



# ***2019 Transportation Impact Fee Report***

*Prepared for:*

***Adams County, Colorado***

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## INTRODUCTION

Adams County's Transportation Impact Fee study was completed in 1998. Since that time, the State of Colorado has implemented a new impact fee statute, demographics, the real estate market and capital cost of transportation improvements have changed, requiring an update of the fee study. Transportation impact fees are one-time payments for new development's proportionate share of the capital cost of infrastructure. Transportation impact fees do have limitations and should not be regarded as the total solution for transportation infrastructure funding. Rather, they are one component of a comprehensive funding strategy to ensure provision of adequate public facilities. Transportation impact fees may only be used for capital improvements or debt service for growth-related infrastructure. Transportation impact fees may not be used for operations, maintenance, replacement of infrastructure, or correcting existing deficiencies. Although Colorado is a "home-rule" state and home-rule municipalities were already collecting "impact fees" under their home-rule authority granted in the Colorado Constitution, the Colorado Legislature passed enabling legislation in 2001, as discussed further below.

### Colorado Impact Fee Enabling Legislation

For local governments, the first step in evaluating funding options for transportation improvements is to determine basic options and requirements established by state law. Some states have more conservative legal parameters that basically restrict local government to specifically authorized actions. In contrast, "home-rule" states grant local governments broader powers that may or may not be precluded or preempted by state statutes depending on the circumstances and on the state's particular laws.

Impact fees are one-time payments imposed on new development that must be used solely to fund growth-related capital projects, typically called "system improvements". An impact fee represents new growth's proportionate share of capital facility needs. In contrast to project-level improvements, impact fees fund infrastructure that will benefit multiple development projects, or even the entire service area, as long as there is a reasonable relationship between the new development and the need for the growth-related infrastructure. Project-level improvements, typically specified in a development agreement, are usually limited to transportation improvements near a proposed development, such as ingress/egress lanes.

According to Colorado Revised Statute Section 29-20-104.5, impact fees must be legislatively adopted at a level no greater than necessary to defray impacts generally applicable to a broad class of property. The purpose of impact fees is to defray capital costs directly related to proposed development. The statutes of other states allow impact fee schedules to include administrative costs related to impact fees and the preparation of capital improvement plans, but this is not specifically authorized in Colorado's statute. Impact fees do have limitations and should not be regarded as the total solution for infrastructure funding. Rather, they are one component of a comprehensive portfolio to ensure adequate provision of public facilities. Because system improvements are larger and more costly they may require bond financing and/or funding from other revenue sources. To be funded by impact fees, Section 29-20-104.5 requires that the capital improvements must have a useful life of at least five years. By law, impact fees can only be used for capital improvements, not operating or maintenance costs. Also, impact fees cannot be used to repair or correct existing deficiencies in existing infrastructure.

## Additional Legal Guidelines

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

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

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

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

The requirement that exactions be proportional to the impacts of development was clearly stated by the U.S. Supreme Court in the *Dolan* case and is logically necessary to establish a proper nexus. Proportionality is established through the procedures used to identify development-related facility costs, and in the methods used to calculate impact fees for various types of facilities and categories of

development. The demand for facilities is measured in terms of relevant and measurable attributes of development (e.g. a typical housing unit's average weekday vehicle trips).

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

Impact fees must increase the carrying capacity of the transportation system. Capacity projects include but are not limited to the addition of travel lanes, intersection improvements (i.e., turning lanes, signalization or roundabouts) and widening roads (e.g. adding travel lanes, paved shoulders, and bike lanes). Whenever improvements are made to existing roads, non-impact fee funding is typically required to help pay a portion of the cost.

## Current and Proposed Transportation Impact Fee

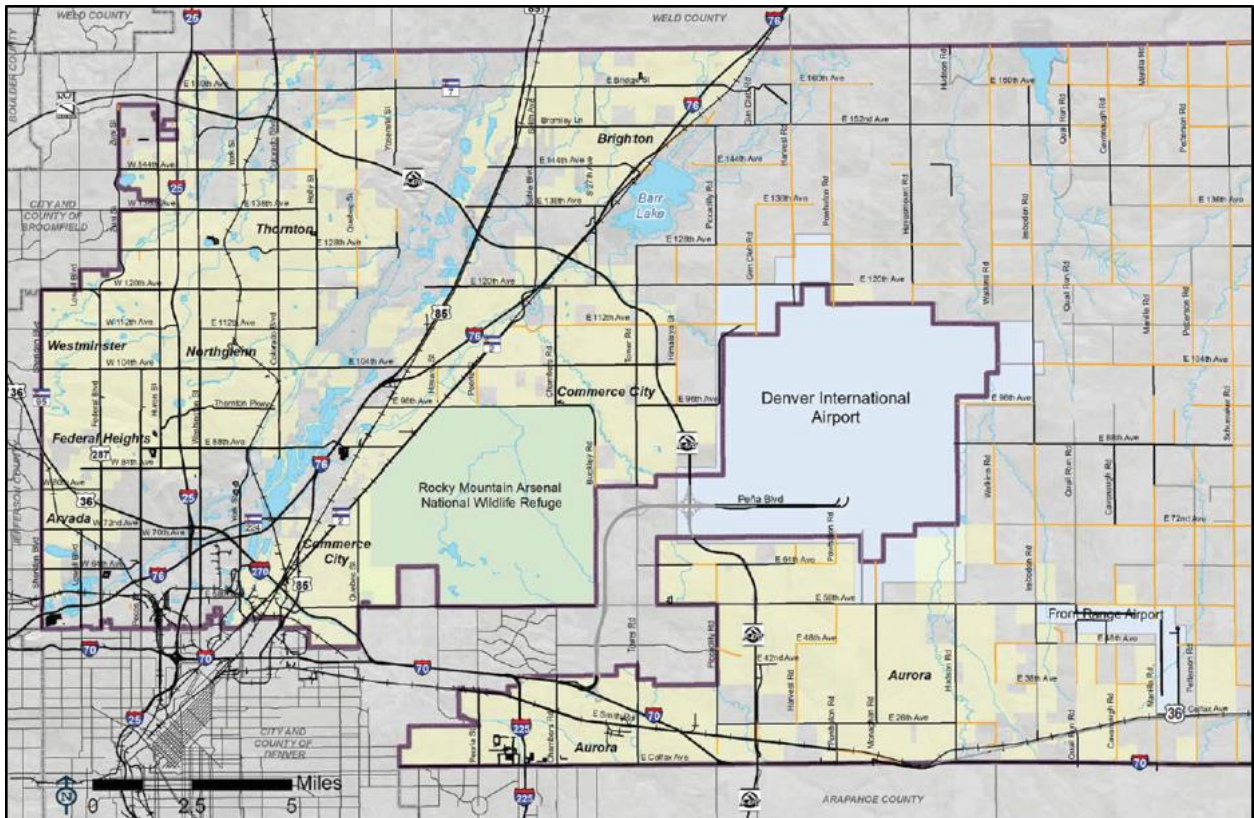
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After reviewing the County's 1998 transportation impact fee study, collaborating with County staff, and receiving input from a stakeholder group, TischlerBise recommends several changes to the proposed transportation impact fees.

- First, the proposed transportation impact fees will be easier to administer by switching from three residential housing unit categories (single family-detached, multifamily, and mobile homes) to fees based on dwelling size, measured by square feet of finished living space. Also, 39 nonresidential categories will be consolidated into three general nonresidential types.
- Second, the proposed fees improve proportionality for residential development because smaller dwellings, that typically have fewer persons, vehicles available, and lower trip generation rates, will no longer pay the same amount as larger dwellings that average more persons, vehicles available, and higher trip generation rates.
- Third, Transportation fees are currently collected and spent in the unincorporated portion of Adams County. Given the very different development patterns between the eastern (rural) and western (suburban/urban) areas of unincorporated County, TischlerBise recommends moving from a countywide transportation impact fee to two distinct service areas, which are based on planning areas contained in the 2012 Transportation Plan, prepared by Felsburg, Holt and Ullevig.

The boundary of the West Service Area is shown below in Figure 1.

Figure 1: West Service Area



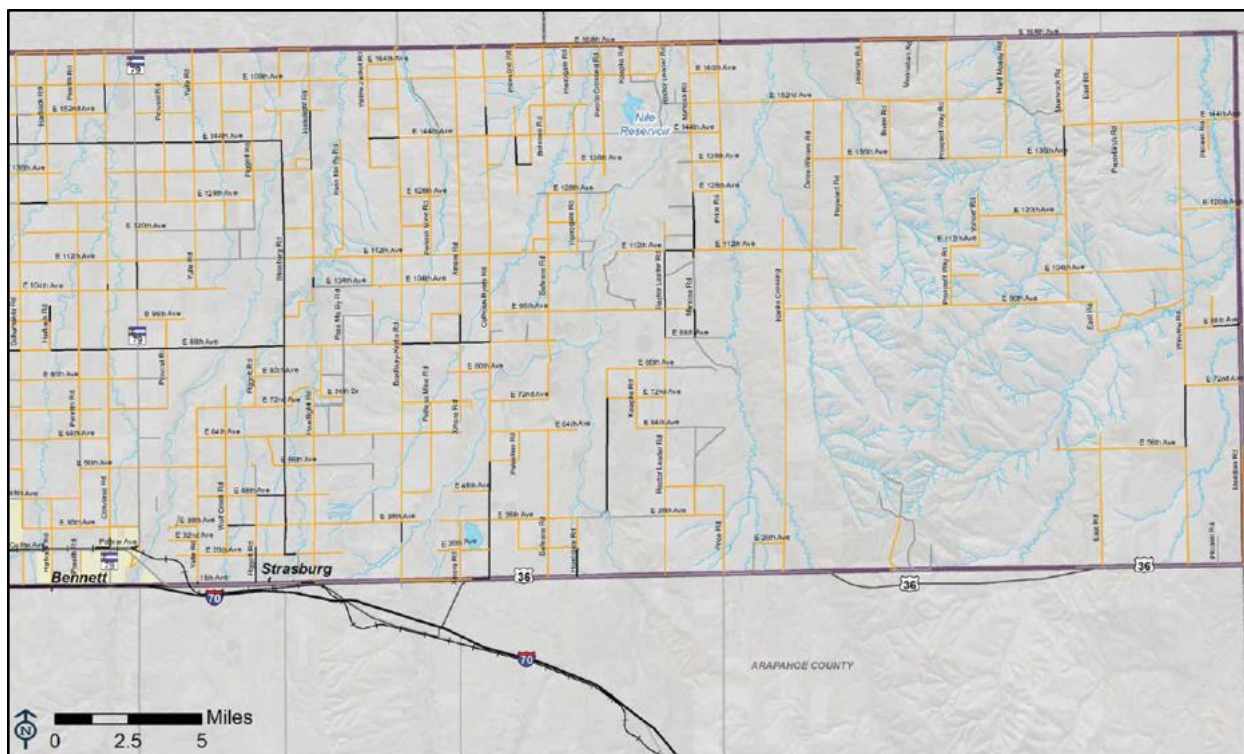
Current and proposed transportation impact fees for the West Service Area are summarized in Figure 2. The middle three columns of the table below indicate current transportation fees and the proposed increase or decrease. Proposed transportation fees decrease for industrial development but increase for retail and office. All residential units see significant increases in the impact fee amount. These residential and nonresidential increases are not surprising given it has been twenty years since the County’s transportation impact fee methodology was updated.

Figure 2: Current and Proposed Transportation Impact Fees: West Service Area

Development Type	Transportation Impact Fee: West Area	Current County Fee (1998)	Increase or Decrease	Percent Change
<b>Residential (per dwelling) by Sq Ft of Finished Living Space</b>				
900 or less	\$2,700	\$888	\$1,812	204%
901 to 1300	\$3,910	\$983	\$2,927	298%
1301 to 1800	\$4,769	\$983	\$3,786	385%
1801 to 2400	\$5,639	\$1,599	\$4,040	253%
2401 or more	\$6,371	\$1,599	\$4,772	298%
<b>Nonresidential (per 1,000 Square Feet of Floor Area)</b>				
Retail	\$6,089	\$4,264	\$1,825	43%
Office/Service	\$2,555	\$2,357	\$198	8%
Industrial	\$1,031	\$1,552	(\$521)	-34%

The boundary of the East Service Area is shown below in Figure 3.

Figure 3: East Service Area



Current and proposed transportation impact fees for the East Service Area are summarized in Figure 4. The middle three columns of the table below indicate current transportation fees and the proposed increase or decrease. Proposed nonresidential transportation impact fees decrease for the office/service and industrial land use categories. All residential units see increases in the impact fee amount. Similar to the West Service Area, these residential increases are not surprising given it has been twenty years since the County’s transportation impact fee methodology was updated.

Figure 4: Current and Proposed Transportation Impact Fees: East Service Area

Development Type	Transportation Impact Fee: East Area	Current County Fee (1998)	Increase or Decrease	Percent Change
<b>Residential (per dwelling) by Sq Ft of Finished Living Space</b>				
900 or less	\$2,906	\$888	\$2,018	227%
901 to 1300	\$3,629	\$983	\$2,646	269%
1301 to 1800	\$4,143	\$983	\$3,160	321%
1801 to 2400	\$4,665	\$1,599	\$3,066	192%
2401 or more	\$5,009	\$1,599	\$3,410	213%
<b>Nonresidential (per 1,000 Square Feet of Floor Area)</b>				
Retail	\$4,436	\$4,264	\$172	4%
Office/Service	\$1,861	\$2,357	(\$496)	-21%
Industrial	\$751	\$1,552	(\$801)	-52%



Figure 5 provides a comparison of current and proposed transportation impact fees in Adams County to other counties along the Front Range of Colorado. Given it has been twenty years since the County updated the transportation impact fee methodology, we have also shown the 1998 fees, adjusted to 2018 dollars.

**Figure 5: Transportation Impact Fee Comparisons**

Jurisdiction	Single Family Housing Unit*	Retail (per 1,000 Sq. Ft.)	Service (per 1,000 Sq. Ft.)	Industrial (per 1,000 Sq. Ft.)
<i>Adams County - Proposed Fees (West Area)</i>	<i>\$5,639</i>	<i>\$6,089</i>	<i>\$2,357</i>	<i>\$1,552</i>
<i>Adams County - Proposed Fees (East Area)</i>	<i>\$4,665</i>	<i>\$4,436</i>	<i>\$1,861</i>	<i>\$751</i>
<i>Adams County - Current Fees, 2018\$</i>	<i>\$2,469</i>	<i>\$6,585</i>	<i>\$3,640</i>	<i>\$2,397</i>
<i>Adams County - Current Fees, 1998\$</i>	<i>\$1,599</i>	<i>\$4,264</i>	<i>\$2,357</i>	<i>\$1,552</i>
Weld County, 2010 Fees	\$2,406	\$3,336	\$2,220	\$2,177
Jefferson County, 2018 Fees	\$2,466	\$5,360	\$3,590	\$1,550
Arapahoe County, 2017 Fees (East)	\$2,531	\$3,806	\$2,223	\$769
Larimer County - Proposed 2018 Fees	\$4,168	\$5,461	\$3,213	\$1,296

Note: fee amounts shown for a 1,900 square foot detached housing unit

## GENERAL METHODS FOR IMPACT FEES

There are three general methods for calculating impact fees. The choice of a particular method depends primarily on the timing of infrastructure construction (past, concurrent, or future) and service characteristics of the facility type being addressed. Each method has advantages and disadvantages and can be used simultaneously for different cost components.

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

### ***Cost Recovery Method (past improvements)***

Although not used in Adams County, the rationale for recoupment, or cost recovery, is that new development is paying for its share of the useful life and remaining capacity of facilities already built, or land already purchased, from which new growth will benefit. This methodology is often used for utility systems that must provide adequate capacity before new development can take place.

### ***Incremental Expansion Method (concurrent improvements)***

The incremental expansion method documents current level-of-service (LOS) standards for transportation, using both quantitative and qualitative measures. This approach assumes there are no existing infrastructure deficiencies or surplus capacity in the transportation system. New development is only paying its proportionate share for growth-related infrastructure. Revenue will be used to expand or provide additional facilities, as needed, to accommodate new development. An incremental expansion cost method is best suited for public facilities that will be expanded in regular increments to keep pace with development.

### ***Plan-Based Method (future improvements)***

Transportation impact fees in Adams County are calculated using the plan-based method, with the fees in the West Service Area calculated using a proprietary plan-based hybrid developed by TischlerBise and the fees in the East Service Area calculated using a traditional plan-based approach. This method allocates costs for a specified set of improvements to a specified amount of development. Improvements are typically identified in a long-range facility plan and development potential is identified by a land use plan. There are two basic options for determining the cost per demand unit: 1) total cost of a public facility can be divided by total service units (average cost), or 2) the growth-share of the public facility cost can be divided by the net increase in service units over the planning timeframe (marginal cost).

## Evaluation of Possible Credits

Regardless of the methodology, a consideration of “credits” is integral to the development of a legally defensible impact fee methodology. There are two types of “credits” with specific characteristics, both

of which should be addressed in impact fee studies and ordinances. The first is a revenue credit due to possible double payment situations, which could occur when other revenues may contribute to the capital costs of infrastructure covered by the impact fee. This type of credit is integrated into the development impact fee calculation, thus reducing the fee amount. The second is a site-specific credit or developer reimbursement for construction of system improvements. This type of credit is addressed in the administration and implementation of the impact fee program.

## TRANSPORTATION IMPACT FEE: WEST SERVICE AREA

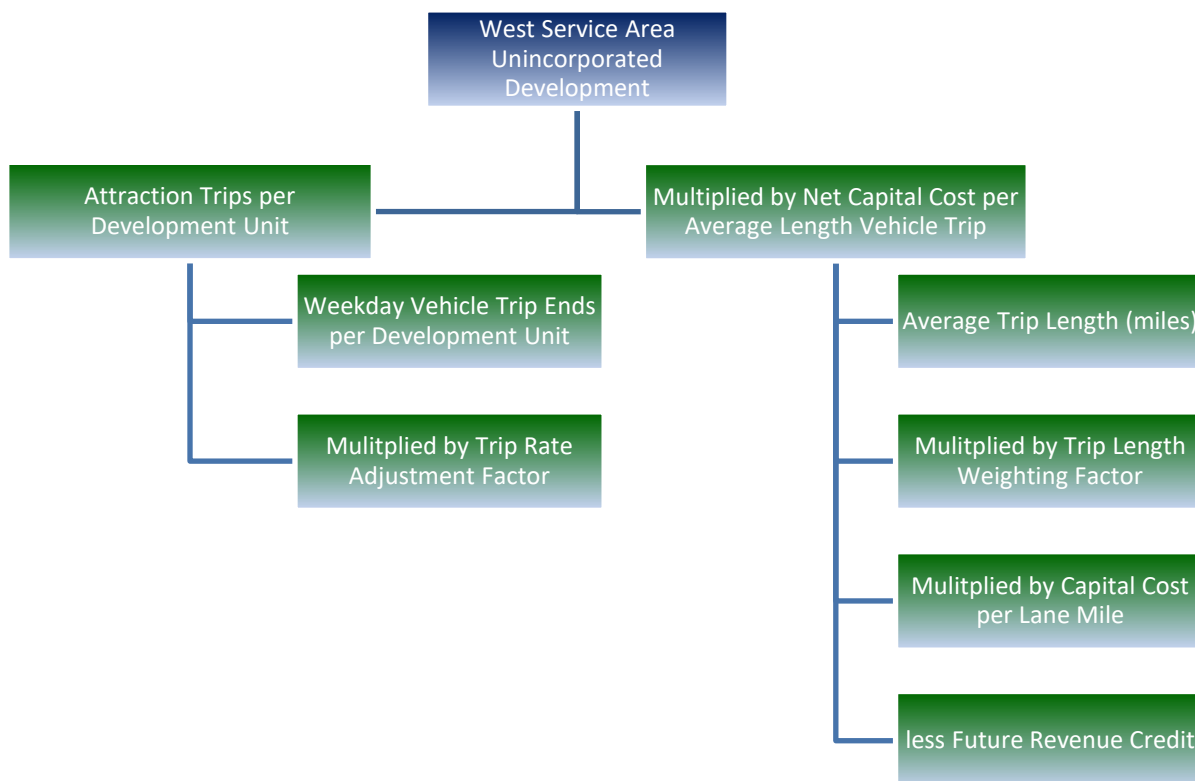
The transportation impact fees in the West Service Area are derived using a proprietary hybrid of the plan-based approach. As shown in the formula and Figure 6 below, the West Area transportation impact fee is the product of Vehicle Miles of Travel (VMT) per development unit multiplied by the net capital cost per VMT for transportation capacity.

$$\text{Transportation Impact Fee} = \text{VMT (vehicle miles of travel) per Development Unit} \times \text{Capital Cost per VMT}$$

VMT is equal to the trip generation rate, multiplied by primary trip adjustment factor, average trip length (in miles) and trip-length weighting factor. The capital cost per VMT is based on the projected ten-year growth-cost of transportation improvements, divided by the increase in projected VMT over ten years. Each component is described below.

Current infrastructure standards and projected development in the West Service Area in unincorporated Adams County are used to determine the general need for growth-related transportation improvements. Adams County will periodically identify specific transportation capital improvements during the regular, annual budget process. As discussed further in the Implementation and Administration Section, Adams County will follow expenditure guidelines to ensure benefit to fee payers.

**Figure 6: West Service Area Transportation Impact Fee Methodology Chart**



## Trip Generation Rates: West Service Area

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

### *Unincorporated Area Control Totals*

Figure 7 indicates the average number of residents per housing unit for three levels of geography. At the top are countywide data, the middle is data for the incorporated areas of the County, and the bottom of the figure provides data for the unincorporated area. Typically, unincorporated places have more persons per dwelling, this is the case for multifamily units in Adams County. However, single family units in the unincorporated areas have a slightly lower persons per housing unit compared to the countywide average. This is a result of a higher vacancy rate in the unincorporated County.

Figure 7: Persons per Housing Unit

**Countywide, Adams County**

Housing Type	Persons	Households	Housing Units	Persons per Housing Unit	Vacancy Rate
Single Family [1]	381,617	120,504	125,400	3.04	4%
Multifamily [2]	85,606	36,034	39,646	2.16	9%
Total	467,223	156,538	165,046	2.83	5%

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

**Incorporated Adams County**

Housing Type	Persons	Households	Housing Units	Persons per Housing Unit	Vacancy Rate
Single Family [1]	298,484	94,098	97,500	3.06	3%
Multifamily [2]	73,808	31,775	35,013	2.11	9%
Total	372,292	125,873	132,513	2.81	5%

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

**Unincorporated Adams County**

Housing Type	Persons	Households	Housing Units	Persons per Housing Unit	Vacancy Rate
Single Family [1]	83,133	26,406	27,900	2.98	5%
Multifamily [2]	11,798	4,259	4,633	2.55	8%
Total	94,931	30,665	32,533	2.92	6%

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Trip generation rates are also dependent upon the average number of vehicles available per dwelling. Figure 8 indicates vehicles available for all of Adams County, incorporated places, and the unincorporated area. As expected, the unincorporated area has more vehicles available per dwelling than housing units located within incorporated places.

Figure 8: Vehicles Available per Housing Unit

Countywide		Households (2)			
Tenure	Vehicles Available (1)	Single Family*	Multifamily	Total	Vehicles per Household by Tenure
Owner-occupied	225,760	97,545	3,498	101,043	2.23
Renter-occupied	87,082	22,959	32,626	55,585	1.57
Total	312,842	120,504	36,124	156,628	2.00
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	253,913	125,400	2.02		
Multifamily	58,929	39,646	1.49		
Total	312,842	165,046	1.90		
Incorporated Places		Households (2)			
Tenure	Vehicles Available (1)	Single Unit Detached or Attached	All Other	Total	Vehicles per Household by Tenure
Owner-occupied	174,896	76,608	2,977	79,585	2.20
Renter-occupied	71,203	17,490	28,883	46,373	1.54
Total	246,099	94,098	31,860	125,958	1.95
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	195,209	97,500	2.00		
Multifamily	50,890	35,013	1.45		
Total	246,099	132,513	1.86		
Unincorporated Area		Households (2)			
Tenure	Vehicles Available (1)	Single Family*	Multifamily	Total	Vehicles per Household by Tenure
Owner-occupied	50,864	20,937	521	21,458	2.37
Renter-occupied	15,879	5,469	3,743	9,212	1.72
Total	66,743	26,406	4,264	30,670	2.18
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	59,056	27,900	2.12		
Multifamily	7,687	4,633	1.66		
Total	66,743	32,533	2.05		

(1) Vehicles available by tenure from Table B25046, American Community Survey, 2015.

(2) Households by tenure and units in structure from Table B25032, American Community

(3) Housing units from Table B25024, American Community Survey, 2015.

\* Includes single family deattached, attached, mobile home

**Demand Indicators by Dwelling Size**

Custom tabulations of demographic data by bedroom range can be created from individual survey responses provided by the U.S. Census Bureau, in files known as Public Use Micro-Data Samples (PUMS).

Because PUMs files are available for areas of roughly 100,000 persons, Adams County is included in Public Use Micro-Data Areas (PUMA) 805, 806 and 807. At the top of Figure 9, in the cells with yellow shading, are the survey results for **Western Adams County**. The unadjusted number of persons and vehicles available per dwelling, derived from the PUMS data, were adjusted downward to match the control totals for the unincorporated area, as documented above in Figures 7 and 8.

In comparison to the national averages based on ITE traffic studies, the unincorporated area of Western Adams County has fewer persons per dwelling, but a greater number of vehicles per dwelling. Rather than rely on one methodology, the recommended multipliers shown below with grey shading and bold numbers are an average of trips rates based on persons and vehicles available for all types of housing units. In the unincorporated area of Western Adams County, each housing unit is expected to yield an average of 9.85 Average Weekday Vehicle Trip Ends (AWVTE), compared to the national average of 9.14 trips ends per household.

**Figure 9: Average Weekday Vehicle Trip Ends by Bedroom Range**

**West Adams County 2015 Data**

Bedroom Range	Persons (1)	Vehicles Available (1)	Housing Units (1)	Adams Co. Hsg Mix	Unadjusted Persons/HU	Adjusted Persons/HU (2)	Unadjusted VehAvl/HU	Adjusted VehAvl/HU (2)
0-1	783	566	536	9.82%	1.46	1.50	1.06	1.14
2	2,578	1,907	1,236	22.64%	2.09	2.15	1.54	1.66
3	5,800	4,510	2,203	40.35%	2.63	2.71	2.05	2.21
4+	5,043	3,699	1,485	27.20%	3.40	3.50	2.49	2.69
<b>Total</b>	<b>14,204</b>	<b>10,682</b>	<b>5,460</b>		<b>2.60</b>	<b>2.68</b>	<b>1.96</b>	<b>2.11</b>

**National Averages According to ITE, 2017**

ITE Code	AWVTE per Person	AWVTE per Vehicle Available	AWVTE per Housing Unit	Unincorp Hsg Mix	Persons per Housing Unit	Veh Avl per Housing Unit
220 Apt	1.42	5.10	7.32	14%	5.15	1.44
210 SFD	2.65	6.36	9.44	86%	3.56	1.48
<b>Wgtd Avg</b>	<b>2.48</b>	<b>6.18</b>	<b>9.14</b>		<b>3.78</b>	<b>1.47</b>

**Recommended AWVTE per Dwelling by Bedroom Range**

Bedroom Range	AWVTE per Housing Unit Based on Persons (3)	AWVTE per Hsg Unit Based on Vehicles Available (4)	Unincorp Adams AWVTE per Housing Unit (5)
0-1	3.72	7.05	<b>5.39</b>
2	5.33	10.26	<b>7.80</b>
3	6.72	13.66	<b>10.19</b>
4+	8.68	16.62	<b>12.65</b>
<b>Total</b>	<b>6.65</b>	<b>13.04</b>	<b>9.85</b>

(1) American Community Survey, Public Use Microdata Sample for CO PUMAs 805, 806, and 807 (2015 Five-Year unweighted data).  
 (2) Adjusted multipliers are scaled to make the average PUMS values match control totals for the unincorporated area, based on American Community Survey 2015 data.  
 (3) Adjusted persons per housing unit multiplied by national weighted average trip rate per person.  
 (4) Adjusted vehicles available per housing unit multiplied by national weighted average trip rate per vehicle available.  
 (5) Average of trip rates based on persons and vehicles available per housing unit.

**AWVTE per Dwelling by House Type**

ITE Code	AWVTE per Housing Unit Based on Persons (3)	AWVTE per Hsg Unit Based on Vehicles Available (4)	Unincorp Adams AWVTE per Housing Unit (5)	Unincorp Adams Co. Persons/HU	Unincorp Adams Co. VehAvl/HU
220 Apt	3.93	10.26	7.10	1.59	1.66
210 SFD	5.06	13.10	9.08	2.04	2.12
<b>All Types</b>	<b>6.65</b>	<b>13.04</b>	<b>9.85</b>	<b>2.68</b>	<b>2.11</b>

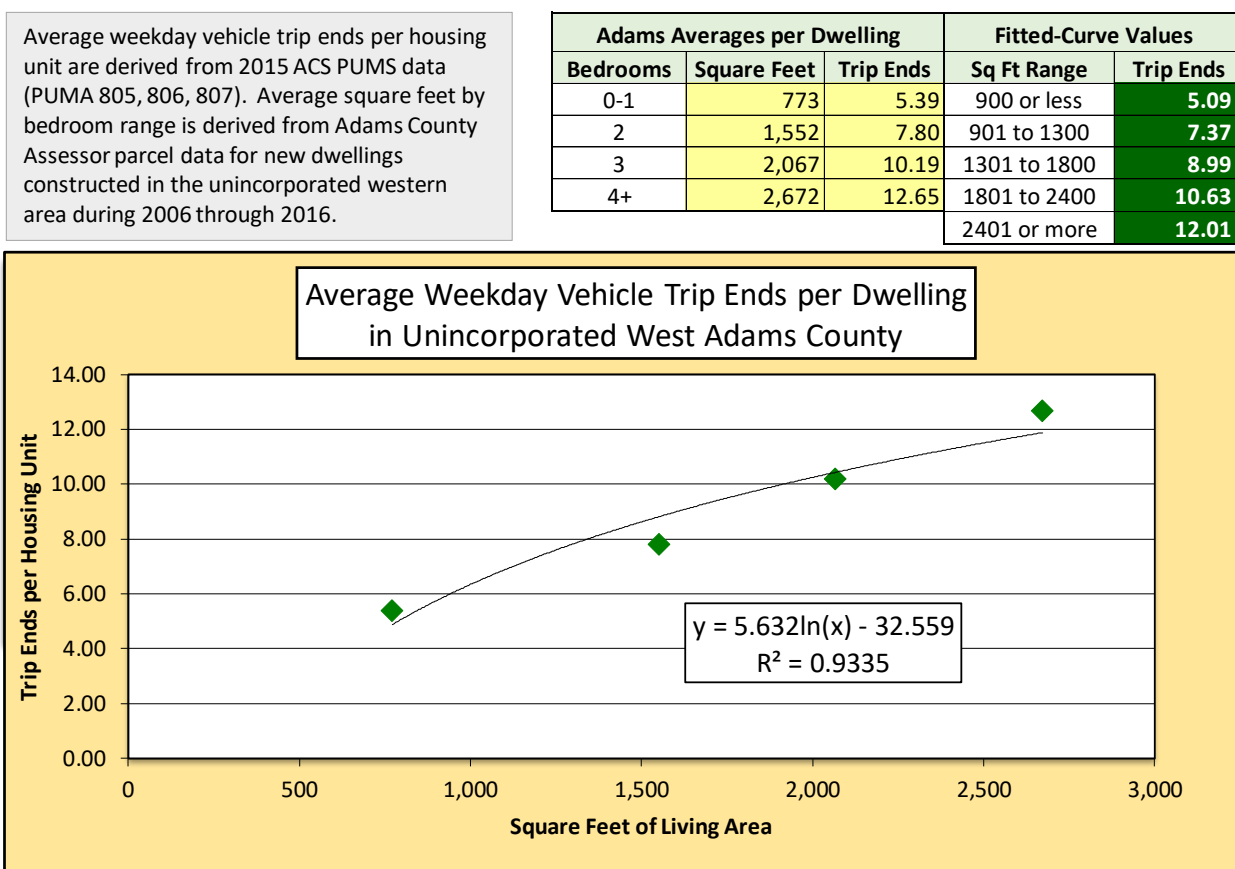
**Trip Generation by Floor Area**

To derive average weekday vehicle trip ends by dwelling size in the West Service Area, TischlerBise matched trip generation rates and average floor area, by bedroom range, as shown in Figure 10. The logarithmic trend line formula, derived from the four actual averages in Adams County, is used to derive estimated trip ends by dwelling size. A mid-size housing unit is estimated to range from 1301-1800 square



feet of finished living space. A small unit (900 square feet or less) would pay 57% of the transportation impact fee paid by a mid-size unit. A large unit of 2,401 square feet or more would pay 133% of the transportation impact fee paid by a mid-size unit. If Adams County were to continue with its present practice of a “one-size-fits-all” approach, smaller housing units will be required to pay more than their proportionate share while large units will pay less than their proportionate share. TischlerBise does not recommend an average fee by house type because it makes small units less affordable and essentially subsidizes larger units.

**Figure 10: Vehicle Trips by Dwelling Size: West Service Area**



### Adjustments for Commuting Patterns and Pass-By Trips

For residential units, the trip adjustment factor includes several components, shown below in Figure 11. According to the National Household Travel Survey (2009), home-based work trips are typically 31 percent of “production” trips, out-bound trips (which are 50 percent of all trip ends). Also, utilizing the most recent data from the Census Bureau's web application "OnTheMap", 71 percent of Adams County's workers travel outside the County for work. In combination, these factors account for 11 percent of additional production trips (0.31 x 0.50 x 0.71 = 0.11). The total adjustment factor for residential housing units

includes attraction trips (50 percent of trip ends) plus the journey-to-work commuting adjustment (11 percent of production trips) for a total of 61 percent.

**Figure 11: Inflow/Outflow Analysis**

Employed Adams County Residents (2015)	224,122
Adams County Residents Working in County (2015)	64,585
Adams County Residents Commuting Outside County for Work	159,537
<b>Percent Commuting out of the County</b>	<b>71%</b>
<b>Additional Production Trips</b>	<b>11%</b>
<b>Residential Trip Adjustment Factor</b>	<b>61%</b>

Source: U.S. Census, OnTheMap Application, 2015

For commercial development, the trip adjustment factor is less than 50% because retail development and some services, like schools and daycare, attract vehicles as they pass by on arterial and collector roads. For example, when someone stops at a convenience store on the way home from work, the convenience store is not the primary destination. For the average shopping center, ITE indicates that 34% of the vehicles that enter are passing by on their way to some other primary destination. The remaining 66% of attraction trips have the commercial site as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor is 66% multiplied by 50%, or approximately 34% of the trip ends.

## Vehicle Miles of Travel

A Vehicle Mile of Travel (VMT) is a measurement unit equal to one vehicle traveling one mile. In the aggregate, VMT is the product of vehicle trips multiplied by the average trip length<sup>1</sup>. For the purpose of transportation impact fees, the average trip length in Adams County is calibrated to existing lane miles of County arterials within the unincorporated area of the West Service Area. According to data provided by Adams County staff, there are currently has 153 lane miles of arterials in the West Service Area of unincorporated Adams County.

### Lane Capacity

Transportation impact fees are based on a lane capacity standard of 8,000 vehicles per lane, which is from the 2012 Adams County Transportation Plan. The lane capacity standard was reviewed by Adams County staff and found to be reasonable for existing arterials within the unincorporated area.

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<sup>1</sup> Typical VMT calculations for development-specific traffic studies, along with most transportation models of an entire service area, are derived from traffic counts on particular road segments multiplied by the length of that road segment. For the purpose of impact fees, VMT calculations are based on attraction (inbound) trips to development located in the service area, with the trip length calibrated to the road network considered to be system improvements. This refinement eliminates pass-through or external- external trips, and travel on roads that are not system improvements (e.g. interstate highways).

### **Trip Length Weighting Factor by Type of Land Use**

The transportation impact fee methodology includes a percentage adjustment, or weighting factor, to account for trip length variation by type of land use. As documented in Table 6 of the 2009 National Household Travel Survey, vehicle trips from residential development are approximately 121% of the average trip length. The residential trip length adjustment factor includes data on home-base work trips, social, and recreational purposes. Conversely, shopping trips associated with commercial development are roughly 66% of the average trip length while other nonresidential development typically accounts for trips that are 73% of the average for all trips.

### **Development Prototypes and Projected Travel Demand**

The relationship between development in the West Service Area of unincorporated Adams County and the need for arterial transportation system improvements is documented below. Figure 12 summarizes the input variables used to determine the average trip length on unincorporated County roads in the West Service Area. In the tables below, DU means dwelling units, KSF means square feet of nonresidential development, in thousands, Institute of Transportation Engineers is abbreviated ITE, and VTE means vehicle trip ends.

Projected unincorporated County development in the West Service Area over the next ten years is shown in the middle section of Figure 12. Trip generation rates and trip adjustment factors convert projected development into average weekday vehicle trips. A typical vehicle trip, such as a person leaving their home and traveling to work, generally begins on a local street that connects to a collector street, which connects to an arterial road and eventually to a state or interstate highway. This progression of travel up and down the functional classification chain limits the average trip length determination, for the purpose of transportation impact fees, to the following question, “What is the average vehicle trip length on transportation fee system improvements (i.e. arterials in the unincorporated area of the West Service Area)?”

With 153 arterial lane miles and a lane capacity standard of 8,000 vehicles per lane, the existing network of unincorporated County roads in the West Service Area has 1,224,000 vehicle miles of capacity (i.e., 8,000 vehicles per lane multiplied by 153 lane miles). To derive the average utilization (i.e., average trip length expressed in miles) of the system improvements, divide vehicle miles of capacity by the vehicle trips attracted to development in the service area. As shown in the bottom-left corner of the table below, existing development attracts 255,070 average weekday vehicle trips. Dividing 1,224,000 vehicle miles of capacity by inbound average weekday vehicle trips *yields an un-weighted* average trip length of approximately 4.79 miles. However, the calibration of average trip length includes the same adjustment factors used in the transportation impact fee calculations (i.e., journey-to-work commuting, commercial pass-by adjustment and average trip length adjustment by type of land use). With these adjustments, TischlerBise determined the weighted-average trip length to be 4.66 miles.

**Figure 12: West Service Area Unincorporated County Projected Travel Demand and Trip Length Calibration**

Development Type	ITE Code	Wkdy VTE	Dev Unit	Trip Adj
0-1 Bedroom Residential	210	5.09	HU	61%
2 Bedrooms Residential	210	7.37	HU	61%
3 Bedrooms Residential	210	8.99	HU	61%
4+ Bedrooms Residential	210	10.63	HU	61%
Retail	820	37.75	KSF	34%
Service	710	9.74	KSF	50%
Industrial	140	3.93	KSF	50%

	Avg Trip Length (miles)								
	Vehicle Capacity Per Lane	2016	2017	2018	2019	2020	2021	2026	10-Year
		Base	1	2	3	4	5	10	Increase
	4.66								
	8,000								
0-1 Bedroom	231	232	233	233	234	234	237	6	
2 Bedrooms	7,249	7,262	7,275	7,288	7,301	7,314	7,378	129	
3 Bedrooms	16,551	16,635	16,719	16,803	16,887	16,971	17,390	839	
4+ Bedrooms	6,360	6,430	6,500	6,570	6,639	6,709	7,058	698	
Retail Floor Area (KSF)	2,557	2,647	2,736	2,826	2,915	3,014	3,524	967	
Service Floor Area (KSF)	5,750	5,909	6,068	6,227	6,386	6,561	7,467	1,717	
Industrial Floor Area (KSF)	14,725	15,093	15,462	15,830	16,198	16,604	18,698	3,973	
0-1 Bedroom Trips	719	720	722	724	725	727	736	17	
2 Bedrooms Trips	32,590	32,648	32,706	32,764	32,822	32,880	33,170	580	
3 Bedrooms Trips	90,765	91,225	91,686	92,146	92,606	93,066	95,367	4,602	
4+ Bedrooms Trips	41,240	41,693	42,146	42,599	43,052	43,504	45,769	4,528	
Retail Trips	32,819	33,969	35,118	36,267	37,416	38,685	45,230	12,411	
Service Trips	28,002	28,776	29,551	30,325	31,099	31,952	36,362	8,360	
Industrial Trips	28,935	29,659	30,382	31,106	31,830	32,626	36,742	7,808	
<b>Total Vehicle Trips</b>	<b>255,070</b>	<b>258,690</b>	<b>262,310</b>	<b>265,930</b>	<b>269,550</b>	<b>273,442</b>	<b>293,376</b>	<b>38,306</b>	
<b>Vehicle Miles of Travel (VMT)</b>	<b>1,226,768</b>	<b>1,240,883</b>	<b>1,254,999</b>	<b>1,269,114</b>	<b>1,283,229</b>	<b>1,298,229</b>	<b>1,374,786</b>	<b>148,019</b>	
<b>Arterial Lane Miles (VMT)</b>	<b>153.35</b>	<b>155.11</b>	<b>156.87</b>	<b>158.64</b>	<b>160.40</b>	<b>162.28</b>	<b>171.85</b>	<b>18.50</b>	
Signalized Intersections	40.0	40.5	40.9	41.4	41.8	42.3	44.8	4.8	

### Potential Road Improvements and Cost Basis

The existing transportation infrastructure standard in the West Service Area in unincorporated Adams County is 1.24 lane-miles of unincorporated County arterial road per 10,000 VMT. The formula is 153 lane miles divided by 1,226,768 VMT divided by 10,000. To maintain the existing infrastructure standard, Adams County needs an additional 18.50 lane miles of system improvements to accommodate projected unincorporated development in the West Service Area over the next ten years.

Figure 13 contains a list of potential road projects the City may construct over the next ten years. The total estimated cost of these projects was used to determine the weighted average cost per lane mile of \$1,451,235.

Figure 13: Cost Basis Determined from Potential West Service Area Impact Fee Projects

CIP Project	Lanes	Length of Project (miles)	Lane Miles	Total Cost	County Share	County Cost per Lane Mile
York Street (Between HWY 224 to E. 78th Ave)	5.00	0.62	3.10	\$5,000,000	\$5,000,000	\$1,612,903
Dahlia Street (Hwy 224 to 70th Ave)	3.00	3.00	9.00	\$8,000,000	\$6,400,000	\$711,111
Lowell Blvd (Clear Creek and W 62nd Ave)	2.00	2.00	4.00	\$3,200,000	\$3,200,000	\$800,000
58th Ave (Between Washington and York)	5.00	1.00	5.00	\$7,000,000	\$7,000,000	\$1,400,000
York Street (58th to Hwy 224)	5.00	0.62	3.10	\$11,300,000	\$11,300,000	\$3,645,161
York Street (78th to 88th)	5.00	1.40	7.00	\$10,500,000	\$10,500,000	\$1,500,000
Pecos Street (52nd Ave to 58th Ave)	5.00	0.70	3.50	\$5,300,000	\$5,300,000	\$1,514,286
66th Ave (West of Broadway) Design	5.00	0.25	1.25	\$600,000	\$600,000	\$480,000
54th Ave (Washington to Franklin) Design	5.00	0.50	2.50	\$6,500,000	\$6,500,000	\$2,600,000
<b>TOTAL</b>	<b>40.00</b>	<b>10.09</b>	<b>38.45</b>	<b>\$57,400,000</b>	<b>\$55,800,000</b>	<b>\$1,451,235</b>

### Revenue Credit Evaluation

As part of the transportation impact fee methodology TischlerBise has evaluated the potential for double payments through the impact fee and future revenue that may be generated to the County’s Road & Bridge Fund. Given the plan-based hybrid methodology utilized for the West Service Area, based on existing infrastructure standards, with no regard for excess capacity that may exist in the system, TischlerBise recommends a future revenue credit for the West Service Area. As shown in Figure 14, tax revenue that is generated to the County’s Road & Bridge Fund include property tax, sales tax, and specific ownership (vehicle) taxes. In order to calculate the future revenue credit, TischlerBise analyzed the percentage of Road & Bridge Fund expenditures that are spent on capital (both capacity projects and road reconstruction), which was 27 percent in the FY19 adopted budget. Therefore, TischlerBise assumed 27 percent of total tax revenue is spent on capital, which is slightly overstated since the Road & Bridge Fund does receive other revenues. We then calculate the percentage of tax revenue attributable to the West Service Area (73 percent) based on the percentage of West Service Area VMT to total unincorporated County VMT. The revenue attributable to the West Service Area is then divided by the projected VMT in a given year. For example, projected tax revenue spent on capital in Year 1 is \$5,521,934. The percentage attributable to the West Service Area is \$4,031, 012. This revenue is divided by the projected VMT of 1,240,883, for a credit of \$3.25 per VMT. To account for the time value of money, annual revenue projections per VMT are discounted using a net present value formula based on a rate of 4.5 percent. The total net present value per VMT for the West Service Area is \$27.17.

Figure 14: West Service Area Future Revenue Credit

Year	Property Tax	Sales Tax	Specific Ownership Tax	Total Tax Revenue	% Spent on Capital (27%)	% Attributable to West (73%)	Projected VMT	Credit per VMT
1	\$5,058,047	\$2,777,543	\$12,616,018	\$20,451,608	\$5,521,934	\$4,031,012	1,240,883	\$3.25
2	\$5,270,010	\$2,879,757	\$12,825,625	\$20,975,392	\$5,663,356	\$4,134,250	1,254,999	\$3.29
3	\$5,510,157	\$2,985,732	\$13,045,913	\$21,541,802	\$5,816,286	\$4,245,889	1,269,114	\$3.35
4	\$5,750,303	\$3,095,607	\$13,266,201	\$22,112,112	\$5,970,270	\$4,358,297	1,283,229	\$3.40
5	\$5,990,450	\$3,209,525	\$13,486,490	\$22,686,464	\$6,125,345	\$4,471,502	1,298,229	\$3.44
6	\$6,230,596	\$3,327,635	\$13,706,778	\$23,265,009	\$6,281,552	\$4,585,533	1,313,228	\$3.49
7	\$6,470,743	\$3,450,092	\$13,927,066	\$23,847,901	\$6,438,933	\$4,700,421	1,328,227	\$3.54
8	\$6,606,511	\$3,511,504	\$14,122,794	\$24,240,808	\$6,545,018	\$4,777,863	1,343,226	\$3.56
9	\$6,742,279	\$3,574,009	\$14,318,521	\$24,634,809	\$6,651,398	\$4,855,521	1,358,225	\$3.57
10	\$6,878,046	\$3,637,626	\$14,514,249	\$25,029,921	\$6,758,079	\$4,933,397	1,374,786	\$3.59
<b>Total</b>	<b>\$60,507,142</b>	<b>\$32,449,030</b>	<b>\$135,829,655</b>	<b>\$228,785,826</b>	<b>\$61,772,173</b>	<b>\$45,093,686</b>		<b>\$34.48</b>

Discount Rate	4.5%
Net Present Value	\$27.17

Source: Revenue projections are from EPS Local Finance Study, prepared for Adams County. VMT projection from TischlerBise, as are percentages of VMT by Service Area. Percentage of capital expenditures to overall revenue from FY2018 Adams County Budget

### Proposed Transportation Impact Fees: West Service Area

Input variables for West Service Area transportation impact fees are shown in the upper section of Figure 15. Inbound vehicle trips by type of development are multiplied by the capacity cost per vehicle mile of travel to yield the proposed transportation impact fees. As an example, to maintain the current infrastructure standard for unincorporated County arterials in the West Service Area, Adams County needs to spend \$26,853,695 on unincorporated County arterial transportation improvements over the next ten years. When the 10-year growth share is divided by the projected increase of 148,019 vehicle miles of travel, the net capital cost is \$154.25 per VMT. The transportation impact fee calculation is shown below using input variables for retail development, as listed in Figure 12.

$$\begin{aligned}
 &37.75 \text{ weekday vehicle trip ends per 1,000 square feet} \\
 &\quad \times \\
 &0.34 \text{ adjustment factor for inbound trips, including pass-by} \\
 &\quad \times \\
 &4.66 \text{ average miles per trip} \\
 &\quad \times \\
 &0.66 \text{ trip length adjustment factor} \\
 &\quad \times \\
 &\$154.25 \text{ growth cost per VMT} \\
 &= \\
 &\$6,089 \text{ per 1000 square feet (truncated)}
 \end{aligned}$$

The middle three columns of the table below indicate current transportation fees and the proposed increase or decrease. Proposed transportation fees decrease for industrial development but increase for retail and office/service uses. All residential units see significant increases in the impact fee amount. These residential and nonresidential increases are not surprising given it has been twenty years since the County’s transportation impact fee methodology was updated.

**Figure 15: Transportation Impact Fees: West Service Area**

Input Variables for Unincorporated Area		Average Miles per Trip		4.66			
		Cost per Additional Lane Mile =>		\$1,451,235			
		Additional Lane Miles Needed to Maintain LOS =>		18.50			
		Ten-Year Growth Cost Funded by Fees		\$26,853,695			
		VMT Increase Over Ten Years		148,019			
		Capital Cost per VMT		\$181.42			
		Revenue Credit		(\$27.17)			
		<b>Net Capital Cost per VMT</b>		<b>\$154.25</b>			
Development Type	Avg Wkdy Veh Trip Ends	Trip Rate Adjustment	Trip Length Adjustment	Transportation Impact Fee	Current County Fee (1998)	Increase or Decrease	Percent Change
<b>Residential (per dwelling) by Sq Ft of Finished Living Space</b>							
900 or less	5.09	61%	121%	\$2,700	\$888	\$1,812	204%
901 to 1300	7.37	61%	121%	\$3,910	\$983	\$2,927	298%
1301 to 1800	8.99	61%	121%	\$4,769	\$983	\$3,786	385%
1801 to 2400	10.63	61%	121%	\$5,639	\$1,599	\$4,040	253%
2401 or more	12.01	61%	121%	\$6,371	\$1,599	\$4,772	298%
<b>Nonresidential (per 1,000 Square Feet of Floor Area)</b>							
Retail	37.75	34%	66%	\$6,089	\$4,264	\$1,825	43%
Office/Service	9.74	50%	73%	\$2,555	\$2,357	\$198	8%
Industrial	3.93	50%	73%	\$1,031	\$1,552	(\$521)	-34%

## TRANSPORTATION IMPACT FEE: EAST SERVICE AREA

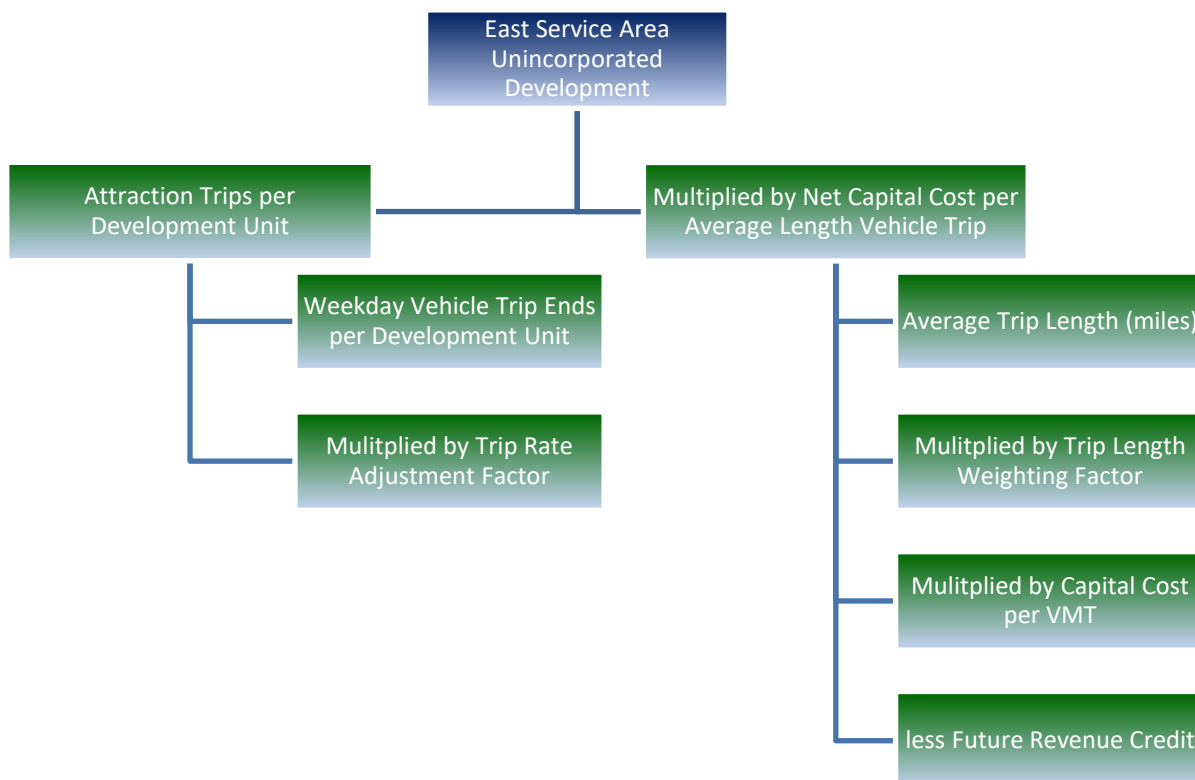
The transportation impact fees in the East Service Area are derived using a proprietary a plan-based approach. As shown in the formula and Figure 16 below, the East Area transportation impact fee is the product of Vehicle Miles of Travel (VMT) per development unit multiplied by the net capital cost per VMT for planned transportation capacity projects.

$$\text{Transportation Impact Fee} = \text{VMT (vehicle miles of travel) per Development Unit} \times \text{Capital Cost per VMT}$$

VMT is equal to the trip generation rate, multiplied by primary trip adjustment factor, average trip length (in miles) and trip-length weighting factor. The capital cost per VMT is based on the projected ten-year growth-cost of transportation improvements, divided by the increase in projected VMT over ten years. Each component is described below.

A ten-year road plan developed by County staff is used as the basis for determining the transportation impact fee in the East Service Area. As discussed further in the Implementation and Administration Section, Adams County will follow expenditure guidelines to ensure benefit to fee payers.

**Figure 16: East Service Area Transportation Impact Fee Methodology Chart**





## Trip Generation Rates: East Service Area

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

### *Unincorporated Area Control Totals*

Figure 17 indicates the average number of residents per housing unit for three levels of geography. At the top are countywide data, the middle is data for the incorporated areas of the County, and the bottom of the figure provides data for the unincorporated area. Typically, unincorporated places have more persons per dwelling, this is the case for multifamily units in Adams County. However, single family units in the unincorporated areas have a slightly lower persons per housing unit compared to the countywide average. This is a result of a higher vacancy rate in the unincorporated County.

Figure 17: Persons per Housing Unit

**Countywide, Adams County**

Housing Type	Persons	Households	Housing Units	Persons per Housing Unit	Vacancy Rate
Single Family [1]	381,617	120,504	125,400	3.04	4%
Multifamily [2]	85,606	36,034	39,646	2.16	9%
Total	467,223	156,538	165,046	2.83	5%

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

**Incorporated Adams County**

Housing Type	Persons	Households	Housing Units	Persons per Housing Unit	Vacancy Rate
Single Family [1]	298,484	94,098	97,500	3.06	3%
Multifamily [2]	73,808	31,775	35,013	2.11	9%
Total	372,292	125,873	132,513	2.81	5%

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

**Unincorporated Adams County**

Housing Type	Persons	Households	Housing Units	Persons per Housing Unit	Vacancy Rate
Single Family [1]	83,133	26,406	27,900	2.98	5%
Multifamily [2]	11,798	4,259	4,633	2.55	8%
Total	94,931	30,665	32,533	2.92	6%

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Trip generation rates are also dependent upon the average number of vehicles available per dwelling. Figure 18 indicates vehicles available for all of Adams County, incorporated places, and the unincorporated area. As expected, the unincorporated area has more vehicles available per dwelling than housing units located within incorporated places.

Figure 18: Vehicles Available per Housing Unit

Countywide		Households (2)			Vehicles per Household by Tenure
Tenure	Vehicles Available (1)	Single Family*	Multifamily	Total	
Owner-occupied	225,760	97,545	3,498	101,043	2.23
Renter-occupied	87,082	22,959	32,626	55,585	1.57
Total	312,842	120,504	36,124	156,628	2.00
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	253,913	125,400	2.02		
Multifamily	58,929	39,646	1.49		
Total	312,842	165,046	1.90		
Incorporated Places		Households (2)			Vehicles per Household by Tenure
Tenure	Vehicles Available (1)	Single Unit Detached or Attached	All Other	Total	
Owner-occupied	174,896	76,608	2,977	79,585	2.20
Renter-occupied	71,203	17,490	28,883	46,373	1.54
Total	246,099	94,098	31,860	125,958	1.95
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	195,209	97,500	2.00		
Multifamily	50,890	35,013	1.45		
Total	246,099	132,513	1.86		
Unincorporated Area		Households (2)			Vehicles per Household by Tenure
Tenure	Vehicles Available (1)	Single Family*	Multifamily	Total	
Owner-occupied	50,864	20,937	521	21,458	2.37
Renter-occupied	15,879	5,469	3,743	9,212	1.72
Total	66,743	26,406	4,264	30,670	2.18
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	59,056	27,900	2.12		
Multifamily	7,687	4,633	1.66		
Total	66,743	32,533	2.05		

(1) Vehicles available by tenure from Table B25046, American Community Survey, 2015.

(2) Households by tenure and units in structure from Table B25032, American Community

(3) Housing units from Table B25024, American Community Survey, 2015.

\* Includes single family deattached, attached, mobile home

**Demand Indicators by Dwelling Size**

Custom tabulations of demographic data by bedroom range can be created from individual survey responses provided by the U.S. Census Bureau, in files known as Public Use Micro-Data Samples (PUMS).

Because PUMs files are available for areas of roughly 100,000 persons, Adams County is included in Public Use Micro-Data Area (PUMA) 824. At the top of Figure 19, in the cells with yellow shading, are the survey results for **Eastern Adams County**. The unadjusted number of persons and vehicles available per dwelling, derived from the PUMS data, were adjusted downward to match the control totals for the unincorporated area, as documented above in Figures 17 and 18.

In comparison to the national averages based on ITE traffic studies, the unincorporated area of Eastern Adams County has fewer persons per dwelling, but a greater number of vehicles per dwelling. Rather than rely on one methodology, the recommended multipliers shown below with grey shading and bold numbers are an average of trips rates based on persons and vehicles available for all types of housing units. In the unincorporated area of Eastern Adams County, each housing unit is expected to yield an average of 10.77 Average Weekday Vehicle Trip Ends (AWVTE), compared to the national average of 9.14 trips ends per household.

**Figure 19: Average Weekday Vehicle Trip Ends by Bedroom Range**

**East Adams County 2015 Data**

Bedroom Range	Persons (1)	Vehicles Available (1)	Housing Units (1)	Adams Co. Hsg Mix	Unadjusted Persons/HU	Adjusted Persons/HU (2)	Unadjusted VehAvl/HU	Adjusted VehAvl/HU (2)
0-1	116	100	79	4.76%	1.47	1.52	1.27	1.37
2	524	455	274	16.50%	1.91	1.97	1.66	1.79
3	1,912	1,662	748	45.03%	2.56	2.64	2.22	2.40
4+	1,927	1,437	560	33.71%	3.44	3.55	2.57	2.77
<b>Total</b>	<b>4,479</b>	<b>3,654</b>	<b>1,661</b>		<b>2.70</b>	<b>2.78</b>	<b>2.20</b>	<b>2.37</b>

**National Averages According to ITE, 2017**

ITE Code	AWVTE per Person	AWVTE per Vehicle Available	AWVTE per Housing Unit	Unincorp Hsg Mix	Persons per Housing Unit	Veh Avl per Housing Unit
220 Apt	1.42	5.10	7.32	14%	5.15	1.44
210 SFD	2.65	6.36	9.44	86%	3.56	1.48
<b>Wgtd Avg</b>	<b>2.48</b>	<b>6.18</b>	<b>9.14</b>		<b>3.78</b>	<b>1.47</b>

**Recommended AWVTE per Dwelling by Bedroom Range**

Bedroom Range	AWVTE per Housing Unit Based on Persons (3)	AWVTE per Hsg Unit Based on Vehicles Available (4)	Unincorp Adams AWVTE per Housing Unit (5)
0-1	3.77	8.47	<b>6.12</b>
2	4.89	11.06	<b>7.98</b>
3	6.55	14.83	<b>10.69</b>
4+	8.80	17.12	<b>12.96</b>
<b>Total</b>	<b>6.89</b>	<b>14.65</b>	<b>10.77</b>

- (1) American Community Survey, Public Use Microdata Sample for CO PUMAs 824 (2015 Five-Year unweighted data).
- (2) Adjusted multipliers are scaled to make the average PUMS values match control totals for the unincorporated area, based on American Community Survey 2015 data.
- (3) Adjusted persons per housing unit multiplied by national weighted average trip rate per person.
- (4) Adjusted vehicles available per housing unit multiplied by national weighted average trip rate per vehicle available.
- (5) Average of trip rates based on persons and vehicles available per housing unit.

**AWVTE per Dwelling by House Type**

ITE Code	AWVTE per Housing Unit Based on Persons (3)	AWVTE per Hsg Unit Based on Vehicles Available (4)	Unincorp Adams AWVTE per Housing Unit (5)
220 Apt	3.93	10.26	7.10
210 SFD	5.06	13.10	9.08
<b>All Types</b>	<b>6.89</b>	<b>14.65</b>	<b>10.77</b>

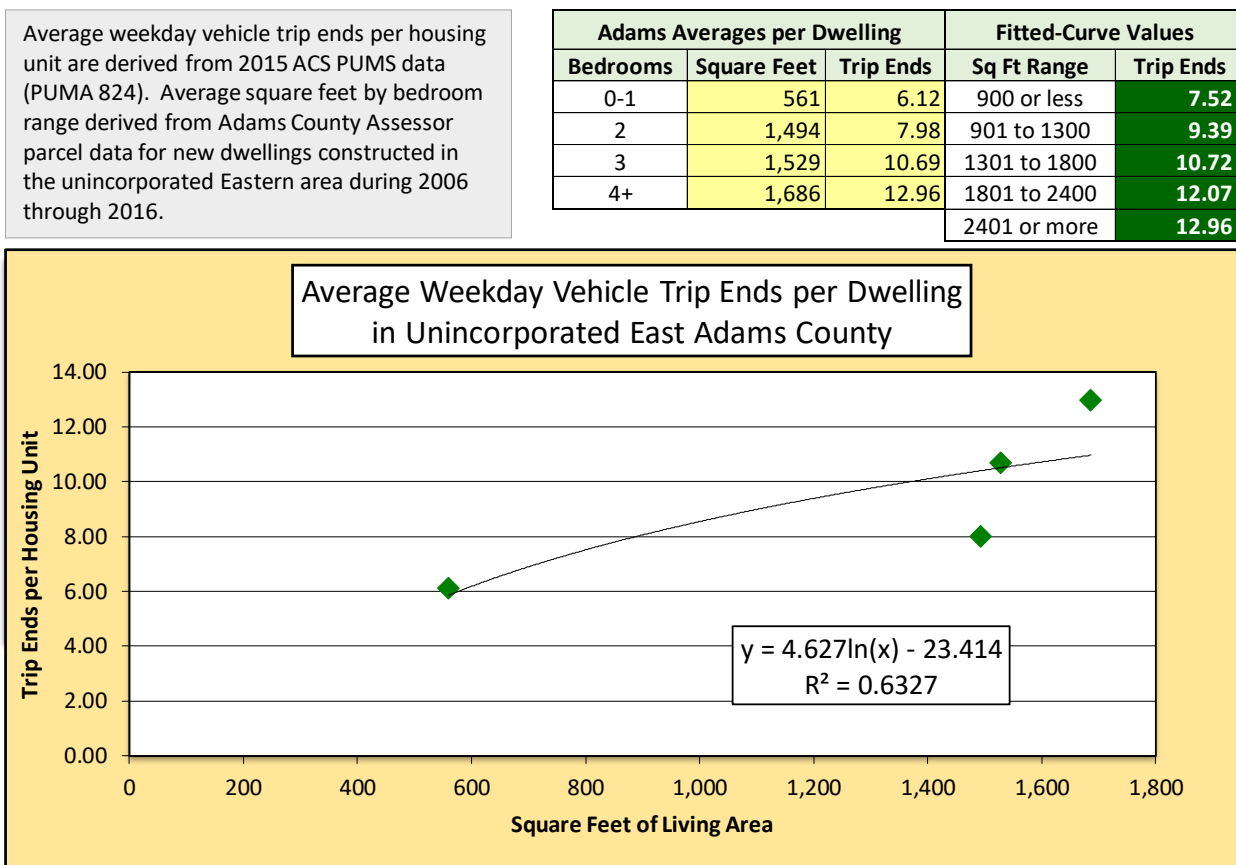
Unincorp Adams Co. Persons/HU	Unincorp Adams Co. VehAvl/HU
1.59	1.66
2.04	2.12
<b>2.78</b>	<b>2.37</b>

**Trip Generation by Floor Area**

To derive average weekday vehicle trip ends by dwelling size in the East Service Area, TischlerBise matched trip generation rates and average floor area, by bedroom range, as shown in Figure 20. The logarithmic trend line formula, derived from the four actual averages in Adams County, is used to derive estimated trip ends by dwelling size. A mid-size housing unit is estimated to range from 1301-1800 square feet of finished living space. A small unit (900 square feet or less) would pay 57% of the transportation impact fee paid by a mid-size unit. A large unit of 2,401 square feet or more would pay 133% of the transportation

impact fee paid by a mid-size unit. If Adams County were to continue with its present practice of a “one-size-fits-all” approach, smaller housing units will be required to pay more than their proportionate share while large units will pay less than their proportionate share. TischlerBise does not recommend an average fee by house type because it makes small units less affordable and essentially subsidizes larger units.

**Figure 20: Vehicle Trips by Dwelling Size: East Service Area**



### Adjustments for Commuting Patterns and Pass-By Trips

For residential units, the trip adjustment factor includes several components, shown below in Figure 21. According to the National Household Travel Survey (2009), home-based work trips are typically 31 percent of “production” trips, out-bound trips (which are 50 percent of all trip ends). Also, utilizing the most recent data from the Census Bureau's web application "OnTheMap", 71 percent of Adams County's workers travel outside the County for work. In combination, these factors account for 11 percent of additional production trips (0.31 x 0.50 x 0.71 = 0.11). The total adjustment factor for residential housing units includes attraction trips (50 percent of trip ends) plus the journey-to-work commuting adjustment (11 percent of production trips) for a total of 61 percent.

**Figure 21: Inflow/Outflow Analysis**

Employed Adams County Residents (2015)	224,122
Adams County Residents Working in County (2015)	64,585
Adams County Residents Commuting Outside County for Work	159,537
<b>Percent Commuting out of the County</b>	<b>71%</b>
<b>Additional Production Trips</b>	<b>11%</b>
<b>Residential Trip Adjustment Factor</b>	<b>61%</b>

Source: U.S. Census, OnTheMap Application, 2015

For commercial development, the trip adjustment factor is less than 50% because retail development and some services, like schools and daycare, attract vehicles as they pass by on arterial and collector roads. For example, when someone stops at a convenience store on the way home from work, the convenience store is not the primary destination. For the average shopping center, ITE indicates that 34% of the vehicles that enter are passing by on their way to some other primary destination. The remaining 66% of attraction trips have the commercial site as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor is 66% multiplied by 50%, or approximately 34% of the trip ends.

### Vehicle Miles of Travel

A Vehicle Mile of Travel (VMT) is a measurement unit equal to one vehicle traveling one mile. In the aggregate, VMT is the product of vehicle trips multiplied by the average trip length<sup>2</sup>. For the purpose of transportation impact fees, the average trip length in Adams County is calibrated to existing lane miles of County arterials within the unincorporated area of the East Service Area. According to data provided by Adams County staff, there are currently has 63 lane miles of arterials in the East Service Area of unincorporated Adams County.

#### Lane Capacity

Transportation impact fees are based on a lane capacity standard of 6,000 vehicles per lane, which is from the 2012 Adams County Transportation Plan (minor arterial). The lane capacity standard was reviewed by Adams County staff and found to be reasonable for existing arterials within the unincorporated area.

#### Trip Length Weighting Factor by Type of Land Use

The transportation impact fee methodology includes a percentage adjustment, or weighting factor, to account for trip length variation by type of land use. As documented in Table 6 of the 2009 National Household Travel Survey, vehicle trips from residential development are approximately 121% of the

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<sup>2</sup> Typical VMT calculations for development-specific traffic studies, along with most transportation models of an entire service area, are derived from traffic counts on particular road segments multiplied by the length of that road segment. For the purpose of impact fees, VMT calculations are based on attraction (inbound) trips to development located in the service area, with the trip length calibrated to the road network considered to be system improvements. This refinement eliminates pass-through or external- external trips, and travel on roads that are not system improvements (e.g. interstate highways).

average trip length. The residential trip length adjustment factor includes data on home-base work trips, social, and recreational purposes. Conversely, shopping trips associated with commercial development are roughly 66% of the average trip length while other nonresidential development typically accounts for trips that are 73% of the average for all trips.

## Development Prototypes and Projected Travel Demand

The relationship between development in the East Service Area of unincorporated Adams County and the need for arterial transportation system improvements is documented below. Figure 22 summarizes the input variables used to determine the average trip length on unincorporated County roads in the East Service Area. In the tables below, DU means dwelling units, KSF means square feet of nonresidential development, in thousands, Institute of Transportation Engineers is abbreviated ITE, and VTE means vehicle trip ends.

Projected unincorporated County development in the East Service Area over the next ten years is shown in the middle section of Figure 22. Trip generation rates and trip adjustment factors convert projected development into average weekday vehicle trips. A typical vehicle trip, such as a person leaving their home and traveling to work, generally begins on a local street that connects to a collector street, which connects to an arterial road and eventually to a state or interstate highway. This progression of travel up and down the functional classification chain limits the average trip length determination, for the purpose of transportation impact fees, to the following question, “What is the average vehicle trip length on transportation fee system improvements (i.e. arterials in the unincorporated area of the West Service Area)?”

With 63 arterial lane miles and a lane capacity standard of 6,000 vehicles per lane, the existing network of unincorporated County roads in the East Service Area has 378,000 vehicle miles of capacity (i.e., 6,000 vehicles per lane multiplied by 63 lane miles). To derive the average utilization (i.e., average trip length expressed in miles) of the system improvements, divide vehicle miles of capacity by the vehicle trips attracted to development in the service area. As shown in the bottom-left corner of the table below, existing development attracts 17,238 average weekday vehicle trips. Dividing 378,000 vehicle miles of capacity by inbound average weekday vehicle trips *yields an un-weighted* average trip length of approximately 21.92 miles. However, the calibration of average trip length includes the same adjustment factors used in the transportation impact fee calculations (i.e., journey-to-work commuting, commercial pass-by adjustment and average trip length adjustment by type of land use). With these adjustments, TischlerBise determined the weighted-average trip length to be 19.32 miles.

**Figure 22: East Service Area Unincorporated County Projected Travel Demand and Trip Length Calibration**

Development Type	ITE Code	Wkdy VTE	Dev Unit	Trip Adj
0-1 Bedroom Residential	210	7.52	HU	55%
2 Bedrooms Residential	210	9.39	HU	55%
3 Bedrooms Residential	210	10.72	HU	55%
4+ Bedrooms Residential	210	12.07	HU	55%
Retail	820	37.75	KSF	34%
Service	710	9.74	KSF	50%
Industrial	140	3.93	KSF	50%

Avg Trip Length (miles)		19.32							
Vehicle Capacity Per Lane		6,000							
	2016	2017	2018	2019	2020	2021	2026	10-Year	
	Base	1	2	3	4	5	10	Increase	
0-1 Bedroom	16	21	27	33	39	45	75	59	
2 Bedrooms	332	339	346	353	359	366	400	68	
3 Bedrooms	1,498	1,569	1,640	1,712	1,783	1,854	2,211	714	
4+ Bedrooms	625	666	707	747	788	829	1,034	409	
Retail Floor Area (KSF)	75	80	85	90	96	101	131	56	
Service Floor Area (KSF)	231	248	265	282	298	317	413	182	
Industrial Floor Area (KSF)	202	215	229	242	256	271	347	145	
0-1 Bedroom Trips	64	89	113	138	162	187	309	244	
2 Bedrooms Trips	1,715	1,750	1,786	1,821	1,856	1,891	2,067	352	
3 Bedrooms Trips	8,830	9,250	9,671	10,092	10,513	10,933	13,037	4,208	
4+ Bedrooms Trips	4,147	4,419	4,690	4,962	5,233	5,505	6,863	2,716	
Retail Trips	960	1,026	1,093	1,160	1,227	1,299	1,675	715	
Service Trips	1,125	1,207	1,289	1,371	1,453	1,544	2,011	886	
Industrial Trips	397	423	450	476	503	532	681	284	
<b>Total Vehicle Trips</b>	<b>17,238</b>	<b>18,165</b>	<b>19,093</b>	<b>20,020</b>	<b>20,947</b>	<b>21,891</b>	<b>26,644</b>	<b>9,406</b>	
<b>Vehicle Miles of Travel (VMT)</b>	<b>378,607</b>	<b>398,564</b>	<b>418,522</b>	<b>438,479</b>	<b>458,437</b>	<b>478,619</b>	<b>579,998</b>	<b>201,391</b>	

### East Service Area Capital Improvement Plan

Figure 23 summarizes a list of prioritized transportation system improvements to accommodate growth in the East Service Area of the unincorporated County over the next 10 years. Adams County staff identified a fiscally realistic list of roadway and intersection improvements for the transportation impact fee calculation. The prioritized list of projects will benefit both existing and new development and includes adding 16 new lane miles of arterial roads.

As shown in Figure 23, the total project cost is \$16 million. The estimated County share is \$15.6 million. The estimated growth share is \$5.46 million. The growth share is based on the percentage increase in VMT over the ten-year planning period. The growth-related portion (\$5.46 million) is divided by the projected increase in vehicle miles of travel (201,391), resulting in a cost per vehicle mile of travel of \$27.11.



Figure 23: East Service Area Road Plan

CIP Project	Lanes	Length of Project (miles)	Lane Miles	Total Cost	County Share	Growth Share	Growth Cost
Piggot Rd (E 29th Ave to E 56th Ave)	2.00	3.00	6.00	\$3,000,000	\$3,000,000	35%	\$1,050,000
Strasburg Rd (15th to E 48th Ave)	2.00	2.00	4.00	\$2,000,000	\$1,600,000	35%	\$560,000
Headlight Mile Rd (US 38 to E 48th)	2.00	3.00	6.00	\$3,000,000	\$3,000,000	35%	\$1,050,000
Wolf Creek Rd (E 26th to E 48th)	2.00	1.00	2.00	\$1,000,000	\$1,000,000	35%	\$350,000
E 120th Ave (Petterson Rd to Hwy 79)	2.00	5.00	10.00	\$5,000,000	\$5,000,000	35%	\$1,750,000
E 38th Ave (Piggot to Headlight Mile)	2.00	2.00	4.00	\$2,000,000	\$2,000,000	35%	\$700,000
<b>TOTAL</b>	<b>12.00</b>	<b>16.00</b>	<b>32.00</b>	<b>\$16,000,000</b>	<b>\$15,600,000</b>	<b>35%</b>	<b>\$5,460,000</b>

Growth-Related Cost	\$5,460,000
10-Year VMT Increase	201,391
<b>Average Cost per VMT</b>	<b>\$27.11</b>

Source: Adams County, CO

### Revenue Credit Evaluation

A credit for future Road & Bridge revenue is only necessary if there is potential double payment for transportation system improvements. In Adams County, Road & Bridge Fund tax revenue is used for maintenance of existing facilities, correcting existing deficiencies, and for capital projects that add capacity. Since a plan-based approach is utilized, and we have identified a growth share for the 10-year CIP, cumulative transportation impact fee revenue over the next ten years will roughly match the growth share East Service Area transportation system improvements. Therefore, a credit for potential double payment is not required.

### Proposed Transportation Impact Fees: East Service Area

Input variables for East Service Area transportation impact fees are shown in the upper section of Figure 24. Inbound vehicle trips by type of development are multiplied by the capacity cost per vehicle mile of travel to yield the proposed transportation impact fees. As an example, to maintain the current infrastructure standard for unincorporated County arterials in the East Service Area, Adams County needs to spend \$5,460,000 on unincorporated County arterial transportation improvements over the next ten years. When the 10-year growth share is divided by the projected increase of 201,391 vehicle miles of travel, the net capital cost is \$27.11 per VMT. The transportation impact fee calculation is shown below using input variables for retail development, as listed in Figure 24.

$$\begin{aligned}
 &37.75 \text{ weekday vehicle trip ends per 1,000 square feet} \\
 &\quad \times \\
 &0.34 \text{ adjustment factor for inbound trips, including pass-by} \\
 &\quad \times \\
 &19.32 \text{ average miles per trip} \\
 &\quad \times \\
 &0.66 \text{ trip length adjustment factor}
 \end{aligned}$$

$$\begin{aligned}
 & \times \\
 & \$27.11 \text{ growth cost per VMT} \\
 & = \\
 & \$4,436 \text{ per 1000 square feet (truncated)}
 \end{aligned}$$

The middle three columns of the table below indicate current transportation fees and the proposed increase or decrease. Proposed transportation fees decrease for the office/service and industrial categories. All residential units see significant increases in the impact fee amount.

**Figure 24: Transportation Impact Fees: East Service Area**

Input Variables for Unincorporated Area	Average Miles per Trip		19.32				
	Ten-Year Growth Cost Funded by Fees		\$5,460,000				
	VMT Increase Over Ten Years		201,391				
	Capital Cost per VMT		<b>\$27.11</b>				
Development Type	Avg Wkdy Veh Trip Ends	Trip Rate Adjustment	Trip Length Adjustment	Transportation Impact Fee	Current County Fee (1998)	Increase or Decrease	Percent Change
<b>Residential (per dwelling) by Sq Ft of Finished Living Space</b>							
900 or less	7.52	61%	121%	\$2,906	\$888	\$2,018	227%
901 to 1300	9.39	61%	121%	\$3,629	\$983	\$2,646	269%
1301 to 1800	10.72	61%	121%	\$4,143	\$983	\$3,160	321%
1801 to 2400	12.07	61%	121%	\$4,665	\$1,599	\$3,066	192%
2401 or more	12.96	61%	121%	\$5,009	\$1,599	\$3,410	213%
<b>Nonresidential (per 1,000 Square Feet of Floor Area)</b>							
Retail	37.75	34%	66%	\$4,436	\$4,264	\$172	4%
Office/Service	9.74	50%	73%	\$1,861	\$2,357	(\$496)	-21%
Industrial	3.93	50%	73%	\$751	\$1,552	(\$801)	-52%

## IMPLEMENTATION AND ADMINISTRATION

Impact fees should be periodically evaluated and updated to reflect recent data. Adams County will continue to adjust for inflation, as specified in the Land Use Code. If cost estimates or demand indicators change significantly, the County should redo the fee calculations. A good rule of thumb for updating an impact fee program is every five years.

Colorado's enabling legislation allows local governments to "waive an impact fee or other similar development charge on the development of low or moderate income housing, or affordable employee housing, as defined by the local government."

### Credits and Reimbursements

A general requirement that is common to impact fee methodologies is the evaluation of credits. A revenue credit may be necessary to avoid potential double payment situations arising from one-time impact fees plus on-going payment of other revenues that may also fund growth-related capital improvements. The determination of revenue credits is dependent upon the impact fee methodology used in the cost analysis and local government policies. A credit for future tax revenue to the Road & Bridge Fund is included in the transportation impact fee methodology.

Policies and procedures related to site-specific credits should be addressed in the resolution or ordinance that establishes the transportation impact fees. Project-level improvements, required as part of the development approval process, are not eligible for credits against impact fees. If a developer constructs a system improvement included in the fee calculations, it will be necessary to either reimburse the developer or provide a credit against the fees due from that particular development. The latter option is more difficult to administer because it creates unique fees for specific geographic areas.

### Service Areas

Two transportation impact fee service areas are recommended. These service areas are shown in Figures 1 and 3 of the Report. The East and West Service Area include only land in unincorporated Adams County. The two Service Areas will be used to track transportation impact fee revenues and expenditures. Impact fee expenditures are limited to the Service Areas that generated the fee revenue.

### Expenditure Guidelines

To ensure benefit to fee payers, Adams County will distinguish system improvements (funded by transportation impact fees) from project-level improvements, such as paving a dirt road within a residential subdivision. TischlerBise recommends limiting transportation impact fee expenditures to arterials and collectors. Acceptable system improvements that are eligible for transportation impact fee funding include:

1. Improving a road surface from gravel to chip seal or asphalt pavement
2. A carrying-capacity enhancement to existing chip seal or asphalt roads, such as widening and/or reconstructing to add greater road depth

3. Adding lanes or constructing new County arterial or collector, or a County arterial with another County arterial or collector.

## Development Categories

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Proposed transportation fees for residential development are by square feet of finished living space, excluding unfinished basement, attic, and garage floor area.

The three general nonresidential development categories in the proposed transportation fee schedule can be used for all new construction within each Service Area. Nonresidential development categories represent general groups of land uses that share similar average weekday vehicle trip generation rates, as documented in the Report and Appendix A.

- “Industrial” includes the processing or production of goods, along with warehousing, transportation, communications, and utilities.
- “Commercial” includes retail development and eating/drinking places, along with entertainment uses often located in a shopping center (e.g. movie theater).
- “Office & Other Services” includes offices, health care and personal services, business services (e.g. banks) and lodging. Public and quasi-public buildings that provide educational, social assistance, or religious services are also included in this category.

The proposed transportation impact fee schedule is designed to provide a reasonable fee amount for general types of development. For unique developments, the County may allow or require an independent assessment. An applicant may submit an independent study to document unique demand indicators for a particular unique development. The independent study must be prepared by a professional engineer or certified planner and use the same type of input variables as those in this transportation impact fee update. For residential development, the fees are based on average weekday vehicle trip ends per housing unit. For nonresidential development, the fees are based on average weekday vehicle trips ends per 1,000 square feet of floor area. The independent fee study will be reviewed by County staff and can be accepted as the basis for a unique impact fee calculation. If the County’s Impact Fee Administrator determines the independent fee study is not reasonable, the applicant may appeal the administrative decision to Adams County elected officials for their consideration.

## APPENDIX A: DEMOGRAPHIC DATA AND DEVELOPMENT PROJECTIONS

As part of our Work Scope, TischlerBise prepared documentation on demographic data and development projections that will be used to update Transportation Impact Fees. An impact fee is authorized by Colorado’s Impact Fee Act (see CRS 29-20-104.5). The demand for growth-related infrastructure from various types of development is a function of additional service units such as population, housing units, jobs, and nonresidential floor area.

In contrast to the County’s Comprehensive Plan that has a long-range horizon, impact fees have a short-range focus. Typically, impact fee studies look out five to ten years, with the expectation that fees will be periodically updated (e.g. every 5 years). Infrastructure standards are calibrated using the latest available data and the first projection year is fiscal year 2019. In Adams County the fiscal year begins on January 1.

### Population and Housing Characteristics

According to the U.S. Census Bureau, a household is a housing unit that is occupied by year-round residents. Impact fees often use per capita standards and persons per housing unit or persons per household to derive proportionate-share fee amounts. When persons per housing unit are used in the fee calculations, infrastructure standards are derived using year-round population. When persons per household are used in the fee calculations, the fee methodology assumes all housing units will be occupied, thus requiring seasonal or peak population to be used when deriving infrastructure standards. TischlerBise recommends that fees for residential development in the Adams County be imposed according to the number of year-round residents per housing unit. Persons per housing unit (PPHU) is an important demographic factor that helps account for variations in service demand by type of housing. Persons per housing unit will be held constant over the projection period since the impact fees represent a “snapshot approach” of current levels of service and costs.

Based on household characteristics, TischlerBise recommends using two housing unit categories for the impact fee study: (1) Single Family and (2) Multifamily. Figure A1 shows the US Census, American Community Survey 2015 5-Year Estimates data for the unincorporated area of Adams County. Single family units have 2.98 persons per unit and multifamily units have 2.55 persons per unit.

**Figure A1: Unincorporated Adams County Persons per Housing Unit**

Housing Type	Persons	Housing Units	Persons per Housing Unit
Single Family [1]	83,133	27,900	2.98
Multifamily [2]	11,798	4,633	2.55

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

## Recent Residential Construction

To estimate current housing units in unincorporated Adams County, TischlerBise obtained building permit data from staff. Residential building permit trends for the unincorporated county by type of housing unit are shown below in Figure A2. From 2012 to 2016, unincorporated Adams County added an average of 291 single family housing units and 1 multifamily unit per year.

**Figure A2: Residential Building Permits in the Unincorporated Adams County, 2012-2016**

Type of Unit	2012	2013	2014	2015	2016	Average
Single Family	108	234	358	376	378	291
Multifamily	2	1	2	0	2	1
Total	110	235	360	376	380	292

Source: Adams County

### Current Estimate of Housing Units

By using the housing stock data available for 2015 from the US Census Bureau and include the building permit data for 2016, a housing unit totals for the Base Year is calculated. Illustrated in Figure A3, it is assumed that there are 28,278 single family housing units and 4,635 multifamily housing units in unincorporated Adams County.

**Figure A3: Unincorporated Adams County 2016 Housing Units**

Type of Unit	2015 Housing Units	2016 Housing Permits	2016 Housing Totals
Single Family	27,900	378	28,278
Multifamily	4,633	2	4,635
Total	32,533	380	32,913

Source: US Census Bureau, ACS 2015; Adams County

### Current Estimate of Population

Applying the persons per housing unit factors found in Figure A1 to the housing unit totals in the Base Year calculates the population for Unincorporated Adams County. It is assumed that there are 96,062 residents in the unincorporated areas of the county, a majority of them in single family housing units.

**Figure A4: Unincorporated Adams County 2016 Population**

Type of Unit	Housing Units	Persons Per Housing Unit	Population
Single Family	28,278	2.98	84,259
Multifamily	4,635	2.55	11,803
Total	32,913		96,062

Source: TischlerBise

According to Adams County’s 2016 Comprehensive Annual Financial Report, the entire county has a population of 498,187. As a result, 19.3 percent of the population in Adams County reside in the unincorporated areas. This is consistent with County staff estimates of 20 percent.

### Unincorporated Population and Housing Unit Projections

Population and housing unit projections are used for the purpose of understanding the possible future pace of service demands, revenues, and expenditures. The projections are driven by housing unit development, which is assumed to grow by the 5-year building permit annual average of 292. The population is calculated by utilizing the persons per housing unit factors with the corresponding housing type. Through 2036, it is projected that the unincorporated areas of Adams County will grow by 17,401 residents and 5,844 housing units. That is an overall increase of 18 percent in housing units from the Base Year.

**Figure A5: Unincorporated Adams County Annual Residential Development Projections**

	Base Year 2016	5-Year Increments								Total Increase
		1 2017	2 2018	3 2019	4 2020	5 2021	10 2026	15 2031	20 2036	
<b>Population</b>	96,062	96,932	97,803	98,673	99,543	100,413	104,763	109,113	113,464	<b>17,401</b>
<b>Housing Type</b>										
Single Family	28,278	28,569	28,860	29,150	29,441	29,732	31,186	32,640	34,094	<b>5,816</b>
Multifamily	4,635	4,636	4,638	4,639	4,641	4,642	4,649	4,656	4,663	<b>28</b>
<b>Total</b>	<b>32,913</b>	<b>33,205</b>	<b>33,497</b>	<b>33,790</b>	<b>34,082</b>	<b>34,374</b>	<b>35,835</b>	<b>37,296</b>	<b>38,757</b>	<b>5,844</b>

Source: Adams County; TischlerBise

### Population and Housing Projection by Service Area

As discussed earlier, there are two service areas for this traffic impact fee study, East and West. The East Service Area is far less developed compared to the West Service Area. After consulting with County staff, there is an average housing growth of 125 units in the East (all single family units) and 167 units in the West (166 single family units and 1 multifamily unit). Of the total assumed development in the unincorporated area of Adams County, 2,500 new housing units will be development in the East and 3,344 housing units will be development in the West. All the multifamily housing unit growth will reside in the West as well. In total, 43 percent of the development occurs in the East Service Area and 57 percent of the development occurs in the West Service Area.

**Figure A6: Service Area Annual Residential Development Projections**

	5-Year Increments								
	1 2017	2 2018	3 2019	4 2020	5 2021	10 2026	15 2031	20 2036	15-Year Increase
<b>EAST SERVICE AREA</b>									
<b>Population</b>	372	745	1,117	1,490	1,862	3,725	5,587	7,449	<b>7,449</b>
<b>Housing Type</b>									
Single Family	125	250	375	500	625	1,250	1,875	2,500	<b>2,500</b>
Multifamily	0	0	0	0	0	0	0	0	<b>0</b>
Total	125	250	375	500	625	1,250	1,875	2,500	<b>2,500</b>
<b>WEST SERVICE AREA</b>									
<b>Population</b>	498	995	1,493	1,990	2,488	4,976	7,464	9,952	<b>9,952</b>
<b>Housing Type</b>									
Single Family	166	332	497	663	829	1,658	2,487	3,316	<b>3,316</b>
Multifamily	1	3	4	6	7	14	21	28	<b>28</b>
Total	167	334	502	669	836	1,672	2,508	3,344	<b>3,344</b>

Source: Adams County; TischlerBise

### Current Employment and Nonresidential Floor Area

Nonresidential trends are an important component to an impact fee study. Utilizing DRCOG’s employment data at the Traffic Analysis Zone (TAZ) level, Figure A7 illustrates the job growth in Unincorporated Adams County. Data is provided in 5-year increments, so a straight-line approach is used to estimate the job totals for the remaining years. In 2016, it is estimated that there are 55,369 jobs in Unincorporated Adams County.

**Figure A7: Employment Trends in Unincorporated Adams County**

	2010	2011	2012	2013	2014	2015	2016	Total Increase
Jobs	46,485	47,940	49,394	50,849	52,303	53,758	55,369	8,884
Percent Increase		3.1%	3.0%	2.9%	2.9%	2.8%	3.0%	

Source: DRCOG, TAZ Database

Additionally, according to DRCOG, the leading industry sector for jobs in Adams County is Industrial, followed by the Service industry. The Service Industry includes service providing jobs such as office and institutional. Figure A8 lists the total jobs by each sector. The Other industry sector includes contract and self-employment.

**Figure A8: Jobs by Sector, Unincorporated Adams County**



Industry Sector	Jobs	%
Retail	6,167	11%
Service [1]	17,760	32%
Industrial	23,750	43%
Other [2]	7,692	14%
Total	55,369	100%

[1] Includes office and institutional jobs

[2] Includes contract and self employment

Source: DRCOG, TAZ Database

### Nonresidential Employment and Floor Area Factors

To estimate the Base Year nonresidential floor area, the factors provided by the Institute of Transportation Engineers in Trip Generation (2017) are utilized. The factors are used to project employment growth and trip generation as well. It is assumed that the Other industry sector does not generate any nonresidential floor area or traffic generation because the industry includes contract work and self-employment. In Figure A9, the highlighted land uses represent the Industrial, Service, and Retail industry sectors in this analysis. TischlerBise calculated the employee per demand unit by dividing the employee trip factor by the demand unit trip factor. The square feet per employee factor is calculated by dividing the demand unit (1,000 square feet) by the employee per demand unit factor.

Figure A9: Nonresidential Demand Factors, Unincorporated Adams County

ITE Code	Land Use	Demand Unit	Wkdy Trip Ends Per Dmd Unit	Wkdy Trip Ends Per Employee	Emp Per Dmd Unit	Sq Ft Per Emp
110	Light Industrial	1,000 Sq Ft	4.96	3.05	1.63	615
130	Industrial Park	1,000 Sq Ft	3.37	2.91	1.16	864
140	Manufacturing	1,000 Sq Ft	3.93	2.47	1.59	628
150	Warehousing	1,000 Sq Ft	1.74	5.05	0.34	2,902
254	Assisted Living	bed	2.60	4.24	0.61	na
320	Motel	room	3.35	25.17	0.13	na
520	Elementary School	1,000 Sq Ft	19.52	21.00	0.93	1,076
530	High School	1,000 Sq Ft	14.07	22.25	0.63	1,581
540	Community College	student	1.15	14.61	0.08	na
550	University/College	student	1.56	8.89	0.18	na
565	Day Care	student	4.09	21.38	0.19	na
610	Hospital	1,000 Sq Ft	10.72	3.79	2.83	354
620	Nursing Home	1,000 Sq Ft	6.64	2.91	2.28	438
710	General Office (avg size)	1,000 Sq Ft	9.74	3.28	2.97	337
760	Research & Dev Center	1,000 Sq Ft	11.26	3.29	3.42	292
770	Business Park	1,000 Sq Ft	12.44	4.04	3.08	325
820	Shopping Center (avg size)	1,000 Sq Ft	37.75	16.11	2.34	427

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

***Current Nonresidential Floor Area***

By combining the Base Year employment data and the square feet per employee factors, the Base Year nonresidential floor area is estimated. In total, there is 23,539,742 square feet of nonresidential floor area in the unincorporated areas of Adams County. Found in Figure A10, the Industrial industry sector accounts for the majority. As noted before, it is assumed that the jobs in the Other industry sector do not generate nonresidential floor area.

Figure A10: Nonresidential Floor Area, Unincorporated Adams County

Industry Sector	Jobs	Square Feet per Employee	Nonresidential Floor Area
Retail	6,167	427	2,631,798
Service [1]	17,760	337	5,980,848
Industrial	23,750	628	14,927,096
Other [2]	7,692	-	-
<b>Total</b>	<b>55,369</b>		<b>23,539,742</b>

[1] Includes office and institutional jobs

[2] Includes contract and self employment

Source: DRCOG, TAZ Database; Trip Generation, Institute of Transportation Engineers, 10th Edition (2017).

### Nonresidential Floor Area and Employment Projections

According to the Denver Regional Council of Governments’ (DRCOG) employment projections, there is going to be considerable growth in the region through 2036. Utilizing DRCOG’s employment forecasts from the Traffic Analysis Zone (TAZ) level database, Figure A11 illustrates the nonresidential growth in unincorporated Adams County. The nonresidential floor area is estimated by applying the ITE square feet per employee factors. By the end of the projection period, the Industrial sector observes the most job and floor area growth, however, the Service sector has a significant increase in job generation as well.

Figure A11: Nonresidential Floor Area and Employment Projections in Unincorporated Adams County

	Base Year 2016	5-Year Increments								Total Increase
		1 2017	2 2018	3 2019	4 2020	5 2021	10 2026	15 2031	20 2036	
<b>UNINCORPORATED ADAMS COUNTY</b>										
<b>Jobs</b>										
Retail	6,167	6,389	6,611	6,833	7,055	7,300	8,563	9,985	11,407	5,240
Service	17,760	18,282	18,805	19,327	19,849	20,424	23,398	26,760	30,122	12,362
Industrial	23,750	24,358	24,965	25,573	26,180	26,849	30,303	34,200	38,098	14,347
Other	7,692	7,951	8,211	8,470	8,730	9,019	10,509	12,176	13,843	6,152
<b>Total</b>	<b>55,369</b>	<b>56,980</b>	<b>58,592</b>	<b>60,203</b>	<b>61,814</b>	<b>63,592</b>	<b>72,774</b>	<b>83,122</b>	<b>93,471</b>	<b>38,102</b>
<b>Nonresidential Square Feet (1,000s)</b>										
Retail	2,632	2,727	2,821	2,916	3,011	3,115	3,654	4,261	4,868	2,236
Service	5,981	6,157	6,333	6,508	6,684	6,878	7,880	9,012	10,144	4,163
Industrial	14,927	15,309	15,691	16,072	16,454	16,874	19,045	21,495	23,944	9,017
<b>Total</b>	<b>23,540</b>	<b>24,192</b>	<b>24,844</b>	<b>25,497</b>	<b>26,149</b>	<b>26,868</b>	<b>30,579</b>	<b>34,768</b>	<b>38,956</b>	<b>15,417</b>

Source: DRCOG; ITE; TischlerBise

By utilizing the spatial distribution of the job projections from DRCOG, the growth is able to be allocate to the East and West Service Areas. Figure A12 illustrates the level of growth that is projected for each Service Area. Over 90 percent of the job and nonresidential floor area that is projected for unincorporated Adams County is in the West.

Figure A12: Nonresidential Floor Area and Employment Projections by Service Area

EAST SERVICE AREA										
<b>Jobs</b>										
Retail	175	187	200	212	224	237	306	385	464	289
Service	686	736	786	836	886	941	1,226	1,548	1,870	1,184
Industrial	321	343	364	386	407	430	552	689	827	505
Other	511	545	578	612	646	684	878	1,093	1,308	797
<b>Total</b>	<b>1,693</b>	<b>1,811</b>	<b>1,928</b>	<b>2,046</b>	<b>2,163</b>	<b>2,293</b>	<b>2,962</b>	<b>3,715</b>	<b>4,469</b>	<b>2,775</b>
<b>Nonresidential Square Feet (1,000s)</b>										
Retail	75	80	85	90	96	101	131	164	198	123
Service	231	248	265	282	298	317	413	521	630	399
Industrial	202	215	229	242	256	271	347	433	519	317
<b>Total</b>	<b>508</b>	<b>543</b>	<b>579</b>	<b>614</b>	<b>650</b>	<b>689</b>	<b>890</b>	<b>1,119</b>	<b>1,347</b>	<b>839</b>
WEST SERVICE AREA										
<b>Jobs</b>										
Retail	5,992	6,202	6,411	6,621	6,831	7,063	8,258	9,601	10,944	4,952
Service	17,074	17,546	18,019	18,491	18,963	19,483	22,172	25,212	28,252	11,178
Industrial	23,429	24,015	24,601	25,187	25,773	26,418	29,751	33,511	37,271	13,842
Other	7,181	7,407	7,632	7,858	8,084	8,335	9,631	11,083	12,535	5,355
<b>Total</b>	<b>53,676</b>	<b>55,170</b>	<b>56,663</b>	<b>58,157</b>	<b>59,651</b>	<b>61,299</b>	<b>69,812</b>	<b>79,407</b>	<b>89,002</b>	<b>35,326</b>
<b>Nonresidential Square Feet (1,000s)</b>										
Retail	2,557	2,647	2,736	2,826	2,915	3,014	3,524	4,097	4,670	2,113
Service	5,750	5,909	6,068	6,227	6,386	6,561	7,467	8,490	9,514	3,764
Industrial	14,725	15,093	15,462	15,830	16,198	16,604	18,698	21,062	23,425	8,700
<b>Total</b>	<b>23,032</b>	<b>23,649</b>	<b>24,266</b>	<b>24,883</b>	<b>25,499</b>	<b>26,179</b>	<b>29,689</b>	<b>33,649</b>	<b>37,609</b>	<b>14,577</b>

Source: DRCOG; ITE; TischlerBise