



2018 Transportation Capital Expansion Fee

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INTRODUCTION

Larimer County's Transportation Capital Expansion Fee (TCEF) study was completed in 2006, prior to the Great Recession. Since then, the real estate market and capital cost of transportation improvements have changed, requiring an update of the fee study. Transportation capital expansion fees are one-time payments for new development's proportionate share of the capital cost of infrastructure. Transportation capital expansion fees do have limitations and should not be regarded as the total solution for infrastructure funding. Rather, they are one component of a comprehensive funding strategy to ensure provision of adequate public facilities. Transportation capital expansion fees may only be used for capital improvements or debt service for growth-related infrastructure. Transportation capital expansion 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 (or capital expansion fees) are one-time payments imposed on new development that must be used solely to fund growth-related capital projects, typically called "system improvements". A capital expansion fee represents new growth's proportionate share of capital facility needs. In contrast to project-level improvements, capital expansion 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, capital expansion 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 capital expansion fees is to defray capital costs directly related to proposed development. The statutes of other states allow capital expansion fee schedules to include administrative costs related to capital expansion fees and the preparation of capital improvement plans, but this is not specifically authorized in Colorado's statute. Capital expansion 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 costlier, they may require bond financing and/or funding from other revenue sources. To be funded by capital expansion fees, Section 29-20-104.5 requires that the capital improvements must have a useful life of at least five years. By law, capital expansion fees can only be used for capital

improvements, not operating or maintenance costs. Also, capital expansion fees cannot be used to repair or correct existing deficiencies in existing infrastructure.

ADDITIONAL LEGAL GUIDELINES

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 are also important, requiring both procedural and substantive due process. The process followed to receive community input (i.e. stakeholder meetings, work sessions, and public hearings) provides opportunities for comments and refinements to the capital expansion fees.

There is little federal case law specifically dealing with capital expansion 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 capital expansion 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 capital expansion 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. Capital expansion 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 capital expansion 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 capital expansion 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 capital expansion fee revenues be segregated from other funds and expended only on the facilities for which the fees were charged. The calculation of capital expansion 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 capital expansion fees they are required to pay. The authority and procedures to implement capital expansion fees is separate from and complementary to the authority to require improvements as part of subdivision or zoning review.

Capital expansion 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-capital expansion fee funding is typically required to help pay a portion of the cost.

CURRENT AND PROPOSED TRANSPORTATION CAPITAL EXPANSION

After reviewing the existing transportation fee study, collaborating with County staff, and receiving input from a stakeholder group, TischlerBise recommends several changes to the 2018 transportation fees.

- First, the proposed transportation fees will be easier to administer by switching from 9 residential categories to fees based on dwelling size, measured by square feet of finished living space. Also, 26 nonresidential categories will be consolidated into three general nonresidential types.
- Second, the 2018 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 (see Appendix A for details).
- Third, TischlerBise recommends consolidating from four to one Benefit Districts, which are used to track revenues and expenditures (see Figure 1). This will provide greater flexibility for expenditures and enable capital improvements to be constructed sooner.

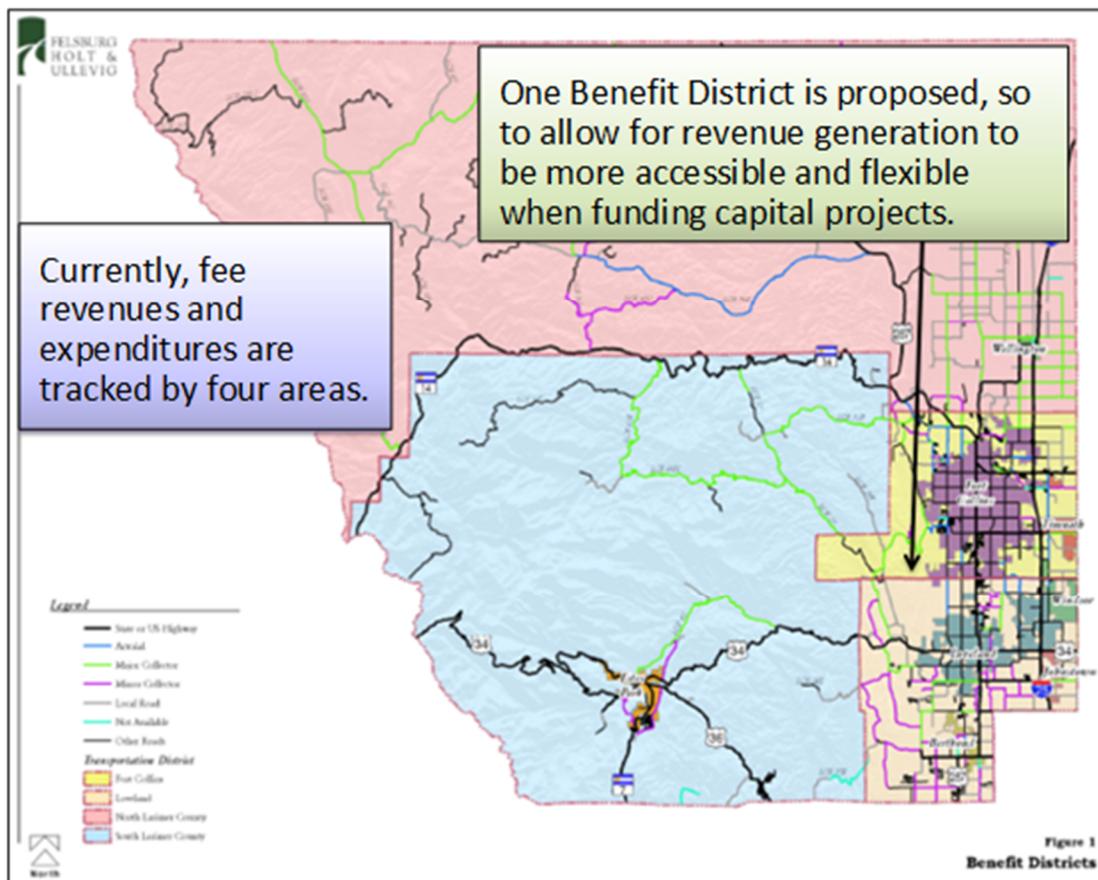
Major reasons for continuing transportation fees are summarized in the following bullet points:

- Infrastructure capacity is essential to accommodate new development.
- Adequate public facilities influence quality of place, which is essential to attract and retain residents.

- Capital expansion fees minimize externalities, like traffic congestion, associated with “no-growth” sentiment.
- Compared to negotiating agreements (during the development approval process) for transportation system improvements, capital expansion fees offer a streamlined approval process with known costs (i.e. more predictability).

Transportation capital expansion fees are currently collected and spent within four Benefit Districts, as shown in Figure 1 (represented by four colors). The 2018 update recommends only one Benefit District. A Benefit District is a region in which a defined set of improvements provide benefit to an identifiable amount of new development. Within the area, all new development is assessed at the same rate. Land use assumptions are defined in terms of this geography, so that capital facility demand, projects needed to meet that demand, and capital facility cost are all quantified in the same terms. Additionally, implementation of a large number of small service areas is problematic because funds collected within a Benefit District should be spent within that area. Multiple service areas may make it difficult to accumulate sufficient revenue to fund any project as well.

Figure 1: Current and Proposed Benefit Districts



Current and proposed transportation capital expansion fees are summarized in Figure 2 - 4. The fee is broken into two categories, County and Regional Roads. In Figure 4, the two categories are combined. The two columns on the right side of the table below indicate current transportation fees and the proposed increase or decrease. Proposed transportation fees decrease for nonresidential development, but increase for most of the residential units. For the average size detached house (1,801 to 2,400 square feet of finished living space), the proposed increase is \$570. Large houses with 3,601 or more square feet will have to pay an additional \$1,842 (Figure 4).

Given the recommended change from residential fees by type of housing to fees by dwelling size, it is difficult to directly compare current and proposed fees for residential development. For example, the current fee schedule provides a lower fee of \$1,026 for structures that qualify as a mountain cabin. The combined road transportation expansion fee proposed in Figure 4 for a dwelling with 900 square feet or less is \$2,109. For a multifamily apartment, the current fee is \$2,525 per dwelling. Most multifamily dwellings will be in the size range of 901 to 1,300 square feet, with a proposed fee of \$2,955 per residential unit.

Figure 2: Current and Proposed County Road Transportation Capital Expansion Fees

Development Type	Proposed County Road TCEF	Current (2017) County TCEF	Increase or Decrease	Percent Change
Residential (per dwelling) by Sq Ft of Finished Living Space				
900 or less#	\$1,946	\$2,303	(\$357)	-16%
901 to 1300#	\$2,727	\$2,303	\$424	18%
1301 to 1800	\$3,284	\$3,280	\$4	0.1%
1801 to 2400	\$3,846	\$3,280	\$566	17%
2401 to 3000	\$4,315	\$3,280	\$1,035	32%
3001 to 3600	\$4,699	\$3,280	\$1,419	43%
3601 or more	\$5,020	\$3,280	\$1,740	53%
Nonresidential (per 1,000 Square Feet of Floor Area)				
Industrial	\$1,196	\$2,776	(\$1,580)	-57%
Commercial	\$5,039	\$8,459	(\$3,420)	-40%
Office & Other Services	\$2,965	\$4,535	(\$1,570)	-35%

#This update proposes to remove the residential fee by housing type and replace with size-based impact fee. To draw a comparison between the proposed fees and current fees, the current multifamily fee is used as a comparison for the smaller housing sizes.

Figure 3: Current and Proposed Regional Road Transportation Capital Expansion Fees

Development Type	Proposed Regional Road TCEF	Current (2017) Regional TCEF	Increase or Decrease	Percent Change
Residential (per dwelling) by Sq Ft of Finished Living Space				
900 or less#	\$163	\$222	(\$59)	-27%
901 to 1300#	\$228	\$222	\$6	3%
1301 to 1800	\$275	\$318	(\$43)	-14%
1801 to 2400	\$322	\$318	\$4	1%
2401 to 3000	\$361	\$318	\$43	14%
3001 to 3600	\$393	\$318	\$75	24%
3601 or more	\$420	\$318	\$102	32%
Nonresidential (per 1,000 Square Feet of Floor Area)				
Industrial	\$100	\$270	(\$170)	-63%
Commercial	\$422	\$816	(\$394)	-48%
Office & Other Services	\$248	\$440	(\$192)	-44%

#This update proposes to remove the residential fee by housing type and replace with size-based impact fee. To draw a comparison between the proposed fees and current fees, the current multifamily fee is used as a comparison for the smaller housing sizes.

Figure 4: Combined Current and Proposed Transportation Capital Expansion Fees

Development Type	Proposed 2017 TCEF	Current County TCEF	Increase or Decrease	Percent Change
Residential (per dwelling) by Sq Ft of Finished Living Space				
900 or less#	\$2,109	\$2,525	(\$416)	-16%
901 to 1300#	\$2,955	\$2,525	\$430	17%
1301 to 1800	\$3,559	\$3,598	(\$39)	-1%
1801 to 2400	\$4,168	\$3,598	\$570	16%
2401 to 3000	\$4,676	\$3,598	\$1,078	30%
3001 to 3600	\$5,092	\$3,598	\$1,494	42%
3601 or more	\$5,440	\$3,598	\$1,842	51%
Nonresidential (per 1,000 Square Feet of Floor Area)				
Industrial	\$1,296	\$3,046	(\$1,750)	-57%
Commercial	\$5,461	\$9,275	(\$3,814)	-41%
Office & Other Services	\$3,213	\$4,975	(\$1,762)	-35%

#This update proposes to remove the residential fee by housing type and replace with size-based impact fee. To draw a comparison between the proposed fees and current fees, the current multifamily fee is used as a comparison for the smaller housing sizes.

Figure 5 provides a comparison of current and proposed transportation fees in Larimer County to other jurisdictions along the Front Range of Colorado.

Figure 5: Transportation Fee Comparisons

Jurisdiction	Single Dwelling	Light Industrial per KSF [2]	Commercial per KSF [2]	Office per KSF [2]
Fort Collins 2017	\$4,777	\$2,017	\$8,507	\$6,737
Larimer - Proposed [1]	\$3,971	\$1,296	\$5,461	\$3,213
Windsor	\$3,838	\$2,016	\$5,076	\$4,674
Jefferson County	\$3,716	\$1,720	\$5,930	\$3,980
Larimer Current	\$3,598	\$3,046	\$9,275	\$4,975
Loveland 2016	\$3,519	\$1,840	\$7,730	\$3,470
Weld County	\$2,377	\$2,141	\$3,296	\$2,174
Timnath	\$2,003	\$2,464	\$4,954	\$2,464
Wellington	\$1,700	\$1,700	\$1,700	\$1,700
Adams County	\$1,599	\$776	\$2,131	\$1,178

[1] Average sized residential unit

[2] 1,000 square feet of floor area

Note: Sorted by Single Dwelling fee

Source: Table compiled by TischlerBise

GENERAL METHODS FOR CAPITAL EXPANSION FEES

There are three general methods for calculating impact/capital expansion 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 in a particular situation and can be used simultaneously for different cost components.

Reduced to its simplest terms, the process of calculating impact/capital expansion 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 impact/capital expansion 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/capital expansion fees and how those methods can be applied to Larimer County.

Cost Recovery Method (past improvements)

Although not used in Larimer 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)

Larimer County transportation capital expansion fees use the incremental expansion method to document 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)

Although not used in Larimer County, the plan-based 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 capital expansion fee methodology. There are two types of “credits” with specific characteristics, both of which should be addressed in capital expansion 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 capital expansion fee. This type of credit is integrated into the capital expansion 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 capital expansion fee program.

TRANSPORTATION CAPITAL EXPANSION FEE

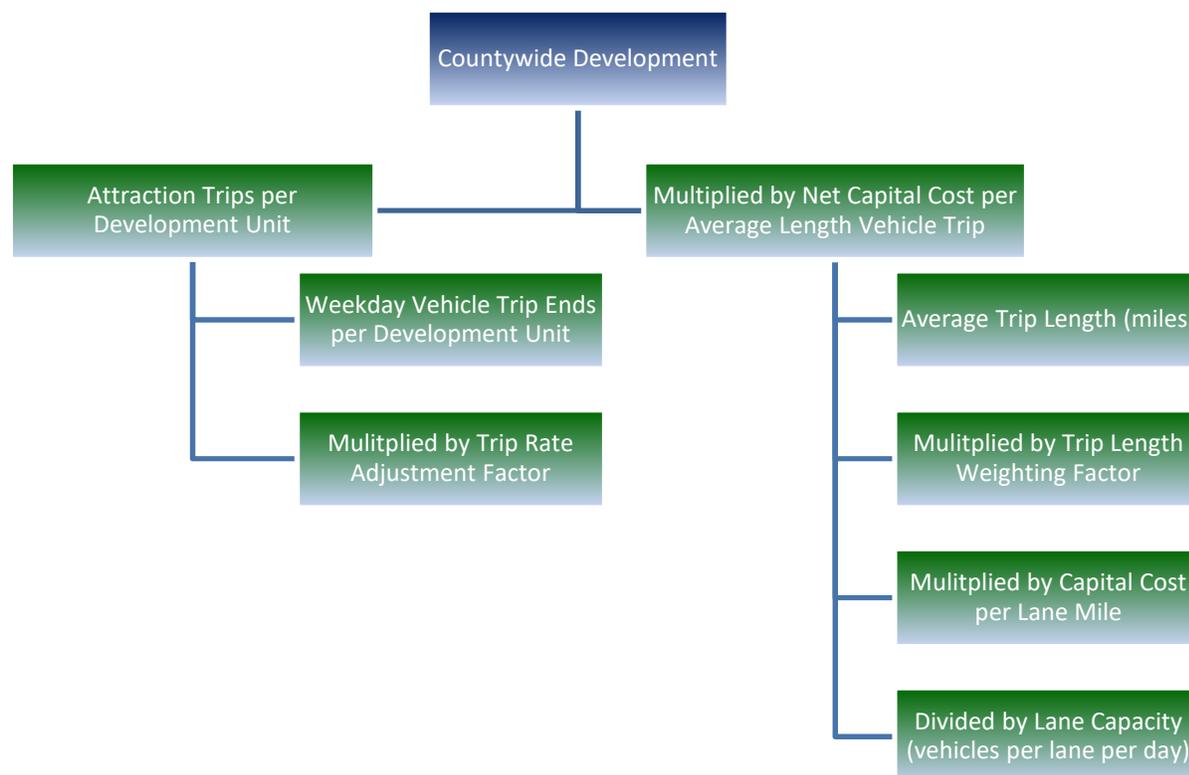
The transportation capital expansion fees for Larimer County are derived using the incremental expansion approach. As shown in the formula and Figure 6 below, the transportation capital expansion fee is the product of Vehicle Miles of Travel (VMT) per development unit multiplied by the net capital cost per VMT for transportation capacity.

$$2018 \text{ Fee} = \text{VMT (vehicle miles of travel) per Development Unit} \times \text{Capital Cost per VMT}$$

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 unincorporated Larimer County determined the general need for growth-related transportation improvements. Larimer County will periodically identify specific transportation capital improvements during the regular, annual budget process. As discussed further in the Implementation and Administration Section, Larimer County will follow expenditure guidelines to ensure benefit to fee payers.

Figure 6: Transportation Capital Expansion Fee Methodology Chart



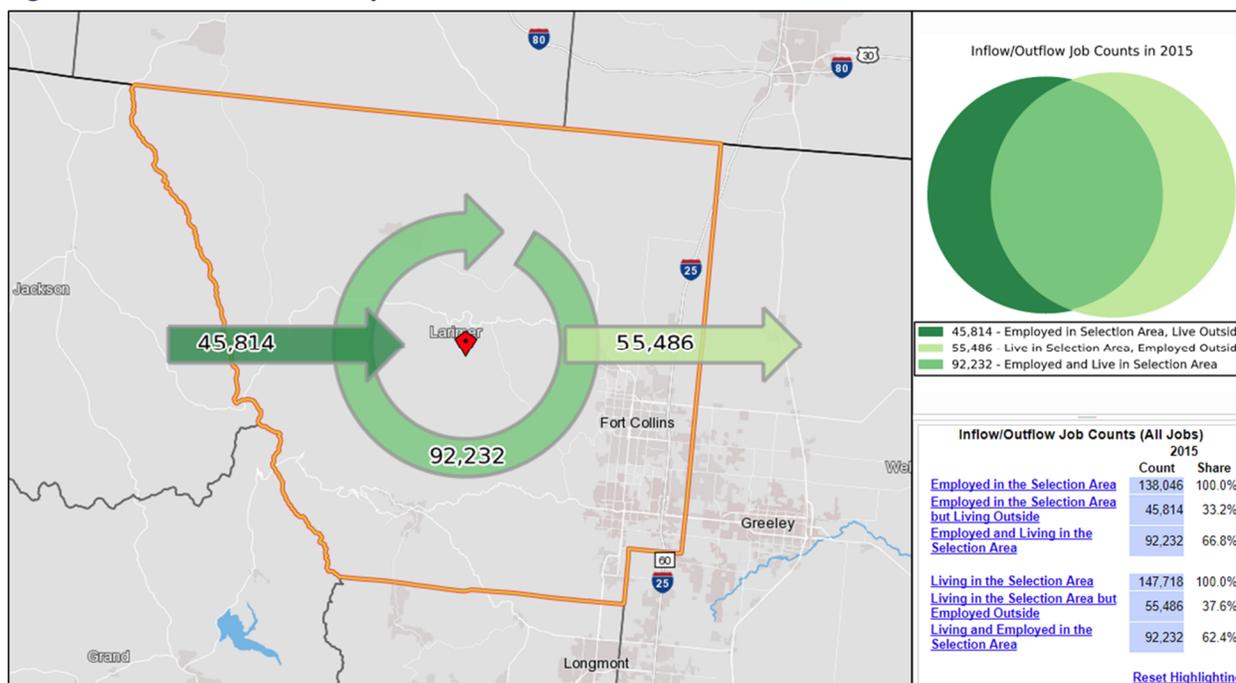
TRIP GENERATION RATES

Transportation capital expansion fees in Larimer County are based on average weekday vehicle trip ends. Trip generation rates are from the reference book *Trip Generation* published by the Institute of Transportation Engineers (ITE 10th Edition 2017). A vehicle trip end represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway). To calculate transportation capital expansion fees, trip generation rates require an adjustment factor to avoid double counting each trip at both the origin and destination points. Therefore, the basic trip adjustment factor is 50%. As discussed further below, the capital expansion fee methodology includes additional adjustments to make the fees proportionate to infrastructure demand for particular types of development.

ADJUSTMENTS FOR COMMUTING PATTERNS AND PASS-BY TRIPS

Residential development has a larger trip adjustment factor of 52% to account for commuters leaving Larimer County for work. According to the 2010 North Front Range Household Travel Survey (see Table R-25) weekday work trips are typically 12.1% of production trips (i.e., all out-bound trips, which are 50% of all trip ends). As shown in Figure 7, the Census Bureau’s web application OnTheMap indicates that 33% of resident workers traveled outside Larimer County for work in 2015. In combination, these factors (0.121 x 0.50 x 0.33 = 0.02) support the additional 2% allocation of trips to residential development.

Figure 7: Inflow/Outflow Analysis



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 33% 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 length¹. For the purpose of transportation capital expansion fees, the average trip length in Larimer County is calibrated to existing lane miles of County arterials. According to staff, in Larimer County there is currently has 150 lane miles of County roads and 30 miles of Regional roads.

Lane Capacity

Transportation capital expansion fees are based on a lane capacity standard of 5,000 vehicles per lane, which assumes a pavement width of 24 feet (see Table 15, Larimer County Master Transportation Plan, 2017). The lane capacity standard was reviewed by Larimer 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 capital expansion fee methodology includes a percentage adjustment, or weighting factor, to account for trip length variation by type of land use. TischlerBise derived the weighting factors using household survey results provided by North Front Range Metropolitan Planning Organization (NRFMPO, 2010). As shown in Figure 8, trips associated with residential development are approximately 114% of the average trip length. Conversely, trips associated with commercial development (i.e. retail and restaurants) are approximately 57% of the average trip length while other nonresidential development typically accounts for trips that are 86% of the average for all trips.

¹ 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 capital expansion 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).

Figure 8: Average Trip Length Weighting Factors in North Front Range

Type of Development	Trip Purpose	Trips	Average Miles Per Trip	Weighting Factor	
1-Residential	All other at home activities	4,920	5.30	2.725	
1-Residential	Work/job	1,637	7.14	1.221	
1-Residential	Dropped off passenger	566	4.36	0.258	
1-Residential	Picked up passenger	557	3.47	0.202	
1-Residential	Indoor recreation/entertainment	516	4.80	0.259	
1-Residential	Visit friends/relatives	435	22.43	1.020	
1-Residential	Change transportation mode	354	9.37	0.347	
1-Residential	Outdoor recreation/entertainment	254	6.60	0.175	
1-Residential	Service private vehicle	160	5.44	0.091	
1-Residential	Working at home	127	4.06	0.054	
1-Residential	Other travel related	37	2.71	0.010	
1-Residential	School at home	7	2.03	0.001	
1-Residential Total		9,570		6.363	1.14
2-Retail/Restaurant	Routine shopping	1,236	2.76	1.571	
2-Retail/Restaurant	Eat meal outside home	577	3.10	0.824	
2-Retail/Restaurant	Other	180	5.37	0.445	
2-Retail/Restaurant	Major purchase / specialty item	91	6.15	0.258	
2-Retail/Restaurant	Drive through	88	1.80	0.073	
2-Retail/Restaurant Total		2,172		3.170	0.57
3-Other Nonresidential	Attend a class	790	2.59	0.756	
3-Other Nonresidential	Work/business related	618	8.48	1.937	
3-Other Nonresidential	Errands (bank, dry cleaning, etc.)	475	2.34	0.411	
3-Other Nonresidential	Personal business (attorney, accountant)	241	5.50	0.490	
3-Other Nonresidential	Health care	224	6.39	0.529	
3-Other Nonresidential	Civic/religious	196	5.13	0.372	
3-Other Nonresidential	Other activities at school	92	3.72	0.126	
3-Other Nonresidential	All other activities at work	70	5.82	0.151	
3-Other Nonresidential Total		2,706		4.771	0.86
TOTAL		14,448	5.58		

Data Source: Table R-27, NFRMPO Household Survey, 2010.

DEVELOPMENT PROTOTYPES AND PROJECTED TRAVEL DEMAND

The relationship between development in unincorporated Larimer County and the need for transportation system improvements is documented below. Figure 9 summarizes the input variables used to determine the average trip length on County roads and Figure 10 summarizes the input variables used to determine the average trip length on Regional roads. 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. Trip generation rates by bedroom range are documented in Figure A8 and related text, found in Appendix A.

Projected development in the unincorporated area over the next ten years is shown in the middle section of Figure 9. 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 capital expansion fees, to the following question, “What is the average vehicle trip length on transportation fee system improvements (i.e. arterials in the unincorporated area)?”

Shown in Figure 9, with 150 arterial lane miles and a lane capacity standard of 5,000 vehicles per lane, the existing network of County roads has 750,000 vehicle miles of capacity (i.e., 5,000 vehicles per lane multiplied by 150 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 202,698 average weekday vehicle trips. Dividing 750,000 vehicle miles of capacity by inbound average weekday vehicle trips yields an un-weighted average trip length of approximately 3.70 miles. However, the calibration of average trip length includes the same adjustment factors used in the transportation 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 3.72 miles. In similar fashion, the weighted-average trip length for Regional roads is calculated in Figure 10. As a result, TischlerBise determined the weighted-average trip length to be 0.23 miles.

Figure 9: County Road Projected Travel Demand and Trip Length Calibration

Dev Type	Weekday VTE	Dev Unit	Trip Adj	Trip Length Wt Factor				
0-1 Bedroom Residential	4.25	DU	52%	1.14				
2 Bedroom Residential	6.61	DU	52%	1.14				
3 Bedroom Residential	9.14	DU	52%	1.14				
4+ Bedroom Residential	11.22	DU	52%	1.14				
Industrial	3.93	KSF	50%	0.86				
Commercial	37.75	KSF	33%	0.57				
Office & Other Services	9.74	KSF	50%	0.86				
Avg Trip Length (miles)	3.72							
Vehicle Capacity Per Lane	5,000	<= See Table 4 in Transportation Plan, 2006.						
Year->	Base	1	2	3	4	5	10	10-Year Increase
Unincorporated Larimer County	2017	2018	2019	2020	2021	2022	2027	
0-1 Bedroom (9% of units)	2,911	2,929	2,948	2,966	2,985	3,004	3,100	189
2 Bedrooms (25% of units)	8,606	8,660	8,714	8,769	8,824	8,880	9,163	557
3 Bedrooms (37% of units)	12,751	12,831	12,912	12,993	13,075	13,157	13,577	826
4+ Bedrooms (29% of units)	9,813	9,875	9,937	10,000	10,062	10,126	10,449	636
Industrial KSF	1,891	1,914	1,937	1,960	1,983	2,006	2,127	236
Commercial KSF	1,961	1,977	1,993	2,010	2,026	2,042	2,126	165
Office & Other Services KSF	4,247	4,275	4,304	4,332	4,361	4,389	4,536	289
0-1 Bedroom Trips	6,433	6,473	6,515	6,555	6,597	6,639	6,851	418
2 Bedroom Trips	29,581	29,766	29,952	30,141	30,330	30,522	31,495	1,915
3 Bedroom Trips	60,603	60,983	61,368	61,753	62,143	62,533	64,529	3,926
4+ Bedroom Trips	57,253	57,615	57,976	58,344	58,706	59,079	60,964	3,711
Industrial Trips	3,716	3,761	3,806	3,851	3,897	3,942	4,180	464
Commercial Trips	24,429	24,628	24,828	25,040	25,239	25,438	26,485	2,055
Office & Other Services Trips	20,683	20,819	20,960	21,097	21,238	21,374	22,090	1,407
Total Vehicle Trips	202,698	204,046	205,406	206,781	208,149	209,527	216,593	13,895
Vehicle Miles of Travel (VMT)	782,767	787,875	793,027	798,221	803,408	808,644	835,405	52,638
LANE MILES	156.6	157.6	158.6	159.6	160.7	161.7	167.1	10.5
Arterial lane miles provided by County staff =>	150							
Ten-Year VMT Increase =>								6.3%

Figure 10: Regional Road Projected Travel Demand and Trip Length Calibration

Dev Type	Weekday VTE	Dev Unit	Trip Adj	Trip Length Wt Factor
0-1 Bedroom Residential	4.25	DU	52%	1.14
2 Bedroom Residential	6.61	DU	52%	1.14
3 Bedroom Residential	9.14	DU	52%	1.14
4+ Bedroom Residential	11.22	DU	52%	1.14
Industrial	3.93	KSF	50%	0.86
Commercial	37.75	KSF	33%	0.57
Office & Other Services	9.74	KSF	50%	0.86
Avg Trip Length (miles)	0.23			
Vehicle Capacity Per Lane	5,000	<= See Table 4 in Transportation Plan, 2006.		

Regional Roads	Year->	Base	1	2	3	4	5	10	10-Year Increase
		2017	2018	2019	2020	2021	2022	2027	
0-1 Bedroom (9% of units)		8,768	8,882	8,996	9,110	9,186	9,262	9,826	1,058
2 Bedrooms (25% of units)		25,922	26,258	26,596	26,933	27,157	27,381	29,048	3,126
3 Bedrooms (37% of units)		38,408	38,907	39,406	39,906	40,238	40,570	43,041	4,633
4+ Bedrooms (29% of units)		29,558	29,942	30,327	30,711	30,967	31,223	33,124	3,566
Industrial KSF		11,739	11,864	11,990	12,117	12,245	12,374	13,028	1,289
Commercial KSF		11,058	11,177	11,297	11,419	11,542	11,666	12,292	1,234
Office & Other Services KSF		24,715	25,068	25,427	25,790	26,159	26,533	28,427	3,712
0-1 Bedroom Trips		19,377	19,629	19,881	20,133	20,301	20,469	21,715	2,338
2 Bedroom Trips		89,099	90,254	91,416	92,574	93,344	94,114	99,844	10,745
3 Bedroom Trips		182,546	184,917	187,289	189,665	191,243	192,821	204,565	22,020
4+ Bedroom Trips		172,453	174,694	176,940	179,180	180,674	182,167	193,259	20,805
Industrial Trips		23,067	23,313	23,560	23,810	24,061	24,315	25,599	2,532
Commercial Trips		137,755	139,237	140,732	142,252	143,784	145,329	153,128	15,373
Office & Other Services Trips		120,362	122,081	123,829	125,597	127,394	129,216	138,441	18,079
Total Vehicle Trips		744,659	754,125	763,648	773,212	780,802	788,431	836,551	91,892
Vehicle Miles of Travel (VMT)		169,217	171,395	173,583	175,778	177,447	179,123	190,122	20,905
LANE MILES		33.8	34.3	34.7	35.2	35.5	35.8	38.0	4.2
Regional Road lane miles provided by County staff =>		30						Ten-Year VMT Increase => 11.0%	

NEEDS ANALYSIS FOR GROWTH-RELATED IMPROVEMENTS

From Figures 9 & 10, there is a total of 14.7 lanes miles of system improvements to accommodate projected development over the next ten years (10.5 lanes miles in County roads and 4.2 lanes miles in Regional roads). The total cost of system improvements to County roads is estimated to be approximately \$10,076,000 in current dollars (i.e. not inflated over time), assuming a cost factor of \$960,000 per lane mile. The total cost of system improvements to Regional roads is estimated to be approximately \$5,376,000 in current dollars, assuming a cost factor of \$1,280,000 per lane mile.

The existing transportation infrastructure standard in Larimer County is 2.0 lane-miles of County arterial/regional road per 10,000 VMT. The formula is 180 lane miles (150 lane miles of County arterial roads and 30 lane miles of regional roads) divided by 951,985 VMT (VMT of 169,217 on regional roads and VMT or 782,767 on County arterials) divided by 10,000. To maintain the existing infrastructure standard, Larimer County needs an additional 14.7 lane miles of system improvements to accommodate projected development over the next ten years.

land use. Some of these centers contained non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, and health clubs. Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include out parcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied include peripheral buildings, it can be assumed that some of the data show their effect.”

The two columns on the right side of the table below indicate current transportation capital expansion fees for county roads and the proposed increase or decrease. Proposed transportation capital expansion fees decrease for nonresidential development, but increase for most residential units. Because the 2018 TCEF schedule varies by dwelling size, the proposed fee change to the County Road fee (Figure 11) for a small single-family house (1,301 to 1,800 square feet of finished living space) is an increase of \$4. For the average size detached house (1,801 to 2,400 square feet of finished living space), the proposed increase is \$566. Large houses with 3,601 or more square feet will have to pay an additional \$1,740.

Given the recommended change from residential fees by type of housing to fees by dwelling size, it is difficult to directly compare current and proposed fees for residential development. For example, the current fee schedule provides a lower fee of \$1,026 for structures that qualify as a mountain cabin. The proposed County Road TCEF for a dwelling with 900 square feet or less is \$1,946. For a multifamily apartment, the current fee is \$2,303 per dwelling. Most multifamily dwellings will be in the size range of 901 to 1,300 square feet, with a proposed fee of \$2,727 per residential unit.

Figure 11: 2018 County Road TCEF Schedule

Input Variables for Unincorporated Area	Average Miles per Trip		3.72				
	Cost per Additional Lane Mile =>		\$960,000				
	Ten-Year Growth Cost Funded by Fees		\$10,076,000				
	VMT Increase Over Ten Years		52,638				
	Capital Cost per VMT		\$191.42				
Development Type	Avg Wkdy Veh Trip Ends	Trip Rate Adjustment	Trip Length Adjustment	Proposed County Road TCEF	Current (2017) County TCEF	Increase or Decrease	Percent Change
Residential (per dwelling) by Sq Ft of Finished Living Space							
900 or less#	4.61	52%	114%	\$1,946	\$2,303	(\$357)	-16%
901 to 1300#	6.46	52%	114%	\$2,727	\$2,303	\$424	18%
1301 to 1800	7.78	52%	114%	\$3,284	\$3,280	\$4	0.1%
1801 to 2400	9.11	52%	114%	\$3,846	\$3,280	\$566	17%
2401 to 3000	10.22	52%	114%	\$4,315	\$3,280	\$1,035	32%
3001 to 3600	11.13	52%	114%	\$4,699	\$3,280	\$1,419	43%
3601 or more	11.89	52%	114%	\$5,020	\$3,280	\$1,740	53%
Nonresidential (per 1,000 Square Feet of Floor Area)							
Industrial	3.93	50%	86%	\$1,196	\$2,776	(\$1,580)	-57%
Commercial	37.75	33%	57%	\$5,039	\$8,459	(\$3,420)	-40%
Office & Other Services	9.74	50%	86%	\$2,965	\$4,535	(\$1,570)	-35%

#This update proposes to remove the residential fee by housing type and replace with size-based impact fee. To draw a comparison between the proposed fees and current fees, the current multifamily fee is used as a comparison for the smaller housing sizes.

Input variables for Larimer County Regional Road component of the transportation capital expansion fees are shown in the upper section of Figure 12. Inbound vehicle trips by type of development are multiplied by the capacity cost per vehicle mile of travel to yield the 2018 regional road component of the transportation capital expansion fees. As an example, to maintain the current infrastructure standard for regional roads, Larimer County needs to spend \$5,376,000 on regional road transportation improvements over the next ten years. When the 10-year growth share is divided by the projected increase of 20,905 vehicle miles of travel on regional roads, the capital cost is \$257.16 per VMT.

Figure 12: 2018 Regional Road TCEF Schedule

Input Variables for Regional Roads	Average Miles per Trip		0.23				
	Additional Lane Miles over Ten Years		4.2				
	Capital Cost per Additional Lane Mile		\$1,280,000				
	Ten-Year Growth Cost Funded by Fees		\$5,376,000				
	VMT Increase Over Ten Years		20,905				
	Capital Cost per VMT		\$257.16				
Development Type	Avg Wkdy Veh Trip Ends	Trip Rate Adjustment	Trip Length Adjustment	Proposed Regional Road TCEF	Current (2017) Regional TCEF	Increase or Decrease	Percent Change
Residential (per dwelling) by Sq Ft of Finished Living Space							
900 or less#	4.61	52%	114%	\$163	\$222	(\$59)	-27%
901 to 1300#	6.46	52%	114%	\$228	\$222	\$6	3%
1301 to 1800	7.78	52%	114%	\$275	\$318	(\$43)	-14%
1801 to 2400	9.11	52%	114%	\$322	\$318	\$4	1%
2401 to 3000	10.22	52%	114%	\$361	\$318	\$43	14%
3001 to 3600	11.13	52%	114%	\$393	\$318	\$75	24%
3601 or more	11.89	52%	114%	\$420	\$318	\$102	32%
Nonresidential (per 1,000 Square Feet of Floor Area)							
Industrial	3.93	50%	86%	\$100	\$270	(\$170)	-63%
Commercial	37.75	33%	57%	\$422	\$816	(\$394)	-48%
Office & Other Services	9.74	50%	86%	\$248	\$440	(\$192)	-44%

#This update proposes to remove the residential fee by housing type and replace with size-based impact fee. To draw a comparison between the proposed fees and current fees, the current multifamily fee is used as a comparison for the smaller housing sizes.

IMPROVEMENTS PLAN AND FUNDING STRATEGY FOR COUNTY AND REGIONAL ROADS

Figure 13 indicates projected County TCEF revenue over the next ten years for County Roads. The County expects to construct \$10 million in transportation improvements within the unincorporated area in order to maintain current infrastructure standards. As shown in the lower portion of the table, projected TCEF revenue will cover the growth cost of improvements.

The revenue projection shown below is based on the demographic data described in Appendix A and the proposed fee schedule. Residential development in the unincorporated area is expected to yield approximately 80% of total transportation fee revenue, with the remaining 20% from nonresidential development. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in transportation fee revenue and capital costs.

Figure 13: Capital Costs and Projected TCEF Revenue for County Roads

Ten-Year Cost of Transportation Improvements, County Roads

Growth Share Funded by TCEF => \$10,076,000

TCEF Revenue from the Unincorporated Area, County Roads

Year		Average-Size Residential	Industrial	Commercial	Office & Other Services
		\$3,664 per housing unit	\$1,196 per 1000 Sq Ft	\$5,039 per 1000 Sq Ft	\$2,965 per 1000 Sq Ft
		Hsg Units	KSF	KSF	KSF
Base	2017	34,080	1,891	1,961	4,247
Year 1	2018	34,295	1,914	1,977	4,275
Year 2	2019	34,511	1,937	1,993	4,304
Year 3	2020	34,729	1,960	2,010	4,332
Year 4	2021	34,947	1,983	2,026	4,361
Year 5	2022	35,167	2,006	2,042	4,389
Year 6	2023	35,389	2,029	2,058	4,418
Year 7	2024	35,612	2,054	2,075	4,448
Year 8	2025	35,837	2,078	2,092	4,477
Year 9	2026	36,062	2,102	2,109	4,506
Year 10	2027	36,289	2,127	2,126	4,536
Ten-Yr Increase		2,209	236	165	289
Projected Revenue =>		\$8,094,000	\$282,000	\$831,000	\$857,000
Total Projected Revenues (rounded) =>					\$10,064,000
Residential Share =>		80%	20%	<= Nonresidential Share	

Figure 14 indicates projected County TCEF revenue over the next ten years for Regional Roads. The County expects over \$5 million in transportation improvements to Regional Roads to maintain current infrastructure standards. As shown in the lower portion of the table, projected TCEF revenue from the Unincorporated Area will generate \$844,000 for growth cost of improvements. **The remaining revenue to cover the improvements costs will be generated by growth within incorporated areas, such as City of Fort Collins.**

Figure 14: Capital Costs and Projected TCEF Revenue for Regional Roads

Ten-Year Cost of Transportation Improvements, Regional Roads

Growth Share Funded by TCEF => \$5,376,000

TCEF Revenue from the Unincorporated Area, Regional Roads

Year	Average-Size Residential	Industrial	Commercial	Office & Other Services
	\$307 per housing unit	\$100 per 1000 Sq Ft	\$422 per 1000 Sq Ft	\$248 per 1000 Sq Ft
	Hsg Units	KSF	KSF	KSF
Base 2017	34,080	1,891	1,961	4,247
Year 1 2018	34,295	1,914	1,977	4,275
Year 2 2019	34,511	1,937	1,993	4,304
Year 3 2020	34,729	1,960	2,010	4,332
Year 4 2021	34,947	1,983	2,026	4,361
Year 5 2022	35,167	2,006	2,042	4,389
Year 6 2023	35,389	2,029	2,058	4,418
Year 7 2024	35,612	2,054	2,075	4,448
Year 8 2025	35,837	2,078	2,092	4,477
Year 9 2026	36,062	2,102	2,109	4,506
Year 10 2027	36,289	2,127	2,126	4,536
Ten-Yr Increase	2,209	236	165	289
Projected Revenue =>	\$678,000	\$24,000	\$70,000	\$72,000
Total Projected Revenues (rounded) =>				\$844,000
Residential Share =>	80%	20%	<= Nonresidential Share	

IMPLEMENTATION AND ADMINISTRATION

Capital expansion fees should be periodically evaluated and updated to reflect recent data. Larimer 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.

Colorado’s enabling legislation allows local governments to “waive a capital expansion 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 capital expansion fee methodologies is the evaluation of credits. A revenue credit may be necessary to avoid potential double payment situations arising from one-time capital expansion 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 capital expansion fee methodology used in the cost analysis and local government policies. Since an incremental expansion methodology was utilized in the fee methodology, there is no existing debt for transportation capacity projects and our cash flow analysis indicates capital expansion fee revenue approximates the growth-related transportation needs, there is no danger of double payment.

Policies and procedures related to site-specific credits should be addressed in the resolution or ordinance that establishes the capital expansion fees. Project-level improvements, required as part of the development approval process, are not eligible for credits against capital expansion 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.

One Benefit Districts

A map of the one recommended Benefit District is shown in Figure 1. The service area is defined as unincorporated land within Larimer County. Fee expenditures are limited to the Benefit District that generated the fee revenue, thus expanding to one district will allow for fee revenue to be more flexible and potentially fund more projects.

Expenditure Guidelines

To ensure benefit to fee payers, Larimer County will distinguish system improvements (funded by transportation fees) from project-level improvements, such as paving a dirt road within or near a residential subdivision. TischlerBise recommends limiting transportation fee expenditures to arterials and collectors. Acceptable system improvements that are eligible for transportation 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 turn lanes, traffic signals, or roundabouts at the intersection of a State Highway with a County arterial or collector, or a County arterial with another County arterial or collector.

Development Categories

Proposed transportation fees for residential development are by square feet of finished living space, excluding unfinished basement, attic, and garage floor area. Appendix A provides further documentation of demographic data by size threshold.

The three general nonresidential development categories in the proposed transportation fee schedule can be used for all new construction within the Service Area. Nonresidential development categories represent general groups of land uses that share similar average weekday vehicle trip generation rates, as documented in 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 TCEF 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 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 fee calculation. If the Fee Administrator determines the independent fee study is not reasonable, the applicant may appeal the administrative decision to Larimer 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 Capital Expansion Fees (TCEF). A Capital Expansion Fee is another name for a development impact fee, 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. To ensure the fees are proportionate by type of development, TischlerBise also documented average weekday vehicle trip generation rates by size of housing unit.

In contrast to the Comprehensive Plan and the Metropolitan Planning Organization's transportation model that have a long-range horizon, capital expansion fees have a short-range focus. Typically, capital expansion 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 2018. In Larimer County the fiscal year begins on January 1.

Summary of Growth Indicators

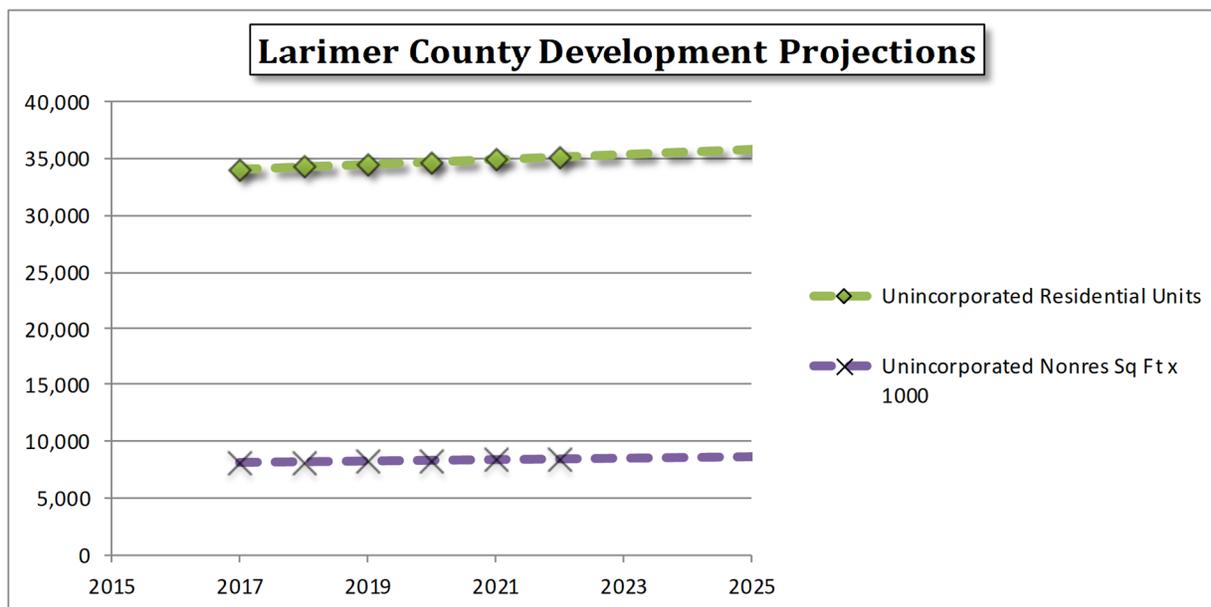
Development projections and growth rates are summarized in Figure A1. These projections are used to estimate TCEF revenue and to indicate the anticipated need for growth-related infrastructure. However, TCEF methodologies are designed to reduce sensitivity to accurate development projections in the determination of the fee amounts. If actual development is slower than projected, TCEF revenues will also decline, but so will the need for growth-related infrastructure. In contrast, if development is faster than anticipated, the County will receive an increase in TCEF revenue, but will also need to accelerate the capital improvements program to keep pace with the actual rate of development.

Larimer County data for the demographic analysis and development projections include Colorado State Demography Office (SDO) population estimates and projections, U.S. Census Bureau OnTheMap job estimates, North Front Range Metropolitan Planning Organization (NFRMPO) Traffic Analysis Zone (TAZ) growth rates, American Community Survey data, and Public Use Microdata Samples (PUMS). SDO population estimates for 2017 were converted to housing units by holding constant the 2017 ratio of year-round residents per housing unit, as reported by the U.S. Census Bureau's American Community Survey. Job estimates for 2017, from the U.S. Census Bureau were converted to nonresidential floor area using average floor area multipliers, as discussed further below (see Figures A3-A4 and related text).

During the next five years, the TCEF study expects an average increase of 217 housing units per year in the unincorporated area. In comparison, Larimer Assessor records indicate an average increase of 163 dwellings per year during calendar years 2012 through 2014. Also, unincorporated Larimer County anticipates an average increase of 66,000 square feet of nonresidential floor area per year from 2015 to 2020. For residential development in the unincorporated area, the TCEF study assumes a compound annual growth rate 0.63%. Nonresidential development in the unincorporated area is projected to increase by a compound average annual growth rate of 0.82%.

Figure A1: Development Projections and Growth Rates

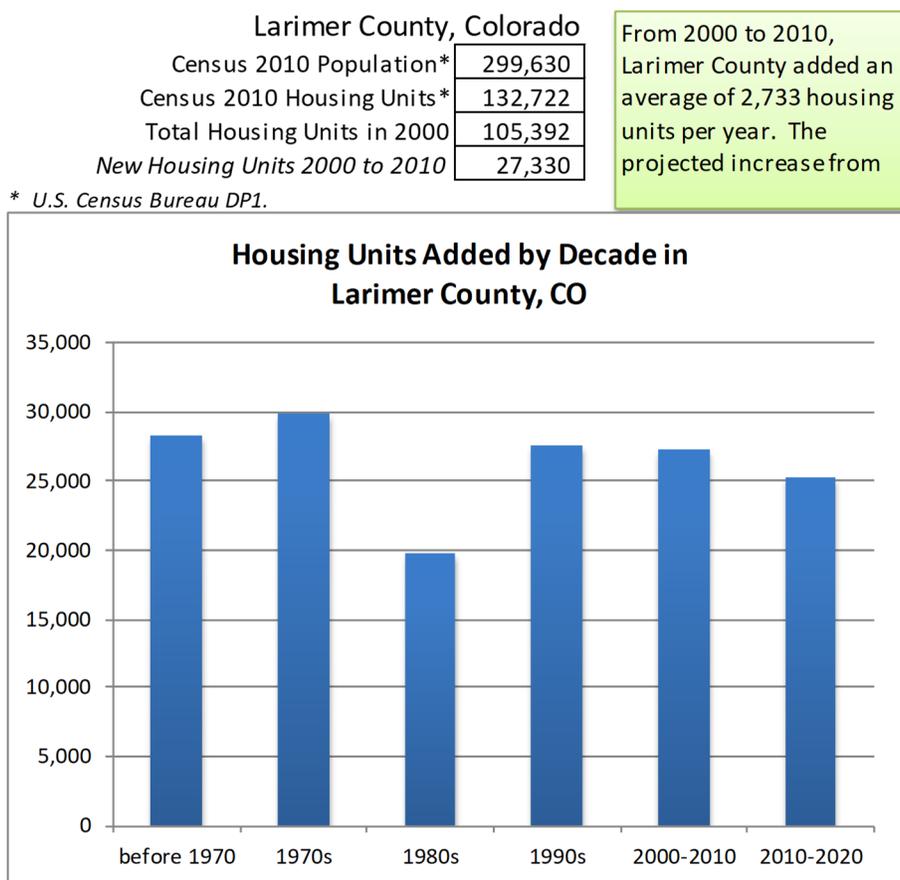
Larimer County, CO	Base	1	2	3	4	5	10	2017 to 2022 Average Annual	
	2017	2018	2019	2020	2021	2022	2027	Increase	Compound Growth Rate
Unincorporated Residential Units	34,080	34,295	34,511	34,729	34,947	35,167	36,289	217	0.63%
Unincorporated Nonres Sq Ft x 1000	8,099	8,166	8,234	8,302	8,370	8,437	8,789	68	0.82%



Recent Countywide Residential Construction

From 2000-2010, Larimer County increased by an average of 2,733 housing units per year. The chart at the bottom of Figure A2 indicates the estimated number of housing units added by decade in Larimer County. Countywide residential construction has remained consistent over the past two decades. Based on the projection of 356,900 residents by 2020, Larimer County will see an average increase of 2,520 units per year from 2010 to 2020.

Figure A2: Housing Units by Decade



Source for 1990s and earlier is B25034, 5-year American Community Survey 2010, adjusted to yield total units in 2000. Projected units from 2010 to 2020 is based on State Demography Office population forecast.

Nonresidential Development

In addition to data on residential development, the calculation of TCEFs requires data on nonresidential development. TischlerBise uses the term “jobs” to refer to employment by place of work. Jobs were converted to nonresidential floor area using average square feet per employee multipliers. Figure A3 indicates 2013 estimates of jobs and nonresidential floor area located in Larimer County. Floor area estimates are from the Tax Assessor’s parcel database, aggregated into three nonresidential categories. Jobs in 2013 are based on two-digit industry sectors (NAICS), as reported by the U.S. Census Bureau’s OnTheMap web application.

Figure A3: Jobs and Floor Area Estimate

	2013 Countywide Jobs (1)		2013 Incorporated Jobs		2013 Unincorporated Jobs (1)	Unincorporated Square Feet per Job	Estimated Unincorporated Floor Area (2)	Jobs per 1000 Sq Ft
Industrial (3)	26,821	20.4%	23,303		3,518	513	1,805,000	1.95
Commercial (4)	29,306	22.3%	25,462		3,844	494	1,900,000	2.02
Services (5)	75,446	57.3%	65,548.85		9,897	418	4,141,000	2.39
TOTAL	131,573	100.0%	114,313		17,260	455	7,846,000	2.20

(1) Jobs in 2013 from Work Area Profile, OnTheMap, U.S. Census Bureau web application.

(2) Source: Larimer County Tax Assessor data.

(3) Major sectors are Construction and Mining/Oil/Gas Extraction.

(4) Major sectors are Retail and Accommodation/Food Services.

(5) Major sectors are Educational Services, Public Administration, Health Care, and Professional/Scientific/Technical Services.

In Figure A4, gray shading indicates three nonresidential development prototypes used by TischlerBise to project average weekday vehicle trips and Vehicle Miles of Travel (VMT). The prototype development for *Industrial* jobs is “Manufacturing”. Average weekday vehicle trip generation rates are from the Institute of Transportation Engineers (ITE 2017). The prototype for *Commercial* development is an average-size shopping center. All businesses that sell merchandise, including eating/drinking places, are considered commercial development. The prototype for *Services* development is an average-size general office building. *Services* include public and quasi-public buildings (e.g. schools, churches and daycare facilities) and all business and personal services (e.g. banks, medical offices, health care facilities and lodging).

Figure A4: Employee and Building Area Ratios

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

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

Detailed Development Projections

Demographic data shown in Figure A5 provide key inputs for the TCEF update in Larimer County. Cumulative data are shown at the top and projected annual increases by type of development are shown at the bottom of the table. Given the expectation that TCEFs are updated every five years, TischlerBise did not evaluate long-term demographic trends. As discussed in the next section, TischlerBise recommends the use of vehicle trip ends per housing unit to derive TCEFs. Therefore, vacancy rates and number of households are not relevant to the demographic analysis.

Cells with yellow shading indicate 2017 estimates (i.e., SDO population and OnTheMap jobs). Cells with blue shading are SDO population projections. The unincorporated population growth rate of 0.63% is based on the actual increase from 2010 to 2013. The North Front Range MPO provided TAZ data used to derive countywide and unincorporated area job growth rates, by type of nonresidential development (i.e. job change from 2012 to 2030).

Figure A5: Cumulative Demographics and Annual Increases

	FY begins January 1st	2017	2018	2019	2020	2021	2022	2027	2032	Compound
	Base Yr	1	2	3	4	5	10	15		Anl Growth
Population										
Countywide Residents		338,841	344,860	350,879	356,900	363,293	369,686	400,846	429,794	1.68%
Incorporated Places		269,819	275,403	280,984	286,565	292,515	298,462	327,350	353,953	1.93%
Unincorporated Area Residents		69,022	69,457	69,895	70,335	70,778	71,224	73,496	75,841	0.63%
% Unincorporated =>		20.4%	20.1%	19.9%	19.7%	19.5%	19.3%	18.3%	17.6%	
Housing Units										
Countywide Dwellings		150,012	152,677	155,341	158,007	160,837	163,668	177,463	190,279	1.68%
Incorporated Dwellings		115,932	118,382	120,830	123,278	125,890	128,501	141,174	152,832	1.97%
Unincorporated Area Dwellings		34,080	34,295	34,511	34,729	34,947	35,167	36,289	37,447	0.63%
Countywide Jobs										
Industrial		28,422	28,837	29,258	29,685	30,119	30,558	32,855	35,325	1.46%
Commercial		31,043	31,493	31,950	32,413	32,883	33,360	35,850	38,525	1.45%
Services		81,505	83,095	84,715	86,367	88,051	89,768	98,868	108,891	1.95%
Total		140,970	143,425	145,923	148,465	151,053	153,686	167,573	182,741	1.74%
Countywide Jobs-Housing Ratio		0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.96	
Jobs in Incorporated Places										
Jobs in Municipalities		123,152	125,463	127,817	130,213	132,655	135,141	148,271	162,648	1.87%
Jobs in Unincorporated Area										
Industrial		3,687	3,731	3,775	3,820	3,865	3,910	4,146	4,397	1.18%
Commercial		3,970	4,003	4,035	4,068	4,101	4,134	4,304	4,481	0.81%
Services		10,161	10,228	10,296	10,364	10,432	10,501	10,852	11,215	0.66%
Total		17,818	17,962	18,106	18,252	18,398	18,545	19,302	20,093	0.80%
% Unincorporated =>		12.6%	12.5%	12.4%	12.3%	12.2%	12.1%	11.5%	11.0%	
Unincorporated Jobs-Housing Ratio		0.52	0.52	0.52	0.53	0.53	0.53	0.53	0.54	
Unincorporated Nonresidential Floor Area (1,000 square feet)										
Industrial KSF		1,891	1,914	1,937	1,960	1,983	2,006	2,127	2,256	1.18%
Commercial KSF		1,961	1,977	1,993	2,010	2,026	2,042	2,126	2,214	0.81%
Services KSF		4,247	4,275	4,304	4,332	4,361	4,389	4,536	4,688	0.65%
Total		8,099	8,166	8,234	8,302	8,370	8,437	8,789	9,158	0.82%
Annual Increases in Unincorporated Area										
		2017	2018	2019	2020	2021	2022	2017-2027		
								Avg Annual		
Population		435	438	440	443	446	449	447		
Housing Units		215	216	218	218	220	222	221		
Jobs		144	144	146	146	147	148	148		
Industrial KSF		23	23	23	23	23	23	24		
Commercial KSF		16	16	17	16	16	16	17		
Services KSF		28	29	28	29	28	29	29		
Total KSF		67	68	68	68	67	68	69		

Customized Trip Generation Rates per Housing Unit

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 Larimer County.

Unincorporated Area Control Totals

Figure A6 indicates the average number of year-round residents per housing unit for three levels of geography. At the top are countywide data; the middle section shows data for incorporated places, and the bottom of the table provides data for the unincorporated area. Typically, incorporated places, like the cities of Fort Collins and Loveland, have fewer persons per dwelling, but that is not the pattern in Larimer County due to a significant number of seasonal units in the unincorporated area. Another demographic anomaly is a greater number of persons per housing unit for All Other dwelling types in the unincorporated area, which is also due to a significant number of seasonal dwellings.

Figure A6: Persons per Housing Unit

Larimer County, Countywide

Housing Type	Persons	Housing Units	Persons per Housing Unit	Households	Persons per Household	Housing Unit Mix	Household Mix
Single Family [1]	256,602	106,529	2.41	97,552	2.63	78%	78%
Multifamily [2]	52,496	30,315	1.73	27,579	1.90	22%	22%
Total	309,098	136,844	2.26	125,131	2.47		

Incorporated Larimer County

Housing Type	Persons	Housing Units	Persons per Housing Unit	Households	Persons per Household	Housing Unit Mix	Household Mix
Single Family [1]	191,679	74,688	2.57	72,225	2.65	72%	73%
Multifamily [2]	50,925	29,324	1.74	26,850	1.90	28%	27%
Total	242,604	104,012	2.33	99,075	2.45		

Unincorporated Larimer County

Housing Type	Persons	Housing Units	Persons per Housing Unit	Households	Persons per Household	Housing Unit Mix	Household Mix
Single Family [1]	64,923	31,841	2.04	25,327	2.56	97%	97%
Multifamily [2]	1,571	991	1.59	729	2.16	3%	3%
Total	66,494	32,832	2.03	26,056	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

Trip generation rates are also dependent upon the average number of vehicles available per dwelling. Figure A7 indicates vehicles available for all of Larimer 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 A7: Vehicles Available per Housing Unit

Countywide		Households (2)			Vehicles per Household by Tenure
Tenure	Vehicles Available (1)	Single Family*	Multifamily	Total	
Owner-occupied	176,785	77,410	2,847	80,257	2.20
Renter-occupied	73,535	20,142	24,732	44,874	1.64
Total	250,320	97,552	27,579	125,131	2.00
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	203,520	106,529	1.91		
All Other	46,800	30,315	1.54		
Total	250,320	136,844	1.83		
Incorporated Places		Households (2)			Vehicles per Household by Tenure
Tenure	Vehicles Available (1)	Single Unit Detached or Attached	All Other	Total	
Owner-occupied	123,859	56,026	2,701	58,727	2.11
Renter-occupied	65,356	16,199	24,149	40,348	1.62
Total	189,215	72,225	26,850	99,075	1.91
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single Detached or Attac	144,402	74,688	1.93		
All Other	44,813	29,324	1.53		
Total	189,215	104,012	1.82		
Unincorporated Area		Households (2)			Vehicles per Household by Tenure
Tenure	Vehicles Available (1)	Single Family*	Multifamily	Total	
Owner-occupied	52,926	21,384	146	21,530	2.46
Renter-occupied	8,179	3,943	583	4,526	1.81
Total	61,105	25,327	729	26,056	2.35
Units per Structure	Vehicles Available	Housing Units (3)	Vehicles per Housing Unit		
Single family	59,693	31,841	1.87		
All Other	1,412	991	1.43		
Total	61,105	32,832	1.86		

(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 Microdata Samples (PUMS). Because PUMS files are available for areas of roughly 100,000 persons, Larimer County is included in Public Use Microdata Areas (PUMA) 102 and 103. At the top of Figure A8, in the cells with yellow shading, are the survey results for Larimer 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 A6 and A7.

In comparison to the national averages based on ITE traffic studies, the unincorporated area of Larimer 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 Larimer County, each housing unit is expected to yield an average of 8.68 Average Weekday Vehicle Trip Ends (AWVTE), compared to the national average of 9.38 trips ends per household.

Figure A8: Average Weekday Vehicle Trip Ends by Bedroom Range

Larimer County 2015 Data

Bedroom Range	Persons (1)	Vehicles Available (1)	Housing Units (1)	Larimer Co. Hsg Mix	Unadjusted Persons/HU	Adjusted Persons/HU (2)	Unadjusted VehAvl/HU	Adjusted VehAvl/HU (2)
0-1	473	398	434	8.54%	1.09	0.98	0.92	0.94
2	2,189	1,849	1,283	25.25%	1.71	1.53	1.44	1.46
3	4,372	3,819	1,901	37.41%	2.30	2.06	2.01	2.04
4+	4,306	3,535	1,463	28.79%	2.94	2.64	2.42	2.46
Total	11,340	9,601	5,081		2.23	2.00	1.89	1.92

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	3%	5.15	1.44
210 SFD	2.65	6.36	9.44	97%	3.56	1.48
Wgtd Avg	2.61	6.32	9.38		3.61	1.48

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 Larimer AWVTE per Housing Unit (5)
0-1	2.56	5.94	4.25
2	3.99	9.23	6.61
3	5.38	12.89	9.14
4+	6.89	15.55	11.22
Total	5.22	12.13	8.68

- (1) American Community Survey, Public Use Microdata Sample for CO PUMAs 102 and 103 (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 Larimer AWVTE per Housing Unit (5)
220 Apt	4.14	9.04	6.59
210 SFD	5.32	11.82	8.57
All Types	5.22	12.13	8.68

Unincorp Larimer Co. Persons/HU
1.59
2.04
2.00

Unincorp Larimer Co. VehAvl/HU
1.43
1.87
1.92

Trip Generation by Floor Area

To derive average weekday vehicle trip ends by dwelling size, TischlerBise matched trip generation rates and average floor area, by bedroom range, as shown in Figure A9. The logarithmic trend line formula, derived from the four actual averages in Larimer County, is used to derive estimated trip ends by dwelling size. A mid-size detached house is estimated to range from 1,801-2,400 square feet of finished living space. A small, detached house (1,301 to 1,800 square feet) would pay 85% of the TCEF paid by an average-size detached unit. A large unit of 3,601 square feet or more would pay 131% of the TCEF paid by an average size detached house. If Larimer County implements a “one-size-fits-all” approach, small detached 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 A9: Vehicle Trips by Dwelling Size

Average weekday vehicle trip ends per housing unit are derived from 2013 ACS PUMS data (PUMA 102 and 103). Average square feet by bedroom range derived from Larimer Assessor parcel data for new dwellings constructed in the unincorporated area during 2012 through 2014.

Larimer Averages per Dwelling			Fitted-Curve Values	
Bedrooms	Square Feet	Trip Ends	Sq Ft Range	Trip Ends
0-1	680	4.25	900 or less	4.61
2	1,440	6.61	901 to 1300	6.46
3	2,290	9.14	1301 to 1800	7.78
4+	3,000	11.22	1801 to 2400	9.11
			2401 to 3000	10.22
			3001 to 3600	11.13
			3601 or more	11.89

