

# **Service Area Report and Impact Fee Study**

Prepared for:  
**Missoula, Montana**

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## Table of Contents

<b>Executive Summary</b> .....	<b>1</b>
<b>Montana Impact Fee Enabling Legislation</b> .....	<b>2</b>
Public Facilities .....	2
Service Area Report .....	2
<b>Legal Framework</b> .....	<b>3</b>
<b>Methodology</b> .....	<b>4</b>
Conceptual Impact Fee Calculation .....	6
Evaluation of Credits .....	6
<b>Impact Fees</b> .....	<b>7</b>
<b>Current Impact Fees</b> .....	<b>8</b>
<b>Proposed Impact Fees</b> .....	<b>9</b>
<b>Difference Between Current and Proposed Impact Fees</b> .....	<b>10</b>
<b>Community Services Service Area Report</b> .....	<b>11</b>
Service Area .....	11
Cost Allocation .....	11
Service Demand Units .....	12
<b>Existing Conditions and Level-of-Service Standards</b> .....	<b>14</b>
Facilities .....	14
Vehicles and Equipment .....	15
<b>Projected Service Demand Units and Demand for Services</b> .....	<b>16</b>
Facilities .....	16
Vehicles and Equipment .....	17
<b>Community Services Impact Fees</b> .....	<b>18</b>
Revenue Credits .....	18
Proposed Community Services Impact Fees .....	18
<b>Projected Community Services Impact Fee Revenue</b> .....	<b>20</b>
<b>Fire Service Area Report</b> .....	<b>21</b>
Service Area .....	21
Cost Allocation .....	21
Service Demand Units .....	22
<b>Existing Conditions and Level-of-Service Standards</b> .....	<b>24</b>
Facilities .....	24
Apparatus .....	25
<b>Projected Service Demand Units and Demand for Services</b> .....	<b>27</b>
Facilities .....	27
Apparatus .....	28
<b>Fire Impact Fees</b> .....	<b>29</b>
Revenue Credits .....	29
Proposed Fire Impact Fees .....	29
<b>Projected Revenue from Fire Impact Fees</b> .....	<b>31</b>
<b>Law Enforcement Service Area Report</b> .....	<b>32</b>
Service Area .....	32
Cost Allocation .....	32
Service Demand Units .....	33

<b>Existing Conditions and Level-of-Service Standards .....</b>	<b>35</b>
Stations .....	35
Evidence Storage.....	36
Facilities Debt Credit .....	37
<b>Projected Service Demand Units and for Demand for Services .....</b>	<b>38</b>
Stations .....	38
Evidence Storage.....	39
<b>Law Enforcement Impact Fees.....</b>	<b>40</b>
Revenue Credits .....	40
Proposed Law Enforcement Impact Fees.....	40
<b>Projected Law Enforcement Impact Fee Revenue .....</b>	<b>42</b>
<b>Parks and Open Space Service Area Report.....</b>	<b>43</b>
Service Area.....	43
Cost Allocation .....	43
Service Demand Units .....	44
<b>Existing Conditions and Level-of-Service Standards .....</b>	<b>45</b>
Community/Regional Park Land.....	45
Park Amenities .....	46
Trailheads .....	48
Vehicles and Equipment.....	49
2014 Parks & Trail Bond Credit .....	50
2018 Open Space Bond Credit .....	51
<b>Projected Service Unit Demand and Demand for Services .....</b>	<b>52</b>
Community/Regional Park Land.....	52
Park Amenities .....	53
Trailheads .....	54
Vehicles and Equipment.....	55
<b>Parks and Open Space Impact Fees .....</b>	<b>56</b>
Revenue Credits .....	56
Proposed Parks and Open Space Impact Fees .....	56
<b>Projected Parks and Open Space Impact Fee Revenue.....</b>	<b>58</b>
<b>Transportation Service Area Report.....</b>	<b>59</b>
Service Area.....	59
Cost Allocation .....	59
Service Demand Units .....	59
Trip Rate Adjustments.....	59
Commuter Trip Adjustment .....	59
Adjustment for Pass-By Trips .....	59
<b>Existing Conditions and Level-of-Service Standards .....</b>	<b>61</b>
Complete Streets.....	61
Improved Intersections .....	62
Commuter Trails.....	63
2018 Open Space Bond Credit .....	64
<b>Projected Service Unit Demand and Demand for Services .....</b>	<b>65</b>
<b>Transportation Impact Fees .....</b>	<b>66</b>

Revenue Credits .....	66
Proposed Transportation Impact Fees .....	66
<b>Projected Transportation Impact Fee Revenue.....</b>	<b>68</b>
<b>Appendix A: Land Use Assumptions.....</b>	<b>69</b>
<b>Summary of Growth Indicators .....</b>	<b>70</b>
<b>Residential Development.....</b>	<b>71</b>
Persons per Housing Unit.....	72
Current Estimate of Population and Housing Units .....	73
Projected Population and Housing Units .....	74
<b>Nonresidential Development .....</b>	<b>75</b>
Current Estimate of Nonresidential Floor Area and Employment .....	76
Projected Nonresidential Floor Area and Employment .....	77
<b>Average Weekday Vehicle Trips .....</b>	<b>78</b>
Trip Rate Adjustments.....	78
Commuter Trip Adjustment .....	78
Adjustment for Pass-By Trips .....	78
Average Residential Vehicle Trip Rates .....	78
<b>Demand Indicators by Dwelling Size.....</b>	<b>79</b>
Missoula Control Totals.....	79
Demand Indicators by Dwelling Size .....	80
Persons by Dwelling Size .....	81
Trip Generation by Dwelling Size .....	82
Vehicle Trip Ends by Dwelling Size .....	83
Functional Population .....	84
<b>Development Projections.....</b>	<b>85</b>
<b>Appendix B: Person Trips.....</b>	<b>86</b>
<b>Person Trip Methodology.....</b>	<b>86</b>
Residential Vehicle Trip Ends .....	86
Nonresidential Vehicle Trip Ends .....	88
<b>Mode Share and Vehicle Occupancy.....</b>	<b>89</b>
<b>Calculation of Person Trip Ends .....</b>	<b>90</b>
Trips Adjustment Factors .....	91
Person Trips by Mode .....	92
<b>Appendix C: Land Use Definitions .....</b>	<b>93</b>
<b>Residential Development.....</b>	<b>93</b>
<b>Nonresidential Development .....</b>	<b>94</b>
<b>Appendix D: PUMA Reference Map .....</b>	<b>95</b>
<b>Appendix E: Community Services Vehicles and Equipment .....</b>	<b>96</b>

## EXECUTIVE SUMMARY

The City of Missoula, Montana, contracted with TischlerBise to document land use assumptions, prepare the Service Area Report, and update impact fees within the applicable service areas pursuant to Montana Code 7-6-16 (hereafter referred to as the “Enabling Legislation”). Governmental entities in Montana may assess impact fees to offset infrastructure costs to the governmental entity for public facilities needed to serve future development. For each public facility for which an impact fee is imposed, the governmental entity shall prepare and approve a service area report. The impact fees must (1) be reasonably related to and reasonably attributable to the development's share of the cost of infrastructure improvements made necessary by the new development and (2) may not exceed a proportionate share of the costs incurred or to be incurred by the governmental entity in accommodating the development.

Impact fees are one-time payments used to construct system improvements needed to accommodate future development, and the fee represents future development's proportionate share of infrastructure costs. Impact fees may be used for infrastructure improvements or debt service for growth-related infrastructure. In contrast to general taxes, impact fees may not be used for operations, maintenance, replacement, or correcting existing deficiencies.

This update of Missoula's Service Area Report and associated update to its impact fees includes the following public facilities:

1. Community Services
2. Fire
3. Law Enforcement
4. Parks and Open Space
5. Transportation

## Montana Impact Fee Enabling Legislation

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The Enabling Legislation governs how impact fees are calculated for governmental entities in Montana.

### Public Facilities

Under the requirements of the Enabling Legislation, impact fees may only be used for construction, acquisition, or expansion of public facilities made necessary by new development. "Public Facilities" means any of the following categories of capital improvements with a useful life of 10 years or more that increase or improve the service capacity of a public facility:

1. a water supply production, treatment, storage, or distribution facility;
2. a wastewater collection, treatment, or disposal facility;
3. a transportation facility, including roads, streets, bridges, rights-of-way, traffic signals, and landscaping;
4. a storm water collection, retention, detention, treatment, or disposal facility or a flood control facility;
5. a police, emergency medical rescue, or fire protection facility; and
6. other facilities for which documentation is prepared as provided in 7-6-1602 that have been approved as part of an impact fee ordinance or resolution by:
  - a. a two-thirds majority of the governing body of an incorporated city, town, or consolidated local government; or
  - b. a unanimous vote of the board of county commissioners of a county government.

### Service Area Report

For each public facility for which an impact fee is imposed, the governmental entity shall prepare and approve a service area report. The service area report is a written analysis that must:

1. describe existing conditions of the facility;
2. establish level-of-service standards;
3. forecast future additional needs for service for a defined period of time;
4. identify capital improvements necessary to meet future needs for service;
5. identify those capital improvements needed for continued operation and maintenance of the facility;
6. make a determination as to whether one service area or more than one service area is necessary to establish a correlation between impact fees and benefits;
7. make a determination as to whether one service area or more than one service area for transportation facilities is needed to establish a correlation between impact fees and benefits;
8. establish the methodology and time period over which the governmental entity will assign the proportionate share of capital costs for expansion of the facility to provide service to new development within each service area;

9. establish the methodology that the governmental entity will use to exclude operations and maintenance costs and correction of existing deficiencies from the impact fee;
10. establish the amount of the impact fee that will be imposed for each unit of increased service demand; and
11. have a component of the budget of the governmental entity that:
  - a. schedules construction of public facility capital improvements to serve projected growth;
  - b. projects costs of the capital improvements;
  - c. allocates collected impact fees for construction of the capital improvements; and
  - d. covers at least a 5-year period and is reviewed and updated at least every 5 years.

## Legal Framework

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Both state and federal courts have recognized the imposition of impact fees as a legitimate form of land use regulation, provided the fees meet standards intended to protect against regulatory takings. Land use regulations, development exactions, and impact fees are subject to the Fifth Amendment prohibition on taking of private property for public use without just compensation. To comply with the Fifth Amendment, development regulations must be shown to substantially advance a legitimate governmental interest. In the case of impact fees, that interest is in the protection of public health, safety, and welfare by ensuring development is not detrimental to the quality of essential public services. The means to this end are also important, requiring both procedural and substantive due process. The process followed to receive community input (i.e. stakeholder meetings, work sessions, and public hearings) provides opportunities for comments and refinements to the impact fees.

There is little federal case law specifically dealing with impact fees, although other rulings on other types of exactions (e.g., land dedication requirements) are relevant. In one of the most important exaction cases, the U. S. Supreme Court found that a government agency imposing exactions on development must demonstrate an “essential nexus” between the exaction and the interest being protected (see *Nollan v. California Coastal Commission*, 1987). In a more recent case (*Dolan v. City of Tigard*, OR, 1994), the Court ruled that an exaction must also be “roughly proportional” to the burden created by development. However, the *Dolan* decision appeared to set a higher standard of review for mandatory dedications of land than for monetary exactions such as impact fees.

There are three reasonable relationship requirements for impact fees that are closely related to “rational nexus” or “reasonable relationship” requirements enunciated by a number of state courts. Although the term “dual rational nexus” is often used to characterize the standard by which courts evaluate the validity of impact fees under the U.S. Constitution, we prefer a more rigorous formulation that recognizes three elements: “need,” “benefit,” and “proportionality.” The dual rational nexus test explicitly addresses only the first two, although proportionality is reasonably implied, and was specifically mentioned by the U.S. Supreme Court in the *Dolan* case. Individual elements of the nexus standard are discussed further in the following paragraphs.

All new development in a community creates additional demands on some, or all, public facilities provided by local government. If the capacity of facilities is not increased to satisfy that additional demand, the quality or availability of public services for the entire community will deteriorate. Impact fees may be used to recover the cost of development-related facilities, but only to the extent that the need for facilities is a consequence of development that is subject to the fees. The *Nollan* decision reinforced the principle that development exactions may be used only to mitigate conditions created by the developments upon which they are imposed. That principle clearly applies to impact fees. In this study, the impact of development on infrastructure needs is analyzed in terms of quantifiable relationships between various types of development and the demand for specific capital facilities, based on applicable level-of-service standards.

The requirement that exactions be proportional to the impacts of development was clearly stated by the U.S. Supreme Court in the *Dolan* case and is logically necessary to establish a proper nexus. Proportionality is established through the procedures used to identify development-related facility costs, and in the methods used to calculate impact fees for various types of facilities and categories of development. The demand for capital facilities is measured in terms of relevant and measurable attributes of development (e.g. a typical housing unit's average weekday vehicle trips).

A sufficient benefit relationship requires that impact fee revenues be segregated from other funds and expended only on the facilities for which the fees were charged. Impact fees must be expended in a timely manner and the facilities funded by the fees must serve the development paying the fees. However, nothing in the U.S. Constitution or the state enabling legislation requires that facilities funded with fee revenues be available exclusively to development paying the fees. In other words, benefit may extend to a general area including multiple real estate developments. Procedures for the earmarking and expenditure of fee revenues are discussed near the end of this study. All of these procedural as well as substantive issues are intended to ensure that new development benefits from the impact fees they are required to pay. The authority and procedures to implement impact fees is separate from and complementary to the authority to require improvements as part of subdivision or zoning review.

As documented in this report, the City of Missoula has complied with applicable legal precedents. Impact fees are proportionate and reasonably related to the capital improvement demands of new development. Specific costs have been identified using local data and current dollars. With input from City staff, TischlerBise identified service demand indicators for each type of infrastructure and calculated proportionate share factors to allocate costs by type of development. This report documents the formulas and input variables used to calculate the impact fees for each type of public facility. Impact fee methodologies also identify the extent to which new development is entitled to various types of credits to avoid potential double payment of growth-related capital costs.

## Methodology

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Impact fees for public facilities made necessary by new development must be based on the same level of service provided to existing development in the service area. There are three basic methodologies used to calculate impact fees. They examine the past, present, and future status of infrastructure. The objective of evaluating these different methodologies is to determine the best measure of the demand created by

new development for additional infrastructure capacity. Each method has advantages and disadvantages in a particular situation and can be used simultaneously for different cost components. Additionally, impact fees for public facilities can also include a fee for the administration of the impact fee not to exceed five percent of the total impact fee collected.

Reduced to its simplest terms, the process of calculating impact fees involves two main steps: (1) determining the cost of growth-related capital improvements and (2) allocating those costs equitably to various types of development. In practice, though, the calculation of impact fees can become quite complicated because of the many variables involved in defining the relationship between development and the need for facilities within the designated service area. The following paragraphs discuss basic methods for calculating impact fees and how those methods can be applied.

- **Cost Recovery** (past improvements) - The rationale for recoupment, often called cost recovery, is that future development is paying for its share of the useful life and remaining capacity of facilities already built, or land already purchased, from which future development will benefit. This methodology is often used for utility systems that must provide adequate capacity before new development can take place.
- **Incremental Expansion** (concurrent improvements) - The incremental expansion methodology documents current level-of-service standards for each type of public facility, using both quantitative and qualitative measures. This approach assumes there are no existing infrastructure deficiencies or surplus infrastructure capacity. Future development is only paying its proportionate share for growth-related infrastructure. Revenue will be used to expand or provide additional facilities, as needed, to accommodate future development. An incremental expansion methodology is best suited for public facilities that will be expanded in regular increments to keep pace with development.
- **Plan-Based** (future improvements) - The plan-based methodology allocates costs for a specified set of improvements to a specified amount of development. Improvements are typically identified in a long-range facility plan and development potential is identified by a land use plan. There are two basic options for determining the cost per service demand unit: (1) total cost of a public facility can be divided by total service demand units (average cost), or (2) the growth-share of the public facility cost can be divided by the net increase in service demand units over the planning timeframe (marginal cost).

## Conceptual Impact Fee Calculation

In contrast to project-level improvements, impact fees fund growth-related infrastructure that will benefit multiple development projects, or the entire service area (usually referred to as system improvements). The first step is to determine an appropriate service demand indicator for the particular type of infrastructure. The service demand indicator measures the number of service units for each unit of development. For example, an appropriate indicator of the demand for parks is population growth and the increase in population can be estimated from the average number of persons per housing unit. The second step in the impact fee formula is to determine infrastructure improvement units per service demand unit, typically called level-of-service (LOS) standards. In keeping with the park example, a common LOS standard is improved park acres per thousand people. The third step in the impact fee formula is the cost of various infrastructure units. To complete the park example, this part of the formula would establish a cost per acre for land acquisition and/or park improvements.

## Evaluation of Credits

A consideration of credits is integral to the development of a legally defensible impact fee. There are two types of credits that should be addressed in impact fee studies and ordinances. The first is a revenue credit due to possible double payment situations, which could occur when other revenues may contribute to the capital costs of infrastructure covered by the impact fee. This type of credit is integrated into the fee calculation, thus reducing the fee amount. As discussed further in the Law Enforcement chapter, a debt credit is used to offset future debt payments for the police substation.

The second type of credit is a site-specific credit for system improvements that have been included in the impact fee calculations. Policies and procedures related to site-specific credits for system improvements should be addressed in the ordinance that establishes the impact fees. However, the general concept is that developers may be eligible for site-specific credits only if they provide system improvements that have been included in the impact fee calculations. Project improvements normally required as part of the development approval process are not eligible for credits against impact fees. Site-specific credits are addressed in the administration and implementation of the development fee program.

## IMPACT FEES

Figure 1 summarizes service areas, methodologies, and infrastructure cost components for each public facility.

**Figure 1: Proposed Service Areas, Methodologies, and Cost Components**

Public Facility	Service Area	Cost Recovery	Incremental Expansion	Plan-Based	Cost Allocation
Community Services	Citywide	N/A	Facilities, Vehicles and Equipment	N/A	Population, Jobs
Fire	Citywide	N/A	Facilities, Apparatus	N/A	Population, Jobs
Law Enforcement	Citywide	Evidence Storage	Stations	N/A	Population, Vehicle Trips
Parks and Open Space	Citywide	N/A	Community/ Regional Park Land, Amenities, Trailheads, Vehicles and Equipment	N/A	Population
Transportation	Citywide	N/A	Complete Streets, Improved Intersections, Commuter Trails	N/A	Person Trips

## Current Impact Fees

Missoula's current impact fee schedule for residential and nonresidential development is shown below in Figure 2. Residential impact fees for single-family units and mobile homes are assessed per housing unit based on the floor area of the unit, and fees for all other types of housing units are assessed per housing unit. Fees for nonresidential development are assessed per 1,000 square feet of floor area.

**Figure 2: Current Impact Fee Schedule**

Residential Development	Development Fees per Unit					
	Community Services	Fire	Law Enforcement	Parks and Open Space	Transportation	Total
Single/Mobile less than 1,200	\$180	\$77	\$14	\$320	\$814	\$1,405
Single/Mobile 1200-1299	\$213	\$82	\$15	\$380	\$871	\$1,561
Single/Mobile 1300-1399	\$213	\$87	\$16	\$380	\$923	\$1,619
Single/Mobile 1400-1499	\$213	\$92	\$17	\$380	\$972	\$1,674
Single/Mobile 1500-1599	\$238	\$96	\$17	\$422	\$1,017	\$1,790
Single/Mobile 1600-1699	\$238	\$100	\$18	\$422	\$1,060	\$1,838
Single/Mobile 1700-1799	\$238	\$104	\$19	\$422	\$1,100	\$1,883
Single/Mobile 1800-1899	\$238	\$108	\$19	\$422	\$1,138	\$1,925
Single/Mobile 1900-1999	\$238	\$111	\$20	\$422	\$1,174	\$1,965
Single/Mobile 2000-2099	\$255	\$114	\$21	\$453	\$1,209	\$2,052
Single/Mobile 2100-2199	\$255	\$117	\$21	\$453	\$1,241	\$2,087
Single/Mobile 2200-2299	\$255	\$120	\$22	\$453	\$1,273	\$2,123
Single/Mobile 2300-2399	\$255	\$123	\$22	\$453	\$1,303	\$2,156
Single/Mobile 2400-2499	\$255	\$126	\$23	\$453	\$1,331	\$2,188
Single/Mobile 2500-2599	\$270	\$128	\$23	\$481	\$1,359	\$2,261
Single/Mobile 2600-2699	\$270	\$131	\$24	\$481	\$1,386	\$2,292
Single/Mobile 2700-2799	\$270	\$133	\$24	\$481	\$1,411	\$2,319
Single/Mobile 2800-2899	\$270	\$136	\$25	\$481	\$1,436	\$2,348
Single/Mobile 2900-2999	\$270	\$138	\$25	\$481	\$1,459	\$2,373
Single/Mobile 3000-3099	\$270	\$140	\$25	\$481	\$1,483	\$2,399
Single/Mobile 3100-3199	\$270	\$142	\$26	\$481	\$1,505	\$2,424
Single/Mobile 3200 or larger	\$270	\$142	\$26	\$481	\$1,505	\$2,424
All Other Housing	\$161	\$69	\$13	\$286	\$733	\$1,262

Nonresidential Development	Development Fees per 1,000 Square Feet					
Land Use Type	Community Services	Fire	Law Enforcement	Parks and Open Space	Transportation	Total
Commercial / Retail	\$260	\$134	\$31	\$0	\$3,205	\$3,630
Industrial	\$367	\$189	\$32	\$0	\$1,447	\$2,035
Office / Other Service	\$210	\$108	\$8	\$0	\$550	\$876
Institutional	\$116	\$60	\$4	\$0	\$391	\$571

## Proposed Impact Fees

Figure 3 provides a schedule of the maximum allowable impact fees by type of land use for the City of Missoula. The fees represent the highest amount allowable for each type of applicable land use, which represents new growth's fair share of the cost for capital facilities. The City may adopt fees that are less than the amounts shown. However, a reduction in impact fee revenue will necessitate an increase in other revenues, a decrease in planned capital expenditures, and/or a decrease in levels of service.

The proposed impact fees for residential development will be assessed per housing unit, based on size of unit. Proposed nonresidential impact fees will be assessed per 1,000 square feet of floor area.

**Figure 3: Proposed Impact Fee Schedule**

Residential Development		Development Fees per Unit				
Size of Unit	Community Services	Fire	Law Enforcement	Parks and Open Space	Transportation	Total
750 or Less	\$571	\$206	\$61	\$1,993	\$769	\$3,601
751 to 1,000	\$767	\$276	\$83	\$2,677	\$970	\$4,773
1,001 to 1,250	\$924	\$333	\$99	\$3,224	\$1,124	\$5,704
1,251 to 1,500	\$1,053	\$379	\$113	\$3,673	\$1,251	\$6,470
1,501 to 1,750	\$1,160	\$418	\$125	\$4,044	\$1,356	\$7,102
1,751 to 2,000	\$1,255	\$452	\$135	\$4,376	\$1,448	\$7,666
2,001 to 2,250	\$1,333	\$480	\$143	\$4,650	\$1,530	\$8,137
2,251 to 2,500	\$1,406	\$506	\$151	\$4,904	\$1,602	\$8,569
2,501 to 2,750	\$1,473	\$531	\$159	\$5,138	\$1,670	\$8,971
2,751 to 3,000	\$1,535	\$553	\$165	\$5,353	\$1,729	\$9,335
3,001 to 3,250	\$1,591	\$573	\$171	\$5,549	\$1,785	\$9,669
3,251 to 3,500	\$1,641	\$591	\$177	\$5,725	\$1,836	\$9,969
3,501 to 3,750	\$1,692	\$609	\$182	\$5,900	\$1,883	\$10,266
3,751 to 4,000	\$1,736	\$625	\$187	\$6,057	\$1,926	\$10,532
4,000 or More	\$1,776	\$640	\$191	\$6,193	\$1,970	\$10,770

Nonresidential Development		Development Fees per 1,000 Square Feet				
Development Type	Community Services	Fire	Law Enforcement	Parks and Open Space	Transportation	Total
Commercial / Retail	\$878	\$498	\$177	\$0	\$4,643	\$6,196
Industrial	\$611	\$347	\$35	\$0	\$925	\$1,918
Office / Other Service	\$1,114	\$632	\$69	\$0	\$1,816	\$3,632
Institutional	\$349	\$198	\$76	\$0	\$1,998	\$2,621

## Difference Between Current and Proposed Impact Fees

Figure 4 shows the difference between the current and the proposed fees for residential and nonresidential development.

**Figure 4: Difference between Current and Proposed Impact Fees**

Residential Development		Development Fees per Unit				
Size of Unit	Community Services	Fire	Law Enforcement	Parks and Open Space	Transportation	Total
750 or Less	\$410	\$137	\$48	\$1,707	\$36	\$2,339
751 to 1,000	\$587	\$199	\$69	\$2,357	\$156	\$3,368
1,001 to 1,250	\$711	\$251	\$84	\$2,844	\$253	\$4,143
1,251 to 1,500	\$840	\$287	\$96	\$3,293	\$279	\$4,796
1,501 to 1,750	\$922	\$314	\$106	\$3,622	\$256	\$5,219
1,751 to 2,000	\$1,017	\$341	\$115	\$3,954	\$274	\$5,701
2,001 to 2,250	\$1,078	\$360	\$121	\$4,197	\$257	\$6,014
2,251 to 2,500	\$1,151	\$380	\$128	\$4,451	\$271	\$6,381
2,501 to 2,750	\$1,203	\$398	\$135	\$4,657	\$259	\$6,652
2,751 to 3,000	\$1,265	\$415	\$140	\$4,872	\$270	\$6,962
3,001 to 3,250	\$1,321	\$431	\$145	\$5,068	\$280	\$7,245
3,251 to 3,500	\$1,371	\$449	\$151	\$5,244	\$331	\$7,545
3,501 to 3,750	\$1,422	\$467	\$156	\$5,419	\$378	\$7,842
3,751 to 4,000	\$1,466	\$483	\$161	\$5,576	\$421	\$8,108
4,000 or More	\$1,506	\$498	\$165	\$5,712	\$465	\$8,346

Nonresidential Development		Development Fees per 1,000 Square Feet				
Land Use Type	Community Services	Fire	Law Enforcement	Parks and Open Space	Transportation	Total
Commercial / Retail	\$618	\$364	\$146	\$0	\$1,438	\$2,566
Industrial	\$401	\$239	\$27	\$0	\$375	\$1,042
Office / Other Service	\$747	\$443	\$37	\$0	\$369	\$1,597
Institutional	(\$18)	\$9	\$44	\$0	\$551	\$586

A note on rounding: Calculations throughout this report are based on an analysis conducted using Excel software. Most results are discussed in the report using two, three, and four decimal places, which represent rounded figures. However, the analysis itself uses figures carried to their ultimate decimal places; therefore, the sums and products generated in the analysis may not equal the sum or product if the reader replicates the calculation with the factors shown in the report (due to the rounding of figures shown, not in the analysis).

## COMMUNITY SERVICES SERVICE AREA REPORT

The Community Services Service Area Report includes components for facilities, and vehicles and equipment. The analysis uses an incremental expansion methodology, based on the existing level of service, for all components.

### Service Area

The City of Missoula provides general governmental services citywide. As a result, the service area for the Community Services Service Area Report is citywide.

### Cost Allocation

For certain public facilities TischlerBise uses functional population to establish the relative demand for infrastructure from both residential and nonresidential development. As shown in Figure CS1, functional population accounts for people living and working in a jurisdiction. Residents who do not work are assigned 20 hours per day to residential development and four hours per day to nonresidential development (annualized averages). Residents who work in Missoula are assigned 14 hours to residential development and 10 hours to nonresidential development. Residents who work outside Missoula are assigned 14 hours to residential development. Inflow commuters are assigned 10 hours to nonresidential development. Based on 2015 functional population data, the resulting proportionate share is 65 percent residential and 35 percent nonresidential.

**Figure CS1: Functional Population**

Service Demand Units in 2015		Demand Hours/Day	Person Hours
<b>Residential</b>			
Population	66,029		
Residents Not Working	32,408	20	648,160
Employed Residents	33,621		
Employed in Missoula	24,969	14	349,566
Employed outside Missoula	8,652	14	121,128
		<b>Residential Subtotal</b>	<b>1,118,854</b>
		<b>Residential Share</b>	<b>65%</b>
<b>Nonresidential</b>			
Non-working Residents	32,408	4	129,632
Jobs Located in Missoula	48,275		
Residents Employed in Missoula	24,969	10	249,690
Non-Resident Workers (inflow commuters)	23,306	10	233,060
		<b>Nonresidential Subtotal</b>	<b>612,382</b>
		<b>Nonresidential Share</b>	<b>35%</b>
		<b>Total</b>	<b>1,731,236</b>

Source: U.S. Census Bureau, OnTheMap 6.5 Application and LEHD Origin-Destination Employment Statistics.

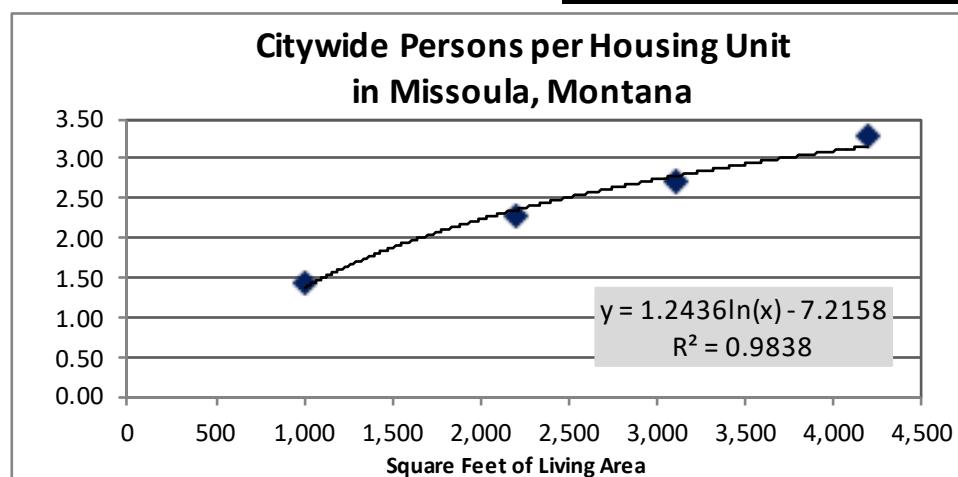
## Service Demand Units

Community Services impact fees for residential development are calculated on a per capita basis, and then converted to an appropriate amount for each square footage range based on a persons per housing unit (PPHU) ratio. The PPHU ratios based on floor area were derived from 2016 square footage estimates provided by the U.S. Census Bureau (west region). Dwellings with two bedrooms or less average 1,000 square feet of floor area—based on multi-family dwellings constructed in West census region. Three-bedroom dwellings average 2,200 square feet, four-bedroom dwellings average 3,100 square feet, and dwellings with five or more bedrooms average 4,200 square feet—based on single-family dwellings constructed in the Census West region. Average floor area and number of persons by bedroom range are plotted in Figure CS2 with a logarithmic trend line. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 15 size thresholds.

**Figure CS2: Persons by Dwelling Size**

Actual Averages per Housing Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Persons	Sq Ft Range	Persons
0-2	1,000	1.43	750 or Less	1.02
3	2,200	2.27	751 to 1,000	1.37
4	3,100	2.70	1,001 to 1,250	1.65
5+	4,200	3.27	1,251 to 1,500	1.88
			1,501 to 1,750	2.07
			1,751 to 2,000	2.24
			2,001 to 2,250	2.38
			2,251 to 2,500	2.51
			2,501 to 2,750	2.63
			2,751 to 3,000	2.74
			3,001 to 3,250	2.84
			3,251 to 3,500	2.93
			3,501 to 3,750	3.02
			3,751 to 4,000	3.10
			4,001 or More	3.17

Average persons per housing unit derived from 2016 ACS PUMS data for the area that includes Missoula. Unit size for 0-2 bedroom is from the 2016 U.S. Census Bureau average for all multi-family units constructed in the Census West region. Unit size for all other bedrooms is from the 2016 U.S. Census Bureau average for single-family units constructed in the Census West region.



Community Services impact fees for nonresidential development are calculated per job, and then converted to an appropriate amount for each land use type based on a jobs per 1,000 square feet ratio. TischlerBise uses the term “job” to refer to employment by place of work. Jobs per 1,000 square feet ratios shown in Figure CS3 are from the 10<sup>th</sup> edition of the reference book, *Trip Generation*, published in 2017 by the Institute of Transportation Engineers (ITE). For future Industrial development, Light Industrial (ITE 110) is a reasonable proxy with an average of 1.63 employees per 1,000 square feet of floor area. For Institutional development, Elementary School (ITE 520), with an average of 0.93 employees per 1,000 square feet, is a reasonable proxy. For Office/Other Service development, General Office (ITE 710) is the prototype for future development, with an average of 2.97 employees per 1,000 square feet. The prototype for future Commercial/Retail development is an average-size Shopping Center (ITE 820). Commercial/Retail development (i.e. retail and eating / drinking places) is assumed to average 2.34 employees per 1,000 square feet.

**Figure CS3: Jobs per Development Unit by Land Use Type**

ITE Code	Development Type	Demand Unit	Jobs Per Demand Unit <sup>1</sup>
110	Industrial	1,000 Sq Ft	1.63
520	Institutional	1,000 Sq Ft	0.93
710	Office / Other Service	1,000 Sq Ft	2.97
820	Commercial / Retail	1,000 Sq Ft	2.34

1. [Trip Generation](#), Institute of Transportation Engineers, 10th Edition (2017).

## Existing Conditions and Level-of-Service Standards

### Facilities

The Community Services impact fees include a component for facilities, and this analysis uses the incremental expansion methodology to calculate the facilities component of the Community Services impact fees. Residential level-of-service standards are calculated based on the 2018 population of 71,711 persons, and nonresidential standards are calculated based on 2018 employment of 57,674 jobs (see the Land Use Assumptions in Appendix A).

As shown in Figure CS4, Missoula has 231,741 square feet of Community Services facilities. To allocate the proportionate share of demand for Community Services facilities to residential and nonresidential development, this analysis uses functional population. Missoula's existing level-of-service standard for residential development is 2.1005 square feet of Community Services facilities per person (231,741 square feet X 65 percent residential share / 71,711 persons). The nonresidential level-of-service standard is 1.4063 square feet of Community Services facilities per job (231,741 square feet X 35 percent nonresidential share / 57,674 jobs). TischlerBise calculated the cost per square foot of \$221 by inflating the cost factors used in the 2002 Study by the 15-year ENR Construction Cost Index (2002-2017). The facilities cost is \$464.22 per person (2.1005 square feet per person X \$221 per square foot) and \$310.80 per job (1.4063 square feet per job X \$221 per square foot).

**Figure CS4: Existing Level-of Service Standards**

Description		Square Feet
Community Services Facilities		231,741
<b>Cost Allocation Factors</b>		
Cost per Square Foot <sup>1</sup>		\$221
<b>Level-of-Service (LOS) Standards</b>		
Existing Square Feet		231,741
Residential		
Residential Share	65%	
2018 Population	71,711	
Square Feet per Person	2.1005	
<b>Cost per Person</b>	<b>\$464.22</b>	
Nonresidential		
Nonresidential Share	35%	
2018 Jobs	57,674	
Square Feet per Job	1.4063	
<b>Cost per Job</b>	<b>\$310.80</b>	

1. 2002 Study cost adjusted by ENR Construction Cost Index.

## Vehicles and Equipment

The Community Services impact fees also include a component for vehicles and equipment. This analysis uses the incremental expansion methodology to calculate the vehicles and equipment component of the Community Services impact fees. Residential level-of-service standards are calculated based on the 2018 population of 71,711 persons, and nonresidential standards are calculated based on 2018 employment of 57,674 jobs (see the Land Use Assumptions in Appendix A).

As shown in Figure CS5, Missoula's inventory of Community Services vehicles and equipment includes 86 units broken down into five categories: Traffic Division, Fleet Services, Development Services, Street Division, and Fleet Maintenance. The total replacement cost for these vehicles is \$7.64 million, or \$88,843 per unit. A detailed list of vehicles and equipment for each division is located in Appendix E.

To allocate the proportionate share of demand for Community Services vehicles and equipment to residential and nonresidential development, this analysis uses functional population. Missoula's existing level-of-service standard for residential development is 0.00078 units per person (86 units X 65 percent residential share / 71,711 persons). The nonresidential level-of-service standard is 0.00052 units per job (86 units X 35 percent nonresidential share / 57,674 jobs). The vehicles and equipment cost is \$69.25 per person (0.00078 units per person X \$88,843 per unit) and \$46.37 per job (0.00052 units per job X \$88,843 per unit).

**Figure CS5: Existing Level-of Service Standards**

Division	Units	Replacement Cost
Traffic Division	8	\$664,000
Fleet Services	3	\$105,000
Development Services	10	\$355,000
Street Division	60	\$6,276,500
Fleet Maintenance	5	\$240,000
<b>Total</b>	<b>86</b>	<b>\$7,640,500</b>

Cost Allocation Factors	
Cost per Unit	\$88,843

Level-of-Service (LOS) Standards	
Existing Units	86
Residential	
Residential Share	65%
2018 Population	71,711
Units per Person	0.00078
<b>Cost per Person</b>	<b>\$69.25</b>
Nonresidential	
Nonresidential Share	35%
2018 Jobs	57,674
Units per Job	0.00052
<b>Cost per Job</b>	<b>\$46.37</b>

## Projected Service Demand Units and Demand for Services

To accommodate projected development over the next 10 years, Missoula will construct additional Community Services facilities and purchase additional vehicles and equipment. The anticipated needs are based on the development projections contained in the Land Use Assumptions (see Appendix A).

### Facilities

Shown in Figure CS6, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 26,530 additional square feet of Community Services facilities (12,630 additional persons X 2.1005 square feet per person) at a cost of approximately \$5.86 million (26,530 square feet X \$221 per square foot). Future nonresidential development will demand 11,434 additional square feet (8,130 additional jobs X 1.4063 square feet per job) at a cost of approximately \$2.53 million (11,434 square feet X \$221 per square foot). The 10-year demand for growth-related Community Services facilities equals 37,963 additional square feet at a cost of approximately \$8.39 million.

**Figure CS6: Growth-Related Need for Community Services Facilities**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Sq. Ft.
Community Services Facilities	2.1005 Square Feet	per Person	\$221
	1.4063 Square Feet	per Job	

Need for Community Services Facilities					
Year	Population	Jobs	Residential	Nonresidential	Total Square Feet
2018	71,711	57,674	150,632	81,109	231,741
2019	72,974	58,438	153,285	82,184	235,468
2020	74,237	59,214	155,938	83,275	239,213
2021	75,500	59,999	158,591	84,379	242,970
2022	76,763	60,795	161,244	85,499	246,742
2023	78,026	61,602	163,897	86,633	250,530
2024	79,289	62,420	166,550	87,784	254,333
2025	80,552	63,249	169,203	88,950	258,152
2026	81,815	64,090	171,855	90,132	261,988
2027	83,078	64,941	174,508	91,329	265,838
2028	84,341	65,804	177,161	92,543	269,704
10-Yr Increase	12,630	8,130	26,530	11,434	37,963

Growth-Related Expenditures	\$5,863,083	\$2,526,816	\$8,389,899
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## Vehicles and Equipment

Shown in Figure CS7, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 9.8 additional units of Community Services vehicles and equipment (12,630 additional persons X 0.00078 units per person) at a cost of approximately \$875,000 (9.8 units X \$88,843 per unit). Future nonresidential development will demand 4.2 additional units (8,130 additional jobs X 0.00052 units per job) at a cost of approximately \$377,000 (4.2 units X \$88,843 per unit). The 10-year demand for growth-related Community Services vehicles and equipment equals 14.1 additional units at a cost of approximately \$1.25 million.

**Figure CS7: Growth-Related Need for Community Services Vehicles and Equipment**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Unit
Community Services Vehicles & Equipment	0.00078 Units	per Person	\$88,843
	0.00052 Units	per Job	

Need for Community Services Vehicles and Equipment					
Year	Population	Jobs	Residential	Nonresidential	Total Units
2018	71,711	57,674	55.9	30.1	86.0
2019	72,974	58,438	56.9	30.5	87.4
2020	74,237	59,214	57.9	30.9	88.8
2021	75,500	59,999	58.9	31.3	90.2
2022	76,763	60,795	59.8	31.7	91.6
2023	78,026	61,602	60.8	32.2	93.0
2024	79,289	62,420	61.8	32.6	94.4
2025	80,552	63,249	62.8	33.0	95.8
2026	81,815	64,090	63.8	33.4	97.2
2027	83,078	64,941	64.8	33.9	98.7
2028	84,341	65,804	65.7	34.3	100.1
10-Yr Increase	12,630	8,130	9.8	4.2	14.1

Growth-Related Expenditures	\$874,687	\$376,964	\$1,251,651
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## Community Services Impact Fees

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### Revenue Credits

A revenue credit is not necessary for Community Services impact fees because 10-year growth-related expenditures exceed the impact fee revenue projected to be generated according to the Land Use Assumptions (see Figure CS9). The City does not have any outstanding debt for Community Services improvements that will be retired through property taxes.

### Proposed Community Services Impact Fees

Figure CS8 shows the proposed maximum supportable Community Services impact fees for residential and nonresidential development in Missoula and includes an administration fee of five percent. The cost per service demand unit is \$560.15 per person and \$375.03 per job.

Residential fees are derived from the average number of persons per housing unit and the total cost per person. For a residential unit with 1,800 square feet, the fee is \$1,255 (\$560.15 per person X 2.24 persons per housing unit).

Nonresidential fees are the product of the average number of jobs per 1,000 square feet of floor area (*Trip Generation*, ITE, 2017) and the total cost per job. Commercial / Retail development will pay \$878 per 1,000 square feet of floor area (\$375.03 per job X 2.34 jobs per 1,000 square feet).

**Figure CS8: Proposed Community Services Impact Fees**

Fee Component	Cost per Person	Cost per Job
Facilities	\$464.22	\$310.80
Vehicles and Equipment	\$69.25	\$46.37
Subtotal	\$533.47	\$357.17
Administration Fee (5%)	\$26.67	\$17.86
<b>Total</b>	<b>\$560.15</b>	<b>\$375.03</b>

Residential Development	Development Fees per Unit			
	Size of Unit	Persons per Housing Unit <sup>1</sup>	Proposed Fees	Current Fees
750 or Less	1.02	\$571	\$161	\$410
751 to 1,000	1.37	\$767	\$180	\$587
1,001 to 1,250	1.65	\$924	\$213	\$711
1,251 to 1,500	1.88	\$1,053	\$213	\$840
1,501 to 1,750	2.07	\$1,160	\$238	\$922
1,751 to 2,000	2.24	\$1,255	\$238	\$1,017
2,001 to 2,250	2.38	\$1,333	\$255	\$1,078
2,251 to 2,500	2.51	\$1,406	\$255	\$1,151
2,501 to 2,750	2.63	\$1,473	\$270	\$1,203
2,751 to 3,000	2.74	\$1,535	\$270	\$1,265
3,001 to 3,250	2.84	\$1,591	\$270	\$1,321
3,251 to 3,500	2.93	\$1,641	\$270	\$1,371
3,501 to 3,750	3.02	\$1,692	\$270	\$1,422
3,751 to 4,000	3.10	\$1,736	\$270	\$1,466
4,000 or More	3.17	\$1,776	\$270	\$1,506

Nonresidential Development	Development Fees per 1,000 Square Feet			
Development Type	Jobs per 1,000 Sq Ft <sup>1</sup>	Proposed Fees	Current Fees	Increase / Decrease
Commercial / Retail	2.34	\$878	\$260	\$618
Industrial	1.63	\$611	\$210	\$401
Office / Other Service	2.97	\$1,114	\$367	\$747
Institutional	0.93	\$349	\$367	(\$18)

1. See Land Use Assumptions

## Projected Community Services Impact Fee Revenue

Revenue projections assume implementation of the proposed Community Services impact fees and that development over the next 10 years is consistent with the Land Use Assumptions described in Appendix A. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the impact fee revenue. As shown in Figure CS9, Community Services fee revenue is projected to total approximately \$10.12 million over the next 10 years, compared to projected expenditures of approximately \$10.12 million.

**Figure CS9: Projected Community Services Impact Fee Revenue**

Fee Component	Growth Share	Existing Share	Total
Facilities	\$8,389,899	\$0	\$8,389,899
Vehicles and Equipment	\$1,251,651	\$0	\$1,251,651
Administration Fee	\$482,078	\$0	\$482,078
Total	\$10,123,628	\$0	\$10,123,628

		Single Family \$1,350 per unit	Multi-Family \$902 per unit	Comm / Ret \$878 per KSF	Industrial \$611 per KSF	Office / Other \$1,114 per KSF	Institutional \$349 per KSF
Year		Housing Unit	Housing Unit	KSF	KSF	KSF	KSF
Base	2018	20,063	13,180	8,215	4,050	5,408	4,451
Year 1	2019	20,305	13,602	8,315	4,085	5,500	4,665
Year 2	2020	20,548	14,023	8,416	4,121	5,594	4,882
Year 3	2021	20,791	14,444	8,518	4,158	5,689	5,101
Year 4	2022	21,033	14,866	8,622	4,195	5,785	5,324
Year 5	2023	21,276	15,287	8,727	4,232	5,883	5,549
Year 6	2024	21,519	15,708	8,833	4,270	5,982	5,778
Year 7	2025	21,761	16,130	8,941	4,308	6,082	6,010
Year 8	2026	22,004	16,551	9,051	4,346	6,185	6,246
Year 9	2027	22,246	16,973	9,162	4,384	6,288	6,483
Year 10	2028	22,489	17,394	9,275	4,423	6,393	6,725
10-Year Increase		2,426	4,214	1,060	373	985	2,275
Projected Revenue		\$3,274,990	\$3,799,918	\$930,054	\$228,013	\$1,097,123	\$793,463

Projected Fee Revenue	\$10,123,561
Total Expenditures	\$10,123,628

## FIRE SERVICE AREA REPORT

The Fire Service Area Report includes components for facilities and apparatus. The analysis uses an incremental expansion methodology, based on the existing level of service, for all components.

### Service Area

Missoula's Fire Department strives to provide a uniform response time citywide, and its fire stations operate as an integrated network. Depending on the number and type of calls, apparatus can be dispatched citywide from any of the stations. As a result, the service area for the Fire Service Area Report is citywide.

### Cost Allocation

Costs for Fire capital improvements are allocated to both residential and nonresidential development using calls for service. Missoula's Fire Department provided calls for service data for years 2014 through 2017, summarized in Figure F1. Calls for service not related to traffic incidents were separated between residential and nonresidential based on the land use of each call's source. During the four-year period, there were a total of 13,977 residential calls and 11,860 nonresidential calls to the Fire Department, representing 54 percent and 46 percent, respectively, of all non-traffic calls. These proportions are used to establish the residential and nonresidential level-of-service standards.

**Figure F1: Fire Calls for Service**

Call Type	2014	2015	2016	2017	Total	Share
Residential	3,033	3,616	3,721	3,607	13,977	54%
Nonresidential	2,547	2,938	3,087	3,288	11,860	46%
Non-Traffic Total	5,580	6,554	6,808	6,895	25,837	100%
Other	1,654	1,437	1,517	1,451	6,059	
Total	7,234	7,991	8,325	8,346	31,896	

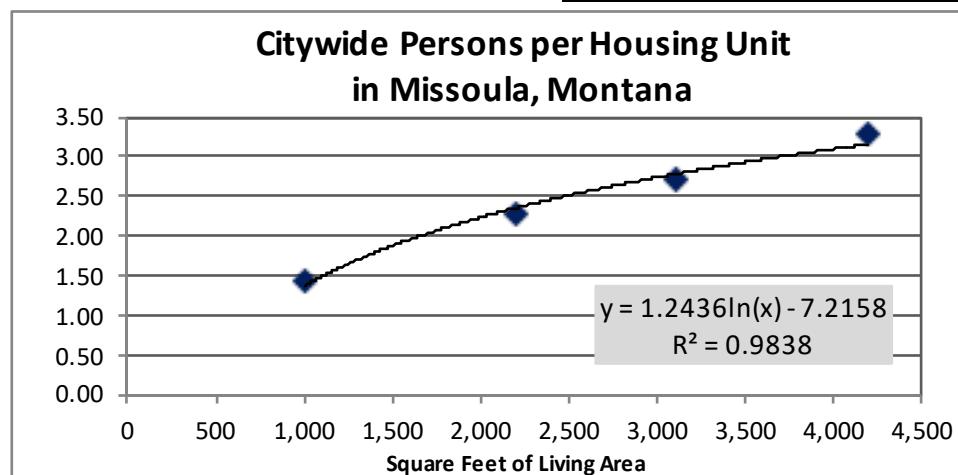
## Service Demand Units

Fire impact fees impact fees for residential development are calculated on a per capita basis, and then converted to an appropriate amount for each square footage range based on a persons per housing unit (PPHU) ratio. The PPHU ratios based on floor area were derived from 2016 square footage estimates provided by the U.S. Census Bureau (west region). Dwellings with two bedrooms or less average 1,000 square feet of floor area—based on multi-family dwellings constructed in West census region. Three-bedroom dwellings average 2,200 square feet, four-bedroom dwellings average 3,100 square feet, and dwellings with five or more bedrooms average 4,200 square feet—based on single-family dwellings constructed in the Census West region. Average floor area and number of persons by bedroom range are plotted in Figure F2 with a logarithmic trend line. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 15 size thresholds.

**Figure F2: Persons by Dwelling Size**

Actual Averages per Housing Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Persons	Sq Ft Range	Persons
0-2	1,000	1.43	750 or Less	1.02
3	2,200	2.27	751 to 1,000	1.37
4	3,100	2.70	1,001 to 1,250	1.65
5+	4,200	3.27	1,251 to 1,500	1.88
			1,501 to 1,750	2.07
			1,751 to 2,000	2.24
			2,001 to 2,250	2.38
			2,251 to 2,500	2.51
			2,501 to 2,750	2.63
			2,751 to 3,000	2.74
			3,001 to 3,250	2.84
			3,251 to 3,500	2.93
			3,501 to 3,750	3.02
			3,751 to 4,000	3.10
			4,001 or More	3.17

Average persons per housing unit derived from 2016 ACS PUMS data for the area that includes Missoula. Unit size for 0-2 bedroom is from the 2016 U.S. Census Bureau average for all multi-family units constructed in the Census West region. Unit size for all other bedrooms is from the 2016 U.S. Census Bureau average for single-family units constructed in the Census West region.



Fire impact fees for nonresidential development are calculated per job, and then converted to an appropriate amount for each land use type based on a jobs per 1,000 square feet ratio. TischlerBise uses the term “job” to refer to employment by place of work. Jobs per 1,000 square feet ratios shown in Figure F3 are from the 10<sup>th</sup> edition of the reference book, *Trip Generation*, published in 2017 by the Institute of Transportation Engineers (ITE). For future Industrial development, Light Industrial (ITE 110) is a reasonable proxy with an average of 1.63 employees per 1,000 square feet of floor area. For Institutional development, Elementary School (ITE 520), with an average of 0.93 employees per 1,000 square feet, is a reasonable proxy. For Office/Other Service development, General Office (ITE 710) is the prototype for future development, with an average of 2.97 employees per 1,000 square feet. The prototype for future Commercial/Retail development is an average-size Shopping Center (ITE 820). Commercial/Retail development (i.e. retail and eating / drinking places) is assumed to average 2.34 employees per 1,000 square feet.

**Figure F3: Jobs per Development Unit by Land Use Type**

ITE Code	Development Type	Demand Unit	Jobs Per Demand Unit <sup>1</sup>
110	Industrial	1,000 Sq Ft	1.63
520	Institutional	1,000 Sq Ft	0.93
710	Office / Other Service	1,000 Sq Ft	2.97
820	Commercial / Retail	1,000 Sq Ft	2.34

1. [Trip Generation](#), Institute of Transportation Engineers, 10th Edition (2017).

## Existing Conditions and Level-of-Service Standards

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### Facilities

The first component of the Fire impact fee is facilities. The incremental expansion methodology is used to calculate the Facilities component of the Fire fees. Residential level-of-service standards are assessed based on the 2018 population, and nonresidential standards are assessed based on 2018 jobs (see the Land Use Assumptions in Appendix A).

As shown in Figure F4, Missoula has a total of 60,597 square feet of Fire facilities, which consist of five fire stations and a small boathouse. The City intends to construct Station 6 within the next 10 years. The new station will be 9,337 square feet in area and is expected to cost \$2.6 million (including land), or \$278 per square foot. The cost per square foot of the new station is used to estimate the replacement cost of the Fire Department's existing facilities.

To determine the residential level-of-service standards, the total existing floor area is multiplied by the residential proportionate share (54 percent) and divided by the 2018 population (71,711), yielding 0.4571 square feet of Fire facilities per person. Similarly, the nonresidential level of service standard is calculated by multiplying the total floor area by the nonresidential proportionate share (46 percent) and dividing by 2018 jobs (57,674), yielding 0.4823 square feet per job. The facilities cost is \$127.29 per person (0.4571 square feet per person X \$278 per square foot) and \$134.30 per job (0.4823 square feet per person X \$278 per square foot).

**Figure F4: Existing Level-of-Service Standards**

Description	Square Feet
Station 1	15,512
Station 2	8,547
Station 3	7,650
Station 4	19,103
Station 5	9,337
Boathouse	448
<b>Total</b>	<b>60,597</b>

Cost Allocation Factors	
Cost per Square Foot <sup>1</sup>	\$278

Level-of-Service (LOS) Standards	
Existing Square Feet	60,597
Residential	
Residential Share	54%
2018 Population	71,711
Square Feet per Person	0.4571
<b>Cost per Person</b>	<b>\$127.29</b>
Nonresidential	
Nonresidential Share	46%
2018 Jobs	57,674
Square Feet per Job	0.4823
<b>Cost per Job</b>	<b>\$134.30</b>

1. Station 6, City of Missoula Fire Department

## Apparatus

The second component of the Fire impact fee is apparatus. The incremental expansion methodology is used to calculate the vehicles component of the Fire fee. Residential level-of-service standards are assessed based on the 2018 population, and nonresidential standards are assessed based on 2018 jobs (see the Land Use Assumptions in Appendix A).

Figure F5 summarizes the City's fire apparatus and replacement costs. Missoula has a total of 35 apparatus with a total estimated replacement cost of \$8.60 million, or \$245,571 per unit. To derive the residential level-of-service standards, the total number of apparatus is multiplied by the residential proportionate share (54 percent) and divided by the 2018 population (71,711), yielding 0.0003 units per person. Similarly, the nonresidential level of service standard is calculated by multiplying the number of apparatus by the nonresidential cost share (46 percent) and dividing by 2018 jobs (57,674), yielding 0.0003 units per job. The apparatus cost is \$64.84 per person (0.0003 units per person X \$245,571 per unit) and \$68.41 per job (0.0003 units per job X \$245,571 per unit).

**Figure F5: Existing Level-of-Service Standards**

Description	Units	Unit Cost	Replacement Cost
Pierce Type 1 Engine	8	\$500,000	\$4,000,000
Smeal Ladder Truck	1	\$1,400,000	\$1,400,000
Pierce Ladder Truck	1	\$1,500,000	\$1,500,000
F550 Wildland Engine	2	\$150,000	\$300,000
Smeal Wildland Engine	1	\$150,000	\$150,000
F450 Wildland Engine	2	\$60,000	\$120,000
International Water Tender	1	\$350,000	\$350,000
2016 Command Vehicle	1	\$70,000	\$70,000
F250 Command Vehicle	2	\$40,000	\$80,000
Chevrolet Impala	1	\$30,000	\$30,000
Ford F250	1	\$35,000	\$35,000
Toyota Prius	1	\$30,000	\$30,000
Chevrolet Colorado	3	\$30,000	\$90,000
Ford Ranger	2	\$30,000	\$60,000
2016 Nissan	1	\$30,000	\$30,000
2016 Nissan	1	\$35,000	\$35,000
2007 Dodge	1	\$35,000	\$35,000
Seadoo	2	\$15,000	\$30,000
CataRaft	1	\$10,000	\$10,000
F550 Utility Vehicle	1	\$40,000	\$40,000
Medix Ambulance	1	\$200,000	\$200,000
<b>Total</b>	<b>35</b>	<b>\$245,571</b>	<b>\$8,595,000</b>

Cost Allocation Factors	
Cost per Unit	\$245,571

Level-of-Service (LOS) Standards	
Existing Apparatus	35
Residential	
Residential Share	54%
2018 Population	71,711
Units per Person	0.0003
<b>Cost per Person</b>	<b>\$64.84</b>
Nonresidential	
Nonresidential Share	46%
2018 Jobs	57,674
Units per Job	0.0003
<b>Cost per Job</b>	<b>\$68.41</b>

## Projected Service Demand Units and Demand for Services

To accommodate projected development over the next 10 years, Missoula will construct additional Fire facilities and purchase additional apparatus. The anticipated needs are based on the development projections contained in the Land Use Assumptions (see Appendix A).

### Facilities

Shown in Figure F6, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 5,774 additional square feet of Fire facilities (12,630 additional persons X 0.4571 square feet per person) at a cost of approximately \$1.61 million (12,630 square feet X \$278 per square foot). Future nonresidential development will demand 3,921 additional square feet (8,130 additional jobs X 0.4823 square feet per job) at a cost of approximately \$1.09 million (3,921 square feet X \$278 per square foot). The 10-year demand for growth-related Fire facilities equals 9,695 additional square feet at a cost of approximately \$2.70 million. This is similar to Station 6 which is planned to include 9,337 square feet at a cost of \$2.60 million.

**Figure F6: Growth-Related Need for Fire Facilities**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Sq. Ft.
Fire Facilities	0.4571 Square Feet	per Person	\$278
	0.4823 Square Feet	per Job	

Need for Fire Facilities					
Year	Population	Jobs	Residential	Nonresidential	Total Square Feet
2018	71,711	57,674	32,781	27,816	60,597
2019	72,974	58,438	33,358	28,184	61,543
2020	74,237	59,214	33,936	28,559	62,494
2021	75,500	59,999	34,513	28,937	63,450
2022	76,763	60,795	35,090	29,321	64,412
2023	78,026	61,602	35,668	29,710	65,378
2024	79,289	62,420	36,245	30,105	66,350
2025	80,552	63,249	36,823	30,505	67,327
2026	81,815	64,090	37,400	30,910	68,310
2027	83,078	64,941	37,977	31,321	69,298
2028	84,341	65,804	38,555	31,737	70,292
10-Yr Increase	12,630	8,130	5,774	3,921	9,695

Growth-Related Expenditures	\$1,607,706	\$1,091,868	\$2,699,574
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## Apparatus

Shown in Figure F7, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 3.3 additional apparatus (12,630 additional persons X 0.0003 units per person) at a cost of approximately \$819,000 (3.3 units X \$245,571 per unit). Future nonresidential development will demand 2.3 additional apparatus (8,130 additional jobs X 0.0003 units per job) at a cost of approximately \$556,000 (2.3 units X \$245,571 per unit). The 10-year demand for growth-related Fire apparatus equals 5.6 additional apparatus at a cost of approximately \$1.38 million.

**Figure F7: Growth-Related Need for Fire Apparatus**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Unit
Fire Apparatus	0.0003 Units	per Person	\$245,571
	0.0003 Units	per Job	

Need for Fire Apparatus					
Year	Population	Jobs	Residential	Nonresidential	Total Units
2018	71,711	57,674	18.9	16.1	35.0
2019	72,974	58,438	19.3	16.3	35.5
2020	74,237	59,214	19.6	16.5	36.1
2021	75,500	59,999	19.9	16.7	36.6
2022	76,763	60,795	20.3	16.9	37.2
2023	78,026	61,602	20.6	17.2	37.8
2024	79,289	62,420	20.9	17.4	38.3
2025	80,552	63,249	21.3	17.6	38.9
2026	81,815	64,090	21.6	17.9	39.5
2027	83,078	64,941	21.9	18.1	40.0
2028	84,341	65,804	22.3	18.3	40.6
10-Yr Increase	12,630	8,130	3.3	2.3	5.6

Growth-Related Expenditures	\$818,908	\$556,159	\$1,375,067
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## Fire Impact Fees

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### Revenue Credits

A revenue credit is not necessary for Fire impact fees because 10-year growth-related expenditures exceed the impact fee revenue projected to be generated according to the Land Use Assumptions (see Figure F9). The City does not have any outstanding debt for Fire improvements that will be retired through property taxes.

### Proposed Fire Impact Fees

Figure F8 shows the proposed maximum supportable Fire impact fees for residential and nonresidential development in Missoula and includes an administration fee of five percent. The cost per service demand unit is \$201.74 per person and \$212.84 per job.

Residential fees are derived from the average number of persons per housing unit and the total cost per person. For a residential unit with 1,800 square feet, the fee is \$452 (\$201.74 per person X 2.24 persons per housing unit).

Nonresidential fees are the product of the average number of jobs per 1,000 square feet of floor area (*Trip Generation*, ITE, 2017) and the total cost per job. Commercial / Retail development will pay \$498 per 1,000 square feet of floor area (\$212.84 per job X 2.34 jobs per 1,000 square feet).

**Figure F8: Proposed Fire Impact Fees**

Fee Component	Cost per Person	Cost per Job
Facilities	\$127.29	\$134.30
Apparatus	\$64.84	\$68.41
Subtotal	\$192.13	\$202.71
Administration Fee (5%)	\$9.61	\$10.14
<b>Total</b>	<b>\$201.74</b>	<b>\$212.84</b>

Residential Development	Development Fees per Unit			
	Size of Unit	Persons per Housing Unit <sup>1</sup>	Proposed Fees	Current Fees
750 or Less	1.02	\$206	\$69	\$137
751 to 1,000	1.37	\$276	\$77	\$199
1,001 to 1,250	1.65	\$333	\$82	\$251
1,251 to 1,500	1.88	\$379	\$92	\$287
1,501 to 1,750	2.07	\$418	\$104	\$314
1,751 to 2,000	2.24	\$452	\$111	\$341
2,001 to 2,250	2.38	\$480	\$120	\$360
2,251 to 2,500	2.51	\$506	\$126	\$380
2,501 to 2,750	2.63	\$531	\$133	\$398
2,751 to 3,000	2.74	\$553	\$138	\$415
3,001 to 3,250	2.84	\$573	\$142	\$431
3,251 to 3,500	2.93	\$591	\$142	\$449
3,501 to 3,750	3.02	\$609	\$142	\$467
3,751 to 4,000	3.10	\$625	\$142	\$483
4,000 or More	3.17	\$640	\$142	\$498

Nonresidential Development	Development Fees per 1,000 Square Feet			
Development Type	Jobs per 1,000 Sq Ft <sup>1</sup>	Proposed Fees	Current Fees	Increase / Decrease
Commercial / Retail	2.34	\$498	\$134	\$364
Industrial	1.63	\$347	\$108	\$239
Office / Other Service	2.97	\$632	\$189	\$443
Institutional	0.93	\$198	\$189	\$9

1. See Land Use Assumptions

## Projected Revenue from Fire Impact Fees

Revenue projections assume implementation of the proposed Fire impact fees and that development over the next 10 years is consistent with the Land Use Assumptions described in Appendix A. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the impact fee revenue. As shown in Figure F9, Fire fee revenue is expected to total approximately \$4.28 million over the next 10 years, compared to projected expenditures of \$4.28 million.

**Figure F9: Projected Fire Impact Fee Revenue**

Fee Component	Growth Share	Existing Share	Total
Facilities	\$2,699,574	\$0	\$2,699,574
Apparatus	\$1,375,067	\$0	\$1,375,067
Administration Fee	\$203,732	\$0	\$203,732
<b>Total</b>	<b>\$4,278,373</b>	<b>\$0</b>	<b>\$4,278,373</b>

		Single Family \$486 per unit	Multi-Family \$325 per unit	Comm / Ret \$498 per KSF	Industrial \$347 per KSF	Office / Other \$632 per KSF	Institutional \$198 per KSF
Year		Housing Unit	Housing Unit	KSF	KSF	KSF	KSF
Base	2018	20,063	13,180	8,215	4,050	5,408	4,451
Year 1	2019	20,305	13,602	8,315	4,085	5,500	4,665
Year 2	2020	20,548	14,023	8,416	4,121	5,594	4,882
Year 3	2021	20,791	14,444	8,518	4,158	5,689	5,101
Year 4	2022	21,033	14,866	8,622	4,195	5,785	5,324
Year 5	2023	21,276	15,287	8,727	4,232	5,883	5,549
Year 6	2024	21,519	15,708	8,833	4,270	5,982	5,778
Year 7	2025	21,761	16,130	8,941	4,308	6,082	6,010
Year 8	2026	22,004	16,551	9,051	4,346	6,185	6,246
Year 9	2027	22,246	16,973	9,162	4,384	6,288	6,483
Year 10	2028	22,489	17,394	9,275	4,423	6,393	6,725
10-Year Increase		2,426	4,214	1,060	373	985	2,275
Projected Revenue		\$1,179,491	\$1,368,544	\$527,848	\$129,408	\$622,667	\$450,267

Projected Fee Revenue	\$4,278,224
Total Expenditures	\$4,278,373

## LAW ENFORCEMENT SERVICE AREA REPORT

The Law Enforcement Service Area Report includes components for stations and evidence storage. The stations component uses an incremental expansion methodology. The evidence storage component uses a cost recovery methodology to recover the cost of excess capacity in the new evidence storage facility.

### Service Area

Missoula's Police Department strives to provide uniform response times citywide, with its stations operating as an integrated network. The service area for the Law Enforcement Service Area Report is citywide.

### Cost Allocation

For certain public facilities TischlerBise uses functional population to establish the relative demand for infrastructure from both residential and nonresidential development. As shown in Figure LE1, functional population accounts for people living and working in a jurisdiction. Residents who do not work are assigned 20 hours per day to residential development and four hours per day to nonresidential development (annualized averages). Residents who work in Missoula are assigned 14 hours to residential development and 10 hours to nonresidential development. Residents who work outside Missoula are assigned 14 hours to residential development. Inflow commuters are assigned 10 hours to nonresidential development. Based on 2015 functional population data, the resulting proportionate share is 65 percent residential and 35 percent nonresidential.

**Figure LE1: Functional Population**

Service Demand Units in 2015		Demand Hours/Day	Person Hours
<b>Residential</b>			
Population	66,029		
Residents Not Working	32,408	20	648,160
Employed Residents	33,621		
Employed in Missoula	24,969	14	349,566
Employed outside Missoula	8,652	14	121,128
	Residential Subtotal		1,118,854
	<b>Residential Share</b>		<b>65%</b>
<b>Nonresidential</b>			
Non-working Residents	32,408	4	129,632
Jobs Located in Missoula	48,275		
Residents Employed in Missoula	24,969	10	249,690
Non-Resident Workers (inflow commuters)	23,306	10	233,060
	Nonresidential Subtotal		612,382
	<b>Nonresidential Share</b>		<b>35%</b>
	<b>Total</b>		<b>1,731,236</b>

Source: U.S. Census Bureau, OnTheMap 6.5 Application and LEHD Origin-Destination Employment Statistics.

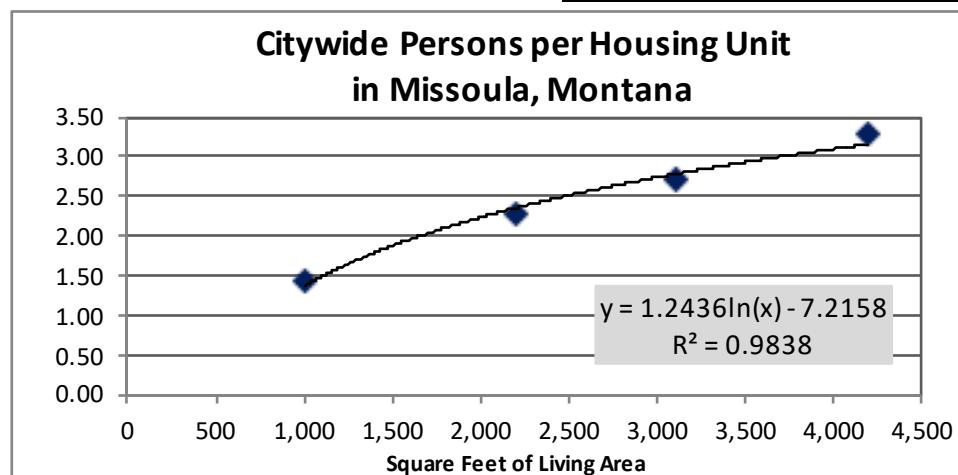
## Service Demand Units

Law Enforcement impact fees for residential development are calculated on a per capita basis, and then converted to an appropriate amount for each square footage range based on a persons per housing unit (PPHU) ratio. The PPHU ratios based on floor area were derived from 2016 square footage estimates provided by the U.S. Census Bureau (west region). Dwellings with two bedrooms or less average 1,000 square feet of floor area—based on multi-family dwellings constructed in West census region. Three-bedroom dwellings average 2,200 square feet, four-bedroom dwellings average 3,100 square feet, and dwellings with five or more bedrooms average 4,200 square feet—based on single-family dwellings constructed in the Census West region. Average floor area and number of persons by bedroom range are plotted in Figure LE2 with a logarithmic trend line. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 15 size thresholds.

**Figure LE2: Persons by Dwelling Size**

Actual Averages per Housing Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Persons	Sq Ft Range	Persons
0-2	1,000	1.43	750 or Less	1.02
3	2,200	2.27	751 to 1,000	1.37
4	3,100	2.70	1,001 to 1,250	1.65
5+	4,200	3.27	1,251 to 1,500	1.88
			1,501 to 1,750	2.07
			1,751 to 2,000	2.24
			2,001 to 2,250	2.38
			2,251 to 2,500	2.51
			2,501 to 2,750	2.63
			2,751 to 3,000	2.74
			3,001 to 3,250	2.84
			3,251 to 3,500	2.93
			3,501 to 3,750	3.02
			3,751 to 4,000	3.10
			4,001 or More	3.17

Average persons per housing unit derived from 2016 ACS PUMS data for the area that includes Missoula. Unit size for 0-2 bedroom is from the 2016 U.S. Census Bureau average for all multi-family units constructed in the Census West region. Unit size for all other bedrooms is from the 2016 U.S. Census Bureau average for single-family units constructed in the Census West region.



TischlerBise uses nonresidential vehicle trips as the nonresidential service unit. Average weekday vehicle trip ends (VTE) for nonresidential development are from the 10th edition of the reference book, *Trip Generation* (2017), by the Institute of Transportation Engineers. A “trip end” represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway). Trip ends for nonresidential development are calculated per thousand square feet, and require an adjustment factor to avoid double counting each trip at both the origin and destination points. The trip generation rates and adjustment factors are shown in Figure LE3. The same ITE land use categories used to determine jobs per 1,000 square feet in the previous chapters (see the Community Services and Fire chapters) were also used to determine vehicle trip generation per 1,000 square feet.

With exception to commercial/retail development, the basic trip adjustment factor is 50 percent for nonresidential development. For commercial/retail development, the trip adjustment factor is less than 50 percent because retail uses attract vehicles as they pass by on arterial and collector roads. For an average size shopping center, the ITE (2017) indicates that on average 34 percent of the vehicles that enter a commercial/retail land use are passing by on their way to some other primary destination. The remaining 66 percent of attraction trips have the shopping center as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor ( $0.66 \times 0.50 = 0.33$ ) is 33 percent of the trip ends.

Multiplying ITE’s ratio of trip ends per 1,000 square feet by the trip adjustment factor produces the number of average weekday vehicle trips generated per 1,000 square feet of development. For example, ITE’s estimate of 4.96 average weekday trip ends per demand unit (Code 110) multiplied by the trip adjustment factor for Industrial uses (50 percent) yields 2.48 average weekday vehicle trips per 1,000 square feet.

**Figure LE3: Vehicle Trip Ends per Development Unit by Land Use Type**

ITE Code	Development Type	Demand Unit	Wkdy Trip Ends Per Dmd Unit <sup>1</sup>	Trip Adjust. Factor <sup>1</sup>	Vehicle Trips Per Dmd Unit
110	Industrial	1,000 Sq Ft	4.96	50%	2.48
520	Institutional	1,000 Sq Ft	19.52	50%	9.76
710	Office / Other Service	1,000 Sq Ft	9.74	50%	4.87
820	Commercial / Retail	1,000 Sq Ft	37.75	33%	12.46

1. Trip Generation, Institute of Transportation Engineers, 10th Edition (2017).

## Existing Conditions and Level-of-Service Standards

### Stations

The first component of the Law Enforcement impact fee is stations, and the incremental expansion methodology is used to calculate the stations component of the fee. Residential level-of-service standards are assessed based on the 2018 population, and nonresidential standards are assessed based on 2018 average weekday vehicle trips (see the Land Use Assumptions in Appendix A).

Missoula plans to expand its current inventory of law enforcement stations to serve demand from new development. Shown below in Figure LE4, Missoula's current stations include 24,893 square feet of floor area. Functional population provides the proportionate share of demand for stations from residential and nonresidential development. Missoula's existing level of service for residential development is 0.2256 square feet per person (24,893 square feet X 65 percent residential share / 71,711 persons). The nonresidential level of service is 0.0536 square feet per vehicle trip (24,893 square feet X 35 percent nonresidential share / 162,575 vehicle trips). Using costs from the recent substation project, the cost per square foot is \$263 (\$3.7 million / 15,923 square feet). To determine the cost per service demand unit, these level-of-service standards are multiplied by the replacement cost per square foot (\$263), producing a cost per service demand unit of \$59.41 per person and \$14.11 per vehicle trip.

**Figure LE4: Existing Level-of-Service Standards**

Description	Square Feet
Police Headquarters	16,445
Police Substation <sup>1</sup>	8,448
<b>Total</b>	<b>24,893</b>

Cost Allocation Factors	
Cost per Square Foot <sup>2</sup>	\$263

Level-of-Service (LOS) Standards	
Existing Square Feet	24,893
Residential	
Residential Share	65%
2018 Population	71,711
Square Feet per Person	0.2256
<b>Cost per Person</b>	<b>\$59.41</b>
Nonresidential	
Nonresidential Share	35%
2018 Vehicle Trips	162,575
Square Feet per Vehicle Trip	0.0536
<b>Cost per Vehicle Trip</b>	<b>\$14.11</b>

1. This does not include evidence storage.

2. Police Substation: \$4,192,790 / 15,923 sq ft.

## Evidence Storage

The second component of the Law Enforcement impact fee is evidence storage. The cost recovery methodology is used to calculate the evidence storage component so that new development pays its fair share of the cost of excess capacity. Residential level-of-service standards are assessed based on the 2018 population, and nonresidential standards are assessed based on 2018 nonresidential vehicle trips (see the Land Use Assumptions in Appendix A).

The City recently constructed a police substation with excess evidence storage capacity to accommodate the law enforcement needs of future development. Missoula plans to recover future development's share of the costs to build the substation over the next 20 years, through 2038. As shown in Figure LE5, Missoula has a total of 7,475 square feet of evidence storage. The cost per square foot of the recently completed substation was used to estimate the total replacement cost. The substation is 15,923 square feet and cost \$4,192,790 to build, or approximately \$263 per square foot.

To determine the residential level-of-service standards, the total existing floor area is multiplied by the residential proportionate share (65 percent) and divided by the 2038 population (96,971), yielding 0.0501 square feet of evidence storage per person. Similarly, the nonresidential level-of-service standard is calculated by multiplying the total floor area by the nonresidential cost share (35 percent) and dividing by 2038 nonresidential vehicle trips (229,293), yielding 0.0114 square feet per vehicle trip. To determine the cost per service demand unit, these level-of-service standards are multiplied by the replacement cost per square foot (\$263), producing a cost per service demand unit of \$13.19 per person and \$3.00 per vehicle trip.

**Figure LE5: Planned Level-of-Service Standards**

Cost Allocation Factors	
Evidence Storage Facility Cost <sup>1</sup>	\$1,968,291
Existing Square Feet	7,475
Cost per Square Foot	\$263

Level-of-Service (LOS) Standards	
2038 Facilities Square Feet	7,475
Residential	
Residential Share	65%
2038 Population	96,971
Square Feet per Person	0.0501
<b>Cost per Person</b>	<b>\$13.19</b>
Nonresidential	
Nonresidential Share	35%
2038 Vehicle Trips	229,293
Square Feet per Vehicle Trip	0.0114
<b>Cost per Vehicle Trip</b>	<b>\$3.00</b>

1. Share of total facility cost

## Facilities Debt Credit

Because the City of Missoula is using property tax revenue to retire existing debt on the police substation through 2038, a credit must be given to offset the City's debt payments. This is done to avoid double payment – once through the payment of impact fees and again through the payment of property taxes.

The credit amount is based on the future annual principal payments used to pay down the debt, shown in Figure LE6. The total principal amount to be paid over the next 20 years totals \$3.2 million, which excludes the portion of the bond used for the Art Park Building. For each year, the principal payment is allocated towards residential and nonresidential development based on the proportionate share. The residential share of the principal is then divided by that year's population, and the nonresidential share of the principal is divided by that year's average weekday vehicle trips. The 20-year totals of principal payments are \$24.11 per person and \$5.62 per vehicle trip. Finally, the credit amount per service demand unit is found by taking the net present value of these figures, based on the coupon rate of the bond (3.95 percent). This produces a credit amount of \$15.20 per person and \$3.55 per vehicle trip. These credit amounts are integrated directly into the fee calculation, reducing the residential and nonresidential fees.

**Figure LE6: Law Enforcement Facilities Debt Credit**

		Residential Share	65%	Nonresidential Share	35%		
Year	Principal	Principal	Population	per Person	Principal	Vehicle Trips	per Trip
2018	-	\$0	71,711	\$0.00	\$0	162,575	\$0.00
2019	\$85,669	\$55,685	72,974	\$0.76	\$29,984	165,498	\$0.18
2020	\$100,186	\$65,121	74,237	\$0.88	\$35,065	168,469	\$0.21
2021	\$104,182	\$67,718	75,500	\$0.90	\$36,464	171,470	\$0.21
2022	\$108,338	\$70,420	76,763	\$0.92	\$37,918	174,515	\$0.22
2023	\$128,466	\$83,503	78,026	\$1.07	\$44,963	177,602	\$0.25
2024	\$133,590	\$86,834	79,289	\$1.10	\$46,757	180,736	\$0.26
2025	\$138,919	\$90,298	80,552	\$1.12	\$48,622	183,909	\$0.26
2026	\$144,461	\$93,899	81,815	\$1.15	\$50,561	187,129	\$0.27
2027	\$150,223	\$97,645	83,078	\$1.18	\$52,578	190,385	\$0.28
2028	\$156,216	\$101,540	84,341	\$1.20	\$54,676	193,692	\$0.28
2029	\$162,447	\$105,591	85,604	\$1.23	\$56,857	197,043	\$0.29
2030	\$168,927	\$109,803	86,867	\$1.26	\$59,125	200,432	\$0.29
2031	\$175,666	\$114,183	88,130	\$1.30	\$61,483	203,869	\$0.30
2032	\$182,673	\$118,737	89,393	\$1.33	\$63,936	207,356	\$0.31
2033	\$189,960	\$123,474	90,656	\$1.36	\$66,486	210,893	\$0.32
2034	\$197,537	\$128,399	91,919	\$1.40	\$69,138	214,473	\$0.32
2035	\$205,417	\$133,521	93,182	\$1.43	\$71,896	218,105	\$0.33
2036	\$213,611	\$138,847	94,445	\$1.47	\$74,764	221,780	\$0.34
2037	\$222,132	\$144,386	95,708	\$1.51	\$77,746	225,513	\$0.34
2038	\$231,378	\$150,396	96,971	\$1.55	\$80,982	229,293	\$0.35
Total	\$3,200,000	\$2,080,000	25,260	\$24.11	\$1,120,000	66,718	\$5.62
		Coupon Rate	3.95%			Coupon Rate	3.95%
				Net Present Value	\$15.20	Net Present Value	\$3.55

## Projected Service Demand Units and for Demand for Services

To accommodate projected development, Missoula will use existing law enforcement facilities and acquire additional vehicles and equipment as development occurs. The anticipated need is based on the development projections contained in the Land Use Assumptions (see Appendix A).

### Stations

Shown in Figure LE7, 10-year population growth equals 12,630 persons, and nonresidential development generates 31,117 additional vehicle trips during the same period. Using the 2018 level-of-service standards, future residential development will demand 2,850 additional square feet of stations (12,630 additional persons X 0.2256 square feet per person) at a cost of approximately \$750,000 (2,850 square feet X \$263 per square foot). Future nonresidential development will demand 1,668 additional square feet (31,117 additional vehicle trips X 0.0536 square feet per vehicle trip) at a cost of approximately \$439,000 (1,668 square feet X \$263 per square foot). The 10-year demand for stations equals 4,517 additional square feet at a cost of approximately \$1.19 million.

**Figure LE7: Growth-Related Need for Stations**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Sq. Ft.
Law Enforcement Stations	0.2256 Square Feet	per Person	\$263
	0.0536 Square Feet	per Vehicle Trip	

Need for Law Enforcement Stations					
Year	Population	Vehicle Trips	Residential	Nonresidential	Total Sq Ft
2018	71,711	162,575	16,180	8,713	24,893
2019	72,974	165,498	16,465	8,869	25,335
2020	74,237	168,469	16,750	9,028	25,779
2021	75,500	171,470	17,035	9,189	26,225
2022	76,763	174,515	17,320	9,352	26,673
2023	78,026	177,602	17,605	9,518	27,123
2024	79,289	180,736	17,890	9,686	27,576
2025	80,552	183,909	18,175	9,856	28,031
2026	81,815	187,129	18,460	10,028	28,489
2027	83,078	190,385	18,745	10,203	28,948
2028	84,341	193,692	19,030	10,380	29,410
10-Yr Increase	12,630	31,117	2,850	1,668	4,517

Growth-Related Expenditures	\$750,389	\$439,104	\$1,189,493
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## Evidence Storage

Shown in Figure LE8, Missoula plans to serve development in 2038 with its existing evidence storage facility. Based on the planned level-of-service standards shown below, existing development requires 5,448 square feet of evidence storage and future development requires 2,027 square feet (7,475 total square feet – 5,448 existing development's share). Since Missoula oversized the evidence storage area of the new substation to serve future development, impact fees will be used to repay debt on the oversized portion of the facility. Future development's share of evidence storage accounts for 2,027 square feet at a cost of \$533,720. Since the evidence storage area of the new substation includes 7,475 square feet of floor area at a cost of \$1,968,291, existing development's share is 5,448 square feet at a cost of \$1,434,571.

**Figure LE8: Growth-Related Need for Evidence Storage**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Sq. Ft.
Evidence Storage Facility	0.0501 Square Feet	per Person	\$263
	0.0114 Square Feet	per Vehicle Trip	

Need for Evidence Storage Facilities					
Year	Population	Vehicle Trips	Residential	Nonresidential	Total Sq Ft
2018	71,711	162,575	3,593	1,855	5,448
2019	72,974	165,498	3,656	1,888	5,545
2020	74,237	168,469	3,720	1,922	5,642
2021	75,500	171,470	3,783	1,956	5,739
2022	76,763	174,515	3,846	1,991	5,837
2023	78,026	177,602	3,910	2,026	5,936
2024	79,289	180,736	3,973	2,062	6,035
2025	80,552	183,909	4,036	2,098	6,134
2026	81,815	187,129	4,099	2,135	6,235
2027	83,078	190,385	4,163	2,172	6,335
2028	84,341	193,692	4,226	2,210	6,436
2033	90,656	210,893	4,542	2,406	6,949
2038	96,971	229,293	4,859	2,616	7,475
20-Yr Increase	25,260	66,718	1,266	761	2,027

Growth-Related Expenditures	\$333,268	\$200,452	\$533,720
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## Law Enforcement Impact Fees

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### Revenue Credits

A revenue credit is necessary for Law Enforcement impact fees because the City of Missoula is using property tax revenue to retire existing debt. A credit must be given to offset the City's debt payments. This is done so as to avoid double payment – once through the payment of impact fees and again through the payment of property taxes.

### Proposed Law Enforcement Impact Fees

Figure LE9 shows the proposed maximum supportable Law Enforcement impact fees for residential and nonresidential development in Missoula and includes an administration fee of five percent. The cost per service demand unit is \$60.28 per person and \$14.24 per vehicle trip.

Residential fees are derived from the average number of persons per housing unit and the total cost per person. Total costs per service demand unit include a facilities credit to offset future debt payments for the police substation. For a residential unit with 1,800 square feet, the fee is \$135 (\$60.28 per person X 2.24 persons per housing unit).

Nonresidential fees are the product of the average number of nonresidential vehicle trip ends per 1,000 square feet of floor area (*Trip Generation*, ITE, 2017), nonresidential trip rate adjustment factors, and the total cost per vehicle trip. Total costs per service demand unit include a facilities credit to offset future debt payments for the police substation. Commercial / Retail development will pay \$177 per 1,000 square feet of floor area (\$14.24 per vehicle trip X 37.75 vehicle trip ends per 1,000 square feet X 33 percent trip rate adjustment).

Figure LE9: Proposed Law Enforcement Impact Fees

Fee Component	Cost per Person	Cost per Vehicle Trip
Stations	\$59.41	\$14.11
Evidence Storage	\$13.19	\$3.00
Facilities Debt Credit	(\$15.20)	(\$3.55)
Subtotal	\$57.41	\$13.56
Administration Fee (5%)	\$2.87	\$0.68
<b>Total</b>	<b>\$60.28</b>	<b>\$14.24</b>

Residential Development	Development Fees per Unit			
	Size of Unit	Persons per Housing Unit <sup>1</sup>	Proposed Fees	Current Fees
750 or Less	1.02	\$61	\$13	\$48
751 to 1,000	1.37	\$83	\$14	\$69
1,001 to 1,250	1.65	\$99	\$15	\$84
1,251 to 1,500	1.88	\$113	\$17	\$96
1,501 to 1,750	2.07	\$125	\$19	\$106
1,751 to 2,000	2.24	\$135	\$20	\$115
2,001 to 2,250	2.38	\$143	\$22	\$121
2,251 to 2,500	2.51	\$151	\$23	\$128
2,501 to 2,750	2.63	\$159	\$24	\$135
2,751 to 3,000	2.74	\$165	\$25	\$140
3,001 to 3,250	2.84	\$171	\$26	\$145
3,251 to 3,500	2.93	\$177	\$26	\$151
3,501 to 3,750	3.02	\$182	\$26	\$156
3,751 to 4,000	3.10	\$187	\$26	\$161
4,000 or More	3.17	\$191	\$26	\$165

Nonresidential Development	Development Fees per 1,000 Square Feet				
	Development Type	Avg Wkdy Veh Trip Ends <sup>1</sup>	Trip Rate Adjustment	Proposed Fees	Current Fees
Commercial / Retail	37.75	33%	\$177	\$31	\$146
Industrial	4.96	50%	\$35	\$8	\$27
Office / Other Service	9.74	50%	\$69	\$32	\$37
Institutional	10.72	50%	\$76	\$32	\$44

1. See Land Use Assumptions

## Projected Law Enforcement Impact Fee Revenue

Revenue projections assume implementation of the proposed Law Enforcement impact fees and that future development is consistent with the Land Use Assumptions described in Appendix A. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the impact fee revenue. As shown in Figure LE10, Law Enforcement fee revenue is expected to total approximately \$1.16 million over the next 20 years, compared to projected expenditures of \$2.60 million. The funding gap between projected revenues and expenditures, \$1.43 million, approximately represents existing development's share of the costs to build the new substation.

**Figure LE10: Projected Law Enforcement Impact Fee Revenue**

Fee Component	Growth Share	Existing Share	Total
Stations	\$1,189,493	\$0	\$1,189,493
Evidence Storage	\$533,720	\$1,434,571	\$1,968,291
Facilities Debt Credit	(\$621,058)	\$0	(\$621,058)
Administration Fee	\$57,291	\$0	\$57,291
Total	\$1,159,446	\$1,434,571	\$2,594,018

	Single Family \$145 per unit	Multi-Family \$97 per unit	Comm / Ret \$177 per KSF	Industrial \$35 per KSF	Office / Other \$69 per KSF	Institutional \$76 per KSF
Year	Housing Unit	Housing Unit	KSF	KSF	KSF	KSF
Base	20,063	13,180	8,215	4,050	5,408	4,451
Year 1	20,305	13,602	8,315	4,085	5,500	4,665
Year 2	20,548	14,023	8,416	4,121	5,594	4,882
Year 3	20,791	14,444	8,518	4,158	5,689	5,101
Year 4	21,033	14,866	8,622	4,195	5,785	5,324
Year 5	21,276	15,287	8,727	4,232	5,883	5,549
Year 6	21,519	15,708	8,833	4,270	5,982	5,778
Year 7	21,761	16,130	8,941	4,308	6,082	6,010
Year 8	22,004	16,551	9,051	4,346	6,185	6,246
Year 9	22,246	16,973	9,162	4,384	6,288	6,483
Year 10	22,489	17,394	9,275	4,423	6,393	6,725
Year 15	23,702	19,501	9,861	4,622	6,940	7,982
Year 20	24,916	21,607	10,489	4,830	7,529	9,325
20-Year Increase	4,853	8,427	2,274	780	2,121	4,874
Projected Revenue	\$340,735	\$395,273	\$179,715	\$12,630	\$65,280	\$165,983

Projected Fee Revenue	\$1,159,616
Total Expenditures	\$2,594,018
Existing Development Share	\$1,434,401

## PARKS AND OPEN SPACE SERVICE AREA REPORT

The Parks and Open Space Service Area Report includes components for community/regional park land, park amenities, trailheads, and vehicles and equipment. The analysis uses an incremental expansion methodology, based on the existing level of service, for all components.

### Service Area

The City of Missoula provides parks and recreational facilities and services citywide. As a result, the service area for the Parks and Open Space Service Area Report is citywide.

### Cost Allocation

Costs for Parks and Open Space are allocated to residential development only, on a per capita basis. Costs are not allocated to nonresidential development because these parks are overwhelmingly used by residents, not workers. For example, consider that a non-Missoula resident who commutes into the City for work is highly unlikely to recreate in Missoula's parks – instead, the individual will most likely return home and recreate at a park within in that community. Because the vast majority of Missoula's parks are used by residents, as opposed to workers, 100 percent of costs are allocated towards residential development.

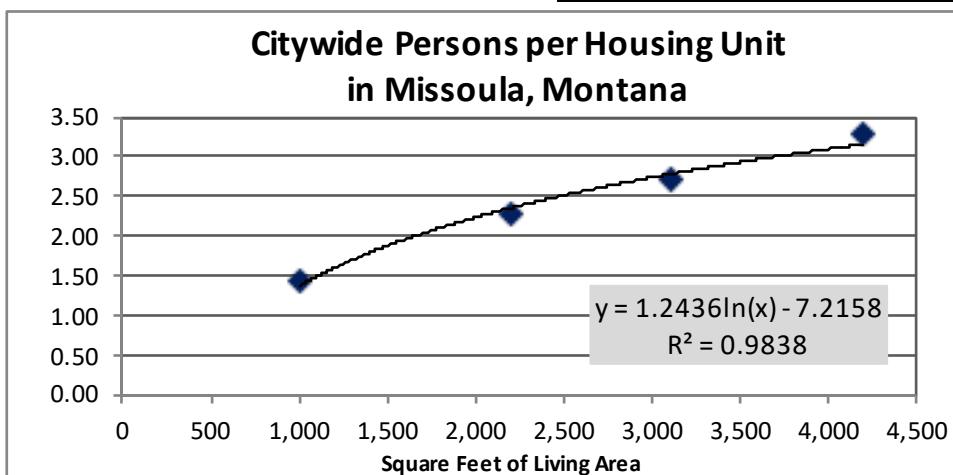
## Service Demand Units

Parks and Open Space impact fees for residential development are calculated on a per capita basis, and then converted to an appropriate amount for each square footage range based on a persons per housing unit (PPHU) ratio. The PPHU ratios based on floor area were derived from 2016 square footage estimates provided by the U.S. Census Bureau (west region). Dwellings with two bedrooms or less average 1,000 square feet of floor area—based on multi-family dwellings constructed in West census region. Three-bedroom dwellings average 2,200 square feet, four-bedroom dwellings average 3,100 square feet, and dwellings with five or more bedrooms average 4,200 square feet—based on single-family dwellings constructed in the Census West region. Average floor area and number of persons by bedroom range are plotted in Figure P1 with a logarithmic trend line. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 15 size thresholds.

**Figure P1: Persons by Dwelling Size**

Actual Averages per Housing Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Persons	Sq Ft Range	Persons
0-2	1,000	1.43	750 or Less	1.02
3	2,200	2.27	751 to 1,000	1.37
4	3,100	2.70	1,001 to 1,250	1.65
5+	4,200	3.27	1,251 to 1,500	1.88
			1,501 to 1,750	2.07
			1,751 to 2,000	2.24
			2,001 to 2,250	2.38
			2,251 to 2,500	2.51
			2,501 to 2,750	2.63
			2,751 to 3,000	2.74
			3,001 to 3,250	2.84
			3,251 to 3,500	2.93
			3,501 to 3,750	3.02
			3,751 to 4,000	3.10
			4,001 or More	3.17

Average persons per housing unit derived from 2016 ACS PUMS data for the area that includes Missoula. Unit size for 0-2 bedroom is from the 2016 U.S. Census Bureau average for all multi-family units constructed in the Census West region. Unit size for all other bedrooms is from the 2016 U.S. Census Bureau average for single-family units constructed in the Census West region.



## Existing Conditions and Level-of-Service Standards

### Community/Regional Park Land

The first component of the Parks and Open Space impact fee is community/regional park land. The incremental expansion methodology is used to calculate the park land component of the impact fee. Level-of-service standards are assessed based on the 2018 population (see the Land Use Assumptions in Appendix A).

As shown in Figure P2, Missoula has 292.5 acres of community and regional park land. Neighborhood parks were excluded because the land for these parks is typically set aside by developers, rather than purchased by the City. Based on land acquisitions for recent parks, the City of Missoula Parks and Recreation Department assumes future land for community and regional parks will cost \$149,500 per acre. To derive the residential level-of-service standard, the total existing park land acreage is multiplied by the proportionate share (100 percent) and divided by the 2018 population (71,711), yielding 0.00408 acres per person. The level-of-service standard is converted to a cost per person by multiplying it by the cost per acre (\$149,500), yielding a cost per person of \$609.79. Because the nonresidential proportionate share is zero percent for Parks and Open Space, there is no cost allocated to nonresidential development.

**Figure P2: Existing Level-of-Service Standards**

Description	Acres
Caras	4.5
Fort Missoula	158.0
Greenough	42.6
McCormick	24.5
Playfair	62.9
<b>Total</b>	<b>292.5</b>

Cost Allocation Factors	
Cost per Acre <sup>1</sup>	\$149,500

Level-of-Service (LOS) Standards	
Existing Acres	292.5
Residential	
Residential Share	100%
2018 Population	71,711
Acres per Person	0.00408
<b>Cost per Person</b>	<b>\$609.79</b>
Nonresidential	
Nonresidential Share	0%
2018 Jobs	57,674
Acres per Job	0.00000
<b>Cost per Job</b>	<b>\$0.00</b>

1. City of Missoula Parks and Recreation

## Park Amenities

The second component of the Parks and Open Space impact fee is park amenities. The incremental expansion methodology is used to calculate the amenities component of the Parks and Open Space fee. Residential level-of-service standards are assessed based on the 2018 population (see the Land Use Assumptions in Appendix A). As shown in Figure P3, Missoula has a total of 416.5 acres of park amenities.

**Figure P3: Existing Park Amenities**

Description	Acres
44 Ranch	5.7
Bellevue	7.9
Ben Hughes	8.0
Bess Reed	3.1
Bonner	4.8
Caras	4.5
Clark Fork Natural Area	9.8
Fort Missoula Regional Park	158.0
Franklin	3.2
Greenough	10.6
Hellgate	3.9
Jeffery Park	5.9
Kiwanis	6.9
LaFray	1.6
LW Heritage	3.2
Maloney Ranch	8.7
Marilyn	9.3
McCormick	24.5
McLeod	2.5
Memorial Rose Garden	3.8
MRL Park	4.0
Nicole	3.2
Northside	2.6
Pineview	4.6
Playfair	62.9
Pleasant View	5.4
Rainbow	5.4
Silver	12.0
Skyview	4.0
Southside Lions	2.2
Syringa Park	2.1
Toole Park	15.9
Wapikia	3.8
White Pine	2.6
Total	416.5

The park amenity acreage, or developed acreage, includes neighborhood parks because, while land for neighborhood parks is generally set aside by developers and conferred to the City, the costs to improve the land with park amenities is borne by the City. The Missoula Parks and Recreation Department estimates the average cost to improve an acre of park land with amenities is \$242,992. The cost per acre was derived from three recent park improvement projects completed by the City of Missoula: MRL Park, and phases I and II of Fort Missoula Regional Park. These three projects improved a total of 161 acres of park land at a cost of \$39.12 million, or \$242,992 per acre. To derive the residential level-of-service standard, the total existing developed park acreage (416.5 acres) is multiplied by the residential proportionate share (100 percent) and divided by the 2018 population (71,711), yielding 0.00581 developed acres per person. The level-of-service standard is converted to a cost per person by multiplying it by the cost per developed acre (\$242,922), yielding a cost of \$1,411.47 per person. Because the nonresidential proportionate share is zero percent for Parks and Open Space, there is no cost allocated to nonresidential development.

**Figure P4: Existing Level-of-Service Standards**

Cost Allocation Factors	
Cost per Developed Acre <sup>1</sup>	\$242,992
Level-of-Service (LOS) Standards	
Existing Developed Acres	416.5
Residential	
Residential Share	100%
2018 Population	71,711
Developed Acres per Person	0.00581
<b>Cost per Person</b>	<b>\$1,411.47</b>
Nonresidential	
Nonresidential Share	0%
2018 Jobs	57,674
Developed Acres per Job	0.00000
<b>Cost per Job</b>	<b>\$0.00</b>

1. City of Missoula Parks and Recreation

## Trailheads

The third component of the Parks and Open Space impact fee is trailheads. The incremental expansion methodology is used to calculate the trailheads component of the Parks and Open Space fee. Residential level-of-service standards are assessed based on the 2018 population (see the Land Use Assumptions in Appendix A).

As shown in Figure P5, Missoula currently has 12 major and 17 minor trailheads. The Missoula Parks and Recreation Department estimates the average replacement costs of a major and minor trailhead to be \$76,000 and 28,400, respectively. Collectively, the City's 29 trailheads have a total replacement cost of \$1,394,800, or \$48,097 per trailhead. To derive the residential level-of-service standard, the total existing number of trailheads is multiplied by the residential proportionate share (100 percent) and divided by the 2018 population (71,711), yielding 0.0004 trailheads per person. The level-of-service standard is converted to a cost per person by multiplying it by the average cost per trailhead (\$48,097), yielding a cost of \$19.45 per person. Because the nonresidential proportionate share is zero percent for Parks and Open Space, there is no cost allocated to nonresidential development.

**Figure P5: Existing Level-of-Service Standards**

Description	Units	Unit Cost	Replacement Cost
Primary (Major)	12	\$76,000	\$912,000
Secondary (Minor)	17	\$28,400	\$482,800
Total	29	\$48,097	\$1,394,800

Cost Allocation Factors	
Cost per Trailhead	\$48,097

Level-of-Service (LOS) Standards	
Existing Trailheads	29
Residential	
Residential Share	100%
2018 Population	71,711
Trailheads per Person	0.0004
<b>Cost per Person</b>	<b>\$19.45</b>
Nonresidential	
Nonresidential Share	0%
2018 Jobs	57,674
Trailheads per Job	0.0000
<b>Cost per Job</b>	<b>\$0.00</b>

Source: City of Missoula Parks and Recreation

## Vehicles and Equipment

The fourth component of the Parks and Open Space impact fee is vehicles and equipment. The incremental expansion methodology is used to calculate the vehicles and equipment component of the Parks and Open Space fee. Residential level-of-service standards are assessed based on the 2018 population (see the Land Use Assumptions in Appendix A).

As shown in Figure P6, Missoula's current inventory includes nine units of vehicles and equipment. The Missoula Parks and Recreation Department estimates the average replacement cost of its heavy equipment to be \$850,000, or \$94,444 per unit. To derive the residential level-of-service standard, the total existing units are multiplied by the residential proportionate share (100 percent) and divided by the 2018 population (71,711), yielding 0.0001 units per person. The level-of-service standard is converted to a cost per person by multiplying it by the average cost per unit (\$94,444), yielding a cost of \$11.85 per person. Because the nonresidential proportionate share is zero percent for Parks and Open Space, there is no cost allocated to nonresidential development.

**Figure P6: Existing Level-of-Service Standards**

Description	Units	Unit Cost	Replacement Cost
Back Hoe	2	\$125,000	\$250,000
Two-Ton Dumptruck	1	\$60,000	\$60,000
Climbing Truck	1	\$90,000	\$90,000
Aerial Lift	1	\$175,000	\$175,000
Chip Truck	1	\$85,000	\$85,000
Chipper	1	\$85,000	\$85,000
Chipper	1	\$60,000	\$60,000
Watering Truck	1	\$45,000	\$45,000
<b>Total</b>	<b>9</b>	<b>\$94,444</b>	<b>\$850,000</b>

Cost Allocation Factors	
Cost per Unit	\$94,444

Level-of-Service (LOS) Standards	
Existing Units	9
Residential	
Residential Share	100%
2018 Population	71,711
Units per Person	0.0001
<b>Cost per Person</b>	<b>\$11.85</b>
Nonresidential	
Nonresidential Share	0%
2018 Jobs	57,674
Units per Job	0.0000
<b>Cost per Job</b>	<b>\$0.00</b>

## 2014 Parks & Trail Bond Credit

In 2014, Missoula County voters approved a \$42.0 million Parks & Trail Bond that included funding for improvements to Fort Missoula Regional Park (\$36.225 million). Because the City of Missoula is using property tax revenue to retire existing debt on Fort Missoula Regional Park, a credit must be given to offset the City's debt payments through 2036. This is done to avoid double payment – once through the payment of impact fees and again through the payment of property taxes.

The credit amount is based on the City of Missoula's future annual principal payments used to pay down the debt, shown in Figure P7. The total principal amount of the 2014 Parks & Trail Bond related to Fort Missoula Regional Park is \$36.225 million and the City of Missoula's share is \$20.0 million. The annual principal payment is divided by that year's population to determine the principal cost per person. Finally, the credit amount per service demand unit is found by taking the net present value of the annual principal costs per person, based on the average coupon rate of the bond (4.14 percent). This produces a credit amount of \$152.09 per person. This credit is integrated directly into the fee calculation. Because the nonresidential proportionate share is zero percent for Parks and Open Space, there is no cost allocated to nonresidential development.

**Figure P7: 2014 Parks & Trail Bond Credit**

2014 Parks & Trail Bond				
Year	Total	City Share	Population	Per Person
2017	\$1,060,000	\$584,747		
2018	\$1,235,000	\$681,285	71,711	\$9.50
2019	\$1,255,000	\$692,318	72,974	\$9.49
2020	\$1,295,000	\$714,384	74,237	\$9.62
2021	\$1,360,000	\$750,241	75,500	\$9.94
2022	\$1,425,000	\$786,098	76,763	\$10.24
2023	\$1,500,000	\$827,472	78,026	\$10.61
2024	\$1,575,000	\$868,846	79,289	\$10.96
2025	\$1,655,000	\$912,978	80,552	\$11.33
2026	\$1,720,000	\$948,835	81,815	\$11.60
2027	\$1,790,000	\$987,450	83,078	\$11.89
2028	\$1,875,000	\$1,034,340	84,341	\$12.26
2029	\$1,970,000	\$1,086,747	85,604	\$12.70
2030	\$2,070,000	\$1,141,911	86,867	\$13.15
2031	\$2,175,000	\$1,199,835	88,130	\$13.61
2032	\$2,280,000	\$1,257,758	89,393	\$14.07
2033	\$2,375,000	\$1,310,164	90,656	\$14.45
2034	\$2,470,000	\$1,362,571	91,919	\$14.82
2035	\$2,535,000	\$1,398,428	93,182	\$15.01
2036	\$2,635,000	\$1,453,593	94,445	\$15.39
Total	\$36,255,000	\$20,000,000	22,734	\$230.63
		Coupon Rate	4.14%	
		Net Present Value	\$152.09	

## 2018 Open Space Bond Credit

In 2018, Missoula County voters approved a \$15.0 million Open Space Bond that included funding for open space, trailheads, and trails. Because the City of Missoula will use property tax revenue to fund parks and open space infrastructure that is also included as part of this impact fee study, a credit must be given to offset the City's debt payments through 2038. This is done to avoid double payment – once through the payment of impact fees and again through the payment of property taxes.

The credit amount is based on the City of Missoula's future annual principal payments used to pay down the debt, shown in Figure P8. The total principal amount of the 2018 Open Space Bond is \$15.0 million and the City of Missoula's share is \$7.5 million. The City's share includes \$5.25 million related to parks and open space infrastructure that is included as part of this impact fee study and \$2.25 million related to transportation infrastructure (trails) that is included as part of this impact fee study. The annual principal payment related to parks and open space infrastructure is divided by that year's population to determine the principal cost per person. Finally, the credit amount per service demand unit is found by taking the net present value of the annual principal costs per person, based on the expected coupon rate of the bond (4.00 percent). This produces a credit amount of \$39.74 per person for the share of the bond related to parks and open space infrastructure – the transportation portion is outlined in the Transportation section of this report. This credit is integrated directly into the fee calculation. Because the nonresidential proportionate share is zero percent for Parks and Open Space, there is no cost allocated to nonresidential development.

**Figure P8: 2018 Open Space Bond Credit**

2018 Open Space Bond				2018 Open Space Bond			
Year	Total	Parks	Transportation	Year	Parks	Population	Per Person
2019	\$219,280	\$153,496	\$65,784	2019	\$153,496	72,974	\$2.10
2020	\$255,482	\$178,837	\$76,645	2020	\$178,837	74,237	\$2.41
2021	\$259,619	\$181,734	\$77,886	2021	\$181,734	75,500	\$2.41
2022	\$267,894	\$187,526	\$80,368	2022	\$187,526	76,763	\$2.44
2023	\$281,341	\$196,938	\$84,402	2023	\$196,938	78,026	\$2.52
2024	\$294,787	\$206,351	\$88,436	2024	\$206,351	79,289	\$2.60
2025	\$310,302	\$217,211	\$93,091	2025	\$217,211	80,552	\$2.70
2026	\$325,817	\$228,072	\$97,745	2026	\$228,072	81,815	\$2.79
2027	\$342,367	\$239,657	\$102,710	2027	\$239,657	83,078	\$2.88
2028	\$355,813	\$249,069	\$106,744	2028	\$249,069	84,341	\$2.95
2029	\$370,294	\$259,206	\$111,088	2029	\$259,206	85,604	\$3.03
2030	\$387,878	\$271,514	\$116,363	2030	\$271,514	86,867	\$3.13
2031	\$407,530	\$285,271	\$122,259	2031	\$285,271	88,130	\$3.24
2032	\$428,217	\$299,752	\$128,465	2032	\$299,752	89,393	\$3.35
2033	\$449,938	\$314,957	\$134,981	2033	\$314,957	90,656	\$3.47
2034	\$471,659	\$330,161	\$141,498	2034	\$330,161	91,919	\$3.59
2035	\$491,312	\$343,918	\$147,393	2035	\$343,918	93,182	\$3.69
2036	\$510,964	\$357,675	\$153,289	2036	\$357,675	94,445	\$3.79
2037	\$524,410	\$367,087	\$157,323	2037	\$367,087	95,708	\$3.84
2038	\$545,097	\$381,568	\$163,529	2038	\$381,568	96,971	\$3.93
Total	\$7,500,000	\$5,250,000	\$2,250,000	Total	\$5,250,000	23,997	\$60.87
				Coupon Rate		4.00%	
				Net Present Value		\$39.74	

## Projected Service Unit Demand and Demand for Services

To accommodate projected development over the next 10 years, Missoula will acquire additional acres of community/regional park land, construct additional park amenities, construct additional trailheads, and acquire additional vehicles and equipment to serve future development.

### Community/Regional Park Land

Shown in Figure P9, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 51.5 additional acres of land for community and regional parks (12,630 additional persons X 0.00408 acres per person) at a cost of approximately \$7.70 million (51.5 acres X \$149,500 per acre). Future nonresidential development will demand no additional acres of land for community and regional parks.

**Figure P9: Growth-Related Need for Community/Regional Park Land**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Acre
Community & Regional Park Land	0.00408 Acres	per Person	\$149,500
	0.00000 Acres	per Job	

Need for Community & Regional Park Land					
Year	Population	Jobs	Residential	Nonresidential	Total Acres
2018	71,711	57,674	292.5	0.0	292.5
2019	72,974	58,438	297.7	0.0	297.7
2020	74,237	59,214	302.8	0.0	302.8
2021	75,500	59,999	308.0	0.0	308.0
2022	76,763	60,795	313.1	0.0	313.1
2023	78,026	61,602	318.3	0.0	318.3
2024	79,289	62,420	323.4	0.0	323.4
2025	80,552	63,249	328.6	0.0	328.6
2026	81,815	64,090	333.7	0.0	333.7
2027	83,078	64,941	338.9	0.0	338.9
2028	84,341	65,804	344.0	0.0	344.0
10-Yr Increase	12,630	8,130	51.5	0.0	51.5

Growth-Related Expenditures	\$7,701,665	\$0	\$7,701,665
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## Park Amenities

Shown in Figure P10, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 73.4 additional acres of park amenities (12,630 additional persons X 0.00581 acres per person) at a cost of approximately \$17.83 million (73.4 acres X \$242,992 per acre). Future nonresidential development will demand no additional acres of park amenities.

**Figure P10: Growth-Related Need for Park Amenities**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Acre
Park Amenities	0.00581 Developed Acres	per Person	\$242,992
	0.00000 Developed Acres	per Job	

Need for Park Amenities					
Year	Population	Jobs	Residential	Nonresidential	Total Acres
2018	71,711	57,674	416.5	0.0	416.5
2019	72,974	58,438	423.9	0.0	423.9
2020	74,237	59,214	431.2	0.0	431.2
2021	75,500	59,999	438.6	0.0	438.6
2022	76,763	60,795	445.9	0.0	445.9
2023	78,026	61,602	453.2	0.0	453.2
2024	79,289	62,420	460.6	0.0	460.6
2025	80,552	63,249	467.9	0.0	467.9
2026	81,815	64,090	475.2	0.0	475.2
2027	83,078	64,941	482.6	0.0	482.6
2028	84,341	65,804	489.9	0.0	489.9
10-Yr Increase	12,630	8,130	73.4	0.0	73.4

Growth-Related Expenditures	\$17,826,859	\$0	\$17,826,859
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## Trailheads

Shown in Figure P11, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 5.1 additional trailheads (12,630 additional persons X 0.0004 units per person) at a cost of approximately \$246,000 (5.1 units X \$48,097 per unit). Future nonresidential development will demand no additional trailheads.

**Figure P11: Growth-Related Need for Trailheads**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Unit
Trailheads	0.0004 Units	per Person	\$48,097
	0.0000 Units	per Job	

Need for Trailheads					
Year	Population	Jobs	Residential	Nonresidential	Total Units
2018	71,711	57,674	29.0	0.0	29.0
2019	72,974	58,438	29.5	0.0	29.5
2020	74,237	59,214	30.0	0.0	30.0
2021	75,500	59,999	30.5	0.0	30.5
2022	76,763	60,795	31.0	0.0	31.0
2023	78,026	61,602	31.6	0.0	31.6
2024	79,289	62,420	32.1	0.0	32.1
2025	80,552	63,249	32.6	0.0	32.6
2026	81,815	64,090	33.1	0.0	33.1
2027	83,078	64,941	33.6	0.0	33.6
2028	84,341	65,804	34.1	0.0	34.1
10-Yr Increase	12,630	8,130	5.1	0.0	5.1

Growth-Related Expenditures	\$245,657	\$0	\$245,657
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## Vehicles and Equipment

Shown in Figure P12, 10-year population growth equals 12,630 persons, and employment growth equals 8,130 jobs during the same period. Using the 2018 level-of-service standards, future residential development will demand 1.6 additional units (12,630 additional persons X 0.00013 units per person) at a cost of approximately \$150,000 (1.6 units X \$94,444 per unit). Future nonresidential development will demand no additional units.

**Figure P12: Growth-Related Need for Vehicles and Equipment**

Type of Infrastructure	Level of Service	Demand Unit	Cost per Unit
Vehicles and Equipment	0.00013 Units	per Person	\$94,444
	0.00000 Units	per Job	

Need for Vehicles and Equipment					
Year	Population	Jobs	Residential	Nonresidential	Total Units
2018	71,711	57,674	9.0	0.0	9.0
2019	72,974	58,438	9.2	0.0	9.2
2020	74,237	59,214	9.3	0.0	9.3
2021	75,500	59,999	9.5	0.0	9.5
2022	76,763	60,795	9.6	0.0	9.6
2023	78,026	61,602	9.8	0.0	9.8
2024	79,289	62,420	10.0	0.0	10.0
2025	80,552	63,249	10.1	0.0	10.1
2026	81,815	64,090	10.3	0.0	10.3
2027	83,078	64,941	10.4	0.0	10.4
2028	84,341	65,804	10.6	0.0	10.6
10-Yr Increase	12,630	8,130	1.6	0.0	1.6

Growth-Related Expenditures	\$149,705	\$0	\$149,705
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## Parks and Open Space Impact Fees

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### Revenue Credits

A revenue credit is necessary for Parks and Open Space impact fees because the City of Missoula is using property tax revenue to retire debt. A credit must be given to offset the City's debt payments. This is done so as to avoid double payment – once through the payment of impact fees and again through the payment of property taxes.

### Proposed Parks and Open Space Impact Fees

Figure P13 shows the proposed maximum supportable Parks and Open Space impact fees for residential and nonresidential development in Missoula and includes an administration fee of five percent. The cost per service demand unit is \$1,953.77 per person and \$0.00 per job.

Residential fees are derived from the average number of persons per housing unit and the total cost per person. For a residential unit with 1,800 square feet, the fee is \$4,376 (\$1,953.77 per person X 2.24 persons per housing unit).

Nonresidential fees are the product of the average number of jobs per 1,000 square feet of floor area (*Trip Generation*, ITE, 2017) and the total cost per job. Commercial / Retail development will pay \$0 per 1,000 square feet of floor area (\$0.00 per job X 2.34 jobs per 1,000 square feet).

**Figure P13: Proposed Parks and Open Space Impact Fees**

Fee Component	Cost per Person	Cost per Job
Community/Regional Park Land	\$609.79	\$0.00
Park Amenities	\$1,411.47	\$0.00
Trailheads	\$19.45	\$0.00
Vehicles and Equipment	\$11.85	\$0.00
2014 Parks & Trail Bond Credit	(\$152.09)	\$0.00
2018 Open Space Bond Credit	(\$39.74)	\$0.00
Subtotal	\$1,860.73	\$0.00
Administration Fee (5%)	\$93.04	\$0.00
<b>Total</b>	<b>\$1,953.77</b>	<b>\$0.00</b>

Residential Development	Development Fees per Unit			
	Size of Unit	Persons per Housing Unit <sup>1</sup>	Proposed Fees	Current Fees
750 or Less	1.02	\$1,993	\$286	\$1,707
751 to 1,000	1.37	\$2,677	\$320	\$2,357
1,001 to 1,250	1.65	\$3,224	\$380	\$2,844
1,251 to 1,500	1.88	\$3,673	\$380	\$3,293
1,501 to 1,750	2.07	\$4,044	\$422	\$3,622
1,751 to 2,000	2.24	\$4,376	\$422	\$3,954
2,001 to 2,250	2.38	\$4,650	\$453	\$4,197
2,251 to 2,500	2.51	\$4,904	\$453	\$4,451
2,501 to 2,750	2.63	\$5,138	\$481	\$4,657
2,751 to 3,000	2.74	\$5,353	\$481	\$4,872
3,001 to 3,250	2.84	\$5,549	\$481	\$5,068
3,251 to 3,500	2.93	\$5,725	\$481	\$5,244
3,501 to 3,750	3.02	\$5,900	\$481	\$5,419
3,751 to 4,000	3.10	\$6,057	\$481	\$5,576
4,000 or More	3.17	\$6,193	\$481	\$5,712

Nonresidential Development	Development Fees per 1,000 Square Feet			
	Development Type	Jobs per 1,000 Sq Ft <sup>1</sup>	Proposed Fees	Current Fees
Commercial / Retail	2.34	\$0	\$0	\$0
Industrial	1.63	\$0	\$0	\$0
Office / Other Service	2.97	\$0	\$0	\$0
Institutional	0.93	\$0	\$0	\$0

1. See Land Use Assumptions

## Projected Parks and Open Space Impact Fee Revenue

Revenue projections assume implementation of the proposed Parks and Open Space impact fees and that development over the next 10 years is consistent with the Land Use Assumptions described in Appendix A. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the impact fee revenue. As shown in Figure P14, Parks and Open Space fee revenue is expected to total approximately \$24.68 million over the next 10 years, compared to projected expenditures of approximately \$24.84 million.

**Figure P14: Projected Parks and Open Space Impact Fee Revenue**

Fee Component	Growth Share	Existing Share	Total
Community/Regional Park Land	\$7,701,665	\$0	\$7,701,665
Park Amenities	\$17,826,859	\$0	\$17,826,859
Trailheads	\$245,657	\$0	\$245,657
Vehicles and Equipment	\$149,705	\$0	\$149,705
2014 Parks & Trail Bond Credit	(\$1,920,856)	\$0	(\$1,920,856)
2018 Open Space Bond Credit	(\$451,770)	\$0	(\$451,770)
Administration Fee	\$1,288,709	\$0	\$1,288,709
<b>Total</b>	<b>\$24,839,969</b>	<b>\$0</b>	<b>\$24,839,969</b>

	Single Family \$4,709 per unit	Multi-Family \$3,146 per unit	Comm / Ret \$0 per KSF	Industrial \$0 per KSF	Office / Other \$0 per KSF	Institutional \$0 per KSF
Year	Housing Unit	Housing Unit	KSF	KSF	KSF	KSF
Base 2018	20,063	13,180	8,215	4,050	5,408	4,451
Year 1 2019	20,305	13,602	8,315	4,085	5,500	4,665
Year 2 2020	20,548	14,023	8,416	4,121	5,594	4,882
Year 3 2021	20,791	14,444	8,518	4,158	5,689	5,101
Year 4 2022	21,033	14,866	8,622	4,195	5,785	5,324
Year 5 2023	21,276	15,287	8,727	4,232	5,883	5,549
Year 6 2024	21,519	15,708	8,833	4,270	5,982	5,778
Year 7 2025	21,761	16,130	8,941	4,308	6,082	6,010
Year 8 2026	22,004	16,551	9,051	4,346	6,185	6,246
Year 9 2027	22,246	16,973	9,162	4,384	6,288	6,483
Year 10 2028	22,489	17,394	9,275	4,423	6,393	6,725
10-Year Increase	2,426	4,214	1,060	373	985	2,275
Projected Revenue	\$11,423,030	\$13,253,956	\$0	\$0	\$0	\$0

Projected Fee Revenue	\$24,676,987
Total Expenditures	\$24,839,969

## TRANSPORTATION SERVICE AREA REPORT

The Transportation Service Area Report includes components for Complete Streets, improved intersections, and commuter trails. The analysis uses an incremental expansion methodology, based on the existing level of service, for all components.

### Service Area

The City of Missoula's transportation infrastructure functions as an integrated network. As a result, the service area for the Transportation Service Area Report is citywide.

### Cost Allocation

Costs for Transportation are allocated to residential and nonresidential development based on average weekday person trips generated by type of development. Trip generation rates and trip adjustment factors are used to determine the proportionate impact of residential, commercial, industrial, office, and institutional development on Missoula's transportation network.

### Service Demand Units

Average Weekday Person Trips are used as a measure of demand by land use. Person trips are based on vehicle occupancy, transportation mode share, and vehicle trips ends from the reference book, *Trip Generation, 10<sup>th</sup> Edition*, published by the Institute of Transportation Engineers (ITE) in 2017. A detailed explanation of the conversion from vehicle trips to person trips is included in Appendix B.

### Trip Rate Adjustments

A vehicle trip end represents a vehicle entering or exiting a development (as if a traffic counter were placed across a driveway). Adjustment factors must be used when calculating vehicle trips in order to avoid double counting each trip, both at the origin and the destination. The basic trip adjustment factor is 50 percent. As discussed further below, the development impact fee methodology includes additional adjustments to make the fees proportionate to the infrastructure demand for particular types of development.

### Commuter Trip Adjustment

Residential development has a trip adjustment factor of 52 percent to account for commuters leaving Missoula for work. According to the 2009 National Household Travel Survey, weekday work trips are typically 31 percent of production trips (i.e., all out-bound trips, which are 50 percent of all trip ends). Based on 2011-2015 ACS data, approximately 16 percent of residents commute outside of Missoula for work. In combination, these factors ( $0.31 \times 0.50 \times 0.16 = 0.02$ ) support the additional two percent allocation of trips to residential development.

### Adjustment for Pass-By Trips

For nonresidential development, the basic trip adjustment factor of 50 percent is applied to industrial, office/other services, and institutional categories. The commercial/retail category has a trip factor of less than 50 percent because this type of development attracts vehicles as they pass by on arterial and collector roads. For example, for an average size shopping center, the ITE (2017) indicates that on average 34 percent of the vehicles that enter are passing by on their way to some other primary destination. The

remaining 66 percent of attraction trips have the shopping center as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor ( $0.66 \times 0.50 = 0.33$ ) is approximately 33 percent of the trip ends.

Shown below in Figure T1, TischlerBise derived the estimated average number of person trips for residential development, by dwelling size, using 15 size thresholds. For nonresidential development, totals represent person trips generated per 1,000 square feet of floor area, by land use.

**Figure T1: Person Trips by Dwelling Size**

Development Type	Weekday Person Trip Ends	Trip Adjustment Factor	Weekday Person Trips/Service Demand Unit			
			Total	Vehicle	Transit	Non-Motorized
<b>Residential (per housing unit)</b>						
750 or less square feet	8.49	52%	4.41	3.88	0.04	0.49
751 to 1,000 sq. ft.	10.69	52%	5.56	4.89	0.06	0.61
Multi-Family Average	11.97	52%	6.22	5.47	0.06	0.68
1,001 to 1,250 sq. ft.	12.38	52%	6.44	5.67	0.06	0.71
1,251 to 1,500 sq. ft.	13.78	52%	7.17	6.31	0.07	0.79
1,501 to 1,750 sq. ft.	14.94	52%	7.77	6.84	0.08	0.85
1,751 to 2,000 sq. ft.	15.97	52%	8.30	7.30	0.08	0.91
2,001 to 2,250 sq. ft.	16.87	52%	8.77	7.72	0.09	0.96
Single Family Average	17.24	52%	8.96	7.88	0.09	0.99
2,251 to 2,500 sq. ft.	17.66	52%	9.18	8.08	0.09	1.01
2,501 to 2,750 sq. ft.	18.40	52%	9.57	8.42	0.10	1.05
2,751 to 3,000 sq. ft.	19.06	52%	9.91	8.72	0.10	1.09
3,001 to 3,250 sq. ft.	19.67	52%	10.23	9.00	0.10	1.13
3,251 to 3,500 sq. ft.	20.23	52%	10.52	9.26	0.11	1.16
3,501 to 3,750 sq. ft.	20.75	52%	10.79	9.50	0.11	1.19
3,751 to 4,000 sq. ft.	21.24	52%	11.04	9.72	0.11	1.21
4,001 or More sq. ft.	21.71	52%	11.29	9.94	0.11	1.24
<b>Nonresidential (per 1,000 square feet)</b>						
Commercial / Retail	80.65	33%	26.61	23.42	0.27	2.93
Industrial	10.60	50%	5.30	4.66	0.05	0.58
Office / Other Services	20.81	50%	10.41	9.16	0.10	1.15
Institutional	22.90	50%	11.45	10.08	0.11	1.26

Source: [Trip Generation](#), Institute of Transportation Engineers, 10th Edition (2017); National Household Travel Survey data, 2017; TischlerBise analysis

## Existing Conditions and Level-of-Service Standards

### Complete Streets

The first component of the Transportation impact fee is Complete Streets. Missoula adopted a Complete Streets policy designed to ensure that all users of its transportation system are able to travel safely and conveniently on all streets and roadways. This includes providing facilities to better serve the needs of those who use transit by providing access to transit systems and providing access and safety for those who cannot or choose not to drive motor vehicles. The incremental expansion methodology is used to calculate the Complete Streets component of the impact fee. Level-of-service standards are assessed based on the 2018 person trips (see Figure T6).

As shown in Figure T2, Missoula has 32.1 lane miles of Complete Streets. Based on recent projects and projects included in the Activate Missoula 2045 Long Range Transportation Plan (March 2017), this analysis uses a cost per lane mile of \$1.6 million. To derive the level-of-service standard, existing lane miles of Complete Streets are divided by 2018 person trips, yielding 0.52671 lane miles per 10,000 person trips (32.1 lane miles / (609,066 person trips / 10,000)). The level-of-service standard is converted to a cost per person trip by multiplying it by the cost per lane mile, yielding a cost per person trip of \$84.27 (0.52671 lane miles per 10,000 person trips / 10,000 X \$1.6 million per lane mile).

**Figure T2: Existing Level-of-Service Standards**

Cost Allocation Factors	
Cost per Lane Mile <sup>1</sup>	\$1,600,000
Level-of-Service (LOS) Standards	
Existing Lane Miles of Complete Streets	32.1
2018 Person Trips	609,066
Lane Miles per 10,000 Person Trips	0.52671
<b>Cost per Person Trip</b>	<b>\$84.27</b>

1. City of Missoula

## Improved Intersections

The next component of the Transportation impact fee is improved intersections. This includes roundabouts and signalized intersections. The incremental expansion methodology is used to calculate the improved intersections component of the impact fee. Level-of-service standards are assessed based on the 2018 person trips (see Figure T6).

As shown in Figure T3, Missoula has 48 improved intersections – this does not include traffic signals located at the entrance of shopping centers, since those are project-level improvements designed to serve a specific development. Based on recent projects and projects included in the Activate Missoula 2045 Long Range Transportation Plan (March 2017), this analysis uses a cost per improved intersection of \$450,000. To derive the level-of-service standard, existing improved intersections are divided by 2018 person trips, yielding 0.78809 improved intersections per 10,000 person trips (48 improved intersections / (609,066 person trips / 10,000)). The level-of-service standard is converted to a cost per person trip by multiplying it by the cost per improved intersections, yielding a cost per person trip of \$35.46 (0.78809 improved intersections per 10,000 person trips / 10,000 X \$450,000 per improved intersection).

**Figure T3: Existing Level-of-Service Standards**

Cost Allocation Factors	
Cost per Improved Intersection <sup>1</sup>	\$450,000
Level-of-Service (LOS) Standards	
Existing Improved Intersections	48
2018 Person Trips	609,066
Improved Intersections per 10,000 Person Trips	0.78809
<b>Cost per Person Trip</b>	<b>\$35.46</b>

1. City of Missoula

## Commuter Trails

The final component of the Transportation impact fee is commuter trails. These trails were identified by Missoula staff because they are used by cyclists and pedestrians for commuting purposes. The incremental expansion methodology is used to calculate the commuter trails component of the impact fee. Level-of-service standards are assessed based on the 2018 person trips (see Figure T6).

As shown in Figure T4, Missoula has 20.3 miles of commuter trails. Based on recent projects, this analysis uses a commuter trail cost of \$1.45 million per mile. To derive the level-of-service standard, existing miles of commuter trails are divided by 2018 person trips, yielding 0.33395 miles per 10,000 person trips (20.3 miles / (609,066 person trips / 10,000)). The level-of-service standard is converted to a cost per person trip by multiplying it by the cost per mile, yielding a cost per person trip of \$48.42 (0.33395 miles per 10,000 person trips / 10,000 X \$1.45 million per mile).

**Figure T4: Existing Level-of-Service Standards**

Cost Allocation Factors	
Cost per Mile <sup>1</sup>	\$1,450,000
Level-of-Service (LOS) Standards	
Existing Miles of Commuter Trails	20.3
2018 Person Trips	609,066
Miles per 10,000 Person Trips	0.33395
<b>Cost per Person Trip</b>	<b>\$48.42</b>

1. City of Missoula

## 2018 Open Space Bond Credit

In 2018, Missoula County voters approved a \$15.0 million Open Space Bond that included funding for open space, trailheads, and trails. Because the City of Missoula will use property tax revenue to transportation infrastructure that is also included as part of this impact fee study, a credit must be given to offset the City's debt payments through 2038. This is done to avoid double payment – once through the payment of impact fees and again through the payment of property taxes.

The credit amount is based on the City of Missoula's future annual principal payments used to pay down the debt, shown in Figure T5. The total principal amount of the 2018 Open Space Bond is \$15.0 million and the City of Missoula's share is \$7.5 million. The City's share includes \$5.25 million related to parks and open space infrastructure that is included as part of this impact fee study and \$2.25 million related to transportation infrastructure (commuter trails) that is included as part of this impact fee study. The annual principal payment related to transportation infrastructure is divided by that year's person trips to determine the principal cost per person trip. Finally, the credit amount per service demand unit is found by taking the net present value of the annual principal costs per person trip, based on the expected coupon rate of the bond (4.00 percent). This produces a credit amount of \$1.98 per person trip for the share of the bond related to transportation infrastructure – the parks and open space portion is outlined in the Parks and Open Space section of this report. This credit is integrated directly into the fee calculation.

**Figure T5: 2018 Open Space Bond Credit**

2018 Open Space Bond				2018 Open Space Bond			
Year	Total	Parks	Transportation	Year	Transportation	Person Trips	Per Person Trip
2019	\$219,280	\$153,496	\$65,784	2019	\$65,784	620,107	\$0.11
2020	\$255,482	\$178,837	\$76,645	2020	\$76,645	631,248	\$0.12
2021	\$259,619	\$181,734	\$77,886	2021	\$77,886	642,454	\$0.12
2022	\$267,894	\$187,526	\$80,368	2022	\$80,368	653,756	\$0.12
2023	\$281,341	\$196,938	\$84,402	2023	\$84,402	665,147	\$0.13
2024	\$294,787	\$206,351	\$88,436	2024	\$88,436	676,634	\$0.13
2025	\$310,302	\$217,211	\$93,091	2025	\$93,091	688,209	\$0.14
2026	\$325,817	\$228,072	\$97,745	2026	\$97,745	699,884	\$0.14
2027	\$342,367	\$239,657	\$102,710	2027	\$102,710	711,635	\$0.14
2028	\$355,813	\$249,069	\$106,744	2028	\$106,744	723,495	\$0.15
2029	\$370,294	\$259,206	\$111,088	2029	\$111,088	735,446	\$0.15
2030	\$387,878	\$271,514	\$116,363	2030	\$116,363	747,482	\$0.16
2031	\$407,530	\$285,271	\$122,259	2031	\$122,259	759,622	\$0.16
2032	\$428,217	\$299,752	\$128,465	2032	\$128,465	771,865	\$0.17
2033	\$449,938	\$314,957	\$134,981	2033	\$134,981	784,216	\$0.17
2034	\$471,659	\$330,161	\$141,498	2034	\$141,498	796,658	\$0.18
2035	\$491,312	\$343,918	\$147,393	2035	\$147,393	809,213	\$0.18
2036	\$510,964	\$357,675	\$153,289	2036	\$153,289	821,859	\$0.19
2037	\$524,410	\$367,087	\$157,323	2037	\$157,323	834,628	\$0.19
2038	\$545,097	\$381,568	\$163,529	2038	\$163,529	847,501	\$0.19
Total	\$7,500,000	\$5,250,000	\$2,250,000	Total	\$2,250,000	227,394	\$3.03
					Coupon Rate		4.00%
					Net Present Value		\$1.98

## Projected Service Unit Demand and Demand for Services

To accommodate demand from projected development over the next 10 years, Missoula will construct additional lane miles of Complete Streets, improved intersections, and commuter trails. Trip generation rates and trip adjustment factors convert projected development into average weekday person trips. Based on estimates shown in Figure T6, existing development generates 609,066 person trips (weekday person trips by type of development X existing development). As shown in Figure T6, future development in Missoula will generate 114,429 additional person trips over the next 10 years.

Missoula's existing infrastructure, highlighted in yellow, includes 32.1 lane miles of Complete Streets, 48.0 improved intersections, and 20.3 miles of commuter trails. To maintain the existing infrastructure standards, Missoula needs approximately 6.0 additional lane miles of Complete Streets, approximately 9.0 additional improved intersections, and approximately 3.9 additional miles of commuter trails to accommodate projected development over the next 10 years.

**Figure T6: Projected Travel Demand**

Development Type	Development Unit	ITE Code	Weekday PTE	Trip Adjustment	Weekday Person Trips
Single Family	Housing Unit	210	17.24	52%	8.96
Multi-Family	Housing Unit	220	11.97	52%	6.22
Commercial / Retail	1,000 Sq Ft	820	80.65	33%	26.61
Industrial	1,000 Sq Ft	110	10.60	50%	5.30
Office / Other Service	1,000 Sq Ft	710	20.81	50%	10.41
Institutional	1,000 Sq Ft	520	22.90	50%	11.45

		2018	2019	2020	2021	2022	2023	2028	10-Year Increase
		Base Year	1	2	3	4	5	10	
Development	Single-Family Units	20,063	20,305	20,548	20,791	21,033	21,276	22,489	2,426
	Multi-Family Units	13,180	13,602	14,023	14,444	14,866	15,287	17,394	4,214
	Commercial / Retail KSF	8,215	8,315	8,416	8,518	8,622	8,727	9,275	1,060
	Industrial KSF	4,050	4,085	4,121	4,158	4,195	4,232	4,423	373
	Office / Other Service KSF	5,408	5,500	5,594	5,689	5,785	5,883	6,393	985
Avg Wkdy Person Trips	Institutional KSF	4,451	4,665	4,882	5,101	5,324	5,549	6,725	2,275
	Single-Family Trips	179,761	181,935	184,110	186,284	188,458	190,632	201,502	21,741
	Multi-Family Trips	81,982	84,603	87,223	89,844	92,465	95,086	108,190	26,208
	Residential Trips	261,743	266,538	271,333	276,128	280,923	285,718	309,692	47,949
	Commercial / Retail Trips	218,604	221,251	223,944	226,660	229,421	232,216	246,806	28,202
Demand	Industrial Trips	21,463	21,652	21,843	22,038	22,233	22,431	23,442	1,979
	Office / Other Service Trips	56,295	57,257	58,232	59,221	60,225	61,242	66,550	10,254
	Institutional Trips	50,960	53,409	55,896	58,407	60,955	63,540	77,005	26,045
	Nonresidential Trips	347,322	353,569	359,915	366,326	372,833	379,429	413,802	66,480
	Total Person Trips	609,066	620,107	631,248	642,454	653,756	665,147	723,495	114,429
Complete Street Lane Miles	Complete Street Lane Miles	32.1	32.7	33.3	33.9	34.5	35.1	38.1	6.0
	Improved Intersections	48.0	48.9	49.7	50.6	51.5	52.4	57.0	9.0
	Commuter Trails	20.3	20.7	21.1	21.5	21.8	22.2	24.2	3.9

## Transportation Impact Fees

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### Revenue Credits

A revenue credit is necessary for Transportation impact fees because the City of Missoula will use property tax revenue to retire debt. A credit must be given to offset the City's debt payments. This is done so as to avoid double payment – once through the payment of impact fees and again through the payment of property taxes.

### Proposed Transportation Impact Fees

Figure T7 shows the proposed maximum supportable Transportation impact fees for residential and nonresidential development in Missoula and includes an administration fee of five percent. The cost per service demand unit is \$174.49 per person trip.

All fees are derived from the average weekday person trips and the total cost per person trip. For a residential unit with 1,800 square feet, the fee is \$1,356 (\$174.49 per person trip X 8.30 person trips per housing unit). Commercial / Retail development will pay \$4,643 per 1,000 square feet of floor area (\$174.49 per person trip X 26.61 person trips per 1,000 square feet).

**Figure T7: Proposed Transportation Impact Fees**

Fee Component	Cost per Trip
Complete Streets	\$84.27
Improved Intersections	\$35.46
Commuter Trails	\$48.42
2018 Open Space Bond Credit	(\$1.98)
Subtotal	\$166.18
Administration Fee (5%)	\$8.31
<b>Total</b>	<b>\$174.49</b>

Residential Development	Development Fees per Unit			
	Size of Unit	Avg Wkdy Person Trips <sup>1</sup>	Proposed Fees	Current Fees
750 or Less	4.41	\$769	\$733	\$36
751 to 1,000	5.56	\$970	\$814	\$156
1,001 to 1,250	6.44	\$1,124	\$871	\$253
1,251 to 1,500	7.17	\$1,251	\$972	\$279
1,501 to 1,750	7.77	\$1,356	\$1,100	\$256
1,751 to 2,000	8.30	\$1,448	\$1,174	\$274
2,001 to 2,250	8.77	\$1,530	\$1,273	\$257
2,251 to 2,500	9.18	\$1,602	\$1,331	\$271
2,501 to 2,750	9.57	\$1,670	\$1,411	\$259
2,751 to 3,000	9.91	\$1,729	\$1,459	\$270
3,001 to 3,250	10.23	\$1,785	\$1,505	\$280
3,251 to 3,500	10.52	\$1,836	\$1,505	\$331
3,501 to 3,750	10.79	\$1,883	\$1,505	\$378
3,751 to 4,000	11.04	\$1,926	\$1,505	\$421
4,000 or More	11.29	\$1,970	\$1,505	\$465

Nonresidential Development	Development Fees per 1,000 Square Feet			
	Development Type	Avg Wkdy Person Trips <sup>1</sup>	Proposed Fees	Current Fees
Commercial / Retail	26.61	\$4,643	\$3,205	\$1,438
Industrial	5.30	\$925	\$550	\$375
Office / Other Service	10.41	\$1,816	\$1,447	\$369
Institutional	11.45	\$1,998	\$1,447	\$551

1. See Land Use Assumptions

## Projected Transportation Impact Fee Revenue

Revenue projections assume implementation of the proposed Transportation impact fees and that development over the next 10 years is consistent with the Land Use Assumptions described in Appendix A. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the impact fee revenue. As shown in Figure T8, Transportation fee revenue is expected to total approximately \$19.97 million over the next 10 years, compared to projected expenditures of \$19.99 million.

**Figure T8: Projected Transportation Impact Fee Revenue**

Fee Component	Growth Share	Existing Share	Total
Complete Streets	\$9,643,337	\$0	\$9,643,337
Improved Intersections	\$4,058,137	\$0	\$4,058,137
Commuter Trails	\$5,541,049	\$0	\$5,541,049
2018 Open Space Bond Credit	(\$204,941)	\$0	(\$204,941)
Administration Fee	\$951,879	\$0	\$951,879
<b>Total</b>	<b>\$19,989,461</b>	<b>\$0</b>	<b>\$19,989,461</b>

		Single Family \$1,563 per unit	Multi-Family \$1,085 per unit	Comm / Ret \$4,643 per KSF	Industrial \$925 per KSF	Office / Other \$1,816 per KSF	Institutional \$1,998 per KSF
Year		Housing Unit	Housing Unit	KSF	KSF	KSF	KSF
Base	2018	20,063	13,180	8,215	4,050	5,408	4,451
Year 1	2019	20,305	13,602	8,315	4,085	5,500	4,665
Year 2	2020	20,548	14,023	8,416	4,121	5,594	4,882
Year 3	2021	20,791	14,444	8,518	4,158	5,689	5,101
Year 4	2022	21,033	14,866	8,622	4,195	5,785	5,324
Year 5	2023	21,276	15,287	8,727	4,232	5,883	5,549
Year 6	2024	21,519	15,708	8,833	4,270	5,982	5,778
Year 7	2025	21,761	16,130	8,941	4,308	6,082	6,010
Year 8	2026	22,004	16,551	9,051	4,346	6,185	6,246
Year 9	2027	22,246	16,973	9,162	4,384	6,288	6,483
Year 10	2028	22,489	17,394	9,275	4,423	6,393	6,725
10-Year Increase		2,426	4,214	1,060	373	985	2,275
Projected Revenue		\$3,792,829	\$4,572,998	\$4,920,837	\$345,238	\$1,789,262	\$4,544,583

Projected Fee Revenue	\$19,965,746
Total Expenditures	\$19,989,461

## APPENDIX A: LAND USE ASSUMPTIONS

The City of Missoula, Montana, retained TischlerBise to analyze the impacts of development on its capital facilities and to calculate development impact fees based on that analysis. The population, housing unit, and job projections contained in this document provide the foundation for the development impact fee study. To evaluate demand for growth-related infrastructure from various types of development, TischlerBise prepared documentation on demand indicators by type of housing unit, jobs and floor area by type of nonresidential development, and average weekday vehicle trip generation rates. These metrics (explained further below) are the service units and demand indicators used in the development impact fee study.

Development impact fees are based on the need for growth-related improvements, and they must be proportionate by type of land use. The demographic data and development projections are used to demonstrate proportionality and to anticipate the need for future infrastructure. Demographic data reported by the U.S. Census Bureau, and data provided by Missoula's Development Services Department, are used to calculate base year estimates and annual projections for a 10-year horizon. Development impact fee studies typically look out five to ten years, with the expectation that fees will be updated every three to five years.

## Summary of Growth Indicators

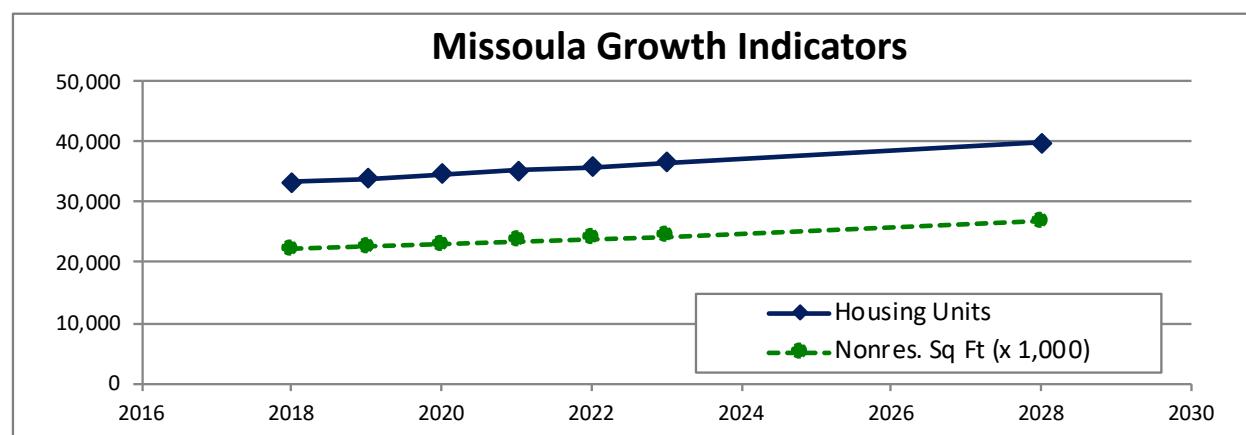
Key development projections for Missoula's development impact fee study are housing units and nonresidential floor area, summarized in Figure A1. These projections are used to estimate development fee revenue and to indicate the anticipated need for growth-related infrastructure. Development impact fees methodologies are designed to reduce sensitivity to development projections in the determination of the proportionate-share fee amounts. If actual development is slower than projected, fee revenue will decline, but so will the need for growth-related infrastructure. In contrast, if development is faster than anticipated, Missoula will receive more fee revenue, but it will also need to accelerate infrastructure improvements to keep pace with the actual rate of development.

Residential development projections use population and household estimates, by Traffic Analysis Zone (TAZ), provided by Missoula's Development Services Department. Household projections through 2027 are used to project population growth over the same time period. Nonresidential projections are based on *Activate Missoula 2045* employment estimates, data provided by Missoula's Development Services Department, and Institute of Transportation Engineers employees per square foot factors.

Based on these projections, development over the next ten years averages 664 residential units per year and 469,000 square feet of nonresidential floor area per year.

**Figure A1: Summary of Development Projections and Growth Rates**

	2018 to 2028 Average Annual							Increase	Compound Growth Rate
	2018	2019	2020	2021	2022	2023	2028		
Housing Units	33,243	33,907	34,571	35,235	35,899	36,563	39,883	664	1.92%
Nonres. Sq Ft (x 1,000)	22,123	22,565	23,013	23,466	23,925	24,391	26,816	469	1.97%

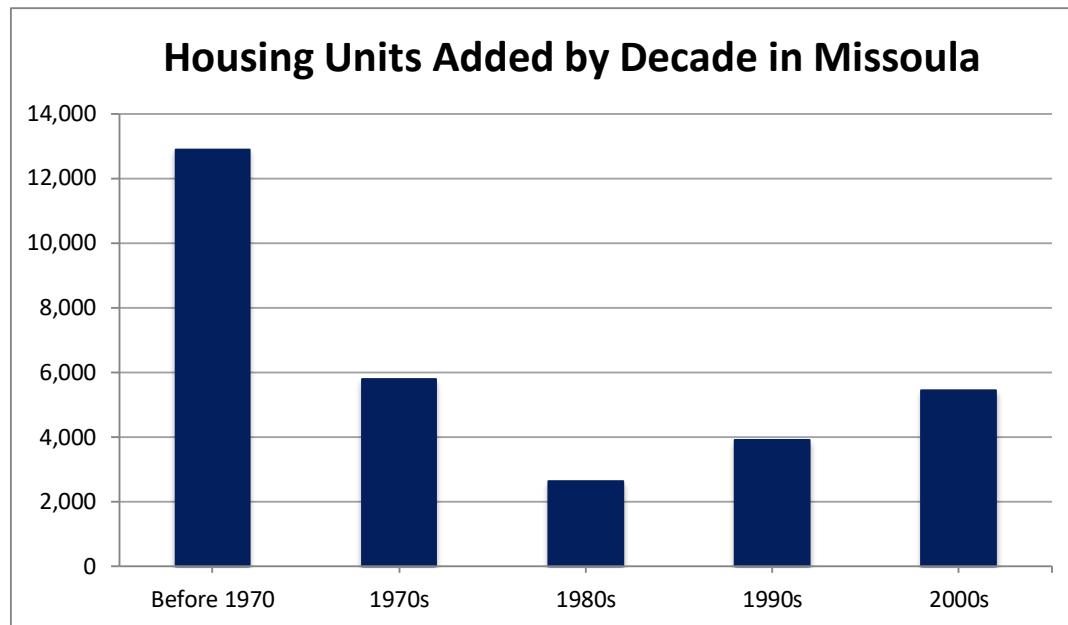


## Residential Development

In 2000, the U.S. Census Bureau estimated Missoula's population at 57,053 with approximately 25,225 housing units. By the 2010 Census total population grew to approximately 66,788 persons and housing units increased to 30,682.

**Figure A2: Historical Residential Construction**

Census 2010 Population	66,788	<b>Missoula added an average of 546 housing units per year from 2000 to 2010.</b>
Census 2010 Housing Units	30,682	
Census 2000 Housing Units	25,225	
New Housing Units 2000 to 2010	5,457	



Source: U.S. Census Bureau, Census 2010 Summary File 1, Census 2000 Summary File 1, 2012-2016 5-Year American Community Survey (for 1990s and earlier, adjusted to yield total units in 2000).

Housing permit data by housing type for the last ten years are shown in Figure A3. Missoula has seen a greater percentage of multi-dwelling unit permits over the last ten years. Over the last five years, multi-dwelling unit permits have increased at a greater rate than single and duplex permits, resulting in a 2013-2017 housing permit mix of 37 percent single and duplex permits and 63 percent multi dwelling permits. Over the last five years an average of 648 units were permitted annually. Approximately 36 permits annually are located in the County.

**Figure A3: Building Permit History – Missoula Growth Area**

Housing Type	Housing Mix		Average Annual Permits	
	5-Year	10-Year	5-Year	10-Year
Single & Duplex	37%	41%	237	199
Multi-Dwelling	63%	59%	411	292
Total	100%	100%	648	491

Source: City of Missoula.

## Persons per Housing Unit

According to the U.S. Census Bureau, a household is a housing unit occupied by year-round residents. Development fees often use per capita standards and persons per housing unit (PPHU) or persons per household (PPH) to derive proportionate share fee amounts. When PPHU is used in the fee calculations, infrastructure standards are derived using year-round population. When PPH is used in the fee calculations, the development fee methodology assumes a higher percentage of housing units will be occupied, thus requiring seasonal or peak population to be used when deriving infrastructure standards. **TischlerBise recommends that development fees for residential development in Missoula be imposed according to the year-round number of residents per housing unit.**

Persons per housing unit (PPHU) calculations require data on population and the types of units by structure. The 2010 census did not obtain detailed information using a “long-form” questionnaire. Instead, the U.S. Census Bureau switched to a continuous monthly mailing of surveys, known as the American Community Survey (ACS), which has limitations due to sample-size constraints. For example, data on detached housing units are now combined with attached single units (commonly known as townhouses). For development fees in Missoula, detached stick-built units and attached units (commonly known as townhouses, which share a common sidewall, but are constructed on an individual parcel of land) are included in the “Single-Family Unit” category. The second residential category includes duplexes and all other structures with two or more units on an individual parcel of land. This category is referred to as “Multi-Family” Unit. (Note: housing unit estimates from ACS will not equal decennial census counts of units. These data are used only to derive the custom PPHU factors for each type of unit).

Figure A4 below shows the 2012-2016 5-year ACS estimates for Missoula. Single-family units averaged 2.41 persons per housing unit (46,825 persons / 19,429 housing units). Multi-family units averaged 1.61 persons per housing unit (20,083 persons / 12,507 housing units). In 2016, Missoula’s housing stock averaged 2.10 persons per housing unit. This PPHU factor will be used in later calculations.

**Figure A4: Persons per Housing Unit by Type of Unit**

Type of Structure	Persons	Households	Persons per Household	Housing Units	Persons per Housing Unit	Housing Mix	Vacancy Rate
Single-Family Unit <sup>1</sup>	46,734	18,888	2.47	19,383	2.41	60.69%	2.6%
Multi-Family Unit <sup>2</sup>	20,174	11,327	1.78	12,553	1.61	39.31%	9.8%
Total	66,908	30,215	2.21	31,936	2.10	100.00%	5.4%

Source: TischlerBise analysis; U.S. Census Bureau, 2012-2016 American Community Survey, 5-Year Estimates.

1. Includes detached, attached (townhouse), and mobile home units.

2. Includes duplexes and structures with two or more units.

## Current Estimate of Population and Housing Units

Missoula's Development Services Department provided population and household estimates for 2017. The 2017 household population was 70,448, and the 2017 group quarters population was 3,209. In 2017, Missoula had an estimated total population of 73,657 ( $70,448 + 3,209$ ) occupying 30,646 households. TischlerBise uses these estimates in combination with household projections and building permit data provided by the Missoula's Development Services Department to derive base year population and housing unit estimates.

Based on Missoula's household projections, the City expects to add a baseline of 571 households per year over the next twenty years. A 10 percent adjustment factor is applied to this estimate to account for annexations, based on discussions with Missoula's Development Services Department and analysis of building permits from the last ten years. As a result, Missoula expects to add 629 households annually over the next twenty years. Thus, there are an estimated 31,274 households (30,646 households in 2017 + 629 new households) in Missoula in 2018.

To determine the total number of housing units in 2018, TischlerBise converts 2018 households (31,274) to housing units by dividing the increase in households between 2017 and 2018 by the 2016 ACS occupancy rate (629 increase in households / 94.6 percent occupancy rate). This number is added to the 2017 estimate of housing units. In 2018, Missoula has a total of 33,244 housing units. 2017 housing units are allocated by type based on the ACS housing mix shown in Figure A4. The projected annual increase in housing units are allocated by type based on historical building permit data provided by Missoula, as shown in Figure A3. Between 2013 and 2017, 37 percent of new units permitted were single-family, while 63 percent of new units permitted were multi-family. In 2018, Missoula has 20,063 single-family units and 13,181 multi-family units.

TischlerBise converts the increase in housing units to household population based on the 2016 ACS PPHU factors shown in Figure A4 (70,448 household population in 2017 + (243 new single-family units x 2.41 persons per unit) + (422 new multi-family units x 1.61 persons per unit)). The group quarters population is assumed to remain constant at 3,209 throughout the ten-year study period. As a result, Missoula's 2018 total population is 74,921.

## Projected Population and Housing Units

Missoula's Development Services Departments produced population and household projections through 2027. Based on these projections and historical building permit data, TischlerBise assumes an annual increase of 629 households over the next twenty years. The household projections serve as the basis for the housing unit and population projections. TischlerBise converts households to housing units by dividing the annual increase in households by the 2016 ACS occupancy rate (94.6%). This number is added to the previous year's estimate of housing units. Housing unit type is estimated based on the average share of new units by type in Missoula between 2013 and 2017. For example, to determine the number of single-family units in 2019, the increase in housing units between 2018 and 2019 (664) is multiplied by the single-family share of units (37%). This results in an increase of 243 single-family units. TischlerBise adds this increase to the 2018 number of housing units (243 new single-family units + 20,063 single-family units in 2018) which results in 20,306 single-family housing units in 2019.

These projections result in an estimated 10-year increase of 6,644 housing units, as shown in Figure A5. The annual increase in housing units is used to project future population growth based on 2016 ACS PPHU factors derived in Figure A4. As previously discussed, the estimated group quarters population is held constant over the 10-year study period. This results in a 10-year increase of 12,639 persons.

**Figure A5: Population and Housing Unit Projections**

	2018	2019	2020	2021	2022	2023	2028	10-Year Increase
	Base Yr	1	2	3	4	5	10	
<b>Population</b>								
HH Population	71,711	72,974	74,237	75,500	76,763	78,026	84,341	12,630
Group Quarters	3,209	3,209	3,209	3,209	3,209	3,209	3,209	0
<b>Total Population</b>	<b>74,920</b>	<b>76,183</b>	<b>77,446</b>	<b>78,709</b>	<b>79,972</b>	<b>81,235</b>	<b>87,550</b>	<b>12,630</b>
<b>Housing</b>								
Households	31,275	31,903	32,532	33,160	33,789	34,418	37,561	6,286
Single-Family Units	20,063	20,305	20,548	20,791	21,033	21,276	22,489	2,426
Multi-Family Units	13,180	13,602	14,023	14,444	14,866	15,287	17,394	4,214
<b>Total Housing Units</b>	<b>33,243</b>	<b>33,907</b>	<b>34,571</b>	<b>35,235</b>	<b>35,899</b>	<b>36,563</b>	<b>39,883</b>	<b>6,640</b>

	2018-19	2019-20	2020-21	2021-22	2022-23	2027-28	Avg Increase
	1	2	3	4	5	10	
Total Population	1,263	1,263	1,263	1,263	1,263	1,263	1,263
Households	629	629	629	629	629	629	629
Single-Family Units	243	243	243	243	243	243	243
Multi-Family Units	421	421	421	421	421	421	421
<b>Total Housing Units</b>	<b>664</b>						

## Nonresidential Development

In addition to data on residential development, the calculation of development impact fees requires data on nonresidential development. TischlerBise uses the term “jobs” to refer to employment by place of work. In Figure A6, gray shading indicates the nonresidential development prototypes used by TischlerBise to derive nonresidential floor area and average weekday vehicle trips ends.

The prototype for future Commercial/Retail development is an average-size Shopping Center (ITE 820). Commercial/Retail development (i.e. retail and eating / drinking places) is assumed to average 427 square feet per job. For future Industrial development, Light Industrial (ITE 110) is a reasonable proxy with an average of 615 square feet per job. For Office/Other Service development, General Office (ITE 710) is the prototype for future development, with an average of 337 square feet per job. For Institutional development both Elementary School (ITE 520), with an average of 1,076 square feet per job, and Hospital (ITE 610) with 354 square feet per job, are reasonable proxies.

**Figure A6: Nonresidential Service Units per Development Unit**

ITE Code	Land Use / Size	Demand Unit	Wkdy Trip Ends Per Dmd Unit <sup>1</sup>	Wkdy Trip Ends Per Employee <sup>1</sup>	Emp Per Dmd Unit	Sq Ft Per Emp
<b>110</b>	<b>Light Industrial</b>	<b>1,000 Sq Ft</b>	<b>4.96</b>	<b>3.05</b>	<b>1.63</b>	<b>613</b>
130	Industrial Park	1,000 Sq Ft	3.37	2.91	1.16	862
140	Manufacturing	1,000 Sq Ft	3.93	2.47	1.59	629
150	Warehousing	1,000 Sq Ft	1.74	5.05	0.34	2,941
254	Assisted Living	bed	2.60	4.24	0.61	na
310	Hotel	room	8.36	14.34	0.58	na
<b>520</b>	<b>Elementary School</b>	<b>1,000 Sq Ft</b>	<b>19.52</b>	<b>21.00</b>	<b>0.93</b>	<b>1,075</b>
530	High School	1,000 Sq Ft	14.07	22.25	0.63	1,587
540	Community College	student	1.15	14.61	0.08	na
550	University/College	student	1.56	8.89	0.18	na
<b>610</b>	<b>Hospital</b>	<b>1,000 Sq Ft</b>	<b>10.72</b>	<b>3.79</b>	<b>2.83</b>	<b>353</b>
620	Nursing Home	bed	3.06	2.91	1.05	na
<b>710</b>	<b>General Office (average size)</b>	<b>1,000 Sq Ft</b>	<b>9.74</b>	<b>3.28</b>	<b>2.97</b>	<b>337</b>
715	Single Tenant Office	1,000 Sq Ft	11.25	3.77	2.98	336
720	Medical-Dental Office	1,000 Sq Ft	34.80	8.70	4.00	250
730	Government Office	1,000 Sq Ft	22.59	7.45	3.03	330
<b>820</b>	<b>Shopping Center (average size)</b>	<b>1,000 Sq Ft</b>	<b>37.75</b>	<b>16.11</b>	<b>2.34</b>	<b>427</b>

1. Trip Generation, Institute of Transportation Engineers, 10th Edition (2017).

## Current Estimate of Nonresidential Floor Area and Employment

TischlerBise uses *Activate Missoula 2045* employment projections to estimate the base year number of jobs. The number of jobs in Missoula in 2018 is estimated to be 57,674. Missoula's Development Services Department provided floor area estimates with the exception of exempt properties. The floor area for University of Montana and St. Patrick Hospital were estimated using ITE factors, as shown in Figure A6, and employment estimates for the two institutions as published in the FY2018 Adopted Budget. 2018 estimated floor area totals 22.12 million square feet. Base year Commercial/Retail development accounts for approximately 8.22 million square feet, Industrial development is approximately 4.05 million square feet, Office / Other Service development totals approximately 5.41 million square feet, and Institutional development totals approximately 4.45 million square feet.

**Figure A7: Estimated Nonresidential Floor Area and Employment**

Nonresidential Category	2018 Jobs <sup>1</sup>	Percent of Total Jobs	2018 Estimated Floor Area <sup>2</sup>	Jobs per 1,000 Sq. Ft. <sup>3</sup>
Commercial / Retail <sup>4</sup>	16,970	29.4%	8,215,103	2.07
Industrial <sup>5</sup>	6,652	11.5%	4,049,655	1.64
Office / Other Service <sup>6</sup>	19,175	33.2%	5,407,821	3.55
Institutional <sup>7</sup>	14,877	25.8%	4,450,654	3.34
Total	57,674	100.0%	22,123,233	

1. Source: Missoula staff, *Activate Missoula 2045*.

2. Source: Missoula staff.

3. Trip Generation, Institute of Transportation Engineers, 10th Edition (2017).

4. Major sectors are Retail Trade and Food Services.

5. Major sectors are Wholesale Trade, Manufacturing, and Construction.

6. Major sectors are Professional, Scientific, & Technical Services and Administration & Support.

7. Major sectors are Education (University of Montana) and Health Care (St. Patrick Hospital).

## Projected Nonresidential Floor Area and Employment

Missoula's Development Services Department provided employment estimates and projections for the years between 2015 and 2045 by industry sector. TischlerBise projects annual employment growth in Missoula between 2018 and 2028 based on the compound annual growth rates for jobs by industry sector between 2015 and 2045. TischlerBise uses ITE square foot per employee factors, as shown in Figure A6, to project the corresponding growth in nonresidential square footage over the same time period. For example, Commercial/Retail employment is projected to increase by 233 jobs between 2018 and 2019. TischlerBise applies the square foot per employee factor shown in Figure A6 to the increase in jobs to project the increase in Commercial/Retail square footage between 2018 and 2019 (233 jobs x 427 square feet per job), resulting in an increase of approximately 106,000 square feet of Commercial/Retail development. These calculations result in an estimated 10-year increase of 8,130 jobs and 4.69 million square feet.

**Figure A8: Employment and Nonresidential Floor Area Projections**

	2018	2019	2020	2021	2022	2023	2028	10-Year Increase
	Base Yr	1	2	3	4	5	10	
<b>Jobs</b>	2,157	1,902						
Commercial / Retail	16,970	17,203	17,440	17,679	17,922	18,168	19,452	<b>2,482</b>
Industrial	6,652	6,710	6,769	6,829	6,889	6,950	7,261	<b>609</b>
Office / Other Service	19,175	19,449	19,727	20,009	20,295	20,585	22,098	<b>2,923</b>
Institutional	14,877	15,076	15,278	15,482	15,689	15,899	16,993	<b>2,116</b>
<b>Total Jobs</b>	<b>57,674</b>	<b>58,438</b>	<b>59,214</b>	<b>59,999</b>	<b>60,795</b>	<b>61,602</b>	<b>65,804</b>	<b>8,130</b>
<b>Nonresidential Floor Area (x 1,000)</b>								
Commercial / Retail	8,215	8,315	8,416	8,518	8,622	8,727	9,275	<b>1,060</b>
Industrial	4,050	4,085	4,121	4,158	4,195	4,232	4,423	<b>373</b>
Office / Other Service	5,408	5,500	5,594	5,689	5,785	5,883	6,393	<b>985</b>
Institutional	4,451	4,665	4,882	5,101	5,324	5,549	6,725	<b>2,275</b>
<b>Total Nonresidential KSF</b>	<b>22,123</b>	<b>22,565</b>	<b>23,013</b>	<b>23,466</b>	<b>23,925</b>	<b>24,391</b>	<b>26,816</b>	<b>4,693</b>

	2018-19	2019-20	2020-21	2021-22	2022-23	2027-28	Avg Increase
	1	2	3	4	5	10	
Commercial / Retail Jobs	233	237	239	243	246	264	<b>248</b>
Industrial Jobs	58	59	60	60	61	63	<b>61</b>
Office / Other Service Jobs	274	278	282	286	290	311	<b>292</b>
Institutional Jobs	199	202	204	207	210	225	<b>212</b>
<b>Total Jobs</b>	<b>764</b>	<b>776</b>	<b>785</b>	<b>796</b>	<b>807</b>	<b>863</b>	<b>813</b>
Commercial / Retail KSF	99	101	102	104	105	113	<b>106</b>
Industrial KSF	36	36	37	37	37	39	<b>37</b>
Office / Other Service KSF	92	94	95	96	98	105	<b>99</b>
Institutional KSF	214	217	219	223	226	242	<b>227</b>
<b>Total Nonresidential KSF</b>	<b>441</b>	<b>448</b>	<b>453</b>	<b>459</b>	<b>466</b>	<b>498</b>	<b>469</b>

## Average Weekday Vehicle Trips

Average Weekday Vehicle Trips are used as a measure of demand by land use. Vehicle trips are estimated using average weekday vehicle trip ends from the reference book, *Trip Generation, 10<sup>th</sup> Edition*, published by the Institute of Transportation Engineers (ITE) in 2017. A vehicle trip end represents a vehicle entering or exiting a development (as if a traffic counter were placed across a driveway). Adjustment factors must be used when calculating vehicle trips in order to avoid double counting each trip, both at the origin and the destination.

### Trip Rate Adjustments

The basic trip adjustment factor is 50 percent. As discussed further below, the development impact fee methodology includes additional adjustments to make the fees proportionate to the infrastructure demand for particular types of development.

### Commuter Trip Adjustment

Residential development has a trip adjustment factor of 52 percent to account for commuters leaving Missoula for work. According to the 2009 National Household Travel Survey, weekday work trips are typically 31 percent of production trips (i.e., all out-bound trips, which are 50 percent of all trip ends). Based on 2011-2015 ACS data, approximately 16 percent of residents commute outside of Missoula for work. In combination, these factors ( $0.31 \times 0.50 \times 0.16 = 0.02$ ) support the additional 2 percent allocation of trips to residential development.

### Adjustment for Pass-By Trips

For nonresidential development the basic trip adjustment factor of 50 percent is applied to industrial, institutional, and office/other service categories. The commercial/retail category has a trip factor of less than 50 percent because this type of development attracts vehicles as they pass by on arterial and collector roads. For example, for an average size shopping center, the ITE (2017) indicates that on average 34 percent of the vehicles that enter are passing by on their way to some other primary destination. The remaining 66 percent of attraction trips have the shopping center as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor ( $0.66 \times 0.50 = 0.33$ ) is approximately 33 percent of the trip ends.

### Average Residential Vehicle Trip Rates

The Institute of Transportation Engineers (ITE) publishes national average trip generation rates for residential development. Based on data published by the Institute of Transportation Engineers (*Trip Generation, 10<sup>th</sup> Edition, 2017*), single-family residential development generates 9.44 (ITE 210) average weekday vehicle trip ends per dwelling. Multi-family residential development generates 6.65 (ITE 221) average weekday vehicle trip ends per dwelling on average.

## Demand Indicators by Dwelling Size

As an alternative to simply using national average trip generation rates for residential development, published by the Institute of Transportation Engineers (ITE), TischlerBise derived custom trip rates using local demographic data. Key inputs needed for the analysis (i.e. average number of persons and vehicles available per housing unit) are available from American Community Survey (ACS) data.

### Missoula Control Totals

The 2010 census did not obtain detailed information using a “long-form” questionnaire. Instead, the U.S. Census Bureau switched to a continuous monthly mailing of surveys, known as the American Community Survey (ACS), which has limitations due to sample-size constraints. For example, data on detached housing units are now combined with attached single units (commonly known as townhouses). Part of the rationale for deriving fees by house size, as discussed further below, is to address this ACS data limitation. Because townhouses generally have fewer bedrooms and less living space than detached units, fees by house size ensure proportionality and facilitate construction of affordable units.

According to the U.S. Census Bureau, a household is a housing unit occupied by year-round residents. Development fees often use per capita standards and persons per housing unit (PPHU) or persons per household (PPH) to derive proportionate share fee amounts. TischlerBise recommends that development fees for residential development in Missoula be imposed according to the year-round number of residents per housing unit. Figure A9 indicates the average number of year-round residents per housing unit. In 2016, the control total for Missoula is 2.10 persons per dwelling (i.e. weighted average for all types of housing).

**Figure A9: Persons per Housing Unit**

Type of Structure	Persons	Households	Persons per Household	Housing Units	Persons per Housing Unit	Housing Mix	Vacancy Rate
Single-Family Unit <sup>1</sup>	46,734	18,888	2.47	19,383	2.41	60.69%	2.6%
Multi-Family Unit <sup>2</sup>	20,174	11,327	1.78	12,553	1.61	39.31%	9.8%
Total	66,908	30,215	2.21	31,936	2.10	100.00%	5.4%

Source: TischlerBise analysis; U.S. Census Bureau, 2012-2016 American Community Survey, 5-Year Estimates.

1. Includes detached, attached (townhouse), and mobile home units.

2. Includes duplexes and structures with two or more units.

Trip generation rates are also dependent upon the average number of vehicles available per dwelling. Key independent variables needed for the analysis (i.e., vehicles available, housing units, households, and persons) are available from the U.S. Census Bureau American Community Survey (ACS). Figure A10 indicates an average of 1.62 vehicles per housing unit in Missoula.

**Figure A10: Vehicles Available by Type of Housing Unit**

Tenure	Vehicles Available <sup>1</sup>	Households <sup>2</sup>			Vehicles per HH by Tenure
		Single Family <sup>3</sup>	Multi-Family	Total	
Owner-occupied	29,648	13,727	647	14,374	2.06
Renter-occupied	22,177	5,207	10,634	15,841	1.40
Total	51,825	18,934	11,281	30,215	1.72

Units per Structure	Vehicles Available	Housing Units <sup>4</sup>	Vehicles per Housing Unit
Single Family	35,567	19,429	1.83
Multi-Family	16,220	12,507	1.30
Total	51,787	31,936	1.62

1. Vehicles available by tenure from Table B25046, American Community Survey, 2012-2016.

2. Households by tenure and units in structure from Table B25032, American Community Survey, 2012-2016.

3. Attached or Detached.

4. Housing units from Table B25024, American Community Survey, 2012-2016.

## Demand Indicators by Dwelling Size

Impact fees must be proportionate to the demand for infrastructure. Because averages per housing unit, for both persons and vehicle trip ends, have a strong, positive correlation to the number of bedrooms, TischlerBise recommends residential fee schedules that increase by unit size. Custom tabulations of demographic data by bedroom range can be created from individual survey responses provided by the U.S. Census Bureau in files known as Public Use Microdata Samples (PUMS). PUMS files are only available for areas of at least 100,000 persons with Missoula included in Public Use Microdata Areas (PUMA) 00200 (Appendix D).

Cells shaded yellow below are survey results for PUMA 00200. Unadjusted persons per housing unit (1.96), derived from PUMS data for the PUMA listed above, are adjusted upward to match the control totals for Missoula (2.10), as shown above in Figure A9. Adjusted persons per housing unit totals are shaded in gray.

**Figure A11: Persons by Bedroom Range**

Bedroom Range	Persons <sup>1</sup>	Vehicles Available <sup>1</sup>	Housing Units <sup>1</sup>	Housing Mix	Unadjusted PPHU	Adjusted PPHU <sup>2</sup>
0-2	2,531	2,639	1,901	38%	1.33	1.43
3	3,879	3,740	1,833	37%	2.12	2.27
4	2,188	1,999	870	17%	2.51	2.70
5+	1,135	971	373	7%	3.04	3.27
Total	9,733	9,349	4,977	100%	1.96	2.10

1. American Community Survey, Public Use Microdata Sample for Montana PUMA 200 (2012-2016 5-Year unweighted data).

2. Adjusted PPHU scaled to make unadjusted PPHU values match control totals for Missoula based on American Community Survey 2012-2016 5-Year Estimates.

## Persons by Dwelling Size

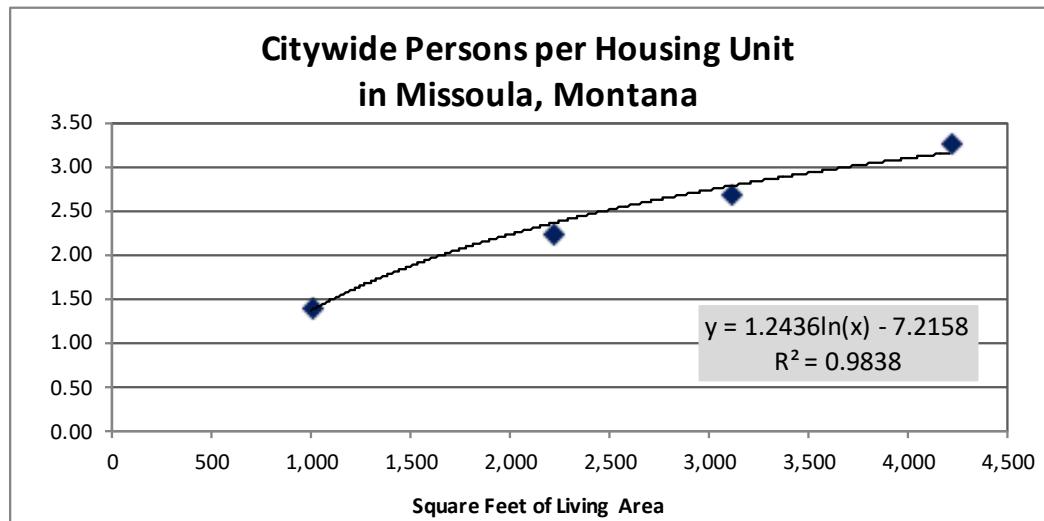
Average floor area and number of persons by bedroom range are plotted in Figure A12 with a logarithmic trend line derived from 2016 square footage estimates provided by the U.S. Census Bureau (west region). Dwellings with two bedrooms or less average 1,000 square feet of floor area—based on multi-family dwellings constructed in West census region. Three-bedroom dwellings average 2,200 square feet, four-bedroom dwellings average 3,100 square feet, and dwellings with five or more bedrooms average 4,200 square feet—based on single-family dwellings constructed in West census region. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 15 size thresholds.

As shown in the upper-right corner of the table below, the smallest floor area range (750 square feet or less) has an estimated average of 1.02 persons per dwelling. The largest floor area range (4,001 square feet or more) has an estimated average of 3.17 persons per dwelling.

**Figure A12: Persons by Dwelling Size**

Actual Averages per Hsg Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Persons	Sq Ft Range	Persons
0-2	1,000	1.43	750 or Less	1.02
3	2,200	2.27	751 to 1,000	1.37
4	3,100	2.70	1,001 to 1,250	1.65
5+	4,200	3.27	1,251 to 1,500	1.88
			1,501 to 1,750	2.07
			1,751 to 2,000	2.24
			2,001 to 2,250	2.38
			2,251 to 2,500	2.51
			2,501 to 2,750	2.63
			2,751 to 3,000	2.74
			3,001 to 3,250	2.84
			3,251 to 3,500	2.93
			3,501 to 3,750	3.02
			3,751 to 4,000	3.10
			4,001 or More	3.17

Average persons per dwelling derived from 2016 ACS PUMS data for the area that includes Missoula. Dwelling size for 0-2 bedroom from the 2016 U.S. Census Bureau average for all multi-family units constructed in the Census West region. Unit size for all other bedrooms from the 2016 U.S. Census Bureau average for single-family units constructed in the U.S. Census West region.



## Trip Generation by Dwelling Size

Rather than rely on one methodology, the recommended trip generation rates shown at the bottom of Figure A13, shaded gray, are an average of trip rates based on persons and vehicles available for all types of housing units. In Missoula, each housing unit is expected to yield an average of 7.80 Average Weekday Vehicle Trip Ends (AWVTE), compared to the national average of 8.34 trip ends per household.

**Figure A13: Average Weekday Vehicle Trip Ends by Bedroom Range**

Bedroom Range	Persons <sup>1</sup>	Vehicles Available <sup>1</sup>	Housing Units <sup>1</sup>	Housing Mix	Unadjusted PPHU	Adjusted PPHU <sup>2</sup>	Unadjusted VPHU	Adjusted VPHU <sup>2</sup>
0-2	2,531	2,639	1,901	38%	1.33	<b>1.43</b>	1.39	1.20
3	3,879	3,740	1,833	37%	2.12	<b>2.27</b>	2.04	1.76
4	2,188	1,999	870	17%	2.51	<b>2.70</b>	2.30	1.98
5+	1,135	971	373	7%	3.04	<b>3.27</b>	2.60	2.25
Total	9,733	9,349	4,977	100%	1.96	<b>2.10</b>	1.88	1.62

National Averages According to ITE

ITE Code	AWVTE per Person	AWVTE per Vehicle	AWVTE per HU	Missoula Housing Mix	Persons per Household	Vehicles per Household
210 SFD	2.65	6.36	9.44	61%	3.56	1.48
220 Apt	3.31	5.10	6.65	39%	2.01	1.30
Weighted Avg	2.91	5.86	8.34	100%	2.95	1.41

Recommended AWVTE per Housing Unit

Bedroom Range	AWVTE per HU Based on Persons <sup>3</sup>	AWVTE per HU Based on Vehicles <sup>4</sup>	AWVTE per Housing Unit <sup>5</sup>
0-2	4.16	7.03	<b>5.60</b>
3	6.61	10.31	<b>8.46</b>
4	7.86	11.60	<b>9.73</b>
5+	9.52	13.19	<b>11.36</b>
Average	6.11	9.49	<b>7.80</b>

1. American Community Survey, Public Use Microdata Sample for Montana PUMA 200 (2012-2016 5-Year unweighted data).
2. Adjusted multipliers are scaled to make the average PUMS values match control totals for Missoula based on American Community Survey 2012-2016 5-Year Estimates.
3. Adjusted persons per housing unit multiplied by national weighted average trip rate per person.
4. Adjusted vehicles available per housing unit multiplied by national weighted average trip rate per vehicle.
5. Average trip rates based on persons and vehicles per housing unit.

## Vehicle Trip Ends by Dwelling Size

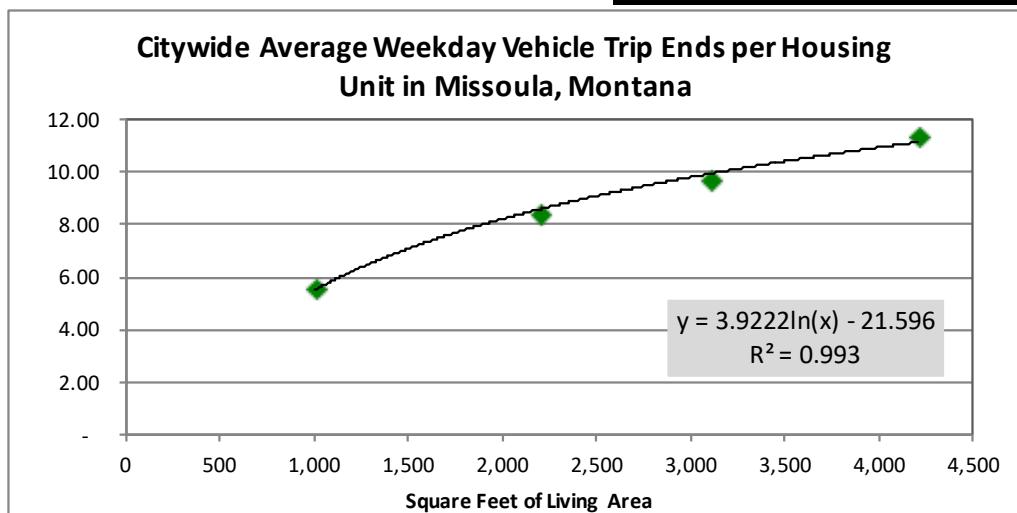
To derive AWVTE by dwelling size, TischlerBise matched trip generation rates and average floor area, by bedroom range, as shown in Figure A13, with a logarithmic trend line derived from 2016 square footage estimates provided by the U.S. Census Bureau (west region). Dwellings with two bedrooms or less average 1,000 square feet of floor area—based on multi-family dwellings constructed in West census region. Three-bedroom dwellings average 2,200 square feet, four-bedroom dwellings average 3,100 square feet, and dwellings with five or more bedrooms average 4,200 square feet—based on single-family dwellings constructed in West census region. Using the trend line formula shown in the chart, TischlerBise derived the estimated average weekday vehicle trip ends, by dwelling size, using 15 size thresholds.

As shown in the upper-right corner of the table below, the smallest floor area range (750 square feet or less) generates an estimated average of 4.37 trip ends per dwelling. The largest floor area range (4,001 square feet or more) generates an estimated average of 11.17 trip ends per dwelling.

**Figure A14: Vehicle Trip Ends by Dwelling Size**

Actual Averages per Hsg Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Trip Ends	Sq Ft Range	Trip Ends
0-2	1,000	5.60	750 or Less	4.37
3	2,200	8.46	751 to 1,000	5.50
4	3,100	9.73	1,001 to 1,250	6.37
5+	4,200	11.36	1,251 to 1,500	7.09
			1,501 to 1,750	7.69
			1,751 to 2,000	8.22
			2,001 to 2,250	8.68
			2,251 to 2,500	9.09
			2,501 to 2,750	9.47
			2,751 to 3,000	9.81
			3,001 to 3,250	10.12
			3,251 to 3,500	10.41
			3,501 to 3,750	10.68
			3,751 to 4,000	10.93
			4,001 or More	11.17

Average weekday vehicle trip ends derived from 2016 ACS PUMS data for the area that includes Missoula. Dwelling size for 0-2 bedroom from the 2016 U.S. Census Bureau average for all multi-family units constructed in the Census West region. Dwelling size for all other bedrooms from the 2016 U.S. Census Bureau average for single-family units constructed in the Census West region.



## Functional Population

TischlerBise recommends functional population to allocate the cost of certain facilities to residential and nonresidential development. As shown in Figure A15, functional population accounts for people living and working in a jurisdiction. OnTheMap is a web-based mapping and reporting application that shows where workers are employed and where they live. It describes geographic patterns of jobs by their employment locations and residential locations as well as the connections between the two locations. OnTheMap was developed through a unique partnership between the U.S. Census Bureau and its Local Employment Dynamics (LED) partner states.

Residents that do not work are assigned 20 hours per day to residential development and four hours per day to nonresidential development (annualized averages). Residents that work in Missoula are assigned 14 hours to residential development and 10 hours to nonresidential development. Residents that work outside Missoula are assigned 14 hours to residential development. Inflow commuters are assigned 10 hours to nonresidential development. Based on 2015 functional population data for Missoula, the cost allocation for residential development is 65 percent while nonresidential development accounts for 35 percent of the demand for municipal facilities.

**Figure A15: Functional Population**

Service Demand Units in 2015		Demand Hours/Day	Person Hours
<b>Residential</b>			
Population	66,029		
Residents Not Working	32,408	20	648,160
Employed Residents	33,621		
Employed in Missoula	24,969	14	349,566
Employed outside Missoula	8,652	14	121,128
		<b>Residential Subtotal</b>	<b>1,118,854</b>
		<b>Residential Share</b>	<b>65%</b>
<b>Nonresidential</b>			
Non-working Residents	32,408	4	129,632
Jobs Located in Missoula	48,275		
Residents Employed in Missoula	24,969	10	249,690
Non-Resident Workers (inflow commuters)	23,306	10	233,060
		<b>Nonresidential Subtotal</b>	<b>612,382</b>
		<b>Nonresidential Share</b>	<b>35%</b>
		<b>Total</b>	<b>1,731,236</b>

Source: U.S. Census Bureau, OnTheMap 6.5 Application and LEHD Origin-Destination Employment Statistics.

## Development Projections

Provided below is a summary of cumulative development projections used in the impact fee study. Base year estimates for 2018 are used in the impact fee calculations. Development projections are used to illustrate a possible future pace of demand for service units and cash flows resulting from revenues and expenditures associated with those demands.

**Figure A16: Development Projections Summary**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	10-Year Increase
	Base Yr	1	2	3	4	5	6	7	8	9	10	
<b>Population</b>												
HH Population	71,711	72,974	74,237	75,500	76,763	78,026	79,289	80,552	81,815	83,078	84,341	12,630
Group Quarters	3,209	3,209	3,209	3,209	3,209	3,209	3,209	3,209	3,209	3,209	3,209	0
<b>Total Population</b>	<b>74,920</b>	<b>76,183</b>	<b>77,446</b>	<b>78,709</b>	<b>79,972</b>	<b>81,235</b>	<b>82,498</b>	<b>83,761</b>	<b>85,024</b>	<b>86,287</b>	<b>87,550</b>	<b>12,630</b>
<b>Housing</b>												
Households	31,275	31,903	32,532	33,160	33,789	34,418	35,046	35,675	36,303	36,932	37,561	6,286
Single-Family Units	20,063	20,305	20,548	20,791	21,033	21,276	21,519	21,761	22,004	22,246	22,489	2,426
Multi-Family Units	13,180	13,602	14,023	14,444	14,866	15,287	15,708	16,130	16,551	16,973	17,394	4,214
<b>Total Housing Units</b>	<b>33,243</b>	<b>33,907</b>	<b>34,571</b>	<b>35,235</b>	<b>35,899</b>	<b>36,563</b>	<b>37,227</b>	<b>37,891</b>	<b>38,555</b>	<b>39,219</b>	<b>39,883</b>	<b>6,640</b>
<b>Jobs</b>												
Commercial / Retail	2.157	1.902										
Industrial	16,970	17,203	17,440	17,679	17,922	18,168	18,418	18,671	18,928	19,188	19,452	2,482
Office / Other Service	6,652	6,710	6,769	6,829	6,889	6,950	7,011	7,073	7,135	7,198	7,261	609
Institutional	19,175	19,449	19,727	20,009	20,295	20,585	20,879	21,177	21,480	21,787	22,098	2,923
<b>Total Jobs</b>	<b>57,674</b>	<b>58,438</b>	<b>59,214</b>	<b>59,999</b>	<b>60,795</b>	<b>61,602</b>	<b>62,420</b>	<b>63,249</b>	<b>64,090</b>	<b>64,941</b>	<b>65,804</b>	<b>8,130</b>
<b>Nonresidential Floor Area (x 1,000)</b>												
Commercial / Retail	8,215	8,315	8,416	8,518	8,622	8,727	8,833	8,941	9,051	9,162	9,275	1,060
Industrial	4,050	4,085	4,121	4,158	4,195	4,232	4,270	4,308	4,346	4,384	4,423	373
Office / Other Service	5,408	5,500	5,594	5,689	5,785	5,883	5,982	6,082	6,185	6,288	6,393	985
Institutional	4,451	4,665	4,882	5,101	5,324	5,549	5,778	6,010	6,246	6,483	6,725	2,275
<b>Total Nonresidential KSF</b>	<b>22,123</b>	<b>22,565</b>	<b>23,013</b>	<b>23,466</b>	<b>23,925</b>	<b>24,391</b>	<b>24,863</b>	<b>25,342</b>	<b>25,827</b>	<b>26,318</b>	<b>26,816</b>	<b>4,693</b>

## APPENDIX B: PERSON TRIPS

Missoula is a unique community with residents and workers using varying modes to travel. In general, an impact fee study calculates future developments' impact on the City's transportation infrastructure. In suburban, greenfield communities that concentrate on roadway expansion to accommodate new vehicles, a development's impact is best estimated by calculating the new vehicle trips or vehicle miles traveled (VMT) generated by the development. However, based on the urban environment and residents' travel behaviors, a multimodal approach is necessary for the City of Missoula. This is also consistent with the capital improvements identified in the City's Capital Improvement Plan and Missoula's desire to develop Complete Streets to serve all modes of travel. As such, the multimodal approach will calculate the daily person trips generated by the varying development types in the study. To encompass the varying modes of travel used in Missoula, the methodology includes persons per vehicle trip, transit trip, and non-motorized trips.

### Person Trip Methodology

According to the Institute of Transportation Engineers (ITE), there are several elements necessary to calculate person trips. The following equation is provided in the ITE's [Trip Generation Handbook](#) (2017):

$$\text{Person trips} = [(\text{vehicle occupancy}) \times (\text{vehicle trips})] + \text{transit trips} + \text{walk trips} + \text{bike trips}$$

To create a more streamlined approach, this study uses "non-motorized trips" as the sum of walk and bike trips. The [Trip Generation Handbook](#) outlines the general approach to calculating person trips:

1. **Estimate vehicle trip ends generated by development type.** This study uses the vehicle trip rates found in ITE's [Trip Generation Manual](#) (2017).
2. **Determine mode share and vehicle occupancy.** Trip survey data from the National Household Transportation Survey (2017) is used to calculate needed factors.
3. **Convert vehicle trips to person trips.** This conversion calculates the total person trips by combining the vehicle trip mode share and vehicle occupancy.
4. **Calculate the estimated person trips by mode.** The mode share split is applied to the total person trip rate to calculate the specific person trip rate for vehicle, transit, and non-motorized trips per land use.

### Residential Vehicle Trip Ends

The person trip methodology uses average weekday vehicle trip ends (AWVTE), shown in Figure A13, to calculate residential person trips. To derive AWVTE by dwelling size, TischlerBise matched trip generation rates and average floor area, by bedroom range, as shown in Figure B1, with a logarithmic trend line derived from 2016 square footage estimates provided by the U.S. Census Bureau (west region). Dwellings with two bedrooms or less average 1,000 square feet of floor area—based on multi-family dwellings constructed in West census region. Three-bedroom dwellings average 2,200 square feet, four-bedroom

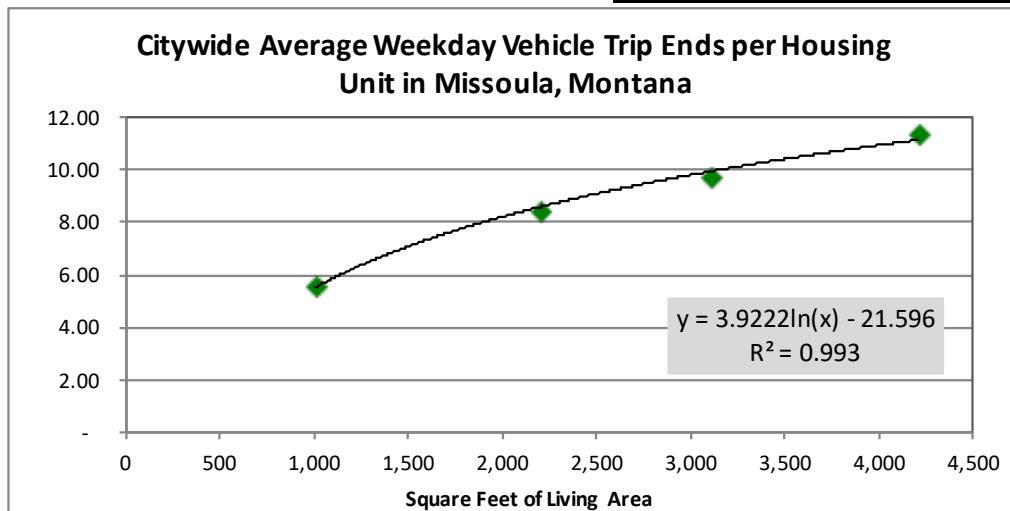
dwellings average 3,100 square feet, and dwellings with five or more bedrooms average 4,200 square feet—based on single-family dwellings constructed in West census region. Using the trend line formula shown in the chart, TischlerBise derived the estimated average weekday vehicle trip ends, by dwelling size, using 15 size thresholds.

As shown in the upper-right corner of the table below, the smallest floor area range (750 square feet or less) generates an estimated average of 4.37 trip ends per dwelling. The largest floor area range (4,001 square feet or more) generates an estimated average of 11.17 trip ends per dwelling.

**Figure B1: Vehicle Trip Ends by Dwelling Size**

Actual Averages per Hsg Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Trip Ends	Sq Ft Range	Trip Ends
0-2	1,000	5.60	750 or Less	4.37
3	2,200	8.46	751 to 1,000	5.50
4	3,100	9.73	1,001 to 1,250	6.37
5+	4,200	11.36	1,251 to 1,500	7.09
			1,501 to 1,750	7.69
			1,751 to 2,000	8.22
			2,001 to 2,250	8.68
			2,251 to 2,500	9.09
			2,501 to 2,750	9.47
			2,751 to 3,000	9.81
			3,001 to 3,250	10.12
			3,251 to 3,500	10.41
			3,501 to 3,750	10.68
			3,751 to 4,000	10.93
			4,001 or More	11.17

Average weekday vehicle trip ends derived from 2016 ACS PUMS data for the area that includes Missoula. Dwelling size for 0-2 bedroom from the 2016 U.S. Census Bureau average for all multi-family units constructed in the Census West region. Dwelling size for all other bedrooms from the 2016 U.S. Census Bureau average for single-family units constructed in the Census West region.



## Nonresidential Vehicle Trip Ends

Vehicle trip generation for nonresidential land uses are calculated by using ITE's average daily trip end rates found in their recently published 10th edition of Trip Generation. The weekday trip end per 1,000 square feet factors highlighted in Figure B2 are used to estimate trip generation in Missoula.

The prototype for future Commercial/Retail development is an average-size Shopping Center (ITE 820). Commercial/Retail development (i.e. retail and eating / drinking places) is assumed to average 37.75 vehicle trip ends per 1,000 square feet of floor area. For future Industrial development, Light Industrial (ITE 110) is a reasonable proxy with an average of 4.96 vehicle trip ends per 1,000 square feet of floor area. For Office/Other Service development, General Office (ITE 710) is the prototype for future development, with an average of 9.74 vehicle trip ends per 1,000 square feet of floor area. For Institutional development Hospital (ITE 610) with 10.72 vehicle trip ends per 1,000 square feet of floor area, is a reasonable proxy.

**Figure B2: Institute of Transportation Engineers Trip Generation Factors**

ITE Code	Land Use / Size	Demand Unit	Wkdy Trip Ends Per Dmd Unit <sup>1</sup>	Wkdy Trip Ends Per Employee <sup>1</sup>	Emp Per Dmd Unit	Sq Ft Per Emp
<b>110</b>	<b>Light Industrial</b>	<b>1,000 Sq Ft</b>	<b>4.96</b>	<b>3.05</b>	<b>1.63</b>	<b>613</b>
130	Industrial Park	1,000 Sq Ft	3.37	2.91	1.16	862
140	Manufacturing	1,000 Sq Ft	3.93	2.47	1.59	629
150	Warehousing	1,000 Sq Ft	1.74	5.05	0.34	2,941
254	Assisted Living	bed	2.60	4.24	0.61	na
310	Hotel	room	8.36	14.34	0.58	na
<b>520</b>	<b>Elementary School</b>	<b>1,000 Sq Ft</b>	<b>19.52</b>	<b>21.00</b>	<b>0.93</b>	<b>1,075</b>
530	High School	1,000 Sq Ft	14.07	22.25	0.63	1,587
540	Community College	student	1.15	14.61	0.08	na
550	University/College	student	1.56	8.89	0.18	na
<b>610</b>	<b>Hospital</b>	<b>1,000 Sq Ft</b>	<b>10.72</b>	<b>3.79</b>	<b>2.83</b>	<b>353</b>
620	Nursing Home	bed	3.06	2.91	1.05	na
<b>710</b>	<b>General Office (average size)</b>	<b>1,000 Sq Ft</b>	<b>9.74</b>	<b>3.28</b>	<b>2.97</b>	<b>337</b>
715	Single Tenant Office	1,000 Sq Ft	11.25	3.77	2.98	336
720	Medical-Dental Office	1,000 Sq Ft	34.80	8.70	4.00	250
730	Government Office	1,000 Sq Ft	22.59	7.45	3.03	330
<b>820</b>	<b>Shopping Center (average size)</b>	<b>1,000 Sq Ft</b>	<b>37.75</b>	<b>16.11</b>	<b>2.34</b>	<b>427</b>

1. Trip Generation, Institute of Transportation Engineers, 10th Edition (2017).

## Mode Share and Vehicle Occupancy

Data from the National Household Travel Survey (NHTS) is used to approximate the percentage split of total person trips by transportation modes in the City of Missoula. NHTS has been conducting stratified, random surveys for nearly 50 years with the aim to understand the modes and purposes of travel in the US. For this study, the most recent survey, 2017, is refined to create a database of survey responses that is both from similar cities to Missoula and statistically significant. Initially, the national database of responses is refined by location and population, the results are limited to areas in the Mountain region (AZ, CO, ID, MT, NM, NV, UT, WY) with less than one million residents<sup>1</sup> and not in a metropolitan statistical area. The database is further filtered to only include responses from urban areas. Lastly, only responses for trips on weekdays are included. As a result, there are 3,117 NHTS responses in the database that are used to approximate the mode splits and vehicle occupancy.

Data from NHTS indicates the purpose of a trip which allows for the mode share and vehicle occupancy to be calculated for residential and nonresidential land uses separately. It is assumed that trips for residential and nonresidential purposes have different characteristics, so by calculating separately the analysis results in more accurate trip factors. There are 1,709 survey responses that are attributed to residential and 1,408 responses attributed to nonresidential land uses. Both databases are well within a 95 percent confidence level with a confidence interval (margin of error) of less than three.<sup>2</sup>

The transportation mode split for residential purpose trips is listed in Figure B3. Of the 1,709 total trips, 88.0 percent are by vehicle, 1.0 percent by transit, and 11.0 percent are non-motorized. Additionally, during the vehicle trips there were 2,588 passengers, resulting in an average vehicle occupancy of 1.71 passengers per vehicle trip.

**Figure B3: Residential Purpose Person Trips by Mode**

Mode	Trips	Share
Vehicle	1,510	88.0%
Transit	6	1.0%
Non-Motorized	193	11.0%
<b>Total</b>	<b>1,709</b>	<b>100.0%</b>

Source: National Household Travel Survey, 2017; TischlerBise analysis.

Note: Percentages have been rounded

<sup>1</sup> The location and population size are used to create a database of surveys that best reflects Missoula, but is also statistically significant.

<sup>2</sup> A confidence level expresses the certainty that the true mean of the population falls within the confidence interval, the margin of error of the results.

The transportation mode split for nonresidential purpose trips is listed in Figure B4. Of the 1,408 total trips, 88.0 percent are by vehicle, 1.0 percent by transit, and 11.0 percent are non-motorized. Additionally, during the vehicle trips there were 2,335 passengers, resulting in an average vehicle occupancy of 1.88 passengers per vehicle trip.

**Figure B4: Nonresidential Purpose Person Trips by Mode**

Mode	Trips	Share
Vehicle	1,242	88.0%
Transit	8	1.0%
Non-Motorized	158	11.0%
<b>Total</b>	<b>1,408</b>	<b>100.0%</b>

Source: National Household Travel Survey, 2017; TischlerBise analysis.

Note: Percentages have been rounded

## Calculation of Person Trip Ends

The total person trip end rate for each land use can be calculated using the vehicle trip end rate, vehicle occupancy rate, and vehicle mode share. The following formula to calculate vehicle trip ends is provided in the ITE's Trip Generation Handbook (2017):

$$\text{Vehicle trip ends} = [(\text{person trip ends} \times \text{vehicle mode share})] / (\text{vehicle occupancy})$$

This is rearranged to calculate total person trips:

$$\text{Person trip ends} = [(\text{vehicle trip ends} \times \text{vehicle occupancy})] / (\text{vehicle mode share})$$

To calculate the daily person trip rate for each land use, the analysis inputs the vehicle trip rate, vehicle occupancy, and vehicle mode share factors found in earlier sections. For example, the daily vehicle trip rate for a 2,000-square-foot housing unit is 8.22, the vehicle occupancy rate is 1.71, and the vehicle mode share is 88.0 percent. Inputting these factors into the formula generates a daily person trip end rate of 15.97 ([8.22 vehicle trips ends X 1.71 occupancy rate] / 88.0 percent vehicle mode share). Figure B5 lists the calculated daily person trip end rate for each land use.

**Figure B5: Daily Person Trip Ends by Land Use**

Development Type	Weekday Vehicle Trip Ends	Vehicle Occupancy Rate	Vehicle Mode Share	Weekday Person Trip Ends
<b>Residential (per housing unit)</b>				
750 or less square feet	4.37	1.71	88%	8.49
751 to 1,000 sq. ft.	5.50	1.71	88%	10.69
Multi-Family Average	6.16	1.71	88%	11.97
1,001 to 1,250 sq. ft.	6.37	1.71	88%	12.38
1,251 to 1,500 sq. ft.	7.09	1.71	88%	13.78
1,501 to 1,750 sq. ft.	7.69	1.71	88%	14.94
1,751 to 2,000 sq. ft.	8.22	1.71	88%	15.97
2,001 to 2,250 sq. ft.	8.68	1.71	88%	16.87
Single Family Average	8.87	1.71	88%	17.24
2,251 to 2,500 sq. ft.	9.09	1.71	88%	17.66
2,501 to 2,750 sq. ft.	9.47	1.71	88%	18.40
2,751 to 3,000 sq. ft.	9.81	1.71	88%	19.06
3,001 to 3,250 sq. ft.	10.12	1.71	88%	19.67
3,251 to 3,500 sq. ft.	10.41	1.71	88%	20.23
3,501 to 3,750 sq. ft.	10.68	1.71	88%	20.75
3,751 to 4,000 sq. ft.	10.93	1.71	88%	21.24
4,001 or More sq. ft.	11.17	1.71	88%	21.71
<b>Nonresidential (per 1,000 square feet)</b>				
Commercial / Retail	37.75	1.88	88%	80.65
Industrial	4.96	1.88	88%	10.60
Office / Other Services	9.74	1.88	88%	20.81
Institutional	10.72	1.88	88%	22.90

Source: [Trip Generation](#), Institute of Transportation Engineers, 10th Edition (2017); National Household Travel Survey data, 2017; TischlerBise analysis

## Trips Adjustment Factors

A person trip end is the out-bound or in-bound leg of a trip. To prevent double counting trips, a standard adjustment of 50 percent is applied to trip ends to calculate a person trip. For example, the out-bound trip from a person's home to work is attributed to the housing unit and the trip from work back home is attributed to the employer.

Residential development has a trip adjustment factor of 52 percent to account for commuters leaving Missoula for work. According to the 2009 National Household Travel Survey, weekday work trips are typically 31 percent of production trips (i.e., all out-bound trips, which are 50 percent of all trip ends). Based on 2011-2015 ACS data, approximately 16 percent of residents commute outside of Missoula for work. In combination, these factors ( $0.31 \times 0.50 \times 0.16 = 0.02$ ) support the additional two percent allocation of trips to residential development.

For nonresidential development the basic trip adjustment factor of 50 percent is applied to industrial, institutional, and office/other service categories. The commercial/retail category has a trip factor of less than 50 percent because this type of development attracts vehicles as they pass by on arterial and collector roads. For example, for an average size shopping center, the ITE (2017) indicates that on average 34 percent of the vehicles that enter are passing by on their way to some other primary destination. The remaining 66 percent of attraction trips have the shopping center as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor ( $0.66 \times 0.50 = 0.33$ ) is approximately 33 percent of the trip ends.

### Person Trips by Mode

In Figure B6, the trip adjustment factor is applied to the person trip end rate of each land use to calculate person trips. For example, a 2,000-square-foot housing unit generates 15.97 person trip ends and has a trip adjustment factor of 52 percent, resulting in a daily person trip rate of 8.30. The impact fee analysis outlined in this report uses the person trip totals, by type of development, shaded in gray.

**Figure B6: Person Trips by Mode**

Development Type	Weekday Person Trip Ends	Trip Adjustment Factor	Weekday Person Trips/Service Demand Unit			
			Total	Vehicle	Transit	Non-Motorized
<b>Residential (per housing unit)</b>						
750 or less square feet	8.49	52%	4.41	3.88	0.04	0.49
751 to 1,000 sq. ft.	10.69	52%	5.56	4.89	0.06	0.61
Multi-Family Average	11.97	52%	6.22	5.47	0.06	0.68
1,001 to 1,250 sq. ft.	12.38	52%	6.44	5.67	0.06	0.71
1,251 to 1,500 sq. ft.	13.78	52%	7.17	6.31	0.07	0.79
1,501 to 1,750 sq. ft.	14.94	52%	7.77	6.84	0.08	0.85
1,751 to 2,000 sq. ft.	15.97	52%	8.30	7.30	0.08	0.91
2,001 to 2,250 sq. ft.	16.87	52%	8.77	7.72	0.09	0.96
Single Family Average	17.24	52%	8.96	7.88	0.09	0.99
2,251 to 2,500 sq. ft.	17.66	52%	9.18	8.08	0.09	1.01
2,501 to 2,750 sq. ft.	18.40	52%	9.57	8.42	0.10	1.05
2,751 to 3,000 sq. ft.	19.06	52%	9.91	8.72	0.10	1.09
3,001 to 3,250 sq. ft.	19.67	52%	10.23	9.00	0.10	1.13
3,251 to 3,500 sq. ft.	20.23	52%	10.52	9.26	0.11	1.16
3,501 to 3,750 sq. ft.	20.75	52%	10.79	9.50	0.11	1.19
3,751 to 4,000 sq. ft.	21.24	52%	11.04	9.72	0.11	1.21
4,001 or More sq. ft.	21.71	52%	11.29	9.94	0.11	1.24
<b>Nonresidential (per 1,000 square feet)</b>						
Commercial / Retail	80.65	33%	26.61	23.42	0.27	2.93
Industrial	10.60	50%	5.30	4.66	0.05	0.58
Office / Other Services	20.81	50%	10.41	9.16	0.10	1.15
Institutional	22.90	50%	11.45	10.08	0.11	1.26

Source: [Trip Generation](#), Institute of Transportation Engineers, 10th Edition (2017); National Household Travel Survey data, 2017; TischlerBise analysis

## APPENDIX C: LAND USE DEFINITIONS

### Residential Development

As discussed below, residential development categories are based on data from the U.S. Census Bureau, American Community Survey. Missoula will collect development fees from all new residential units. One-time development fees are determined by site capacity (i.e. number of residential units).

#### Single-Family:

1. Single-family detached is a one-unit structure detached from any other house, that is, with open space on all four sides. Such structures are considered detached even if they have an adjoining shed or garage. A one-family house that contains a business is considered detached as long as the building has open space on all four sides.
2. Single-family attached (townhouse) is a one-unit structure that has one or more walls extending from ground to roof separating it from adjoining structures. In row houses (sometimes called townhouses), double houses, or houses attached to nonresidential structures, each house is a separate, attached structure if the dividing or common wall goes from ground to roof.
3. Mobile home includes both occupied and vacant mobile homes, to which no permanent rooms have been added, are counted in this category. Mobile homes used only for business purposes or for extra sleeping space and mobile homes for sale on a dealer's lot, at the factory, or in storage are not counted in the housing inventory.

#### Multi-Family:

1. 2+ units (duplexes and apartments) are units in structures containing two or more housing units, further categorized as units in structures with "2, 3 or 4, 5 to 9, 10 to 19, 20 to 49, and 50 or more apartments."
2. Boat, RV, Van, Etc. includes any living quarters occupied as a housing unit that does not fit the other categories (e.g., houseboats, railroad cars, campers, and vans). Recreational vehicles, boats, vans, railroad cars, and the like are included only if they are occupied as a current place of residence.

## Nonresidential Development

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The proposed general nonresidential development categories (defined below) can be used for all new construction within Missoula. Nonresidential development categories represent general groups of land uses that share similar average weekday vehicle trip generation rates and employment densities (i.e., jobs per thousand square feet of floor area).

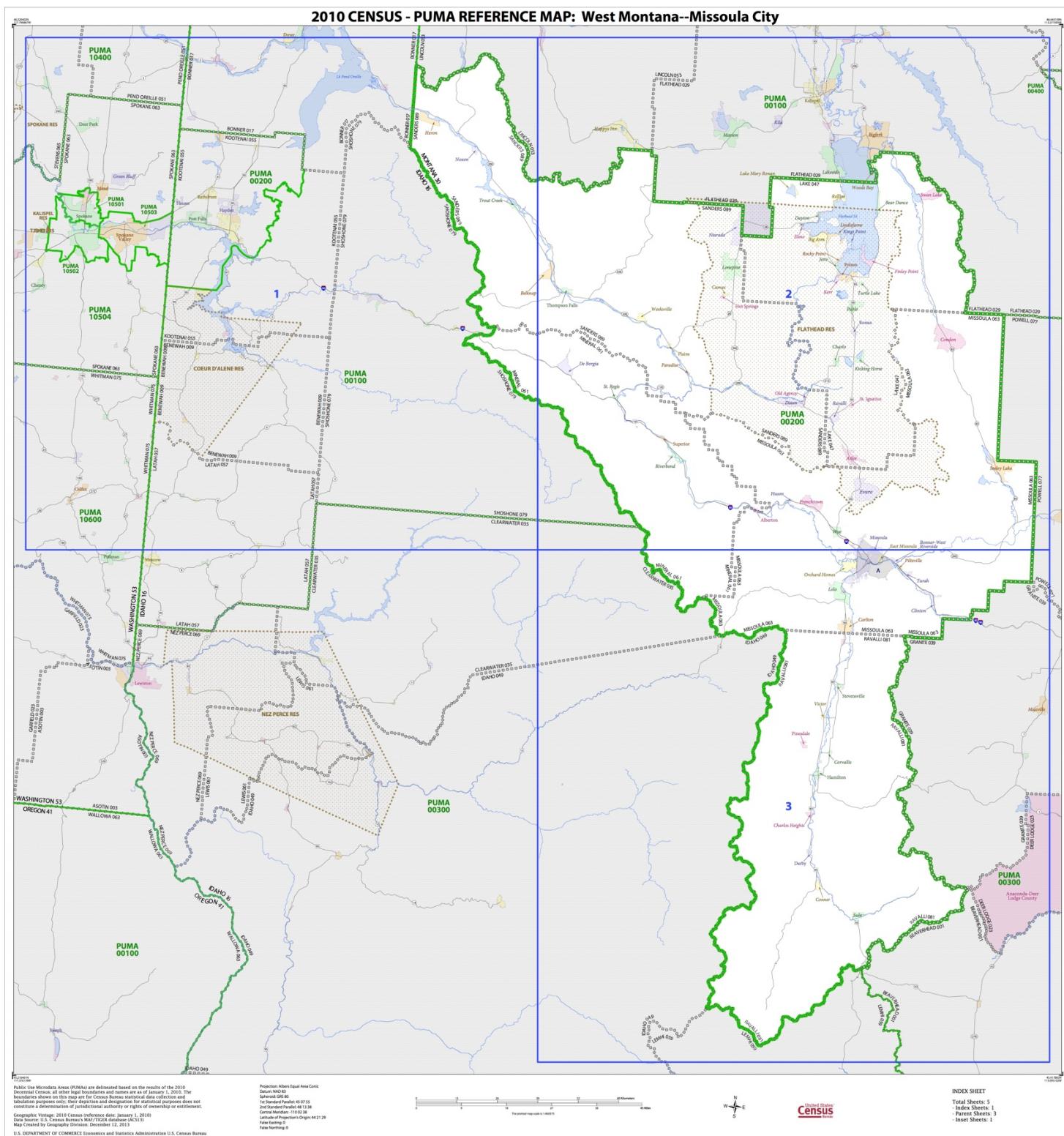
**Commercial / Retail:** Establishments primarily selling merchandise, eating/drinking places, and entertainment uses. By way of example, *Commercial / Retail* includes shopping centers, supermarkets, pharmacies, restaurants, bars, nightclubs, automobile dealerships, and movie theaters, hotels, and motels.

**Industrial:** Establishments primarily engaged in the production, transportation, or storage of goods. By way of example, *Industrial* includes manufacturing plants, distribution warehouses, trucking companies, utility substations, power generation facilities, and telecommunications buildings.

**Office / Other Service:** Establishments providing management, administrative, professional, or business services; personal and health care services; public and quasi-public buildings providing educational, social assistance, or religious services. By way of example, *Office / Other Service* can include banks, business offices, assisted living facilities, nursing homes, hospitals, medical offices, veterinarian clinics, schools, universities, churches, daycare facilities, government buildings, and prisons.

**Institutional:** Establishments providing education and healthcare services. By way of example, *Institutional* includes universities, nursing homes, daycare facilities, and hospitals.

## APPENDIX D: PUMA REFERENCE MAP



## APPENDIX E: COMMUNITY SERVICES VEHICLES AND EQUIPMENT

Traffic Division	Units	Unit Cost	Total Cost
Isuzu NPR Paint Truck	1	\$250,000	\$250,000
Isuzu NPR	2	\$73,000	\$146,000
Ford F550	1	\$195,000	\$195,000
GMC Sierra	1	\$40,000	\$40,000
Pacesetter	2	\$9,000	\$18,000
EDCO 8 Inch Cement Grinder	1	\$15,000	\$15,000
Total	8	\$83,000	\$664,000

Fleet Services	Units	Unit Cost	Total Cost
Toyota Prius	1	\$35,000	\$35,000
Dodge Grand Caravan	1	\$35,000	\$35,000
Jeep Grand Cherokee	1	\$35,000	\$35,000
Total	3	\$35,000	\$105,000

Development Services	Units	Unit Cost	Total Cost
Ford Escape	1	\$35,000	\$35,000
Jeep Liberty	1	\$35,000	\$35,000
Chevrolet Impala	1	\$35,000	\$35,000
Chevrolet Colorado	3	\$35,000	\$105,000
GMC Sierra 2500	1	\$35,000	\$35,000
Nissan Frontier	1	\$35,000	\$35,000
Ford F250	1	\$45,000	\$45,000
Ford Escape	1	\$30,000	\$30,000
Total	10	\$35,500	\$355,000

Fleet Maintenance	Units	Unit Cost	Total Cost
Hyster Forklift	1	\$40,000	\$40,000
CAT - Olympian	1	\$90,000	\$90,000
Cargo Trailer	1	\$10,000	\$10,000
Geni One Man Lift	1	\$15,000	\$15,000
BENPAK Vehicle Lift	1	\$85,000	\$85,000
Total	5	\$48,000	\$240,000

Street Division	Units	Unit Cost	Total Cost
Chevrolet Silverado	1	\$35,000	\$35,000
Dodge 1500 4X4	2	\$35,000	\$70,000
Dodge 3/4 TON	1	\$45,000	\$45,000
F350 Flat Bed / Lift Gate	1	\$45,000	\$45,000
Ford F350 Crew Cab	1	\$45,000	\$45,000
CAT	2	\$330,000	\$660,000
CAT	3	\$160,000	\$480,000
CAT	1	\$120,000	\$120,000
CAT	1	\$55,000	\$55,000
CAT AP500E	1	\$250,000	\$250,000
F350 Ford Dump Box	1	\$50,000	\$50,000
I.H. Tandem Axle	3	\$150,000	\$450,000
Freightliner	3	\$150,000	\$450,000
Sterling Tandem Axle	1	\$150,000	\$150,000
Rosco SPR-H	1	\$200,000	\$200,000
Ford 700 w/ Rosco Distributor	1	\$235,000	\$235,000
Bomag	1	\$100,000	\$100,000
Komtsu	1	\$160,000	\$160,000
Ford Single Axle	1	\$120,000	\$120,000
BOBCAT	1	\$55,000	\$55,000
Ford F750	1	\$185,000	\$185,000
Ford\Rosco	1	\$250,000	\$250,000
Sterling	2	\$120,000	\$240,000
IH 7400 Single Axle	1	\$120,000	\$120,000
Freightliner	6	\$120,000	\$720,000
Freightliner 108SD	1	\$120,000	\$120,000
Cimline Crack Sealer	1	\$70,000	\$70,000
Hudson HD	1	\$250,000	\$250,000
Caterpillar PS 150B	1	\$80,000	\$80,000
Dynapack CP132 9	1	\$80,000	\$80,000
Tow Master	1	\$15,000	\$15,000
Econoline	1	\$41,000	\$41,000
Tow Master T40	1	\$41,000	\$41,000
Trail King	1	\$41,000	\$41,000
Boss RTE Plow	1	\$6,500	\$6,500
Schmidt Plow	6	\$22,000	\$132,000
Schmidt HSP4210 Polly Plow	1	\$22,000	\$22,000
Norton Clipper	1	\$22,000	\$22,000
<b>Total</b>	<b>60</b>	<b>\$104,608</b>	<b>\$6,276,500</b>