Draft

Henderson,
Young &
Company

MEMORANDUM

TO: Clackamas County CRC Project Management Team

FROM: Randy Young
Henderson, Young & Company
and
Deb Galardi
Galardi Rothstein Group

DATE: December 9, 2015

RE: TSDC Methodology Alternatives for Clackamas County

Background

Clackamas County (County) currently has a transportation system development charge (TSDC) for unincorporated areas (Countywide TSDC), and the County and the City of Happy Valley (City) have a Joint Area TSDC (Joint Area TSDC).

The County and City seek to consider updates to their 2006 TSDC methodology in order to be consistent with the goals and objectives of the County's 2013 Transportation System Plan (TSP) and the City's 2012 TSP that is scheduled for update in early 2016. For example, the County's 2013 TSP goals and objectives support equity, accessibility, and health along with more traditional transportation goals. This is a significant change of direction, and the TSDC should be updated to support the new objectives. Examples of potential changes to TSDCs that would support the County's 2013 TSP include additional modes of travel and traveler safety.

What are TSDCs?

TSDCs are one-time fees charged to new development to help pay a portion of the costs associated with building transportation facilities to meet needs created by growth. The portion of costs that may be recovered through TSDCs is based on methodology applied to a capital improvement program (CIP) that lists specific capital projects that increase capacity of transportation facilities. TSDCs are paid at the issuance of the development permit. TSDC revenue is used only

for the capital projects in the CIP or to reimburse for completed projects that were in previous CIPs and which have capacity for additional development.

TSDCs have been in use in Oregon since the mid-1970's and state legislation regarding SDCs was adopted in 1989. The purpose of the Oregon Systems Development Act (ORS 237.297 - 314) is to "...provide a uniform framework for the imposition of system development charges…." Additions and modifications to the Oregon Systems Development Act have been made in 1993, 1999, 2001, and 2003. Together, these pieces of legislation require local governments that enact SDCs to:

- Adopt SDCs by ordinance or resolution;
- Develop a methodology outlining how the SDCs were developed;
- Adopt a CIP to designate capital improvements that can be funded with "improvement fee" SDC revenues;
- Provide credit against the amount of the SDC for the construction of "qualified public improvements";
- Account for and separately report receipt and expenditure of SDC revenues, and develop procedures for challenging expenditures; and.
- Use SDC revenues only for costs related to capital expenditures (operations and maintenance uses are prohibited).

The Oregon Systems Development Act provides for the imposition of two types of SDCs: (1) "improvement fee" SDCs, and (2) "reimbursement fee" SDCs. "Improvement fee" SDCs may be charged for new capital improvements that will increase capacity. An increase in capacity may result from new facilities, or from improvements to existing facilities that enhance the level of service or performance. Revenues from "improvement fee" SDCs may be spent only on capacity-increasing capital improvements identified in the required CIP that lists the timing and cost of each project. "Reimbursement fee" SDCs may be charged for the costs of existing capital facilities if "excess capacity" is available to accommodate growth.

Purpose of this Memo

This memo presents methodology alternatives that could be used to update the County's TSDC and the Joint Area TSDC.

There are numerous components to TSDCs, and there are different methodologies that can be used for each component. This memo identifies the

current methodology used for 16 components of the 2006 TSDCs that could be improved by a change in methodology. The memo describes one or more alternative methodologies for each component, and identifies examples of other counties and cities that use the alternative methodologies. The notes section of each description explains the rationale for and/or benefits of the alternative methodologies.

Summary of Current and Alternative Methodology for TSDCs

The TSDC components of the countywide and joint area are listed in Table 1 with a summary of current and alternative methodologies for each component, and names one or more examples of jurisdictions that use the alternative methodology. More details are provided in the descriptions of each component that are presented after Table 1.

Table 1: TSDC Methodology Alternatives

#	Component of TSDC Methodology	Current (2006) Methodology	Alternative Methodology	Example Jurisdiction
1	Modes of travel	Motor vehicles only	All modes	Portland; Issaquah, WA
2	Priority of projects	All potential projects	Financially constrained priority projects	Bend; Albany; Kirkland, WA
3	Types of projects	Capacity projects	New capacity and enhanced level of service projects	Bend, Springfield
4	Capacity costs	Roads and streets for motor vehicles	Additional criteria for multimodal projects	Portland, Bend; Renton, WA
5	Growth costs	Growth's % of future trips	Total costs less any existing deficiency cost	Portland, Bend
6	Future projects and completed projects	Future and completed projects	Future projects; limit completed projects to those with unpaid debt	Portland
7	Trip types	Vehicle trips	Person trips	Portland; Issaquah, WA
8	Trip time of day	Weekday average	P.M. Peak hour	Portland, Bend
9	New trips	Pass-by	Diverted linked trips	Bend

#	Component of TSDC Methodology	Current (2006) Methodology	Alternative Methodology	Example Jurisdiction
10	Trip length	Trip length factor	No trip length adjustment	Bend
11	Land use types	Most types listed by ITE	Types with statistically significant research	Monroe, WA, Mercer Island, WA
12	Residential development rates	Flat rate for each type of residence	Rates scaled based on size of units	Tucson, AZ
13	Service areas	2 areas: Joint Area and Balance of County	1. Two tiered service areas to distinguish urban and rural areas. 2. Additional district if MMA is created	Seminole County, FL; Portland
14	Compliance costs	Estimated	Actual	Springfield
15	Adjustments for mixed use and station areas	Included in Code	Include in methodology study	Bellingham, WA
16	Indexing future TSDC rates	Complex formulas	Published indices	Renton, WA

Descriptions of Current and Alternative Methodology for TSDCs

The descriptions on the following pages present the components of the TSDC methodologies. Each component description includes a description of the current methodology that was adopted in 2006, an alternative methodology, notes about the alternative, and one or more examples of jurisdictions that use the alternative methodology. For components where the alternative methodology is detailed or complex, the memo includes additional details from the specific alternative methodology of another jurisdiction.

1. Modes of Travel

Component of TSDC Methodology:	Modes of travel included in the TSDC CIP.
Current (2006) Methodology	Current TSDCs primarily benefit motor vehicles because the projects in the TSDC methodologies are mostly for street and road segments and intersections. Non-motorized transportation, including bicycle and pedestrian facilities, are only included in current TSDCs if they are part of a street, road or intersection project.
Alternative Methodology	Motor vehicles, non-motorized (bicycle and pedestrian), and transit support (bus pullouts, que jumps, and passenger shelters, but not rolling stock).
Notes	Current Oregon law authorizes TSDCs to be used for all modes of travel (vehicular, bicycle, pedestrian and transit), and several Oregon jurisdictions have multimodal TSDCs.
Jurisdiction Using Alternative Method	City of Portland has included significant multi-modal projects, including bike, pedestrian, and streetcar, since 1997. An example from another state is Issaquah, Washington.

2. Priority of Projects

Component of TSDC Methodology: List of priority transportation capital improvement projects that are eligible, in whole or part, for TSDCs.

Current (2006) Methodology The TSDC methodology update reports include a list of transportation projects. The format includes the project name, description and map number, the total costs, and a series of columns that calculate the portion of the total cost that is eligible for the TSDC. This table functions as the CIP that is required by Oregon law for SDCs.

It appears that the lists contain most of the projects from the TSPs developed by the County and City. The lists do not appear to exclude projects that may be lower in priority and/or not financially feasible within a reasonable period of time.

The two existing TSDC districts collect SDCs for projects in their respective service areas. The majority of the revenue in both districts is dedicated to debt service in the near-term to repay loans from the Oregon Transportation Infrastructure Bank that enabled the construction of SE Sunnyside Road and SE 172nd Avenue. The remaining balance of the loans is $$5,485,363 for the Countywide TSDC and $5,109,032 for the Joint Area TSDC.

Alternative Methodology The County's most recent TSP establishes priorities among projects. The next updated TSDC CIP could list only the projects with the higher levels of priority.

Notes Longer lists of projects that are eligible for the TSDC generally mean that the local government has a higher cost for the portion of the projects that are not eligible for TSDCs, thus reducing the likelihood that all of the projects will be built. Cities and counties that prioritize or otherwise financially constrain their CIPs reduce or eliminate this risk. The cities of Bend, Albany, and Kirkland, Washington have taken a particularly careful approach to

	prioritizing and constraining its transportation plan and CIP.
Jurisdiction Using Alternative Method	Cities of Bend and Albany; Kirkland, Washington

3. Types of Projects

Component of TSDC Methodology:	Types of capital improvement projects that are funded by TSDCs.
Current (2006) Methodology	Projects that directly increase the carrying capacity of road segments and intersections.
Alternative Methodology	Capacity projects and enhancements to level of service/performance (e.g., safety projects) that improve the operational capacity of roads, non-motorized and transit travel.
Notes	TSDCs can be charged for projects that enhance the existing level of service or performance of the system, which may include safety features. Each project on the CIP should be reviewed to determine whether all or a portion of improvements increase the capacity of the transportation system or enhances the ability for roads and non-motorized and/or transit travel to operate at full capacity while meeting other performance criteria (e.g., safety and access).
Jurisdiction Using Alternative Method	The cities of Bend and Springfield include improvements to existing facilities to address safety, modernization, and other performance considerations which provide capacity for growth and enhanced performance for existing development. Because of the shared benefit (to growth and existing development) from these improvements, the costs are allocated in proportion to the utilization of the facilities, as determined for each improvement individually.

4. Capacity Costs

Component of TSDC Methodology:	Criteria that determine the capacity portion of transportation capital improvement project cost that is eligible to be included in a TSDC. In some instances, criteria may indicate that a portion of a project may be eligible, and the remainder may not be eligible.
Current (2006) Methodology	Projects that add capacity, but also include non-capacity elements, such as reconstruction of existing road surfaces, have their costs apportioned between capacity and non-capacity. Only the capacity portions are eligible for the TSDC. For example, if 80% of a $10,000,000 project adds capacity and the other 20% does not add capacity, then 80% x $10,000,000 = $8,000,000 is eligible for the TSDC.
Alternative Methodology	Additional criteria and steps are needed for TSDCs for multimodal projects. First, criteria are needed to determine that the non-motorized and transit elements of projects provide capacity that is needed by new development. Second, projects that include more than one mode of travel need to have their costs apportioned among the travel modes so that each mode's costs can be assigned to the amount of travel in that mode.
Notes	There are a variety of examples of alternative criteria for evaluating the eligibility of transportation capital improvement projects for TSDCs. Examples of alternative criteria from the City of Portland, Oregon, and the City of Renton, Washington are presented below.
Jurisdiction Using Alternative Method	Cities of Portland and Bend City of Renton, Washington

Examples of Criteria for Eligibility of Multimodal Projects: Portland, Oregon and Renton, Washington

Portland, Oregon

The City of Portland uses the following criteria to determine if transportation capital improvement projects are eligible for TSDCs

Table 2: Project Evaluation Criteria

Criteria	Sub-Criteria
Level A Criteria	
1. Support bicycle, pedestrian and/or transit modes (i.e., add capacity, improve access, improve connections, remove bottlenecks, fill in missing links)	▪ Accommodates increased density ▪ Supports mixed use development ▪ Supports 2040 Growth Concept land-use components ▪ Improves connections and access from neighborhoods to employment and industrial areas ▪ Fills a gap ▪ Improves safety
2. Improve movement of freight and goods	▪ Reduce conflicts between freight and non-freight uses ▪ Provide access to inter-modal terminals and related distribution facilities ▪ Fills a gap ▪ Improves safety ▪ Support emergency services
3. Reduce congestion, improve access and/or circulation	▪ Among business districts ▪ To and within activity centers ▪ Fills a gap ▪ Improves safety ▪ Support emergency services
Level B Criteria (only applies if project also meets one or more of Level A criteria)	
4. Community and business priority	▪ Priority expressed by neighborhood and business interests ▪ Addresses equitable geographic distribution of projects
5. Strong potential leverage	▪ Amount and likelihood of potential funding from other sources

Renton, Washington

The City of Renton, Washington uses the following criteria to determine if multimodal transportation capital improvement projects are eligible for non-motorized mitigation fees (somewhat similar to Oregon's TSDCs).

Minimum Requirements:

A. Adds capacity to the multimodal transportation system (i.e., more miles of bicycle and/or pedestrian facilities provide increased opportunities for non-motorized travel)
B. Is primarily for transportation purposes, and recreational benefits are incidental (i.e., the project is intended to increase multimodal mode share, thus reducing motorized vehicle mode share)

Eligibility Criteria:

1. Serves areas where significant growth is planned (i.e., is not primarily for areas where growth is not planned or intended)
2. Improves connectivity of existing multimodal transportation system (i.e. increases ability to reach more locations without interruptions, thus increasing potential use of multimodal transportation)
3. Alternative to congested motorized traffic (i.e., provides alternative mode(s) and/or route(s) in areas of congested motorized travel, thus creating an alternative to motorized travel)
4. Increases buffering and/or safety for nonmotorized travel (i.e., will enhance the security of nonmotorized travelers, thus increasing usage)
5. Serves areas of transit and/or higher density (i.e., provides convenient and lower cost transportation modes that support areas expected to develop higher density.)

Renton's final step apportions the cost of eligible projects between future growth and existing development. All eligible projects are apportioned future growth's pro rata share of total development projected at the planning horizon.

5. Growth Costs

Component of TSDC Methodology:	Methodologies that determine the portion of transportation capital improvement project cost that is attributable to growth (new development).
Current (2006) Methodology	Capacity portions of cost are apportioned between trips from new development in the service area and all other users (defined as (a) existing development that would use the new transportation project plus (b) new development outside the service area that would use the new transportation project.) This is sometimes called the "capacity utilization" approach. For example, it a project cost is $8,000,000 and 75% of the traffic on the new project will come from new development in the service area, and 25% from other traffic, then 75% x $8,000,000 = $6,000,000 is eligible for the TSDC. For projects like 172nd that are in both service areas (Countywide and Joint), the project and its cost is apportioned between the two areas.
Alternative Methodology	A "standards-based" approach for allocating cost to growth charges existing development only for correcting any existing deficiency. Existing deficiencies are evaluated based on current performance relative to the appropriate planning/design standard for the particular improvement. For roadways and intersections, the standard is generally a "volume-capacity ratio (v/c ratio)". For bike and pedestrian improvements, the standard is generally the planned level of service (LOS).
Notes	The current "capacity utilization" methodology allocates a portion of all new capacity costs to existing development, whether or not an existing deficiency exists. The portion of costs allocated to existing and new development is based on each

group's share of a roadway segment's forecast trip volume. The assumption is that existing development will use new road capacity, therefore it should pay for a share of the new road cost. However, the new road capacity would not be needed unless growth occurred, therefore growth should pay the cost. Furthermore, new development is not charged for its use of existing roads, therefore existing development should not be charged for new roads that are needed only because growth occurred.

Examples of the standards-based approach from the cities of Bend and Portland are presented below.

Jurisdiction Using Alternative Method Cities of Portland and Bend

Examples of Standards-Based Approach to Cost Allocation: Bend and Portland

City of Bend

The City of Bend uses a combination of approaches for the growth-eligible share of capacity costs. As the table below shows, the standards-based approach is used for new roadway and intersection projects that provide new capacity only, and for new bike and pedestrian facilities (based on system-wide LOS analysis*). The capacity utilization approach is used for projects that increase the level of performance of existing facilities through safety and modernization improvements (since these improvements benefit both existing and future development).

Table 3: Summary of Improvement Project Cost Allocations

Project Type	Existing Development Share	Future Development Share
New Roadways Facilities (Capacity only)	Limited to existing deficiency (i.e., v/c ratio > 1.0)	100% - Existing Deficiency
New Intersection Facilities (Capacity only)	Limited to existing deficiency (i.e., v/c ratio > 1.0)	100% - Existing Deficiency
New Bike/Ped Facilities	Limited to existing deficiency (i.e., increase in level of service defined by linear feet per capita)	100% - Existing Deficiency
Performance Improvements – Roadway & intersection safety and modernization, crossings, and other improvements	Existing development trips as a percent of total future trips	Future development trips as a percent of total future trips

*The following equation shows the calculation of the planned LOS:

$$\frac{Existing\,Q + Planned\,Q}{Future\,Population\,Served} = Planned\,LOS$$

Where:

Q = quantity (miles of bike or pedestrian facilities), and
Future Population Served

Use of the standard-based methodology increased the portion of new roadway/intersection projects and bike/pedestrian projects that were eligible for growth (compared to the prior methodology that was based purely on capacity utilization); however, the City balanced this impact by limiting the number of projects that were on the SDC Project List, such that the overall fee did not increase. The development community generally supported the methodology because the fee did not increase, and because the potential for developer credits increased (as a greater share of the project costs were SDC eligible).

City of Portland

The City of Portland's transportation SDC methodology utilizes a mode analysis approach. The costs of all projects are first allocated across modes (including motorized, transit, and non-motorized), and then the SDC-eligible amounts are determined using a standards-based approach specific to each mode, where the deficiency (or existing development portion) is determined as follows:

- Motorized deficiency = Existing traffic volume – existing capacity on roadway (if existing volume is less than existing capacity, then there is no deficiency)
- Non-motorized deficiency (analyzed on a district basis)
  - Sidewalks = % of arterials without sidewalks
  - Bike lanes = citywide average bike lane-miles per 1,000 households – district bike lane-miles per 1,000 households (if the district bike lane-miles per 1,000 households is greater than the citywide average, there is no deficiency)
  - Transit deficiency = 1 – Maximum load factor during pm peak on route (if the load factor is less than 1, then there is no deficiency)

The growth-eligible portion is then equal to total project costs less any existing deficiency portion.

6. Future Projects and Completed Projects

Component of TSDC Methodology:	Projects that are the basis for TSDCs.
Current (2006) Methodology	The Countywide and Joint Area TSDCs include both categories of transportation projects allowed by Oregon law. The first category is for "improvement" projects that will be constructed in the future. The other category is "reimbursement" projects that have been completed, but which have capacity to serve additional development.
Alternative Methodology	Charge TSDCs for future "improvement" projects, but only charge TSDCs for completed projects that must pay future debt.
Notes	Projects that have been completed are often fully paid for by a combination of grants and local revenues. Some may question whether the reimbursement TSDC will be used to repay the original funding sources, and if not, how the reimbursement TSDC will be used. Legally, reimbursement TSDC revenue may be used for any transportation capital costs. Clearly, if a project was built with borrowed money, it would be logical to charge a TSDC for the borrowed portion of costs that serve new development. In this case of debt-funded reimbursement projects, special care must be taken to ensure that new development is not double charged if it is contributing to taxes or other revenues that are pledged to repayment of the debt. In an atmosphere of fiscal constraint (i.e., where local policy makers are reluctant to increase TSDCs), limiting the TSDC to improvement projects and debt-funded reimbursement projects can balance affordability concerns with the need to fund additional project.

	However, limiting reimbursement projects will limit the flexibility of the TSDCs to fund non growth-eligible costs (e.g., existing system deficiencies).
Jurisdiction Using Alternative Method	City of Portland

7. Trip Types

Component of TSDC Methodology: Measurements of the amount of impact on transportation infrastructure by different types of development.

Current (2006) Methodology The impact of different types of development is determined by the average number of vehicle trip ends arriving at and departing from different types of development. For example, a shopping center has 42.94 average weekday trip ends per 1,000 square feet, and an office building has 11.01 trip ends per 1,000 square feet. The difference is because shopping centers have more vehicles traveling to them than travel to office buildings of the same size.

Alternative Methodology A mode neutral metric is person trips (PT). One person walking or bicycling counts as one PT. A motor vehicle, such as an automobile, SUV, or similar that has a driver and 2 passengers counts as 3 PT. A transit vehicle carrying 20 passengers counts as 20 PT.

The PT metric can be used at two distinct points in calculating TSDCs. First, the cost of transportation improvement projects can be allocated among the modes (as discussed elsewhere in this memo) and each mode's total cost can be divided by the total PT for that mode to calculate the cost per PT for that mode. Second, trip generation rates can be calculated separately for each type of land use, thus supporting TSDC rates for each mode of travel.

Notes Multimodal TSDCs cannot rely solely on vehicle trips because pedestrian, bicycle and transit trips are not in the vehicles that are counted as the basis for trip generation in the current (2006) TSDCs. Clackamas County's traffic model can provide person trips. Other jurisdictions have developed methods for calculating person trips from their travel demand models, or using other techniques. Examples from

the City of Portland, and the City of Issaquah, Washington are presented below.

Jurisdiction Using Alternative Method	City of Portland City of Issaquah, Washington

Examples of Person Trips: Portland, Oregon and Issaquah, Washington

City of Portland

Portland's travel demand model uses employees and households to predict the number of trips that will be generated on the transportation network. The model is able to generate total person trips and trips for each mode (motorized, transit, and non-motorized). Table 4 shows the forecast of trips for 2007 and 2017. Trip "ends" are shown, representing the beginning and end of each trip. Overall, person trip ends are expected to increase by approximately 12 percent across all modes.

Table 4: Growth in Daily Person Trip Ends

Trip Type	2007	2017	10 Year Growth	Growth Percent	2017 Mode Share
Motorized	4,198,725	4,617,862	419,137	10.0%	82%
Transit	433,819	545,927	112,108	25.8%	10%
Non-Motorized	386,061	436,345	50,284	13.0%	8%
Total Daily Person Trip Ends	5,018,605	5,600,133	581,528	11.6%	100%

Note: Data shown are trip 'ends'. Each trip has two ends.

These data show that transit and non-motorized trips will increase at a faster rate than motorized trips during the 10 years.

City of Issaquah, Washington

An established practice of transportation impact fees is to begin with the data reported in Trip Generation, compiled and published by the Institute of Transportation Engineers (ITE). The report is a detailed compilation of data from hundreds of surveys of trip origins and destinations conducted throughout the United States. The data is reported on several variables (i.e., type of land use, units of development, number of employees, hour of day, etc.). The data is reported as the number of vehicle trip ends for each variable.

The data used in Issaquah's impact fee rate study is for trip ends generated during the p.m. peak hour, since that is the same basis as the trip data from Issaquah's model and the City's level of service standard.

Impact fee rates are calculated in Issaquah's study for many frequently used types of land use (i.e., houses, apartments, offices, retail, restaurants, etc.). Impact fees can be calculated for other land uses not listed in this rate study by referring to the data in the ITE report.

Trip generation data is reported by ITE as the total number of trips leaving and arriving at each type of land use. The trips leaving are the origins, and the trips arriving are the destinations. Each origin or destination is a trip end.

Several adjustments are made to each ITE trip generation rate so that the result is person trips that can be used to calculate multimodal impact fees for Issaquah.

First, the number of vehicle trips is converted to the number of person trips in vehicles. Person trips are needed in order to apportion total person trips between the modes of travel. Converting vehicle trip ends to person trip ends is accomplished by multiplying the ITE vehicle trip generation rate times the vehicle occupancy rate for Issaquah (1.353 persons per vehicle reported by the Puget Sound Regional Council).

Second, the person trips in all modes of travel is determined by dividing the person trips in vehicles by the mode share of trips in vehicles (75.5% according to the City's transportation consultant). The result is the total person trips in all modes of travel at each land use.

The third adjustment is to reduce the number of trips charged to land uses that are incidental attractors and generators of trips. For example, if a person leaves work to return home at the end of the work day, the place of employment is the origin, and the home is the destination. But if the person stops en route to run an errand at a store, the ITE data counts the stop at the store as a new destination (and a new origin when the person leaves the store). In reality, the work-to-home trip was going to occur regardless of the incidental stop, therefore the trip rate of the store should not be charged as an additional impact on the road system. The adjustment is based on the number of "pass-by" trips that stop at the store instead of "passing by." In the trip generation table these trips are eliminated by counting only the trips that are truly "new" trips (i.e., a person made a special trip to the store). The adjustment is the "Percent New Trips." This data is from ITE's Trip

Generation Handbook, Second Edition (2004), or from Issaquah's 2006 Impact Fee Rate Study.

The last step is to calculate the number of new person trip ends that are attributable to the each mode. The new person trips are apportioned 79% to vehicles and 21% to other modes of travel because 79% of person trips in Issaquah are in vehicles, and 21% are in other modes of travel.

8. Trip Time of Day

Component of TSDC Methodology:	The time of day during which traffic impacts are measured.
Current (2006) Methodology	Weekday average trip rates are used in the 2006 methodology.
Alternative Methodology	P.M. peak hour trip rates.
Notes	The County's current traffic model uses P.M. peak hour trip rates, in part because it measures the performance of the road system when its capacity is used the most, and the congestion problems are most readily observed. As a result, the transportation improvement projects are sized for P.M. peak hour conditions. Basing the TSDC on P.M. peak hour traffic would be consistent with the traffic model and TSP.
Jurisdiction Using Alternative Method	Portland, Bend

9. New Trips

Component of TSDC Methodology:	Adjustments to trips rates for specific land uses because of "pass-by" and/or "diverted" trips.
Current (2006) Methodology	Adjustments for pass-by trips.
Alternative Methodology	Adjustments for pass-by AND diverted linked trips.
Notes	Pass-by trip adjustments are applied to the ITE trip rates for certain land use types. Pass-by trips refer to trips that occur when a motorist is already on the roadway, as in the case of a traveler stopping by a fast-food restaurant on the way home from work. In this case, the motorist making a stop while "passing by" is counted as a trip generated by the restaurant, but it does not represent a new (or primary) trip on the roadway. A diverted linked trip is another type of non-primary trip but in this case the motorist will divert from a primary route to access a nearby use (e.g., a vehicle may turn off a major roadway onto an intersecting street to access a land use), and then return to the original route to complete the trip.
Jurisdiction Using Alternative Method	Bend

10. Trip Length

Component of TSDC Methodology:	Adjustments to trips rates for specific land uses because the length of trips may affect the amount of impact on roads and streets.
Current (2006) Methodology	Adjustments for trip lengths.
Alternative Methodology	No trip length adjustment.
Notes	Available data to reasonably estimate average trip length for a given land use type in comparison to other uses is extremely limited. Furthermore, trip length may be more directly attributable to location within an area and the availability of other similar uses in the area than it is to simply the type of use.
Jurisdiction Using Alternative Method	Bend

11. Land Use Types

Component of TSDC Methodology:	List of specific types of land use for which TSDC rates have been calculated.
Current (2006) Methodology	There are 94 types of land use for which separate TSDC rates have been calculated. They are grouped as follows: 6 Residential land uses 17 Recreational land uses 13 Institutional/Medical land uses 38 Commercial/Services land uses 10 Office land uses 10 Port/Industrial land uses
Alternative Methodology	Fewer land use types could be listed in the TSDC rate schedules. Overlapping or similar land use types could be consolidated. Land use types for which the support data is not statistically significant could be omitted.
Notes	Each land use has a different TSDC rates because each land use has different trip generation rates as reported by the primary source of such data, the Trip Generation report by the Institute of Transportation Engineers (ITE). The multitude of land uses gives the appearance of great specificity and accuracy, but there are several reasons that the data should be used with caution: 1. Many of the trip generation calculations are not statistically significant because they are based on very small sample sizes. ITE reports R^2 ("R squared") values for some land uses, but ITE does not report R^2 for many of the land uses because there are too few traffic studies for those land uses. R^2 is a coefficient of determination that measures how well data in a sample fit a regression line; 2. Some of the data is old, and has not been updated;

3. There are narrowly defined land uses that are not different from others in ways that are meaningful or enforceable, such a distinctions among some types of restaurants, or the hours of operation of some convenience stores; and,

4. Some jurisdictions calculate TSDCs for changes of use. The greater the number of land use types in the rate schedule, the more likely there will be instances in which remodeling or renovation projects will appear to generate a different number of trips than the previous use, yet the differences may not be accurate (see reasons 1-3, listed above). An example of consolidated land uses from the City of Monroe, Washington is provided below.

Jurisdiction Using Alternative Method	Monroe, Washington Mercer Island, Washington

Example of Consolidated Land Use Types: City of Monroe

Table 5. Land Use Types and Trip Generation

Land Uses	Unit of Measure[1]	Basic Rate PM Peak Trips/Unit[2]	New Trips %[3]	New Trip Rate
Single Family (1 or 2 dwellings)	dwelling	1.00	100%	1.00
Multi Family (3 or more dwellings)	dwelling	0.57	100%	0.57
Senior Housing	dwelling	0.27	100%	0.27
Commercial Services	SF GFA	3.98	100%	3.98
School	student	0.13	100%	0.13
Institutional	SF GFA	0.74	100%	0.74
Light Industry/ Industrial Park	SF GFA	0.91	100%	0.91
Warehousing/Storage	SF GFA	0.45	100%	0.45
Restaurant	SF GFA	9.02	56%	5.05
General Retail	SF GFA	3.71	66%	2.45
Supermarket	SF GFA	9.48	64%	6.07
Administrative Office	SF GFA	1.49	100%	1.49
Medical Office/Dental Clinic	SF GFA	3.57	100%	3.57

12. Residential Development TSDC Rates

Component of TSDC Methodology:	Rates of TSDCs charged to residential development.
Current (2006) Methodology	There are four types of residential development in the TSDC rate schedule: single family detached, apartment, condominium/townhouse, and manufactured housing. There is a different flat rate for each of the four types. Every new dwelling unit of a specific type pays the same TSDC as all other dwelling units of the same type, regardless of the size of the dwelling unit. For example, if the TSDC rate for a single family detached home is $3,500, every new single family detached home is charged $3,500, regardless of the size of the home.
Alternative Methodology	TSDC rates for residential development can be based on the size of the dwelling unit in order to reflect the differences in trip generation from different size dwelling units.
Notes	Scaling measures are common in assessment of TSDC for nonresidential development, due to the wide variation in developments. Variation in SDCs based on size of development has been less common practice for assessing residential development, though that is changing. Census data show that the smaller the dwelling unit (regardless of type) the fewer the number of people who live in it on average. Homes of 1,000 square feet for example average about 2 persons per unit while homes of more than 3,500 square feet average about 3.3 persons. Thus, to be proportionate to differences in impact, SDCs should be less for a smaller home than a larger home because as house size increases so do average occupancy levels and hence impact on facilities. If fees do not reflect house size, the smaller home in the example above pays 25% more than its proportionate impact while the larger home pays about 33% less than its

proportionate share.

Other research shows that the average number of vehicle trips generated is almost directly proportional to the number of people living in the dwelling unit which is strongly related to the size of the dwelling unit. The research provides an objective basis for varying TSDC rates based on the size of the dwelling unit. An example from the City of Tucson, Arizona is included below.

Jurisdiction Using Alternative Method	City of Tucson, Arizona

Example of Residential Trip Generation Based on Size of Units: Tucson, Arizona

The City of Tucson, Arizona developed transportation impact fees (Arizona's term for TSDCs) using rates for residential development that vary according to the size of the residence, rather than the type of residence.

In order to develop trip rates by the size of the unit in square feet, one must first find the relationship between average household size and size characteristics reported by the Census Bureau. The most recent and reliable data on average household size by number of bedrooms or rooms when the Tucson study was prepared in 2004 were the five percent sample data from 2000 U.S. Census. The five percent sample data for the City of Tucson were combined with sample data for some other cities and unincorporated portions of Pima County.

The City of Tucson makes up 73 percent of the total population sampled; therefore, the results obtained should be representative. The average household size for all single-family units from the two samples is identical, and for multi-family is almost identical. Because of the nature of the data sources for unit size in square feet, the average household size was varied by rooms for single-family units and by bedrooms for multi-family, as shown in Table 6 on the next page.

Table 6: Average Household Size by Rooms and Bedrooms

Housing Type	Sample Households	Weighted Population	Weighted Households	Avg. HH Size
Single-Family, 4 Rooms or Fewer	1,245	58,662	24,141	2.43
Single-Family, 5 Rooms	1,744	91,937	34,494	2.67
Single-Family, 6 Rooms	1,674	93,632	33,617	2.79
Single-Family, 7 Rooms	1,010	60,023	20,513	2.93
Single-Family, 8 Rooms or More	657	44,646	13,585	3.29
All Single-Family Detached Units	**6,330**	**348,900**	**126,350**	**2.76**
Multi-Family, Efficiency	433	15,132	10,140	1.49
Multi-Family, One Bedroom	1,409	53,483	32,345	1.65
Multi-Family, Two Bedrooms	1,533	78,925	34,582	2.28
Multi-Family, Three Bedrooms	353	23,902	7,885	3.03
Multi-Family, Four Bedrooms or More	72	6,014	1,533	3.92
All Multi-Family Units	**3,800**	**177,456**	**86,485**	**2.05**

Source: U.S. Census Bureau, 2000 Public Use Microdata Sample (PUMS), 5 percent weighted sample data for portions of Pima County including the City of Tucson (PUMAs 201, 202, 204, 206 and 207) for households occupying single-family detached and multi-family units.

The above information on household size by room/bedrooms is combined with the trip rate data by household size presented in another document to derive peak hour trip rates by the size of the unit, represented by rooms and bedrooms, as shown in Table 7.

Table 7: Peak Hour Trips by Rooms and Bedrooms

Housing Type	Avg. HH Size	Peak Hr Trips
Single-Family, 4 Rooms or Fewer	2.43	0.806
Single-Family, 5 Rooms	2.67	0.860
Single-Family, 6 Rooms	2.79	0.884
Single-Family, 7 Rooms	2.93	0.917
Single-Family, 8 Rooms or More	3.29	0.983
All Single-Family Detached Units	**2.76**	**0.872**
Multi-Family, Efficiency	1.49	0.488
Multi-Family, One Bedroom	1.65	0.546
Multi-Family, Two Bedrooms	2.28	0.683
Multi-Family, Three Bedrooms	3.03	0.822
Multi-Family, Four Bedrooms or More	3.92	0.983
All Multi-Family Units	**2.04**	**0.628**

Source: Average household sizes from Table 22; peak hour trips derived from Table 21 using linear interpolation.

To determine a relationship between the unit square footage and peak hour trip rates, a data set was compiled with information on the square footage of dwelling units from single-family detached and multi-family units derived from two different data sources. For single-family detached units, the Pima County Tax Assessor data for the 2004 tax year was analyzed. Tax Assessor data give total living space in square feet and the total number of rooms for the majority of single-family homes in the City of Tucson.

Data from the Arizona Multi-Family Housing Association provides information on all apartment complexes in the City of Tucson consisting of 20 or more units. This information includes the number of dwelling units by floor plan, and the floor plan information includes number of bedrooms and square footage. From these two data sources, a stratified random sample was taken that was distributed in the same proportion by housing type and size (rooms for single-family and bedrooms for multi-family) as households from the 2000 Census.

The combined data base consisted of information on 10,000 single-family detached and multi-family dwelling units. To this data base, a variable for peak hour trips was added, based on housing type and number of bedrooms or rooms shown in the preceding table. Regression analysis was then performed to determine the relationship between unit size in square feet and persons residing in the unit. Housing type turned out to be significant, with single-family and multi-family units displaying much different relationships.

Both linear and logarithmic regressions were performed for single-family detached and multi-family data sets. In both cases, logarithmic equations were determined to provide the best explanation of the data. The curves are shown in Figure 1.

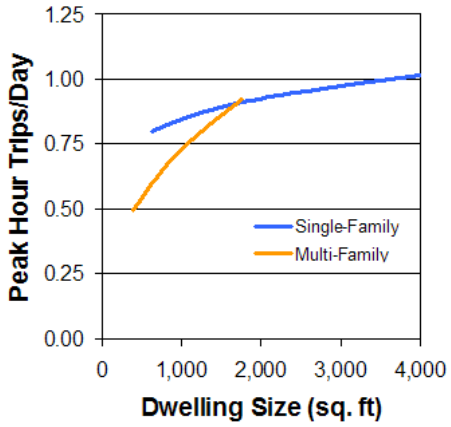

Figure 1. Relationship of Trips to Size

While the equations for single-family detached and apartment units are very different, there is actually relatively little overlap and at 1,125 square feet, the midpoint of the 1,000 to 1,250 square feet category, the two equations produce the identical result. Only 2.2 percent of the apartment units in the sample are larger than 1,250 square feet, and while 21.6 percent of the single-family units in the sample are less than 1,000 square feet, it is unlikely that very many homes that size are being built in Tucson today. Consequently, the progressive residential rates were based on the multi-family equation for up to 1,000 square feet, and on the single-family equation for the larger size categories.

Using the regression equations, peak hour trip rates were derived for 12 square footage size categories. The two curves intersect in the 1,250 to 1,500 square foot range. Since the multi-family equation yields the lower trip rate estimates, and since relatively few single-family units are being built in the lower size range, the multi-family equation is used for unit sizes less than 1,500 square feet, and the single-family equation for larger units. The results are shown in Table 8.

Table 8. Residential Road Impact Fees by Size Category

Housing Type/Size Category	Midpoint	Peak Hour Trips	Road Fee
Less than 500 sq. ft.	375	0.48	$2,186
500 - 749 sq. ft.	625	0.60	$2,743
750 - 999 sq. ft.	875	0.69	$3,198
1,000 - 1,249 sq. ft.	1,125	0.76	$3,462
1,250 - 1,499 sq. ft.	1,375	0.83	$3,829
1,500 - 1,999 sq. ft.	1,750	0.91	$4,196
2,000 - 2,999 sq. ft.	2,500	0.95	$4,386
3,000 - 3,999 sq. ft.	3,500	0.99	$4,562
4,000 sq. ft. or more	4,500	1.03	$4,738

Source: Duncan Associates and James C. Nicholas, *Road and Park Impact Fee Study for the City of Tucson*, June 2004

13. Service Areas

Component of TSDC Methodology: Geographical area(s) subject to TSDCs.

Current (2006) Methodology The County and City have a Joint Area TSDC, which is separate from the Countywide TSDC that applies to the remaining unincorporated area. Each existing TSDC service area collects TSDCs from development in its service area for transportation projects in its service area.

Alternative Methodology The unincorporated area of the County could be divided into more than one service area in order to reflect different functional classifications of roads, and therefore the differences in the characteristics of urban and rural areas. Seminole County, Florida developed a countywide service area for major arterials because they serve most areas of the county. The minor arterials and collector roads in Seminole County were assigned to one of four smaller service areas that reflected the urban or rural character of different areas of the county. Development anywhere in the unincorporated area would pay two impact fees, one to the countywide service area for major arterials, and the second to one of the four smaller areas for minor arterials and collector roads.

Also, alternative service areas may be needed if the County pursues a Multimodal Mixed-Used Area (MMA). There are two potential alternatives:

1. Create a third service area for the MMA, and reduce the boundaries of the Joint Area and the unincorporated County service areas; or,
2. Leave the existing district boundaries in place, but create an overlay district for the MMA. Development in the MMA would pay two TSDCs, one to the existing district (County or Joint) and a second TSDC to the MMA.

Notes	The City of Portland has two overlay TSDC districts in which development pays the Citywide TSDC and also the Overlay TSDC.
Jurisdiction Using Alternative Method	Seminole County, Florida (districts for functional classifications, therefore urban vs. rural development) City of Portland (overlay districts)

14. Compliance Costs

Component of TSDC Methodology:	Costs incurred to comply with legal requirements for TSDCs.
Current (2006) Methodology	Estimated costs of Transportation System Plan, CIP, SDC Methodology Updates, CIP management, collection of TSDCs, accounting and reporting costs.
Alternative Methodology	Actual costs for the same compliance items.
Notes	The County and City Joint Area TSDCs have been in place since 2006. The County and City now have at least eight years of experience from which they could calculate actual costs and use them as the basis for future compliance costs.
Jurisdiction Using Alternative Method	City of Springfield – costs are tracked across SDC funds, and a uniform percentage (5%) is added to each SDC to recover the costs

15. Adjustments for Mixed Use and Station Areas

Component of TSDC Methodology:	TSDC rate adjustments for mixed use areas and/or development near transit stations.
Current (2006) Methodology	Clackamas County provides for these adjustments in its development code. Mixed-use development can receive reductions of 7-18%, depending on floor area ratio (FAR) and residential/retail/commercial mixtures on the site. Transit oriented development can receive reductions of 5-20% depending on floor area ratio (FAR), proximity to transit, and type of transit system. Applies only to permanent transit routes/lines, such as SAM, CAT, SMART, or TriMet.
Alternative Methodology	Review and update the adjustment data points and move the adjustments to the TSDC methodology report.
Notes	The adjustments should be based on recent data and analysis that should be part of the methodology, rather than in the code where it might be considered a policy decision.
Jurisdiction Using Alternative Method	Bellingham, Washington

16. Indexing Future TSDC Rates

Component of TSDC Methodology:	Basis for revising future TSDC rates during years between updates of the methodology report.
Current (2006) Methodology	The adjustment factor is based on (1) 30% of the change in average market value of undeveloped land, except resource properties, in Clackamas County according to the records of the County Tax Assessor; (2) 35% of the change in construction costs according to the Engineering News Record (ENR) Northwest (Seattle, Washington) Construction Cost Index; and (3) 35% of the Washington State Department of Transportation (WSDOT) Construction Cost Index.
Alternative Methodology	Use one published index as the basis for the annual adjustment of TSDC rates.
Notes	Of the three indices currently used by Clackamas County, the most relevant is the Washington State Department of Transportation Construction Cost index.
Jurisdiction Using Alternative Method	Renton, Washington

Conclusion

The next update of the TSDCs for the Countywide and Joint Area should consider the alternative methodologies described in this memo. The most significant changes will produce TSDCs that are multimodal, financially constrained, based on person trips, charged to consolidated lists of land uses, scaled to the size of residential development, use service areas that reflect the different urban and rural areas, and improve the transparency and administration of the program.