

# **Cost of Infrastructure to Serve New Residential Development in Austin, Texas**

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For Brian Rodgers

By Eben Fodor

**FODOR & ASSOCIATES LLC**

Community  
Planning Consulting



Eugene, Oregon

[www.FodorandAssociates.com](http://www.FodorandAssociates.com)

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## Introduction

This study examines the costs of public facilities and infrastructure required to serve new residential development in Austin, Texas. Each new residential unit adds to the demand for public facilities such as roads, schools, sewers, and so forth. The incremental costs for these facilities are compared with the fees and revenues each new residential unit is likely to generate that offset the costs.

As shown in Table 1, there are 12 categories of basic infrastructure provided by local government in Austin. This report constitutes Part 1 of an envisioned multi-part research project and looks at the first six of these categories, including school facilities, roads, sanitary sewer system, water service, stormwater drainage system, and park and recreation facilities.

**Table 1**

<b>Basic Public Infrastructure Required by New Residential Development</b>		
	<b>All Categories</b>	<b>Included in this Report?</b>
1	School Facilities	Yes
2	Transportation System	Yes
3	Water Service Facilities	Yes
4	Sanitary Sewer System	Yes
5	Storm Drainage System	Yes
6	Parks & Rec. Facilities	Yes
7	Fire & EMS Facilities	No
8	Police Facilities	No
9	Library Facilities	No
10	General Gov. Facilities	No
11	Solid Waste Facilities	No
12	Power Gen. & Dist. Sys.	No

The cost of providing infrastructure to serve new urban development is well known by many in the design, construction, and urban planning professions. However, the general public is often unaware of the magnitude of these costs and the commitment of local financial resources required to support urban growth.

Cities typically provide little or no information that would help citizens and public officials understand these fiscal impacts. When they do, it can significantly improve

the quality of decision-making on major land use actions. One local example is provided in the *SH 130 District Case Study* in the next section.

The following two sections, *Methodology* and *Characteristics of New Housing in Austin*, provide essential information that is used elsewhere in the report. Reviewing later sections without reading these two sections may leave the reader unclear about the methodology or the calculations used.

Each of the six infrastructure categories is addressed in a separate section. The cost for each type of facility is determined and the demand for capacity by each new residential unit is estimated. This is followed by a section on *Impact Fees in Austin* that describes which fees are allowed by state law and which fees are collected in Austin. The findings of the study are summarized in the *Conclusions*.

## I. SH 130 District Case Study

An illustration of the costs associated with new development can be found in the City of Austin's *SH 130 Infrastructure District Report*, conducted in 2006 to study the fiscal impacts of a proposed development district along the SH 130 corridor. The idea was to create a special 42-square-mile district surrounding SH 130 outside of current city limits, but inside the City's extraterritorial jurisdiction (ETJ) that could be prepared for future development. In theory, future development in the SH 130 District would pay for all of the new infrastructure needed to serve the area. All of the new taxes generated by the new development would be allocated to the district's infrastructure costs and to operation and maintenance of the facilities.

However, the study's findings revealed a different conclusion. The study examined only the costs for the new roads, water and sewer mains, and drainage systems within the district. The study found that the cost of financing these basic infrastructure requirements would exceed the proposed district's revenues by a wide margin and would ultimately result in large debts being transferred to the City to be repaid by all the City's taxpayers.

Specifically, the SH 130 District would require \$569 million for the four categories of basic infrastructure evaluated (roads, water and sewer mains, and drainage systems). The study did not include costs for expanding water and sewage treatment plants and did not try to estimate additional costs of providing the other facilities and services new development requires from local government (schools, parks, libraries, fires stations, police stations, etc.). Had these been included, the costs would have been considerably higher.

Potential new revenues from all future property taxes and sales taxes in the District could reach \$13 million to \$26 million per year, depending on how much development actually occurs. Even if 100% of this revenue was devoted to making payments on the bonds to fund the infrastructure, they would not be adequate to repay the \$569 million cost. Furthermore, once facilities are built, they must be operated and maintained. The estimated operating cost for the facilities in the study is \$13 million per year. The operation and maintenance of the new facilities alone would consume the entire lower-range estimate of all tax revenues from the district, leaving little or nothing to repay the \$569 million in infrastructure bonds.

In a more-optimistic scenario, with more development and higher tax revenues, some of the tax revenues from the new district would go toward repaying bonds. According to the study, when the district is closed after its 15-year life, the remaining bonded debt transferred to the City would range from \$184 million to \$460 million. City taxpayers and ratepayers would repay most of the balance of the costs for the infrastructure to serve the SH 130 District. The report indicates that

42% of the costs would end up being repaid by the Austin Water Utility, presumably via increased water and sewer rates for customers citywide.

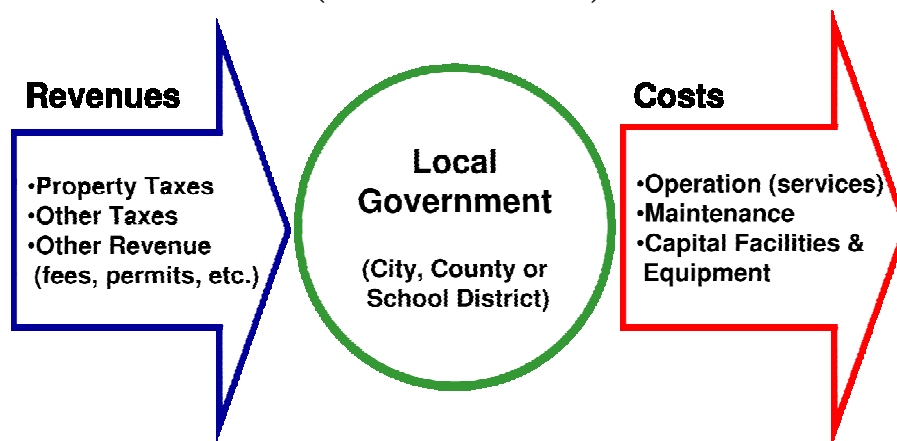
The bottom line from this study is that, under current tax rates, utility rates, and fees, new development will not pay its own way and will instead create a substantial cost burden on local taxpayers and utility ratepayers. Due to the negative fiscal impacts shown in this report, no further action has been taken to create the new district.

In most cases, cities embark on annexations and growth plans, like the SH 130 District, without any sort of fiscal impact study. Citizens and city leaders have no clear idea what the financial impact will be on the existing community. Frequently it is assumed that the new growth will bring a bonanza of new revenues to fill city coffers. Not until after the development has occurred do citizens discover the true fiscal impacts of these decisions. Fortunately the City of Austin prepared the *SH 130 Infrastructure District Report* and identified the fiscal impacts before making a decision.

## 2. Methodology

Fiscal impact analysis focuses on the differences between government revenues and costs that will result from a proposed action. As shown in Figure 2-1, revenues include taxes, fees and other income. Costs include operation (services) and maintenance (O&M) and new or expanded capital facilities and equipment. The difference between costs and revenues is the net fiscal impact – either a cost or a surplus.

**Figure 2-1: Diagram of fiscal impacts on local government.**  
(Fodor & Associates)



Usually local governments must balance their budgets every year so that costs don't exceed revenues. While this is generally true for government services (O&M costs), it is not the case for major capital expenditures. Local governments may issue general obligation bonds for new capital facilities that enable them to carry debt into the future. General obligation debt is a reasonable way to finance facilities that have a broad public benefit and a life that exceeds the financing period (typically 20 years for bonds). However, when the new facilities are constructed primarily to serve new development, an inherent inequity results whereby all City taxpayers pay to fund facilities that benefit a small segment of the population.

One solution to this problem is the *special tax district* or *local improvement district* (LID) that limits funding of improvements to the area that will benefit from the investment. Another is the *development impact fee* that directly recovers some, or all, of the costs associate with providing certain facilities to new development. Austin uses several impact fees to partially offset costs, as described in more detail later in the section *Impact Fees in Austin*.

This study focuses on the costs and revenues associated with the expansion of the City's capital facilities that will be required to serve residential development. Capital costs include all construction and land costs for buildings, roads, equipment, utility

mains, and so forth. Capital facilities are typically funded by general obligation bonds. These bonds are repaid through direct increases in local tax rates for the life of the bond.

This phase of the study does not evaluate the costs and revenues associated with operating and maintaining city services for new development.

The net fiscal impact associated with providing public infrastructure to new development in Austin can be expressed as:

$$\text{Net Fiscal Impact} = \text{Revenues toward Infrastructure} - \text{Cost of Infrastructure}$$

Where,

$$\text{Revenues toward Infrastructure} = \text{Impact Fees Paid} + \text{Taxes Paid Toward Infrastructure}$$

A net fiscal impact that is a *cost* will be negative in the above equations. However, rather than report costs as negative values, they are simply labeled as costs.

From an accounting perspective, there are two basic types of costs and revenues: annual streams that occur every year, and one-time costs or payments. Tax revenues and service costs represent the former. Infrastructure costs and any associated impact fees or charges are treated as the latter. As soon as a new development is completed, the occupants will need water and sewer service, adequate road capacity, classroom space for their children, fire protection, and public safety services, so all these facilities must be in place.

### Estimating Demand for Infrastructure

From a practical perspective, infrastructure is not built or expanded each time a new house is built. Instead, infrastructure is built in larger increments based on recent development that has occurred and future development that is expected. None-the-less, each new housing unit adds to system demand. There are a number of standard methods for estimating the demand for new facilities and infrastructure a new development will generate. These include:

- Existing service standards (or level-of-service requirements),
- Planning estimates based on long-range plans, and
- Averaged demand based on the total population of the service area.

Each method has advantages and drawbacks. The methods used here were selected to yield the best estimates of demand given the limitations of available data. Where more than one method is available, a second method can be used to crosscheck results.



In some cases the capacity of infrastructure must be adequate to serve peak demands. For example, water treatment capacity must be adequate to meet peak demand periods, not just average demand. In such cases, the demand for public facilities is based on peak demand, rather than average demand.

The basic unit of development evaluated in this study is the “typical new housing unit.” This housing unit represents the average of new units being built today. It is based on the mix of single-family and multifamily units built in recent years in Austin (see the following section *Characteristics of New Housing in Austin* for more details). The demand for infrastructure, and the associated costs and revenues calculated in this report, are based on serving this typical new housing unit.

The demand for infrastructure from a new development may be different than from an older development. This has been taken into consideration in a number of ways. For example, the following section on *Characteristics of New Housing in Austin* shows that new housing will tend to be larger, have more occupants, and generate a greater demand for services than the average of existing housing. Also, new water and sewer mains are likely to be tighter and have fewer leaks than older ones, reducing the demand for these services.

The costs for City infrastructure are taken from the most recent available City reports and supplemented by information provided by City staff. Where necessary, costs are adjusted to 2009 values using a construction cost index. The cost per unit of capacity for each category of infrastructure is multiplied by the demand for that infrastructure created by a typical housing unit, resulting in a “gross” cost per unit.

### Accounting for Future Tax Contributions

New development will pay property taxes that will largely go toward fund the ongoing services provided by the City of Austin. Some of these tax revenues will offset a portion of the cost of the public facilities required to serve the development. The portion funded in this manner depends on how each category of infrastructure is funded by the City. Funding is addressed at the end of the section for each type of infrastructure. In most cases, general obligation bonds are used. These bonds are issued for specific capital projects and are typically repaid over 20 years through fixed increases in the property taxes paid by all property owners in the City. The total assessed value of all private property in the City forms the tax base that is used to repay bonds.

The contribution of new development towards bond repayment can be estimated by examining a single year of urban growth. If new development in a given year increases the City’s total tax base by 2%, then this development will pay for 2% of the cost of the bonds issued in that year to pay for new infrastructure to serve the development. The remaining 98% of the costs will be paid by the existing tax base.

This is a simplification of a more complex dynamic. In reality, development will continue year after year and new infrastructure will be added on a regular basis. The infrastructure will be built in larger blocks, or increments, intended to anticipate the needs of future development for many years. Nonetheless, this simplification provides a reasonable approximation of the contribution new development makes towards bond repayment for the infrastructure costs it creates.

Because Austin's population is projected to grow at a rate of about 2% per year over the next two decades, residential and commercial development can be expected to increase at about the same rate. For infrastructure funded through the general tax base (or through the rate base in the case of water and wastewater facilities), it has been assumed that new development will contribute 2% of the capital costs. An example of this calculation is provided in the funding discussion of the *School Facility Cost* section.

In the final tally of costs in the *Conclusions* section of the report, this tax contribution is deducted from the total gross infrastructure costs. New residential development will also pay impact fees towards the costs for water, wastewater and park infrastructure. The impact fees that will be paid are calculated in the section *Impact Fees in Austin*. These impact fees are also deducted from the gross infrastructure costs.

### Data Sources

The study methodology is intended to be transparent. All essential data is provided, sources of all information are identified, and the calculations used are explicit in this report. The most recent and best available local information was used in the study. The study relied on existing data and reports from City, County, State, and Federal sources. It was beyond the scope of the study to collect or generate new empirical data where none existed.

For each category of public facilities studied, all available, relevant public information was collected and carefully reviewed. Where published reports and documents were insufficient, Public Information Requests were used to request additional data and clarifications. In some areas, excellent data was available. However, in others, information was very limited and reasonable assumptions or estimates had to be made. These assumptions are stated in the report. In a few cases there were no data available for Austin and proxy data from other nearby cities, or national data, had to be used.

### Other Notes on Methodology

The capital costs associated with all onsite facilities, such as local roads and water and sewer lines, are assumed to be borne by the developer. Only the costs of the offsite public facilities are included in this study.

All revenue and cost figures are given in 2009 dollars and values. Costs from other years were adjusted to 2009 values based on the appropriate inflation index or construction cost index. Tax rates, utility rates, impact fees, and other charges were based on the 2009 rates.

This study examines only impacts on the City of Austin, and does not include impacts to Travis County, the State of Texas, or the Federal Government. This is especially significant in connection with transportation system costs, as most of the funding for these facilities comes from state and federal governments. The City of Austin will fund less than 4% of future transportation system improvements for the tri-county metro area.<sup>1</sup>

The terms “gross” and “net” are used to describe costs and revenues in this report. In the case of costs, a *gross cost* would be the total cost to provide a particular facility or service, while the *net cost* would be the gross cost, minus any payment or revenue from the development towards that facility. In other words, it is the balance of costs after any revenues are deducted. In the *Conclusions* section of the report, future tax revenues towards the infrastructure costs and any impact fees or other direct payments by new development are deducted from the gross cost to yield a final net cost.

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<sup>1</sup> See the *Road System Costs* section for a description of regional transportation funding.

### 3. Characteristics of New Housing in Austin

To properly estimate the impacts of new housing on services and infrastructure in Austin, it is necessary to characterize new housing in terms of its size and number of occupants. New housing units tend to be larger than the average of existing units and therefore tend to accommodate more occupants per unit.

The size of the house affects demand for public services and infrastructure in a number of ways. Large houses will have more bedrooms and accommodate more occupants. There will be more bathrooms and plumbing fixtures that affect demand for water and sewage treatment. They will tend to have more impervious surface area, resulting in more stormwater runoff. They may have more vehicles with greater travel demand.

#### New Housing Occupancy

The 2000 U.S. Census reports an average occupancy of 2.4 persons per housing unit for Austin. This data represents the average for all types of housing and all ages of housing. The City of Austin does not collect data on the characteristics of new housing. However the *American Housing Survey* (AHS) periodically collects data on housing built in the past 4 years for various large cities and metropolitan areas in the U.S. The closest cities for which AHS data is available are Dallas (2002) and Houston (2007). The AHS data for both cities were evaluated to determine the relationship between new and existing housing.

As shown in Table 3-1, the *American Housing Survey* shows that new homes in Houston had 7.3% higher occupancy levels than the average for all homes. For Dallas, new home occupancy was 8.8% higher. The average for these two cities is 8.1% higher occupancy for new housing.

**Table 3-1**

**Occupancy of New vs. All Housing for Houston and Dallas**

	<b>Persons per Occupied Housing Unit</b>		
	<b>Houston 2007<sup>(1)</sup></b>	<b>Dallas 2002<sup>(2)</sup></b>	<b>Average for Two Cities</b>
All Units	2.73	2.73	2.73
New Units	2.93	2.97	2.95
Difference	7.3%	8.8%	<b>8.1%</b>

(1) Derived from *American Housing Survey for the Houston Metropolitan Area: 2007*, Issued February 2009, U.S. Department of Housing and Urban Development.

(2) Derived from *American Housing Survey for the Dallas Metropolitan Area: 2002*, Issued July 2003, U.S. Department of Housing and Urban Development.

To estimate the occupancy of a typical new housing unit in Austin, the average occupancy of 2.4 persons per unit from the 2000 Census was increased by 8.1% based on the average increase found in Dallas and Houston. This results in an estimated average occupancy of 2.6 persons per new unit in Austin. This estimate was used in the study to reflect typical new housing units. Note that this estimate is not for a single-family house, but is an average for all new housing, including multifamily housing.

The estimate of occupancy for new housing units used here (2.6 persons/housing unit) is likely to be lower than the actual occupancy in Austin due to the use of the 2000 Census base year. The AHS provides data allowing comparison of new housing built in the previous 4 years with all existing housing at the time of the study. The relationship between new and existing housing in the same year from the AHS is being applied in 2009 to housing occupancy data for Austin from 2000. Nine years have passed since the Census, and housing has almost certainly increased in both size and occupancy levels during that time. For example, new single-family houses in the U.S. have increased in size from an average of 2,266 sq.ft. in 2000 to 2,534 sq.ft. in 2008, an increase of 12% in eight years.<sup>2</sup> The increase in house sizes would likely have resulted in an increase in occupancy levels. Lacking any clear method to estimate this increase in occupancy in Austin from 2000 to 2009, it could not be included in the study. Since the occupancy rate used here is likely lower than actual rates, the impacts of new housing on demand for services and infrastructure will be understated somewhat.

New Housing Floor Area

New housing tends to be larger than the average for existing housing. As noted above, the average size for a new single-family house built in the U.S. in 2008 was 2,534 square feet. House sizes have been increasing steadily for many decades. The

<sup>2</sup> *Annual 2008 Characteristics of New Housing*, U.S. Census, released June 1, 2009, One-Family Houses.

house built in 2008 is 16% larger than one built 10 years earlier (2,190 sq.ft.) and 27% larger than one built 20 year earlier (1,995 sq.ft.).

As shown in Table 3-2, the *American Housing Survey* for Dallas and Houston reported the floor area of new housing to be from 17% to 33% larger than the median for all housing in those cities. The average for the two cities is a 25% increase for new housing. Data on the size of the average housing unit in Austin is not available, however, based on data from Dallas and Houston, it is reasonable to assume that new housing units in Austin will be roughly 25% larger than the average of all existing units.

Average floor area for new housing units will also depend on the unique mix of single-family and multifamily housing in Austin. This mix is addressed later in this section. In the U.S., new multifamily housing units averaged 1,259 square feet in 2008, which is approximately 50% of the size of new single-family units (2,534 sq.ft.).<sup>3</sup> Multifamily units have increased less in size than single-family units and have remained relatively constant for the past four years.

**Table 3-2**

<b>Size of New vs. All Housing for Houston and Dallas</b>			
	<b>Median Floor Area per Housing Unit (Sq.Ft.)</b>		
	<b>Houston 2007<sup>(1)</sup></b>	<b>Dallas 2002<sup>(2)</sup></b>	<b>Average for Two Cities</b>
All Units	1,956	1,927	1,942
New Units	2,287	2,559	2,423
Difference	16.9%	32.8%	<b>24.8%</b>

(1) Derived from American Housing Survey for the Houston Metropolitan Area: 2007, Issued February 2009, U.S. Department of Housing and Urban Development.

(2) Derived from American Housing Survey for the Dallas Metropolitan Area: 2002, Issued July 2003, U.S. Department of Housing and Urban Development.

### Population and Housing Growth in Austin

For the purposes of estimating future changes in the population and housing in Austin, a population forecast is used based on figures prepared by the City Demographer.<sup>4</sup> As shown in Figure 3-1, future growth is expected to occur at a rate

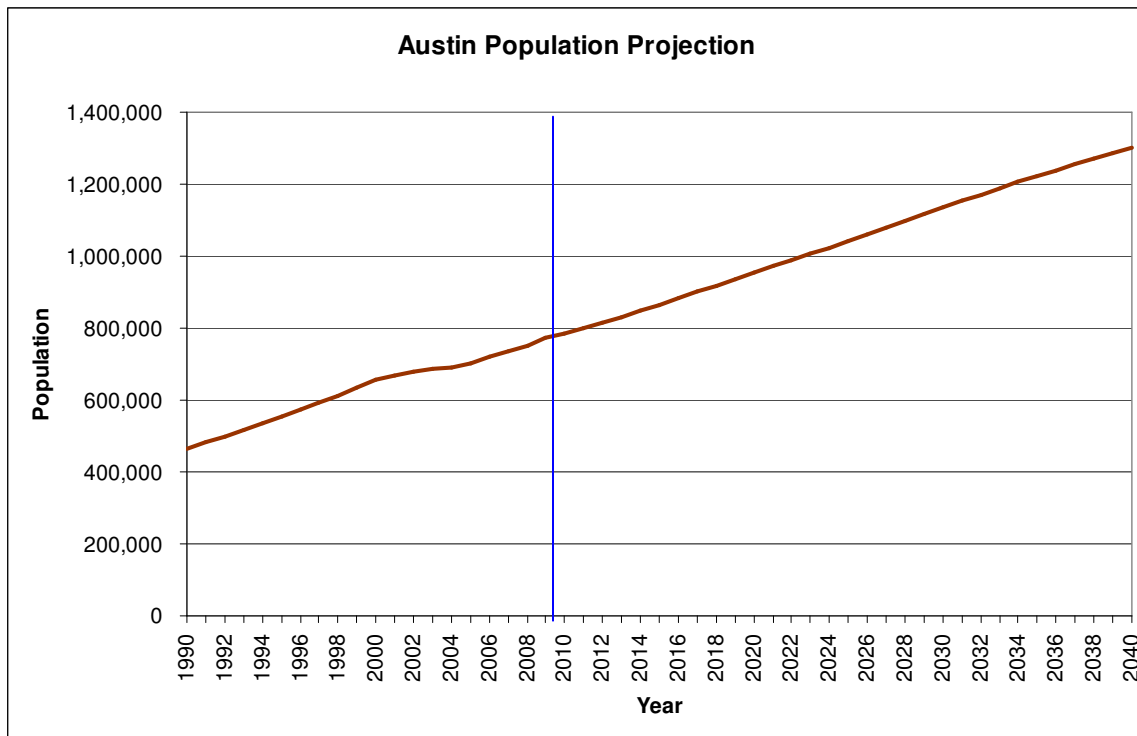
<sup>3</sup> *Annual 2008 Characteristics of New Housing*, U.S. Census, released June 1, 2009, Units in New Multifamily Buildings.

<sup>4</sup> Data from *City of Austin Demographics*, by Ryan Robinson, City Demographer, Department of Planning, City of Austin, dated January 2009. The population data used in this report is provided in the Appendix.

of about 2% per year for the next decade and slightly slower thereafter. These population figures do not assume further annexations by the City, which would have the effect of increasing the population levels. The full population data is provided in Table A-1 in the Appendix.

In the next 20 years the population of Austin is expected to grow by 268,000 people, from 774,037 people in 2009 to 1,041,923 in 2029. Based on the estimated average of 2.6 persons occupying new housing units, this increase in population will result in the construction of 103,000 additional housing units in the City.

**Figure 3-1**



Single-Family and Multifamily Housing in Austin

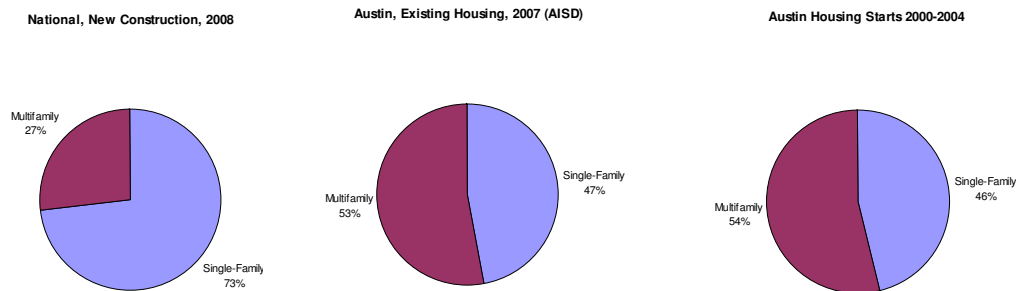
The figures in this study are for average new housing units. These are composed of a mix of new single-family and multifamily units. Nationally, in 2008 about 73% of new housing units were single-family and 27% were multifamily.<sup>5</sup> In Austin the percentage of multifamily is much higher. According to an analysis of tax records from the Travis Central Appraisal District by the Austin ISD, there were 129,000

<sup>5</sup> *Annual 2008 Characteristics of New Housing*, U.S. Census, released June 1, 2009.

single-family units and 143,000 multifamily units in the City in 2007.<sup>6</sup> Therefore, single-family units currently comprise 47% and multifamily comprise 53% of the 272,000 housing units identified in the study.

For a look at more recent development, the City analyzed housing starts from 2000 to 2004 and reported that single-family comprised 15,290 units (46%) and multifamily comprised 18,023 units (54%) of the total.<sup>7</sup> As shown graphically in Figure 3-2, it appears that the mix of new housing in Austin is similar to the existing mix, with a much higher share of new multifamily housing than is being built nationally. This mix of housing is used in the study to reflect the typical housing unit in Austin.

**Figure 3-2: Mix of single-family and multifamily housing in Austin compared with nation.**



All of the final costs and revenues in the main report are for a typical residential housing unit. Cost estimates for single- and multifamily units are provided in *Appendix D*.

<sup>6</sup> *Demographic Analysis and Enrollment Projections for the Austin Independent School District, 2008-2009 Update*, Harner and Associates, January 8, 2008, pages 19 and 20. Multifamily included condos and townhouses in this study. Note that City Limits vary somewhat from the AISD boundary.

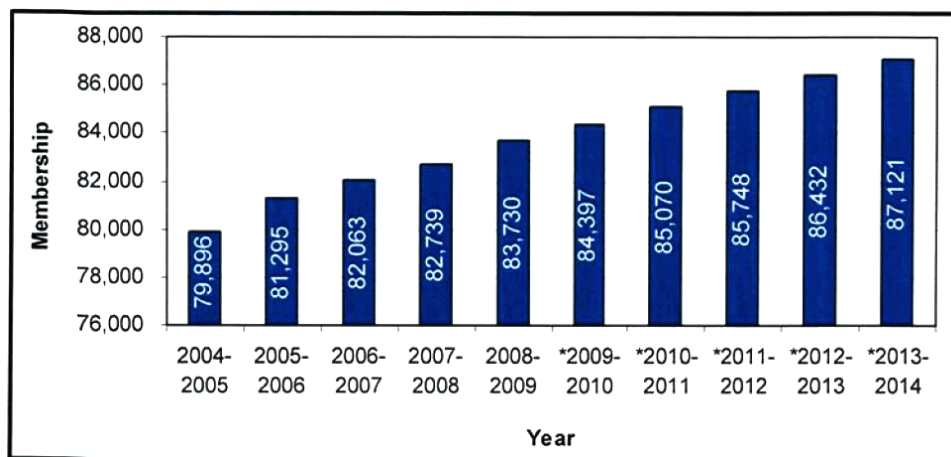
<sup>7</sup> *City of Austin Population and Households Forecast by ZIP Code*, Updated Forecast, Table on page 13 titled: City of Austin Housing Starts by ZIP Code January 1, 2000 through October 1, 2004 ([http://www.ci.austin.tx.us/demographics/downloads/zip\\_forecast\\_update\\_2020c.pdf](http://www.ci.austin.tx.us/demographics/downloads/zip_forecast_update_2020c.pdf)).



## 4. School Facility Costs

Public school facilities in Austin are provided by the Austin Independent School District (AISD). This section examines the costs for expanding school facilities to accommodate housing growth in Austin. As shown in Figure 4-1, enrollment in the district has grown steadily and is expected to continue to increase as a result of local population growth.

**Figure 4-1: Student enrollment history and projections from the AISD 2008-09 Budget Report show steady growth.**



To estimate school facility costs, it is necessary to have local data on the number of school-age children generated by new housing and the cost for expanding facilities to accommodate more students.

### Student Generation

As described earlier, new housing units are likely to be larger and have more occupants than the average of all existing housing in Austin. However, it is assumed that the demographics of the occupants will be similar and that the percentage of school-age children and the general age distribution is the same in new housing as it is for the general population. Based on this assumption, data from the 2000 U.S. Census for school-age children and the latest AISD enrollment projections were compared.<sup>8</sup>

<sup>8</sup> The School District boundaries are somewhat different than the city limits of Austin with an area of 232 square miles for AISD compared with 300 square miles for the City. This makes direct comparisons of AISD and Census data difficult.

U.S. Census data for the City of Austin in 2000 shows that 15.36% of the population was of K-12 school age (5 to 17 years old). A breakdown of population for each school level is shown in Table 4-1. For a typical new housing unit with 2.6 occupants, this would equate to 0.40 school-age children per unit (2.6 x 0.1536). However, for various reasons, not all of these children will go to AISD schools.

**Table 4-1**

<b>School-Age Children in Austin from 2000 Census<sup>(1)</sup></b>				
<b>Grades</b>	<b>Age Cohort</b>	<b>Population in Age Cohort</b>	<b>Percent of Total City Population<sup>(2)</sup></b>	<b>Children per New Housing Unit<sup>(3)</sup></b>
K-5	Total 5-10 years	49,070	7.47%	0.19
6-8	Total 11-13 years	22,091	3.36%	0.09
9-12	Total 14-17 years	29,672	4.52%	0.12
All	School Age 5-17 years	100,833	15.36%	0.40

1) Source: Compiled from Table QT-P1, Age Groups and Sex: 2000. Data set: Census 2000 Summary File 1 (SF 1) 100-Percent Data.

2) Population reported in 2000 Census for Austin was 656,562.

3) Based on 2.6 occupants per new residential unit.

AISD commissioned a study of demographics and student enrollment that was released at the beginning of 2008 which provides the best recent data on enrollment.<sup>9</sup> According to this study, existing single-family housing units in the District have 0.40 students per unit on average and multifamily units have 0.22 students per unit on average.<sup>10</sup> Combining these two categories yields an average of 0.31 students for all housing units in the School District (see Table 4-2). To adjust the AISD figures for larger occupancy of new housing units, the average for existing housing was increase by 8.1 percent. This results in a student generation rate of 0.34 students per new housing unit.

These figures are for students actually attending public schools in the AISD and are not for all school-age children in the District. Some children may attend private schools, be home schooled, or may have dropped out of the school system. No data is provided in the AISD report regarding what portion of school-age children in the District are not attending public schools.<sup>11</sup>

<sup>9</sup> *Demographic Analysis and Enrollment Projections for the Austin Independent School District, 2008-2009 Update*, Harner and Associates, January 8, 2008. Contents of the report indicate that it was updated later in 2008 after it was issued.

<sup>10</sup> For this study, “multifamily units” included condos and townhouses.

<sup>11</sup> According to the AISD, the District does not have any information on the percentage of school-age children in the District that attend private schools, are home-schooled, or otherwise do not attend public schools.

**Table 4-2**

<b>Students per Existing Housing Unit in AISD, 2008<sup>(1)</sup></b>			
<b>Housing Type</b>	<b>Number of Students</b>	<b>Housing Units</b>	<b>Students per Unit</b>
Single Family Units <sup>(2)</sup>	52,000	129,000	0.40
Multifamily Units <sup>(3)</sup>	31,000	143,000	0.22
<b>Average All Housing Units</b>	<b>83,000</b>	<b>272,000</b>	<b>0.31</b>

(1) Source: Demographic Analysis and Enrollment Projections for the Austin Independent School District, 2008-2009 Update, Harner and Associates, January 8, 2008.

(2) Single Family includes manufactured housing.

(3) AISD defines "multifamily" as including townhouses and condos.

The distribution of students generated by new housing at each school level are shown in Table 4-3 based on a total of 0.34 students per new housing unit. This distribution is used to estimate the costs associated with school facilities at each level (elementary, middle and high). The distribution of students based on school-age students reported in the 2000 Census is slightly different and is provided in *Appendix B* for comparison purposes.

**Table 4-3**

<b>Student Generation Rate for New Housing Units in Austin by Grade Level</b>				
<b>School Level</b>	<b>Grades</b>	<b>2008-09 AISD Enrollment<sup>(1)</sup></b>	<b>Percent of Students at Each School Level</b>	<b>AISD Students Generated Per New Housing Unit<sup>(2)</sup></b>
Elementary School	K-5	46,589	55.6%	0.19
Middle School	6-8	16,273	19.4%	0.07
High School	9-12	20,904	25.0%	0.08
<b>Total All Levels</b>		<b>83,766</b>	<b>100.0%</b>	<b>0.34</b>

1) AISD Enrollment data from Table 2 of *Demographic Analysis and Enrollment Projections for the Austin Independent School District, 2008-2009 Update*, Harner and Associates, January 8, 2008.

2) This column based on the percentage of students at each school level multiplied by 0.34 students per new housing unit.

### School Facility Costs

The next step is to determine the cost of expanding school facilities to serve more students. Facility costs are based on the total costs for designing, constructing, furnishing, and equipping new schools, as well as the land costs. Dividing the total cost of a school by the school's design capacity for students yields a cost per student.

Note that these facility costs are not associated with any particular housing unit, family, or individual students, but rather they are attributed to the average number of new students generated by new housing. New housing will generate new residents and new students which will create a perpetual demand for increased school capacity.

School cost data was obtained from AISD for schools recently completed under the 2004 voter-approved bond issue. Four new elementary schools and one middle school were completed in 2006 and 2007 and the costs associated with those facilities are shown in Table 4-4. The land for several of the elementary schools was donated. Since the values of the land and the terms of the donations could not be determined, complete cost figures could not be compiled for these facilities and only the building-related costs were used.

The last high school built in Austin was Akins High School, completed in 2000. Partial cost data was available for this facility, as shown in Table 4-4. Based on the design capacity for the high school of 2225 students, this school had unusually low construction costs of \$18,706 per student at capacity.<sup>12</sup> Whereas the land cost for Akins HS was \$945,831 in 2000, the 2008 School Bond Election by the AISD included \$32 million just for the land costs for a planned new high school in the City. Based on other recent high school costs, the construction and land costs for Akins HS were not considered to be representative of the cost AISD will incur for a future high school.

For comparison, data collected by the Council of Educational Facility Planners International (CEFPI) for Texas high schools shows an average building construction cost of \$24,892 per student capacity for a sample of nine high schools built in Texas from 1997 to 2008.<sup>13</sup> The construction costs were adjusted by CEFPI to 2009 costs. These figures are building construction costs only and do not include land costs or the costs of designing, equipping and furnishing the schools, and therefore do not reflect the full facility costs. The CEFPI construction costs for the nine high schools average \$186 per square foot of building floor area.

To obtain more-recent and complete cost figures for high school facilities, information was obtained for the Conrad High School in Dallas, as shown in Table 4-4. This high school was completed in 2006 and the Dallas ISD provided complete cost and capacity data. Adjusting the construction costs to 2009 values using a construction cost index resulted in a current construction cost of \$167 per square foot (including designing, furnishing and equipping the facility). While this

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<sup>12</sup> As adjusted to 2009 values using ENR Construction Cost Index.

<sup>13</sup> Data provided by The Council of Educational Facility Planners International on 7/21/09 and dated 8/14/08. Costs were adjusted by CEFPI to estimate 2009 values.

construction cost is less than the CEFPI estimate, it was considered to be the most-complete and recent data and was used in the study.

**Table 4-4**

**Nominal Costs of Building Recent Schools in Austin<sup>(1)</sup>**

	<b>Blazier ES</b>	<b>Clayton ES</b>	<b>Overton ES</b>	<b>Perez ES</b>	<b>Garcia MS</b>	<b>Akins HS<sup>(2)</sup></b>	<b>Dallas Conrad HS<sup>(3)</sup></b>	<b>Nine Texas High Schools (CEFPI, 2009\$)<sup>(4)</sup></b>
Year Completed <sup>(5)</sup>	2007	2006	2007	2006	2007	2000	2006	Various
School Design Capacity <sup>(6)</sup>	748	880	726	792	1,100	2,225	2,000	19,341
Land Area, acres <sup>(7)</sup>	15.71	16.84	70.36	15.5	41.34	57.65	[14.37]	NA
<b><u>Building Costs:</u></b>								
Construction	\$13,369,444	\$14,787,529	\$18,026,151	\$13,063,557	\$27,546,027	\$30,911,101	\$43,002,972	\$481,439,090
Architectural/Engineering	\$810,779	\$1,186,980	\$1,040,229	\$957,713	\$1,323,037	NA	\$2,517,123	included
Furniture/Fixtures/Equipment	\$291,491	\$290,010	\$385,870	\$279,083	\$884,097	NA	\$1,530,492	NA
Computers	\$362,212	\$404,060	\$681,379	\$334,477	\$960,361	NA	\$782,463	NA
Library Collection	\$106,224	\$114,119	\$103,118	\$137,980	\$88,604	NA	\$119,630	NA
<b>Total Building Cost:</b>	<b>\$14,940,150</b>	<b>\$16,782,698</b>	<b>\$20,236,747</b>	<b>\$14,772,810</b>	<b>\$30,802,126</b>	<b>\$30,911,101</b>	<b>\$47,952,680</b>	<b>NA</b>
<b>Land Cost</b>	<b>\$525,000</b>	Donated by Circle C Land L.P.	Joint Land Use with City of Austin	Donated by Chateau Comity at Bluff Springs, L.P.	<b>\$599,900</b>	<b>\$945,831</b>	<b>\$10,063,816</b>	<b>NA</b>
<b>Total School Cost</b>	<b>\$15,465,150</b>	<b>\$16,782,698</b>	<b>\$20,236,747</b>	<b>\$14,772,810</b>	<b>\$31,402,026</b>	<b>\$31,856,932</b>	<b>\$58,016,496</b>	<b>NA</b>

NA = Not Available

1) All costs are nominal dollars at time of construction. Cost information for elementary and middle schools provided by AISD on May 28, 2009 in response to a public information request.

2) Cost information for Akins High School provided by AISD on July 10, 2009 in response to public information request. Complete cost data for design and furnishings was not available.

3) Cost data for Conrad HS in Dallas was provided by the Dallas ISD in letters dated July 16, 2009 and August 10, 2009 in response to a public information request. Additional information from Dallas ISD web site:

<http://www.dallasisd.org/bond/schools/conrad.html>. Figure for land area provided by Dallas ISD does not appear to reflect all acreage of school site and does not include adjoining park land used by school.

4) Data provided by The Council of Educational Facility Planners International on 7/21/09 and dated 8/14/08. Costs were adjusted by CEFPI to estimate 2009 values.

5) Completion dates are from the AISD web site: <http://www.austinsd.org/inside/2004bond/bond.phtml?opt=schoolNames>

6) Student capacity of schools as originally built. Information provided by AISD on June 24, 2009 in response to public information request.

7) Land area for schools provided by AISD on July 10, 2009 in response to public information request. Data for Perez ES was revised in correspondence from AISD on July 27, 2009.

Land costs vary widely around the City. To obtain an average value for vacant land, data were obtained from the Travis Central Appraisal District (TCAD). As shown in Table 4-5, land values for schools are based on average assessed market values for vacant land in the “agricultural” and “non-qualified” land categories (tax codes D1 and D2). Vacant land values in tax code “C” (vacant lots) were not included, since TCAD had no data on total acreage in this category. Vacant lots are likely to have a higher value on a per-acre basis than agricultural and non-qualified land. Therefore the land cost of \$30,991 per acre used here for schools is likely to be lower than the actual average for vacant land. For example, the Leander ISD northwest of Austin paid \$198,000 per acre for 126 acres of land purchased for two schools in 2006.<sup>14</sup> As another example, the 92 acres of land for planned Wastewater Treatment Plant #4 were purchased at a cost of \$348,000 per acre.<sup>15</sup>

**Table 4-5**

<b>Assessed Values for Vacant Land in Austin, 2009</b>				
<b>Code</b>	<b>Categories</b>	<b>Market Value</b>	<b>Acres</b>	<b>Value per Acre</b>
D1	Qualified Ag Land	\$212,074,525	7,550.11	\$28,089
D2	Non-Qualified Land	\$220,329,501	6,402.46	\$34,413
	<b>Total Vacant Land</b>	<b>\$432,404,026</b>	<b>13,952.57</b>	<b>\$30,991</b>

Source: 2009 Preliminary Totals, City of Austin, by Travis County on 6/30/09.

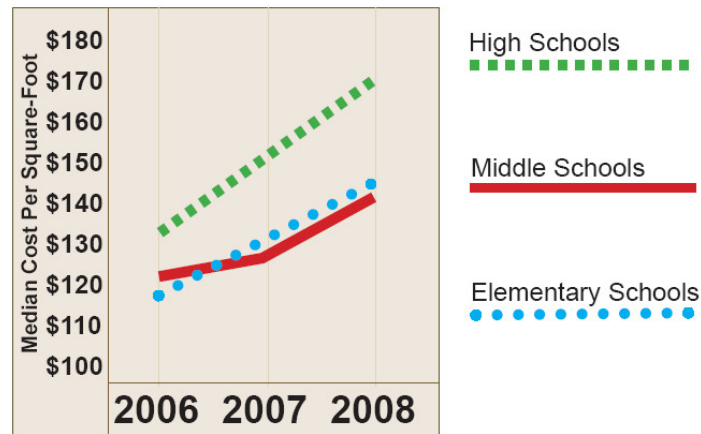
The land area requirements for new schools are based on the actual land areas for each level of the Austin schools shown previously in Table 4-4. Land costs for new schools are based on the land area required for each level multiplied by the average vacant land value per acre in Table 4-5.

School construction costs have increased significantly in the past few years, as shown in Figure 4-2 for schools in Houston. To obtain current cost estimates, all construction costs were adjusted to 2009 costs based on the ENR Construction Cost Index for the nearest city (Dallas).

<sup>14</sup> Source: Real property appraisal report dated December 28, 2007 by Paul Hornsby & Company ordered by the City of Austin for the purchase of land as the future site of Water Treatment Plant #4 and obtained through open records.

<sup>15</sup> Based on a response to a Public Information Request by the Austin Water Utility, September 24, 2009.

**Figure 4-2: School facility costs in Houston (from *School Construction Cost Outlook, Fall 2008 and Projection for Spring 2009*, by Council of Educational Facility Planners).**



Source: School Cost Survey, Conducted August 2008

Total school facility costs are obtained by adding the current construction costs with the average land values. The total cost for each level of school facility is shown in Table 4-6 on a per-student-capacity basis. To obtain a cost per housing unit, the per-student cost at each level is multiplied by the students generated by a typical new housing unit. The final cost of providing the school facilities for new residential development in Austin is estimated to be \$9,270 per new housing unit.

**Table 4-6**

**School Costs Per New Housing Unit in Austin, 2009**

School Level	2009 Building Cost Per Student Capacity <sup>(1)</sup>	Land Area Per Student	Land Cost per Student Capacity <sup>(2)</sup>	Total Facility Cost Per Student	AISD Students Generated Per New Housing Unit <sup>(3)</sup>	School Cost Per New Housing Unit
Elementary School	\$24,192	0.020	\$615	\$24,808	0.19	\$4,691
Middle School	\$31,655	0.038	\$1,165	\$32,820	0.07	\$2,168
High School <sup>(4)</sup>	\$27,613	0.026	\$803	\$28,416	0.08	\$2,411
<b>All Levels</b>					<b>0.34</b>	<b>\$9,270</b>

1) School building costs were adjusted to 2009 levels using the ENR Construction Cost Index for the closest city (Dallas). Original construction costs were assumed to be established before the start of construction, approximately one year before completion.

2) Based on average 2009 assessed market value of vacant land in Austin of \$30,991 per acre. This figure includes only land categories D1 and D2. Data for category C (vacant lots) was not available from TCAD. Category C land values are likely much higher per acre.

3) From Table 4-3.

4) Due to limited recent local data, high school building costs may be low. High school construction costs typically exceed elementary and middle schools on a per-student capacity basis due to increased space and facility requirements.



## Funding for New Schools

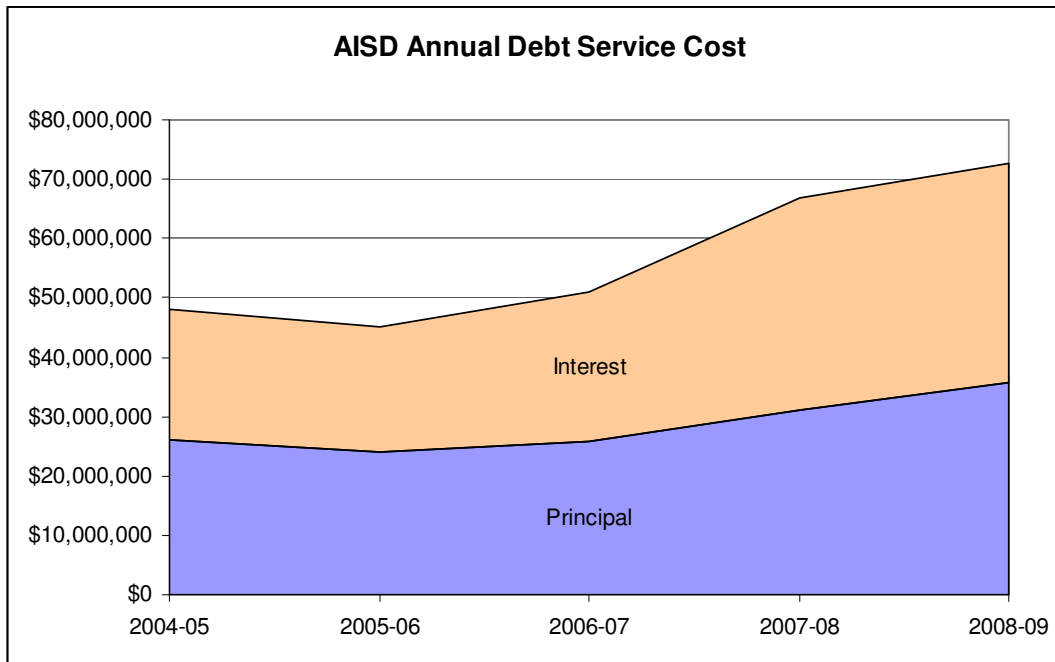
School system costs fit into two basic categories: operations and maintenance; and capital facilities. This study is focused on the costs associated with capital facilities. However, funding for both is addressed briefly here.

School operations and maintenance (O&M) are funded primarily through property taxes. These property taxes are based on a fixed annual level that is limited by the State of Texas. Some of the property tax funds collected by the school district are sent to the state and the state distributes the money back to school district based on the number of students enrolled. O&M costs are funded on a pay-as-you-go system where the expenditures match revenues on an annual basis. Financing via bonds is generally not used to fund O&M costs because it would require taxpayers to continue paying off bonds long after the services have been provide and would place an unfair burden on future taxpayers to fund past services. Because school O&M costs are funded with a fixed property tax rate, each new house will increase revenues to the school district. In this manner, new growth tends to pay its own way for school O&M.

New and expanded capital facilities are funded exclusively through long-term general obligation bonds of 20 or 25 years in duration that are repaid through property tax revenues. This financing is reasonable because the life of school facilities is longer than the bond period, so the taxpayers will continue receiving the benefits of the facilities throughout the repayment period. These bonds are essentially city-wide loans taken out by the school district with guaranteed repayment by all of the City's property tax payers. The school district makes regular payments of interest and principal on the bonds until they are paid off. Taxpayers agree to take on these payments through higher property taxes when they vote to approve a school bond issue.

**Figure 4-3: AISD costs to finance the bonds for new schools, expansions and renovations have increased to \$73 million per year.**

(Data from AISD Budget, FY 2008/09, page 118)



The nature of general obligation bond-funded facilities is that all property owners in the City pay towards the bond costs, regardless of whether or not they benefit from the investment in new facilities. Alternative financing methods such as local improvement districts and special tax districts are a means of taxing only the area that benefits from the investment, but these do not appear to be in use within the AISD.

As shown in this section, a new housing unit in Austin will generate a demand for new or expanded school facilities costing an estimated \$9,270. But this cost will be repaid by all the property owners in the City. So how much of the cost will be paid by the owner of the new housing unit? This can be estimated by examining the new houses built in a single year. Based on the annual growth rate projected by the City over the next 10 years of 2% per year, it can roughly be assumed that 2% of the housing units are new and will create a cost of \$9,270 each for new school facilities. Assuming that 2% of the developed property in the city is new each year, the new property will make up roughly 2% of the property tax base. The remaining 98% of the school facility costs will be repaid by the existing community. In other words, a new housing unit will pay for only about 2% of the capital costs for new schools it creates. To credit the new housing unit for its future property tax payments toward school facilities, the facilities cost of \$9,270 should be reduced by 2%, or \$185. The balance of the cost, \$9,085 per new residential unit, will be funded by the other taxpayers in the City.

## 5. Road System Costs

This section examines the roadway expansion costs incurred by the City of Austin to accommodate new residential development. Local roadways that are funded by other government entities (i.e., state and federal) are not included. Transit, pedestrian and bicycle improvements are also not included, so that the focus is exclusively roadways. Road costs included here are limited to those capital expenditures for increasing system capacity and do not include operations or maintenance.

Future road system costs can be evaluated based on a long-range planning estimate. This method has the advantage of a longer time period that averages variations in spending that are likely to occur from year to year. These long-range plans benefit from the experience of local planners. They use relatively recent cost figures and take local revenue sources into account. However, planning estimates also rely on the ability of planners to accurately predict future needs.

The Capital Area Metropolitan Planning Organization (CAMPO) is the Metropolitan Planning Organization (MPO) for the Williamson, Travis and Hays Counties in central Texas. CAMPO is the main transportation planning organization for the greater Austin area.

The CAMPO *Mobility 2030 Plan* (2030 Plan), adopted by the Transportation Policy Board on June 6, 2005, is a planning guide that contains transportation policies, projects, programs and action items for the next 25 years (to 2030).<sup>16</sup> The 2030 Plan includes programs and policies for congestion management, transit, bicycle and pedestrian facilities, roadways, freight and financing strategies. This long-range metropolitan transportation plan is revised every five years.

The 2030 Plan is a financially constrained plan in which planned expenditures must be matched with anticipated revenues. According to the Plan, “the projects and programs will not meet the full extent of future transportation need that has been identified through the planning process.”<sup>17</sup> In other words, the projects proposed under the 2030 Plan are not sufficient to maintain the current level of service of the transportation system. This is evident in the “System Performance” section of the Plan. As shown in Table 5-1, system performance will decline by 2030, even if all planned projects are constructed.

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<sup>16</sup> The currently adopted *Mobility 2030 Plan* is scheduled to be replaced in June, 2010 with a new plan to be titled, *People, Planning and Preparing for the Future: Your 25 Year Transportation Plan*.

<sup>17</sup> CAMPO *Mobility 2030 Plan*, page 203.

**Table 5-1**

<b>Transportation System Performance</b> (from <i>CAMPO Mobility 2030 Plan</i> , June, 2005)			
<b>Performance Parameter</b>	<b>2000</b>	<b>2030<sup>(1)</sup></b>	<b>Percent Change 2000 to 2030</b>
Total vehicle lane miles	7,347	12,719	73%
Percent of roadways experiencing congestion <sup>(2)</sup>	10%	23%	130%
Texas Congestion Index <sup>(3)</sup>	1.22	1.32	8%
Total motor vehicle hours of delay per year	58,462	419,647	618%
Average network travel speed (mph)	36.1	31.2	-14%

(1) Data for 2030 is based on completion of the financially-constrained project list adopted with the Plan.

(2) Congestion is defined as the percentage of roadways that experience a volume-to-capacity ratio of greater than or equal to 1 over a 24-hour period."

(3) The Texas Congestion Index is defined as the ratio of peak period traffic speed to free-flow speeds in the region.

The 2030 Plan's Project List contains planning estimates for the costs of all projects envisioned by the plan for the 25-year period from 2005 to 2030. The planning estimates for road costs are based on a simple \$1,000,000 per lane-mile cost formula. This cost is for the year 2003 and all CAMPO costs are in 2003 dollars. The costs for planning studies and corridor studies were not included in the CAMPO figures. As shown in Figure 5-1, regional roadway construction costs greatly exceed roadway operations and maintenance expenses for the three-county CAMPO planning area. According to the 2030 Plan, Austin's road construction costs for new and expanded capacity will total \$496.6 million<sup>18</sup> through 2030, while Austin's operation and maintenance (O&M) costs will total \$126.9 million<sup>19</sup> over this same period.

<sup>18</sup> CAMPO Mobility 2030 Plan, page G-11

<sup>19</sup> CAMPO Mobility 2030 Plan, page G-17

**Figure 5-1**

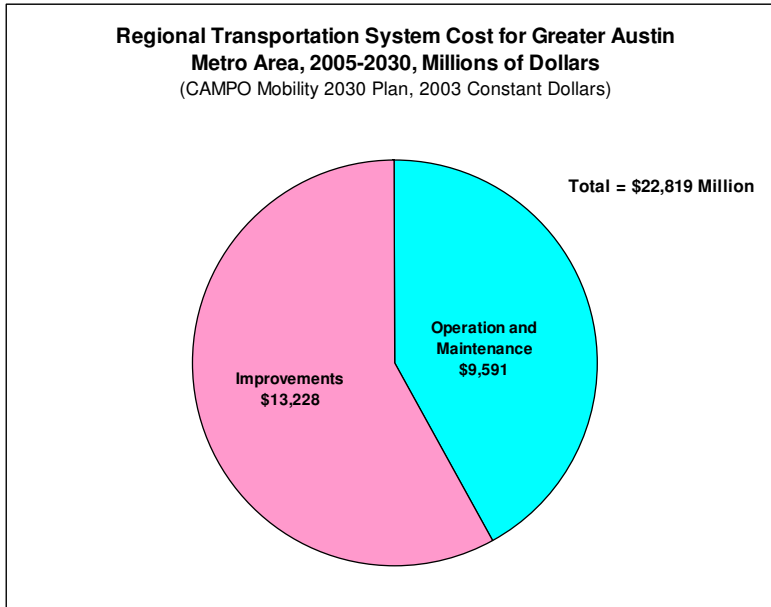


Figure 5-2 shows that roadway improvements comprise 88% of transportation infrastructure spending. These figures show how spending for new road construction tends to dominate local transportation system costs over transit, pedestrian and bike facilities.

**Figure 5-2**

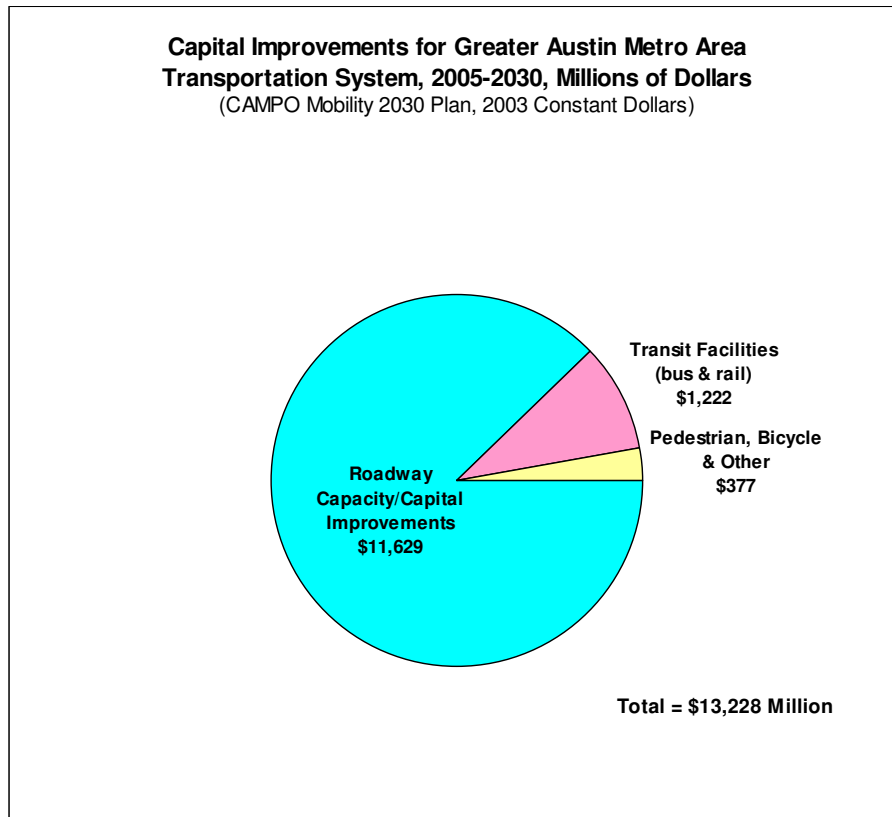
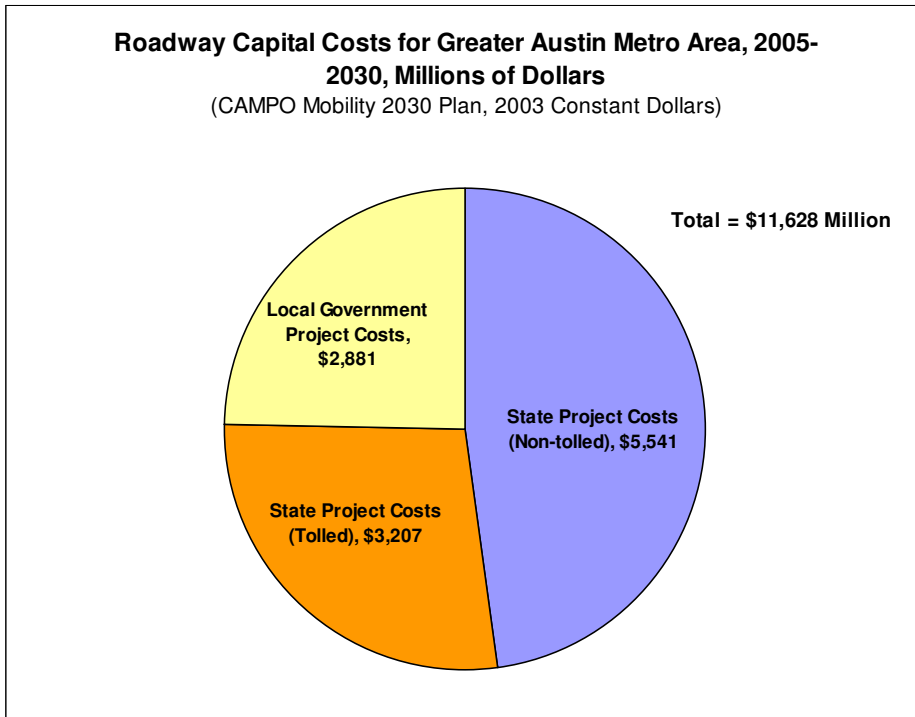
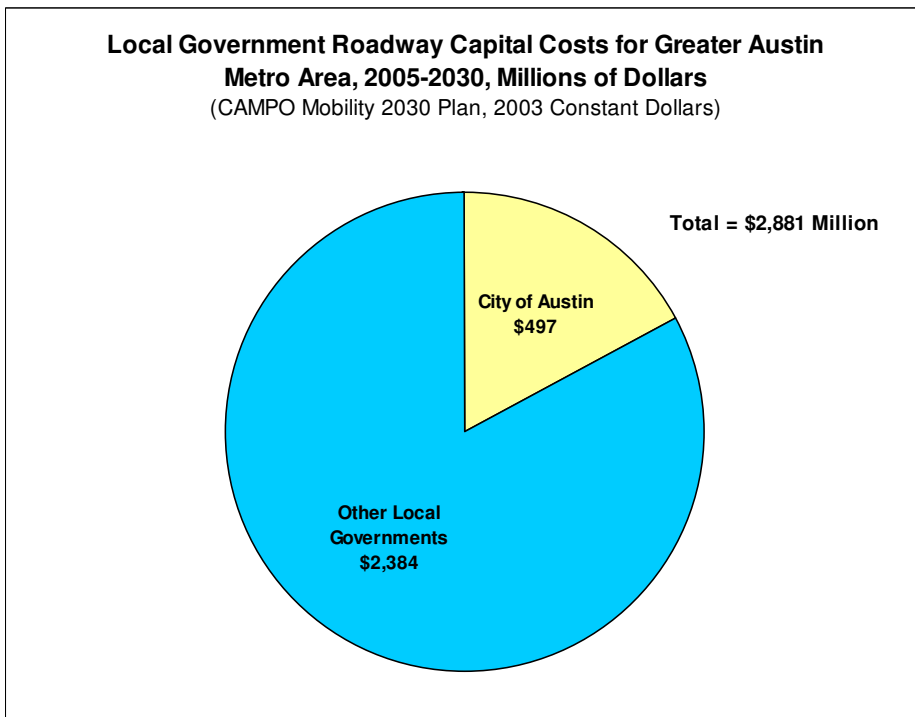


Figure 5-3 shows the relative government funding share of roadway improvements. Most of the costs for new roads will be paid by the state and only 22% will be funded by local governments. Finally, Figure 5-4 shows that Austin's share of the three-county regional road expansion costs is relatively small, amounting to \$496.6 million at 2003 construction costs. No toll roads are included in the City's road list.

**Figure 5-3**



**Figure 5-4**



A summary of the 2030 Plan costs is provided in Table 5-2. The costs from the Plan are given in 2003 dollars. To estimate current costs, a construction cost index was used to adjust values to 2009 levels in the table. The adjusted 2009 value of Austin road projects is \$656 million. Note that the City of Austin's roadway improvement costs represent only 3.8% of the region's total improvement costs. While Austin may be driving the region's growth, other jurisdictions are building and paying for most of the new roads.

**Table 5-2**

<b>Roadway Project Costs for 3-County Austin Metro Area, 2005-2030</b>			
CAMPO Mobility 2030 Plan			
<b>Roadway Category</b>	<b>2003 Cost (millions of dollars)</b>	<b>Costs Adjusted to 2009 (millions of dollars)<sup>(1)</sup></b>	<b>Percent of Regional Transportation Improvements</b>
<u>Regional Costs:</u>			
Operation and Maintenance	\$9,591	NA	NA
Improvements	\$13,228	\$17,478	100.0%
<u>Improvements by Category:</u>			
Roadway Capacity/Capital Improvements	\$11,629	\$15,366	87.9%
Transit Facilities (Bus & Rail)	\$1,222	\$1,615	9.2%
Pedestrian, Bicycle & Other	\$377	\$498	2.9%
<u>Roadway Improvements by Government:</u>			
State Project Costs (Non-tolled)	\$5,541	\$7,322	41.9%
State Project Costs (Tolled)	\$3,207	\$4,237	24.2%
Local Government Project Costs	\$2,881	\$3,806	21.8%
<u>Local Government Costs (Road Imp.):</u>			
City of Austin	\$497	\$656	3.8%
Other Local Governments	\$2,384	\$3,150	18.0%

1) The ENR Construction Cost Index for Dallas was used to adjust costs from 2003 dollars used in the 2030 Plan to 2009 values.  
NA = not applicable. The construction cost adjustment does not apply to O&M costs.

The \$656 million in roadway projects for the City of Austin represent planned roadway construction costs to expand the capacity of the system to serve new growth. The increase in Austin's population over the 2005-2030 planning period is 435,932 people, based on the City's current projection (see Table 5-3). Using the



estimate of 2.6 occupants per new household (developed earlier), this growth equates to 167,666 new housing units. Roadway improvement costs must be distributed between residential and non-residential land uses. On an area basis, residential land use represents approximately 70% of the land area and non-residential represents 30%.<sup>20</sup> Allocating road expansion costs to residential uses based on the rough estimate that they will generate 70% of the new travel demand, results in a cost for expanding roads of \$2,739 per new housing unit ( $[\$656 \text{ million} \times 0.7]/167,666 \text{ new housing units}$ ).

This road cost estimate based on the CAMPO 2030 Plan is likely to be low for several reasons. First, CAMPO's road costs are based on a planning estimate of \$1,000,000 per lane mile for road construction. This cost estimate is at the low end of road costs and other sources indicate that current road construction costs may be two to four times higher.<sup>21</sup> Second, no value is included for the existing roadway system capacity (excess capacity) that will be consumed by new development. And third, the roads included in the CAMPO Project List are not adequate to maintain the current levels of service (as shown previously in Table 5-1). The result of planning inadequate road infrastructure is that the cost of unbuilt roadways will be transferred to the road users, who will pay through increasing congestion and delays.

**Table 5-3**

**Projected Population and Housing Changes in Austin  
Over 2005-2030 Planning Period<sup>(1)</sup>**

<b>Metric</b>	<b>Value</b>
Population 2005	700,407
Population 2030	1,136,339
Pop Change over planning period	435,932
Housing Units Added 2005-2030 <sup>(2)</sup>	167,666

1) See Appendix for population data and projections used in this study.

2) Based on average of 2.6 occupants per new housing unit, as described earlier in report.

**Alternative Road Costing Method**

An alternative level-of-service method for estimating road system costs can be used as a comparison to the planning estimate calculated above. The level-of-service (LOS) method assumes that LOS is either maintained at the current level or not

<sup>20</sup> 2) Cost allocated based on 70/30 residential/non-residential land use split from *SH 130 Infrastructure District Report*, City of Austin, January 26, 2006, page 1-6).

<sup>21</sup> State models for estimating new road costs based on the Federal Highway Administration's *Highway Economic Requirements System* for Florida and Oregon show lane-mile costs on level terrain in the \$2 million to \$4 million range. Costs can be much higher in urban areas and hilly terrain.

allowed to fall below an adopted standard. The first step is to establish the level of service that will be applied to future development. The City of Austin appears to have a minimum LOS standard of “D” or better.<sup>22</sup> This is a standard scale ranking transportation facilities from A to E, with A being free-flowing traffic, and E being extremely congested. The average daily vehicle trips (ADT) that can be accommodated on a roadway depend on the number of lanes, roadway width and posted speed. The City does not provide any specific ADT guidelines for local roadways to achieve LOS D. For the purposes of this study it is assumed that 5,000 ADT per lane is the maximum under LOS D.<sup>23</sup> This would mean that a 4-lane roadway could accommodate up to 20,000 ADT without exceeding the standard.

According to the CAMPO 2030 Plan, average daily vehicle miles traveled (VMT) per capita was 26.4 in 2000.<sup>24</sup> The projected increase in the population of the City from 2005 to 2030 is 435,932 people. This will result in an increase in total daily VMT of 11,508,595 miles over this planning period. Based on a maximum ADT of 5,000 per lane mile, this additional travel demand will require 2,302 new lane miles of roadway (11,508,595/5,000).

Using CAMPO’s 2003 planning cost estimate of \$1,000,000 per new lane mile (adjusted to 2009 values), the total cost for new roadways is \$3.04 billion.<sup>25</sup> Assuming that 70% of future travel demand is generated by new housing, the cost per new housing unit is \$12,697.

As shown in Table 5-4, this LOS-based estimate is almost five times greater than the figure based on CAMPO’s 2030 Plan Project List. Some of this difference can be explained by the fact that the LOS-based cost estimate is based on the predicted total increase in travel demand generated within Austin. It includes all road costs necessary to meet this demand and does not distinguish which government entity is funding the improvements. The planning estimate includes only the local road costs that will be funded by the City.

This study uses the lower cost figure of \$2,739 per new housing unit to reflect the City’s costs in the final tally of cost.

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<sup>22</sup> According to the City of Austin’s *Transportation Criteria Manual*, Section 2.3.4 Capacity Analysis and Traffic Impact Assessment, “Level of Service D shall be the minimum acceptable standard.” This applies to traffic studies for new development and is not a true city-wide performance standard.

<sup>23</sup> While no City vehicle volume standard for roadways could be identified, *The Code Of The City Of Austin*, Title 25, Land Development, § 25-6-116 Desirable Operating Levels for Certain Streets, states the desirable traffic levels on collector street of 40 feet or greater in width is under 4,000 vehicles per day (2,000 in each direction).

<sup>24</sup> See CAMPO *Mobility 2030 Plan*, page 33, Table 3.

<sup>25</sup> Calculation: 2,302 lane miles x \$1,321,310 per lane mile construction cost (2009\$).

Table 5-4

<b>Roadway Facility Costs Based on Two Estimation Methods</b>	
<b>Method<sup>(1)</sup></b>	<b>Cost per New Housing Unit</b>
Planning Estimate (Mobility 2030 Plan)	\$2,739
Level-of-Service-Based Estimate	\$12,697

1) Both methods are based on the 2003 roadway costs of \$1 million per lane-mile of new roadway used by CAMPO in the Mobility 2030 Plan adjusted to 2009 values using the ENR Construction Cost Index.

### Road Funding

Current transportation system revenues are not adequate to fund the projects called for in the 2030 Plan.<sup>26</sup> One possible new revenue source to pay for future roads projects proposed in the 2030 Plan is to “assess transportation impact fees through system development charges and other mechanisms.” A roads impact fee is authorized by state statutes, but Austin does not collect any fees. The Plan also assumes that a new 3.5 cent local option gas tax increase will be implemented to help fund the plan.

According to the 2030 Plan, Austin will fund its road projects primarily through bonds that will be repaid through future sales tax revenues. A small portion will also be funded through the City’s general fund, which is supported largely by property taxes. In this manner, broad-based tax revenues will be used to pay for new roads needed to serve new development. As with school facility costs, new development will pay for only a small fraction of road costs needed to serve it.

According to City Code, the City may require developers to contribute towards the cost of new roads that directly serve their developments, but the City is not required to do so.<sup>27</sup> It is not clear how much of future roadway costs will be addressed in this manner. There is no formal policy requiring developer payments, and no record was available from the City of what portion of new road costs are paid in this manner. For the purposes of this study it is assumed that developers may pay some portion of new road costs, but there is no basis for estimating this contribution.

<sup>26</sup> CAMPO recently reported that 27% less funding will be available for transportation projects than estimated in the 2030 Plan. See *Austin American-Statesman* article “Planner see dip in money for roads,” of 9/15/09.

<sup>27</sup> See *The Code Of The City Of Austin, Title 25, Land Development, § 25-6-55 Dedication of Right-of-Way*.

## 6. Water System Costs

Water and sewerage in Austin are provided by Austin Water Utility. Austin Water Utility (AWU) utility maintains and operates two water treatment plants totaling 285 million gallons per day (MGD) of treatment capacity to meet the potable water needs of the city. AWU's service area is 537 square miles and is larger than the Austin City Limits (285 sq.mi.) and includes all of City and some of the Extraterritorial Jurisdiction outside the City Limits. There are 3,500 miles of water mains, 16 pumping stations, and 18 major reservoirs (storage tanks) to deliver water to AWU's service area.<sup>28</sup>

### Water Treatment Plant Costs

AWU is proposing to add a third water treatment plant (WTP) to the system, which is being called "WTP #4" (the third plant was decommissioned in 2008). WTP #4 will have an initial capacity of 50 MGD by 2014, but could be expanded to an ultimate capacity of 300 MGD in the future. The costs for WTP #4 are used here to estimate the water system costs associated with new residential development.

As shown in Table 6-1, the estimated costs for WTP #4 total \$508 million, including land and construction costs (water intake, WTP, pipelines, design, and administrative costs). This cost estimate includes \$54.2 million in inflation costs to account for likely construction cost increases from 2010 to 2014.<sup>29</sup> To obtain a present value for the plant, the \$54.2 million is deducted from the total, resulting in a present value of \$453.8 million. Dividing this present value by the 50 million gallons per day capacity, results in a unit cost of \$9.08 per gallon/day of water treatment capacity.

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<sup>28</sup> Austin Water Utility Cost of Service Rate Study 2008, Report Vol. II, Red Oak Consulting, August 2009, page C-36, and 37.

<sup>29</sup> The WTP#4 cost breakdown showing inflation costs is from the response to a Public Information Request by Austin Water Utility, City of Austin, Texas, 9/24/09.

**Table 6-1**

<b>Water Treatment Plant Costs in Austin<sup>(1)</sup></b>	
<b>Metric</b>	<b>Water Treatment Plant #4 (2009 dollars)</b>
WTP#4 Phase 1 Capacity (MGD)	50
Plant Costs	\$465,100,000
Land Costs, 92 acres	\$42,900,000
Total WTP Cost Estimate	<u>\$508,000,000</u>
Deduct Inflation Costs <sup>(2)</sup>	<u>-\$54,200,000</u>
Present Value of WTP	\$453,800,000
Cost, Dollars Per Gallon/Day Capacity	<b>\$9.08</b>

1) Cost data from Memo to Mayor and City Council, from Rudy Garza, Assistant City Manager, July 22, 2009, titled "Responses to WTP4 Questions," page 15. Total Plant Cost includes intake, WTP, pipelines, design, and administrative costs.

2) Cost estimate includes \$54.2 million for inflation cost for work conducted from 2010 to 2014. Inflation costs are deducted here to obtain a present value in 2009.  
MGD = million gallons per day.

### Water Demand from New Residential Units

The next step is to determine how much water treatment capacity is required by each new housing unit. The capacity requirement for water treatment is not established by the average daily water use. Instead it is based on the peak day water demand created by all system users. The Utility must have sufficient capacity to meet the peak day water demand. Because peak water demand can fluctuate from year to year, utilities typically maintain about 10 percent more capacity than the average peak for recent years as a safety margin. However, for the purposes of this study, only the actual peak demand is used for determining costs associated with residential development.

Residential water users consume about 59% of the water currently delivered by AWU.<sup>30</sup> Peak demand by residential users can be estimated based on a "peaking factor" that indicates how much peak demand is likely to be relative to average demand for the customer group as a whole. Peaking factors are 1.66 for single-family residential and 1.37 for multifamily residential.<sup>31</sup>

As described earlier, this study estimates costs to serve a typical new residential unit in Austin, which include both single-family and multifamily housing. Because single-family residential customers are individually metered, there is good data on water use by single-family units. However, multifamily housing typically uses a

<sup>30</sup> Source: *Cost of Service Rate Study 2008*, by Red Oak Consulting, August 2009, Table B-1.

<sup>31</sup> *Cost of Service Rate Study 2008*, Table B-13, page B-14

common water meter on the building for all units. While AWU keeps track of water sales to multifamily customers, it does not have data on the number of individual housing units served. This makes it impossible to directly calculate the actual water use characteristics for the average multifamily unit. For the purposes of this study, it was assumed that average water usage by multifamily units is 50% of the water used by single-family units. This difference is intended to reflect both the smaller size of multifamily units and the lack of yard irrigation.

Table 6-2 shows the use characteristics for residential water customers and shows the calculated peak demand. For single-family units, average peak demand is 457 gallons per day (GPD) and for multifamily units it is 188 GPD. These two categories were combined to form a typical residential unit by weighting according to the relative share of each type of housing existing in Austin (47% single-family and 53% multifamily, as described earlier in this report).

Note that the data described so far is for *existing* housing in Austin. Since new housing tends to be larger and have a correspondingly greater demand for services, the combined residential figure was adjusted to reflect new housing characteristics. This results in an estimate peak water demand of 340 GPD for typical new residential units, as shown in Table 6-2.

**Table 6-2**

<b>Residential Water Demand for Austin Housing Units</b>			
<b>Metric</b>	<b>Single-Family Residential</b>	<b>Multifamily Residential</b>	<b>Combined Residential<sup>(1)</sup></b>
Number of Accounts <sup>(2)</sup>	185,620	5,738	NA
Water Sales (kgal/year) <sup>(2)</sup>	18,637,701	9,109,523	27,747,224
Average Daily Water Use per Account or Unit, GPD <sup>(3)</sup>	275	138	203
Average Monthly Water Use per Account or Unit (gal.)	8,253	4,126	6,083
Peaking Factor (max day) <sup>(4)</sup>	1.66	1.37	1.51
Peak Day Demand per Unit, GPD <sup>(5)</sup>	<b>457</b>	<b>188</b>	<b>314</b>
Adjustment for New Units <sup>(6)</sup>	NA	NA	8.1%
<b>Peak Demand for Typical New Residential Unit, GPD</b>			<b>340</b>

1) Single and Multifamily are combined to reflect a typical residential unit using the percentage of each type of housing in Austin, as reported earlier (47% SF, 53% MF)

2) *Cost of Service Rate Study 2008*, by Red Oak Consulting, August 2009, Table B-1. Note that the 3% water loss reported by AWU was not include here on the assumption that new water services would have fewer losses.

3) Multifamily units share common water meters so water use per unit is estimated based on 50% of single-family use.

4) *Cost of Service Rate Study 2008*, Table B-13, page B-14.

5) Peak day demand = average daily use x peaking factor.

6) New units are estimated to be 8.1% larger with a commensurate increase in demand for services, as described earlier in this report.

Notes: kgal = 1000 gallons; GPD = gallons per day; NA = not applicable.

## Water Treatment System Costs to Serve New Residential

As calculated earlier, the cost per gallon of water treatment capacity is estimated to be \$9.08. A typical new residential unit requires an estimated peak of 340 gallons per day. As shown in Table 6-3, the cost for the water treatment facilities to serve a typical new residential unit is \$3,087.

**Table 6-3**

<b>Water Treatment System Costs to Serve Residential Development in Austin<sup>(1)</sup></b>			
<b>Housing Category</b>	<b>Peak Day Demand per Unit, GPD</b>	<b>WTP Cost in \$/GPD</b>	<b>Cost per Housing Unit</b>
Existing Housing:			
Single Family Unit	457	\$9.08	\$4,146
Multifamily Unit	188	\$9.08	\$1,707
Combined Residential	314	\$9.08	\$2,851
Typical New Residential Unit	340	\$9.08	<b>\$3,087</b>

1) Costs are for water treatment facilities only. Distribution system costs are not included in this table.

## Water Distribution System Costs

Water distribution system costs include water transmission mains, pumping stations and water reservoirs. AWU compiled these cost in the utility's 2007 *Impact Fee Report*.<sup>32</sup> The report carefully allocates the costs for each system improvement according the amount of capacity that will be utilized by new growth over the 10-year planning period.<sup>33</sup> The 2007 distribution system costs totaled \$1,494 per "service unit," or \$1,602 when adjusted to 2009 construction costs.<sup>34</sup> As mentioned previously, a *service unit* is equivalent to the 5/8<sup>th</sup>-inch water meter used by a typical single-family house. To reflect the costs for a typical new residential unit, the number of services units was based on the expected mix of single-family and multifamily units, as shown in Table 6-4. For the 0.73 service units estimated for the

<sup>32</sup> *Impact Fee Report: Impact Fee Land Use Assumptions and Impact Fee Capital Improvements Plan, Year 2007 Update*, Austin Water Utility, September 10, 2007, Table 12.

<sup>33</sup> The cost for new and expanded water treatment facilities were also included in Table 12 of the Impact Fee Report, however they are deducted here so that only the distribution system costs are included. Water treatment plant costs increased significantly since the 2007 Impact Fee Report, so the more-recent costs were used in the prior section of this report.

<sup>34</sup> ENR Construction Cost Index for nearest city (Dallas) used to adjust cost from 2007 to 2009.

typical new residential unit, the water distribution system costs are \$1,170 (0.73 x \$1,602).

**Table 6-4**

<b>Average Service Units Per New Residential Unit</b>		
<b>Housing Type</b>	<b>Percent of New Units<sup>(1)</sup></b>	<b>Service Units</b>
Single-Family	46%	1
Multifamily <sup>(2)</sup>	54%	0.5
<b>Average Service Units Per New Residential Unit<sup>(3)</sup></b>		<b>0.73</b>

1) Percentage of new housing types based on *City of Austin Population and Households Forecast by ZIP Code, Updated Forecast*, Table on page 13 titled: City of Austin Housing Starts by ZIP Code January 1, 2000 through October 1, 2004.

2) Multifamily unit assumed to have half the water demand of single-family unit due to smaller size and no yard irrigation.

3) Weighted average based on expected mix of new housing types.

### Total Water System Costs

The total water system cost per new residential unit is \$4,257. This figure does not include any of the interest or financing costs associated with the infrastructure.

**Table 6-5**

<b>Total Water System Costs</b>	
<b>System Cost Category</b>	<b>Cost Per New Residential Unit</b>
Water Treatment Plant Costs	\$3,087
Distribution System Costs	\$1,170
<b>Total:</b>	<b>\$4,257</b>

### Water Facility Funding

New water facilities are funded by water user fees and impact fees on new development. AWU charges a water system impact fee of \$1000 per service unit for development inside city limits in the desired development zone. A “service unit” is based on the typical 5/8<sup>th</sup>-inch water meter commonly used by single-family units. Assuming the average new residential unit is 0.73 service units (from Table 10-2), the typical impact fee will be approximately \$730, and is considerably lower than the



system cost of \$4,257 calculated here. This impact fee amount is deducted from the total cost in the final cost summary.

The balance of costs not recovered through the impact fee will be funded by all AWU ratepayers. In the case of WTP #4, the cost of the new plant is expected to increase water rates to the average residential customer by 12 to 15 percent, or \$38.40 to \$48.00 per year.<sup>35</sup> In this manner, all customers will pay through their water rates to fund new capacity needed to serve future growth.

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<sup>35</sup> Memo titled "WTP4 City Council Briefing" by Greg Meszaros, Director, Austin Water Utility, July 23, 2009.

## 7. Wastewater System Costs

Wastewater services in Austin are provided by the Austin Water Utility (AWU). The AWU wastewater system includes a collection system with 2,500 miles of sewer mains to collect effluent, pumping (or lift) stations, and two wastewater treatment plants with a combined total treatment capacity of 150 million gallons per day (MGD). AWU's service boundaries extend beyond the City Limits and include some of the Extraterritorial Jurisdiction.

To estimate the sewage treatment requirements of the typical new residential unit, data from the *2008 Cost of Service Rate Study* were used.<sup>36</sup> The study broke out wastewater flows by customer class. As shown in Table 7-1, single-family and multifamily residential customers combined, generated 63% of the total system wastewater flow. Single-family residential units have individual sewer connections, so average wastewater flows can be calculated directly. However, multifamily units typically share a single connection among all units in the building, so multifamily flows were estimated at 50% of single-family flows. The typical new residential unit reflects a mix of single- and multifamily and would require 121 gallons per day of wastewater treatment capacity.

Table 7-1

<b>Residential Sewage Treatment Demand</b>			
<b>Metric</b>	<b>Single-family Residential</b>	<b>Multifamily Residential</b>	<b>Combined Residential</b>
Number of Connections <sup>(1)</sup>	177,229	5,202	
Wastewater Flows from Customer, kgal <sup>(1)</sup>	9,942,419	6,943,006	16,885,425
I&I (leaks), kgal <sup>(1)</sup>	1,166,429	814,543	1,980,972
Total Wastewater Flows, kgal <sup>(1)</sup>	11,108,848	7,757,549	18,866,397
Percent of Total System Flow <sup>(2)</sup>	37%	26%	63%
Average Sewage per Connection (gpd) <sup>(3)</sup>	154	3,657	
Average Sewage per Housing Unit (gpd) <sup>(4)</sup>	154	77	112
Average Sewage per New Hsg Unit (gpd) <sup>(5)</sup>	166	83	<b>121</b>

1) Source: *Cost of Service Rate Study 2008*, by Red Oak Consulting, August 2009, Table C-1. No peaking factors were used for wastewater capacity.

2) Total system wastewater flow was reported to be 29,725,342 kgal.

3) Figure excludes I&I for new development.

4) Multifamily sewage volume based on 50% of single-family. "Combined residential" assumes new units will be 46% SF and 54% MF.

5) New housing units assumed to be 8.1% larger than average of existing units with commensurate increase in services.

Notes: kgal = 1000 gallons; gpd = gallons per day.

<sup>36</sup> Austin Water Utility *Cost of Service Rate Study 2008*, Report Vol. II, Red Oak Consulting, August 2009.

In order to estimate the costs of the treatment and collection system necessary to meet the residential demand, both decentralized and centralized systems were examined.

### Decentralized Wastewater System Costs

Decentralized cluster wastewater systems are envisioned in the AWU's 2007 *Impact Fee Report* to address future needs, however, no such systems are currently in use or planned.<sup>37</sup> These localized systems are intended to reduce costs by minimizing the need for new sewer mains, pumping stations, and regional treatment plant expansions. AWU estimated costs for these systems to range from \$15 to \$40 per gallon/day of treatment capacity. Adjusting these costs to 2009 values, as shown in Table 7-2, the midrange cost to provide the 121 gallons per day of treatment capacity required by the typical new housing unit is \$3,577.

**Table 7-2**

<b>Decentralized "Cluster" Wastewater System Costs</b>			
	<b>Low Estimate</b>	<b>High Estimate</b>	<b>Midrange Cost</b>
Estimated 2007 Cost Range, \$/gal/day <sup>(1)</sup>	\$15.00	\$40.00	\$27.50
Adjusted to 2009 Costs, \$/gal/day <sup>(2)</sup>	\$16.09	\$42.90	\$29.49
Demand per New Housing Unit, GPD	121	121	121
System Cost per Housing Unit	\$1,951	\$5,203	<b>\$3,577</b>

1) System cost estimates are per GPD capacity from *Impact Fee Report, 2007 Update*, page CIP-25.

2) Construction costs adjusted to 2009 values using the ENR Construction Cost Index for the nearest city (Dallas).

### Centralized Wastewater System Costs

A centralized wastewater system involves a large central or regional treatment facility combined with citywide or regional collection system of sewer mains and pumping stations. The City's two large regional wastewater treatment plants (WWTPs) were recently expanded to increase capacity. As shown in Table 7-3, the combined additions to the two WWTPs were 40 million gallons per day (MGD) capacity. At current construction costs the value of the additions was approximately \$186 million, or \$4.64 per gallon per day (GPD) of treatment capacity. For the typical residential demand of 121 GPD per unit, the cost per housing unit is \$563 for the treatment facility. This estimate may not fully reflect the cost of the treatment capacity, as plant expansions may not include the value of the land and may utilize

<sup>37</sup> *Impact Fee Report: Impact Fee Land Use Assumptions and Impact Fee Capital Improvements Plan, Year 2007 Update*, Austin Water Utility, September 10, 2007, page LUA-9.

some existing plant equipment. However, it is based on the best available cost data for central treatment facilities in Austin.

**Table 7-3**

<b>Regional WWTP Expansions<sup>(1)</sup></b>							
<b>Facility</b>	<b>Capacity Addition, MGD</b>	<b>Year Completed</b>	<b>Cost to Build</b>	<b>Adjusted 2009 Cost</b>	<b>Cost per GPD Capacity</b>	<b>Sewage Treatment per Housing Unit, GPD</b>	<b>Cost per Housing Unit</b>
Southern Austin Regional WWTP	25	2006	\$97,612,000	\$110,347,978	\$4.41	121	\$535
Walnut Creek WWTP	15	2005	\$65,499,000	\$75,434,586	\$5.03	121	\$610
<b>Combined WWTPs</b>	<b>40</b>		<b>\$163,111,000</b>	<b>\$185,782,563</b>	<b>\$4.64</b>	<b>121</b>	<b>\$563</b>

1) Source: *Impact Fee Report: Impact Fee Land Use Assumptions and Impact Fee Capital Improvements Plan*, Year 2007 Update, Austin Water Utility, September 10, 2007, Table 13, page CIP-32.

Central WWTPs require a regional wastewater collection system. No collection system costs figures were available from the City for serving new development, so the cost used here are taken from estimates developed for the proposed SH 130 District. The *SH 130 Infrastructure District Report* estimated the wastewater collection costs for the 42-square mile district. However, the costs for the collection system were combined with costs for the water distribution system in the report. For the purposes of making a rough analysis it was assumed that the costs for water distribution and sewage collection systems were approximately equal, and half the total cost was attributed to sewage collection. As shown in Table 7-4, the cost per residential unit for the wastewater collection system in the SH 130 District is \$3,420.

**Table 7-4**

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**Sewage Collection System Cost**  
Based on 2006 SH 130 Infrastructure District Report<sup>(1)</sup>

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**SH 130 District, Phase 1 Annexation Plan**

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Major Collection and Distribution Infrastructure (Water & Wastewater)	\$239,600,000
Wastewater Share at 50% <sup>(2)</sup>	\$119,800,000
Residential Share of Wastewater at 32% <sup>(3)</sup>	\$38,336,000
Number of New Residential Units in District <sup>(4)</sup>	12,671
WW Collection System Cost per New Residential Unit, 2006\$	\$3,025
<b>WW Collection System Cost per New Residential Unit, 2009\$<sup>(5)</sup></b>	<b>\$3,420</b>

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1) SH 130 Infrastructure District Report, January 26, 2006, by City of Austin.

2) Wastewater collection is assumed to represent half of the total combined cost for water and wastewater collection and distribution facilities reported in the SH 130 Report.

3) Based on goal of the District to achieve a significantly higher percentage of non-residential land uses than has been achieved elsewhere in the City (see page 1-6 of SH 130 Report).

4) Number of residential units derived from assessed values and unit values from table in SH 130 Infrastructure District Report on page 1-6.

5) Construction costs adjusted to 2009 values using the ENR Construction Cost Index for the nearest city (Dallas).

The combined cost of the WWTP and collection system for the existing centralized system totals \$3,983 per new residential unit, as shown in Table 7-5.

**Table 7-5**

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Total Wastewater Facilities Cost for Regional System

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<b>System Component</b>	<b>Cost per Residential Unit</b>
WW Treatment Plant	\$563
WW Collection System	\$3,420
<b>Total Wastewater System Cost:</b>	<b>\$3,983</b>

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The cost of the central (or regional) system is slightly higher than the cost for a decentralized system, based on these estimates derived from City reports. Therefore, the lower, decentralized system cost of \$3,577 per new residential unit is used in this report.

### Wastewater System Funding

Wastewater facilities are funded by user charges and impact fees on new development. AWU charges a wastewater system impact fee of \$600 per service unit for development inside city limits in the desired development zone. A “service unit” is based on the typical 5/8<sup>th</sup>-inch water meter commonly used by single-family units.

Assuming the average new residential unit (single- and multifamily) is 0.73 service units (from Table 7-4 in the next section), the typical impact fee will be approximately \$438. This impact fee amount is deducted from the total cost in the final cost summary.

The impact fee is well below the system cost of \$3,577 calculated here. The balance of costs will be paid through the service rates to all water/sewer customers.

## 8. Stormwater System Costs

The stormwater system is necessary to manage rainwater runoff from the impervious surfaces resulting from urban development. Impervious surfaces include roads, sidewalks, parking lots, and building roofs. These surfaces amplify stormwater flows. Stormwater management seeks to prevent or minimize flooding, avoid soil erosion and destruction of natural stream channels, and protect ground and surface water quality. Urban development also creates water pollution sources, including vehicle leaks, landscaping chemicals, and soil erosion from construction and runoff that affect water quality. Water quality protection is part of the stormwater management system in most major cities, including Austin.

According to the Austin City Code,<sup>38</sup> most large new developments are required to have certain stormwater management facilities constructed on site by the developer. These facilities may include drainage conveyance and detention basins. Off-site stormwater flows are addressed by a public system. According to the 2000 *Watershed Protection Master Plan*, this public system is in need of being upgraded and expanded.<sup>39</sup> The Plan identifies \$875 million in needed capital facilities to address creek flooding, storm drains, stream bank stabilization and detention ponds. It is not possible to determine how much of this capital cost is for addressing the needs of future development and how much is for fixing existing deficiencies.

In order to estimate the cost of providing stormwater facilities for new development, the drainage costs calculated by the City for the proposed SH 130 District were used.

### Stormwater Costs in SH 130 Infrastructure District Report

The *SH 130 Infrastructure District Report* was issued in 2006 and examined some of the infrastructure costs associated with the development of a proposed new urban district around State Highway 130. Since this area had no existing stormwater infrastructure, the cost estimates for drainage systems reflect those required to serve new development. The total estimated cost for drainage facilities associated with serving development in the district was \$114.8 million. Operation and maintenance of the facilities was not included in this cost figure.

The drainage projects in the report are based on estimates for building regional stormwater management ponds and nominal channel and low water crossing improvements. Flood control facility costs include the design and construction of regional detention facilities to mitigate flood hazards associated with increased

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<sup>38</sup> Austin City Code Chapter 25-7 addresses drainage requirements.

<sup>39</sup> Watershed Protection Master Plan, Phase 1 Watersheds Report, 2000 (<http://www.ci.austin.tx.us/watershed/rptmpl4.htm>).

stormwater runoff rates from future development. Costs also include the design and construction of nominal channel conveyance/low water roadway crossing improvements to allow increased flows from future development to be safely transported to the regional detention facilities without increase in flood hazard. The projects did not include on-site drainage conveyance or water quality and erosion controls that would be required for each development and no off-site water quality or erosion control facilities were included in the facilities cost estimate.

The report assumes that 32% of the land area will become residential, with the remainder being non-residential (commercial and industrial).<sup>40</sup> Therefore, for the purposes of this study, it was assumed that 32% of the stormwater costs are attributable to residential development in the district, or \$36.7 million, as shown in Table 8-1.

**Table 8-1**

<b>Stormwater System Costs</b>	
Based on 2006 <i>SH 130 Infrastructure District Report</i> <sup>(1)</sup>	
	<b>Values</b>
SH130 District Stormwater Costs	\$114,767,171
Percent of Area Residential <sup>(2)</sup>	32%
Stormwater Cost due to Residential	\$36,725,495
Number of Residential Units <sup>(3)</sup>	12,671
Cost per Unit (in 2006\$)	<b>\$2,898</b>

1) Report issued January 26, 2006 by City of Austin.

2) Based on goal of the District to achieve a significantly higher percentage of non-residential land uses than has been achieved elsewhere in the City. See *SH 130 Infrastructure District Report*, page 1-6.

3) Number of residential units derived from assessed values and unit values from table in *SH 130 Infrastructure District Report* on page 1-6.

Based on the *SH 130 Infrastructure District Report*, 12,671 residential units are anticipated.<sup>41</sup> Dividing the total residential stormwater system costs by the number of residential units yields a cost per unit of \$2,898. Since the report was issued in 2006, this cost was adjusted to the 2009 value of \$3,277 per residential unit.<sup>42</sup>

<sup>40</sup> Note that this estimate of 32% residential is considerably different from the existing development pattern for Austin which is about 70% residential, as noted in the *SH 130 Infrastructure District Report* on page 1-6.

<sup>41</sup> Numbers of residential units are calculated from the total assessed values and values per unit (see table in *SH 130 Infrastructure District Report*, page 1-6).

<sup>42</sup> Using the ENR Construction Cost Index for Dallas.



## Funding

The City funds the stormwater system by charging a “Comprehensive Drainage Fee” on its utility bill. This fee is paid by residents and property owners in the City. The City does not charge an impact fee for stormwater, though the State does authorize such a fee. As a result, all residents will pay through their utility bills for the stormwater facilities needed to serve new development.

## 9. Park and Recreation System Costs

The Austin Parks and Recreation Department (PARC) provides and maintains a system of parkland and recreational facilities for the City. According to the Draft Executive Summary of the *Long Range Plan for Land, Facilities and Programs, 2010-2015* by the Austin Parks and Recreation Department:

“The City of Austin has over 17,000 acres of parks and preserves consisting of 13 district parks, 12 metropolitan parks, 74 neighborhood parks, 22 school parks, 19 pocket parks, 29 greenways, 5 golf courses, 20 recreation centers, 3 senior activity centers, 4 tennis centers, 50 aquatic facilities, 28 special parks, and 13 nature preserves.”

Austin has a current service standard of 24 acres of parkland per 1000 residents.<sup>43</sup> It is unclear that the City will be able to maintain this excellent parkland standard in the future as land becomes more limited and prices increase. However, for the purposes of this study it was assumed that the current level of service would be maintained.

**Table 9-1**

<b>Inventory of Austin Parks and Land Acreage</b>		
<b>Park Type</b>	<b>Number of Each Type</b>	<b>Acres</b>
Metropolitan Parks	12	8,898.92
Greenbelts	29	4,525.46
Nature Preserves	13	1,063.91
Golf Courses	5	839.17
Neighborhood Parks	74	794.39
District Parks	13	749.05
Special Parks	28	478.53
School Playgrounds	22	156.96
Tennis Centers	4	26.78
Pocket Parks	19	15.68
Senior Activity Centers	3	11.21
<b>Total all Parks</b>	<b>222</b>	<b>17,560.06</b>

Source: Austin PARC Land and Facility Inventory, October 2008, provided July 28, 2009 by the Parks and Recreation Department in response to a Public Information Request.

<sup>43</sup> Austin PARC Land and Facility Inventory, October 2008.

In order to expand the park system to accommodate new development, additional acres of parkland will need to be acquired. The average cost for vacant land in the City was estimated in the *School System Costs* section of this report to be \$30,991 per acre. As shown in Table 9-2, each new housing unit will require on average 0.0624 acres of additional parkland at a cost of \$1,934.

In addition to the land there is the cost of park development with facilities such as recreation centers, pools, tennis courts, ball fields, golf courses, landscaping, gardens, paths and parking areas. A listing of park facilities was obtained from the City that included all buildings, building contents, and pools. The listing was created for insurance purposes and included the total 2008 insurance values for 1,351,000 square feet of buildings and all pools. Certain types of durable facilities were not included in this listing, presumably because they do not require insurance coverage. The costs for facilities such as ball fields, tennis courts, parking areas, golf courses, paths and landscaping were not included, so the full cost of park development would be somewhat higher than reported here. As shown in Table 9-2, the total value of the park facilities in the City listing was \$174 million in 2008. The per-capita cost was adjusted to a 2009 value of \$242 per person, or \$629 per new housing unit.

The total combined cost of park land (\$1,934) and park facilities (\$629) is \$2,563 per new housing unit.



## 10. Development Impact Fees in Austin

An “impact fee” is a fee that is implemented by a local government on a new development to help offset a portion of the costs associated with expanding the capacity of public facilities to serve that development. Impact fees are widely used around the country to help fund the infrastructure new development requires.

In Texas, impact fees were enabled statewide in 1987 by the 70<sup>th</sup> Legislature (SB 336). *Texas Local Government Code*, Chapter 395, authorizes cities to impose and collect impact fees and establishes guidelines.<sup>44</sup> This statute also limits the types of facilities for which local government can charge impact fees to the following:

- water facilities (supply, treatment and distribution);
- wastewater facilities (sewage collection and treatment);
- stormwater facilities (drainage and flood control); and,
- roadway facilities.

In Austin, impact fees are charged only for water and wastewater systems by the Austin Water Utility. In addition, the Parks and Recreation Department charges a “parkland dedication fee” which functions in a similar manner to an impact fee and is treated as such in this study.

Impact fees are based on the total cost of system-wide planned projects for the next ten years that are attributable to new growth. This cost is then divided by the number of new service units (such as standard housing units) anticipated over the same period (LGC Sec. 395.015). This results in the full system cost per service unit. However this is not the amount used in the fee.

According to *Texas Local Government Code*, the city has two options in calculating the impact fee it charges. One is a “safe harbor” method of collecting only 50% of the full cost attributed to growth, which is the method used by Austin Water Utility. The other allows for 100% cost recovery but requires a full accounting of all future tax and service charge payments the development is likely to make towards the cost of infrastructure and deducts these from the full cost.

### Water and Wastewater Impact Fees

The Austin Water Utility has an impact fee for both water and wastewater systems. The impact fees for a new housing unit are based on the number of *service units*, which is determined by the size of the water meter used. For example, a housing

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<sup>44</sup> Texas State Statutes - Local Government Code  
<http://tlo2.tlc.state.tx.us/statutes/docs/LG/content/html/lg.012.00.000395.00.htm>

unit that installs a 5/8-inch water meter will be charged impact fees for 1.0 service units. A housing unit that purchases a 3/4-inch water meter will pay impact fees for 1.5 service units. A complete list of service units associated with meter size and types can be found on the City of Austin’s *2007 Impact Fee Reports*.<sup>45</sup>

The schedule of fees varies by zone in and around the city and is provided in Table 10-1. The “maximum allowable amount” shown in the table reflect only 50% of AWU’s total estimated cost for the water and wastewater systems, based on one calculation option specified by Chapter 395 of the *Texas Local Government Code*. The actual fees charged by AWU for the various zones are less than 38% of the full cost calculated by the Utility.

**Table 10-1**

Location of Development <sup>(3)</sup>	Fee in Dollars per Service Unit <sup>(2)</sup>		
	Water System	Wastewater System	Total
	Maximum Allowable Amount <sup>(4)</sup>	\$3,307	\$1,852
DWPZ – Outside ETJ fee	\$2,500	\$1,400	\$3,900
DWPZ – ETJ fee	\$2,500	\$1,400	\$3,900
DWPZ- Inside City fee	\$2,200	\$1,200	\$3,400
DDZ – ETJ fee	\$1,800	\$1,000	\$2,800
DDZ – Inside City fee	\$1,000	\$600	\$1,600
DDZ – Urban Watersheds fee	\$800	\$500	\$1,300
DDZ – Cure fee	\$700	\$400	\$1,100

1) Source: City of Austin Water and Wastewater Impact Fee Schedule, <http://www.ci.austin.tx.us/water/downloads/impactfeeschedule.pdf>

2) A service unit is considered to be the equivalent average demand from a residence with a 5/8-inch meter, or 445 gallons per day of water usage.

3) Abbreviations used:

DWPZ is the Drinking Water Protection Zone

DDZ is the Desired Development Zone

CURE is the Central Urban Redevelopment Combining District plus the area bounded by Town Lake, Lamar Boulevard, 15th Street and IH 35

ETJ is the City of Austin Extraterritorial Jurisdiction outside city limits.

4) The “maximum allowable amount” shown here is 50% of the full cost.

According to the *2007 Impact Fee Reports*, the projection for the future mix of service units is based on the existing mix of installed meters. The average new housing unit will use 0.66 service units, according to this formula.<sup>46</sup> This low value can be

<sup>45</sup> *Impact Fee Reports: Impact Fee Land Use Assumptions and Impact Fee Capital Improvement Plan, 2007*, <http://www.ci.austin.tx.us/water/downloads/approved2007impactfeeluaandciproreport.pdf>, pg. 44

<sup>46</sup> Table 1 (pg. LUA-4) of the *Impact Fee Reports* estimates 65,764 new dwelling units served by Austin Water Utility between 2005 and 2015. Table 5 (pg. LUA-8) estimates 19.24 million gallon per day for new residential dwellings, which equates to 43,236 new service units during the same period.

attributed to the number of multifamily buildings where multiple units operate from a single water meter. The projection for service units in the report does not appear to take into consideration any differences between new and existing housing. Increasing the average service units per new house by 8.1% to reflect the larger size of new housing units, results in a value of 0.71 service units. However, to maintain consistency in this study, single-family units are assumed to require 1.0 service units and multifamily are assumed to require 0.5 services units (50% of single-family). Based on the recent mix of single- and multifamily units, the average new unit will require 0.73 service units, as shown in Table 10-2. This results in a slightly higher impact fee than would be calculated directly from AWU’s impact fee report. For the purposes of this study it is assumed that the housing unit is built inside the Austin city limits and in the Desired Development Zone (DDZ).

**Table 10-2**

<b>Average Service Units Per New Residential Unit</b>		
<b>Housing Type</b>	<b>Percent of New Units<sup>(1)</sup></b>	<b>Service Units</b>
Single-Family	46%	1
Multifamily <sup>(2)</sup>	54%	0.5
<b>Average Service Units Per New Residential Unit<sup>(3)</sup></b>		<b>0.73</b>

1) Percentage of new housing types based on *City of Austin Population and Households Forecast by ZIP Code*, Updated Forecast, Table on page 13 titled: City of Austin Housing Starts by ZIP Code January 1, 2000 through October 1, 2004.

2) Multifamily unit assumed to have half the water demand of single-family unit due to smaller size and no yard irrigation.

3) Weighted average based on expected mix of new housing types.

## **Transportation**

Currently, the City of Austin does not charge impact fees for roadway facilities. However, according to the Austin City Code, Section 25-6-113<sup>47</sup>, “a person submitting a site plan application or a zoning or rezoning application must submit a traffic impact analysis to the department if the expected number of trips generated by a project exceeds 2,000 vehicle trips per day.” If the proposed development does not meet the standards set forth by Title 25, Article 3 of the Austin City Code and the Transportation Criteria Manual, the developer might be required to pay the capital costs for such expenses as the dedication of additional right-of-way, funding of a traffic signal or intersection improvement and other modification determined to

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Dividing the new dwelling units by the new service units yields an average of 0.66 service units per new dwelling unit.

<sup>47</sup> American Legal Publishing, [http://www.amlegal.com/austin\\_tx/](http://www.amlegal.com/austin_tx/)

be necessary. There is no specific guideline for these contributions, however, and any contribution by the developer is decided on a case by case basis.

### **Stormwater**

Currently, the City of Austin does not charge impact fees for stormwater, drainage and flood control facilities. The City requires a certain amount of on-site mitigation of stormwater impacts for most new development.

### **Parks**

The City first adopted an ordinance in 1985 requiring either park land dedication or fees for residential subdivisions. According to the current City Ordinance No. 20070621-027, adopted in June of 2007,<sup>48</sup> the City of Austin requires that developers of residential subdivisions and site plans with three or more dwelling units dedicate five acres of parkland to the City of Austin per 1,000 residents. If less than six acres are required to be dedicated or the land available for dedication does not comply with the standards for dedication, the developer may instead be charged \$650 for every dwelling unit. The fee is the same for all types and sizes of dwelling units. The payment is the most common option used.<sup>49</sup>

### **Total Impact Fees for a New Austin Housing Unit**

A typical new housing unit in Austin will pay a total of \$1,818 in impact fees towards water system, sewer system and park system impacts, as shown in Table 10-3.

**Table 10-3**

<b>Total Impact Fees for Typical Housing Unit in Austin<sup>(1)</sup></b>	
<b>Category</b>	<b>Fee</b>
Water	\$730
Sewerage	\$438
Parks	\$650
<b>Total:</b>	<b>\$1,818</b>

1) Typical housing unit is assumed to be 0.73 service units for purposes of water and sewerage impact fee calculation, as explained in the text.

<sup>48</sup> City of Austin, Office of the City Clerk,  
<http://www.cityofaustin.org/edims/document.cfm?id=104212>

<sup>49</sup> *Parkland Dedication Presentation PowerPoint to Boards & Commissions, 2006-2007*, by the Parks and Recreation Department.



Austin's impact fees are relatively low for a city charging such fees. The average among cities in the U.S. that collect impact fees was a total of \$10,500 for a single-family house in 2007.<sup>50</sup> By comparison, Austin charges from \$2,250 to \$4,050 in total impact fees for a single-family house within City Limits.<sup>51</sup>

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<sup>50</sup> Average total of impact fees for a single-family house according to *National Impact Fee Survey: 2007*, by Duncan Associates, August 2007.

<sup>51</sup> Fees are for a single-family house built within city limits. Fees vary depending on development zone. Total includes water, wastewater, and park dedication fees.

## II. Conclusions

The gross costs for the six categories of infrastructure evaluated in this study total \$25,683, as shown in first data column in Table 11-1. These costs represent the estimated expense the City incurs to build the infrastructure necessary to serve a typical residential unit in Austin in 2009. The costs are referred to here as *gross* costs because new residential development contributes a certain amount to offset the costs.

To arrive at a *net* costs, or cost not paid by the new development, credits for impact fees and future tax contributions must be deducted from the gross costs. Impact fees paid by a typical new residential unit total \$1,818.<sup>52</sup> Future tax revenues and utility payments that will go towards bond repayments total \$514. The total net cost for a typical new residential unit in Austin is \$23,351, as shown in the last column of Table 11-1.

**Table 11-1**

<b>Summary of Infrastructure Costs for Typical New Residential Unit</b>				
<b>Categories</b>	<b>Gross Cost to Serve Typical New Housing Unit</b>	<b>Credit for Impact Fees or Other Payments<sup>(1)</sup></b>	<b>Credit for Future Contribution Via Tax and Utility Payments<sup>(2)</sup></b>	<b>Net Cost to Serve Typical New Housing Unit</b>
School Facilities	\$9,270	\$0	\$185	\$9,085
Road System	\$2,739	\$0	\$55	\$2,684
Water Service Facilities <sup>(3)</sup>	\$4,257	\$730	\$85	\$3,442
Wastewater System <sup>(3)</sup>	\$3,577	\$438	\$72	\$3,067
Storm Drainage System	\$3,277	\$0	\$66	\$3,211
Park & Rec. Facilities	\$2,563	\$650	\$51	\$1,862
<b>Total Cost:</b>	<b>\$25,683</b>	<b>\$1,818</b>	<b>\$514</b>	<b>\$23,351</b>

Notes:

1) Impact fees paid by new development are discussed in the section *Impact Fees in Austin*.

2) Crediting new development for future tax and utility payments that will go towards its infrastructure costs is addressed in the *Methodology* section.

3) The water and sewer system impact fees are based on the likely mix of single-family and multifamily housing constructed inside city limits in the desired development zone and reflect 0.73 service units each. See *Housing Characteristics* section for more information.

The net cost of \$23,351 is the amount ultimately paid by the taxpayers and ratepayers of Austin and not by the new development itself. This amount can be

<sup>52</sup> These deductions are explained in the previous sections: *Impact Fees in Austin* and *Methodology*.

viewed as a subsidy of new development by established residents and businesses of the City. The cost is effectively a one-time cost that is due when the development is completed.

The City forecasts that Austin will grow at a rate of about 2% per year over the next decade.<sup>53</sup> This rate of growth would increase the current population by 15,481 people in one year. Based on a housing occupancy level of 2.6 persons per unit, 5,954 additional housing units will be constructed to accommodate this growth. At an average net cost of \$23,351 per unit, the total net cost for the facilities to serve this residential development will be \$139 million each year. The forecasted population growth over the next 20 years will result in 103,000 new housing units, costing \$2.4 billion in current dollars.<sup>54</sup>

As noted earlier in the study, a “typical residential unit” is based on the recent mix of single- and multifamily units being built in Austin. However, since a single-family dwelling is a commonly used increment of urban growth and development, costs were calculated for this type of housing.<sup>55</sup> The net cost for infrastructure to serve a new single-family unit is estimated to be \$32,308.

Impact fees are widely used around the country to recover some or all of these costs directly from the development. Austin’s impact fees are only 25% to 40% as much as the average among U.S. cities that collect impact fees.

The State of Texas authorizes impact fees for roadway, water, wastewater and stormwater facilities. Austin collects only two of the four categories of infrastructure authorized by the State, and the fees are set at less than 38% of the full cost determined by the City. Clearly there is an opportunity for Austin to collect additional impact fees to directly recover more of these costs.

The costs reported here are only those required to serve the development at current service standards, and do not include excess capacity that might benefit others. Under the City’s current infrastructure financing system, the costs represent an ongoing financial burden to established residents and businesses which are required to help fund the new facilities that serve growth.

All costs and revenues are treated as current 2009 values and no financing costs have been included. This approach was used in order to simplify the analysis and make the results more intuitive. However, financing costs are incurred whenever bonds are used to fund capital improvements. Interest, bonding fees, and insurance can double the ultimate cost for bond-financed facilities.

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<sup>53</sup> Based on projections by the City Demographer, Department of Planning, City of Austin, dated January 2009. See *Appendix A* for data.

<sup>54</sup> For forecast information see the section *Characteristics of New Housing in Austin*.

<sup>55</sup> For calculation details see *Appendix D: Relative Impacts of New Single- and Multifamily Units*.

This fiscal impact analysis provides new insight into the consequences of public policies and land use decisions related to residential development. The net costs identified for six of the twelve basic infrastructure categories required by new residential development show a significant negative fiscal impact. Additional research on the remaining six categories of infrastructure will yield a more-complete picture of development impacts in Austin.

## **Appendices**

- A. Population Projections for Austin
- B. Data on Student Generation
- C. Water and Wastewater System Cost Estimates from Other City Reports
- D. Relative Impacts of New Single- and Multifamily Units
- E. Notes on Data and Calculations Used in Study

## A. Population Projections for Austin

Table A-1

<b>Austin Population History and Forecast</b>		
<b>Year</b>	<b>Population</b>	<b>Annual Growth Rate</b>
1990	465,622	3.0%
1991	481,901	3.5%
1992	498,749	
1993	516,186	
1994	534,233	
1995	552,910	
1996	572,241	
1997	592,247	
1998	612,953	
1999	634,383	
2000	656,562	3.5%
2001	669,693	2.0%
2002	680,899	1.7%
2003	687,708	1.0%
2004	692,102	0.64%
2005	700,407	1.20%
2006	718,912	2.64%
2007	735,088	2.25%
2008	750,525	2.10%
2009	774,037	3.13%
2010	785,647	1.50%
2011	799,396	1.75%
2012	815,384	2.00%
2013	831,692	2.00%
2014	848,326	2.00%
2015	865,292	2.00%
2016	882,598	2.0%
2017	900,250	
2018	918,255	
2019	936,620	
2020	955,353	2.00%
2021	972,071	1.8%
2022	989,082	

2023	1,006,391	
2024	1,024,003	
2025	1,041,923	1.75%
2026	1,060,157	1.8%
2027	1,078,710	
2028	1,097,587	
2029	1,116,795	
2030	1,136,339	1.75%
2031	1,153,384	1.5%
2032	1,170,685	
2033	1,188,245	
2034	1,206,069	
2035	1,224,160	1.50%
2036	1,239,462	1.3%
2037	1,254,955	
2038	1,270,642	
2039	1,286,525	1.25%
2040	1,302,606	1.25%

Source: Ryan Robinson, City Demographer, Department of Planning, City of Austin, dated January 2009.

Note: Shading indicates extrapolated data added for continuity. Extrapolated annual data is based on calculated average annual growth rate over period in right column.

## B. Data on Student Generation

The estimate of school children generation based on the 2000 Census distribution of school-age children in Austin shows a higher enrollment in high schools and lower enrollment in elementary schools than the actual enrollment data reported by AISD.<sup>56</sup> The AISD enrollment data is used in this study, however the distribution of students that would be expected, based on the 2000 Census, is provided in Table B-1 for comparison purposes.

The adjusted average student generation rate for new housing from the AISD report is 85% of the total school-age children per new housing unit estimated from the 2000 Census. Therefore, it is assumed that 15% of the school-age children in Austin are either attending private schools, are home schooled, or not attending public schools for some other reason. Since only the growth in students attending public schools will affect AISD facility expansion needs, the Census data is adjusted accordingly based on 85% public school attendance, as shown in Table B-1.

**Table B-1**

**Estimated Student Generation Rate for New Housing Units in Austin  
by Grade Level from 2000 Census Data**

<b>School Level</b>	<b>Grades</b>	<b>School Age Children Per New Housing Unit<sup>(1)</sup></b>	<b>AISD Students Generated Per New Housing Unit<sup>(2)</sup></b>
Elementary School	k-5	0.19	0.17
Middle School	6-8	0.09	0.07
High School	9-12	0.12	0.10
School Age 5-17 years		0.40	0.34

1) From 2000 Census data, as shown in Table 4-1 of this report.

2) This column provides the distribution of students at each grade level based on the estimate that 85% of school-age children attend public schools. The 85% attendance is based on the ratio of the number of school-age children per housing unit to the number of children attending AISD public schools per housing unit (0.34/0.40).

<sup>56</sup> *Demographic Analysis and Enrollment Projections for the Austin Independent School District, 2008-2009 Update*, Harner and Associates, January 8, 2008.



## C. Water and Wastewater System Cost Estimates from Other City Reports

For comparison purposes, data from two other City reports on water and wastewater system costs was evaluated and is summarized in this appendix. These reports include the Austin Water Utility's *2007 Impact Fee Report* and the current *Capital Improvement Program*. The costs from these reports were not used in the findings of this study, but provide an additional check of the reasonableness of the findings.

### Water and Wastewater System Costs from Impact Fee Report

The City's *2007 Impact Fee Report* calculates the costs for water and wastewater systems to serve new development.<sup>57</sup> The *Impact Fee Report* is based on different water usage estimates than are used in this study, so is not directly comparable.<sup>58</sup>

The *Impact Fee Report* calculated fees based on the cost of serving a typical new "service unit," which represent a 5/8<sup>th</sup>-inch water meter used for most single-family houses. The "maximum allowable impact fee" reported by AWU is 50% of the full costs. This is based on AWU's interpretation of the State Statutes for impact fees. Actual fees charged by AWU vary, but are no more than about 75% of the allowable fee, or 38% of the full cost. As shown in Table C-1, the full cost for a typical new single-family house using one service unit, is \$10,318.

This study is based on a typical residential unit that reflects a mix of new single-family and multifamily units representing an average of 0.73 service units each. The total cost for this typical new residential unit is \$7,532, as shown in Table C-1.

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<sup>57</sup> *Impact Fee Reports: Impact Fee Land Use Assumptions and Impact Fee Capital Improvement Plan, 2007* by Austin Water Utility.

<sup>58</sup> This study was based on more recent data than was used in the *2007 Impact Fee Report*. A public information request was made to AWU for clarification on the calculations used in the Impact Fee Report, but no response was received.

**Table C-1**

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**System Costs per Service Unit from 2007 Impact Fee Report<sup>(1)</sup>**

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<b>System</b>	<b>50% Cost/SU</b>	<b>Full Cost/SU</b>	<b>0.73 SU</b>
Water	\$3,307	\$6,614	\$4,828
Sewer	\$1,852	\$3,704	\$2,704
<b>Total</b>	<b>\$5,159</b>	<b>\$10,318</b>	<b>\$7,532</b>

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<sup>1)</sup> *Impact Fee Reports: Impact Fee Land Use Assumptions and Impact Fee Capital Improvement Plan, 2007* by Austin Water Utility.  
SU = service unit

Water and Sewer System Growth Costs from CIP

In order to examine the growth-related system costs from another perspective, AWU’s estimate of “system growth” costs for the water and sewer systems was used. The utility’s *Capital Improvement Program* (CIP) report for the 2010-2014 period groups projects by the category of expenditure.<sup>59</sup> The *System Growth* category provides 5- and 10-year summaries of growth-related costs, as shown in Table C-2.

Residential customers (single-family and multifamily) represent 58.7% of the total volume of water sales, and therefore are assumed to represent roughly 58.7% of the total water and sewer systems cost.<sup>60</sup> The residential share of costs is divided by the estimated population growth over the period to obtain a per-capita cost. At 2.6 persons per new housing unit, the cost ranges from \$11,179 to \$13,971 per housing unit for water and sewer facilities, as shown in Table C-2.

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<sup>59</sup> *Capital Improvement Program*, Austin Water Utility FY 2010-2014 Proposed Spending Plan v03, CIP Summary by Category, page 19.

<sup>60</sup> Share of water flow based on Austin Water Utility *Cost of Service Rate Study 2008*, Report Vol. II, Red Oak Consulting, August 2009, Table B-1, page B-1.

**Table C-2**

<b>Water and Sewer Growth Costs from CIP Report<sup>(1)</sup></b>		
<b>Water and Sewer System Metric</b>	<b>5 Years 2010-14</b>	<b>10 Years 2010-19</b>
System Growth Cost (water and sewer)	\$776,085,000	\$1,224,961,000
Share of System Cost to Residential <sup>(2)</sup>	58.7%	58.7%
Residential Cost	\$455,928,530	\$719,630,799
Estimated Population Change for Period <sup>(3)</sup>	84,848	167,374
Residential Cost Per Capita	\$5,373	\$4,300
<b>Cost per New Housing Unit (at 2.6 pers/unit)</b>	<b>\$13,971</b>	<b>\$11,179</b>

1) "System Growth" category from *Capital Improvement Program (CIP)* report by AWU, Table on page 19/19, 2010-2014 Proposed Spending - Summary by Category.

2) Share of cost to residential based on water flow reported in Austin Water Utility's *Cost of Service Rate Study 2008*, Report Vol. II, Red Oak Consulting, August 2009, Table B-1, page B-1.

3) Population projections were not available from AWU for the years reported in the CIP, so City population projections were used and the totals increased by 12% to 14% (based on AWU data for other years) to reflect larger service area for water and sewer.

Comparison of Alternative Estimates

The costs derived from the Impact Fee Report and the CIP are compared with those used in this study in Table C-3. The total of costs from the *Impact Fee Report* is slightly lower, but would be very close if adjusted from 2007 to 2009 costs. However, the cost from the *CIP* are significantly higher. Based on this, it is possible that the water and/or sewer system costs calculated in this study are too low and do not reflect the full cost of the infrastructure. An in-depth analysis of the CIP source data would be necessary to determine if this is the case.

**Table C-3**

<b>Comparison of Water and Sewer System Costs Calculated in this Study with Alternative Sources</b>			
<b>Source</b>	<b>Cost per Typical New Housing Unit</b>		
	<b>Water</b>	<b>Sewer</b>	<b>Combined Total</b>
Costs Calculated in this Study	\$4,257	\$3,983	<b>\$8,240</b>
2007 Impact Fee Report	\$4,828	\$2,704	<b>\$7,532</b>
System Growth Costs from CIP	NA	NA	<b>\$11,179 to \$13,971</b>

## **D. Relative Impacts of New Single- and Multifamily Units**

The impacts estimated in this study are for average new housing units. However, it is possible to roughly estimate the relative share of impacts from single-family and multifamily units by assuming that the floor area of a housing unit correlates with the level of impact on public services and facilities. Housing units with more floor area are assumed to have more bedrooms on average, and therefore more occupants and more demand on public facilities.

The City of Austin does not have data on average floor areas for new housing units. The City also does not have data on the number of occupants in new housing units. Instead, the national average floor area for new units of both types in built in 2008 was used, as shown in Table D-1. The percentage of each type of unit being built is reflected in the City's housing starts data for 2000 to 2004. Based on this mix of housing types, it is possible to calculate the average floor area for all new units to be 1,846 square feet. Based on the differences in floor areas, new single-family units will have approximately 37% more impact, and multifamily units will have 32% less impact than the average for all new units, as shown in Table D-1.

For comparison purposes, AISD data for school children generated by single-family and multifamily housing units was included in Table D-1. This data is for all existing housing, so does not reflect the increased size of new single-family housing relative to multifamily. As might be expected, the difference between the two housing categories is slightly less for existing housing, since older single-family units tend to be smaller. The AISD data tends to corroborate the difference in impacts estimated by floor area – at least as far as school system impacts. School system impacts were by far the most expensive infrastructure category included in this study.

**Table D-1**

**Gauging Relative Impacts of New Single-family and Multifamily Housing in Austin**

<b>Housing Unit Type</b>	<b>Floor Area of New Housing</b>			<b>Student Generation in Existing Housing</b>	
	<b>Percentage of All New Housing Starts in Austin (2000-2004)<sup>(1)</sup></b>	<b>National Average Floor Area per Unit Built in 2008, sq.ft.<sup>(2)</sup></b>	<b>Percent Difference in Floor Area from Average Housing Unit</b>	<b>AISD Student Generation<sup>(3)</sup></b>	<b>Percent Difference in Student Generation from Average Housing</b>
Single-family	46%	2,534	<b>37.3%</b>	0.40	<b>31.1%</b>
Multifamily	54%	1,259	<b>-31.8%</b>	0.22	<b>-27.9%</b>
All Units	100%	1,846	0.0%	0.31	0.0%

1) *City of Austin Population and Households Forecast by ZIP Code*, Updated Forecast, Table on page 13 titled: City of Austin Housing Starts by ZIP Code January 1, 2000 through October 1, 2004  
([http://www.ci.austin.tx.us/demographics/downloads/zip\\_forecast\\_update\\_2020c.pdf](http://www.ci.austin.tx.us/demographics/downloads/zip_forecast_update_2020c.pdf)).

2) Assumes new Austin housing is similar in size to average for new U.S. housing. Source for single- and multifamily floor areas: *Annual 2008 Characteristics of New Housing*, U.S. Census, released June 1, 2009, data for One-Family Houses and Units in New Multifamily Buildings. Floor area for "all units" is calculated based on mix of single- and multifamily units in Austin.

3) *Demographic Analysis and Enrollment Projections for the Austin Independent School District, 2008-2009 Update*, Harner and Associates, January 8, 2008, pages 19 and 20.

The relative differences in impacts between single- and multifamily can be applied to gross infrastructure costs reported in Table 11-1 of the *Conclusions* section of this report. Table D-2 shows that the total gross cost of infrastructure for a new single-family residential unit is \$35,263. Deducting the appropriate impact fees of \$2,250 and future tax contributions of \$705, results in a net cost for single-family dwellings of \$32,308. Table D-3 provides a similar tabulation of the infrastructure costs for multifamily housing units.

**Table D-2**

<b>Summary of Infrastructure Costs for New Single-family Residential Unit</b>				
<b>All Categories</b>	<b>Gross Cost per New Single-family Unit</b>	<b>Credit for Impact Fees or Other Payments</b>	<b>Credit for Future Contribution Through Tax and Utility Payments</b>	<b>Net Cost</b>
School Facilities	\$12,728	\$0	\$255	\$12,473
Road System	\$3,761	\$0	\$75	\$3,685
Water Service Facilities	\$5,845	\$1,000	\$117	\$4,728
Wastewater System	\$4,911	\$600	\$98	\$4,213
Storm Drainage System	\$4,499	\$0	\$90	\$4,409
Park Facilities	\$3,519	\$650	\$70	\$2,799
<b>Total Cost:</b>	<b>\$35,263</b>	<b>\$2,250</b>	<b>\$705</b>	<b>\$32,308</b>

**Table D-3**

<b>Summary of Infrastructure Costs for New Multifamily Residential Unit</b>				
<b>All Categories</b>	<b>Gross Cost per New Multifamily Unit</b>	<b>Credit for Impact Fees or Other Payments</b>	<b>Credit for Future Contribution Through Tax and Utility Payments</b>	<b>Net Cost</b>
School Facilities	\$6,322	\$0	\$126	\$6,196
Road System	\$1,868	\$0	\$37	\$1,831
Water Service Facilities	\$2,903	\$500	\$58	\$2,345
Wastewater System	\$2,440	\$300	\$49	\$2,091
Storm Drainage System	\$2,235	\$0	\$45	\$2,190
Park Facilities	\$1,748	\$650	\$35	\$1,063
<b>Total Cost:</b>	<b>\$17,516</b>	<b>\$1,450</b>	<b>\$350</b>	<b>\$15,715</b>

## **E. Notes on Data and Calculations Used in Study**

It is the intention of the author to use the most accurate data available throughout the study. Where accurate data was not available, reasonable estimates were necessary. Where a range of reasonable estimates existed, the more conservative estimates were used. By “conservative” it is meant that the figures used would tend to estimate lower costs from new development, or tend to err on the low side in the costs determined in this study. Below are some of the specific instances in which conservative, or lower-impact, values were used:

### **New Housing Characteristics**

- Limited data were available on the characteristics of new housing in Austin. As noted in the text, the estimate of occupancy for new housing units used in this report of 2.6 persons per housing unit, is likely to be lower than the actual occupancy level in Austin due to the use of the 2000 Census base year. Lacking any clear method to estimate the increase in occupancy levels in Austin from 2000 to 2009, it could not be included in the study. Since the occupancy rate used here is likely lower than actual rates, the impacts of new housing on demand for services and infrastructure will be understated somewhat.

### **Schools**

- The values for vacant land used in this study are based on average assessed market values for agricultural and non-qualified land (tax codes D1 and D2). Land values did not include land in tax code “C” (vacant lots), since TCAD had no data on total acreage in this category. Vacant lots are likely to have a higher value on a per-acre basis than agricultural or non-qualified land. Therefore land cost of \$30,991 per acre used here for schools and parks is likely to be lower than actual. For example, the Leander ISD northwest of Austin paid \$198,000 per acre for 126 acres of land purchased for two schools in 2006.
- Data collected by the Council of Educational Facility Planners International (CEFPI) for Texas high schools did not include the costs of equipping and furnishing the schools and therefore do not reflect the full facility costs.

### **Roads**

- The cost for planning studies and corridor studies was not included in the CAMPO figures for road costs. No toll roads are included in road costs.
- Road cost impacts based on the CAMPO 2030 Plan are likely to be low for several reasons. First, CAMPO’s road costs are based on a fairly low planning estimate of \$1,000,000 per lane mile for road construction. Other sources indicate

this cost may be two to four times higher. Second, no value is included for the existing roadway system capacity (excess capacity) that will be consumed by new development. And third, the roads included in the CAMPO Project List are not adequate to maintain the current levels of service.

- Road costs included in this study are City of Austin costs only. Most local road costs are funded by state and federal government.

#### Water System

- Water treatment plant costs for WTP #4 were reduced by 10% to reflect investments related to future capacity increases.

#### Water and Sewer System

- System growth costs reported in the *Capital Improvement Program* for future water and sewer system expansion indicate that the full cost of these systems may be significantly higher than reported here.

#### Stormwater System

- Stormwater system costs are based on an assumption in the *SH 130 Infrastructure District Report* that only 32% of the land area would be used for residential purposes. If the proposed district ends up having a development pattern similar to the existing pattern in Austin, 70% of the land would be residential and the cost calculated in this study would likely increase.
- The *SH 130 Infrastructure District Report* assumes that a larger percentage of new residential units in the District will be multifamily than has been the case in the City's recent development. Multifamily units are smaller and will require fewer services. Since multifamily units have less impervious surface and require less stormwater management per unit, the costs reported will be lower than for typical development in Austin.

#### Parks

- Certain types of durable park facilities were not included in the City's facility listing, presumably because they do not require insurance coverage. The costs for facilities such as ball fields, tennis courts, parking areas, golf courses, paths and landscaping were not included, so the full cost of park development would be somewhat higher than reported here.
- Land costs were the principal expense association with expanding the park system. The land cost used in this study for parks is the same as for schools and



is likely to be lower than actual costs for the same reasons as described previously.

#### General

- Financing costs are not included in the costs presented in this report in order to give a clear picture of the immediate, direct capital costs associated with new development. Since most capital facilities are bond financed, financing costs will be incurred, including interest, bonding fees and insurance.

