Highway Cost Allocation Study

2023-2025 Biennium

PREPARED BY

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ECONOMICS · FINANCE · PLANNING

PREPARED FOR

STATE OF OREGON 1859

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TABLE OF CONTENTS

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THE 2023 OREGON HIGHWAY COST ALLOCATION STUDY CONCLUDES THAT:

- For the 2023-25 biennium and under existing, current-law tax rates, full-fee-paying light vehicles will contribute 63.9 percent of state highway user revenues, and full-fee-paying heavy vehicles (those weighing more than 10,000 pounds), as a group, will contribute 36.1 percent.
- For the 2023-25 biennium and under existing, current-law tax rates, full-fee-paying light vehicles are responsible for 72.7 percent of state highway user revenues, and full-fee-paying heavy vehicles (those weight more than 10,000 pounds), as a group, are responsible for 27.3 percent.
- Equity ratios for full-fee-paying vehicles, the ratio of projected payments to responsibilities for vehicles in each class, are **0.8783** for light vehicles and **1.3242** for heavy vehicles. Under existing tax rates and fees, light vehicles are projected to underpay their responsibility by 12.2 percent. Heavy vehicles are projected to overpay by 32.4 percent during the next biennium.
- Recent changes in economic conditions from the COVID-19 pandemic have affected the forecasts of miles traveled. Some uncertainty about forecasts for both revenues and vehicle miles traveled remains.
- The projected spending attributable to light vehicles has also increased as a share of total expenditures and is contributing to the disparity in equity between light and heavy vehicles.
- A new vendor for weigh-in-motion data provided more information on basic vehicles, resulting in a higher share of pavement costs allocated to basic vehicles than for previous HCAS models.
- The legislature enacted incremental rate increases for tax rates and fees between 2018 and 2024, which are now fully accounted for in this study. These rate increases have slightly increased the share of revenues collected from heavy vehicles, having a modest impact on equity ratios between light and heavy vehicles.
- Should the Legislature choose to modify user fee rates for other reasons beyond the scope of this study, the HCAS model can be used to design those rates to ensure those rates produce revenues in proportion to expected costs imposed by light and heavy vehicles.

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INTRODUCTION

For more than 70 years, Oregon has based the financing of its highways on the principle of cost responsibility. Cost responsibility is the principle that those who use the public roads should pay for them and, more specifically, that users should pay in proportion to the road costs for which they are responsible. Cost responsibility requires each category of highway users to contribute to highway revenues in proportion to the costs they impose on the highway system. The State of Oregon uses the cost allocation process to apportion costs of highway work to vehicles that impose those costs.

This tradition has served Oregon well by ensuring that the state's highway taxes and fees are levied in a fair and equitable manner. The State of Oregon commissions periodic studies to determine the "fair share" that each class of road users should pay for the maintenance, operation, and improvement of the state's highways, roads, and streets. Prior to the present study, 21 such studies had been completed; the first in 1937, the most recent in 2021.

Oregon voters ratified the principle of cost responsibility in the November 1999 special election by voting to add the following language to Article IX, Section 3a (3) of the Oregon Constitution:

"Revenues that are generated by taxes or excises imposed by the state shall be generated in a manner that ensures that the share of revenues paid for the use of light vehicles, including cars, and the share of revenues paid for the use of heavy vehicles, including trucks, is fair and proportionate to the costs incurred for the highway system because of each class of vehicle. The Legislative Assembly shall provide for a biennial review and, if necessary, adjustment, of revenue sources to ensure fairness and proportionality."

Purpose of Study

The purpose of this 2023 Oregon Highway Cost Allocation Study (HCAS) is to:

(1) determine the share that each class of road users should pay based on their respective share of costs for maintenance, operation, and improvement of Oregon's highways, roads, and streets; and

(2) if necessary, recommend adjustments to existing tax rates and fees to bring about a closer match between payments and responsibilities for each vehicle class.

BACKGROUND

Past Oregon Highway Cost Allocation Studies

Oregon, more than any other state, has a long history of conducting highway cost allocation or responsibility studies and basing its system of road user taxation on the results of these studies. The State of Oregon completed studies in 1937, 1947, 1963, 1974, 1980, 1984, 1986, 1990, 1992, 1994, and 1999-2021. As noted above, the Oregon Constitution requires that a study is conducted biennially and highway user tax rates adjusted, if necessary, to ensure fairness and proportionality between light and heavy vehicles.

Prior to 1999, Oregon used the term cost responsibility studies, whereas the federal government and most other states called their studies cost allocation studies. Oregon has now adopted the more conventional terminology, although the two terms are equivalent and used interchangeably in this report.[1]

In this study and all prior studies, highway users and other interested parties have been given the opportunity to offer their input in an open and objective process. During the 1986 study, for example, three large public meetings were held to provide information on the study and solicit the input of all user groups.

As part of the 1994 study process, a Policy Advisory Committee was formed to address several cost responsibility issues that arose during the 1993 legislative session. This committee consisted of 12 members, including a representative of AAA Oregon and five representatives of the trucking industry. The committee held six meetings devoted to understanding and recommending policies for the 1994 study as well as future Oregon studies.

In 1996, the Oregon Department of Transportation (ODOT) formed the Cost Responsibility Blue Ribbon Committee to evaluate the principles

[1] It should be noted that, to be precise, neither term is technically correct. Since all previous state studies, including Oregon's, have allocated expenditures rather than actual costs imposed, they are really expenditure allocation studies. The 2011 Efficient Fee Study, performed for Oregon during the 2009-2011 biennium, was, to our knowledge, the first state-level study to estimate and allocate the actual costs of highway use.

and methods of the Oregon cost responsibility studies and, if warranted, recommend improvements to the existing methodology. This 11-member committee was chaired by the then Chairman of the Oregon Transportation Commission and included representatives of the trucking industry, AAA Oregon, local governments, academia, and Oregon business interests. The committee held a total of seven meetings and reached agreement on several recommendations for future studies. Because the trucking industry, in some cases, did not agree with the full committee recommendations, it was given the opportunity and elected to file a Minority Report that was included in the committee report.

All studies prior to 1999 were conducted by ODOT staff. In February 1998, the ODOT and Oregon Department of Administrative Services (DAS) Directors reached agreement to transfer responsibility for the study from ODOT to DAS. The 1999, 2001, and 2005 through 2021 studies, as well as the current study, were conducted by consultants to the DAS Office of Economic Analysis. ODOT's role in these studies was to provide technical assistance and most of the data and other required information. In 2003, ODOT conducted the study using the model developed for the 2001 study.

The Oregon studies prior to 1999 relied on an internal technical advisory committee to provide the expertise and some of the many data elements required for the studies. As noted, highway users and other interested parties were also provided the opportunity to offer their input as the studies were being conducted. For the 1999 and subsequent studies, DAS formed a Study Review Team (SRT) to provide overall direction for the studies. The SRT's role has been to provide policy guidance and advisory input on all study methods and issues.

The SRT for the 2001 study consisted of ten members and the SRTs for the 2003 and 2005 studies had eight members. The SRT for the 2007 through 2021 consisted of ten members, and the present study consisted of nine members. The composition of the SRTs has changed from study to study, but all have included motorist, trucking industry, and Oregon business representatives; academics; and state officials. All SRTs have been chaired by the State Economist. ODOT did not have a representative on the 1999 SRT but was represented on subsequent SRTs.

Other Highway Cost Allocation Studies

Although Oregon has the longest history of conducting highway cost allocation studies, several other states have also conducted such studies, the majority of which have been completed over the past two decades. Since the first HCAS, 32 states have performed at least 88 cost allocation studies. Since the late 1970s, 30 states have conducted such studies.

The interest of other states in undertaking these studies has in many cases been sparked by the completion of similar studies by the federal government. Several states undertook studies following the release of the 1982 Federal HCAS. With the release of the 1997 Federal HCAS and the Federal Highway Administration's (FHWA) interest in helping states do their own studies, there was again a renewed interest among the states. Upon completion of the 1997 Federal study, FHWA formed a state representatives' Steering Committee to assist the states in adopting the research and methods employed in that study.

A 1996 Oregon Legislative Revenue Office report concluded that most of the differences in study results among states can be explained by differences in the types of expenditures that are allocated.[2] Oregon, for example, does not include state police expenditures in its studies because, since 1980, state police do not receive Highway Fund monies. California, on the other hand, includes large Highway Patrol expenditures in its studies. Since policing expenditures are typically viewed as a common responsibility of all highway users and are assigned to all vehicle classes based on each class's relative travel, they are primarily the responsibility of automobiles and other light vehicles. Therefore, it is not surprising that the California studies find a higher light vehicle responsibility and lower heavy vehicle responsibility share than the Oregon studies.

A review of state studies conducted in connection with the 1997 Federal study found that those studies attempting to clearly allocate costs between light and heavy vehicle classes have found heavy vehicles to be responsible for 30 to 40 percent of total highway expenditures. The past several Oregon studies have produced results in this range. Both the 1982 and 1997 Federal HCASs found trucks and other heavy vehicles to be responsible for 41 percent of federal highway expenditures.[3]

[2] "Oregon Cost Responsibility Studies Compared to Other States," Legislative Revenue Office Research Report #4-96, September 10, 1996.
[3] It should be noted, however, that the results of the federal studies are not directly comparable to those of state studies for two reasons: highway maintenance is a state-funded activity and thus is not included in the federal studies, and the heavy vehicle responsibility share is generally lower for most maintenance activities than for construction, particularly major rehabilitation projects. Therefore, the responsibility for federal expenditures will typically be more weighted toward heavy vehicles than is the case for state expenditures.

OREGON ROAD USER TAXATION

Oregon governs the State Highway Fund using the concept of cost responsibility. The State collects a fair share of revenue from each highway user class through three highway user taxes. The three taxes are: **vehicle registration fees, motor vehicle fuel taxes** (primarily the gasoline tax), and **motor carrier fees** (primarily the weight-mile tax).

Registration Fee

The registration fee is levied on a biennial basis for all road users, based on the type and weight of the vehicle being registered. The registration fee is considered payment for the fixed or non-use related costs of providing a highway system. These costs include minimal maintenance of facilities and equipment along with certain administrative functions necessary to keep the system accessible. Since these costs account for a small portion of total highway costs, registration fees in Oregon have traditionally been low (for both cars and trucks) in comparison to the corresponding fees in most other states.

Road user taxes were initially levied against motor vehicles to cover the cost of registration. A one-time fee of $3.00 was instituted in 1905. Because this proved to be a productive source of revenue, the state soon annualized the fee and began to increase the rates and use the proceeds to finance highways.

From 1990 to 2003, the two-year registration fee for automobiles and other vehicles weighing 8,000 pounds or less was $30, and in 2004, it was increased to $54. This shift to higher registration fees represents a change in philosophy away from the "user pays" approach and toward the use of fixed fees to cover more of the variable costs of road construction and maintenance. In 2018, the legislature increased the biennial registration rates for automobiles from $86 to $112. Starting in 2020, additional registration fees were based on the fuel efficiency of registered vehicles, with increasing fees for high-efficiency vehicles

Fuel Tax

The fuel tax applies to gasoline or diesel fuel purchased from an authorized seller who collects the taxes at the time of sale. In 1919, Oregon became the first state in the nation to enact a fuel tax on gasoline. It was regarded as a "true" road user tax because those who used the roads more paid more. The fuel tax came to be viewed as the most appropriate means of collecting the travel-related share of costs for which cars and other light vehicles are responsible.

The state fuel tax was extended to diesel and other fuels in 1943. Since that time, the tax on diesel and other fuels, referred to as a "use fuel" tax, has been at the same rate per gallon as the tax on gasoline. On January 1, 2022 the Oregon Legislature increased the fuel tax and use tax rates to $0.38. The rates are expected to increase by an additional $0.02 in 2024.

Motor Carrier Fees

The primary motor carrier fee is the weight-mile tax, which applies to all commercial motor vehicles with declared gross weights of more than 26,000 pounds. It is based on the declared weight of the vehicle and the distance it travels in Oregon. The weight-mile tax is a use-tax that takes the place of the fuel tax on heavy vehicles. Vehicles subject to the weight-mile tax are not subject to the state fuel tax.

The Oregon weight-mile tax system consists of a set of schedules and alternate flat fee rates. There are separate schedules for vehicles with declared weights of 26,001 to 80,000 pounds and those over 80,000 pounds. Additionally, log, sand and gravel, and wood chip haulers have the option to pay flat monthly fees in lieu of the mileage tax.

Since 1947, the State has adjusted the weight-mile rates 15 times based on the results of updated cost responsibility studies or the passage of transportation funding packages. Another adjustment will occur on January 1, 2024 when HB 2017 takes full effect and increases weight-mile rates by an average of 53 percent across all weight classes as compared with pre-HB 2017 rates.

Other recent revisions to the weight-mile rates include:

- October 1, 2010, when weight-mile rates increased by an average of 24.5 percent because of the 2009 Jobs and Transportation Act (JTA).
- January 1, 2004, when the 2003 Legislature increased weight-mile rates by 9.9 percent when enacting the third phase of the Oregon Transportation Investment Act (OTIA III).
- On September 1, 2000, rates were reduced across the board by 12.3 percent to reflect the results of the 1999 study.

- In January 1, 1996, the rates were also reduced by 6.2 percent based on the results of the 1994 study.
- Rates were also increased on January 1, 1992, to maintain equivalency with the fuel tax increases enacted by the 1991 Legislature.

The 1999 Oregon Legislature repealed the weight-mile tax and replaced it with a 29 cent per gallon diesel fuel tax and higher heavy truck registration fees. This measure, House Bill 2082, was subsequently referred to the voters and defeated in the May 2000 primary election.

After the May 2000 vote, the trucking industry challenged the Oregon tax in the courts. The primary focus of the legal action was the feature that allows haulers of logs, sand and gravel, and wood chips to pay alternate flat fees in lieu of the mileage tax. The industry argued that these fees are, from a practical standpoint, available only to Oregon intrastate motor carriers, and this provision of the Oregon system therefore unfairly discriminates against non-Oregon based interstate firms. In February 2002, the Third District Circuit Court ruled in favor of the State in the lawsuit. The ruling was reversed in the Court of Appeals in 2003. The Oregon Supreme Court affirmed the original Circuit Court decision in December 2005.

For carriers hauling divisible-load commodities at gross weights between 80,001 and 105,500 pounds pay a weight-mile tax (statutory Table B) based on the vehicle's declared weight and number of axles. There are separate schedules for five, six, seven, eight, and nine or more axle vehicles, with each schedule graduated by declared weight. The rates are structured so that, at any declared weight, carriers can qualify for a lower per-mile rate by utilizing additional axles.

Carriers hauling non-divisible loads at gross weights greater than 98,000 pounds under special, single-trip permits pay a per-mile road use assessment fee. Non-divisible (or "heavy haul") permits are issued for the transportation of very heavy loads that cannot be broken apart, such as construction equipment, bridge beams, and electrical transformers.

The road use assessment fees are expressed in terms of permit gross weight and number of axles and are based on a charge of 10.9 cents per equivalent single axle load (ESAL)[4] mile of travel as of January 1, 2024. As with the Table B rates, carriers are assessed a lower per-mile charge the greater the number of axles used at any given gross weight. The road use assessment fee takes the place of the weight-mile tax for the loaded, front-haul portion of non-divisible load trips. With rare exceptions, empty back haul miles continue to be subject to the weight-mile tax and taxed at the vehicle's regular declared weight.

Each biennium, ODOT conducts a study to test for the revenue neutrality of flat-fee rates and recommends adjustments to those rates as necessary to treat intrastate and interstate carriers equitably.

ORGANIZATION OF THIS REPORT

This volume of the 2023 study provides an overview of the study issues, methodology, and results, as well as recommendations for future studies. There are several exhibits throughout this report to illustrate specific data. Please note that amounts shown are rounded and may not total exactly.

This chapter has provided an introductory discussion of the purpose, scope, and process of the 2023 study as well as a brief background discussion of the history of Oregon highway cost allocation studies, studies by the federal government and other states, and the evolution of Oregon road user taxation.

- **Chapter 2** briefly summarizes the basic structure and parameters of the 2023 study, including the analysis periods, road (highway) systems, revenues attributed to vehicle classes, and expenditures allocated to those vehicle classes.
- **Chapter 3** presents the general methodology and approach used for the study. It includes a description of the special analyses conducted for the study and discussion of the major methodological and procedural changes from previous Oregon studies.
- **Chapter 4** summarizes the data and forecasts used in the study and compares them to the data and forecasts used in recent studies.
- **Chapter 5** presents the study expenditure allocation and revenue attribution procedures and results and compares the methods and results to those of previous Oregon studies.

[4] An ESAL is equivalent to a single axle carrying 18,000 pounds.

- **Chapter 6** brings together the expenditure allocation and revenue attribution results from the previous chapter to develop ratios of projected payments to cost responsibilities for light vehicles and the detailed heavy vehicle weight classes. It also compares these ratios with those from the 2013-2021 Oregon studies.
- **Chapter 7** contains a description of the changes that contributed to the shift in equity ratios resulting from this study. It isolates the various contributing factors of project mix, changes in tax rates, and availability of new weigh-in-motion data, on the shift.

Prior studies have typically included a chapter with recommendations for changes in existing tax rates and fees to bring about a closer match between revenues contributed and cost responsibilities for each vehicle class. Unfortunately, the timeline of the 2023 study did not permit the requisite discussions with the Study Review Team to enable the inclusion of such explorations in this report.

The appendices to this study are presented in a separate document because of their size. The appendices include:

Appendix A. Glossary of terms

Appendix B. Summary of highway cost-allocation studies in other states

Appendix C. The minutes of each SRT meeting

Appendix D. HCAS model user guide

Appendix E. HCAS model reference guide

Appendix F. 2023 input data and assumptions

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CHAPTER 2: SUMMARY OF THE BASIC STRUCTURE & PARAMETERS OF STUDY

The underlying approach and methods used in this highway cost allocation study are, with a few major exceptions, like those used in the last six Oregon studies. The analytical framework and basic parameters of the 2023 study are briefly summarized below.

STUDY APPROACH

This study uses the cost-occasioned approach, employing an incremental, design-based allocation methodology for bridges and the 2010 version of the National Pavement Cost Model (NAPCOM) for pavement costs. This is the same general approach that was used in previous Oregon studies and virtually all studies conducted by the federal government and other states.

GENERAL METHODOLOGY

This section describes key assumptions and data sources for the analysis.

Analysis Periods

- **Base Year:** Calendar year 2021, the most recent full year for which data were available when the study was undertaken.
- **Forecast Year:** Calendar year 2024, the middle 12 months of the 24-month study biennium.
- **Study Period:** The 2023-25 State Fiscal Biennium, or July 1, 2023 to June 30, 2025.

The expenditures allocated in this study are those projected for the 2023-25 biennium using ODOT's Cash Flow Forecast model. All traffic data used in the study were first developed from data for the 2021 base year, and then projected forward to the 2023 forecast year using weight-class-specific growth rates.

Road (Highway) Systems

This study uses the Federal Highway Administration's classification system for highway functional classes. Every public road in Oregon is assigned to one of 14 functional classes, which are defined as combinations of urban or rural and seven classifications based on the purpose of the road:

1. Interstate Freeways
2. Other Freeways and Expressways
3. Other Principal Arterials
4. Minor Arterials
5. Major Collectors
6. Minor Collectors
7. Local Streets and Roads

Each roadway segment is also assigned to one of four ownership categories: state, county, city, or federal. Note that U.S. Highways and Interstates are owned by the state; federal ownership consists mostly of Forest Service and Bureau of Land Management roads.

In addition to the 14 federal functional classes, we developed three other categories to facilitate the allocation of costs for projects on multiple functional classes. The additional categories are: all roads, all state-owned roads, and all locally-owned roads.

Vehicle Classes

Light vehicles include all vehicles up to 10,000 pounds gross weight, consistent with Oregon law and registration fee schedules. In studies prior to 2007, light vehicles were defined as vehicles up to 8,000 pounds.

Vehicles weighing more than 10,000 pounds are divided into 2,000-pound vehicle classes. All vehicles over 200,000 pounds are in the top weight class. Those over 80,000 pounds are further divided into subclasses based on the number of axles on the vehicle. The five subclasses are five, six, seven, eight, and nine or more axles.

Vehicles over 26,000 pounds are assigned to weight classes based on their declared weight, which may be different from their registered gross weight. For example, a given tractor may operate with different configurations (number and type of trailers) at various times and may have different declared weights for different configurations.

For modeling purposes, each weight class up to 80,000 pounds is assigned a distribution of numbers of axles, and each combination of weight class and number of axles is assigned a distribution of operating weights. For vehicles over 26,000 pounds, these distributions are obtained from Weigh-In-Motion data, which are collected and supplied by ODOT.

For reporting purposes, the expenditure allocation and revenue attribution results reported in Chapters 5 and 6 are presented in terms of the following seven summary-level vehicle weight groups:

- 1 to 10,000 pounds
- 10,001 to 26,000 pounds
- 26,001 to 78,000 pounds
- 78,001 to 80,000 pounds
- 80,001 to 104,000 pounds
- 104,001 to 105,500 pounds
- 105,501 pounds and up

The study team determined the various weight classes based on the characteristics of the vehicles in each group, logical divisions in the tax structure, and the number of vehicles and miles in each group. Operators of vehicles in the 10,001 to 26,000-pound group, for example, pay the state fuel tax and higher registration fees rather than the weight-mile tax. Additionally, most of these vehicles are two-axle, single-unit trucks or buses used in local commercial delivery operations or passenger transport. Thus, they have similar characteristics with respect to their cost responsibility and tax payments. It is, therefore, logical to combine them for reporting purposes.

Similarly, it makes sense to combine the individual weight classes above 105,500 pounds because these vehicles are (a) operated under special, single-trip, non-divisible load permits, (b) operated with multiple axles and legally allowed higher axle weights than regular commercial trucks, (c) subject to the road use assessment fee rather than the weight-mile tax for their loaded front haul miles, and (d) typically used for short-mileage hauls (e.g., transporting heavy equipment from one construction site to another) and so account for a very small proportion of total truck miles in the state.

The weight classes of 78,001 to 80,000 and 104,001 to 105,500 pounds are the largest two truck classes by miles of travel. These two classes alone account for a majority of the total commercial truck miles in Oregon. Because of the dominant role of these two classes in terms of miles of travel, cost responsibilities, and revenue contributions, it is logical they be kept as separate groups.

EXPENDITURES ALLOCATED

State Expenditures

All state expenditures of highway user fee revenues are allocated to vehicle weight classes, as are all state expenditures of federal highway funds (e.g., matching funds). Federal funds are included because they are interchangeable with state user fee revenues. Any differences in the way they are spent are arbitrary and subject to change.

State expenditures of bond revenues are included because the bonds are repaid from state user fees. Such expenditures are, however, reduced to the amount that will be repaid in the study period before these expenditures are allocated. The remaining expenditures will be included in future studies using the allocation to vehicle classes applied in this study, consistent with the approach taken in the 2005 through 2021 studies. Thus, expenditures of bond revenues that were allocated in the most recent prior study will be included in this and the next eight studies.

Local Government Expenditures

The study allocates all expenditures by local governments of state highway user fees and federal highway funds. Federal funds are included because, again, they are interchangeable with state user-fee revenues.

Some local-government own-source revenues are allocated because they are interchangeable with state highway user fees. The study excludes local-government own-source revenues reported as coming from locally issued bonds, property taxes (including local improvement districts), systems development charges, and traffic impact fees (also called system

development charges). These revenue sources must be spent on certain projects or certain types of projects and are not considered interchangeable with state highway user fees.

In studies prior to 2003, only the expenditures of state highway user fee revenues were allocated. This approach failed to account for the interchangeability of funds from other sources and required local governments to estimate how state funds were spent because their accounting systems do not track expenditures by funding source.

In the 2003 study, all expenditures by local governments were allocated. The 2005 study refined the approach taken in the 2003 study by excluding certain categories of own-source revenue that are not interchangeable. This approach has been used to allocate local government expenditures since the 2005 study.

Expenditure Categories

The four major expenditure categories used for the 2023 study are:

- **Modernization (new construction or reconstruction).** Examples include adding lanes and straightening curves. Modernization adds to the capacity of a roadway either directly or by improving throughput. A replacement bridge with more lanes than the bridge it replaces is considered modernization.
- **Preservation (rehabilitation).** Most preservation projects involve repaving existing roads. Preservation projects extend the useful life of a facility but does not add to its capacity. A replacement bridge that does not add capacity is considered preservation.
- **Maintenance and Operations.** Examples of maintenance include pot-hole patching, pavement striping, snow and ice removal, and bridge maintenance. Examples of operations include traffic signals, signage, and lighting.
- **Administration, Revenue Collection, Planning, and Other Costs**. Within each of these major categories, expenditures are further broken down into several individual work types. Maintenance and Operations, for example, includes 16 individual work types. A separate allocation is performed for the expenditures in each individual work type. Chapter 3 contains a full listing of these work categories and the allocators used for each.

REVENUES ATTRIBUTED TO VEHICLES

The revenues attributed to vehicles are based on forecasted collections for the 2023-25 biennium by major state revenue source under the existing tax structure and current-law tax rates (i.e., current registration and title fees, fuel tax, weight-mile tax, flat fee, and road use assessment fee rates).

Because non-state funding sources are included as expenditures, the total expenditures allocated is larger than the amount of total revenues attributed. This difference in absolute size does not, however, affect the calculation of equity ratios, which are ratios of ratios (each vehicle class's share of attributed revenues divided by its share of allocated expenditures).

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CHAPTER 3: GENERAL METHODOLOGY & STUDY APPROACH

This chapter presents the general methodology and approach used in the 2023 Oregon Highway Cost Allocation Study.

COST-OCCASIONED APPROACH

All Oregon highway cost allocation studies, as well as the studies conducted by the federal government and most other states, use what is called the cost-occasioned approach. The basic premise of this approach is that each class of road user should pay for the system of roads in proportion to the costs associated with road use by that class. The equity of a road tax system may then be judged by how well shares of payments by different classes of road users match their shares of costs resulting from their use of the road system.

The principal alternative to the cost-occasioned approach is the benefits approach, in which an attempt is made to identify and measure the benefits received by both users and nonusers of the system. The benefits approach begins with the recognition that the purpose of a highway system is to provide benefits, both directly to highway users and indirectly to the rest of society. Basing user fees on the value of benefits received, rather than on the costs imposed, would promote both fairness (people pay in proportion to the value they receive) and efficiency (agencies would have less incentive to build facilities where the costs exceed the benefits).

The benefits approach has two major drawbacks: benefits are not directly measurable, and the benefits associated with traveling a mile on a given road can vary between identical-appearing vehicles or individuals and for the same vehicle or person at various times. Additionally, such an approach assumes that the benefits would not otherwise, and more economically, be realized through non-road-based modes of transportation.

A long-running debate about the proper balance of cost responsibility and tax burden between highway users and nonusers continues at both the state and federal levels, fueled over the years by numerous studies. Arguments that support charging nonusers for highways are based on the societal benefits attributable to the highway system, including increased mobility, safety, and economic development.

There are, however, some serious conceptual problems in quantifying benefits and deciding which accrue to users and which accrue to nonusers. In many cases, highway improvements benefit individuals or businesses simultaneously as both users and nonusers. Additionally, the more readily understood economic impacts of highway improvements often reflect a transfer of user benefits to nonusers—the clearest example being reduced shipping costs, which are passed to businesses and consumers in the form of lower product prices.

Because of these problems, and because of the inherent advantages of user fees in promoting an economically efficient allocation of scarce resources, the federal government and most states conducting cost allocation studies now rely on a cost-occasioned approach to determine responsibility for highways. The Oregon studies continue to use a cost-occasioned approach.

Incremental Method

Within the cost-occasioned approach, different methods may be used to allocate costs or expenditures to the various vehicle classes. Virtually every recent study, including Oregon's, has used some version of what is referred to as the incremental method. This method divides selected aspects of highway costs into increments, allocating the costs of successive increments to only those vehicles needing the higher cost increment. The design, considered adequate for light vehicles only, is viewed as a common responsibility of all highway users and is shared by all vehicle classes. Each group of successively larger and heavier vehicles also shares in the incremental costs they occasion.

In Oregon, the incremental method is used directly in the allocation of bridge costs. The first increment for a new bridge, for example, identifies the cost of building the bridge to support its own weight, withstand other non-load-related stresses (e.g., stream flow, high winds, and potential seismic forces), and carry light vehicle traffic only.[5] This cost is a common responsibility of all vehicles and is assigned to all classes based on each class's share of total vehicle miles traveled (VMT).

[5] The factors influencing the design requirements, and therefore costs, of bridges, are sometimes expressed by the terms dead load, live load, and total load. Bridges need to be designed to support their own weight and the other non-load-related forces such as stream flow, wind, and seismic forces (the dead load) plus the traffic loadings anticipated to be applied to the bridge (the live load). The total design load is the sum of the dead and live loads. Although the precise relationships differ by the type and location of the bridge under consideration, as a rule, the longer the span length, the greater the relative importance of the non-load-related factors in determining the total cost of the bridge.

The second increment identifies the additional cost of building the bridge to accommodate trucks and other heavy vehicles weighing up to 50,000 pounds. This cost is assigned to all vehicles with gross weights exceeding 10,000 pounds based on the relative VMT of each class over 10,000 pounds. Similarly, the additional cost of the third increment is assigned to all vehicles with gross weights over 50,000 pounds, the cost of the fourth increment to vehicles having gross weights over 80,000 pounds, and the cost of the fifth and final increment to vehicles having gross weights over 105,500 pounds.

National Pavement Cost Model (NAPCOM)

In the past, highway cost allocation studies typically used an incremental methodology to allocate pavement costs as well. Increased depth and strength of pavement surface and base is required to support increases in the number, and particularly weight, of the vehicles anticipated to use the pavement during its design life.

For the 1997 federal study, Roger Mingo adapted the National Pavement Cost Model (NAPCOM) for use in highway cost allocation. The model had two increments: non-load-related costs and load-related costs, with the load-related costs allocated using results from detailed engineering models of several different pavement degradation mechanisms that consider the effects of climate, traffic levels, mix of vehicle types, and the interactions between different mechanisms.

Roger Mingo adapted the pavement model to use Oregon's special weighing data[6] and to use 2,000-pound increments of declared vehicle weight for data input and results reporting. The allocation of costs in the second increment used the detailed results of the Oregon-specific pavement cost model, which provides allocation factors by weight class and number of axles for each combination of functional class and pavement type (flexible or rigid).

An updated version of NAPCOM was completed in 2010. This version of the model is different from the earlier versions in several ways, though the fundamental idea of incremental allocation of non-load-related and load-related costs is the same. Among the main differences in the newest version of NAPCOM are the new pavement distress models and equations for load-related costs, which have been updated to reflect the current accepted pavement damage models and theories. Load-related costs are allocated using results from newer detailed, empirical engineering models that have been calibrated to pavement distress data.

The 2010 NAPCOM model was used to develop the pavement factors for the 2011 through 2021, and 2023 Oregon Studies. Like the development of pavement factors for past studies, pavement factors were developed by 2,000-pound increments of declared vehicle weight. Weigh-in-motion (WIM) data were also used to construct distributions of configurations and declared weights by operating weight. The 2011 Oregon Highway Cost Allocation Study was the first study to use the updated version of NAPCOM to generate pavement factors for highway cost allocation.

THE CHOICE OF APPROPRIATE COST ALLOCATORS

Some quantifiable measure, or allocator, must be used to distribute each category of cost, or each increment within a category where the incremental approach is used, to the individual vehicle classes. For many costs, there are logical relationships that suggest which allocator is most appropriate.

Wear-related costs are a direct, empirically established consequence of use by vehicles, and are the easiest cost to allocate. The amount of wear a vehicle imposes per mile of travel relates closely to measurable attributes of the vehicle. Two approaches may be used for choosing allocators for wear-related costs:

- Results from a detailed model that predicts costs imposed by individual vehicles are used to develop allocation factors that produce the same attribution of costs as the model. That is how pavement costs are handled in this study.
- When a detailed model for attributing wear-related costs does not exist, this analysis uses allocation factors based on how wear is expected to vary in proportion to the wear imposed per unit of use by the vehicles in each category. For example, striping costs are allocated according to axle-miles of travel because it is expected that stripes wear in proportion to the number of axles that pass over them.

[6] Special weighings, which are no longer conducted, record the weight of every truck passing the scale, even if empty. Weights were reported for each axle grouping, along with the number of axles in the group. These data replaced the more generalized assumed distributions of operating weight and vehicle configurations used in the national model. The 2010 version of NAPCOM, and Oregon HCAS studies since 2011 use weigh-in-motion data, which record the weight on each axle and the distances between axles for every truck passing each of many sensors around the state.

For structures and, to a lesser extent, roadways, the cost of constructing a facility with a given capacity will vary with the maximum weight and size of vehicle expected to use it. Part of the difference in construction costs, however, may be offset by increased useful life of a sturdier facility. If one attributes capital costs based on differences in the size or strength of the structure required to accommodate several types of vehicles, then the incremental approach may be used.

The incremental approach, by itself, does not account for the capacity demand that drove the decision to build the facility. For bridges and structures, projects that added capacity were identified so that the base increment of the structure cost could be allocated using the peak-period passenger-car-equivalent VMT allocator (peak PCE-VMT). The incremental approach may be modified to consider the expected effects of structure design on useful life, as was done in the allocation of bridge costs in recent Oregon studies.

All other approaches to capital-cost allocation are theoretically arbitrary and thus inherently second best. However, other approaches may be selected because of their convenience, despite the lack of a compelling underlying logic. One such second-best approach to allocating capacity-enhancing capital costs was used in the most recent Oregon studies. The non-wear-related portion of capital costs were allocated in proportion to passenger-car-equivalent vehicle-miles traveled during the peak hour (peak PCE-VMT), which varies in proportion to each vehicle's contribution to congestion on existing facilities but does not consider the relationship between volume and capacity on existing facilities. The approach also assumes that the value of time is equal across all vehicle types, trip types, and vehicle occupancies.

If the benefits resulting from a given expenditure vary with vehicle use, the cost may be allocated in proportion to the level of benefit. For example, if the occupants of every vehicle passing a safety improvement benefit from reduced risk of death or injury, the cost could be attributed based on occupant-miles traveled or, if occupancy is assumed to be the same across all vehicles, vehicle-miles traveled. Other costs may not vary at all with vehicle use but must still be allocated to vehicles. If one allocates costs that do not vary with use, any allocator that seems "fair" may be chosen. In these cases, there is no single right allocator to use.

In general, an allocator that varies more closely with costs imposed should be selected over one that varies less closely. The degree of correlation may be measurable given enough data, but the necessary data usually do not exist, so one must calculate the expected relationship based on engineering and economic theory. A strong statistical correlation does not necessarily indicate a good allocator, as there is no reason to believe that an accidental correlation will persist. An allocator must also vary with measurable (and measured) attributes of vehicles, such as miles traveled, weight, length, number of axles, or some combination of those.

Allocators Used In This Study

As noted above, there are several cost allocators available for use in a cost allocation study. Allocators may be applied on either a per-vehicle or per-vehicle-mile-traveled basis. Because it is vehicle use, rather than the existence of vehicles, that imposes costs on the highway system, many costs in the current Oregon study are allocated using some type of weighted vehicle-miles traveled (VMT). Exhibit 3-1 shows the allocators applied to each expenditure category for this study.

EXHIBIT 3-1: ALLOCATORS APPLIED TO EACH WORK TYPE

Work Type Description	Work Type	Allocator 1	Share 1	Allocator 2	Share 2
Preliminary and Construction Engineering (and etc.)	1	CongestedPCE	0.5595	Other_Construction	0.4405
Right of Way (and Utilities)	2	CongestedPCE	0.7375	Other_Construction	0.2625
Grading and Drainage	3	CongestedPCE	1.0000	None	0.0000
New Pavements-Rigid	4	CongestedPCE	0.0410	Rigid	0.9590
New Pavements-Flexible	5	CongestedPCE	0.0548	Flex	0.9452
New Shoulders-Rigid	6	CongestedPCE	1.0000	None	0.0000
New Shoulders-Flexible	7	CongestedPCE	1.0000	None	0.0000
Pavement and Shoulder Reconstruction-Rigid	8	CongestedPCE	0.0410	Rigid	0.9590
Pavement and Shoulder Reconstruction-Flexible	9	CongestedPCE	0.0548	Flex	0.9452
Pavement and Shoulder Rehab-Rigid	10	All_VMT	0.0410	Rigid	0.9590
Pavement and Shoulder Rehab-Flexible	11	All_VMT	0.0548	Flex	0.9452
Culverts	12	All_VMT	0.8752	Flex	0.1248
New Structures	13	None	1.0000	None	0.0000
Replacement Structures	14	None	1.0000	None	0.0000
Structures Rehabilitation	15	None	1.0000	None	0.0000
Climbing Lanes	16	UphillPCE	1.0000	None	0.0000
Truck Weight/Inspection Facilities	17	Over_26_VMT	1.0000	None	0.0000
Truck Escape Ramps	18	Over_26_VMT	1.0000	None	0.0000
Interchanges	19	None	1.0000	None	0.0000
Roadside Improvements	20	All_VMT	1.0000	None	0.0000
Safety Improvements	21	CongestedPCE	1.0000	None	0.0000
Traffic Service Improvements	22	CongestedPCE	1.0000	None	0.0000
Other Construction (modernization)	23	Other_Construction	1.0000	None	0.0000
Other Construction (preservation)	24	Other_Construction	1.0000	None	0.0000
Surface and Shoulder Maintenance-Rigid	25	All_VMT	0.0410	Rigid	0.9590
Surface and Shoulder Maintenance-Flexible	26	All_VMT	0.0548	Flex	0.9452
Surface and Shoulder Maintenance-Other	27	All_AMT	1.0000	None	0.0000
Drainage Facilities Maintenance	28	All_VMT	1.0000	None	0.0000
Structures Maintenance	29	All_VMT	1.0000	None	0.0000
Roadside Items Maintenance	30	All_VMT	1.0000	None	0.0000
Safety Items Maintenance	31	All_VMT	1.0000	None	0.0000
Traffic Service Items Maintenance	32	CongestedPCE	1.0000	None	0.0000
Pavement Striping and Marking (maintenance)	33	All_AMT	1.0000	None	0.0000
Sanding and Snow and Ice Removal (maintenance)	34	All_VMT	1.0000	None	0.0000
Extraordinary Maintenance	35	All_VMT	1.0000	None	0.0000
Truck Scale Maintenance-Flexible	36	Over_26_VMT	1.0000	None	0.0000
Truck Scale Maintenance-Rigid	37	Over_26_VMT	1.0000	None	0.0000
Truck Scale Maintenance-Buildings and Grounds	38	Over_26_VMT	1.0000	None	0.0000
Studded Tire Damage	39	Basic_VMT	1.0000	None	0.0000
Miscellaneous Maintenance	40	All_VMT	1.0000	None	0.0000
Bike/Pedestrian Projects	41	All_VMT	1.0000	None	0.0000
Railroad Safety Projects	42	All_VMT	1.0000	None	0.0000

EXHIBIT 3-1: ALLOCATORS APPLIED TO EACH WORK TYPE (CONTINUED)

Work Type Description	Work Type	Allocator 1	Share 1	Allocator 2	Share 2
Transit and Rail Support Projects	43	CongestedPCE	1.0000	None	0.0000
Fish and Wildlife Enabling Projects	44	All_VMT	1.0000	None	0.0000
Highway Planning	45	All_VMT	1.0000	None	0.0000
Transportation Demand & Transportation System Management	46	CongestedPCE	1.0000	None	0.0000
Multimodal	47	CongestedPCE	1.0000	None	0.0000
Reserve Money, Fund Exchange, Immediate Opportunity Fund	48	All_VMT	1.0000	None	0.0000
Seismic Retrofits on Structures	49	All_VMT	1.0000	None	0.0000
Other Common Costs	50	All_VMT	1.0000	None	0.0000
Other-Over 26,000 Only	55	Over_26_VMT	1.0000	None	0.0000
Other-Basic Only	56	Basic_VMT	1.0000	None	0.0000
Other-Over 8,000 Only	57	Over_10_VMT	1.0000	None	0.0000
Other-Under 26,000 Only	58	Under_26_VMT	1.0000	None	0.0000
Other Administration	59	All_VMT	1.0000	None	0.0000
Bridge-All Vehicles Share (no added capacity)	60	All_VMT	1.0000	None	0.0000
Bridge-Over 8,000 Vehicles Share	61	Over_10_VMT	1.0000	None	0.0000
Bridge-Over 50,000 Vehicles Share	62	Over_50_VMT	1.0000	None	0.0000
Bridge-Over 80,000 Vehicles Share	63	Over_80_VMT	1.0000	None	0.0000
Bridge-Over 106,000 Vehicle Share	64	Over_106_VMT	1.0000	None	0.0000
Bridge-All Vehicles Share (added capacity)	65	CongestedPCE	1.0000	None	0.0000
Other Bridge	66	Other_Bridge	1.0000	None	0.0000
Interchange Modernization	67	None	1.0000	None	0.0000
Bridge Replacement with Capacity	68	None	1.0000	None	0.0000

Note: Although work types 13, 14, 15, 19, 67, and 68 are shown in this table with allocators of "None," expenditures associated with these work types are re-assigned to the bridge work types 60 through 65 and allocated as bridge expenditures.

Unweighted VMT is the most general measure of system use and is considered a fair way to assign many types of common costs, that is, costs considered to be the joint responsibility of all highway users. VMT repr esent a reasonable and accepted measure to assign costs among the members of a subgroup (e.g., the individual vehicle classes within a cost increment), especially when members of the subgroup have similar characteristics or when an investment is made to provide a safer highway facility. Unweighted VMT are used for many traffic-oriented services, such as the provision of lighting, signs, and traffic signals since these services are related to traffic volumes.

Weighted VMT, with an appropriate vector of zeros and ones, will produce an allocator that restricts the allocation to a corresponding subset of weight classes. Such allocators are used to implement the incremental approach for bridge costs and for other costs allocated on VMT for a subset of all vehicles. One example is the allocation of Motor Carrier Transportation Division administrative costs only to vehicles over 26,000 pounds.

Other VMT weighting factors may also be used to allocate certain costs more appropriately. VMT can be weighted to account for the effective roadway space occupied by several types of vehicles relative to a standard passenger car. This is accomplished by using passenger-car equivalence (PCE) factors to weight VMT, producing PCE-VMT. Because trucks are larger and heavier than cars and require greater acceleration and braking distances, they occupy more effective roadway space and therefore have higher PCE factors.

A variety of PCE factors were developed for the 1997 federal study, including factors for different functional classes and traffic congestion, as well as uphill factors for steep grades. The uphill factors are used in this study to allocate the costs of climbing lanes.

Congested (or peak-period) PCE-VMT is peak-period VMT weighted by the PCE factors for congested traffic conditions. It is used in this study for the common cost portion of projects undertaken to add capacity to the highway system.

VMT can also be weighted to reflect the amount of pavement wear imposed by vehicles of various weights and axle configurations. The factors used for this weighting are produced from the results of the pavement model described above.

Costs not accounted for as a part of specific construction projects but that are expected to vary with the overall level of construction are allocated with special factors developed during the allocation process. These factors allocate costs in proportion to the construction costs that were allocated from specific projects. Separate "other construction" factors are calculated and applied for work performed by the state and by local governments.

Prospective View

The costs or expenditures allocated in a cost allocation study can be those for a past period, those anticipated for a future period, or a combination of past and future costs. Some studies conducted by the federal government and other states have allocated both historical and planned expenditures.

The Oregon studies have traditionally used a prospective approach in which the expenditures allocated are those planned for a future period, specifically, the next fiscal biennium. Similarly, the traffic data used in these studies are those projected for a future year. This is done to allow for changes in expenditure levels and traffic volumes, and so that the study results will be applicable for the period for which legislation is enacted to implement the study recommendations.

There are some disadvantages associated with allocating only projected future expenditures. Specifically, it requires relying on forecasts, which are subject to greater error than historical data.

The 1996 Cost Responsibility Blue Ribbon Committee recommended that the Oregon studies continue allocating only projected future expenditures. The current Oregon study again follows that recommendation, except for incorporating study-period expenditures on the repayment of bonds issued in the prior study periods, allocated in the same proportions as in the prior studies.

Exclusion of External (Social) Costs

The Oregon studies, as well as studies conducted by most other states have chosen to allocate direct governmental expenditures and exclude external costs associated with highway use. The proponents of a cost-based approach argue that to be consistent, a HCAS should include all costs that result from use of the highway system. They further argue that economically efficient pricing of highways requires the inclusion of all costs and that failure to do so encourages an over-utilization of highways. Including external costs adds to the breadth and completeness of the analysis and helps determine appropriate user charges necessary to reflect these costs.

However, there are several disadvantages associated with including external costs. Although these costs represent actual costs to society, they are decidedly more difficult to quantify and incorporate in the analysis than are direct highway costs. Inclusion of external costs therefore increases the data requirements and complexity of the studies and could reduce their overall accuracy.

The 1996 Blue Ribbon Committee recommended that the Oregon studies continue to exclude social costs until the state implements explicit user charges to capture these costs. Both the 1982 and 1997 federal HCASs included some social costs in supplementary analyses. The 1999 Oregon study recommended that future studies include "a separate assessment of the impacts of proposed changes in highway user taxes on the total costs of highway use including all major external costs." The 2001 and 2003 studies made this same recommendation.

In 2009, the State Legislature directed the Oregon Department of Administrative Services to prepare a second highway cost allocation study based on the concept of the efficient pricing of highways, in addition to the traditional study. ORS 366.506 Section 30 in House Bill 2001 specifically required that an efficient fee study "consider the actual costs users impose on the highway system, including but not limited to highway replacement costs, traffic congestion costs and the cost of greenhouse gas emissions." Additionally, the efficient fee study report needed to "include recommendations for legislation to implement the efficient fee method of cost allocation." The results of the 2011 Oregon Efficient Fee Highway Cost Allocation Study were presented in a separate report.

EXPENDITURE ALLOCATION

The Oregon studies allocate expenditures of road-related user fees, rather than costs. Over the long run, expenditures must cover the full direct costs being imposed on the system or the system will deteriorate. Over any shorter period, however, expenditures will exceed or fall short of the costs imposed. Additionally, local governments spend money from sources other than user fees on local roads and bridges. Oregon's highway cost allocation process includes the expenditure of the portion of local governments' own-source revenues that are fungible with state user fees but excludes the expenditure of own-source funds that are dedicated to specific projects or purposes. In this study, 21.4 percent of local government expenditures (5.2 percent of all expenditures) were excluded.

Some past Oregon studies, including a special analysis in the 2001 study, attempted to estimate and allocate a full-cost budget in addition to a base-level (actual expenditure) budget. The intent was to approximate costs by estimating the level of expenditures required to preserve service levels and pavement conditions at existing levels. In these studies, heavy vehicles were found to be responsible for a greater share of the preservation level budget than of the base-level budget. This was because most unmet needs at that time involved pavement rehabilitation and maintenance, items for which heavy vehicles have the predominant responsibility.

There are convincing arguments for moving toward a full cost-based approach in highway cost allocation studies. Recognizing the benefit of moving toward a financing system based on efficient fees, a full 2011 Efficient Fee Highway Cost Allocation Study was performed in addition to the traditional study. "True" costs are still more difficult to quantify and incorporate in the analysis than are direct highway expenditures. Some of these problems are theoretical in nature or are limited by our knowledge of such costs, and data limitations also plague the calculation of many of these costs. As a practical matter, therefore, highway cost allocation studies, including this study, continue to focus on the allocation of expenditures rather than costs.

Treatment of Debt-Financed Expenditures and Debt Service

Oregon has traditionally relied much less on debt financing of its highway program than have other states. This has changed since the enactment of the Oregon Transportation Investment Act (OTIA) by the 2001 Legislature. The first OTIA authorized the issuance of $400 million in new debt for projects to be completed across Oregon. It provided $200 million for projects that add lane capacity or improve interchanges and $200 million for bridge and pavement rehabilitation projects. Automobile and truck title fees were increased to finance the repayment of construction bonds for OTIA projects.

Favorable bond-rate conditions allowed the 2002 Special Legislative Session to authorize an additional $100 million in debt without needing to further increase revenues. The original OTIA projects became known as OTIA I and the additional projects as OTIA II.

The 2003 Legislature authorized an additional $2.46 billion in new debt and increased title, registration, and other DMV fees to produce the additional revenue necessary to repay the bonds. The OTIA III money was to be spent as follows:

- $1.3 billion to repair or replace 365 state bridges
- $300 million to repair or replace 141 locally owned bridges
- $361 million for local-government maintenance and preservation
- $500 million for modernization

The issue of how to treat OTIA project expenditures and the associated debt service was discussed at some length by the Study Review Teams for both the 2003 and 2005 studies. Debt finance introduces a disconnect between study-period revenues and expenditures because the period in which the revenues are received differs from the period in which the funds are expended. Care needs to be taken to avoid double counting, which would occur if both the debt-financed project expenditures and full debt service expenditures (including interest and repayment of principal) were included.

While not all the funds expended on OTIA projects come from bonds, the bonded amounts are easily identifiable, as are the associated debt service expenses. The dollar amount allocated in the model is the study-period debt service expenditure, given the bond rate and amortization period, in this case 20 years. The expenditures associated with each bond-financed project are scaled down by a bond factor to one study-period worth of debt service expenditure before allocation. This method retains the project detail necessary to assign expenditure shares by vehicle class. The dollar amounts allocated to each vehicle class for bonded projects are recorded and carried forward to each of the next nine studies.

This approach has two disadvantages: the choice of which projects get bond financing can affect the results of the study, as well as the next nine studies, and the allocation of those expenditures in future studies remains based on traffic conditions expected for the first two years of the 20-year repayment period. The Study Review Team considered several alternative approaches and decided that the advantages of simplicity and limited data requirements for the chosen approach outweighed its disadvantages. They also noted that the failure to update the allocation in future studies was consistent with the treatment of cash-financed projects, which are completely ignored in all future studies.

Treatment of Alternative-Fee-Paying Vehicles

Under Oregon's existing highway taxation structure, some types of vehicles are exempt from certain fees or qualify to pay according to alternative-fee schedules. These types of vehicles are collectively referred to in this report as "alternative-fee-paying" vehicles. The two main types of such vehicles are publicly owned vehicles and farm trucks. Publicly owned vehicles pay a nominal registration fee and are not subject to the weight-mile tax. Most types of publicly owned vehicles are now subject to the state fuel tax, but many diesel-powered publicly owned vehicles are not. Operators of farm trucks pay lower annual registration fees than operators of regular commercial trucks, and most pay fuel taxes, rather than weight-mile taxes when operated on public roads.

The reduced rates paid by certain types of vehicles mean they are paying less per mile than comparable vehicles subject to full fees. The difference between what alternative-fee-paying vehicles is projected to pay and what they would pay if they were subject to full fees is the alternative-fee difference. The approach used in past Oregon studies was to calculate this difference for each weight class and sum these amounts. The total alternative-fee difference (subsidy amount) was then reassigned to all other, full-fee-paying vehicles on a per-VMT basis, that is, this amount was treated as a common cost to be shared proportionately by all full-fee-paying vehicles.

The rationale for this approach was that the granting of these reduced fees represents a public policy decision, and most vehicles paying reduced fees are providing some public service that should be paid for by all taxpayers in relation to their use of the system. Because the heavy vehicle share of the total alternative-fee difference is greater than their share of total statewide travel, reassigning this amount based on relative vehicle miles had the effect of increasing the light vehicle responsibility share and reducing the heavy vehicle share.

Beginning with the 2013 study, the Study Review Team recommended that the alternative-fee difference be reported, but that the results be calculated for full-fee paying vehicles only, without any adjustment related to alternative-fee paying vehicles.

Treatment of Tax Avoidance and Evasion

When vehicles subject to Oregon's fuel tax purchase fuel in another state and then drive in Oregon, they avoid the Oregon fuel tax. The reverse is also true, so if the number of miles driven in Oregon on out-of-state fuel equaled the number of miles driven outside Oregon on in-state fuel, the net avoidance would be zero. The net avoidance is specifically accounted for in the highway cost allocation study by assuming that 3.5 percent of VMT by fuel-tax paying vehicles do not result in fuel-tax collections for Oregon.

The International Fuel Tax Agreement sorts out the payments of state fuel taxes and the use of fuel in other states for interstate truckers. If truckers pay fuel tax in California, for example, and then use that fuel in Oregon while paying the weight-mile tax, IFTA provides a mechanism for California to reimburse them. If truckers then buy fuel in Oregon, paying no fuel tax, and drive in Washington, IFTA provides a mechanism for them to pay what they owe to Washington.

The avoidance of the weight-mile tax by vehicles that are not legally required to pay it is treated as described above, under alternative-fee paying vehicles, rather than as avoidance.

Virtually any tax is subject to some evasion. While it is generally agreed that evasion of the state gasoline tax and vehicle registration fees is quite low, there is more debate concerning evasion of the weight-mile and use fuel (primarily diesel) taxes. For this study, we assume that evasion of the weight-mile tax is equal to 9.4 percent of what would be collected if all that is due were paid.[7] This study also assumes that an additional 1.0 percent of the use-fuel tax on diesel (beyond the 3.5 percent gas tax avoidance) is successfully evaded.

[7] The weight-mile tax evasion percentage is based on a 2021 report commissioned by ODOT, which measured the rate of weight-mile tax evasion in Oregon.

TYPES OF DATA

Five major types of data are required to conduct a highway cost allocation study:

- **Traffic data.** The miles of travel by vehicle weight and type on each of the road systems used in the study.
- **Expenditure data.** Projected expenditures on construction projects by work type category, road system, and funding source, and projected expenditures in other categories by funding source.
- **Revenue data**. Projected revenues by revenue source or tax instrument.
- **Allocation factors.** Factors used to allocate costs to individual vehicle classes, including passenger-car equivalence (PCE) factors, pavement factors, and bridge increment shares.
- **Conversion factors and distributions**. Examples include distributions used to convert VMT by declared weight class to VMT by operating weight class or to VMT by registered weight class.

The allocation factors used in this study are described in Chapter 3 and the development and use of conversion factors is described in Appendix E: Model Reference Guide.

The remainder of this chapter presents the traffic, expenditure, and revenue data used in the 2023 study and compares them with the data used in the previous Oregon studies.

Traffic Data and Forecasts

VMT by road system, by vehicle weight class and number of axles, and by vehicle tax class are important throughout the cost allocation and revenue attribution processes. VMT estimates and projections are used in both the allocation of expenditures and the attribution of revenues to detailed vehicle classes. Additionally, as explained in Chapter 3, VMT weighted by factors such as PCEs or pavement factors is used to assign several of the individual expenditure categories allocated in the study.

For this study, the required traffic data were first collected for the 2021 base year, the latest year for which complete historical data were available. These data were then projected forward to calendar year 2024, the middle 12 months of the 2023-25 fiscal biennium, which is the study period.

The base year traffic data were obtained from several sources. These include ODOT Motor Carrier Transportation Division (MCTD) weight-mile tax information, Highway Performance Monitoring System (HPMS) submittals, MCTD and Driver & Motor Vehicle Services vehicle registrations data, and the Weigh-In-Motion data. For each road system used in the study, travel estimates are developed for light vehicles and each 2,000-pound heavy-vehicle weight class.

Information from state economic forecasts and from ODOT's revenue forecasting model is used to forecast projected study year traffic from the base year data. Data from Weigh-In-Motion are used to convert truck miles of travel by declared weight class to miles of travel by operating weight class and to obtain detailed information on vehicle configurations and axle counts for each weight class. HPMS and FHWA Highway Statistics data are used to spread VMT to functional classifications.

EXHIBIT 4-1: CURRENT AND FORECASTED VMT BY WEIGHT GROUP (MILLIONS OF MILES)

Declared Weight in Pounds			2021 VMT (estimate)	2024 VMT (forecast)	Avg. Annual Growth Rate
1	to	10,000	33,243	32,539	-0.7%
10,001	to	26,000	947	927	-0.7%
26,001	to	78,000	461	446	-1.1%
78,001	to	80,000	1,434	1,388	-1.1%
80,001	to	104,000	254	224	-4.2%
104,001	to	105,500	336	306	-3.1%
105,501	and	up	4	3	-1.7%
		Total	**36,679**	**35,833**	**-0.8%**
Total by Weight Range					
1	to	10,000	33,243	32,539	-0.7%
10,001	and	up	3,436	3,294	-1.4%
1	to	26,000	34,190	33,466	-0.7%
26,001	and	up	2,490	2,367	-1.7%
% of Total by Weight Range					
1	to	10,000	91%	91%	
10,001	and	up	9%	9%	
1	to	26,001	93%	93%	
26,001	and	up	7%	7%	

Exhibit 4-1 shows that total vehicle travel in Oregon is projected to decrease from 36.7 billion miles in 2021 to 35.8 billion miles in 2024. This represents an average annual decline of about 0.8 percent. Light vehicle travel is projected to decline from 33.2 billion miles in 2021 to 32.5 billion miles in 2024, which represents an average annual decline of 0.7 percent. Total heavy vehicle travel (10,001 pounds or greater) is forecasted to decline from 3.4 billion miles in 2021 to 3.3 billion miles in 2024, for an average annual decline of 1.4 percent. These projections are based on the projections from ODOT's revenue forecast model.

While these traffic projections are based on accepted practices and the best available data, VMT has, in recent years, become more difficult to forecast accurately. The current decline in VMT is primarily related to the COVID-19 pandemic, which led to a change in economic activity. During the pandemic truck volumes increased while passenger vehicle use declined. Post-pandemic, these changes have begun to revert themselves. The final distribution of VMT during the next biennium will depend on how commuting patterns, preferences for travel modes, and reliance on delivery trucks for e-commerce continue to evolve over time. Given the rapid changes in behavior during and after 2020, expectations about future preferences may not be clearly represented in the underlying data.

Exhibit 4-1 also shows that the change in projected VMT for heavy vehicle travel varies by weight group. The largest contraction among the heavy vehicle weight classes, -4.2 percent, is expected to be in the 80,001 to 104,000-pound weight class group; however, this weight class represents a relatively small share of the overall VMT for heavy trucks at about 7 percent.

Exhibit 4-2 shows the distribution of projected 2024 travel between light and heavy vehicles for different combinations of road system and ownership. Although light vehicles are projected to account for 90.8 percent and heavy vehicles 9.2 percent of total statewide VMT, the mix of traffic varies significantly among the different road systems. Within that distribution of total VMT, heavy vehicles are expected to account for 11.9 percent of the overall travel on state roads and 5.1 percent of the travel on local roads.

Exhibit 4-3 illustrates the separate distributions of projected VMT by road system for light vehicles, heavy vehicles, and all vehicles. As shown, 58.5 percent of total travel in the state is expected to be on state highways and 41.1 percent on local roads and streets. The distribution of VMT, however, differs significantly for light versus heavy vehicles across road systems.

EXHIBIT 4-2: PROJECTED 2024 VMT BY ROAD SYSTEM (MILLIONS OF MILES)

		VMT by VC		Percent of Total VMT	
Road System	Total VMT	Light	Heavy	Light	Heavy
State Roads	21,614	19,050	2,564	88.1%	11.9%
Urban Interstate	5,362	4,790	571	89.3%	10.7%
Rural Interstate	4,050	3,131	919	77.3%	22.7%
Urban Other	5,981	5,647	334	94.4%	5.6%
Rural Other	6,221	5,482	740	88.1%	11.9%
Local Roads	14,087	13,366	720	94.9%	5.1%
County Roads	7,095	6,660	434	93.9%	6.1%
City Streets	6,992	6,706	286	95.9%	4.1%
State & Local Roads	35,701	32,416	3,284	90.8%	9.2%
Federal Roads	133	123	10	92.8%	7.2%
Total All Roads	**35,833**	**32,539**	**3,294**	**90.8%**	**9.2%**

Note: Light includes all vehicles 10,000 pounds & under. Heavy includes all vehicles over 10,000 pounds.

Rural interstate highways, for example, are projected to handle 11.3 percent of total VMT in 2024 but 27.9 percent of heavy vehicle VMT. At the other extreme, 20.6 percent of light vehicle travel, but only 8.7 percent of heavy vehicle travel, is forecast to be on city streets. State highways are expected to handle about 58.5 percent of total travel by light vehicles and 77.8 percent of travel by heavy vehicles.

EXHIBIT 4-3: DISTRIBUTION OF PROJECTED 2024 VMT BY ROAD SYSTEM

		Percent of Total VMT	
Road System	Percent of Total VMT	Light	Heavy
State Roads	60.3%	58.5%	77.8%
Urban Interstate	15.0%	14.7%	17.3%
Rural Interstate	11.3%	9.6%	27.9%
Urban Other	16.7%	17.4%	10.1%
Rural Other	17.4%	16.8%	22.5%
Local Roads	39.3%	41.1%	21.9%
County Roads	19.8%	20.5%	13.2%
City Streets	19.5%	20.6%	8.7%
State & Local Roads	99.6%	99.6%	99.7%
Federal Roads	0.4%	0.4%	0.3%
Total All Roads	**100.0%**	**100.0%**	**100.0%**

EXHIBIT 4-4: COMPARISON OF FORECAST VMT USED IN PRIOR OR HCASs (BILLIONS OF MILES)

	2013 Study		2015 Study		2017 Study		2019 Study		2021 Study		2023 Study	
Road System	**2014 VMT**	**% of Total**	**2016 VMT**	**% of Total**	**2018 VMT**	**% of Total**	**2020 VMT**	**% of Total**	**2022 VMT**	**% of Total**	**2024 VMT**	**% of Total**
State Roads	23.8	62.0%	21.3	59.4%	21.6	60.5%	22.4	60.1%	22.1	67.8%	21.6	60.5%
Urban Interstate	5.5	14.4%	4.9	13.6%	5.4	15.0%	5.8	15.6%	5.8	17.8%	5.4	15.0%
Rural Interstate	4.8	12.6%	4.5	12.7%	4.1	11.3%	4.0	10.8%	4.1	12.6%	4.1	11.3%
Urban Other	5.8	15.2%	5.0	14.0%	6.0	16.8%	6.6	17.6%	6.1	18.8%	6.0	16.8%
Rural Other	7.6	19.8%	6.9	19.2%	6.2	17.4%	6.1	16.2%	6.1	18.6%	6.2	17.4%
Local Roads	14.6	38.0%	14.6	40.6%	14.1	39.5%	14.9	39.9%	10.5	32.2%	14.1	39.5%
County Roads	7.0	18.2%	7.3	20.2%	7.1	19.9%	8.5	22.7%	4.5	13.7%	7.1	19.9%
City Streets	7.6	19.7%	7.3	20.4%	7.0	19.6%	6.4	17.2%	6.0	18.5%	7.0	19.6%
Total All Roads	**38.3**	**100.0%**	**35.9**	**100.0%**	**35.7**	**100.0%**	**37.3**	**100.0%**	**32.6**	**100.0%**	**35.7**	**100.0%**

Note: VMT on Federally-owned roads not included in Totals.

Exhibit 4-4 compares the VMT projections by road system used in the 2013 through 2021 studies. It shows a general decline in the share of VMT that is on rural and urban road systems and a corresponding increase in the share of VMT on local roads. The systems projected to account for the largest shares of total statewide travel are Local County Roads and Local City Streets.

Expenditure Data

Until the 2001 study, Oregon highway cost allocation studies allocated only expenditures of Oregon highway user fees by state and local-government agencies. Because federal funds are in many cases interchangeable with state funds, and because the proportion of federal funds used for any project is arbitrary and subject to change between the time of the study and the time the money is spent, excluding federal funds can introduce arbitrary bias and inaccuracy into the study results.

The 2001 study included the expenditure of federal funds by the state and reported their allocation both separately and in combination with state funds.

The 2003 study, for the first time ever, included all expenditures on roads and streets in the state. In addition to state-funded expenditures, expenditures (both state and local) funded from federal highway revenues and locally generated revenues were also included. This change increased the level and breadth of expenditures allocated in the 2003 study as compared to previous studies.

Since 2005, Oregon highway cost allocation studies have included expenditures of state, federal, and local revenues but exclude certain categories of local revenues determined to not be interchangeable with state user fees. Those sources are locally issued bonds, property taxes (including local improvement districts), systems development charges, and traffic impact fees.

The expenditure data for this study were obtained from several sources. Data from ODOT's monthly Budget and Cash Flow Forecast were used to develop projected construction expenditures by project for 2023-25 biennium. Projected expenditures on maintenance and other programs were obtained from ODOT Financial Services and based on ODOT's Agency Request Budget.

Identifying those expenditures projected to be federally funded was straightforward and based on detailed information from the ODOT Cash Flow Forecast model and Project Control System. Local expenditures were projected from data obtained from the 2021 Local Roads and Streets Survey combined with information from ODOT's Agency Request Budget.

EXHIBIT 4-5: AVERAGE ANNUAL EXPENDITURES BY CATEGORY AND FUNDING SOURCE (THOUSANDS OF DOLLARS)

Major Expenditure Category	All Funding Sources	Funds by Source				Percent of All Funding Sources				All Funding Sources	Percent of Source			
		State	Federal	Local	Bond	State	Federal	Local	Bond		State	Federal	Local	Bond
Modernization	338,288	113,570	203,410	21,309	0	33.6%	60.1%	6.3%	0.0%	15.9%	9.9%	23.3%	21.4%	0.0%
Preservation	193,012	54,621	128,611	9,780	0	28.3%	66.6%	5.1%	0.0%	9.1%	4.8%	14.7%	9.8%	0.0%
Maintenance	469,469	377,551	57,410	34,507	0	80.4%	12.2%	7.4%	0.0%	22.1%	33.1%	6.6%	34.6%	0.0%
Bridge	179,902	31,528	132,558	2,606	13,210	17.5%	73.7%	1.4%	7.3%	8.5%	2.8%	15.2%	2.6%	100.0%
Other	946,493	564,715	350,339	31,439	0	59.7%	37.0%	3.3%	0.0%	44.5%	49.5%	40.2%	31.6%	0.0%
Total	**2,127,163**	**1,141,984**	**872,328**	**99,641**	**13,210**	**53.7%**	**41.0%**	**4.7%**	**0.6%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Exhibit 4-5 presents the average annual expenditures projected for the 2023-25 biennium by major category (modernization, preservation, maintenance, bridge, and other) and funding source (state, federal, local, and bond). As shown, projected expenditures total $2.1 billion. This compares to $1.9 billion annual expenditures allocated in the 2021 study.

Of the $2.1 billion total annual expenditures, $1.1 billion (53.7 percent) are projected to be state funded, $872 million (41.0 percent) federally funded, and $99.6 million (4.7 percent) locally funded. An additional $231.3 million per year of previously-allocated bond expenditures from prior studies is included in the allocated costs in this study.

The local funds column of Exhibit 4-5 includes only local expenditures from the own-source revenues that were included in this study. Local expenditures from state and federal revenues are included in the state funds and federal funds columns, respectively.

Bridge and interchange expenditures are shown separately from other modernization, preservation, and maintenance expenditures.

The "other" category in the exhibit encompasses expenditures for many activities. In addition to general administrative and tax collection costs for the state, counties, and cities, it includes expenditures for:

- Preliminary engineering
- Right of way acquisition and property management
- Safety-related projects, safety inspections, and rehabilitation and maintenance of existing safety improvements
- Pedestrian/bike projects
- Railroad safety projects
- Fish- and wildlife-enabling projects (e.g., salmon culverts)
- Transportation demand management and transportation system management projects (e.g., Traffic Operations Centers)
- Multi-modal projects
- Transportation project development and delivery
- Transportation planning, research, and analysis

The exhibit shows significant differences in the funding of different expenditure categories. Modernization, preservation, and bridge expenditures have large federal funds components. About 60.1 percent of modernization, 66.6 percent of preservation, and 73.7 percent of bridge expenditures will be federally funded. Maintenance expenditures, on the other hand, are largely state-funded, and to a lesser extent, locally funded, with a small federal-funds component.

Revenue Data and Forecasts

The revenues projected for this study include receipts from taxes and fees collected by the state from highway users, that is, revenues flowing into Oregon's dedicated State Highway Fund. Revenues from federal taxes and user fees are not estimated. Similarly, revenues generated by local governments from their own funding sources (e.g., property taxes, street assessments, system development charges, local fuel taxes) are not included.

Because the expenditures of federal and local revenues are included among the expenditures to be allocated, and because a portion of the expenditure of bond revenue in the prior biennium is included, average

annual allocated expenditures exceed average annual attributed revenues in this study by $740 million.

The revenue data required for the study are obtained directly from ODOT's revenue forecasting model. The revenue forecast used for this study was the October 2022 forecast. This is a change from previous studies that relied on the December forecast. In the 2019 study, the SRT decided to rely on the updated forecast to ensure that the model is internally consistent with the VMT forecast provided by ODOT. The forecasts include the 40 percent of State Highway Fund revenues transferred to local governments for use on local roads and streets, and all state funds used for highways, including matching requirements for federal-aid highway projects.

EXHIBIT 4-6: REVENUE FORECASTS BY TAX AND FEE TYPE (THOUSANDS OF DOLLARS) AVERAGE ANNUAL AMOUNTS FOR 2023-2025 BIENNIUM

Tax or Fee Type	Forecast Revenue	Percent of Total
Fuel Tax	685,877	42.4%
Registration Fees	357,350	22.1%
Title Fees	108,206	6.7%
Other Motor Carrier Revenue	2,352	0.1%
Road Use Assessment Fees	3,472	0.2%
Weight-Mile Tax	461,168	28.5%
Total	**1,618,425**	**100.0%**

Average annual state revenues for the 2023-25 biennium are expected to total $1.6 billion. As shown in Exhibit 4-6, fuel taxes and the weight-mile tax are the two largest sources of state user-fee revenue. Revenue from the state fuel tax is projected to average $686 million per year (42 percent of total revenues) and weight-mile tax revenue is forecast to average $461 million (28 percent of total revenues). These two sources account for 71 percent of highway user revenues, illustrating that Oregon's system of highway finance is based heavily on taxes and fees related to use of the system.

Revenue from registration and title fees is anticipated to average $357 million annually (22 percent of total revenues), consistent with recent prior studies, but down slightly from the 2021 study. Other revenue sources bring in smaller amounts of revenue.

EXHIBIT 4-7: COMPARISON OF FORECAST REVENUE (MILLIONS OF DOLLARS) USED IN PRIOR OR HCASs

Year of Study	Average Annual Forecast Revenue
1999	691
2001	690
2003	713
2005	826
2007	879
2009	870
2011	1,126
2013	1,096
2015	1,123
2017	1,186
2019	1,482
2021	1,491
2023	1,618

Exhibit 4-7 compares the forecasts of average annual total revenues used in the 1999 through 2023 studies. The increase between the 2021 and 2023 studies reflects the increases in the fuel tax, weight-mile tax, and registration fees enacted as by the Oregon Legislature in 2017.

Caution should be used in comparing these forecasts, however, because they were made at various times for different biennia, and they used different assumptions regarding the treatment of ODOT beginning and ending balances. Additionally, title fees were not identified as a revenue source in studies prior to 2003 because they did not produce net revenue.

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CHAPTER 5: EXPENDITURE ALLOCATION & REVENUE ATTRIBUTION RESULTS

This chapter presents the expenditure allocation and revenue attribution results of the 2023 study and compares them to the results of previous Oregon studies. The following chapter reports equity ratios for each vehicle group and weight class based on the expenditure allocation and revenue attribution results.

EXPENDITURE ALLOCATION RESULTS

The 2003 study was the first to base expenditure allocation results on all highway expenditures, including those financed by federal, state, and local revenues. This approach was considered necessary to address the impacts of the federal advance construction program on expenditures. This change in approach meant the expenditure allocation results for the 2003 study were not directly comparable to those of the earlier Oregon studies.

For the 2005 and later studies, the approach used in the 2003 study was modified to exclude the expenditure of certain local-government, own-source revenues that were not considered to be interchangeable with State Highway Fund monies. The excluded categories were property taxes (including local improvement districts), local bond revenues, systems development charges, and traffic impact fees. The 2023 study uses the same methodology as the 2005 through 2021 studies. As a result, the expenditure allocations in this study are comparable to the 2005 and later studies, but not directly comparable to those in the 2003 or earlier studies.

Exhibit 5-1 presents the expenditure allocation results by major expenditure category and vehicle weight group. Light (up to 10,000 pound) and heavy (over 10,000 pound) vehicles are projected to be responsible for 70.9 percent and 29.1 percent (respectively) of average annual total expenditures for the 2023-25 biennium.

As shown in the exhibit, the responsibility shares vary significantly among the major expenditure categories. Heavy vehicles, as a group, are projected to be responsible for much of the preservation expenditure (74.9 percent).

EXHIBIT 5-1: AVERAGE ANNUAL COST RESPONSIBILITY BY EXPENDITURE CATEGORY AND WEIGHT CLASS (THOUSANDS OF DOLLARS)

Declared Weight in Pounds			Expenditure Categories						Total
			Modernization	Preservation	Maintenance	Bridge	Other	Prior Bonds	
1	to	10,000	281,445	48,350	304,984	115,920	803,479	118,791	1,672,969
10,001	to	26,000	8,435	15,795	27,494	13,120	20,519	11,814	97,177
26,001	to	78,000	6,936	15,134	23,835	6,065	21,294	10,287	83,552
78,001	to	80,000	24,290	65,717	64,558	23,329	70,481	44,030	292,405
80,001	to	104,000	6,131	17,433	17,323	5,618	12,281	22,169	80,955
104,001	to	105,500	9,573	26,173	29,572	7,338	17,086	22,460	112,203
105,501	and	up	1,478	4,409	1,703	8,510	1,353	1,791	19,245
		Total	**338,288**	**193,012**	**469,469**	**179,902**	**946,493**	**231,343**	**2,358,506**
Total by Weight Range									
1	to	10,000	281,445	48,350	304,984	115,920	803,479	118,791	1,672,969
10,001	and	up	56,843	144,661	164,485	63,981	143,014	112,553	685,537
1	to	26,001	289,880	64,145	332,478	129,041	823,997	130,605	1,770,146
26,001	and	up	48,408	128,866	136,990	50,861	122,496	100,738	588,360
% of Total by Weight Range									
1	to	10,000	83.2%	25.1%	65.0%	64.4%	84.9%	51.3%	70.9%
10,001	and	up	16.8%	74.9%	35.0%	35.6%	15.1%	48.7%	29.1%
1	to	26,001	85.7%	33.2%	70.8%	71.7%	87.1%	56.5%	75.1%
26,001	and	up	14.3%	66.8%	29.2%	28.3%	12.9%	43.5%	24.9%

That group is responsible for smaller shares of modernization, maintenance, bridge, and other expenditures (16.8 percent, 35.0 percent, 35.6 percent, and 15.1 percent, respectively); this illustrates the point made previously that the mix of expenditures allocated can have a significant impact on the overall results.

Both the state and local governments spend funds from state user fees and from the federal government. Exhibit 5-2 shows the funds received from each revenue source and by whom they are expended. The difference between the funds received and the expenditures allocated is due to the allocation of bond expenditures. The upper part of the table shows the full expenditure of bond revenues, and the lower part shows the portions of current and prior expenditures of bond revenues that are allocated to vehicles in this study. In the exhibits that follow, where allocated expenditures are broken down into state, federal, local, and bond, the categories correspond to rows in the lower part of Exhibit 5-2.

EXHIBIT 5-2: SOURCES AND EXPENDITURES OF FUNDS (THOUSANDS OF ANNUAL DOLLARS)

Expenditures of Funds	Source of Funds				All Sources
	State Revenues	Bond Revenues	Federal Revenues	Local Revenues	
State Government	879,418	0	838,657	0	1,718,075
Local Governments	262,566	0	33,671	99,641	395,878
Expenditure of Bond Revenue	0	89,764	0	0	89,764
Total Expenditures	**1,141,984**	**89,764**	**872,328**	**99,641**	**2,203,718**
Allocated State Expenditures	879,418	0	838,657	0	1,718,075
Allocated Local Expenditures	262,566	0	33,671	99,641	395,878
Allocated Current Bond	0	13,210	0	0	13,210
Allocated Prior Bond	0	231,343	0	0	231,343
Total Allocated Expenditures	**1,141,984**	**244,553**	**872,328**	**99,641**	**2,358,506**

EXHIBIT 5-3: EXPENDITURE ALLOCATION RESULTS FOR WEIGHT GROUPS BY FUNDING SOURCE (THOUSANDS OF DOLLARS)

Funding Source	Avg. Annual Total Expenditures Allocated	Allocation to Vehicles			
		Under 10,001 Pounds	Over 10,000 Pounds	Under 26,001 Pounds	Over 26,000 Pounds
State (Highway Fund)	879,418	693,502	185,916	717,813	161,605
		78.9%	21.1%	81.6%	18.4%
Federal	838,657	614,163	224,494	645,196	193,461
		73.2%	26.8%	76.9%	23.1%
Local	395,878	238,106	157,773	267,285	128,593
		60.1%	39.9%	67.5%	32.5%
Bond	13,210	8,408	4,802	9,248	3,962
		63.6%	36.4%	70.0%	30.0%
Current	2,127,163	1,554,178	572,985	1,639,542	487,622
		73.1%	26.9%	77.1%	22.9%
Prior Bond	231,343	118,791	112,553	130,605	100,738
		51.3%	48.7%	56.5%	43.5%
Total	**2,358,506**	**1,672,969**	**685,537**	**1,770,146**	**588,360**
		70.9%	**29.1%**	**75.1%**	**24.9%**

The responsibility amounts for state, federal, local, and bond expenditures are broken out separately in Exhibit 5-3. In this exhibit, the expenditure of state and federal monies by local governments are counted under the state and federal categories. The local category contains only the expenditure by local governments of their own revenues.

Light vehicles are projected to be responsible for 78.9 percent of state, 73.2 percent of federal, and 60.1 percent of local bond expenditures. Heavy vehicles are projected to be responsible for 21.1 percent of state, 26.8 percent of federal, and 39.9 percent of local expenditures. Overall, state-funded expenditures are expected to average $879 million annually over the 2023-25 biennium. Comparable annual amounts for federal and local expenditures are $834 million and $396 million, respectively.

The allocation results for state, federal, local, and bond expenditures are further broken out by major category in Exhibit 5-4 through Exhibit 5-7.

EXHIBIT 5-4: AVERAGE ANNUAL COST RESPONSIBILITY, STATE HIGHWAY FUND DETAIL (THOUSANDS OF DOLLARS)

Declared Weight in Pounds			Modernization	Preservation	Maintenance	Bridge	Other	Total
1	to	10,000	52,267	9,415	223,837	15,219	392,763	693,502
10,001	to	26,000	746	1,852	9,900	2,008	9,805	24,310
26,001	to	78,000	501	1,670	6,119	912	14,307	23,508
78,001	to	80,000	2,469	9,414	30,137	3,798	46,760	92,579
80,001	to	104,000	520	2,383	6,419	740	7,602	17,663
104,001	to	105,500	736	3,347	8,835	958	10,338	24,214
105,501	and	up	180	721	1,410	1,025	304	3,640
		Total	**57,419**	**28,802**	**286,657**	**24,661**	**481,879**	**879,418**
Total by Weight Range								
1	to	10,000	52,267	9,415	223,837	15,219	392,763	693,502
10,001	and	up	5,151	19,387	62,820	9,441	89,116	185,916
1	to	26,000	53,013	11,268	233,737	17,227	402,568	717,813
26,001	and	up	4,405	17,535	52,920	7,433	79,311	161,605
% of Total by Weight Range								
1	to	10,000	91%	33%	78%	62%	82%	79%
10,001	and	up	9%	67%	22%	38%	18%	21%
1	to	26,000	92%	39%	82%	70%	84%	82%
26,001	and	up	8%	61%	18%	30%	16%	18%

EXHIBIT 5-5: AVERAGE ANNUAL COST RESPONSIBILITY, FEDERAL DETAIL (THOUSANDS OF DOLLARS)

Declared Weight in Pounds			Modernization	Preservation	Maintenance	Bridge	Other	Total
1	to	10,000	163,054	29,516	40,247	85,564	295,782	614,163
10,001	to	26,000	3,840	9,005	1,354	9,098	7,736	31,033
26,001	to	78,000	3,021	8,230	619	4,134	4,979	20,983
78,001	to	80,000	15,958	46,530	2,598	17,213	20,910	103,208
80,001	to	104,000	3,765	11,820	401	4,183	3,924	24,093
104,001	to	105,500	5,319	16,606	521	5,414	5,366	33,226
105,501	and	up	1,252	3,601	9	6,071	1,019	11,951
		Total	**196,209**	**125,306**	**45,750**	**131,677**	**339,715**	**838,657**
Total by Weight Range								
1	to	10,000	163,054	29,516	40,247	85,564	295,782	614,163
10,001	and	up	33,155	95,791	5,503	46,113	43,933	224,494
1	to	26,000	166,894	38,521	41,600	94,663	303,518	645,196
26,001	and	up	29,315	86,786	4,149	37,015	36,197	193,461
% of Total by Weight Range								
1	to	10,000	83%	24%	88%	65%	87%	73%
10,001	and	up	17%	76%	12%	35%	13%	27%
1	to	26,000	85%	31%	91%	72%	89%	77%
26,001	and	up	15%	69%	9%	28%	11%	23%

EXHIBIT 5-6: AVERAGE ANNUAL COST RESPONSIBILITY, LOCAL GOVERNMENT DETAIL (THOUSANDS OF DOLLARS)

Declared Weight in Pounds			Modernization	Preservation	Maintenance	Bridge	Other	Total
1	to	10,000	66,124	9,420	40,900	6,729	114,934	238,106
10,001	to	26,000	3,849	4,938	16,241	1,174	2,978	29,179
26,001	to	78,000	3,415	5,235	17,096	637	2,009	28,392
78,001	to	80,000	5,863	9,773	31,823	729	2,811	50,999
80,001	to	104,000	1,846	3,231	10,503	159	755	16,493
104,001	to	105,500	3,518	6,220	20,215	272	1,382	31,607
105,501	and	up	46	88	284	654	31	1,102
		Total	**84,661**	**38,903**	**137,062**	**10,354**	**124,899**	**395,878**
Total by Weight Range								
1	to	10,000	66,124	9,420	40,900	6,729	114,934	238,106
10,001	and	up	18,537	29,484	96,163	3,625	9,965	157,773
1	to	26,000	69,973	14,357	57,141	7,902	117,912	267,285
26,001	and	up	14,688	24,546	79,921	2,451	6,987	128,593
% of Total by Weight Range								
1	to	10,000	78%	24%	30%	65%	92%	60%
10,001	and	up	22%	76%	70%	35%	8%	40%
1	to	26,000	83%	37%	42%	76%	94%	68%
26,001	and	up	17%	63%	58%	24%	6%	32%

EXHIBIT 5-7: AVERAGE ANNUAL COST RESPONSIBILITY, BOND DETAIL (THOUSANDS OF DOLLARS)

Declared Weight in Pounds			Modernization	Preservation	Maintenance	Bridge	Other	Current	Prior	Total
1	to	10,000	0	0	0	8,408	0	8,408	118,791	127,198
10,001	to	26,000	0	0	0	840	0	840	11,814	12,655
26,001	to	78,000	0	0	0	382	0	382	10,287	10,669
78,001	to	80,000	0	0	0	1,589	0	1,589	44,030	45,619
80,001	to	104,000	0	0	0	537	0	537	22,169	22,706
104,001	to	105,500	0	0	0	694	0	694	22,460	23,155
105,501	and	up	0	0	0	760	0	760	1,791	2,551
		Total	**0**	**0**	**0**	**13,210**	**0**	**13,210**	**231,343**	**244,553**
Total by Weight Range										
1	to	10,000	0	0	0	8,408	0	8,408	118,791	127,198
10,001	and	up	0	0	0	4,802	0	4,802	112,553	117,355
1	to	26,000	0	0	0	9,248	0	9,248	130,605	139,853
26,001	and	up	0	0	0	3,962	0	3,962	100,738	104,700
% of Total by Weight Range										
1	to	10,000	0%	0%	0%	64%	0%	64%	51%	52%
10,001	and	up	0%	0%	0%	36%	0%	36%	49%	48%
1	to	26,000	0%	0%	0%	70%	0%	70%	56%	57%
26,001	and	up	0%	0%	0%	30%	0%	30%	44%	43%

Because of restrictions on the types of expenditures for which federal-aid highway funds can be used, federal funds tend to be concentrated on construction (i.e., modernization, preservation, and bridge) projects and other types of work for which heavy vehicles have the predominant responsibility.

Additionally, federal funds are focused on projects on interstate and other higher order highways where the heavy vehicle share of travel is highest. Hence, the inclusion of federally funded expenditures in a state HCAS will typically have the effect of reducing the light vehicle responsibility share and increasing the heavy vehicle share.

Conversely, state funds are more concentrated on maintenance, operations, administration, and other activities for which light vehicles have the largest responsibility share.

The inclusion of local expenditures in a state HCAS will, by itself, typically increase the relative responsibility of light vehicles and reduce that of heavy vehicles. This is because local streets see a higher proportion of traffic from light vehicles and many types of expenditures are allocated on a relative travel basis.

This factor, however, is partially offset by the fact that local governments spend more of their road and street funds on activities having a comparatively high heavy vehicle responsibility component, including rehabilitation, repair, and maintenance of pavements and bridges. In addition, locally owned roads often are less able to withstand the weight of heavy vehicles than are freeways and state highways.

Because pavements and bridges represent two of the largest and most important expenditure areas in a highway cost allocation study, the responsibility results for these expenditures are broken out separately in Exhibit 5-8 and Exhibit 5-9.

EXHIBIT 5-8. COMPARISON OF PAVEMENT RESPONSIBILITY RESULTS FROM PRIOR OR HCASs (THOUSANDS OF ANNUAL DOLLARS)

Expenditure Work Type	2013 Study			2015 Study			2017 Study			2019 Study			2021 Study			2023 Study		
	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility
New Pavements	57,185	9,986	47,199	48,984	7,530	41,454	37,084	3,938	33,146	31,199	5,097	26,103	27,691	3,587	24,104	36,605	7,075	29,530
	3.6%	17.5%	82.5%	3.4%	15.4%	84.6%	2.5%	10.6%	89.4%	1.7%	16.3%	83.7%	1.4%	13.0%	87.0%	1.7%	19.3%	80.7%
Pavement and Shoulder Reconstruction	19,734	3,029	16,705	28,823	4,233	24,590	4,106	384	3,722	1,988	245	1,743	306	28	278	6,022	841	5,181
	1.2%	15.3%	84.7%	2.0%	14.7%	85.3%	0.3%	9.4%	90.6%	0.1%	12.3%	87.7%	0.0%	9.3%	90.7%	0.3%	14.0%	86.0%
Pavement and Shoulder Rehabilitation	98,921	24,047	74,874	64,885	11,114	53,771	141,338	14,780	126,558	208,765	26,918	181,847	204,237	19,715	184,522	164,801	26,218	138,584
	6.2%	24.3%	75.7%	4.5%	17.1%	82.9%	9.4%	10.5%	89.5%	11.5%	12.9%	87.1%	10.6%	9.7%	90.3%	7.7%	15.9%	84.1%
Pavement Maintenance	263,624	63,465	200,159	221,898	54,784	167,114	227,903	29,773	198,131	211,770	36,577	175,193	183,275	22,330	160,945	166,965	35,403	131,562
	16.6%	24.1%	75.9%	15.4%	24.7%	75.3%	15.2%	13.1%	86.9%	11.6%	17.3%	82.7%	9.5%	12.2%	87.8%	7.8%	21.2%	78.8%
Other Pavement Expenditures	18,451	16,582	1,869	5,013	4,957	56	5,416	4,434	983	5,883	4,225	1,658	2,325	2,325	0	2,325	2,325	0
	1.2%	89.9%	10.1%	0.3%	98.9%	1.1%	0.4%	81.9%	18.1%	0.3%	71.8%	28.2%	0.1%	100.0%	0.0%	0.1%	100.0%	0.0%
Total Pavement Expenditures	**457,914**	**117,109**	**340,805**	**369,604**	**82,618**	**286,986**	**415,848**	**53,308**	**362,539**	**459,605**	**73,062**	**386,544**	**417,834**	**47,986**	**369,848**	**376,719**	**71,862**	**304,857**
	28.9%	**25.6%**	**74.4%**	**25.7%**	**22.4%**	**77.6%**	**27.8%**	**12.8%**	**87.2%**	**25.3%**	**15.9%**	**84.1%**	**21.6%**	**11.5%**	**88.5%**	**17.7%**	**19.1%**	**80.9%**

Note: Percents in the Expends. Allocated columns are the share of total expenditures allocated in each study accounted for the expenditures for each pavement work type. Percents in the Light and Heavy Vehicle Responsibility. Columns are the light and heavy vehicle

EXHIBIT 5-9: COMPARISON OF BRIDGE AND INTERCHANGE RESPONSIBILITY RESULTS FROM PRIOR OR HCASs (THOUSANDS OF DOLLARS)

Expenditure Work Type	2013 Study			2015 Study			2017 Study			2019 Study			2021 Study			2023 Study		
	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility
Bridge and Interchange	76,901	49,436	27,466	86,528	54,743	31,785	42,474	26,727	15,747	97,647	59,707	37,940	92,270	62,126	30,145	236,175	148,038	88,136
	4.8%	64.3%	35.7%	6.0%	63.3%	36.7%	2.8%	62.9%	37.1%	5.4%	61.1%	38.9%	4.8%	67.3%	32.7%	11.1%	62.7%	37.3%
Bridge Maintenance	51,490	47,219	4,271	20,064	17,883	2,181	1,098	984	114	3,533	3,149	384	9,428	8,368	1,060	15,165	13,366	1,799
	3.2%	91.7%	8.3%	1.4%	89.1%	10.9%	0.1%	89.6%	10.4%	0.2%	89.1%	10.9%	0.5%	88.8%	11.2%	0.7%	88.1%	11.9%
Total Bridge & Interchange Expenditures	**128,391**	**96,655**	**31,737**	**106,592**	**72,626**	**33,966**	**43,572**	**27,711**	**15,861**	**101,180**	**62,856**	**38,324**	**101,698**	**70,494**	**31,204**	**251,339**	**161,404**	**89,935**
	8.1%	**75.3%**	**24.7%**	**7.4%**	**68.1%**	**31.9%**	**2.9%**	**63.6%**	**36.4%**	**5.6%**	**62.1%**	**37.9%**	**5.3%**	**69.3%**	**30.7%**	**11.8%**	**64.2%**	**35.8%**

Note: Percents in the Expends. Allocated columns are the share of total expenditures allocated in each study accounted for the expenditures for each pavement work type. Percents in the Light and Heavy Vehicle Responsibility. Columns are the light and heavy vehicle

Exhibit 5-8 shows that pavement expenditures allocated in the 2023 study total $376.7 million, 9.8 percent lower than in the 2021 study, and 18.0 percent less than the pavement expenditures allocated in the 2019 study. The pavement cost responsibility for heavy trucks decreased during the 2023 study due to updated information about the distribution of the volume of vehicles by weight class using various parts of the state highway network.

Given the substantial changes to the distress equations in the 2010 NAPCOM model (which is used to generate pavement factors for pavement expenditure allocation), the pavement expenditure allocation based on the 2011 pavement factors was compared to the pavement expenditure allocation when using the 2009 study pavement factors with the 2011 model. First, the pavement factors developed for the 2011 study for light vehicles are slightly lower than those from the 2009 study.

Pavement factors are also lower for certain heavy vehicle weight classes but are offset by increases in the pavement factors for other heavy vehicle classes. Sensitivity analyses performed using new pavement factors demonstrated that pavement expenditure allocations are sensitive to the light vehicle pavement factors. In the 2019 study, additional weigh-in-motion data was provided to the study team, which revealed information about the distribution of light vehicles in Oregon. This additional information shifted pavement expenditure allocations toward light vehicles. This same shift has occurred again in 2023 as a result of even more detailed and accurate data from weigh-in-motion reporting.

Exhibit 5-9 compares the bridge and interchange expenditure amounts and responsibility results in the 2013 through 2023 studies. Bridge-related expenditures increased by about 147 percent in the 2023 study relative to the 2021 study and were higher as a share of total expenditures in the current study (11.8 percent) than in the 2021 study (5.3 percent). In part this increase is due to a large project expenditure for the Abernethy Bridge in the I-205 corridor. The expenditure amounts reported in Exhibit 5-9 do not include this study's share of prior biennia's bond expenditures.

The heavy vehicle responsibility share for total bridge plus interchange expenditures in the current study is 35.8 percent, compared to 30.7 percent in the 2021 study, 37.9 percent in the 2019 study, 36.4 percent in the 2017 study, 31.9 percent in the 2015 study, and 24.7 percent in the 2013 study. The change since 2011 reflects the results of a new bridge cost allocation study completed for the 2013 study.

EXHIBIT 5-10: AVERAGE ANNUAL COST RESPONSIBILITY BY WEIGHT GROUP WITH PRIOR ALLOCATED EXPENDITURES (THOUSANDS OF DOLLARS)

Declared Weight in Pounds			Total Without Prior Allocated Expenditures	Prior Allocated Expenditures	Total With Prior Allocated Expenditures
1	to	10,000	1,554,178	118,791	1,672,969
10,001	to	26,000	85,363	11,814	97,177
26,001	to	78,000	73,265	10,287	83,552
78,001	to	80,000	248,375	44,030	292,405
80,001	to	104,000	58,786	22,169	80,955
104,001	to	105,500	89,743	22,460	112,203
105,501	and	up	17,454	1,791	19,245
		Total	**2,127,163**	**231,343**	**2,358,506**

Exhibit 5-10 shows the amounts of allocated expenditures of bond revenues, including the amount that carried forward from the prior studies. These represent amounts that were spent in prior biennia and that will be repaid during the 2023-25 biennium. The 2023 study will include the same allocated expenditures from the 2011 through 2021 studies, as well as allocated bond expenditures from the current study.

EXHIBIT 5-11: COST RESPONSIBILITY DISTRIBUTIONS BY WEIGHT GROUP-COMPARISON BETWEEN CURRENT AND PRIOR OR HCAS

Declared Weight in Pounds			2021 Study	2023 Study	Change in Percentage
1	to	10,000	67.6%	70.9%	3.30
10,001	to	26,000	4.6%	4.1%	-0.46
26,001	to	78,000	5.3%	3.5%	-1.72
78,001	to	80,000	12.4%	12.4%	0.04
80,001	to	104,000	3.8%	3.4%	-0.37
104,001	to	105,500	5.6%	4.8%	-0.84
105,501	and	up	0.8%	0.8%	0.06
		Total	**100.0%**	**100.0%**	
% for Vehicles Over 10,000 lbs			**32.4%**	**29.1%**	**-3.30**

For illustrative purposes, Exhibit 5-11 compares the expenditure allocation results (with prior allocated costs) for the current study with those of the previous study. As shown, the shares shares increased for light vehicles and decreased for heavy vehicles: the all-vehicle responsibility shares in the 2021 study are 67.6 percent for light vehicles and 32.4 percent for heavy vehicles; the 2023 study shares are 70.9 percent for light vehicles and 29.1 percent for heavy vehicles.

REVENUE ATTRIBUTION RESULTS

The attribution of revenues to the various vehicle types and weight classes is a principal element of a highway cost allocation study. Once accomplished, the shares of projected payments are compared to the shares of cost responsibility for each class to determine whether each class is paying more or less than its fair share under the existing tax structure and rates. Where significant imbalances are detected, recommendations for changes in tax rates are made to bring payments back into balance with cost responsibilities.

As noted in Chapter 4, most of the required revenue data for the study, including control totals for forecasted revenues by tax instrument (e.g., fuel taxes, registration fees, weight-mile tax), are obtained from ODOT's revenue forecasting model. Every effort is made to ensure that the data used in the HCAS are consistent with the revenue forecast upon which the Agency Request Budget is based.

Some information required for the HCAS, however, is not available from the revenue forecasting model and so must be estimated from other sources. The revenue model, for example, does not project fuel tax payments by detailed, 2,000-pound weight class. Therefore, estimated fuel efficiencies by vehicle type and weight group must be used together with control totals from the revenue model to attribute projected fuel tax payments to the detailed vehicle classes.

The revenue attribution results are summarized in Exhibit 5-12. For the next biennium, under existing tax rates and forecasted spending by ODOT, we anticipate that light vehicles will contribute 63.4 percent of State Highway Fund revenues and heavy vehicles will contribute 36.6 percent. These shares are for all vehicles and differ from the shares for full-fee paying vehicles that are used in the calculation of equity ratios.

Exhibit 5-12 also illustrates how the relative payments of different vehicle weight groups vary by tax instrument. Light vehicles are projected to contribute 98.4 percent of fuel tax revenues and 75.5 percent of registration and title fee revenues. Heavy vehicles, on the other hand, contribute 100 percent of weight-mile tax, flat fee, and road use assessment fee revenues. Heavy vehicles also contribute 100 percent of the other motor carrier revenue identified in the exhibit. This category includes revenues from truck overweight/overlength permit fees, overdue payment penalties and interest, etc.

EXHIBIT 5-12: AVERAGE ANNUAL USER-FEE REVENUE BY TAX INSTRUMENT AND WEIGHT CLASS (THOUSANDS OF DOLLARS)

Declared Weight in Pounds			Fuel Tax	Registration and Title Fees	Weight-Mile Tax	Other Motor Carrier	Flat Fee	RUAF	Total
1	to	10,000	675,125	351,529	0	0	0	0	1,026,654
10,001	to	26,000	5,438	60,859	0	0	0	0	66,297
26,001	to	78,000	3,262	6,891	29,849	285	23	0	40,310
78,001	to	80,000	972	34,690	309,099	1,529	2,336	0	348,625
80,001	to	104,000	314	4,650	43,443	208	5,936	57	54,607
104,001	to	105,500	765	6,784	69,395	326	1,088	35	78,394
105,501	and	up	0	153	0	4	0	3,381	3,538
		Total	**685,877**	**465,556**	**451,785**	**2,352**	**9,383**	**3,472**	**1,618,425**
Total by Weight Range									
1	to	10,000	675,125	351,529	0	0	0	0	1,026,654
10,001	and	up	10,752	114,027	451,785	2,352	9,383	3,472	591,771
1	to	26,000	680,563	412,388	0	0	0	0	1,092,951
26,001	and	up	5,314	53,168	451,785	2,352	9,383	3,472	525,474
% of Total by Weight Range									
1	to	10,000	98.4%	75.5%	0.0%	0.0%	0.0%	0.0%	63.4%
10,001	and	up	1.6%	24.5%	100.0%	100.0%	100.0%	100.0%	36.6%
1	to	26,001	99.2%	88.6%	0.0%	0.0%	0.0%	0.0%	67.5%
26,001	and	up	0.8%	11.4%	100.0%	100.0%	100.0%	100.0%	32.5%

EXHIBIT 5-13: REVENUE ATTRIBUTION DISTRIBUTIONS BY WEIGHT GROUP-COMPARISON BETWEEN CURRENT AND PRIOR OR HCAS

Declared Weight in Pounds			2021 Study	2023 Study	Change in Percentage
1	to	10,000	64.2%	63.4%	-0.7
10,001	to	26,000	4.6%	4.1%	-0.5
26,001	to	78,000	2.9%	2.5%	-0.4
78,001	to	80,000	19.1%	21.5%	2.4
80,001	to	104,000	3.8%	3.4%	-0.4
104,001	to	105,500	5.3%	4.8%	-0.4
105,501	and	up	0.2%	0.2%	0.0
		Total	**100.0%**	**100.0%**	
% for Vehicles Over 10,000 lbs.			**35.8%**	**36.6%**	**0.7**

Exhibit 5 13 compares the revenue attribution results of the current study with those of the 2021 study.[8] The projected share of revenues contributed by light vehicles has decreased from 64.2 percent in the 2021 study to 63.4 percent in the current study. Conversely, the overall heavy vehicle share of projected payments has increased from 35.8 percent in the previous study to 36.6 percent in the current study.

[8] Since the original publication of the 2021 HCAS report, an error in reporting of the fuel tax rate and weight-mile tax rates has been identified. This error resulted in inaccurate revenue attribution shares as well as inaccurate equity ratios. In the current 2023 HCAS report, this original error has been corrected.

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CHAPTER 6: COMPARISON OF EXPENDITURES ALLOCATED TO REVENUES PAID

This chapter brings together the expenditure allocation and revenue attribution results reported in Chapter 5 to compare projected responsibilities and tax payments for each vehicle class and for broader groups of vehicles (e.g., all heavy vehicles combined).

This comparison is facilitated by the calculation of equity ratios, or the ratio of the share of revenues contributed by the vehicles in a class to the share of cost responsibility for vehicles in that class. An equity ratio greater than one indicates that the vehicles in that class are projected to pay more than their cost-responsible share of user fees. Conversely, an equity ratio less than one indicates that the vehicles in that class are projected to pay less than their cost-responsible share.

The comparison of revenue shares to cost responsibility shares in the Oregon studies is traditionally done for full-fee-paying vehicles only. This study takes the same approach, which requires some further adjustments to the numbers presented in Chapter 5. The model separately estimates the revenue contributions from full-fee-paying and alternative-fee-paying vehicles for each tax instrument. For alternative-fee-paying vehicles, the model also estimates the fees they would pay if they were full-fee-paying vehicles. The expenditures allocated to each vehicle class are apportioned among full-fee-paying and alternative-fee-paying vehicles based on the relative miles of travel of each in that class.[9]

PRESENTATION OF EQUITY RATIOS

EXHIBIT 6-1: COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Declared Weight in Pounds			Annual VMT			Percent of Annual VMT		
			All	Full-Fee	Alternative Fee	All	Full-Fee	Alternative Fee
1	to	10,000	32,539,347,034	32,319,372,576	219,974,457	90.8%	91.9%	34.0%
10,001	to	26,000	926,815,177	723,027,406	203,787,771	2.6%	2.1%	31.5%
26,001	to	78,000	446,286,172	252,895,208	193,390,964	1.2%	0.7%	29.9%
78,001	to	80,000	1,388,047,883	1,372,722,279	15,325,604	3.9%	3.9%	2.4%
80,001	to	104,000	223,642,348	219,185,670	4,456,678	0.6%	0.6%	0.7%
104,001	to	105,500	305,849,353	295,605,551	10,243,802	0.9%	0.8%	1.6%
105,501	and	up	3,406,272	3,406,272	0	0.0%	0.0%	0.0%
		Total	**35,833,394,238**	**35,186,214,962**	**647,179,276**	**100.0%**	**100.0%**	**100.0%**
10,001	and	up	3,294,047,204	2,866,842,386	427,204,819	9.2%	8.1%	66.0%
26,001	to	80,000	1,834,334,056	1,625,617,487	208,716,568	5.1%	4.6%	32.3%
80,001	to	105,500	529,491,700	514,791,221	14,700,480	1.5%	1.5%	2.3%
26,001	to	105,500	2,363,825,756	2,140,408,708	223,417,048	6.6%	6.1%	34.5%
26,001	and	up	2,367,232,028	2,143,814,980	223,417,048	6.6%	6.1%	34.5%

[9] If, for example, 80 percent of the VMT in a weight class are by full-fee-paying vehicles and 20 percent are by alternative-fee-paying vehicles, then 80 percent of the total responsibility of that class is assigned to full-fee-paying vehicles and 20 percent to alternative-fee-paying vehicles. This division is based on the reasonable assumption that two vehicles that are identical, except one is subject to full fees and the other alternative fees, have exactly the same per-mile cost responsibility.

EXHIBIT 6-1 (CONTINUED): COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Declared Weight in Pounds			Annual Cost Responsibility				Percent of Annual Cost Responsibility			
			State	Federal	Local	Full-Fee	State	Federal	Local	Full-Fee
1	to	10,000	820,700,540	614,162,577	238,105,884	1,661,659,295	73.0%	73.2%	60.1%	72.7%
10,001	to	26,000	36,965,208	31,033,026	29,179,175	75,330,745	3.3%	3.7%	7.4%	3.3%
26,001	to	78,000	34,177,442	20,982,591	28,392,106	52,310,096	3.0%	2.5%	7.2%	2.3%
78,001	to	80,000	138,198,078	103,207,907	50,998,676	289,176,186	12.3%	12.3%	12.9%	12.7%
80,001	to	104,000	40,369,196	24,093,024	16,493,189	79,314,566	3.6%	2.9%	4.2%	3.5%
104,001	to	105,500	47,369,438	33,226,446	31,607,192	108,444,597	4.2%	4.0%	8.0%	4.7%
105,501	and	up	6,190,894	11,951,476	1,102,264	19,241,814	0.6%	1.4%	0.3%	0.8%
		Total	**1,123,970,796**	**838,657,048**	**395,878,486**	**2,285,477,300**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
10,001	and	up	303,270,256	224,494,471	157,772,602	623,818,005	27.0%	26.8%	39.9%	27.3%
26,001	to	80,000	172,375,520	124,190,498	79,390,782	341,486,282	15.3%	14.8%	20.1%	14.9%
80,001	to	105,500	87,738,634	57,319,470	48,100,381	187,759,163	7.8%	6.8%	12.2%	8.2%
26,001	to	105,500	260,114,154	181,509,969	127,491,163	529,245,445	23.1%	21.6%	32.2%	23.2%
26,001	and	up	266,305,048	193,461,444	128,593,427	548,487,259	23.7%	23.1%	32.5%	24.0%

EXHIBIT 6-1 (CONTINUED): COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Declared Weight in Pounds			Annual User Fees			Annual User Fees		
			All	Full-Fee	Alternative Fee Difference	All	Full-Fee	Alternative Fee Difference
1	to	10,000	1,026,653,648	1,020,517,540	809,812	63.4%	63.9%	2.6%
10,001	to	26,000	66,297,262	56,688,846	6,281,882	4.1%	3.5%	20.3%
26,001	to	78,000	40,309,708	36,657,373	17,102,241	2.5%	2.3%	55.2%
78,001	to	80,000	348,625,211	348,137,948	3,399,484	21.5%	21.8%	11.0%
80,001	to	104,000	54,607,388	54,508,982	1,020,351	3.4%	3.4%	3.3%
104,001	to	105,500	78,393,552	78,072,566	2,384,679	4.8%	4.9%	7.7%
105,501	and	up	3,538,087	3,538,084	0	0.2%	0.2%	0.0%
		Total	**1,618,424,855**	**1,598,121,340**	**30,998,450**	**100.0%**	**100.0%**	**100.0%**
10,001	and	up	591,771,207	577,603,800	30,188,638	36.6%	36.1%	97.4%
26,001	to	80,000	388,934,919	384,795,322	20,501,726	24.0%	24.1%	66.1%
80,001	to	105,500	133,000,939	132,581,549	3,405,030	8.2%	8.3%	11.0%
26,001	to	105,500	521,935,858	517,376,870	23,906,756	32.2%	32.4%	77.1%
26,001	and	up	525,473,945	520,914,954	23,906,756	32.5%	32.6%	77.1%

EXHIBIT 6-1 (CONTINUED): COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Declared Weight in Pounds			Scaled Equity Ratio		Share of Cost	
			All	Full-Fee	All	Full-Fee
1	to	10,000	0.8943	0.8783	70.9%	72.7%
10,001	to	26,000	0.9942	1.0762	4.1%	3.3%
26,001	to	78,000	0.7031	1.0022	3.5%	2.3%
78,001	to	80,000	1.7375	1.7217	12.4%	12.7%
80,001	to	104,000	0.9830	0.9828	3.4%	3.5%
104,001	to	105,500	1.0182	1.0296	4.8%	4.7%
105,501	and	up	0.2679	0.2630	0.8%	0.8%
		Total	**1.0000**	**1.0000**	**100.0%**	**100.0%**
10,001	and	up	1.2580	1.3242	29.1%	27.3%
26,001	to	80,000	1.5076	1.6115	15.9%	14.9%
80,001	to	105,500	1.0034	1.0098	8.2%	8.2%
26,001	to	105,500	1.3365	1.3980	24.1%	23.2%
26,001	and	up	1.3015	1.3582	24.9%	24.0%

Exhibit 6-1 includes calculated equity ratios for the summary-level weight groups shown in earlier exhibits. As shown in the first table within Exhibit 6-1, projected 2024 vehicle miles traveled (VMT) for full-fee-paying vehicles are 35.2 billion, 91.9 percent of these miles being traveled by light vehicles and 8.1 percent by heavy vehicles. This compares to projected 2024 miles of travel by all vehicles of 35.8 billion, 90.8 percent by light vehicles and 9.2 percent by heavy vehicles.

Exhibit 6-2 at the end of this chapter, shows the equity ratios for each 2,000-pound weight class. **These equity ratios are for full-fee-paying vehicles only and exclude vehicles that pay on an alternative-fee basis.**

As explained in Chapter 3, alternative-fee-paying vehicles are disproportionately concentrated in the heavy vehicle classes, so excluding them will reduce the heavy vehicle share of VMT. The heavy vehicle-share of VMT, in other words, will always be lower if only full-fee-paying vehicles are considered than if all vehicles are considered.

The projected total cost responsibility of full-fee-paying vehicles is $2.29 billion per year, with responsibility shares of 72.7 percent for light vehicles and 27.3 percent for heavy vehicles. This compares to the projected total responsibility for all vehicles of $2.36 billion. The difference between these two amounts is the projected responsibility of alternative-fee-paying vehicles.

Forecasted average annual user fees paid by full-fee-paying vehicles total $1.60 billion, 63.9 percent from light vehicles and 36.1 percent from heavy vehicles. The difference between this total and the $1.62 billion for all vehicles represents projected revenues from alternative-fee-paying vehicles.

The total of the Alternative-Fee Difference column represents the average annual difference between what alternative-fee-paying vehicles are projected to pay and what they would pay if subject to full fees. This total is $31.0 million annually for the next biennium under existing tax rates.[10] Beginning with the 2013 study, equity ratios are calculated using allocated costs and attributed revenues for full-fee paying vehicles only.

Because the current study includes expenditures of funds from federal and local revenue sources, the allocated expenditures for full-fee-paying vehicles are more than the attributed state revenues for these vehicles. This does not present a problem in calculating the equity ratios.[11]

This study finds full-fee equity ratios of 0.8783 for light vehicles and 1.3242 for heavy vehicles as a group. This means that, for the 2023-25 biennium, under the existing tax structure and rates, light vehicles are expected to underpay their fair share by 12.2 percent and heavy vehicles are expected to overpay by 32.4 percent under the existing tax rates and relative to the projected distribution of project spending.

Exhibit 6-1 also shows the overall equity ratios for vehicles under and over 26,000 pounds, as well as for the summary-level weight groups shown in earlier exhibits. Vehicles with declared weights between 10,001 pounds and 26,000 pounds are projected to overpay their responsibility by 7.6 percent. Vehicles with weights between 26,001 and 78,000 pounds, as a group, overpay their fair share by 0.22 percent and those between 78,001 and 80,000 pounds overpay by 72.2 percent.

[10] These amounts represent the underpayment by alternative-fee-paying vehicles relative to what they would pay on a full-fee basis — the difference, for example, between revenues from publicly owned vehicles under the existing tax structure versus revenues from these vehicles if they were all subject to the state fuel tax or weight- mile tax and full registration fees.

[11] The calculation of equity ratios in the model is accomplished by comparing ratios of revenues attributed to ratios of expenditures allocated. For each vehicle class, the ratio of the revenues attributed to this class to the total revenues attributed to all classes is first calculated. This ratio is then divided by the ratio of the expenditures allocated to this class to the total expenditures allocated to all classes. Thus, the calculation of the equity ratios does not require scaling of either the attributed revenues or allocated expenditures when the two are not equal.

Vehicles in the 78,001 to 80,000-pound class alone account for 47.9 percent of the VMT by full-fee-paying heavy vehicles and 64.0 percent of the VMT by full-fee-paying vehicles over 26,000-pounds. These vehicles also account for 46.4 percent of the cost responsibility and 60.3 percent of the user fees paid by full-fee-paying heavy vehicles. The reason for the difference in the equity ratio between this group and the groups above and below it is that most truckers who can operate at 80,000 pounds and do not know in advance how much their loads will weigh declare at 80,000 pounds. As a result, the average operating weights of vehicles declared at 80,000 pounds are a lower fraction of their declared weight than for other declared weight classes, and the wear-related costs they impose per mile are correspondingly lower.

As a group, vehicles between 80,001 and 105,500 pounds (Schedule B vehicles) pay 1.0 percent more than their fair share. Those in the 104,001 to 105,500 range pay 3.0 percent more than their fair share.

Vehicles over 105,500 pounds all pay the road use assessment fee, as do some vehicles between 98,001 and 105,500 pounds. Those over 105,500 pounds underpay their fair share by 73.7 percent. This is consistent with underpayment levels found in previous studies. The model was changed for the 2005 study to attribute portions of vehicle registration fees to these vehicles. Since no vehicle can register above 105,500 pounds, no registration fees were attributed to these vehicles in pre-2005 studies.

COMPARISON WITH PREVIOUS OREGON STUDIES

Overall, the heavy and light equity ratios found by this study align with those ratios determined in previous Oregon studies (see Exhibit 6-2). The 2001 study found adjusted equity ratios of 1.003 for light vehicles and 0.995 for heavy vehicles as a group. This indicated a situation of near-perfect equity for the 2001-03 biennium analysis period, that is, a 0.3 percent projected overpayment by full-fee-paying light vehicles and a 0.5 percent projected underpayment by heavy vehicles. Consequently, no adjustment in tax rates was deemed necessary by the legislature to satisfy the constitutional requirement of "fairness and proportionality" between light and heavy vehicles.

The 2003 study found adjusted equity ratios of 0.9921 for light vehicles and 1.0158 for heavy vehicles. The 2003 Legislature did not change rates as a direct result of the 2003 study but did increase registration and other fees to meet the debt-service requirements of the OTIA III bond program. Those fee increases were designed to preserve light/heavy equity given the nature of the projects they would fund, and the results of subsequent studies indicate that they succeeded.

The 2013-2021 studies found adjusted equity ratios ranging between 0.9284 to 1.0076 for light vehicles and 0.9865 to 1.1635 for heavy vehicles. Over these biennia the gap between the heavy and light equity ratios ranged from 0.7 percent to 25.3 percent.

EXHIBIT 6-2: COMPARISON OF EQUITY RATIOS FROM PREVIOUS OREGON HCASs

Declared Weight in Pounds			Study Year					
			2013	2015	2017	2019	2021	2023
1	to	10,000	0.9927	0.9974	1.0076	0.9846	0.9284	0.8783
10,001	to	26,000	1.1189	1.0498	1.0993	1.0819	1.0654	1.0762
26,001	to	78,000	0.8885	0.9031	0.7705	0.8338	0.7207	1.0022
78,001	to	80,000	1.2014	1.3423	1.2065	1.3288	1.5258	1.7217
80,001	to	104,000	0.8084	0.6929	0.7513	0.7901	0.9772	0.9828
104,001	to	105,500	0.7444	0.7325	0.7219	0.7282	0.9480	1.0296
105,501	and	up	0.3866	0.2406	0.3133	0.1538	0.2914	0.2630
		Total	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**
10,001	and	up	1.0139	1.0047	0.9865	1.0314	1.1635	1.3242
26,001	to	80,000	1.1527	1.2680	1.1310	1.2306	1.3445	1.6115
80,001	to	105,500	0.7751	0.7109	0.7348	0.7549	0.9600	1.0098
26,001	to	105,500	1.0173	1.0194	0.9847	1.0602	1.2033	1.3980
26,001	and	up	1.0023	0.9986	0.9712	1.0247	1.1763	1.3582

The 2023 study found adjusted equity ratios of 0.8783 for light vehicles and 1.3242 for heavy vehicles. The gap between the heavy and light equity ratios in 2023 is partially attributable to proposed rate and fee changes made by the legislature in HB 2017. The gap in the 2023 study is larger than in recent biennia and is the result of a combination of factors including the mix of highway investments, updated pavement factors and changes in tax rates. We discuss these factors in more detail below.

EXHIBIT 6-3: DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
1	0	32,539,347,034	32,319,372,576	1,672,969,001	1,661,659,295	1,026,653,648	1,020,517,540	0.8783
10,001	0	150,789,085	104,941,235	10,198,021	7,097,284	6,675,695	5,070,992	1.0218
12,001	0	86,470,659	72,464,298	6,442,421	5,398,889	5,079,377	4,573,204	1.2114
14,001	0	144,087,409	121,318,778	11,748,923	9,892,363	9,334,376	8,458,023	1.2227
16,001	0	79,096,425	67,588,735	7,076,753	6,047,160	5,666,177	5,160,412	1.2204
18,001	0	119,632,696	99,967,570	11,133,823	9,303,654	9,357,719	8,493,779	1.3056
20,001	0	26,415,141	17,462,208	2,960,082	1,956,816	1,808,773	1,422,029	1.0393
22,001	0	32,795,622	20,840,455	4,360,296	2,770,813	2,399,743	1,902,488	0.9819
24,001	0	287,528,140	218,444,128	43,257,090	32,863,765	25,975,402	21,607,918	0.9403
26,001	0	8,235,477	1,924,338	1,587,974	371,053	386,805	176,710	0.6811
28,001	0	12,772,142	2,976,585	2,249,418	524,234	632,117	296,377	0.8085
30,001	0	103,380,380	13,276,803	15,579,955	2,000,882	2,077,486	1,254,378	0.8965
32,001	0	29,836,807	22,104,111	5,371,524	3,979,406	2,365,263	2,199,275	0.7904
34,001	0	11,033,777	4,159,757	1,704,569	642,626	580,205	431,018	0.9592
36,001	0	4,486,128	2,232,721	928,038	461,879	278,706	237,786	0.7362
38,001	0	45,654,295	8,765,550	6,002,981	1,152,563	1,183,995	975,013	1.2098
40,001	0	3,108,996	2,410,096	534,888	414,646	319,340	289,667	0.9991
42,001	0	4,414,331	2,459,208	950,412	529,471	404,314	318,747	0.8609
44,001	0	32,191,218	26,330,018	6,308,230	5,159,662	3,904,242	3,580,371	0.9924
46,001	0	13,710,913	8,233,626	2,782,765	1,671,096	1,497,188	1,184,487	1.0137
48,001	0	19,641,986	13,461,657	4,233,015	2,901,101	2,274,637	1,931,666	0.9522
50,001	0	12,035,314	10,101,154	2,538,532	2,130,572	1,497,886	1,404,550	0.9428
52,001	0	31,726,281	26,889,031	6,164,108	5,224,277	4,157,012	3,932,357	1.0765
54,001	0	33,371,033	30,022,591	7,385,504	6,644,444	4,717,942	4,546,420	0.9785
56,001	0	13,197,024	12,939,000	3,688,041	3,615,934	1,941,056	1,929,914	0.7633
58,001	0	16,217,713	15,120,213	3,795,987	3,539,101	2,417,231	2,358,390	0.9530
60,001	0	5,012,526	4,809,184	1,259,561	1,208,464	779,118	769,002	0.9100
62,001	0	6,999,757	6,790,292	2,263,721	2,195,980	1,145,107	1,136,653	0.7402
64,001	0	9,137,893	8,881,239	2,184,429	2,123,076	1,560,147	1,550,771	1.0446
66,001	0	2,577,343	2,492,972	603,138	583,394	469,945	467,435	1.1458
68,001	0	9,277,855	9,121,000	1,882,657	1,850,829	1,796,173	1,791,178	1.3840

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
70,001	0	5,786,076	5,594,759	1,037,569	1,003,262	1,179,840	1,175,265	1.6753
72,001	0	2,990,494	2,818,122	469,159	442,117	628,954	622,457	2.0134
74,001	0	7,306,589	7,077,218	1,614,916	1,564,220	1,630,110	1,622,814	1.4837
76,001	0	2,183,826	1,903,964	431,047	375,807	484,891	474,673	1.8063
78,001	0	1,388,047,883	1,372,722,279	292,404,661	289,176,186	348,625,211	348,137,948	1.7217
80,001	5	4,815,367	4,735,746	1,856,835	1,826,133	1,042,126	1,042,541	0.8164
80,001	6	344,154	336,435	137,184	134,107	80,007	79,746	0.8504
80,001	7	250,227	244,077	111,452	108,713	55,099	54,871	0.7218
80,001	8	442	431	13,004	12,674	94	94	0.0106
80,001	9	310	303	1,210	1,179	63	63	0.0759
82,001	5	6,221,574	6,085,590	2,377,414	2,325,451	1,612,062	1,608,737	0.9893
82,001	6	1,510,027	1,478,119	456,593	446,945	351,594	350,823	1.1225
82,001	7	51,551	50,388	34,151	33,380	11,651	11,612	0.4975
82,001	8	40,648	39,731	20,455	19,993	8,755	8,723	0.6240
82,001	9	0	0	743	0	0	0	
84,001	5	7,881,885	7,416,157	3,188,414	3,000,016	2,065,407	2,050,834	0.9776
84,001	6	4,539,452	4,278,495	1,505,093	1,418,571	1,090,673	1,081,112	1.0899
84,001	7	498,781	469,948	158,307	149,156	111,155	110,123	1.0559
84,001	8	130,803	122,671	46,616	43,717	28,269	27,927	0.9136
84,001	9	618	580	1,279	1,199	127	126	0.1498
86,001	5	1,943,467	1,904,152	826,430	809,712	462,943	463,237	0.8182
86,001	6	13,450,964	13,187,216	5,312,988	5,208,810	2,995,362	2,992,884	0.8217
86,001	7	654,228	633,518	259,270	251,063	153,548	152,663	0.8696
86,001	8	82,551	79,896	86,351	83,574	18,588	18,467	0.3160
86,001	9	894	865	7,496	7,255	191	190	0.0374
88,001	5	5,101,167	4,970,974	1,294,011	1,260,985	1,389,906	1,387,781	1.5739
88,001	6	36,389,795	35,737,260	11,741,465	11,530,919	7,910,383	7,912,762	0.9814
88,001	7	704,377	685,597	304,972	296,841	159,582	159,040	0.7662
88,001	8	342,477	333,931	140,153	136,656	72,972	72,735	0.7612
88,001	9	3,481	3,374	2,555	2,476	755	750	0.4333
90,001	5	929,441	905,141	240,197	233,917	272,756	272,039	1.6632
90,001	6	4,786,916	4,683,910	2,366,863	2,315,933	1,134,421	1,132,983	0.6996
90,001	7	508,486	494,423	356,016	346,170	120,439	119,870	0.4952
90,001	8	19,784	19,224	13,443	13,063	4,523	4,498	0.4924
90,001	9	8,213	7,980	1,550	1,506	1,786	1,775	1.6854
92,001	5	1,196,058	1,137,340	342,435	325,624	372,381	370,306	1.6263
92,001	6	1,403,016	1,349,314	614,669	591,142	360,368	358,988	0.8685
92,001	7	1,677,658	1,602,153	947,109	904,483	390,797	388,427	0.6142
92,001	8	166,540	158,489	69,055	65,717	37,636	37,334	0.8124
92,001	9	248	236	451	428	54	53	0.1784

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
94,001	5	675,577	660,703	244,586	239,201	176,107	176,716	1.0565
94,001	6	4,743,637	4,608,602	1,484,202	1,441,952	1,231,581	1,229,611	1.2195
94,001	7	15,300,714	14,747,426	5,716,853	5,510,126	3,729,004	3,710,960	0.9631
94,001	8	581,129	560,821	280,266	270,472	133,683	133,036	0.7034
94,001	9	3,889	3,745	10,805	10,405	861	856	0.1176
96,001	5	2,272,046	2,243,735	642,430	634,425	745,661	745,303	1.6800
96,001	6	5,482,529	5,437,836	1,696,745	1,682,913	1,385,729	1,385,867	1.1777
96,001	7	26,091,552	25,745,399	10,183,875	10,048,767	6,577,794	6,565,719	0.9344
96,001	8	1,612,727	1,590,733	687,558	678,181	378,723	377,997	0.7971
96,001	9	235,336	232,127	252,495	249,051	47,408	47,366	0.2720
98,001	5	16	16	2,251	2,204	1	1	0.0003
98,001	6	1,283,769	1,265,308	394,175	388,507	341,768	341,738	1.2579
98,001	7	7,810,369	7,666,877	3,137,210	3,079,574	1,949,500	1,945,422	0.9034
98,001	8	891,236	872,808	376,105	368,329	214,954	214,276	0.8320
98,001	9	36,569	35,813	4,330	4,241	8,335	8,306	2.8012
100,001	5	4,454	4,454	1,168	1,168	863	863	1.0569
100,001	6	45,049	45,049	9,318	9,318	7,725	7,725	1.1856
100,001	7	9,205,518	9,096,461	3,056,085	3,019,880	2,378,981	2,376,388	1.1254
100,001	8	9,938,083	9,809,685	3,192,482	3,151,235	2,450,817	2,447,145	1.1106
100,001	9	15,857	15,652	2,257	2,228	3,677	3,671	2.3562
102,001	5	5,320	5,320	1,488	1,488	936	936	0.8995
102,001	6	4,813	4,813	2,399	2,399	2,775	2,775	1.6542
102,001	7	3,596,083	3,568,244	1,959,289	1,944,121	927,605	926,976	0.6819
102,001	8	38,122,082	37,782,238	12,776,938	12,663,036	9,589,730	9,578,530	1.0818
102,001	9	28,396	28,143	3,867	3,833	6,697	6,688	2.4955
104,001	5	78,751	78,751	39,303	39,303	11,023	11,023	0.4011
104,001	6	162,735	162,735	53,718	53,718	26,213	26,213	0.6979
104,001	7	96,165,421	92,994,054	33,765,029	32,651,518	25,606,991	25,515,784	1.1176
104,001	8	206,164,855	199,201,230	76,116,396	73,545,414	52,001,006	51,774,081	1.0068
104,001	9	3,277,591	3,168,781	2,228,630	2,154,643	748,318	745,464	0.4948
106,001	5	0	0	181	0	3	0	
106,001	6	31,234	31,234	147,460	147,460	21,743	21,743	0.2109
106,001	7	36,100	36,100	152,319	152,319	14,661	14,661	0.1377
106,001	8	5,281	5,281	22,729	22,729	1,458	1,458	0.0918
106,001	9	1,803	1,803	6,548	6,548	426	426	0.0930
108,001	5	0	0	0	0	0	0	
108,001	6	49,591	49,591	242,700	242,700	36,505	36,505	0.2151
108,001	7	100,340	100,340	427,535	427,535	44,764	44,764	0.1497
108,001	8	8,502	8,502	37,270	37,270	2,433	2,433	0.0933
108,001	9	7,563	7,563	43,686	43,686	1,786	1,786	0.0585

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
110,001	5	0	0	0	0	0	0	
110,001	6	22,510	22,510	122,339	122,339	19,046	19,046	0.2226
110,001	7	28,432	28,432	126,326	126,326	13,253	13,253	0.1500
110,001	8	6,183	6,183	25,816	25,816	1,893	1,893	0.1049
110,001	9	4,225	4,225	16,037	16,037	1,082	1,082	0.0965
112,001	5	0	0	0	0	0	0	
112,001	6	29,620	29,620	159,610	159,610	25,951	25,951	0.2325
112,001	7	25,565	25,565	116,581	116,581	12,428	12,428	0.1525
112,001	8	2,826	2,826	12,863	12,863	950	950	0.1056
112,001	9	864	864	4,087	4,087	239	239	0.0835
114,001	5	0	0	0	0	0	0	
114,001	6	36,840	36,840	201,091	201,091	33,381	33,381	0.2374
114,001	7	103,324	103,324	452,981	452,981	52,295	52,295	0.1651
114,001	8	5,352	5,352	26,296	26,296	2,120	2,120	0.1153
114,001	9	1,990	1,990	10,465	10,465	549	549	0.0751
116,001	5	0	0	0	0	0	0	
116,001	6	15,857	15,857	89,531	89,531	15,637	15,637	0.2498
116,001	7	56,715	56,715	254,816	254,816	30,973	30,973	0.1738
116,001	8	5,367	5,367	24,008	24,008	2,180	2,180	0.1298
116,001	9	2,434	2,434	10,526	10,526	696	696	0.0946
118,001	5	0	0	1,869	0	0	0	
118,001	6	41,451	41,451	237,435	237,435	44,192	44,192	0.2662
118,001	7	128,152	128,152	603,988	603,988	76,395	76,395	0.1809
118,001	8	32,907	32,907	139,485	139,485	14,681	14,681	0.1505
118,001	9	20,811	20,811	79,653	79,653	6,371	6,371	0.1144
120,001	5	0	0	0	0	0	0	
120,001	6	29,745	29,745	174,002	174,002	33,199	33,199	0.2729
120,001	7	24,681	24,681	125,090	125,090	15,700	15,700	0.1795
120,001	8	2,615	2,615	14,149	14,149	1,219	1,219	0.1232
120,001	9	1,075	1,075	5,488	5,488	361	361	0.0941
122,001	5	0	0	0	0	0	0	
122,001	6	5,989	5,989	38,280	38,280	7,104	7,104	0.2654
122,001	7	36,733	36,733	182,776	182,776	24,836	24,836	0.1943
122,001	8	4,656	4,656	21,966	21,966	2,357	2,357	0.1534
122,001	9	433	433	4,000	4,000	171	171	0.0613
124,001	5	0	0	0	0	0	0	
124,001	6	16,542	16,542	106,847	106,847	21,606	21,606	0.2892
124,001	7	122,505	122,505	582,784	582,784	87,729	87,729	0.2153
124,001	8	12,529	12,529	59,492	59,492	6,592	6,592	0.1585
124,001	9	2,422	2,422	13,241	13,241	984	984	0.1062

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
126,001	5	0	0	0	0	0	0	
126,001	6	5,292	5,292	35,478	35,478	7,229	7,229	0.2914
126,001	7	57,774	57,774	298,140	298,140	43,685	43,685	0.2095
126,001	8	11,619	11,619	55,822	55,822	6,345	6,345	0.1626
126,001	9	2,137	2,137	10,686	10,686	911	911	0.1219
128,001	5	0	0	0	0	0	0	
128,001	6	1,818	1,818	13,230	13,230	2,720	2,720	0.2940
128,001	7	142,928	142,928	743,349	743,349	118,077	118,077	0.2272
128,001	8	23,306	23,306	113,030	113,030	13,893	13,893	0.1758
128,001	9	3,773	3,773	20,052	20,052	1,683	1,683	0.1200
130,001	5	0	0	0	0	0	0	
130,001	6	0	0	360	0	0	0	
130,001	7	67,966	67,966	352,442	352,442	60,906	60,906	0.2471
130,001	8	14,862	14,862	72,585	72,585	9,454	9,454	0.1863
130,001	9	2,625	2,625	12,297	12,297	1,223	1,223	0.1423
132,001	5	0	0	0	0	0	0	
132,001	6	340	340	2,640	2,640	586	586	0.3176
132,001	7	53,508	53,508	302,378	302,378	50,625	50,625	0.2394
132,001	8	12,319	12,319	63,852	63,852	8,083	8,083	0.1810
132,001	9	738	738	5,112	5,112	344	344	0.0962
134,001	5	0	0	0	0	0	0	
134,001	6	122	122	1,960	1,960	226	226	0.1646
134,001	7	113,724	113,724	632,477	632,477	112,147	112,147	0.2536
134,001	8	24,023	24,023	124,427	124,427	16,723	16,723	0.1922
134,001	9	6,530	6,530	32,100	32,100	3,305	3,305	0.1472
136,001	5	0	0	0	0	0	0	
136,001	6	0	0	1	0	0	0	
136,001	7	49,621	49,621	284,902	284,902	53,894	53,894	0.2705
136,001	8	26,783	26,783	138,937	138,937	19,716	19,716	0.2029
136,001	9	6,131	6,131	26,929	26,929	3,226	3,226	0.1713
138,001	5	0	0	0	0	0	0	
138,001	6	203	203	1,804	1,804	444	444	0.3524
138,001	7	102,093	102,093	596,669	596,669	115,990	115,990	0.2780
138,001	8	46,931	46,931	251,384	251,384	36,424	36,424	0.2072
138,001	9	7,179	7,179	36,157	36,157	3,921	3,921	0.1551
140,001	5	0	0	0	0	0	0	
140,001	6	0	0	0	0	0	0	
140,001	7	30,856	30,856	188,176	188,176	37,216	37,216	0.2828
140,001	8	29,682	29,682	159,439	159,439	25,115	25,115	0.2253
140,001	9	2,436	2,436	12,921	12,921	1,379	1,379	0.1526

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
142,001	5	0	0	0	0	0	0	
142,001	6	0	0	0	0	0	0	
142,001	7	28,127	28,127	215,471	215,471	36,738	36,738	0.2438
142,001	8	49,027	49,027	266,351	266,351	44,425	44,425	0.2385
142,001	9	5,820	5,820	26,218	26,218	3,586	3,586	0.1956
144,001	5	0	0	0	0	0	0	
144,001	6	0	0	0	0	0	0	
144,001	7	54,387	54,387	359,966	359,966	74,300	74,300	0.2952
144,001	8	52,298	52,298	291,843	291,843	49,480	49,480	0.2425
144,001	9	7,284	7,284	38,853	38,853	4,634	4,634	0.1706
146,001	5	0	0	0	0	0	0	
146,001	6	0	0	0	0	0	0	
146,001	7	105,653	105,653	787,282	787,282	157,013	157,013	0.2852
146,001	8	48,785	48,785	282,955	282,955	47,132	47,132	0.2382
146,001	9	5,082	5,082	26,473	26,473	3,334	3,334	0.1801
148,001	5	0	0	0	0	0	0	
148,001	6	0	0	0	0	0	0	
148,001	7	21,612	21,612	157,091	157,091	33,631	33,631	0.3062
148,001	8	66,191	66,191	394,318	394,318	70,568	70,568	0.2559
148,001	9	16,714	16,714	83,135	83,135	11,301	11,301	0.1944
150,001	5	0	0	0	0	0	0	
150,001	6	0	0	0	0	0	0	
150,001	7	12,054	12,054	90,083	90,083	19,723	19,723	0.3131
150,001	8	21,128	21,128	129,495	129,495	23,159	23,159	0.2558
150,001	9	10,976	10,976	52,208	52,208	7,860	7,860	0.2153
152,001	5	0	0	0	0	0	0	
152,001	6	0	0	0	0	0	0	
152,001	7	75	75	627	627	129	129	0.2946
152,001	8	43,842	43,842	274,602	274,602	50,686	50,686	0.2640
152,001	9	6,501	6,501	32,148	32,148	4,786	4,786	0.2129
154,001	5	0	0	0	0	0	0	
154,001	6	0	0	0	0	0	0	
154,001	7	333	333	2,987	2,987	602	602	0.2881
154,001	8	37,784	37,784	245,733	245,733	44,817	44,817	0.2608
154,001	9	13,028	13,028	77,304	77,304	10,111	10,111	0.1871

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
156,001	5	0	0	0	0	0	0	
156,001	6	0	0	0	0	0	0	
156,001	7	0	0	85	0	0	0	
156,001	8	34,726	34,726	236,146	236,146	44,662	44,662	0.2705
156,001	9	7,649	7,649	39,983	39,983	6,702	6,702	0.2397
158,001	5	0	0	0	0	0	0	
158,001	6	0	0	0	0	0	0	
158,001	7	0	0	65	0	0	0	
158,001	8	61,754	61,754	429,978	429,978	81,894	81,894	0.2724
158,001	9	32,233	32,233	171,800	171,800	29,207	29,207	0.2431
160,001	5	0	0	0	0	0	0	
160,001	6	0	0	0	0	0	0	
160,001	7	0	0	12	0	0	0	
160,001	8	11,533	11,533	88,686	88,686	15,871	15,871	0.2559
160,001	9	5,760	5,760	32,471	32,471	5,449	5,449	0.2400
162,001	5	0	0	0	0	0	0	
162,001	6	0	0	0	0	0	0	
162,001	7	0	0	0	0	0	0	
162,001	8	4,992	4,992	43,128	43,128	7,469	7,469	0.2477
162,001	9	10,520	10,520	56,426	56,426	10,374	10,374	0.2629
164,001	5	0	0	0	0	0	0	
164,001	6	0	0	0	0	0	0	
164,001	7	0	0	194	0	0	0	
164,001	8	11,865	11,865	95,329	95,329	18,464	18,464	0.2770
164,001	9	35,903	35,903	193,514	193,514	38,277	38,277	0.2829
166,001	5	0	0	0	0	0	0	
166,001	6	0	0	0	0	0	0	
166,001	7	0	0	0	0	0	0	
166,001	8	11,834	11,834	95,530	95,530	19,125	19,125	0.2863
166,001	9	14,290	14,290	77,676	77,676	15,949	15,949	0.2936
168,001	5	0	0	0	0	0	0	
168,001	6	0	0	0	0	0	0	
168,001	7	301	301	3,645	3,645	749	749	0.2937
168,001	8	12,018	12,018	103,007	103,007	20,504	20,504	0.2847
168,001	9	40,596	40,596	223,200	223,200	47,746	47,746	0.3059
170,001	5	0	0	0	0	0	0	
170,001	6	0	0	0	0	0	0	
170,001	7	0	0	0	0	0	0	

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
170,001	8	3,690	3,690	32,041	32,041	6,517	6,517	0.2909
170,001	9	20,530	20,530	110,604	110,604	24,762	24,762	0.3202
172,001	5	0	0	0	0	0	0	
172,001	6	0	0	0	0	0	0	
172,001	7	62	62	871	871	171	171	0.2805
172,001	8	1	1	140	140	1	1	0.0135
172,001	9	17,371	17,371	103,753	103,753	22,688	22,688	0.3127
174,001	5	0	0	0	0	0	0	
174,001	6	0	0	0	0	0	0	
174,001	7	0	0	0	0	0	0	
174,001	8	0	0	33	0	0	0	
174,001	9	69,271	69,271	381,464	381,464	93,247	93,247	0.3496
176,001	5	0	0	0	0	0	0	
176,001	6	0	0	0	0	0	0	
176,001	7	0	0	1	0	0	0	
176,001	8	0	0	11	0	0	0	
176,001	9	11,789	11,789	72,064	72,064	16,459	16,459	0.3266
178,001	5	0	0	0	0	0	0	
178,001	6	0	0	0	0	0	0	
178,001	7	0	0	0	0	0	0	
178,001	8	318	318	3,185	3,185	677	677	0.3039
178,001	9	56,907	56,907	339,266	339,266	85,140	85,140	0.3589
180,001	5	0	0	0	0	0	0	
180,001	6	0	0	0	0	0	0	
180,001	7	0	0	0	0	0	0	
180,001	8	0	0	0	0	0	0	
180,001	9	22,286	22,286	124,257	124,257	34,680	34,680	0.3991
182,001	5	0	0	0	0	0	0	
182,001	6	0	0	0	0	0	0	
182,001	7	0	0	0	0	0	0	
182,001	8	0	0	0	0	0	0	
182,001	9	16,041	16,041	104,505	104,505	25,925	25,925	0.3548
184,001	5	0	0	0	0	0	0	
184,001	6	0	0	0	0	0	0	
184,001	7	0	0	0	0	0	0	
184,001	8	268	268	3,060	3,060	652	652	0.3045
184,001	9	49,069	49,069	313,862	313,862	83,718	83,718	0.3815
186,001	5	0	0	0	0	0	0	
186,001	6	0	0	0	0	0	0	

EXHIBIT 6-3 (CONTINUED): DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Full-Fee Scaled Equity Ratio
		All	Full-Fee	All	Full-Fee	All	Full-Fee	
186,001	7	0	0	0	0	0	0	
186,001	8	0	0	0	0	0	0	
186,001	9	25,187	25,187	153,631	153,631	43,980	43,980	0.4094
188,001	5	0	0	0	0	0	0	
188,001	6	0	0	0	0	0	0	
188,001	7	0	0	0	0	0	0	
188,001	8	32	32	90	90	84	84	1.3420
188,001	9	45,704	45,704	298,843	298,843	83,461	83,461	0.3994
190,001	5	0	0	0	0	0	0	
190,001	6	0	0	0	0	0	0	
190,001	7	0	0	0	0	0	0	
190,001	8	0	0	0	0	0	0	
190,001	9	35,114	35,114	217,165	217,165	67,283	67,283	0.4431
192,001	5	0	0	0	0	0	0	
192,001	6	0	0	0	0	0	0	
192,001	7	0	0	0	0	0	0	
192,001	8	0	0	0	0	0	0	
192,001	9	18,244	18,244	125,105	125,105	36,417	36,417	0.4163
194,001	5	0	0	0	0	0	0	
194,001	6	0	0	0	0	0	0	
194,001	7	0	0	0	0	0	0	
194,001	8	0	0	6	0	0	0	
194,001	9	52,278	52,278	337,868	337,868	107,490	107,490	0.4550
196,001	5	0	0	0	0	0	0	
196,001	6	0	0	0	0	0	0	
196,001	7	0	0	0	0	0	0	
196,001	8	0	0	0	0	0	0	
196,001	9	26,290	26,290	173,869	173,869	56,685	56,685	0.4662
198,001	5	0	0	0	0	0	0	
198,001	6	0	0	0	0	0	0	
198,001	7	0	0	0	0	0	0	
198,001	8	0	0	0	0	0	0	
198,001	9	106,621	106,621	719,513	719,513	235,219	235,219	0.4675
200,001	5	0	0	0	0	0	0	
200,001	6	0	0	0	0	0	0	
200,001	7	0	0	0	0	0	0	
200,001	8	0	0	0	0	0	0	
200,001	9	7,440	7,440	189,325	189,325	16,934	16,934	0.1279

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As stated in the introduction to this report, the purpose of this 2023 Oregon Highway Cost Allocation Study (HCAS) is to:

1. determine the share that each class of road users should pay based on the respective share of costs for maintenance, operation, and improvement of Oregon's highways, roads, and streets attributable to their use; and

2. if necessary, recommend adjustments to existing tax rates and fees to bring about a closer match between payments and responsibilities for each vehicle class.

A principal finding of this study is that equity ratios for full-fee-paying vehicles, the ratio of projected payments to responsibilities for vehicles in each class, are **0.8783** for light vehicles and **1.3242** for heavy vehicles. Under existing tax rates and fees, light vehicles are projected to underpay their responsibility by 12.2 percent whereas heavy vehicles are projected to overpay by 32.4 percent during the next biennium.

This finding is a continuation of recent trends that depart from previous studies.[12] An examination of equity ratios from previous HCAS reports over the last decade, as seen in Exhibit 7-1 below, demonstrates that equity between light-duty and heavy vehicles has been relatively stable.

EXHIBIT 7-1: EQUITY RATIOS FROM PREVIOUS HCAS REPORTS

	Equity Ratio, Full-Fee	
	Basic	Heavy
2011	1.00	1.01
2013	0.99	1.01
2015	1.00	1.00
2017	1.01	0.99
2019	0.98	1.03
2021	0.93	1.16
2023	0.88	1.32

This shift in equity necessitates some additional exploration of factors contributing to this change. As is always the case, the current HCAS relies upon new forecasts of both vehicle miles traveled and transportation revenues for the upcoming biennium. The revenue forecasts serve to provide control totals for the revenue that is attributed to each vehicle class, and the vehicle-miles-traveled forecasts are used in the apportionment of costs to classes of vehicles. Miles driven, in combination with weigh-in-motion data, contributes to a process for deriving pavement damage costs. And each new HCAS study involves a projection of transportation-related expenditures at the programmatic level and on individual transportation projects. Finally, any changes in tax rates are also incorporated into the revenue apportionment process. Any and all of these factors may play a role in changing the equity ratios that are produced by the HCAS modeling.

ISOLATING FACTORS IN THE HCAS MODEL

To better understand which factors are leading to the finding of underpayment by light-duty vehicles in the current HCAS, the study team conducted a series of tests. These tests were designed to isolate, as best as possible, individual contributing factors. The following three tests were performed:

1. A test to isolate the effect of the specific mix of projects expected to be implemented in the upcoming biennium.

2. A test to isolate the effect of changes in tax rates associated with the final implementation of HB2017.

3. A test to isolate the effect of new data on weigh-in-motion records that influences the manner by which pavement costs are allocated.

These tests concluded that no single factor is responsible for the five percentage point drop in the basic (light-duty) vehicle's equity ratio. Rather, each factor contributes to the total. However, the changing nature of the mix of investments appears to contribute more substantially than other factors.

[12] As noted in Chapter 5 since the original publication of the 2021 HCAS report, an error in reporting of the fuel tax rate and weight-mile tax rates was identified. This error resulted in inaccurate revenue attribution shares as well as inaccurate equity ratios. In the current 2023 HCAS report, this 2021 error has been corrected. And as such, the trend in heavy vehicle overpayment is evident beginning with the 2021-23 biennium.

EXHIBIT 7-2:
MODEL TESTS TO ASSESS CHANGES SINCE THE 2021 HCAS

Model Tests to Assess Changes Since 2021	
Change attributable to Project Costs	~ 0.029
Change attributable to Revenue	~ 0.010
Change attributable to Pavement Factors	~ 0.016
Sum of differences	**0.054**

Investment Mix

The purpose of the HCAS is to determine if revenues attributed to light and heavy vehicles over the upcoming biennium are adequate and equitable given the particular set of investment priorities that has been established by the state legislature and local governments. As such, the emphasis is on supporting the investment priorities. And these priorities may change over time. Given the expected drop in the basic vehicle's equity ratio, it is important to understand how changes in expected investments may be contributing to this finding. The study team examined the mix of expenditures over the last three HCAS studies. The exhibit below displays these expenditures by work type as a percentage of total expenditures.

Most notable is the shift toward increasing expenditures on bike and pedestrian-related projects. The other increase is for bridge expenditures which are, in part, related to spending in the I-205 corridor. Bike and pedestrian investments have been increasing over recent years and the current HCAS includes nearly 400 bike and pedestrian projects, compared with approximately 250 projects in each of the previous two biennia.

Each project and program expenditure is assigned a work type and each work type is assigned one or more allocation factors. These allocation factors determine how the costs are apportioned to different vehicle classes in the HCAS model. As a result of the changes to the investment mix, the share of cost responsibility also changes. The exhibit below displays the cost responsibility of various vehicle classes over the last three HCAS studies.

The study team then isolated the effect of the investment mix on the final equity ratios by substituting the 2021 projects and expenditures in the 2023 HCAS model. This test resulted in a three-percentage point change in the basic (light-duty) vehicle's equity ratio. In short, the changes in the equity findings between previous studies and the current study are attributable to a combination of factors and are not explained by a single larger change.

EXHIBIT 7-3: COSTS BY WORK TYPE, 2019-2023 HCASs

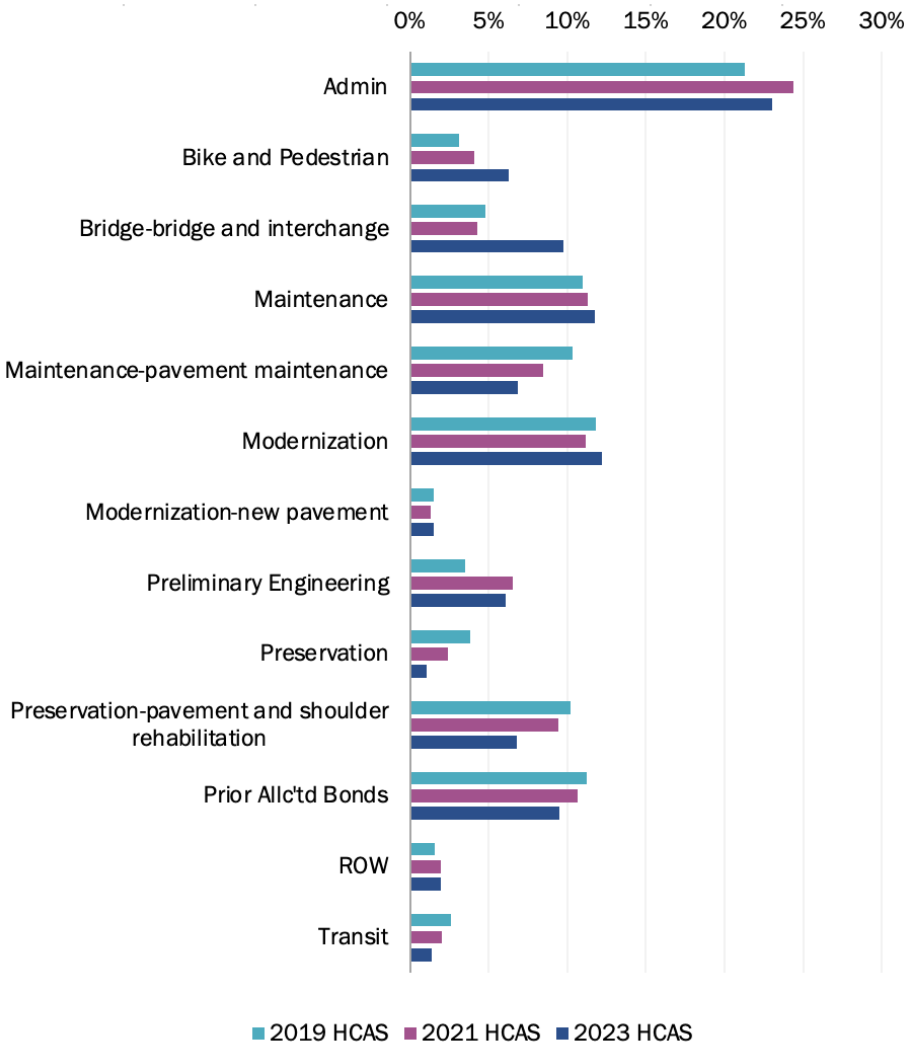


EXHIBIT 7-4: SHARE OF COST RESPONSIBILITY OVER TIME, 2019-2023 HCASs

Share of Cost Responsibility			
Declared Weight	**2019**	**2021**	**2023**
1 to 10,000	67%	70%	73%
10,001 to 26,000	4%	4%	3%
26,001 to 78,000	4%	4%	2%
78,001 to 80,000	14%	13%	13%
80,001 to 104,000	4%	4%	3%
104,001 to 105,500	6%	6%	5%
105,501 and up	1%	1%	1%
Total	**100%**	**100%**	**100%**

Tax Rates

HB2017 set in motion a series of tax-rate adjustments, the final installment of which takes effect during the upcoming biennium. This final rate adjustment involves:

- increases in vehicle registration fees,
- an increase in the state tax on motor fuels by 5.3 percent over the 2021 rates,
- and an increase in weight-mile tax rates by six percent over the 2021 rates.

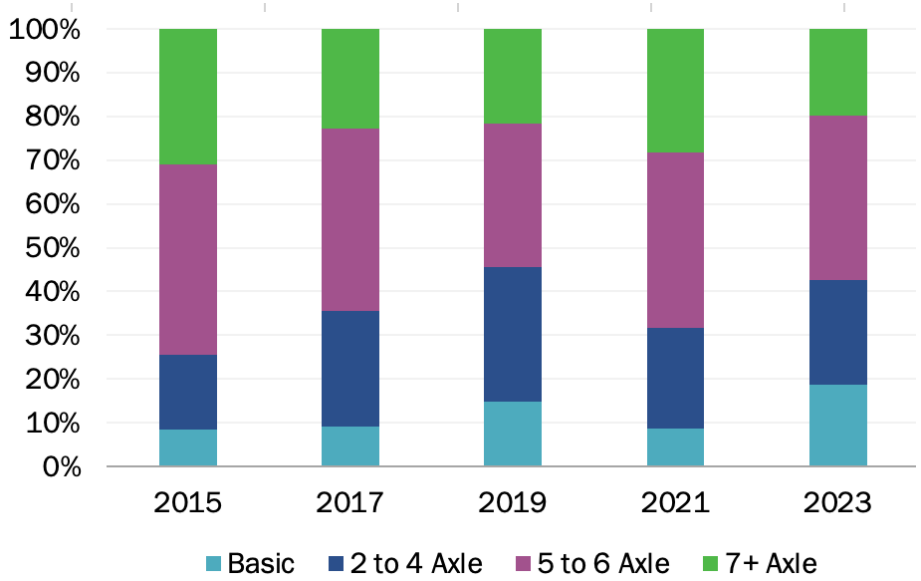
As a result, the user-fee revenue attributed to heavy vehicles has increased by 10 percent over 2021, even while heavy vehicle miles traveled are projected to decline slightly.

The study team tested the magnitude of the results of these changes by substituting the 2021 tax rates and revenue totals into the current HCAS model. The resulting change in the basic (light-duty) vehicle's equity ratio was one percentage point.

Pavement Factors

The allocation of pavement costs is an important step in determining equity ratios since heavy vehicles are responsible for a significant portion of pavement damages. And since the current study made use of a new source of information (new state data vendor) about weigh-in-motion records, the study team isolated the new pavement factors by running the previous 2021 HCAS model with the current observations of axle/weight distributions across the various functional classes of roadways. As shown in Exhibit 7-5 below, the share of light-duty vehicles on some functional classes has increased in the most current data. This finding is likely due to an improvement in data rather than a change in the actual share of vehicles on various parts of the state road network.

EXHIBIT 7-5: FLEXIBLE PAVEMENT SHARES (OTHER PRINCIPAL ARTERIAL ROADS)



The result of isolating the new pavement factors is that the basic (light-duty) vehicle's equity ratio decreases by just over 1.5 percentage points when the new weigh-in-motion data is incorporated into the HCAS model.

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CHAPTER 8: RECOMMENDATIONS FOR CHANGES IN TAX RATES

This section calculates the "as-if" rate changes to return the light and heavy vehicle classes to equity under an alternative rate scenario. Given the recent set of rate adjustments set out in HB2017 and other factors related to the economic shock following the pandemic, the legislature may want to consider the timing of making additional changes that would affect the distribution of revenue burdens between light and heavy vehicles. The current imbalance in equity between light and heavy vehicles is principally related to changes in transportation spending priorities, as opposed to tax-rate adjustments. If these spending priorities persist in the future, then the existing rate structure should be re-evaluated at this broadest level. Below, we present a few alternative rate scenarios that bring equity back into balance while retaining the total transportation revenues associated with user fees.

If rates are adjusted for other reasons, which reside outside the scope of this study, those adjustments should strive to maintain the proportional burden on light and heavy vehicles by adjusting either the rates levied or overall distribution of spending.

Within the various classes of heavy vehicles, there are inequities that the legislature could choose to address through changes to the rate structure. In this chapter, we offer alternative rate schedules that, if implemented, would bring about substantially greater equity within heavy vehicle classes without materially changing the total amount of revenue collected from heavy vehicles.

The inequities within heavy vehicle classes may be generalized as follows:

- Vehicles between 10,001 and 26,000 pounds are paying more than their fair share
- Vehicles weighing between 26,001 and 78,000 pounds are paying slightly more than their fair share
- Vehicles with a declared weight of 78,001 to 80,000 pounds (which account for 47.9 percent of vehicle miles by full-fee-paying vehicles over 26,000 pounds) are paying more than their fair share
- Vehicles weighing more than 80,000 pounds are paying less than their fair share

To achieve equity within heavy vehicle classes, several rate schedules would need to be changed under the projected spending during the biennium. These include the Table A and Table B weight-mile tax rates; the optional flat fee rates for haulers of logs, sand and gravel, and wood chips; and the road use assessment fee applicable to vehicles operated under single-trip, non-divisible load permits at gross weights over 98,000 pounds. The 2021 Highway Cost Allocation Study included recommendations for adjustments to the Table A and Table B rates in order to achieve greater equity between different weight categories of heavy vehicles. We refer to that study for a more detailed discussion of those suggested rate adjustments.

REDUCING THE WEIGHT-MILE TAX

Heavy-duty vehicles are expected to overpay during the 2023-25 biennium by 32.4 percent. In order to bring the heavy vehicle equity ratio back closer to 1.0, it would be necessary to reduce Weight-Mile Tax rates across the board to approximately 70 percent of their current rates.

Commercial vehicles operated at declared weights of 26,001 to 105,500 pounds are subject to the weight-mile tax for their Oregon miles of travel. Operators of vehicles with declared weights of 26,001-80,000 pounds pay the statutory Table A rates. Vehicles operated under special annual permits at declared weights of 80,001-105,500 pounds are subject to the statutory Table B rates.[13]

Table A rates are specified for each 2,000-pound declared gross weight increment. As shown in Exhibit 8-1, the rates for 2023 range from 7.64 cents per mile for vehicles declared at 26,001-28,000 pounds to 25.12 cents per mile for vehicles declared at 78,001-80,000 pounds.

The Alternative rates in Table A are between 65 percent and 100 percent of the current rates. Adjustments to Table A rates would also be accompanied by corresponding adjustments to Table B rates in order to maintain revenue neutrality.

Table B rates are specified for combinations of 2,000-pound increments and numbers of axles. The rates are structured so that at any given declared

[13] Under the Oregon weight-mile tax system, a power unit (tractor) can have multiple declared weights, depending on the configuration in which it is being operated (i.e., the number of trailers/semi-trailers the truck or tractor is pulling). Hence, during any given reporting period, portions of a vehicle's miles may be reported under both Table A and Table B.

EXHIBIT 8-1: WEIGHT-MILE TAX TABLE A

Declared Weight in Pounds			Current WMT Rate	Alternative Rates	Difference	Percent Difference
26,001	to	28,000	0.0764	0.0926	0.0162	21.2%
28,001	to	30,000	0.0809	0.0941	0.0132	16.3%
30,001	to	32,000	0.0846	0.0956	0.0110	13.0%
32,001	to	34,000	0.0884	0.0971	0.0087	9.8%
34,001	to	36,000	0.0918	0.0987	0.0069	7.5%
36,001	to	38,000	0.0966	0.1003	0.0037	3.8%
38,001	to	40,000	0.1002	0.1019	0.0017	1.7%
40,001	to	42,000	0.1038	0.1035	-0.0003	-0.3%
42,001	to	44,000	0.1077	0.1052	-0.0025	-2.3%
44,001	to	46,000	0.1113	0.1069	-0.0044	-4.0%
46,001	to	48,000	0.1149	0.1086	-0.0063	-5.5%
48,001	to	50,000	0.1187	0.1103	-0.0084	-7.1%
50,001	to	52,000	0.1231	0.1121	-0.0110	-8.9%
52,001	to	54,000	0.1277	0.1139	-0.0138	-10.8%
54,001	to	56,000	0.1325	0.1157	-0.0168	-12.7%
56,001	to	58,000	0.1380	0.1176	-0.0204	-14.8%
58,001	to	60,000	0.1443	0.1195	-0.0248	-17.2%
60,001	to	62,000	0.1517	0.1214	-0.0303	-20.0%
62,001	to	64,000	0.1601	0.1233	-0.0368	-23.0%
64,001	to	66,000	0.1693	0.1253	-0.0440	-26.0%
66,001	to	68,000	0.1813	0.1273	-0.0540	-29.8%
68,001	to	70,000	0.1941	0.1293	-0.0648	-33.4%
70,001	to	72,000	0.2069	0.1314	-0.0755	-36.5%
72,001	to	74,000	0.2187	0.1335	-0.0852	-39.0%
74,001	to	76,000	0.2300	0.1356	-0.0944	-41.0%
76,001	to	78,000	0.2411	0.1378	-0.1033	-42.8%
78,001	to	80,000	0.2512	0.1400	-0.1112	-44.3%

weight, carriers can qualify for a lower rate by utilizing additional axles. Current Table B rates range from 19.87 cents per mile for a nine-axle vehicle declared at 82,000 pounds to 35.33 cents per mile for a five-axle vehicle declared at 96,000 pounds. Vehicles declared at over 98,000 pounds must have six or more axles, and vehicles declared at over 100,000 pounds must have seven or more axles.

The Alternative rates in Table B, as shown in Exhibit 8-2, are between 70 percent and 100 percent of the current rates.

EXHIBIT 8-2: WEIGHT-MILE TAX TABLE B

Declared Weight in Pounds			Axles	Current WMT Rate	Alternative Rates	Difference	Percent Difference
80,001	to	82,000	5	0.2594	0.2470	-0.0124	-4.8%
80,001	to	82,000	6	0.2373	0.2058	-0.0315	-13.3%
80,001	to	82,000	7	0.2218	0.1764	-0.0454	-20.5%
80,001	to	82,000	8	0.2107	0.1544	-0.0563	-26.7%
80,001	to	82,000	9	0.1987	0.1372	-0.0615	-30.9%
82,001	to	84,000	5	0.2678	0.2537	-0.0141	-5.3%
82,001	to	84,000	6	0.2411	0.2106	-0.0305	-12.7%
82,001	to	84,000	7	0.2254	0.1805	-0.0449	-19.9%
82,001	to	84,000	8	0.2134	0.1579	-0.0555	-26.0%
82,001	to	84,000	9	0.2014	0.1403	-0.0611	-30.3%
84,001	to	86,000	5	0.2758	0.2606	-0.0152	-5.5%
84,001	to	86,000	6	0.2466	0.2155	-0.0311	-12.6%
84,001	to	86,000	7	0.2291	0.1847	-0.0444	-19.4%
84,001	to	86,000	8	0.2161	0.1615	-0.0546	-25.3%
84,001	to	86,000	9	0.2042	0.1435	-0.0607	-29.7%
86,001	to	88,000	5	0.2852	0.2677	-0.0175	-6.1%
86,001	to	88,000	6	0.2520	0.2205	-0.0315	-12.5%
86,001	to	88,000	7	0.2327	0.1890	-0.0437	-18.8%
86,001	to	88,000	8	0.2199	0.1652	-0.0547	-24.9%
86,001	to	88,000	9	0.2069	0.1468	-0.0601	-29.0%
88,001	to	90,000	5	0.2962	0.2750	-0.0212	-7.2%
88,001	to	90,000	6	0.2584	0.2256	-0.0328	-12.7%
88,001	to	90,000	7	0.2365	0.1934	-0.0431	-18.2%
88,001	to	90,000	8	0.2235	0.1690	-0.0545	-24.4%
88,001	to	90,000	9	0.2107	0.1501	-0.0606	-28.8%
90,001	to	92,000	5	0.3090	0.2825	-0.0265	-8.6%
90,001	to	92,000	6	0.2659	0.2308	-0.0351	-13.2%
90,001	to	92,000	7	0.2399	0.1979	-0.0420	-17.5%
90,001	to	92,000	8	0.2271	0.1729	-0.0542	-23.9%
90,001	to	92,000	9	0.2144	0.1535	-0.0609	-28.4%
92,001	to	94,000	5	0.3230	0.2902	-0.0328	-10.2%
92,001	to	94,000	6	0.2731	0.2362	-0.0369	-13.5%
92,001	to	94,000	7	0.2438	0.2025	-0.0413	-16.9%
92,001	to	94,000	8	0.2308	0.1769	-0.0539	-23.4%
92,001	to	94,000	9	0.2172	0.1570	-0.0602	-27.7%
94,001	to	96,000	5	0.3377	0.2981	-0.0396	-11.7%
94,001	to	96,000	6	0.2815	0.2417	-0.0398	-14.1%
94,001	to	96,000	7	0.2483	0.2072	-0.0411	-16.6%
94,001	to	96,000	8	0.2346	0.1810	-0.0536	-22.8%

Declared Weight in Pounds			Axles	Current WMT Rate	Alternative Rates	Difference	Percent Difference
94,001	to	96,000	9	0.2207	0.1606	-0.0601	-27.2%
96,001	to	98,000	5	0.3533	0.3409	-0.0124	-3.5%
96,001	to	98,000	6	0.2917	0.2473	-0.0444	-15.2%
96,001	to	98,000	7	0.2539	0.2120	-0.0419	-16.5%
96,001	to	98,000	8	0.2384	0.1852	-0.0532	-22.3%
96,001	to	98,000	9	0.2245	0.1642	-0.0603	-26.9%
98,001	to	100,000	5	0.0000	0.0000	0.0000	NA
98,001	to	100,000	6	0.3025	0.2710	-0.0315	-10.4%
98,001	to	100,000	7	0.2594	0.2169	-0.0425	-16.4%
98,001	to	100,000	8	0.2428	0.1895	-0.0533	-22.0%
98,001	to	100,000	9	0.2281	0.1679	-0.0602	-26.4%
100,001	to	102,000	5	0.0000	0.0000	0.0000	NA
100,001	to	102,000	6	0.0000	0.0000	0.0000	NA
100,001	to	102,000	7	0.2649	0.2219	-0.0430	-16.2%
100,001	to	102,000	8	0.2483	0.1939	-0.0544	-21.9%
100,001	to	102,000	9	0.2319	0.1717	-0.0602	-26.0%
102,001	to	104,000	5	0.0000	0.0000	0.0000	NA
102,001	to	104,000	6	0.0000	0.0000	0.0000	NA
102,001	to	104,000	7	0.2705	0.2270	-0.0435	-16.1%
102,001	to	104,000	8	0.2539	0.1984	-0.0555	-21.9%
102,001	to	104,000	9	0.2365	0.1756	-0.0609	-25.8%
104,001	to	106,000	5	0.0000	0.0000	0.0000	NA
104,001	to	106,000	6	0.0000	0.0000	0.0000	NA
104,001	to	106,000	7	0.2777	0.2323	-0.0454	-16.3%
104,001	to	106,000	8	0.2594	0.2031	-0.0563	-21.7%
104,001	to	106,000	9	0.2411	0.1796	-0.0615	-25.5%

INCREASING RATES ON LIGHT-DUTY VEHICLES

A reduction in the Weight-Mile Tax rates would necessitate a corresponding increase in the tax rates on light-duty vehicles in order to maintain a similar amount of revenue generated from transportation user fees. This increase could be achieved by either increasing the taxes on motor fuels, increasing the light-duty registration fees, or some combination of the two.

In order to raise the required revenue from an increase in the taxes applied to motor fuels, the rate adjustment would need to be in the range of 20 percent, from $0.40/gallon to $0.48/gallon.

In order to raise the required revenue from an increase in the light-duty registration fee, the rate adjustment would need to be in the range of a 46-percent increase, from $144 to $210 for a two-year registration.

A combination of adjusting the tax on motor fuels and light-duty registration fees could also be used to raise the required revenue. An example of this approach would be a 10-percent increase in the tax on fuels, from $0.40/gallon to $0.44/gallon, and a 28-percent increase in registration fees, from $144 to $184 for a two-year registration.

OPTIONAL FLAT FEE RATES

Under existing law, carriers hauling qualifying commodities—logs, sand and gravel, and wood chips—have the option of paying monthly flat fees in lieu of the weight-mile tax. There are separate flat fee rates applicable to each of the three different commodity groups. Each rate is set so that carriers paying it should, on average, pay the same amount as they would on a mileage basis. For this reason, flat fee vehicles are treated as full-fee vehicles in this study. Before the 2015 study, flat fee vehicles were classified as alternative fee vehicles.

When paying the weight-mile tax, log haulers can use a lower declared weight when their trailer is empty and stowed above the tractor unit. It was assumed that 55 percent of log-truck miles are with an empty, decked trailer. Weight-mile taxes apply only to miles on public roads in Oregon, but log trucks may incur some of their miles on private logging roads.

The existing statutory flat fee rate for carriers transporting logs is $11.60 per 100 pounds of declared combined weight. These fees are typically paid in monthly installments. The monthly flat fee applicable to a log truck declared at 80,000 pounds, for example, is $773.34 ($11.60 x 800 = $9,280/12 months = $773.34). This amount must be paid each month the vehicle remains on a flat fee basis, regardless of the number of miles traveled during the month.

The flat fee rates are required to be reviewed biennially and appropriate adjustments are presented to each regular legislative session. This review is accomplished through the biennial flat fee studies, the latest of which was completed in August 2022 and entitled “Testing for Revenue Neutrality of Flat Fee Firms in Oregon (2021).”

That study compared flat fee revenues in 2021 to what those vehicles would have paid in weight-mile tax in 2021. The 2021 flat fee study found that sand and gravel haulers underpaid by 44.77 percent relative to what they otherwise would have paid on a per-mileage basis, while log haulers underpaid by 6.92 percent. There were no flat fee records recorded for wood chip haulers for the 2021 study.

In 2017, the legislature passed HB2017, which increases flat fees by 53.4 percent between 2018 and 2024. A large share of the rate increases (around 32 percent) was front-loaded between 2018 and 2020. Based on the proposed rate changes from the legislature, the report recommends waiting until the impact of those new rates can be assessed across commodities before recommending further adjustment.

ROAD USE ASSESSMENT FEE RATES

Since 1990, carriers operating vehicles under single-trip, non-divisible load permits at gross weights above 98,000 pounds pay the road use assessment fee. The road use assessment fee takes the place of the weight-mile tax for the loaded portion of non-divisible load hauls. With rare exceptions, the empty backhaul portion of these trips is subject to the weight-mile tax and taxed at the vehicle's regular declared weight.[14]

The fees carriers pay are contained in a table of per-mile rates expressed in terms of permit gross weight and number of axles. Because of its size, that table is not reproduced in this report. Per-mile rates for loads over 200,000 pounds are calculated from the actual weight on each axle. As with the Table B rates, carriers are charged a lower per-mile fee for the use of additional axles at any given gross weight. This reduction reflects the fact that spreading any given total load over additional axles reduces the amount of pavement damage imposed by that load.

For the 2023 HCAS, the equity ratios presented in Chapter 6 suggest that vehicles in weight classes above 105,500 significantly underpay relative to their cost responsibility. With the rate changes from HB2017 and the impact on economic activity associated with the COVID-19 pandemic, this report does not recommend further changes to the flat fee rates for the current biennium.

[14] See Appendix A for a detailed explanation of declared and operating weight.

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