recruitment methods that were attempted.

All of combined tribal outreach was confirmed to have reached 177 tribal contacts of the 214 contacts on the Native American Heritage Commission list, and yet while significant recruitment activities were implemented, few tribal members signed up to participate in the Project. Overall, the most effective recruitment approach was receiving approval from tribal leadership. Without this support, it was difficult to recruit members of tribes to participate in the pilot. Participation in this Project by tribal members was exceptionally low as a result. Caltrans continues to explore and implement other ways to ensure the voice of the tribes is included and involved in the development of the road charge concept.

TCA Approach and Results

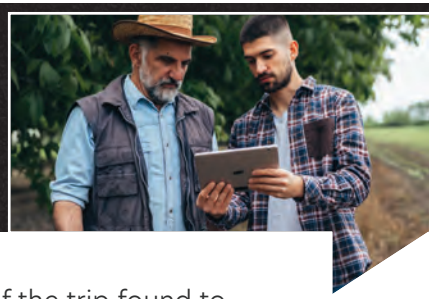
GOAL: 50 TCA account holder pilot participants

RESULT: 34 TCA account holder pilot participants

Caltrans worked in coordination with California's Transportation Corridor Agencies (TCA) to recruit participants for the tolling sub pilot, which was based on a set of active users of the existing TCA toll program. Recruiting emails were sent to existing TCA customers, and TCA employees oversaw recruiting and operations. Appropriate recruiting criteria for the TCA sub pilot were mutually developed. This included eligibility requirements, desired participant stratification goals, and recruitment executed through TCA's existing channels with its customers. The TCA sub pilot recruitment kicked off in late February 2023 and ran for only a few days into March 2023, with 369 existing TCA customers expressing interest in participation even in that brief time period.

Operational Concepts

It is important to note that in the fully implemented road charge system that California envisions, multiple ways for taxpayers to report miles would exist, most of which would not use any location data. However, for this specific pilot, the purpose was to explore technical issues and community preferences around this more high-tech, data-heavy option.



All participant vehicles taking part in the Public/Private Roads Pilot were given a location-enabled On-board Diagnostics, Version Two (OBD-II) plug-in device, which was inserted into the dashboard and collected travel information from the vehicle. The device received satellite location data and transferred it to the pilot platform throughout the course of the six-month live demonstration. For each trip taken by the vehicle, the device reported the times of the day when the trip began and ended, the geolocational coordinates of the trip's starting and ending locations, and a set of geolocational coordinates for waypoints traversed during the trip (Figure 2-3). For a more detailed overview of how trip information was gathered by the device and transmitted to the pilot platform via the device vendor's gateway, please see Appendix H, Plug-In Device and Geolocation Report.

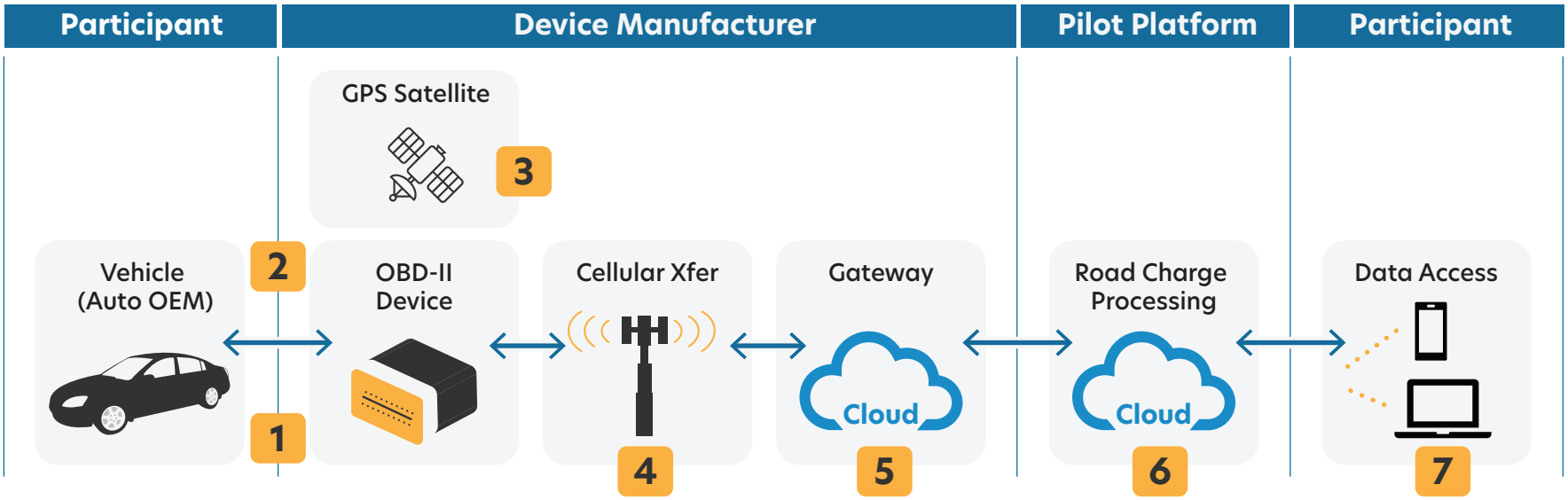
Once all device-reported information for a given trip had been collected by the pilot platform, the waypoints traversed by the trip were computationally assessed against a set of map-sets, to determine the distances traveled during the trip on State of California public roadways—which are maintained by Caltrans and local cities and counties and subject to a per-mile road charge—versus in-state roads classified as rural or traversing tribal lands—which are not maintained by Caltrans or local cities or counties and therefore not subject to a per-mile road charge. This process is referred to as the "differentiation" of trip mileage.

Subsequent to differentiation, the portions of the trip found to traverse in-state public roadways were assessed the appropriate road charge. The EPA-rated fuel efficiency for the vehicle was also used to approximate the amount of fuel that was required by the vehicle to travel the overall distance of the trip (on all road types). To avoid "double taxation," state fuel taxes that would be required to purchase the estimated amount of fuel to complete the trip were then credited back to the participant. Each processed transaction, embodying the road charges and credits associated with the trip, was then captured in a monthly simulated road charge statement.

Upon generation of each month's invoices, the pilot participants were notified via email of the availability of their monthly statement. Participants then logged into the web-based pilot participant portal to review the statement for accuracy and make a simulated payment against their balance.

Since 1996, vehicles have a standardized port on the dash to allow diagnostic checks for repairs and emissions (the on-board diagnostics, version two or OBD-II). The OBD-II port allows data to be retrieved from the onboard computer system of the vehicle and a device plugged into the port can utilize this access to report mileage.

FIGURE 2-3 Pilot Informational Data Flow



1. Device requests data from participant vehicle
2. Vehicle returns requested data to device
3. Device determines GPS location at trip waypoints
4. Device transmits collected vehicle data to gateway via cellular network
5. Gateway processes and stages raw data
6. Pilot platform pulls travel data from gateway staging and performs road charge processing
7. Participant accesses portal to review curated travel data and road charges

TCA SUB PILOT

The operational concepts underlying the TCA sub pilot were identical to those of the Public/Private Roads Primary Pilot, with the sole exception of a different web platform used by the TCA participants to review their statements and make their simulated payments.

All participants in the TCA sub pilot were issued the same OBD-II plug-in device, and travel information gathered from their vehicle followed the same processing path as did trip data gathered on behalf of the Primary Pilot, all the way through the differentiation of the trip mileage, assessment of road charges, and calculation of fuel tax credits. However, the resulting transactional information feeding into the monthly statements was then forwarded by the sub pilot platform to the TCA back-office system. Participants in the sub pilot then logged into their pre-existing TCA accounts to review their monthly road charges and make the associated simulated payments. These participants effectively had one monthly statement for both their tolls and road charges, creating a simple user experience without an "extra" bill.

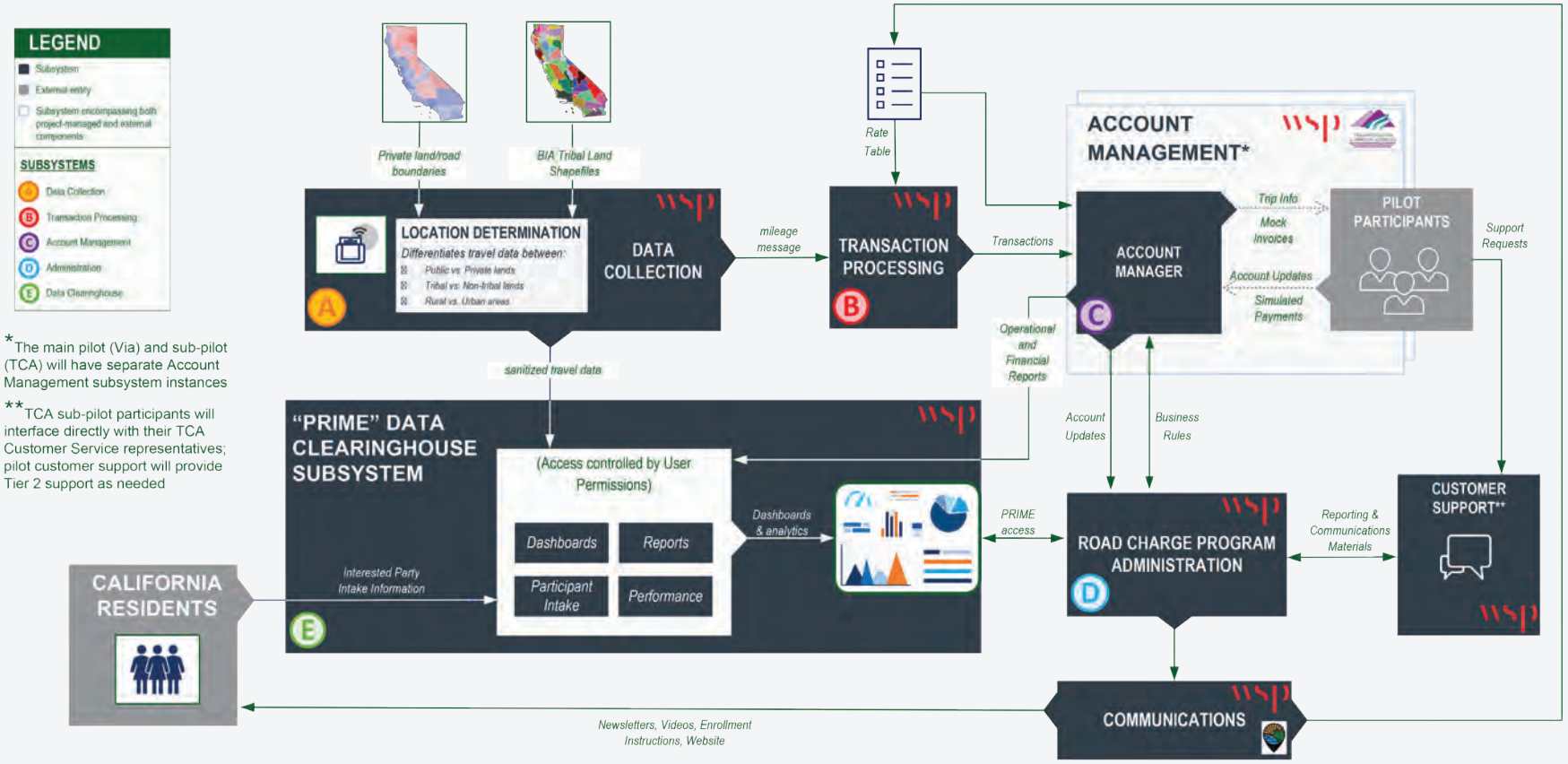
Functional Systems Architecture

The Project's functional systems architecture comprised five logical subsystems, with standardized interfaces between subsystems to facilitate flexibility and scalability. This functional architecture is depicted in the illustration below, and subsystems may be summarized in Figure 2-4:

FIGURE 2-4 **Road Charge Public/Private Roads Pilot - Functional System Architecture**

- **Data Collection** – Captures travel/trip data from the OBD-II device installed in the participating vehicles.
- **Transaction Processing** – Processes the travel/trip data into transactions, applies road charge and fuel tax credit rates based on the differentiation by road type of waypoints traversed during the trip, and calculates the net road charge owed.
- **Account Management** – Provides the frontline interface to the participant, facilitating participant review of their accounts and monthly road charge statements, as well as the submission of simulated payments against those statements.
- **Administration** – Provides an interface to those managing the pilot to access pilot information, results, and reports.
- **Data Warehouse** – Provides the central data repository for collecting aggregated travel/trip data and associated road charge transactions.

For in-depth information on the Project's technical design and functional system architecture, please see Appendix E, Pilot System Report.



Public/Private Roads Pilot Operations

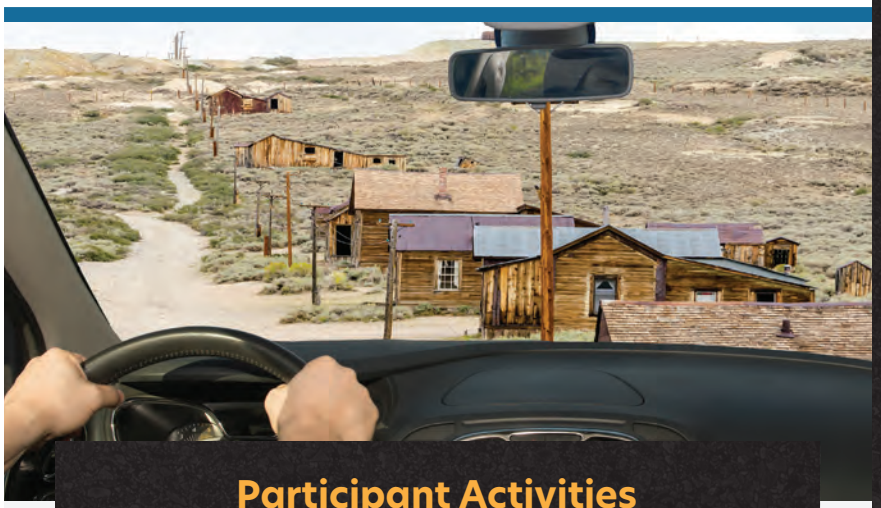
ONBOARDING

As described in the Recruitment Efforts subsection above, candidates who had expressed an interest in participating in the Public/Private Roads Primary Pilot were vetted against the pre-established requirements and targeted characteristics for the Rural and Tribal Cohorts, and selected candidates were then provided with a link to the participant portal and invited to enroll into the pilot.

Once an invitee had successfully completed enrollment, a welcome packet was mailed to the enrollee, which contained an OBD-II plug-in device, (Figure 2-5) installation instructions for the device, instructions for account access and pilot participation, and an overview of the pilot incentive activities and payouts. Upon successful installation of the device into their vehicle's OBD-II port the pilot system began collecting travel information from the enrollee's vehicle, thereby making them an active participant in the pilot.

FIGURE 2-5 On-board diagnostics (OBD) refers to the automotive electronic system that provides vehicle self-diagnosis and reporting capabilities for repair technicians and others.

Source: Caltrans



Participant Activities

Participants who agreed to participate in the Private/ Public Roads Primary Pilot were asked to undertake the following activities:

- Complete the web-based enrollment process on the primary pilot's participant portal.
- Install the OBD-II plug-in device that was shipped to them.
- Drive at least 20 miles every month, for all six months of the pilot.
- Access the pilot participant portal each month, to review each of their monthly road charge statements.
- Access the pilot participant portal to simulate road charge payment for each monthly statement, no later than the 15th calendar day of the following month.
- Complete both the pre-pilot and post-pilot surveys.
- Return their OBD-II device at the completion of the pilot.

Customer Support

The system administrator established a comprehensive customer service program to allow for multiple avenues of contact with Project participants. Tier 1 customer support offered frontline support to participants and served as the first point of contact. This involved an initial screening of customer support requests to determine the appropriate course of action and resolution, when possible. Three major channels were offered for Tier 1 support: (1) a participant portal, (2) a toll-free customer support hotline, and (3) a dedicated email address.

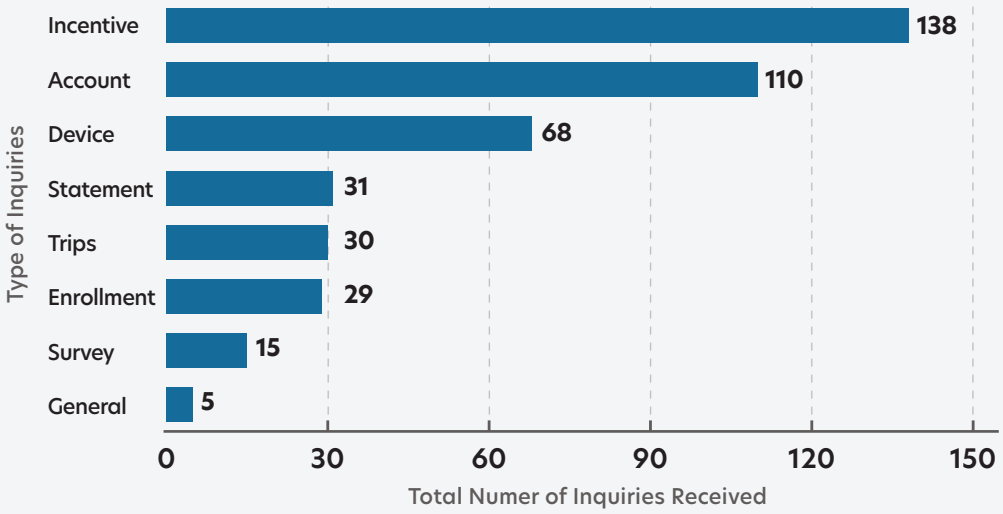
TCA sub pilot participants utilized the same customer support mechanisms used by the Primary Pilot participants. TCA participants had access to the customer hotline, support email, and participant portal options to contact the Tier 1 customer support team if needed.

The Project team grouped participant inquiries into eight topical categories:

- **Enrollment**: Questions on account setup, locating the Vehicle Identification Number (VIN), shipment of the OBD-II plug-in device, and enrollment steps.
- **Account**: Questions about account information/access, and issues accessing/using participant portal (e.g., forgotten password).
- **Device**: Questions about device installation/activation, how device reports travel data to pilot system, and device not reporting.
- **Trips**: Questions about travel data, mileage calculations, mileage or fuel discrepancies, and road type differentiation.
- **Statements**: Questions about simulated monthly road charge statements.
- **Incentives**: Questions about incentive-eligible activities, how to earn incentives, and incentive payments.
- **Survey**: Questions related to pre-pilot or post-pilot survey, including issues accessing or completing survey.
- **General:** General participant inquiries and questions related to pilot and Road Charge Program as a whole.

Of the more than 400 inquiries that were fielded by the Project team during the course of the Project's six-month live demonstration period—in addition to the two months immediately following the demonstration—75 percent of inquiries were focused on (in descending order of inquiry count) the pilot incentive program, the participant's account, or the OBD-II plug-in device. Figure 2-6 shows the total inquiry counts over the eight months of the pilot demonstration and closeout timeframes. For a more detailed breakout of all participant inquiries, as well as a summary of inquiry resolution timeframes, see Appendix F, Customer Support Plan and Closeout.

FIGURE 2-6 Total Customer Support Inquiries During the Eight Months of the Pilot Demonstration and Closeout



Incentives

Caltrans paid a series of incentives, up to $250 to each participant, for their time in participating in the Project. Instructions clearly identifying each milestone, and the amounts payable for their achievement were provided to participants as part of their onboarding information. Participants were able to view within the participant portal their incentive-eligible activities, which activities they had completed, and the resulting incentive payouts they had earned. Table 2-1 outlines all participant activities that were eligible for an incentive, as well as the payout amount associated with the completion of each activity.

TABLE 2-1 Incentive-Eligible Activities and Incentive Amounts

INCENTIVE-ELIGIBLE ACTIVITY	INCENTIVE AMOUNT
Complete All Enrollment Activities	$55
Complete the Pre-Survey	$25
Monthly: Drive at Least 20 Miles	$5 (each month; 6 months)
Monthly: Review Statement and Pay (simulated)	$10 (each month; 6 months)
Complete the Post-Survey	$25
Close Pilot Account and Return Plug-in Device	$55
Total Possible Incentive Payout:	**$250**

All participants received incentive payouts for completing at least some activities, and 90 participants across the three cohorts completed all 16 incentive-eligible activities. It should be noted that the least-paid incentive activity overall was the viewing of monthly statements. As might be anticipated, it was observed that the incentive participation rate was highest during the early months of the pilot, with the fall-off in participation rate during the course of the Project being attributable to "pilot fatigue." For each incentivized activity, Figure 2-7 shows the percentage of all participants that received the payout associated with that activity. Figure 2-8 depicts the average incentive payout by participant cohort.

FIGURE 2-7 Percentage of Incentive Activities Paid

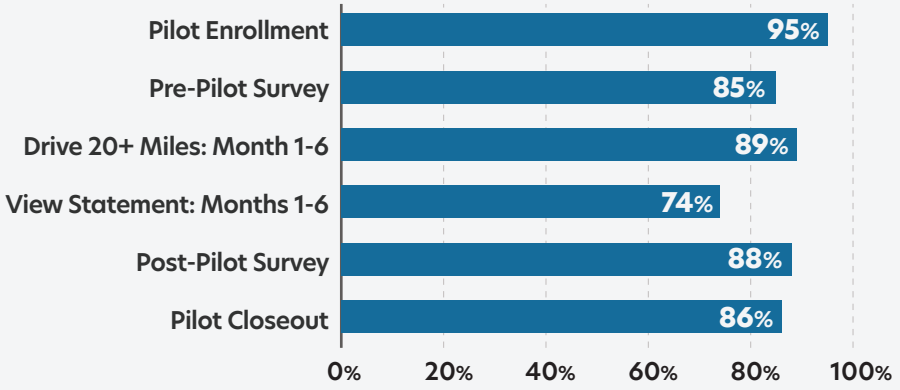
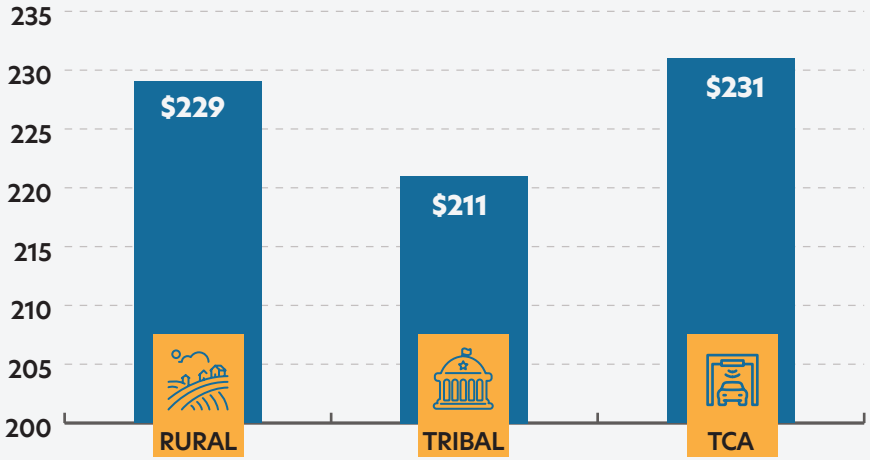


FIGURE 2-8 Average Incentive Payout by Cohort



The pilot's findings and recommendations relative to incentives are detailed within Appendix G, Incentive Plan with Payout Results, but a few key takeaways are are discussed on the next page.

INCENTIVES ARE HIGHLY REGARDED

In light of the considerable number of participant inquiries received with questions related to incentives, it was clear that the various incentives served as a viable motivator and that participants were extremely interested in receiving the rewards that were promised them to participate in this Project.

Monthly Payout is Frustrating to the Participants and Administratively Burdensome

In past road charge pilots, Caltrans had made lump-sum incentive payouts to participants at the completion of those pilots. In this pilot, the Project team thought it worthwhile to explore whether ongoing monthly payments would facilitate increased participant engagement. Thus, payouts for completed activities were totaled and sent to participants each month.

This approach caused considerable frustration for participants, as the small monthly payout amounts caused difficulty because many retail locations would not allow participants to combine multiple gift cards they received. Additionally, the payout of incentives on a monthly basis increased the hours that were expended by the Project team to support the incentive program, in terms of facilitating the incentive payouts, answering questions on how to redeem the incentives, and tracking and managing the association of activities to the incentives. It is highly recommended future initiatives adopt the practice of paying all incentives at the end of the pilot.

Physical Gift Cards Are Strongly Preferred

Although electronic gift cards were the sole incentive payout option at the outset of the pilot, a sufficient number of people complained about the difficulty they encountered in redeeming the digital version of the gift cards that an alternative option to receive a physical gift card was additionally offered. A relatively considerable number of participants (107) to whom electronic gift cards had previously been sent, subsequently requested to be switched to the physical Visa gift card option. Figure 2-9 breaks out the participants' gift card format preferences (i.e., physical vs. digital gift cards).

Visa Gift Cards Are Problematic

In spite of the near-universal acceptance of Visa gift cards at retail outlets, their overly restrictive usage allowances and the fact that these gift cards cannot be used to pay a portion of any given purchase price proved to be highly frustrating to recipients, particularly for gift cards with small denominations (e.g., $5). This resulted in many of the participants having balances remaining on their cards that they could not readily redeem. Additionally, once a card was sent to a participant, there were no means for the Project team to monitor its successful receipt and subsequent redemption, nor was it possible to re-send the card in the event it was never received.

FIGURE 2-9 **Percentage of Participants Opting for Physical vs. Digital Gift Cards**

Closeout

In the final month of the Project, the customer support team, with oversight from Caltrans, created closeout instructions. At the end of the Project's live demonstration, the closeout instructions were emailed to each participant notifying them of the Project end date and the information necessary for them to close out their accounts and return their plug-in devices.

Each participant was then sent a pre-paid envelope with instructions on how to remove the OBD-II device from their vehicle and return it to the Project team. The customer support team tracked the return of devices from participants and issued follow-up reminders to participants who do not return the device after the initial closeout correspondence. A $55 incentive was tied to the return and successful receipt of devices to encourage return.

Within 24 hours after the end of the Project's live demonstration, the system administrators coordinated with the device vendor to terminate data collection and transmittal from the devices deployed on behalf of the pilot. To ensure any outstanding transaction processing, statement generation, and financial reporting activities were complete, the transaction processing and road charge statements functionality remained available to the participants for 30 days after the Project's live demonstration ended.

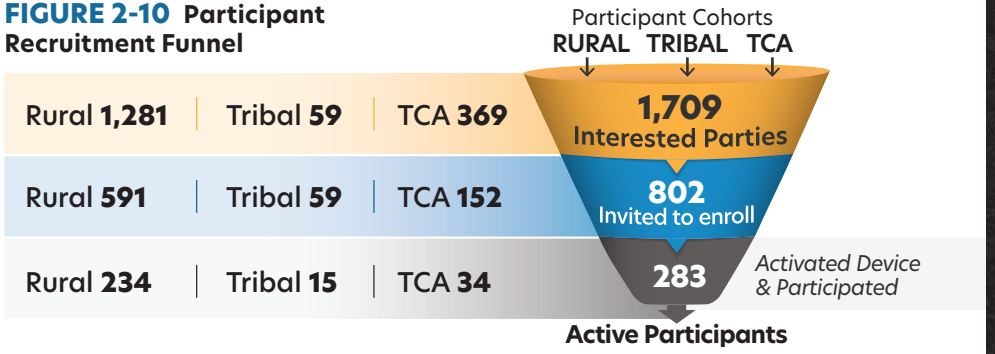
Within thirty days after the completion of the Project's live demonstration, the system administrators sanitized and destroyed all Personally Identifiable Information (PII) for the participants. This included removing all data fields that contained PII, assigning surrogate identifiers to participant information where necessary, and removing all geolocational waypoint information from trip records. Once this data was completely sanitized, it was provided to Caltrans for use in future research and analysis.

Pilot Results

PARTICIPANT DEMOGRAPHICS

As described in the Recruitment Efforts subsection, candidates who had expressed an interest in participating in the pilot demonstration were vetted against the pre-established requirements and targeted characteristics for each cohort, and selected candidates were then invited to enroll into the pilot on behalf of each of the three cohorts. Figure 2-10 summarizes enrollment numbers for each of the three participant cohorts.

FIGURE 2-10 Participant Recruitment Funnel

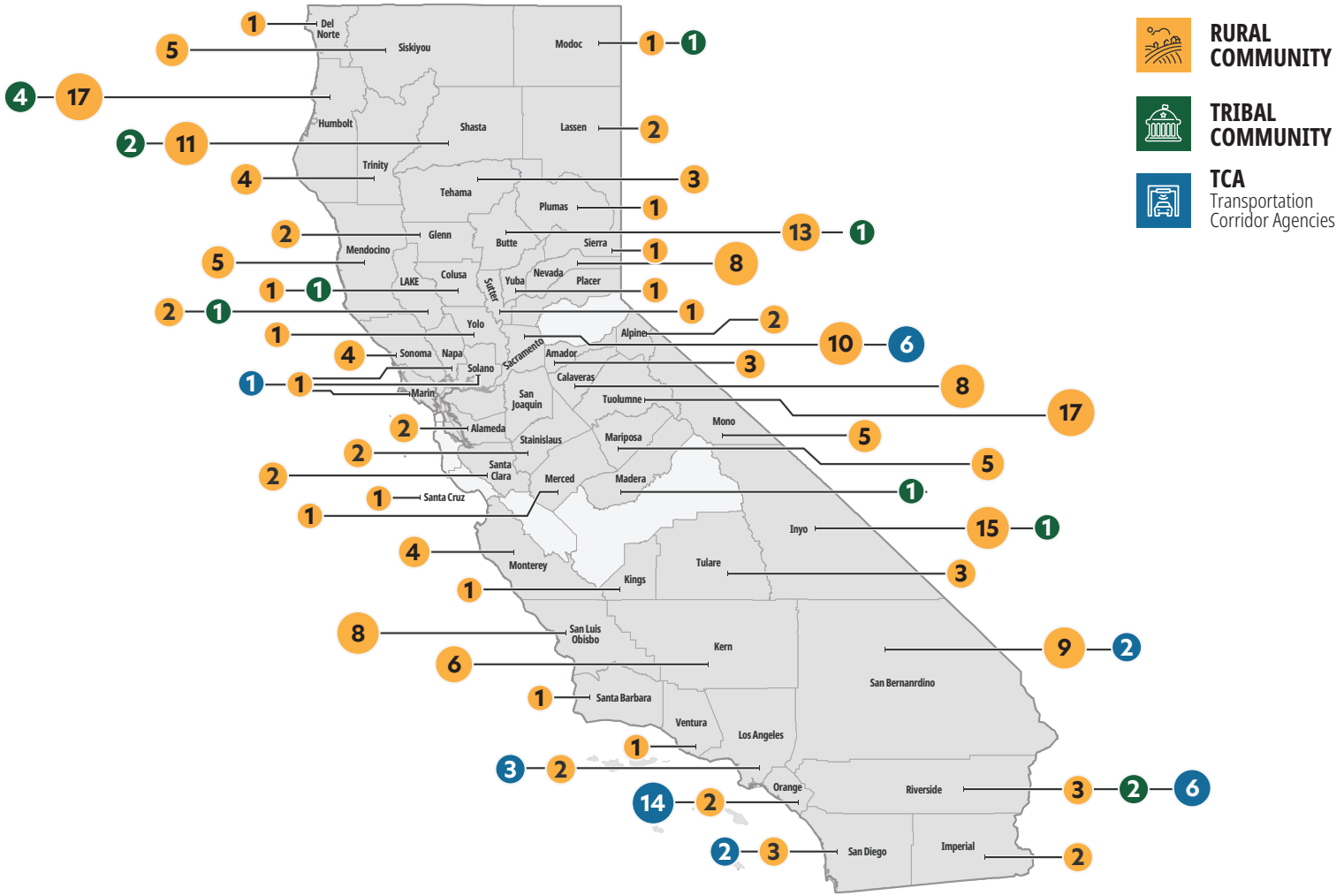


The recruitment objectives for the Project did not establish demographic stratification goals for the participants. Nonetheless, understanding the demographic makeup of the California citizens who chose to participate in the Project can only serve to share a more comprehensive picture with respect to the insights to be gleaned from the pilot. A detailed breakdown of the pilot participants by gender, age, education, income level, and ethnicity can be found in Appendix D, Pilot Operations Plan and Closeout. While all demographic categories were well-represented by the active participants within each cohort, the rural participants were on average older (63 percent were more than 50 years of age), and the TCA participants were on average more highly compensated in their professional salaries (52 percent earned more than $100,000 annually), relative to the participants in the other cohorts.

REGIONS REPRESENTED

A breakdown of the pilot participants by geographic region of residence, shown in Figure 2-11 in the map below, indicates that all rural regions of California were well represented in the geographic makeup of the Project's participants. More than half of the Rural and Tribal Cohorts was made up of participants who reside in northern California. In contrast, almost three-quarters of the TCA Cohort was made up of participants who reside in southern California, a finding that makes sense in light of the fact that The Toll Roads administered by TCA are all located in that region of the state.

FIGURE 2-11 **Active Pilot Participants by Geographic Region of Residence**



VEHICLE DATA

At the time of enrollment, every Project participant was asked to identify a single vehicle that they would be using for their participation in the pilot. Figure 2-12 shows a segmentation of the pilot vehicles by fuel type as well as by EPA fuel economy rating:

- A total of 14 EVs participated, with 13 in the Rural Cohort and 1 in the TCA Cohort.
- The Rural Cohort included 1 alternative fuel vehicle, which utilized E85 flex fuel.
- The TCA Cohort also included 1 alternative fuel vehicle, which utilized Compressed Natural Gas (CNG).
- A total of 9 diesel vehicles participated.
- The balance was made up of gasoline vehicles.

The breakdown by vehicle age of each cohort's pool of vehicles is depicted in Figure 2-13. The distribution of vehicles across age ranges was fairly similar for the Rural and Tribal Cohorts, as 6 out 10 of the newer vehicles in each group were no more than 10 years old. In contrast, the vehicles in the TCA Cohort were newer, with 9 out of 10 vehicles in that group being no more than 10 years old.

FIGURE 2-12 Segmentation of pilot vehicles by fuel type as well as by EPA fuel economy rating

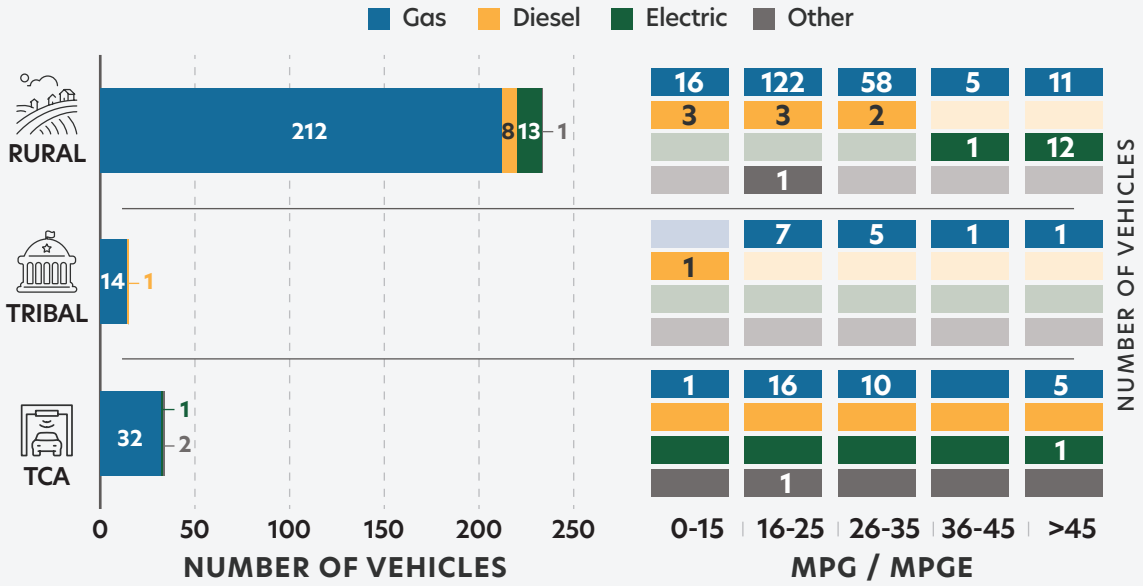
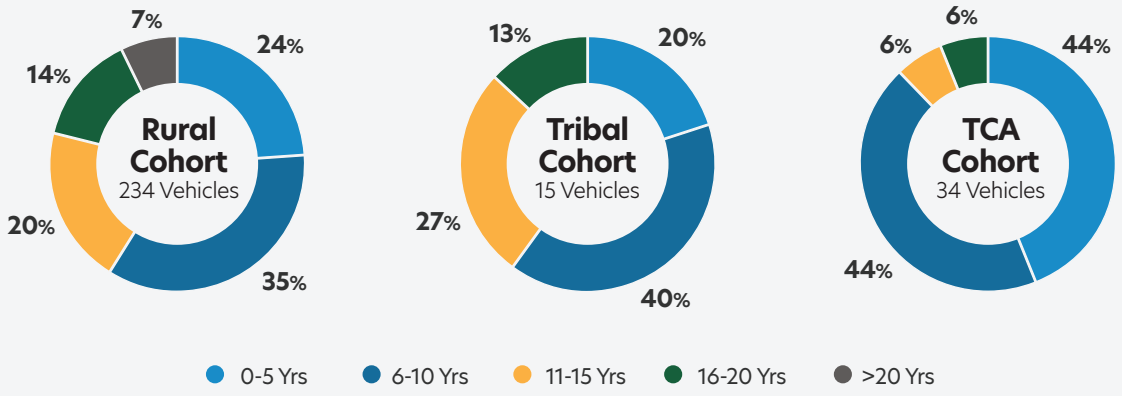


FIGURE 2-13 Vehicle Age of Each Cohort's Pool of Vehicles



Collected Mileage

The overall summary of the trips taken, and the mileage captured, for each cohort is shown in Table 2-2. The average daily trips taken by each participant, as well as the average miles driven during each trip, are in line with the values observed within various other Road Charge pilots, both in the state of California as well as within other states (i.e., 3 trips per day and 10 miles per trip). The slightly higher average daily trips that were observed for the Tribal Cohort is likely more attributable to the relatively very small participant count for that particular pool of participants (i.e., 15 participants), than to any general driving trend for the tribal community, as the driving frequency of a single participant within such a small sample size could significantly skew the results for the entire cohort.

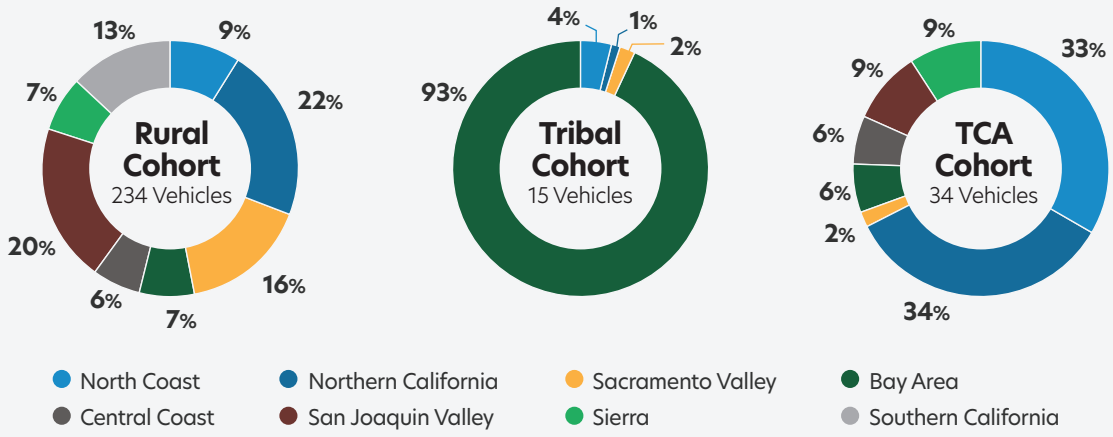
Figure 2-14 shows the California regions traversed by the mileage collected for each cohort. All regions of California were well-represented by the miles captured for the Rural Cohort, while two-thirds of the miles captured for the Tribal Cohort were in the northernmost portion of the state. With regard to the TCA Cohort, since The Toll Roads administered by TCA are all located in Southern California, it makes sense that more than 9 out of 10 miles captured for TCA account holder participants were driven in that portion of the state.

TABLE 2-2 Summary of Trips / Miles by Cohort

METRIC	COHORT		
	Rural	Tribal	TCA
Active Participants	234	15	34
Total Trips *	121,456	10,889	20,138
Avg Total Trips / Participant	519	726	592
Avg Daily Trips / Participant	2.8	4.0	3.2
Total Miles Driven	1,238,453	107,740	176,803
Avg Miles / Trip	10.2	9.9	8.8

** Excludes zero-distance trips*

FIGURE 2-14 California Regions Traversed by the Mileage Collected for Each Cohort



Mileage Differentiation Results

To facilitate the differentiation by road type of the mileage collected for the pilot, the plug-in device reported the vehicle's locational coordinates at waypoints traversed during a trip. The frequency with which this locational assessment occurred during a trip was a configurable parameter of the device, referenced in the following content as "GPS frequency."

As per pilot requirements, the devices were to be pre-configured with a GPS frequency of 60 "waypoint captures" per minute (i.e., an inter-waypoint interval of one second). However, 60 days into the pilot, the Project team discovered that the device vendor had inadvertently set the GPS frequency for all pilot devices to only 12 waypoint captures per minute (5 seconds between waypoints). The Project team viewed this as an opportunity to learn what differences in accuracy and administrative costs might exist between the two different GPS frequencies. A process was therefore undertaken to alter every deployed device's GSP frequency to the proper value of one waypoint every second, but the time required to fully implement and test this reconfiguration unfortunately amounted to an additional 60 days. As a result, GPS information for trip waypoints was collected at five-second intervals during the first four months of the pilot, and it was collected at one-second intervals for the last two months.

Table 2-3 shows a breakdown by month of all the waypoints that were stored, the mileage captured, and the resulting average number of waypoints stored on behalf of each captured mile. The waypoints-per-mile values shown in Table 2-3 for the first four months (all with waypoints captured at five-second intervals) averaged out to a value of 23.7, and the corresponding values for the last two months (during which the waypoint-interval was shortened to one second) averaged out to 111.3, representing an increase by a factor of 4.7.

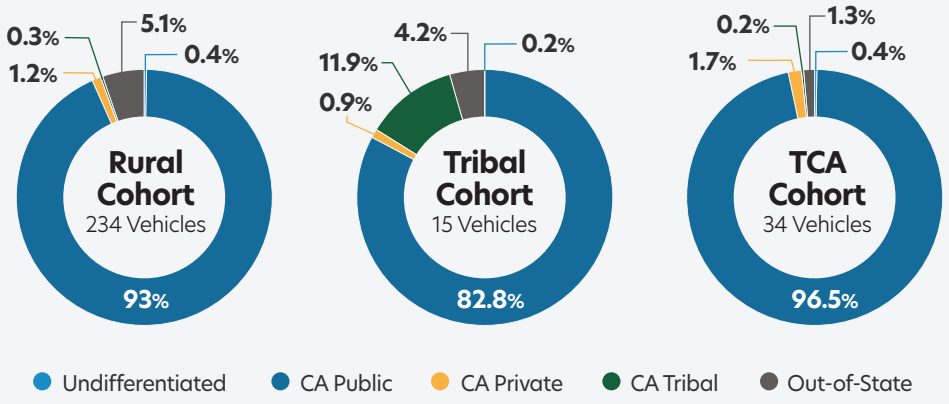
TABLE 2-3 Waypoints Stored and Mileage Collected by Pilot Month

PILOT MONTH	GPS FREQUENCY (SECONDS)	WAYPOINTS STORED	MILES RECORDED	WAYPOINTS PER MILE
APR	5	2,278,627	97,143	23.5
MAY	5	6,928,234	299,175	23.2
JUN	5	6,776,618	283,785	23.9
JUL	5	6,775,084	280,655	24.1
AUG	1	32,779,386	289,621	113.2
SEPT	1	29,824,168	272,617	109.4

DIFFERENTIATION BY ROAD TYPE

All mileage captured for the pilot underwent a road type differentiation process, as detailed in Appendix D, Pilot Operations Plan and Closeout. The results of the road type differentiation process for each cohort are shown within Figure 2-15.

FIGURE 2-15 Results of the Road Type Differentiation Process for each Cohort



Roughly 19 out of every 20 miles were driven in-state by the Rural and Tribal Cohorts, while only one out of every 100 miles driven by the TCA Cohort was done so out-of-state.

The fact that almost 12 percent of the miles driven by the Tribal Cohort was driven on tribal land was in line with the participation criteria for that group (i.e., driving on tribal land an average of at least once per month). In contrast, in light of the request that participants in the Rural Cohort drive on private roads at least once per week, it was initially surprising to learn that only one out of every 100 miles driven by the Rural cohort was done so on private roads.

Further analysis revealed that for those pilot trips involving travel on private roads, the average portion of the trip on private roadways was only 0.15 miles, and for such trips the travel on private roads constituted an average of only 12 percent of the overall trip distance. By way of comparison, for those trips involving travel on tribal land, the average portion of the trip on tribal roadways was 1.9 miles (approximately one order of magnitude higher than the same figure for private roads), and the average share of the overall trip distance made up of travel on tribal roads was a much higher 50 percent.

When participants did take a trip involving travel on a private road, that portion of their overall trip typically represented a much smaller share of the overall trip distance, relative to trips involving the traversal of tribal land; and it then makes sense that even if the majority of the Rural Cohort participants actually fulfilled their target of driving on private roads at least once per week, it is to be expected that the overall share of their driving miles represented by travel on private roads would be relatively small (e.g., the above-referenced one percent that was observed for the cohort during this pilot).

Lastly, it should be noted that there were several scenarios encountered during the pilot that interfered with the system's ability to accurately differentiate the miles collected for a given trip, and which therefore resulted in the miles for such a trip having to be allocated to an "undifferentiated" category (versus a category such as public road, private road, etc.). However, since less than four out of every 1,000 miles collected on behalf of the pilot, actually fell into this undifferentiated category, the impact upon total revenue was inconsequential. For more information on undifferentiable mileage, please refer to Appendix H, Plug-In Device and Geolocation Report.

REVENUE IMPACT

Appendix D also details the manner in which the simulated road charge fees and fuel tax credits were calculated against the differentiated pilot mileage. In summary:

- Mileage that was determined to have taken place on public roads was assessed a $0.024 per-mile road charge.
- For all differentiable mileage (whether out-of-state or in-state, and on any road type), the vehicle's EPA Combined MPG rating was leveraged to approximate the amount of fuel used by the vehicle to achieve the distance, and the state tax that would be required to purchase that amount of fuel was credited back to the participant.

For a detailed summary of the resulting simulated road charge, fuel tax credit, and net balance totals at the cohort level, for each of the three cohorts, please reference Appendix D. Table 2-4 summarizes these revenue results from the perspective of the individual cohort participant.

TABLE 2-4 Summary of Individual Cohort Participant Results

COHORT	NUMBER OF ACTIVE PARTICIPANTS	TOTAL COHORT NET BALANCE DURING 6-MONTH PILOT	NET BALANCE PER PARTICIPANT, PER MONTH	NET BALANCE PER PARTICIPANT, ANNUALIZED
Rural Cohort	234	$513.47	$0.37	$4.39
Tribal Cohort	15	-$360.59	-$4.01	-$48.08
TCA Cohort	34	$529.44	$2.60	$31.14

Of the three cohorts, the participants in the TCA Cohort incurred the highest average net fees per-person. Relative to the other two cohorts, a relatively small share of the TCA Cohort's total mileage was driven out-of-state (i.e., 1.3 percent of the TCA miles were out-of-state, versus 5.1 percent and 4.2 percent for the other two cohorts), where there was zero road charge assessed but where fuel tax was still credited. Additionally, a relatively large percentage of the vehicles in the TCA Cohort fell into the high-efficiency or EV categories (e.g., 44% of the TCA Cohort vehicles either exceeded 26 mph or were electrically powered, versus 36% of the Rural Cohort vehicles), leading to a greater gap between road charges assessed and fuel tax refunded for all in-state chargeable miles.

The participants in the Tribal Cohort on average actually received a net credit of about $4 per month, or $48 when projected to a full year. This was due to road charge being applied to only 83 percent of the cohort's overall mileage (i.e., 95.5 percent of the miles were driven in-state, with only 86.6 percent of those in-state miles being driven on public roads), while fuel tax was refunded against almost 100 percent of the cohort's miles (i.e., all but the 0.2 percent that were determined to be undifferentiable). Of note is that this net credit-back standing of the Tribal Cohort was accomplished in spite of the fact that of the three cohorts, it actually had the highest percentage of high-efficiency vehicles (47%), which worked against the cohort's net fee results relative to the other two cohorts.

Lastly, the participants in the largest of the three cohorts, the Rural Cohort, broke even on a per-person basis, with the average cohort participant paying only $0.37 a month, or less than $5.00 per year. On the one hand, the Rural Cohort had the highest percentage of low-efficiency vehicles, for which the refunded fuel tax credit outweighed the assessed per-mile fee. Offsetting this, however, was the fact that a relatively very small percentage of the Rural Cohort's in-state miles were found to be on non-public roads, where road fees would be avoided altogether but fuel tax would still be credited; i.e., the Rural Cohort benefited to a lesser extent, relative to the other two cohorts, from the dampening influence that in-state non-public miles had on the net fees collected from the cohort.

Device and Geolocation Analysis

A key objective of this pilot was to assess the extent to which an aftermarket geolocation-enabled OBD-II plug-in device can successfully support the accurate differentiation by road type of mileage on behalf of a road charge platform. The in-depth findings, lessons learned, costs, and associated recommendations gleaned from the six-month live demonstration pilot with respect to the plug-in device, are detailed within Appendix H, Plug-In Device and Geolocation Report.

DEVICE KEY FINDINGS

The pilot demonstrated that cost and support issues aside, an OBD-II plug-in device enabled with GPS technology can most definitely be used to successfully facilitate the accurate differentiation of public versus non-public roads. The distance traveled reported by the device using its own internal algorithm is extremely precise and serves as a reliable source of mileage on behalf of road charge applications. Furthermore, the GPS locational information collected and reported by the device can support highly accurate differentiation by road and land types, subject to the granularity and accuracy of the map-sets being referenced by the differentiation process. From a broader perspective, vehicle data as reported by the OBD-II plug-in device is also standardized and normalized across the broadest spectrum of vehicle years, makes and models, relative to alternative mileage reporting methods. No other automated mileage-reporting option is even close, with respect to the range of vehicle makes, models, and years supported.

Nonetheless, as detailed within Appendix H, Plug-In Device and Geolocation Report, several factors definitely should be taken into consideration with regard to the use of an OBD-II plug-in device on behalf of a large-scale Road Charge program:

- While the device-reported distances are highly accurate, the pilot revealed several reliability issues with regard to the odometer values reported by the device. The unstableness of device-reported odometer values has implications for a Road Charge program's ability to effectively check for compliance, as the CA DMV uses the odometer as the defining measure of distance traveled. As a result, for an operational program there will need to be a non-device-based method for obtaining a valid/verified odometer reading for true-up processes.
- The fact that the mandate for inclusion of an OBD-II port within newly manufactured vehicles has always been tied to emissions compliance, when coupled with the trend of EVs (with zero emissions) inevitably continuing to gain market share, casts doubt upon the long-term continued presence of OBD-II ports in newer vehicles. The mandate to include an OBD-II port does not apply to EVs.
- Given the variety of technologies that have been integrated into the OBD-II device, it is highly susceptible to "technology creep;" i.e., when technologies utilized by the device undergo advancements that are not backwards compatible, the only available option is to physically replace the device to maintain operability. The best example of this would be the evolution of cellular phone networks from 3G to 4G to 5G, on behalf of which each such upgrade in the prevailing standard necessitated the physical replacement of all OBD-II devices already deployed on behalf of previous road charge initiatives.

PER-DEVICE PILOT COSTS

Appendix H, Plug-In Device and Geolocation Report, provides a detailed overview of the associated costs that should be anticipated for utilization of plug-in devices in a pilot or program involving low volumes (e.g., less than 50,000 devices), as well as insights into how those costs might be impacted by increases in the scale of a Road Charge program. Table 2-5 breaks down the monthly per-device cost for this pilot.

TABLE 2-5 Breakdown of the Monthly Per-Device Cost for this Pilot

CATEGORY	COST PER DEVICE IN THIS PILOT	FREQUENCY OF COST	SIX-MONTH COST
Device	$95.00	1	$95.00
Wireless data plan	$0.90	6	$5.40
Shipping	$3.80	3	$11.40
Packaging	$0.24	3	$0.71
Labels	$0.032	3	$0.096
Collateral	$0.25	1	$0.25
Gateway	$9.26	6	$55.56
Hosting - raw data	$0.008	6	$0.048
Hosting - processed data	$0.01	6	$0.06
Processing costs	$8.83	6	$52.98
		Total per-device cost for 6 months →	**$221.50**
		Total monthly cost per device →	**$36.92**

A monthly cost of $36.92 per location-enabled device is typical of a small-scale pilot. It would not, however, be typical of a large-scale program that runs at high volumes. While device, gateway, cellular, and processing costs all are high at low volumes, those same costs are all inversely proportional to the number of devices being supported. Although it has yet to be demonstrated empirically, as to-date a high-volume program has not yet been deployed (e.g., involving well over 1 million devices), it is highly likely that such costs would be reduced dramatically on a per-device basis within a full-scale Road Charge program.

Also, it should be noted that a significant share of these device-based costs is specifically tied to the use of location-tracking. The tradeoffs between the benefits of being able to leverage location-tracking (e.g., in-state vs. out-of-state, differentiation by road type, congestion pricing, etc.) need to be situationally weighed against the operational needs and specific design of a given state's envisioned Road Charge program, to determine if the incremental costs associated with location-enabling the program's plug-in devices is in fact warranted for that particular state.

As an alternative to eliminating the location-tracking feature altogether, future Road Charge programs might also consider mitigating its incremental cost impact by decreasing the frequency at which waypoints are captured for each vehicle. The attendant decrease in costs associated with storing and processing the resulting reduced volume of waypoints, would need to be traded off against any potential accompanying loss of acuity in the program's differentiation process. At the extremely small scale of this pilot, a comparison of the two periods of time during which the waypoint capture frequencies were set to one second and five seconds, respectively, did not reveal any appreciable savings in storage/processing costs at the decreased frequency. However, at the significantly larger scale of a fully operational program, reducing the number of waypoints collected from millions of deployed program devices by simply decreasing the collection frequency, could play a significant role in reducing costs for a full-scale Road Charge program, while having minimal impact upon the financial net outcome of the differentiation process.

Although not specifically related to the use of devices, it should also be mentioned that for this pilot, Caltrans was able to make available at no cost, highly accurate GIS map-sets to facilitate the differentiation process with regards to the in-state road network and land ownership. In many states this would not be an option, forcing Road Charge programs employing location-tracking to incur the additional third-party cost of sourcing such map-sets.

California Road Charge

3 What Do Rural Drivers Think About Road Charge?

California rural environments and residents are unique and diverse economically, culturally, and socially, and understanding these nuances is important. Rural residents are employed in a diverse array of professions, such as construction, farming and agriculture, ranching, forestry, fishing, hunting, mining, education, health, social services, arts and entertainment, recreation, hospitality, public administration, and food service and retail trade occupations. While many live on and work the land in the rural areas of the state, the last several years have led to a dramatic increase in the number of people commuting to and from urban areas using public and private roads.

There is no one-size-fits-all lens that can capture the many unique perspectives on the complex issues facing California rural residents. This is true not only for critical transportation matters such as the road charge concept, but for many other topics like land use, water and natural resources, housing, wildfire protection policies, and health and human services. However, a common thread among rural residents is having their way of life valued, feeling represented, and knowing their opinions matter. This Project was envisioned to bring the voice of these often-marginalized communities to the table as California explores the possibilities of a road charge system.

Rural Local Government Outreach and Feedback

Working with the California State Association of Counties and the Rural County Representatives of California, Caltrans reached out to their rural members to offer presentations in their communities. This led to a series of informational presentations to Boards of Supervisors and county transportation commissions across the state. While little interest was shown in the southern part of the state, Caltrans was able to directly visit 21 communities from Humboldt to Inyo County. The feedback received from local elected officials and county leadership, who are intricately involved with the issues their communities face, provided a valuable and insightful source of input.

First, rural government officials recognize and understand that there is a long-term problem with funding our transportation system based on gas tax revenue and that something needs to be done. They are hesitant about whether road charge is the solution but are open to exploring it. Consistent appreciation was expressed that Caltrans would actively seek their input and physically visit their communities to listen to their concerns. Most of all, rural leaders expressed that they want a seat at the table as a solution is developed and to ensure that it works for rural communities. One county Supervisor noted that whenever Sacramento considers the numerous benefits and tradeoffs of statewide policies, rural communities always end up being the tradeoff.

Many county Supervisors were skeptical that the gas tax would ever go away. In some areas, such as Yuba County and Lassen County, strong frustration was expressed at State policies encouraging a shift to electric vehicles, both for their direct consequences and the effect on funding. On the other hand, some Supervisors, such the one in Nevada County, were interested in understanding how a road charge system might support the State's climate goals. Many noted that there does need to be a way for electric vehicles to contribute to road maintenance, with several Supervisors even noting that they owned electric vehicles and were worried about not paying their fair share. Some asked about the potential of registration fees or taxes on charging stations.

Many Supervisors had very practical questions about how a road charge system would work. This included how out-of-state drivers would be addressed, inquiries about enforcement processes, and concerns about administrative costs, potential fraud, patchy cell service, and whether pick-up trucks are considered passenger or commercial vehicles. One county Supervisor asked whether the current agricultural discount on the diesel sales tax could be continued. Privacy issues were a consistent concern, particularly with members of the public who shared their comments. In addition, concerns about government tracking of private citizens were strong.

County Supervisors also had concerns about how various groups might be impacted. First and most consistently was the impact of a road charge on rural drivers, who frequently need to drive long distances and do not have viable transit alternatives. Caltrans shared research that has been done across multiple states showing that on average, rural drivers are likely to pay less in taxes under a road charge since they tend to driver less fuel-efficient vehicles. This reassured some people, but not all. They also expressed concern related to potential negative impacts for super commuters, low-income families, and the trucking industry. Some, however, felt a road charge had potential to bring benefits to rural drivers.

The state of local roads in rural areas was a big concern, leading to questions of whether money from a road charge would increase or decrease the amount of funding that counties received. Some noted that they felt rural state highways were sufficiently maintained, but that large backlogs of needed maintenance for rural county roads existed, highlighting the disparity in the minimal funding the rural counties received as compared to non-rural areas. They wondered whether a road charge system could more directly tie funding to the use of the road. Counties surrounding popular tourist destinations, such as Lake Tahoe and Yosemite, noted that the State's current local funding formula does not account for the millions of miles traveled by visitors on their roads each year. They wanted to know whether road charge revenue would be committed to transportation purposes under Article XIX of the State Constitution just as the gas tax is, and others wanted to know whether funding would be used on High-Speed Rail. Some raised the point that they could stretch their limited funds further if prevailing wage requirements were suspended. Others expressed dissatisfaction in the implementation of SB 1 (Beall, 2017), leading to expressions of lack of trust related to future potential legislative funding packages.

The combination of these questions and concerns, desire for fairness, and recognition of the pressing need for funding for road maintenance, led many people to express the preference that if a road charge system is enacted by the State, it should apply only to electric vehicles, while the gas tax should remain in place for gas-powered vehicles. All wanted to be kept apprised as State policymakers consider this policy matter.

Rural Response Through Surveys and Focus Groups

As described in Section 2 Outreach, one survey and four focus groups were conducted with Californians who live in rural and remote areas in the state. For in-depth results and discussion guides, please see Appendix J.

RURAL COMMUNITIES SURVEY

The survey with rural respondents was conducted through a multi-modal live telephone, email- and text-to-web methodology, with 500 surveys completed March 2-7, 2023. Key findings from the survey include the following:

1. Californians who live in rural areas gave very low ratings to the condition of freeways, state highways, and local roads, with 69 percent of rural residents giving freeways and highways a negative rating of "fair" or "poor," compared with 58 percent of general public giving them a negative rating – more than 10 percentage points more dissatisfaction among rural/remote communities than the general population. Rural residents agreed that there is at least some need for additional funding for road repairs (54%) compared with the general public (64%), again 10 percentage points less than the general population.
2. Although two-thirds of rural residents agreed that it is important to replace the gas tax with a sustainable revenue stream, initial ratings among rural respondents showed that only 38 percent of them have a positive first impression of the road charge concept compared to 50 percent in the general population.
3. Additional information about road charge improved the impressions around it among rural audiences, and more respondents rated road charge fairer than gas tax upon hearing more information.
4. Positive impressions dropped below initial ratings after participants heard about the mileage-reporting device that transmits location data. Respondents from rural communities were particularly concerned about the privacy implications of using a mileage-reporting device with location tracking.

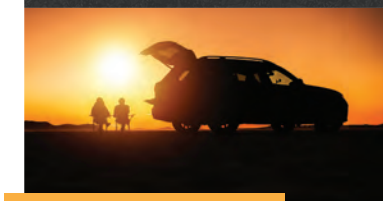
More understanding and information still help. While rural residents found replacing the gas tax important, their initial impressions of road charge were more negative than the statewide general population audiences surveyed in the Project. However, even with this more skeptical group, additional information about road charge did help improve the perceptions around it.

Fairness concerns. Rural residents held more negative impressions around the fairness of road charge towards distinct categories of drivers, especially for rural drivers and super commuters.

Resistance to location-tracking devices. The option of installing a device in one's vehicle to record the number of miles driven damaged positive impressions around road charge among rural residents, and many people indicated that they would prefer not to install the device in their own cars even though they would potentially benefit the most from the mileage-reporting device. This preference for not installing a device is higher among rural residents than among the general population, but still over a third of rural respondents expressed a preference for a location tracking device. This highlights that a potential road charge system needs to offer individuals a choice on how to report their miles. Overall, rural residents who did not want the device were most concerned about privacy and the possibility of the government tracking them. Those that did like the option cited the opportunity to save money or the simplicity and convenience of reporting as the top reasons.

"I don't want Big Brother tracking my every move."

"It's simpler [because] it automatically tracks, and I don't have to turn in paperwork."



—Anonymous Pilot Participants

RURAL COMMUNITIES FOCUS GROUPS

Four focus groups were conducted with Californians who live in rural and remote areas in the state in November 2023. Two focus groups were conducted among Northern California drivers (one group of those who drive less than 100 miles per week and one group who drove more than 100 miles per week), and two focus groups were conducted among Central Coast/Central Valley drivers (again, one group of those who drive less than 100 miles per week and one group who drove more than 100 miles per week). All four groups were conducted online using a moderated on-camera chat room with all discussion in English.

The discussion guide for the focus groups asked questions on multiple topics, including about participants' driving habits, their thoughts on the state of California roads, as well as their current gas tax awareness and attitudes. The conversation also described the gas tax's shortcomings, followed by introduction of the concept of road charge, and facilitating discussion about initial reactions to the concept. Focus group participants shared their perceptions of potential negative and positive outcomes from road charge on their own communities, as well as perceptions of private roads funding and the mileage tracking device. Key takeaways included:

Many were displeased with road conditions in their communities, although state highways and busier roads were viewed as better maintained. Potholes and construction were common complaints about local roads in the rural and remote areas where participants lived. Participants reported positive experiences with state highways, leading some to believe that more densely populated areas are prioritized when it comes to road maintenance. Even in their local communities, they observed main roads and those near commercial centers to be usually better kept. Participants felt that rural roads were the most neglected and many questioned whether their tax dollars were staying local or being used to fix roads in more urban areas. Many pointed out the disparity between the high price of gas and the crumbling roads they saw in their own communities.

> ***"I don't know if [funding] is going to my county's roads as I haven't really seen any progress in the entire time I've lived here, so I don't know if it's actually doing too much unless it's helping out the highways."***
>
> **—Shorter distance Northern California driver**

Some believed that the root cause of unmaintained roads was government misspending, rather than insufficient gas tax funds due to evolving vehicle technologies. When made aware of the problem of decreasing revenues from the gas tax, most participants found it hard to believe that there were enough electric vehicles on the roads to significantly impact gas tax funding, as they focused on electric cars rather than vehicles getting more fuel efficient in general. Consequently, some were convinced that the issue is one of inefficient use of tax dollars rather than a funding shortage. This notion was bolstered by the perceived differences in quality between run-down local roads and well-maintained highways; many felt as though rural communities were deprioritized in terms of road repairs compared to their urban counterparts.

Many thought that rural drivers would be unfairly impacted by a road charge. Road charge was also perceived as especially unfair to low-income households and those who have to drive for work. Many participants thought that a road charge would impact people living in rural and remote areas in a negative way, since those residents have to rely on driving and to drive long distances to get anywhere—including cities to which they commute for work. One participant gave the example of people who drive long distances to work in San Francisco but cannot afford to live near the city.

The initial road charge description was met with many logistical concerns and questions. Most participants were not enthusiastic about a potential road charge for California when they heard a brief description of the mechanism, especially those who disagreed with the premise that there was a need to generate more revenue in the first place. The startup and operational costs of road charge were perceived to be too high to make implementation worth it. Some thought a road charge would be difficult to budget for if it is billed a few times per year such as a property tax. They prefer the smaller, frequent increments of a gas tax for personal budgeting purposes. Some were concerned about road charges not being applicable to out-of-state vehicles, which also contribute to road wear and tear but would no longer contribute to repairs the way they do when they purchase in the state under gas tax. There was a sentiment that if tech giants like Google and Apple cannot perfect their mapping and GPS functionalities, the government will not be able to do any better.

Many were skeptical of the mileage tracking device and viewed it as an invasion of privacy and a sign of government overreach. Beyond logistical concerns, many thought mileage tracking would provide the government with too much control over communities. While someone in each group brought up that their phones already have tracking capabilities, and others mentioned that their miles are already tracked through their insurance or similar mechanisms, most felt uncomfortable with the idea of the government tracking their location and other information. Some wondered whether the device could be used to issue speeding tickets or for other punitive charges, which presented additional invasion-of-privacy concerns.

"I know that's the way the world's going, but that's just a further invasion of privacy. We all know our cell phones are tracking us. We all know they know exactly where you're at... It's just not okay."

—Longer distance Northern California driver

There was little concern about the details of being charged for driving on private roads. While many participants were aware of private roads in their area that do not receive state funding from the gas tax, and some even drove regularly on private roads, there were no strong feelings about paying into the gas tax when they did so. There was no awareness around the option to get a gas tax refund for the distances driven/gas spent driving on private roads.

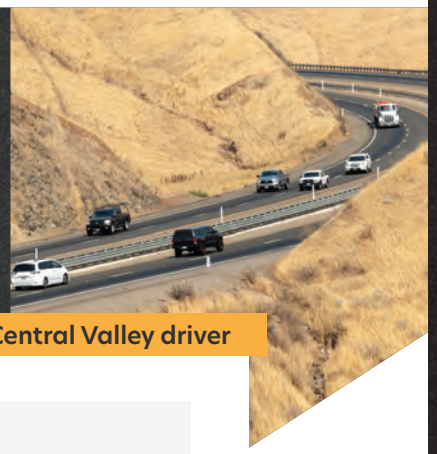
Most did not see the option to avoid paying road charges on private roads as a good enough reason to install a tracking device in their car. Just as paying gas tax when one drives on private roads was accepted as normal, participants did not raise concerns about having to pay road charge when they drive on private roads. They did not see enough of a benefit from installing a device to track the miles they drove on distinct types of roads, which, because of the spotty cell phone service in the areas that they lived in, they did not believe would accurately distinguish between public and private roads anyway.

There was significant concern about the possibility of people cheating the system. Drivers tampering with a mileage tracking device or self-reporting mileage incorrectly were concerns raised across the groups. Some compared it to emissions tampering. A few predicted that wealthy people will "find the loopholes" as they can with other taxes and be able to leverage it to their advantage.

A split system whereby hybrid and electric vehicles pay a road charge, and others continue paying a gas tax, was viewed mostly favorably. Despite initial skepticism toward the road charge itself, many agreed that electric vehicles should be paying their fair share for road repair and maintenance. As such, implementing a road charge for only electric and hybrid vehicles and otherwise maintaining the gas tax was well received.

"it feels like [the split system] would be the most fair way to address all the points. If you're driving a gas vehicle, you're paying the gas tax. If you're not driving a gas vehicle, and you're paying the mile tax or whatever, then that's a way to collect from all the vehicles who are on the road, minus your tourists. But when the tourists come, they pay the gas tax, or maybe there'll be some kind of charge on the charging stations. I don't know, but I just feel like that would just make it a fair field for everybody. That way everybody is still contributing. So that's just my opinion."

—Shorter distance Central Coast/Central Valley driver



Response from Rural Project Participants

How did rural residents who experienced the road charge system through the pilot respond to it? As part of the pilot, two surveys were conducted, one at the beginning of the Project and a second at the end of the Project. In total, 205 rural participants completed the first survey, and 215 rural participants completed the second survey (a 90% completion rate). Both surveys asked questions on the following topics:

- How satisfied they were with their experience.
- What their satisfaction / confidence was in reporting mileage. What, if any, issues they experienced while reporting.
- What perceptions did they have about key aspects of Road Charge, including data security, accuracy, equity, and fairness.
- How they would rate their ease of use, confidence, and perceived importance around the Project.
- What challenges they faced in the specific steps they took, during onboarding, technical setup, recording miles, and more.
- What their satisfaction was with communications about Project and their participation in it.
- What general policy preferences and perceptions did they have.

Rural participants rated their overall experience with the Project positively, and nearly all found the process of reporting mileage easy, with a large majority that was confident that mileage was reported accurately. Rural participants gave slightly lower ratings to "the ease of differentiating between public and private roads" and "confidence in the device accurately identifying the miles they drove on public roads versus private roads." The majority of rural participants were confident in the privacy protections they were provided and in the data security of the Project.

Overview of Rural Feedback

Rural residents are dissatisfied with the condition of roads in their areas, and they perceive a difference in quality between different types of roads. Many acknowledge the need for some additional funding for road repairs, and levels of awareness around existing revenue sources vary. In-depth conversation reveals a generalized mistrust of government that leads many rural residents to believe that the problem is not necessarily a lack of revenue, but government misspending. While rural residents agree that it is important to replace the gas tax with a sustainable revenue stream, their initial reactions to the concept of road charge tend to be lukewarm, if not outright negative.

Additional information and discussion of road charge improves the perceptions around the concept; however, the idea of having to install a device that collects location data in their vehicles is met with strong resistance, straining overall impressions of road charge. In-depth discussions on how they would personally benefit from not having to pay for the miles they drive on private roads does not lead to more receptiveness toward the concept, and even leads them to believe more strongly that a road charge would impact their communities negatively, as well as lower-income Californians and those who have to drive as part of their jobs. Overall, rural residents and government officials expressed a strong preference for a split system whereby hybrid and electric vehicles pay a road charge, and others continue paying a gas tax.

Despite these negative perceptions and reactions among the rural community at large, those who actually participated in the Project and had first-hand experience with the road charge and the mileage-reporting device reported a significantly more positive overall experience. Further, they were confident in the privacy protections that the program offered, found it easy to do, and 75 percent found road charge as a fair funding option for California that the state should continue to explore.

This difference between those hearing about the road charge concept for the first time and those who actually tried it out raises the possibility that one of the largest reasons for opposition to the idea is simply instinctive resistance to something new. Humans are rarely comfortable with change. Given the state's experience seeing this phenomenon happen across pilots in multiple states, it seems practicable that should a road charge system be implemented in the state, many Californians would adapt to and accept it, even in rural areas.

Few rural participants rated road charge as unfair to any driver group. **A strong majority (74%) of rural participants said the road charge was a better option for California than the gas tax and 85% agreed the State should continue exploring the road charge.**

California Road Charge

4 What Do Tribal Drivers Think About Road Charge?

Looking at 2022 U.S. Census figures, 1.7 percent of the population in California is American Indian or Alaska Native, which translates into about 660,000 people. There are approximately 110 Federally Recognized Native American Tribes in California, which includes those tribes with lands that cross state boundaries. Another 81 groups have sought federal recognition in recent years.

What do these unique and diverse communities think about the idea of a road charge? This report cannot definitely say. Despite extensive outreach across all surveying, interview, and participant opportunities, Caltrans was only able to collect feedback from 42 survey respondents, 14 pilot participants, 10 interviewees (some of whom had either previously taken the survey or participated in the pilot) and nine tribal representatives. None of these feedback channels constitute a representative sample, and so no generalizable conclusions can be drawn about the general opinion of tribal communities. That said, qualitative interpretation of the feedback offers valuable insight into how those who were exposed to road charge reacted to and interacted with the concept.

However, while the small amount of feedback received cannot be translated to general tribal opinion, the individual opinions shared, and topics expressed by tribal leadership raised many good points of consideration and identified issues that were new to Caltrans staff. These things are worth sharing with the public as this policy is considered, and this section details what was heard through these various engagement opportunities.

Chairmen

Caltrans was privileged to share information about the Road Charge Program and the pilot with the Northern and Southern Chairmen's' Associations. Caltrans was unsuccessful in its efforts to connect with the Central Chairmen's Association.

The Southern Chairmen's' group expressed much frustration. Frustration with their history with state government and Caltrans. Frustration with equity efforts that felt empty to them. Frustration with state policies promoting a shift to electric vehicles or to transit, both of which they feel do not reflect the reality of their communities' transportation needs. They expressed a strong dislike of the road charge idea, sharing their opposition to both SB 339 (Wiener, 2021) and regional policy efforts in the San Diego area, feeling it is just meant to push people out of their cars. They clearly stated they did not want to expend their tribes' limited resources on the state's road charge research effort. Feedback included that if the state considers a road charge policy, tribal members should be exempt, and if the state ever passed such a policy without their consent, they would take legal action.

One key issue raised by the Southern Chairmen was their concern over the potential impact of a repeal of the gas tax on their finances. Some tribes own and operate gas stations. Caltrans estimates there are around 40 tribally owned gas stations within California. As sovereign nations, they do not collect state fuel taxes. Consequently, they have a competitive advantage over other non-tribally owned gas stations in the area, which drives business to their location. The revenue from these stations does not just fund transportation, but many critical government services for these tribes. Thus, the potential repeal of the gas tax that a shift to a road charge system could represent is viewed as a threat to their ability to serve their communities well.

The Northern Chairmen's group also had frustration to express, especially around the state's policies promoting a shift to electric vehicles and state government negotiating in bad faith on many fronts beyond transportation. However, they did welcome information about the Road Charge program and pilot and expressed an expectation of being at the table with the Director of Caltrans when future policy decisions were made. They hypothesized that the data from a road charge system might be useful. The impact on gas station revenue was also a key point of concern, as was the issue of insufficient revenues received from the state and federal government. The Northern Chairmen also noted that if California were to pass a road charge policy that affected their members without their consent, the tribes would band together to sue to protect their sovereignty.

Caltrans also notes it received a letter from the Elk Valley Rancheria in response to its outreach to all tribes through the Native American Heritage Commission contact list. This letter detailed many of these issues and expressed that the state should share the road charges from reservation roads with the tribes and exempt tribal government vehicles from the road charge. To read the letter in its entirety, please see Appendix M.

Gas Station Revenue Is Critical To Some Tribes

"We use our fuel tax revenue to take care of this essential governmental service, as well as funding 100% of our fire depts' budget, funds our Tribal Social Services dept, funds our scholarships program, youth and elders' program, cultural preservation, etc. … It has helped our tribe tremendously over the 8 years our store has been in operation and now we are dependent upon that revenue stream. Disrupting this important tribal tax revenue stream is going to completely disrupt our path to self-reliance and self-determination and force us back to relying on an underfunded system."

—Anonymous Tribal Member

Interviews with NAAC Members

Caltrans offered concerned members of the Caltrans Native American Advisory Council the opportunity to sit down directly with the consultant team to talk about their questions and concerns about the road charge idea. As these individuals are consistently and professionally involved in transportation policy issues, they have a more specific expert lens than leadership or general members. This discussion with these nine members of Northern tribes highlighted many important considerations.

Tribal representatives emphasized the rural nature of tribal lands in Northern California as a predominant concern regarding the Road Charge proposal and pointed at several layers of complexity that rurality posed for a program like this. Tribal representatives questioned the way in which rurality is described for the purposes of the Public/Private Roads Pilot. A major concern was that most tribal lands in Northern California are not only in rural areas, but the communities that are located in their vicinities are also very rural. In other words, those living on tribal lands need to drive long distances to get to the nearest town, which itself is also rural, offering limited amenities and options—meaning that tribal residents would have to drive even further to meet their various needs, including food supplies and medical services. Driving distances of 100-plus miles just for basics was frequently cited as challenging, expensive, and a burden to these communities. Overall, representatives felt that it was not fair to make tribal communities pay more for driving since they do not have any choice other than driving long distances to sustain themselves.

Caltrans notes that the number of miles rural residents must drive to receive essential services and the associated cost burden is a concern to many in the state beyond tribal and rural communities themselves. There is good news as research[2] shows that rural drivers on average would actually pay less in taxes under a scenario in which road charges would replace the gas tax.

The current condition of roads in rural areas reinforced negative reactions to road charge. Tribal representatives felt that the roads in rural Northern California are poorly maintained and in a bad condition. Some brought up that rough road conditions already mean a higher cost of driving for tribal community members compared to urban Californians, in the form of increased need for vehicle and tire maintenance. From that lens, representatives perceived the road charge proposal as an additional, undue burden on rural and tribal communities.

A few suggested that the funds generated through the gas tax did not pay for better roads in their areas and suspected road charge monies would be allocated in an equivalent way. Therefore, they did not perceive a benefit for their own communities in the proposal. Many circled back to the question of how road repair funds are allocated throughout the state several times throughout the conversation, expressing skepticism each time that the allocation is not fair and equitable.

Representatives perceived additional logistical hurdles that tribal communities would face should a road charge be implemented in California. Topping these concerns was the extent to which internet connection tends to be unstable in tribal areas, coupled with the fact that many tribal community members do not have cell phones or other devices that would allow them to connect to the internet to log their miles driven, or other tasks related to road charge. One representative pointed out that even applying for a gas tax refund was so difficult for tribal communities that nobody ended up doing it, and they envisioned similar challenges would emerge if the gas tax were replaced with a road charge.

2 https://caroadcharge.com/media/vktncxgu/rucamerica_urbrur_finalreport_2022-09-16.pdf

Representatives felt that the entire road charge system was being built around and for electric vehicles, which they saw as having little to do with their communities. One representative commented on the unfairness of constructing a system around higher-income, urban drivers who drive less anyway, with ramifications of that system being felt more by people living in the rural areas of California. A few representatives remarked that road charge seems to be designed for incentivizing the use of electric vehicles, which they found is unrealistic for tribal communities to drive; with frequent power outages on tribal lands, electric vehicles are seen as unreliable for tribal community members. They need to drive long distances "in the middle of nowhere" to get to other places and cannot depend on electric vehicles for the kinds of trips they need to take regularly, often through snow and rugged terrain, while pulling heavy loads. Charging time can almost double the length of an eight hour supply run.

Some felt this type of state policy raises a series of complex issues regarding tribal sovereignty. One representative used the example of gas tax and how even that mechanism is problematic from a tribal-sovereignty perspective—whether the gas being used is purchased from a tribe or not, whether the user is a tribal resident or not, and whether the gas was bought or consumed out of state—all presented different ramifications, which the tribal representatives thought would be difficult to reflect in a road charge-like mechanism. One representative went as far to say that tribes would be unable to maintain their sovereign status with a system like this.

The negative reception of the road charge concept paralleled mistrust in government. Some tribal representatives alluded to historical relations between tribes and the government, hinting that their general lack of trust led them to be skeptical of the concept of road charge. Caltrans as a government entity was also perceived in an untrusting light. One representative who had been invited to participate in the Public/Private Roads Pilot said they declined the invitation because they thought it would enable Caltrans, hence the government, to "track" their whereabouts. Others echoed the sentiment that they would not trust Caltrans with their private information.

Representatives thought the State should engage with tribal communities more in order to build a truly equitable program. Tribal representatives said there were too many unknowns around the plans for a road charge for California, which led them to oppose the concept until they were convinced any potential ramifications of the program for their communities are resolved. Several representatives remarked that Caltrans officials needed to see the roads in and around tribal communities for themselves in order to truly understand what driving on those roads for daily life means. Their general sentiment was that more on-the-ground discussions and more in-depth involvement with the communities was needed—especially for government officials to understand the uniqueness of tribal communities. For them, this meant direct consultation with Tribal Chairs in addition to open engagement with members of the community in areas where they live. One representative said policy decisions should not be made without first-hand experience of the issues that tribal communities deal with on a daily basis.

Caltrans notes that the specific intent of this project was to engage with tribes on the potential ramifications of a Road Charge program for their communities and work together to identify and define the unknowns. However, with the clear direction from the Chairmen not to spend time on this policy matter, Caltrans could not engage further without being disrespectful of leadership's wishes. Tribes have a right to determine what issues are important to them, and Caltrans respects that. Nonetheless, Caltrans remains willing and available should any tribal community wish to engage further at any time.

Interviews with General Tribal Members

The Project team was able to conduct one-on-one interviews with 10 individuals that had participated either in the pilot or the survey. These are general tribal community members who do not spend their professional time in the transportation policy space.

Most were unsatisfied with road conditions in their communities and cited various potential hazards on the roads. Potholes and construction were frequently cited as concerns, and interviewees who live in more remote areas described a series of safety risks the roads in their area posed to them.

Awareness of private roads and how they are funded was remarkably high among these tribal community members. Most interviewees live near private roads, and one described that there are six miles of private roads between their home and public roads.

There were mixed perceptions on the fairness of a road charge. Interviewees agreed that electric vehicles should contribute to road maintenance funds, and they appreciated that everyone would have to pay the same price per mile no matter their car's efficiency. Despite this, road charge was seen as unfair in some respects, as some believed that low-income drivers would end up paying the most.

Road charge was viewed as another bill to pay that would burden low-income people and residents of rural areas. Many participants believed that low income and rural folks would suffer the most from a road charge for a variety of reasons. One interviewee described their town's skyrocketing rents due to tourism because of a local ski resort and was fearful that a road charge would be an added cost burden for the locals who are being priced out of their hometown. Another interviewee from a rural area pointed out that they cannot opt to take public transit like someone living in a city center could. Similarly, another mentioned that many people with higher-paying jobs have the option to work from home, while service workers and those with other lower-paying jobs would be forced to pay a road charge on their commutes. Concern was expressed that this is primarily an urban issue and solutions for a state like California should not be one size fits all.

Other perceived negative outcomes included government intrusion and people cheating the system. Some were concerned about mileage-tracking data being used for nefarious purposes and viewed it as government overreach. A few foresaw people avoiding road charges by tampering with the tracking device.

—Anonymous Pilot Participants

"Living in a rural area, wherever it is that I go, I have to pay. I would still have to pay more than... somebody who lives in a populated area and can take a bus."

"I don't like having to have something in my vehicle. Keeping track of where I go or what I'm doing if I'm deep in the reservation...it just seemed creepy."

"I wouldn't be uncomfortable personally using a device. Because if somebody wanted to find out where I was going, I mean, my phone's with me all the time. It's the same exact thing."

There were mixed levels of concern about privacy implications. Some were not at all worried about being tracked, either because they thought carrying a smart phone around already came down to being tracked at all times. Some others said they were not concerned about being tracked since they were not doing anything illegal while driving. Yet, some others saw a tracking device as a violation of their right to privacy, especially since they would not be able to turn off tracking in their vehicle, and one compared it to second amendment laws infringing on gun owners' rights.

In general, those who had participated in the pilot program were less opposed to tracking. Several participants had participated in the pilot and had used a tracking device, compared to other interviewees who were hearing about road charge for the very first time. One of these participants described the process as easy and that they did not mind being tracked at all, and another said they would rather be tracked than pay a higher fee. Among those who had not participated, several said they would rather pay a higher fee than be tracked. A few were staunchly opposed to being tracked for privacy and other reasons; one participant drove a car made in 1997 and was concerned that his car would not accommodate the technology for a plug-in device.

Some were hopeful that a road charge could lead to lower gas prices and improved roads conditions. Several mentioned falling gas prices as a potential positive road charge outcome, and one interviewee said they liked that the cost of a road charge would be more stable than gas taxes because it is not tied to gas prices. A few mentioned better road conditions as an expected road charge outcome. In addition to smoother roads with less potholes, shorter and more efficient construction timelines were noted as possible results of increased funding for road maintenance. One interviewee was hopeful that their area could add more bike lanes as a result of a road charge.

A majority of interviewees had not heard of the gas tax refund for private roads. Most said they would not be interested in such a program, either because they do not drive on enough private roads or because they do not want the hassle of tracking mileage. One interviewee was aware of the refund and had tried to redeem it, but said their request was denied because they could not prove that they had driven on private roads.

AAA was the most trusted organization when it came to mileage data. While some trusted the DMV, others did not share this sentiment because they saw it as an organ of the government. Others brought up how difficult it is to get anything done at the DMV and said they would not want to deal with them for something like mileage reporting. Many cited the AAA as a trusted entity, and some brought up insurance companies as a trusted party with personal information.

Caltrans notes that both AAA and insurance companies have the potential to serve as commercial account managers in a road charge system.

Most said they would rather continue paying the gas tax rather than having to track and report their miles, although a few pilot program participants said they would rather pay a road charge. When asked how the cost of a road charge would compare to the cost of a gas tax, most thought they would pay more with a road charge system. A hybrid system whereby only hybrid and electric vehicle drivers pay a road charge was the most popular of all the options presented.

—Anonymous Pilot Participants

"Oh, no, I don't want the DMV or the state."

"That to me is only scary because the unknown is always scary, change is always scary. But if it's going to even the playing field and then everybody's putting in based on how many miles are driving, it would seem a little bit more fair."

Tribal Communities Survey Results

The statewide survey with tribal respondents was conducted through a mix of live telephone interviewing, email and text invites, and a static web link sent to tribal representatives to be circulated in their communities. There were 42 tribal respondents who completed the survey from December 1, 2022, through April 30, 2023. Again, please note that due to the small sample size, the results of the tribal communities' survey cannot be considered generalizable to the entire population of tribal community members in California.

Key findings from the survey include the following:

- Respondents who self-identified as tribal community members gave low ratings to the condition of freeways, state highways, and local roads. They agreed that there is at least some need for additional funding for road repairs.
- Although many tribal community members agreed that it is important to replace the gas tax with a sustainable revenue stream, initial ratings among tribal respondents showed that less than half of them had a positive first impression of the road charge.
- Additional information about road charge improved the impressions around it among tribal community members, and many respondents rated road charge as more fair than gas tax upon hearing more detailed information about how the program would actually work.
- Positive impressions dropped below initial ratings after participants heard about the mileage-reporting device that transmitted location data. The option of installing a device in one's vehicle to record the number of miles driven damaged positive impressions around road charge among tribal respondents, and many indicated they would prefer not to install the device in their own cars even though they would potentially benefit the most from the mileage-reporting device that could differentiate between public and private roads.

For detailed results on all surveys, please see Appendix K, but again these results should be considered more qualitative given the small participation numbers and should not be considered statistically reliable.

Tribal Pilot Participant Feedback

As part of the Project, two surveys of the participants were conducted, one at the beginning of the pilot and a second at the end of the pilot. In total, 11 tribal participants completed the first survey, and 14 tribal participants completed the second survey. Both surveys asked questions on the following topics:

- How satisfied they were with their pilot experience.
- What their satisfaction/confidence was in reporting mileage. What, if any, issues they experienced while reporting.
- What perceptions did they have about key aspects of Road Charge, including data security, accuracy, equity, and fairness.
- How they would rate their ease of use, confidence, and perceived importance around the Project.
- What challenges they faced in the specific steps they took, during onboarding, technical setup, recording miles, and more.
- What their satisfaction was with communications about the pilot and their participation in it.
- What general policy preferences and perceptions did they have.

Again, with such a small sample size, no conclusions can be drawn except through a qualitative lens. A few interesting individual comments were:

> ***That GPS is not always a great indicator of where public and private roads are. Google doesn't always get the destination correct.***
>
> ***Infrastructure needs to be built and maintained. Just because someone isn't using it much at one point, doesn't mean they won't be needing it at a different point.***
>
> ***Public transportation, Lyft, Uber are not available in remote areas. Electrical infrastructure is not available in remote area. These people should not be penalized for not using services that are not available.***
>
> ***Lower income individuals in rural areas may be disproportionately impacted by having to drive further distance for employment or essential services but may already be paying more in gas tax due to driving vehicles that are not fuel efficient.***
>
> ***Curious about other ways to fund our road maintenance besides raising our taxes. We live in Camp Fire area and apparently no funds to repair our roads. They are ruined from all the dump trucks and heavy equipment.***
>
> **—Tribal Participants**

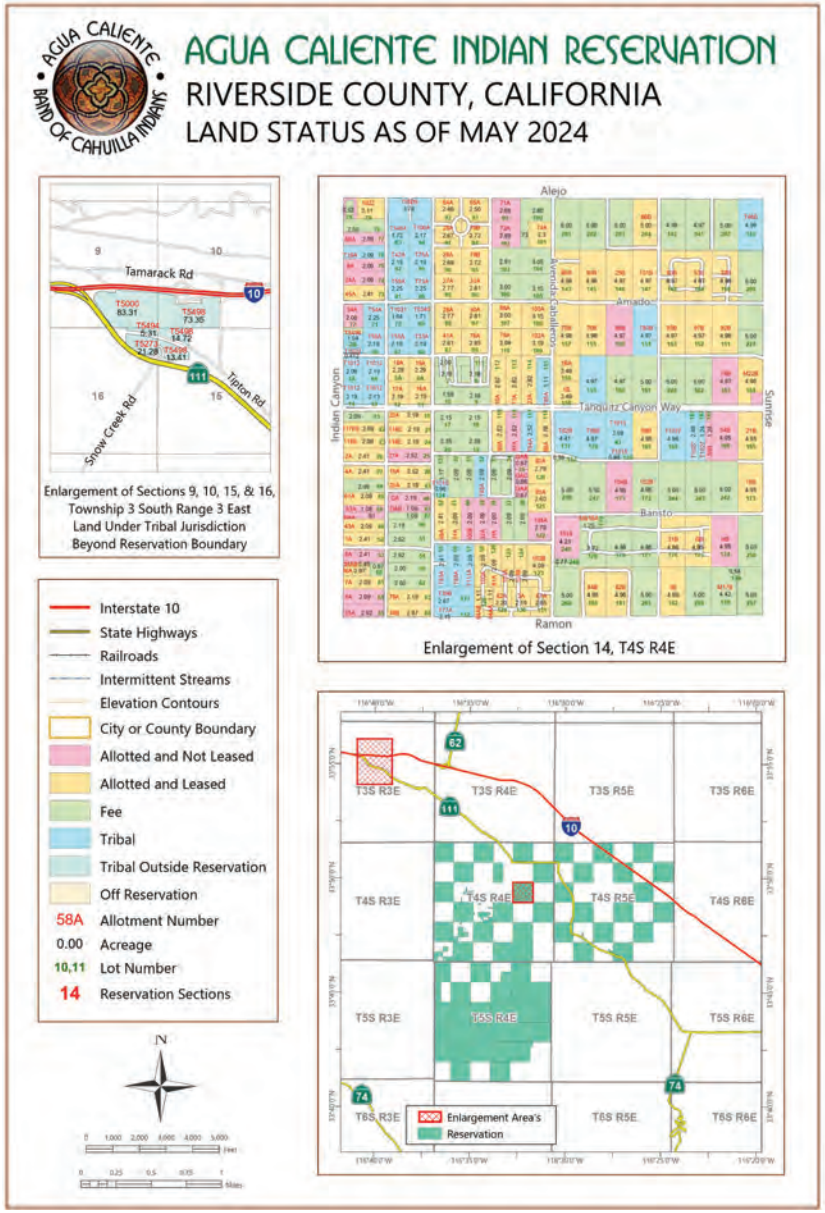
Unique Tribal Scenarios

The Project presented two potential unique technical scenarios for a road charge system's use by tribal communities. The first was the issue of sacred sites. The location of sacred sites is often highly confidential. If a tribal member were to choose a location tracking option to report their miles, what kind of safeguards could be developed in the system to protect that information? Would there be any measures that the tribes would have confidence in? Is it solvable or not? Unfortunately, Caltrans did not have sufficient interaction with tribes to work together on this issue. However, the protection of sacred sites must remain an important consideration in the broader policy debate.

The second unique technical scenario relates to reservation land. The Agua Caliente Band of Cahuilla Indians owns and operates a reservation spanning approximately 31,500 acres in Southern California. Located in the Coachella Valley of Riverside County, this area also includes the municipalities of several cities, including Palm Springs, Cathedral City, and Rancho Mirage. This area's high degree of overlap between tribal and public lands represents somewhat of a unique scenario, and in this area, there are 1,000+ commercial leases, 7,500+ residential subleases, and 11,000+ time shares on Indian land leases under the jurisdiction of the Bureau of Indian Affairs[3]. As a consequence, roadways through this particular region typically run through a wide assortment of public and tribal lands in a concentrated area, and in this respect the region might be described as a "checkerboard" of varying land types (see Figure 5-1).

From a road charge perspective, the uniqueness of this checkerboard area is that a given trip in this vicinity is likely to traverse relatively small (i.e., short distance) contiguous segments of roadway involving differing road charge and/or fuel tax rates (i.e., such areas are highly heterogeneous, or "dense," relative to road types, land types, and/or road charge assessments). The accuracy of the road type differentiation process in such areas would be tied to the granularity with which the process can successfully identify the trip's traversal of frequently encountered road type boundaries.

FIGURE 5-1 **Agua Caliente Indian Reservation**



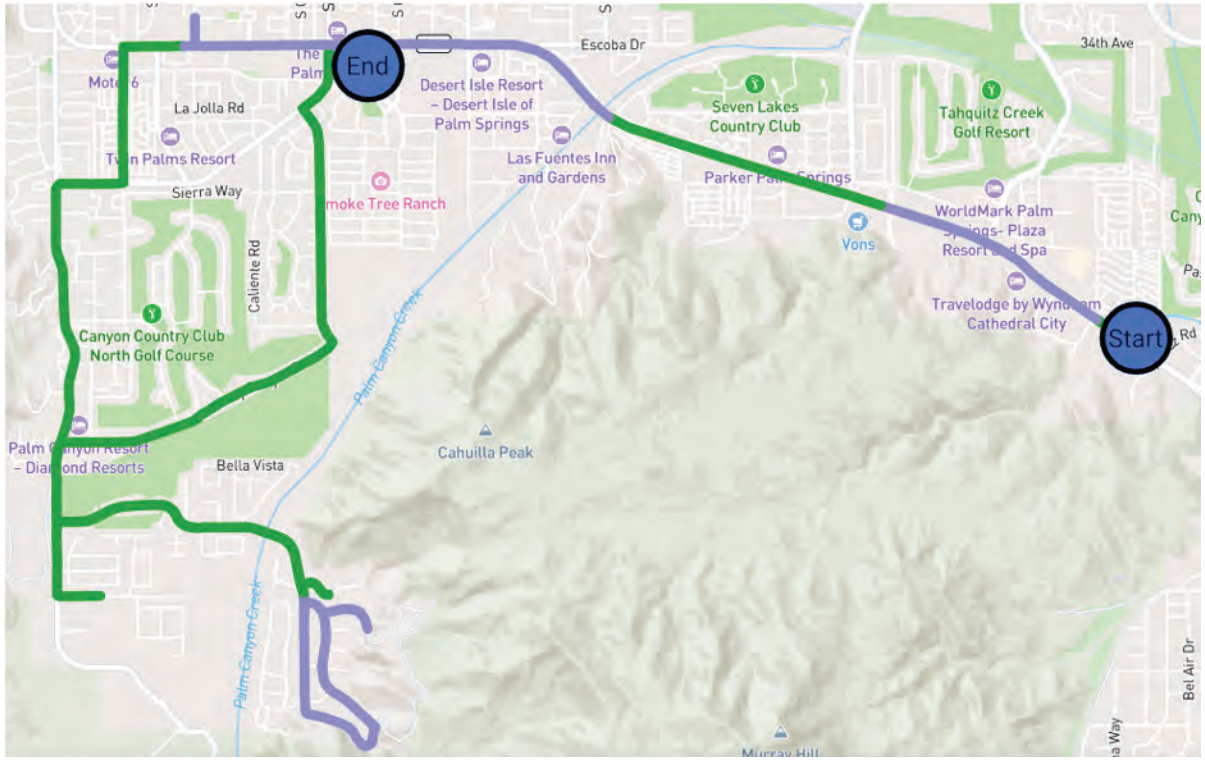
Source: Agua Calliente Indian Reservation

3 Bureau of Indian Affairs / Palm Springs Agency (https://www.bia.gov/regional-offices/pacific/palm-springs-agency)

As this region presents a unique opportunity to assess the effectiveness of roadway differentiation, a member of the Project team, who was participating in the pilot, was specifically tasked to undertake several trips in this particular area. For the handful of trips taken during this outing, the differentiation results revealed that multiple road types were successfully detected for each such trip. For example, Figure 5-2 shows a participant portal screenshot of a trip taken through this area on September 19, 2023. The trip segments that were determined to have traversed tribal land are colored green, and the segments traversing public roads are colored blue.

These findings would therefore indicate that even in areas exhibiting a high degree of overlap between tribal and public lands, current GPS/mapping capabilities are sufficient to support accurate differentiation between tribal and public roads.

FIGURE 5-2 **Sept. 19, 2023, Trip Taken Through "Checkerboard" Area**



Source: Caltrans

5 Conclusions

Community Preferences

RURAL COMMUNITY PREFERENCES

Examining the perspectives of rural communities in the state revealed that satisfaction with the condition of local roads is extremely low among rural California residents. While many rural residents acknowledge the need for some additional funding for road repairs, project research showed a generalized mistrust of government that leads many rural residents to believe that the problem is not necessarily a lack of revenue, but government misspending. That said, rural residents agree that it is important to replace the gas tax with a sustainable revenue stream, and that EVs should pay their fair share into road repairs and maintenance. Rural leaders understand there is a problem and want to be at the table helping the state find solutions.

Privacy or Lower Taxes?

Initial reactions among rural residents to the concept of road charge tended to be lukewarm, if not outright negative. While additional information and discussion of road charge improved the perceptions around the concept, the specific idea of having to install a device that collects location data in their vehicles was met with strong resistance, straining overall impressions of road charge. The reason is two-fold: On the one hand is the value placed on their privacy, bolstering aversion to the idea of the government collecting their personal data in this way. On the other is the perception that the cost savings from not paying for miles driven on private roads would not be worth carrying a tracking device. Indeed, awareness around private roads was not very high among research participants, and those who had awareness around private roads did not feel they made a substantive difference in terms of taxes paid. Combined, these two attitudes led to the belief that rural residents would not personally benefit from not having to pay for the miles they drive on private roads and that they would end up worse off by sharing their location data.

It is important to restate that the sharing of location information is not necessary for the implementation of a statewide road charge program and would never be required. However, this is a key finding for understanding the priorities of rural communities that this pilot set out to discover. Knowing that the rural areas of the state tend to set high value on both paying lower amounts in taxes and privacy, this pilot tested which would be their priority if they had to choose between the two. The general answer appears to be privacy. However, variation in preferences does exist in rural communities as well, reinforcing the importance of providing multiple options for reporting miles in a potential future program so that individual taxpayers can make the choice that works best for them.

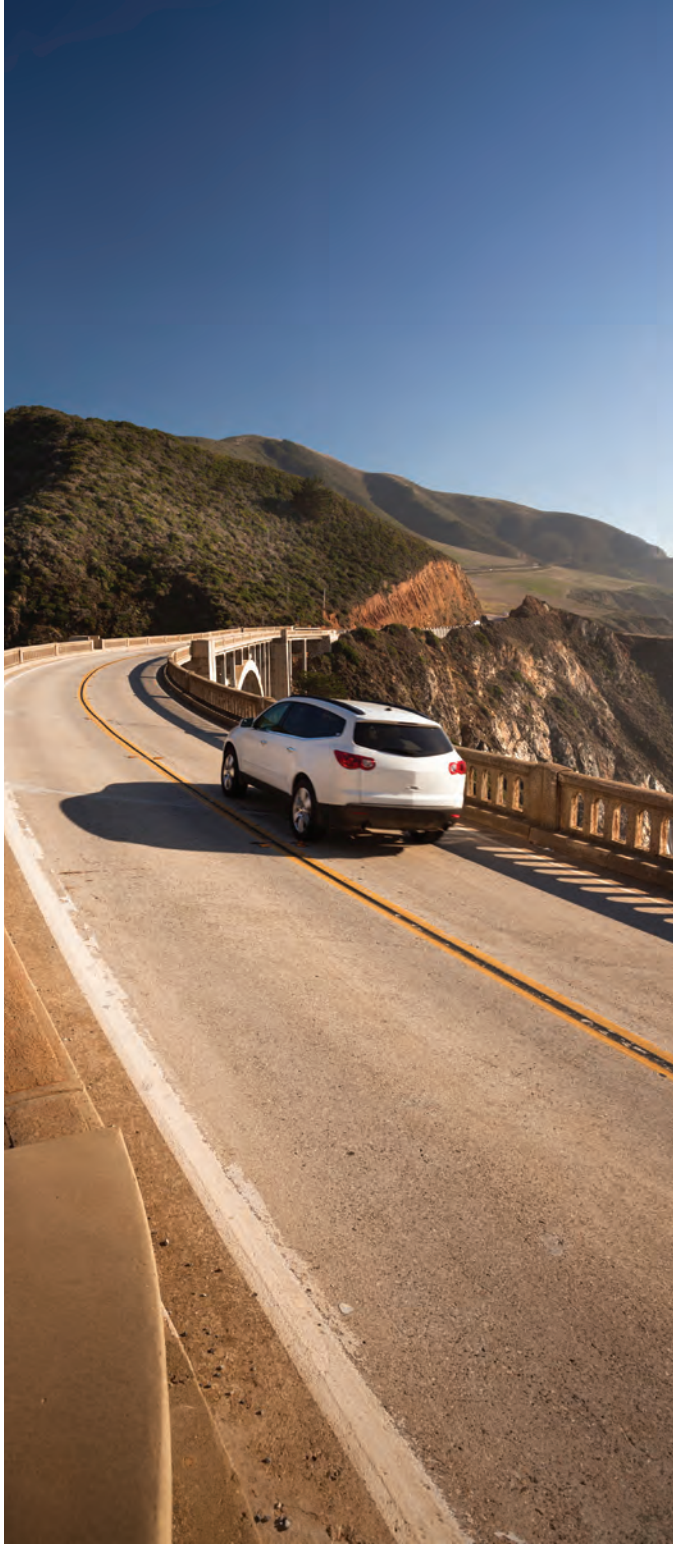
EV Only Preference

In general, rural communities expressed a strong preference for a split system whereby hybrid and electric vehicles pay a road charge, and others continue paying a gas tax. This is important to note, because an EV-only road charge system would not contain all the tax benefits for rural drivers that a full road charge program that includes all vehicles would. A full road charge program raises the contribution from very full-efficient vehicles that are not currently contributing equally to road maintenance (typically urban drivers) and lowers the contribution from low fuel-efficiency vehicles that are currently paying too much (typically rural and disadvantaged communities). However, an EV-only program raises the very fuel-efficient contribution, but does NOT lower the amounts paid by lower fuel-efficient vehicles.

Experience Still Translates to Support

Despite these negative perceptions and reactions among the rural community at large, those who actually participated in the Project and had first-hand experience with the road charge and the mileage-reporting device reported a significantly more positive overall experience. Further, they were confident in the privacy protections that the program offered, found it easy to do, and 75 percent found road charge as a fair funding option for California that the state should continue to explore.

This difference between those hearing about the road charge concept for the first time and those who actually tried it out raises the possibility that one of the largest reasons for opposition to the idea is simply instinctive resistance to something new. Humans are rarely comfortable with change. Given the state's experience seeing this phenomenon happen across multiple pilots in multiple states, it seems practicable that should a road charge system be implemented in the state, many Californians would adapt to and accept it, even in rural areas.



TRIBAL COMMUNITY PREFERENCES

When analyzing the preferences of tribal communities in the state, it should be noted that the Project team had more limited ability to draw conclusions from the tribal communities research conducted as part of this Project. Despite multiple outreach methods having been utilized over many months, a relatively small number of community members participated in the research, meaning statistically significant conclusions cannot be drawn.

With that caveat, the research suggested that tribal residents were very dissatisfied with the condition of roads in their areas. Awareness around the gas tax tended to be high among this audience, and research hinted at a belief that the government collects enough revenue for road repairs, but the funds are distributed in an unfair way that disadvantaged their communities. Consequently, many perceived replacing the gas tax with a road charge as unnecessary, and while many agreed that electric vehicles should contribute to road maintenance, they believed road charge would be unfair to their own communities. The idea of having to install a device in their vehicle further strains receptiveness to the concept of road charge, especially among those who did not participate in the Project. Even those who did participate and had first-hand experience with the road charge, despite giving positive ratings to the program, were split in their perceptions of fairness around road charge, as well as their preference for what California should use to fund transportation in the future.

The Northern and Southern Chairmens' Associations are both strongly opposed to the imposition of a road charge on their members. They view it as a potential threat to tribal sovereignty, and expressed willingness to pursue court action if necessary. They challenge the government of California to engage with them early on this topic and in good faith.

Further, the impact on tribal gas station revenue was also a key point of concern. Not all tribes own gas stations, but Caltrans estimates there are around 40 tribally owned gas stations within California. As sovereign nations, they do not collect state fuel taxes. Consequently, the tribal gas stations currently have a competitive advantage over other non-tribally owned gas stations in the area, which drives business to their locations. The revenue from these stations does not just fund tribal transportation needs, but many critical government services for these tribes. Thus, the potential repeal of the state gas tax, which would take place upon the implementation of a full road charge program, causes significant concern. For this reason, tribes would generally prefer an EV-only road charge program, which would keep the gas tax in place for gas-powered vehicles.

Securing reliable revenue to support their communities' needs is an important consideration for tribal leadership. Not all tribes have casinos or gas stations or other independent sources of revenue, making them reliant on often insufficient revenues received from the federal government. As the U.S. Department of Transportation embarks on a federal road charge pilot authorized by the Bipartisan Infrastructure Law, California encourages the consideration of tribal sovereignty and revenue matters to be a priority as this policy is explored at the federal level.

In many ways, individual Native Americans tend to express similar concerns and priorities to those in rural communities and throughout the state regarding the practical implementation aspects of a road charge program. Many of these can be successfully addressed by program structure, education, and familiarity. However, it is the Government to Government issues of sovereignty and revenue that make a potential road charge program impact on these sovereign nations much more complex.

Technical and Administrative Findings

GPS TECHNOLOGY WORKS

The six-month live pilot demonstrated that an OBD-II plug-in device enabled with GPS technology most definitely can be used to successfully facilitate the accurate differentiation of public versus non-public roads. The distance traveled reported by the device using its own internal algorithm is extremely precise and serves as a reliable source of mileage on behalf of road charge applications. Furthermore, the GPS locational information collected and reported by the device can support highly accurate differentiation by road and land types, subject to the granularity and accuracy of the map-sets and shapefiles being referenced by the differentiation process. To safeguard the ongoing accuracy of the differentiation process, it is imperative that a reliable source of up-to-date map-sets and GIS shapefiles is identified relative to road networks and land ownership, and that a process is adopted for periodically updating such map-sets and shapefiles throughout the course of the program.

While not the only reporting technology that can be paired with GPS location sharing capabilities, this pilot utilized plug-in devices. These devices are generally very reliable, but do have some technical considerations that will hopefully be addressed through future design upgrades and policy changes. At this time, odometer values reported by the devices have some reliability issues. This may stem from the fact that they are not designed for mileage reporting and road charging, but for emissions reporting. The ability to accurately report odometer information could serve as a valuable "true-up" cross check to ensure reporting accuracy and prevent fraud. Should state such as California implement a road charge program, a market could emerge for more specifically designed devices.

Beyond the device performance, the fact that the mandate to include an OBD-II port in vehicles does not apply to EVs, inevitably casts a shadow upon the long-term viability of the plug-in device. Furthermore, the very nature of the plug-in device makes it highly susceptible to "technology creep," whereby advancements in technology standards used by the device that are not backwards compatible (e.g., 5G cellular), could very well force periodic physical replacement of every deployed device.

All of these points underline the importance of developing a road charge system that can adapt to changing technologies in reporting methods, ensuring that have a range of reporting options that are reliable, accurate, cost-effective, and secure.

But Is It Worth It?

A detailed breakdown of all device-related pilot costs revealed that a significant share of these costs was attributable directly to the collection, storage, and processing of GPS waypoints in support of the differentiation process. At the large scale of a fully operational Road Charge program, the incremental costs associated with location-tracking could likely be mitigated to a degree by decreasing the frequency at which waypoints are captured for each vehicle, thereby reducing the overall volume of locational waypoints that need to be collected and processed. Nonetheless, for any given program, a tradeoff analysis should be undertaken to determine whether the degree of road charge savings derived by taxpayers from the program's identification of their out-of-state or non-public road usage warrants the incremental costs for the support of location-tracking and differentiation that would be incurred by the program.

To illustrate this latter point, the pilot demonstrated that even for those who self-identified as relatively frequent drivers on private roads, the share of their overall mileage that took place on private roads was negligible (1.2%), and their resulting overall monetary savings realized by opting into location-tracking was diminutive (a tax reduction of a mere $.18 per month for each taxpayer). This was a much lower usage of private roads than hypothesized by the Project team. While a greater share of mileage might be traversed on private roads in other areas of the country, at least in the State of California, it potentially could be much more cost-effective for the Road Charge program to simply assume that any participant residing in a rural-designated area will generally drive a certain percentage of their mileage on private roads. This assumed percentage might then be applied accordingly to adjust the rural participant's mileage that is subjected to a road charge fee, thereby avoiding altogether both the cost and privacy concerns associated with location-tracking and road type differentiation. However, it should be noted that the issue of private, tribal, and out-of-state miles likely affects states differently, particularly between the East Coast and West Coast. As states look forward to future interoperability, these issues need to be considered carefully.

In contrast to rural drivers and private roads, this Project determined that for those who self-identify as frequent drivers on tribal land, the share of their overall mileage on such lands was larger (11.9%), though so few tribal members participated, this number is not statistically reliable. Even so, given the costs associated with waypoint collection and processing, Road Charge programs might still consider adopting a similar "mileage percentage" approach in lieu of location-tracking, with regard to drivers who can be shown to be frequent travelers on tribal roadways.

Administrative Costs for Plug-Ins

As outlined in the report, there are numerous administrative program costs that are unique to the plug-in data collection option. Beyond the procurement cost of the device itself, the Road Charge program must account for the resources and time associated with the warehousing of the device pool and ongoing management of inventory. The logistical costs associated with distributing the device to the participant include the procurement of shipping labels and packaging, the printing costs for the labels and installation collateral, and the fees paid to the shipping service. There are also costs associated with the intake processing of returned devices, as well as the refurbishment and re-stocking of malfunctioning devices. Most of these costs are larger for a small-scale pilot than they would be with the economies of scale possible with a full program, with the possible exception of data processing costs.

These unique and incremental overhead costs need to be weighed against the singular advantages offered by the plug-in data collection method. An OBD-II plug-in device is the sole mileage reporting option that offers a "set it and forget it" style of revenue collection for the participant, as other data collection methods cannot match the simplicity of this hands-off, device-based approach, once the device is plugged in and successfully sending data. (The in-vehicle telematics reporting option comes close, but still requires the participant to maintain an independent subscription in good standing with the OEM's telematics service on an ongoing basis.) Furthermore, the OBD-II plug-in reporting option provides locational data in support of differentiation at a frequency higher than any other data collection method. Also, the data collected from the vehicle through the plug-in is standardized and normalized across the broadest spectrum of vehicle years, makes and models, relative to other reporting options. Moreover, given the market size of California, a statewide program would likely incentivize the private sector to develop devices specifically for charging purposes, potentially addressing current limitations and lowering costs.

Technology will continue to advance as the state debates whether a road charge is the best tool to replace the gas tax. Thus the plug-in device of today may not look the same by the time California implements a potential program. As the implementing agency, the Department of Motor Vehicles will have the ongoing responsibility of assessing current technologies to find the best range of reporting options to serve California's taxpayers. The cost/benefit question really centers around the sharing of location data and the data costs it entails, given the privacy concerns of many, the small amount of private or out-of-state miles actually driven as identified in this pilot, and implications for future interoperability with other states.

TOLLING AGENCY FINDINGS

The tolling-focused sub pilot demonstrated that there is indeed a great deal of promise in the notion of California's existing tolling agency serving as a Commercial Account Manager for its Road Charge program. For the TCA account holders participating in the six-month live demonstration as part of the sub pilot, the successful leveraging of TCA's existing infrastructure was substantiated. This extended to all participant-facing functionality, including account creation and management, the participant portal, statement generation and review, and simulated payment of road charge fees. TCA officials reported that in support of the sub pilot, "it was relatively easy to update our system to accommodate road charge transactions, and to simply supplement the tolling transactions on existing TCA statements with road charge transactions." Once the TCA and sub pilot technical teams had finalized the interface that would be used to facilitate the transfer of road charge transactions to their system, TCA officials noted that "no subsequent technical involvement was required thereafter … it was very incremental to what we were already doing."

For this sub pilot, all road charge inquiries from TCA account holders were fielded by Project team resources. The TCA team noted that the biggest impact upon their organization of serving as an account manager for a fully operational program would be the need to add additional customer support resources to address the incremental inquiry workload introduced by the addition of road charge transactions to the account holder statements. TCA also noted the fact that as it is "extremely difficult to cheat" in the tolling world, the need for compliance-checking on behalf of road charge functionality essentially would represent a new consideration.

In this exercise, the mileage reporting devices were provided by the Project team and were not an additional cost to TCA. In a fully implemented program, if a tolling agency were to serve as a commercial account manager, it would take the lead selecting and integrating mileage reporting options into its account management systems. This combined collection and account management system would then be submitted to the state for certification and cost allocation discussions.

In summarizing their experience with the sub pilot, TCA officials offered their viewpoint that "partnering with a tolling organization is a great approach for mitigating costs in the deployment of a Road Charge program, while also leveraging experience on the public sector side … it represents a true win-win." They also noted that such an approach would enable the state's drivers to interact with a single public entity to pay all fees associated with travel on California roads on a single, unified monthly statement, whether such travel takes place on a designated toll road or on any in-state public roadway. From the sub pilot participants' perspective, overall, TCA account holders expressed extremely high levels of satisfaction with their experience.