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DRAFT MEMORANDUM

TO: Mike Kress, Missoula, Montana

FROM: Dwayne Pierce Guthrie, AICP

DATE: April 24, 2007

SUBJECT: **Conversion of Impact Fees to Square Feet of Housing**

This memo documents the methodology for deriving residential impact fees based on the floor area of a single-family housing unit. Benefits of the proposed methodology are summarized below.

1. Progressive fee structure (i.e. smaller units pay less and larger units pay more).
2. More precise assessment of infrastructure demand using local demographic data.
3. Enhanced vertical equity (i.e. distributes burdens fairly across people with different abilities to pay).

To derive impact fees by floor area of housing requires a linkage of demographic data from the U.S. Census Bureau and house size data from the Department of Revenue, with number of bedrooms as the common connection between the two databases. OPG staff provided City of Missoula data on average floor area of single family housing, by bedroom range. Based on the entire housing stock, 14,995 single-family housing units were identified using the Montana Department of Revenue CAMA data file. Average floor area results are shown below for single-family housing units (attached and detached). Multi-family units (apartments) were excluded from the analysis. Useable square footage represents all levels of the structure, including basements and finished attic space (11,535 housing units included basement area and 1,167 had finished attics). The average number of bedrooms fell at three.

- Avg. potential useable square feet = 2,195 (all bedroom sizes together)
- Avg. potential useable square feet 0-2 Bedrooms = 1,442
- Avg. potential useable square feet 3 Bedrooms = 2,265
- Avg. potential useable square feet 4+ Bedrooms = 2,988

Persons per Housing Unit

As shown below, Missoula had 25,225 housing units in 2000. The weighted-average size in 2000 for all housing types was 2.13 persons per housing unit and 2.23 persons per household. According to the U.S. Census Bureau, a household is a housing unit that is occupied by year-round residents. In Missoula, the 2000 census indicates that 4.3% of residential units are vacant or seasonal housing.

TischlerBise recommends that impact fees for residential development in Missoula be imposed according to the floor area of single-family housing units. Demand indicators, such as persons or vehicle trip ends by size of housing unit, are discussed further in the next section. To provide an indication of the demand units and impact fees for average size housing units, the impact fee report indicates typical fees for both single-family and all other housing types. Because single-family housing units are normally larger than all other housing types, they average 2.40 persons per housing unit (see the rows with yellow shading in the table below). All other housing types are normally smaller, averaging 1.68 persons per housing unit (see the rows with light gray shading in the table below).

Population and Households by Units in Structure

Units in Structure	***Renter & Owner***			*Housing Units*	*Persons Per Housing Unit*	*Vacancy Rate*
	Persons	Hsehlds	PPH			
1-Detached	33,383	13,137	2.54	13,534	2.47	2.9%
Mobile Homes	3,624	1,578	2.30	1,615	2.24	2.3%
1-Attached (Townhouse)	1,645	876	1.88	976	1.69	10.2%
Two (Duplex)	3,617	1,698	2.13	1,739	2.08	2.4%
3 or 4	4,669	2,531	1.84	2,699	1.73	6.2%
5 to 9	2,413	1,321	1.83	1,379	1.75	4.2%
10 to 19	1,629	943	1.73	1,052	1.55	10.4%
20 to 49	952	708	1.34	756	1.26	6.3%
50 or more	1,765	1,223	1.44	1,317	1.34	7.1%
Other (Boat, RV, etc.)	0	0		28	0.00	100.0%
Total SF3 Sample Data	53,697	24,015	2.24	25,095		4.3%
SF1 100-Percent Data	53,767	24,141	2.23	25,225	2.13	4.3%

House Type Demographics				*Housing Units*	*Persons Per Housing Unit*	
	Persons	Hsehlds	PPH			Hsg Mix
Single Family	38,652	15,591	2.48	16,125	2.40	64%
All Other Housing Types	15,045	8,424	1.79	8,970	1.68	36%
Group Quarters	3,286					
Sample Difference	70	126		130		
TOTAL	57,053	24,141		25,225		

Source: U.S. Census Bureau, 2000 data.

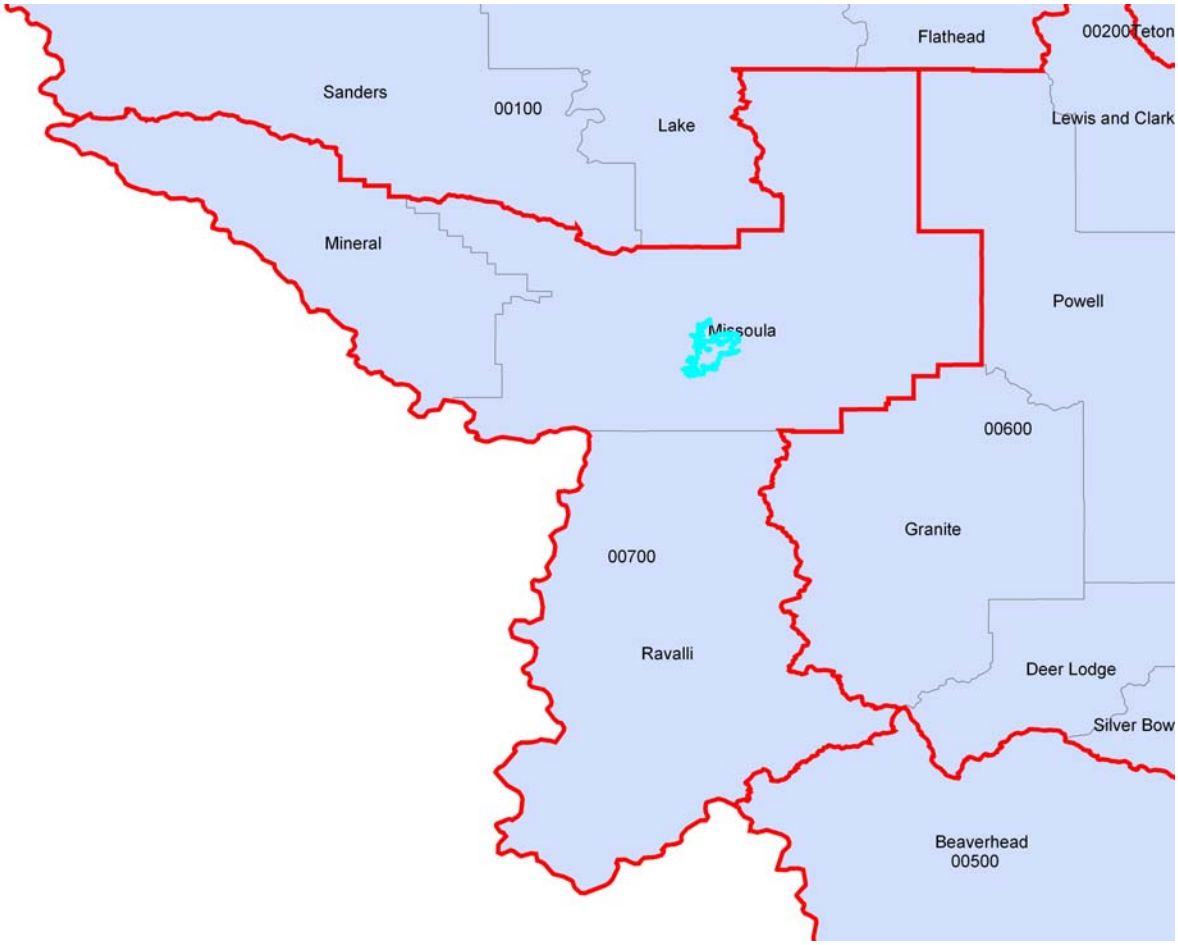
Demand Indicators by Size of Housing Unit

Impact fees often use per capita standards and persons per housing unit or persons per household to derive proportionate-share fee amounts. When persons per housing unit are used in the fee calculations, infrastructure standards are derived using year-round population. When persons per

household are used in the fee calculations, the impact fee methodology assumes all housing units will be occupied, thus requiring seasonal or peak population to be used when deriving infrastructure standards. TischlerBise recommends persons per housing unit multipliers that vary by number of bedrooms and/or residential floor area.

Number of persons by bedroom range may be determined from survey data provided by the U.S. Census Bureau. As shown in the map below, Missoula is in Public Use Microdata Area (PUMA) 00700 along with two other counties (Mineral and Ravalli). PUMAs are areas of roughly 100,000 persons for which the Census Bureau makes available a 5% sample of responses to the long-form census questionnaire. TischlerBise used this data to prepare persons per housing unit multipliers that vary by number of bedrooms. Because the number of persons increases with the number of bedrooms, this approach may be used to make impact fees more "progressive" with higher impact fees imposed on larger housing units and lower impact fees on smaller, more affordable housing.

Map of PUMS Area for Demographic Analysis



The table below indicates persons per housing unit, by number of bedrooms, based on PUMS data for PUMA 00700 (three-county area including Missoula). To avoid sample size problems, TischlerBise aggregated bedroom ranges to derive demographic multipliers for small (2 or less bedrooms), medium (3 bedroom) and large (4 or more bedrooms) housing units.

Unadjusted Persons Per Housing Unit by Bedrooms

Persons

	0-2 Bdrms	*3 Bdrms*	*4+ Bdrms*	*TOTAL*
Single-Family Housing	28,295	47,044	35,433	110,772

Housing Units

	0-2 Bdrms	*3 Bdrms*	*4+ Bdrms*	*TOTAL*
Single-Family Housing	17,071	19,241	11,273	47,585

Persons Per Housing Unit

	0-2 Bdrms	*3 Bdrms*	*4+ Bdrms*	*Wt Avg*
Single-Family Housing	1.66	2.44	3.14	2.33

Source: Data for PUMA 00700 (includes SFD, SFA and MH)
US Census Bureau 2000 Public Use Microdata 5% Sample.

TischlerBise recommends adjusting the persons per housing unit data (shown above) to 2000 census data for the City of Missoula, which had an average of 2.13 persons per housing unit. The calibration multiples each persons per housing unit factor by the ratio of 2.13 divided by 2.33 (unadjusted weighted average shown above). The demographic multipliers shown in the table below will enable Missoula to adopt progressive impact fees by size of housing that are proportionate to the demand for infrastructure.

Persons Per Housing Unit by Bedrooms

City of Missoula, Montana

	0-2 Bdrms	*3 Bdrms*	*4+ Bdrms*	*Wt Avg*
Single-Family Housing	1.52	2.23	2.87	2.13

Source: Census 2000. Weighted average from SF1.

Average Number of Persons by Square Feet of Housing

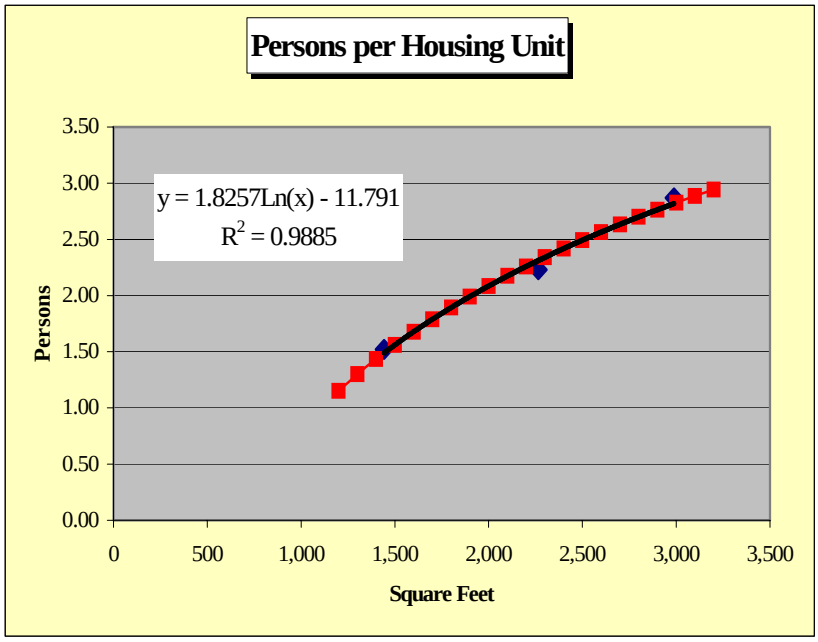
Determining the average number of persons by square feet of single-family housing requires a combination of demographic data from the Census Bureau and house size data from the Department of Revenue, with number of bedrooms as the common connection between the two databases. In Missoula, the average size single-family housing unit with two or less bedrooms has 1,442 square feet of floor area. The average size of a three bedroom single-family unit is 2,265 square feet of floor area. Single-family housing units with four or more bedrooms average 2,988 square feet of floor area. Average floor area and number of persons by bedroom range are plotted on the chart below, with a logarithmic trend line derived from the three actual averages in the City of Missoula. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons by size of single-family housing, using 100 square feet intervals. For the purposed of impact fees in the City of Missoula, TischlerBise recommends a

minimum fee based on a unit size of 1,200 square feet and a maximum fee based on a unit size of 3,200 square feet. For single-family residential units smaller than 1,200 square feet, impact fee will be based on an average of 1.15 persons per housing unit. For single-family units larger than 3,200 square feet, impact fees will be based on an average of 2.94 persons per housing unit.

Persons by Floor Area of Single-Family Housing

City of Missoula, Montana

Actual Averages			*Estimated*	
Bedrooms	*Square Feet*	*Persons*	*Square Feet*	*Persons*
2 or less	1,442	1.52	1,200	1.15
3 bedrooms	2,265	2.23	1,300	1.30
4 or more	2,988	2.87	1,400	1.43
			1,500	1.56
			1,600	1.68
			1,700	1.79
			1,800	1.89
			1,900	1.99
			2,000	2.09
			2,100	2.18
			2,200	2.26
			2,300	2.34
			2,400	2.42
			2,500	2.49
			2,600	2.56
			2,700	2.63
			2,800	2.70
			2,900	2.76
			3,000	2.83
			3,100	2.89
			3,200	2.94



Trip Generation by Size of Housing

In Missoula, the recommended road impact fees are based on average weekday vehicle trip ends. Trip generation rates are from the reference book Trip Generation published by the Institute of Transportation Engineers (ITE, 2003). ITE publishes formulas for deriving trip generation rates based on the number of persons and vehicles available in a residential development. Using year 2000 PUMS data, TischlerBise derived average persons and vehicles available by number of bedrooms, as shown in the following table.

Trip Generation Rates by Number of Bedrooms

Bedrooms	*Persons (1)*	*Trip Ends (2)*	*Vehicles (1)*	*Trip Ends (3)*	*Average Trip Ends*	*Recommended Trip Ends (4)*
Rates per Housing Unit by Bedroom Range						
0-2	1.52	6.69	1.79	10.86	8.78	7.46
3	2.23	9.49	2.15	13.04	11.26	9.57
4+	2.87	11.93	2.51	15.17	13.55	11.52
Wt Avg	2.13	9.10	1.53	9.31	9.20	7.82

(1) Persons and vehicles available per housing unit, by bedroom range, are from Census 2000 Public Use Microdata Sample, 5% data for Montana PUMA 00700.
(2) Vehicle trips ends based on number of persons [ITE, 2003, page 278, fitted curve equation is EXP(0.91*LN(persons)+1.52), r-squared=0.94].
(3) Vehicle trip ends based on vehicles available [ITE, 2003, page 287, fitted curve equation is EXP(0.99*LN(vehicles)+1.81), r-squared=0.96].
(4) Recommended trip ends are scaled down to make the average trip ends for a three bedroom housing unit match the average trip generation rate for a single-family detached unit (ITE, 2003, page 269).

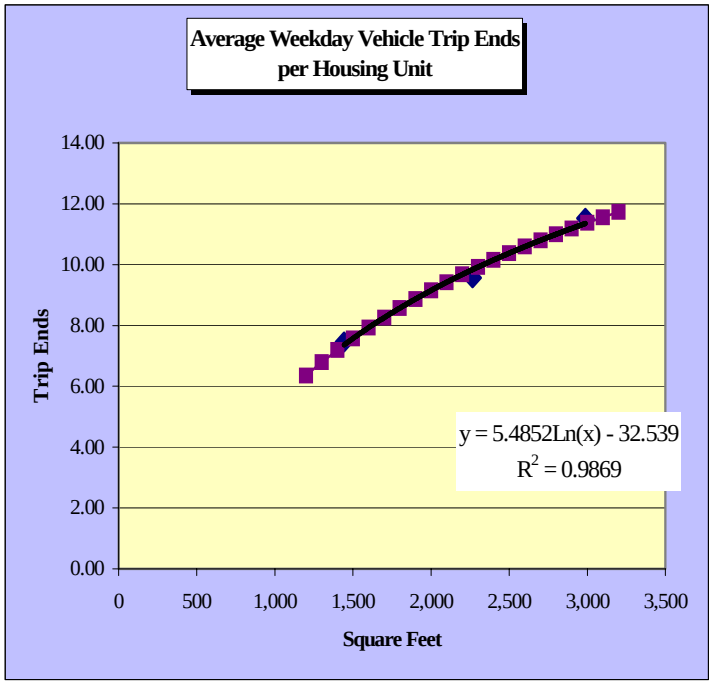
To derive number of vehicle trip ends by square feet of housing TischlerBise combined demographic data from the Census Bureau and house size data from the Department of Revenue that was summarized by OPG staff. The number of bedrooms per housing unit was the common connection between the two databases. In Missoula, the average size housing unit with two or less bedrooms has 1,442 square feet of floor area. The average size of a three bedroom unit is 2,265 square feet of floor area. Single-family housing units with four or more bedrooms average 2,988 square feet of floor area.

Average floor area and number of trip ends by bedroom range are plotted in the chart below, with a logarithmic trend line derived from the three actual averages in the City of Missoula. TischlerBise derived the estimated average number of trip ends and preliminary road impact fees by size of housing, using 100 square feet intervals. The input variables used to derive the road fee are from the draft report dated 3/8/07.

For single-family housing in the City of Missoula, TischlerBise recommends a minimum impact fee based on a unit size of 1,200 square feet and a maximum impact fee based on a unit size of 3,200 square feet. For single-family residential units smaller than 1,200 square feet, the road impact fee will be based on an average of 6.35 vehicle trip ends per housing unit on an average weekday. For single-family units larger than 3,200 square feet, the road impact fees will be based on an average of 11.73 vehicle trip ends per housing unit on an average weekday.

Missoula, Montana

Actual Averages		
Bedrooms	*Square Feet*	*Trip Ends*
two or less	1,442	7.46
three	2,265	9.57
four or more	2,988	11.52



Square Feet	*Trip Ends*	*Road Fee*
1,200	6.35	$1,643
1,300	6.79	$1,757
1,400	7.20	$1,862
1,500	7.58	$1,960
1,600	7.93	$2,052
1,700	8.26	$2,138
1,800	8.58	$2,219
1,900	8.87	$2,296
2,000	9.15	$2,369
2,100	9.42	$2,438
2,200	9.68	$2,504
2,300	9.92	$2,567
2,400	10.15	$2,628
2,500	10.38	$2,686
2,600	10.59	$2,741
2,700	10.80	$2,795
2,800	11.00	$2,846
2,900	11.19	$2,896
3,000	11.38	$2,944
3,100	11.56	$2,991
3,200	11.73	$3,036