



TRANSPORTATION IMPACT FEE TECHNICAL REPORT

City of Redmond Department of Planning and Community Development
August 19th, 2014

Contents

Introduction.....	1
Overview.....	1
Methodology.....	1
Estimating Travel Demand for Individual Developments	2
Land Uses, ITE Land Use Code, and Standard of Measure – Columns B, C, and D..	3
BKR Daily Production and Attraction Rates – Column E	4
ITE Trip Rates and Conversion Factors – Columns F, G, L, and M.....	6
Net New Trips – Columns N and O	6
Trip Length Calculations – Columns P, Q, and R.....	7
Normalizing to Within-City Averages - Columns Q and R	8
Final Person-Mile of Travel Rates by Geographic Area– Columns S, T, and U	8
Custom Mode Split Adjustment – Columns W, X, Y, and Z.....	9
Setting the Price of a Mobility Unit.....	11
Calculating the Impact Fee Charge	13
Independent Studies.....	13
Conclusion	13

Introduction

This document describes the basic concept behind transportation impact fees in Redmond and provides a detailed review of the methodology used to calculate them. The methodology described in this report was adopted by the Redmond City Council on August 19th, 2014.

Overview

Impact fees are charges assessed by local governments on development projects to offset the cost of growth-related infrastructure. In Redmond, developers pay fire, parks, transportation, and school impact fees.

Redmond's transportation impact fee assessments are determined by 1) evaluating the amount of travel demand that a development project will place on the transportation system, and 2) charging the developer for a proportion of the cost of the infrastructure needed to serve that growth. Revenues from these fees may only be used to pay for projects needed to accommodate growth—not for projects that address maintenance and existing deficiencies, or for off-street pedestrian and bicycle paths. Impact fee rates are also scaled to ensure that the City collects only the revenues needed to fund the proportion of these growth-related projects that is attributable to development within Redmond. The remaining transportation funding comes from other sources including grants, the business tax, and the real estate excise tax.

Methodology

Transportation impact fees are calculated when a developer applies for a building permit from the City of Redmond. City planners estimate the amount of travel that the development will generate during the PM peak hour of travel (aka “rush hour”) and multiply that estimate by the price of a unit of PM peak hour travel as determined by the City. This calculation yields the transportation impact fee assessment to be paid by the developer.

Both of these concepts—the individual project travel estimate and the cost per unit of travel—are explained in detail below.

Estimating Travel Demand for Individual Developments

The first figure needed to generate an impact fee assessment is an estimate of how much travel demand a development will place on the transportation system. The unit of measure for this travel demand is the PM peak hour person-mile of travel, also known as a mobility unit. One mobility unit is one person traveling one mile during the peak hour. For example, an individual walking one mile represents one mobility unit; two people traveling together in a car for one mile represents two mobility units.

The mobility units generated by a development project are estimated using the Person-Mile Calculator. The Calculator is a spreadsheet populated with data and adjustment factors used to estimate how many mobility units of demand a development will generate. It uses a variety of data sources, including local data from the 2010 Redmond Household and Employee Travel Survey, the 2013 City of Redmond version of the Bellevue-Kirkland-Redmond (BKR) travel model, the Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition), and ITE Trip Generation Handbook (2nd Edition).

The Person-Mile Calculator takes the following factors into account when estimating mobility units:

- Person trip generation
- Net new trip rates
- Trip length
- Portion of the trip that occurs within Redmond
- Mode split

Following is a step-by-step explanation of the calculations that yield the final mobility unit estimate. The descriptions refer to rows, columns, and cells in the ‘Person-Mile Calculator’ tab of the City’s “Person Mile Calculator v12” spreadsheet. For example, the Retirement Community land use is in row 12, the BKR daily production and attraction rates for different land uses are in column E, and the BKR daily production and attraction rate for retirement communities is in cell E12 (outlined in red in the following figure).

	A	B	C	D	E	F
1	Person-Mile Calculator					
2						
3				(1)	(2)	(3)
4				Standard of Measure (1)	BKR Daily Prod + Attr	Basic Rate Daily Trips/Unit (ITE 9)
5		Land Uses	ITE Land USE Code			
6						
7						
8		<u>Residential</u>				
9		Single Family	210	dwelling	13.800	9.52
10		Multiple Family	220	dwelling	10.920	6.65
11		Residential Suites		dwelling	6.660	3.18
12		Retirement Community	251	dwelling	6.340	3.68
13		Nursing Home	620	bed	4.721	2.74
14		Congregate Care/Asst Living	253	dwelling	3.480	2.02
15		Hotel/Motel	310	room	10.920	8.17

Land Uses, ITE Land Use Code, and Standard of Measure – Columns B, C, and D

These columns list the relevant land use types (e.g., residential), their sub-categories (e.g., single family home), the associated code number from the ITE Trip Generation manual, and unit of measure (e.g., dwelling unit). The list of land uses includes housing, commercial, and industrial categories. Cell D12 above indicates that the Retirement Community land use with ITE Land Use Code 251 will display person-mile results per dwelling unit.



BKR Daily Production and Attraction Rates – Column E

Dark blue cells in this column display the calculated daily production and attraction rates from the City of Redmond version of the BKR Model¹. These rates include all modes, including pedestrian, bicycle, transit, and automobile. The City of Redmond BKR model estimates person trip generation based on the number of persons, workers, and children present in the household. The model's estimate of person trip generation is in turn based on the City of Redmond Household and Employee Travel Survey, which was conducted in 2010 to support the model update². For each of these categories, data from the 2010 US Census were used to determine the number of persons per each type of residential development³. From the Census data, the following assumptions were made about worker-status and presence of children.

Residential

The average owner-occupied household in Redmond contains 2.57 persons, so the Single Family category assumes a 3-person household with 2 workers and 1 child, which yields 13.8 daily person-trips (cell E9).

Multiple-family households assume 2 workers and no children based on the American Community Survey's Redmond average of 2.09 persons per renter-occupied household, yielding 10.92 daily person-trips (cell E10).

Residential suites apply trip rates for a single worker, producing 6.66 daily person-trips (cell E11). US Census bureau data indicate that only 3% of rental households have more than one occupant per room. Therefore, studio apartment-style units such as residential

¹ There are fewer land use categories in the City of Redmond model than in the spreadsheet. Redmond's travel model, like all travel models in the region has a simplified set of land use categories since widespread detailed data on specific land use categories is not available, particularly for future conditions. Therefore more generic land use categories (e.g., retail, office, industrial) are used in the model.

² The City of Redmond Household and Employee Travel Survey evaluated the travel choices and patterns of both residents and employees who live/work in Redmond. The travel survey asked people about how many trips they take during the day, when they take trips, which mode they use, where they were going, and other travel questions. This data is summarized for the entire city and used to calibrate the travel model so that trip generation, average trip length, mode choice are all accurately modeled across the City.

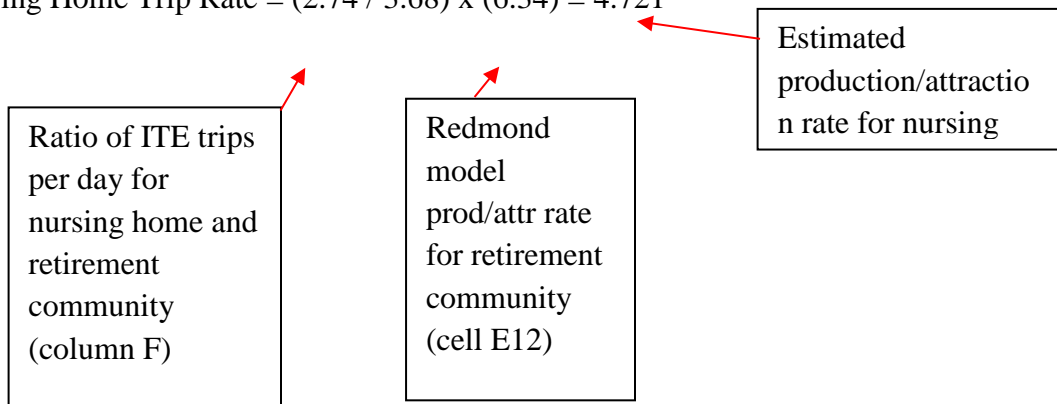
³ The City of Redmond travel model contains more than 250 trip generation rates for residential land uses based on different combinations of persons, workers, and children in the household. For each traffic analysis zone (TAZ) in the city, there is a distribution of households across the categories that is based on the US Census Bureau's Public Use Microdata Sample. Rather than aggregate the TAZ data across the entire City, the project team used summary statistics from the US Census Bureau to identify an "average" household-type for each land use category.

suites are assumed to have only one resident on average, compared to 2.09 for rental housing in general.

Retirement communities employ trip rates for a single non-worker, yielding 6.34 daily person-trips (cell E12).

Light blue cells estimate trip rates by factoring the “core” trip rates defined above. The factoring is based on the ratio of ITE Daily Vehicle Trips between the core use and the non-core use. For example, to estimate the daily productions and attractions for a nursing home (non-core use), the ratio of the ITE daily vehicle trip generation rates for nursing homes and retirement communities is calculated. This ratio is then multiplied by the Redmond model’s production/attraction rate for the retirement community (a core use). See below:

$$\text{Nursing Home Trip Rate} = (2.74 / 3.68) \times (6.34) = 4.721$$



Congregate Care/Assisted Living follows the same procedure. Hotel/Motel is set equal to the trip rate for multiple-family households since the ITE vehicle trip generation rates for hotel/motel uses and multifamily are very similar.

Commercial and Industrial

The dark blue cells (E29, E41, E54, E61) indicate daily person trip rates for the Education, Retail, Commercial Office (finance, insurance, real estate, and services), and Industrial employment sectors, respectively. These rates were derived directly from Redmond travel model assumptions for person trip rates by employment sector. For retail and commercial office, the land use table has several categories based on the square footage of the development. As described in footnote one above, the Redmond model has generic assumptions for commercial and industrial land uses. In other words, the average

trip rate assumed in the model does not change based on the size or amount of development entered in the model. To link this generic land use assumption from the Redmond travel model to the more detailed land use data in the spreadsheet, the output of the Redmond model was compared to the daily trip data from ITE⁴. From this comparison, the team determined that the Redmond travel model retail trip rate and commercial office trip rate were consistent with a 100,000-199,999 square foot development. This size of development is typical of a retail strip center or office park development in Redmond.

Light blue cells were derived by applying an adjustment factor based on ITE daily vehicle trip rates in the same manner as residential uses. The categories of Services (rows 17 – 26) and Restaurants (rows 34 – 36) are derived from the 100,000 – 199,999 square foot Retail Shopping Center category in cell E41.

ITE Trip Rates and Conversion Factors – Columns F, G, L, and M

The Redmond impact fee program is based on PM peak hour person-miles of travel (mobility units). Columns F, G, L, and M convert the estimated daily person trip generation rate to a PM peak hour person trip generation rate. Similar to how the “non-core” person trip generation rates were calculated, the PM peak hour person trip generation rates are estimated using the ratio of daily to PM peak hour trip generation from the ITE Trip Generation manual. Columns F and G come directly from the Trip Generation Manual for each land use category.

Column L is the proportion of ITE PM peak hour vehicle trips to ITE daily vehicle trips, or Column G divided by Column F. Column M then applies this daily to PM conversion factor to the estimated daily person trip rate from Column E to produce an estimated PM person trip rate.

Net New Trips – Columns N and O

Some types of land uses generate “pass-by” trips. These are trips that enter a property because someone happens to be passing by on their way to another destination. These trips do not contribute to an impact fee assessment because they do not place additional

⁴ The City of Redmond travel model estimates person trips, while the ITE Trip Generation Manual estimates vehicle trips. To relate person trips to vehicle trips, the Redmond model output was scaled by average vehicle occupancy data from City of Redmond Household and Employee Travel Survey.

demand on the transportation system. Common pass-by trips include convenience trips (e.g., trip to a dry cleaner or fast food restaurant) and some recreational trips (a stop at a park or field to walk a dog). Columns N and O adjust the PM peak hour person trip generation rate to account for pass-by trips. Column N displays the percentage of trips produced by each land use that are not pass-by. The percentages in Column N are from the ITE Trip Generation Handbook, 2nd Edition (2004). Column O multiplies the PM peak hour person trip rate by the proportion of new trips to produce a new person trip rate for each land use, with pass-by trips removed.

Trip Length Calculations – Columns P, Q, and R

The previous columns address how many trips people make in Redmond on average. The next step in calculating person-mile rates is determining how far people typically go to make these trips. Column P uses the average trip lengths from the 2010 Redmond Household and Employee Travel Survey for the three basic trip types – Home-Based Work, Home-Based Other, and Non-Home-Based. Each land use category assumes some combination of these trip purposes.

Residential

One third Home-Based Work, two thirds Home-Based Other. Trip lengths based on household travel survey data.

Commercial Services, Institutional, Restaurant, Retail Shopping Center – all Home-Based Other

Trip lengths based on blended household and employment trip lengths. This blended rate is an output of the calibrated City of Redmond travel model and is set to match observed travel data such as traffic volumes and regional VMT totals.

Commercial Office

All Home-Based Work. Trip lengths based on employee travel survey data.

Industrial

All Home-Based Work. Trip lengths based on employee travel survey data.

Normalizing to Within-City Averages - Columns Q and R

The Redmond travel model estimates that one third of a typical trip beginning or ending in Redmond takes place on streets within the city, and the rest occurs outside the city limits. These columns in the Person-Mile Calculator adjust the average trip length for each land use to account for this fact and ensure that only in-city travel is counted.

	A	B	P	Q	R
1	Person-Mile Calculator				
2					
3			(9)	(10)	(11)
4			Average Trip Length from 2010 Redmond Travel Diary (miles)	Normalize Trip Length to Within-City Average	Calculated within-City Average (miles)
5		Land Uses			
51		Commercial -			
52		Administrative Office			
53		up to 99,999	7.33	0.33	2.4
54		100,000-199,999	7.33	0.33	2.4
55		200,000-299,999	7.33	0.33	2.4
56		300,000 and over	7.33	0.33	2.4
57		Medical Office/Clinic	7.33	0.33	2.4
58					
59		Industrial			
60		Light Industry/Manufacturing	8.60	0.33	2.8
61		Industrial Park	8.60	0.33	2.8
62		Warehousing/Storage	8.60	0.33	2.8
63		Mini Warehouse	8.60	0.33	2.8

Final Person-Mile of Travel Rates by Geographic Area– Columns S, T, and U

With the person trip rate (Column O) and average within-City trip length (Column R) now known, Columns S, T, and U calculate the person-mile rates for each land use,



adjusted by activity center within Redmond (Downtown, Overlake, and Rest of City). Cells S6, T6, and U6 make adjustments for the location of the land use within the City due to different mode splits and average trip distances by mode in certain districts (cells W9, X9, Y9, and Z9). Compared to the City-wide average, trips in the Downtown area are ten percent shorter (when accounting for travel by all modes) (cell S6), trips in the Overlake area are seven percent shorter (cell T6), and trips in the rest of the City are ten percent longer (cell U6).

	A	B	S	T	U
1	Person-Mile Calculator				
2					
3			(13)		
4			Activity Center Person-Mile Rates		
5		Land Uses	Downtown	Overlake	Rest of City
6			0.90	0.93	1.10
7					
8		Residential			
9		Single Family	2.74	2.84	3.36
10		Multiple Family	1.93	1.99	2.36
11		Residential Suites	1.17	1.22	1.44
12		Retirement Community	0.88	0.91	1.08
13		Nursing Home	0.72	0.74	0.88
14		Congregate Care/Asst Living	0.55	0.57	0.68
15		Hotel/Motel	1.86	1.93	2.28

Custom Mode Split Adjustment – Columns W, X, Y, and Z

Columns W, X, Y, and Z allow a user to manually vary the mode split (but not the average trip length by mode). To enter custom mode splits, the values in row 6 must be updated appropriately and the dropdown box in Cell Y7 must be set to “Y.” This change will update the PMT estimates using the new mode splits for all Redmond activity centers

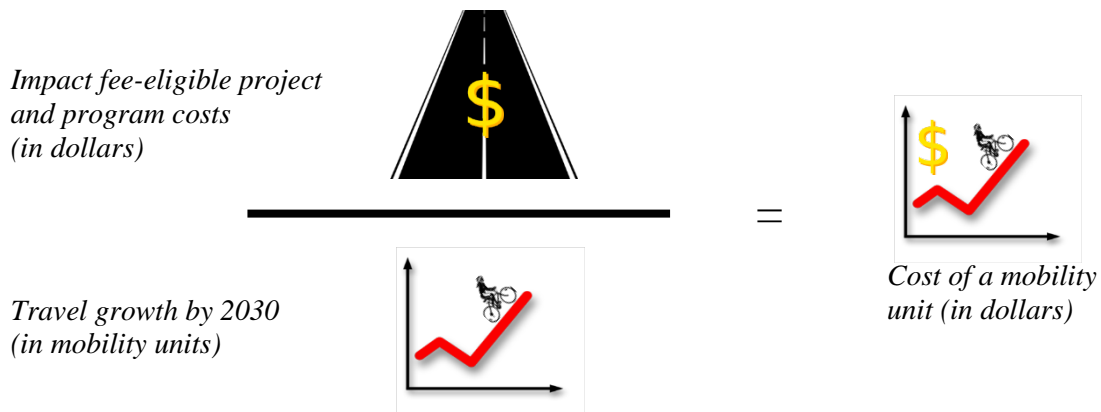
and all land use categories. In this way, the updated person-mile generation rate of a given land use category with the manually-entered mode split can be estimated.

	V	W	X	Y	Z
1					
2					
3		(14)			
4		From 2010 Redmond Travel Survey			
5		SOV	HOV	Transit	Walk / Bike
6		63%	27%	5%	5%
7		Custom mode splits? (Y/N)		N	VALID
8		City Average	Downtown	Overlake	Rest of City
9		5.41	4.84	5.01	5.93

	V	W	X	Y	Z
1					
2					
3		(14)			
4		From 2010 Redmond Travel Survey			
5		SOV	HOV	Transit	Walk / Bike
6		20%	0%	0%	80%
7		Custom mode splits? (Y/N)		Y	VALID
8		City Average	Downtown	Overlake	Rest of City
9		5.41	1.46	1.52	1.72

Setting the Price of a Mobility Unit

The sections above describe how the Person-Mile Calculator estimates the number of mobility units that a given development will generate. The other number needed to calculate an impact fee assessment is the price of a mobility unit. This price is determined by dividing the total cost of impact fee-eligible projects and program by the number of



new mobility units that Redmond’s transportation system will serve by the year 2030.

The growth-oriented project list is a subset of the City’s Transportation Facilities Plan (TFP): the 18-year list of transportation projects and programs that are necessary to maintain the transportation system, accommodate growth, and advance the City’s vision. This subset of project and program costs is referred to as the “fee-eligible” portion of the TFP, or “eligible costs” (see the “Eligible Costs” tab of the “ImpactFeeRedmond_Final_2014” spreadsheet). Excluded from eligible costs are maintenance projects, off-street pedestrian and bicycle projects, and most programmatic expenses since these generally address existing deficiencies in the system or fund non-capital activities such as the transportation demand management programs or transit service. Eligible costs are further reduced to reflect the proportion of travel demand growth that is due to development within Redmond, as estimated by the Redmond version of the BKR travel model. Impact fee-eligible costs amount to approximately \$130.9M, or 34% of the full TFP.

Exhibit A-1					
ELIGIBLE COSTS BY PROJECT GROUP					
Group #	Description	Project Costs (Total)	Percent of New Project Traffic due to Growth within City	Project Costs Allowable for Impact Fees	
1	North + West Redmond	\$17,038,568	52.9%	\$9,010,982	
2	SE Redmond	\$59,956,568	55.2%	\$33,106,948	
3	Downtown	\$44,750,764	68.6%	\$30,679,809	
4	Overlake	\$81,902,000	56.2%	\$46,044,874	
5	Programs	\$61,600,000	19.6%	\$12,088,270	
Total				\$130,930,883	
PMT Growth				64,829	
Cost per PMT				\$2,020	

The next step in calculating the price per mobility unit is to divide this eligible cost figure by the number of new mobility units that Redmond’s transportation will serve by 2030. This citywide travel growth figure is estimated using a method similar to that used for individual developments as described above, however the citywide version of the PMT Calculator uses a collapsed set of land use categories that correspond to the broad land use categories used as inputs by the BKR travel model.

Person Mile Travel Calculator						
Land Uses	ITE Land USE Code	Standard of Measure (1)	BKR Daily Prod + Attr (2)	Basic Rate Daily Trips/Unit (ITE 9) (3)	Basic Rate PM Peak Trips/Unit (ITE 9) (4)	
Residential						
Single Family	210	dwelling	13.800	9.52	1.00	
Multiple Family	220	dwelling	10.920	6.65	0.62	
Commercial - Services						
Hotel/Motel	310	room	10.920	8.17	0.60	
Commercial - Institutional						
School	520	student	1.115	1.29	0.15	
Commercial - Retail Shopping Center						
Retail Shopping	820	sq ft/GLA	71.748	58.93	5.24	
Commercial - Administrative Office						
Office	710,715, 750	sq ft/GFA	14.016	11.91	1.64	
Industrial						
Industrial	130	sq ft/GFA	7.436	6.83	0.85	

The tool estimates the per-unit person-mile rates for these seven land uses and then multiplies those rates by the amount of growth anticipated in each category, by area of



the city (Downtown, Overlake, and the rest of the city). These subtotals are summed to yield the total PMT growth expected within Redmond by 2030. In the current system that equals 64,829 mobility units.

The last step in calculating the cost per mobility unit is to divide the eligible costs by the growth in mobility units: $\$130,930,883 / 64,829$ mobility units = \$2,020 per mobility unit. After applying a 5.38% escalation factor to account for construction cost inflation since the adoption of the TFP, we arrive at the final cost per mobility unit of \$2,128.

Calculating the Impact Fee Charge

The dollar amount of the impact fee assessment is the cost of a mobility unit of demand—\$2,128 in the current system—multiplied by the number of mobility units that a permit applicant will generate given the development land use type and the number of units. For ease of administration this final step is simplified into a lookup table.

Independent Studies

Per RMC 3.10.120 applicants may choose to submit an independent fee calculation study as an alternative to the published rates. Staff review independent studies to confirm that they are prepared by qualified professionals, follow accepted practices and methodologies, and use appropriate data sources. After this review staff may accept the study, reject the study, or request additional information.

Conclusion

This report described an impact fee system that is intended to help fund transportation improvements in as fairly a manner as possible, using up-to-date data sources and a methodology that incorporates all modes of travel. City staff will continue working in future years to improve the data and methodology used to calculate transportation impact fees in Redmond.