

CLACKAMAS COUNTY BOARD OF COUNTY COMMISSIONERS

Policy Session Worksheet

Presentation Date: 11/05/19 **Approx Start Time:** 3:00 pm **Approx Length:** 30 min

Presentation Title: Tiered Residential Transportation System Development Charge (TSDC) Program Proposal

Department: Transportation & Development

Presenters: Dan Johnson, Director, DTD; Diedre Landon, Administrative Services Manager, DTD

Other Invitees: Ellen Rogalin, Community Relations Specialist, DTD/PGA

WHAT ACTION ARE YOU REQUESTING FROM THE BOARD?

Review decisions made by the Tiered Residential TSDC work group, and the resulting Tiered Residential Transportation System Development Charge (TSDC) Program proposal, to determine whether staff should initiate a methodology update to implement a tiered residential TSDC rate in the unincorporated areas of Clackamas County.

EXECUTIVE SUMMARY:

In January 2018, the County adopted a new Transportation System Development Charge (TSDC) plan. At that time, many regional discussions were focused on tiered residential SDC rates, and the Board of County Commissioners was interested in the concept.

The original work group did not have the necessary data to decide whether actual behaviors and travel data would support a tiered residential rate. So when the new TSDC plan was adopted in 2018, the county continued having one rate per detached single-family home dwelling unit, regardless of the size of the home. However, staff was asked to revisit the concept of a tiered residential rate, and to determine whether there is a link between home size and number of transportation trips in Clackamas County.

In November 2018, after hiring a consultant to help analyze the data, the County brought together a group of stakeholders to consider a tiered residential TSDC rate. The group was made up of representatives from the development community, a member of the Home Builders Association (HBA), a county resident interested in developing an Accessory Dwelling Unit (ADU) on their land and County staff.

Staff met with the work group three times between October 2018 and July 2019 to review the analysis and refine the recommended program (see Attachment 1).

- The data supports a tiered residential TSDC rate structure for detached single-family homes, and the work group recommends a three-tier rate structure for these units (see Attachment 2).
- There is little data available for smaller homes, such as accessory dwelling units. However, the work group considered the smaller home size and the data for the

detached single family homes, and recommends a two-tiered rate structure for accessory dwelling units (see Attachment 3).

- The group discussed concerns with implementing the new program, like the implication of additions to single-family homes and recommends that the County exempt additions or detached units that are 199 square feet or smaller
- After extensive deliberation, the work group recommends that the County continue assessing TSDCs for multifamily residential units, without consideration of the size of the unit. This is based on the fact that the County ordinance has a number of potential discounts available to multifamily development projects.

The final step in the analysis was to explore whether the recommended TSDCs would be revenue neutral with respect to the current TSDC structure. Based on the distribution of permits since 2010, the 3-tier approach is not expected to generate revenue that is materially different than the current rate. We would expect to collect about 98% of the current TSDC assessments (see Attachment 4).

If the Board would like to move forward with adoption of a tiered residential TSDC rate, this would be done through a modification of the existing TSDC methodology to reflect this change to the rate structure. It would require two public hearings and a published notice of the change.

FINANCIAL IMPLICATIONS (current year and ongoing):

Is this item in your current budget? YES NO

What is the cost? 98% of historical TSDC collections, if tiered rates are implemented.

What is the funding source? Countywide TSDCs; Fund 223

STRATEGIC PLAN ALIGNMENT:

- How does this item align with your Department's Strategic Business Plan goals?

This supports the department's mission to *provide transportation maintenance and construction, land use planning, permitting ... to residents, property owners, businesses and the traveling public so they and future generations can experience and invest in a safe, well-designed and livable community.*

- How does this item align with the County's Performance Clackamas goals?

This supports the following County goals:

- *Grow a vibrant economy*
- *Build a strong infrastructure*
- *Build public trust through good government*

LEGAL/POLICY REQUIREMENTS:

TSDCs have been used in Oregon since the mid-1970s; state legislation on SDCs was adopted in 1989. Additions and modifications to the Oregon Systems Development Act (ORS 237.297 - 314) were made in 1993, 1999, 2001 and 2003.

PUBLIC/GOVERNMENTAL PARTICIPATION:

Stakeholder involvement is critical to the success of the TSDC update process. In November 2018, after hiring a consultant to help facilitate the data review, the County brought together a work group of stakeholders to consider a tiered residential TSDC rate. The group was made up of representatives from the development community, a member of the Home Builders Association (HBA), a county resident interested in developing an Accessory Dwelling Unit (ADU) on their land, and County staff.

OPTIONS:

Option A. Concur with the work group recommendations and direct staff to proceed with adoption of the tiered residential TSDC rates.

Option B. Amend the work group recommendations and direct staff to develop an alternative to the current draft tiered residential TSDC rate program prior to adopting a local program.

Option C. Do not pursue a tiered residential TSDC rate and direct staff to retain the current rate structure.

RECOMMENDATION:

Staff respectfully recommends that the Board of Commissioners approve Option A: concurring with the work group recommendations, and direct staff to proceed with adoption of a tiered residential TSDC rates.

ATTACHMENTS:

1. Tiered Residential Transportation System Development Charge (TSDC) Program: Workgroup Decision Overview
2. Detached Single-Family Homes: Tiered Transportation System Development Charge (TSDC) Rates - Proposed
3. Accessory Dwelling Units: Tiered Transportation System Development Charge (TSDC) Rates - Proposed
4. Clackamas County Residential TSDC Analysis

SUBMITTED BY:

Division Director/Head Approval _____

Department Director/Head Approval _____

County Administrator Approval _____

*For information on this issue or copies of attachments, please contact
Diedre Landon, DTD Administrative Services Manager @ 503-742-4411.*

Tiered Residential Transportation System Development Charge (TSDC) Program Workgroup Decision Overview



In November 2018, after hiring a consultant to help facilitate the data review, the County brought together a work group of stakeholders to consider a tiered residential TSDC rate. The group was made up of representatives from the development community, a member of the Home Builders Association (HBA), a county resident interested in developing an Accessory Dwelling Unit (ADU) on their land, and County staff.

The group was tasked with:

- Considering the advantages and limitations of each archived data source that can be used to link trips rates to dwelling size;
- Identifying which residential units would be considered (single family residential (SFR), multifamily, and accessory dwelling units), based on existing assessment policies and selected data sources;
- Identifying the number and scale of dwelling size tiers that best represents a fluctuation in impact, based on the data analysis;
- Looking at the data sources to define the dwelling size measurement (e.g., bedrooms, square footage, living area);
- Process for application of tiers and potential issues or considerations
- Policies related to dwelling additions and conversions

The group met three times between October 2018 and July 2019 to review data and make decisions to review the analysis and refine the recommended program.

STEP 1	DISCUSSION	
<p>Link Trip Rates to Dwelling Size.</p>	<p>The number of trips generated from new development provide the basis of evaluating transportation impacts. The industry standard is to use the ITE Trip Generation Handbook & Trip Generation Manual, which does not consider the urban or social context of the sites. Rates are charged ‘per dwelling unit’.</p> <p>When considering a tiered residential rate, we would need to consider the number of people living in the dwelling or their characteristics. It can be challenging to develop rates that are sensitive to the number of people, so dwelling size (square footage or number of bedrooms) is often used as a proxy for number of people.</p>	
<p>OPTIONS:</p> <ol style="list-style-type: none"> 1) Collect new data from single-family dwellings that include information about number of people or dwelling size; or 2) Use a combination of archived data sources to estimate trips/dwelling unit size. 	<p>DECISION:</p> <p>Use a combination of archived data sources to estimate trips/dwelling unit size:</p> <ol style="list-style-type: none"> 1) Use household travel survey data to establish trip rates per household <ul style="list-style-type: none"> • Vehicle trips and/or person trips to/from residence • By household size (# people) 2) Link trips/person to persons/dwelling unit size <ul style="list-style-type: none"> • 2a. American Housing Survey: provides information on number of people per housing unit and size of dwelling unit (number of bedrooms, square footage) • 2b. Regional Land Information System (RLIS): Portland Metro regional tax lot information and assessor's data (square footage of dwelling and lot), street address 	

STEP 2	DISCUSSION	
<p>Select the household travel survey data to establish trip rates per household.</p>	<p>There are two surveys that can be used to link trips with the number of people, the National Household Travel Survey (NHTS: 2017) and the Oregon Household Activity Survey (OHAS: 2011-12).</p> <ul style="list-style-type: none"> • NHTS is a National sample (~26,000 households) and the OHAS is specific to the Portland Metro region (~4400 households) • NHTS has limited location information and the OHAS has detailed spatial information • NHTS does not differentiate between Single Family and Multi-Family dwellings, but the OHAS includes that variable 	
<p>OPTIONS:</p> <ol style="list-style-type: none"> 1) Use the National Household Travel Survey (NHTS) to establish trip rates per household; or 2) Use the Oregon Household Activity Survey (OHAS) to establish trip rates. 	<p>DECISION:</p> <p>Use the Oregon Household Activity Survey (OHAS) to establish trip rates.</p> <ul style="list-style-type: none"> • Large, local trip and housing sample of data • Household information (socio economics, vehicle ownership, etc) • Does not include trip records of visitors, services, other people coming/going from home • Local trip data with location • Can distinguish between SF and MF housing 	

The workgroup preferred local data that represented the travel behavior of Clackamas County residents. So, they chose to move forward with the OHAS data, which were limited to SFR observations located in Clackamas County or elsewhere within the Portland metropolitan area in areas with similar densities and dwelling sizes to those in Clackamas County.

From the OHAS information, the Consultant Team calculated the home-based vehicle trip rates for a 24-hr period (Monday through Thursday only) by household size (i.e., number of people).

STEP 3	DISCUSSION	
<p>Select the data source that will establish the average number of people in a particular size dwelling unit.</p>	<p>There are two surveys that can be used to identify the average number of people that typically live in a particular size dwelling unit, the American Housing Survey (AHS) and the Regional Land Information System (RLIS).</p> <ul style="list-style-type: none"> • AHS is a National sample (~85,000 housing units) and RLIS is specific to the Portland Metro regional tax lot information and assessor's data • AHS has the number of people per housing unit, but RLIS does not provide the number of people per unit • AHS provides the size of the dwelling unit (both number of bedrooms and square footage) and RLIS provides the square footage of the dwelling and the lot • RLIS also provides the street address, so it could be spatially paired with household survey data 	
<p>OPTIONS:</p> <ol style="list-style-type: none"> 1) Use the American Housing Survey (AHS) to establish # of people per dwelling unit; or 2) Use Regional Land Information System (RLIS) to establish # people/unit. 	<p>DECISION:</p> <p>Use Regional Land Information System (RLIS) to establish the number of people per dwelling unit.</p> <ul style="list-style-type: none"> • Portland Metro regional tax lot information and assessor's data • Includes information for square footage of dwelling and lot • No information on the number of bedrooms • Limited ability to repeat the analysis for multifamily housing • Provides a direct link from trip making to dwelling size with street address 	

The OHAS data from Step 2 was spatially linked to the RLIS tax lot data, which provides information about dwelling square footage. From this analysis, the household vehicle-trip rates by dwelling size were calculated.

Finally, data on County SFR building permits since 2010 were used to determine the historical distribution of new SFR dwellings by size (based on square footage of living space, excluding garage and deck space).

STEP 4	DISCUSSION
<p>Review policies for program administration and provide recommendations for applying a tiered rate.</p>	<p>Once a rate structure for single family residential (SFR) homes was identified, the workgroup had to formalize decisions regarding the assessment policy:</p> <ul style="list-style-type: none"> • Would the policy apply to multi-family, single family detached and/or accessory dwelling units? • Number and scale of dwelling size tiers? • Definition of dwelling size (e.g., bedrooms, square footage, living area)? • Identify a process for application of tiers and potential issues or considerations. • Clarify policies related to dwelling additions and conversions.
<p>DECISIONS:</p> <p>Detached Single Family housing:</p> <ul style="list-style-type: none"> • The group recommended an adjustment to the TSDC fee schedule for single-family detached dwellings, with three possible assessments based on the living area (square footage) of the unit. Thresholds for each category were based on: <ul style="list-style-type: none"> 1) The historical distribution of dwellings by size (from the permit data), 2) Degree to which average trip rates were statistically different within various square footage groupings with adequate sample sizes; and 3) Whether the adjusted schedule would be revenue neutral when compared to the current TSDC structure. • The group provided a recommendation for a policy that would reduce the rate for Accessory Dwelling Units, which resulted in a tiered rate with two possible assessments based on the square footage of the unit. • The group recommended that the County exempt up to 199 sq. ft. additions or detached units 199 sq. ft. or smaller. <p>Multi-Family housing:</p> <ul style="list-style-type: none"> • After extensive deliberation, the stakeholder group recommended that the County continue the current practice of assessing TSDCs for multifamily residential based on the type of unit only (without consideration of the size of the unit). The County’s existing ordinance has a number of potential discounts that are available to multifamily development projects. 	



DETACHED SINGLE-FAMILY HOMES

TIERED TRANSPORTATION SYSTEM DEVELOPMENT CHARGE
(TSDC) RATES
- PROPOSED -

DETACHED SINGLE-FAMILY HOMES

[CURRENT = \$4,590]

PROPOSED:



< 1,700 Sq. Ft.
87.5%

\$4,015



1,700 – 2,999 Sq. Ft.
99.8%

\$4,579



≥ 3,000 Sq. Ft.
105.4%

\$4,840

- Clackamas County adopted a new TSDC methodology in January 2018.
- Staff committed to performing an analysis to see if there is a link between home size and number of transportation trips in unincorporated Clackamas County.
- The study showed that there is a link, so we are proposing a tiered residential rate that reflects this data.
- Based on permit history, with this proposal the County will collect 98% of the anticipated revenue from the original rates.

EXEMPTIONS

[NO TSDC CHARGED]

ADDITIONS & DETACHED
UNITS
≤ 199 SQ. FT.
\$0



ACCESSORY DWELLING UNITS

TIERED TRANSPORTATION SYSTEM DEVELOPMENT CHARGE
(TSDC) RATES
- PROPOSED -

ACCESSORY DWELLING UNITS

[CURRENT = \$3,207]

PROPOSED:



200 – 450 Sq. Ft.

30.5%

\$1,401



450 – 900 Sq. Ft.

60%

\$2,802

- There is little data available for smaller homes, like Accessory Dwelling Units (ADUs).
- The work group recommended lowering the rate for the ADUs given the lack of local data, and the results of the single-family analysis showing reduced trips based on size.
 - Historically, the County has charged the multi-family rate.
 - Consideration was given to zoning restrictions on the allowable size of ADUs, and a decision was made to tier the condo rate for smaller units.

EXEMPTIONS

[NO TSDC CHARGED]

ADDITIONS & DETACHED UNITS

≤ 199 Sq. Ft.

\$0



FINAL MEMORANDUM

PREPARED FOR: Diedre Landon, Administrative Services Manager, Clackamas County

PREPARED BY: Kristina Currans, Clifton-Currans, LLC
 Deb Galardi, Galardi Rothstein Group

SUBJECT: Clackamas County Residential TSDC Analysis

DATE: September 16, 2019

Introduction

Clackamas County (the County) adopted a transportation system development charge (TSDC) methodology in 2018 that includes TSDCs for different categories of residential development (e.g., single family residential and multifamily). Under the current methodology, each unit within a defined category pays the same TSDC regardless of size of dwelling unit. In the fall of 2018, the County authorized Galardi Rothstein Group, in association with Clifton-Currans LLC (collectively the Consultant Team), to work with a group of stakeholders to evaluate the merits of scaling the TSDC based on the size of the dwelling unit. This memorandum summarizes the recommendations of the stakeholders and describes the supporting analysis used to develop the final recommended TSDCs for single-family dwellings.

Over the course of the study, the Consultant Team developed a number of options for consideration by the stakeholder group. These options differed in terms of data used, basis for rate differential (number of bedrooms or square footage of dwelling), development type (single family or multifamily, and number of rate tiers. The preliminary options and analyses are provided in the Appendix of this memorandum.

Stakeholder Involvement

A working group made up of representatives from the development community, a member of the Home Builders Association (HBA), a county resident interested in developing an Accessory Dwelling Unit (ADU) on their land, and County staff was convened to provide input to help shape the review. Members of the group met three times between October 2018 and July 2019. Members reviewed and provided input on the following topics:

- Data sources for trip rate adjustments
- Rate structure for single family residential (SFR), multifamily, and accessory dwelling units
- Number and scale of dwelling size tiers
- Definition of dwelling size (e.g., bedrooms, square footage, living area)
- Process for application of tiers and potential issues or considerations

- Policies related to dwelling additions and conversions

The recommendations outlined in this memorandum reflect the consensus of the working group on these issues.

Summary of Recommendations

Single Family Homes

Table 1 shows the potential relative adjustments to the TSDC fee schedule for single-family dwellings (currently \$4,590 / dwelling unit). Adjustments are shown as a percentage of the current TSDC for single-family dwellings and as a dollar amount. Key results include:

- No change to the TSDC rate for homes between 1,700-2,999 square feet (sq. ft.).
- Decrease in TSDC for homes smaller than 1,700 sq. ft. (up to 1,699).
- Increase in TSDC for homes 3,000 sq. ft. or larger.

Table 1 Comparison of Current and Recommended Single Family Residential TSDC Fee Schedule and Trip Rates

Item	Current	Recommended		
	All Units	<1,700	1,700-2,999	≥3,000
Avg. (Weighted) Vehicle Trip Rate ¹	4.23	3.70	4.22	4.46
Relative Adjustment ²	100%	87.5%	99.8%	105.4%
Proposed (Adjusted) TSDC Rate ³	\$4,590	\$4,015	\$4,579	\$4,840

¹ Source: 2011 OHAS & RLIS

² Source: Computed from analysis of OHAS & RLIS and Regional Average Trip Rate of 4.23 trips (see FIGURE 2 for interpolation)

³ Source: Current TSDC Rate (\$4,590) multiplied by the relative adjustment percentage

Additions, Conversions & Detached Units

In the event that the County moves forward with implementation of SFR TSDC structure based on the size of the unit, the following additional recommendation is provided to balance administrative burdens and equity:

- Exempt up to 199 sq. ft. additions or detached units 199 sq. ft. or smaller.

Accessory Dwelling Units (ADUs)

Historically the County has charged the multi-family rate (currently \$3,207 or about 70% of the SFR rate) for accessory dwelling units (ADUs). While local travel data allowed for transportation impact analysis for SFR dwellings, few observations exist in existing travel model data for smaller homes comparable to ADUs. Specifically, less than 50 travel observations were observed for dwellings less than 800 square feet, and only one observation was collected for SFR housing less than 500 square feet. Given the lack of local data specifically for ADUs, the working group provided the following recommendation:

- Apply the lower Condo/Townhome rate of \$2,802 (61% of the standard SFR rate) for ADUs ranging in size from 900-450 sq. ft.
- Apply ½ of this rate (\$1,401) for an ADU between 450-200 sq. ft.

Multifamily Dwelling Units

After extensive deliberation, the stakeholder group recommended that the County continue the current practice of assessing TSDCs for multifamily residential based on the type of unit only (without consideration of the size of the unit). The County's existing TSDC methodology has a number of potential discounts that are available to multifamily development projects, if they meet requirements for transit access or development density.

In addition to the Mixed-Use Development and Station Area reductions, the existing ordinance provides a mechanism for developers to submit trip data from similar facilities in the region to demonstrate reduced trips from a proposed development type. Because the available transportation network and the design of the facilities can vary greatly, the County has had workforce housing facilities take advantage of this provision to reduce the TSDC assessment on a particular development.

Single-Family Residential Supporting Analysis

The supporting analysis for the recommended SFR TSDC structure links household-generated travel to dwelling size. Current methods used to calculate the TSDC fee schedule in Clackamas County rely on daily vehicle trip rates from the Institute of Transportation Engineers (ITE) *Trip Generation* manual. However, there is no way to relate ITE data to variations in household size (people) or dwelling size (square footage). Thus, for this analysis we relied on household travel survey data from Oregon to estimate vehicle trip generation rates and provide information on dwelling size. Unlike the rates from ITE, the trip generation information from household survey data include travel generated from household members only and exclude trips made by visitors, including friends, deliveries, and service workers. Because of this difference between trip generation data sources, the rates calculated from household travel surveys are used to create *relative* adjustments to the current fee schedule.

Data Sources

The SFR analysis used three local data sources:

- (1) 2011-2012 Oregon Household Activity Survey (OHAS);
- (2) 2012 tax lot data from the Regional Land Information System (RLIS) for Clackamas County; and
- (3) 2010-2019 single-family development permits data for Clackamas County (ACCELA program).

The OHAS data were limited to SFR observations located in Clackamas County or elsewhere within the Portland metropolitan area in areas with similar densities and dwelling sizes to those in Clackamas County (Observations (N)=2750)¹.

From the OHAS information, the Consultant Team calculated the home-based vehicle trip rates for a 24-hr period (Monday through Thursday only) by household size (i.e., number of people). These data were then spatially linked to the RLIS tax lot data, which provides information about dwelling square footage. From this analysis, the household vehicle-trip rates by dwelling size were calculated.

Finally, data on County SFR building permits since 2010 were used to determine the historical distribution of new SFR dwellings by size (based on square footage of living space, excluding garage and deck space).

¹ Clackamas County (N= 552) and the rest of Portland Metro region with similar activity density ranges and dwelling unit sizes as those in Clackamas County (N=2198).

Summary of Analysis

The working group recommended that any adjustments to the existing TSDC schedule be categorical (i.e., limited to 3 or 4 categories) in order to balance administrative burden and equity of the charges. In recommending the specific thresholds for each category, the working group considered: 1) the historical distribution of dwellings by size (from the permit data), 2) the degree to which average trip rates were statistically different within various square footage groupings with adequate sample sizes; and 3) whether the adjusted schedule would be revenue neutral when compared to the current TSDC structure.

The recommended SQFT categories, and the historical percentage of permits issued within each category are shown in Figure 1.

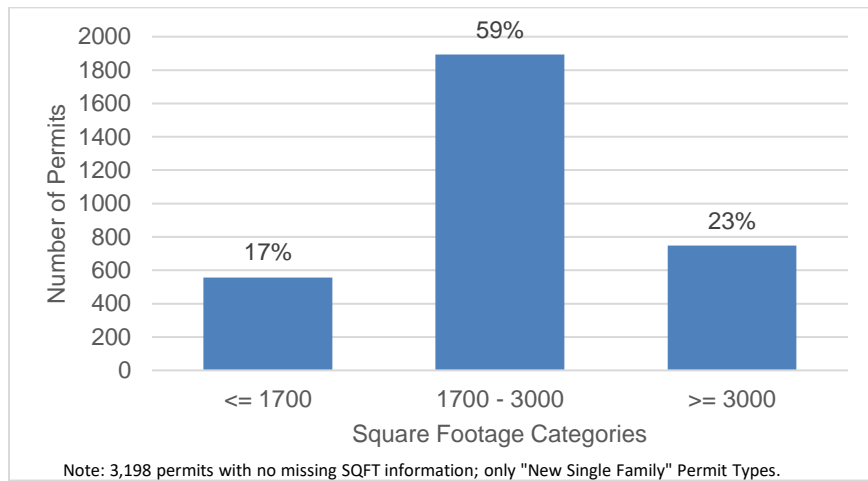


Figure 1 New Single-Family Permits Issued in Clackamas County (since 2010, ACCELA program)

Average Trip Rates by Dwelling Size Category

Vehicle trip rates by selected dwelling size category (tier) were estimated using OHAS and RLIS data. This process started with determination of the trip rates by household size (people per household) from the OHAS data, as shown in Table 2.

Table 2 Daily Vehicle Trip Rate by Household Size

Household Size (people)	Average Daily Vehicle Trips
1	1.98
2	3.55
3	4.77
4	5.81
5+	6.95

Source: OHAS 2011/2012

Then, the distribution of household sizes across the selected dwelling size categories were determined from the combined OHAS/RLIS information described previously. The results of this analysis are shown in Table 3.

Table 3 Distributions of Household Size by Dwelling Unit Size

Household Size (people)	% Households within Dwelling Size Category		
	<1,700	1,700-2,999	≥3,000
1	29%	14%	9%
2	40%	41%	42%
3	15%	20%	18%
4	12%	19%	21%
5+	5%	6%	11%
	100%	100%	100%
<i>N</i>	1027	1385	350

Source: 2011 OHAS & RLIS

Finally, the average trip rates within each dwelling size category are determined by multiplying the trip rate for each household size (from Table 2) by the percent of households at each household size (Table 3) and summing the results within each dwelling size category. The results are shown in Table 4.

Table 4 Estimated Trip Generation Rates by Square Footage of Dwelling Unit

Dwelling Square Footage Category	<1,700	1,700-2,999	≥3,000
Avg. (weighted) Vehicle Trip Rate	3.70	4.22	4.46

Source: 2011 OHAS & RLIS

Relative TSDC Adjustments by Dwelling Size Category

To determine the recommended TSDCs by dwelling size category, the average vehicle trip rates by category (from Table 4) are compared to the average SFR vehicle trip rate for the County as a whole. To approximate this average trip rate for a typical household in Clackamas County, we interpolate vehicle trip rates by household size from the data in Table 2 and apply the results to the average persons per household in Clackamas County. As shown in Figure 2, the average household size for Clackamas County is 2.56 people (from 2010 Census Data), and the resulting estimated average trip rate 4.23 vehicle trips per household, excluding visitors (friends, deliveries and service workers).

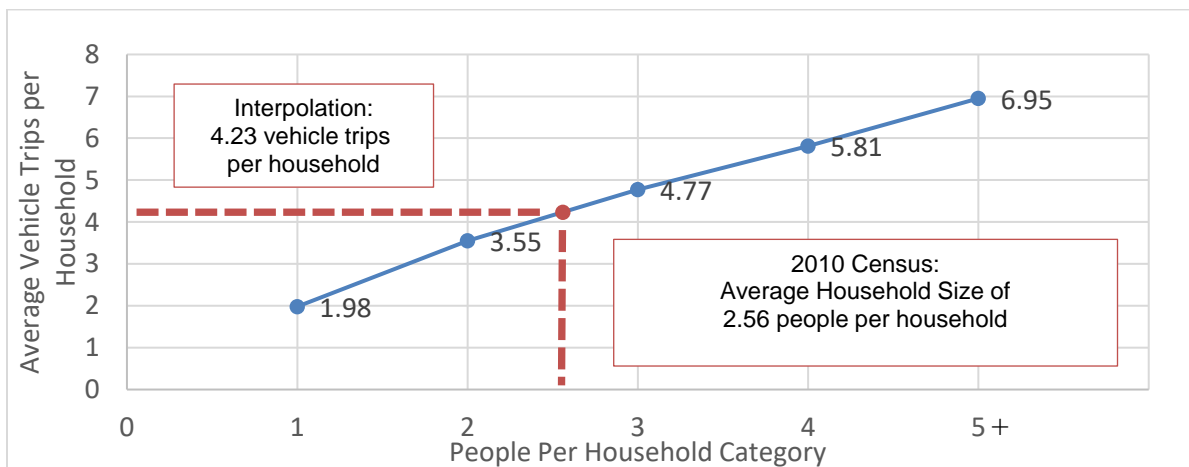


FIGURE 2 Average Vehicle Trips by Household Size (OHAS 2011-2012)

The average trip rates by dwelling size category in Table 4 are compared to the average SFR trip rate of 4.23 in order to determine adjustments to the current system-wide average TSDC for each category. These adjustments are shown in Table 5.

Table 5 Estimated TSDC Adjustments by Dwelling Size Category

Dwelling Square Footage Category	<1,700	1,700-2,999	≥3,000
Avg. (weighted) Vehicle Trip Rate ¹	3.70	4.22	4.46
Relative Adjustment ²	87.5%	99.8%	105.4%
Proposed (Adjusted) TSDC Rate ³	\$4,015	\$4,579	\$4,840

¹ Source: 2011 OHAS & RLIS

² Source: Computed from analysis of OHAS & RLIS and Regional Average Trip Rate of 4.23 trips (see FIGURE 2 for interpolation)

³ Source: Current TSDC Rate (\$4,590) multiplied by the relative adjustment percentage

For example, a dwelling that is 1,500 square feet (<1,700 SQFT) is estimated to have an average (weighted) vehicle trip rate of 3.70, which is about 87% of the estimated vehicle trip rate for the County (4.23). In our 1,500 square foot example, the estimated adjusted TSDC rate for this size dwelling would be 87% of the current TSDC charge – or \$4,015.

Revenue Neutrality Analysis

The final step in the analysis is to explore whether the recommended TSDCs by dwelling size category would be revenue neutral with respect to the current TSDC structure. Based on the distribution of permits since 2010 (from Figure 1), we apply the proposed adjustments to the same distribution of forecasted permits (per 100 permits) to estimate what each of the forecasted permits would be worth in terms of the 'current TSD schedule'. This analysis is presented in Table 6. Based on permit history (since 2010), the 3-tier approach is not expected to generate revenue that is materially different than the current rate (within 2.1%).

Table 6 Estimation of Change in Revenue for Proposed Adjustments per 100 Future Permits

Square Footage Category	Proportion of Permits Issued (Since 2010) ¹	Proposed Adjustments to the TSDC Schedule ²	Forecasted Permits to be Issued per 100 Permits ³	For the forecasted permits, how many 'current TSDC schedule' permits are these worth? ⁴
< 1,700	17%	87.5%	17	14.9
1,700 – 2,999	59%	99.8%	59	58.9
≥ 3000	23%	105.4%	23	24.3
<i>Total revenue change (out of 100)⁵:</i>				<i>98.0</i>

¹ Source: Clackamas County permit data

² See Table 5.

³ 100 permits issued multiplied by proportion of permits issued since 2010.

⁴ Forecasted permits issued per 100 permits multiplied by the proposed adjustments to the TSDC schedule.

⁵ The sum of the 'worth' of forecasted permits across all dwelling size categories.



Appendix



PREPARED FOR: Diedre Landon, Administrative Services Manager, Clackamas County
PREPARED BY: Kristina Currans and Kelly Clifton, Clifton-Currans, LLC
REVIEWED BY: Deb Galardi, Galardi Rothstein Group
SUBJECT: Clackamas County Residential TSDC Analysis – Preliminary Results
DATE: December 11, 2018

Introduction

This memo outlines the preliminary results of analysis to determine the potential for differentiating Transportation System Development Charges (TSDCs) rates for single-family and multifamily residential developments by average dwelling size. Using the most comparable data (local sources, where possible) for the Clackamas County context (typical densities), we have examined the daily home-based vehicle trip generation rates by number of people in the household for single-family and multifamily dwelling types under multiple approaches.

All of these methodologies rely on approaches that link measures of household-generated travel demand to dwelling size. Current methods used to calculate the TSDC fee schedule in Clackamas County rely on vehicle trip rates from the Institute of Transportation Engineers (ITE) *Trip Generation* manual. However, there is no way to relate ITE data to household size and dwelling size. Thus, we rely on household travel survey data from Oregon to estimate vehicle trip generation rates and provide information on household size. Unlike the rates from ITE, the trip generation information from household survey data include travel generated from household members only and exclude trips made by visitors, including friends, deliveries, and service workers. Because of this difference between trip generation data sources, the rates calculated from household travel surveys are used to create *relative* adjustments to the fee schedule.

A more detailed description of the methodology is available in the Appendix. Here we will provide a summary of our work and preliminary results.

Summary of Results

Table 1 (next page) shows the potential relative adjustments to the TSDC fee schedule for single-family dwellings and compares the various approaches and measures of dwelling sizes used in our analysis. Adjustments are shown as a percentage of the current TSDC for single-family dwellings (\$4,374) and as a dollar amount. Each of the three methods are described in detail in the appendix. The methods use two categories of measures of dwelling unit size: 1) square footage of living space in the structure and 2) the number of bedrooms in the structure. These categories vary slightly in the table due to the character of the data used in the analysis.

Table 1 Relative adjustments to current fee schedule for single-family dwellings¹

	Method 1 OHAS + RLIS		Method 2 OHAS+AHS		Method 3 OHAS+AHS		
Clackamas Context							
by square feet				by bedrooms			
	Percentage Adjustment	TSDC	Percentage Adjustment	TSDC	Percentage Adjustment	TSDC	
≤1200 sqft	86%	\$3,767	95%	\$4,147	84%	\$3,683	0-2
1201-1700sqft	96%	\$4,213	105%	\$4,575	104%	\$4,567	3
1701-2200sqft	103%	\$4,491	101%	\$4,398	112%	\$4,906	4
2201+sqft	110%	\$4,822	111%	\$4,863	129%	\$5,659	5+
Rural Only							
by square feet				by bedrooms			
			Percentage Adjustment	TSDC	Percentage Adjustment	TSDC	
≤700sqft	-		68%	\$2,983	53%	\$2,309	0
701-1200sqft	-		86%	\$3,783	58%	\$2,557	1
1201-1700sqft	-		94%	\$4,121	92%	\$4,042	2
1701-2200sqft	-		88%	\$3,831	123%	\$5,369	3
2201+sqft	-		93%	\$4,059	141%	\$6,155	4+
Clackamas Context + Rural Combined							
by square feet				by bedrooms			
		Percentage Adjustment	TSDC		Percentage Adjustment	TSDC	
≤700sqft		83%	\$3,626		79%	\$3,436	0
701-1200sqft		86%	\$3,770		80%	\$3,481	1
1201-1700sqft		96%	\$4,197		86%	\$3,748	2
1701-2200sqft		100%	\$4,373		108%	\$4,711	3
2201+sqft		107%	\$4,685		117%	\$5,130	4
					131%	\$5,749	5+

Using the adjustments shown in Table 1, the current TSDC fee schedule can be modified to account for the differential trip generation impacts resulting from the average differences in the number of people living in dwelling units of different size categories. For example, a developer building housing <1200 square feet in size would be charged \$3,767 or 86% of the current TSDC for a single-family dwelling (or a 14% discount) under Method 1 and \$4,147 or 95% of the current fee schedule (or a 5% discount) using Method 2. When the data are organized by number of bedrooms, we see that a developer building single-family housing with 4 bedrooms would be charged \$4,906 or 112% of the current fee schedule.

¹ Terminology OHAS = Oregon Household Travel Survey, RLIS = Regional Land Information System, AHS = American Housing Survey. More information can be found about each of these methods and data sources in the appendix.

Table 1 also shows results of three spatial groupings of single-family data: 1) Clackamas Context, defined as data from Clackamas County and observations from the rest of Portland Metro region with similar activity density ranges and dwelling unit sizes as those in Clackamas County, 2) Rural locations, defined as rural near a major center or rural for counties located in Willamette Valley, and 3) a weighted average by the proportions of households in 1) and 2) based on data from the US Census. This is done largely to illustrate the differences between these spatial definitions. Currently, Clackamas County does not differentiate TSDC by the location characteristics (urban, suburban, rural, e.g.).

Table 2 shows the results for multifamily dwellings for Clackamas Context, defined as data from Clackamas County and observations from the rest of Portland Metro region with similar activity density ranges as those in Clackamas County. The results are shown as a percentage of the current fee schedule for apartments (\$3,056) and as a dollar amount. As above, differences in methods and size categories are based upon variations in the data available. Note that Regional Land Information System data is not available for multifamily, so Method 1 is not an option. Under Method 2, small apartments <700 square feet would be charged 84% of the current fee schedule and 3-bedroom apartments would be charged 137% of the current fee schedule based upon the vehicle trip generation patterns of the number of people living in each.

Table 2 Relative adjustments to current fee schedule for multifamily dwellings²

	Method 1 OHAS + RLIS	Method 2 OHAS+AHS		Method 3 OHAS+AHS		
	by square feet			by bedrooms		
		Percentage Adjustment	TSDC	Percentage Adjustment	TSDC	
≤700sqft	-	84%	\$2,567	69%	\$2,109	0
701-1200sqft	-	108%	\$3,300	90%	\$2,750	1
1201+sqft	-	112%	\$3,423	111%	\$3,392	2
				137%	\$4,187	3+

Note that application of these relative rates may have a consequence for revenue from TSDC. If the discounts given to smaller dwelling units (the adjustment is less than 100%) are not offset by a surcharge for those categories that exceed 100%, the approach would not be revenue neutral. The approach used to compute the adjustment and the ways that they are employed is a policy decision.

² Terminology OHAS = Oregon Household Travel Survey, RLIS = Regional Land Information System, AHS = American Housing Survey. More information can be found about each of these methods and data sources in the appendix.

Appendix

A. SINGLE-FAMILY ANALYSIS

Using 2011-2012 Oregon Household Activity Survey (OHAS), the home-based vehicle trip rates for a 24-hr period (Monday through Thursday only) per household by household size (by number of people) are calculated for those observations that are single-family units, located in:

- Clackamas Context (N=2750): Clackamas County (N= 552) and the rest of Portland Metro region with similar activity density ranges and dwelling unit sizes as those in Clackamas County (N=2198), or
- Rural locations, defined in the OHAS data as rural near a major center or rural for counties located in Willamette Valley (N=1290), or
- Combination of the Clackamas Context and Rural locations

N = number of observations

From here, we had three alternative approaches to relate daily vehicle trip generation by number of household members to a measure of dwelling size using these data above.

METHOD 1 Oregon Household Travel Survey and Regional Land Information System (Square Feet)

The OHAS data for the Clackamas Context are spatially linked to the Regional Land Information System (RLIS), which provides information about dwelling square footage (hereby called the OHAS/RLIS data). From these data, the household vehicle trip rates by household size (number of people) are calculated from the OHAS data.

While the trip rates by dwelling size can be computed directly from OHAS/RLIS, this is just a subset of the households in the sample; thus, the estimated trip rates may not necessarily be representative of the distribution of household and dwelling sizes in the region. To account for this, the distribution of households as a percent by household size categories and square footage of dwelling unit categories is then obtained from the combined OHAS/RLIS information for the Clackamas Context described previously. The distribution of households by household size and dwelling size (OHAS/RLIS) is multiplied by the trip rates by household size (OHAS) for each dwelling size category estimating trip rates by each dwelling size category. This provides both a direct link between the number of people in the household and the actual size of the structure where they reside, and it allows the trip rates to be weighted by household size by their distribution across dwelling sizes.

The dwelling size categories were developed using an iterative process that explored the sample size of available observations within each size category as well as the estimated trip rates approximated at the end of the method. For example, similar estimated trip rates or small sample sizes led to aggregated dwelling unit size ranges. The size categories vary for each method

because the input data varies slightly, but the aim was that the developed ranges be somewhat similar or nest within each other to ease application while capturing the categories with distinct variation in estimated trip rates.

To make these estimated trip rates comparable to the existing fee schedule, the relative adjustment to the TSDC is computed by comparing (or normalizing) each of the estimated trip rates (by dwelling size category) to a weighted average trip rate for the entire county. The weighted average trip rate was computed by multiplying the average trip rates for each household size (OHAS) by the distribution of household sizes for Clackamas County based upon the 2011 American Community Survey (ACS) one-year sample. This process converts the estimated trip rates into relative ratios that can then be used to adjust the TSDC for single-family dwellings by square footage of dwelling size. A 100% estimated ratio would reflect a category that approximates similar demand as those in the current fee schedule. Those with less than 100% reflect categories with demand at a lower rate than the current fee schedule; and those higher than 100% are categories with demand higher than the current fee schedule.

This approach was employed to develop the TSDC adjustments for single-family housing using the Clackamas Context and the results from various steps are shown in Table 1 through Table 4.

Table 1 Single-Family Household Vehicle Trip Generation Rates for Clackamas Context

Daily Vehicle Trip Rate by Household Size	
Household Size (people)	Avg. Vehicle Trips
1	1.98
2	3.55
3	4.77
4	5.81
5+	6.95
Wt. Avg.*	3.98

Source: 2011 OHAS; *weighted by distribution of households in the ACS

Table 2 Household Size by Dwelling Unit Size for Clackamas Context

Distribution of Households by Size of Dwelling				
Household Size (people)	Dwelling Square Footage Categories			
	≤1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
1	37%	25%	17%	11%
2	38%	41%	41%	41%
3	13%	16%	21%	18%
4	7%	14%	16%	22%
5+	4%	5%	5%	9%
N	340	685	717	1008

Source: 2011 OHAS & RLIS

Table 3 Average Daily Vehicle Trip Generation by Square Footage of Dwelling Unit for Clackamas Context

Avg. (weighted) Vehicle Trip Rate by Dwelling Unit Size

≤1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
3.43	3.84	4.09	4.39

Source: 2011 OHAS & RLIS

Table 4 Adjustments to TSDC Fee Schedule by Square Footage of Dwelling Unit for Clackamas Context
 Relative adjustment to the fee schedule by dwelling square footage

≤1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
86%	96%	103%	110%

Source: Computed from analysis of OHAS, RLIS, and ACS

METHOD 2 Oregon Household Travel Survey and American Housing Survey (Square Feet)

The same trip rates by household sizes from OHAS will be used, as in Method 1 above and shown in Table 1. Instead of linking to the RLIS data, the distribution of households by size and dwelling unit square footage was obtained from the 2011 American Housing Survey (AHS) for areas around Clackamas County (Figure 1: Portland Metro, Zone 104) and is shown in Table 5. However, unlike Method 1, using the AHS to link between household travel and dwelling size does not provide a *direct* spatial link to the housing units in OHAS. This distribution was used to create weights to relate the trip rates by household size to dwelling size as shown in Table 6, using a similar approach to the weighting for Method 1. Once the estimated trip rates by dwelling size have been estimated, a similar normalization process was used to approximate relative differences in demand by dwelling size and these are shown in Table 7.

Figure 1 American Housing Survey Portland Metro Zones (2011)

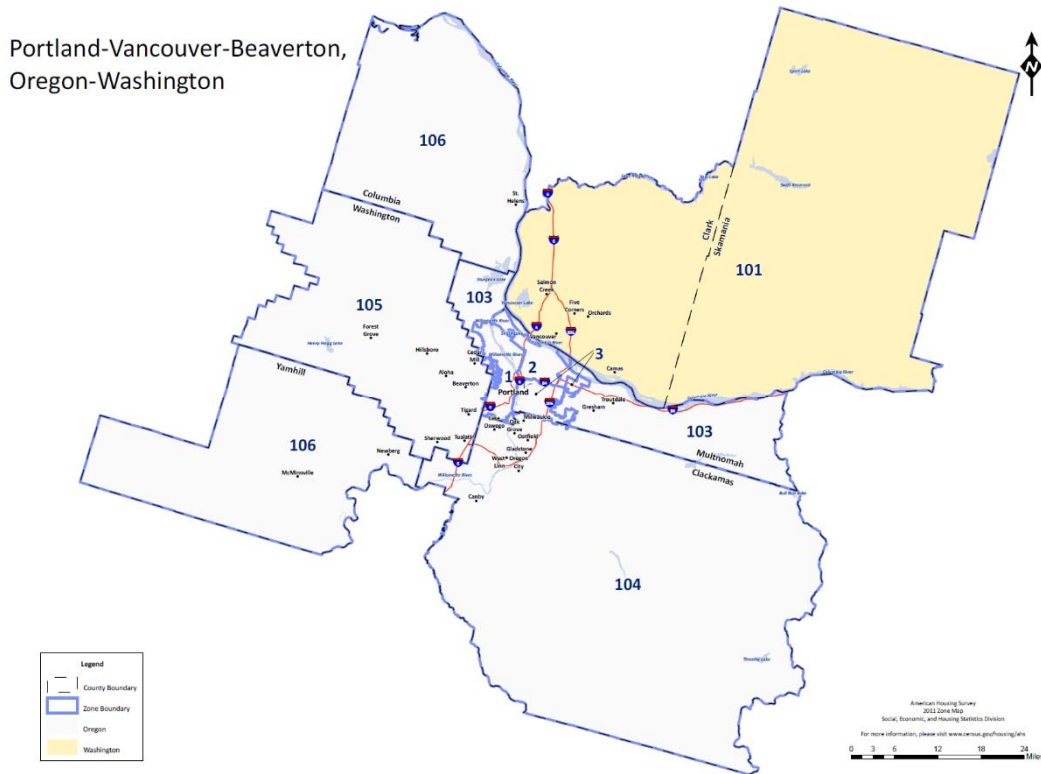


Table 5 Household Size (People) by Dwelling Unit Size using American Housing Survey for Clackamas Context

Distribution of Households by Size of Dwelling

Household Size (people)	Dwelling Square Footage Categories			
	≤1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
1	25%	19%	21%	13%
2	42%	34%	41%	36%
3	18%	24%	15%	21%
4	11%	15%	16%	18%
5+	5%	8%	7%	12%
N	85	95	87	152

Source: 2011 AHS

Table 6 Average Daily Vehicle Trip Generation by Square Footage of Dwelling Unit for Clackamas Context

Avg. (weighted) Vehicle Trip Rate by Dwelling Unit Size

≤1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
3.78	4.17	4.01	4.43

Source: 2011 OHAS & AHS

Table 7 Adjustments to TSDC Fee Schedule by Square Footage of Dwelling Unit for Clackamas Context

Relative adjustment to the fee schedule by dwelling square footage

≤1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
95%	105%	101%	111%

Source: Computed from analysis of OHAS, AHS, and ACS

The approach outlined here in Method 2 was also used to compute adjustments by the square footage of the dwelling for rural locations. The vehicle trip rates by household sizes from OHAS sample in rural locations within the Willamette Valley are computed, as in Method 1 above, and shown in Table 8. Instead of linking to the RLIS data, the distribution of households by size and dwelling unit square footage was obtained from the 2011 American Housing Survey (AHS) for national sample of rural locations and is shown in Table 9. As mentioned in Method 1, the dwelling size categories were determined through an iterative process for each method and do vary somewhat between methods although the categories nest within each other to make comparisons easier.

Table 8 Daily Vehicle Trip Rates by Household Size for Rural Context

Daily Vehicle Trip Rate by Household Size

Household Size (people)	Avg. Vehicle Trips
1	1.85
2	3.4
3	5.01
4	5.86
5+	6.81
Wt. Avg.*	3.92

Source: 2011 OHAS;

*weighted by distribution of households in the ACS

Table 9 Household Size by Dwelling Unit Size using American Housing Survey for Rural Context

Distribution of Households by Size of Dwelling

Household Size (people)	Dwelling Square Footage Categories				
	≤700sqft	701-1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
1	66%	41%	32%	39%	35%
2	21%	31%	33%	32%	31%
3	7%	15%	16%	16%	14%
4	4%	8%	12%	8%	14%
5+	3%	5%	7%	5%	7%
N	3032	3659	612	149	88

Source: 2011 OHAS & AHS

The distribution shown in Table 9 was used to create weights to relate the trip rates by household size to dwelling size as shown in Table 10, using a similar approach to the weighting for Method 1. Once the estimated trip rates by dwelling size have been estimated, a similar normalization process was used to approximate relative differences in demand by dwelling size and these are shown in Table 11.

Table 10 Average Daily Vehicle Trip Generation by Square Footage of Dwelling Unit for Rural Context

Avg. (weighted) Vehicle Trip Rate by Dwelling Unit Size				
≤700sqft	701-1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
2.68	3.39	3.70	3.44	3.64

Source: 2011 OHAS & AHS

Table 11 Adjustments to TSDC Fee Schedule by Square Footage of Dwelling Unit for Rural Context
Relative adjustment to the fee schedule by dwelling square footage

≤700sqft	701-1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
68%	86%	94%	88%	93%

Source: Computed from analysis of OHAS, AHS, and ACS

The results for the TSDC fee adjustments by square footage of single-family dwellings in Clackamas Context (Method 1; Table 4) and Rural Context (Method 2; Table 11) were then subsequently weighted by the proportion of households found in each context (Census: ~82% Clackamas Context; 18% rural). The Clackamas Context Method 1 results were used in this combined adjustment because they provide a more direct estimate of Clackamas County travel with spatially linked travel and building structure information. The same level of detail was not accessible for the Rural estimates, which is why Method 2 was used. These are shown in Table 12.

Table 12 Adjustments to TSDC Fee Schedule by Square Footage of Dwelling Unit for Weighted by Proportion in Clackamas and Rural Context

Relative adjustment to the fee schedule by dwelling square footage				
≤700sqft	701-1200sqft	1201-1700sqft	1701-2200sqft	2201+sqft
83%	86%	96%	100%	107%

Source: Computed from analysis of OHAS, RLIS, AHS, and ACS

METHOD 3 Oregon Household Travel Survey and American Housing Survey (Bedrooms)

This method uses a similar approach as Method 2 but considers ‘bedrooms’ as the dwelling size category variable. The trip rates by household size category as shown in Table 1 above are also used in this analysis. The 2011 American Housing Survey (AHS) for the Portland region shown in Zone 104 in Figure 1 will be used to map the distribution of household size categories relative to the number of bedrooms in that data set, shown in Table 13. This distribution will be used to create weights that will be used to relate the trip rates by household size to numbers of bedrooms, shown in Table 14. A similar normalization process was used to approximate relative differences in demand by number of bedrooms and the adjustments are shown in Table 15.

Table 13 Household Size by Number of Bedrooms for Clackamas Context using American Housing Survey

Distribution of Households by Number of Bedrooms

Household Size (people)	0-2	3	4	5+
1	33%	17%	13%	13%
2	48%	38%	32%	25%
3	12%	23%	22%	8%
4	5%	16%	24%	13%
5+	1%	7%	9%	42%
N	73	222	109	24

Source: 2011 AHS

Table 14 Average Daily Vehicle Trip Generation by Number of Bedrooms in the Dwelling Unit for Clackamas Context

Avg. (weighted) Vehicle Trip Rate by Number of Bedrooms

0-2	3	4	5+	Avg. Wt.
3.35	4.16	4.47	5.15	3.98

Source: 2011 OHAS & AHS

Table 15 Adjustments to TSDC Fee Schedule by Number of Bedrooms in the Dwelling Unit for Clackamas Context

Relative adjustment to the fee schedule by number of bedrooms

0-2	3	4	5+
84%	104%	112%	129%

Source: Computed from analysis of OHAS, AHS and ACS

The approach outlined here in Method 3 was also used to compute adjustments by the number of bedrooms in the dwelling for rural locations. The vehicle trip rates by household sizes from OHAS sample in rural locations within the Willamette Valley are computed, and are the same as those for rural locations in Method 2 above, and shown in Table 8.

The distribution of rural households by size and number of bedrooms was obtained from the 2011 American Housing Survey (AHS) for rural locations and is shown in Table 16. This distribution was used to create weights to relate the trip rates by household size to number of bedrooms as shown in Table 17, using a similar approach to the weighting as in all of the methods. Once the estimated trip rates by dwelling size have been estimated, a similar normalization process was used to approximate relative differences in demand by number of bedrooms and these are shown in Table 18.

Table 16 Household Size by Number of Bedrooms using American Housing Survey for the Rural Context

Distribution of Households by Number of Bedrooms					
Household Size (people)	Number of Bedrooms				
	0	1	2	3	4+
1	89%	78%	29%	14%	10%
2	8%	17%	39%	18%	10%
3	2%	3%	18%	28%	11%
4	1%	1%	10%	20%	27%
5+	0%	1%	4%	20%	42%
N	343	4412	3999	1036	171

Source: 2011 OHAS & AHS

Table 17 Average Daily Vehicle Trip Generation by Number of Bedrooms in the Dwelling Unit for Rural Context

Avg. (weighted) Vehicle Trip Rate by Number of Bedrooms				
0	1	2	3	4+
2.07	2.29	3.63	4.82	5.52

Source: 2011 OHAS & AHS

Table 18 Adjustments to TSDC Fee Schedule by Number of Bedrooms in the Dwelling Unit for Rural Context

Relative adjustment to the fee schedule by number of bedrooms				
0	1	2	3	4+
53%	58%	92%	123%	141%

Source: Computed from analysis of OHAS, AHS, and ACS

As in Method 2 above, the results for the TSDC fee adjustments for the number of bedrooms in single-family dwellings in Clackamas Context (Table 15) and Rural Context (Table 18) were then subsequently weighted by the proportion of households found in each context (~82% Clackamas context, 18% rural) using the American Housing Survey. These are shown in Table 19.

Table 19 Adjustments to TSDC Fee Schedule by Number of Bedrooms in the Dwelling Unit for Weighted by Proportion in Clackamas and Rural Context

Relative adjustment to the fee schedule by number of bedrooms					
0	1	2	3	4	5+
79%	80%	86%	108%	117%	131%

Source: Computed from analysis of OHAS, AHS, and ACS

B. MULTIFAMILY ANALYSIS

Using 2011-2012 Oregon Household Activity Survey (OHAS), the home-based vehicle trip rates for a 24-hr period (Monday through Thursday only) per household by household size (by number of people) are calculated for those observations that are multifamily units, located in:

- Clackamas Contexts (N=2750): Clackamas County (N= 552) and the rest of Portland Metro region with similar activity density ranges and dwelling unit sizes as those in Clackamas County (N=2198).

N= number of observations

These resulting trip generation rates are shown in Table 20 below.

Table 20 Multifamily Household Vehicle Trip Generation Rates for Clackamas Context

Daily Vehicle Trip Rate by Household Size	
Household Size (people)	Avg. Vehicle Trips
1	1.53
2	2.60
3	2.82
4	3.63
5+	4.11

Wt. Avg.* 2.25

Source: 2011 OHAS; *weighted by distribution of households in the AHS

From here, we had two competing approaches to relate these daily vehicle trip generation for multifamily dwellings by number of household members to a measure of dwelling size using these data above. Method 1 for multi-family dwellings develops adjustments based upon square footage of the development follow a similar approach as in Method 2 for single-family dwellings described previously. Method 2 for multi-family develops the TSDC adjustments by the number of bedrooms and corresponds to Method 3 for single family. The details of each are summarized below.

METHOD 1 Oregon Household Travel Survey and American Housing Survey (Square Feet)

Using the sample of households living in multifamily dwellings in OHAS, the household vehicle trip rates by household size (number of people) are calculated. The distribution of households by household size and dwelling unit square footage was obtained from the 2011 American Housing Survey (AHS) for areas in Clackamas County as well as the neighboring exurban portion of Multnomah County (Portland Metro, Zone 103 and 104). These locations are identified in Figure 1 and are commensurate with the Clackamas Context used for the single-family analysis.

This distribution, shown in Table 21, was used to create weights to relate the trip rates by household size to dwelling size in a similar approach to Method 2 for single-family homes presented in Section A. Once the estimated trip rates by dwelling size have been estimated (Table 22), a similar normalization process was used to approximate relative differences in demand by dwelling size and are shown in Table 23.

Table 21 Household Size by Dwelling Unit Size for Clackamas Context

Distribution of Households by Size of Dwelling

Household Size (people)	Dwelling Square Footage Categories		
	≤700sqft	701-1200sqft	1201+sqft
1	71%	38%	31%
2	22%	33%	34%
3	4%	10%	16%
4	2%	10%	14%
5+	1%	8%	5%
N	225	368	58

Source: 2011 AHS

Table 22 Average Daily Vehicle Trip Generation by Square Footage of the Dwelling Unit for Clackamas Context

Avg. (weighted) Vehicle Trip Rate by Dwelling Unit Size

≤700sqft	701-1200sqft	1201+sqft
1.90	2.45	2.52

Source: 2011 OHAS & AHS

Table 23 Adjustments to TSDC Fee Schedule by Square Footage of Dwelling Unit for Clackamas Context

Relative adjustment to the fee schedule by dwelling square footage

≤700sqft	701-1200sqft	1201+sqft
84%	108%	112%

Source: Computed from analysis of OHAS and AHS

METHOD 2 Oregon Household Travel Survey and American Housing Survey (Bedrooms)

As we have done previously, we also examine the relative differences in demand by number of bedrooms for multifamily housing. The 2011 American Housing Survey (AHS) the Portland region shown in Zone 104 and 103 in Figure 1 is used to map the distribution of household size categories in multi-family dwellings relative to the number of bedrooms in that data set. This distribution, shown in Table 24, will be used to create weights that will be used to relate the trip rates by household size to numbers of bedrooms, shown in Table 25. A similar normalization process was used to approximate relative differences in demand by number of bedrooms and the adjustments are shown in Table 26.

Table 24 Household Size by Number of Bedrooms using American Housing Survey for the Clackamas Context

Distribution of Households by Number of Bedrooms

Household Size (people)	Number of Bedrooms Categories			
	0	1	2	3+
1	97%	75%	31%	18%
2	3%	22%	39%	15%
3	0%	2%	12%	18%
4	0%	1%	11%	21%
5+	0%	0%	7%	28%
N	35	252	336	61

Source: 2011 AHS

Table 25 Average Daily Vehicle Trip Generation by Number of Bedrooms in the Dwelling Unit for Clackamas Context

Avg. (weighted) Vehicle Trip Rate by Number of Bedrooms

0	1	2	3+
1.56	1.81	2.51	3.09

Source: 2011 OHAS & AHS

Table 26 Adjustments to TSDC Fee Schedule by Number of Bedrooms in the Dwelling Unit for Clackamas Context

Relative adjustment to the fee schedule by number of bedrooms			
0	1	2	3+
69%	80%	111%	137%

Source: Computed from analysis of OHAS and AHS