Highway Cost Allocation Study

2017 – 2019 Biennium

PREPARED BY:

ECONorthwest

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2017-2019 OREGON HIGHWAY COST ALLOCATION STUDY

STUDY TEAM

Carl Batten, ECONorthwest

Erin Haswell, ECONorthwest

Matthew Kitchen, ECONorthwest

Ralph Mastromonaco, ECONorthwest

Roger Mingo, RD Mingo & Associates

Tina Morgan, ECONorthwest

Randall Pozdena, ECONorthwest

STUDY REVIEW TEAM

Mark McMullen, Office of Economic Analysis (Chair)

Jerri Bohard, Oregon Dept of Transportation

Gerik Kransky, Bicycle Transportation Alliance

Mazen Malik, Legislative Revenue Office

Mike McArthur, Association of Oregon Counties

Tim Morgan, AAA Oregon/Idaho

Don Negri, Willamette University

Bob Russell, Oregon Trucking Associations

PROJECT MANAGER

Amy Williams, Oregon Office of Economic Analysis

The study team received valuable assistance from Waylon Buchan, Jennifer Campbell, Sven Johnson, Jim Leamon, Richard Munford, Lani Pennington, Dan Porter, Dave Ringeisen, Amber Tayler, and Paul R. Wirfs, at the Oregon Department of Transportation; from Josh Lehner at the Office of Economic Analysis; from Daniel Hauser and Mike Eliason at the Association of Oregon Counties; and from Victor Dodier.

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SUMMARY OF MAJOR FINDINGS

The 2017 Oregon Highway Cost Allocation Study concludes that:

- Light vehicles (those weighing 10,000 pounds or less) paying full fees should pay 63.98 percent of state highway user revenues, and heavy vehicles (those weighing more than 10,000 pounds) paying full fees should contribute 36.02 percent during the 2017-19 biennium.
- For the 2017-19 biennium and under existing, current-law tax rates, it is projected that full-fee-paying light vehicles will contribute 64.46 percent of state highway user revenues and full-fee-paying heavy vehicles, as a group, will contribute 35.54 percent.
- The calculated equity ratios for full-fee-paying vehicles, defined as the ratio of projected payments to responsibilities for the vehicles in each class, are 1.0076 for light vehicles and 0.9865 for heavy vehicles as a group. This means that, under existing tax rates and fees, light vehicles are projected to overpay their responsibility by 0.76 percent. Heavy vehicles, as a group, are projected to underpay their responsibility by 1.35 percent during the next biennium.
- The equity ratios for the individual heavy vehicle weight classes show some classes are projected to overpay and some to underpay their responsibility during the 2017-19 biennium. Chapter 7 of this report offers alternative fee schedules that would minimize this cross-subsidization of some heavy vehicle weight classes by others.
- The reduced rates paid by certain types of vehicles, principally publicly owned and farm vehicles, mean these vehicles are paying lower per-mile charges than comparable vehicles subject to full fees. Those vehicles are supposed to pay less than their cost responsibility and are not included in the calculation of the equity ratios reported above.
- The margins of error in the forecasts of miles traveled, costs imposed, and revenues generated are larger than the estimated inequity between light and heavy vehicles. One therefore cannot conclude that light vehicles will overpay their cost responsibility and constitutional requirement to change user fee rates.
- If the Legislature chooses to change user fee rates for other reasons, the model developed for this study may be used to design those rates to produce revenues in proportion to expected costs imposed by light and heavy vehicles.

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CHAPTER 1: INTRODUCTION AND BACKGROUND

INTRODUCTION

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. Cost allocation is the process of apportioning the cost of highway work to the vehicles that impose those costs and is therefore necessary for the implementation of the cost responsibility policy of the State of Oregon.

For more than 70 years, Oregon has based the financing of its highways on the principle of cost responsibility. This tradition has served Oregon well by ensuring that the state's highway taxes and fees are levied in a fair and equitable manner. Periodic studies have been conducted 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, 19 such studies had been completed; the first in 1937, the most recent in 2015.

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 2017 Oregon Highway Cost Allocation Study (HCAS) is to

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

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

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. Studies were completed in 1937, 1947, 1963, 1974, 1980, 1984, 1986, 1990, 1992, 1994, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, and 2015. As noted above, the Oregon Constitution now requires that a study be 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 essentially equivalent and used interchangeably in this report.[1]

In this 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.

[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.

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 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 a number of 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, 2005, 2007, 2009, 2011, and 2013 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, 2009, 2011, 2013 and the present study consisted of ten 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, a number of 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

[2] "Oregon Cost Responsibility Studies Compared to Other States," Legislative Revenue Office Research Report #4-96, September 10, 1996.

as a common responsibility of all highway users and are assigned to all vehicle classes on the basis of each class's relative travel, they are predominantly the responsibility of automobiles and other light vehicles. Therefore, it is not surprising that the California studies find a higher light 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 commonly 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]

OREGON ROAD USER TAXATION

Oregon's constitutionally dedicated State Highway Fund derives most of its revenue from three major highway user taxes: vehicle registration fees, motor vehicle fuel taxes (primarily the gasoline tax), and motor carrier fees (primarily the weight-mile tax). The basis of each of these taxes is governed by the concept of cost responsibility. This three-tiered structure is used to collect a fair share of revenue from each highway user class.

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.

The registration fee was 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. 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. It is currently $86 biennially. This shift to relatively 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.

The second tier in the Oregon system is the fuel tax. 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, 2011, Oregon's fuel tax rate increased from $0.24 per gallon to $0.30 per gallon. The last time it was increased was in 1993.

The third tier in the Oregon highway finance system is the weight-mile tax. Oregon's first third-structure tax was put into effect in 1925 in the form of a ton-mile tax. It was used to cover the responsibility of the growing number of trucks and other heavy vehicles appearing on the public roadways at that time.

Oregon's first weight-mile tax was enacted in 1947 and implemented in 1948. The tax applies to all commercial motor vehicles with declared gross weights in excess of 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.

[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 largely 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.

Since 1990, 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.

Also since 1990, carriers hauling non-divisible loads at gross weights in excess of 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 currently based on a charge of 7.1 cents per equivalent single axle load (ESAL[4]) mile of travel. 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.

In the years since 1947, the weight-mile rates have been adjusted 15 times based on the results of updated cost responsibility studies or the passage of transportation funding packages. The most recent revision occurred on October 1, 2010, when weight-mile rates increased by an average of 24.5 percent as a result of the 2009 Jobs and Transportation Act (JTA). Prior to the 2009 JTA rate increase, the last increase occurred on January 1, 2004, when the 2003 Legislature increased weight-mile rates by approximately 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 approximately 12.3 percent to reflect the results of the 1999 Study. The rates were also reduced by 6.2 percent on January 1, 1996, based on the results of the 1994 Study. Before then, rates were 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 substantially 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.

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 2017 Study provides an overview of the study issues, methodology, and results, as well as recommendations for future studies. There are a number of 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 2017 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.

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

- **Chapter 2** briefly summarizes the basic structure and parameters of the 2017 Study, including the analysis periods, road (highway) systems, vehicle classes, revenues attributed, and expenditures allocated to the 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.
- **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 001, 2003, 2005, 2007, 2009, 2011, 2013, and 2015 Oregon studies.
- **Chapter 7** contains 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.

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

  A. Glossary of terms

  B. Summary of highway cost allocation studies in other states

  C. The minutes of each SRT meeting

  D. HCAS model user guide

  E. HCAS model reference guide

  F. 2017 input data and assumptions

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CHAPTER 2: BASIC STRUCTURE AND PARAMETERS OF STUDY

The underlying approach and methods used in this highway cost allocation study are, with a few significant exceptions, similar to those used in the last five Oregon studies. The analytical framework and basic parameters of the 2017 Study are briefly summarized below.

STUDY APPROACH AND GENERAL METHODOLOGY

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.

ANALYSIS PERIODS

Base Year: Calendar Year 2015, the most recent full year for which data were available when the study was undertaken (2016).

Forecast Year: Calendar Year 2018, the middle 12 months of the 24-month study biennium.

Study Period: The 2017-19 State Fiscal Biennium, or July 1, 2017 to June 30, 2019.

The expenditures allocated are those projected for the 2017-19 biennium using ODOT's Cash Flow Forecast model. All traffic data used in the study were first developed from data for the 2015 base year, and then projected forward to the 2018 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 previous studies before 2007, light vehicles were defined as all 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 different 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, data collected by ODOT and supplied by Portland State University.

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 various weight classes were selected on the basis of 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, a large majority of these vehicles are two-axle, single-unit trucks or buses used in local commercial delivery operations or passenger transport. Thus, they have relatively similar characteristics with respect to their cost responsibility and tax payments, and 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 by far 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, 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, 2007, 2009, 2011, 2013, and 2015 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. These revenue sources generally 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 generally are not interchangeable. This approach was also used in the 2007, 2009, 2011, and 2013 studies.

Expenditure Categories

The four major expenditure categories are:

- **Modernization (new construction or reconstruction).** Examples include adding lanes and straightening curves. Modernization generally 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 generally do not add to its capacity. A replacement bridge that does not add capacity is considered preservation.
- **Maintenance and Operations.** Examples of maintenance include pothole 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 (everything else).**

Within each of these major categories, expenditures are further broken down into a number of 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

The revenues attributed to vehicles are based on forecasted collections for the 2017-19 biennium by major state revenue source under the existing tax structure and current-law tax rates (i.e., current registration and title fees, 30 cent per gallon fuel tax rate, current weight-mile tax, flat fee, and road use assessment fee rates).

Because non-state funding sources are included as expenditures, the total expenditures allocated amount is considerably larger than the total revenues attributed amount. 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 AND STUDY APPROACH

This chapter presents the general methodology and approach used in the 2017 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 greatly between identical-appearing vehicles or individuals and for the same vehicle or person at different 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 on the basis of each class's share of total vehicle miles traveled (VMT). 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 on the basis of 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 take into account the effects of climate, traffic levels, mix of vehicle types, and the interactions between different mechanisms. Mingo adapted the pavement model to use Oregon's special weighings 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).

A new 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, 2013, 2015, and 2017 Oregon Studies. Similar to 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 new 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 a particular allocator as most appropriate.

Wear-related costs are the easiest to allocate. Wear-related costs are a direct, empirically established consequence of use by vehicles. The amount of wear a vehicle imposes per mile of travel generally 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 may be

[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 general 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.

[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.

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.

If a detailed model for attributing wear-related costs does not exist, one may choose allocation factors that one expects 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.

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 cost, 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 different types of vehicle, 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 take into account 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 four 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 take into account 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 on the basis of 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 sufficient 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 a number of 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 generally 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.

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 represent 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 generally related to traffic volumes.

Weighting 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 various 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 different factors for different functional classes and different levels of 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 the studies is that 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, with the exception of 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 the 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 real 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.

EXHIBIT 3-1: ALLOCATORS APPLIED TO EACH WORK TYPE

Work Type	Work Type Description	Allocator 1	Share 1	Allocator 2	Share 2
1	Preliminary and Construction Engineering (and etc.)	CongestedPCE	55.95%	Other_Construction	44.05%
2	Right of Way (and Utilities)	CongestedPCE	73.75%	Other_Construction	26.25%
3	Grading and Drainage	CongestedPCE	100.00%	None	0%
4	New Pavements-Rigid	CongestedPCE	4.10%	Rigid	95.90%
5	New Pavements-Flexible	CongestedPCE	5.48%	Flex	94.52%
6	New Shoulders-Rigid	CongestedPCE	100.00%	None	0%
7	New Shoulders-Flexible	CongestedPCE	100.00%	None	0%
8	Pavement and Shoulder Reconstruction-Rigid	CongestedPCE	4.10%	Rigid	95.90%
9	Pavement and Shoulder Reconstruction-Flexible	CongestedPCE	5.48%	Flex	94.52%
10	Pavement and Shoulder Rehab-Rigid	All_VMT	4.10%	Rigid	95.90%
11	Pavement and Shoulder Rehab-Flexible	All_VMT	5.48%	Flex	94.52%
12	Culverts	All_VMT	87.52%	Flex	12.48%
13	New Structures	None	100.00%	None	0%
14	Replacement Structures	None	100.00%	None	0%
15	Structures Rehabilitation	None	100.00%	None	0%
16	Climbing Lanes	UphillPCE	100.00%	None	0%
17	Truck Weight/Inspection Facilities	Over_26_VMT	100.00%	None	0%
18	Truck Escape Ramps	Over_26_VMT	100.00%	None	0%
19	Interchanges	None	100.00%	None	0%
20	Roadside Improvements	All_VMT	100.00%	None	0%
21	Safety Improvements	CongestedPCE	100.00%	None	0%
22	Traffic Service Improvements	CongestedPCE	100.00%	None	0%
23	Other Construction (modernization)	Other_Construction	100.00%	None	0%
24	Other Construction (preservation)	All_VMT	100.00%	None	0%
25	Surface and Shoulder Maintenance-Rigid	All_VMT	4.10%	Rigid	95.90%
26	Surface and Shoulder Maintenance-Flexible	All_VMT	5.48%	Flex	94.52%
27	Surface and Shoulder Maintenance-Other	All_AMT	100.00%	None	0%
28	Drainage Facilities Maintenance	All_VMT	100.00%	None	0%
29	Structures Maintenance	All_VMT	100.00%	None	0%
30	Roadside Items Maintenance	All_VMT	100.00%	None	0%
31	Safety Items Maintenance	All_VMT	100.00%	None	0%
32	Traffic Service Items Maintenance	CongestedPCE	100.00%	None	0%

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

Work Type	Work Type Description	Allocator 1	Share 1	Allocator 2	Share 2
33	Pavement Striping and Marking (maintenance)	All_AMT	100.00%	None	0.0%
34	Sanding and Snow and Ice Removal (maintenance)	All_VMT	100.00%	None	0.0%
35	Extraordinary Maintenance	All_VMT	100.00%	None	0.0%
36	Truck Scale Maintenance-Flexible	Over_26_VMT	100.00%	None	0.0%
37	Truck Scale Maintenance-Rigid	Over_26_VMT	100.00%	None	0.0%
38	Truck Scale Maintenance-Buildings and Grounds	Over_26_VMT	100.00%	None	0.0%
39	Studded Tire Damage	Basic_VMT	100.00%	None	0.0%
40	Miscellaneous Maintenance	All_VMT	100.00%	None	0.0%
41	Bike/Pedestrian Projects	All_VMT	100.00%	None	0.0%
42	Railroad Safety Projects	All_VMT	100.00%	None	0.0%
43	Transit and Rail Support Projects	CongestedPCE	100.00%	None	0.0%
44	Fish and Wildlife Enabling Projects	All_VMT	100.00%	None	0.0%
45	Highway Planning	All_VMT	100.00%	None	0.0%
46	Transportation Demand & Transportation System Management	CongestedPCE	100.00%	None	0.0%
47	Multimodal	CongestedPCE	100.00%	None	0.0%
48	Reserve Money, Fund Exchange, Immediate Opportunity Fund	All_VMT	100.00%	None	0.0%
49	Seismic Retrofits on Structures	All_VMT	100.00%	None	0.0%
50	Other Common Costs	All_VMT	100.00%	None	0.0%
55	Other--Over 26,000 Only	Over_26_VMT	100.00%	None	0.0%
56	Other--Basic Only	Basic_VMT	100.00%	None	0.0%
57	Other--Over 8,000 Only	Over_10_VMT	100.00%	None	0.0%
58	Other--Under 26,000 Only	Under_26_VMT	100.00%	None	0.0%
59	Other Administration	All_VMT	100.00%	None	0.0%
60	Bridge --All Vehicles Share (no added capacity)	All_VMT	100.00%	None	0.0%
61	Bridge --Over 8,000 Vehicles Share	Over_10_VMT	100.00%	None	0.0%
62	Bridge --Over 50,000 Vehicles Share	Over_50_VMT	100.00%	None	0.0%
63	Bridge --Over 80,000 Vehicles Share	Over_80_VMT	100.00%	None	0.0%
64	Bridge --Over 106,000 Vehicle Share	Over_106_VMT	100.00%	None	0.0%
65	Bridge --All Vehicles Share (added capacity)	CongestedPCE	100.00%	None	0.0%
66	Other Bridge	Other_Bridge	100.00%	None	0.0%
67	Interchange Modernization	None	100.00%	None	0.0%
68	Bridge Replacement with Capacity	None	100.00%	None	0.0%

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 particular projects or purposes. In this study, 22.8 percent of local government expenditures (5.4 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 the majority of unmet needs at that time involved pavement rehabilitation and maintenance, items for which heavy vehicles have the predominant responsibility.

There are strong 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 many 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 time 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 of 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's 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 a number of 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 are 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 arguably 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 on the basis of 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 final 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. Net avoidance in Oregon is significant because of the large number of people who live in Washington and work in Oregon. These people tend to buy a smaller proportion of their fuel in Oregon than the proportion of their total miles that are driven in Oregon. This 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 the purpose of this study, it was assumed that evasion of the weight-mile tax is equal to 5.0 percent of what would be collected if all that is due were paid. This is the midpoint of the 3 to 7 percent evasion rate estimated by the Oregon Weight-Mile Tax Study conducted by consultants for the Legislative Revenue Office in 1996. This study also assumes that an additional 1.0 percent of the use-fuel tax on diesel (beyond the 3.5 percent avoidance) is successfully evaded.

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CHAPTER 4: STUDY DATA AND FORECASTS

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

- **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 2017 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 2015 base year, the latest year for which complete historical data were available. These data were then projected forward to calendar year 2018, the middle 12 months of the 2017-19 fiscal biennium, which is the study period.

The base year traffic data were obtained from a number of 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 previously discussed. 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 shows that total vehicle travel in Oregon is projected to increase from 36.1 billion miles in 2015 to 38.8 billion miles in 2016. This represents an average annual growth of about 2.4 percent. Light vehicle travel is projected to increase from 33.3 billion miles in 2015 to 35.7 billion miles in 2018, which also represents an average annual growth of 2.4 percent. Total heavy vehicle travel is forecast to increase from 2.8 billion miles in 2015 to 3.0 billion miles in 2018, an average annual growth of about 2.3 percent. These projections are based on, and consistent with, the projections from ODOT's revenue forecast model.

The traffic growth projections for the current study are higher than those for the 1999,

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

Declared Weight in Pounds	2015 VMT (estimate)	2018 VMT (forecast)	Average Annual Growth Rate
1 to 10,000	33,291	35,718	2.4%
10,001 to 26,000	805	869	2.6%
26,001 to 78,000	378	380	0.2%
78,001 to 80,000	1,152	1,264	3.2%
80,001 to 104,000	248	248	0.0%
104,001 to 150,500	264	289	3.0%
150,501 and up	3	3	2.2%
Total for All Vehicles	36,140	38,771	2.4%
Total by Weight Range			
1 to 10,000	33,291	35,718	2.4%
10,000 and up	2,849	3,053	2.3%
1 to 26,000	34,096	36,587	2.4%
26,000 and up	2,044	2,184	2.2%
Percentage of Total by Weight Range			
1 to 10,000	92.1%	92.1%	
10,000 and up	7.9%	7.9%	
1 to 26,000	94.3%	94.4%	
26,000 and up	5.7%	5.6%	

2001, 2003, 2005, 2007, 2009, 2011, and 2015 studies. The 1999 Study projected that total state VMT would grow at an average annual rate of 1.7 percent between 1997 and 2000. The 2001 Study projected 1.3 percent annual growth between 1999 and 2002. The 2003 Study projected 1.1 percent annual growth between 2001 and 2004. The 2005 Study growth projection of 1.6 percent reflected recovery from the economic downturn in Oregon and the nation that limited growth in the early part of the decade. The 2007 Study projected a 1.9 percent annual growth rate between 2005 and 2008, reflecting the upward trend in the economy during that period. The 2009 Study projected a growth rate of 1.1 percent from 2007 to 2010, reflecting the recession of 2008 through 2009, with a particularly high negative growth rate for heavy vehicles over the study period. The 2011 Study projected a growth rate of 1.9 percent from 2009 to 2012, reflecting some of the expected recovery from the recent recession. The 2013 study projected a growth rate of 2.5 percent from 2011 to 2014, reflecting continued recovery from the recession. The 2015 study projected 2.1 percent growth from 2013 to 2016, starting from a revised base, reflecting that the previously-expected recovery didn't happen as soon as expected.

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. Possible explanations include changes in the distribution of ages in the population, differences in preferences for travel modes between age cohorts, changes in commuting patterns, and telecommuting.

Forecasted heavy vehicle travel is expected to grow at about the same rate as light vehicle travel between 2015 and 2018. The share of travel accounted for by light vehicles is not expected to change by much between 2015 and 2018 (forecasts are 92.5 percent in both 2015 and 2018

Exhibit 4-1 also shows that the growth projected for heavy vehicle travel varies by weight group. The fastest growth among the heavy vehicle weight classes, 3.2 percent, is expected to be in the 78,001 to 80,000 pound weight class group.

Exhibit 4-2 shows the distribution of projected 2018 travel between light and heavy vehicles for different combinations of road system and ownership. Although light vehicles are projected to account for 92.1 percent and heavy vehicles 7.9 percent of total statewide VMT, the mix of traffic varies significantly among the different road systems. Heavy vehicles are projected to account for 19.9 percent of the travel on rural interstate highways but only 3.3 percent of the travel on city streets. Heavy vehicles are expected to account for 10.4 percent of the overall travel on state highways and 4.3 percent of the travel on local roads.

Exhibit 4-3 illustrates, in a slightly different manner, how the relative mix of traffic varies by road system. It presents the separate distributions of projected VMT by road system for light vehicles, heavy vehicles, and all vehicles. As shown, 58.6 percent of total travel in the state is expected to be on state highways and 40.7 percent on local roads and streets. These shares, however, differ significantly for light versus heavy vehicles. Rural interstate highways, for example, are projected to handle 10.5 percent of

EXHIBIT 4-2: PROJECTED 2018 VMT BY ROAD SYSTEM (MILLIONS OF MILES)

Road System	Total VMT	Light Vehicles		Heavy Vehicles	
		VMT	Percent of Total	VMT	Percent of Total
State Roads	22,739	20,378	89.6%	2,361	10.4%
Urban Interstate	5,984	5,438	90.9%	546	9.1%
Rural Interstate	4,066	3,258	80.1%	808	19.9%
Urban Other	6,628	6,238	94.1%	391	5.9%
Rural Other	6,060	5,444	89.8%	616	10.2%
Local Roads	15,796	15,118	95.7%	678	4.3%
County Roads	8,424	7,989	94.8%	435	5.2%
City Streets	7,372	7,129	96.7%	243	3.3%
State and Local Roads	38,535	35,496	92.1%	3,039	7.9%
Federal Roads	236	222	93.9%	14	6.1%
Total All Roads	38,771	35,718	92.1%	3,053	7.9%

EXHIBIT 4-3: DISTRIBUTION OF PROJECTED 2018 VMT BY ROAD SYSTEM

Road System	Percent of Total VMT	Percent of VC Total VMT	
		Light Vehicles	Heavy Vehicles
State Roads	58.6%	57.1%	77.3%
Urban Interstate	15.4%	15.2%	17.9%
Rural Interstate	10.5%	9.1%	26.5%
Urban Other	17.1%	17.5%	12.8%
Rural Other	15.6%	15.2%	20.2%
Local Roads	40.7%	42.3%	22.2%
County Roads	21.7%	22.4%	14.2%
City Streets	19.0%	20.0%	7.9%
State and Local Roads	99.4%	99.4%	99.5%
Federal Roads	0.6%	0.6%	0.5%
Total All Roads	100%	100%	100%

total travel in 2018 but 26.5 percent of heavy vehicle travel. At the other extreme, 20.0 percent of light vehicle travel, but only 7.9 percent of heavy vehicle travel, is forecast to be on city streets. State highways are expected to handle about 58.6 percent of total travel by light vehicles and 77.3 percent of travel by heavy vehicles.

Exhibit 4-4 compares the VMT projections by road system used in the 1999 through 2017 studies. It shows a steady decline in the share of VMT that is on on rural road systems and a corresponding increase in the share of VMT on urban roads. The systems projected to account for the largest shares of total statewide travel are Other State Rural highways, County Roads, and 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 particular 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 substantially increased the level and breadth of expenditures allocated in the 2003 Study as compared to previous studies.

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

Road System	1999 Study		2001 Study		2003 Study		2005 Study		2007 Study		2009 Study		2011 Study		2013 Study		2015 Study		2017 Study	
	2000 VMT	% of Total	2002 VMT	% of Total	2004 VMT	% of Total	2006 VMT	% of Total	2008 VMT	% of Total	2010 VMT	% of Total	2012 VMT	% of Total	2014 VMT	% of Total	2016 VMT	% of Total	2018 VMT	% of Total
State Roads	20.4	60.0%	21.7	62.3%	21.0	60.5%	22.1	61.1%	23.6	60.8%	23.7	61.6%	23.4	61.7%	23.8	62.0%	21.3	59.4%	22.7	59.0%
Urban Interstate	4.0	11.8%	3.9	11.4%	3.9	11.2%	4.1	11.3%	5.0	12.9%	5.1	13.2%	5.0	13.2%	5.5	14.4%	4.9	13.6%	6.0	15.5%
Rural Interstate	4.4	12.9%	4.4	12.7%	4.4	12.6%	4.7	13.0%	4.8	12.4%	4.8	12.6%	4.8	12.7%	4.8	12.6%	4.5	12.7%	4.1	10.6%
Urban Other	4.5	13.2%	5.5	15.7%	5.2	15.1%	5.3	14.7%	6.1	15.7%	6.1	15.9%	5.7	15.1%	5.8	15.2%	5.0	14.0%	6.6	17.2%
Rural Other	7.5	22.1%	7.8	22.5%	7.5	21.6%	8.0	22.1%	7.7	19.8%	7.7	19.9%	7.8	20.6%	7.6	19.8%	6.9	19.2%	6.1	15.7%
Local Roads	13.6	40.0%	13.1	37.7%	13.7	39.5%	14.1	38.9%	15.2	39.2%	14.7	38.4%	14.6	38.3%	14.6	38.0%	14.6	40.6%	15.8	41.0%
County Roads	8.6	25.3%	8.0	22.9%	8.9	25.6%	8.0	22.0%	8.3	21.3%	7.4	19.3%	7.0	18.4%	7.0	18.2%	7.3	20.2%	8.4	21.9%
City Streets	5.0	14.7%	5.1	14.8%	4.8	13.9%	6.1	17.0%	6.9	17.9%	7.3	19.0%	7.6	19.9%	7.6	19.7%	7.3	20.4%	7.4	19.1%
Total All Roads	34.0	100.0%	34.8	100.0%	34.7	100.0%	36.2	100.0%	38.8	100.0%	38.4	100.0%	38.0	100.0%	38.3	100.0%	35.8	100.0%	38.5	100.0%

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

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 a number of sources. Data from ODOT's monthly Budget and Cash Flow Forecast were used to develop projected construction expenditures by project for the 2015-17 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 relatively 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 2015 Local Roads and Streets Survey combined with information from ODOT's Agency Request Budget.

Exhibit 4-5 presents the average annual expenditures projected for the 2017-19 biennium by major category (modernization, preservation, maintenance, bridge, and other) and funding source (state, federal, bond, and local). As shown, projected expenditures total $1.5 billion. This compares to annual expenditures allocated in the 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, and 2015 studies of $691 million, $649 million, $1.5 billion, $1.5 billion, $1.7 billion, $1.8 billion, $1.5 billion, $1.4 billion, and $1.4 billion respectively.

Of the $1.5 billion total annual expenditures, $900 million (60.2 percent) are projected to be state funded, $516 million (34.5 percent) federally funded, and $67 million (4.4 percent) locally funded. The remaining $13 million (0.9 percent) of allocated expenditures are the allocated portion of the $97 million per year of expended bond revenue. An additional $217 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

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

Major Expenditure Category	Funds by Source					Percentage of All Funding				Percentage of Source				
	All Sources	State	Federal	Local	Bond	State	Federal	Local	Bond	All Sources	State	Federal	Local	Bond
Modernization	210,792	61,442	133,960	10,050	5,340	29.1%	63.6%	4.8%	2.5%	14.1%	6.8%	25.9%	15.1%	41.1%
Preservation	209,847	67,452	135,741	6,606	48	32.1%	64.7%	3.1%	0.0%	14.0%	7.5%	26.3%	9.9%	0.4%
Maintenance	444,545	354,337	59,629	30,579	0	79.7%	13.4%	6.9%	0.0%	29.7%	39.4%	11.5%	45.9%	0.0%
Bridge	43,572	4,493	37,154	283	1,642	10.3%	85.3%	0.6%	3.8%	2.9%	0.5%	7.2%	0.4%	12.6%
Other	587,531	412,670	149,847	19,060	5,954	70.2%	25.5%	3.2%	1.0%	39.3%	45.8%	29.0%	28.6%	45.9%
All Expenditures	1,496,287	900,393	516,330	66,578	12,985	60.2%	34.5%	4.4%	0.9%	100.0%	100.0%	100.0%	100.0%	100.0%

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 a large number of different 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, in particular, have large federal funds components. About 64 percent of modernization, 65 percent of preservation, and 85 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. About 13 percent of the bond expenditures in the study period will be on state- and locally-owned bridges, a much lower proportion than in studies before 2015. Modernization expenditures make up an additional 41 percent of bond expenditures. An additional 46 percent of bond expenditures fall into the "other" category.

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 $527 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 December 2015 forecast; the same forecast upon which the budgeted expenditures used in this study were based. The forecasts include the approximately 40 percent of State Highway Fund revenues transferred to

EXHIBIT 4-6: REVENUE FORECASTS BY TAX AND FEE TYPE (THOUSANDS OF DOLLARS) AVERAGE ANNUAL AMOUNTS FOR 2017-2019 BIENNIUM

Tax/Fee	Forecast Revenue	Percent of Total
Fuel Tax	559,442	47.2%
Registration Fees	235,753	19.9%
Title Fees	81,241	6.8%
Other Motor Carrier Revenue	7,675	0.6%
Road Use Assessment Fees	2,220	0.2%
Weight-Mile Tax	299,689	25.3%
Total	1,186,021	100.0%

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

local governments for use on local roads and streets, and all state funds used for highways, including matching requirements for federal-aid highway projects.

Average annual state revenues for the 2017-19 biennium are expected to total $1.2 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 $559 million per year (47.2 percent of total revenues) and weight-mile tax revenue is forecast to average $300 million (25.3 percent of total revenues). These two sources account for 72.4 percent of highway user revenues, illustrating that Oregon's system of highway finance is based heavily on taxes and fees directly related to use of the system.

Revenue from registration and title fees is anticipated to average $317 million annually (26.7 percent of total revenues), relatively consistent with recent prior studies, but up sharply from pre-OTIA prior studies as a result of registration fee increases. Other revenue sources bring in smaller amounts of revenue.

Exhibit 4-7 compares the forecasts of average annual total revenues used in the 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, and 2015 studies. The total revenues forecast for the current study are $1.2 billion. The increase between the 2009 and 2011 studies reflects the increases in the fuel tax, weight-mile tax, and registration fees enacted as part of the 2009 Jobs and Transportation Act.

Caution should be used in comparing these forecasts, however, because they were made at different times for different biennia, and they used somewhat 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.

CHAPTER 5: EXPENDITURE ALLOCATION AND REVENUE ATTRIBUTION RESULTS

This chapter presents the expenditure allocation and revenue attribution results of the 2015 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, or those financed by federal, local, and state 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 2017 Study uses the same methodology as the 2005 through 2015 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 62.9 percent and 37.1 percent (respectively) of average annual total expenditures for the 2017-19 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 the majority of preservation expenditures (72.3 percent). That group is responsible for smaller shares of modernization, maintenance, bridge, and other expenditures (25.3 percent, 48.9 percent, 36.4 percent, and 15.4 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.

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 72.6 percent of state, 65.0 percent of federal, 49.3 percent of local, and 55.5 percent of bond expenditures. Heavy vehicles are projected to be responsible for 27.4 percent of state, 35.0 percent of federal, 50.7 percent of local, and 55.6 percent of bond expenditures. Overall,

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

		All Funding Sources						
Declared Weight in Pounds		**Modernization**	**Preservation**	**Maintenance**	**Bridge**	**Other**	**Prior Bonds**	**Total**
1 to 10,000		157,474	58,207	226,963	27,711	497,086	110,774	1,078,215
10,001 to 26,000		7,102	18,679	36,078	3,153	11,171	11,070	87,254
26,001 to 78,000		5,361	15,206	28,815	1,372	13,054	9,741	73,549
78,001 to 80,000		23,978	67,940	86,586	5,701	44,921	41,189	270,315
80,001 to 104,000		6,835	20,103	25,010	1,644	9,436	21,349	84,378
104,001 to 150,500		8,892	26,339	39,374	1,789	11,269	21,467	109,131
150,501 and up		1,150	3,371	1,717	2,202	593	1,510	10,544
Total		210,792	209,847	444,545	43,572	587,531	217,100	1,713,386
Total by Weight Range	1 to 10,000	157,474	58,207	226,963	27,711	497,086	110,774	1,078,215
	10,000 and up	53,319	151,639	217,582	15,861	90,445	106,326	635,171
	1 to 26,000	164,576	76,886	263,041	30,863	508,258	121,845	1,165,469
	26,000 and up	46,217	132,960	181,503	12,708	79,273	95,255	547,917
Percentage of Total by Weight Range	1 to 10,000	74.7%	27.7%	51.1%	63.6%	84.6%	51.0%	62.9%
	10,000 and up	25.3%	72.3%	48.9%	36.4%	15.4%	49.0%	37.1%
	1 to 26,000	78.1%	36.6%	59.2%	70.8%	86.5%	56.1%	68.0%
	26,000 and up	21.9%	63.4%	40.8%	29.2%	13.5%	43.9%	32.0%

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

	All Funding Sources				
Expenditures of Funds	**State Revenues**	**Bond Revenues**	**Federal Revenues**	**Local Revenues**	**All Sources**
State Government	661,056	0	476,104	0	1,137,160
Local Governments	239,338	0	40,226	66,578	346,142
Expenditure of Bond Revenue	0	96,589	0	0	96,589
All Expenditures	900,393	96,589	516,330	66,578	1,579,891
Allocated State Expenditures	661,056	0	476,104	0	1,137,160
Allocated Local Expenditures	239,338	0	40,226	66,578	346,142
Allocated Current Bond	0	12,985	0	0	12,985
Allocated Prior Bond	0	217,100	0	0	217,100
Allocated Expenditures	900,393	230,084	516,330	66,578	1,713,386

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

		Allocation to Vehicles			
Funding Source	**Average Annual Total Expenditures Allocated**	**Under 10,001 Pounds**	**Over 10,000 Pounds**	**Under 26,001 Pounds**	**Over 26,000 Pounds**
State (Highway Fund)	661,056	480,056	180,999	500,422	160,634
		72.6%	27.4%	75.7%	24.3%
Federal	476,104	309,685	166,419	330,498	145,606
		65.0%	35.0%	69.4%	30.6%
Local	346,142	170,487	175,655	204,823	141,320
		49.3%	50.7%	59.2%	40.8%
Bond	12,985	7,213	5,772	7,882	5,103
		55.5%	44.5%	60.7%	39.3%
Current	1,496,287	967,441	528,846	1,043,625	452,662
		64.7%	35.3%	69.7%	30.3%
Prior Bond	217,100	110,774	106,326	121,845	95,255
		51.0%	49.0%	56.1%	43.9%
Total	1,713,386	1,078,215	635,171	1,165,469	547,917
		62.9%	37.1%	68.0%	32.0%

state-funded expenditures are expected to average $661.1 million annually over the 2017-19 biennium. Comparable annual amounts for federal, local, and bond-funded expenditures are $476.1 million, $346.1 million, and $13.0 million, respectively.

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

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 almost always have the effect of reducing the light vehicle responsibility share and increasing the heavy vehicle share.

Conversely, state funds are generally 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 Exhibits 5-8 and 5-9.

Exhibit 5-8 shows that pavement expenditures allocated in the 2017 Study total $415.8

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		16,862	21,571	161,758	2,242	277,623	480,056
10,001 to 26,000		923	2,567	10,547	228	6,101	20,366
26,001 to 78,000		737	1,903	7,427	99	10,205	20,371
78,001 to 80,000		4,025	10,224	39,133	428	35,062	88,872
80,001 to 104,000		1,156	3,006	10,891	144	6,960	22,158
104,001 to 150,500		1,410	3,606	13,052	156	8,047	26,271
150,501 and up		200	762	1,652	180	168	2,962
Total		25,314	43,640	244,460	3,476	344,166	661,056
Total by Weight Range	1 to 10,000	16,862	21,571	161,758	2,242	277,623	480,056
	10,000 and up	8,451	22,068	82,702	1,234	66,543	180,999
	1 to 26,000	17,785	24,139	172,305	2,470	283,724	500,422
	26,000 and up	7,528	19,501	72,155	1,007	60,443	160,634
Percentage of Total by Weight Range	1 to 10,000	66.6%	49.4%	66.2%	64.5%	80.7%	72.6%
	10,000 and up	33.4%	50.6%	33.8%	35.5%	19.3%	27.4%
	1 to 26,000	70.3%	55.3%	70.5%	71.0%	82.4%	75.7%
	26,000 and up	29.7%	44.7%	29.5%	29.0%	17.6%	24.3%

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		96,223	31,169	36,794	23,434	122,064	309,685
10,001 to 26,000		3,635	10,689	1,055	2,649	2,785	20,813
26,001 to 78,000		2,780	8,658	462	1,151	1,576	14,627
78,001 to 80,000		14,991	47,616	2,012	4,971	7,468	77,058
80,001 to 104,000		4,233	14,045	394	1,417	1,855	21,944
104,001 to 150,500		5,189	16,977	428	1,530	2,190	26,315
150,501 and up		837	2,596	8	1,830	391	5,662
Total		127,888	131,750	41,153	36,983	138,331	476,104
Total by Weight Range	1 to 10,000	96,223	31,169	36,794	23,434	122,064	309,685
	10,000 and up	31,664	100,581	4,359	13,548	16,267	166,419
	1 to 26,000	99,859	41,858	37,849	26,083	124,849	330,498
	26,000 and up	28,029	89,892	3,304	10,899	13,481	145,606
Percentage of Total by Weight Range	1 to 10,000	75.2%	23.7%	89.4%	63.4%	88.2%	65.0%
	10,000 and up	24.8%	76.3%	10.6%	36.6%	11.8%	35.0%
	1 to 26,000	78.1%	31.8%	92.0%	70.5%	90.3%	69.4%
	26,000 and up	21.9%	68.2%	8.0%	29.5%	9.7%	30.6%

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		43,349	5,439	28,411	964	92,324	170,487
10,001 to 26,000		2,097	5,421	24,476	173	2,169	34,335
26,001 to 78,000		1,475	4,643	20,926	77	1,194	28,315
78,001 to 80,000		2,923	10,091	45,441	105	1,983	60,544
80,001 to 104,000		842	3,049	13,725	23	509	18,148
104,001 to 150,500		1,562	5,753	25,894	37	897	34,143
150,501 and up		3	13	57	93	3	169
Total		52,251	34,410	158,932	1,471	99,080	346,142
Total by Weight Range	1 to 10,000	43,349	5,439	28,411	964	92,324	170,487
	10,000 and up	8,902	28,970	130,521	507	6,756	175,655
	1 to 26,000	45,446	10,860	52,888	1,137	94,493	204,823
	26,000 and up	6,805	23,550	106,044	334	4,587	141,320
Percentage of Total by Weight Range	1 to 10,000	83.0%	15.8%	17.9%	65.6%	93.2%	49.3%
	10,000 and up	17.0%	84.2%	82.1%	34.4%	6.8%	50.7%
	1 to 26,000	87.0%	31.6%	33.3%	77.3%	95.4%	59.2%
	26,000 and up	13.0%	68.4%	66.7%	22.7%	4.6%	40.8%

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		1,039	28	0	1,071	5,075	7,213	110,774	117,987
10,001 to 26,000		447	3	0	103	116	669	11,070	11,740
26,001 to 78,000		369	2	0	45	79	495	9,741	10,236
78,001 to 80,000		2,039	9	0	197	407	2,653	41,189	43,842
80,001 to 104,000		604	3	0	61	112	779	21,349	22,128
104,001 to 150,500		731	3	0	66	134	934	21,467	22,402
150,501 and up		110	1	0	99	31	241	1,510	1,751
Total		5,340	48	0	1,642	5,954	12,985	217,100	230,084
Total by Weight Range	1 to 10,000	1,039	28	0	1,071	5,075	7,213	110,774	117,987
	10,000 and up	4,301	20	0	572	879	5,772	106,326	112,098
	1 to 26,000	1,486	30	0	1,174	5,191	7,882	121,845	129,726
	26,000 and up	3,854	18	0	469	763	5,103	95,255	100,358
Percentage of Total by Weight Range	1 to 10,000	19.5%	57.9%	0	65.2%	85.2%	55.5%	51.0%	51.3%
	10,000 and up	80.5%	42.1%	0	34.8%	14.8%	44.5%	49.0%	48.7%
	1 to 26,000	27.8%	63.2%	0	71.5%	87.2%	60.7%	56.1%	56.4%
	26,000 and up	72.2%	36.8%	0	28.5%	12.8%	39.3%	43.9%	43.6%

million, 12.5 percent more than in the 2015 study, but 9.2 percent less than the pavement expenditures allocated in the 2013 Study.

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 highly sensitive to the light vehicle pavement factors. Overall, light vehicle pavement expenditure responsibility in the 2011 Study is about 3 percentage points lower when using the 2011 pavement factors than when using the 2009 pavement factors.

Exhibit 5-9 compares the bridge and interchange expenditure amounts and responsibility results in the 2015 and current studies. Bridge-related expenditures were lower as a share of total expenditures in the current study (2.9 percent) than in the five most recent studies (7.4 percent in 2015, 8.1 percent in 2013, 11.4 percent in 2011, 10.1 percent in 2009, and 15.0 percent in 2007). This reflects the winding down of the OTIA investment in bridges. The

EXHIBIT 5-8: COMPARISON OF PAVEMENT RESPONSIBILITY RESULTS FROM 2015 AND 2017 OREGON HCASs (THOUSANDS OF ANNUAL DOLLARS)

	2015 Study			2017 Study		
Expenditure Work Type	**Expenditures Allocated**	**Light Vehicle Responsibility**	**Heavy Vehicle Responsibility**	**Expenditures Allocated**	**Light Vehicle Responsibility**	**Heavy Vehicle Responsibility**
New Pavements	48,984	7,530	41,454	37,084	3,938	33,146
	3.4%	15.4%	84.6%	2.5%	10.6%	89.4%
Pavement and Shoulder Reconstruction	28,823	4,233	24,590	4,106	384	3,722
	2.0%	14.7%	85.3%	0.3%	9.4%	90.6%
Pavement and Shoulder Rehabilitation	64,885	11,114	53,771	141,338	14,780	126,558
	4.5%	17.1%	82.9%	9.4%	10.5%	89.5%
Pavement Maintenance	221,898	54,784	167,114	227,903	29,773	198,131
	15.4%	24.7%	75.3%	15.2%	13.1%	86.9%
Other Pavement Expenditures	5,013	4,957	56	5,416	4,434	983
	0.3%	98.9%	1.1%	0.4%	81.9%	18.1%
Total Pavement Expenditures	369,604	82,618	286,986	415,848	53,308	362,539
	25.7%	22.4%	77.6%	27.8%	12.8%	87.2%

EXHIBIT 5-9: COMPARISON OF BRIDGE AND INTERCHANGE RESPONSIBILITY RESULTS FROM 2015 AND 2017 OREGON HCASs (THOUSANDS OF DOLLARS)

	2015 Study			2017 Study		
Expenditure Work Type	**Expenditures Allocated**	**Light Vehicle Responsibility**	**Heavy Vehicle Responsibility**	**Expenditures Allocated**	**Light Vehicle Responsibility**	**Heavy Vehicle Responsibility**
Bridge and Interchange	86,528	54,743	31,785	42,474	26,727	15,747
	6.0%	63.3%	36.7%	2.8%	62.9%	37.1%
Bridge Maintenance	20,064	17,883	2,181	1,098	984	114
	1.4%	89.1%	10.9%	0.1%	89.6%	10.4%
Total Bridge and Interchange Expenditures	106,592	72,626	33,966	43,572	27,711	15,861
	7.4%	68.1%	31.9%	2.9%	63.6%	36.4%

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	967,441	110,774	1,078,215
10,001 to 26,000	76,184	11,070	87,254
26,001 to 78,000	63,809	9,741	73,549
78,001 to 80,000	229,127	41,189	270,315
80,001 to 104,000	63,029	21,349	84,378
104,001 to 150,500	87,664	21,467	109,131
150,501 and up	9,034	1,510	10,544
Total	1,496,287	217,100	1,713,386

EXHIBIT 5-11: COST RESPONSIBILITY DISTRIBUTIONS BY WEIGHT GROUP: COMPARISON BETWEEN 2015 AND 2017 OREGON HCASs

Declared Weight in Pounds	2015 Study	2017 Study	Change in Percentage
1 to 10,000	63.6%	62.9%	-0.6%
10,001 to 26,000	5.0%	5.1%	0.1%
26,001 to 78,000	3.8%	4.3%	0.5%
78,001 to 80,000	13.6%	15.8%	2.2%
80,001 to 104,000	7.2%	4.9%	-2.3%
104,001 to 150,500	6.1%	6.4%	0.3%
150,501 and up	0.7%	0.6%	-0.1%
Total	100.0%	100.0%	
10,000 and up	36.4%	37.1%	0.6%

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 36.4 percent, compared to 31.9 percent in the 2015 study, 24.7 percent in the 2013 study, 48.1 percent in the 2011 Study, and 51.3 percent in the 2009 Study. The change since 2011 reflects the results of a new bridge cost allocation study completed for the 2013 study.

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 2017-19 biennium. The 2019 Study will include the same allocated expenditures from the 2003, 2005, 2007, 2009, 2011, 2013, and 2015 studies, as well as allocated bond expenditures from the current study.

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 are similar: the all-vehicle responsibility shares in the 2015 Study are 63.6 percent for light vehicles and 36.4 percent for heavy vehicles; the 2017 Study shares are 62.9 percent for light vehicles and 37.1 percent for heavy vehicles.

REVENUE ATTRIBUTION RESULTS

The attribution of revenues to the various vehicle types and weight classes is an important 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, it is forecasted that light vehicles will contribute 64.5 percent of State

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		537,164	227,818	0	0	0	0	764,983
10,001 to 26,000		18,966	41,002	0	0	0	0	59,968
26,001 to 78,000		2,455	7,291	20,388	1,001	43	0	31,177
78,001 to 80,000		381	29,272	191,586	4,774	3,124	0	229,138
80,001 to 104,000		122	5,056	33,868	816	4,421	24	44,306
104,001 to 150,500		354	6,406	45,401	1,071	859	21	54,112
150,501 and up		0	149	0	13	0	2,175	2,337
Total		559,442	316,993	291,243	7,675	8,446	2,220	1,186,021
Total by Weight Range	1 to 10,000	537,164	227,818	0	0	0	0	764,983
	10,000 and up	22,278	89,175	291,243	7,675	8,446	2,220	421,038
	1 to 26,000	556,130	268,820	0	0	0	0	824,951
	26,000 and up	3,312	48,173	291,243	7,675	8,446	2,220	361,070
Percentage of Total by Weight Range	1 to 10,000	96.0%	71.9%	0.0%	0.0%	0.0%	0.0%	64.5%
	10,000 and up	4.0%	28.1%	100.0%	100.0%	100.0%	100.0%	35.5%
	1 to 26,000	99.4%	84.8%	0.0%	0.0%	0.0%	0.0%	69.6%
	26,000 and up	0.6%	15.2%	100.0%	100.0%	100.0%	100.0%	30.4%

Highway Fund revenues and heavy vehicles will contribute 35.5 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 approximately 96 percent of fuel tax revenues and 72.0 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, late payment penalties and interest, etc.

Exhibit 5-13 compares the revenue attribution results of the current study with those of the 2015 Study. The projected share of revenues contributed by light vehicles has increased from 64.1 percent in the 2015 Study to 64.5 percent in the current study. Conversely, the overall heavy vehicle share of projected payments has decreased from 35.9 percent in the previous study to 35.5 percent in the current study.

EXHIBIT 5-13: REVENUE ATTRIBUTION DISTRIBUTIONS BY WEIGHT GROUP: COMPARISON BETWEEN 2015 AND 2017 OREGON HCASs

Declared Weight in Pounds	2015 Study	2017 Study	Change in %
1 to 10,000	64.1%	64.5%	0.4%
10,001 to 26,000	5.0%	5.1%	0.1%
26,001 to 78,000	2.7%	2.6%	-0.1%
78,001 to 80,000	18.5%	19.3%	0.9%
80,001 to 104,000	5.0%	3.7%	-1.3%
104,001 to 150,500	4.5%	4.6%	0.1%
150,501 and up	0.2%	0.2%	0.0%
Total	100.0%	100.0%	
10,000 and up	35.9%	35.5%	-0.4%

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 on the basis of the relative miles of travel of each in that class.[7]

PRESENTATION OF EQUITY RATIOS

Exhibit 6-1 includes calculated equity ratios for the summary-level weight groups shown in earlier exhibits. Exhibit 6-3, at the end of this chapter, shows the equity ratios for each 2,000-pound weight class. It needs to be emphasized that these equity ratios are for full-fee-paying vehicles only, and exclude vehicles that pay on an alternative-fee basis.

As shown in the first table within Exhibit 6-1, projected 2018 vehicle miles traveled (VMT) for full-fee-paying vehicles are 37.9 billion, 92.6 percent of these miles being traveled by light vehicles and 7.4 percent by heavy vehicles. This compares to projected 2018 miles of travel by all vehicles of 38.8 billion, 92.1 percent by light vehicles and 7.9 percent by heavy vehicles. 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 $1.66 billion per year, with responsibility shares of 64.0 percent for light vehicles and 36.0 percent for heavy vehicles. This compares to the projected total responsibility for all vehicles of $1.71 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 $1.17 billion, 64.5 percent from light vehicles and 35.5 percent from heavy vehicles. The difference between this total and the $1.19 billion total for all vehicles represents projected revenues from alternative-fee-paying vehicles.

[7] 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.

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 $22.2 million annually for the next biennium under existing tax rates.[8] In the approach used in studies prior to 2013, this amount would be reassigned to the full-fee-paying vehicle classes based on the relative VMT of each class. 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.[9]

This study finds overall equity ratios of 1.0076 for light vehicles and 0.9865 for heavy vehicles as a group. This means that, for the 2017-19 biennium, under the existing tax structure and rates, light vehicles are expected to overpay their fair share by 0.76 percent and heavy vehicles are expected to underpay by 1.35 percent.

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 9.9 percent. Vehicles with weights between 26,001 and 78,000 pounds as a group underpay their fair share by 23.0 percent and those between 78,001 and 80,000 pounds overpay by 20.7 percent.

Vehicles in the 78,001- to 80,000-pound class alone account for 44.9 percent of the VMT by full-fee-paying heavy vehicles and 60.7 percent of the VMT by full-fee-paying vehicles over 26,000-pounds. These vehicles also account for 45.0 percent of the cost responsibility and 55.0 percent of the user fees paid by full-fee-paying heavy vehicles. The reason for the large difference in the equity ratio between this group and the groups above and below it is that most truckers who are capable of operating 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 26.5 percent less than their fair share. Those in the 104,001 to 105,500 range pay 27.8 percent less 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 68.7 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

The overall light and heavy vehicle equity ratios found by this study are slightly different from those determined by the prior five Oregon studies (see Exhibit 6-2). The equity ratios found by the 1999 Study were 0.97 for light vehicles and 1.05 for heavy vehicles as a group, indicating a projected underpayment of 3 percent by light vehicles and overpayment of 5 percent by heavy vehicles. The analysis period for the 1999 Study was the 1999-2001 biennium. On the basis of these results, the 1999 Legislature enacted an across-the-board 12.3 percent reduction in the weight-mile tax rates.[10] This reduction became effective September 1, 2000.

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

[8]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.

[9]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.

[10]The overall results of the 1999 Study were implemented by a proportionate reduction in all the weight-mile tax rates. The legislature, however, did not implement the detailed recommendations of the 1999 or 2001 studies.

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. As a consequence, 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 2005 Study found adjusted equity ratios of 1.0032 for light vehicles and 0.9936 for heavy vehicles. This indicated near-perfect equity for the 2005-07 biennium analysis period: a 0.32 percent projected overpayment by full-fee paying light vehicles and a 0.64 percent underpayment by full-fee paying heavy vehicles.

The 2007 Study found adjusted equity ratios of 0.9933 for light vehicles and 1.0129 for heavy vehicles. As in the 2005 Study, these equity ratios indicated near-perfect equity for the 2007-09 biennium analysis period.

The 2009 Study found adjusted equity ratios of 0.9915 for light vehicles and 1.0173 for heavy vehicles, and the 2011 Study found adjusted equity ratios of 0.9954 for light vehicles and 1.0089 for heavy vehicles. Again, these equity ratios indicated near-perfect equity for the 2009-11 and 2011-13 biennium analysis periods.

All of the recent prior studies, as well as this current study, have projected an overpayment by vehicles in the 78,001- to 80,000-pound weight class and underpayments by vehicles weighing more than 80,000 pounds.

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	35,718,059,053	35,133,836,928	584,222,125	92.1%	92.6%	69.5%
10,001 to 26,000	868,580,281	726,085,169	142,495,112	2.2%	1.9%	17.0%
26,001 to 78,000	379,884,176	282,237,183	97,646,993	1.0%	0.7%	11.6%
78,001 to 80,000	1,264,090,401	1,256,641,522	7,448,878	3.3%	3.3%	0.9%
80,001 to 104,000	248,415,811	246,158,186	2,257,625	0.6%	0.6%	0.3%
104,001 to 150,500	288,721,113	282,426,079	6,295,034	0.7%	0.7%	0.7%
150,501 and up	3,308,161	3,308,161	0	0.0%	0.0%	0.0%
Total	**38,771,058,996**	**37,930,693,228**	**840,365,767**	**100.0%**	**100.0%**	**100.0%**
10,001 and up	3,052,999,943	2,796,856,301	256,143,642	7.9%	7.4%	30.5%
26,001 to 80,000	1,643,974,577	1,538,878,705	105,095,872	4.2%	4.1%	12.5%
80,001 to 105,500	537,136,924	528,584,265	8,552,658	1.4%	1.4%	1.0%
26,001 to 105,500	2,181,111,501	2,067,462,971	113,648,530	5.6%	5.5%	13.5%
26,001 and up	2,184,419,662	2,070,771,132	113,648,530	5.6%	5.5%	13.5%

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 Cost Responsiblity			
	State	Federal	Local	Full-Fee	State	Federal	Local	Full-Fee
1 to 10,000	598,043,142	309,684,746	170,487,260	1,060,579,330	67.1%	65.0%	49.3%	64.0%
10,001 to 26,000	32,105,277	20,813,156	34,335,481	71,288,085	3.6%	4.4%	9.9%	4.3%
26,001 to 78,000	30,606,570	14,627,484	28,315,329	56,311,838	3.4%	3.1%	8.2%	3.4%
78,001 to 80,000	132,714,002	77,057,846	60,543,596	268,722,562	14.9%	16.2%	17.5%	16.2%
80,001 to 104,000	44,285,737	21,943,858	18,148,306	83,593,873	5.0%	4.6%	5.2%	5.0%
104,001 to 150,500	48,672,360	26,315,252	34,143,496	106,750,070	5.5%	5.5%	9.9%	6.4%
150,501 and up	4,713,039	5,661,593	168,917	10,541,414	0.5%	1.2%	0.0%	0.6%
Total	**891,140,126**	**476,103,935**	**346,142,384**	**1,657,787,173**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
10,001 and up	293,096,984	166,419,189	175,655,125	597,207,843	32.9%	35.0%	50.7%	36.0%
26,001 to 80,000	163,320,572	91,685,330	88,858,924	325,034,400	18.3%	19.3%	25.7%	19.6%
80,001 to 105,500	92,958,097	48,259,110	52,291,802	190,343,943	10.4%	10.1%	15.1%	11.5%
26,001 to 105,500	256,278,669	139,944,440	141,150,726	515,378,343	28.8%	29.4%	40.8%	31.1%
26,001 and up	260,991,707	145,606,033	141,319,643	525,919,757	29.3%	30.6%	40.8%	31.7%

Declared Weight in Pounds	Annual User Fees			Percent of User Fees		
	All	Full-Fee	Alternative-Fee Difference	All	Full-Fee	Alternative-Fee Difference
1 to 10,000	764,982,887	756,191,918	3,783,349	64.50%	64.46%	17.0%
10,001 to 26,000	59,967,771	55,454,476	6,900,176	5.1%	4.7%	31.0%
26,001 to 78,000	31,176,864	30,702,585	7,727,206	2.6%	2.6%	34.7%
78,001 to 80,000	229,137,776	229,429,618	1,651,811	19.3%	19.6%	7.4%
80,001 to 104,000	44,306,201	44,443,999	545,764	3.7%	3.8%	2.5%
104,001 to 150,500	54,111,973	54,528,200	1,631,880	4.6%	4.6%	7.3%
150,501 and up	2,337,067	2,337,058	0	0.2%	0.2%	0.0%
Total	**1,186,020,539**	**1,173,087,853**	**22,240,186**	**100.0%**	**100.0%**	**100.0%**
10,001 and up	421,037,651	416,895,935	18,456,838	35.5%	35.54%	83.0%
26,001 to 80,000	260,314,639	260,132,203	9,379,017	21.9%	22.2%	42.2%
80,001 to 105,500	98,418,175	98,972,198	2,177,644	8.3%	8.4%	9.8%
26,001 to 105,500	358,732,814	359,104,401	11,556,661	30.2%	30.6%	52.0%
26,001 and up	361,069,881	361,441,459	11,556,661	30.4%	30.8%	52.0%

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	Scaled Equity Ratio		Share of Costs	
	All	Full-Fee	All	Full-Fee
1 to 10,000	1.0250	1.0076	62.9%	64.0%
10,001 to 26,000	0.9929	1.0993	5.1%	4.3%
26,001 to 78,000	0.6124	0.7705	4.3%	3.4%
78,001 to 80,000	1.2246	1.2065	15.8%	16.2%
80,001 to 104,000	0.7586	0.7513	4.9%	5.0%
104,001 to 150,500	0.7163	0.7219	6.4%	6.4%
150,501 and up	0.3202	0.3133	0.6%	0.6%
Total	**1.0000**	**1.0000**	**100.0%**	**100.0%**
10,001 and up	0.9576	0.9865	37.1%	36.0%
26,001 to 80,000	1.0936	1.1310	20.1%	19.6%
80,001 to 105,500	0.7347	0.7348	11.3%	11.5%
26,001 to 105,500	0.9644	0.9847	31.4%	31.1%
26,001 and up	0.9520	0.9712	32.0%	31.7%

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

Declared Weight in Pounds	Study Year								
	2001	2003	2005	2007	2009	2011	2013	2015	2017
1 to 10,000	1.0027	0.9921	1.0032	0.9933	0.9915	0.9954	0.9927	0.9974	1.0076
10,001 to 26,000	0.9440	1.3803	1.1846	1.2557	1.1576	1.2439	1.1189	1.0498	1.0993
26,001 to 78,000	0.9596	1.0091	0.7401	0.7485	0.7881	0.8301	0.8885	0.9031	0.7705
78,001 to 80,000	1.0603	1.0931	1.0610	1.1274	1.1234	1.2630	1.2014	1.3423	1.2065
80,001 to 104,000	0.9479	0.7430	0.9034	0.8427	0.8278	0.7114	0.8084	0.6929	0.7513
104,001 to 150,500	0.8712	0.7576	0.8759	0.8299	0.9210	0.6813	0.7444	0.7325	0.7219
150,501 and up	0.4727	0.2678	0.6395	0.6127	0.5932	0.4776	0.3866	0.2406	0.3133
Total	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**
10,001 and up	0.9952	1.0158	0.9936	1.0129	1.0173	1.0089	1.0139	1.0047	0.9865
26,001 to 80,000			1.0189	1.0742	1.0655	1.1903	1.1527	1.2680	1.1310
80,001 to 105,500			0.8880	0.8357	0.8763	0.6945	0.7751	0.7109	0.7348
26,001 to 105,500			0.9812	1.0007	1.0068	0.9934	1.0173	1.0194	0.9847
26,001 and up	0.9996	0.9870	0.9789	0.9984	1.0013	0.9857	1.0023	0.9986	0.9712

EXHIBIT 6-3: DETAILED COMPARISON OF AVERAGE ANNUAL COST RESPONSIBILITY AND USER FEES PAID BY FULL-FEE-PAYING VEHICLES BY DECLARED WEIGHT CLASS[11]

Weight Class	Axles	Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
1	0	35,718,059,053	35,133,836,928	1,078,215,147	1,060,579,330	764,982,887	756,191,918	3,783,349	1.0076
10,001	0	165,152,136	150,678,208	7,826,623	7,140,698	9,330,343	8,865,716	387,000	1.7546
12,001	0	87,603,533	70,732,070	5,109,169	4,125,200	4,904,772	4,367,018	503,895	1.4960
14,001	0	171,697,417	139,116,393	11,492,425	9,311,641	10,338,931	9,115,324	911,200	1.3834
16,001	0	85,758,746	79,115,022	6,995,898	6,453,926	6,215,673	6,029,310	319,951	1.3202
18,001	0	89,411,802	78,124,442	8,660,061	7,566,814	6,815,846	6,505,883	630,002	1.2150
20,001	0	22,191,193	14,776,733	2,829,563	1,884,157	1,442,794	1,260,550	450,257	0.9455
22,001	0	37,226,848	28,349,706	5,611,630	4,273,476	2,942,025	2,745,096	662,643	0.9078
24,001	0	209,538,605	165,192,594	38,728,546	30,532,173	17,977,388	16,565,579	3,035,227	0.7667
26,001	0	33,590,098	7,739,507	4,000,608	921,782	679,882	568,422	1,787,117	0.8714
28,001	0	26,235,862	8,220,587	6,889,534	2,158,725	720,707	621,841	1,263,888	0.4071
30,001	0	40,062,938	24,771,704	6,775,872	4,189,655	1,658,279	1,804,004	1,259,311	0.6085
32,001	0	29,338,025	23,027,749	5,200,848	4,082,205	1,978,782	1,893,848	434,035	0.6556
34,001	0	11,675,449	4,503,722	1,533,879	591,683	479,451	396,112	547,430	0.9461
36,001	0	6,293,210	2,359,584	1,097,799	411,610	230,167	195,215	290,488	0.6702
38,001	0	5,293,955	2,997,420	988,348	559,600	310,582	288,098	198,248	0.7275
40,001	0	4,601,686	2,723,192	663,728	392,782	276,956	271,807	182,346	0.9779
42,001	0	4,368,317	3,288,027	800,696	602,683	383,749	355,713	88,834	0.8341
44,001	0	37,652,150	34,604,888	7,745,469	7,118,613	3,746,777	3,701,541	280,717	0.7348
46,001	0	18,261,086	15,064,458	3,371,277	2,781,130	1,770,890	1,709,316	301,137	0.8686
48,001	0	21,476,412	18,465,713	4,310,595	3,706,308	2,135,650	2,096,655	302,849	0.7994
50,001	0	18,571,627	17,344,734	3,481,987	3,251,957	1,897,247	1,893,717	130,423	0.8229
52,001	0	23,461,979	21,765,596	4,681,977	4,343,454	2,458,890	2,455,673	188,174	0.7990
54,001	0	31,426,053	29,745,080	6,765,086	6,403,223	3,462,669	3,447,065	179,199	0.7608
56,001	0	14,028,597	13,815,240	3,484,430	3,431,436	1,586,030	1,586,140	24,606	0.6532
58,001	0	10,090,962	9,584,391	2,118,797	2,012,432	1,165,519	1,168,666	64,915	0.8207
60,001	0	2,127,511	2,059,047	407,629	394,512	260,575	261,468	9,587	0.9366
62,001	0	2,861,158	2,732,637	771,981	737,304	356,989	357,851	17,692	0.6859
64,001	0	13,722,596	13,396,240	3,575,049	3,490,026	1,792,022	1,794,198	45,886	0.7265
66,001	0	3,188,415	3,117,085	620,079	606,207	442,547	443,447	11,047	1.0338

[11]Weights displayed in the "Weight Class" column represent the initial weight of each 2,000-pound class.

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
68,001	0	6,564,716	6,423,568	1,378,591	1,348,950	958,856	960,888	23,147	1.0066
70,001	0	5,503,372	5,385,939	1,144,667	1,120,242	851,382	854,666	21,919	1.0782
72,001	0	2,726,803	2,645,597	417,000	404,581	441,234	443,539	15,920	1.5493
74,001	0	5,146,195	5,068,779	905,413	891,792	866,760	869,412	15,931	1.3777
76,001	0	1,615,002	1,386,698	418,042	358,946	264,272	263,284	42,359	1.0366
78,001	0	1,264,090,401	1,256,641,522	270,315,444	268,722,562	229,137,776	229,429,618	1,651,811	1.2065
80,001	5	8,247,470	8,160,919	2,690,132	2,661,901	1,392,289	1,397,414	19,946	0.7419
80,001	6	241,611	238,363	72,366	71,393	42,127	42,253	702	0.8364
80,001	7	266,604	262,969	83,964	82,819	44,099	44,237	749	0.7548
80,001	8	2,923	2,883	12,894	12,719	463	465	8	0.0517
80,001	9	1,774	1,749	1,277	1,260	268	269	5	0.3019
82,001	5	7,966,202	7,870,807	2,843,220	2,809,172	1,522,724	1,527,004	22,787	0.7682
82,001	6	1,118,399	1,104,937	324,191	320,288	197,707	198,272	2,980	0.8748
82,001	7	61,568	60,821	13,980	13,811	10,247	10,279	158	1.0518
82,001	8	51,614	50,988	9,807	9,688	8,213	8,239	127	1.2017
82,001	9	2,545	2,514	883	872	386	387	6	0.6277
84,001	5	10,839,197	10,635,981	4,118,714	4,041,495	2,106,688	2,115,515	49,246	0.7397
84,001	6	5,764,907	5,673,752	1,643,798	1,617,807	999,184	1,003,421	20,358	0.8765
84,001	7	333,499	327,600	109,394	107,458	56,720	56,944	1,250	0.7489
84,001	8	110,655	108,358	17,996	17,623	17,866	17,952	467	1.4396
84,001	9	5,548	5,433	1,525	1,493	856	860	23	0.8142
86,001	5	2,276,836	2,257,655	790,840	784,178	398,051	399,534	4,877	0.7200
86,001	6	18,595,466	18,443,044	5,346,502	5,302,678	2,932,727	2,943,850	35,452	0.7845
86,001	7	878,112	865,839	372,105	366,905	147,472	148,074	2,701	0.5703
86,001	8	84,792	83,537	60,362	59,468	14,177	14,229	266	0.3381
86,001	9	8,882	8,750	6,918	6,815	1,415	1,421	27	0.2946
88,001	5	3,794,931	3,738,741	1,161,508	1,144,310	775,259	778,336	14,775	0.9612
88,001	6	33,550,598	33,203,396	8,946,990	8,854,401	5,384,382	5,410,559	82,754	0.8635
88,001	7	915,993	903,796	394,320	389,069	148,867	149,581	2,733	0.5433
88,001	8	154,653	152,356	62,556	61,627	24,640	24,762	495	0.5678

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
88,001	9	8,262	8,126	1,950	1,918	1,320	1,326	28	0.9769
90,001	5	1,813,252	1,807,042	556,303	554,398	395,351	395,693	1,702	1.0086
90,001	6	20,983,292	20,914,657	5,328,978	5,311,548	3,965,623	3,969,468	16,872	1.0561
90,001	7	1,799,142	1,792,980	737,366	734,841	315,454	315,780	1,411	0.6073
90,001	8	46,174	46,016	8,270	8,241	7,733	7,741	35	1.3274
90,001	9	8,582	8,553	1,251	1,246	1,369	1,371	6	1.5540
92,001	5	192,021	187,808	90,828	88,836	40,119	40,412	1,199	0.6429
92,001	6	1,332,235	1,301,631	669,076	653,707	248,972	250,790	7,715	0.5422
92,001	7	1,622,222	1,573,059	643,024	623,537	287,318	289,713	11,449	0.6566
92,001	8	94,825	91,952	9,228	8,948	16,049	16,188	645	2.5564
92,001	9	7,571	7,342	882	855	1,220	1,231	49	2.0338
94,001	5	609,788	598,303	231,960	227,591	136,643	137,413	3,408	0.8532
94,001	6	5,284,130	5,207,446	1,389,625	1,369,458	967,735	973,351	19,950	1.0044
94,001	7	14,266,270	13,974,760	5,566,044	5,452,310	2,566,397	2,582,078	69,542	0.6692
94,001	8	462,214	452,843	200,765	196,694	80,562	81,036	2,151	0.5822
94,001	9	12,202	11,951	6,628	6,491	1,993	2,006	55	0.4367
96,001	5	1,525,551	1,516,485	460,962	458,223	358,855	359,502	2,796	1.1087
96,001	6	4,956,510	4,936,542	1,350,936	1,345,493	889,829	891,579	5,356	0.9364
96,001	7	28,791,225	28,606,711	11,284,427	11,212,109	5,239,228	5,250,319	44,956	0.6618
96,001	8	1,854,171	1,842,116	727,717	722,985	319,578	320,297	2,815	0.6261
96,001	9	99,900	99,375	74,325	73,935	9,299	9,368	118	0.1791
98,001	5	0	0	2,249	0	0	0	0	
98,001	6	593,428	584,364	219,630	216,275	115,514	116,206	2,495	0.7593
98,001	7	5,915,186	5,807,773	2,608,179	2,560,818	1,003,084	1,010,930	26,544	0.5579
98,001	8	281,005	274,104	172,877	168,632	49,511	49,886	1,631	0.4181
98,001	9	9,284	9,056	1,355	1,322	1,553	1,565	52	1.6733
100,001	5	0	0	738	0	0	0	0	
100,001	6	51,359	51,359	7,973	7,973	10,610	10,610	0	1.8806
100,001	7	6,427,438	6,381,713	2,623,167	2,604,506	1,165,791	1,169,075	11,660	0.6343
100,001	8	6,458,988	6,404,554	2,261,697	2,242,636	1,157,870	1,161,293	13,293	0.7318
100,001	9	10,902	10,810	1,345	1,333	1,844	1,850	21	1.9603

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
102,001	5	0	0	982	0	0	0	0	
102,001	6	5,559	5,559	2,246	2,246	1,436	1,436	0	0.9040
102,001	7	5,349,911	5,334,556	2,401,056	2,394,164	1,026,016	1,027,028	3,968	0.6062
102,001	8	42,222,791	42,097,948	15,631,573	15,585,353	7,687,674	7,695,770	30,918	0.6978
102,001	9	45,637	45,502	16,048	16,000	7,822	7,831	32	0.6917
104,001	5	89,515	89,515	36,734	36,734	18,280	18,280	0	0.7032
104,001	6	340,546	340,546	57,580	57,580	48,793	48,793	0	1.1975
104,001	7	98,773,628	96,626,106	36,218,385	35,430,930	19,194,935	19,338,922	573,797	0.7713
104,001	8	186,693,291	182,607,026	71,644,052	70,075,936	34,390,547	34,658,172	1,043,183	0.6989
104,001	9	2,824,133	2,762,886	1,174,357	1,148,889	459,419	464,033	14,901	0.5708
106,001	5	0	0	181	0	6	0	0	
106,001	6	23,536	23,536	58,468	58,468	11,036	11,036	0	0.2667
106,001	7	33,878	33,878	71,071	71,071	10,125	10,125	0	0.2013
106,001	8	2,853	2,853	7,959	7,959	567	567	0	0.1007
106,001	9	959	959	1,715	1,715	162	162	0	0.1334
108,001	5	0	0	0	0	2	0	0	
108,001	6	41,485	41,485	115,016	115,016	20,696	20,696	0	0.2543
108,001	7	92,125	92,125	198,063	198,063	29,377	29,377	0	0.2096
108,001	8	3,179	3,179	10,951	10,951	664	664	0	0.0857
108,001	9	4,858	4,858	24,429	24,429	820	820	0	0.0475
110,001	5	0	0	0	0	0	0	0	
110,001	6	36,128	36,128	101,901	101,901	20,552	20,552	0	0.2850
110,001	7	27,033	27,033	61,750	61,750	9,161	9,161	0	0.2097
110,001	8	2,580	2,580	6,850	6,850	565	565	0	0.1165
110,001	9	1,942	1,942	4,073	4,073	367	367	0	0.1272
112,001	5	0	0	0	0	0	0	0	
112,001	6	49,284	49,284	135,810	135,810	29,022	29,022	0	0.3020
112,001	7	28,901	28,901	66,852	66,852	10,372	10,372	0	0.2193
112,001	8	3,095	3,095	7,271	7,271	739	739	0	0.1437
112,001	9	572	572	1,874	1,874	114	114	0	0.0857

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
114,001	5	0	0	0	0	0	0	0	
114,001	6	40,011	40,011	116,269	116,269	24,362	24,362	0	0.2961
114,001	7	106,098	106,098	251,645	251,645	40,198	40,198	0	0.2257
114,001	8	7,063	7,063	17,679	17,679	1,899	1,899	0	0.1518
114,001	9	3,641	3,641	8,724	8,724	724	724	0	0.1173
116,001	5	0	0	0	0	1	0	0	
116,001	6	13,960	13,960	43,262	43,262	9,198	9,198	0	0.3005
116,001	7	51,894	51,894	126,216	126,216	20,699	20,699	0	0.2318
116,001	8	9,626	9,626	19,831	19,831	2,781	2,781	0	0.1982
116,001	9	1,517	1,517	4,032	4,032	317	317	0	0.1111
118,001	5	0	0	1,869	0	0	0	0	
118,001	6	43,404	43,404	140,962	140,962	30,768	30,768	0	0.3085
118,001	7	161,100	161,100	398,815	398,815	67,481	67,481	0	0.2391
118,001	8	18,970	18,970	42,682	42,682	5,859	5,859	0	0.1940
118,001	9	5,994	5,994	13,009	13,009	1,312	1,312	0	0.1425
120,001	5	0	0	0	0	0	0	0	
120,001	6	23,024	23,024	72,053	72,053	17,242	17,242	0	0.3382
120,001	7	41,515	41,515	108,334	108,334	18,220	18,220	0	0.2377
120,001	8	4,507	4,507	11,888	11,888	1,437	1,437	0	0.1708
120,001	9	1,098	1,098	3,226	3,226	262	262	0	0.1150
122,001	5	0	0	0	0	0	0	0	
122,001	6	6,121	6,121	21,596	21,596	4,890	4,890	0	0.3200
122,001	7	63,318	63,318	164,276	164,276	29,055	29,055	0	0.2499
122,001	8	4,103	4,103	10,415	10,415	1,432	1,432	0	0.1942
122,001	9	894	894	3,794	3,794	240	240	0	0.0896
124,001	5	0	0	0	0	0	0	0	
124,001	6	13,293	13,293	48,450	48,450	11,550	11,550	0	0.3369
124,001	7	128,121	128,121	357,755	357,755	62,636	62,636	0	0.2474
124,001	8	12,767	12,767	31,429	31,429	4,582	4,582	0	0.2060
124,001	9	4,228	4,228	10,945	10,945	1,221	1,221	0	0.1577

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
126,001	5	0	0	0	0	0	0	0	
126,001	6	5,928	5,928	21,610	21,610	5,388	5,388	0	0.3524
126,001	7	89,179	89,179	254,943	254,943	46,273	46,273	0	0.2565
126,001	8	8,844	8,844	23,296	23,296	3,262	3,262	0	0.1979
126,001	9	650	650	3,629	3,629	194	194	0	0.0756
128,001	5	0	0	0	0	0	0	0	
128,001	6	975	975	4,526	4,526	973	973	0	0.3040
128,001	7	129,651	129,651	390,028	390,028	72,459	72,459	0	0.2625
128,001	8	16,534	16,534	44,243	44,243	6,760	6,760	0	0.2159
128,001	9	5,030	5,030	14,001	14,001	1,554	1,554	0	0.1568
130,001	5	0	0	0	0	0	0	0	
130,001	6	251	251	1,330	1,330	268	268	0	0.2852
130,001	7	48,307	48,307	152,076	152,076	28,930	28,930	0	0.2688
130,001	8	8,285	8,285	22,733	22,733	3,636	3,636	0	0.2260
130,001	9	3,118	3,118	7,458	7,458	994	994	0	0.1884
132,001	5	0	0	0	0	0	0	0	
132,001	6	276	276	1,264	1,264	317	317	0	0.3542
132,001	7	80,147	80,147	247,996	247,996	51,204	51,204	0	0.2918
132,001	8	13,581	13,581	37,645	37,645	6,096	6,096	0	0.2289
132,001	9	492	492	3,081	3,081	157	157	0	0.0719
134,001	5	0	0	0	0	0	0	0	
134,001	6	62	62	1,283	1,283	76	76	0	0.0832
134,001	7	114,744	114,744	371,786	371,786	77,897	77,897	0	0.2961
134,001	8	28,893	28,893	79,440	79,440	13,547	13,547	0	0.2410
134,001	9	11,951	11,951	27,476	27,476	4,169	4,169	0	0.2144
136,001	5	0	0	0	0	0	0	0	
136,001	6	0	0	1	0	0	0	0	
136,001	7	33,411	33,411	111,719	111,719	24,019	24,019	0	0.3038
136,001	8	19,481	19,481	54,548	54,548	9,719	9,719	0	0.2518
136,001	9	1,747	1,747	5,706	5,706	627	627	0	0.1553

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
138,001	5	0	0	0	0	0	0	0	
138,001	6	0	0	51	0	0	0	0	
138,001	7	86,518	86,518	291,730	291,730	65,657	65,657	0	0.3181
138,001	8	46,010	46,010	138,582	138,582	23,874	23,874	0	0.2434
138,001	9	9,318	9,318	24,343	24,343	3,437	3,437	0	0.1996
140,001	5	0	0	0	0	0	0	0	
140,001	6	0	0	0	0	0	0	0	
140,001	7	25,286	25,286	90,898	90,898	20,454	20,454	0	0.3180
140,001	8	21,095	21,095	61,299	61,299	12,000	12,000	0	0.2767
140,001	9	1,978	1,978	6,692	6,692	769	769	0	0.1625
142,001	5	0	0	0	0	0	0	0	
142,001	6	0	0	0	0	0	0	0	
142,001	7	31,516	31,516	148,664	148,664	27,384	27,384	0	0.2603
142,001	8	20,244	20,244	60,476	60,476	12,326	12,326	0	0.2880
142,001	9	1,984	1,984	6,063	6,063	831	831	0	0.1937
144,001	5	0	0	0	0	0	0	0	
144,001	6	0	0	0	0	0	0	0	
144,001	7	52,778	52,778	204,801	204,801	47,969	47,969	0	0.3310
144,001	8	39,105	39,105	126,497	126,497	24,983	24,983	0	0.2791
144,001	9	15,038	15,038	37,272	37,272	6,600	6,600	0	0.2502
146,001	5	0	0	0	0	0	0	0	
146,001	6	0	0	0	0	0	0	0	
146,001	7	39,878	39,878	236,898	236,898	39,035	39,035	0	0.2329
146,001	8	22,850	22,850	77,889	77,889	14,827	14,827	0	0.2690
146,001	9	4,396	4,396	13,818	13,818	1,973	1,973	0	0.2018
148,001	5	0	0	0	0	0	0	0	
148,001	6	0	0	0	0	0	0	0	
148,001	7	19,534	19,534	84,098	84,098	20,099	20,099	0	0.3377
148,001	8	43,031	43,031	147,698	147,698	30,504	30,504	0	0.2919
148,001	9	21,888	21,888	56,309	56,309	10,044	10,044	0	0.2521

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
150,001	5	0	0	0	0	0	0	0	
150,001	6	0	0	0	0	0	0	0	
150,001	7	1,437	1,437	6,700	6,700	1,551	1,551	0	0.3271
150,001	8	16,061	16,061	57,577	57,577	11,867	11,867	0	0.2913
150,001	9	5,986	5,986	17,031	17,031	2,926	2,926	0	0.2428
152,001	5	0	0	0	0	0	0	0	
152,001	6	0	0	0	0	0	0	0	
152,001	7	251	251	1,161	1,161	288	288	0	0.3512
152,001	8	16,772	16,772	63,573	63,573	12,896	12,896	0	0.2867
152,001	9	6,098	6,098	16,320	16,320	3,042	3,042	0	0.2634
154,001	5	0	0	0	0	0	0	0	
154,001	6	0	0	0	0	0	0	0	
154,001	7	634	634	854	854	760	760	0	1.2569
154,001	8	40,839	40,839	160,266	160,266	32,626	32,626	0	0.2877
154,001	9	25,771	25,771	73,492	73,492	13,372	13,372	0	0.2571
156,001	5	0	0	0	0	0	0	0	
156,001	6	0	0	0	0	0	0	0	
156,001	7	37	37	271	271	47	47	0	0.2473
156,001	8	36,886	36,886	150,166	150,166	31,680	31,680	0	0.2981
156,001	9	9,614	9,614	26,566	26,566	5,661	5,661	0	0.3012
158,001	5	0	0	0	0	0	0	0	
158,001	6	0	0	0	0	0	0	0	
158,001	7	431	431	2,317	2,317	572	572	0	0.3491
158,001	8	44,937	44,937	195,713	195,713	39,494	39,494	0	0.2852
158,001	9	48,550	48,550	132,479	132,479	29,561	29,561	0	0.3153
160,001	5	0	0	0	0	0	0	0	
160,001	6	0	0	0	0	0	0	0	
160,001	7	0	0	12	0	0	0	0	
160,001	8	17,346	17,346	80,291	80,291	15,939	15,939	0	0.2805
160,001	9	11,862	11,862	32,417	32,417	7,578	7,578	0	0.3304

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
162,001	5	0	0	0	0	0	0	0	
162,001	6	0	0	0	0	0	0	0	
162,001	7	0	0	0	0	0	0	0	
162,001	8	10,838	10,838	54,274	54,274	10,826	10,826	0	0.2819
162,001	9	12,332	12,332	35,459	35,459	8,125	8,125	0	0.3238
164,001	5	0	0	0	0	0	0	0	
164,001	6	0	0	0	0	0	0	0	
164,001	7	154	154	1,107	1,107	232	232	0	0.2964
164,001	8	8,649	8,649	45,167	45,167	8,899	8,899	0	0.2784
164,001	9	47,836	47,836	137,424	137,424	33,910	33,910	0	0.3487
166,001	5	0	0	0	0	0	0	0	
166,001	6	0	0	0	0	0	0	0	
166,001	7	0	0	0	0	0	0	0	
166,001	8	4,266	4,266	6,157	6,157	4,560	4,560	0	1.0466
166,001	9	13,871	13,871	42,745	42,745	10,388	10,388	0	0.3434
168,001	5	0	0	0	0	0	0	0	
168,001	6	0	0	0	0	0	0	0	
168,001	7	12	12	16	16	19	19	0	1.6556
168,001	8	9,750	9,750	53,426	53,426	11,006	11,006	0	0.2911
168,001	9	37,980	37,980	116,650	116,650	29,582	29,582	0	0.3584
170,001	5	0	0	0	0	0	0	0	
170,001	6	0	0	0	0	0	0	0	
170,001	7	0	0	0	0	0	0	0	
170,001	8	660	660	3,894	3,894	772	772	0	0.2802
170,001	9	11,657	11,657	38,659	38,659	9,429	9,429	0	0.3447
172,001	5	0	0	0	0	0	0	0	
172,001	6	0	0	0	0	0	0	0	
172,001	7	0	0	0	0	0	0	0	
172,001	8	74	74	539	539	90	90	0	0.2356
172,001	9	28,613	28,613	88,313	88,313	24,861	24,861	0	0.3978

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
174,001	5	0	0	0	0	0	0	0	
174,001	6	0	0	0	0	0	0	0	
174,001	7	0	0	0	0	0	0	0	
174,001	8	567	567	579	579	743	743	0	1.8114
174,001	9	59,860	59,860	187,062	187,062	53,807	53,807	0	0.4065
176,001	5	0	0	0	0	0	0	0	
176,001	6	0	0	0	0	0	0	0	
176,001	7	0	0	1	0	0	0	0	
176,001	8	0	0	11	0	0	0	0	
176,001	9	11,181	11,181	39,541	39,541	10,386	10,386	0	0.3712
178,001	5	0	0	0	0	0	0	0	
178,001	6	0	0	0	0	0	0	0	
178,001	7	0	0	0	0	0	0	0	
178,001	8	0	0	1	0	0	0	0	
178,001	9	57,406	57,406	198,155	198,155	57,342	57,342	0	0.4089
180,001	5	0	0	0	0	0	0	0	
180,001	6	0	0	0	0	0	0	0	
180,001	7	0	0	0	0	0	0	0	
180,001	8	0	0	0	0	0	0	0	
180,001	9	14,288	14,288	46,771	46,771	14,701	14,701	0	0.4442
182,001	5	0	0	0	0	0	0	0	
182,001	6	0	0	0	0	0	0	0	
182,001	7	0	0	0	0	0	0	0	
182,001	8	0	0	0	0	0	0	0	
182,001	9	18,613	18,613	69,026	69,026	19,895	19,895	0	0.4073
184,001	5	0	0	0	0	0	0	0	
184,001	6	0	0	0	0	0	0	0	
184,001	7	0	0	0	0	0	0	0	
184,001	8	419	419	427	427	674	674	0	2.2320
184,001	9	52,577	52,577	204,539	204,539	59,353	59,353	0	0.4101

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
186,001	5	0	0	0	0	0	0	0	
186,001	6	0	0	0	0	0	0	0	
186,001	7	0	0	0	0	0	0	0	
186,001	8	0	0	0	0	0	0	0	
186,001	9	21,289	21,289	35,164	35,164	24,671	24,671	0	0.9915
188,001	5	0	0	0	0	0	0	0	
188,001	6	0	0	0	0	0	0	0	
188,001	7	0	0	0	0	0	0	0	
188,001	8	0	0	1	0	0	0	0	
188,001	9	50,139	50,139	197,445	197,445	60,611	60,611	0	0.4338
190,001	5	0	0	0	0	0	0	0	
190,001	6	0	0	0	0	0	0	0	
190,001	7	0	0	0	0	0	0	0	
190,001	8	0	0	0	0	0	0	0	
190,001	9	14,791	14,791	63,515	63,515	18,768	18,768	0	0.4176
192,001	5	0	0	0	0	0	0	0	
192,001	6	0	0	0	0	0	0	0	
192,001	7	0	0	0	0	0	0	0	
192,001	8	0	0	0	0	0	0	0	
192,001	9	19,609	19,609	36,919	36,919	25,862	25,862	0	0.9900
194,001	5	0	0	0	0	0	0	0	
194,001	6	0	0	0	0	0	0	0	
194,001	7	0	0	0	0	0	0	0	
194,001	8	0	0	6	0	0	0	0	
194,001	9	35,129	35,129	57,633	57,633	47,736	47,736	0	1.1705
196,001	5	0	0	0	0	0	0	0	
196,001	6	0	0	0	0	0	0	0	
196,001	7	0	0	0	0	0	0	0	
196,001	8	0	0	0	0	0	0	0	
196,001	9	23,927	23,927	93,628	93,628	33,950	33,950	0	0.5124

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		Alternative-Fee Difference	Full-Fee Equity Ratio
		All	Full-Fee	All	Full-Fee Cost	All	Full-Fee		
198,001	5	0	0	0	0	0	0	0	
198,001	6	0	0	0	0	0	0	0	
198,001	7	0	0	0	0	0	0	0	
198,001	8	0	0	0	0	0	0	0	
198,001	9	63,147	63,147	282,258	282,258	92,124	92,124	0	0.4612
200,001	5	0	0	0	0	0	0	0	
200,001	6	0	0	0	0	0	0	0	
200,001	7	0	0	0	0	0	0	0	
200,001	8	0	0	0	0	0	0	0	
200,001	9	152,352	152,352	790,550	790,550	229,880	229,880	0	0.4109
Total		38,771,058,996	37,930,693,228	1,713,386,445	1,657,787,173	1,186,020,539	1,173,087,853	22,240,186	

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CHAPTER 7: RECOMMENDATIONS FOR CHANGES IN TAX RATES

Because light and heavy vehicles pay equitable shares of highway costs in Oregon, there is no constitutional requirement to change user-fee rates for the 2015-17 biennium. This report does not recommend any change that would affect the distribution of revenue burdens between light and heavy vehicles. Should rates be adjusted for other reasons, such as implementing a transportation revenue package, the proportional burdens on light and heavy vehicles should be maintained.

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 less than their fair share
- Vehicles with a declared weight of 78,001 to 80,000 pounds (which account for 60.7 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. 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.

WEIGHT-MILE TAX TABLE A AND TABLE B 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.[12]

Table A rates are specified for each 2,000-pound declared gross weight increment. The existing rates range from 4.98 cents per mile for vehicles declared at 26,001-28,000 pounds to 16.38 cents per mile for vehicles declared at 78,001-80,000 pounds.

To achieve better equity within heavy vehicle classes, Table A rates could be changed to range from 6.000 cents per mile to 14.000 cents per mile, as shown in Exhibit 7-1. These rates are higher than existing rates for lower weights and lower than existing rates for the highest weights and would result in a 12.3 percent reduction in revenue collected from vehicles paying Table A rates. If Table A rates are to be adjusted as recommended here, Table B rates must also be adjusted as described below in order to maintain revenue neutrality.

Table B rates are specified for combinations of 2,000-pound increment and number of axles. The rates are structured so that, at any given declared weight, carriers can qualify for a lower rate by utilizing additional axles. At a declared weight of 98,000 pounds, for example, the

[12]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.

per-mile rate for a five-axle vehicle is 23.04 cents and the rate for a six-axle vehicle is 19.02 cents. Thus, by adding an axle, a carrier can reduce his or her tax liability by more than four cents per mile. Current Table B rates range from 12.96 cents per mile for a nine-axle vehicle declared at 82,000 pounds to 23.04 cents per mile for a five-axle vehicle declared at 98,000 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.

To achieve better equity within the heavy vehicle classes, Table B rates could be adjusted as shown in Exhibit 7-2.

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.

The existing statutory flat fee rate for carriers transporting logs is $7.59 per 100 pounds of declared combined weight. The comparable rates for carriers transporting wood chips and sand and gravel are $30.65 and $7.53, respectively. These are annual rates that are typically paid in monthly installments. The monthly flat fee applicable to a log truck

EXHIBIT 7-1: WEIGHT-MILE TAX TABLE A

Declared Weight	Current WMT Rate	Alternative Rate	Difference	Percent Difference
26,001 to 28,000	0.0498	0.0600	0.0102	20.48%
28,001 to 30,000	0.0528	0.0620	0.0092	17.42%
30,001 to 32,000	0.0552	0.0641	0.0089	16.12%
32,001 to 34,000	0.0576	0.0662	0.0086	14.93%
34,001 to 36,000	0.0599	0.0684	0.0085	14.19%
36,001 to 38,000	0.0630	0.0707	0.0077	12.22%
38,001 to 40,000	0.0654	0.0730	0.0076	11.62%
40,001 to 42,000	0.0677	0.0754	0.0077	11.37%
42,001 to 44,000	0.0702	0.0779	0.0077	10.97%
44,001 to 46,000	0.0726	0.0805	0.0079	10.88%
46,001 to 48,000	0.0749	0.0832	0.0083	11.08%
48,001 to 50,000	0.0774	0.0860	0.0086	11.11%
50,001 to 52,000	0.0803	0.0888	0.0085	10.59%
52,001 to 54,000	0.0833	0.0917	0.0084	10.08%
54,001 to 56,000	0.0864	0.0947	0.0083	9.61%
56,001 to 58,000	0.0900	0.0978	0.0078	8.67%
58,001 to 60,000	0.0941	0.1010	0.0069	7.33%
60,001 to 62,000	0.0990	0.1043	0.0053	5.35%
62,001 to 64,000	0.1045	0.1078	0.0033	3.16%
64,001 to 66,000	0.1104	0.1114	0.0010	0.91%
66,001 to 68,000	0.1183	0.1151	-0.0032	-2.70%
68,001 to 70,000	0.1266	0.1189	-0.0077	-6.08%
70,001 to 72,000	0.1350	0.1228	-0.0122	-9.04%
72,001 to 74,000	0.1427	0.1269	-0.0158	-11.07%
74,001 to 76,000	0.1500	0.1311	-0.0189	-12.60%
76,001 to 78,000	0.1572	0.1354	-0.0218	-13.87%
78,001 to 80,000	0.1638	0.1400	-0.0238	-14.53%

EXHIBIT 7-2: WEIGHT-MILE TAX TABLE B

Declared Weight	Axles	Current Rate	Alternative Rate	Difference	Percent Difference
80,001 to 82,000	5	0.1692	0.2000	0.0308	18.20%
80,001 to 82,000	6	0.1548	0.1700	0.0152	9.82%
80,001 to 82,000	7	0.1447	0.1600	0.0153	10.57%
80,001 to 82,000	8	0.1374	0.1400	0.0026	1.89%
80,001 to 82,000	9	0.1296	0.1300	0.0004	0.31%
82,001 to 84,000	5	0.1747	0.2057	0.0310	17.74%
82,001 to 84,000	6	0.1572	0.1761	0.0189	12.02%
82,001 to 84,000	7	0.1470	0.1661	0.0191	12.99%
82,001 to 84,000	8	0.1392	0.1459	0.0067	4.81%
82,001 to 84,000	9	0.1313	0.1353	0.0040	3.05%
84,001 to 86,000	5	0.1799	0.2115	0.0316	17.57%
84,001 to 86,000	6	0.1609	0.1824	0.0215	13.36%
84,001 to 86,000	7	0.1494	0.1724	0.0230	15.39%
84,001 to 86,000	8	0.1409	0.1521	0.0112	7.95%
84,001 to 86,000	9	0.1332	0.1408	0.0076	5.71%
86,001 to 88,000	5	0.1860	0.2175	0.0315	16.94%
86,001 to 88,000	6	0.1643	0.1890	0.0247	15.03%
86,001 to 88,000	7	0.1518	0.1789	0.0271	17.85%
86,001 to 88,000	8	0.1434	0.1585	0.0151	10.53%
86,001 to 88,000	9	0.1350	0.1465	0.0115	8.52%
88,001 to 90,000	5	0.1932	0.2237	0.0305	15.79%
88,001 to 90,000	6	0.1686	0.1958	0.0272	16.13%
88,001 to 90,000	7	0.1543	0.1857	0.0314	20.35%
88,001 to 90,000	8	0.1458	0.1652	0.0194	13.31%
88,001 to 90,000	9	0.1374	0.1525	0.0151	10.99%
90,001 to 92,000	5	0.2016	0.2301	0.0285	14.14%
90,001 to 92,000	6	0.1734	0.2029	0.0295	17.01%
90,001 to 92,000	7	0.1565	0.1927	0.0362	23.13%
90,001 to 92,000	8	0.1482	0.1722	0.0240	16.19%
90,001 to 92,000	9	0.1398	0.1587	0.0189	13.52%
92,001 to 94,000	5	0.2107	0.2366	0.0259	12.29%
92,001 to 94,000	6	0.1782	0.2102	0.0320	17.96%
92,001 to 94,000	7	0.1590	0.2000	0.0410	25.79%

EXHIBIT 7-2 (CONTINUED): WEIGHT-MILE TAX TABLE B

Declared Weight	Axles	Current Rate	Alternative Rate	Difference	Percent Difference
92,001 to 94,000	8	0.1505	0.1795	0.0290	19.27%
92,001 to 94,000	9	0.1417	0.1652	0.0235	16.58%
94,001 to 96,000	5	0.2202	0.2433	0.0231	10.49%
94,001 to 96,000	6	0.1836	0.2178	0.0342	18.63%
94,001 to 96,000	7	0.1620	0.2076	0.0456	28.15%
94,001 to 96,000	8	0.1530	0.1871	0.0341	22.29%
94,001 to 96,000	9	0.1439	0.1719	0.0280	19.46%
96,001 to 98,000	5	0.2304	0.2502	0.0198	8.59%
96,001 to 98,000	6	0.1902	0.2256	0.0354	18.61%
96,001 to 98,000	7	0.1656	0.2155	0.0499	30.13%
96,001 to 98,000	8	0.1555	0.1950	0.0395	25.40%
96,001 to 98,000	9	0.1464	0.1789	0.0325	22.20%
98,001 to 100,000	6	0.1973	0.2337	0.0364	18.45%
98,001 to 100,000	7	0.1692	0.2237	0.0545	32.21%
98,001 to 100,000	8	0.1584	0.2032	0.0448	28.28%
98,001 to 100,000	9	0.1488	0.1862	0.0374	25.13%
100,001 to 102,000	7	0.1728	0.2322	0.0594	34.38%
100,001 to 102,000	8	0.1620	0.2118	0.0498	30.74%
100,001 to 102,000	9	0.1513	0.1938	0.0425	28.09%
102,001 to 104,000	7	0.1764	0.2410	0.0646	36.62%
102,001 to 104,000	8	0.1656	0.2207	0.0551	33.27%
102,001 to 104,000	9	0.1543	0.2017	0.0474	30.72%
104,0001 to 106,000	7	0.1811	0.2500	0.0689	38.05%
104,0001 to 106,000	8	0.1692	0.2300	0.0608	35.93%
104,0001 to 106,000	9	0.1572	0.2100	0.0528	33.59%

declared at 80,000 pounds, for example, is $506 ($7.59 x 800 = $6,072/12 months = $506). 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 presented to each regular legislative session. This review is accomplished through the biennial flat fee studies, the latest of which was completed in September 2016 and entitled *Testing for Revenue Neutrality of Flat Fee Firms in Oregon (2015)*. That study compared flat fee revenues in 2015 to what those vehicles would have paid in weight-mile tax in 2015. Both the flat fee rates and weight-mile rates were increased as of October 1, 2010 as a result of the 2009 Jobs and Transportation Act. Previously, both flat fee rates and weight-mile rates were increased as a result of the OTIA III legislation on January 1, 2004. The 2015 flat fee study found that no wood chip haulers reported on a flat fee basis in 2015, while flat fee log haulers paid more and sand and gravel haulers paid less than they would have on a mileage basis.

When paying the weight-mile tax, log haulers are allowed to 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.

Based on the results of *Testing for Revenue Neutrality of Flat Fee Firms in Oregon (2015)*, ODOT recommends new flat-fee rates of $7.03 for logs, down from the current rate of $7.59, and $8.69 for sand and gravel, up from the current rate of $7.53. There is no basis for changing the $30.65 rate for wood chips, as no wood chip haulers paid flat fees in 2015.

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 back haul portion of these trips is subject to the weight-mile tax and taxed at the vehicle's regular declared weight.

The existing statutory road use assessment fee rate is 7.1 cents per equivalent single-axle load (ESAL) mile of travel. The fees carriers actually 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 reflects the fact that spreading any given total load over additional axles reduces the amount of pavement damage imposed by that load.

The equity ratio results presented in Chapter 6 suggest that the weight classes above 105,500 pounds are significantly underpaying their responsibility. To increase equity within heavy vehicles, the road use assessment fee rates could be increased to 22.7 cents per ESAL-mile. Doing so would increase revenues from the fee by about 3.2 times.