

# Land Use Assumptions

Prepared for:  
**City of Yuma North Service Area**  
**Yuma, Arizona**

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**4701 Sangamore Road**

**Suite S240**

**Bethesda, MD 20816**

**301.320.6900**

**[www.TischlerBise.com](http://www.TischlerBise.com)**

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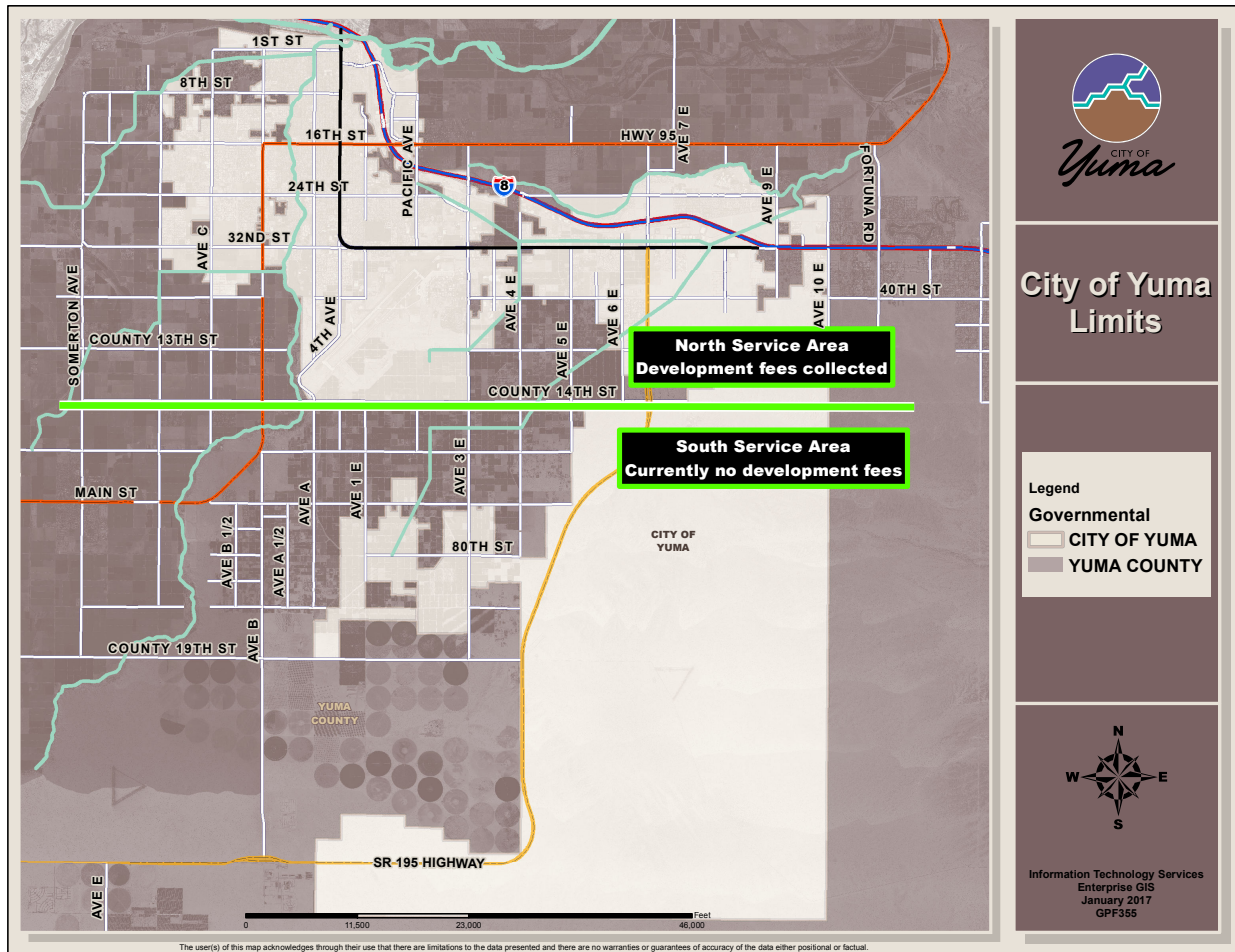
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## INTRODUCTION

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 Yuma North City Service Area. The map below illustrates the area within the City of Yuma North City Service Area boundaries.

Figure A1: City of Yuma North Service Area



## SUMMARY OF GROWTH INDICATORS

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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 data estimates for 2018 are used in calculating levels of service (LOS) provided to existing development in the City of Yuma North Service Area—referred to as “Yuma” or “City of Yuma” throughout this document. 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.

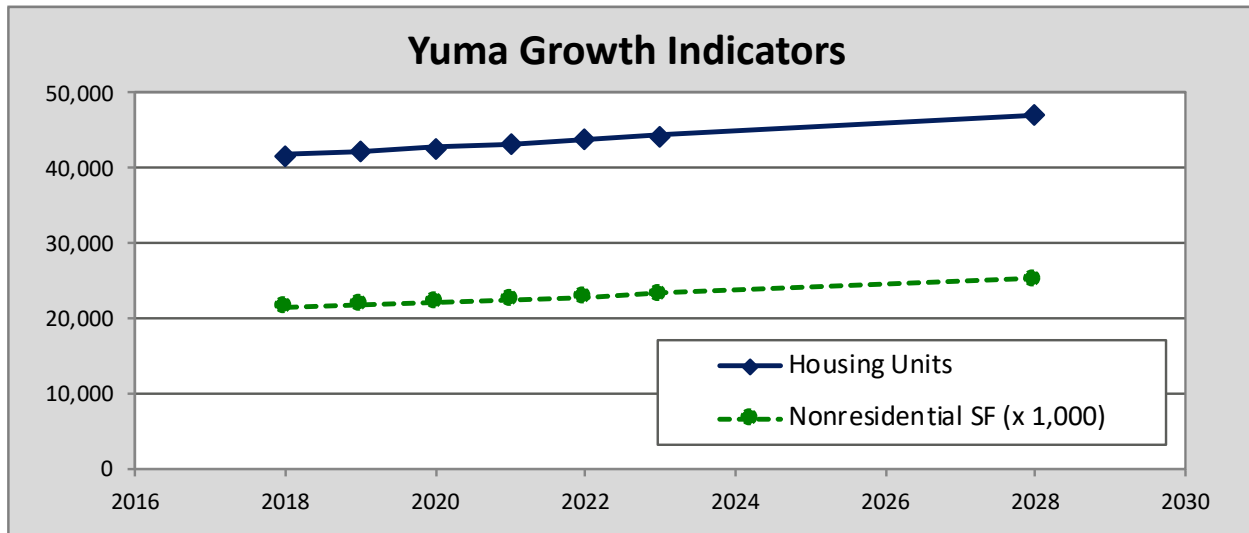
Key land use assumptions for the City of Yuma development fee study are population, housing units, and employment projections. Housing units are estimated by adding housing permits by type of unit provided by the City of Yuma to the 2010 Census housing unit estimate. The housing unit growth rate, based on the number of permits issued since the previous study, is used to project future housing units. TischlerBise uses Arizona Department of Administration population estimates to derive the 2018 base year population and converted projected housing units to population using 2016 American Community Survey data. For nonresidential development, the Arizona Department of Administration 2014-2016 nonfarm average annual growth rate (excluding Maricopa, Pinal, and Pima Counties) is applied to the base year employment estimate from Esri’s 2015 business summary for Yuma. The employment estimate is converted into floor area based on average square feet per job multipliers. Three nonresidential development prototypes are discussed further below (see Figure A8 and related text).

Development projections and growth rates are summarized in Figure A2. These projections will be used to estimate development fee revenue and to indicate the anticipated need for growth-related infrastructure. However, development fees methodologies are designed to reduce sensitivity to development projections in the determination of the proportionate-share fee amounts. If actual development is slower than projected, fee revenue will decline, but so will the need for growth-related infrastructure. In contrast, if development is faster than anticipated, Yuma will receive an increase in fee revenue, but will also need to accelerate infrastructure improvements to keep pace with the actual rate of development.

During the next five years, land use assumptions indicate an average increase of 526 housing units per year. Also, Yuma expects to add nonresidential floor area averaging approximately 355,000 square feet per year.

Figure A2: Summary of Development Projections

	2018	2019	2020	2021	2022	2023	2028	2018 to 2023 Average Annual	
								Increase	Compound Growth Rate
Housing Units	41,740	42,254	42,773	43,298	43,831	44,370	47,167	526	1.23%
Nonresidential SF (x 1,000)	21,511	21,855	22,205	22,560	22,921	23,288	25,215	355	1.60%



## RESIDENTIAL DEVELOPMENT

Current estimates and future projections of residential development are detailed in this section including population and housing units by type.

### Recent Residential Construction

Development fees require an analysis of current levels of service. For residential development, current levels of service are determined using estimates of population and housing units. To estimate current housing units in Yuma, city staff provided building permits issued since the last development fee study. This information is then used to determine a base year estimate of housing units. Shown in Figure A3, the 2011 housing unit estimate of 38,902 represents the number of housing units at the time of the previous development fee study. To estimate housing units for each fiscal year since the last study, residential building permits issued each quarter are allocated to the corresponding fiscal year and added to the 2011 housing unit estimate. For example, 148 single-family units were constructed from the third quarter of 2011 through the second quarter of 2012. Based on the 2011 single-family unit estimate of 20,395, the 2012 estimate is 20,543 (20,395 + 148 = 20,543). TischlerBise estimates Yuma’s July 1, 2017 housing unit total to be 41,233. This represents an increase of 1,929 single-family units, 151 multi-family units, and 251 mobile homes since the last study.

**Figure A3: Residential Permits**

	July 1, 2011	July 1, 2012	July 1, 2013	July 1, 2014	July 1, 2015	July 1, 2016	July 1, 2017	6-Yr Change
Single Family	20,395	20,543	20,853	21,134	21,427	21,866	22,324	1,929
Multi-family	7,400	7,429	7,493	7,494	7,494	7,501	7,551	151
Mobile Homes	11,107	11,144	11,198	11,258	11,315	11,328	11,358	251
	38,902	39,116	39,544	39,886	40,236	40,695	41,233	2,331

### Household Size

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

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

Figure A4 below shows the ACS 2016 estimates for Yuma – the most current data available. Single-family units averaged 3.10 persons per household (67,732 / 21,732), multi-family units averaged 2.16 persons per household (15,360 / 7,119), and all other types of housing averaged 1.80 persons per household (7,708 / 4,291). Yuma’s 2016 persons per household factor is 2.73. This factor is used to project future population.

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

<i>Units in Structure</i>	<i>Persons</i>	<i>Households</i>	<i>Persons per Household</i>	<i>Housing Units</i>	<i>Persons per Housing Unit</i>	<i>Housing Mix</i>	<i>Vacancy Rate</i>
Single-Family Units <sup>1</sup>	67,268	21,732	<b>3.10</b>	23,728	2.83	59%	8.41%
Multi-Family Units <sup>2</sup>	15,360	7,119	<b>2.16</b>	8,461	1.82	21%	15.86%
All Other Types <sup>3</sup>	7,708	4,291	<b>1.80</b>	8,203	0.94	20%	47.69%
Subtotal	90,336	33,142	<b>2.73</b>	40,392	2.24		17.95%
Group Quarters	3,368						
<b>TOTAL</b>	<b>93,704</b>						

Source: U.S. Census Bureau, 2012-2016 American Community Survey, Tables B25024, B25032, B25033, and B26001.

1. Includes detached and attached units (i.e. townhouse).
2. Includes dwellings in structures with two or more units.
3. Includes all other dwellings.

### Population Estimates

The first step in determining a base year peak population estimate is to calculate a year-round population estimate, and the 2017 Arizona Department of Administration population estimate of 101,620 is the most recent year-round estimate available. This estimate includes persons in group quarters and is adjusted based on 2016 ACS estimates (3,368 persons in group quarters) to reflect an estimated year-round population in households of 98,252 (101,620 – 3,368). To determine base year households, the 2016 ACS year-round occupancy rate of 82.05 percent (100 percent – 17.95 percent vacancy) is applied to the 2017 estimate of housing units discussed above. This yields a base year estimate of 33,832 year-round households (41,253 X 82.05 percent), and a persons per household ratio of 2.90 (98,252 / 33,832).

**Figure A5: Year-Round Population and Households**

Year-Round Population <sup>1</sup>	101,620
Group Quarters Population <sup>2</sup>	3,368
<hr/> Year-Round Population in Households	<hr/> 98,252
Year-Round Occupancy Rate <sup>2</sup>	82.05%
Housing Units <sup>3</sup>	41,233
Year-Round Households <sup>4</sup>	33,832

1. Arizona Department of Administration, July 1, 2017 estimate.
2. U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.
3. City of Yuma, Community Development Department.
4. TischlerBise calculation.



To calculate peak population, the year-round households estimate of 33,832 is used as the base. Next, seasonal housing units are added to year-round households to determine peak households. Seasonal housing units, according to 2016 ACS estimates, account for 10.41 percent (92.46 percent peak occupancy – 82.05 percent year-round occupancy) of total housing units; therefore, 4,292 housing units are occupied for seasonal use (41,233 X 10.41 percent). When combined, Yuma has a peak household estimate of 38,124 (33,832 + 4,292). To estimate peak population in households, the estimate of peak households is converted to population by applying the PPH ratio of 2.90 (38,124 X 2.90 = 110,560). When combined with persons in group quarters, the 2017 peak population is 113,928 (110,560 + 3,368).

**Figure A6: Peak Population and Households**

Peak Occupancy Rate <sup>1</sup>	92.46%
Year-Round Households <sup>2</sup>	33,832
Housing Units for seasonal, recreation, or occasional use <sup>2</sup>	4,292
<hr/>	
Peak Households	38,124
Persons per Household <sup>2</sup>	2.90
Peak Population in Households	110,560
Group Quarters Population <sup>1</sup>	3,368
<hr/>	
Peak Population	113,928

1. U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.
2. TischlerBise calculation.

### **Population Projections**

To more accurately determine future population, TischlerBise analyzed recent population and housing growth trends, reviewed Arizona Department of Administration population projections, and had discussions with staff. In 2016, the Arizona Department of Administration released sub-county population projections for 2016-2050 based on its medium growth scenario for each county. Yuma’s 2016 population was estimated to be 98,735 with a projected population of 114,156 in 2028. As discussed above, the 2017 year-round population estimate is also provided by the Arizona Department of Administration. The 2017 estimate and the 2028 projection are then used as the basis for population and housing unit projections. For this study, it is assumed that household size will remain constant; therefore, population projections for Yuma are based on the 2016 American Community Survey PPH estimate of 2.73 and projected housing units.

To project housing units, the 2018-2028 housing unit growth rate of 1.23 percent is used to project housing units in 2018. This growth rate matches the 2015 – 2017 housing unit growth rate based on permit data. Next, the projected new housing units are distributed, by type of structure, based on the 2016 ACS housing unit mix shown in Figure A4 – 59 percent single-family units, 21 percent multi-family units, and 20 percent mobile homes. For example, Figure A7 estimates the construction of 514 new housing units from 2018 to 2019 (42,254 – 41,740). Based

on the existing housing unit mix, this will include 303 single-family units (514 X 59 percent), 108 multi-family units (514 X 21 percent), and all other units will account for the remaining 103 new housing units (514 X 20 percent). See Figure A7 below for a summary of population and housing unit projections.

Population and housing unit projections are used to illustrate the possible future pace of service demands, revenues, and expenditures. To the extent these factors change, the projected need for infrastructure will also change. If development occurs at a more rapid rate than projected, the demand for infrastructure will increase at a corresponding rate. If development occurs at a slower rate than is projected, the demand for infrastructure will also decrease.

**Figure A7: Population and Housing Unit Projections**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	10-Year Increase
	Base Yr	1	2	3	4	5	6	7	8	9	10	
<b>POPULATION</b>												
Year-Round	102,756	103,905	105,068	106,247	107,440	108,647	109,870	111,107	112,363	113,630	114,913	12,157
Seasonal	12,452	12,600	12,747	12,895	13,048	13,201	13,357	13,515	13,670	13,834	13,998	1,546
Peak	115,208	116,505	117,815	119,142	120,488	121,848	123,227	124,622	126,033	127,464	128,911	13,703
<b>HOUSING UNITS</b>												
Single-Family	22,624	22,927	23,233	23,543	23,857	24,175	24,497	24,823	25,153	25,487	25,825	3,201
Multi-Family	7,657	7,765	7,874	7,984	8,096	8,209	8,324	8,440	8,558	8,677	8,797	1,140
All Other Types	11,459	11,562	11,666	11,771	11,878	11,986	12,095	12,205	12,317	12,430	12,545	1,086
Total Housing Units	41,740	42,254	42,773	43,298	43,831	44,370	44,916	45,468	46,028	46,594	47,167	5,427

## NONRESIDENTIAL DEVELOPMENT

Current estimates and future projections of nonresidential development are detailed in this section including jobs and nonresidential floor area.

### Employment Estimates

In addition to data on residential development, the calculation of development fees requires data on employment (number of jobs) and nonresidential square footage in the City of Yuma. TischlerBise analyzed recent employment trends, reviewed data provided by city staff, and had discussions with city staff.

TischlerBise uses a four-step process to calculate a base year job estimate and projections for each year past the base. First, job estimates from Esri's<sup>1</sup> 2015 business summary are used as the base year for Yuma (Figure A8). Second, job estimates are grouped by type: commercial/retail, office/institutional, and industrial/flex. Third, the Arizona Department of Administration's nonfarm average annual growth rate of 1.6 percent (2014-2016, excludes Maricopa, Pinal, and Pima Counties) is applied to the 2015 job estimates discussed in step one to project the number of citywide jobs. Finally, projected jobs are distributed by type of employment based on the 2015 share of total jobs.

**Figure A8: Estimated Employment and Distribution by Industry Type**

<i>Type</i>	<i>2015 Jobs<sup>1</sup></i>	<i>Share of Total Jobs</i>	<i>SF per Employee<sup>2</sup></i>	<i>2015 Estimated Floor Area</i>	<i>Jobs per 1,000 SF<sup>2</sup></i>
Commercial/Retail <sup>3</sup>	23,807	48.9%	500	11,904,000	2.00
Office/Institutional <sup>4</sup>	16,307	33.5%	301	4,908,000	3.32
Industrial/Flex <sup>5</sup>	8,540	17.6%	433	3,698,000	2.31
<i>TOTAL</i>	<u><u>48,654</u></u>			<u><u>20,510,000</u></u>	

1. Yuma Business Summary 2015, Esri Total Residential Forecasts for 2015.

2. Trip Generation, Institute of Transportation Engineers, 2012.

3. Major sectors include Eating & Drinking Places, General Merchandise Stores.

4. Major sectors include Health Services, Education Institutions & Libraries.

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

<sup>1</sup> Esri's 2015 business summary is extracted from Dun & Bradstreet data that includes over 24 million US businesses. Data is provided by industry classification – Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) – and includes estimates of businesses and employment.

## Nonresidential Square Footage Estimates

Job estimates are used to estimate nonresidential square footage based on nationally recognized average square feet per employee data published by The Institute of Transportation Engineers (ITE) and shown in Figure A9 below. Rows shaded in gray are used as prototypes for development in Yuma. TischlerBise uses 2012 data from the ITE to calculate the total nonresidential floor area for the development categories used in the calculation of development fees.

To estimate current nonresidential floor area, ITE square feet per employee factors are applied to 2015 job estimates shown in Figure A8. For future commercial/retail development, an average size shopping center (ITE code 820) is a reasonable proxy with an average 500 square feet per job. The prototype for future office/institutional development is a general office (ITE code 710). This type of development averages approximately 301 square feet per job. For industrial/flex development, light industrial (ITE 110) is the prototype for future development, with an average of 433 square feet per job. TischlerBise estimates the City of Yuma has approximately 20.5 million square feet of nonresidential space in active use.

**Figure A9: The Institute of Transportation Engineers, Employee and Building Area Ratios**

ITE Code	Land Use	Demand Unit	Wkdy Trip Ends		Emp Per 1,000 Sq Ft	Sq Ft Per Emp <sup>2</sup>
			Per 1,000 Sq Ft <sup>1</sup>	Per Employee <sup>1</sup>		
<b>Commercial</b>						
	<b>Average</b>	<b>1,000 Sq Ft</b>	<b>42.70</b>	<b>na</b>	<b>2.00</b>	<b>500</b>
820	10K gross leasable area	1,000 Sq Ft	152.03	na	3.33	300
820	25K gross leasable area	1,000 Sq Ft	110.32	na	3.03	330
820	50K gross leasable area	1,000 Sq Ft	86.56	na	2.86	350
<b>General Office and Other Services</b>						
	<b>Average</b>	<b>1,000 Sq Ft</b>	<b>11.03</b>	<b>3.32</b>	<b>3.32</b>	<b>301</b>
710	10K gross floor area	1,000 Sq Ft	22.66	5.06	4.48	223
710	25K gross floor area	1,000 Sq Ft	18.35	4.43	4.14	241
710	50K gross floor area	1,000 Sq Ft	15.65	4.00	3.91	256
<b>Industrial</b>						
<b>110</b>	<b>Light Industrial</b>	<b>1,000 Sq Ft</b>	<b>6.97</b>	<b>3.02</b>	<b>2.31</b>	<b>433</b>
140	Manufacturing	1,000 Sq Ft	3.82	2.13	1.79	558
150	Warehousing	1,000 Sq Ft	3.56	3.89	0.92	1,093
<b>Other Nonresidential</b>						
610	Hospital	1,000 Sq Ft	13.22	4.50	2.94	340
760	Research & Dev Center	1,000 Sq Ft	8.11	2.77	2.93	342
857	Discount Club	1,000 Sq Ft	41.80	32.21	1.30	771
310	Hotel	room	8.17	14.34	0.57	na

1. Trip Generation, Institute of Transportation Engineers, 2012.

2. Square feet per employee calculated from trip rates except for Shopping Center data, which are derived from the Urban Land Institute's Development Handbook and Dollars and Cents of Shopping Centers.

## Employment and Nonresidential Floor Area Projections

Future employment growth and nonresidential development in Yuma are projected based on information provided by city staff and analysis of past trends in Yuma. To project employment, TischlerBise applies an average annual growth rate estimated by the Arizona Department of Administration to each year beyond the 2015 estimate of 48,654 jobs. This results in a base year employment estimate of 51,027 jobs.

The projected increase in employment is then used to project growth in nonresidential square footage using the square feet per employee factors previously discussed. Results are shown in Figure A10. Over the next ten years, Yuma is projected to gain 8,779 jobs. To keep pace with employment growth, Yuma should expect to add roughly 3.70 million square feet of nonresidential development during the same period. The projected increase in nonresidential floor area is approximately 370,400 square feet per year and is similar to the average annual increase of 363,000 square feet of nonresidential floor area constructed between January 1, 2012 and June 30, 2015 – according to building permits issued in Yuma.

**Figure A10: Employment and Nonresidential Floor Area Projections**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	10-Year Increase
	Base Yr	1	2	3	4	5	6	7	8	9	10	
<b>EMPLOYMENT BY TYPE</b>												
Commercial/Retail	24,967	25,366	25,772	26,184	26,603	27,028	27,460	27,899	28,345	28,798	29,259	4,292
Office/Institutional	17,102	17,375	17,653	17,935	18,222	18,513	18,809	19,110	19,416	19,727	20,043	2,941
Industrial/Flex	8,958	9,102	9,248	9,396	9,547	9,700	9,856	10,014	10,175	10,338	10,504	1,546
<b>Total Employment</b>	<b>51,027</b>	<b>51,843</b>	<b>52,673</b>	<b>53,515</b>	<b>54,372</b>	<b>55,241</b>	<b>56,125</b>	<b>57,023</b>	<b>57,936</b>	<b>58,863</b>	<b>59,806</b>	<b>8,779</b>
<b>NONRES. FLOOR AREA (X 1,000 SF)</b>												
Commercial/Retail	12,485	12,685	12,888	13,094	13,304	13,517	13,733	13,953	14,176	14,403	14,634	2,149
Office/Institutional	5,148	5,230	5,314	5,399	5,485	5,573	5,662	5,753	5,845	5,939	6,034	886
Industrial/Flex	3,878	3,940	4,003	4,067	4,132	4,198	4,266	4,334	4,404	4,475	4,547	669
<b>Total Nonres. Floor Area</b>	<b>21,511</b>	<b>21,855</b>	<b>22,205</b>	<b>22,560</b>	<b>22,921</b>	<b>23,288</b>	<b>23,661</b>	<b>24,040</b>	<b>24,425</b>	<b>24,817</b>	<b>25,215</b>	<b>3,704</b>

## AVERAGE DAILY VEHICLE TRIPS

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Average Daily Vehicle Trips are used as a measure of demand by land use. Vehicle trips are estimated using average weekday vehicle trip ends from the reference book, *Trip Generation, 9<sup>th</sup> Edition*, published by the Institute of Transportation Engineers (ITE) in 2012. A vehicle trip end represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway).

### Trip Rate Adjustments

Yuma's streets development fees use average weekday trip generation rates from the reference book *Trip Generation* published by the Institute of Transportation Engineers (ITE 2012). A vehicle trip end represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway). To calculate streets development fees, trip generation rates require an adjustment factor to avoid double counting each trip at both the origin and destination points. Therefore, the basic trip adjustment factor is 50 percent. As discussed further below, the development fee methodology includes additional adjustments to make the fees proportionate to the infrastructure demand for particular types of development.

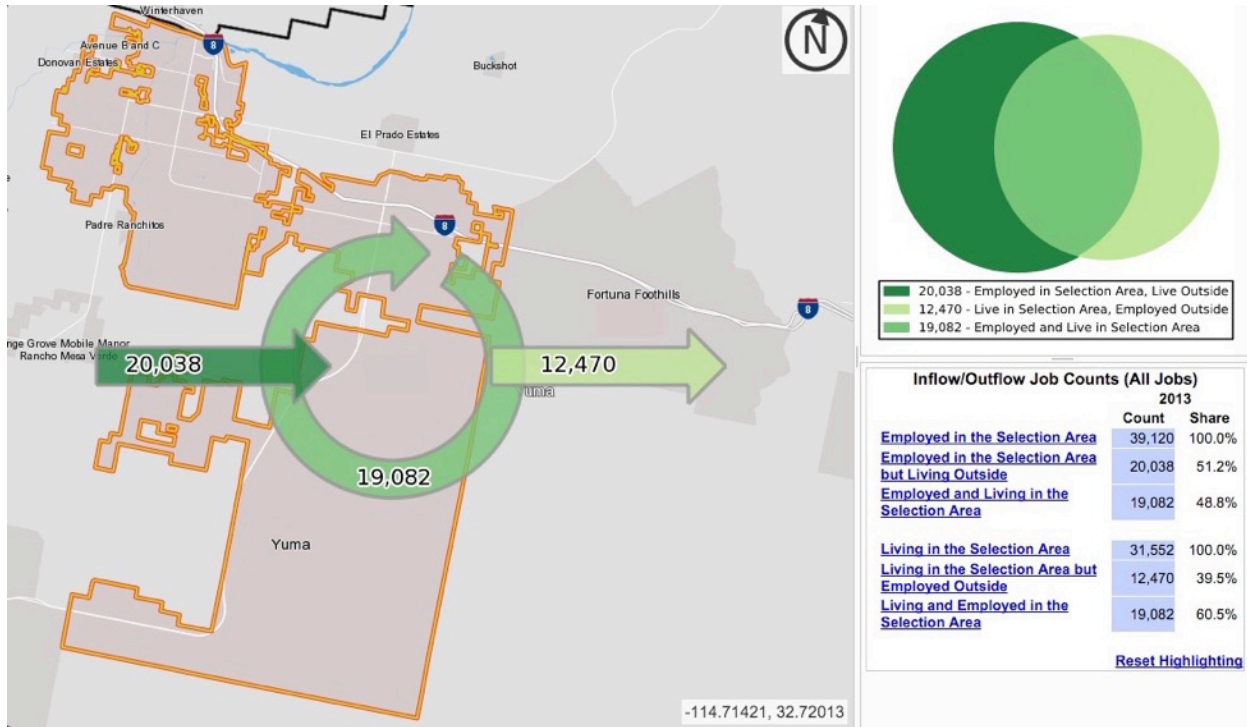
### *Adjustment for Journey-To-Work Commuting*

Residential development has a larger trip adjustment factor of 56% to account for commuters leaving Yuma 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 A11, the Census Bureau's web application OnTheMap<sup>2</sup> indicates that 39.5 percent of resident workers traveled outside Yuma for work in 2013. In combination, these factors ( $0.31 \times 0.50 \times 0.395 = 0.06$ ) support the additional six percent allocation of trips to residential development.

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<sup>2</sup> OnTheMap is a web-based mapping and reporting application that shows where workers are employed and where they live and it describes geographic patterns of jobs by their employment locations and residential locations as well as the connections between the two locations. OnTheMap was developed through a unique partnership between the U.S. Census Bureau and its Local Employment Dynamics (LED) partner states.

Figure A11: Inflow/Outflow Analysis



### Adjustment for Pass-By Trips

For commercial development, the trip adjustment factor is less than 50 percent because retail development attracts vehicles as they pass by on arterial and collector roads. For example, when someone stops at a convenience store on the way home from work, the convenience store is not the primary destination. For the average shopping center, ITE data indicate 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 commercial site as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor is 66 percent multiplied by 50 percent, or approximately 33 percent of the trip ends.

### Estimated Vehicle Trips

Custom tabulations of demographic data by bedroom range can be created from individual survey responses provided by the American Community Survey (ACS) published by the U.S. Census Bureau, in files known as Public Use Micro-Data Samples (PUMS). Because PUMS files are available for areas of roughly 100,000 persons, Yuma is included in Public Use Micro-Data Area (PUMA) 00700 with San Luis, Somerton, and Wellton. At the top of Figure A12, cells with yellow shading indicate the survey results, which yield the unadjusted number of persons and vehicles available per single-family dwelling in PUMA 00700. These multipliers are adjusted to match control totals for single-family dwellings in Yuma, as documented above in Figure A4.

The middle section of Figure A12 provides nation-wide data from the Institute of Transportation Engineers (ITE). AWWTE is the acronym for Average Weekday Vehicle Trip Ends, which measures vehicles coming and going from a development on an average weekday. Dividing trip ends per household by trip ends per person yields an average of 3.73 persons per occupied single-family unit, based on ITE’s national survey. Similarly, dividing trip ends per household by trip ends per vehicle yields an average of 1.58 vehicles per occupied single-family unit. In comparison to the national data, Yuma averages 3.04 persons per household and 1.82 vehicles per household.

Rather than rely on one methodology, the recommended trip generation rates shown in the bottom section of Figure A12 (see Yuma AWWTE per Single-Family Household), are an average of trip rates based on persons and vehicles available for single-family housing units by bedroom range. In Yuma, each single-family housing unit is expected to generate an average of 9.36 weekday vehicle trip ends, compared to the national average of 9.52 trip ends per household.

This methodology is repeated below for multi-family units (Figure A13) and mobile homes (Figure A14).

**Figure A12: Average Weekday Vehicle Trip Ends (Single Family)**

Bedroom Range	Persons <sup>1</sup>	Vehicles Available <sup>1</sup>	Households <sup>1</sup>	PUMA HH Mix	Unadjusted Persons/HH	Adjusted Persons/HH <sup>2</sup>	Unadjusted VehAvl/HH	Adjusted VehAvl/HH <sup>2</sup>
0-2	1,001	777	485	21.2%	2.06	2.20	1.60	1.42
3	3,639	2,526	1,231	53.7%	2.96	3.16	2.05	1.82
4	1,710	1,200	509	22.2%	3.36	3.59	2.36	2.09
5+	283	162	66	2.9%	4.29	4.59	2.45	2.17
Total	6,633	4,665	2,291		2.90	3.10	2.04	1.81

**National Averages According to ITE**

ITE Code	AWVTE per Person	AWVTE per Vehicle Available	AWVTE per Household
210 SFD	2.55	6.02	9.52

Persons per Household
3.73

Veh Avl per Household
1.58

**Recommended AWWTE per Dwelling Unit by Bedroom Range**

Bedroom Range	AWVTE per HH Based on Persons <sup>3</sup>	AWVTE per HH Based on Vehicles Available <sup>4</sup>	Yuma AWWTE per Single-Family Household <sup>5</sup>
0-2	5.61	8.55	<b>7.08</b>
3	8.06	10.96	<b>9.51</b>
4	9.15	12.58	<b>10.87</b>
5+	11.70	13.06	<b>12.38</b>
Total	7.91	10.90	<b>9.41</b>

1. American Community Survey, Public Use Microdata Sample for AZ PUMA 00700 (2012-2016 5-year unweighted data).
2. Adjusted multipliers are scaled to make the average PUMS values match control totals for Yuma, based on American Community Survey 2012-2016 5-Year Estimates.
3. Adjusted persons per household multiplied by national weighted average trip rate per person.
4. Adjusted vehicles available per household multiplied by national weighted average trip rate per vehicle available.
5. Average of trip rates based on persons and vehicles available per household.



Figure A13: Average Weekday Vehicle Trip Ends (Multi-Family)

Bedroom Range	Persons <sup>1</sup>	Vehicles Available <sup>1</sup>	Households <sup>1</sup>	PUMA HH Mix	Unadjusted Persons/HH	Adjusted Persons/HH <sup>2</sup>	Unadjusted VehAvl/HH	Adjusted VehAvl/HH <sup>2</sup>
0-1	195	105	133	34.7%	1.47	1.48	0.79	1.03
2	402	202	181	47.3%	2.22	2.23	1.12	1.46
3+	228	97	69	18.0%	3.30	3.32	1.41	1.84
Total	825	404	383		2.15	2.16	1.05	1.37

National Averages According to ITE

ITE Code	AWVTE per Person	AWVTE per Vehicle Available	AWVTE per Household
220 Apt	3.31	5.10	6.65

Persons per Household
2.01

Veh Avl per Household
1.30

Recommended AWVTE per Dwelling Unit by Bedroom Range

Bedroom Range	AWVTE per HH Based on Persons <sup>3</sup>	AWVTE per HH Based on Vehicles Available <sup>4</sup>	Yuma AWVTE per Multi-Family Household <sup>5</sup>
0-1	4.90	5.25	5.08
2	7.38	7.45	7.42
3+	10.99	9.38	10.19
Total	7.15	6.99	7.07

1. American Community Survey, Public Use Microdata Sample for AZ PUMA 00700 (2012-2016 5-year unweighted data).
2. Adjusted multipliers are scaled to make the average PUMS values match control totals for Yuma, based on American Community Survey 2012-2016 5-Year Estimates.
3. Adjusted persons per household multiplied by national weighted average trip rate per person.
4. Adjusted vehicles available per household multiplied by national weighted average trip rate per vehicle available.
5. Average of trip rates based on persons and vehicles available per household.

Figure A14: Average Weekday Vehicle Trip Ends (Mobile Home/Other)

Bedroom Range	Persons <sup>1</sup>	Vehicles Available <sup>1</sup>	Households <sup>1</sup>	PUMA HH Mix	Unadjusted Persons/HH	Adjusted Persons/HH <sup>2</sup>	Unadjusted VehAvl/HH	Adjusted VehAvl/HH <sup>2</sup>
0-1	780	485	440	42.1%	1.77	1.53	1.10	1.45
2	785	570	391	37.4%	2.01	1.74	1.46	1.92
3+	608	425	214	20.5%	2.84	2.46	1.99	2.62
Total	2,173	1,480	1,045		2.08	1.80	1.42	1.87

National Averages According to ITE

ITE Code	AWVTE per Person	AWVTE per Vehicle Available	AWVTE per Household
240 MH	2.46	3.38	4.99

Persons per Household
2.03

Veh Avl per Household
1.48

Recommended AWVTE per Dwelling Unit by Bedroom Range

Bedroom Range	AWVTE per HH Based on Persons <sup>3</sup>	AWVTE per HH Based on Vehicles Available <sup>4</sup>	Yuma AWVTE per Mobile Home Household <sup>5</sup>
0-1	3.76	4.90	4.33
2	4.28	6.49	5.39
3+	6.05	8.86	7.46
Total	4.43	6.32	5.38

1. American Community Survey, Public Use Microdata Sample for AZ PUMA 00700 (2014 1-year unweighted data).
2. Adjusted multipliers are scaled to make the average PUMS values match control totals for Yuma, based on American Community Survey 2014 1-Year Estimates.
3. Adjusted persons per household multiplied by national weighted average trip rate per person.
4. Adjusted vehicles available per household multiplied by national weighted average trip rate per vehicle available.
5. Average of trip rates based on persons and vehicles available per household.

Figure A15 details the calculations used to determine that existing development in Yuma generates an average of 401,885 inbound vehicle trips on a typical weekday. Residential development is estimated to generate 184,059 inbound trips (45.8 percent) compared to 217,827 inbound trips (54.2 percent) generated by nonresidential development. An example of the calculation is as follows for single-family units: 22,624 single-family units x 9.41 average weekday vehicle trips ends per unit x 56 percent adjustment factor = 119,219 total inbound vehicle trips per day from single-family units in Yuma. The same calculation is performed for each land use type.

**Figure A15: Average Daily Trips from Existing Development**

<b>Residential Vehicle Trips on an Average Weekday</b>		<b>2018</b>	
<b>Residential Units</b>		<b>Assumptions</b>	
Single-Family		22,624	
Multi-Family		7,657	
All Other Types		11,459	
Total Housing Units		41,740	
<b>Average Weekday Vehicle Trip Ends per Unit<sup>1</sup></b>		<b>Trip Ends</b>	<b>Adj. Factor</b>
Single-Family		9.41	56%
Multi-Family		7.07	56%
All Other Types		5.38	56%
<b>Residential Vehicle Trip Ends of an Average Weekday</b>			
Single-Family	119,219		
Multi-Family	30,316	<b>Share of</b>	
All Other Types	34,524	<b>Total Trips</b>	
<b>Total Inbound Residential Trips</b>		<b>184,059</b>	<b>45.8%</b>
<b>Nonresidential Vehicle Trips on an Average Weekday</b>		<b>2018</b>	
<b>Nonresidential Gross Floor Area (1,000 sq. ft.)</b>		<b>Assumptions</b>	
Commercial/Retail		12,485	
Office/Institutional		5,148	
Industrial/Flex		3,878	
Total Nonresidential Floor Area (x1,000 sq. ft.)		21,511	
<b>Average Weekday Vehicle Trips Ends per 1,000 Sq. Ft.<sup>2</sup></b>		<b>Trip Ends</b>	<b>Adj. Factor</b>
Commercial/Retail		42.70	33%
Office/Institutional		11.03	50%
Industrial/Flex		6.97	50%
<b>Nonresidential Vehicle Trips on an Average Weekday</b>			
Commercial/Retail	175,919		
Office/Institutional	28,393	<b>Share of</b>	
Industrial/Flex	13,514	<b>Total Trips</b>	
<b>Total Inbound Nonresidential Trips</b>		<b>217,827</b>	<b>54.2%</b>
<b>TOTAL INBOUND TRIPS</b>		<b>401,885</b>	<b>100%</b>

1. Trip rates are customized for Yuma. See accompanying tables and discussion.

2. Trip rates are from the Institute of Transportation Engineers (ITE) Trip Generation Manual (2012).

## Functional Population

For certain infrastructure facilities TischlerBise often uses “functional population” to establish the relative demand for infrastructure from both residential and nonresidential development. As shown in Figure A16, functional population accounts for people living and working in a jurisdiction. Residents who don't work are assigned 20 hours per day to residential development and four hours per day to nonresidential development (annualized averages). Residents who work in Yuma are assigned 14 hours to residential development and 10 hours to nonresidential development. Residents who work outside Yuma are assigned 14 hours to residential development. Inflow commuters are assigned 10 hours to nonresidential development. Based on 2013 functional population data, the resulting proportionate share is 73 percent from residential development and 27 percent from nonresidential development.

**Figure A16: Functional Population**

	<i>Demand Units in 2013</i>	<i>Demand Hours/Day</i>	<i>Person Hours</i>	<i>Proportionate Share</i>
<b>Residential</b>				
Estimated Residents	95,423			
Residents Not Working	63,871	20	1,277,417	
Employed Residents	31,552			
Employed in Service Area	19,082	14	267,148	
Employed outside Service Area	12,470	14	174,580	
<i>Residential Subtotal</i>			<u>1,719,145</u>	<b>73%</b>
<b>Nonresidential</b>				
Non-working Residents	63,871	4	255,483	
Jobs in Service Area	39,120			
Residents Employed in Service Area	19,082	10	190,820	
Non-Resident Workers (inflow Commuters)	20,038	10	200,380	
<i>Nonresidential Subtotal</i>			<u>646,683</u>	<b>27%</b>
			<u>2,365,828</u>	<b>100%</b>
		<b>TOTAL</b>		

Source: Arizona Department of Administration 2013 Population Estimate; U.S. Census Bureau, OnTheMap 6.1.1 Application, 2013.

## DETAILED DEVELOPMENT PROJECTIONS

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

**Figure A17: Development Projections Summary**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	10-Year Increase
	Base Yr	1	2	3	4	5	6	7	8	9	10	
<b>POPULATION</b>												
Year-Round	102,756	103,905	105,068	106,247	107,440	108,647	109,870	111,107	112,363	113,630	114,913	12,157
Seasonal	12,452	12,600	12,747	12,895	13,048	13,201	13,357	13,515	13,670	13,834	13,998	1,546
Peak	115,208	116,505	117,815	119,142	120,488	121,848	123,227	124,622	126,033	127,464	128,911	13,703
<b>HOUSING UNITS</b>												
Single-Family	22,624	22,927	23,233	23,543	23,857	24,175	24,497	24,823	25,153	25,487	25,825	3,201
Multi-Family	7,657	7,765	7,874	7,984	8,096	8,209	8,324	8,440	8,558	8,677	8,797	1,140
All Other Types	11,459	11,562	11,666	11,771	11,878	11,986	12,095	12,205	12,317	12,430	12,545	1,086
Total Housing Units	41,740	42,254	42,773	43,298	43,831	44,370	44,916	45,468	46,028	46,594	47,167	5,427
<b>EMPLOYMENT BY TYPE</b>												
Commercial/Retail	24,967	25,366	25,772	26,184	26,603	27,028	27,460	27,899	28,345	28,798	29,259	4,292
Office/Institutional	17,102	17,375	17,653	17,935	18,222	18,513	18,809	19,110	19,416	19,727	20,043	2,941
Industrial/Flex	8,958	9,102	9,248	9,396	9,547	9,700	9,856	10,014	10,175	10,338	10,504	1,546
Total Employment	51,027	51,843	52,673	53,515	54,372	55,241	56,125	57,023	57,936	58,863	59,806	8,779
<b>NONRES. FLOOR AREA (X 1,000 SF)</b>												
Commercial/Retail	12,485	12,685	12,888	13,094	13,304	13,517	13,733	13,953	14,176	14,403	14,634	2,149
Office/Institutional	5,148	5,230	5,314	5,399	5,485	5,573	5,662	5,753	5,845	5,939	6,034	886
Industrial/Flex	3,878	3,940	4,003	4,067	4,132	4,198	4,266	4,334	4,404	4,475	4,547	669
Total Nonres. Floor Area	21,511	21,855	22,205	22,560	22,921	23,288	23,661	24,040	24,425	24,817	25,215	3,704