

WASHINGTON STATE ROAD USAGE CHARGE ASSESSMENT

Concept of Operations

prepared for

**Washington State
Transportation Commission**

prepared by

**Cambridge Systematics, Inc.
D'Artagnan Consulting, LLC**



**Washington State
Transportation Commission**



**Washington State
Department of Transportation**

**CAMBRIDGE
SYSTEMATICS**



**D'ARTAGNAN
CONSULTING**

BERK

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Executive Summary

This document provides a Concept of Operations (ConOps) for the Washington State Road Usage Charge Assessment prepared for the Washington State Transportation Commission (“the Commission”). This ConOps can serve as a basis for further development of a road usage charge in Washington State, including:

- A requirements development effort that can be used to procure a system.
- A potential demonstration project or revenue-generating program

A ConOps is often the first systems engineering document produced in a systems development process, with the intent of completely describing all system functionality. A ConOps supports discussions among stakeholders – discussions that should lead to agreement on major design decisions – before any implementation details are decided. After a ConOps, the next step in the systems engineering process is to develop a set of technical requirements to serve as a basis for procuring system hardware, software, and integration.

Motor fuel tax revenues in Washington have leveled off and are projected to decline in future years due to the increasing number of fuel-efficient vehicles, including hybrid and fully-electric vehicles, in the fleet. Because of this, in spring 2012, the Washington State Legislature’s 2011-2013 Supplemental Transportation Budget contained a proviso directing the Washington State Transportation Commission to investigate the feasibility of transitioning from the fuel tax to a road usage charge under the direction of a Steering Committee of business, government, nonprofit, and academic stakeholders. In December 2012, the Steering Committee unanimously agreed that road usage charging is a feasible approach for generating transportation revenue. Most recently, in the spring of 2014, the Legislature directed the Steering Committee to examine options for assessing motorists from other states under a road usage charge, answer questions about the relative equity of road usage charges on rural versus urban drivers, consider alternative transition strategies, update the business case analysis, and develop a Concept of Operations (ConOps) based on preferred operational concepts. This document, the ConOps, fulfills the last of these legislative requirements for 2014.

The policy basis for this ConOps is the Legislature’s interest in understanding the details of how a road usage charge system could work in practice, including the process of transitioning from the current gas-tax system. In prior phases of work, the Steering Committee and the Commission developed a single overarching goal: a **Sustainable Revenue Source**. Specifically, the objective was to identify and develop a sustainable, long-term revenue source for Washington State’s transportation system to replace, over time, the current motor fuel tax system. They also recommended 13 principles to guide policy, technology, and institutional choices along the path of achieving the goal: Transparency, Complementary policy objectives, Cost-effectiveness, Equity, Privacy, Data Security, Simplicity, Accountability, Enforcement, System Flexibility, User Options, Interoperability and Cooperation, Phasing. This ConOps attempts to fulfill all of these guiding principles.

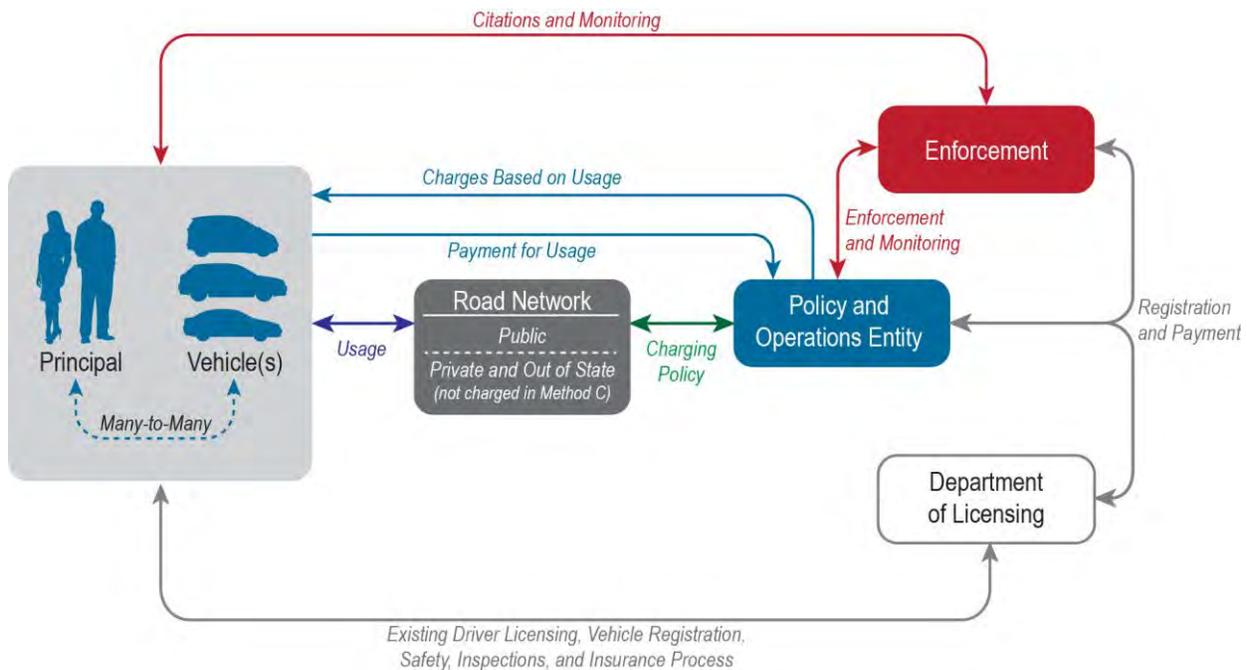
A core element of the ConOps involves the design and delineation of methods for road usage charge collection. Four such methods are explored in this document:

- Method A: Time Permit – unlimited driving for a specific time for a flat rate;
- Method B: Odometer Charge – prepayment of miles for a given year with reconciliation at the end of the year based on actual miles driven as measured by the vehicle odometer;

- Method C: Automated Distance Charge – postpayment on a periodic basis for actual miles driven as measured by an in-vehicle mileage reporting device; and
- Method D – Smartphone Application Road Usage Charge Measurement – prepayment for miles driven as measured by an individual’s smartphone with a special application, and supplemented with photos of the odometer as recorded by the smartphone.

At a high level, the envisioned road usage charging system is illustrated by the following diagram:

Figure E.1 Road Usage Charging System Overview



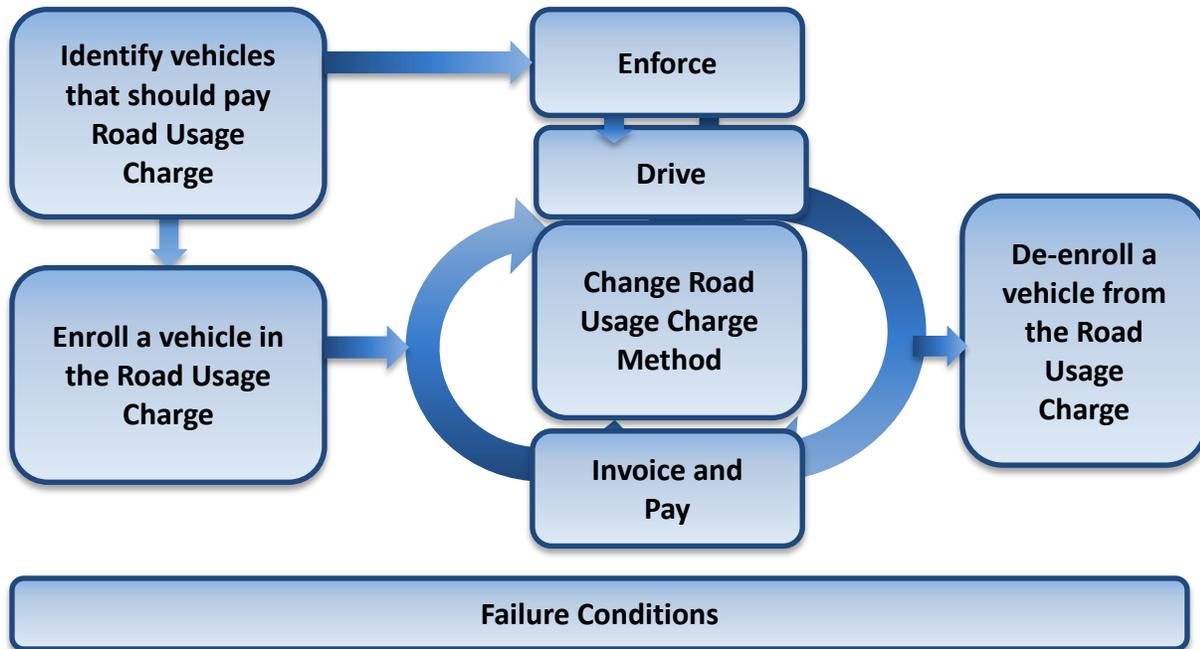
This diagram illustrates the following stakeholders relationships:

- Principals and their road usage charge-liable vehicles use the road network consisting of public, private and out of state roads.
- The Principals are authorized to use the road network based on registration of their road usage charge-liable vehicles with the Policy and Operational Agency.
- The Principals’ usage of the road network is reported using Method A, B, C, or D.

What are “Principals”?
Throughout the study, we have referred to the person responsible for paying a road usage charge as the “Principal.”

The ConOps also includes eight usage scenarios that further explain the operations of the Road Usage Charging system, as illustrated by the following diagram:

Figure E.2 Road Usage Charging System Usage Scenarios



The final section in the ConOps describes how the system outlined here will fulfill the policy goals of the legislature and sets the basis for a demonstration project and/or a revenue-collecting road usage charging system. It also gives further takeaways and a list of issues to resolve.

1.0 Introduction

This document provides a Concept of Operations (ConOps) for the proposed Washington State Road Usage Charge Assessment prepared for the Washington State Transportation Commission (WSTC). This ConOps can serve as a basis for further development of a road usage charge in Washington State. Specifically, it sets the stage for a requirements development effort that can be used to procure a system and/or develop a demonstration project.

This ConOps also allows all potential system stakeholders – the Legislature, WSTC, Washington State Department of Transportation (WSDOT), the Road Usage Charge Steering Committee, Department of Licensing (DOL), and other interested organizations and citizens – to understand and contribute to the system design. Feedback gained on this ConOps, and other lessons learned such as those sure to be learned in a potential demonstration project, will inform future documents, which will be more detailed than the ConOps, and set the stage for technical implementation.

The remainder of this section defines a ConOps, provides background information on highway funding in Washington and the motivations for considering road usage charging, summarizes prior work by the Road Usage Charge Steering Committee, and outlines the remaining contents of the ConOps document.

1.1 What is a ConOps?

The U.S. Federal Highway Administration (FHWA) provides the following description of a ConOps:¹

The Concept of Operations is a description of how the system will be used. It is nontechnical, and presented from the viewpoints of the various stakeholders. This provides a bridge between the often-vague needs that motivated the project to begin with and the specific technical requirements. There are several reasons for developing a Concept of Operations.

- *Get stakeholder agreement identifying how the system is to be operated, who is responsible for what, and what the lines of communication are.*
- *Define the high-level system method and justify that it is superior to the other alternatives.*
- *Define the environment in which the system will operate.*
- *Derive high-level requirements, especially user requirements.*
- *Provide the criteria to be used for validation of the completed system.*

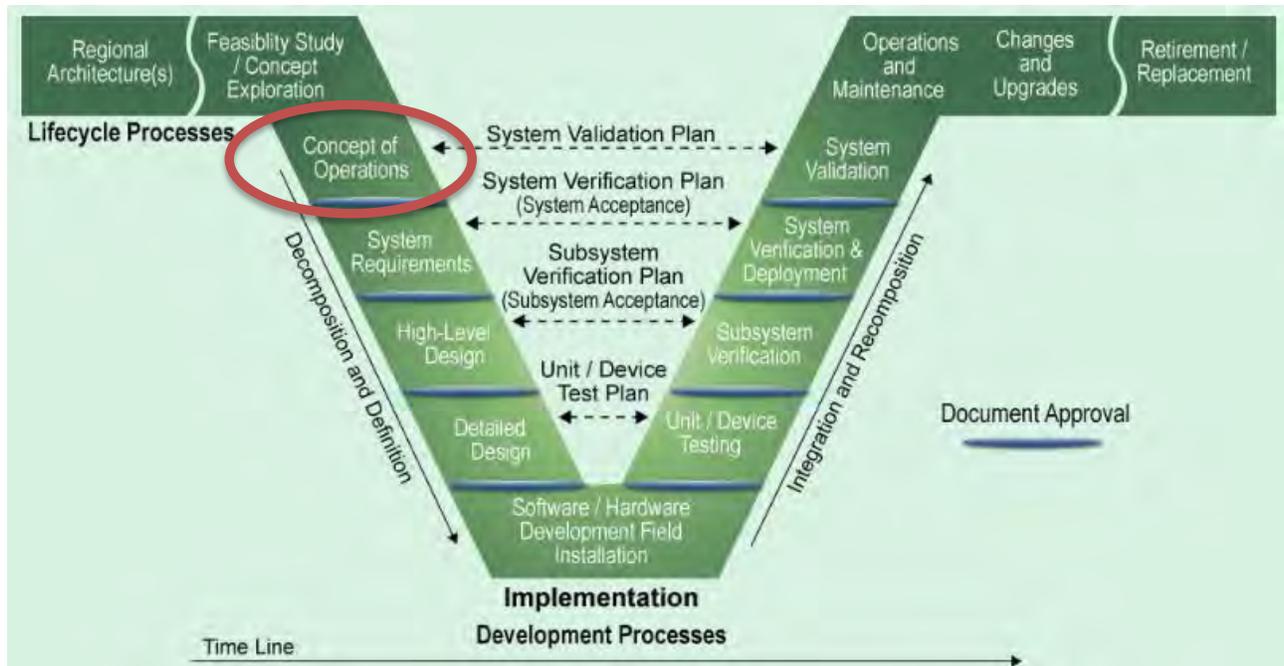
A ConOps is intended to inform a broad audience with varying levels of technical knowledge, and is the first step in a systems engineering process. Using the systems engineering process, and in particular using a ConOps to define a system, is now standard practice for many transportation agencies. For example, the Federal Highway Administration

¹ Federal Highway Administration, California Division, “Systems Engineering Guidebook for Intelligent Transportation Systems, Version 3.0,” November 2009. Available at: http://www.fhwa.dot.gov/cadiv/segb/views/document/sections/section8/8_4_5.cfm.

(FHWA) encourages the use of a ConOps.² Although there are many templates for a ConOps, the best known and most widely used was published by the Institute of Electrical and Electronics Engineers (IEEE).³ This document uses the IEEE’s ConOps template as a starting point, but omits sections more relevant to consumer electronics products.

This ConOps sets the stage for further systems engineering development, which is illustrated in the U.S. Department of Transportation’s system engineering “V diagram” (Figure 1.1)⁴, a standard illustration of the systems engineering process frequently used in transportation systems development:

Figure 1.1 Systems Engineering V Diagram



According to the V-Diagram, the next steps in systems engineering are:

- **A system requirements document:** This describes the complete functionality of the system— how the system outwardly performs – in great detail but does not specify how the system operates internally to generate the outward performance. Such a document is necessary before system procurement—for a demonstration project or a revenue-collecting system—can occur.
- **High-level and detailed design documents:** These documents specify exactly how the system operates internally. At the lowest level, design documents may include such detailed information as circuit board layouts and computer algorithms.

² FHWA, “Developing and Using a Concept of Operations in Transportation Management System,” 2005, available at: http://tmcps.ops.fhwa.dot.gov/cfprojects/uploaded_files/conops_tms_handbook.pdf.

³ This template can be accessed via the IEEE website: <http://standards.ieee.org/findstds/standard/1362-1998.html>.

⁴ Source: U.S. DOT, “Planning for Operations” <http://ops.fhwa.dot.gov/publications/fhwahop12001/images/f21.jpg>

If the Legislature decides to move ahead to implementation, the detailed design and implementation documents can be developed. Finally, the system can be installed, and a test plan for system functionality can be developed and executed according to the right hand side of the V-diagram.

The right hand side of the V-diagram includes the tests to validate that the final product fulfills the specifications developed in the processes on the left hand side of the diagram. These tests are performed in the order indicating the V-diagram, starting with the most detailed specification test and concluding with the system validation, which validates that the final product fulfills the ConOps.

By virtue of providing the first comprehensive high-level outline of systems functionality, the ConOps document informs discussions among stakeholders – discussions that should lead to agreement on major design decisions – before any implementation details are decided. Getting agreement among stakeholders early in the design process can circumvent the need for more costly design changes at later stages in the project.

While a ConOps is written from a system user’s perspective, there is more than one type of system user. Thus, the ConOps describes high-level functionality from the perspectives of system administration users as well as system end users.

A ConOps is never set in stone – it remains a “living document” that can be changed. For example, if Washington State were to undertake a test project, the ConOps might be revised afterward based on lessons learned. Even after the system is in place, it may be desirable to revisit the ConOps to account for changes such as policy, law, regulation, or other ways the system is run.

1.2 Background: Highway Funding in Washington State

Historically, user fees have provided the majority of funding Washington’s highways. Highway user fees include fuel taxes (on both gasoline and diesel), registration and licensing fees, tolls, weight fees on heavy vehicles, and Federal funds derived principally from fuel taxes. Fuel taxes represent the most important highway revenue source for Washington. However, improvements in on-road vehicle fuel economy and conversion of the fleet to other energy sources (e.g., electric vehicles), threaten to undermine fuel tax revenues.

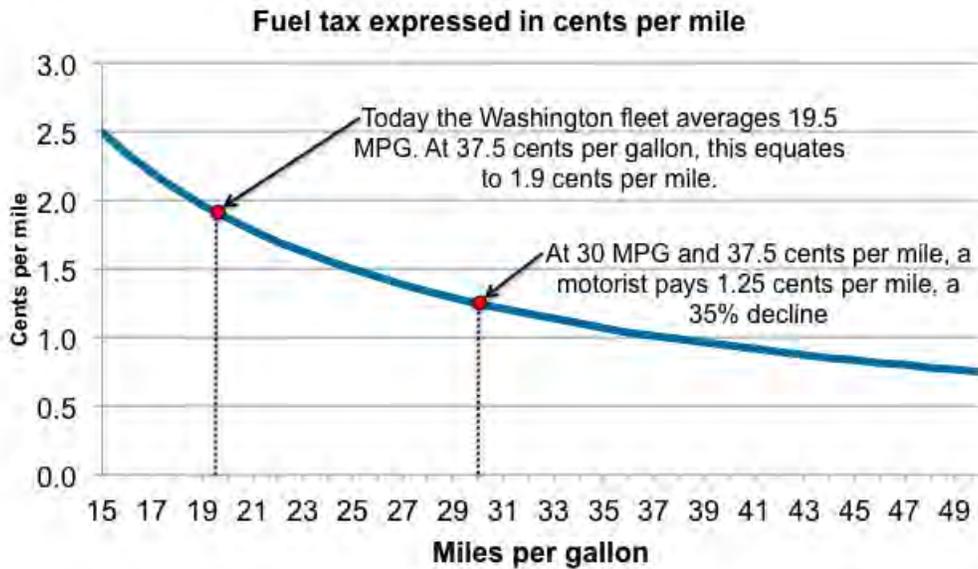
According to the University of Michigan Transportation Research Institute (UMTRI), EPA-measured fuel economy of new light vehicle sales across the United States has improved each year since 2008, from 20.8 miles per gallon (MPG) for Model Year 2008 to 25.3 MPG for Model Year 2014 through September. In the past three years, average fuel economy of new light vehicles sales in the United States has improved about 1 MPG per year.⁵ Based on the new CAFE standards, the availability of new vehicle technology, consumer purchasing habits, government incentives, and other factors, the possibility exists for continued improvement in on-road fuel economy of the light vehicle fleet. For example, the U.S. Energy Information Administration (EIA) projects an improvement in on-road fuel economy of the light vehicle fleet nationally of 2% per year, or 73% through 2040, to 37.2 MPG.⁶

⁵ UMTRI. *Eco-Driving Index*. Accessed 6 November 2014. Available from: http://www.umich.edu/~umtriswt/EDI_sales-weighted-mpg.html

⁶ U.S. EIA. *Annual Energy Outlook 2014*, April 2014.

Figure 1.2 illustrates the relationship between fuel economy and fuel tax revenues on a per mile basis. The horizontal axis depicts on-road fuel economy as reflected in MPG, while the vertical axis represents the equivalent cents per mile in fuel tax paid, at 37.5 cents per gallon. Analysis conducted by Washington State DOT, Department of Licensing, and Legislative staff as part of the analysis of impacts of road usage charging on urban vs. rural motorists suggests that light vehicles in Washington State presently average about 19.5 miles per gallon (MPG) on the road.⁷ At Washington’s current fuel tax rate of 37.5 cents per mile, this means that the average vehicle is contributing $37.5 \div 19.5 = 1.92$ cents per mile driven in fuel taxes. If fleet fuel economy improves, the equivalent amount paid by the average vehicle as measured in cents per mile will decline. For example, at a state fleet average of 30 MPG, the amount of fuel tax paid is 1.25 cents per mile, a 35% decline from today.

Figure 1.2 Relationship between fleet fuel economy and per-mile fuel tax revenue



Although the Steering Committee instructed us to focus on light vehicles, information is provided here about heavy vehicles for context. EIA projects improvements in on-road fuel economy of heavy vehicles averaging 0.5% per year, or 15% by 2030, based on first-ever CAFE standards published by the federal government beginning in Model Year 2012 for medium-duty trucks and Model Year 2014 for heavy-duty trucks. A truck averaging 7 MPG currently pays 5.4 cents per mile driven in fuel taxes. An improvement of 14% to 8 MPG would reduce the amount paid in fuel taxes to 4.7 cents per mile. More details on the aggregate implications of various scenario involving fuel economy improvements can be found in the financial analysis included with the 2014 Steering Committee final report.

The prospects for improvements in vehicle fuel economy, mean that there are likewise prospects declining fuel tax revenue. This prospect motivated the Legislature to direct the Commission to study a transition from fuel taxes to a road usage charge system of collecting revenue from light vehicles, in order to preserve funding for transportation.

⁷ The Road Usage Charge Steering Committee has adopted a definition of light vehicles as those weighing <10,000 pounds gross vehicle weight rating (GVWR).

1.3 Background: the Road Usage Charge Program in Washington State

In spring 2012, the Washington State Legislature's 2011-2013 Supplemental Transportation Budget contained a proviso directing the Washington State Transportation Commission to investigate the feasibility of transitioning from the fuel tax to a road usage charge. The Legislature further specified that WSTC should convene a Steering Committee comprising business, government, nonprofit, and academic stakeholders to direct the investigation. The Steering Committee reviewed worldwide experience with road usage charging, examined alternative operational approaches to its implementation, and identified key policy issues to consider in implementing a future policy. In December 2012, the Steering Committee unanimously agreed that road usage charging represents a feasible approach for generating transportation revenue meriting further exploration.⁸

In spring 2013 the Legislature expanded the Steering Committee's scope to develop detailed operational concepts, examine policy issues more deeply, and perform a business case evaluation. In December 2013, the Steering Committee concluded that a business case exists to pursue further study of road usage charging.⁹

Most recently, in spring 2014, the Legislature directed the Steering Committee to:

1. Consider alternative strategies for transitioning from fuel taxes to road usage charging,
2. Update the business case analysis, and
3. Develop a Concept of Operations (ConOps) based on preferred operational concepts.
4. Consider the issue of how to assess motorists from other states under a road usage charge,
5. Answer questions about the relative equity of road usage charges on rural versus urban drivers,
6. Explore legal issues surrounding existing and potential future motor fuel tax bonds

This document, the ConOps, fulfills item 3 above. The 2014 Steering Committee final report addresses the remaining topics.

1.4 Document Contents

The remainder of this ConOps document is organized as follows:

Section 2: Policy Basis explains the justification for the evaluation of road usage charging in Washington.

Section 3: Operational Concepts presents the three operational concepts chosen by the Commission for detailed study, all of which are included in this document. They are Method A: Time Permit, Method B: Odometer Charge, and Method C: Automated Distance Charge. This section also introduces a Smartphone Application that represents an alternate technical approach for implementing the functionality of either Method B or Method C.

⁸ Washington State Transportation Commission, "Washington State Road Usage Charge Assessment, Feasibility Assessment, Work Plan, and Budget, Report to the Legislature," January 23, 2013.

⁹ Washington State Transportation Commission, "Washington State Road Usage Charge Assessment, Business Case Evaluation Final Report," January 7, 2014.

Section 4: System Components provides a functional overview of the components needed to operate a road usage charging system.

Section 5: Usage Scenarios is the heart of the ConOps document. This section documents the complete functionality of the road usage charging system from the perspective of different types of system users.

Section 6: Major Issues to Resolve lists the most important open issues to be resolved. These issues should ideally be resolved in advance of a demonstration project, and they must be resolved prior to system revenue operation.

2.0 Policy Direction and Stakeholders

2.1 Policy Direction

The policy basis for this ConOps is the Legislature’s interest in understanding the details of how a road usage charge system would work, as well as how the transition from the current gas-tax system to a future road usage charging system could unfold. In prior phases of work, the Steering Committee and the Commission developed a single overarching goal:

- **Sustainable Revenue Source:** Identify and develop a sustainable, long-term revenue source for Washington State’s transportation system to transition from the current motor fuel tax system.

They also recommended 13 guiding principles to inform policy, institutional, and technical decisions about how to achieve the sustainable revenue source goal:

Transparency	A road usage charge system should provide transparency in how the transportation system is paid for.
Complementary policy objectives	A road usage charge system should, to the extent possible, be aligned with Washington’s energy, environmental, and congestion management goals.
Cost-effectiveness	The administration of a road usage charge system should be cost-effective and cost-efficient.
Equity	All road users should pay a fair share with a road usage charge.
Privacy	A road usage charge system should respect an individual’s right to privacy.
Data Security	A road usage charge system should meet applicable standards for data security, and access to data should be restricted to authorized people.
Simplicity	A road usage charge system should be simple, convenient, transparent to the user, and compliance should not create an undue burden.
Accountability	A road usage charge system should have clear assignment of responsibility and oversight, and provide accurate reporting of usage and distribution of revenue collected.
Enforcement	A road usage charge system should be costly to evade and easy to enforce.
System Flexibility	A road usage charge system should be adaptive, open to competing vendors, and able to evolve over time.
User Options	Consumer choice should be considered wherever possible.
Interoperability and Cooperation	A Washington road usage charge system should strive for interoperability with systems in other states, nationally, and internationally, as well as with other systems in Washington. Washington should proactively cooperate and collaborate with other entities that are also investigating road usage charges.
Phasing	Phasing should be considered in the deployment of a road usage charge system.

Some of these guiding principles can be incorporated directly into the ConOps, such as privacy, data security, and simplicity. Others will depend on future policy decisions, such as complementary policy objectives and equity. The complementary policy objectives relating to energy, environmental, and congestion management goals will best be addressed through rate setting.

In 2013, the Steering Committee examined the cost and revenue implications of three operational concepts for road usage charging, as well as combinations of the three concepts, and compared each to the financial performance of maintaining the fuel tax at its current rate. Key findings were as follows:

- The road usage charge systems evaluated will cost more to collect than the fuel tax, but should generate greater and more stable net revenue over 25 years;
- Providing drivers choices as to how they pay a road usage charge will help improve public acceptance and mitigate privacy concerns;
- Gas tax increases can raise more net revenue in the short term than the road usage charges evaluated, but over the long term will continue to erode in value, thus requiring frequent increases; and
- A road usage charge system with choice helps ensure everyone pays their fair share for using the roads, regardless of fuel source or miles per gallon.

Summing up the implication of the work conducted, the Steering Committee observed that the decay in revenue for the roadway system is likely to creep up on us like the proverbial frog that does not jump out of a slowly warming pot of water.

These findings led the Steering Committee to conclude that there is a compelling business case to continue studying methods of implementing road usage charges. This in turn prompted the Legislature to call for the preparation of this ConOps along with the investigation of other policy issues.

The Legislature also directed the Steering committee to examine the work in Oregon on road usage charging, which has been ongoing since 2001, and has included two successful demonstration projects. Oregon's model has included Private Account Management Entities, thus this ConOps includes private account management entities as one option for Washington to consider.

2.2 Stakeholders

In addition to explaining the policy motivation and policy goals, this section of the ConOps also enumerates the major stakeholders involved in system design, implementation, and operations. These are as follows:

- **Principals.** Principals are the individuals required to pay road usage charges as the registered owners or lessees of Washington-registered vehicles that meet the criteria for such taxation. The Steering Committee has recommended that road usage charges only apply to light vehicles (with gross vehicle weight rating, or GVWR, less than 10,000 pounds) or a subset thereof.
- **Policy and Operations Entity.** This would be either a new agency or housed within an existing agency (or group of agencies,) in Washington state government, tasked with carrying out the development and collection of road usage charges. For purposes of simplicity, we refer to the group carrying out these functions as the policy and operations entity.
- **Washington State Transportation Commission (WSTC).** WSTC was tasked by the Legislature to lead investigations into road usage charging. WSTC could, if authorized by the Legislature, have a continuing role in rate setting (as they currently do for tolling and ferries, although not for fuel tax rates). They could also conduct oversight and independent evaluation of road usage charging, or other roles at the direction and discretion of the Legislature.
- **Washington State Department of Transportation (WSDOT).** As with fuel taxes, WSDOT would be the recipient of a considerable portion of road usage charge revenues and hence has an important stake in the design, implementation, and operations of a road usage charge system. At minimum, WSDOT's potential role in a future

system would involve accounting, budget analysis, and revenue forecasting. There may also be an important role in operations given WSDOT's existing capacities for revenue collection through its Tolling Division.

- **Washington State Department of Licensing (DOL).** DOL presently collects fuel taxes and has relationships with Washington motorists through the vehicle registration and titling processes, as well as driver licensing. Consequently, DOL could play a primary role in the implementation and operation of a road usage charge system. At minimum, the vehicle registration and titling processes are essential to identifying and enrolling vehicles subject to a road usage charge.
- **DOL Agents.** DOL agents could expand their current role in licensing and registration to take on some of the functions of setting up accounts and collecting payments for the road usage charge system processes.
- **Enforcement Agencies.** On-the-ground enforcement of up-to-date road usage charges may fall to existing law enforcement agencies, including the Washington State Patrol as well as local police.
- **Equipment Suppliers and Private Account Management Entities.** Private companies will at a minimum provide the technology and systems to implement the road usage charge, and potentially offer account management services.
- **Citizen Interest Groups.** Citizen groups representing various causes, such as the environment or electric vehicle owners will be interested in ensuring that the road usage charge supports the states environmental goals and other goals of those organizations.

3.0 Methods of Road Usage Charge Collection

We have previously used the term *operational concepts* to refer to alternative methods by which a road usage charge system could work at a high level. To avoid confusion of terminology in the context of this Concept of Operations document, we will now refer to them as individual Methods of road usage charge collection. The primary differentiator among the methods is the way road usage is measured: by time, by odometer, or by a device in the vehicle. The choice of how to measure road usage has significant implications for the way the State administers road usage charges, how the Principal pays, and other aspects of operations.

The Legislature directed that this ConOps provide Principals with a choice of all three methods from the business case evaluation. Additionally, the ConOps considers a potential alternative based on smartphone technology. The full set of methods examined thus includes:

- Method A – Time Permit;
- Method B – Odometer Charge;
- Method C – Automated Distance Charge; and
- Method D – Smartphone Application Road Usage Charge Measurement.

This section presents the details of each of these methods in turn. This lays the groundwork for Section 5 in which we describe the user experience of a complete system comprising all four methods. While there is some overlap between the information presented here and the information in Section 5, the latter is more detailed and complete than the information presented here. Further, the material in Section 5 is organized according to usage scenarios – specific ways in which different users will interact with the system. The organization in Section 5 is helpful for progressing to a requirements document, the next step in the systems engineering process.

All four methods of road usage charge collection are included in this ConOps. Further policy development may lead to the elimination or addition of methods. Such a change would need to be covered in a revised ConOps. Only methods A and B are likely to be suitable for providing road usage charge services to Principals who have no bank account; and only methods C and D allow credits for travel on non-public roads in Washington. To be politically acceptable, it is likely that a road usage charging system would need to provide both of these possibilities, so it is likely that any future system would include at least one of methods A and B, and at least one of Methods C and D.

The discussion of each Method within this section is organized as follows:

- Overview of Method.
- Method from two perspectives.
 - Principal’s perspective:
 - › Acquisition.
 - › Usage (driving).

- › Paying (refreshing).
- › Deleting (selling car, switching methods, or moving out-of-state).
- Policy and operations entity’s perspective:
 - › Accounting (verifying that all vehicles are included in system and verifying that payments are correct).
- Compliance and Enforcement:
 - Detecting fraud.
 - Tolerances.
 - Issuing penalties.

Note that discussion of payment by the Principal also includes consideration of possible refunding of estimated fuel taxes to avoid double-taxation during a (potentially long) transition period during which the current fuel tax system and the road usage charging system are operating in parallel.

3.1 Method A – Time Permit

In exchange for purchasing a Time Permit, the policy and operations entity would allow unlimited road usage for the specified period. Principals would be encouraged to pay for one full year (although installment plans would be available.) Principals’ payment status or payment could simply be recorded in a database that could be accessed by enforcement personnel.

This method does not involve distance measurement. Because the Steering Committee envisions this method as a complement to the other methods, the charge for the Time Permit needs to be set relatively high, otherwise no one would choose the other methods (B/C/D). For purposes of this document, we assumed that the rate for a Time Permit would be based on the number of miles driven by the top one to two percent of drivers in terms of distance. Nationally, the 98th percentile of motorists drive roughly 35,000 miles per year.

One of the benefits of this method is that Principals would not have to report anything to the policy and operations entity – not even a single odometer reading. Without an odometer reading, however, there is no way to tell how much a person has driven in a given period. We thus recommend that Principals be forbidden from switching away from this method to another method during the year and getting a refund for the remaining months. If this prohibition is not made, Principals facing a short period of heavy driving could switch to Method A during that period and then immediately switch back to another method after the heavy driving period was over, getting a refund for the portion of the time period not used. This would enable the Principal to drive a large number of miles at a rate substantially lower than the standard per-mile rate.

3.1.1 Experience from Principal’s Perspective: Time Permit

The Principal would encounter the following experience for the Time Permit:

- **Acquisition:**

- Principals would purchase a valid permit for one year at the time of vehicle registration through the same methods used for vehicle registration today: in person at the Department of Licensing (DOL), through a DOL agent or subagent, on-line, or via mail.
- A Time Permit could also be issued for a shorter length of time, such as one, three, or six months. A one-year period, however, would have the lowest administrative costs, as it could be synced with vehicle registration renewal, and so is assumed for the remainder of the method description.
- **Usage (driving):**
 - There would be no change in driving behavior from today.
- **Paying (refreshing):**
 - Principals could pay for the upcoming year's permit at time of registration renewal.
 - Principals could also pay their permit in installments over the course of the year, for example, paying 25 percent of the cost each quarter.
 - Either principals would receive no fuel tax credits, or principals could receive fuel tax credits for the value of the miles assumed for setting the time permit rate (e.g., the 98th percentile) times the EPA fuel economy rating for their vehicle, but this value must be capped at a maximum amount (for example, \$200 less than the cost of the time permit). If the value of the fuel tax refund is not capped, the lowest mileage vehicles would pay almost nothing, or even earn a net credit (have a credit larger than the cost of the permit) if they choose the time permit.
- **Deleting (selling car, switching):**
 - Principals could be allowed to apply for refunds of the unused portion of the permit (fraction of year) upon canceling vehicle registration, should policy allow such refunds. However, a refund process may be costly to administer. Alternatives to providing refunds are 1) forcing the Principal to accept the money as lost, which is the case with registration fees when drivers move out-of-state shortly after re-registering their vehicles for the coming year; and 2) forcing the principal to accept the money as lost, but requiring quarterly payments, so that the most that could be lost is a quarter of the total annual cost.

3.1.2 Experience from Agency's Perspective: Time Permit

The policy and operations entity would encounter the following experience with Method A:

- **Distribution:**
 - New vehicles (including newly purchased used vehicles).
 - › Owners of vehicles purchased or leased in Washington State would be given information about the road usage charge at the time of vehicle purchase.
 - › For Principals opting for this method, the road usage charge purchase would be completed at the time of registration. Registration would not be possible without purchase of road usage charge Time Permit.
 - Vehicles moving into state.

- › Owners of vehicles moving into Washington State would be given information about the road usage charge at the time of vehicle registration. For those opting for this method, registration would not be possible without purchase of road usage charge Time Permit.
- **Operation:**
 - Monitoring of Usage.
 - › Vehicle usage would not be monitored.
 - Collection of payments.
 - › Payments would be collected by the same means as vehicle registration.
 - › Payment by installment plan could be possible: for example, Principals could be sent a bill each quarter for 25 percent of the cost of the permit. The policy and operations entity could charge users an additional fee for payment by installment plan, to encourage less frequent transactions.¹⁰
- **Decommissioning** (car sale, transfer out-of-state, or total loss):
 - It would be the Principal’s responsibility to notify the policy and operations entity that the vehicle is decommissioned.
 - Upon cancellation of registration, the road usage charge permit would likewise be canceled.
 - Principals could apply for a refund of the unused portion of the permit (fraction of year).
 - It is fairly common for people to neglect to cancel their vehicle registrations when they move out of state or even when they sell a car. However, Principals should be charged for all time that a Time Permit is valid up until they cancel their registration, even if they moved out of state well before they canceled their registration. The reasoning is that it would be very difficult to verify when (or even if) a Principal actually left the state, creating a significant potential for fraud. Principals should be clearly informed of this fact when they enroll in the road usage charging program.
- **Accounting:**
 - Verifying that all vehicles are included in system.
 - › Whether a vehicle is subject to the road usage charge would be determined at the time of vehicle registration.
 - › Vehicles subject to the charge would be unable to register without purchasing a Time Permit or selecting some other method for paying the road usage charge.
 - Verifying that payments are correct.
 - › Payments would be verified at time of registration payment.

¹⁰A for-profit business would likely charge customers for spreading their payments out over time (insurance companies typically offer payment spread out over time at an additional fee to cover their additional processing costs). However, the main reason to allow Principals to spread their payments over time would be to acknowledge that a larger (likely several hundred dollar) up-front payment may be a hardship for some people. Levying a surcharge for spreading the payments for people that have difficulty affording the full amount poses a policy dilemma that will need to be addressed.

3.1.3 Compliance and Enforcement: Time Permit

Mechanisms to deter/discourage attempts at cheating are fairly straightforward with a Time Permit: for Principals that select this option, it would be impossible to obtain legitimate vehicle registration tabs or register an eligible vehicle without purchasing a Time Permit, although allowing principals to pay the road usage charge for a short period of time in order to register their vehicles, then following up with them after the time has elapsed, may be desirable.

Compliance can be encouraged through some combination of the following enforcement mechanisms:

- **Detecting fraud:**

- Time Permits that are not up to date or for which a Principal has failed to pay an installment payment could be detected via regular database operations.
- Traffic stops already include checking for valid tabs.
 - › For Principals that choose the installment method of paying a road usage charge, enforcement officers would have to take an extra step to make sure their road usage charge payment is up to date.
 - › Since officers may not know if a given Principal is on the installment plan, this means that traffic stops would involve looking up the license plate number in a database to see if there are any outstanding issues, which is typically done anyway.
 - › The policy and operations entity should consider implementing automated approaches to linking payment information to the databases that officers query upon traffic stops.
- License plate camera scanners could be used to match vehicles to valid Time Permits.
- Fake tabs could be detected in the same manner as fake tabs are detected for vehicle registration.

- **Issuing penalties:**

- Penalties could be issued in the same manner as penalties issued for failure to register a vehicle.

3.2 Method B – Odometer Charge

With an Odometer Charge, a state agency would charge per-mile fees based on readings of the vehicle's odometer – a simple system in which the user self-reports mileage traveled, but is subject to random checks.

3.2.1 Experience from Principal's Perspective: Odometer Charge

The Principal would encounter the following experience with Method B:

- **Acquisition:**

- Principals would prepay for estimated road usage for a year based on a reasonable estimate – for example, the amount driven in the previous year. If the driver is unable to provide an estimate, a standard amount could instead be applied (e.g., 12,000 miles). Principals would receive an offset for anticipated fuel taxes to be paid, presumably based on EPA combined city-highway MPG for the vehicle.
- Principals' payment for the year would be entered in a road usage charging database that would link to their Vehicle Identification Numbers (VINs).

- Principals could pay for all miles at once, or Principals could choose to pay in installments (e.g., monthly or quarterly) to avoid the need for large individual payments.
- **Usage (driving):**
 - No action is needed by the Principal during driving.
- **Paying (refreshing):**
 - The Principal would self-report actual miles driven at the time of annual vehicle registration renewal, Official odometer readings taken during emissions inspections might also be used in the parts of the state with emission inspection requirements..
 - The Principal would reconcile estimated charges based on the actual amount of driving – driving more miles than estimated would result in a payment due, driving fewer miles than estimated would result in a credit of funds to next year’s estimated amount. All miles would be offset for fuel taxes paid based on EPA combined city-highway MPG for the vehicle.¹¹
 - If, at the end of the year, a Principal has driven a substantially greater number of miles than estimated for the year, the Principal could be compelled to pay a penalty.
 - › If the Principal underestimates the mileage that will be driven in a given year, and the Principal realizes this fact long before the end of the year, the policy and operations entity could make it possible for the Principal to increase their payment. In this case, the policy and operations entity should require Principals to buy a minimum number of additional miles (e.g., 5,000). Repeated underestimation and additional purchases could result in Principals being charged an additional fee.
 - Principals who choose the installment plan would pay their installment at a DOL office, an authorized DOL Agent or on-line.
- **Deleting (selling car, moving out of State):**
 - Principals would remove the vehicle from the road usage charge program at the time of selling a vehicle or moving out of state.
 - Principals could apply for refund of unused portion of the Odometer Charge (number of miles) at time of canceling vehicle registration. This would require in-person odometer inspection to verify miles actually traveled at the DOL or an authorized DOL Agent. However, a refund process may be costly to administer. Alternatives to providing refunds are 1) forcing the Principal to accept the money as lost, which is the case with registration fees when drivers move out-of-state shortly after re-registering their vehicles for the coming year; and 2) forcing the principal to accept the money as lost, but requiring quarterly payments, so that the most that could be lost is a quarter of the total annual cost.

¹¹ Several factors may make it hard to eliminate the fuels tax in the near term, including the need to fulfill bonding. However, when fuels tax elimination seems feasible, Washington might also consider the potential increases in tourism dollars from border areas resulting from a lowering or repeal of Washington fuel taxes.

3.2.2 Experience from Agency's Perspective: Odometer Charge

The operating agency would carry out the following procedures with Method B:

- **Distribution:**

- New vehicles (including newly purchased used vehicles).
 - › Owners of vehicles purchased or leased in Washington State would be given information about the road usage charge at the time of vehicle purchase.
 - › The road usage charge purchase would be completed at time of registration. Registration would not be possible without purchase of road usage charge mileage permit for Principals opting for this method.
 - › An official “start” odometer reading would be required. The starting odometer reading should not be self-reported – an officer should verify this reading. Alternatively or in addition to state-employed officers, auto dealers, mechanics, DOL subagents, and others could potentially be authorized to verify start odometer readings.
- Vehicles moving into State.
 - › Owners of vehicles moving into Washington State would be given information about the road usage charge at the time of vehicle registration. Registration would not be possible without purchase of road usage charge mileage permit for Principals opting for this method.
 - › The official “start” odometer start odometer reading should not be self-reported – it should be verified by officer or other DOL-authorized entity.

- **Operation:**

- Monitoring of Usage.
 - › Usage would be monitored through annual self-reports.
 - › A small portion of the vehicle population will be required to have their odometer reading verified by an officer. The size of the pool of vehicles subject to review will need to be determined.
- Collection of payments.
 - › In Method B, payment would occur at the time of vehicle registration renewal. At that time, unused miles could be credited towards the charge for the next year, and payment for any additional miles driven in the previous year (miles driven in addition to the estimate) would be required. All miles are offset for fuel taxes paid based on EPA combined city-highway MPG for the vehicle.
 - › Payment would typically be for a year in advance, but an installment plan could be a shorter period such as three months. Principals might have to pay the administrative fee or extra fee to pay for each installment.¹²

¹² As with the Time Permit, the issue of whether to charge for allowing installment payments is an important decision.

- **Decommissioning** (car sale, moving out-of-state, or total loss):
 - It would be the Principal’s responsibility to notify the policy and operations entity that the vehicle is decommissioned
 - Upon cancellation of registration, the road usage charge permit would be canceled with it.
 - Principals could apply for a refund of unused miles at that time subject to in-person inspection of the odometer to verify actual miles driven.
- **Accounting:**
 - Verifying that all vehicles are included in system.
 - › Whether a vehicle is subject to the road usage charge would be determined at the time of vehicle registration.
 - › Vehicles subject to road usage charges would be unable to register without purchasing road usage charge miles for Principals that opt for this method.
 - Verifying that payments are correct.
 - › The odometer reconciliation process would be employed to ensure payments are correct, and spot checks of some vehicles that are self-reporting will be employed to deter and detect significant under-reporting.

3.2.3 Compliance and Enforcement: Odometer Charge

It would be impossible to obtain legitimate vehicle registration tabs or register a road usage charge-eligible vehicle without paying the road usage charge, although allowing principals to pay the road usage charge for a short period of time in order to register their vehicles, then following up with them after the time has elapsed, may be desirable.. Annual odometer reporting would be obtained through self-reporting, as with Federal income taxes. Note that as long as the fuel tax is in place, in which case those subject to a road usage charge would also receive a rebate for estimated fuel taxes in proportion to reported miles, there is little incentive to cheat for most Principals. Compliance could also be encouraged through spot enforcement involving manual odometer checks by officers.

- **Detecting Fraud:**
 - Odometer fraud (fraudulently setting the odometer to a false value) is possible, even with many modern vehicles with digital odometers.
 - Spot enforcement (checks by police while issuing other traffic stops) would be a possible option for detecting falsely reported odometer values.
 - To detect odometer rollback, cross-referencing current odometer values with odometer values for the vehicle from other sources (e.g., CARFAX reports and records of vehicle repair shop manifests) could be performed. Large deviations from predicted mileage either on a yearly average or dividing that yearly average over quarters would also be indicators of potential fraud, and could trigger audit requests.
- **Issuing penalties:**

- Penalties for failure to pay the road usage charge would be issued at the same time as failing to register, but would be in addition to registration violations.
- Odometer tampering is a felony under Federal law and a gross misdemeanor under Washington State law (RCW 46.37.540). Penalties for odometer tampering already exist at the Federal level (in the Odometer Act), but further penalties should be considered as it relates to road usage charge avoidance.

3.3 Method C – Automated Distance Charge

With an Automated Distance Charge, miles driven on public roads within Washington State would be charged, while miles driven outside of the State and on private roads would not be charged. Method C would require location-sensing technology that can distinguish whether miles are driven on Washington public roads or not, an on-board unit with memory for storage of road usage data, and communications technology for transmitting travel data for billing purposes.

Although this road usage data can be handled securely, many people have concerns about data security and privacy. Because of the additional data and data security needs, Method C would involve data handling, accounting, and auditing that is more complex than Method A or B.

Note that it is not possible to install a standard usage based insurance on-board unit on vehicles without an on-board diagnostic port (called OBDII). OBDII ports are usually located under the dashboard of vehicles that allow mechanics to read trouble codes. Vehicles manufactured before 1996 typically did not have these ports (although some 1994 and 1995 models do), nor do most electric vehicles, although electric vehicles typically do have in-vehicle telematics systems that could support an Automated Distance Charge if automakers approved such an application. It may be possible to acquire GPS-only mileage reporting devices (no OBDII connection) that could support Method C, but such devices are likely to be expensive. If such devices are not incorporated into the program, then pre-1996 vehicles would be compelled to choose Method A or B. Electric vehicles might use Method C through in-vehicle telematics.

Method C involves Principals being invoiced for their mileage on a regular (monthly or quarterly) basis. It is presented as a postpay option here, for two reasons. First, postpay is likely to be viewed as more convenient for Principals. Second, the postpay with Method C is relatively low risk, due to the more frequent (most likely quarterly) invoicing. However, Method C could also be prepay, like the others, based on estimated mileage for the following year.

Method C could be run by the policy and operations entity, or by private account management entities that collect taxes on behalf of the government. Private account management entities have the opportunity to sell taxpayers additional services and may be able to collect a fee (from the policy and operations entity or from the Principal) for collection of taxes. Private account management entities would likely have technology expertise not currently available in government-run agencies. A system of private account management entities is used to collect road usage charges or tolls in New Zealand, Ireland, and Portugal, and is used in other industries in the U.S. and abroad. Importantly for Washington, Oregon is procuring private account management entities to collect road usage charges from vehicles participating in its voluntary program beginning July 1, 2015.

Potential advantages of engaging private account management entities in relation to a government-run system for Method C include:

- They may bring a lower overall system cost when the system operates at a large scale (1 million+ users), due to their potential for serving multiple states and creating economies of scale;
- They may operate in multiple states, allowing easy transfer for individuals moving from state to state and allowing interoperability between the states; and
- They may provide additional services for customers, such as usage-based insurance.

However, no decision has been reached regarding the use of private account management entities for road usage charging in Washington, and they have not been included in the financial model based on this ConOps.

Since Method C raises privacy concerns among some individuals, it will be important for the policy and operations entity to provide data protection and retention guidelines and a privacy policy that must be followed. One major privacy measure is that miles only be reported in three categories: miles driven in-state, miles driven out-of-state, and miles driven on private roads. Oregon's road usage charge program has such policies. As an additional means of addressing privacy concerns, Principals may be offered switchable road usage charging devices that only record location data when users engage a switch. In such cases, users would be charged for all miles recorded while location detection was turned off, regardless of whether they were on Washington public roads or not.

There are several technology options for on-board units:

- **Stand-alone mileage recording devices.** These would be custom manufactured for the purpose of collecting road usage charges.
- **Usage-based insurance devices.** These are small devices offered by some insurance companies that drivers can plug into the OBDII port of a vehicle to record certain aspects of driving behavior. This allows an insurance company to offer customers discounted premiums based on low annual mileage or demonstrated safe driving habits.
- **In-vehicle telematics.** Technically, it is possible to integrate mileage recording with existing in-vehicle telematics systems such as GM's OnStar, Ford's Sync, or Toyota's Entune. This would provide the smoothest interface possible for Principals that have a vehicle equipped with a telematics system. However, auto manufacturers have historically been resistant to integrating mileage recording into their telematics systems, so we have not assumed such integration in this analysis. Nonetheless other groups may reach out to automakers, and it is possible that they will allow their telematics systems to run an application by a third party designed to collect data for a road usage charge.

3.3.1 Experience from Principal's Perspective: Automated Distance Charge

The experience of a Principal with Method C would be as follows:

- **Acquisition:**
 - The Principal would register with the responsible government agency or a private account management entity.
 - › A private account management entity would be a private company that agrees to collect road usage charges from the Principal, possibly in addition to offering a range of other value-added services such as automated parking payments, usage-based insurance, or concierge services. The system would

support multiple private account management entities that compete for Principals' business. As this operational concept is being modeled as a postpay concept (although it could also be prepay), registering would typically involve proving credit-worthiness, such as by providing a credit card or linked bank account. Private account management entities would likely not allow unbanked individuals (individuals without bank accounts) to register with Method C.

- › If the State chooses to manage accounts and billing, in addition to or instead of private account management entities, the State would need to choose whether to allow unbanked individuals to register with Method C. It could ameliorate concerns about credit worthiness if it allowed prepayment.
- The Principal acquires a mileage reporting device either from a private account management entity (if they are used), or independently, or from the State. The mileage reporting device is a small electronic device that mounts in a vehicle, connected to the OBDII port, and measures the number of miles driven in three different zones: in-state on public roads, in-state on private roads, and out-of-state.
 - › Depending on the system choices, the mileage reporting device may be provided by a private account management entity or may be acquired independently, e.g., from an on-line or bricks-and-mortar retailer. Such devices are not currently sold at retailers so this would require a change in the marketplace. If the State administers Method C, the policy and operations entity would provide a device and/or a list of approved devices for purchase by the Principal.
 - › Instead of a separate electronic device, the mileage reporting device could also be an application that runs on the Principal's in-vehicle telematics device. However, since auto manufacturers have not yet been willing to support the use of their telematics systems for revenue collection, we have not assumed the availability of this option in the analysis. Such an option could be easily integrated into this system, however, if one or more manufacturers were to begin supporting the program.
 - › Some electric vehicles have nonstandard OBDII ports. Such vehicles might therefore be required to use a telematics-based solution instead of an OBDII-connected mileage reporting device, assuming that a telematics solution becomes available. For those electric vehicles without standard OBDII ports and without telematics support, Method C will not be possible.
- The Private account management entities would notify the policy and operations entity of all vehicles registered with them. The authority can then verify that all vehicles subject to the road usage charge for which the Principals have opted for Method C are registered.
- **Usage (driving):**
 - The mileage reporting device would measure distance driven and also determine the location of travel, e.g., via GPS. Based on electronic location information, the device would differentiate travel between priced and nonpriced zones. For purposes of our analysis we have assumed three zones – within Washington State on public roads, within Washington State on private roads or off-road, and outside of Washington State. The latter two zones would not be priced.
 - The mileage reporting device would never record the specific coordinates of where the vehicle is located at any time. Instead, it would only record total travel by zone.

- The mileage reporting device could also measure fuel consumed (using OBDII data) and/or fuel added to the vehicle (using data from a vehicle electronics system on a telematics device, if available) to compute fuel tax credit.
- The Principal would generally be free to change Private account management entities. If the Principal has received a mileage reporting device for free from his/her current entity in exchange for signing a one- or two-year contract, however, that entity may charge an early termination fee if the Principal tries to leave before the contract is over.
- Data would be sent via wireless communication to either the private account manager or the State, depending on who administers Method C.
- **Paying** (refreshing):
 - The private account management entities and/or the policy and operations entity would periodically (monthly or quarterly) invoice customers for whatever services it provides (e.g., insurance, navigation) in addition to the road usage charges, and would process payments.
 - Principals would be provided credits for fuel taxes paid.
 - Periodically, the private account management entities, if utilized, would remit the amounts due from their customers to the policy and operations entity.
 - Private account management entities would be responsible for collecting the funds due to government from their customers and would guarantee the revenues. If they fail to collect funds owed from Principals, they would assume the loss.
 - The State would retain the right to audit both private account management entities and individual accounts.
- **Deleting** (selling car, moving out of state):
 - The Principal is responsible for paying the road usage charge for the vehicle until it is removed from the DOL vehicle registry.
 - The Principal informs the private account management entity or the State of account closure. Once the mileage recording device is removed from the vehicle, the Principal can inform the private account management entity or the State that the final bill can be sent. The account manager reports the date of final invoicing to the policy and operations entity. If the policy and operations entity determines that there was a period when the vehicle still being driven in Washington with valid registration but without metering mileage and paying charges through an account management entity, it can assess a penalty.

3.3.2 *Experience from Agency's Perspective: Automated Distance Charge*

The operating agency would carry out the following procedures with Method C:

- **Distribution:**
 - New vehicles and used vehicles sold by dealers:
 - › Principals would be informed of account management options (and possibly separate mileage reporting device options) at the time of vehicle purchase by vehicle sales representatives.

- › The vehicle sales representatives would inform the policy and operations entity of the new-vehicle sale.
- › Principals would be given a certain number of days (e.g., 15) to obtain a mileage reporting device and sign up with an account manager (whether private or State administered).
- › Principals that do not register within the specified time will face a penalty.
- › Principals would obtain mileage reporting devices from the State, a private retailer, or directly from a private account management entity.
- Private sales of used vehicles:
 - › The existing Principal is responsible for the road usage charge until removed from the DOL vehicle registry.
 - › The new Principal will be given information about the road usage charge at the time of vehicle registration. Ideally, the old Principal will inform the new Principal about this need, but that cannot be assumed.
 - › The official “start” odometer reading would be required by the policy and operations entity (the start odometer reading should not be self-reported, but rather must be verified by an officer of the State, or possibly an authorized representative such as a DOL agent or auto dealer).
 - › Registration with the State or with a private account management entity would need to be completed within a certain number of days or the Principal would face a penalty.
- Vehicles moving into Washington State:
 - › Principals with vehicles migrating from other states would be given information about the road usage charge at the time of vehicle registration.
 - › The official “start” odometer reading would be required by the policy and operations entity (the start odometer reading should not be self-reported, but rather must be verified by an officer of the State or possibly an authorized representative such as a DOL agent or auto dealer).
 - › Registration with a private account management entity would need to be completed within a certain number of days or the Principal would face a penalty.
- **Operation:**
 - The State and/or private account management entities would be responsible for collecting payments from Principals.
 - The private account management entities would send usage data in monthly reports and payments to the policy and operations entity. The State would collect and summarize its own data from its accounts into monthly reports as well.
 - In the case of private account management entities, such entities would be responsible for paying the policy and operations entity for all miles traveled, even if the Principal does not pay the Private account management entities. In other words, private account management entities would assume the risk of ensuring that their registered Principals pay all required fees.
- **Decommissioning** (car sale, transfer out-of-state):

- The Principal would be solely responsible for removing the vehicle from the DOL vehicle registry, and the Principal would be liable for all road usage charges until the vehicle is officially removed.
- After the Principal informs the private account management entity that the account has been closed, the account management entity can prepare a final invoice and report this date of final invoicing to the policy and operations entity. If the policy and operations entity determines that there was a period when the vehicle was still officially registered but not paying mileage fees through an account management entity, it can assess a penalty on the Principal.
- **Accounting:**
 - Verifying that all vehicles are included in system:
 - › Private account management entities would periodically (weekly or monthly) send reports to the policy and operations entity that list all vehicles that are registered with them. The mileage reporting devices would transmit vehicle identification numbers to the private account management entities to make this report easy to compile. The State would combine these lists with its own list of Principals and compare it with the registry of vehicles eligible for road usage charges.
 - › These reports would highlight vehicles newly registered with the private account management entities, and also include a list of vehicles that have been removed from the registry.
 - › The policy and operations entity’s road usage charge accounting system would maintain a list of all vehicles that should be registered with the road usage charge, and cross-reference this list with the reports from the private account management entities. Any vehicles that are not registered for Method A or B with the policy and operations entity, or Method C or D with a private entity, would be notified by the policy and operations entity of the need to comply or face a penalty (if they have not already incurred a penalty).
 - Verifying that payments are correct:
 - › Private account management entities would periodically send reports to the policy and operations entity listing aggregate mileage by zone by month for each vehicle, as well as aggregate miles by zone, and total road usage charges owed by zone. Precise mileage by zone by day would not be listed, except in cases that the policy and operations entity suspects fraud and makes a specific audit request on given vehicle.
 - › Private account management entities will also provide chargeable miles traveled by Principal, and amounts invoiced by Principal, so the entities can verify each Principal is correctly charged and maintain a running tally for each vehicle.
 - Certification:
 - › Each private account management entity would be subject to initial certification, periodic focused audits, and periodic recertification. Also, each mileage reporting device would be subject to certification and include various anti-tampering measures – for example, transmitting an alert message if the device is disconnected.

3.3.3 Compliance and Enforcement: Automated Distance Charge

Each mileage reporting device would include significant fraud detection measures (listed immediately below under detecting fraud) that encourage compliance. The mileage reporting device transmits signals related to fraud detection – most notably, the approximate timing of the periods that it has been unplugged from the vehicle – to the State or to private account management entities, which would in turn pass this information on to the State. Analysis of this data is the core of Method C compliance and enforcement.

- **Detecting Fraud:**

- Detecting fraud by Principals:
 - › Each mileage reporting device would include anti-tampering measures, including recording and transmitting alerts if the device has been opened or disconnected; cross-referencing vehicle speed and odometer data with GPS data to ensure all miles are being recorded; security measures to determine if the mileage reporting device has been hacked; and security measures to ensure only legitimate communications with the State and/or private account management entities.
 - › The policy and operations entity could demand detailed records of individual vehicles in cases of suspected fraud.
 - › The private account management entity would be motivated to ensure compliance because it would still owe government for miles traveled even if the Principal does not pay.
- Detecting fraud by private account management entities:
 - › Private account management entities would be subject to initial certification, periodic recertification, monthly reporting, and periodic focused auditing to ensure that any attempt at fraud would be detected.

- **Issuing penalties:**

- Principals could be subject to penalties by private account management entities or by the State.
- Private account management entities may issue penalties for late payment if legally empowered to handle such penalties. Alternatively, a private account management entity may not be empowered, but the terms of their agreement with the policy and operations entity would prescribe a process for them to identify any Principal who is suspected of a penalty to the policy and operations entity with supporting information.
- Private account management entities could also handle penalties by terminating the Principal's service agreement and transferring the account to the policy and operations entity for handling. The policy and operations entity may issue penalties for attempts to defraud or for noncompliance. The legislative mandate should specify the specific penalties and their value and the method of appeal or resolution.
- Private account management entities would be subject to certification being revoked and financial penalties in case of fraud.

3.4 Method D – Smartphone Application Road Usage Charge Measurement

This new method has been added as a consequence of new technologies entering the market and in compliance with the Legislature’s directive stating, “in addition to a time permit and an odometer charge, the concept of operations recommendation must be developed to include a means for periodic payments based on mileage reporting utilizing methods other than on-board diagnostic in-vehicle devices.”

In the last 12 months, several companies have marketed a smartphone application for measurement and reporting of road usage charges. Depending on how such an application is utilized, it can support metering options similar to either method B (odometer reading) or method C (metering mileage in different geographic zones). This section will describe how the device operates.

The key to this application is that it provides regular updates of miles traveled to the policy and operations entity for enforcement purposes. The smartphone measures miles traveled whenever the device is turned on and in the subject vehicle. The device knows it is in the subject vehicle through “Bluetooth pairing” – having the device connect to the vehicle with a wireless Bluetooth connection, the same connection that is used to couple phones with hands-free speakerphones in vehicles. This works because the vehicle has a consistent Bluetooth address. The system would work like this:

- The Principal installs the application on his or her smartphone.
- The Principal sets up an account by providing the requested information – either on the phone or on-line from a web site.
- The Principal then pairs the device with the vehicle’s Bluetooth network in the manner described in the vehicle owner’s manual. After this, the device will automatically couple with the vehicle whenever it is turned on and in the vehicle.
- When the vehicle moves, the application computes distance traveled from internal smartphone electronics. It provides regular updates on miles traveled to the policy and operations entity over the smartphone’s cellular connection.
- Principals will not always have their smartphone with them when they drive. Alternatively, the phone may be out of battery power, or simply turned off.
 - To cover miles traveled when the phone is not in the vehicle or turned on but the vehicle is being driven, Principals must provide regular photos of their odometers, taken by the application itself.
 - An initial odometer image is required at sign-up.
 - Then, odometer images are required at whatever frequency the State chooses – monthly, quarterly, biannually, or yearly.
- The application would allow multiple vehicles to be supported by one phone, and the same vehicle to be supported by multiple phones, to maximize convenience for the user.
 - The application will only charge the Principal when driving in the car—it recognizes the car by the Bluetooth MAC address.

- If two people with the car programmed onto their phones are in are in the car, the duplicate mileage can be removed by post-processing if the accounts are linked.
- Several image security features would be included in the application:
 - Pictures must be taken in real time, like images of checks for bank deposit via mobile application.
 - Pictures are only possible with an active Bluetooth link to the vehicle,
 - An initial picture of the vehicle illustrating its make/model will also be required.
 - Further image verification by software may also be desirable.
- The State can invoice for mileage, and proceed in all other respects, similarly to Method B.
- The smartphone application can also be used with Method C. In this case:
 - The smartphone would use GPS location data to determine the location in which the vehicle is located.
 - The Principal could enable or disable the use of location data via the smartphone application.
 - The Principal would only receive credit for driving out of state or on private lands so long as the phone is turned on and in the vehicle and use of location data is enabled.
- Fuel tax credits would always be computed using EPA fuel economy ratings, as the smartphone application does not have access to any engine data from the vehicle.

The companies that market this method are likely to serve as private account management entities. However, if they would license their software for use by the State, the State could also be the account management entity.

This method could involve prepayment or postpayment. However, since a Principal could exploit the concept by consistently forgetting to bring his/her phone into the vehicle, we suggest making it prepay. Prepay would work exactly as with Method B: prepayment at the start of the year for the estimated miles to driven, minus the fuel tax credit.

The team was also asked to investigate the possibility of using a system such as the state's vehicle fleet fuel cards as method to comply with the Legislature's desire to consider a means for periodic payments based on mileage reporting utilizing methods other than on-board diagnostic in-vehicle devices. The team investigated this approach and found it infeasible for this system. A memo describing this evaluation is in the Appendix.

3.4.1 Concept D from the Principal's Perspective

- **Acquisition:**
 - The Principal downloads the application onto his or her smartphone and sets up an account with the private account management entity.
 - If the account is approved, the Principal would then prepay the expected miles to be driven in the next year – generally the amount driven in the previous year – as in Method B. When an estimate is not possible, a standard amount (e.g., 12,000 miles) would be used.
 - Principals' payments for the year would be entered in a road usage charging database that would link to their Vehicle Identification Numbers (VINs).

- When the Principal drives for the first time, he or she opens the application and pairs the phone for the first time with the Bluetooth address in the vehicle. When multiple people share the same vehicle, multiple devices can be paired to the Bluetooth address of the vehicle. Charges registered by any phone that pairs with the vehicle would accrue to the Principal to whom the vehicle is registered.
- The Principal will also be prompted by the application to take an initial smartphone image of the odometer at the time of first Bluetooth pairing with the vehicle. This will serve as the start odometer reading from the perspective of the application.
- Note that the application itself will contain clear instructions to the Principal on how to take a good picture of the vehicle's primary odometer (i.e., not a trip odometer), and that online image processing may be developed to reject unusable images, including images of a trip odometer.
- **Usage (driving):**
 - The Principal and other regular drivers of the vehicle bring their charged, turned-on smartphones into the vehicle when they drive it. The Principal needs no further action during driving.
 - If the Principal wishes to use the smartphone for automated distance charging, they will have to have the phone turned on in the vehicle when driving, with GPS data enabled in the application.
- **Paying:**
 - Principals could prepay for all miles at once, or Principals could choose to pay in installments (e.g., monthly or quarterly) to avoid the need for large individual payments.
 - The Principal will submit pictures of the odometer at regular intervals, at least once a year at registration renewal.
 - The application prompts the Principal to take a picture of the odometer with the smartphone camera and submits the picture via cellular communications.
 - The Principal would be subject to random selection to present the registered vehicle for odometer inspection.
 - The Principal would reconcile charges based on the actual amount of driving – more miles would result in a payment due, and lower miles would result in a refund or application of funds to next year's estimated amount.
 - › If at the end of the year, a Principal has driven a substantially greater number of miles than they estimated for the year, that Principal might be compelled to pay a penalty. However, in case the Principal underestimates the mileage he or she will drive in a given year, and the Principal realizes this fact long before the end of the year, the policy and operations entity could make it possible for the Principal to buy additional miles in order to avoid the penalty.
 - › If the smartphone application is used for most of the driving, the application will compute when the purchased miles will run out and remind the Principal to buy more. In this case, the policy and operations entity should require Principals to buy a minimum number of miles (e.g., 5,000). Repeated underestimation and additional purchases could result in Principals being charged an additional fee.
 - Principals who choose the installment plan would pay their installment at an authorized location or on-line.
- **Deleting (selling car, moving out of state):**

- Principals would remove the vehicle from the road usage charge program at the time of selling a vehicle or moving out of state. Principals could do so via the application on the smartphone. Principals could apply for a refund of the unused portion of the prepaid miles at the time of canceling vehicle registration. A photo of the odometer would be required.

3.4.2 Concept D from the Perspective of the Policy and Operations Entity

- **Distribution:**

- New vehicles:
 - › Owners of vehicles purchased or leased in Washington State would be given information about the road usage charge at the time of vehicle purchase.
 - › Road usage charge purchase would be completed at the time of registration. For Principals opting for this method, registration would not be possible without purchase of a road usage charge mileage permit. This could be done through the private account management entity that supports the smartphone app after registration, or separately, the same as in Method B. An official “start” odometer reading would be required for new vehicles as well as for used vehicle purchases. The starting odometer reading should not be self-reported, but rather verified by an officer of the State or an authorized representative (such as DOL agent or auto dealer) should verify them.
- Vehicles moving into Washington State:
 - › Owners of vehicles moving into Washington State would be given information about the road usage charge at the time of vehicle registration. For Principals opting for this method, registration would not be possible without the purchase of a road usage charge mileage permit. This could be done through the private account management entity that supports the smartphone app after registration, or separately, the same as in Method B. An official “start” odometer required start odometer reading should not be self-reported, but rather verified by an officer of the State or an authorized representative (such as DOL agent or auto dealer).

- **Operation:**

- Monitoring of usage:
 - › Usage would be monitored by regular updates from the private account management entity based on miles traveled when the phone is in the vehicle. This would be coupled with periodic images of the odometer, annual checks where an officer is present (not necessarily required for all vehicles), and possible spot-checks.
- Collection of payments:
 - › In Method D, payment would occur at the time of vehicle registration renewal for the following year. At that time, unused miles would be credited towards the charge for the next year, and payment for any additional miles driven in the previous year (miles driven in addition to the estimate) would be required. Penalties would be possible if the number of additional miles driven exceeds a threshold and if the Principal has not purchased any additional miles to offset the difference.

- › Payment would typically be for a year in advance but could alternatively be structured in a series of more frequent installments (e.g., every three months). Under an installment plan, however, a Principal might be assessed an additional administrative fee for each installment.¹³
- **Decommissioning** (car sale, moving out-of-state):
 - It would be the Principal’s responsibility to notify the private account management entity providing the smartphone application that the vehicle is decommissioned. This entity would in turn notify the policy and operations entity, at which time the road usage charge permit would be canceled with it. Principals could apply for a refund of unused miles at that time.
- **Accounting:**
 - Verifying that all vehicles are included in system:
 - › Whether or not a vehicle is subject to the road usage charge would be computed at the time of vehicle registration. Vehicles subject to road usage charges would be unable to register without purchasing road usage charge miles if the Principal opts for this method.
 - Verifying that payments are correct:
 - › The regular input of the smartphone, coupled with the odometer reconciliation process, would be employed to ensure payments are correct. Spot checks of some vehicles that are self-reporting could also be employed to strengthen fraud deterrence.

3.4.3 Compliance and Enforcement

- **Compliance:**
 - It would be impossible to obtain legitimate vehicle registration tabs or register a road usage charge-eligible vehicle without paying the road usage charge under this method, although allowing principals to pay the road usage charge for a short period of time in order to register their vehicles, then following up with them after the time has elapsed, may be desirable.
 - Annual odometer reporting would be obtained from data provided by the private account management entity and the images of the odometer, and compliance could be further encouraged through spot enforcement. Spot enforcement may only be needed in cases where suspicious circumstances exist, but could also be implemented for a random subset of vehicles.
- **Enforcement:**
 - Detecting Fraud:
 - › Miles reported by the smartphone application itself are not subject to fraud opportunities. Miles traveled when the phone is not in the vehicle or is not operational, however, are similar to miles traveled under Method B.

¹³ As with the time permit, the issue of whether to charge for allowing installment payments is an important decision.

- › Odometer fraud (fraudulently setting the odometer to a false value) is possible, even with many modern vehicles with digital odometers. Spot enforcement (checks by police while issuing other traffic stops) would be possible forms of enforcement to help detect odometer fraud.
 - Digital manipulation of images can be prevented by requiring the images to be taken in real time by the mobile application (in a manner similar to how mobile bank deposits are made).
 - If for some reason this measure should prove insufficient, digital manipulation can be detected automatically through software applications such as izitru (<http://www.izitru.com/>), which detects all but the most sophisticated digital manipulation.
 - › Cross-referencing current odometer values from the smart phone app with odometer values drawn from other sources (e.g., CARFAX reports, records of vehicle repair shop manifests and records) could be another means of detecting fraud. Large deviations from predicted mileage based on a yearly average or on quarterly statistical metrics would also be indicators of potential fraud and could trigger corresponding audit requests.
 - › The application could require users to take pictures of their odometer more than once a year – say, quarterly. This step should not be burdensome for the Principal, as the Principal has a smartphone, and could upload the image via the application. It should typically be a quick task to take and upload the picture.
 - › Having multiple images does not prevent fraud. It minimizes the size and impact of fraud, however, because the fraudster would have to roll back the odometer each time the new image is taken.
- Issuing penalties:
- › Penalties for failure to pay the road usage charge would be issued at the same time as failing to register, but would be in addition to registration violations.
 - › Penalties for odometer tampering already exist at the Federal level (in the Odometer Act), and a gross misdemeanor under Washington State law (RCW 46.37.540).

4.0 Road Usage Charge System Components

This section presents the road usage charge system components from a functional perspective – it delineates a conceptual set of system components and describes what they do. These system components, taken together, will create a system that enables all of the usage scenarios that are subsequently outlined in Section 5.

This functional description of a road usage charging system does not make any assumptions about where these system components are located in terms of institutional responsibility. Certain components may be assigned, for example, to the Washington State Department of Licensing (DOL), the Washington State Department of Revenue (DOR) or the Washington State Department of Transportation (WSDOT). Any discussion of specific institutional responsibilities or potential organizational structures is beyond the scope of this ConOps document. That said, in places the document makes suggestions about an agency where a given function could be conveniently located, but these suggestions are not meant to be taken as definitive decisions.

This section begins with an overview of the road usage charge system components. The remaining subsections describe the functional elements for each of the four main components: Principal account management, processing, compliance and enforcement, and system accounting and management.

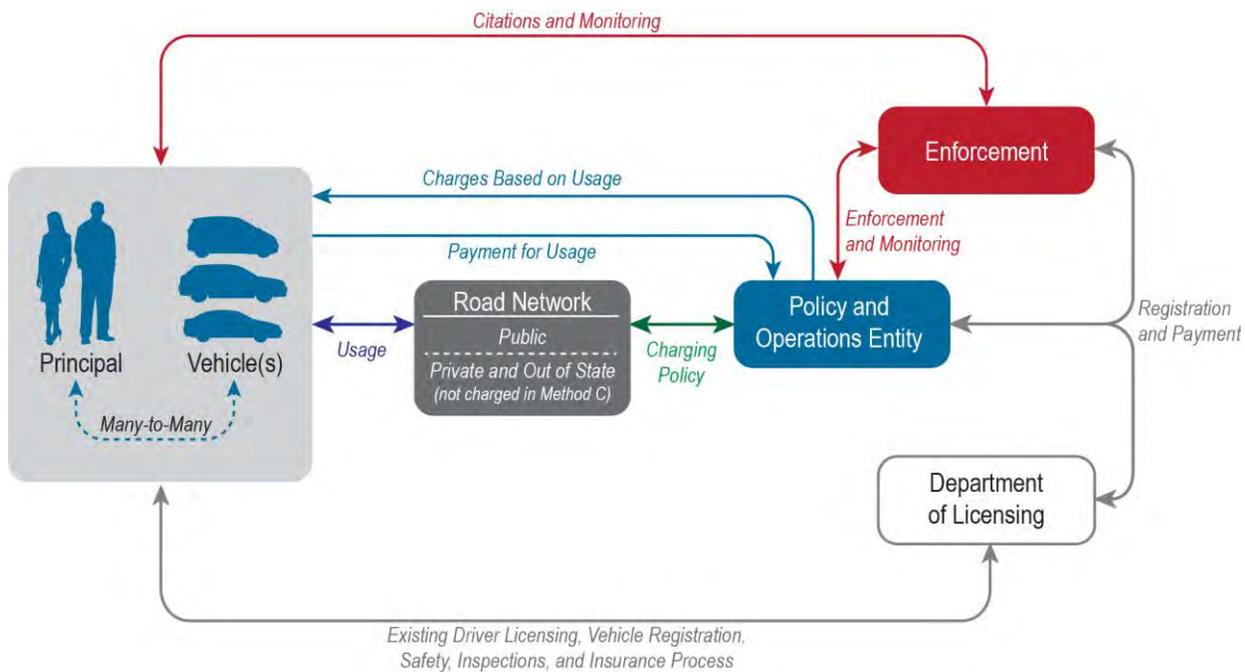
4.1 Overview of Road Usage Charge System Components

The objective of the road usage charge system is to operate, manage, and administer a viable road usage charge program in the State of Washington. The road usage charge system can either be operated entirely by the government or by the government in collaboration with private account management entities. The first of these would be most suitable for Method A or Method B, as described in the previous section, while the latter could be desirable for Method C or Method D. Two figures below illustrate these possible configurations.

It should be emphasized that these diagrams are intended to illustrate functions only, not organizations. In some cases, these diagrams necessarily illustrate entities, but these diagrams are not intended to suggest any final organizational state. The policy and operations entity, for example, could be part of DOL, could be part of WSDOT, or could be an entirely new entity.

First, Figure 4.1 represents the government-centric concept previously provided to the Steering Committee at its second meeting on October 30, 2012.

Figure 4.1 Road Usage Charging System Overview



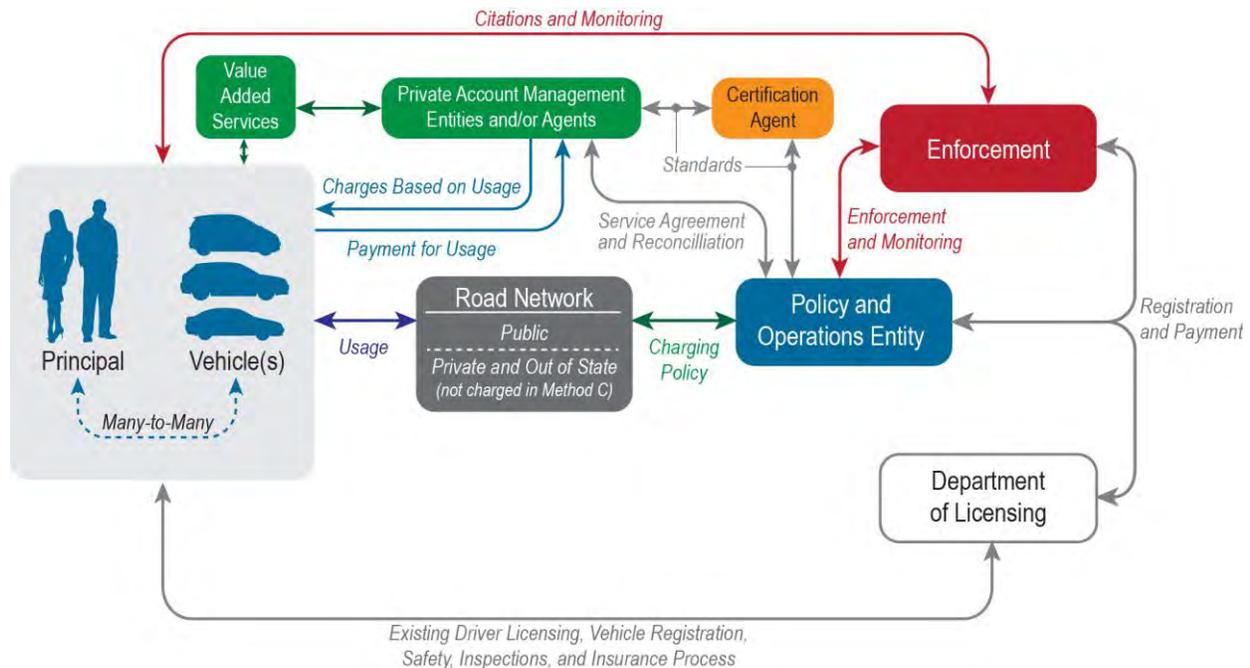
The system usage scenarios included in Section 5 below fully explain the operations of the system depicted here. This diagram illustrates the following stakeholder relationships:

- Principals and their vehicles liable for a road usage charge use the road network consisting of public, private, and out-of-state roads.
- The Principals are authorized to use the road network by virtue of registering their road usage charge-liable vehicles with the policy and operations entity (which could be part of DOL, or part of WSDOT, or a new entity).
 - The policy and operations entity is used to denote whatever entity the Legislature empowers to collect revenue and set policy related to the road usage charge.
- The Principals’ usage of the road network is reported using Method A, B, C, or D as presented in Section 3.
 - If the Principal abides by the laws, they are considered compliant.
 - If the Principal does not follow the laws (does not pay in a timely way or attempts to defraud the system), the enforcement group of the policy and operations entity will issue a citation.
 - The policy and operations entity handles the charges and the payment interface to the Principal.

Alternatively, Washington State may choose to engage private account management entities to handle the Principal-facing activities for Method C or Method D. Private account management entities would be authorized agents of the State certified by the policy and operations entity to assist in the collection of the road usage charges and manage the accounts of Principals who elect to have their accounts handled by such companies. Principals may have an existing relationship with a private account management entities via existing services such as pay-as-you-drive insurance or in-vehicle telematics. This alternate operational concept is depicted in Figure 4.2. In this diagram, the Principal interfaces

with the private account management entities that in turn have a relationship with the policy and operations entity based on a certification process.

Figure 4.2 Road Usage Charging System Overview with Private Account Management Entities



4.2 Functional Elements of the Road Usage Charge System

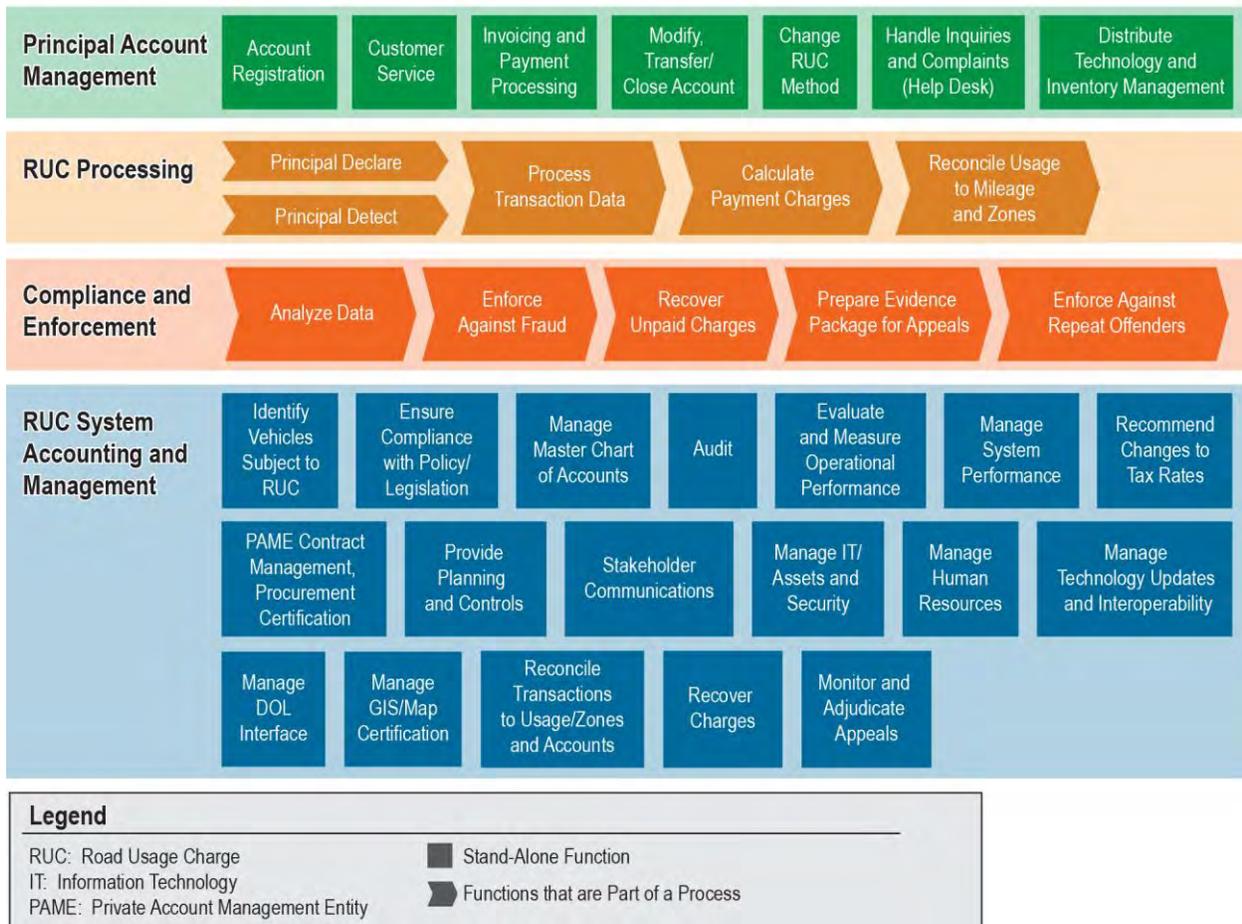
This section describes some of the typical functions of a road usage charge system, to give the reader a flavor of what it could look like, and to provide a context for the usage scenarios in Section 5.

- The functions described in this section are not meant to be comprehensive or prescriptive – a road usage charge system could be designed with more, fewer, or different functions.
- Ultimately, the road usage charge system should be designed to fulfill the usage scenarios in Section 5.
- More than likely, most of the functionality illustrated in this section will be incorporated in the ultimate system design, but a few functions mentioned here may not be included or may be accomplished in a different way.

Figure 4.3 depicts the proposed road usage charge functional elements grouped into four functional areas, which are described in the remainder of this Section. The text:

- Describes some closely related functions (such as the declare and detect functions of charge processing together in the same subsection).
- Does not specifically describe all of the accounting and management functionality.

Figure 4.3 Functional Elements, Grouped into Four Functional Areas



4.3 Principal Account Management

Principal account management functions comprise services provided to Principals. Key account management functions are as follows.

4.3.1 Account Registration

- **Function:**
 - Support Principals opening and creating accounts.
 - Involves collecting registration information from the Principal, including vehicle information such as vehicle identification number (VIN), license plate number, address, phone, and payment information.
- **Considerations:**
 - It may be possible to port this information from existing vehicle registration data from DOL.

4.3.2 Customer Service

- **Function:**
 - A range of services for Principals available via web site and telephone:
 - Provision of general information as well as the ability to view account status, make payments, resolve technical and account issues via a complaint tracking system, and ask questions or post complaints or comments.
- **Considerations:**
 - The policy and operations entity could also provide in-person services at DOL locations or DOL agents.

4.3.3 Invoicing and Payment Processing

- **Function:**
 - Sending invoices to the Principals.
 - Depending on policy parameters, Principals may be able to pay road usage charge via a range of methods, including on-line, telephone, postal mail, and in person. Depending on the method, multiple payment options may be available, including cash, check, debit and credit cards, or direct debit.
 - The road usage charge processing subsystem will capture standard data regardless of the method of payment. For example, checks received via mail or in person will be batch processed, with data (payment amount, date received, account number, payment method, check number) entered into the system automatically whenever possible.
 - On-line payments will capture data as entered by customers.
- **Considerations:**
 - Invoices may be sent by paper or email.
 - Payment may be possible in person at a government facility or DOL agent, by mail, or via web site.
 - Payments may be made periodically.
 - Late payments may be referred to the enforcement arm of the policy and operations entity.

4.3.4 Modifying, Transferring, and Closing Accounts

- **Function:**
 - Modify account characteristics (e.g., name, address, vehicle, road usage charging method of choice) and status (e.g., active, delinquent, closed) based on information received from Principals.
- **Considerations:**
 - Needs to be consistent with operating rules about modifying or closing accounts.
 - Account close-out in particular involves reconciliation of any outstanding balance or credit as well as potentially the need for evidence that the corresponding vehicles is no longer in the possession of the account holder or is no longer legally required to be registered for the road usage charge.

4.3.5 Change Road Usage Charging Method

- **Function:**
 - Support Principals when they want to change their road usage charging method for a given vehicle.
- **Considerations:**
 - This would involve closing out the account for one road usage charging method, including invoicing for final miles traveled, and opening up a new account for the new road usage charging method.
 - It may be undesirable to allow Principals using road usage charging Method A (time permit) to switch to other methods during the year, as this could invite users to exploit the ability to drive at lower cost than intended (e.g., by driving a very high number of miles during the period while on Method A, before switching to the mileage-based Methods B/C/D.
 - › If the policy and operations entity does decide to allow switching from Method A, then it may be beneficial to have a start-of-year official odometer reading for that account to screen for such potential exploitation.
 - In the case of switching from Method B, C, or D to Method A, it may be desirable to require the Principal to restart the 12-month billing period at the time of the change, instead of allowing the remainder of the existing 12-month period only to be covered under Method A, as this would invite users to drive more cheaply than intended for similar reasons to the above.
 - › Instead of restarting the 12-month cycle, the State could require users to purchase Method A for the following 12-month cycle in addition to the remainder of the current year.
 - › Alternatively, the State could simply forbid switching in and out of Method A until the end of the 12-month cycle.

4.3.6 Handle Inquiries and Complaints (Help Desk)

- **Function:**
 - Provide service to members of the public who are not paying road usage charge (non-Principals) who may soon become Principals. This activity includes maintaining a web site and phone-based customer service functions for noncustomers with inquiries or complaints about the road usage charge system.
- **Considerations:**
 - May be integrated with the customer service function, but specific information/replies should be prepared for noncustomers.

4.3.7 Technology and Inventory Management

- **Function:**
 - This function includes maintaining inventory and carrying out inventory controls for road usage charge mileage reporting devices.

- **Considerations:**

- This function includes forecasting future equipment needs and the timely ordering of that equipment to ensure sufficient inventory is maintained.
- This function includes testing equipment received from suppliers, as well as replacement of malfunctioning or inoperative units.

4.4 Road Usage Charge Processing

Processing road usage charging involves the interface between the “front end” or Principal-facing aspects of road usage charging and the accounting “back end” or data and payment processing analysis. Details are described below.

4.4.1 Principal Declare, System Detect

- **Function:**

- Collectively, these two activities refer to the collection of mileage data from Principals.
- For Methods B and D, Principals self-declare the amount of miles they plan to drive or have driven..
- For Method C (and possibly D), in-vehicle equipment automatically detects mileage.

- **Considerations:**

- Declarations for Methods B and D would generally be handled once per year, or at shorter installments.
- Detection for Method C (and possibly D) would occur periodically throughout the year and be differentiated according to zone (in-state on public roads, or otherwise).

4.4.2 Process Transaction Data

- **Function:**

- This function involves the collection, storing, and transmission of data relating to mileage charge liability, including validating and collating records, and other related processes to prepare charge data into a suitable format.

- **Considerations:**

- Data processing may be either manual or automated, depending on the road use charging method.
 - › For vehicles choosing Method C, the system receives data in a digital format compliant with the system’s messaging standards (i.e., a “mileage message”).
 - › For vehicles choosing Method B, the system will receive data directly from customers or third parties manually via web form entry, hand-written mail-in notices, or telephone.
 - › Vehicles under Method A provide no data.
- This function will take all data collected under Methods B, C, or D, regardless of the medium, and convert them into standard data elements needed for calculating and assessing charges.
- Data validation occurs as part of this function.

- › For example, the road usage charge system will validate that the data elements received (e.g., via a standard mileage message) are complete, that data elements match (e.g., account number and VIN), that the date and accumulated miles are incrementing logically, and that no error codes exist that might indicate missing mileage.

4.4.3 Calculate Charges

- **Function:**

- After collecting and processing data from Principals, the next step involves calculating charges owed as well as credits or offsets based on a rate table, applying charges and credits to an account, calculating amounts owed or refunds due, assessing a charge or issuing a refund. The result of this automated back-end function is an invoice and account statement that can be mailed, emailed, or otherwise delivered to an account holder for payment. This could include a refund check or refund direct deposit for instances when a refund is owed and where policy and regulations allow for refunds rather than for credits to carry forward to the next billing cycle.
- For Method A, the road usage charge system will generate an invoice prior to the registration renewal date each year with a new charge corresponding to the current annual fee, as determined by policy-makers. This will be sent to the Principal allowing for sufficient time for payment before the deadline. Should policy allow for periodic payments under Method A, the system will generate invoices more frequently based on prorated charges for any Principals choosing the periodic option.
- Under Method B, a Principal will pay the estimated road usage charge in advance, which in turn will be posted to the account (see discussion of processing road usage charge payments below). If the prepayment is sufficient to cover charges incurred at the outset of the next reporting cycle, the road usage charge system will send an account statement along with a request for the next cycle's estimated road usage charge prepayment, with any overpayment from the previous year credited towards the next year's estimated road usage charge prepayment. Alternatively, it may include an invoice with estimated payment due, calculated automatically by the road usage charge system based on mileage incurred in the previous year.
- For Method C, the road usage charge system will continuously calculate charges owed and credits due as data are received, but will issue invoices only periodically either according to a minimum time schedule (e.g., quarterly) or once the account has exceeded a threshold balance (e.g., \$100).
- In Method D, like Method B, the Principal will pay estimated road usage charge in advance (whether or not the Principal intends to use location determination technology). This payment will be posted to the account (see discussion of processing road usage charge payments below). At the end of the year, the Principal submits a current odometer reading. If the prepayment was sufficient to cover all charges incurred at the outset of the next reporting cycle, any remaining funds are credited against the next year's mileage. If the prepayment was insufficient, the road usage charge system will demand payment for the extra miles, possibly with penalties if the differential was significant.

- **Considerations:**

- This step is automated, completed by accounting programs running on central servers. Only when the automated system determines that an unusual circumstance has arisen is human intervention needed.

- **Considerations:**

- Mileage rates are provided by the policy and operations entity and may be updated over time.

4.4.4 Reconcile Usage to Mileage and Zones

- **Function:**

- This function applies only to Principals using Method C and D with location data.
- The objective is to verify that the total mileage reported by each individual is equal to the sum of the mileage reported as in-state on public roads, in-state on private roads, and out-of-state.

- **Considerations:**

- This function is automated, completed by accounting programs running on central servers. Only when the system determines that an unusual circumstance has arisen is human intervention needed.

4.5 Compliance and Enforcement

Compliance and enforcement activities involve analyzing data to determine suspected cases of noncompliance, contacting Principals to audit or justify their records, and pursuing enforcement activities such as penalties against Principals who are found to be noncompliant. Compliance and enforcement activities vary by operational concept:

- Method A – enforcement activities for individuals in Method A are covered in the annual registration activities. For Principals opting for Method A, it is impossible to evade miles; the sole issue is whether or not a Principal has paid for the upcoming period.
- Method B – the enforcement group observes year-on-year trends in reported odometer readings and verifies that odometer readings by officers or authorized individuals are in line with the estimated readings made by the Principal. The group may ask Principals why large drop-offs in reported mileage have occurred. The group may also perform spot checks of odometers.
- Method C – enforcement activities for Principals under Method C would mainly involve the account manager (public or private, if available) monitoring activities via data from the on-board unit, including reported mileage along with any alerts sent by the mileage reporting device (e.g., that the device was disconnected or physically tampered with).
- Method D – as with Method B, the enforcement group observes year-on-year trends in reported odometer readings and verifies that odometer readings by officers or authorized officials are in line with the photographed readings made by the Principal. The enforcement group may also reference any miles reported using location determination technology. The group may ask Principals why large drop-offs in reported mileage occur, and may also perform spot checks of odometers.

Full details of the enforcement activities are covered in the enforcement usage scenarios in Section 5. The following activities are the primary enforcement functions of the road usage charge system.

4.5.1 Analyze data to find and verify infractions

- **Function:**

- This activity involves analyzing trends in data to determine if there is any suspicious activity in an account that requires further follow-up by the enforcement group.
- **Considerations:**
 - Most of this activity will be done automatically by computer algorithms established and calibrated by the enforcement group.
 - For Method B and D, this activity involves reviewing the mileage driven by each Principal and looking for anomalies such as large drop-offs in the amount of miles driven.
 - For Method C, it involves reviewing the reports from the devices and determining if fraud is suspected. This might result from device itself reporting a fraud attempt, or because the device has been disconnected too often or for long periods of time.
 - For Method D, this function involves reviewing the reports from smartphones and determining if fraud is suspected, along with analysis of the images of the odometers.

4.5.2 *Enforce Against Fraud*

- **Function:**
 - When activity exceeding predetermined thresholds is found in the Data Analysis step, the enforcement group will ask the Principal (via email, phone, or postal mail) to explain the reasons for the suspicious activity.
 - Alternatively, the enforcement group may call for an audit or may ask an enforcement officer to visit the individual for a routine odometer check. If the Principal cannot adequately explain the discrepancy, or if the officer measures the odometer at a much higher value than reported by the Principal, the enforcement group proceeds to the next function, recovering the road usage charge.
- **Considerations:**
 - Unlike the preceding step (data analysis), this activity involves human interaction—looking at the algorithm output to determine that an infraction has occurred, and initiating an audit or requesting more data from the Principal.

4.5.3 *Recover Unpaid Charges*

- **Function:**
 - This activity involves sending a penalty notice to a Principal suspected of fraud.
 - The penalty notice includes charges for the miles traveled that the Principal is suspected of evading, and a fine component.
 - The Principal will be offered the chance to appeal the penalty.
 - If an odometer is accurate, the miles traveled while evading can be measured exactly. If it is not accurate (in case of odometer rollback), a standard penalty may be used.
- **Considerations:**

- Depending on the size of the penalty, this could include forcing the Principal to transition to Method A – unlimited driving – for the year, since that would certainly make up for the evaded miles.

4.5.4 Prepare Evidence Package for Appeals

- **Function:**

- Some Principals suspected of evading road usage charge will want the opportunity to demonstrate their innocence. The intent of this function is to support appeals in a quick and easy manner, outside of the court system, by preparing evidence packages that an appeals group will use when they rule on appeals. Note that the enforcement group would not execute appeals themselves, for the same reason that policemen do not adjudicate traffic tickets—lack of objectivity.

- **Considerations:**

- The evidence package will contain all the raw evidence needed to determine that an infraction had occurred, as well as an explanation of how they reached their conclusion.

4.5.5 Enforce Against Repeat Offenders

- **Function:**

- This activity involves placing increased scrutiny on and demanding increased penalties of repeat offenders.

- **Considerations:**

- The road usage charge system should flag the record of every Principal who has been determined to have evaded the system.
- This flag should increase the likelihood of the Principal being audited.
- It should also increase the penalties the Principal receives for any future evasion attempt.

4.6 Road Usage Charge System Accounting and Management

The road usage charge system accounting and management category includes 20 functional elements covering accounting activities spanning both aggregate financial and road usage information. It also involves a series of management activities. This subsection discusses just a subsection of these functions.

4.6.1 Identify Vehicles Subject to Road Usage Charge

- **Function:**

- Policy (legislation) will determine which vehicles are subject to road usage charge, but this translates into the need for a function that identifies those specific vehicles subject to road usage charge from among the entire population of vehicles.
- Using established policy criteria, the road usage charge processing system will identify subject vehicles and notify their corresponding owners or lessees of the need to register for road usage charge.

- Those vehicles failing to do so could be subject to enforcement action such as canceled registration, roadside penalties, or other mechanisms as determined by policy-makers.

- **Considerations**

- DOL is the most logical and reliable source of existing data on vehicles and their characteristics, which could be used to address this function either through the tab renewal (registration) process or through title transactions.

4.6.2 *Ensure Compliance with Policy / Legislation*

- **Function:**

- This function involves actions to ensure compliance with law, policy, and regulation governing the policy and operations entity by law. The duties and responsibilities of the policy and operations entity derive from the empowering legislation and any associated regulations.

- **Considerations:**

- This function includes the possibility of suggesting changes to road usage charge enabling law, regulation, and policy.

4.6.3 *Manage Master Chart of Accounts*

- **Function:**

- This is the primary accounting activity of the road usage charge system.
- It includes accounting for all vehicles in the state liable for the road usage charge.
- Vehicles are typically sorted by VIN, and total miles by vehicle are tracked.
- This function also includes recording aggregate mileage by private account management entities, and aggregate mileage by region (e.g., in-state public roads, in-state private property, and out-of-state).
- Finally, it includes financial accounting – making sure aggregate sums received by the policy and operations entity align with the sums that the policy and operations entity should expect to receive.

- **Considerations:**

- This is classical financial accounting with the addition of tallying vehicle mileage.

4.6.4 *Audit*

- **Function:**

- Auditing in this case involves internal and external process audits of the overall system to be sure it is functioning properly.

- **Considerations:**

- This function involves both self-evaluation and external evaluation.

- External evaluation may be triggered by a poor performance in evaluations or by a desire to improve overall system performance and accounting.

4.6.5 Evaluate and Measure Operational Performance

- **Function:**

- This function involves evaluation and measurement of the policy and operations entity in the performance of its goals and mission, including:
 - › Financial goals and financial performance.
 - › Policy goals (as described in Section 2).
 - › A formal and independent operational review each year of each function and process. The review would include performance, and the effectiveness and efficiency of the whole organization. Metrics and key performance indicators should be kept, refined and evaluated yearly during the initial life of the organization. The report should be published after it is reviewed and approved by the Legislative committee responsible for the oversight of the policy and operations entity.

- **Considerations:**

- After the first several years, the evaluation and measurement can continue to be an independent contract awarded to an outside entity, or it can continue to be done by the policy and operations entity. Either way, there is a need to manage and monitor the ongoing refinement of key performance indicators in the organization.

4.6.6 Manage System Performance

- **Function:**

- This function includes the management of the entire universe of road usage charge functions.

- **Considerations:**

- This function encompasses all aspects of system performance, but its major foci are financial performance (as measured by revenues, costs, efficiency of revenue collection, etc.) and operational performance (as measured by customer satisfaction, and other measures included in the preceding function).
- This function governs all managers involved in the road usage charge program, but final authority and responsibility for performance rest with the director of the policy and operations entity.

4.6.7 Recommend Changes to Tax Rates

- **Function:**

- This function provides the means for the policy and operations entity to monitor and manage the effects of the road usage charge and on the revenue streams. New rates must be publicized and implemented, including publication of official rates and effective dates to private account management entities (if used).

- **Considerations:**

- Final decisions about rates will always be made either by the legislature (or delegated by them to another body), but this function involves providing analysis

4.6.8 *Private Account Management Entity Procurement, Management, and Certification*

- **Function:**

- This function includes the procurement, management, and certification of private account management entities contracted by the state (if this approach is used) to handle Principal accounts, technology, and value-added services.

- **Considerations:**

- This function reviews the performance of each private account management entity through key performance indicators and updates and follows up with each if the performance or contractual obligations fall short of desired levels.
- This function may also in some cases include termination of third parties that do not abide by the contract obligations and performance standards set for them.

4.6.9 *Provide Planning and Controls*

- **Function:**

- This function handles the future planning and controlled growth of the policy and operations entity itself. It charts the vehicle fleet and the eligible vehicle classifications into the future to address the needs of the policy and operations entity to meet its obligations under the law. In addition, this function will address trends in the market and possible new vehicle classes that should be recommended for inclusion in the road usage charge program.

- **Considerations:**

- This function should also address the competitive market needs of the private account management entities (if used) and work closely with the contract management function to identify expansion or contraction of the marketplace, creation of new value-added service providers, and identification of data aggregators who can better service the Principals. This function will also work closely with other planning groups within state government for fostering a cohesive and responsive environment across the state.

4.6.10 *Stakeholder Communications*

- **Function:**

- This function includes the outreach activities of the policy and operations entity. It involves provision of communications and public relations of the policy and operations entity's mission and responsibility to the public.
- It will involve managing and maintaining outreach activities in the form of marketing materials and general educational materials to the Principals and stakeholders involved in road usage charging. (such as the public, legislators, private account management entities, DOL, WSDOT, and Principals)

4.6.11 Manage Information Technology (IT) Assets and Security

- **Function:**
 - This function includes maintaining, updating, and providing security measures for all IT assets. It can be integrated into the overall IT and communications structure of state agencies, but the unique character of road usage charge transaction processing, cloud computing, communications, security requirements for Principal accounts, and privacy requirements for Principal data lend themselves to a dedicated and separate function.
 - The IT functions will manage and run the policy and operations entity's overall IT architecture and keep it both in operation and updated with technology developments in both the hardware and the software services required.

4.6.12 Manage Human Resources

- **Function:**
 - This function includes personnel management activities of the policy and operations entity.
- **Considerations:**
 - This function will either be executed by the parent agency of the policy and operations entity, or if the policy and operations entity is stand-alone, it will be part of the stand-alone entity.

4.6.13 Manage Interoperability and related Technology Updates

- **Function:**
 - This activity involves ensuring that any future financial and data exchanges with other states to support are maintained and accurate.
 - It also involves ensuring that all technology used, especially mileage reporting devices, are up-to-date. It may involve updating device software, or changing hardware, and includes communications with private account management entities on these topics.

4.6.14 Manage Interface to DOL database

- **Function:**
 - This activity involves insuring that the DOL database connection to the road usage charge program is maintained and accurate.

4.6.15 Manage GIS / Map Certification

- **Function:**
 - This function ensures that the digital maps used in Methods C and possibly D are compliant with a set of standards that the policy and operations entity will establish.
- **Considerations:**

- Most digital maps have good representations of state lines and of all public roads, but these maps need regular updating (e.g., once a year).
- The mapping method needs to calculate off-road/private-road areas correctly.
- It will likely be preferable to certify digital mapmakers (e.g., Navteq, Tele-Atlas/TomTom, Google) instead of the maps themselves (since they are updated constantly), so this function may mean reviewing the processes used by the mapmakers.

4.6.16 Reconcile Transactions to Usage/Zone and Accounts

- **Function:**

- The objective in this function is to verify that the total mileage reported by each private account management entity is equal to the sum of the mileage reported as in-state on public roads, in-state on private roads, and out-of-state.

- **Considerations:**

- This is similar to the function included above in the Road Usage Charge Processing category, but it involves looking at the comprehensive inputs of the private account management entities instead of that of individuals.
- This function is automated, completed by accounting programs running on central servers. Only when the system determines that an unusual circumstance has arisen is human intervention needed.

4.6.17 Recover Charges

- **Function:**

- This function involves assembling and confirming charges are paid and tracking, accounting, and processing usage charges centrally.

- **Considerations:**

- This function is the final verification that all Principals have paid what they owe.

4.6.18 Monitor and Adjudicate Appeals

- **Function:**

- This function involves the establishment of an entity to ensure that violations or perceived unfair charges can be appealed. While the policy and operations entity handles the evidentiary files to back up its claims, an independent body should carry out the actual handling of appeals and privacy concerns. This independent body is a “safety valve” for the overall system and provides the Principal a means to address any inequitable practices, perceived or real.

- **Considerations:**

- In this function, the policy and operations entity sets up and manages an interface with the entity that manages the appeals.

Note that some of the policy and operations entity functions might also be carried out by private account management entities in the cases of Methods C and D. As with prior work, we have assumed that the policy and operations entity will handle all aspects of the system, but acknowledge the possibility of other approaches. We address the implications of using private account management entities in Section 6.

5.1 Identify Vehicles That Should Pay Road Usage Charge

- **Context:**
 - Legislation authorizing a road usage charge should specify which vehicles are subject to the charge and how they are to be phased in. During this transition, which may one or many years, some vehicles will be responsible for paying a road usage charge, while others will not. The policy and operations entity will need to make this distinction. This activity will use information provided by the DOL vehicle database and will need to be updated as new vehicles are registered and other vehicles have their registrations changed or canceled.
- **Principal activities:**
 - None.
- **Policy and operations entity activities:**
 - Identify those vehicles that are subject to the road usage charge based on the criteria in the enabling legislation.
 - › This activity should be completed on a daily basis, as vehicles change registration status.
 - Maintain and update a list of vehicle makes and models subject to the charge.
 - › Publish on the road usage charge web site and also make available to car dealers.
 - Maintain a list of categories of vehicles that are liable for the road usage charge but do not have OBD II ports or have nonstandard ports.
 - Reach out to automakers of electric vehicles to try to allow telematics programs to support road usage charging. Principals for vehicles without standard OBDII ports or telematics platform support will not be able to choose Method C, the automated distance charge.
- **Private account management entity activities:**
 - None.
- **Issues:**
 - The criteria need to be specific enough so that there is no doubt about which vehicles are required to pay a road usage charge and which methods each vehicle is eligible for.
- **Possible Changes Over Time:**
 - If all vehicles are subject to a road usage charge, this scenario will no longer be relevant.

5.2 Enroll a Vehicle in the Road Usage Charge

Whenever a vehicle becomes subject to the road usage charge system, the Principal must register the vehicle with the policy and operations entity.

5.2.1 Provide Public Information

- **Context:**
 - Washington residents should easily be able to learn about the road usage charging program, about what vehicle models and model years are liable for the charge, and about available payment methods.
- **Principal activities:**
 - The Principal must learn about the road usage charge program. Road usage charge program information can be included in vehicle registration renewal notices, and/or an additional mailing in advance of the registration renewal notice. The Principal can also learn about the program by going to the web site, by reading a brochure, or by calling the help line.
- **Policy and operations entity activities:**
 - The policy and operations entity must:
 - › Design and keep up-to-date a user-friendly web site and possibly a social media presence with complete information on how the program operates.
 - › Prepare one or more brochures introducing the road usage charge and directing readers to sources for more information.
 - › Operate a road usage charge help telephone service.
 - › Prepare materials to be used by auto dealers, including enrollment forms.
- **Private account management entity activities:**
 - None.
- **Issues:**
 - Information needs to be accurate, understandable, available, and up to date
 - Communication systems must be robust, and links to the proper information should be available on the WSDOT and DOL web sites.
- **Possible changes over time:**
 - As the system matures and applies to more vehicles, the details of the operational concepts may change. Thus, the web site literature should be updated on an ongoing basis as needed.

5.2.2 Enroll a Vehicle Newly Purchased from an Auto Dealer in the Road Usage Charge

- **Context:**

- A Washington resident purchases or leases a new vehicle subject to road usage charge from a dealer and must register in the road usage charge system. The dealer may choose to facilitate road usage charge registration.
- **Principal activities:**
 - Receive, read, and sign a form provided by the auto dealer (but developed by the policy and operations entity) that explains road usage charge options.
 - › The car dealer will give the road usage charge information brochure to the car buyer and forward the car buyer’s information (including odometer reading of the vehicle when it left the lot) to the policy and operations entity’s accounting system.
 - Principals may also choose a road usage charge method and set up an account immediately at the car dealer, if the car dealer chooses to support that option.
 - If they choose to support that option, dealers would work with the buyer to fill out the form and forward it to the policy and operations entity along with registration information.
 - If the Principal chooses Method C, they (or the dealer, if they choose to support that option) must obtain and install a mileage reporting device in the vehicle or work with the vendor of their mileage reporting device to enable it for road usage charging.
- **Policy and operations entity activities:**
 - Provide car dealers with road usage charge paperwork and designate a process for transmitting information to the agency.
- **Private account management entity activities:**
 - A private account management entity will set up a new account for any Principal that opts for Method C and selects the private account management entity as its service provider.
- **Issues:**
 - The policy and operations entity will need to decide the maximum time after vehicle purchase for choosing the road usage charge method along with any penalties or remedies for Principals that do not adhere to this timelines.
- **Possible changes over time:**
 - The policy and operations entity will need to maintain communications with dealers if the criteria for vehicles liable for the road usage charge program change over time.
 - The policy and operations entity will also need to decide who pays for the mileage reporting device when a Principal opts for Method C. It could possibly be paid for by the Principal, by the policy and operations entity, or by a private account management entity (e.g., in return for a two-year contract).

5.2.3 *Enroll a Vehicle Newly Purchased from a Private Seller in the Road Usage Charge*

- **Context:**

- A Washington resident purchases a vehicle subject to road usage charge from a private seller and must register in the road usage charge system.
- **Principal activities:**
 - The Principal registers the vehicle. Ideally, the Principal will have been told by the previous owner about the road usage charge, but this will not always be the case.
 - Before or during registration, the Principal reads information available on the road usage charge system.
 - At the time of registration, the Principal chooses a road usage charge method and enrolls.
 - If the Principal chooses Method C, they must obtain and install the mileage reporting device in the vehicle or work with the vendor of their mileage reporting device to enable it for road usage charging.
- **Policy and operations entity activities:**
 - Provide information on the road usage charge to residents.
 - Add or update information on the transferred vehicle in the list of vehicles paying road usage charge, including the new owner and the road usage charge method chosen.
 - Contact DOL for the odometer reading on the vehicle title, which will be recorded with the vehicle account.
- **Private account management entity activities:**
 - A private account management entity will set up a new account for any Principal that opts for Method C and selects the private account management entity as its service provider.
- **Issues:**
 - The policy and operations entity will need to decide the maximum time after vehicle purchase for choosing the road usage charge method along with any penalties or remedies for Principals that do not adhere to this timeline.
- The policy and operations entity will also need to decide who pays for the mileage reporting device when a Principal opts for Method C. It could possibly be paid for by the Principal, by the policy and operations entity, or by a private account management entity (e.g., in return for a two-year contract).
- **Possible changes over time:**
 - None foreseen.

5.2.4 *Vehicle Owner Opt's in to Paying the Road Usage Charge*

- **Context:**
 - If the road usage charge does not apply to all vehicles at the start of the program, some drivers of vehicle not liable for the road usage charge may wish to pay the road usage charge in return for rebated fuel taxes. The policy and operations entity may wish to allow owners of such vehicles to opt in to the road usage charge system. Note, however, that this could result in reduced overall revenue given that vehicles with poor fuel economy would likely pay less in road usages charges than they do with fuel taxes.

- **Principal activities:**
 - The new Principal must register the vehicle for road usage charge, similar to the process for registering a vehicle that is liable for the charge.
- **Policy and operations entity activities:**
 - The policy and operations entity will need to develop the opt-in registration form, including any criteria governing the ability to opt in to the program. Older and less fuel-efficient vehicles may not be allowed to opt-in (due to their paying more fuel tax). Road usage charge legislation will need to include these criteria. Also, the road usage charge legislation may cap the number of vehicles opting in to the program.
 - The policy and operations entity will need to review and approve or decline each vehicle opt-in registration request.
- **Private account management entity activities:**
 - A private account management entity will set up a new account for any Principal that opts for Method C and selects the private account management entity as its service provider.
- **Issues:**
 - The policy and operations entity will need to decide who pays for the mileage reporting device when a Principal opts for Method C. It could possibly be paid for by the Principal, by the policy and operations entity, or by a private account management entity (e.g., in return for a two-year contract).
- **Possible changes over time:**
 - The criteria for opting in may change, especially in light of any policy or law changes.

5.2.5 *Vehicle Becomes Liable for Road Usage Charge after Initial Purchase*

- **Context:**
 - The road usage charge program is likely to be phased in over a number of years with new Principals needing to register for the road usage charge.
- **Principal activities:**
 - Enroll the vehicle in the road usage charge and select a payment method at the time of registration renewal.
 - In-person registration will likely be desired, in order to obtain an official “start” odometer reading. However if an official odometer reading can be obtained in another way (e.g., from an authorized individual such as a DOL agent or gas station owner), the new Principal may also register on-line.
 - If the Principal chooses Method C, they obtain and install the mileage reporting device in the vehicle or work with the vendor of their mileage reporting device to enable it for road usage charging.
- **Policy and operations entity activities:**
 - The policy and operations entity will need to scan the DOL database at appropriate periods, depending on the transition plan by which vehicles are phased into the road usage charge, for vehicles that are required to enroll

in the road usage charge. The policy and operations entity will need to coordinate with DOL to send out a letter and road usage charge brochure.

- The policy and operations entity will need to process each application and follow up with each individual registration.
- **Private account management entity activities:**
 - A private account management entity will set up a new account for any Principal that opts for Method C and selects the private account management entity as its service provider.
- **Issues:**
 - The policy and operations entity will need to decide who pays for the mileage reporting device when a Principal opts for Method C. It could possibly be paid for by the Principal, by the policy and operations entity, or by a private account management entity (e.g., in return for a two-year contract).
- **Possible changes over time:**
 - When the number of makes/models of vehicles liable for the road usage charge ceases to expand, this scenario is no longer relevant.

5.2.6 *Person Moves into State and Registers Vehicle Liable for Road Usage Charge*

- **Context:**
 - The owner or lessee of a vehicle liable for the road usage charge moves to Washington from another state or country and is required to enroll in the road usage charge program.
- **Principal activities:**
 - The new resident registers the vehicle.
 - Before or during registration, the new resident reads information available on the road usage charge system.
 - Either at the time of registration, or within a predetermined time period (e.g., two to four weeks), the new resident chooses a road usage charge method and enrolls.
 - If the new resident chooses Method C, they obtain and install the mileage reporting device in the vehicle or work with the vendor of their mileage reporting device to enable it for road usage charging.
- **Policy and operations entity activities:**
 - Provide information to new residents.
 - Add the transferred vehicle to the list of vehicles paying road usage charge, including the road usage charge method chosen.
 - Contact DOL for the odometer reading on the vehicle title, which will be recorded with the vehicle account.
- **Private account management entity activities:**
 - A private account management entity will set up a new account for any Principal that opts for Method C and selects the private account management entity as its service provider.

- **Issues:**

- New state residents are required to register and title their vehicles in Washington State within 30 days of moving to Washington.
 - › Anecdotal evidence indicates that many new residents ignore this requirement. Owners of vehicles liable for the road usage charge may be even more likely to ignore this requirement than others since they could avoid paying road usage charge for some time.
 - › To deal with this issue, the policy and operations entity should consider adding penalties in cases where new residents bring proof of residence that is older than 30 days.
 - › So long as out-of-state vehicles are not subject to the road usage charge, it will be very difficult to proactively enforce against vehicles that are overdue for being registered in the state.
- The policy and operations entity will need to decide who pays for the mileage reporting device when a Principal opts for Method C. It could possibly be paid for by the Principal, by the policy and operations entity, or by a private account management entity (e.g., in return for a two-year contract).

- **Possible changes over time:**

- If the state from which a resident is moving also has a road usage charge, there may be ways to coordinate the transfer between states.

5.3 Principal Changes Choice of Road Usage Charge Method

- **Context:**

- This scenario occurs when an existing Principal decides to change their road usage charge method.

- **Principal activities:**

- For changes from B to C or D:
 - › The Principal should register for the automated distance charge with the policy and operations entity (or if available, private account management entities).
 - › Principals may discover that their vehicle is incompatible with the automated distance charge (no or nonstandard OBDII port / telematics requirements), or that they do not pass any possible credit requirements needed for Method C.
 - › Principals will be required to give an odometer reading on a paper or Internet form at the time they install their road usage charging device.
 - › Alternatively, the policy and operations entity may require the Principal to have an odometer reading by an officially designated agent.
 - › The policy and operations entity will register the change in their database when it receives the application.
 - › The policy and operations entity will send a final invoice to the customer for the miles driven under Method B.

- › The policy and operations entity will record the final odometer reading under Method B as a basis for future enforcement.
- B to A:
 - › The Principal should fill out an application to the policy and operations entity to switch.
 - › The policy and operations entity must decide whether to allow a prorated version of Method A (i.e., charge for a partial year corresponding with the amount of time remaining until the Principal’s annual renewal), or whether to require that the Principal pay for all 12 months of Method A, starting from the time that the individual switches.
 - › After the policy and operations entity receives the application to switch from Method B to Method A, they record the individual’s change in their database. The agency then sends the final invoice to the Principal for the miles driven under Method B.
- C or D to B:
 - › The Principal should file an application to the policy and operations entity specifying the odometer reading at the time of the switch.
 - › In the case of private account management entities, the Principal will need to notify the entity, which will fill out the application on behalf of the Principal.
 - › If official odometer readings are required for closeout, the Principal will go to a location where the representative can remove the mileage reporting device and make the official recorded closeout odometer reading.
- C or D to A:
 - › The Principal should fill out an application with the private account management entity to switch.
 - › The policy and operations entity must decide whether to allow a prorated version of Method A (i.e., charge for a partial year corresponding with the amount of time remaining until the Principal’s annual renewal), or whether to require the Principal to pay for all 12 months of Method A, starting from the time that the individual switches to Method A.
 - › After the policy and operations entity receives the application to switch from Method B to Method A, they record the individual’s change in their database and send the final invoice to the customer for the miles driven under Method B.
- **Policy and operations entity activities:**
 - Create change of Method applications;
 - Receive change of Method applications from Principals;
 - Provide a method for official odometer readings (by state representatives or certified readers) if desired;
 - Perform accounting associated with changing Methods, including recording odometer readings as necessary; and
 - Send final invoices for Method B.

- **Private account management entity activities:**
 - A private account management entity will assist with closing out the mileage payment under Method C for any Principal that switches from Method C to an alternate method; and
 - A private account management entity will set up a new account for any Principal that opts into Method C and selects the private account management entity as its service provider.
- **Issues:**
 - The policy and operations entity will need to make sure that it is not possible for Principals to “game the system” by switching methods midyear and put in place protections against that possibility.

5.4 Driving

- **Context:**
 - The Principal drives. All methods charge in state for all driving on public roads. Method C and D, when location data is enabled, do not charge for driving in state on private roads or for driving out of state.
- **Principal activities:**
 - None. The driver drives the vehicle. Principals using Method C with devices on which location data is always being registered are not charged for driving out of state or on private in-state roads. Principals on Method C or D with devices that allow location data to be switched on and off must ensure that their GPS location data is enabled in order that they not be charged for driving out of state or on private in-state roads.
- **Policy and operations entity activities:**
 - For vehicles on Method C or D, if the policy and operations entity runs accounts, the policy and operations entity system receives and processes data regularly from mileage reporting devices.
- **Private account management entity activities:**
 - For vehicles on Method C or D, private entities that manage accounts will receive and process data regularly from the mileage reporting devices.
- **Issues:**
 - Accurate maps of public and private roads (or simply accurate maps of all public roads, and a default distance from the public roads to be considered private, e.g., 0.1 mile) must be maintained in order to allow this option. However, accurate maps of what roads are private roads may not be readily available. Account management entities (either the policy and operations entity or private) must maintain a map database that can be updated when users provide information illustrating that certain lands are private. Account management entities (the policy and operations entity or private) must also disclose their mapping policies and capabilities to Principals.
- **Possible changes over time:**
 - Mapping accuracy may improve, as driven by the public’s demand not to pay for travel on private lands.
 - When a neighboring state or province implements a road usage charge, Washington and the neighboring state will likely want to reach an agreement to charge each other’s drivers, and in the case of Methods A and B, make some form of funds exchange, even though the precise driving of users on those concepts cannot be

measured. The Western Road Usage Charging Coalition is working on this issue right now. In the case of Method C or D with private account management entities, the private account management entities could facilitate seamless charging between the two states.

5.5 Charge Calculation, Invoicing and Payment

5.5.1 Road Usage Charge Calculation

- **Context:**
 - This subscenario addresses how road usage charges are calculated.
- **Principal activities:**
 - Method A: Not applicable – all Principals on Method A pay the same flat fee.
 - Method B and D: The number of miles for the coming year is estimated based on the Principal’s driving history with that vehicle. If the Principal is new to the state, the number of miles is based on other factors, such as the average amount of driving across all drivers. The Principal has the opportunity to raise the estimate, thus paying for more miles, but not to lower it. The road usage charge for the coming year is the number of miles times the per-mile rate. The Principal may also choose a periodic payment plan, in which the road usage charge is divided into regular payments (say, four quarterly payments), although there may be a small additional administrative fee for breaking the road usage charge into periodic payments.
 - Method C: The account manager (state or commercial) computes the charge by multiplying the number of miles traveled in state on public roads (along with all miles traveled when mileage reporting device’s location capability is turned off) by the per-mile rate.
- **Policy and operations entity activities:**
 - Method A: determine number of miles for flat fee (e.g., 98th percentile of annual vehicle miles).
 - Method B or D: Provide the mileage estimate for the coming year to the Principal based on the Principal’s driving history with that vehicle. If the Principal is new to the state, provide an estimate based on other factors such as the average amount of driving across all vehicles. The road usage charge for the coming year is the number of miles times the per-mile rate. Allow the Principal to increase the annual mileage estimate if desired. Support periodic payments (e.g., quarterly), possibly with a fee.
 - Method B accounts for fuel taxes by assuming that the EPA combined city/highway fuel economy for the vehicle is achieved, on average, for all miles. The amount of fuel taxes on presumed fuel usage is credited against the per-mile rate in computing the amount owed.
 - Method C: If the policy and operations entity manages accounts under Method C, the policy and operations entity computes the charge by multiplying the number of miles traveled in state (including any miles traveled when the mileage reporting device’s location capability is turned off) by the per-mile rate.
- **Private account management entity activities:**
 - For Method C, if account management is handled by a private entity, the entity computes the charge by multiplying the number of miles traveled in state (including any miles traveled when the mileage reporting device’s location capability is turned off) by the per-mile rate.

- **Issues:**
 - Whether periodic payment plans should be offered for Methods A and B and, if so, whether an additional administrative fee should be charged for this option.
 - How high the annual mileage for Method A should be set.
 - The amount of prepayment that the policy and operations entity should set for Method B.
- **Possible changes over time:**
 - The per-mile rate may change, and the fee charged for a periodic payment may change.

5.5.2 Road Usage Charge Invoicing

- **Context:**
 - Once a charge is calculated, the Principal is invoiced. This scenario addresses how charges are invoiced.
- **Principal activities:**
 - Method A: The policy and operations entity invoices the Principal for the entire amount of Method A at the time the Principal signs up for Method A. The Principal pays for road usage in advance, at the time of registration and invoicing. The agency may offer a periodic payment plan, for which it may charge a payment plan fee; in this case, only the first installment is due at the time of registration.
 - Method B or D: The policy and operations entity invoices for the entire estimated amount at the time the user signs up for Method B or D. The Principal pays for road usage in advance, at the time of invoicing. The agency may offer a periodic payment plan, for which it may charge a payment plan fee; in this case, only the first installment is due at the time of Principal registration. The agency records the odometer reading at the time of registration, which may be recorded by an officer or authorized representative such as DOL agent or auto dealer.
 - Method C: The account manager (either the policy and operations entity or a private firm) invoices the Principal periodically (e.g., monthly or quarterly). The Principal pays the invoice. There are penalties for late payment. Method C could also be set up for prepayment if the policy and operations entity prefers.
- **Policy and operations entity activities:**
 - For Method A, the policy and operations entity invoices the Principal once, at the time of registration renewal. Alternatively, if a periodic payment option is available and the Principal chooses it, the policy and operations entity issues invoices multiple times per year.
 - For Method B or D, the policy and operations entity invoices the Principal at the beginning of the year for the estimated mileage. Alternatively, if a periodic payment option is available and the Principal chooses it, the policy and operations entity issues invoices multiple times per year.
 - For Method C, if the policy and operations entity runs account management, the agency invoices customers for miles driven on a monthly or quarterly basis. Method C could also be structured for prepayment if the agency prefers. The agency could also choose to charge a monthly fee for the account management service, if desired, as the administrative overhead for this method may be greater than for the other road usage charge methods.

- **Private account management entity activities:**

- For Method C, if the system includes private account management entities, these entities will invoice customers for miles driven on a monthly or quarterly basis. The policy and operations entity could allow account management providers to charge an administrative fee for Method C.

- **Issues:**

- Whether periodic payment plans should be offered for Methods A and B and, if so, whether they should involve an additional administrative fee.
- Whether the policy and operations entity should support on-line accounts and invoicing for Method B.
- Whether Method C should be postpay, as presented here, or prepay.
- Whether the policy and operations entity should attach an additional administrative fee for Method C when run by the agency. If the system includes private account management entities, the same question applies.

- **Possible changes over time:**

- The percentages of individuals using the various road usage charging methods will shift over time, in turn leading to changes in the average cost of associated invoicing processes.

5.5.3 Road Usage Charge Payment and Reconciliation

- **Context:**

- This scenario addresses how the Principal reconciles (for Method B) and pays the road usage charge, and how the policy and operations entity and private account management entities follow up on those payments

- **Principal activities:**

- Method A: The Principal pays the policy and operations entity once or, in the case of an installment plan, multiple times. Payment can be made by web, by mail, or in person.
- Method B or D: The Principal receives an estimated mileage and charge for the next year from the policy and operations entity. First, the Principal must reconcile the payment amount from the previous year. The Principal self-reports the odometer reading and computes the difference between the start-of-year and end-of-year odometer readings. If the Principal has driven fewer miles than they paid for, they can claim a credit against the charge for next year. If the Principal has driven more miles than they prepaid, the Principal must pay the difference in addition to the charge for the next year. This difference must be paid within a certain timeframe or the Principal will be subject to penalties. The difference should include an adjustment for the fuel taxes paid. Reconciliation and payment can be made by web, by mail, or in person.
- Method C: The Principal pays the account manager (either the policy and operations entity or a private account manager) by web, mail, or phone, or in person (if available). There are penalties for late payment. Private account management entities, if included in the system, may offer numerous payment options for Principals, such as by credit or debit, by check, or by bank transfer.

- **Policy and operations entity activities:**

- For Method A, the policy and operations entity must process the payment and follow up on late payments, typically with penalties and eventual referral to a collections agency.
- For Method B, the policy and operations entity must process the payment and follow up on late payments, typically with penalties and eventual referral to a collections agency. Also, the agency must support the reconciliation process at the end of a year by providing Principals with a means of reporting their odometers. If the Principal has overpaid, the agency must credit the overpayment towards the next year of driving. If the Principal has underpaid, the policy and operations entity must invoice the Principal for the amount of the underpayment plus charges for miles expected to be driven next year.
- For Method C, the policy and operations entity must process the payment and follow up on late payments, typically with penalties and eventual referral to a collections agency.
- **Private account management entity activities:**
 - For Method C, if the system includes private account management entities, such entities must process the payment. Additionally, they must follow up on late payments, typically with penalties and eventual referral to a collections agency. They must send all road usage charges collected and reports to the policy and operations entity per their agreement with the program.
- **Issues:**
 - Whether, under Method B, the Principal is always responsible for taking odometer readings, or if there are certain circumstances in which the reading should be taken by a designated representative of the policy and operations entity.
 - What penalties and other consequences for not reconciling and paying on time (e.g., within X days of vehicle registration renewal) should be applied.
 - Whether the policy and operations entity should support on-line accounts for Method B.
 - Whether overpayments under Method B should ever be paid out. There may be some threshold of overpayment (e.g., \$500) above which excess overpayment should be paid back to the Principal rather than applied to the next year.
- **Possible changes over time:**
 - The percentages of individuals using the various road usage charging methods will shift over time, in turn leading to changes in the average cost of associated invoicing processes.

5.6 *De-enrolling a Vehicle from the Road Usage Charge Program*

There are four subscenarios in which a vehicle will be de-enrolled from the Program:

- Vehicle sold (private sale);
- Vehicle moved out of state;
- Vehicle stolen; and
- Vehicle destroyed (e.g., totaled in a crash or scrapped).

This scenario deals with each of these subscenarios in turn.

5.6.1 Vehicle Sold (Private Sale)

- **Context:**
 - A Principal sells his/her vehicle to another person. Under Washington State law, a title transfer (and consequent notification of DOL) must be made within 15 days of the completion of the private sale.
- **Principal activities:**
 - At the time of the sale, the Principal should de-enroll the vehicle from the road usage charge. This is accomplished by filling out a deregistration form provided by the policy and operations entity or, if applicable, by the private account management entities.
 - The deregistration form will indicate why the vehicle is being de-enrolled (sale, moving out of state, stolen or destroyed) and include a final odometer reading.
 - If an official odometer reading is required, it must be taken. In the case of sale, the Principal should also be asked to indicate the name and address of the party purchasing the vehicle. The policy and operations entity can use this information to follow up with the new Principal.
- **Policy and operations entity activities:**
 - The policy and operations entity must process the de-enrollment form, including noting a change in ownership of the vehicle to another state resident for accounting purposes.
 - The policy and operations entity must send a final invoice or refund to the Principal and follow up on the payment in the case of the former. The agency generally waits for the new Principal to set up the account for the vehicle when they register the vehicle for the road usage charge, per the above usage scenario. If needed, however, the policy and operations entity can rely on the odometer reading provided at de-enrollment as the base odometer reading for the new Principal.
 - If the new Principal fails to register the vehicle in a timely way, the agency may assess extra penalties.
 - If there is any dispute regarding the odometer reading, the odometer reading on the vehicle title from the transfer is taken as authoritative.
- **Private account management entity activities:**
 - If private account management entities are involved in the system, they must provide and process any deregistration forms and pass that information along to the policy and operations entity.
 - Private account management entities must also send a final invoice to the Principal involved in selling the vehicle and follow up on the payment.
- **Issues:**
 - Whether Principals should be allowed to claim a refund for any Method A time not used up at the time of sale.
 - Whether an authorized odometer reading is needed at the time of sale and, if so, how it should be obtained?
 - How long a new owner has to register the vehicle and what penalties should be applied for late registration.

- **Possible changes over time:**

- No changes expected.

5.6.2 *Vehicle Moved Out of State*

- **Context:**

- A Principal moves out-of-state with vehicle subject to the road usage charge.

- **Principal activities:**

- At the time of the move, the Principal should de-enroll the vehicle from the road usage charge filling out a deregistration form provided by the policy and operations entity or by the private account management entity, if applicable.
 - › The form will indicate why the vehicle is being de-enrolled (sale, moving out of state, stolen or destroyed) and include a final odometer reading.
 - › If an official odometer reading is required, it must be taken by an officer or authorized representative of the policy and operations entity.
 - › In the case of moving, the Principal should be required to provide the new address on the form such that the final invoice or refund can be forwarded to the new address.
- If a Principal fails to de-enroll their vehicle from the road usage charge in a timely way, the Principal will be responsible for paying the road usage charge until the time that it is de-enrolled. No refund should be made, as there is no way to verify how many miles were driven in state in the intervening period.

- **Policy and operations entity activities:**

- The policy and operations entity must process the deregistration form.
- The agency must send a final invoice or refund to the Principal. For the former, the policy and operations entity must also follow up on the payment.

- **Vendor activities:**

- If private account management entities are involved in the system, they must provide and process any deregistration forms and pass the information along to the policy and operations entity.
- They must also send a final invoice to the Principal and follow up on the payment.

- **Issues:**

- Whether Principals should be allowed to claim a refund for any Method A time not used up.
- Whether an authorized odometer reading needed at the time of deregistration and, if so, how that should be obtained.
- Whether there any circumstances under which a refund is warranted if a Principal does not de-enroll on time.

- **Possible changes over time:**

- If the Principal moves to another state with road usage charging, Washington may consider bilateral or multistate agreements to facilitate the move.
- If Washington and the new state both allow private account management entities, the Principal may be able to stay with the same account manager, allowing for a seamless transition from the perspective of the Principal.

5.6.3 Vehicle Stolen

- **Context:**

- The vehicle is stolen. The Principal obtains a police report showing vehicle theft.

- **Principal activities:**

- The Principal reports the vehicle theft to the policy and operations entity, including a copy of the police report.
- If the Principal uses a private account management entity, the policy and operations entity should report the theft to the private account manager.
- If the vehicle is recovered in a specified time period, the Principal must report the recovery, along with the latest odometer reading, to the policy and operations entity (if the Principal uses a private account management entity, the information should be reported to the private account manager as well).
- If the vehicle is not recovered in the specified time period, the process should proceed as specified below in the “Vehicle Destroyed” subscenario.

- **Policy and operations entity activities:**

- The policy and operations entity should change the vehicle status to stolen as soon as it receives a verified police report.
- If and when the vehicle is recovered, the agency should make appropriate adjustments to the Principal’s account. The question of an appropriate refund for the period during which the Principal did not have possession of the vehicle merits additional attention.
- The policy and operations entity should then reset the odometer reading in the account to a new base odometer reading taken after the vehicle is recovered.

- **Private account management entity activities:**

- If the system includes private account management entities, the policy and operations entity or the Principal should notify the account manager in the case of a stolen vehicle.
- If location data are turned on in the device and the thieves do not remove the device, the private account manager may be able to assist the police in locating and recovering the vehicle.
- Depending on policy choices, the account manager should invoice the Principal for any outstanding miles as of the date of the theft. The mileage accounting should then be reset in the case of recovery.

- **Issues:**

- The appropriate length of time after a vehicle is stolen before it should be considered destroyed (i.e., gone forever, from the perspective of the Principal at least). A related question is what to do if the vehicle is then subsequently recovered after that change in designation.
- How to forgive Principals for any miles driven by thieves. The answer to this question is likely to vary depending on the road usage charge method.
- **Possible changes over time:**
 - None foreseen.

5.6.4 *Vehicle Destroyed*

- **Context:**
 - The vehicle is damaged in an accident and declared a total loss by the insurer (or a vehicle is stolen and not recovered within a specified timeframe).
- **Principal activities:**
 - The Principal should de-enroll the vehicle from the road usage charge.
 - The Principal does so by filling out a deregistration form provided by the policy and operations entity or by a private account manager, if applicable.
 - The deregistration form will indicate why the vehicle is being de-enrolled (sale, moving out of state, stolen/destroyed) and include a final odometer reading.
 - The Principal should be given the option to indicate that the odometer is unreadable.
- **Policy and operations entity activities:**
 - The policy and operations entity should process the de-enrollment form and provide a final refund or invoice as appropriate.
 - The final refund for Method A and B could be based on a prorated version of charges already paid (e.g., if the vehicle is destroyed after 7 months of a 12-month cycle, the Principal could be awarded $12-7=5$ months, so $5/12$ *the original cost estimate).
 - The final invoice for Method C and D will be based on the actual measured usage.
 - The policy and operations entity should cross-reference the odometer reading on the final title, if provided, when it is received from the insurance company.
- **Private account management entity activities:**
 - If the system includes private account managers, they should process the deregistration form and provide a final invoice to the Principal.
 - They should also provide the vehicle destroyed information to the policy and operations entity.
- **Issues:**
 - Whether to allow refunds for Method A.

- How much to refund for Method B if the odometer is unreadable. One possibility would be to simply prorate the amount paid based on estimated mileage for the year, but this would not reflect the degree to which actual mileage deviated from estimated mileage.
- Whether car insurance would cover the cost of a mileage reporting device if the vehicle is lost or destroyed.
- **Possible changes over time:**
 - No changes foreseen.

5.7 Enforcement

There are four subscenarios in which enforcement activities must be undertaken:

- The Principal does not set up an account;
- The Principal provides a false odometer reading (Method B), including odometer rollback;
- The Principal tampers with or removes a mileage reporting device (Method C); and
- The Principal does not pay an invoice.

This section deals with each of these subscenarios in turn.

5.7.1 Principal Does Not Set Up Account

- **Context:**
 - The owner or lessee of a vehicle subject to the road usage charge does not register it for the charge.
 - Method A becomes the default.
- **Principal activities:**
 - None. An individual buys or leases a vehicle subject to the road usage charge, or moves into state with one, but does not register for the charge in the specified time.
- **Policy and operations entity activities:**
 - The policy and operations entity constantly monitors vehicle sales in the state, noting the people who purchase or lease vehicle subject to the road usage charge, either from dealers or from private sellers. This includes monitoring road usage charge deregistration forms and title transfers.
 - › The policy and operations entity also specifically records individuals who have registered their vehicles with the state but who have decided not to choose a road usage charge method at vehicle registration, and those who have chosen to go to a private account manager (if allowed).
 - › After an amount of time specified in road usage charging legislation or regulation, if a liable vehicle is not registered for road usage charge, the policy and operational agency assesses a penalty against this person.

- › One logical penalty would be to force the Principal to enroll in Method A – the time permit – starting at the time the vehicle was registered. This allows payment for any miles that they have driven while contemplating what method of road usage charge to select.
 - › Another possibility would be to prorate the time permit for number of the days until the Principal registers for a road usage charge method (although this option opens up the possibility of exploiting a short period of unlimited mileage).
 - › Optionally, the policy and operations entity may send a warning note or email to such owners or lessees before the penalty is exacted.
- **Private account management entities activities:**
 - Private account management entities, if included in the system, must update their list of all registered customers on a daily basis.
 - **Issues:**
 - The length of time that individuals have to register with the road usage charge.
 - Whether the policy and operations entity should send a warning letter before exacting a penalty.
 - What penalty to exact for delinquent road usage charge registrations: for example, automatic enrollment in Method A, or a prorated version of Method A.
 - **Possible changes over time:**
 - None foreseen.

5.7.2 *Principal Provides False Odometer Reading (Method B or D)*

- **Context:**
 - The Principal, in an attempt to defraud the policy and operations entity, provides a false odometer reading at reconciliation, at registration, or both (note that explicit tampering with the odometer is covered in the next subscenario).
- **Principal activities:**
 - For Method B:
 - The Principal intentionally reports to the policy and operations entity a lower than accurate odometer reading at the end of the year in order to pay for fewer miles.
 - Alternatively, the Principal reports a higher than accurate odometer reading at the start of the program.
 - When confronted about these deliberate falsifications, the Principal is likely to claim “I misread the odometer” or “I wrote down the wrong number,” or some other similar variant. Sometimes these claims will be true.
 - For Method D:
 - The Principal uses digital means to alter the photograph of the odometer reading.

- **State activities:**

- An authorized representative of the policy and operations entity who also takes a digital image of the odometer should make a Principal's first odometer reading when the Principal is registering the vehicle for road usage charge. This provides an irrefutable baseline for the odometer reading.
- As vehicles must be registered in person the first time at a DOL agent or subagent, this should be not be cumbersome for Principals.
- We also recommend that the final odometer reading (when vehicle is de-enrolled) be taken by an authorized representative. This could be somewhat more cumbersome given that deregistration would otherwise not need to be done in person.
- However, it might be sufficient to provide a digital image of the odometer reading – one that includes the whole driver's side dashboard, yet in which the odometer numbers are still visible – as an alternative. This image could be compared with the initial image to determine fraud.
- Further, the policy and operations entity should randomly select a certain percentage of individuals reconciling at the end of the year to have their odometers officially checked.
- The operations and policy agency should require individuals who report many fewer miles than expected in a given year to have their odometers checked. Note that many of these Principals will not be fraudsters, but rather people whose driving habits changed due to life changes (new job, etc.).
- Digital image fraud can be detected automatically through software applications such as izitru (<http://www.izitru.com/>), which detects all but the most sophisticated digital image fakes.

- **Private account management entity activities:**

- None.

- **Issues:**

- Setting up authorized representatives to read odometers.
- Determining a reliable formula for what constitutes many fewer miles than expected.

- **Possible changes over time:**

- None foreseen.

5.7.3 *Principal Rolls Back Odometer Reading (Method B)*

- **Context:**

- The Principal attempts to defraud the policy and operations entity by “rolling back” the odometer reading.
- In the days of mechanical odometers, this was a mechanical process. In the days of digital odometers, it is a software process. Car manufacturers have secret electronic codes that allow digital odometers to be set, via the OBDII port, to an arbitrary value. These codes are used, for example, to reset the odometers of vehicles to zero when they arrive at a dealership, when in fact they have been driven for a few miles at the factory or while in transit.

- › Manufacturers attempt to keep these codes secret, but hackers, aided by dishonest mechanics that have access to proprietary testing devices that include the codes, often find the codes for popular models. They then sell these codes to dishonest individuals who offer the service of rolling back an odometer for the purpose of selling a vehicle with a lower odometer reading in order to get a higher sale price.
- Such a fraudulent odometer reading really only allows individuals on Method B to defraud the government. With Method A, allowable mileage is unlimited, while with Method C the mileage reporting device meters each mile as it is driven.
- **Principal activities:**
 - The Principal would go to the dishonest individual who is selling the service of reprogramming the odometer, pay a specified amount to reprogram the odometer, and get the odometer reprogrammed to a lower value than actually driven.
 - As this is a fraudulent activity, there is no systematic data on how much such individuals charge for reprogramming the odometer. Anecdotally, however, current prices can be \$100 or more – prices so high that they are likely to offset the amount that most people could save. Thus such an option would likely be attractive to high-mileage drivers that have not opted for Method A.
 - It is possible that the market for fraudulent odometer rollbacks could increase as the road usage charge is rolled out should the black market price for such rollback services drop.
- **Policy and operations entity activities:**
 - Detecting this type of fraud involves several activities for the policy and operations entity:
 - › Keeping a record of verified odometer readings and estimated readings. The policy and operations entity should also maintain all odometer readings from prior title transfers.
 - › Observing each year's estimated odometer readings and apply logical rules to ensure that the readings appear reasonable.
 - › Requesting CarFax or equivalent records of selected vehicles, which sometimes include odometer readings (such requests entail a significant associated cost, but the policy and operations entity may be able to negotiate favorable volume-based rates).
 - › Requesting Department of Environmental Quality records with odometer readings for vehicles subject to emissions testing.
 - › Request any odometer records available from mechanics' shops where suspected fraudulent vehicles have been serviced. Legal implications of such requests should be considered.
 - › Keeping current with automotive fraud literature, which could provide clues about which vehicle make/models are most likely to be rolled back.
 - › Ask owners of vehicles suspected of fraud to explain their low mileage.
 - › Require estimated odometer readings not once per year, but twice or more. And require a dashboard image with each reading. This would require people who want to defraud the government to roll back the odometer multiple times per year, making the fraud even less financially attractive.

- › Work with the National Highway Traffic Safety Administration and the National Odometer and Title Fraud Enforcement Association (NOTFEA, <http://notfea.org/>) on the latest investigative techniques.
 - › Ultimately, this type of fraud is likely to be rare given the cost, complexity, risk of getting caught, and relatively low payback.
- **Private account management entity activities:**
 - None.
 - **Issues:**
 - Creating algorithms to detect suspect patterns of odometer readings.
 - The cost and effort associated with finding odometer readings from multiple sources.
 - How to handle the responses of Principals when asked to explain low mileage.
 - **Possible changes over time:**
 - At some point the government could change regulations to forbid odometer-modifying codes in testers.

5.7.4 *Principal Tamper With or Removes Device (Method C)*

- **Context:**
 - The Principal tampers with or removes the mileage reporting device with the aim of reporting fewer miles.
 - Legitimate causes for device removal exist, such as taking the vehicle to a repair shop where the staff use a tester device on the OBDII port or getting an emissions test. Thus infrequent, brief periods of device removal cannot be considered intentional fraud.
 - Similarly, devices may be unintentionally kicked by a driver or passenger, so any rough physical contact with the device does not necessarily constitute tampering.
- **Principal activities:**
 - The Principal commits intentional fraud by tampering with or removing the device.
 - Tampering with devices is very challenging, so the most likely tactic would be to simply remove it for a single long trip.
- **Policy and operations entity activities:**
 - If the policy and operations entity serves as the account manager, it should observe device messages to determine if frequent removal is occurring or if device tampering has been detected.
 - If a pattern suggestive of fraud is detected, the agency should audit the Principal. This would include questioning the Principal to see if there is a reasonable explanation.
 - If no reasonable explanation is provided, the policy and operations entity would assess a penalty on the Principal.
- **Private account management entity activities:**

- If private account management entities are included in the system, they would observe device messages to determine if frequent removal is occurring, or if device tampering has been detected.
 - If a pattern suggestive of fraud is detected, the private account manager would follow up with Principal to see if there is a reasonable explanation.
 - If the Principal cannot offer a reasonable explanation, the account manager would refer the Principal to the policy and operations entity, passing along all relevant information, for potential assessment of fees and any other legal action.
- **Issues:**
 - Software should be developed to analyze messages that describe when a device was disconnected or if tampering has been detected to determine signals that indicate fraud.
 - Defining a sequence of escalating enforcement activities (e.g., penalty fee, criminal proceedings, a lien on the vehicle, etc.).
 - **Possible changes over time:**
 - None foreseen.

5.7.5 *Principal Does Not Pay Invoice*

- **Context:**
 - The Principal is registered for the road usage charge but fails to pay an invoice – either an installment invoice for Methods A or B or a regular invoice for Method C.
- **Principal activities:**
 - The Principal fails to pay an invoice.
- **Policy and operations entity activities:**
 - Follow state guidelines for collecting delinquent payments (second invoice, possibly with penalty, third invoice, etc.).
 - Eventually send to collections agency and possibly put a lien on vehicle.
 - Execute any follow-up enforcement activities as allowed by law.
- **Private account management entity activities:**
 - If included in the system, private account managers would follow their own internal guidelines for collecting delinquent payments (second invoice, possibly with penalty, third invoice, etc.).
 - Eventually send to collections agency.
 - Inform the policy and operations entity that the Principal is delinquent for specified amount such that the policy and operations entity can execute any follow-up enforcement activities as allowed by law.
- **Issues:**

- Determine guidelines for delinquent accounts, including delinquency periods, level of penalties, when to send to a collections agency, what collections agency to use, etc.
- Define any follow-up enforcement activities (e.g., placing lien on vehicle) and who will execute these activities.
- **Possible changes over time:**
 - None foreseen.

5.8 Failure Conditions.

To succeed, the road usage charge system must be reliable. Mileage reporting hardware should include diagnostics to indicate failure conditions. And the policy and operations entity's system should have a self-evaluation function that displays key performance indicators on a dashboard.

When failures occur, the system should be able to continue functioning, albeit in a potentially degraded manner. The failure conditions included here are known possibilities. As-yet unknown failure possibilities may also exist.

- **Method A:**
 - No known failure conditions.
- **Method B:**
 - Odometer failure:
 - › Although vehicle odometers are highly reliable, in extremely rare circumstances they may fail.
 - › Principals should be expected to have odometer failures fixed promptly, and also to report the failures to the road usage charge program, along with best estimates of mileage driven and proof of repair records.
 - › Odometer failure should not be accepted as an excuse by the policy and operations entity except when repair records are presented. If the repair shop can recover mileage driven, it should do so. If not, then Principals should be asked to make their best estimate of mileage driven.
 - › The policy and operations entity could also make Principals liable for a standard amount of mileage for a year in case of odometer failure.
 - › Another approach would be for the policy and operations entity to require all individuals claiming odometer failure to have their vehicles inspected by a special mechanic to determine if the failure was caused by intentional tampering.
 - Unintentional reporting of wrong mileage:
 - › Principals will sometimes write down the wrong mileage unintentionally.
 - › In case of large errors, such a negative difference with the previous year, or a mileage in excess of 100,000, the policy and operations entity should ask the Principal to resubmit the mileage, along with a digital photo of the dashboard with the odometer. Alternatively, for more security, the policy and operations entity may require that the Principal get an odometer reading by an officer or authorized representative such as a DOL agent or auto dealer.

- › Allowing revisions of previous odometer readings is not advised.
 - Principals might request such a revision when they discover, at the end of a given driving year, that the previous year's reading was too high. They could discover this, for example, when they find that their odometer reading is lower than the odometer reading reported for the previous year.
 - Allowing revisions, however, could invite fraud. Smaller errors – say, 5,000 miles or so – will simply be corrected in subsequent years when an accurate reading is given.
- **Method C:**
 - Mileage recording device loses communications.
 - › If the device attempts to communicate, but no network is available, it should retry until a network is available. The device should be able to buffer (store for transmittal) mileage data for at least 30 days.
 - Failure at account management system.
 - › Disasters, extended power failures, or widespread IT problems could cause an account manager to be down for some period of time.
 - › Redundancy of utilities (uninterruptable power supply and power generators), IT equipment (backup servers), and offsite as well as on-site data backup should be provided by the system.
 - Defective mileage reporting device.
 - › All mileage reporting devices should include self-diagnostics and the ability to send error messages.
 - › When the account manager receives an such an error message, it should immediately notify the Principal of the problem.
 - › Either the account manager or the Principal should be responsible for replacing the device, depending on policy choices.
 - › To account for data missing when the device had failed, the mileage can be estimated by the policy and operations entity (or by the private account management entity, if applicable), perhaps based on average daily travel in recent months.
 - › If device failures are not promptly corrected after notification, the Principal should face a penalty.
 - GPS failure:
 - The device should continue to record miles even when the GPS fails. It can do based on the vehicle speed signal from the OBDII port.

6.0 Going Forward

ConOps documents do not normally have conclusions. Rather, they typically end after the usage scenarios, which provide the greatest detail of system operation yet recorded.

However, instead of a conclusion, the authors thought that the Steering committee would find it useful to have a summary of what next steps would be needed to move forward, including a list of the most important issues to resolve from among the issues identified in Section 5 and elsewhere in this document. This enables a demonstration project to be constructed that most accurately reflects the final system. These issues do not necessarily have to be resolved before a demonstration project begins. However, the more of these issues that are resolved before the demonstration project design phase, the more the system used in the demonstration project will imitate the final system.

In addition, this chapter includes a separate subsection on the inclusion of private account management entities, a concept suggested but not assumed in the earlier passages of the ConOps. The decision of whether or not to include such entities in the system is one of the most important decisions in the design of the program.

6.1 Key Takeaways

- This document fulfills legislative and steering committee guidance to generate an engineering design document constituting a feasible RUC system in Washington that reflects the decisions made by the Steering Committee thus far.
- This document serves as the technical basis for the financial model that is being used to forecast potential costs and revenues of the road usage charging system.
- This document provides the technical framework for a demonstration project or revenue generating road usage charging system. The next step in the systems engineering process is to create a requirements document, which can then be used to procure the technology components of a system.
- All four road usage charging collection methods described in the ConOps work well together and could be implemented in parallel.
- There are still several major issues to resolve, as described below.

6.2 Important Remaining Issues

High-priority unresolved issues are arranged by method of collection:

- **Method A (Time Permit):**
 - We assumed that Washington would want to set the rate sufficiently high so that people that drove higher than average miles would not automatically opt for the fixed annual rate plan. For the financial analysis, we assumed the rate would be equal to the number of miles driven by the 98th percentile of vehicles (about 35,000 miles) times the per-mile rate for the mileage-based methods. This threshold will need to be set.
 - Whether Principals be allowed to transition in and out of Method A within a registration year.

- Whether official odometer readings should be required before entering Method A, in order to support refunds for Principals who move out of state or have their cars totaled.
- **Method B (Odometer Reading):**
 - Whether official odometer readings should be required before entering Method B.
 - The percentage of Principals in Method B that should be selected for official odometer readings every year.
 - Whether state police, other officers, or authorized representatives such as DOL agents or auto dealers would carry out official odometer readings and how they would be carried out.
 - The enforcement mechanisms and penalties that should be used for Method B to counter odometer misreporting.
 - The enforcement mechanisms and penalties that should be used for Method B to counter odometer rollback.
 - Whether the policy and operations entity or Principals should make the estimate of how many miles will be driven in the coming year.
 - Whether the policy and operations entity should require Principals who already have used up the estimated mileage they paid for at the start of the year to buy additional mileage before the end of the year.
- **Method C (Automated Distance Charge):**
 - Whether private account management entities should be engaged and if so, how they will be certified.
 - Whether this method should be prepay or postpay.
- **Method D (Smartphone Application Road Usage Charge Measurement):**
 - Assuming the smartphone is used to support the Method B road use charging approach, all unresolved issues for Method B apply.
 - Assuming the smartphone is used to support the Method C road use charging approach, all unresolved issues for Method C apply.

6.3 Implications of Using Private Account Management Entities for Principal Account Management Functions

Washington State may choose to allow private companies to handle all Principal-facing tasks for Method C. Other functional areas of the road usage charge system, such as the policy and operations entity’s accounting system, would maintain contractual, technical, and process relationships with the private account management entities to ensure the system functions properly and collects the correct road usage charge from all Principals.

The private account management entities would be required to deposit net collections into State accounts periodically, report summary account statements, report errors or issues with their systems and customers, and communicate changes in policies or procedures that affect road usage charge collections. Private account management entities would also be required to meet any legal standards regarding account management procedures such as privacy protection.

Potentially, private account management entities could operate Principal accounts at lower costs than the policy and operations entity could because:

- Private account management entities could use the road usage charge as a platform to sell value-added services, such as diagnostic monitoring, youth and eco-driving monitoring, automated parking payment, and a range of other possibilities.
- Private account management entities could add a road usage charge to existing ITS services such as pay-as-you-drive insurance.
- Such entities could operate across multiple states that have a road usage charge, allowing them to achieve greater economies of scale than any state could achieve alone.

In addition, in a multistate road usage charging environment, in which two states both have private account management entities, the use of such entities would make system interoperability between the two states easy and convenient to execute for Principals who use them, and would make moving from one state to another very convenient.

Oregon has been examining the potential for the use of private account management entities in its road usage charge program, and is currently procuring the services of several entities to fulfill this role. Washington State could take advantage of the contracts that Oregon will sign with the private account management entities through the Western Road Usage Charging Consortium, a consortium to which both Washington and Oregon are party, along with a range of other Western states, including California. Washington State could retain the services of such firms for a demonstration project without going through a full procurement process, potentially saving time and money, and purchasing a system whose functionality has already been proven in Oregon.

Examples of companies that are well qualified to provide road usage charge services include telecommunications providers, auto insurers, and tolling companies.

Appendix

Memo Relating to Use of WSDOT Fuel Cards as an Operational Concept for RUC Payment