University Trip Exchange District Study

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The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official policies of the Western Transportation Institute (WTI), Montana State University (MSU) or the City of Bozeman.

This report does not constitute a standard, specification, or regulation. However, the information contained in this report could be used as justification for creating a university transportation exchange district.

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The power of where and when

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1. INTRODUCTION

When a new development is constructed, a fee is charged based on the estimated impact to the city facilities and services including water, sewer, fire and street systems. The transportation portion of the impact fee is based on an estimate of how much traffic the site generates, an estimate of the current capacity of the network, and an estimate of the cost to expand capacity of the network (Figure 1). The traffic generated by the site is estimated based on some measure of the size of the development such as number of residential dwelling units or square footage of office space. The size of the development is used to estimate the amount of vehicle miles travelled (VMT) per day, which is based on the product of the number of trips and the average trip length. The traffic impact fee schedule was last updated by Tischler-Bise (2012) and is further detailed in Chapter 2.

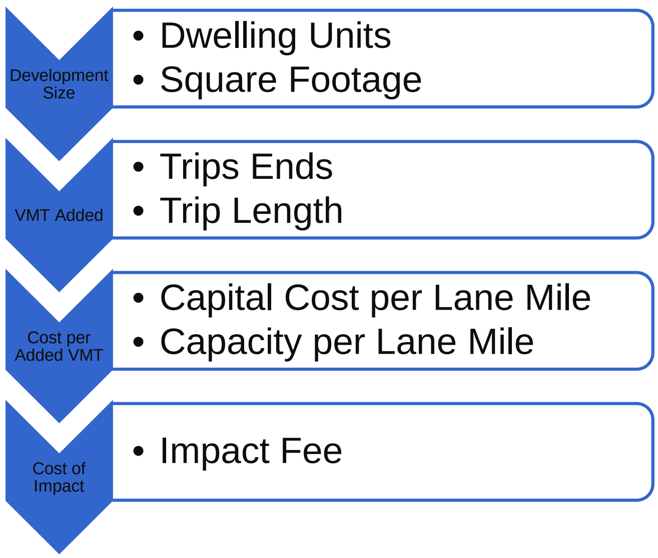


Figure 1: Street Impact Fee Estimation Method

The current regulations regarding impact fees allow for the creation of a trip exchange district (TED), where a reduction could be allowed for new developments within that zone if a reduction in traffic is warranted due to characteristics of that zone. In the last update by Tischler-Bise (2012), the downtown TED was allowed a 29 percent flat reduction in the street impact fees.

The purpose of this study is to determine if developments generate less traffic in and around Montana State University when compared to the rest of Bozeman. The proposed boundary of the University TED is shown in Figure 2. These boundaries were chosen based on the following parameters: including land that is not fully built out, incorporating a distance from the core of MSU of about a mile, and utilizing existing boundaries and break points.

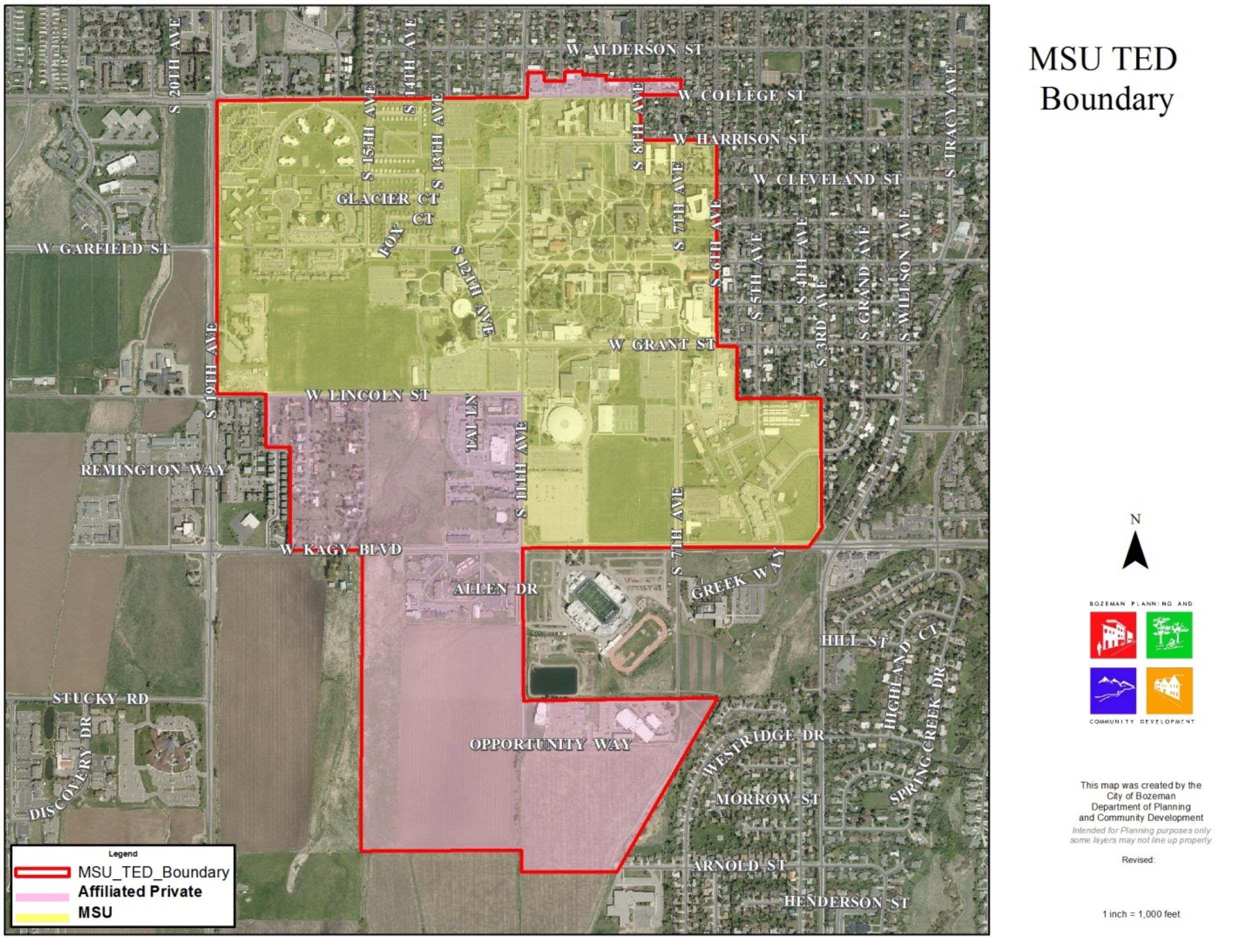


Figure 2: Boundary of the University TED

Before measuring an actual reduction in traffic generated by developments in this area, one should consider if this area is unique enough, when compared to the rest of Bozeman, to even warrant such a study. When comparing data for US Census Tracts within the City of Bozeman, a clear difference is seen. The census tract is not the exact boundary of the University TED, but very similar and provides a good general representation of residents living in this area. As seen in Table 1, the MSU area has the highest population density, the highest percent of attached housing, the highest portion of renters, the lowest vehicle ownership, and the lowest household income. All of the characteristics are known to be related to lower travel per household.

Table 1: Census Tract Results

Variable	*Univ. TED (Tract)*	*Other Tracts*
Population density (ppl / sq. mi.)	70,900	1,100 – 63,600
% Single detached homes	14%	21 – 77%

% Renters	97%	10 – 73%
Vehicles / household	1.3	1.5 – 2.3
Average household income	$18,146	$29,100 – $87,600

Because of the complexities of how people travel, no single dataset seemed appropriate for this study. For that reason, the researchers decided to collect several datasets in order to find corroborating support for an adjustment. Some datasets may not provide information on the resulting VMT, but only some related aspect such as the number of people trips, the mode split, or internal trip captures (meaning the trip end is within the same development where the trip originated. Figure 3 provides a schematic of the overall approach envisioned for this study.

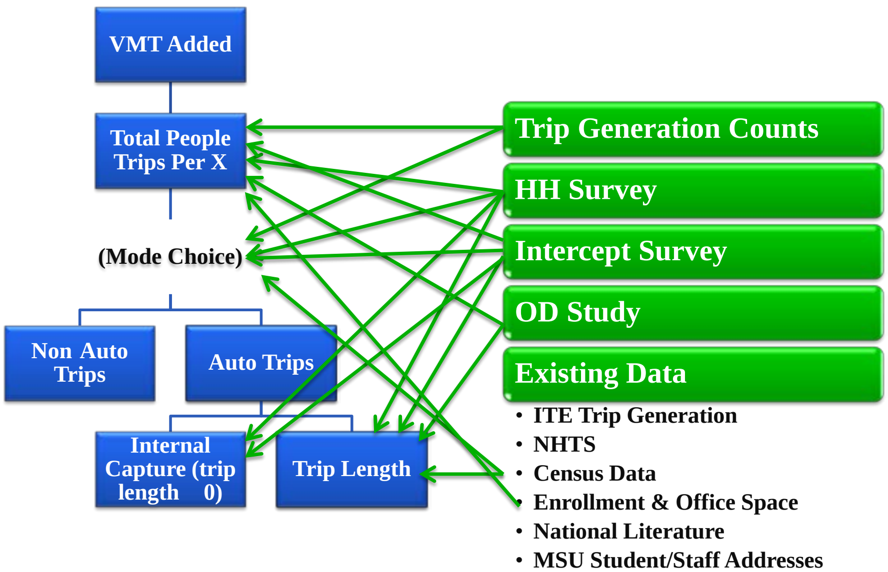


Figure 3: Approach of This Study

Instead of a flat reduction for all development types, the results fit into one of six categories shown in Figure 4. MSU campus and the privately owned developments directly adjacent to MSU (but still within the University TED) were separated. Developments were further separated into those that were housing focused (e.g., residence halls and apartments) and those that were not (e.g., commercial retail, classrooms). The US Census defines group housing as something other than a typical house, apartment or mobile home and the individuals in group quarters do not have separate living quarters. “Separate living quarters are those in which the occupants live separately from any other persons in the building and which have direct access from the outside of the building or through a common hall” (US Census, 2014).

Residence halls are categorized as group quarters. After discussions with developers, it appears that off campus developments in this category are rare, but at least one group quarters development is currently planned. The current impact fee has a separate category for group quarters, so the results of this study also consider group housing separately.

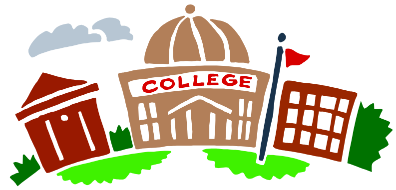
	Private / Near MSU	MSU On Campus
Non-Housing		
Housing	Apartment 	Family Housing 
Housing Group Quarters	Group Quarter 	Residence Hall 

Figure 4: Framework for Results: Development Type Categories

This study will provide a basis for the results shown in Table 2. For example, the data show that apartments near MSU (that is, in the University TED, but not on campus) generate 35 percent fewer auto trips per unit when compared to similar sized apartments in other areas of Bozeman. However, once an auto trip is made by a resident, the length is as long as trips made by residents in the rest of Bozeman.

Table 2: Study Results Showing Reductions in Travel for Different Development Categories in the University TED

	Private / Near MSU	MSU On Campus
Non-Housing	25% trip chaining Same auto trip length	Fewer auto trips -31% Office -46% Academic Same auto trip length
Housing	35% fewer auto trips Same auto trip length	44% fewer auto trips Same auto trip length

Housing Group Quarters	59% fewer auto trips Same auto trip length	62% fewer auto trips Same auto trip length

2. BACKGROUND

The City of Bozeman, Montana, first implemented a transportation impact fee (or street impact fee) in 1996. Bozeman's Street Impact Fees have been updated over the intervening years as required by state statute (MCA 7-6-1602). A transportation impact fee is a one-time fee that developers pay when constructing a new development that generates vehicle traffic. Since 1990, Bozeman has been growing at a rapid pace and the increase in vehicle traffic from new developments has caused congestion and other kinds of stress on the city's local road network (Tindale-Oliver & Associates, Inc. 2008). Transportation impact fees serve as a source of revenue to pay for road capacity expansion projects to alleviate these congestion problems.

2.1. Bozeman's Transportation Impact Fee

In a general sense the transportation impact fee for a given development is based on the traffic created by the development, measured in vehicle miles travelled (VMT) and the cost to improve street facilities to add capacity for that traffic, as depicted in the following relationship.

$$\frac{Cost\ of\ Improving\ One\ Lane\ Mile}{Capacity\ (in\ VMT) of\ One\ Lane\ Mile} * Traffic\ (in\ VMT)\ Created\ by\ Development$$

Considering the revenue credit and administrative fee, the cost estimated by Tischler-Bise (2012) is $167.39 per VMT. This amount is adjusted for inflation annually. VMT for a development is determined by the product of the trip ends generated and the average trip length. Different adjustment factors are applied to different development types based on local and national data. This essentially leads to the example fee schedule shown in Figure 5.

Transportation Impact Fee — Calendar Year 2013, *Effective March 30, 2013*

Residential (Square Feet of Living Area)	*Impact Fee Per Dwelling*
1400 or less	$ 2,631.00
1401-1600	$ 3,093.00
1601-1800	$ 3,508.00
1801-2000	$ 3,876.00
2001-2200	$ 4,211.00
2201-2400	$ 4,519.00
2401-2600	$ 4,800.00
2601-2800	$ 5,062.00
2801-3000	$ 5,303.00
3001 or more	$ 5,370.00
Group Quarters per person	$ 2,075.00

Non-Residential (Unit descriptor)	*Impact Fee per Unit*
Retail/Restaurant (per 1,000 sq. ft)	$ 9,028.94
Research & Development Center (per 1,000 sq. ft.)	$ 2,873.85
Office (per 1,000 sq. ft.)	$ 3,908.58
Hospital (per 1,000 sq. ft.)	$ 4,684.63
Day Care (per student)	$ 745.00
University (per student)	$ 605.95
Secondary School (per 1,000 sq. ft.)	$ 3,288.73
Elementary School (per 1,000 sq. ft.)	$ 3,608.72
Lodging (per room)	$ 1,995.04
Assisted Living (per bed)	$ 942.59
Mini-warehouse (per 1,000 sq. ft.)	$ 885.89
Warehouse (per 1,000 sq. ft.)	$ 1,261.51
Manufacturing (per 1,000 sq. ft.)	$ 1,353.65
Light Industrial (per 1,000 sq. ft.)	$ 2,469.88

Those projects located within the Trip Exchange District (TED) are charged 29% less than those fees listed here. The TED is an area with documented reduced transportation demand. A map is attached at the end of this file. This modification only applies to transportation charges.

Figure 5: Bozeman's Impact Fee Schedule (City of Bozeman, 2013)

Because of the significant amount of previous work completed to estimate the transportation impact of developments, this study will focus on how VMT is different for developments in the University TED when compared to other areas.

2.2. Current Bozeman Trip Exchange Districts

Bozeman's transportation impact fee is largely based on data from the Institute of Transportation Engineers (ITE) Trip Generation Handbook (ITE, 2012). The ITE Trip Generation Handbook serves as a guide to determine the number of trips in and out of different land use types, such as residential, commercial, industrial, and office. Trip rates for a given development type are averaged and do not account for such things as proximity to core downtown areas, access to public transit, density of development and neighboring land use mix. Existing literature has supported the idea that mixed-use developments generate less traffic impact due to factors such as shorter vehicle trips, higher transit/walk/bicycle trip generation (Ewing, et al. 2010), internal trip capture or the amount of trips starting and ending within one area (Bochner and Sperry 2010), and high-density developments (Walters, Bochner and Ewing 2013).

In Bozeman's downtown mixed-use developments, referred to as the Downtown Trip Exchange District (TED), there is a **29 percent reduction** in transportation impact fee as a result of the latest Bozeman transportation impact fee and mixed-use study (Tischler-Bise, 2012).

While there is a large body of literature on downtown / mixed-use developments and traffic impacts, research on the traffic impacts of universities is minimal. In many ways, university campuses are different from other developments. Like downtown areas, university campuses have diverse land uses. They contain academic buildings, administrative buildings, faculty and staff office buildings, residence halls, sports stadiums, recreation centers, and dining halls. Furthermore, the characteristics of various campus populations (e.g. students, staff, and faculty) tend to be different from those of other developments. For example, the highly seasonal academic schedule affects how many students, staff, and faculty are on campus per season and how they travel to and around the campus. Research on whether these differences cause different auto travel patterns is limited.

Section 2.06.1630.A.16 of the Bozeman Municipal Code provides the following definition for trip exchange districts:

"Trip exchange district" means a defined geographic area that meets the following criteria, pursuant to the transportation fee study and an independent fee calculation study as provided in section 2.06.1640.B.3:

1. *The use of shared and consolidated parking;*
2. *A high degree of pedestrian and bicycle access to and throughout the proposed development;*
3. *The availability of public transit;*
4. *Extensive trip capture within the proposed development where trips to the proposed development result in visits to multiple businesses in the area via a mode other than automobile;*

The following additional physical development characteristics are associated with trip exchange district land uses:

1. *The majority of buildings associated with the proposed development are multi-story building, often more than two stories;*
2. *Diverse business proprietorships within the development;*

3. *Primary use at the ground floor is commercial;*
4. *The majority of individual businesses within the development are less than 20,000 square feet;*
5. *Structures within the development are near to each other and the public street (with small or no setbacks);*
6. *Having a high percentage building coverage on the lot and typically in excess of 0.5;*
7. *The physical characteristics are shared among the entire business area, not just one or a few of the businesses;*
8. *The area should be at least 50 percent developed as measured by lot area utilized; and*
9. *The area is the subject of a city enforceable common plan of development, such as an urban renewal plan.*

2.3. How Urban Form Relates to Travel

Previous studies show that travel behavior is dependent upon attributes of a developed area. In general, the amount of auto travel goes down (either through fewer trips, shorter trips, or a mode shift) as:

- Density increases,
- Diversity (or land mix) increases,
- Accessibility to major destinations increases,
- The transportation network is more connected,
- The area is more walkable or bikeable, and/or
- There is more access to public transit.

Some would argue that many of the attributes of a development that result in a reduction in auto travel also improve the livability of a community. Further, it is typically more expensive to construct livable developments in core urban areas than to construct a single land use further away from the urban core. A uniform impact fee applied to all developments could actually dis-incentivize developments that promote a more livable community and have a lower impact on transportation congestion.

The remainder of this section provides a selection of studies from literature that document how travel changes with a change in urban form. First, the impact on the number of auto trips is discussed along with the mode shift to walking, biking, or taking public transit. Next, the trip length is discussed. Finally, this section discusses studies that focus on vehicle miles travelled (VMT) which is the combination of trip rate and trip length.

The number of work trips made by residents is not typically affected by urban form. Most employed residents commute to and from work once a day, regardless of what type of neighborhood or community they live in. Antipova (2010) did find that urban form can impact trip chaining. Since a non-work activity is accomplished during a work trip, trip chaining essentially eliminates non-work trips. She found that employed women living in high density areas were more likely to trip chain than employed women living in lower density areas. Antipova stated that, in general, the trip chaining behavior of men is not affected by urban form.

Non-work trips account for 85 percent of all vehicle miles travelled (VMT) according to Litman (2011).

Litman found that as employment density increases, the mode share for single passenger car commuting trips decreased. He hypothesized that when more workers have the same employment destination (which occurs with increased employment density), rideshare opportunities and transit access increase as well.

Litman (2010) also found that as intersection density (i.e., fewer cul-de-sacs) and neighborhood connectivity increased, residents were more likely to make walking trips. He also found that residents of more connected neighborhoods (greater sidewalk connectivity) were more than twice as likely to walk to local shopping areas as residents of neighborhoods with poor connectivity. However, these results should be interpreted with care, as many neighborhoods with high connectivity usually have a more traditional layout, with more local stores available at a short distance to residents.

Handy (1996) focused her study on shopping trips and found that higher accessibility increases the number of walking trips made by residents (thus reducing the number of auto trips). Accessibility was defined by the distance from a residence to destinations of possible shopping trips. According to Handy (1996), traditional neighborhoods had higher accessibility, based on their proximity to downtown areas and street network grid like layouts. Handy also found that arterials cutting through a neighborhood can reduce the number of walking trips made by the residents by creating a barrier to pedestrian movements.

DKS Associates (2007) performed a comprehensive analysis of the current literature and data from a study performed in the San Diego area. The urban form variables used were density (residents plus jobs per square mile) and land mix (also called diversity, a value from zero to one denoting the balance between resident population and jobs within an area). Their research found that a 10 percent increase in land use mix led to a 0.6 percent decrease in average trip rate. Additionally, a 10 percent increase in density led to a 0.4 percent decrease in average trip rate. This is equivalent to an arc elasticity of -0.06 and -0.04 for land mix and density respectively.

Ewing and Cervero (2010) found that the nearer residents live to a transit stop, the higher the likelihood that they will select transit as their transportation mode for a trip. Litman (2010) found that employees living near a transit station were five times more likely to use transit to commute than average workers on a given day (based on a California study).

A study in the Puget Sound Region focusing on non-work trips found numerous relationships between urban form variables and mode split (Frank et al. 2008). Home and destination intersection densities have an arc elasticity for transit of +0.24 and +0.23 respectively. Land use mix at the home location has an arc elasticity for non-work travel of +0.06 for walking and +0.15 for bicycling.

Generally, auto trip rates decrease with one or more of the following factors: increase in density, more land use mix, higher network connectivity, increase in accessibility (i.e., the distance to employment or shopping decreases), and shorter walking distance to transit stops.

Urban form can also affect trip length. Litman (2010) found that regional accessibility affects trip length. He defines regional accessibility as the relative location of an individual site to the regional urban center (either a central city or central business district), and the number of jobs and public services available within a given travel time. He found that areas with lower regional accessibility would generate trips of greater length.

Crane and Chapman (2003) found that the spread of employment locations into suburban areas decreased average commuter trip lengths. Their study showed that commuter trip lengths decreased at a rate of 1.5 percent per 5 percent increase in employment growth in suburban areas. However, Litman (2010) states that the trip length saved by suburbanizing employment is lost to non-work trips, which will increase in length with the spread of employment locations.

Krizek (2003) found that households in highly accessible areas (high land use mix) made shorter average errand trips than households in less accessible (more exclusive land use) areas. Ewing and Cervero (2010) also found that trip lengths decreased with increased land use mix. Litman (2010) hypothesized that both commutes and shopping trips can be reduced in length by land use mix, as residents will be more likely to shop and work near their home.

The study performed by DKS Associates (2007) regarding trip rates found a linear elastic relationship between trip length and both density and land use mix. The study found that a 10 percent increase in land use mix led to a 0.5 percent decrease in average trip length. Additionally, a 10 percent increase in density led to a 0.5 percent decrease in average trip length. These both result in an arc elasticity of -0.05.

Trip rate and trip length combine to total VMT. Manville and Shoup (2005) state that as density increases, commuter VMT decreases at a rate of 0.58 percent per 1.0 percent increase in density. This is consistent with the arc elasticity discussed above of -0.058. However, their findings were based on a rather sweeping analysis of the 20 largest urban regions in the United States, using only population density and VMT as variables. Therefore, their correlation between population density and VMT does not take into account the distribution or accessibility options of the populations analyzed, and therefore should not be assumed to represent the effect of urban form on travel behavior for all areas.

The Trip Generation Handbook (ITE, 2004) provides an internal trip capture method for estimating the traffic impact for a multi-use development. The approach is applicable for single development projects in the range of 100,000-2,000,000 square feet in size that have a mix of office, retail and residential and cannot be captured by a standard development type in the Trip Generation Manual (e.g., shopping center, office park). Local data is preferred, but the percent reductions in Table 3 could be applied to the new trips generated by a development.

Table 3: Trips Captured Internally for Multi-Use Development (Source: ITE, 2004).

		To		
		Office	Retail	Residential
From	Office	2%	22%	2%
	Retail	3%	30%	11%
	Residential	N/A	38%	N/A

N/A, in the limited sample size used here, these numbers showed no interaction.

Ewing et al. (2011) collected data on mixed use developments in six metropolitan areas (Atlanta, Boston, Houston, Portland, Sacramento and Seattle). There were a total of 239 mixed use developments that had two or more land use types where trips could be made within the development only using local streets (not major arterials). These developments typically also had many of the attributes associated with reduced travel (walkable, high density communities). These mixed use developments had 17.8 percent internal trip capture and 5.9 percent walking trips and 5.6 percent transit trips. This, along with other studies that back up the numbers, is the basis for the 29 percent reduction in trips for Bozeman's Downtown TED.

Daggett and Gutkowski (2003) write of the density of university communities: "Unlike other areas in modern communities, a densely populated residential area where a large portion of students, and even faculty and staff, reside generally surrounds universities. Various forms of commercial development also may be located close to campus to serve the university population's needs" (Daggett and Gutkowski 2003).

In a North Carolina State University study of university students' travel patterns, Eom et al (2009) found that walking was the primary mode for students living on-campus. Driving was the primary mode for off-campus students, though these students' auto usage was not as high as an average household and their auto occupancy tended to be higher. Walking was the dominant mode for secondary trips for both students living on campus and off (Eom, Stone and Ghosh 2009).

2.4. Impact Fee Reductions by Other Jurisdictions

It may be beneficial to look at how other jurisdictions handle transportation impact fees. The website impactfees.com, an online database maintained by Duncan Associates, lists 512 cities around the United States with impact fees. This list was narrowed to 10 cities that were similar to Bozeman that provided a systematic reduction in transportation impact fees. The list reduced as follows:

- 512 cities with an impact fee,
- Of those only 163 had a population range of 30,000 to 100,000,
- Of those only 90 had a four-year university present,
- Of those only 53 had a component of the impact fee specifically designated to transportation,
- Of these only 10 had a reduction specified in their transportation impact fee.

The final case study cities were: Santa Cruz, CA; Santa Monica, CA; Bradenton, FL; Nassau County, FL; Stillwater, OK; Franklin, TN; Burlington, VT; Bellingham, WA; Olympia, WA; and Puyallup, WA. Eugene, OR was added at the request of Bozeman city planning staff.

These cities were sent emails introducing the researchers and the Western Transportation Institute (WTI), describing the University TED study, providing a list of sample questions, and asking for either a phone interview or a contact at the department. Emails were sent to the city's transportation planner, transportation engineer, transportation department head, city planning department, or city clerk depending on what contact information was available online. Questions asked during the phone interview included:

- How did the city's transportation impact fee come about?
- Why did the city decide to establish a transportation impact fee adjustment?
- How was the city's transportation impact fee adjustment value determined?
- Is there an impact fee reduction for the local university? If so, why? And if not, why not?

- Has there been a change in new development locations since the establishment of the transportation impact fee adjustments?
- How is city's impact fee assessed for new developments (per square foot? per student?)?
- Are there any studies done for the city's travel patterns or university travel patterns?

Ultimately, phone interviews were conducted with:

- Christopher Comeau, Transportation Planner (Bellingham, WA)
- Carol Berry, Western Washington University Campus Conservation and Sustainable Transportation Program Manager (Bellingham, WA)
- Christophe Schneiter, City Engineer (Santa Cruz, CA)
- Randy Wesselman, Transportation Engineering and Planning Manager (Olympia, WA)

Emailed answers to our questions were received from:

- Catherine Powers, Director of Planning and Sustainability (Franklin, TN)
- Cara Mitchell, Olympic Region Communications Consultant (Washington State Department of Transportation)
- Dave Smith, Transportation Engineer (Olympia, WA)
- Ron Marquez, Traffic Engineer (Santa Cruz, CA)
- Beth Rolandson, Principal Transportation Planner (Santa Monica, CA)
- Brent Baldwin, Public Works Development Manager (Bellingham, WA)
- Nancy Burns, SDC Analyst (Eugene, OR)

The information collected from Franklin, TN and Santa Monica, CA was not included in the summaries that follow, because they did not have a four-year university and did not add any insight which was not provided by other case studies.

Based on the responses, the research team selected four cities that provided information that was the most applicable to Bozeman when considering options for providing a reduction in the transportation impact fee. The cities include Santa Cruz, CA; Olympia, WA; Bellingham, WA, and Eugene, OR. A general overview is provided in Table 4.

All four cities had some kind of transportation impact fee reduction program. These reductions were created to incentivize development where the city's community plans have indicated growth and development is desirable. These areas are typically high-density and mixed-use corridors or downtowns.

Santa Cruz's reductions started in 2006 and are reserved for its downtown (referred to as the Downtown Parking District) and three mixed-used corridors – Mission Street, Ocean Street, and Soquel Avenue.

In Santa Cruz, the reduction percentage for downtown was calculated by looking at downtown trip generation (how many trips were coming in and out and by what mode) during the PM peak, the peak with the heaviest vehicle traffic. The downtown trip generation rates were then compared with the rates of other developments in the city. The reductions for the three mixed-use corridors were calculated based on the corridors' individual mix of land uses, presence of commercial developments geared towards serving the local community, and bike/pedestrian/transit accessibility. In the end, developments in the Downtown Parking District receive a 40 percent transportation impact fee reduction, Mission Street receives a 13.8 percent reduction, Ocean Street receives a 7.8 percent reduction, and Soquel Avenue receives a 17.3 percent reduction.

Table 4: Summary of Case Studies

	Bozeman	*Santa Cruz*	*Olympia*	*Bellingham*	*Eugene*
Population	37,286	59,948	46,476	80,872	156,185
Square Miles	19.1	12.7	17.8	27.1	43.7
Persons / Square Mile	1,950	4,705	2,608	2,987	3,572
University	Montana State University	UC Santa Cruz	Evergreen State College, South Puget Sound Community College (SPSCC)	Western Washington University	University of Oregon
Transit System	Streamline	Santa Cruz Metro	Intercity Transit	Whatcom Transit Authority	Lane Transit District, Emerald Express
Transportation Impact Fee Start Year	1996	2004	1995	1995	1978
Reduction Areas	Downtown Trip Exchange District	Downtown Parking District, Mixed-use corridors	Downtown, High density corridors (planned)	Urban Villages, High frequency transit	Nodal Development Areas
Reduction	29%	40%	Max 20%	Max 50%	10% (Nodal) As Approved

Both Olympia and Bellingham's transportation impact fees are additive, meaning developers can pick reduction options from an approved list to reach a maximum reduction of 20 percent for Olympia and 40 percent for Bellingham.

Olympia's reduction options are based on operational or physical improvements that reduce vehicle traffic. Operational improvements include provision of a transportation information center, Commute Trip Reduction (CTR) law compliance, designated paid parking spaces, and carpool/vanpool parking lots. CTR is a demand management program. Physical improvements include constructing a direct walkway connection to the nearest arterial road, sheltered bus stops within ¼ mile of the site, bike lockers, employee showers, on-site bike/walk networks, fewer parking spaces, and no parking for downtown developments. Aside from physical and operational reduction options, developers can also come up with their own options for reduction, but must prove to the city that the option helps reduce the development's vehicle traffic. For a complete list of Olympia's reductions options and reduction percentages, refer to Appendix A.

Bellingham's reduction program was implemented in 2011 and is perhaps the most comprehensive and developed program out of all the case study cities. Bellingham's program is based on its seven designated "urban villages," mixed-use districts with transit connections and bike/pedestrian accessibility. Bellingham's additive reduction options are reserved for developments in these urban villages, though developments that are not in urban villages can work with the city to get reductions if they "can provide defensible traffic demand management strategies" (Baldwin, Brent, Personal Communication, July 28, 2014). Bellingham's reduction options are split into automatic and optional reductions. Automatic reductions include credits for redevelopment, proximity to a high-frequency transit stop, CTR law compliance, and location within an urban village. See Appendix B for a list of automatic reductions. Optional reductions include two-year minimum bus pass purchase, car-share membership purchase, car-share vehicle accommodation, and installation of bike racks. Bellingham is also considering provision of employee shuttles and secure bike parking as optional reductions.

Eugene has utilized impact fees (called Systems Development Charges, or SDCs) since 1978. The transportation SDCs include both an auto related component and an off street bicycle system component. Reductions to and credits toward the Transportation SDCs are available. "For the transportation system, an impact reduction may be granted if the applicant demonstrates to the satisfaction of the City Transportation Engineer, that the improvement or program to be instituted in connection with the development will materially reduce the number of automobile trips the development will generate and that it will continue for at least twenty years after the development is occupied." (http://www.eugene-or.gov/index.aspx?NID=2247). An example of reductions is providing bus pass program to employees.

Additionally there is a 10 percent reduction to transportation SDCs to approved development types in the designated Nodal Development Areas. These are areas of mixed use development designated in the General or Metro Plan.

2.4.1. University Reductions

Each case study city had at least one local university. Santa Cruz had the University of California at Santa Cruz, a public four year university; Olympia had Evergreen State College, a public liberal arts college, and South Puget Sound Community College, a two year community college; Bellingham had Western Washington University, a public four year university; Eugene had University of Oregon, a public four year university. Reductions allowed for universities and/or neighboring areas varied across the case studies.

In 2008, UC Santa Cruz paid the city of Santa Cruz $1.5 million to pay for road network improvements as a result of a lawsuit against the University for generating too much vehicle traffic. Also as a part of the settlement, UC Santa Cruz created a Long Range Development Plan in which it established a cap on its average daily traffic for the university's main corridors (City of Santa Cruz Planning and Community Development Department 2010). Transportation impact fees for the university are based on the average number of vehicle trips generated by the new development on a daily basis. If UC Santa Cruz constructed a new development that pushes it over their ADT cap, the university would be penalized by having to pay triple the current transportation impact fee rate.

Neither Evergreen State College nor South Puget Sound Community College (SPSCC) in Olympia, Washington receives any adjustments to their transportation impact fees because both colleges generate as much vehicle impact as other developments in Olympia. This can be attributed to the facts that Evergreen State College is located in a low-density area far away from the center of Olympia and SPSCC is a commuter school.

Although Western Washington University (WWU) is not located in an urban village, it receives a 10 percent reduction because it demonstrated good faith by compliance with the Commute Trip Reduction (CTR) Law, which states that any employer in Washington with over 100 employees must make the effort to reduce its vehicle commute trips. Transportation impact fees for WWU are assessed through the ITE methodology of looking at trip generation for the new development. If the vehicle trip generation rates for a new development in the university campus could be shown to be less than the rates of other developments, it would receive a reduction.

Western Washington University has numerous programs and policies to discourage car ownership and usage by students and employees and promote alternative, sustainable forms of transportation. First, WWU imposes a high price for on-campus parking, and on-street parking in adjacent neighborhoods requires a residence parking permit. The university also provides Zipcar car sharing and late night shuttles for university affiliates as well as local bus passes for students; the university bus line actually has the highest transit ridership out of all the city's lines. The university also strives to educate its affiliates about intra-city transportation services like Whatcom Transit Authority (WTA) buses, taxis, bike/walk routes, and park and ride services as well as intercity services like County Connector, rideshares, Amtrak trains, Greyhound buses, ferries, and airports. The university is also highly involved in the creation of the City of Bellingham's master plans including the Bellingham Comprehensive Plan, Pedestrian Master Plan, and Bike Master Plan, Multimodal Transportation Concurrency Program, and Growth Management Act. Lastly, WWU gets its students involved in the university's transportation planning through the Western Student Transportation program and the Office of Sustainability.

New developments in and around the University of Oregon are treated as any other development. If adjustments to trip rates are proposed by the university, they would be reviewed and a reduction could be approved.

3. TRIP GENERATION COUNTS

The current impact fee is based largely on trip generation data, which is an estimate of the number of trip ends entering and exiting a development. Trip generation count data was collected with the goal of determining how the trip generation is different for developments inside the University TED when compared to similar developments in other areas of Bozeman. Trip generation counts were collected in accordance with ITE standards for trip generation (ITE, 2012). Deviations from typical methods (specifically conducting manual counts) and site selection are detailed in the Data Collection Section.

Trip generation counts for similar residential units allow an easy comparison; trips can be reduced to trips per dwelling unit (for non-group quarters) and trips per person/bedroom (for group quarters). Trip generation counts were not taken for non-housing developments as there is too much variability in the different types of developments. For example, within the University TED there is office space, academic space, pizza restaurants, gas stations, grocery stores, and coffee shops. Further complicating things, there are typically multiple uses within one development. It is too difficult to control the other variability with non-housing developments in order to measure a difference in travel caused by being inside the University TED.

3.1. Data Collection

Sites were identified based on distance to the MSU campus, ease of capturing data, type of development, and distance to other goods and services. Distance factors should give insight into how travel is different for developments closer to (and inside) the University TED. Areas with limited entrances and exits were chosen to allow for ease of data collection. The number of units for each site was also collected based on the number of mailboxes, Montana Cadastral data, and interviews with property managers. Figure 6 shows the various study locations in their relationship to the center of MSU campus (taken as Montana Hall).

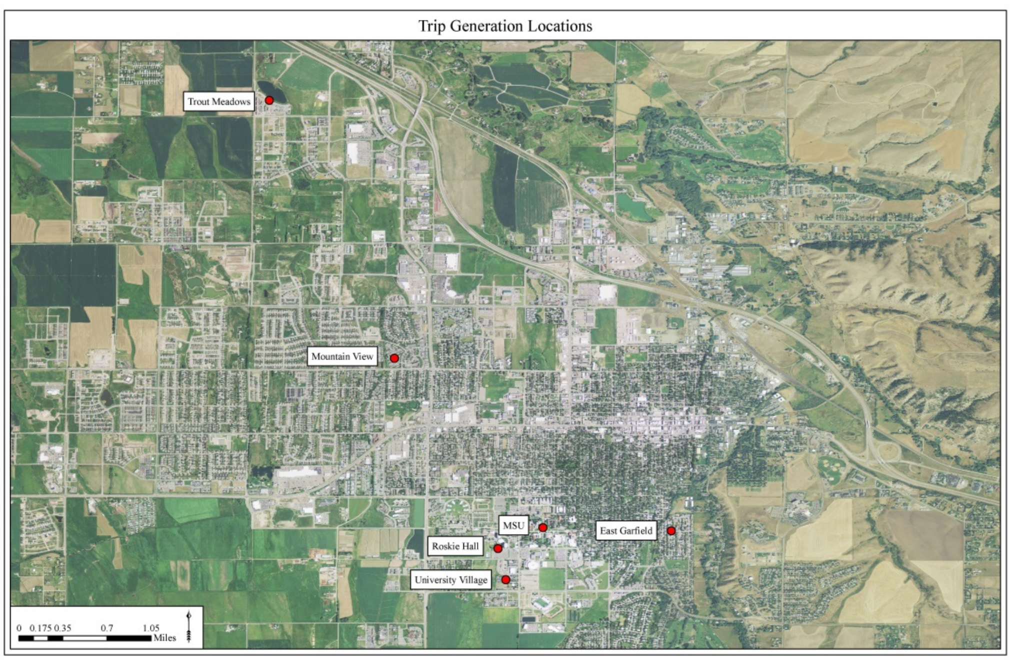


Figure 6: Trip Generation Data Collection Sites

Roskie Hall represents a typical group quarters housing development on the MSU campus. University Village represents a typical private apartment complex in the University TED. East Garfield represents a typical apartment development just beyond the University TED boundary. Mountain View and Trout Meadows represent typical apartments in various locations in Bozeman.

With exception of Roskie Hall, these sites are all apartments with mostly two-bedrooms and fall into the smallest housing size in the current impact fee schedule (i.e., less than 1400 square feet, refer back to Figure 5).

Table 5: Trip Generation Site Characteristics

Site	*Units*	*Bedrooms*	*Size (sf)*
Roskie (grp. qtr.)	286	1	~210
	(400 beds)	2	
Univ. Village	86	2	*
	(172 beds)		
East Garfield	118	2 (almost all)	830
		3	
Mountain View	161	2 (70%)	950
		3 (30%)	1200
Trout Meadows	218	Studio	518
		1	608-627
		2	868-990
		3	1189-1224

* Data was unavailable, but anecdotally similar in size to Green Tree two-bedroom apartments

East Garfield had six single-family homes; it is assumed that six out of 118 housing units would make a negligible difference to trip generation so the entire area is assumed to be apartments.

Most trip generation counts utilize automated vehicle counters at the major entrances and exits of a development. The challenge with these counters is that they do not work well at low vehicle speeds and when vehicles are turning. Also, an automated counter cannot tell if the vehicle trip is associated with the development or is just passing through. For example, a person could park his or her car in the Roskie Hall parking lot and walk to campus, thus Roskie Hall is not the attraction for this vehicle trip. For this reason trip generation counts were collected manually.

A benefit of manual counts is that modes other than auto can be collected as well. The downside of manual counts is that a 24-hour count requires too much manpower. For this reason two hour data collection periods were used. The Trip Generation Manual (ITE, 2008) has data for typical weekdays (total), the AM Peak of 7-9 am, and the PM Peak from 4-6 pm. If the time periods of the AM and PM peak were used, the results could be compared to ITE Trip Generation Manual values, and it could be used to extrapolate daily totals. More importantly one would like to collect data during the peak hours of congestion for the area. The Montana Department of Transportation (MDT) provided raw data from several traffic data collection sites around MSU. The average hourly traffic for these sites is shown in Figure 7. Note that there are peaks that match up to the AM and PM peak periods. There is also a noon-time peak.

Typically a university class is scheduled three times a week (Monday, Wednesday and Friday) or two times a week (Tuesday and Thursday). Differences in class schedules may cause a difference in travel patterns between a typical Monday/Wednesday and a typical Tuesday/Thursday. Based on the peak traffic periods and class schedules, trip generation counts were collected twice for each site from 7 am to 9 am, 11:30 am to 1:30 pm and 4 pm to 6 pm. One had to be on a Monday or Wednesday, and one on a Tuesday or Thursday.

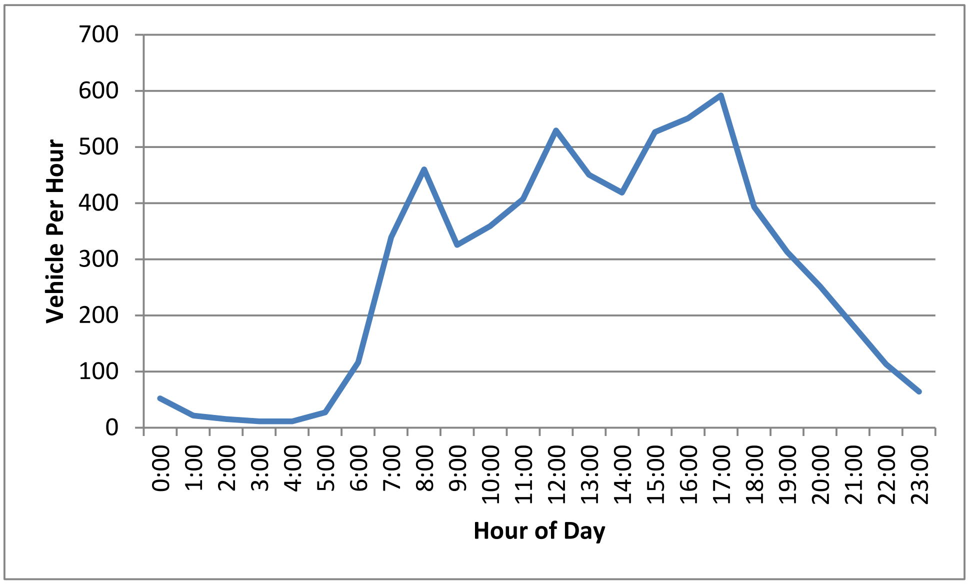


Figure 7: Auto Traffic Averaged over Several Sites on 11th St. and College St. near MSU

3.2. Findings

Several aspects indicate that the trip generation data collected was representative of typical apartments. Entering and exiting percentages compared well with the specific time periods in the ITE Trip Generation Manual. The number of people trips (Figure 8) is fairly consistent for the apartment buildings. For the developments outside of the University TED, the auto trip generation rates are also in line with the ITE Trip Generation manual.

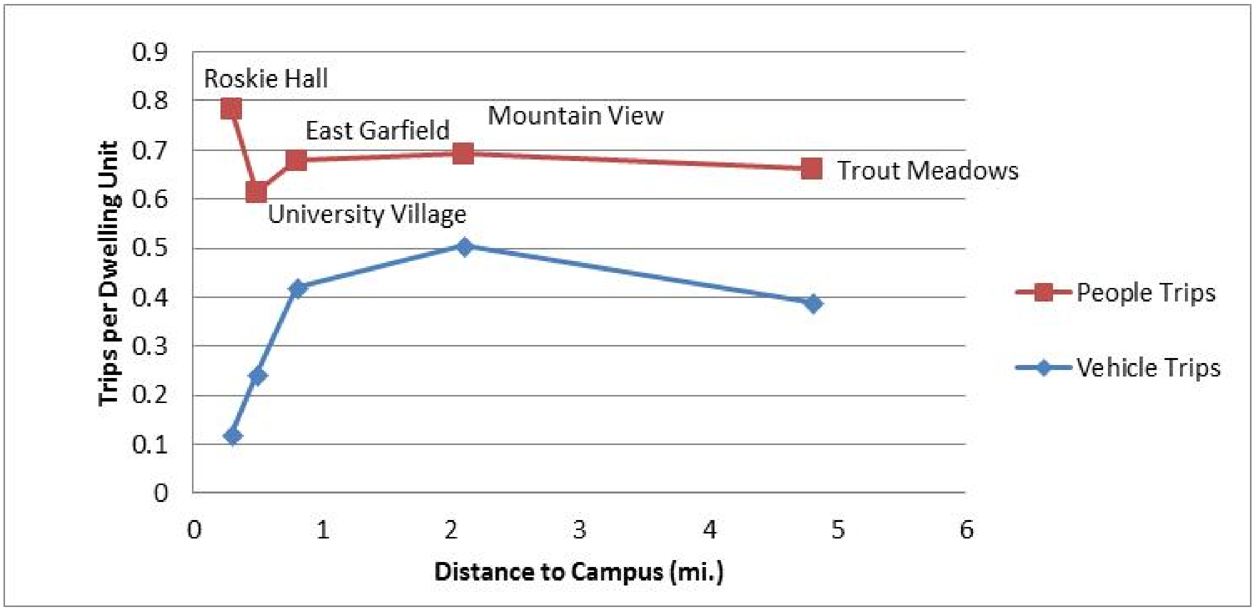


Figure 8: Trip Generation Rates Averaged Across All Collection Periods

Figure 8 shows that although the people trips per dwelling unit are similar, the auto trips for the developments inside the University TED are much lower. Also, note that the impact MSU has on the auto travel seems to be mostly gone at distances of about a mile (i.e., East Garfield), which indicates that the boundary of the TED, between University Village and East Garfield, is appropriate.

The difference in travel is largely due to mode choice. Figure 9 shows a comparison of mode choice between the study sites, listed in order by their distance from campus. The proportion of auto trips is shown to increase as the distance from campus increases, while pedestrian trips decrease. Shared rides also increased as the distance from campus increased, with the exception of Trout Meadows. Bike mode share was highest at East Garfield with 8 percent. Being outside of typical walking distances, it is hypothesized that more choose to utilize their bikes instead of walking as an alternative to driving. The “Other” mode (primarily public transit) was highest at Mountain View with 3 percent. Note that Mountain View was the only site with a transit stop directly adjacent to the development.

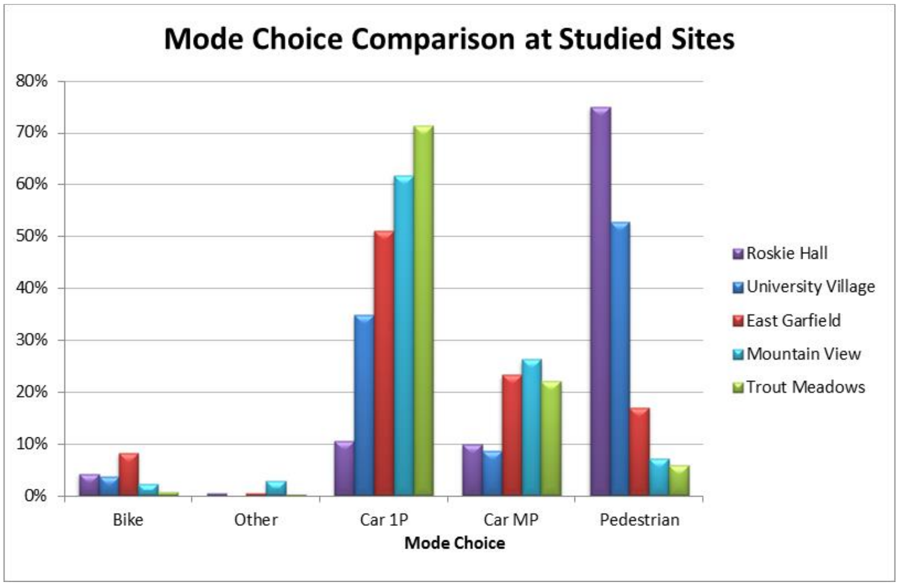


Figure 9: Mode Choice Comparison

3.3. Results

Whether looking at the extrapolated daily totals, or any single peak period, the proportional relationships are similar. The PM peak had the highest trip generation and the nearby streets had the most congestion, when compared to other times of the day. Therefore, the research team used PM peak data for comparing differences across sites. The trip generation rates in Figure 10 show that the three developments outside of the University TED are on average (dashed line) slightly lower than the average rate in the ITE Trip Generation Manual (solid line). Using East Garfield, Mountain View, and Trout Meadows as representative of typical Bozeman residential apartments, the rate for **University Village is 35 percent lower**. Roskie Hall is 58 percent lower, but this number is based on comparing trips per dorm room (or bedroom) verses trips per apartment and should be adjusted.

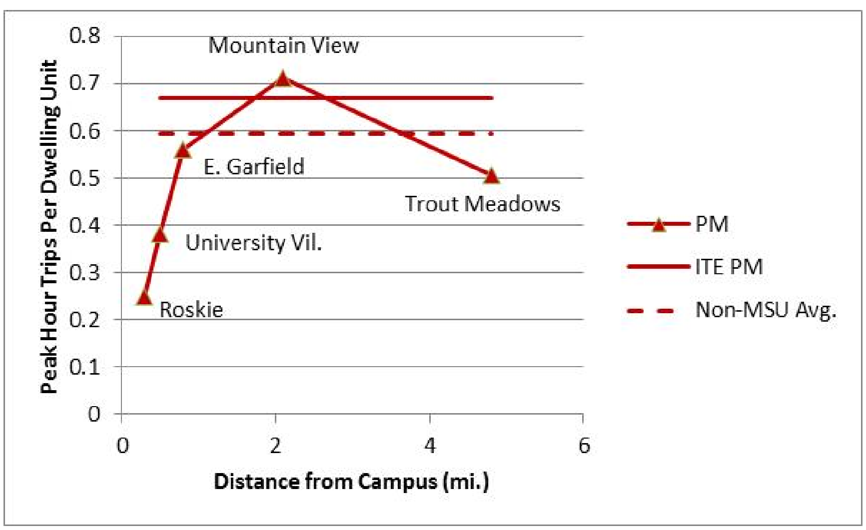


Figure 10: PM Peak Trip Generation Rates

The challenge in adjusting this rate is that there are no existing dormitory type housing (group quarters) off campus. An adjustment factor is needed to compare Roskie Hall (group quarters) to this average rate of the rest of Bozeman. Further, there are future plans for group housing private developments within the University TED. The ratio comparing apartment trip rates (per unit) to group quarters trip rates (per bed) is 1.268 based on previous impact fee studies (Table 6). This factor is used to adjust down the average trip rate for apartments in Bozeman (dashed line in Figure 10 above) in order to provide a group quarters comparison for Roskie Hall. The resulting reduction found is that **Roskie Hall has 62 percent fewer trips generated per bed** when compared to the rest of Bozeman.

Table 6: Known Travel Difference between Group Quarters and Small Apartment

Type	*Current Fee*	*Based on Trip Rate (Tischler-Bise, 2012)*	*Resulting Travel Ratio*
<1400 SF Apartment.	$2631 / unit	3.93 / unit	1.268 bed/unit
Grout Quarters	$2075 / bed	3.10 / bed	

A similar adjustment was performed to consider University Village as if it were a group quarters apartment and adjust its trip rate to trips per bedroom. When **considered as a group housing development, University Village has 59 percent fewer auto trips** as compared to the rest of Bozeman. Again, the challenge is that there are no true group quarters apartments outside of the university currently for comparison.

These three results are added to the final findings chart (shown in bold in Table 7).

Table 7: Summary of Findings after Trip Generation Data

	Private / Near MSU	MSU On Campus
Non-Housing		
Housing	**35% less auto trips**	
Housing Group Quarters	**59% less auto trips**	**62% less auto trips**

Chapters 4-7 document that once a person in the TED begins an auto trip the distance they travel is very similar to the average in Bozeman. Therefore, the reduction in the number of auto trips is proportional to a reduction in VMT. This justifies a reduction in the corresponding impact fee charged.

4. RESIDENT TRAVEL SURVEY

A travel survey was conducted to further understand transportation patterns in high density residential areas in Bozeman. The travel survey was designed to develop an understanding of: where people in the study areas travel, how far individuals travel from their home, what modes they use for travel, and what factors affect whether they drive or choose some other mode of transportation. Collection of local data allows for verification or adjustment of trip information available from national sources such as the ITE Trip Generation Manual and the National Household Transportation Survey (NHTS).

4.1. Methods

The survey was developed to collect data from individuals living within the six different residential study areas of the trip generation data (see Chapter 3): Trout Meadows, Mountain View Apartments, University Village, East Garfield, Figgins Addition, and Roskie Hall. Note that trip generation was not completed for Figgins Addition, but it was included in the survey as an example of single family home travel. The survey included questions similar to the NHTS and other survey instruments that have been developed to ascertain trip distances and mode choices.

Respondents were asked several questions directed at understanding general travel patterns and factors that influence mode choice. In addition, to document specific information on trips made from their home for one weekday, respondents completed a travel journal. For each trip the respondent was asked to provide data on departure time, travel mode, trip purpose, return time, and trip destination.

The research team developed the online survey utilizing SurveyMonkey. Mailing lists were developed for the six study sites and a postcard mailer was created to introduce the survey and provided a URL to access the survey. Additionally each postcard had a unique code number. The code number was only used to associate the response with one of the six study areas. The postcards were mailed during the week of April 21, 2014.

4.2. Findings

While the response rate to the initial survey distribution was low, at least one response was received from each study area. In total the team received 24 responses documenting 37 different trips from home. Only one response, documenting one trip, was received from Roskie Hall. Nine responses, documenting 13 trips, were received from Figgins Addition. The majority of responses to the travel survey were for the dates of April 21-24, 2014. The weather for those days was mainly clear with some precipitation recorded on the evening of the April 22. The high temperature for the period was 73 F and the low was 31 F.

Trip distances were determined using Google Maps utilizing the center of each study area and the Trip Destination responses from the travel journal. Figure 11 summarizes the average trip distances by mode of travel for each of the six study sites. The highest average driving trip distance was reported from Trout Meadows at 3.6 miles. Roskie reported zero driving trips. Mountain View had the lowest average reported driving trip length at 1.6 miles. The overall average for reported driving trips from all study areas was 2.5 miles.

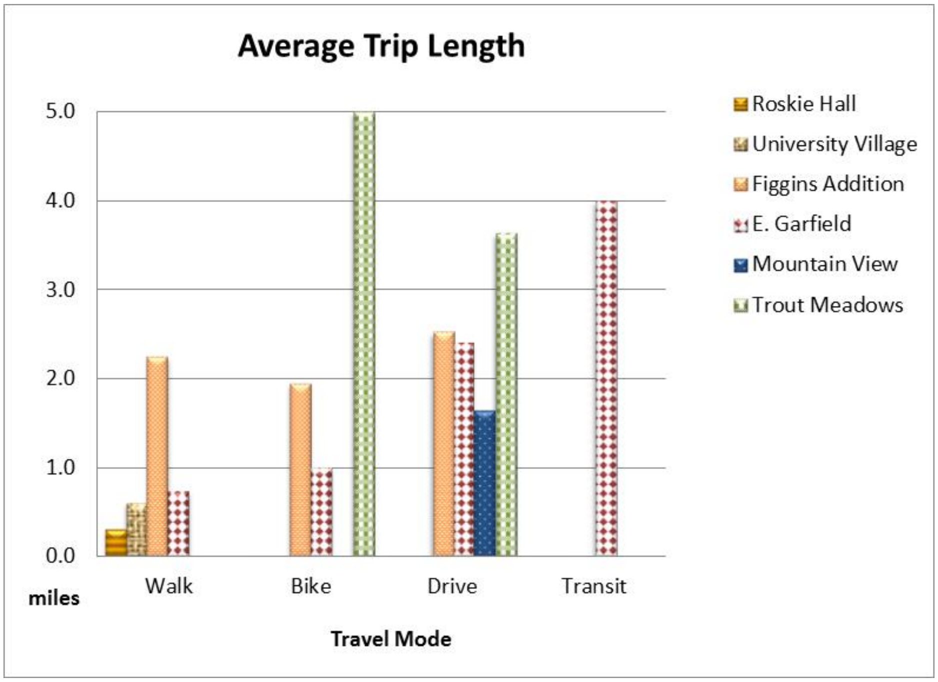


Figure 11: Average Trip Lengths

Respondents were asked "For most trips I… walk, bike, drive, ride transit, other?" Residents in Roskie and University Village selected walk or bike exclusively while the majority of respondents in Mountain View and Trout Meadows selected drive as their most likely mode or travel. (Figure 12).

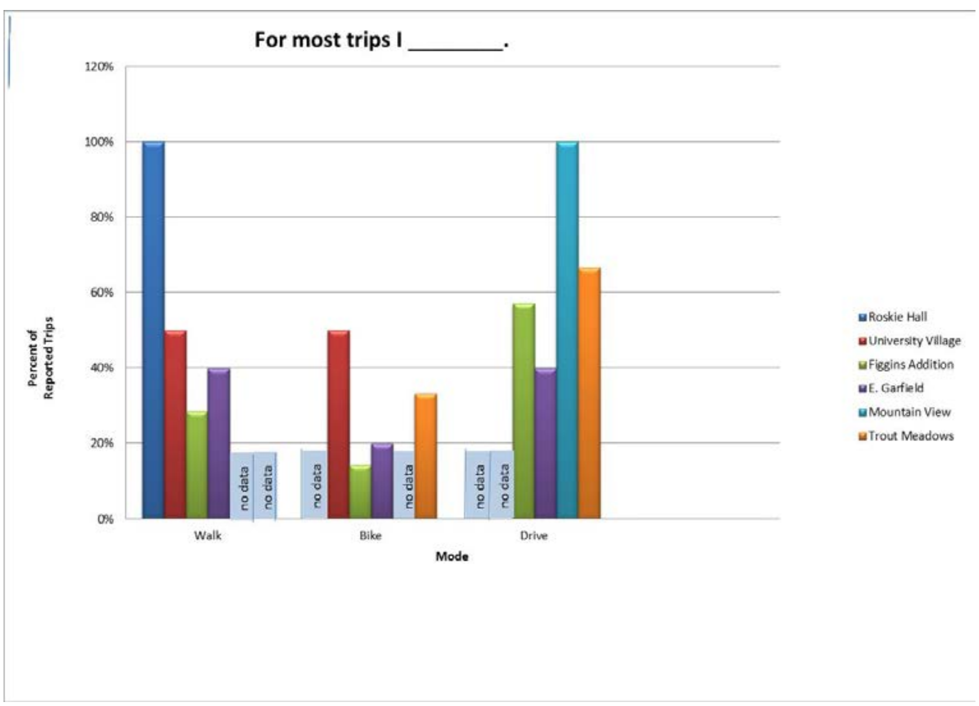


Figure 12: Preferred Travel Mode

When asked about the influence of weather on mode choice, the responses indicate that winter weather has a significant influence in reducing the likelihood of choosing to walk for the school or work trip (Figure 13 and Figure 14).

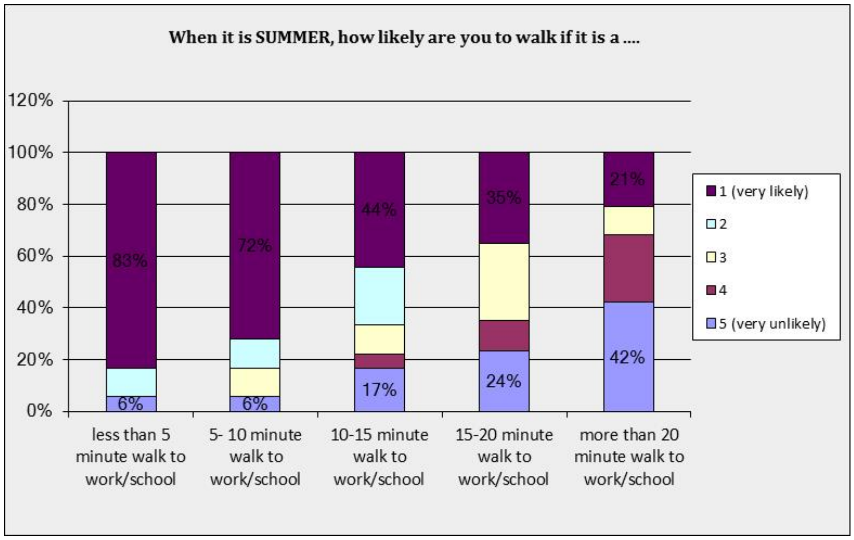


Figure 13: Influence of Weather on Mode Choice in Summer

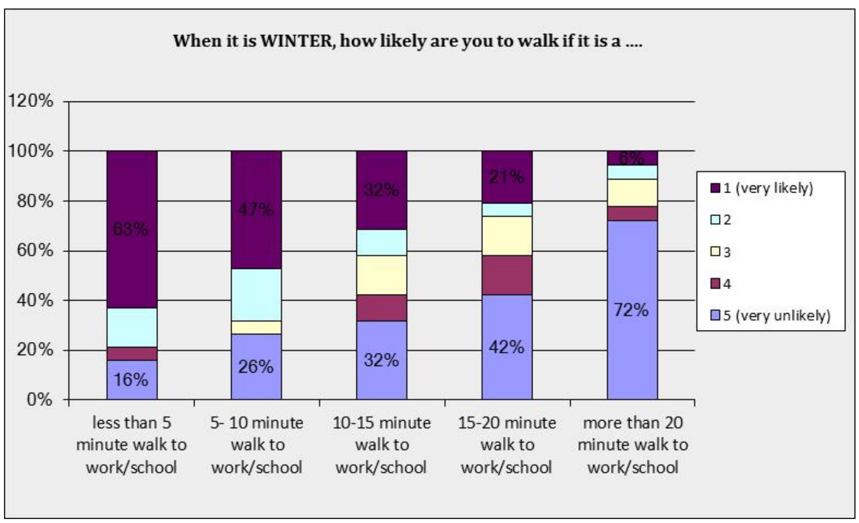


Figure 14: Influence of Weather on Mode Choice in Winter

4.3. Results

While the response rate for the travel survey was low, responses were received from all study areas. From the data collected, no consistent pattern emerges for driving trip length based on residence location. Anecdotally, the average driving trip reported from Trout Meadows was slightly longer. Differences in average driving trip lengths are more likely due to variability and small sample size. With respect to mode choice, the results from the survey indicate that the location does affect mode choice. Respondents residing closer to Montana State University indicated that they were most likely to choose walking or biking while the locations further away indicated they were more likely to choose driving for most of their trips.

The likelihood of choosing a mode other than auto decreases rapidly as residents live further from where they work or attend school. There is a pretty significant drop at around 15 or 20 minutes. Assuming a walking speed of four miles per hour, the impact of MSU on walking by residents that live close would be dissipated within about one mile.

5. ORIGIN DESTINATION STUDY

Another way to track travel patterns is through an origin-destination study. For some period of time, a unique identifier for a person or vehicle is recorded at numerous locations in a study area. This allows for the creation of an origin-destination matrix, which can be used to see how travel is different for different parts of town. The primary purpose of the origin-destination study was to determine average trip length for trips that start or end in different areas of town.

In the past, these studies were conducted by recording license plates or blue-tooth IDs from portable devices. A new technology allows the use of cellular phone data. WTI subcontracted with Air-Sage, a company that provides this data.

5.1. Methods

Essentially Air-Sage works with cellphone providers to identify locations of each cellphone in an area and track its location to determine its likely home location and where it travels. To protect privacy, no personally identifiable data is tracked and only aggregate movement patterns are reported.

> *Combining patented and proprietary data collection and analysis technologies with signaling data from wireless carriers, AirSage has developed and deployed a secure data collection and reporting network with over 100 million mobile "sensors" (mobile devices) that provide unprecedented visibility into where groups of people are, where they were, where they are likely to be, and how they move from one area to another. (AirSage, 2014)*

Because of the coarseness of the location accuracy of cellphone triangulation, US census block groups (Figure 15) were used to aggregate trip starting and ending points. To give an idea of the size, there are three block groups in the University TED, one for MSU core, one for MSU family housing, and one for private developments near MSU. AirSage provided an origin-destination matrix showing the number of trips per day that started and ended in each zone to zone pair. This was an average for the weekday travel, taking in all the weekdays in October 2013.

AirSage estimated they were able to capture travel for about 20 percent of the Bozeman population, as they are currently able to utilize only one carrier. While there is clearly more cellphone ownership than this, 20 percent should well represent travel in Bozeman. Note that this includes all mode types and not just auto. The coarseness of the location data, and the algorithm used by AirSage eliminates shorter trips which are mostly walking trips. Thus the data does include some non-auto trips, but is mostly representative of auto trips.

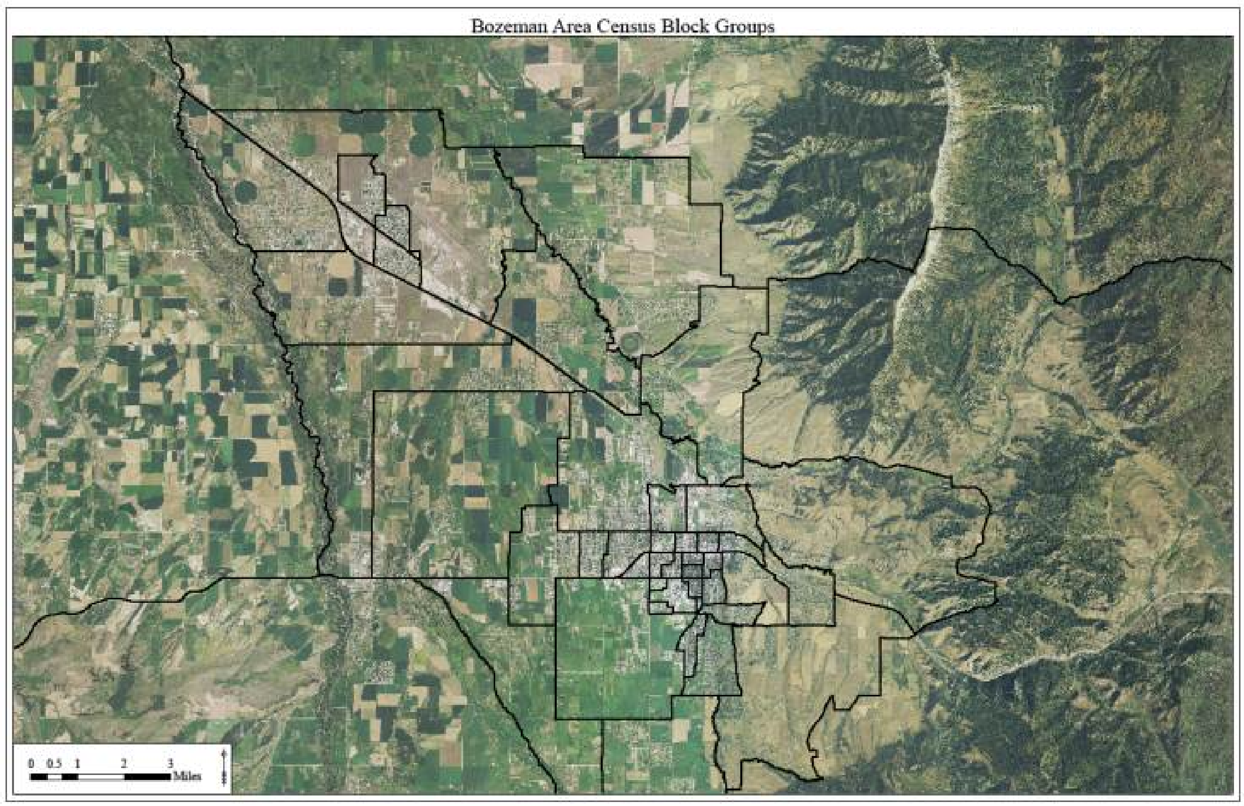


Figure 15: Census Block Groups Used for Origin-Destination Study

The trip data provided by AirSage was separated into several matrices. Their algorithm determines the home location of the cellphone, so it can be determined if the trip starts or ends at home. Thus, the trips can be separated into the home side of the trip and the non-home side of the trip. This is important for determining travel to/from residential developments in the university TED and travel to/from non-residential developments in the University TED.

Transcad software was used to load the origin-destination matrix onto the street network. For each trip the path is determined based on the fastest travel time between the origin and destination point. Travel times were determined based on free-flow speeds (i.e., no congestion delay) of the streets. This mimics typical behavior of travelers; they may not take the shortest path if there is a faster moving arterial that gets them to their destination faster. Once the path was determined, the trip distance was calculated. This trip distance includes only the travel on streets within the city limits. Thus, the total trip length may be longer, but only the portion within the city limits was considered. Trip lengths calculated in this chapter are one-way trip lengths.

5.2. Findings

Trips for the residential side of the trip were analyzed separately from the non-residential side. Because the data is based on a typical 24-hour day of travel, the trips from homes are essentially a mirror image of trips to homes. Thus the same results are found when looking at trips from homes or trips to homes. Looking at all the trips originating from homes in a given zone, the average trip length is generally the same for residents inside the University TED and the rest of the areas in Bozeman (Figure 16).

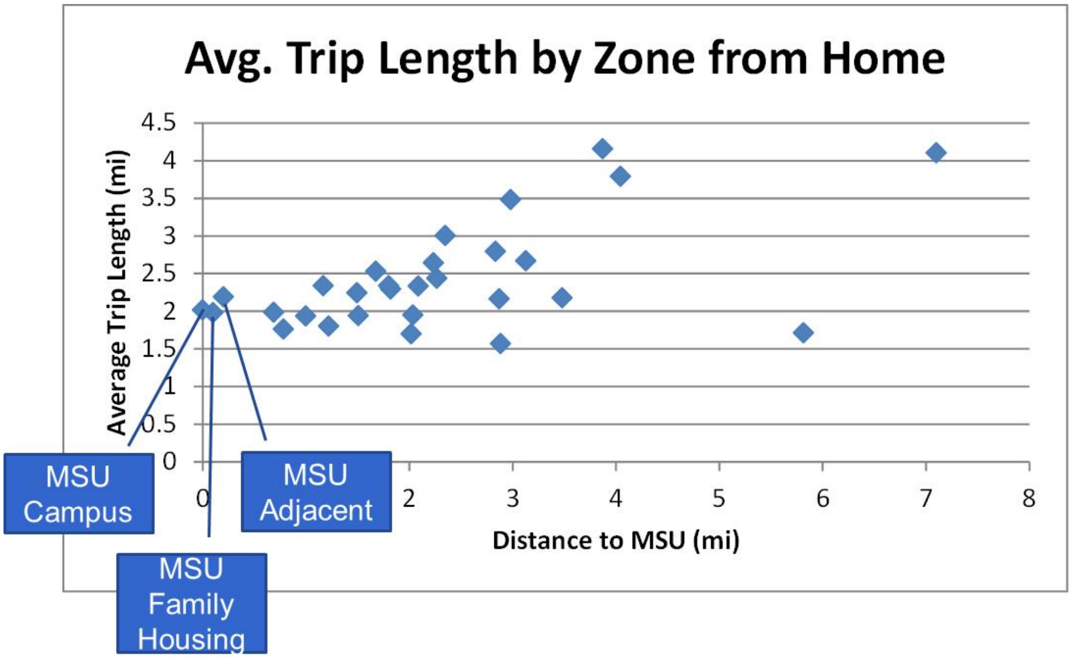


Figure 16: Average Trip Length Determined by Origin Destination Data (housing side)

The non-housing side of the trip shows a similar result. This data shows that if a trip is made to or from a zone, the distance travelled is just as long as trips to or from any other zone in Bozeman.

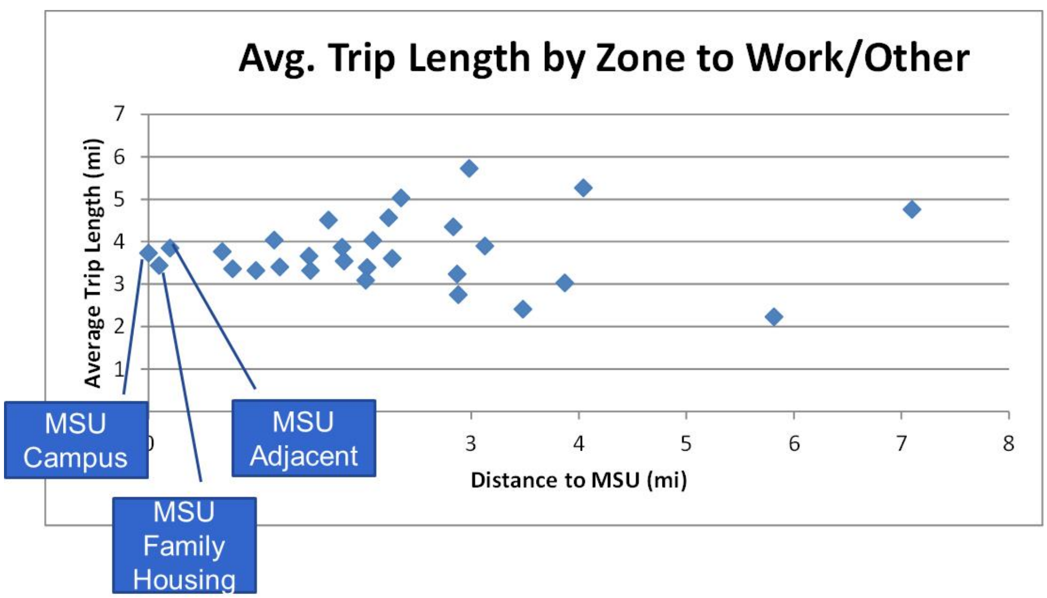


Figure 17: Average Trip Length Determined by Origin Destination Data (non-housing side)

The AirSage algorithm uses census data to aggregate the sample to determine population travel patterns. Because of this aggregation, the data is not as accurate as the manual trip generation data discussed in Chapter 3. Trips per household are shown in Figure 18. MSU campus trip generation is problematic because of errors in the group housing numbers in the census data. However, the family housing zone and the MSU adjacent zone (i.e., off-campus but inside the University TED) each have a much lower trip generation rate than the rest of Bozeman (84 percent and 75 percent reduction respectively).

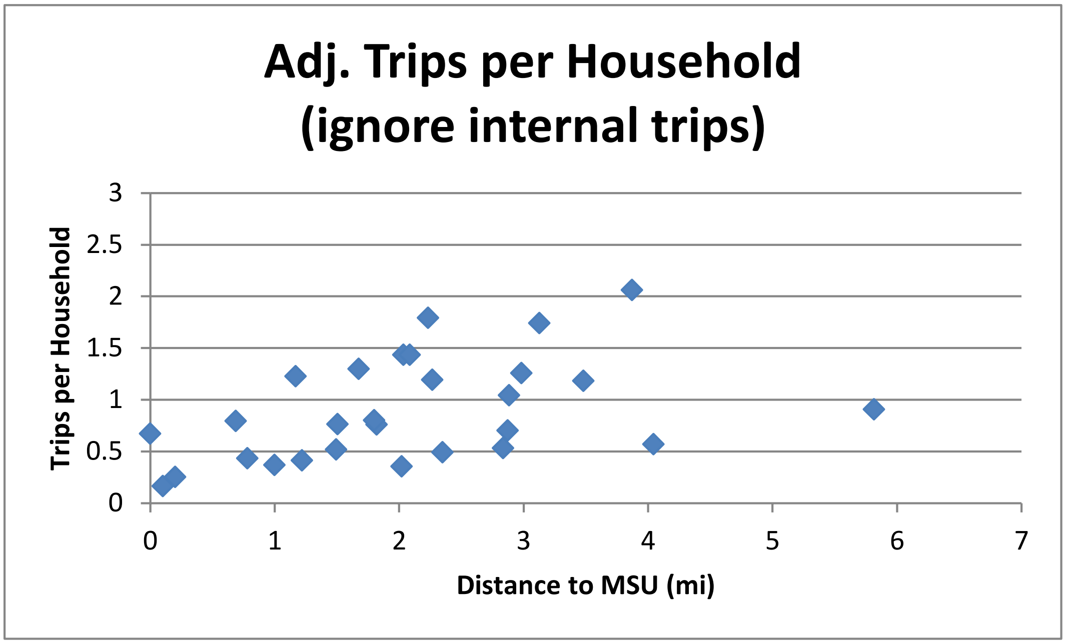


Figure 18: Trip Generation Rates from Origin Destination Study

This reduction in trip rate cannot be used for an impact fee reduction in a similar way that the rates in Chapter 3 are used, because these are trip rates across all housing types. It has already been shown in previous impact fee studies that households from smaller housing generate less traffic than households with larger square footage. Specifically, a zone with mostly small apartments (less than 1400 square feet) should have 42 percent less travel impact than a zone (or zones) with average housing sizes (Figure 19). If the MSU family housing zone and the MSU adjacent zone contain almost entirely small apartment housing, they would be expected to generate 42 percent fewer trips than the average for Bozeman, based only on housing size. Thus if the previous reductions are adjusted up to remove the impact of smaller housing, the remaining reductions are assumed to be attributable to being near MSU. This results in **42 percent fewer trips for family housing and 33 percent fewer trips for off campus housing** in the University TED.

Calendar Year 2013

Transportation Impact Fee — ***Effective March 30, 2013***

Residential (Square Feet of Living Area)	*Impact Fee Per Dwelling*	
1400 or less	$	2,631.00
1401-1600	$	3,093.00
1601-1800	$	3,508.00
1801-2000	$	3,876.00
2001-2200	$	4,211.00
2201-2400	$	4,519.00
2401-2600	$	4,800.00
2601-2800	$	5,062.00
2801-3000	$	5,303.00
3001 or more	$	5,370.00
Group Quarters per person	$	2,075.00

Avg. (2201-2400)

42% reduction

Figure 19: Current Impact Fee Showing Difference in Small Apartment Compared to Average Bozeman Housing

5.3. Results

Based on the origin destination study, regardless of the type of development, the University TED appears to have no impact on the length of the trip, for those trips that are made. This does not mean there are the same numbers of trips. In fact, the data shows that the existing apartment housing near MSU has 33 percent fewer trips when compared to the rest of Bozeman. This corroborates the 35 percent found from Chapter 3. Since there is more confidence in the data in Chapter 3, the 35 percent figure will be used. For the family housing zone, the data showed a 44 percent reduction in trips. In lieu of trip generation data, this number will be used.

Table 8: Summary of Findings after Origin Destination Study

	Private / Near MSU	MSU On Campus
Non-Housing	**Same auto trip length**	**Same auto trip length**
Housing	35% fewer auto trips **33% fewer auto trips** **Same auto trip length**	**42% fewer auto trips** **Same auto trip length**
Housing Group Quarters	59% fewer auto trips **Same auto trip length**	62% fewer auto trips **Same auto trip length**

6. INTERCEPT SURVEY

Similar to the resident survey (Chapter 4) that provided information on travel generated by residential developments, an intercept survey was completed to provide information on travel generated by non-housing developments. People travelling to MSU and to adjacent commercial developments were surveyed about their travel patterns.

6.1. Methods

Survey instruments were developed to capture trip generation, mode choice, trip chaining, trip length, and internal trip capture on and around the Montana State University campus during summer and during the previous school year. Since the surveys were conducted during July 2014 when only summer classes were in session, the on-campus survey included questions asking participants about their travel patterns for the last school year (Fall 2013 to Spring 2014). Results discussed in this section focus on the school year travel. Likewise, the off-campus survey for adjacent developments included questions about participants' travel patterns to the development during the fall and winter.

The on-campus sites were selected based on high utilization and traffic. The off-campus sites were selected based on both their high utilization and their proximity to campus. Maps of survey sites can be found in Appendix C. Surveys were gathered at three peak times: the morning peak from 7 a.m. to 11 a.m., the midday peak from 11 a.m. to 3 p.m., and the evening peak from 3 p.m. to 6 p.m. Surveys were collected on weekdays for two weeks in July 2014.

The survey was distributed using traditional intercept survey methodology. Surveyors approached people at the sites, gave a brief explanation of the research, and asked if the person would be willing to take the survey. If the person agreed to take the survey, he or she would be given the survey questionnaire sheet then asked the survey questions in an interview style with the surveyor logging the answers in a notebook. Participants' identities were kept confidential; names, ages, genders, and other demographic factors about the participant were not recorded. Participation in the survey was voluntary. A total of 410 valid surveys were collected. The sample sizes from each survey site are shown in Table 9.

Surveys were omitted if they were not fully completed or if at least one answer was invalid. In addition, carpoolers of the same vehicle were only counted once to assess the number of vehicles on the road. This reduced the sample size to 370 surveys.

In the survey, people were asked to provide the street that they live on and a nearest intersecting street for calculation of the trip length, or distance that people travel to get to the survey location. Google Maps was used to calculate trip length using the intersection nearest to the respondent's home and a destination point. For consistency the destination point was the same within each location group (refer to location group in Table 9). For all on-campus locations the destination point used was Montana Hall, because it is the center of the MSU campus. For the T&C off-campus survey, the common end destination was Town and Country Food Store. Finally, for the ICT/PB/JP off-campus survey, the common end destination was Joe's Parkway Market.

Table 9: Intercept Survey Sample Size

Site Location	*Surveys*	*Location Group*
Centennial Mall	20	On Campus
Strand Union Building (SUB)	37	On Campus
SUB and Renne Library Alley	31	On Campus
Duck Pond	34	On Campus
Harrison Hall	21	On Campus
Culbertson Hall	35	On Campus
Bobcat Statue	64	On Campus
Engineering Complex (Roberts Hall)	42	On Campus
Town and Country Foods	71	T&C Off Campus
International Coffee Traders	10	ICT/PB/JP Off Campus
Pickle Barrel	15	ICT/PB/JP Off Campus
Joe's Parkway Market	30	ICT/PB/JP Off Campus

6.2. Findings

There is a high variability in the mode choice and length when comparing the various off-campus destinations. Figure 20 shows the disparity between the two grocery stores (Town and Country and Joe's Parkway). Town and Country seems to be more of a regional market while Joe's Parkway is more of a neighborhood market.

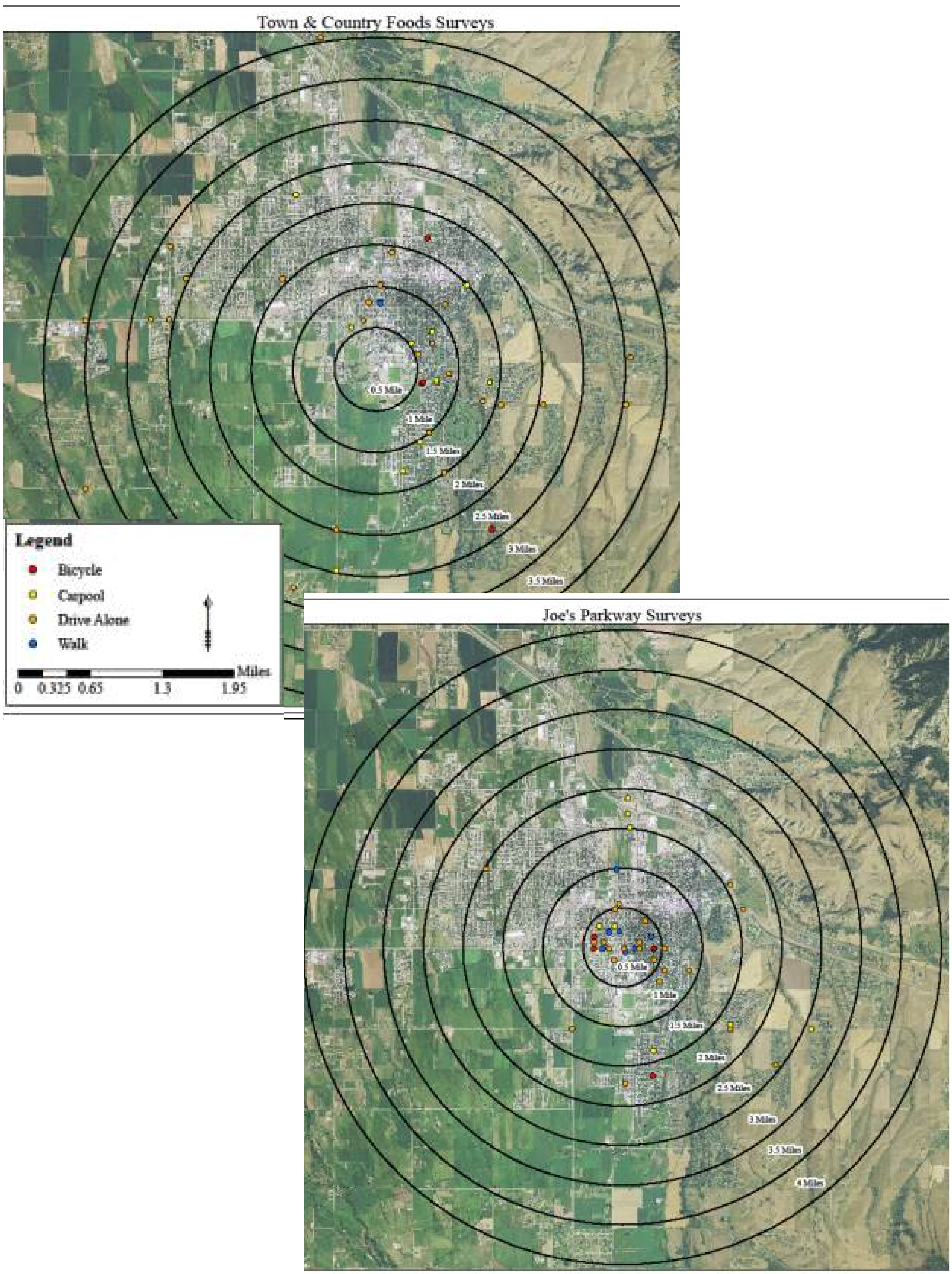


Figure 20: Home Location and Mode of Intercept Survey Comparing Two Grocery Stores

Total mode split was studied to determine how people were traveling to the campus area. Figure 21 shows the results for the total mode split for all on and off campus locations.

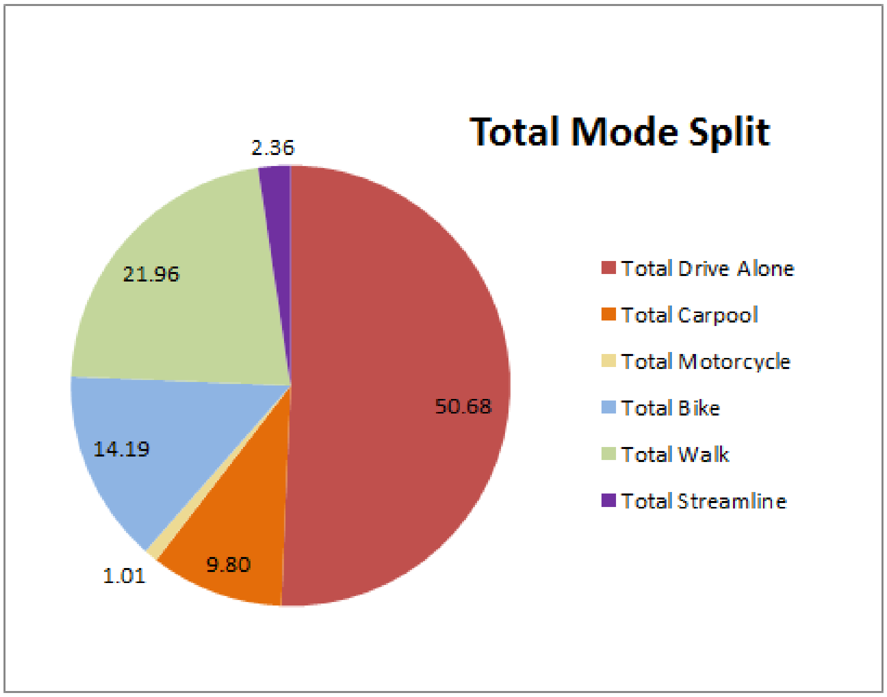


Figure 21: Mode Split for Intercept Surveys

Next, mode split by distance of the trip was investigated for the three location groups. This data is shown in Figures 22-24.

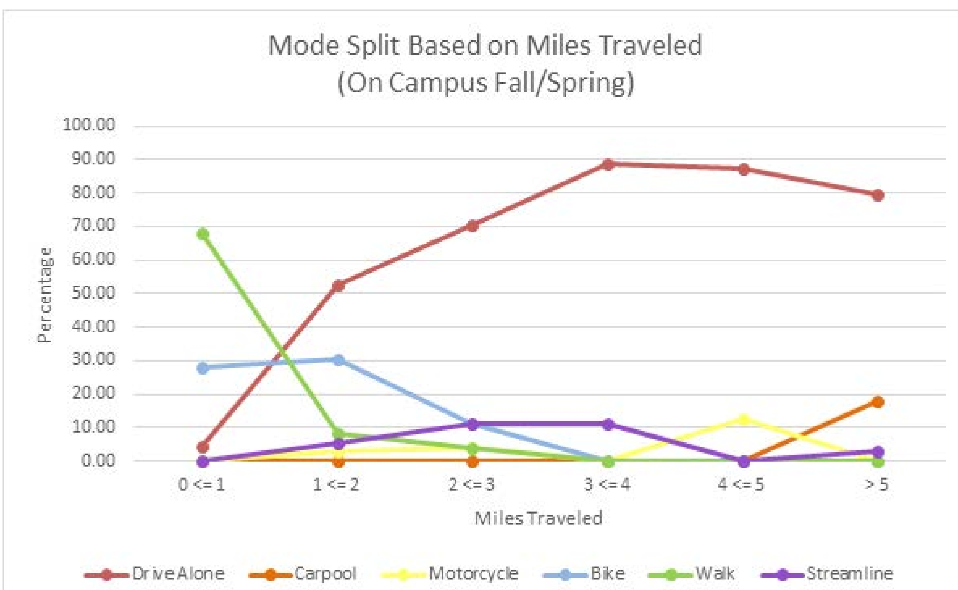


Figure 22: Mode Split and Miles Traveled for On Campus Intercept Survey

Figure 22 (on-campus destination) shows a clear relationship where almost all short trips are made by a non-auto mode and as trip length increases, driving alone becomes the primary mode. Figure 23 and Figure 24 (off-campus destination) have much higher auto use particularly comparing the shorter trips. The zero at four to five miles for all modes might be due to the sample size not being large enough. However, had the sample size been larger, it is believed that the results would produce a similar trend where biking and walking trips are low and vehicle trips are high for this distance.

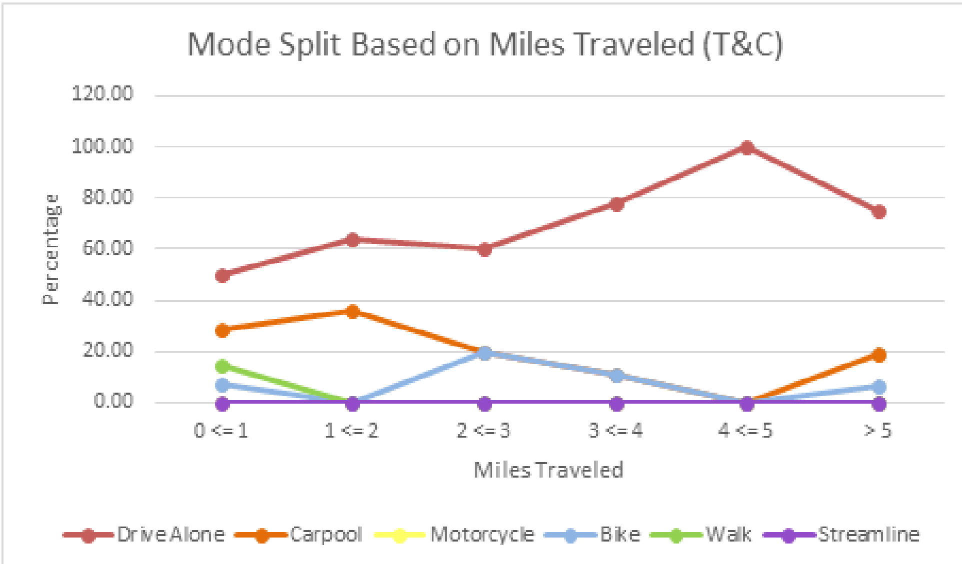


Figure 23: Mode Split and Miles Traveled for T&C off Campus Intercept Survey

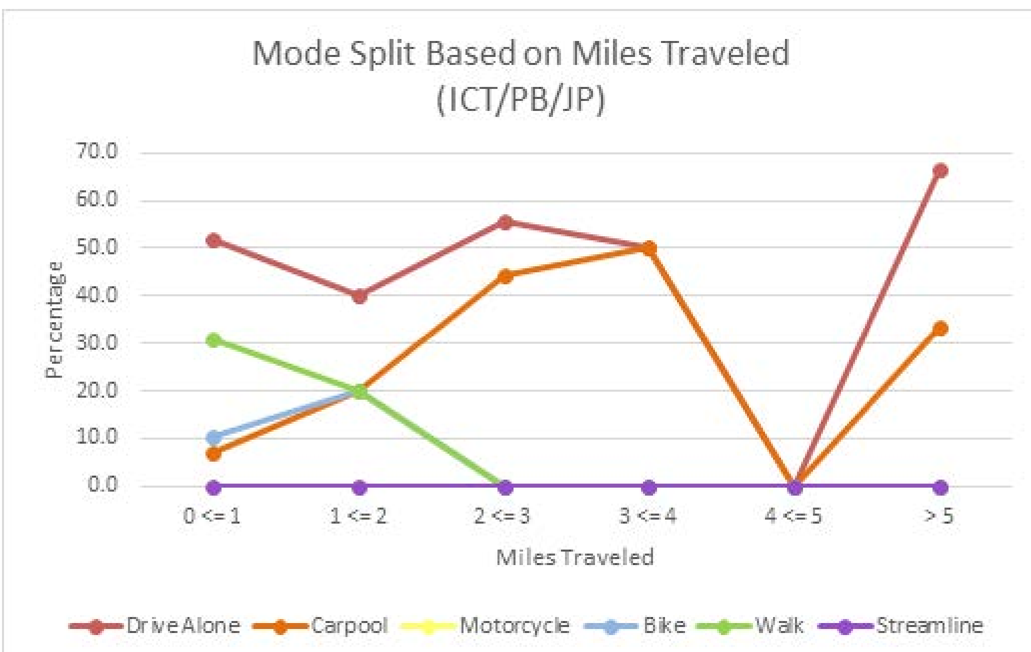


Figure 24: Mode Split and Miles Traveled for ICT/PB/JP Off Campus Intercept Survey

For the off-campus surveys, questions were asked regarding the respondents' affiliation to the university (i.e., were they a student or staff). Also, they were asked whether the university is the main purpose of their trip for the day (Figure 25).

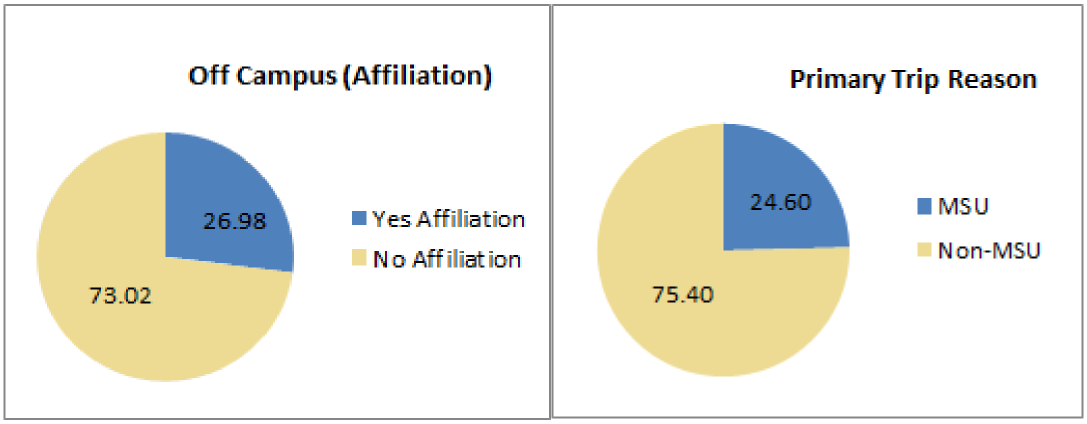


Figure 25: Trip Chaining for Visitors to Commercial Locations Adjacent to MSU

Of the people who traveled to the off-campus adjacent developments, 27 percent reported an affiliation to MSU. When asked about their primary trip purpose for the day, 25 percent of people reported that they were stopping by the developments on their way to or from MSU. This shows that 25 percent of people are trip chaining to the off-campus developments, meaning that they are not adding much vehicle traffic to the road network because the trip distance between campus and the developments is so short.

Also, some of the people who are trip chaining use alternative modes to travel to the off-campus developments, therefore not generating vehicle traffic. For those with a primary trip purpose of going to MSU, 74 percent arrive by car (including 35 percent that carpool), compared to 87 percent by car (including 26 percent carpool) for those who are not going to MSU (Figure 26).

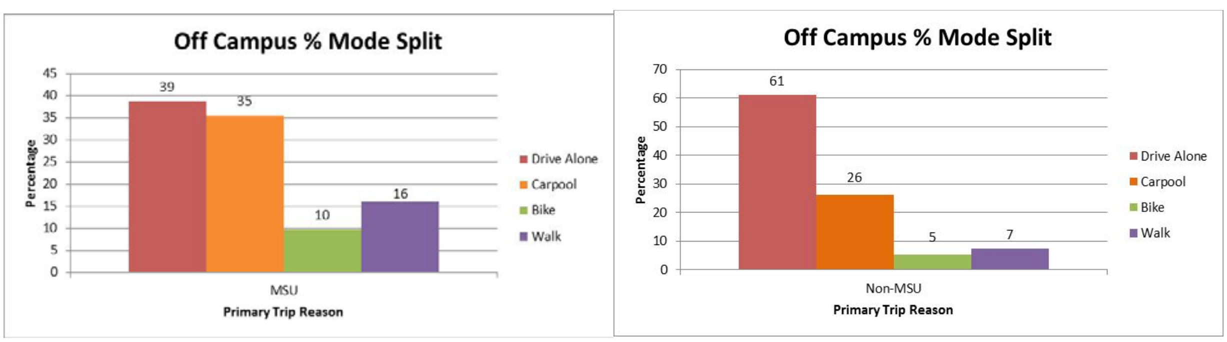


Figure 26: Mode Split for Off-Campus Visitors Split by Their Primary Destination

6.3. Results

People travelling to MSU have a high percentage of alternative mode use and thus may produce fewer auto trips than a similar development elsewhere. For people travelling to non-housing developments directly adjacent to MSU, driving mode was predominant. Further, when considering only visitors who are not trip-chaining to MSU, but have a primary destination to the private adjacent development, almost all of them drive. However, **25 percent of people visiting the MSU adjacent locations are trip-chaining** with MSU as their primary trip purpose.

To determine how mode split might impact travel, a baseline comparison of travel for the non-home side of a trip is needed. Mode splits were compared to the national and state of Montana travel pattern data obtained from the National Household Travel Survey (NHTS).

When comparing the off-campus locations to NHTS data, the T&C location has nearly the same percent of auto trips (90 percent) as the average Montana driver (88 percent). The other location set (International Coffee Traders, Pickle Barrel and Joe's Parkway) has a slight reduction in auto trips, but as mentioned above, this is largely due to the travelers heading to/from MSU.

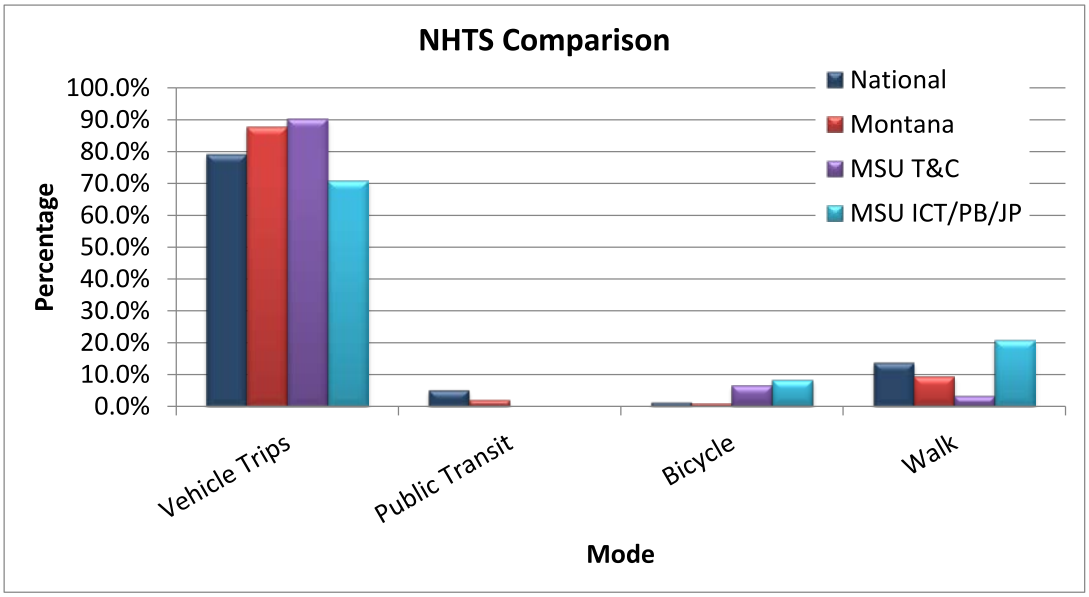


Figure 27: Mode Choice Comparison of Off-Campus Locations to NHTS

For travelers to MSU campus there is significantly less vehicle usage and more usage of bicycling and walking (Figure 28). From this comparison, there is a significant **reduction, 44 percent, in vehicle traffic generated by Montana State University on-campus developments** when compared to typical travel in the state of Montana.

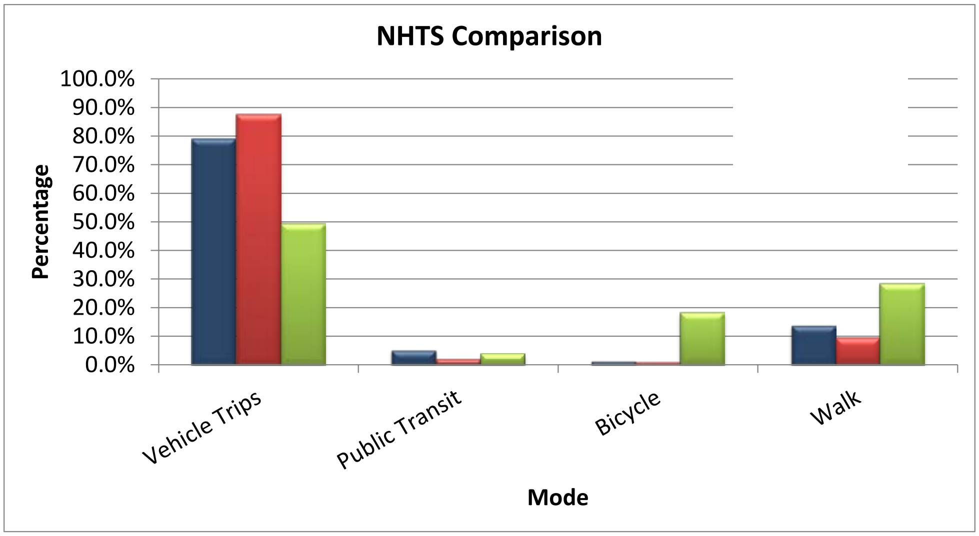


Figure 28: Mode Choice Comparison of On Campus Locations to NHTS

During meetings with MSU Facilities and City Planning staff, it became clear that two reductions should be determined, one for academic related buildings and one for non-academic buildings. The only site that was truly non-academic was Culbertson Hall. **Culbertson had a 31 percent reduction in vehicle traffic and the remaining sites had an average 46 percent reduction** (Figure 29).

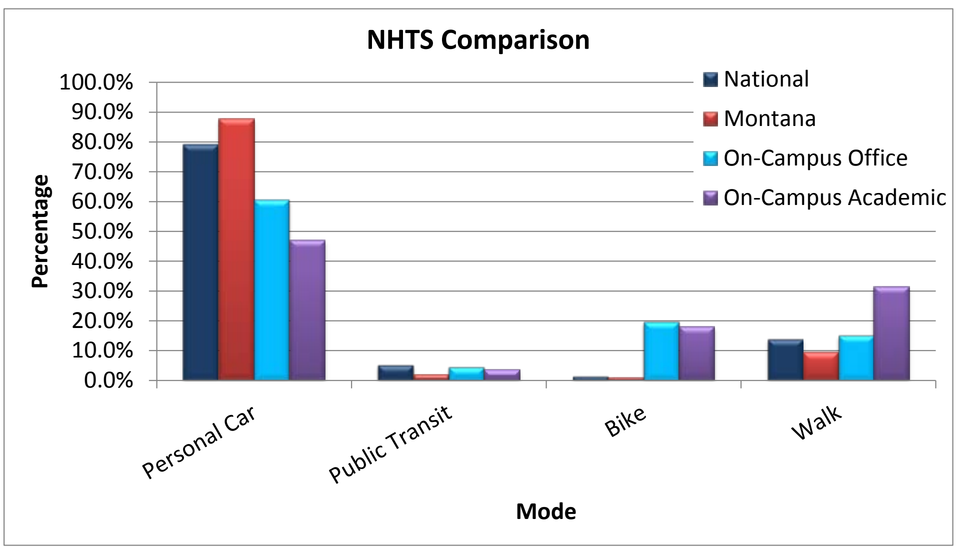


Figure 29: Mode Choice Comparison of Off-Campus Locations Academic and Non-Academic to NHTS

The final recommendation is based on how many visitors to private developments near campus were part of a trip chained to MSU (25%) and the reduction in vehicle travel due to alternative mode use (44%, 31% and 46%) for those visiting MSU. These results are shown in Table 10.

Table 10: Summary of Findings after Intercept Surveys

	Private / Near MSU	MSU On Campus
Non-Housing	**25% trip chaining** Same auto trip length	**44% fewer auto trips** **-31% Office** **-46% Academic** Same auto trip length
Housing	35% fewer auto trips Same auto trip length	42% fewer auto trips Same auto trip length
Housing Group Quarters	59% fewer auto trips Same auto trip length	62% fewer auto trips Same auto trip length

7. OTHER DATA SOURCES

In addition to collecting data on travel patterns in the University TED, several other existing data sources were investigated that provide corroborating evidence for the reduction factors found.

7.1. Travel to Work Census Data

The US Census Bureau conducts the American Community Survey. The data used was the 2012 release, which is an average over the prior five year period. This data has a spatial resolution of the Census Tract. The census tract that has a very similar boundary to the University TED was compared to all other census tracts in Bozeman. The reported travel to work data was analyzed. When comparing the travel time to work (distribution shown in Figure 30), those living in the University TED have an 18 percent shorter trip.

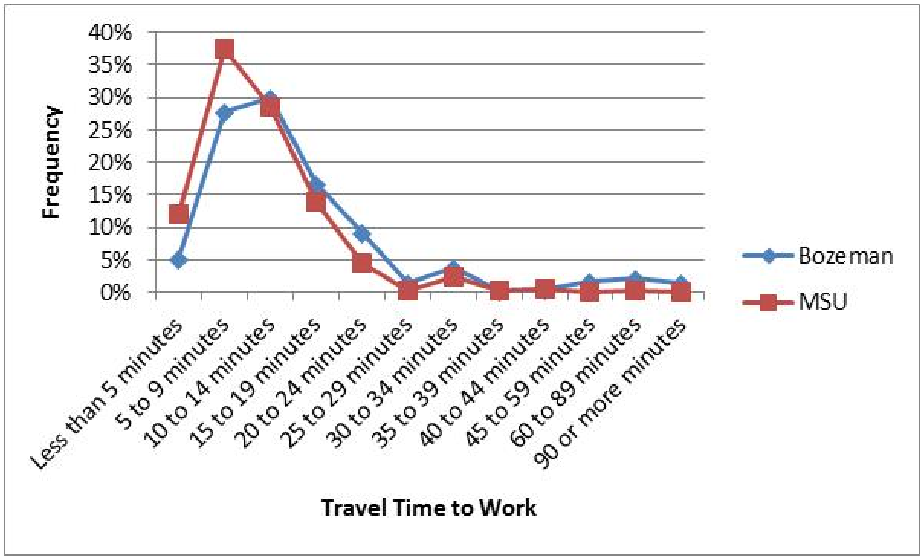


Figure 30: Reported Travel Time to Work (all modes)

This analysis contradicts some of the previous findings that travel distance is the same. However, this is not just auto trips, but also walking and biking trips, which are typically shorter. Looking at this same data, it can be seen that residents of the University TED travel much more by walking and biking (Figure 31). Considering the trips to work, **47 percent fewer University TED residents travel by auto**.

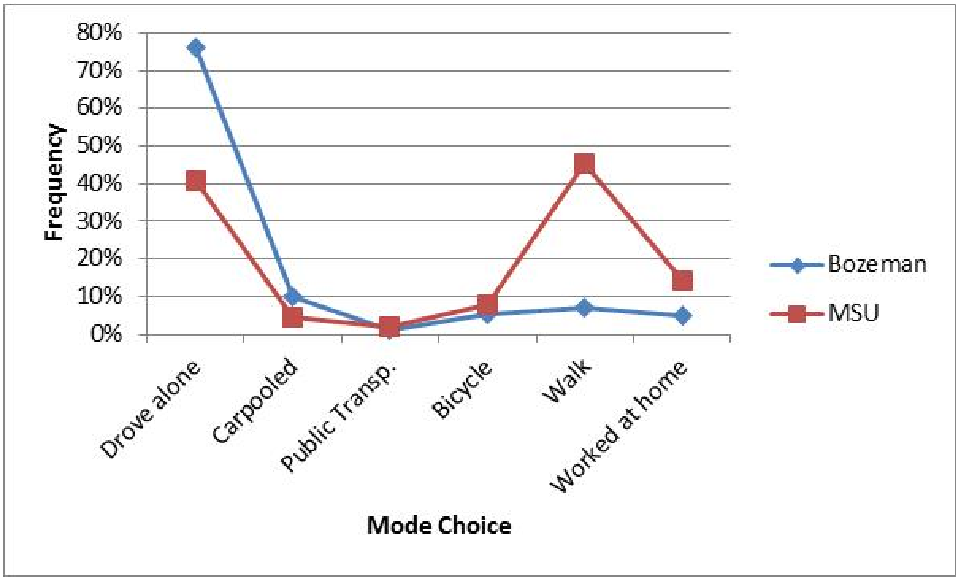


Figure 31: Reported Work Trip Mode Used

Removing non-auto trips, there is still a desire to compare car travel trip distance. For the driving work trip, the average travel time is within one percent comparing the University TED to the rest of Bozeman (distribution shown in Figure 32).

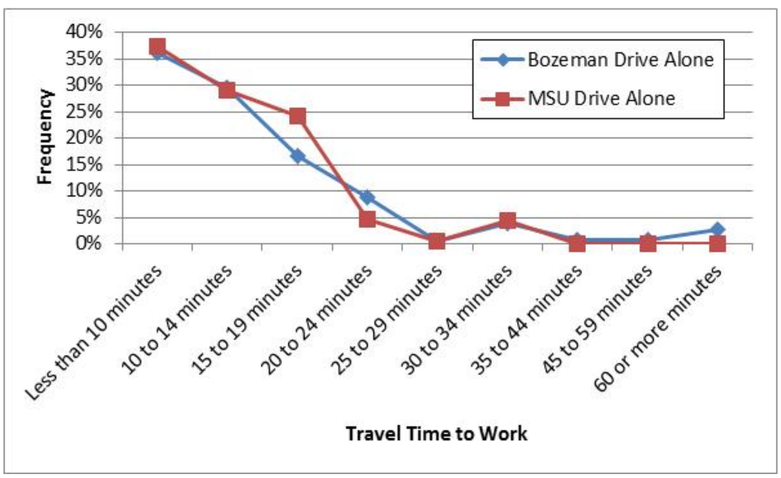


Figure 32: Reported Travel Time to Work (drive alone)

Although this analysis only looks at the work trip and does not include other travel, this finding reinforces the prior findings that if residents living in the University TED choose to drive, they drive just as far as residents that live in other areas of town. This is for all residents of all housing types and corroborates the previous trip reduction findings. In other words 47 percent is within the range of the average across all housing types. These results are shown in bold in Table 11.

Table 11: Summary of Findings with US Census Work Travel Data

	Private / Near MSU	MSU On Campus
Non-Housing	25% trip chaining Same auto trip length	44% fewer auto trips -31% Office -46% Academic Same auto trip length
Housing	35% fewer auto trips **Same auto trip length**	42% fewer auto trips **Same auto trip length**
	47% fewer auto trips	
Housing Group Quarters	59% fewer auto trips **Same auto trip length**	62% fewer auto trips **Same auto trip length**

7.2. MSU Building Space and Enrollment

When considering non-housing, on campus buildings, the current street impact fee is $605.95 per student. This is based on the ITE Trip Generation Manual data that counts travel to campuses of various enrollment sizes. To evaluate how a new building on campus might increase traffic on Bozeman's streets, one needs to consider the relationship between non-housing building space and student enrollment. Fall 2013 had the following enrollment and building space numbers

- Enrollment was 15,294 students.
- There were 6,970 seats in classrooms.
- There was 2,793,533 square feet of non-housing building space.

The breakdown of on campus building space by type is shown in Figure 33. Auxiliary space includes such things as the student union and the library. "Other" includes such things as the police station and the Museum of the Rockies. "Academic Other" includes space in academic buildings such as offices, hallways, bathrooms, and mechanical space. For the remainder of this section housing space will not be considered. Note that it is difficult to assign space exactly. For example hallways, bathrooms and other common spaces associated with a classroom are included in the "academic other" category. The breakdown from Figure 33 creates the following relationships for the Fall 2013 semester:

$$1\ student = 0.46\ seats = 182.7sf\ building\ space =$$

$$7.5sf\ classroom + 122.5sf\ academic\ nonclassroom + 60.1sf\ auxiliary$$

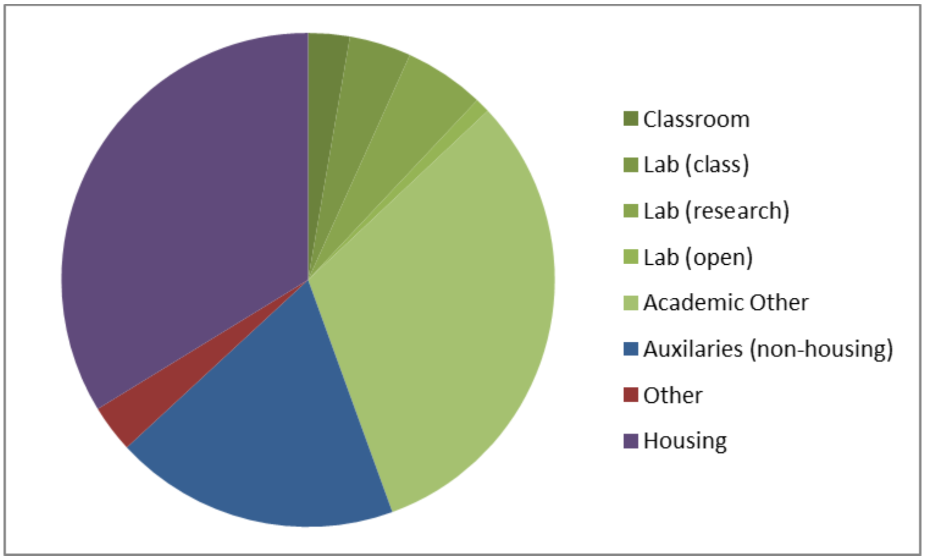


Figure 33: MSU Building Space by Type

The relationship may not be as clear as "a new building of X size will attract Y number of new students to enroll." In reality the relationship probably works the other direction, where increases in student enrollment create need for more building space. When looking at enrollment (Figure 34), it has increased steadily over recent decades, and the last few years leading up to 2013 have had substantial growth.

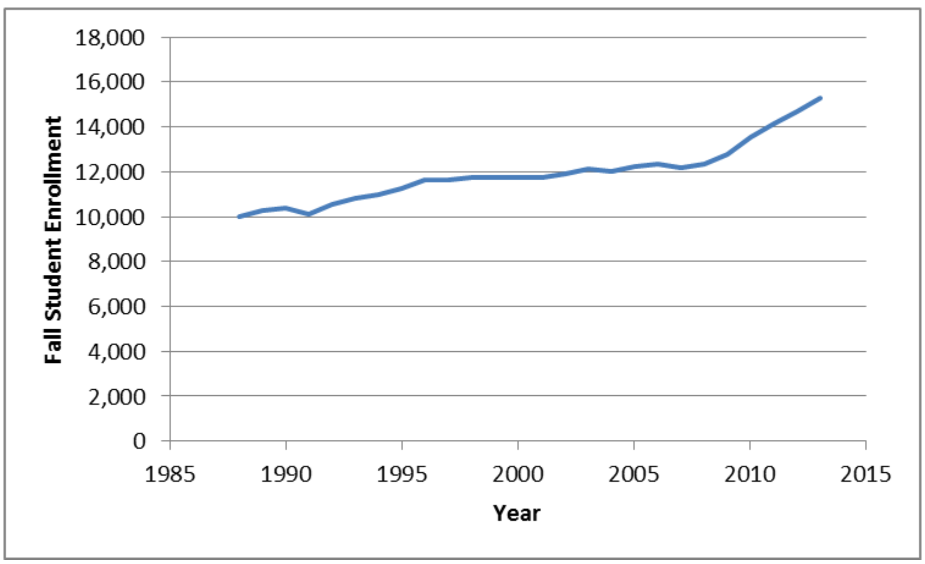


Figure 34: Historical Fall Enrollment at MSU (1988-2013)

Historic building space is difficult to determine because the methods of categorization have changed over the years. A study conducted by MSU Facilities used the most current methods of measuring and categorizing building space to look back at 1988 and found that the total increase in building space was 20 percent from then to 2013. Over that same time period student enrollment has increased 50 percent. The point is that the ratio of building space to students in 2013 is as low as it is likely to be. Further there will be an increase in building space soon with the construction of Jabs Hall and the planned Asbjornson engineering building.

Considering there are more than two students per seat also suggests that MSU enrollment is far exceeding its physical capacity. The actual demand for seats is lower because not all students are in class at the same time. Looking at the number of students starting class in a given hour (Figure 35), the peak of the day fills 65 percent of the seats on campus. While this may seem to indicate that there is a lot of spare capacity, when considering course scheduling issues and constraints of room sizes, it may be difficult to get much more capacity out of the current number of classroom seats. The remainder of this section assumes that with the Fall 2013 ratios of students to non-housing building space, MSU is at or near functional capacity.

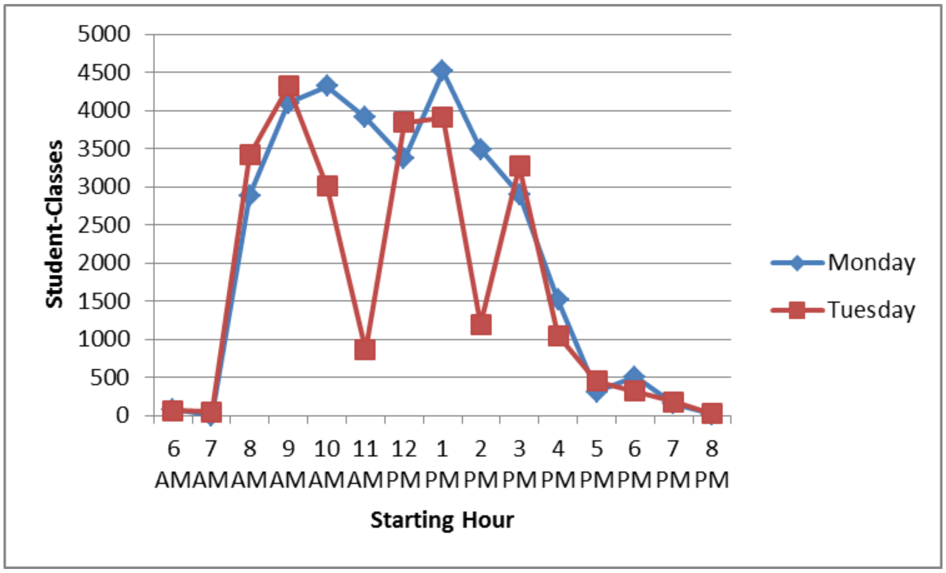


Figure 35: Enrollment in Classes throughout the Day

If MSU were charged for its building space based on the current “office” impact fee, the current ratio of 182.7 square feet of office space per student results in a fee of $713.93 per student. Thus MSU is currently receiving a 15 percent reduction when using the $605.95 per student fee when compared to other office space in Bozeman. From the intercept survey (Chapter 6), MSU on campus buildings generate an average of 44 percent less auto travel. If the per student impact fee is used, MSU should receive an additional 29 percent reduction (to get to 44 percent). Table 12 shows this option. However, because it is difficult to determine the number of students a building might support, it would be more straightforward to abandon the “per student” impact fee and use building space and the office impact fee.

The simplest method for adjusting impact fees for MSU non-housing buildings is to use the current “office” fee and apply the 44 percent reduction found in Chapter 6. Alternatively, if the building has a mix of office and academic space, the two reduction values (31 and 46 percent) could be applied proportionally based the relative square footage by type.

Table 12: Summary of Findings after Considering Enrollment and Building Space

	Private / Near MSU	MSU On Campus
Non-Housing	25% trip chaining Same auto trip length	44% fewer auto trips -31% Office -46% Academic **29% reduction (per student)** Same auto trip length
Housing	35% fewer auto trips Same auto trip length	42% fewer auto trips Same auto trip length
Housing Group Quarters	59% fewer auto trips Same auto trip length	62% fewer auto trips Same auto trip length

7.3. MSU Staff and Student Addresses

Student and staff residential addresses were provided by MSU. The data included the most current addresses, which were essentially for the Spring 2014 semester. This included addresses for 13,822 students and 3,544 staff. From this raw list of 17,366 MSU affiliated addresses, numerous addresses could not be used for this study because they were out of the region or an exact address could not be mapped. After significant work eliminating and fixing addresses to make as many usable as possible, there were 9,041 student addresses and 2,557 staff addresses (about two-thirds). Of the 9,041 student addresses, 2390 live in residence halls and 621 live in graduate and family housing. Figure 36 indicates that people who work and learn at MSU are likely to find housing close.

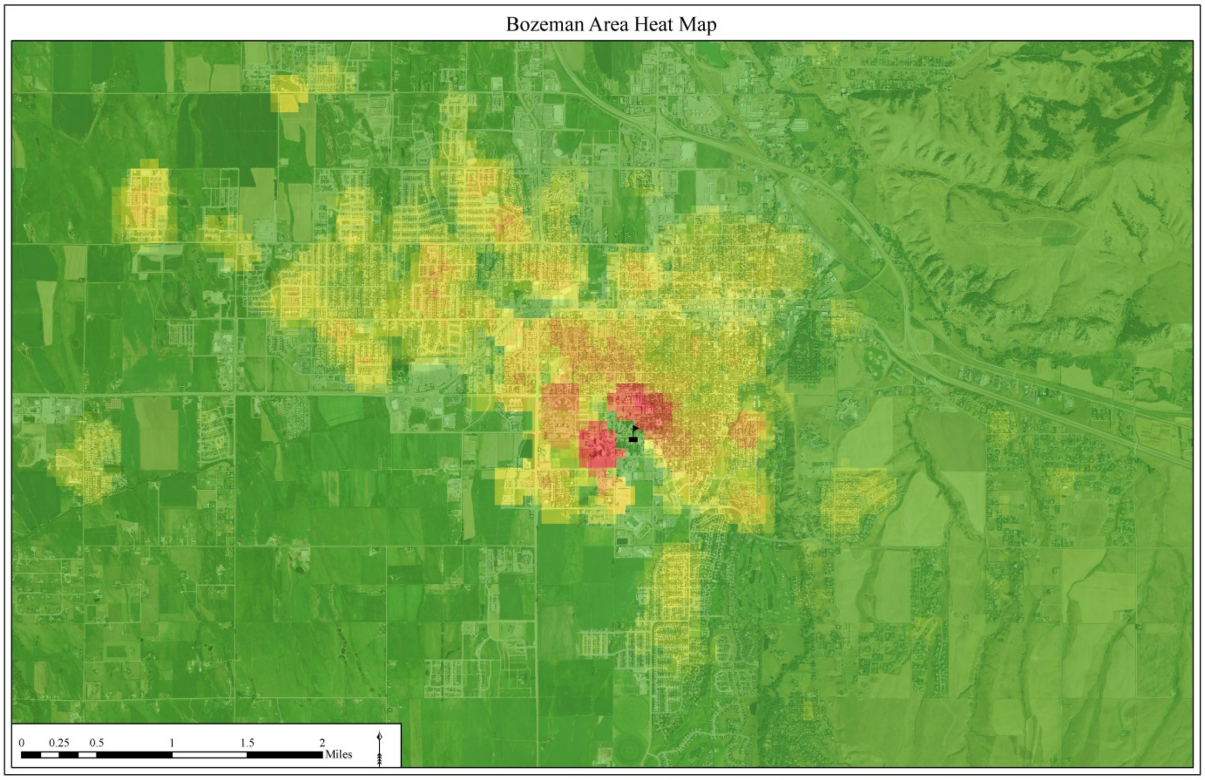


Figure 36: Population Density of where MSU Students/Staff Live

Figure 37 shows the population density of these MSU affiliated addresses at increasing distances from MSU campus. Figure 38 compares the density of SB (commuter) parking permits issued in the spring of 2014 with the number of MSU affiliated residential addresses by distance from campus. Due to the time constraints and data issues the parking permit addresses represent around 10 percent of the total permits issued in a year. This graph demonstrates that as the distance from campus increases, both the density of MSU affiliated residents and those with parking permits decrease along a similar curve; except inside of the 1-mile buffer the graph demonstrates that far smaller percentage of the total number of MSU students, faculty, and staff in that area obtain parking permits. This corroborates other data demonstrating that those living close to campus (inside about one mile) choose modes other than driving for their trip to campus.

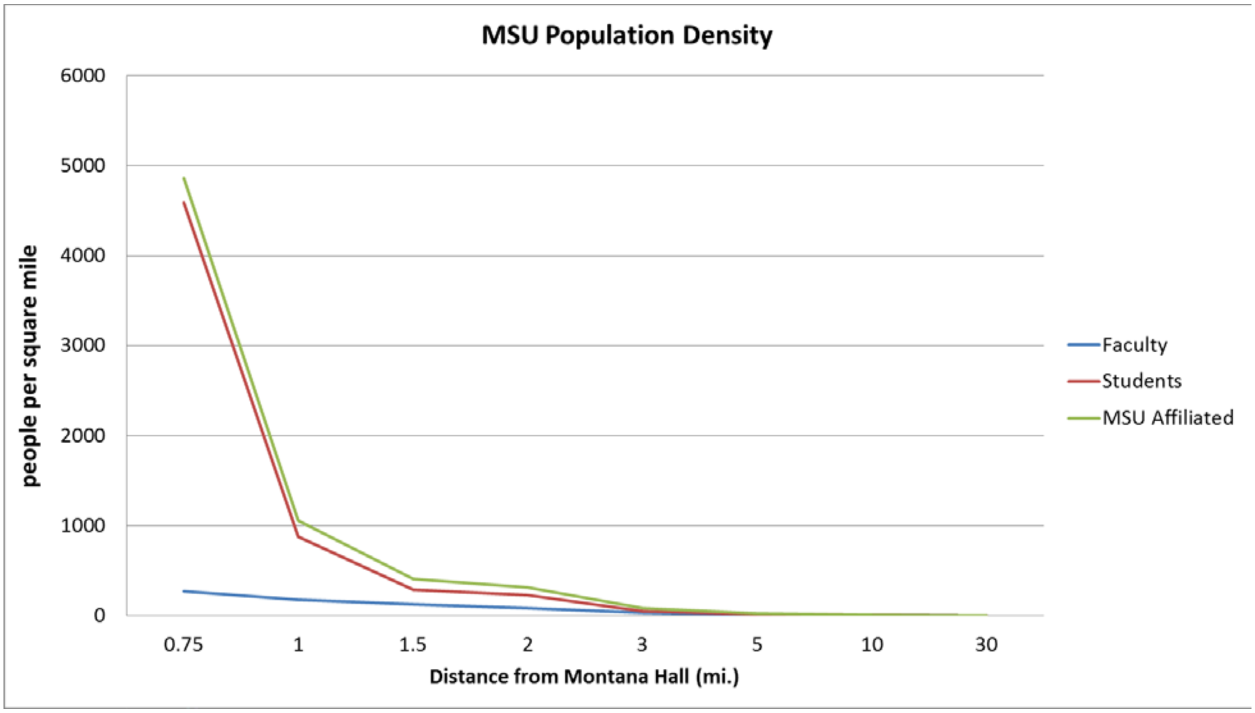


Figure 37: MSU Affiliated Population Density by Distance from Montana Hall

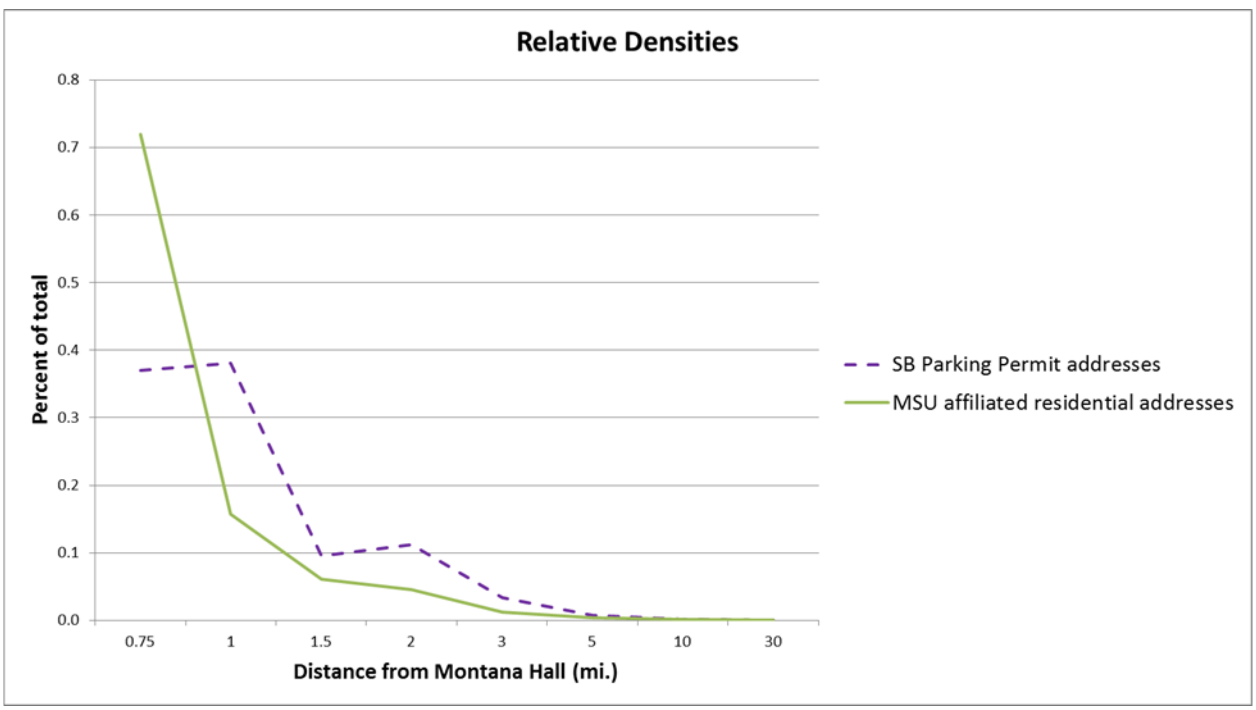


Figure 38: Relative Densities Comparing Affiliate addresses with Parking Permit Holders

8. SUMMARY AND RESULTS

There is precedence for allowing a reduction in transportation impact fees, both locally, and nationally. Bozeman already has a Downtown TED that provides a 29 percent reduction. Nationally there are numerous examples of cities that designate special locations that are allowed a fee reduction. Though not a comprehensive search, an example of a designated zone, based around a university, was not found. Several examples were found where universities were allowed a reduction if they were able to prove a reduction in actual travel generated and/or they participated in traffic reducing programs.

Many jurisdictions require that a development include trip reducing components in order to receive a reduction. Examples of trip reducing components include:

- Participation in travel demand management programs (e.g., employee/tenant bus pass programs, vanpools, increased parking costs, limiting parking availability),
- Well connected pedestrian and bicycle facilities,
- Availability of public transit
- Mixed uses (e.g., residential and commercial),
- Dense developments,
- Bike racks or lockers,
- Employee showers, and
- Car-share programs.

Based on census data, the University TED area is an area of extremes with the highest population density, lowest percentage of single family homes, highest percentage of renters, lowest average income and lowest average household vehicle ownership. These attributes are known to relate to lower traffic generation.

In order to inform a potential impact fee reduction for the University TED, numerous datasets were collected to determine how travel to and from developments in the University TED area is different from the rest of Bozeman.

If auto trips are made to or from the University TED, there is no evidence that they are shorter than travel ending in other areas of Bozeman. This was confirmed by origin destination data and travel to work data from the US Census. Thus any vehicle miles travelled (VMT) reduction is based on a reduction in the number of auto trips.

Based on actual trip generation counts, the rate of people trips in the University TED was similar to that of other areas, but there was a significantly higher proportion using non-auto modes for these trips. The trip generation counts indicated that on-campus group quarters had 62 percent fewer auto trips, group quarters off-campus adjacent to MSU had 59 percent fewer auto trips, and off-campus adjacent apartment housing had 35 percent fewer auto trips.

The origin-destination data showed that on-campus apartment housing had 42 percent fewer auto trips, which is expected if interpolating the three reductions from the trip generation counts. Also the origin-destination data showed a 33 percent reduction in auto trips for off-campus adjacent apartment housing, which corroborates the 35 percent found with the trip generation counts.

The intercept survey showed that 25 percent of people visiting commercial developments adjacent to MSU were either on their way to, or coming from MSU. In addition to being a pass-by trip, this group had a high proportion of non-auto mode use. The intercept survey also found that because of non-auto mode use, visitors to the MSU campus had 44 percent fewer auto trips; if broken into office buildings and academic / academic-related, there were 31 percent and 46 percent fewer auto trips respectively. Thus if the “office” impact fee were used for MSU non-housing buildings, these reductions could be applied. An analysis of the current enrollment and building space determined that if a “per student” impact fee were used, the reduction should be 29 percent.

If the “office” impact fee is used for a non-housing on-campus building that has a mix of office and academic space, the two reduction values (31 and 46 percent) could be applied proportionally based the relative square footage by type. Based on discussions with MSU facilities and City planning, City policy and practice is that if more than 75 percent of the building can be classified as a single type (either office or academic), the reduction for predominant type could be applied to the entire building.

Finally, the size and extent of the proposed University TED (about a mile from the core of MSU campus) seems appropriate. Most of the travel reductions found are based on a shift in mode. It is known that there is a heavy drop in walking mode at travel distances of over a mile. Several data sources collected for this study (trip generation, resident travel survey, intercept survey, travel to work, and MSU staff and student addresses) support this trend. The southern end of the proposed University TED boundary is pushing the limits of this distance. In order to achieve the travel reductions (and receive an impact fee reduction), developments at the southern boundary of the University TED should meet a higher standard for ensuring non-auto mode connectivity to the MSU campus (e.g., multi-use pathways, easy pedestrian crossing of Kagy Blvd. and Stucky Rd, public transit access).

The reductions in travel are summarized in Table 13. It is difficult to measure how people travel and this data can have a high variability. Even with this challenge, the reductions below are based on a defensible, unbiased approach that used local data. Using multiple datasets resulted in numbers that corroborated each other. The approach and results were presented to numerous developers, MSU staff, and City of Bozeman staff. Although there were some minor recommendations that were incorporated, the general feedback was that this was a good approach and the results seemed valid.

Table 13: Final Summary of Reductions in Travel

	Private / Near MSU	MSU On Campus
Non-Housing	25% trip chaining Same auto trip length	44% fewer auto trips (use “office”) -31% Office -46% Academic Same auto trip length
Housing	35% fewer auto trips Same auto trip length	42% fewer auto trips Same auto trip length
Housing Group Quarters	59% fewer auto trips Same auto trip length	62% fewer auto trips Same auto trip length

9. REFERENCES

AirSage. Understanding Population Movements. [white paper] 2014.

Antipova, A. “Land Use, Individual Attributes, and Travel Behavior in Baton Rouge, Louisiana,” A Doctorate Dissertation Submitted to the Graduate Faculty of the Louisiana State University, Louisiana State University, Baton Rouge, LA 70803, 2010.

Bochner, Brian S., and Benjamin R. Sperry. Internal Trip Capture Estimator for Mixed-Use Developments. College Station: Texas A&M Univeristy Texas Transportation Institute, 2010.

City of Bozeman. Bozeman Impact Fee Schedule. Effective March 30, 2013.

City of Santa Cruz Planning and Community Development Department. Draft Environmental Impact Report for the Draft General Plan 2030. EIR, Santa Cruz: City of Santa Cruz, 2010.

Crane, R., and Chatman, D., “Traffic and Sprawl: Evidence from U.S. Commuting, 1985 To 1997,” Planning and Markets, Vol. 6, Is. 1, Sept., 2003.

Daggett, John, and Richard Gutkowski. University Transportation Survey: Transportation in University Communities. Fargo: Upper Great Plains Transportation Institute, 2003.

DKS Associates, & University of California, “Assessment of local models and tools for analyzing smart-growth strategies,” Irvine: University of California, 2007. Retrieved March, November 3, 2011, from www.dot.ca.gov/hq/research/researchreports/reports/2007/local_models_tools.pdf.

Eom, Jin Ki, John R. Stone, and Sujit K. Ghosh. "Daily Activity Patterns of University Students." Journal of Urban Planning and Development, 2009: 141-149.

Ewing, Reid, et al. "Traffic Generation by Mixed-Use Developements - Six-Region Study Using Consistent Built Environment Measures." Journal of Urban Planning and Development, 2010: 248-261.

Ewing, R., and Cervero, R. (2010), “Travel and the Built Environment: A Meta-Analysis,” Journal of the American Planning Association, Vol. 76, No. 3, pp. 265-294.

Ewing, R., Greenwald, M., Zhang, M., Walters, J., Feldman, M., Cervero, R., Frank, L., and Thomas, J. Traffic Generated by Mixed-Use Developments: Six-Region Study Using Consistent Built Environment Measures. ASCE Journal of Urban Planning and Development. September 2011.

Frank, L., Bradley, M., Kavage, S., Chapman, J., & Lawton, K.. Urban form, travel time, and cost relationships with tour complexity and mode choice. Transportation, Vol. 35, Issue 1, pp. 37-54, 2008.

Handy, S., “Methodologies for Exploring the Link Between Urban Form and Travel Behavior,” Transportation Research D, Vol. 1, No. 2, pp. 151- 165, 1996.

Institute of Transportation Engineers (ITE). Trip Generation Handbook, Second Edition, 2004.

Institute of Transportation Engineers (ITE). Trip Generation Manual, Eighth Edition, 2008.

Institute of Transportation Engineers (ITE). Trip Generation Handbook, Ninth edition. Washington DC, 2012.

Krizek, K., “Residential Relocation and Changes in Urban Travel: Does Neighborhood-Scale Urban Form Matter?” Journal of the American Planning Association, Vol. 69, No. 3, Summer, pp. 265-281, 2003.

Litman, T., “How Land Use Factors Affect Travel Behavior” Land Use Impact on Transport, Victoria Transport Policy Institute, 1250 Rudlin Street, Victoria, BC, V8V 3R7, Canada, 2010.

Manville, M., and D. Shoup (2005), “People, Parking, and Cities,” Journal of Urban Planning and Development, American Society of Civil Engineers, pp. 233- 245.

Tindale-Oliver & Associates, Inc. City of Bozeman Transportation Impact Fee Study Final Report. Tampa: Tindale-Olver & Associates, Inc., 2008.

TischlerBise Fiscal, Economic, and Planning Consultants and WGM Group, Inc. Transportation Impact Fee Study: City of Missoula, Montana. Temecula: TischlerBise Fiscal, Economic, and Planning Consultants and WGM Group, Inc., 2007.

TischlerBise Fiscal, Economic, and Planning Consultants. Street Development Impact Fee: City of Bozeman, Montana. Temecula: TischerBise Fiscal, Economic, and Planning Consultants, 2012.

Walters, Jerry, Brian Bochner, and Reid Ewing. "Getting Trip Generation Right: Eliminating the Bias Against Mixed-Use Development." American Planning Association PAS Memo, 2013.

US Census. Group Quarters and Housing Unit Estimates Terms and Definitions [webpage] available online at http://www.census.gov/popest/about/terms/housing.html. Last accessed September 2014.

10.APPENDIX

10.1. Appendix A: Olympia Fee Reduction Options

There are five (5) options regarding the amount of impact fee to pay.

1. Pay the amount as shown on this rate schedule.
2. Prior to obtaining a building permit, submit a request to the Director of Community Planning and Development (CP&D) for the City to provide an independent fee calculation for you. There is a $500 fee for this calculation.
3. Submit your own independent fee calculation. The fee for review of this calculation is $500 plus payment of any review costs (a second $500 is required as a deposit toward such costs).
4. Appeal Process: Prior to an impact fee appeal, the fee payer must first make a Request for Director's Review on form available from CP&D. This request must be submitted in writing within 14 days of payment of the impact fee at issue. A written determination will be made by the Director and that determination may be appealed to the Olympia Hearing Examiner. See OMC 15.04.090 and OMC 18.75.040 for more information.
5. Include in the project proposal Transportation Demand Management (TDM) and Commute Trip Reduction (CTR) measures that reduce peak-hour traffic and, thus, reduce the need to build some transportation improvements. Eligible projects may reduce transportation impact fee assessments by providing:

ACTION	REDUCTION
Operational Improvements:	
• Installation of centralized Transportation Demand Management (TDM) information center with maintained information.	1%
• Commercial development that would be occupied by employees subject to Commute Trip Reduction ordinance or evidence to voluntarily comply with Commute Trip Reduction ordinance.	3%
• Installation of parking spaces that are **designated** as paid parking (by residents or employees).	3%
• Signage and enforcement designating parking lots to be used for carpool or vanpool parking for non-building occupants.	1%
Physical Improvements:	
• Construction of direct walkway connection to the nearest arterial.	1%
• Installation of on-site sheltered bus stop or bus stop within 1/4 mile of site with adequate walkways as determined by Transportation Division staff.	1%
• Installation of bike lockers or employee showers.	1%
• Construction of on-site internal walk/bikeway network that connects to existing City bicycle/pedestrian networks.	1%
• Installation of preferential carpool/vanpool parking facilities.	2%
• Under-build median parking requirements by at least 20% OR under-build by at least 30% OR under-build by at least 40%.	2% or 4% or 7%
• Downtown construction that provides no parking for employees or customers.	10%
Other:	
• Other operational or physical Transportation Demand Management measures identified by the developer (with supporting documentation).	Up to 20% based upon peak-hour trip reductions
Total Maximum Reduction	**Up to 20%**

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10.2. Appendix B: Bellingham Fee Reduction Options

Location Factors and Performance Measures to Reduce Vehicle Trips	**Percent Reduction of Transportation Impact Fee**
Mixed-Use Urban Village Location (based on ITE internal trip capture — mixed-use urban environment)	15%
Whatcom Transit Authority transit proximity (Note: only one transit proximity reduction below may be used):	
• Development fronts on a high-frequency WTA Line	10%
• Development within 1/4-mile of WTA Line	7%
• Development fronts on standard WTA Route (< 60 min)	5%
• Development within 1/4-mile of standard WTA Route (< 60 min)	2%
Employer mandatory commitment to commute trip reduction: Commute trip reduction/transportation demand management commitment combining economic incentives with transportation services	10%
Voluntary annual WTA transit pass provision	
• 2-year transit pass provided for residential units = 1% per unit pass	1%
• 2-year transit pass provided for employees = 1% per employee pass	1%
Voluntary car share participation or provision	
• Car share vehicle(s) parked on residential or employment site = 2% per vehicle	2%
• Car share membership fee provided for residential units = 2% per unit	2%
• Car share membership fee provided for employees = 2% per employee	2%

Note: Reductions are additive and may not exceed a total of 50%.

10.3. Appendix C: Intercept Survey Locations