

Final Land Use Assumptions and Infrastructure Improvements Plan with Development Fee Report

**Prepared for:
City of Tempe, Arizona**

February 27, 2020



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EXECUTIVE SUMMARY

The City of Tempe, Arizona, contracted with TischlerBise to document land use assumptions, prepare the Infrastructure Improvements Plan (hereinafter referred to as the “IIP”), and update development fees within the Tempe Service Area pursuant to Arizona Revised Statutes (“ARS”) § 9-436.05 (hereafter referred to as the “Enabling Legislation”). Municipalities in Arizona may assess development fees to offset infrastructure costs to a municipality for necessary public services. The development fees must be based on an Infrastructure Improvements Plan and Land Use Assumptions. The IIP for each necessary public service is in the middle section of this document.

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

This update of Tempe’s Infrastructure Improvements Plan and associated update to its development fees includes the following necessary public services:

1. Street Facilities
2. Wastewater Facilities
3. Water Facilities

This update to Tempe’s IIP and development fees does not include updates to Fire Facilities, Parks and Recreational Facilities, or Police Facilities. This plan includes all necessary elements required to be in full compliance with SB 1525.

ARIZONA DEVELOPMENT FEE ENABLING LEGISLATION

The Enabling Legislation governs how development fees are calculated for municipalities in Arizona.

Necessary Public Services

Under the requirements of the Enabling Legislation, development fees may only be used for construction, acquisition or expansion of public facilities that are necessary public services. “Necessary public service” means any of the following categories of facilities that have a life expectancy of three or more years and that are owned and operated on behalf of the municipality: water, wastewater, storm water, library, street, fire, police, and neighborhood parks and recreational. Additionally, a necessary public service includes any facility that was financed before June 1, 2011 and that meets the following requirements:

1. Development fees were pledged to repay debt service obligations related to the construction of the facility.
2. After August 1, 2014, any development fees collected are used solely for the payment of principal and interest on the portion of the bonds, notes, or other debt service obligations issued before June 1, 2011 to finance construction of the facility.

Infrastructure Improvements Plan

Development fees must be calculated pursuant to an IIP. For each necessary public service that is the subject of a development fee, by law, the IIP shall include the following seven elements:

1. A description of the existing necessary public services in the service area and the costs to update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.
2. An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.
3. A description of all or the parts of the necessary public services or facility expansions and their costs necessitated by and attributable to development in the service area based on the approved Land Use Assumptions, including a forecast of the costs of infrastructure, improvements, real property, financing, engineering and architectural services, which shall be prepared by qualified professionals licensed in this state, as applicable.
4. A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial, and industrial.
5. The total number of projected service units necessitated by and attributable to new development in the service area based on the approved Land Use Assumptions and calculated pursuant to generally accepted engineering and planning criteria.
6. The projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years.
7. A forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved Land Use Assumptions and a plan to include these contributions in determining the extent of the burden imposed by the development.

Qualified Professionals

The IIP must be developed by qualified professionals using general accepted engineering and planning practices. A qualified professional is defined as “a professional engineer, surveyor, financial analyst or planner providing services within the scope of the person’s license, education, or experience.” TischlerBise is a fiscal, economic, and planning consulting firm specializing in the cost of growth services. Our services include development fees, fiscal impact analysis, infrastructure financing analyses, user fee/cost of service studies, capital improvement plans, and fiscal software. TischlerBise has prepared over 900 development fee studies over the past 30 years for local governments across the United States.

Conceptual Development Fee Calculation

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

Evaluation of Credits

Regardless of the methodology, a consideration of credits/offsets is integral to the development of a legally defensible development fee. There are two types of credits/offsets that should be addressed in development fee studies and ordinances. The first is a revenue credit/offset due to possible double payment situations, which could occur when other revenues may contribute to the capital costs of infrastructure covered by the development fee. This type of credit/offset is integrated into the fee calculation, thus reducing the fee amount. The second is a site-specific credit or developer reimbursement for dedication of land or construction of system improvements. This type of credit/offset is addressed in the administration and implementation of the development fee program. For ease of administration, TischlerBise normally recommends developer reimbursements for system improvements.

DEVELOPMENT FEE REPORT

METHODOLOGY

Development fees for the necessary public services made necessary by future development must be based on the same level of service (“LOS”) provided to existing development in the service area. There are three basic methodologies used to calculate development fees. They examine the past, present, and future status of infrastructure. The objective of evaluating these different methodologies is to determine the best measure of the demand created by future development for additional infrastructure capacity. 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 development 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 fees can become quite complicated because of the many variables involved in defining the relationship between development and the need for facilities within the designated service area. The following paragraphs discuss basic methods for calculating development fees and how those methods can be applied.

1. **Cost Recovery** (past improvements) - The rationale for recoupment, often called 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.
2. **Incremental Expansion** (concurrent improvements) - The incremental expansion method documents current level-of-service (LOS) standards for each type of public facility, using both quantitative and qualitative measures. This approach assumes there are no existing infrastructure deficiencies or surplus capacity in infrastructure. 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.
3. **Plan-Based** (future improvements) - 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 demand units (average cost), or (2) the growth-share of the public facility cost can be divided by the net increase in demand units over the planning timeframe (marginal cost).

METHODOLOGIES AND COST COMPONENTS

Figure 1 summarizes service areas, methodology, and infrastructure cost components for each necessary public service.

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

Necessary Public Service	Service Area	Incremental Expansion	Plan-Based	Cost Allocation
Street Facilities	North	Bus Pullouts	Street Improvements, Development Fee Report	Person Trips
	South	Bus Pullouts	Street Improvements, Development Fee Report	Person Trips
Wastewater Facilities	Citywide	N/A	Siphon Facilities, Wastewater Reclamation Facilities, Wastewater Treatment Facilities, SROG Interceptor Enhancements, SROG Interceptor, Development Fee Report	Gallons
Water Facilities	Citywide	N/A	Water Production Enhancements, Water Production Facilities, Water Resource Facilities, Development Fee Report	Gallons

Rounding

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

CURRENT DEVELOPMENT FEES

Tempe’s current non-utility development fees are shown below in Figure 2. Demand for non-utility facilities is driven by the intensity of the land use for those particular services; therefore, fees are assessed based on development type – residential or nonresidential. Current non-utility fees are assessed per unit to residential development and per 1,000 square feet of floor area to nonresidential development.

Figure 2: Current Non-Utility Development Fees

Development Type	Fire	Parks	Police	Street	Total
Residential Development	Development Fees per Housing Unit (by Square Feet of Living Space)				
900 or less	\$233	\$412	\$264	\$54	\$963
901 to 1,400	\$383	\$676	\$433	\$94	\$1,586
1,401 to 1,900	\$487	\$859	\$550	\$122	\$2,018
1,901 or more	\$562	\$991	\$635	\$142	\$2,330
Nonresidential Development	Development Fees per 1,000 Square Feet of Floor Area				
Industrial	\$124	\$211	\$95	\$33	\$463
Commercial	\$148	\$251	\$706	\$224	\$1,329
Institutional	\$66	\$113	\$255	\$89	\$523
Office & Other	\$259	\$438	\$276	\$97	\$1,070

Demand for utility (wastewater and water) facilities is driven by flows and consumption. Therefore, current utility development fees, as shown in Figure 3 below, are assessed by meter size.

Figure 3: Current Utility Development Fees

Meter Size	Capacity Ratio	Wastewater	Water	Total
5/8"	1.0	\$1,334	\$1,664	\$2,998
3/4"	1.5	\$2,001	\$2,496	\$4,497
1"	2.5	\$3,335	\$4,160	\$7,495
1.5"	5.0	\$6,670	\$8,320	\$14,990
2"	8.0	\$10,672	\$13,312	\$23,984
3"	20.0	\$26,680	\$33,280	\$59,960
4"	40.0	\$53,360	\$66,560	\$119,920
6"	80.0	\$106,720	\$133,120	\$239,840
8"	190.0	\$253,460	\$316,160	\$569,620
10"	285.0	\$400,200	\$449,200	\$849,400

PROPOSED DEVELOPMENT FEES

Development fees for residential development will be assessed per dwelling unit, based on the size of the unit. Nonresidential development fees will be assessed per 1,000 square feet of floor area, according to four general types of development. The fees shown in Figure 4 represent the proposed fees for development located within the North Service Area, and Figure 5 includes proposed fees for development located within the South Service Area. A map of the Street Facilities service areas is included in the Street Facilities IIP.

Tempe may adopt fees that are less than the amounts shown; however, a reduction in development fee revenue will necessitate an increase in other revenues, a decrease in planned capital improvements, and/or a decrease in Tempe’s LOS standards. All costs in the development fee study are in current dollars with no assumed inflation rate over time. If cost estimates change significantly over time, development fees should be recalculated.

Figure 4: Proposed Non-Utility Development Fees – North Service Area

Development Type	Fire	Parks	Police	Street	Total
Residential Development	Development Fees per Housing Unit (by Square Feet of Living Space)				
900 or less	\$233	\$412	\$264	\$192	\$1,101
901 to 1,400	\$383	\$676	\$433	\$306	\$1,798
1,401 to 1,900	\$487	\$859	\$550	\$386	\$2,282
1,901 or more	\$562	\$991	\$635	\$454	\$2,642
Nonresidential Development	Development Fees per 1,000 Square Feet of Floor Area				
Industrial	\$124	\$211	\$95	\$215	\$645
Commercial	\$148	\$251	\$706	\$1,078	\$2,183
Institutional	\$66	\$113	\$255	\$558	\$992
Office & Other	\$259	\$438	\$276	\$422	\$1,395

Figure 5: Proposed Non-Utility Development Fees – South Service Area

Development Type	Fire	Parks	Police	Street	Total
Residential Development	Development Fees per Housing Unit (by Square Feet of Living Space)				
900 or less	\$233	\$412	\$264	\$151	\$1,060
901 to 1,400	\$383	\$676	\$433	\$241	\$1,733
1,401 to 1,900	\$487	\$859	\$550	\$303	\$2,199
1,901 or more	\$562	\$991	\$635	\$356	\$2,544
Nonresidential Development	Development Fees per 1,000 Square Feet of Floor Area				
Industrial	\$124	\$211	\$95	\$169	\$599
Commercial	\$148	\$251	\$706	\$847	\$1,952
Institutional	\$66	\$113	\$255	\$438	\$872
Office & Other	\$259	\$438	\$276	\$331	\$1,304

Proposed Utility fees are shown in Figure 6 and are assessed by meter size.

Figure 6: Proposed Utility Development Fees

Meter Size	Capacity Ratio	Wastewater	Water	Total
5/8"	1.0	\$1,329	\$1,648	\$2,977
3/4"	1.5	\$1,994	\$2,472	\$4,466
1"	2.5	\$3,323	\$4,120	\$7,443
1.5"	5.0	\$6,645	\$8,240	\$14,885
2"	8.0	\$10,632	\$13,184	\$23,816
2" T	14.0	\$18,606	\$23,072	\$41,678
3" C	20.0	\$26,580	\$32,960	\$59,540
3" T	25.0	\$33,225	\$41,200	\$74,425
4" C	40.0	\$53,160	\$65,920	\$119,080
4" T	50.0	\$66,450	\$82,400	\$148,850
6" C	80.0	\$106,320	\$131,840	\$238,160
6" T	100.0	\$132,900	\$164,800	\$297,700
8" T	190.0	\$252,510	\$313,120	\$565,630
10" T	285.0	\$378,765	\$469,680	\$848,445

T = Turbine, C = Compound

DIFFERENCE BETWEEN PROPOSED AND CURRENT DEVELOPMENT FEES

Figure 7 and Figure 8 show the proposed change in non-utility development fees in the North Service Area and the South Service Area, respectively. Positive values indicate a proposed net increase in development fees, while negative values indicate a proposed net decrease.

Figure 7: Proposed Change in Non-Utility Development Fees – North Service Area

Development Type	Fire	Parks	Police	Street	Difference
Residential Development	Development Fees per Housing Unit (by Square Feet of Living Space)				
900 or less	\$0	\$0	\$0	\$138	\$138
901 to 1,400	\$0	\$0	\$0	\$212	\$212
1,401 to 1,900	\$0	\$0	\$0	\$264	\$264
1,901 or more	\$0	\$0	\$0	\$312	\$312
Nonresidential Development	Development Fees per 1,000 Square Feet of Floor Area				
Industrial	\$0	\$0	\$0	\$182	\$182
Commercial	\$0	\$0	\$0	\$854	\$854
Institutional	\$0	\$0	\$0	\$469	\$469
Office & Other	\$0	\$0	\$0	\$325	\$325

Figure 8: Proposed Change in Non-Utility Development Fees – South Service Area

Development Type	Fire	Parks	Police	Street	Difference
Residential Development	Development Fees per Housing Unit (by Square Feet of Living Space)				
900 or less	\$0	\$0	\$0	\$97	\$97
901 to 1,400	\$0	\$0	\$0	\$147	\$147
1,401 to 1,900	\$0	\$0	\$0	\$181	\$181
1,901 or more	\$0	\$0	\$0	\$214	\$214
Nonresidential Development	Development Fees per 1,000 Square Feet of Floor Area				
Industrial	\$0	\$0	\$0	\$136	\$136
Commercial	\$0	\$0	\$0	\$623	\$623
Institutional	\$0	\$0	\$0	\$349	\$349
Office & Other	\$0	\$0	\$0	\$234	\$234

Figure 9 shows the proposed change in utility development fees. Positive values indicate a proposed net increase in development fees, while negative values indicate a proposed net decrease.

Figure 9: Proposed Change in Utility Development Fees

Meter Size	Capacity Ratio	Wastewater	Water	Difference
5/8"	1.0	(\$5)	(\$16)	(\$21)
3/4"	1.5	(\$7)	(\$24)	(\$31)
1"	2.5	(\$12)	(\$40)	(\$52)
1.5"	5.0	(\$25)	(\$80)	(\$105)
2"	8.0	(\$40)	(\$128)	(\$168)
2" T	14.0	N/A	N/A	N/A
3" C	20.0	(\$100)	(\$320)	(\$420)
3" T	25.0	N/A	N/A	N/A
4" C	40.0	(\$200)	(\$640)	(\$840)
4" T	50.0	N/A	N/A	N/A
6" C	80.0	(\$400)	(\$1,280)	(\$1,680)
6" T	100.0	N/A	N/A	N/A
8" T	190.0	(\$950)	(\$3,040)	(\$3,990)
10" T	285.0	(\$21,435)	\$20,480	(\$955)

T = Turbine, C = Compound

STREET FACILITIES INFRASTRUCTURE IMPROVEMENTS PLAN

ARS 9-463.05 (T)(7)(f) defines the facilities and assets which can be included in the Street Facilities IIP:

“Street facilities located in the service area, including arterial or collector streets or roads that have been designated on an officially adopted plan of the municipality, traffic signals and rights-of-way and improvements thereon.”

The Street Facilities IIP includes components for street improvements, bus pullouts, and the cost of professional services for preparing the Street Facilities IIP and related Development Fee Report. An incremental expansion methodology is used for bus pullouts while a plan-based methodology is used for street improvements and the Development Fee Report.

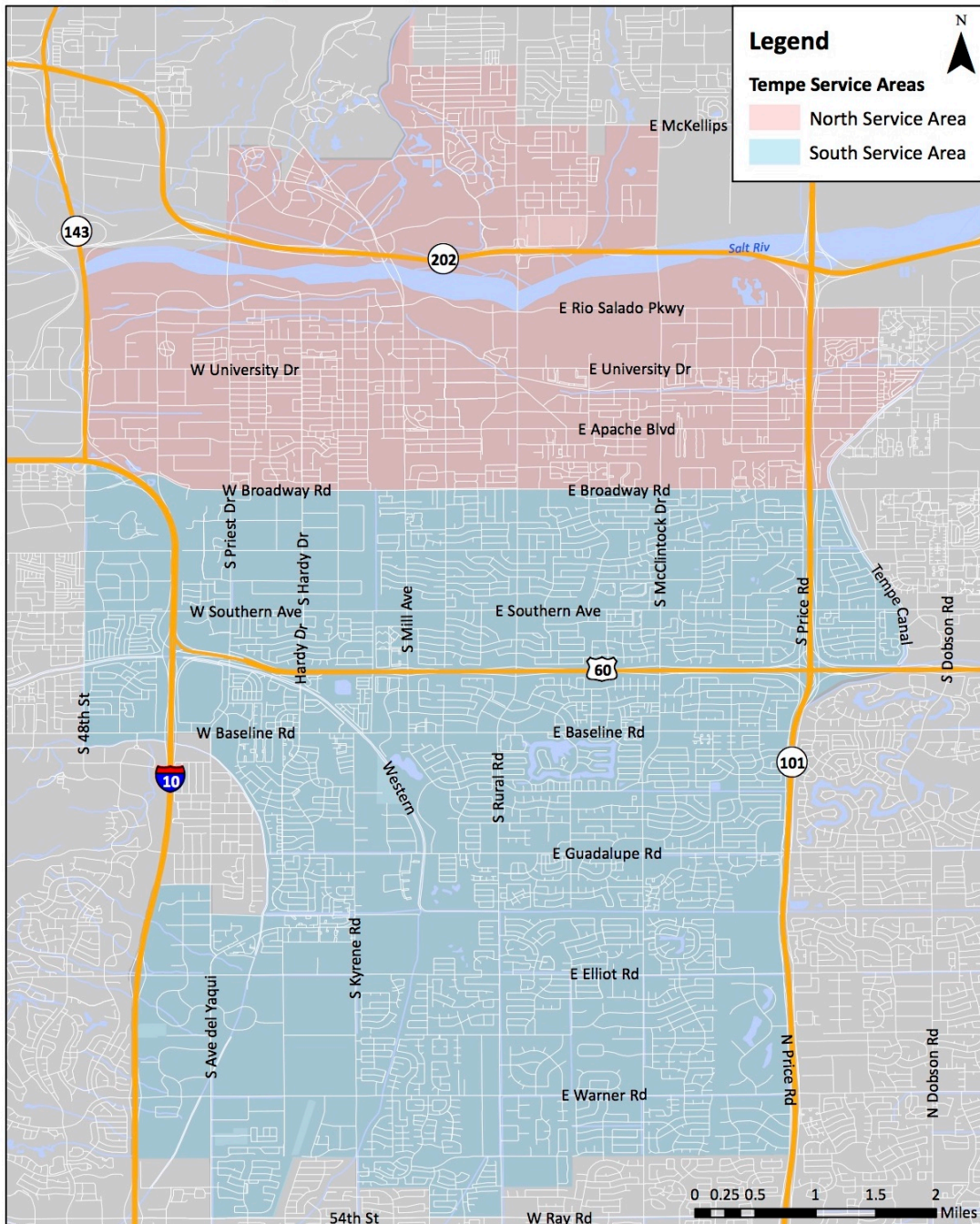
Proportionate Share

ARS 9-463.05 (B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to provide necessary public services to the development. Trip generation rates, vehicle occupancy, mode share, and trip adjustment factors are used to determine the proportionate impact of residential, industrial, commercial, institutional, and office land uses on Tempe’s transportation network.

Service Area

The City of Tempe plans to provide a uniform level of service for bus pullouts within the city limits, and it plans to construct street improvements that generally serve either the northern or southern areas of Tempe. Due to the geographic focus of planned street improvements, the service areas for the Street Facilities IIP include a North Service Area and a South Service Area generally separated by Broadway Road—all properties adjacent to Broadway Road are included in the North Service Area. The map in Figure S1 illustrates the proposed Street Facilities service areas within Tempe’s boundaries.

Figure S1: Street Facilities Service Areas



ANALYSIS OF CAPACITY, USAGE, AND COSTS OF EXISTING PUBLIC SERVICES

ARS 9-463.05(E)(1) requires:

“A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.”

As shown in Figure S2, Tempe’s existing transportation network includes 447 lane miles of arterials, 51 improved intersections, and 86 bus pullouts. Costs related to each necessary public service are shown later in this section.

Figure S2: Tempe Transportation Inventory

Necessary Public Service	Inventory
Arterial Lane Miles	447
Improved Intersections	51
Bus Pullouts	86

RATIO OF SERVICE UNITS TO DEVELOPMENT UNITS

ARS § 9-463.05(E)(4) requires:

“A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial.”

Figure S3: Summary of Service Units

Development Type	ITE Code	Weekday Person Trip Ends	Development Unit	Trip Adjustment
0-1 Bedrooms	210	6.67	HU	61%
2 Bedrooms	210	10.63	HU	61%
3 Bedrooms	210	13.38	HU	61%
4+ Bedrooms	210	15.74	HU	61%
Industrial	140	9.09	KSF	50%
Commercial	820	69.17	KSF	33%
Institutional	520	35.77	KSF	33%
Office & Other	710	17.85	KSF	50%

Trip Generation Rates

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

Trip Rate Adjustments

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

Adjustments for Pass-By Trips and Commuting Patterns

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

Residential development has a trip adjustment factor of 61 percent to account for commuters leaving Tempe for work. According to the 2009 National Household Travel Survey, weekday work trips are typically 31 percent of production trips (i.e., all out-bound trips, which are 50 percent of all trip ends). As shown in Figure S4, the Census Bureau's web application OnTheMap indicates that 73 percent of resident workers traveled outside the city for work in 2015. In combination, these factors ($0.31 \times 0.50 \times 0.73 = .11$) support the additional 11 percent allocation of trips to residential development.

Figure S4: Inflow/Outflow Analysis

Trip Adjustment Factor for Commuters¹	
Employed Residents	72,217
Residents Working and Living in Tempe	19,270
Residents Commuting Outside Tempe for Work	52,947
Percent Commuting out of Tempe	73%
Additional Production Trips²	11%
Residential Trip Adjustment Factor	61%

1. U.S. Census Bureau, OnTheMap Application (version 6.1.1) and LEHD Origin-Destination Employment Statistics, 2015.

2. According to the National Household Travel Survey (2009)*, published in December 2011 (see Table 30), home-based work trips are typically 30.99 percent of “production” trips, in other words, out-bound trips (which are 50 percent of all trip ends). Also, LED OnTheMap data from 2015 indicate that 73 percent of Tempe’s workers travel outside the city for work. In combination, these factors ($0.3099 \times 0.50 \times 0.73 = 0.1136$) account for 11 percent of additional production trips. The total adjustment factor for residential 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.

*<http://nhts.ornl.gov/publications.shtml> ; Summary of Travel Trends - Table "Daily Travel Statistics by Weekday vs. Weekend"

Shown below in Figure S5, TischlerBise derived the estimated average number of person trips for residential development, by dwelling size, using four size thresholds. For nonresidential development, totals represent person trips generated per 1,000 square feet of floor area, by land use.

Figure S5: Person Trips by Floor Area of Development

Development Type	Daily Vehicle Trip Ends ¹	Vehicle Occupancy ²	Vehicle Mode Share ²	Daily Person Trip Ends	Trip Adjustment	Person Trips
Residential (per housing unit)						
900 or less	3.64	1.29	70.4%	6.67	61%	4.07
901 to 1,400	5.80	1.29	70.4%	10.63	61%	6.48
1,401 to 1,900	7.30	1.29	70.4%	13.38	61%	8.16
1,901 or more	8.59	1.29	70.4%	15.74	61%	9.60
Nonresidential (per 1,000 square feet)						
Industrial	4.96	1.29	70.4%	9.09	50%	4.55
Commercial	37.75	1.29	70.4%	69.17	33%	22.83
Institutional	19.52	1.29	70.4%	35.77	33%	11.80
Office & Other	9.74	1.29	70.4%	17.85	50%	8.93

1. See Land Use Assumptions.

2. Maricopa Association of Governments Fall 2017 Conformity Run.

PROJECTED DEMAND AND COSTS FOR SERVICES

ARS 9-463.05(E)(2) requires:

“An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.”

ARS 9-463.05(E)(5) requires:

“The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria.”

To accommodate demand from projected development over the next 10 years, Tempe will construct additional street improvements and bus pullouts. Development projections are multiplied by the input variables in Figure S6 to yield average weekday person trips on Tempe’s transportation network. Trip generation rates and trip adjustment factors convert projected development into average weekday person trips. For example, industrial development produces 133,355 average weekday person trips in 2018 (29,341 KSF X 9.09 average weekday person trips X 50 percent trip adjustment).

Based on estimates shown in Figure S6, existing development generates 1,494,722 person trips (weekday person trips by type of development X existing development). As shown in Figure S6, future development in Tempe will generate 1,705,031 person trips in 2028 – an increase of 210,309 person trips over the next 10 years. This results in a citywide growth share of 12 percent (210,309 additional person trips / 1,705,031 total person trips in 2033).

Tempe’s existing infrastructure, shown at the bottom of Figure S6, includes 447 lane miles of arterials, 51 improved intersections, and 86 bus pullouts. To maintain the existing infrastructure standards, Tempe needs 63 additional lane miles of arterials, 7 additional improved intersections, and 12 additional bus pullouts to accommodate projected development over the next 10 years.

Since bus pullouts use a single, citywide service area, development fee revenue collected throughout Tempe will be used to construct 12 additional bus pullouts with a total cost of \$2,400,000 (\$200,000 each). Street improvements will be collected within two service areas, therefore, TischlerBise prepared travel demand models for the North Service Area (Figure S7) and the South Service Area (Figure S8). Based on 10-year projected development from the *Land Use Assumptions* document, person trips in the North Service Area will increase by 165,754 trips (21 percent growth share) and person trips in the South Service Area will increase by 44,555 (5 percent growth share).

Figure S6: Citywide Travel Demand Model

Development Type	ITE Code	Weekday PTE	Dev Unit	Trip Adj
0-1 Bedrooms	210	6.67	HU	61%
2 Bedrooms	210	10.63	HU	61%
3 Bedrooms	210	13.38	HU	61%
4+ Bedrooms	210	15.74	HU	61%
Industrial	140	9.09	KSF	50%
Commercial	820	69.17	KSF	33%
Institutional	520	35.77	KSF	33%
Office & Other	710	17.85	KSF	50%

		Base	1	2	3	4	5	10	10-Year Increase
		2018	2019	2020	2021	2022	2023	2028	
Development	0-1 Bedroom Units	13,280	13,420	13,564	13,714	13,868	14,025	14,871	1,591
	2 Bedroom Units	20,445	20,662	20,883	21,114	21,350	21,592	22,894	2,449
	3 Bedroom Units	25,700	25,972	26,251	26,540	26,837	27,141	28,778	3,079
	4+ Bedroom Units	19,776	19,986	20,200	20,423	20,652	20,886	22,146	2,369
	Industrial KSF	29,341	29,605	29,869	29,956	30,045	30,134	30,601	1,260
	Commercial KSF	13,105	13,336	13,567	13,691	13,816	13,942	14,583	1,477
	Institutional KSF	19,175	19,542	19,914	20,287	20,668	21,056	23,134	3,959
	Office & Other KSF	27,971	28,658	29,361	29,877	30,411	30,961	34,010	6,039
Average Weekday Person Trips	0-1 Bedroom Trips	54,031	54,604	55,190	55,799	56,423	57,062	60,504	6,473
	2 Bedroom Trips	132,572	133,977	135,415	136,909	138,441	140,009	148,454	15,882
	3 Bedroom Trips	209,756	211,978	214,253	216,618	219,041	221,523	234,884	25,128
	4+ Bedroom Trips	189,881	191,892	193,952	196,093	198,286	200,533	212,628	22,747
	Residential Trips	586,241	592,451	598,809	605,419	612,192	619,127	656,470	70,230
	Industrial Trips	133,355	134,555	135,753	136,152	136,553	136,960	139,080	5,725
	Commercial Trips	299,146	304,410	309,683	312,519	315,375	318,240	332,870	33,724
	Institutional Trips	226,341	230,681	235,071	239,474	243,967	248,547	273,076	46,735
	Office & Other Trips	249,639	255,775	262,043	266,654	271,415	276,330	303,535	53,895
	Nonresidential Trips	908,481	925,421	942,551	954,799	967,310	980,078	1,048,561	140,080
Total Person Trips	1,494,722	1,517,872	1,541,360	1,560,218	1,579,501	1,599,205	1,705,031	210,309	
Demand	Lane Miles	447	454	461	467	472	478	510	63
	Improved Intersections	51	52	53	53	54	55	58	7
	Bus Pullouts	86	87	89	90	91	92	98	12
Growth Share Based on Trip Increase									12%

Figure S7: North Travel Demand Model

		Base	1	2	3	4	5	10	10-Year
		2018	2019	2020	2021	2022	2023	2028	Increase
Development	0-1 Bedroom Units	5,453	5,575	5,702	5,838	5,979	6,123	6,904	1,452
	2 Bedroom Units	8,395	8,584	8,778	8,989	9,205	9,427	10,630	2,235
	3 Bedroom Units	10,553	10,790	11,034	11,299	11,571	11,850	13,362	2,809
	4+ Bedroom Units	8,120	8,303	8,491	8,694	8,904	9,118	10,282	2,162
	Industrial KSF	14,878	15,016	15,155	15,243	15,331	15,420	15,887	1,009
	Commercial KSF	4,417	4,524	4,632	4,705	4,779	4,854	5,241	824
	Institutional KSF	11,297	11,589	11,886	12,194	12,509	12,831	14,581	3,284
	Office & Other KSF	9,647	10,110	10,590	10,961	11,349	11,754	14,074	4,427
Average Weekday Person Trips	0-1 Bedroom Trips	22,186	22,685	23,198	23,754	24,326	24,913	28,092	5,906
	2 Bedroom Trips	54,436	55,660	56,918	58,284	59,687	61,126	68,927	14,491
	3 Bedroom Trips	86,129	88,065	90,056	92,217	94,437	96,714	109,056	22,927
	4+ Bedroom Trips	77,968	79,720	81,523	83,479	85,488	87,550	98,722	20,755
	Residential Trips	240,718	246,129	251,695	257,735	263,938	270,304	304,797	64,079
	Industrial Trips	67,620	68,249	68,879	69,277	69,679	70,085	72,206	4,586
	Commercial Trips	100,820	103,266	105,722	107,399	109,095	110,800	119,631	18,811
	Institutional Trips	133,353	136,792	140,307	143,936	147,654	151,461	172,119	38,766
	Office & Other Trips	86,097	90,236	94,513	97,824	101,286	104,902	125,610	39,512
	Nonresidential Trips	387,890	398,543	409,421	418,437	427,714	437,248	489,566	101,676
Total Person Trips	628,608	644,672	661,116	676,172	691,652	707,552	794,362	165,754	
Growth Share Based on Trip Increase									21%

Figure S8: South Travel Demand Model

		Base	1	2	3	4	5	10	10-Year
		2018	2019	2020	2021	2022	2023	2028	Increase
Development	0-1 Bedroom Units	7,827	7,845	7,863	7,876	7,889	7,902	7,966	139
	2 Bedroom Units	12,050	12,078	12,106	12,125	12,145	12,165	12,265	215
	3 Bedroom Units	15,147	15,182	15,217	15,242	15,267	15,292	15,417	270
	4+ Bedroom Units	11,656	11,683	11,710	11,729	11,748	11,767	11,863	207
	Industrial KSF	14,463	14,589	14,714	14,714	14,714	14,714	14,714	251
	Commercial KSF	8,689	8,812	8,935	8,986	9,037	9,088	9,342	653
	Institutional KSF	7,878	7,954	8,028	8,094	8,159	8,225	8,553	675
	Office & Other KSF	18,324	18,548	18,771	18,916	19,062	19,208	19,936	1,612
Average Weekday Person Trips	0-1 Bedroom Trips	31,845	31,919	31,992	32,045	32,097	32,150	32,412	567
	2 Bedroom Trips	78,136	78,317	78,496	78,625	78,754	78,883	79,527	1,391
	3 Bedroom Trips	123,627	123,913	124,197	124,401	124,605	124,809	125,828	2,201
	4+ Bedroom Trips	111,913	112,172	112,429	112,613	112,798	112,982	113,905	1,992
	Residential Trips	345,522	346,322	347,114	347,684	348,254	348,824	351,673	6,151
	Industrial Trips	65,735	66,306	66,874	66,874	66,874	66,874	66,874	1,140
	Commercial Trips	198,327	201,144	203,960	205,120	206,280	207,440	213,239	14,913
	Institutional Trips	92,988	93,889	94,764	95,539	96,313	97,087	100,957	7,969
	Office & Other Trips	163,542	165,539	167,530	168,830	170,129	171,428	177,925	14,383
	Nonresidential Trips	520,592	526,878	533,130	536,363	539,596	542,829	558,996	38,404
Total Person Trips	866,114	873,199	880,243	884,046	887,850	891,653	910,669	44,555	
Growth Share Based on Trip Increase									5%

ARS 9-463.05(E)(3) requires:

“A description of all or the parts of the necessary public services or facility expansions and their costs necessitated by and attributable to development in the service area based on the approved land use assumptions, including a forecast of the costs of infrastructure, improvements, real property, financing, engineering and architectural services, which shall be prepared by qualified professionals licensed in this state, as applicable.”

Street Improvements – North Service Area

Shown below, Figure S9 includes planned street improvements located within the North Service Area. Tempe hired CivTech to conduct a traffic study within the North Service Area to determine the growth share of potential street improvements. CivTech’s analysis shows planned intersection improvements at Rural Road and University Drive have a growth share of 28 percent, while pedestrian separation at College Avenue and University Drive have a growth share of 35 percent, and pedestrian separation at Rural Road and Terrace Drive has a growth share of 13 percent. Projects included in the previous study use a growth share of 10 percent to account for development fees collected since the adoption of Tempe’s current IIP. All other improvements use a growth share of 21 percent – equal to the North Service Area growth share of person trips shown at the bottom of Figure S7.

Tempe provided the total cost for each project and identified any other funding sources, including development fees collected for current IIP projects, leaving a remaining cost of \$24,728,136. Applying the growth share for each project to the remaining cost for each project results in a total growth cost of \$5,841,514. Dividing the total growth cost by the 10-year person trip increase results in a cost of \$35.24 per person trip (\$5,841,514 growth cost / 165,754 person trip increase). This fee will be charged in the North Service Area.

Figure S9: Street Improvement Projects – North Service Area

Description	Total Cost	Other Funding	Remaining Cost	Growth Share ¹	Growth Cost
Rural Rd & University Dr Intersection Improvements ²	\$6,110,000	\$209,996	\$5,900,004	28%	\$1,670,719
Light Rail Efficiency ²	\$575,000	\$19,694	\$555,306	10%	\$55,056
East Valley Arterial Congestion ²	\$265,385	\$9,090	\$256,295	10%	\$25,410
Fiber Optic Broadway Rio Salado ²	\$333,645	\$11,428	\$322,217	10%	\$31,946
Roundabout: College Ave & McKellips Rd	\$1,094,314	\$0	\$1,094,314	21%	\$229,806
Pedestrian Separation Intersection - College & University	\$5,500,000	\$0	\$5,500,000	35%	\$1,930,337
Pedestrian Separation Intersection - Rural & Terrace	\$5,500,000	\$0	\$5,500,000	13%	\$728,724
Rural Rd & Rio Salado Intersection Improvements	\$3,400,000	\$0	\$3,400,000	21%	\$707,516
Downtown ITS	\$1,200,000	\$0	\$1,200,000	21%	\$252,000
Fiber Optic Installation: Downtown	\$1,000,000	\$0	\$1,000,000	21%	\$210,000
Total	\$24,978,344	\$250,208	\$24,728,136	24%	\$5,841,514

1. Determined by 10-year increase in person trips (21%) or CivTech traffic study.

2. Project from current IIP.

10-Year Person Trip Increase	165,754
Cost per Person Trip	\$35.24

Street Improvements – South Service Area

Shown below, Figure S10 includes planned street improvements located within the South Service Area. Based on estimates from Tempe’s Engineering Department, the planned intersection improvement at Priest Drive and Grove Parkway has a growth share of 31 percent, and the intersection improvement at Baseline Road and Rural Road has a growth share of 31 percent. Projects included in the previous study use an adjusted growth share to account for development fees collected since the adoption of Tempe’s current IIP.

Tempe provided the total cost for each project and identified any other funding sources, including development fees collected for current IIP projects, leaving a remaining cost of \$5,214,835. Applying the growth share for each project to the remaining cost for each project results in a total growth cost of \$1,117,866. Dividing the total growth cost by the 10-year person trip increase results in a cost of \$25.09 per person trip (\$1,117,866 growth cost / 44,555 person trip increase). This fee will be charged in the South Service Area.

Figure S10: Street Improvement Projects – South Service Area

Description	Total Cost	Other Funding	Remaining Cost	Growth Share ¹	Growth Cost
Roundabout: Priest Dr & Grove Pkwy	\$1,437,714	\$0	\$1,437,714	31%	\$449,286
Baseline Rd and Rural Rd Intersection Improvements	\$1,045,000	\$0	\$1,045,000	31%	\$326,563
Rural Rd & Southern Ave Intersection Improvements ²	\$3,078,000	\$892,298	\$2,185,702	13%	\$287,842
Fiber Optic Elliot Guad and Warner ²	\$565,798	\$19,379	\$546,419	10%	\$54,175
Total	\$6,126,512	\$911,677	\$5,214,835	21%	\$1,117,866

- 1. Determined by additional capacity available to future development.
- 2. Project from current IIP.

10-Year Person Trip Increase	44,555
Cost per Person Trip	\$25.09

Street Improvements – Citywide Service Area

Shown below, Figure S11 includes a planned street improvement located within the Citywide Service Area. The Rural Road fiber optic installation uses a growth share of 22 percent to account for development fees collected since the adoption of Tempe’s current IIP.

Tempe provided the total cost and identified any other funding sources, including development fees collected for current IIP projects, leaving a remaining cost of \$979,541. Applying the growth share to the remaining cost results in a total growth cost of \$210,945. Dividing the total growth cost by the 10-year person trip increase results in a cost of \$1.00 per person trip (\$210,945 growth cost / 210,309 person trip increase). This fee will be charged citywide.

Figure S11: Street Improvement Projects – Citywide Service Area

Description	Total Cost	Other Funding	Remaining Cost	Growth Share ¹	Growth Cost
Fiber Optic Installation: Rural Road ²	\$3,402,045	\$2,422,504	\$979,541	22%	\$210,945
Total	\$3,402,045	\$2,422,504	\$979,541	22%	\$210,945

- 1. Determined by additional capacity available to future development.
- 2. Project from current IIP.

10-Year Person Trip Increase	210,309
Cost per Person Trip	\$1.00

Bus Pullouts – Citywide Service Area

Based on the 2018 estimate of 1,494,722 person trips, and an existing inventory of 86 bus pullouts, the existing level of service is 0.575 bus pullouts per 10,000 person trips (86 bus pullouts / (1,494,722 person trips / 10,000)). As shown in Figure S6, Tempe plans to maintain the existing level of service by constructing 12 additional bus pullouts over the next 10 years¹. This results in a planned level of service of 0.575 bus pullouts per 10,000 person trips (98 bus pullouts / (1,705,031 person trips / 10,000)).

Tempe provided the total cost and identified any other funding sources, including development fees collected for current IIP projects, leaving a remaining cost of \$2,232,694. Applying the growth share to the remaining cost results in a total growth cost of \$2,232,694. Dividing the total growth cost by the 10-year person trip increase results in a cost of \$10.62 per person trip (\$2,232,694 growth cost / 210,309 person trip increase). This fee will be charged citywide.

Figure S12: Bus Pullouts – Citywide Service Area

Description	Total Cost	Other Funding	Remaining Cost	Growth Share ¹	Growth Cost
Construction of Bus Pullouts ²	\$2,400,000	\$167,306	\$2,232,694	100%	\$2,232,694
Total	\$2,400,000	\$167,306	\$2,232,694	100%	\$2,232,694

1. Determined by maintaining current level of service for bus pullouts per person trip.

2. Project from current IIP.

10-Year Person Trip Increase	210,309
Cost per Person Trip	\$10.62

IIP and Development Fee Report

The cost to prepare the Street Facilities IIP and development fees totals \$40,100. Tempe plans to update its report every five years. Based on this cost, proportionate share, and five-year projections of new residential and nonresidential development from the *Land Use Assumptions* document, the cost is \$0.38 per person trip.

Figure S13: IIP and Development Fee Report

Necessary Public Service	Cost	Demand Unit	5-Year Demand Unit Increase	Cost per Demand Unit
Street Facilities	\$40,100	Person Trips	104,483	\$0.38
Wastewater Facilities	\$16,570	Gallons	1,137,112	\$0.01
Water Facilities	\$16,570	Gallons	2,112,651	\$0.01
Total	\$73,240			

¹ Appendix D includes a list of bus pullout projects provided to Tempe’s City Council. The prioritized list may change based on the availability to acquire rights-of-way.

STREET FACILITIES DEVELOPMENT FEES

Revenue Credit

A revenue credit is not necessary for the Street Facilities development fees because 10-year growth costs exceed the amount of revenue that is projected to be generated by development fees according to the *Land Use Assumptions* document.

Proposed Street Facilities Development Fees – North Service Area

The proposed Street Facilities development fees for the North Service Area are shown in Figure S14. Cost factors for street improvements, bus pullouts, and the Development Fee Report are summarized at the top of the figure. Residential development fees are expressed per housing unit. Nonresidential development fees are expressed per 1,000 square feet of floor area. The Street Facilities development fees are calculated by (1) multiplying the cost of \$47.24 per person trip by (2) the average weekday person trip ends by (3) the trip rate adjustment factor for each land use type.

For residential development of 1,500 square feet, the fee of \$386 per housing unit is calculated as follows: \$47.24 per person trip X 13.38 average weekday person trip ends per housing unit X 61 percent trip rate adjustment.

For commercial development, the fee of \$1,078 per 1,000 square feet is calculated as follows: \$47.24 per person trip X 69.17 average weekday person trip ends per 1,000 square feet X 33 percent trip rate adjustment.

Figure S14: Proposed Street Facilities Development Fees – North Service Area

Fee Component	Cost per Trip
North Street Improvements	\$35.24
Citywide Street Improvements	\$1.00
Bus Pullouts	\$10.62
Development Fee Report	\$0.38
Total	\$47.24

Development Type	Avg Wkdy Person Trip Ends ¹	Trip Rate Adjustment	Proposed Fees	Current Fees	Increase / Decrease
Residential Development	Development Fees per Housing Unit (by Square Feet of Living Space)				
900 or less	6.67	61%	\$192	\$54	\$138
901 to 1,400	10.63	61%	\$306	\$94	\$212
1,401 to 1,900	13.38	61%	\$386	\$122	\$264
1,901 or more	15.74	61%	\$454	\$142	\$312
Nonresidential Development	Development Fees per 1,000 Square Feet of Floor Area				
Industrial	9.09	50%	\$215	\$33	\$182
Commercial	69.17	33%	\$1,078	\$224	\$854
Institutional	35.77	33%	\$558	\$89	\$469
Office & Other	17.85	50%	\$422	\$97	\$325

1. See Land Use Assumptions

Proposed Street Facilities Development Fees – South Service Area

The proposed Street Facilities development fees for the South Service Area are shown in Figure S15. Cost factors for street improvements, bus pullouts, and the Development Fee Report are summarized at the top of the figure. Residential development fees are expressed per housing unit. Nonresidential development fees are expressed per 1,000 square feet of floor area. The Street Facilities development fees are calculated by (1) multiplying the cost of \$37.09 per person trip by (2) the average weekday person trip ends by (3) the trip rate adjustment factor for each land use type.

For residential development of 1,500 square feet, the fee of \$303 per housing unit is calculated as follows: \$37.09 per person trip X 13.38 average weekday person trip ends per housing unit X 61 percent trip rate adjustment.

For commercial development, the fee of \$847 per 1,000 square feet is calculated as follows: \$37.09 per person trip X 69.17 average weekday person trip ends per 1,000 square feet X 33 percent trip rate adjustment.

Figure S15: Proposed Street Facilities Development Fees – South Service Area

Fee Component	Cost per Trip
South Street Improvements	\$25.09
Citywide Street Improvements	\$1.00
Bus Pullouts	\$10.62
Development Fee Report	\$0.38
Total	\$37.09

Development Type	Avg Wkdy Person Trip Ends ¹	Trip Rate Adjustment	Proposed Fees	Current Fees	Increase / Decrease
Residential Development	Development Fees per Housing Unit (by Square Feet of Living Space)				
900 or less	6.67	61%	\$151	\$54	\$97
901 to 1,400	10.63	61%	\$241	\$94	\$147
1,401 to 1,900	13.38	61%	\$303	\$122	\$181
1,901 or more	15.74	61%	\$356	\$142	\$214
Nonresidential Development	Development Fees per 1,000 Square Feet of Floor Area				
Industrial	9.09	50%	\$169	\$33	\$136
Commercial	69.17	33%	\$847	\$224	\$623
Institutional	35.77	33%	\$438	\$89	\$349
Office & Other	17.85	50%	\$331	\$97	\$234

1. See Land Use Assumptions

PROJECTED STREET FACILITIES DEVELOPMENT FEE REVENUE

Projected Street Facilities Development Fee Revenue – North Service Area

Projected fee revenue shown in Figure S16 is based on the development projections in the *Land Use Assumptions* (see Appendix) and the updated Street Facilities development fees in Figure S14. If development occurs at a faster rate than projected, the demand for infrastructure will increase along with development fee revenue. If development occurs at a slower rate than projected, the demand for infrastructure will decrease and development fee revenue will decrease at a similar rate. Anticipated development fee revenue equals approximately \$7.80 million over the next 10 years, while expenditures are projected to be approximately \$27.98 million.

Figure S16: Projected Street Facilities Development Fee Revenue – North Service Area

Fee Component	Future Share	Existing Share	Total Cost
North Street Improvements	\$5,841,514	\$18,886,622	\$24,728,136
Citywide Street Improvements	\$210,945	\$768,596	\$979,541
Bus Pullouts	\$2,232,694	\$0	\$2,232,694
Development Fee Report	\$40,100	\$0	\$40,100
Total	\$8,325,253	\$19,655,218	\$27,980,471

		Residential \$350 per unit	Industrial \$215 per KSF	Commercial \$1,078 per KSF	Institutional \$558 per KSF	Office & Other \$422 per KSF
Year		Hsg Unit	KSF	KSF	KSF	KSF
Base	2018	32,521	14,878	4,417	11,297	9,647
Year 1	2019	33,252	15,016	4,524	11,589	10,110
Year 2	2020	34,004	15,155	4,632	11,886	10,590
Year 3	2021	34,820	15,243	4,705	12,194	10,961
Year 4	2022	35,658	15,331	4,779	12,509	11,349
Year 5	2023	36,518	15,420	4,854	12,831	11,754
Year 6	2024	37,402	15,511	4,930	13,163	12,177
Year 7	2025	38,308	15,603	5,006	13,504	12,620
Year 8	2026	39,239	15,696	5,083	13,854	13,083
Year 9	2027	40,196	15,791	5,162	14,213	13,567
Year 10	2028	41,178	15,887	5,241	14,581	14,074
10-Year Increase		8,657	1,009	824	3,284	4,427
Projected Revenue		\$3,013,963	\$215,832	\$885,169	\$1,823,393	\$1,858,630

Total Expenditures	\$27,980,471
Projected Fee Revenue	\$7,796,987

Projected Street Facilities Development Fee Revenue – South Service Area

Projected fee revenue shown in Figure S17 is based on the development projections in the *Land Use Assumptions* (see Appendix) and the updated Street Facilities development fees in Figure S15. If development occurs at a faster rate than projected, the demand for infrastructure will increase along with development fee revenue. If development occurs at a slower rate than projected, the demand for infrastructure will decrease and development fee revenue will decrease at a similar rate. Anticipated development fee revenue equals approximately \$1.65 million over the next 10 years, while expenditures are projected to be approximately \$9.38 million.

Figure S17: Projected Street Facilities Development Fee Revenue – South Service Area

Fee Component	Future Share	Existing Share	Total Cost
South Street Improvements	\$1,117,866	\$5,008,646	\$6,126,512
Citywide Street Improvements	\$210,945	\$768,596	\$979,541
Bus Pullouts	\$2,232,694	\$0	\$2,232,694
Development Fee Report	\$40,100	\$0	\$40,100
Total	\$3,601,605	\$5,777,242	\$9,378,847

		Residential \$275 per unit	Industrial \$169 per KSF	Commercial \$847 per KSF	Institutional \$438 per KSF	Office & Other \$331 per KSF
Year		Hsg Unit	KSF	KSF	KSF	KSF
Base	2018	46,680	14,463	8,689	7,878	18,324
Year 1	2019	46,788	14,589	8,812	7,954	18,548
Year 2	2020	46,895	14,714	8,935	8,028	18,771
Year 3	2021	46,972	14,714	8,986	8,094	18,916
Year 4	2022	47,049	14,714	9,037	8,159	19,062
Year 5	2023	47,126	14,714	9,088	8,225	19,208
Year 6	2024	47,203	14,714	9,139	8,290	19,353
Year 7	2025	47,280	14,714	9,189	8,356	19,499
Year 8	2026	47,357	14,714	9,240	8,422	19,644
Year 9	2027	47,434	14,714	9,291	8,487	19,790
Year 10	2028	47,511	14,714	9,342	8,553	19,936
10-Year Increase		831	251	653	675	1,612
Projected Revenue		\$227,058	\$42,312	\$550,642	\$294,054	\$531,147

Total Expenditures	\$9,378,847
Projected Fee Revenue	\$1,645,213

Projected Street Facilities Development Fee Revenue – Total

Projected fee revenue shown in Figure S18 represents the sum of projected fee revenue for the North Service Area and the South Service Area. Anticipated development fee revenue equals approximately \$9.44 million over the next 10 years, while projected expenditures are approximately \$34.11 million. Existing development’s share of total costs must be paid with other funding sources.

Figure S18: Projected Street Facilities Development Fee Revenue – Total

Fee Component	Future Share	Existing Share	Total Cost
North Street Improvements	\$5,841,514	\$18,886,622	\$24,728,136
South Street Improvements	\$1,117,866	\$5,008,646	\$6,126,512
Citywide Street Improvements	\$210,945	\$768,596	\$979,541
Bus Pullouts	\$2,232,694	\$0	\$2,232,694
Development Fee Report	\$40,100	\$0	\$40,100
Total	\$9,443,119	\$24,663,864	\$34,106,983

Total Expenditures	\$34,106,983
Existing Development Share	\$24,664,783
Projected Fee Revenue	\$9,442,200

WASTEWATER FACILITIES INFRASTRUCTURE IMPROVEMENTS PLAN

ARS 9-463.05 (T)(5)(b) defines facilities and assets which can be included in the Wastewater Facilities IIP:

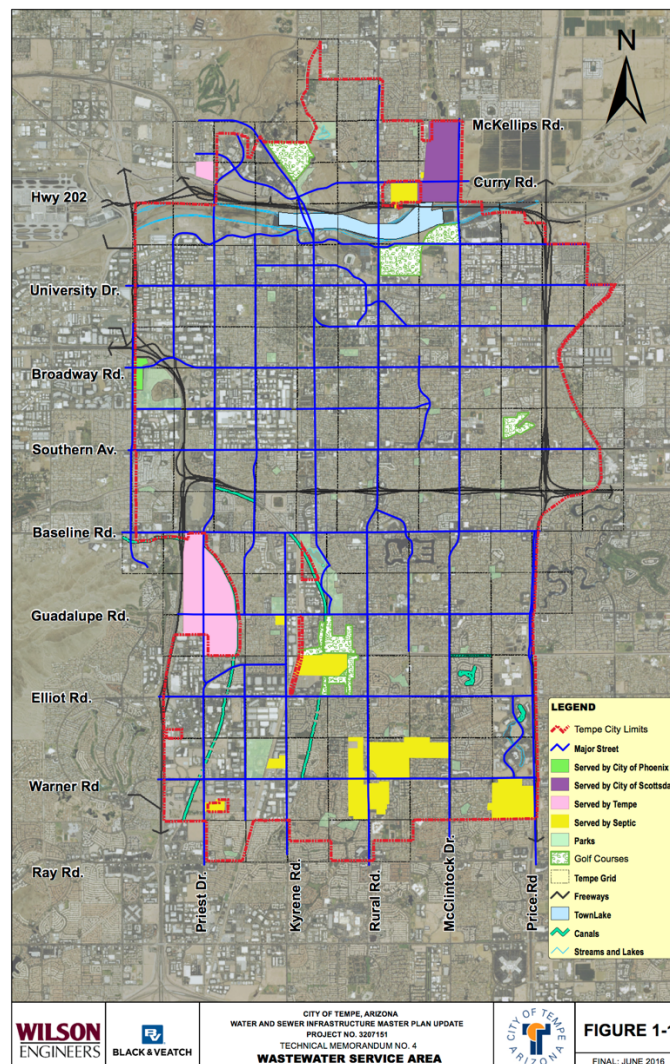
“Wastewater facilities, including collection, interception, transportation, treatment and disposal of wastewater, and any appurtenances for those facilities.”

The Wastewater Facilities IIP includes components for wastewater siphon facilities, wastewater reclamation facilities, wastewater treatment facilities, SROG Interceptor enhancements, SROG Interceptor, and the cost of professional services for preparing the Wastewater Facilities IIP and related Development Fee Report. All components use a plan-based methodology.

Service Area

Shown below in Figure WW1, the Wastewater Service Area includes the City of Tempe Municipal Planning Area (MPA) which includes all areas within the Tempe city limits, the Town of Guadalupe, and several County islands.

Figure WW1: Tempe Wastewater Service Area



Proportionate Share

ARS 9-463.05(B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to provide necessary public services to the development.

The Wastewater Facilities IIP and development fees are assessed on both residential and nonresidential development as both types of development create demand for additional wastewater facilities. Customers by land use are used to determine the proportionate share of this burden. In 2017, residential customers accounted for approximately 49 percent of average day flows, and nonresidential customers accounted for approximately 51 percent of average day flows.

RATIO OF SERVICE UNITS TO DEVELOPMENT UNITS

ARS 9-463.05(E)(4) requires:

“A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial, and industrial.”

Wastewater Facilities development fees are assessed based on meter size. Development fees assume a single-family unit is served by a 5/8” meter, and this size meter serves as the base meter size or equivalent dwelling unit (EDU). Capacity ratios equate 5/8” meters to demand per single-family residential unit with average day flows of 147 gallons. For all development requiring a larger meter, capacity ratios by meter size are the appropriate demand indicator for wastewater facilities.

Figure WW2: Wastewater Facilities Ratio of Service

Demand Indicators per EDU		Meter Size (inches)	Capacity Ratio
Single-Family Unit (5/8" Meter)	147 avg day	5/8"	1.0
		3/4"	1.5
		1"	2.5
		1.5"	5.0
		2"	8.0
		2" T	14.0
		3" C	20.0
		3" T	25.0
		4" C	40.0
		4" T	50.0
		6" C	80.0
		6" T	100.0
		8" T	190.0
		10" T	285.0

Source: City of Tempe, Arizona
 T = Turbine, C = Compound

PROJECTED DEMAND AND COSTS FOR SERVICES

ARS 9-463.05(E)(5) requires:

“The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria.”

Projected Wastewater Flows

Using projections from Tempe’s 2016 Water and Wastewater Master Plan, projected wastewater flows increase by 2.70 MGD over the next ten years, as shown in Figure WW3.

Figure WW3: Projected Service Units

Year	Average Day ¹	Annual	Cumulative
2017	19,647,478		
Base 2018	19,752,305		
1 2019	19,852,987	100,682	100,682
2 2020	19,953,669	100,682	201,364
3 2021	20,265,585	311,916	513,280
4 2022	20,577,501	311,916	825,196
5 2023	20,889,417	311,916	1,137,112
6 2024	21,201,333	311,916	1,449,028
7 2025	21,513,249	311,916	1,760,944
8 2026	21,825,165	311,916	2,072,860
9 2027	22,137,081	311,916	2,384,776
10 2028	22,448,997	311,916	2,696,692

1. City of Tempe Water and Wastewater Master Plan 2016, Table 6-6.

ANALYSIS OF CAPACITY, USAGE, AND COSTS OF EXISTING PUBLIC SERVICES

ARS 9-463.05(E)(1) requires:

“A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.”

ARS 9-463.05(E)(2) requires:

“An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.”

Existing Capacity and Usage

In 2016, Wilson Engineers completed Tempe’s 2016 Water and Wastewater Master Plan. Through its analysis, Wilson Engineers inventoried Tempe’s existing wastewater facilities and evaluated the system’s overall capacity. The total capacity of Tempe’s share of the 91st Avenue Wastewater Treatment Plant equals 32.5 MGD and the permitted capacity is 29.4 MGD. Based on 2017 average day flows of 19.6 MGD, Tempe’s wastewater treatment infrastructure has 9.8 MGD capacity remaining.

Figure WW4: Existing Usage of Wastewater Facilities

Wastewater Treatment Infrastructure	Capacity MGD
91st Avenue Wastewater Treatment Plant	32.5
Permitted Capacity	29.4

Average Day Flows (2017)	19.6
Remaining Capacity	9.8

Equivalent Dwelling Unit

For Wastewater Facilities development fees, flows generated from a single-family unit with a 5/8” meter represent an equivalent dwelling unit (EDU). Average days flows equal 147 gallons per day.

Figure WW5: Flows per Equivalent Dwelling Unit

Single-Family Development (5/8" meter)	Gallons per Capita	Persons per Housing Unit¹	Gallons per EDU
Average Day Flows	60	2.45	147

1. See Land Use Assumptions.

Average Day Flows

Figure WW6 shows 2017 average day flows, by customer class, provided by Tempe’s Public Works Department. In 2017, Tempe’s average day flows equaled approximately 19.65 MGD. For single-family residential development, per capita flows were 60 gallons per person per day.

Figure WW6: Wastewater Level of Service

Customer Class	Average Day Gallons¹	Demand Units²	Gallons per Capita
Single Family	5,052,852	83,959 persons	60
Multi-Family	4,066,469	99,974 persons	41
Commercial	6,472,465	147,410 jobs	44
Industrial	4,055,692	43,037 jobs	94
Total	19,647,478		

1. Public Works Department, City of Tempe, Arizona, 2017.

2. See Land Use Assumptions.

Wastewater Siphon Facilities

Within the next ten years, Tempe plans to construct wastewater siphon facilities to serve future development. To calculate the cost per service unit (gallons), costs are allocated to the additional capacity of each wastewater facility. For the planned wastewater siphon facilities, this results in a cost of \$3.70 per gallon (\$7,400,000 / 2.00 MGD). Based on a projected flow increase of approximately 2.70 MGD over the next ten years, development fee revenue will fund approximately 100 percent of growth-related wastewater siphon facility costs during this period. Tempe should discontinue collection of the wastewater siphon facilities component when no additional wastewater siphon facilities capacity exists.

Figure WW7: Wastewater Siphon Facilities

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost
		Total	Existing	Future	
Spence Diversion + Flow Monitoring Stations	\$500,000	2.00	0.00	2.00	\$500,000
Siphon Outlet Pumping Station	\$6,900,000				\$6,900,000
Total	\$7,400,000	2.00	0.00	2.00	\$7,400,000

Total Cost of Additional Capacity	\$7,400,000
Additional Gallons of Capacity	2,000,000
Cost per Gallon of Capacity	\$3.70

10-Year Flow Increase	2,696,692
10-Year Share of Cost	\$7,400,000

Wastewater Reclamation Facilities

Within the next ten years, Tempe plans to construct wastewater reclamation facilities to serve future development. To calculate the cost per service unit (gallons), costs are allocated to the additional capacity of each wastewater facility. For the planned wastewater reclamation facilities, this results in a cost of \$2.46 per gallon (\$7,375,000 / 3.00 MGD). Based on a projected demand increase of approximately 2.70 MGD over the next ten years, development fee revenue will fund approximately 90 percent of growth-related wastewater reclamation costs during this period.

Figure WW8: Wastewater Reclamation Facilities

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost
		Total	Existing	Future	
Recharge Wells	\$7,375,000	3.00	0.00	3.00	\$7,375,000
Total	\$7,375,000	3.00	0.00	3.00	\$7,375,000

Total Cost of Additional Capacity	\$7,375,000
Additional Gallons of Capacity	3,000,000
Cost per Gallon of Capacity	\$2.46

10-Year Flow Increase	2,696,692
10-Year Share of Cost	\$6,629,367

Wastewater Treatment Facilities

Within the next ten years, Tempe plans to construct wastewater treatment facilities to serve future development. To calculate the cost per service unit (gallons), costs are allocated to the additional capacity of each wastewater facility. For the planned wastewater treatment facilities, this results in a cost of \$0.35 per gallon (\$1,114,074 / 3.18 MGD). Based on a projected demand increase of approximately 2.70 MGD over the next ten years, development fee revenue will fund approximately 85 percent of growth-related wastewater treatment costs during this period.

Figure WW9: Wastewater Treatment Facilities

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost
		Total	Existing	Future	
Sludge Digestion System ¹	\$375,964	3.18	0.00	3.18	\$375,964
Solar Sludge Drying Beds ¹	\$738,110				\$738,110
Total	\$1,114,074	3.18	0.00	3.18	\$1,114,074

1. Necessary public service included in Tempe's 2014 IIP.

Total Cost of Additional Capacity	\$1,114,074
Additional Gallons of Capacity	3,180,000
Cost per Gallon of Capacity	\$0.35

10-Year Flow Increase	2,696,692
10-Year Share of Cost	\$944,753

SROG Interceptor Enhancements

Within the next ten years, Tempe plans to fund SROG interceptor enhancements to serve future development. To calculate the cost per service unit (gallons), costs are allocated to the additional capacity of each wastewater facility. For the planned SROG interceptor enhancements, this results in a cost of \$0.10 per gallon (\$2,315,883 / 22.60 MGD). Based on a projected demand increase of approximately 2.70 MGD over the next ten years, development fee revenue will fund approximately 93 percent of growth-related SROG interceptor enhancement costs during this period.

Figure WW10: SROG Interceptor Enhancements

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost
		Total	Existing	Future	
SRO/SAI Interceptor Odor Control ¹	\$258,866	22.60	19.70	2.90	\$33,217
SRO/SAI Interceptor Odor Control Implement ¹	\$1,021,480				\$131,075
Metering Station ¹	\$1,071,537				\$137,498
Total	\$2,351,883	22.60	19.70	2.90	\$301,790

1. Necessary public service included in Tempe's 2014 IIP.

Total Cost of Additional Capacity	\$2,351,883
Additional Gallons of Capacity	22,600,000
Cost per Gallon of Capacity	\$0.10

10-Year Flow Increase	2,696,692
10-Year Share of Cost	\$280,633

SROG Interceptor

Within the next ten years, Tempe plans to fund SROG interceptor improvements to serve future development. To calculate the cost per service unit (gallons), costs are allocated to the additional capacity of each wastewater facility. For the planned SROG interceptor improvements, this results in a cost of \$2.42 per gallon (\$21,749,596 / 9.00 MGD). Based on a projected demand increase of approximately 2.70 MGD over the next ten years, development fee revenue will fund approximately 96 percent of growth-related SROG interceptor costs during this period.

Figure WW11: SROG Interceptor

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost
		Total	Existing	Future	
SROG Interceptor Capacity ¹	\$21,749,596	9.00	6.20	2.80	\$6,766,541
Total	\$21,749,596	9.00	6.20	2.80	\$6,766,541

1. Necessary public service included in Tempe's 2014 IIP.

Total Cost of Additional Capacity	\$21,749,596
Additional Gallons of Capacity	9,000,000
Cost per Gallon of Capacity	\$2.42

10-Year Flow Increase	2,696,692
10-Year Share of Cost	\$6,516,884

IIP and Development Fee Report

The cost to prepare the Wastewater Facilities IIP and development fees totals \$16,570. Tempe plans to update its report every five years. Based on this cost, proportionate share, and five-year projections of new residential and nonresidential development from the *Land Use Assumptions* document, the cost is \$0.01 per gallon.

Figure WW12: IIP and Development Fee Report

Necessary Public Service	Cost	Demand Unit	5-Year Demand Unit Increase	Cost per Demand Unit
Street Facilities	\$40,100	Person Trips	104,483	\$0.38
Wastewater Facilities	\$16,570	Gallons	1,137,112	\$0.01
Water Facilities	\$16,570	Gallons	2,112,651	\$0.01
Total	\$73,240			

WASTEWATER FACILITIES COST SUMMARY

Tempe’s updated Wastewater Facilities IIP includes necessary public services equal to \$40,007,123. Of the total costs, existing development’s share is \$17,033,148 and future development’s share is \$22,973,975. Since 2016, Tempe collected Wastewater Facilities development fees related to ongoing IIP projects equal to \$547,203. Based on projected wastewater flows, Wastewater Facilities development fees will generate \$21,788,207 over the next ten years. Tempe will need to collect the remaining balance of \$638,566 from future development beyond the ten-year projection timeline.

Figure WW13: Cost Summary

Description	Total
Total Cost of Additional Capacity	\$40,007,123
Less: Existing Development Share of Additional Capacity	\$17,033,148
Future Development Share of Additional Capacity	\$22,973,975
Less: Development Fees Collected for Ongoing IIP Projects ¹	\$547,203
Less: 10-Year Projected Development Fee Revenue	\$21,788,207
Remaining Cost of Additional Capacity	\$638,566

1. January 1, 2016 - April 30, 2019

WASTEWATER FACILITIES DEVELOPMENT FEES

Revenue Credit

A revenue credit is not necessary for the Wastewater Facilities development fees because 10-year growth costs exceed the amount of revenue that is projected to be generated by development fees according to the *Land Use Assumptions* document.

Proposed Wastewater Facilities Development Fees

Demand indicators and cost factors for Wastewater Facilities development fees are summarized in the upper portion of Figure WW14. Demand indicators per EDU (5/8" meter) equal 147 gallons per average day, and cost factors equal \$9.04 per gallon of capacity.

For a 5/8" meter, 147 average day gallons multiplied by \$9.04 per gallon of capacity equals \$1,329 per EDU.

For meters larger than 5/8", multiply the cost of \$1,329 per EDU by the corresponding capacity ratio. Future development needing a 1.0" meter will pay a Wastewater Facilities development fee of \$3,323 (\$1,329 per EDU X 2.5 capacity ratio).

Figure WW14: Proposed Wastewater Facilities Development Fees

Demand Indicators	
Gallons per EDU	147 avg day
Cost Factors per Gallon of Capacity	
Wastewater Siphon Facilities	\$3.70
Wastewater Reclamation Facilities	\$2.46
Wastewater Treatment Facilities	\$0.35
SROG Interceptor Enhancements	\$0.10
SROG Interceptor	\$2.42
Development Fee Report	\$0.01
Capital Cost per Gallon of Capacity	\$9.04

Development Fees per Meter				
Meter Size (inches)	Capacity Ratio ¹	Proposed Fees	Current Fee	Increase / Decrease
5/8"	1.0	\$1,329	\$1,334	(\$5)
3/4"	1.5	\$1,994	\$2,001	(\$7)
1"	2.5	\$3,323	\$3,335	(\$12)
1.5"	5.0	\$6,645	\$6,670	(\$25)
2"	8.0	\$10,632	\$10,672	(\$40)
2" T	14.0	\$18,606	N/A	N/A
3" C	20.0	\$26,580	\$26,680	(\$100)
3" T	25.0	\$33,225	N/A	N/A
4" C	40.0	\$53,160	\$53,360	(\$200)
4" T	50.0	\$66,450	N/A	N/A
6" C	80.0	\$106,320	\$106,720	(\$400)
6" T	100.0	\$132,900	N/A	N/A
8" T	190.0	\$252,510	\$253,460	(\$950)
10" T	285.0	\$378,765	\$400,200	(\$21,435)

1. Public Works Department, City of Tempe, Arizona.

PROJECTED WASTEWATER FACILITIES DEVELOPMENT FEE REVENUE

Projected fee revenue shown in Figure WW15 is based on the projected increase in average day wastewater flows and the updated Wastewater Facilities development fees shown in Figure WW14. If development occurs at a faster rate than projected, the demand for infrastructure will increase along with development fee revenue. If development occurs at a slower rate than projected, the demand for infrastructure will decrease and development fee revenue will decrease at a similar rate. Total expenditures for the next ten years equal approximately \$40.01 million with \$17.03 million required to serve existing development. Anticipated development fee revenue is approximately \$21.79 million over the next ten years.

Figure WW15: Projected Wastewater Facilities Development Fee Revenue

Fee Component	Future Share	Existing Share	Total Cost
Wastewater Siphon Facilities	\$7,400,000	\$0	\$7,400,000
Wastewater Reclamation Facilities	\$7,375,000	\$0	\$7,375,000
Wastewater Treatment Facilities	\$1,114,074	\$0	\$1,114,074
SROG Interceptor Enhancements	\$301,790	\$2,050,093	\$2,351,883
SROG Interceptor	\$6,766,541	\$14,983,055	\$21,749,596
Development Fee Report	\$16,570	\$0	\$16,570
Total	\$22,973,975	\$17,033,148	\$40,007,123

		\$9.04 per gallon
Year		Gallons
Base	2018	19,752,305
Year 1	2019	19,852,987
Year 2	2020	19,953,669
Year 3	2021	20,265,585
Year 4	2022	20,577,501
Year 5	2023	20,889,417
Year 6	2024	21,201,333
Year 7	2025	21,513,249
Year 8	2026	21,825,165
Year 9	2027	22,137,081
Year 10	2028	22,448,997
10-Year Increase		2,696,692
Projected Revenue		\$21,788,207

Total Expenditures	\$40,007,123
Existing Development Share	\$17,033,148
Projected Fee Revenue	\$21,788,207
Development Fee Fund Balance	\$547,203
Remaining Cost of Additional Capacity	\$638,566

WATER FACILITIES INFRASTRUCTURE IMPROVEMENTS PLAN

ARS 9-463.05 (T)(5)(a) defines the facilities and assets which can be included in the Water Facilities IIP:

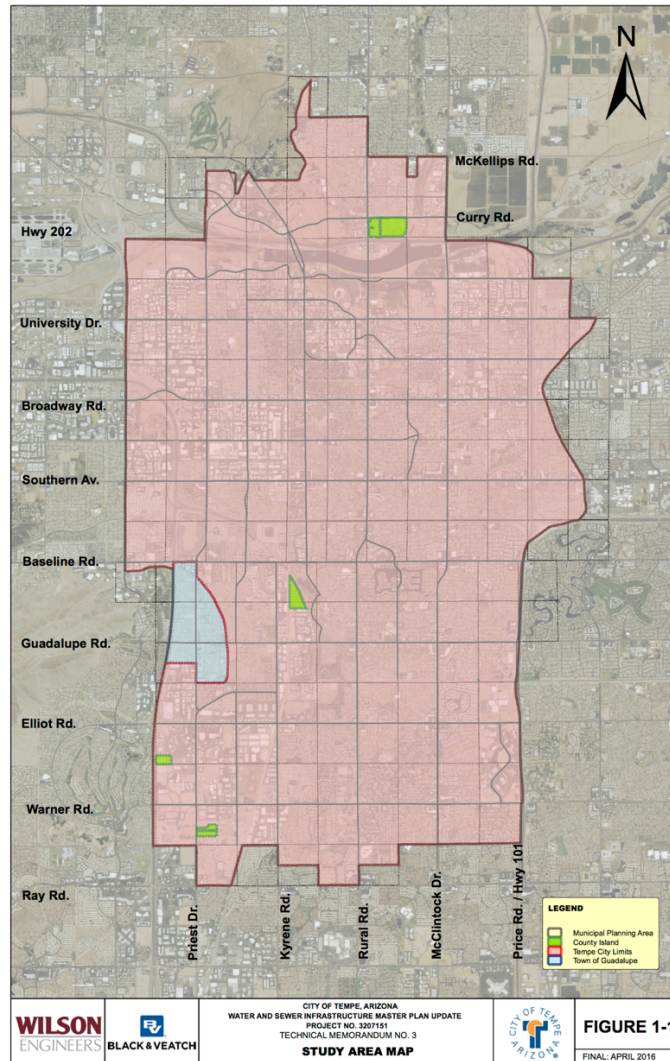
“water facilities, including the supply, transportation, treatment, purification and distribution of water, and any appurtenances for those facilities”

The Water Facilities IIP includes components for water production, water resource, and the cost of professional services for preparing the Water Facilities IIP and related Development Fee Report. All components use a plan-based methodology.

Service Area

Shown below in Figure W1, the Water Service Area includes the City of Tempe Municipal Planning Area (MPA) which includes all areas within the Tempe city limits, the Town of Guadalupe, and several County islands.

Figure W1: Tempe Water Service Area



Proportionate Share

ARS 9-463.05(B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to provide necessary public services to the development. The Water Facilities IIP and development fees are assessed on both residential and nonresidential development as both types of development create demand for additional water facilities. Customers by land use are used to determine the proportionate share of this burden. In 2017, residential customers accounted for approximately 51 percent of average day demand, and nonresidential customers accounted for approximately 49 percent of average day demand.

RATIO OF SERVICE UNITS TO DEVELOPMENT UNITS

ARS 9-463.05(E)(4) requires:

“A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial, and industrial.”

Water Facilities development fees are assessed based on meter size. Development fees assume a single-family unit is served by a 5/8” meter, and this size meter serves as the base meter size or equivalent dwelling unit (EDU). Capacity ratios equate 5/8” meters to demand per single-family residential unit with average day demand of 368 gallons and max day demand of 571 gallons. For all development requiring a larger meter, capacity ratios by meter size are the appropriate demand indicator for water facilities.

Figure W2: Water Facilities Ratio of Service

Demand Indicators per EDU		Meter Size (inches)	Capacity Ratio
Single-Family Unit (5/8" Meter)	368 avg day	5/8"	1.0
	571 max day	3/4"	1.5
		1"	2.5
		1.5"	5.0
		2"	8.0
		2" T	14.0
		3" C	20.0
		3" T	25.0
		4" C	40.0
		4" T	50.0
		6" C	80.0
		6" T	100.0
		8" T	190.0
		10" T	285.0

Source: City of Tempe, Arizona

T = Turbine, C = Compound

PROJECTED DEMAND AND COSTS FOR SERVICES

ARS 9-463.05(E)(5) requires:

“The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria.”

Projected Water Consumption

Using projections from Tempe’s 2016 Water and Wastewater Master Plan, average day water demand increases by 3.38 MGD over the next ten years, as shown in Figure W3.

Figure W3: Projected Service Units—Average Day Demand

Year	Average Day ¹	Annual	Cumulative
2017	41,452,546		
Base 2018	41,527,656		
1 2019	41,602,766	75,110	75,110
2 2020	41,677,876	75,110	150,220
3 2021	42,082,136	404,260	554,480
4 2022	42,486,396	404,260	958,740
5 2023	42,890,657	404,260	1,363,001
6 2024	43,294,917	404,260	1,767,261
7 2025	43,699,177	404,260	2,171,521
8 2026	44,103,437	404,260	2,575,781
9 2027	44,507,697	404,260	2,980,041
10 2028	44,911,957	404,260	3,384,301

1. City of Tempe Water and Wastewater Master Plan 2016, Table 5-6.

Projected max day demand, based on the projections shown above in Figure W3 and a max day peaking factor of 1.55, increases by 5.25 MGD over the next ten years.

Figure W4: Projected Service Units—Max Day Demand

Year	Max Day ¹	Annual	Cumulative
2017	64,251,446		
Base 2018	64,367,867		
1 2019	64,484,287	116,421	116,421
2 2020	64,600,708	116,421	232,841
3 2021	65,227,311	626,603	859,444
4 2022	65,853,914	626,603	1,486,048
5 2023	66,480,518	626,603	2,112,651
6 2024	67,107,121	626,603	2,739,254
7 2025	67,733,724	626,603	3,365,858
8 2026	68,360,327	626,603	3,992,461
9 2027	68,986,930	626,603	4,619,064
10 2028	69,613,533	626,603	5,245,667

1. Max Day Demand = Average Day Demand X 1.55, City of Tempe Water and Wastewater Master Plan 2016.

ANALYSIS OF CAPACITY, USAGE, AND COSTS OF EXISTING PUBLIC SERVICES

ARS 9-463.05(E)(1) requires:

“A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.”

ARS 9-463.05(E)(2) requires:

“An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.”

Existing Capacity and Usage

In 2016, Wilson Engineers completed Tempe’s 2016 Water and Wastewater Master Plan. Through its analysis, Wilson Engineers inventoried Tempe’s existing water facilities and evaluated the system’s overall capacity. The firm capacity of water production facilities equals 122.4 MGD and includes the Johnny G Martinez Water Treatment Plant, the South Tempe Water Treatment Plant, member wells, and non-member wells. Based on 2017 max day demand of 64.3 MGD, Tempe’s water production infrastructure has 58.1 MGD capacity remaining.

Figure W5: Existing Usage of Water Facilities

Water Production Infrastructure	Capacity MGD
Johnny G Martinez Water Treatment Plant	45.0
South Tempe Water Treatment Plan	45.0
Member Wells	31.2
Non-Member Wells	1.2
Total Firm Capacity	122.4
Max Day Demand (2017)	64.3
Remaining Capacity	58.1

Equivalent Dwelling Unit

For Water Facilities development fees, demand from a single-family unit with a 5/8” meter represents an equivalent dwelling unit (EDU). Average day demand equals 368 gallons per day and max day demand equals 571 gallons per day.

Figure W6: Demand per Equivalent Dwelling Unit

Single-Family Development (5/8” meter)	Gallons per Capita	Persons per Housing Unit ¹	Gallons per EDU
Average Day Demand	150	2.45	368
Max Day Demand	233	2.45	571

1. See Land Use Assumptions.

Average Day Demand

Figure W7 shows 2017 average day demand, by customer class, provided by Tempe’s Public Works Department. In 2017, Tempe’s average day demand was approximately 41.45 MGD. For single-family residential development, per capita demand was 150 gallons per person per day.

Figure W7: Water Level of Service—2017 Average Day Demand

Customer Class	Average Day Gallons ¹	Demand Units ²	Gallons per Capita
Single Family	12,632,130	83,959 persons	150
Multi-Family	7,393,580	99,974 persons	74
Commercial	9,957,639	147,410 jobs	68
Industrial	3,086,524	43,037 jobs	72
Irrigation	6,259,489		
Construction	149,254		
Unaccounted	1,973,931		
Total	41,452,546		

1. Public Works Department, City of Tempe, Arizona, 2017.
2. See Land Use Assumptions.

Max Day Demand

Shown in Figure W8, max day demand includes a peaking factor of 1.55 times average day demand. In 2017, Tempe’s max day demand was approximately 64.25 MGD. For single-family residential development, per capita demand was 233 gallons per person per day.

Figure W8: Water Level of Service—2017 Max Day Demand

Customer Class	Max Day Gallons ¹	Demand Units ²	Gallons per Capita
Single Family	19,579,801	83,959 persons	233
Multi-Family	11,460,049	99,974 persons	115
Commercial	15,434,340	147,410 jobs	105
Industrial	4,784,112	43,037 jobs	111
Irrigation	9,702,208		
Construction	231,344		
Unaccounted	3,059,593		
Total	64,251,446		

1. Max Day Demand = Average Day Demand X 1.55, City of Tempe Water and Wastewater Master Plan 2016.
2. See Land Use Assumptions.

Water Production Enhancements

Within the next ten years, Tempe plans to construct water production enhancements to serve existing and future development. To calculate the cost per service unit (gallons), costs are allocated to the additional capacity of each water production enhancement. For example, Johnny G. Martinez Water Treatment Plant water quality improvements will cost \$1,036,395 and provide enhancements to the plant’s 45.00 MGD of treatment capacity – a cost of \$0.02 per gallon (\$1,036,395 / 45.00 MGD). Current max day demand, from existing development, at this plant equals approximately 32.18 MGD of the total 45.00 MGD capacity. This leaves approximately 12.82 MGD of capacity for future development and a growth share of \$295,167 (\$0.02 per gallon X 12.82 MGD). The analysis repeats this calculation for each water production enhancement.

The total cost for water production enhancements equals \$13,166,736, and the growth cost is \$3,749,906. Existing development’s share of water production enhancement costs is \$9,416,830. Based on a cost of \$0.23 per gallon and a projected max day demand increase of approximately 5.25 MGD over the next ten years, projected development fee revenue equals \$1,206,503 during this period – approximately 32 percent of growth-related costs for water production enhancements.

Figure W9: Water Production Enhancements

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost	Cost per Gallon
		Total	Existing	Future		
WTP Chlorine Generation Cell Replacement ¹	\$1,837,396	90.00	64.37	25.63	\$523,293	\$0.02
WTP Filter Rehabilitation ¹	\$3,693,304	90.00	64.37	25.63	\$1,051,858	\$0.04
JGM WTP Water Aqueduct Rehabilitation ¹	\$1,307,364	45.00	32.18	12.82	\$372,339	\$0.03
JGM WTP Water Quality Improvements ¹	\$1,036,395	45.00	32.18	12.82	\$295,167	\$0.02
ST WTP Water Quality Improvements ¹	\$718,982	45.00	32.18	12.82	\$204,767	\$0.02
ST WTP Main Power Replacement ¹	\$4,573,295	45.00	32.18	12.82	\$1,302,481	\$0.10
Total	\$13,166,736				\$3,749,906	\$0.23

1. Necessary public service included in Tempe's 2014 IIP.

Total Cost of Additional Capacity	\$13,166,736
Cost per Gallon of Capacity	\$0.23

10-Year Max Day Demand Increase	5,245,667
10-Year Share of Cost	\$1,206,503

New Water Production Facilities

Within the next ten years, Tempe plans to construct additional production wells with 12.00 MGD of capacity to serve future development. To calculate the cost per service unit (gallons), costs are allocated to the additional capacity of each water production facility. For new water production facilities, this results in a cost of \$0.83 per gallon (\$10,001,176 / 12.00 MGD).

The total cost for new water production facilities equals \$10,001,176, and the growth cost is \$10,001,176. Based on a cost of \$0.83 per gallon and a projected max day demand increase of approximately 5.25 MGD over the next ten years, projected development fee revenue equals \$4,353,903 during this period – approximately 44 percent of growth-related costs for new water production facilities.

Figure W10: Water Production Facilities

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost
		Total	Existing	Future	
New Production Wells	\$10,001,176	12.00	0.00	12.00	10,001,176
Total	\$10,001,176	12.00	0.00	12.00	\$10,001,176

Total Cost of Additional Capacity	\$10,001,176
Additional Gallons of Capacity	12,000,000
Cost per Gallon of Capacity	\$0.83

10-Year Max Day Demand Increase	5,245,667
10-Year Share of Cost	\$4,353,903

Water Resource Facilities

Within the next ten years, Tempe plans to acquire approximately 2.21 MGD of water resources from the White Mountain Apache Tribe at a cost of \$6,235,514. This results in a cost of \$2.82 per gallon (\$6,235,514/ 2.21 MGD). Based on a projected average day demand increase of approximately 3.38 MGD over the next ten years, future development will consume 100 percent of the additional water resources prior to the end of the ten-year time period. Development fee revenue will fund 100 percent of water resource costs during this period.

Figure W11: Water Resource Facilities

Facility Description	Total Cost	Gallons of Capacity (MGD)			Growth Cost
		Total	Existing	Future	
WMAT Settlement Agreement ¹	\$6,235,514	2.21	0.00	2.21	\$6,235,514
Total	\$6,235,514	2.21	0.00	2.21	\$6,235,514

1. Necessary public service included in Tempe's 2014 IIP.

Total Cost of Additional Capacity	\$6,235,514
Additional Gallons of Capacity	2,214,897
Cost per Gallon of Capacity	\$2.82

10-Year Average Day Demand Increase	3,384,301
10-Year Share of Cost	\$6,235,514

IIP and Development Fee Report

The cost to prepare the Water Facilities IIP and development fees totals \$16,570. Tempe plans to update its report every five years. Based on this cost, proportionate share, and five-year projections of new residential and nonresidential development from the *Land Use Assumptions* document, the cost is \$0.01 per gallon.

Figure W12: IIP and Development Fee Report

Necessary Public Service	Cost	Demand Unit	5-Year Demand Unit Increase	Cost per Demand Unit
Street Facilities	\$40,100	Person Trips	104,483	\$0.38
Wastewater Facilities	\$16,570	Gallons	1,137,112	\$0.01
Water Facilities	\$16,570	Gallons	2,112,651	\$0.01
Total	\$73,240			

WATER FACILITIES COST SUMMARY

Tempe’s updated Water Facilities IIP includes necessary public services equal to \$29,419,996. Of the total costs, existing development’s share is \$9,416,830 and future development’s share is \$20,003,166. Since 2016, Tempe collected Water Facilities development fees related to ongoing IIP projects equal to \$1,666,980. Based on projected water demand, Water Facilities development fees will generate \$11,812,491 over the next ten years. Tempe will need to collect the remaining balance of \$6,523,695 from future development beyond the ten-year projection timeline.

Figure W13: Cost Summary

Description	Total
Total Cost of Additional Capacity	\$29,419,996
Less: Existing Development Share of Additional Capacity	\$9,416,830
Future Development Share of Additional Capacity	\$20,003,166
Less: Development Fees Collected for Ongoing IIP Projects ¹	\$1,666,980
Less: 10-Year Projected Development Fee Revenue	\$11,812,491
Remaining Cost of Additional Capacity	\$6,523,695

1. January 1, 2016 - April 30, 2019

WATER FACILITIES DEVELOPMENT FEES

Revenue Credit

A revenue credit is not necessary for the Water Facilities development fees because 10-year growth costs exceed the amount of revenue that is projected to be generated by development fees according to the *Land Use Assumptions* document.

Proposed Water Facilities Development Fees

Demand indicators and cost factors for Water Facilities development fees are summarized in the upper portion of Figure W14. Demand indicators per EDU (5/8" meter) equal 368 gallons per average day and 571 gallons per max day. Cost factors allocated to average day demand equal \$2.82 per gallon of capacity, and cost factors allocated to max day demand equal \$1.07 per gallon of capacity. The Water Facilities development fees equal \$1,648 per EDU.

For a 5/8" meter, 368 average day gallons multiplied by \$2.82 per gallon of capacity equals \$1,038 per EDU, and 571 max day gallons multiplied by \$1.07 per gallon of capacity equals \$610 per EDU. This results in a Water Facilities development fee of \$1,648 per EDU.

For meters larger than 5/8", multiply the cost of \$1,648 per EDU by the corresponding capacity ratio. Future development needing a 1.0" meter will pay a Water Facilities development fee of \$4,120 (\$1,648 per EDU X 2.5 capacity ratio).

Figure W14: Proposed Water Facilities Development Fees

Demand Indicators		
Gallons per EDU	368 avg day	571 max day
Cost Factors per Gallon of Capacity		
Water Production Enhancements	-	\$0.23
New Water Production Facilities	-	\$0.83
New Water Resource Facilities	\$2.82	-
Development Fee Report	-	\$0.01
Capital Cost per Gallon of Capacity	\$2.82	\$1.07
Capital Cost per EDU	\$1,038	\$610

Development Fees per Meter				
Meter Size (inches)	Capacity Ratio ¹	Proposed Fees	Current Fee	Increase / Decrease
5/8"	1.0	\$1,648	\$1,664	(\$16)
3/4"	1.5	\$2,472	\$2,496	(\$24)
1"	2.5	\$4,120	\$4,160	(\$40)
1.5"	5.0	\$8,240	\$8,320	(\$80)
2"	8.0	\$13,184	\$13,312	(\$128)
2" T	14.0	\$23,072	N/A	N/A
3" C	20.0	\$32,960	\$33,280	(\$320)
3" T	25.0	\$41,200	N/A	N/A
4" C	40.0	\$65,920	\$66,560	(\$640)
4" T	50.0	\$82,400	N/A	N/A
6" C	80.0	\$131,840	\$133,120	(\$1,280)
6" T	100.0	\$164,800	N/A	N/A
8" T	190.0	\$313,120	\$316,160	(\$3,040)
10" T	285.0	\$469,680	\$449,200	\$20,480

1. Public Works Department, City of Tempe, Arizona.

PROJECTED WATER FACILITIES DEVELOPMENT FEE REVENUE

Projected fee revenue shown in Figure W15 is based on the projected increase in water demand and the updated Water Facilities development fees shown in Figure W14. If development occurs at a faster rate than projected, the demand for infrastructure will increase along with development fee revenue. If development occurs at a slower rate than projected, the demand for infrastructure will decrease and development fee revenue will decrease at a similar rate. Total expenditures for the next ten years equal approximately \$29.42 million with \$9.42 million required to serve existing development. Anticipated development fee revenue is approximately \$11.81 million over the next ten years.

Figure W15: Projected Water Facilities Development Fee Revenue

Fee Component	Future Share	Existing Share	Total Cost
Water Production Enhancements	\$3,749,906	\$9,416,830	\$13,166,736
New Water Production Facilities	\$10,001,176	\$0	\$10,001,176
New Water Resource Facilities	\$6,235,514	\$0	\$6,235,514
Development Fee Report	\$16,570	\$0	\$16,570
Total	\$20,003,166	\$9,416,830	\$29,419,996

		\$2.82 per gallon	\$1.07 per gallon
Year		Average Day	Max Day
Base	2018	41,527,656	64,367,867
Year 1	2019	41,602,766	64,484,287
Year 2	2020	41,677,876	64,600,708
Year 3	2021	42,082,136	65,227,311
Year 4	2022	42,486,396	65,853,914
Year 5	2023	42,890,657	66,480,518
Year 6	2024	43,294,917	67,107,121
Year 7	2025	43,699,177	67,733,724
Year 8	2026	44,103,437	68,360,327
Year 9	2027	44,507,697	68,986,930
Year 10	2028	44,911,957	69,613,533
10-Year Increase		3,384,301	5,245,667
Projected Revenue		\$6,235,514	\$5,576,977

Total Expenditures	\$29,419,996
Existing Development Share	\$9,416,830
Projected Fee Revenue	\$11,812,491
Development Fee Fund Balance	\$1,666,980
Remaining Cost of Additional Capacity	\$6,523,695

APPENDIX A: FORECAST OF REVENUES OTHER THAN FEES

ARS 9-463.05(E)(7) requires:

“A forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved Land Use Assumptions, and a plan to include these contributions in determining the extent of the burden imposed by the development as required in subsection B, paragraph 12 of this section.”

ARS 9-463.05(B)(12) states:

“The municipality shall forecast the contribution to be made in the future in cash or by taxes, fees, assessments or other sources of revenue derived from the property owner towards the capital costs of the necessary public service covered by the development fee and shall include these contributions in determining the extent of the burden imposed by the development. Beginning August 1, 2014, for purposes of calculating the required offset to development fees pursuant to this subsection, if a municipality imposes a construction contracting or similar excise tax rate in excess of the percentage amount of the transaction privilege tax rate imposed on the majority of other transaction privilege tax classifications, the entire excess portion of the construction contracting or similar excise tax shall be treated as a contribution to the capital costs of necessary public services provided to development for which development fees are assessed, unless the excess portion was already taken into account for such purpose pursuant to this subsection.”

Tempe does not have a higher than normal construction excise tax rate; therefore, the required offset described above is not applicable. The required forecast of non-development fee revenue from identified sources that can be attributed to new development over the next five years is summarized in Figure A1. These funds are available for capital investments; however, the City of Tempe directs these revenues to non-development fee eligible capital needs including maintenance, repair, and replacement. The forecast of water / wastewater revenues beyond 2019 was derived from a linear regression analysis. Historical revenue data from 2017 through 2018, obtained from the City of Tempe, were correlated to water and wastewater growth (in gallons). Tempe’s Municipal Budget Office provided revenue projections for all other revenue sources.

Figure A1: Revenue Projections

Fiscal Year	Inter-governmental	Secondary Property Tax Levies	Privilege and Use Tax	Water / Wastewater	Total
FY16-17	\$89,383,867	\$26,577,755	\$99,865,430	\$86,273,324	\$302,100,376
FY17-18	\$90,577,368	\$27,834,226	\$105,643,666	\$87,807,953	\$311,863,213
FY18-19	\$101,514,952	\$28,030,238	\$108,228,409	\$89,564,112	\$327,337,711
FY19-20	\$90,607,995	\$30,177,956	\$109,104,650	\$91,355,394	\$321,245,995
FY20-21	\$93,936,814	\$31,520,599	\$112,864,926	\$93,182,502	\$331,504,841
FY21-22	\$97,148,366	\$32,769,300	\$117,039,315	\$95,046,152	\$342,003,133
FY22-23	\$100,173,845	\$34,067,468	\$121,383,414	\$96,947,075	\$352,571,802
FY23-24	\$52,109,563	\$32,009,885	\$114,083,802	\$98,886,017	\$297,089,267
FY24-25	\$49,636,870	\$32,601,262	\$115,897,705	\$100,863,737	\$298,999,574

Source: Municipal Budget Office, City of Tempe, Arizona

Only revenue generated by future development that is dedicated to growth-related capital improvements needs to be considered in determining the extent of the burden imposed by future development. Offsets against development fees are warranted in the following cases: (1) new development will be paying taxes or fees used to retire debt on existing facilities serving existing development; (2) new development will be paying taxes or fees used to fund an existing deficiency, or (3) new development will be paying taxes or fees that are dedicated for growth-related improvements. The analysis provided in the individual sections of this report identified no need for offsets against the proposed development fees.

Shown below in Figure A2 is a comparison of projected revenue per person and job. Intergovernmental revenue is projected to decline substantially relative to population and job growth. Secondary property tax, privilege and use tax, and water / wastewater revenue are projected to increase slightly. These funds are available for capital investments; however, the City of Tempe directs these revenues to non-development fee eligible capital needs including maintenance, repair, and replacement. In other words, there is no surplus available for growth-related capital improvements due to the overall decrease in projected revenue per person and job.

Figure A2: Revenue Projections per Person and Job

Fiscal Year	Inter-governmental	Secondary Property Tax Levies	Privilege and Use Tax	Water / Wastewater	Total
FY16-17	\$239	\$71	\$267	\$230	\$807
FY17-18	\$238	\$73	\$278	\$231	\$819
FY18-19	\$262	\$72	\$280	\$231	\$846
FY19-20	\$230	\$77	\$277	\$232	\$817
FY20-21	\$236	\$79	\$284	\$234	\$833
FY21-22	\$241	\$81	\$290	\$236	\$849
FY22-23	\$245	\$83	\$297	\$238	\$864
FY23-24	\$126	\$77	\$276	\$239	\$719
FY24-25	\$119	\$78	\$277	\$241	\$715

APPENDIX B: IMPLEMENTATION AND ADMINISTRATION

As specified in ARS 9-463.05, there are certain accounting requirements that must be met by the City:

Monies received from development fees assessed pursuant to this section shall be placed in a separate fund and accounted for separately and may only be used for the purposes authorized by this section. Monies received from a development fee identified in an infrastructure improvements plan adopted or updated pursuant to subsection D of this section shall be used to provide the same category of necessary public services or facility expansions for which the development fee was assessed and for the benefit of the same service area, as defined in the infrastructure improvements plan, in which the development fee was assessed. Interest earned on monies in the separate fund shall be credited to the fund.

All costs in the development fee calculations are given in current dollars with no assumed inflation rate over time. If cost estimates change significantly the City should update the fee calculations.

RESIDENTIAL DEVELOPMENT

As discussed below, residential development categories are based on data from the U.S. Census Bureau, American Community Survey. Development fees will be collected from all new residential units, including mobile homes and Recreational Vehicles (RV). For a parcel intended for occupancy by multiple mobile homes and/or RVs, the landowner will pay a development fee for each site than can accommodate a residential unit. One-time development fees are determined by site capacity (i.e. number of residential units) and will not be imposed on replacement units.

Single Unit: includes Single-Family and Mobile Home

Single-Family: includes fully detached, semi-detached (semi-attached, side-by-side), row houses, and townhouses. In the case of attached units, each must be separated from the adjacent unit by a ground-to-roof wall in order to be classified as a single-family structure. Also, these units must not share heating/air-conditioning systems or utilities.

Mobile Home: includes both occupied and vacant mobile homes, to which no permanent rooms have been added, are counted in this category. Mobile homes used only for business purposes or for extra sleeping space and mobile homes for sale on a dealer's lot, at the factory, or in storage are not counted in the housing inventory.

2+ Unit: includes Multi-Family and All Other Types

Multi-Family: includes residential buildings containing units built one on top of another and those built side-by-side which do not have a ground-to-roof wall and/or have common facilities (i.e., attic, basement, heating plant, plumbing, etc.).

All Other Types: includes boats, RVs, vans, etc., occupied as a housing unit or units that do not fit into the other categories. Recreational vehicles, boats, vans, railroad cars, and the like are included only if they are occupied as a current place of residence.

NONRESIDENTIAL DEVELOPMENT

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

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

Institutional: Establishments providing educational, social assistance, or religious services. By way of example, *Institutional* includes schools, universities, churches, daycare facilities, and government buildings.

Office and Other: Establishments providing management, administrative, professional, or business services; personal and health care services; lodging facilities. By way of example, *Office and Other* includes banks, business offices; hotels and motels; assisted living facilities, nursing homes, hospitals and medical offices; veterinarian clinics.

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

APPENDIX C: LAND USE ASSUMPTIONS

Arizona Revised Statutes (ARS) 9-463.05 (T)(7) requires the preparation of a *Land Use Assumptions* document, which shows:

“projections of changes in land uses, densities, intensities and population for a specified service area over a period of at least ten years and pursuant to the General Plan of the municipality.”

TischlerBise prepared current demographic estimates and future development projections for both residential and nonresidential development that will be used in the Infrastructure Improvements Plan (IIP) and calculation of the development fees. Current demographic estimates for 2017 are used in calculating levels of service (LOS) provided to existing development in the City of Tempe.

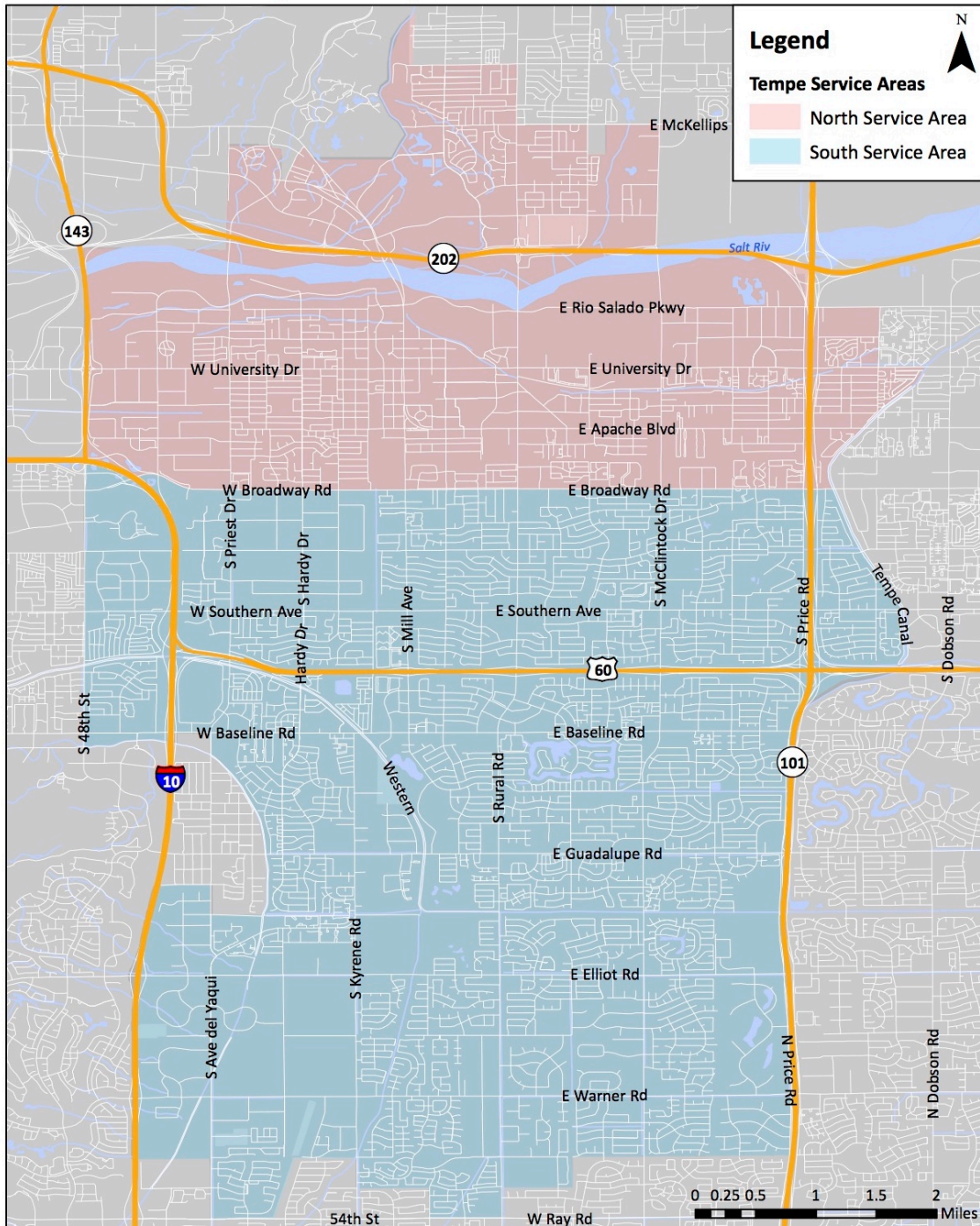
Starting with population, housing unit, and job projections from the Maricopa Association of Governments (MAG), TischlerBise prepared additional documentation on persons per housing units by bedroom range, nonresidential floor area, jobs per 1,000 square feet of nonresidential floor area, average weekday vehicle trip generation rates, and average weekday vehicle miles of travel. These metrics are the “service units” required by Arizona’s development fee enabling legislation (see ARS 9-463.05 E 4 and 5). Tempe-specific data used in the land use assumptions include U.S. Census Bureau 2010 counts of population and housing units, American Community Survey tables, Public Use Microdata Samples (PUMS), Maricopa County Assessor’s parcel-level livable square feet, and land use assumptions from Tempe’s General Plan 2040.

Although long-range projections are necessary for planning infrastructure systems, a shorter time frame of five to ten years is critical for the development fee analysis. Arizona’s Development Fee Act requires fees to be updated at least every five years and limits the IIP to a maximum of ten years. Therefore, the use of a very long-range “build-out” analysis is no longer acceptable for deriving development fees in Arizona municipalities.

SERVICE AREA

The estimates and projections of residential and nonresidential development in this *Land Use Assumptions* document are for areas within the boundaries of the City of Tempe. The map below illustrates the proposed street service areas within Tempe’s boundaries. The service areas for the Street Facilities IIP include a North Service Area and a South Service Area generally separated by Broadway Road—all properties adjacent to Broadway Road are included in the North Service Area.

Figure C1: City of Tempe Service Areas



SUMMARY OF GROWTH INDICATORS

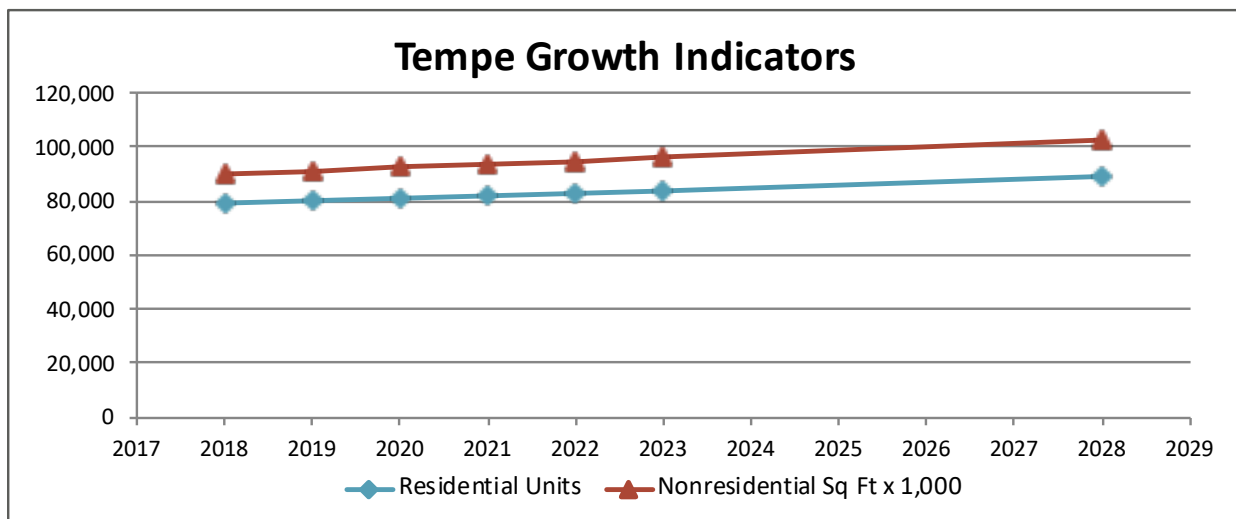
Key land use assumptions for the City of Tempe development fee study are population, housing unit, and employment projections adopted by MAG in June 2016. TischlerBise used 2015, 2020, and 2030 data for the Tempe Municipal Planning Area (MPA), deriving interim-year data using compound growth rates – compound growth rates yield more conservative short-range increases. MAG employment projections (i.e. jobs located within the Tempe MPA) were converted to nonresidential floor area based on average square feet per job multipliers. Four nonresidential development prototypes are discussed further below.

Development projections and growth rates are summarized in Figure C2. These projections will be used to estimate development fee revenue and to indicate the anticipated need for growth-related infrastructure. Development fee methodologies, however, are designed to reduce sensitivity to development projections in the determination of the proportionate-share fee amounts. If actual development is slower than projected, fee revenue will decline, but so will the need for growth-related infrastructure. In contrast, if development is faster than anticipated, fee revenue will increase, but the city will also need to accelerate infrastructure improvements to keep pace with the actual rate of development.

During the next five years, development projections indicate an average increase of 889 housing units per year. Also, Tempe expects to add nonresidential floor area averaging approximately 1.30 million square feet per year.

Figure C2: Summary of Development Projections

	2018	2019	2020	2021	2022	2023	2028	2018 to 2023	
								Avg Annual Increase	Compound Growth Rate
Residential Units	79,201	80,040	80,899	81,792	82,707	83,644	88,689	889	1.10%
Nonresidential Sq Ft x 1,000	89,592	91,142	92,711	93,812	94,940	96,093	102,327	1,300	1.41%



RESIDENTIAL DEVELOPMENT

Current estimates and future projections of residential development are detailed in this section. This includes population and housing units.

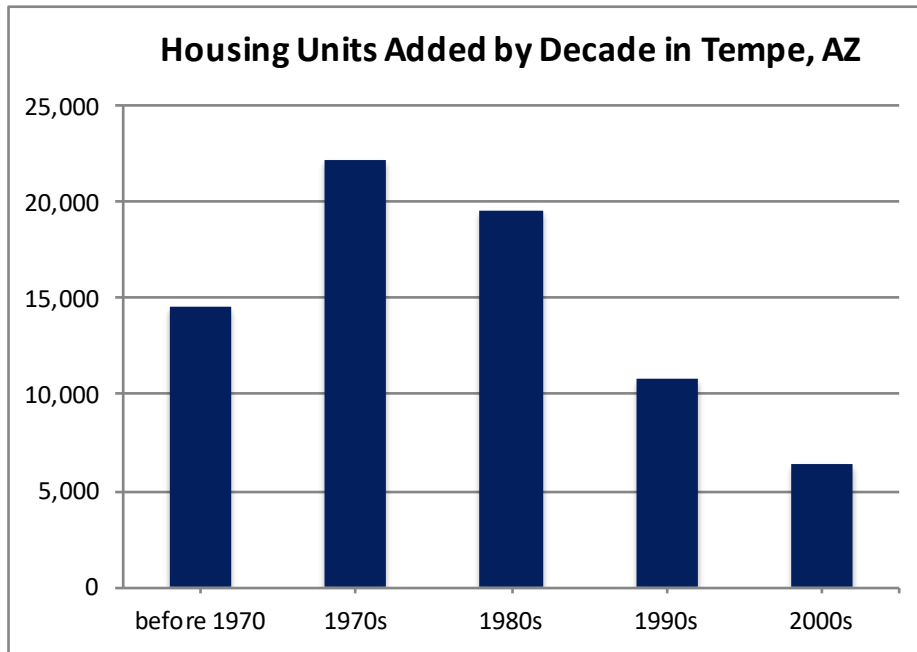
Recent Residential Construction

The chart at the bottom of Figure C3 indicates the estimated number of housing units added by decade in Tempe. Housing unit growth saw a large increase during the 1970s and 1980s with modest growth in more recent decades. From 2000 to 2010, Tempe’s housing stock increased by an average of 639 units per year.

Figure C3: Housing Units by Decade

Census 2010 Population	161,719
Census 2010 Housing Units	73,462
Total Housing Units in 2000	67,068
New Housing Units 2000-2010	6,394

From 2000 to 2010, Tempe added an average of 639 housing units per year.



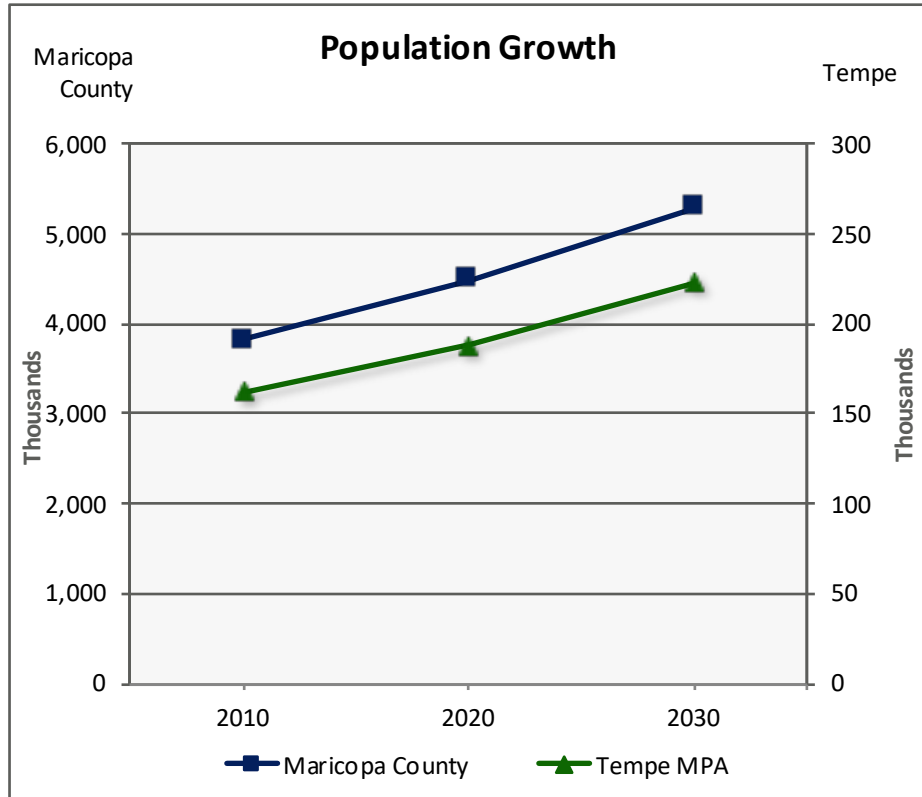
Source for 1990s and earlier is Table B25034, 2015 American Community Survey 1-Year Estimates adjusted to yield total units in 2000.

Population Forecast

In June 2016, the Maricopa Association of Governments released population projections through 2050. Shown in Figure C4 below, Tempe’s population was estimated at 162,100 in 2010, and it is projected to reach 222,800 in 2030. Based on these projections, Tempe’s share of Maricopa County’s population remains stable at 4.2 percent.

Figure C4: City of Tempe Population Share

Area	2010	2020	2030
Maricopa County	3,823,900	4,484,900	5,288,400
Tempe MPA	162,100	188,100	222,800
Remainder of County	3,661,800	4,296,800	5,065,600
Tempe Share	4.2%	4.2%	4.2%



Source: Socioeconomic Projections (June 2016), Maricopa Association of Governments.

Housing Unit Size

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

Development fees often use per capita standards and persons per housing unit (PPHU) or persons per household (PPH) to derive proportionate share fee amounts. When PPHU is used in the fee calculations, infrastructure standards are derived using year-round population. When PPH is used in the fee calculations, the development fee methodology assumes a higher percentage of housing units will be occupied, thus requiring seasonal or peak population to be used when deriving infrastructure standards. TischlerBise recommends that development fees for residential development in Tempe use the number of persons per housing unit to account for the impacts of year-round population. As shown in Figure C5, dwellings with a single unit per structure (detached, attached, and mobile homes) averaged 2.45 persons per housing unit and dwellings in structures with multiple units averaged 1.82 persons per housing unit. Tempe’s overall average is 2.15 persons per housing unit.

Figure C5: Persons per Housing Unity by Type of Unit

Units in Structure	Persons	Households	Persons per Household	Housing Units	Persons per Housing Unit	Housing Mix	Vacancy Rate
Single Unit ¹	98,050	36,518	2.68	39,939	2.45	52%	8.6%
2+ Units	66,420	30,807	2.16	36,511	1.82	48%	15.6%
Subtotal	164,470	67,325	2.44	76,450	2.15	100%	11.9%
Group Quarters	11,356						
Total	175,826						

Source: U.S. Census Bureau, 2015 American Community Survey, 1-Year estimates, Tables B25024, B25032, B25033, and B26001.
 1. Single unit includes detached, attached, and mobile homes.

Residential Projections

To project future residential development by service area, the study uses two sources. The North Service Area uses data provided by CivTech, as part of Tempe and Arizona State University’s Small Area Transportation Study, and data provided by MAG. The South Service Area uses data provided by MAG.

Through a partnership between Tempe and Arizona State University, CivTech is preparing a Small Area Transportation Study to better understand the effects of development on downtown Tempe, ASU’s Novus Innovation Corridor, the surrounding neighborhoods, and the regional network. To reflect their planning efforts in the development fee update, the study uses CivTech’s 2040 population and housing unit projections for the Downtown and Novus Innovation Corridor Study Areas. Boundaries for these study areas are shown below in Figure C6. For areas outside of CivTech’s study areas, but within the North Service Area of the development fee study, TischlerBise uses MAG data to project population and housing unit growth. These combined projections form the North Service Area.

Figure C6: Downtown and Novus Innovation Corridor Study Areas



Both service areas use MAG’s 2015 estimates of population and housing units to estimate base year population and housing units. These estimates, shaded yellow, are shown below in Figure C7. To estimate 2018 base year population and housing units, TischlerBise uses compound growth rates based on CivTech and MAG projections. For 2018, the study assumes a total population of 180,506 and 79,201 housing units.

Using the 2018 estimates, TischlerBise projects population through 2020 using a compound growth rate of 2.60 percent (CivTech and MAG) for the North Service Area and 0.94 percent (MAG) for the South Service Area. From 2020 through 2028, the final year of the study’s timeline, population projections use a compound growth rate of 2.54 percent (CivTech and MAG) for the North Service Area and 0.47 percent (MAG) for the South Service Area. Demographic data shown in Figure C7 provide key inputs for updating development fees in the City of Tempe. Over the next 10 years, Tempe’s population is projected to increase from 180,506 in the 2018 base year to 207,517 in 2028. Projected population growth results in the need for 9,488 additional housing units during the same period – an average annual increase of 949 housing units per year.

Figure C7: Residential Projections

	2015	2018	2019	2020	2021	2022	2023	2028	10-Year Increase
		Base Yr	1	2	3	4	5	10	
Total Population	172,104	180,506	183,396	186,334	188,796	191,309	193,872	207,517	27,011
North Service Area	67,249	72,630	74,513	76,442	78,379	80,367	82,405	93,425	20,795
South Service Area	104,855	107,876	108,883	109,892	110,417	110,942	111,467	114,092	6,216
Resident Population	159,952	167,297	169,818	172,374	174,439	176,545	178,693	190,105	22,808
North Service Area	55,904	60,339	61,890	63,477	65,064	66,692	68,362	77,384	17,045
South Service Area	104,048	106,958	107,928	108,897	109,375	109,853	110,331	112,721	5,763
Dwelling Units	76,801	79,201	80,040	80,899	81,792	82,707	83,644	88,689	9,488
North Service Area	30,445	32,521	33,252	34,004	34,820	35,658	36,518	41,178	8,657
South Service Area	46,356	46,680	46,788	46,895	46,972	47,049	47,126	47,511	831

NONRESIDENTIAL DEVELOPMENT

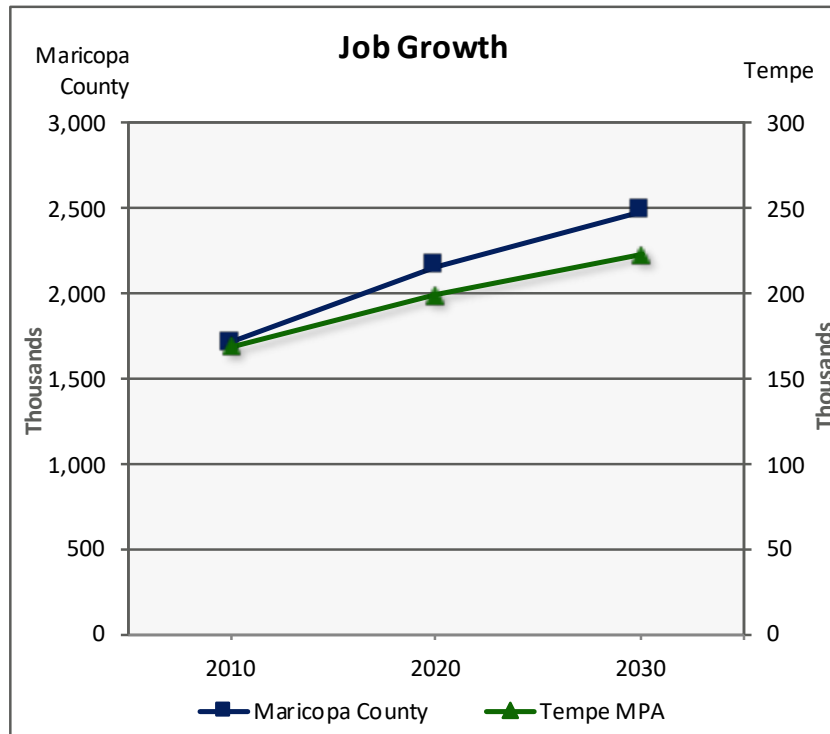
Current estimates and future projections of nonresidential development are detailed in this section. This includes employment and nonresidential floor area.

Jobs Forecast

In June 2016, the Maricopa Association of Governments released employment projections through 2050. Shown in Figure C8 below, estimated employment was 169,100 in 2010, and it is projected to reach 222,300 in 2030. Tempe’s share of countywide jobs declines to 9.2 percent in 2020 and 9.0 percent in 2030.

Figure C8: City of Tempe Job Share

Area	2010	2020	2030
Maricopa County	1,706,300	2,156,700	2,480,200
Tempe MPA	169,100	199,300	222,300
Remainder of County	1,537,200	1,957,400	2,257,900
Tempe Share	9.9%	9.2%	9.0%



Source: Socioeconomic Projections (June 2016), Maricopa Association of Governments.

Types of Nonresidential Development

Nonresidential development categories represent general groups of land uses with a similar number of service units per development unit (e.g. average weekday vehicle trip ends per thousand square feet of floor area). The general nonresidential development categories (defined below) can be used for all new nonresidential construction within Tempe.

1. **Industrial:** Establishments primarily engaged in the production, transportation, or storage of goods. By way of example, Industrial includes manufacturing plants, distribution warehouses, trucking companies, utility substations, power generation facilities, and telecommunications buildings.
2. **Commercial:** Establishments primarily selling merchandise, eating/drinking places, and entertainment uses. By way of example, Commercial includes shopping centers, supermarkets, pharmacies, restaurants, bars, nightclubs, automobile dealerships, and movie theaters.
3. **Institutional:** Public and quasi-public buildings providing educational, social assistance, or religious services. By way of example, Institutional includes schools, universities, churches, daycare facilities, and government buildings.
4. **Office and Other Services:** Establishments providing management, administrative, professional, or business services; personal and health care services; and lodging facilities. By way of example, Office and Other Services includes banks, business offices; hotels and motels; assisted-living facilities, nursing homes, and hospitals.

Jobs and Floor Area by Type of Development

Figure C9 indicates 2017 estimates of jobs and nonresidential floor area located in Tempe. Community Development staff provided current floor area estimates for industrial, commercial, and office and other development, using Co-Star databases. For institutional development, such as public buildings, schools, and churches, floor area is based on public sector jobs and an average of 1,075 square feet per job. The prototype for institutional development is an elementary school (see *Trip Generation*, Institute of Transportation Engineers, 10th Edition, 2017). For future industrial development, manufacturing (ITE code 140) is a reasonable proxy. In Tempe, industrial jobs average 676 square feet per job. The prototype for future commercial development is an average size shopping center (ITE code 820). Commercial development (i.e. retail and eating/drinking places) averages 395 square feet per job in Tempe. For office and other services, a general office (ITE 710) is the prototype for future development, with an average of 281 square feet per job in Tempe.

Figure C9: Jobs and Floor Area Estimates

Development Type	2017 Jobs¹	Share of Jobs	2017 Floor Area²	Sq Ft per Job³	ITE Sq Ft per Job (Proxy)
Industrial ⁵	43,037	23%	29,078,591	676	613
Commercial ⁶	32,615	17%	12,875,303	395	427
Institutional ⁷	17,502	9%	18,814,650	1,075	1,075
Office & Other ⁸	97,293	51%	27,297,810	281	337
Total	190,447	100%	88,066,354		

1. Jobs in 2017 based on MAG socioeconomic projections (June 2016).
2. CoStar data for Industrial, Commercial, and Office & Other Services. Institutional floor area estimated from the number of jobs and ITE multipliers.
3. TischlerBise analysis and calculation.
4. ITE Multipliers used in analysis (as proxy): Industrial (ITE 110), Commercial (ITE 820), Institutional (ITE 520), Office & Other (ITE 710).
5. Major sectors include manufacturing, and wholesale trade.
6. Major sectors include retail trade, accommodation, and food services.
7. Major sector is educational services.
8. Major sectors include finance and insurance, administration and support, professional and scientific

Nonresidential Projections

To project future nonresidential development by service area, the study uses two sources. The North Service Area uses data provided by CivTech, as part of Tempe and Arizona State University's Small Area Transportation Study, and data provided by MAG. The South Service Area uses data provided by MAG.

As discussed in the residential projections section of the report, CivTech is preparing a Small Area Transportation Study to better understand the effects of development on downtown Tempe, ASU's Novus Innovation Corridor, the surrounding neighborhoods, and the regional network. The development fee update uses CivTech's 2040 employment projections for the Downtown and Novus Innovation Corridor Study Areas. Boundaries for these study areas are shown above in Figure C6. For areas outside of CivTech's study areas, but within the North Service Area of the development fee study, TischlerBise used MAG data to project employment growth. These combined projections form the North Service Area.

Both service areas use MAG's 2015 employment estimates to estimate base year employment. These estimates, shaded yellow, are shown below in Figure C10. For the 2018 base year estimates, TischlerBise uses compound growth rates based on CivTech and MAG projections for the North Service Area and MAG projections for the South Service Area. For 2018, the study assumes total employment of 193,746 jobs – 88,102 in the North Service Area and 105,644 in the South Service Area.

Using the 2018 estimates, TischlerBise projects employment through 2020 using a compound growth rate of 2.41 percent (CivTech and MAG) for the North Service Area and 1.18 percent (MAG) for the South Service Area. From 2020 through 2028, the final year of the study's timeline, employment projections use a compound growth rate of 1.99 percent (CivTech and MAG) for the North Service Area and 0.51 percent (MAG) for the South Service Area.

To project future nonresidential floor area, TischlerBise applies the square feet per job multipliers shown in Figure C9 to projected employment. For institutional development, such as public buildings, schools, and churches, floor area is based on public sector jobs and an average of 1,075 square feet per job. The prototype for institutional development is an elementary school (see *Trip Generation*, Institute of Transportation Engineers, 10th Edition, 2017). For future industrial development, manufacturing (ITE code 140) is a reasonable proxy. In Tempe, industrial jobs average 676 square feet per job. The prototype for future commercial development is an average size shopping center (ITE code 820). Commercial development (i.e. retail and eating/drinking places) averages 395 square feet per job in Tempe. For office and other services, a general office (ITE 710) is the prototype for future development, with an average of 281 square feet per job in Tempe.

Over the next 10 years, Tempe's employment is projected to increase from 193,746 jobs in the 2018 base year to 220,863 jobs in 2028 – an increase of 27,117 jobs. Projected employment growth results in the demand for 12.74 million square feet of nonresidential floor area during the same period – an average annual increase of 1.27 million square feet per year.

Figure C10: Nonresidential Projections

	2015	2018	2019	2020	2021	2022	2023	2028	10-Year Increase
		Base Yr	1	2	3	4	5	10	
Total Jobs in Tempe									
Industrial	42,185	43,465	43,896	44,326	44,469	44,613	44,759	45,520	2,055
Commercial	31,544	33,154	33,694	34,235	34,526	34,819	35,113	36,614	3,460
Institutional	16,852	17,837	18,179	18,525	18,872	19,226	19,587	21,520	3,683
Office & Other	93,417	99,290	101,330	103,414	104,947	106,530	108,164	117,209	17,919
Total Jobs	183,998	193,746	197,099	200,500	202,814	205,188	207,623	220,863	27,117
Total Nonresidential Floor Area in MPA (x 1,000)									
Industrial		29,341	29,605	29,869	29,956	30,045	30,134	30,601	1,260
Commercial		13,105	13,336	13,567	13,691	13,816	13,942	14,583	1,477
Institutional		19,175	19,542	19,914	20,287	20,668	21,056	23,134	3,959
Office & Other		27,971	28,658	29,361	29,877	30,411	30,961	34,010	6,039
Total Floor Area		89,592	91,142	92,711	93,812	94,940	96,093	102,327	12,735
Jobs in North Tempe									
Industrial	19,206	19,871	20,097	20,323	20,466	20,610	20,756	21,517	1,646
Commercial	12,063	12,806	13,057	13,309	13,481	13,655	13,830	14,736	1,930
Institutional	9,737	10,509	10,780	11,057	11,343	11,636	11,936	13,564	3,055
Office & Other	41,035	44,916	46,292	47,714	48,815	49,966	51,168	58,053	13,137
North Tempe Jobs	82,041	88,102	90,226	92,403	94,105	95,867	97,690	107,870	19,768
Nonresidential Floor Area in North Tempe (x 1,000)									
Industrial		14,878	15,016	15,155	15,243	15,331	15,420	15,887	1,009
Commercial		4,417	4,524	4,632	4,705	4,779	4,854	5,241	824
Institutional		11,297	11,589	11,886	12,194	12,509	12,831	14,581	3,284
Office & Other		9,647	10,110	10,590	10,961	11,349	11,754	14,074	4,427
North Tempe Floor Area		40,239	41,239	42,263	43,102	43,968	44,859	49,783	9,544
Jobs in South Tempe									
Industrial	22,979	23,594	23,799	24,003	24,003	24,003	24,003	24,003	409
Commercial	19,481	20,348	20,637	20,926	21,045	21,164	21,283	21,878	1,530
Institutional	7,115	7,328	7,399	7,468	7,529	7,590	7,651	7,956	628
Office & Other	52,382	54,374	55,038	55,700	56,132	56,564	56,996	59,156	4,782
South Tempe Jobs	101,957	105,644	106,873	108,097	108,709	109,321	109,933	112,993	7,349
Nonresidential Floor Area in South Tempe (x 1,000)									
Industrial		14,463	14,589	14,714	14,714	14,714	14,714	14,714	251
Commercial		8,689	8,812	8,935	8,986	9,037	9,088	9,342	653
Institutional		7,878	7,954	8,028	8,094	8,159	8,225	8,553	675
Office & Other		18,324	18,548	18,771	18,916	19,062	19,208	19,936	1,612
South Tempe Floor Area		49,353	49,903	50,448	50,710	50,972	51,234	52,544	3,191

DETAILED DEVELOPMENT PROJECTIONS

Demographic data shown below provide key inputs for updating development fees in the City of Tempe.

	2015	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	10-Year Increase
	Base Yr	1	2	3	4	5	6	7	8	9	10		
Total Population	172,104	180,506	183,396	186,334	188,796	191,309	193,872	196,489	199,160	201,888	204,673	207,517	27,011
North Service Area	67,249	72,630	74,513	76,442	78,379	80,367	82,405	84,497	86,643	88,846	91,106	93,425	20,795
South Service Area	104,855	107,876	108,883	109,892	110,417	110,942	111,467	111,992	112,517	113,042	113,567	114,092	6,216
Dwelling Units	76,801	79,201	80,040	80,899	81,792	82,707	83,644	84,605	85,588	86,596	87,630	88,689	9,488
North Service Area	30,445	32,521	33,252	34,004	34,820	35,658	36,518	37,402	38,308	39,239	40,196	41,178	8,657
South Service Area	46,356	46,680	46,788	46,895	46,972	47,049	47,126	47,203	47,280	47,357	47,434	47,511	831
Jobs in North Tempe													
Industrial	19,206	19,871	20,097	20,323	20,466	20,610	20,756	20,904	21,054	21,206	21,361	21,517	1,646
Commercial	12,063	12,806	13,057	13,309	13,481	13,655	13,830	14,007	14,186	14,367	14,550	14,736	1,930
Institutional	9,737	10,509	10,780	11,057	11,343	11,636	11,936	12,245	12,562	12,887	13,221	13,564	3,055
Office & Other	41,035	44,916	46,292	47,714	48,815	49,966	51,168	52,424	53,738	55,112	56,549	58,053	13,137
North Tempe Jobs	82,041	88,102	90,226	92,403	94,105	95,867	97,690	99,580	101,540	103,572	105,681	107,870	19,768
Nonresidential Floor Area in North Tempe (x 1,000)													
Industrial		14,878	15,016	15,155	15,243	15,331	15,420	15,511	15,603	15,696	15,791	15,887	1,009
Commercial		4,417	4,524	4,632	4,705	4,779	4,854	4,930	5,006	5,083	5,162	5,241	824
Institutional		11,297	11,589	11,886	12,194	12,509	12,831	13,163	13,504	13,854	14,213	14,581	3,284
Office & Other		9,647	10,110	10,590	10,961	11,349	11,754	12,177	12,620	13,083	13,567	14,074	4,427
North Tempe Floor Area	40,239	41,239	42,263	43,102	43,968	44,859	45,781	46,733	47,716	48,732	49,783	49,783	9,544
Jobs in South Tempe													
Industrial	22,979	23,594	23,799	24,003	24,003	24,003	24,003	24,003	24,003	24,003	24,003	24,003	409
Commercial	19,481	20,348	20,637	20,926	21,045	21,164	21,283	21,402	21,521	21,640	21,759	21,878	1,530
Institutional	7,115	7,328	7,399	7,468	7,529	7,590	7,651	7,712	7,773	7,834	7,895	7,956	628
Office & Other	52,382	54,374	55,038	55,700	56,132	56,564	56,996	57,428	57,860	58,292	58,724	59,156	4,782
South Tempe Jobs	101,957	105,644	106,873	108,097	108,709	109,321	109,933	110,545	111,157	111,769	112,381	112,993	7,349
Nonresidential Floor Area in South Tempe (x 1,000)													
Industrial		14,463	14,589	14,714	14,714	14,714	14,714	14,714	14,714	14,714	14,714	14,714	251
Commercial		8,689	8,812	8,935	8,986	9,037	9,088	9,139	9,189	9,240	9,291	9,342	653
Institutional		7,878	7,954	8,028	8,094	8,159	8,225	8,290	8,356	8,422	8,487	8,553	675
Office & Other		18,324	18,548	18,771	18,916	19,062	19,208	19,353	19,499	19,644	19,790	19,936	1,612
South Tempe Floor Area	49,353	49,903	50,448	50,710	50,972	51,234	51,496	51,758	52,020	52,282	52,544	52,544	3,191

AVERAGE WEEKDAY VEHICLE TRIPS

Trip Generation Rates

Average Weekday Person Trips are used as a measure of demand by land use. Person trips are based on vehicle occupancy, transportation mode share, and vehicle trips ends from the reference book, *Trip Generation, 10th Edition*, published by the Institute of Transportation Engineers (ITE) in 2017.

Trip Rate Adjustments

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

Adjustments for Pass-By Trips and Commuting Patterns

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

Residential development has a trip adjustment factor of 61 percent to account for commuters leaving Tempe for work. According to the 2009 National Household Travel Survey, weekday work trips are typically 31 percent of production trips (i.e., all out-bound trips, which are 50 percent of all trip ends). As shown in Figure C11, the Census Bureau's web application OnTheMap indicates that 73 percent of resident workers traveled outside the city for work in 2015. In combination, these factors ($0.31 \times 0.50 \times 0.73 = .11$) support the additional 11 percent allocation of trips to residential development.

Figure C11: Inflow/Outflow Analysis

Trip Adjustment Factor for Commuters¹	
Employed Residents	72,217
Residents Working and Living in Tempe	19,270
Residents Commuting Outside Tempe for Work	52,947
Percent Commuting out of Tempe	73%
Additional Production Trips²	11%
Residential Trip Adjustment Factor	61%

1. U.S. Census Bureau, OnTheMap Application (version 6.1.1) and LEHD Origin-Destination Employment Statistics, 2015.

2. According to the National Household Travel Survey (2009)*, published in December 2011 (see Table 30), home-based work trips are typically 30.99 percent of “production” trips, in other words, out-bound trips (which are 50 percent of all trip ends). Also, LED OnTheMap data from 2015 indicate that 73 percent of Tempe’s workers travel outside the city for work. In combination, these factors ($0.3099 \times 0.50 \times 0.73 = 0.1136$) account for 11 percent of additional production trips. The total adjustment factor for residential 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.

*<http://nhts.ornl.gov/publications.shtml> ; Summary of Travel Trends - Table "Daily Travel Statistics by Weekday vs. Weekend"

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

DEMAND INDICATORS BY DWELLING SIZE

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

TischlerBise recommends a fee schedule where larger units pay higher development fees. Benefits of the proposed methodology include: 1) proportionate assessment of infrastructure demand using local demographic data, and 2) progressive fee structure (i.e. smaller units pay less and larger units pay more).

Custom tabulations of demographic data by bedroom range can be created from individual survey responses provided by the U.S. Census Bureau, in files known as Public Use Microdata Samples (PUMS). PUMS files are only available for areas of at least 100,000 persons, with the City of Tempe in two 2010 Public Use Microdata Areas (AZ PUMA 108 and 109).

Shown in Figure C12, cells with yellow shading indicate the survey results, which yield the unadjusted number of persons and vehicles available per housing unit. Unadjusted persons per housing unit estimates, derived from PUMS data, are adjusted to match the control totals for Tempe – 2.15 persons per housing unit. For the purpose of transportation fees, unadjusted vehicles per housing unit are adjusted to control totals in Tempe – 1.38 vehicles per unit.

Figure C12: Citywide Vehicle Trip Ends and Persons by Bedroom Range

Bedroom Range	Persons ¹	Vehicles Available ¹	Housing Units ¹	Tempe Housing Mix	Unadjusted PPHU	Adjusted PPHU ²	Unadjusted VPHU	Adjusted VPHU ²
0-1	169	114	139	17%	1.22	1.23	0.82	0.71
2	408	280	214	26%	1.91	1.93	1.31	1.13
3	615	472	269	32%	2.29	2.31	1.75	1.52
4+	570	455	207	25%	2.75	2.79	2.20	1.90
Total	1,762	1,321	829	100%	2.13	2.15	1.59	1.38

National Averages According to ITE

ITE Code	AWVTE per Person	AWVTE per Vehicle	AWVTE per HU	Tempe Housing Mix	Persons per Household	Vehicles per Household
210 SFD	2.65	6.36	9.44	52%	3.56	1.48
220 Apt	3.31	5.10	6.65	48%	2.01	1.30
Weighted Avg	2.97	5.76	8.10	100%	2.82	1.39

Recommended AWVTE per Housing Unit

Bedroom Range	AWVTE per HU Based on Persons ³	AWVTE per HU Based on Vehicles ⁴	AWVTE per Housing Unit ⁵
0-1	3.65	4.09	3.87
2	5.73	6.51	6.12
3	6.86	8.76	7.81
4+	8.29	10.94	9.62
Average	6.39	7.95	7.17

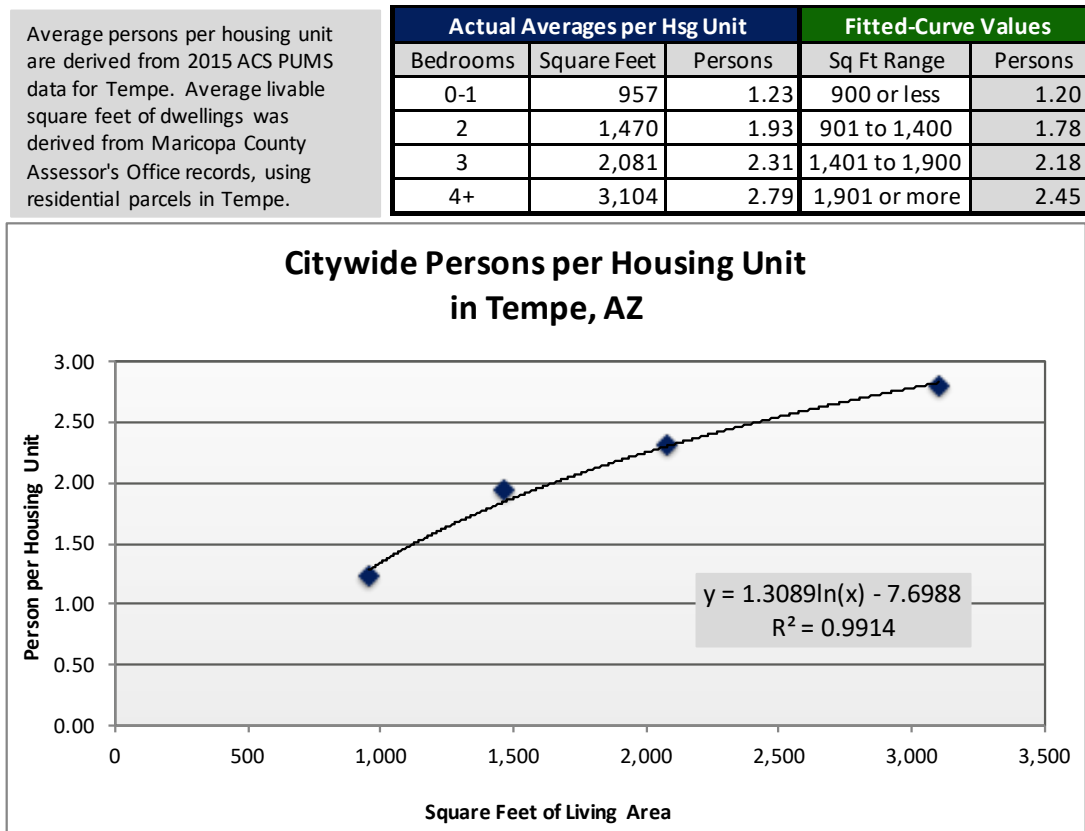
1. American Community Survey, Public Use Microdata Sample for Arizona PUMAs 108 & 109 (2015 1-Year unweighted data).
2. Adjusted multipliers are scaled to make the average PUMS values match control totals for Tempe based on ACS 2015 1-Year Estimates.
3. Adjusted persons per housing unit multiplied by national weighted average trip rate per person.
4. Adjusted vehicles available per housing unit multiplied by national weighted average trip rate per vehicle.

Persons by Square Feet of Living Space

Using parcel-level data from the Maricopa Assessor’s Office, TischlerBise derived average livable square feet by four size ranges: units with 0-1 bedrooms average 957 square feet, 2-bedroom units average 1,470 square feet, 3-bedrooms units average 2,081 square feet, and units with four or more bedrooms average 3,104 square feet. To confirm the size ranges, Tempe planning staff provided a database of “residential entitlements.” For development applications submitted from the last half of 2010 through the first half of 2014, new multi-family units range from 699 to 1,877 square feet, with an average size of 1,263 square feet. Based on the size of “entitled” multi-family units, these units are expected to average 1.20 to 2.18 persons per housing unit, as shown in the upper-right corner of Figure C13. The residential entitlements database also indicates new townhomes in Tempe range from 1,311 to 2,367 square feet. Based on the size of “entitled” townhomes, these units are expected to average 1.78 to 2.45 persons per housing unit.

Average floor area and number of persons by bedroom range are plotted in Figure C13, with a logarithmic trend line derived from four actual averages for Tempe. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 500 square feet intervals. For the purpose of development fees, TischlerBise recommends a minimum development fee based on a unit size of 900 square feet and a maximum fee for units 1,901 square feet or larger. For the upper threshold, each dwelling averages 2.45 persons, which is the average for all single-family residential units regardless of size, as shown above in Figure C5.

Figure C13: Citywide Persons by Square Feet of Living Space



Vehicle Trip Ends by Square Feet of Living Space

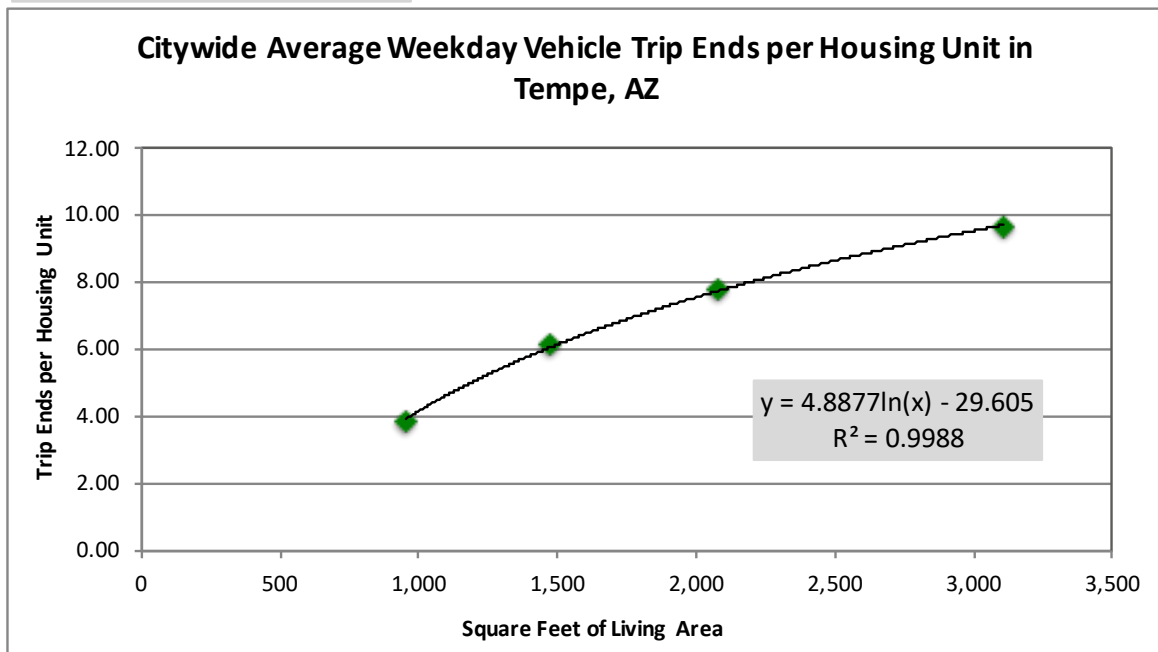
To derive average weekday vehicle trip ends by dwelling size, TischlerBise combined demographic data derived from U.S. Census Bureau PUMS files with floor area data from the Maricopa County Assessor and a residential entitlements database provided by Tempe staff. Citywide average floor area and weekday vehicle trip ends, by bedroom range, are plotted in Figure C14, with a logarithmic trend line derived from four actual averages in Tempe. TischlerBise used the trend line formula to derive estimated trip ends by housing unit size, in 500 square feet intervals. For the purpose of development fees, TischlerBise recommends a minimum fee based on a unit size of 900 square feet and a maximum fee for units 1,901 square feet or larger. For the upper threshold, each dwelling averages 8.59 vehicle trip ends.

A medium-size residential unit in Tempe with 1,401 to 1,900 square feet has a fitted-curve value of 7.30 vehicle trip ends on an average weekday. A small unit of 900 square feet or less would pay 50 percent of the street impact fee paid by a medium-size unit. A large unit of 1,901 square feet or more would pay 118 percent of the streets impact fee paid by a medium-size unit. If Tempe implements a “one-size-fits-all” approach, small units will pay more than their proportionate share while large units will pay less than their proportionate share. An average fee that does not vary by size makes small units less affordable and essentially subsidizes larger units.

Figure C14: Citywide Vehicle Trip Ends by Square Feet of Living Space

Actual Averages per Hsg Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Trip Ends	Sq Ft Range	Trip Ends
0-1	957	3.87	900 or less	3.64
2	1,470	6.12	901 to 1,400	5.80
3	2,081	7.81	1,401 to 1,900	7.30
4+	3,104	9.62	1,901 or more	8.59

Average weekday vehicles trip ends per housing unit are based on 2015 ACS PUMS data for Tempe. Average livable square feet per dwelling was derived from Maricopa County Assessor's Office records, using residential parcels in Tempe.



TRIP GENERATION RATES FOR NONRESIDENTIAL DEVELOPMENT

Shown below in Figure C15, gray shading indicates the four nonresidential development prototypes used by TischlerBise to derive average weekday vehicle trips and Vehicle Miles of Travel (VMT). Trip generation rates are from the Institute of Transportation Engineers (ITE 2017).

Figure C15: Average Weekday Vehicle Trip Ends

ITE Code	Land Use / Size	Demand Unit	Wkdy Trip Ends Per Dmd Unit ¹	Wkdy Trip Ends Per Employee ¹	Emp Per Dmd Unit	Sq Ft Per Emp
110	Light Industrial	1,000 Sq Ft	4.96	3.05	1.63	613
130	Industrial Park	1,000 Sq Ft	3.37	2.91	1.16	862
140	Manufacturing	1,000 Sq Ft	3.93	2.47	1.59	629
150	Warehousing	1,000 Sq Ft	1.74	5.05	0.34	2,941
254	Assisted Living	bed	2.60	4.24	0.61	na
310	Hotel	room	8.36	14.34	0.58	na
520	Elementary School	1,000 Sq Ft	19.52	21.00	0.93	1,075
530	High School	1,000 Sq Ft	14.07	22.25	0.63	1,587
540	Community College	student	1.15	14.61	0.08	na
550	University/College	student	1.56	8.89	0.18	na
565	Day Care	student	4.09	21.38	0.19	na
610	Hospital	1,000 Sq Ft	10.72	3.79	2.83	353
620	Nursing Home	bed	3.06	2.91	1.05	na
710	General Office (average size)	1,000 Sq Ft	9.74	3.28	2.97	337
715	Single Tenant Office	1,000 Sq Ft	11.25	3.77	2.98	336
720	Medical-Dental Office	1,000 Sq Ft	34.80	8.70	4.00	250
730	Government Office	1,000 Sq Ft	22.59	7.45	3.03	330
750	Office Park	1,000 Sq Ft	11.07	3.54	3.13	319
820	Shopping Center (average size)	1,000 Sq Ft	37.75	16.11	2.34	427

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

PERSON TRIPS

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

PERSON TRIP METHODOLOGY

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

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

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

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

Residential Vehicle Trip Ends

The person trip methodology uses average weekday vehicle trip ends (AWVTE), shown in Figure C16, to calculate residential person trips. To derive AWVTE by dwelling size, TischlerBise matched trip generation rates and average floor area, by bedroom range, as shown in Figure C14. As shown in the table below, the smallest floor area range (900 square feet or less) generates an estimated average of 3.64 vehicle trip ends per dwelling. The largest floor area range (1,901 square feet or more) generates an estimated average of 8.59 vehicle trip ends per dwelling.

Figure C16: Residential Vehicle Trip Ends

Actual Averages per Hsg Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Trip Ends	Sq Ft Range	Trip Ends
0-1	957	3.87	900 or less	3.64
2	1,470	6.12	901 to 1,400	5.80
3	2,081	7.81	1,401 to 1,900	7.30
4+	3,104	9.62	1,901 or more	8.59

Nonresidential Vehicle Trip Ends

Vehicle trip generation for nonresidential land uses are calculated by using ITE's average daily trip end rates found in their recently published 10th edition of Trip Generation. The weekday trip end per 1,000 square feet factors shaded gray in Figure C17 are used to estimate trip generation in Tempe.

Figure C17: Institute of Transportation Engineers Trip Generation Factors

ITE Code	Land Use / Size	Demand Unit	Wkdy Trip Ends Per Dmd Unit ¹	Wkdy Trip Ends Per Employee ¹	Emp Per Dmd Unit	Sq Ft Per Emp
110	Light Industrial	1,000 Sq Ft	4.96	3.05	1.63	613
130	Industrial Park	1,000 Sq Ft	3.37	2.91	1.16	862
140	Manufacturing	1,000 Sq Ft	3.93	2.47	1.59	629
150	Warehousing	1,000 Sq Ft	1.74	5.05	0.34	2,941
254	Assisted Living	bed	2.60	4.24	0.61	na
310	Hotel	room	8.36	14.34	0.58	na
520	Elementary School	1,000 Sq Ft	19.52	21.00	0.93	1,075
530	High School	1,000 Sq Ft	14.07	22.25	0.63	1,587
540	Community College	student	1.15	14.61	0.08	na
550	University/College	student	1.56	8.89	0.18	na
565	Day Care	student	4.09	21.38	0.19	na
610	Hospital	1,000 Sq Ft	10.72	3.79	2.83	353
620	Nursing Home	bed	3.06	2.91	1.05	na
710	General Office (average size)	1,000 Sq Ft	9.74	3.28	2.97	337
715	Single Tenant Office	1,000 Sq Ft	11.25	3.77	2.98	336
720	Medical-Dental Office	1,000 Sq Ft	34.80	8.70	4.00	250
730	Government Office	1,000 Sq Ft	22.59	7.45	3.03	330
750	Office Park	1,000 Sq Ft	11.07	3.54	3.13	319
820	Shopping Center (average size)	1,000 Sq Ft	37.75	16.11	2.34	427

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

MODE SHARE AND VEHICLE OCCUPANCY

Vehicle trip estimates, by mode, from the Maricopa Association of Governments (MAG) Fall 2017 Conformity Run provide mode share and vehicle occupancy data used in this analysis. There were 911,489 trips beginning in Tempe and 932,401 trips ending in Tempe. Of these trips, 70.4 percent were vehicle trips, 5.0 percent were transit trips, and 24.6 percent were non-motorized trips (bike, walk, other). Additionally, the vehicle trips had an average vehicle occupancy of 1.29 passengers per vehicle trip.

CALCULATION OF PERSON TRIP ENDS

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

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

This is rearranged to calculate total person trips:

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

To calculate the daily person trip end rate for each land use, the analysis inputs vehicle trip ends, vehicle occupancy, and vehicle mode share factors found in earlier sections. For example, daily vehicle trip ends for a 1,500-square-foot housing unit equal 7.30, the vehicle occupancy rate is 1.29, and the vehicle mode share is 70.4 percent. Inputting these factors into the formula generates 13.38 daily person trip ends $([7.30 \text{ vehicle trips ends} \times 1.29 \text{ occupancy rate}] / 70.4 \text{ percent vehicle mode share})$. Figure C18 lists the calculated daily person trip end rate for each land use.

Figure C18: Daily Person Trip Ends by Land Use

Development Type	Daily Vehicle Trip Ends	Vehicle Occupancy	Vehicle Mode Share	Daily Person Trip Ends
Residential (per housing unit)				
900 or less	3.64	1.29	70.4%	6.67
901 to 1,400	5.80	1.29	70.4%	10.63
1,401 to 1,900	7.30	1.29	70.4%	13.38
1,901 or more	8.59	1.29	70.4%	15.74
Nonresidential (per 1,000 square feet)				
Industrial	4.96	1.29	70.4%	9.09
Commercial	37.75	1.29	70.4%	69.17
Institutional	19.52	1.29	70.4%	35.77
Office & Other	9.74	1.29	70.4%	17.85

Trips Adjustment Factors

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

Residential development has a trip adjustment factor of 61 percent to account for commuters leaving Tempe for work. According to the 2009 National Household Travel Survey, weekday work trips are typically 31 percent of production trips (i.e., all out-bound trips, which are 50 percent of all trip ends). Based on 2015 ACS data, approximately 73 percent of residents commute outside of Tempe for work. In combination, these factors ($0.31 \times 0.50 \times 0.73 = 0.11$) support the additional 11 percent allocation of trips to residential development.

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

Person Trips by Mode

In Figure C19, the trip adjustment factor is applied to the person trip end rate of each land use to calculate person trips. For example, a 1,500-square-foot housing unit generates 13.38 person trip ends and has a trip adjustment factor of 61 percent, resulting in a daily person trip rate of 8.16. The development fee analysis outlined in this report uses the person trip totals, by type of development, shaded in gray.

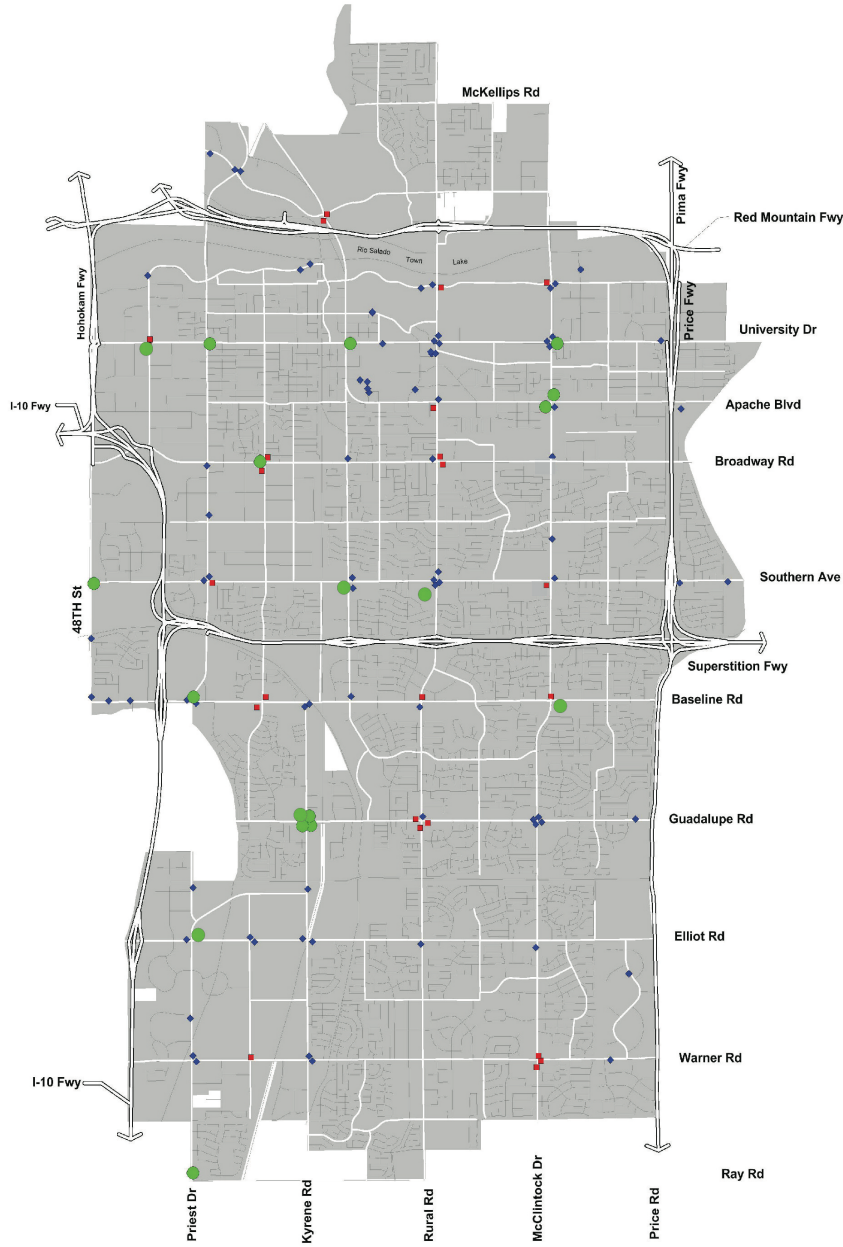
Figure C19: Person Trips by Mode

Development Type	Daily Vehicle Trip Ends ¹	Vehicle Occupancy ²	Vehicle Mode Share ²	Daily Person Trip Ends	Trip Adjustment	Person Trips
Residential (per housing unit)						
900 or less	3.64	1.29	70.4%	6.67	61%	4.07
901 to 1,400	5.80	1.29	70.4%	10.63	61%	6.48
1,401 to 1,900	7.30	1.29	70.4%	13.38	61%	8.16
1,901 or more	8.59	1.29	70.4%	15.74	61%	9.60
Nonresidential (per 1,000 square feet)						
Industrial	4.96	1.29	70.4%	9.09	50%	4.55
Commercial	37.75	1.29	70.4%	69.17	33%	22.83
Institutional	19.52	1.29	70.4%	35.77	33%	11.80
Office & Other	9.74	1.29	70.4%	17.85	50%	8.93

1. TischlerBise Land Use Assumptions
2. Maricopa Association of Governments Fall 2017 Conformity Run

APPENDIX D: BUS PULLOUTS

**MAP 1
 BUS PULLOUT LOCATION MAP**



LEGEND

- Recommended 18 Bus Pullout Locations for Design FY17-18
- Recommended 22 Bus Pullout Locations for Design After FY17-18
- ◆ Existing Bus Pullouts

Source: Transportation Division, City of Tempe, Arizona

Final Land Use Assumptions and Infrastructure Improvements Plan with Development Fee Report
City of Tempe, Arizona

	Location			Overall	
	Direction	On Street	At Street	Score	Rank
1	NB	Priest	Ray	30	1
2	EB	University	McClintock	29	2
3	EB	University	Priest	29	2
4	NB	Priest	Baseline	27	4
5	EB	University	Mill Avenue	27	4
6	NB	McClintock	Apache	23	6
7	WB	Broadway	Hardy	22	7
8	SB	McClintock	Apache	20	8
9	EB	Guadalupe	Kyrene	20	8
10	SB	Kyrene	Guadalupe	19	10
11	NB	Kyrene	Guadalupe	19	10
12	EB	Southern	48th	19	10
13	EB	Southern	Priest	19	10
14	SB	Mill	Southern	19	10
15	SB	McClintock	Broadway	18	15
16	WB	Guadalupe	Kyrene	18	15
17	SB	52nd	University	18	15
18	NB	52nd	University	18	15
19	SB	Hardy	Baseline	18	15
20	NB	McClintock	Baseline	18	15
21	WB	Rio Salado	McClintock	17	21
22	EB	Rio Salado	Rural Road	17	21
23	SB	Hardy	Broadway	17	21
24	NB	Hardy	Broadway	17	21
25	EB	Warner	McClintock	17	21
26	SB	Rural	Apache	17	21
27	NB	McClintock	Warner	17	21
28	EB	Broadway	Rural	17	21
29	EB	Curry	Mill	16	29
30	NB	Hardy	Warner	16	29
31	SB	Mill	Washington	16	29
32	NB	Hardy	Baseline	16	29
33	WB	Guadalupe	Rural	16	29
34	EB	Guadalupe	Rural	16	29
35	SB	Rural	Guadalupe	16	29
36	NB	Rural	Baseline	16	29
37	NB	Rural	Broadway	16	29
38	SB	McClintock	Warner	16	29
39	EB	Baseline	McClintock	7	102
40	NB	Priest	Elliot	5	121
41		Library	Internal		

Source: Transportation Division, City of Tempe, Arizona