Cost of Infrastructure to Serve New Residential Development in Austin, Texas – 2014

FINAL DRAFT
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For Brian Rodgers

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Introduction

This study examines the cost of expanding public infrastructure to serve new residential development in Austin. Three categories of infrastructure are included in the study: school facilities, roads, and energy facilities. These were selected because they tend to be the highest-cost facilities provided by local government (see Table I-1). The purpose of this study is to gain a better understanding of growth-related costs in Austin and how they are funded. The focus is on local costs paid by the City of Austin and Austin Energy. Except as noted, state and federal funding of local infrastructure are not included in the costs evaluated here.

Table I-1

Infrastructure Required by New Residential Development

	Infrastructure Category	Relative Cost	Included in Study?	Local Impact Fee?
1	Schools (K-12)	$$$$	**Yes**	No
2	Roads and Highways	$$$$	**Yes**	No
3	Public Electric Utility	$$$$	**Yes**	No
4	Water Supply	$$$	No	**Yes**
5	Sewerage	$$$	No	**Yes**
6	Parks & Recreation	$$-$$$	No	**Yes**[1]
7	Police Protection	$	No	No
8	Fire Protection	$	No	No
9	Natural Resources	$	No	No
10	Libraries	$	No	No
11	Solid Waste Disposal	$	No	No
12	Corrections & Jails	$	No	No
13	General Gov. & Admin.	$$	No	No
14	Public Transit	$$	No	No

Source: Fodor & Associates

1 Parks dedication fee functions like an impact fee.

The unit of housing examined in this study is the average housing unit, which represents the average of a mix of single-family, duplex, and multifamily housing. It has an average occupancy of 2.49 people. The construction of new housing in Austin creates additional housing capacity, which generate more demand for public services and facilities. The demand for public facilities, and the cost of

providing them, was estimated from available data by the methods described in this report.

This study updates and expands parts of an earlier study, ***Cost of Infrastructure to Serve New Residential Development in Austin, Texas***, which was issued May 2010 and updated January 2011. The earlier study examined capital costs for expanding schools, roadways, the water system, the wastewater system, the stormwater system, and parks and recreation facilities.

School Facility Costs

The Austin Independent School District (AISD) serves most of Austin and has a total student enrollment of 85,355 for the 2013-14 school year. The boundary of the AISD is not quite the same as the City limits. It included a District population of 684,346 people in 2013, whereas the City included a population of 842,750.

Each new housing unit built in Austin contributes towards an aggregate demand for new school capacity. The cost of adding this capacity can be estimated by determining the average number of school-age children per housing unit and then calculating the cost to add the increment of school facility capacity needed.

To obtain actual school facility costs for Austin, a Public Information Request was filed with AISD for schools constructed since 2006. Data for seven of the nine new schools was provided by the District and the data is reported in the Appendix. These data were used to compile facility costs for each school level. Building and site construction costs were adjusted to 2014 values based on the ENR Construction Cost Index.[1] Land costs were estimated based on the typical land area required for each school and the estimated land cost per acre for current acquisition. Costs were calculated on a per-student basis according to the reported student capacity of each school. The results are summarized in Table 1-1, below.

[1] The Engineering News Record (ENR) Construction Cost Index for the nearest available city (Dallas) was used to adjust construction cost from the year of start to May 2014.

Table 1-1

Austin School Facility Costs per Student Capacity
(Adjusted to 2014 dollars)

	Building Construction[1]	Land[2]	Total
Elementary School	$24,470	$9,525	$33,994
Middle School[3]	$25,495	$11,429	$36,924
High School[4]	$47,500	$13,333	$60,833

Notes
1 – Building construction includes site work and parking.
2 – Land cost was calculated by multiplying average acres of land area per student times the current land cost estimate for the planned south high school of $400,000 per acre.
2- Construction costs for the single middle school available (Gorzycki Middle School) in Austin were low relative to nationally-reported school construction costs and fell below the costs reported for the lowest quartile nationally. Per-student land area for this middle school was lower than for the elementary schools in Austin, so it was adjusted to be half way between elementary and high schools to reflect the greater land requirement per middle school student.
3- Austin has no recent high school construction costs, so building costs are the median value taken from *19th Annual School Construction Report*, Table 5, page 22, February 2014, by School Planning & Management. These figure are for schools completed in 2013, which would have been started in 2012. Land costs are an AISD estimate for a planned new Austin high school.

Based on AISD data, students enrolled in public schools are about 12.5% of the District's total population. The 2010 US Census shows 14.9% of the Austin population was school aged (5-17 years old). The more-recent 2012 American Community Survey (ACS) for Austin reports 14.7% of the local population being school aged. Comparing the percent of the population that is school-aged reported in the ACS with the percent enrolled in AISD, shows that about 15.4% of school-age children in Austin are either attending private schools or are otherwise not attending public schools. Therefore, for the purposes of this analysis, it is assumed that 84.6% of school-age children will attend public schools.

Based on the average household size in Austin in 2012 of 2.49 people, there will be about 0.311 public school students per household (12.5% of population).[2] This is the average *student generation rate* assumed for new housing units in Austin. The student generation rate is used to calculate the additional school facility costs required per new housing unit of $13,332, as shown in Table 1-2.

[2] Average household size is taken from the 2012 American Community Survey for Austin by the U.S. Census. Similar figures are reported by the AISD and in the 2010 U.S. Census for Austin.

Table 1-2

School Costs Per New Housing Unit in Austin, 2014

School Level	Total School Facility Cost per Student Capacity	Student Generation per New Housing Unit	School Facility Cost per New Housing Unit
Elementary School	$33,994	0.143	$4,873
Middle School	$36,924	0.072	$2,646
High School	$60,833	0.096	$5,813
All Levels		0.311	**$13,332**

School Facility Funding

New school facilities in Austin are funded by general obligation bonds which are repaid via property taxes levied on all property owners in the school district. Voters approved AISD bonds in 2004 and 2008 for a total of $863 million, as shown in Table 1-3, below. Capacity-increasing expenditures in both bond programs included new schools, new classrooms, land acquisition, and a new performance center. These represented 43% of the total bond amount, with the remainder used for renovations, meeting new standards, and technology and safety upgrades.

Table 1-3

School Bonds Issued in Austin

Millions of Dollars in Year Issued

Bond Program (approved)	Bond Amount	Capacity Increasing Portion[1]	Percent Capacity-Increasing
2004 Bond Program (Sept. 2004)	$519.50	$228.20	44%
2008 Bond Program (May 2008)	$343.70	$146.90	43%
Total:	**$863.20**	**$375.10**	**43%**

1 Based on available project descriptions in AISD bond program materials.

Assuming these bonds will be expended by the end of 2014, they reflect expenditures over a 10-year period from 2004 to 2014 averaging $37.5 million per year for expanding school facilities.

Because the bonds funding new school capacity will be repaid by all property owners, the new development will pay for a small fraction of the costs, which are approximately equal to its share of the total tax base. For development in 2014, this is estimated to be equal to the population growth rate of 2.7% projected for this year.[3] Therefore, a typical new housing unit would eventually repay about $360 of its $13,332 in school facility costs, for a net cost of $12,972.

[3] Source: Austin Area Population Histories and Forecasts, City Demographer, Department of Planning, City of Austin, January 2014

Road System Costs

This section examines the roadway expansion costs incurred by the City of Austin to accommodate new residential development. The focus is on local roadways that are funded by the City, rather than by other government entities (i.e., state and federal governments). Transit, pedestrian and bicycle improvements are not included in the cost analysis, 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. The construction of local neighborhood roads, which are not arterials or collectors, is assumed to be funded by developers and is also not included in the costs reported here. Various methods can be used to estimate the road infrastructure required by new development. Multiple methods were used here to better gage actual costs, including: long-range planning method, level-of-service method, and actual expenditure averaging.

Long-Range Planning Method

Future road system costs can be evaluated based on a long-range facilities 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 and estimate future costs. The longer timeframe the plan covers, the more difficult it is to identify all the potential projects that will be needed. This can result in understated costs for more distant projection years.

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

The ***CAMPO 2035 Regional Transportation Plan*** (2035 Plan), adopted by the Transportation Policy Board May 24, 2010, is a planning guide that contains transportation projects for the next 25 years (2010 to 2035). The 2035 Plan includes roadways, transit, bicycle, and pedestrian facilities, as well as congestion management strategies. This long-range metropolitan transportation plan is revised every five years.

The 2035 Plan is a financially-constrained plan in which planned expenditures cannot exceed anticipated revenues. According to the Plan, "*…the projects and programs fall considerably short of addressing the full extent of transportation need that has been identified through the planning process.*"[4] In other words, the projects proposed under the 2035 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 2-1, roadway travel (VMT) is projected to increase by 79%, while miles of roadway will increase by only 22%, resulting in an increase in congested lane-miles of 226 percent.[5] Congested roadways will increase by 2,166 lane-miles. Severely congested roads will increase by 930 lane-miles.

Table 2-1

Transportation System Performance Measures
(from CAMPO 2035 Plan, Appendix, page 61)

Performance Parameter	2010	2035	Percent Change
Population	1,725,260	3,250,531	88.4%
Vehicle Miles Traveled (VMT)	41,751,704	74,788,031	79.1%
VMT/Person	24.20	23.01	-4.9%
Lane-Miles of Roadway	11,545	14,069	21.9%
Person Trips	6,607,655	11,811,016	78.7%
Congested Lane-Miles	959	3,125	225.9%
Severely Congested Lane-Miles	188	1,118	494.7%
Percent Congested Roadways	8.31%	22.21%	167.3%
Percent Severely Congested	1.63%	7.95%	387.7%

Notes:
VMT = vehicle miles traveled (per day)
Congested Roadway are those having a volume/capacity ratio greater than 1.0.
Severely congested roadways have a V/C ratio greater than 1.3.

Even if fully implemented, the CAMPO 2035 Transportation Plan will result in dramatically increased congestion in the Austin area. According to the Texas A&M Transportation Institute's 2013 report, ***Mobility Investment Priorities Project Long-Term Central Texas IH 35 Improvement Scenarios***[6] the average commute time in 2011 of 32 minutes to drive the 15 miles between Round Rock

[4] ***CAMPO 2035 Regional Transportation Plan***, page 113.
[5] A "lane-mile" is a single lane of roadway one mile in length.
[6] ***Mobility Investment Priorities Project: Long-Term Central Texas IH 35 Improvement Scenarios***, August 2013, by Texas A&M Transportation Institute, Exhibits 38 and 39, page 58.

and Downtown Austin will increase to 1 hour and 39 minutes in the morning (southbound) and 3 hours and 13 minutes in the evening (northbound) via IH 35 in 2035. Alternative routes will take even longer.

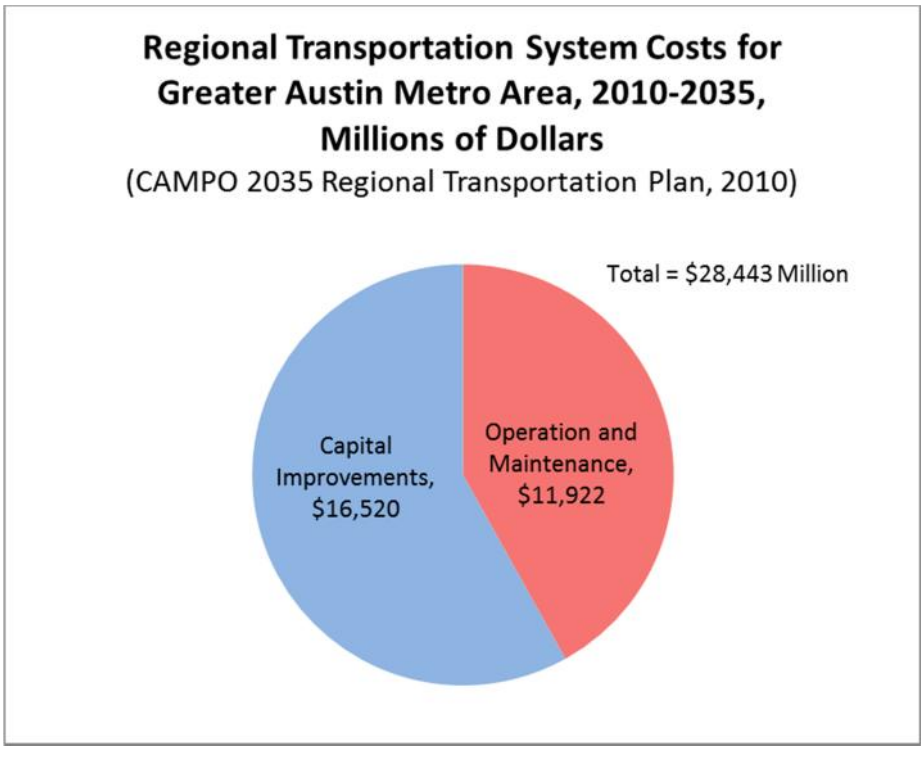
According to the report:

> "Basically, traffic "swamps" the IH 35 corridor and the Austin region in 2035. In addition, peak-period congestion is so bad that it extends into off-peak periods, for example as late as 10 pm."[7]

The implication of declining system performance is that there are other significant growth costs related to increased congestion, delays, and loss of mobility that are not included in the planned expenditures for transportation improvements, and therefore are not reported here.

As shown in Figure 5-1, capital improvements exceed operation and maintenance expenses for the five-county CAMPO planning area, representing 58% of total costs.

Figure 2-1



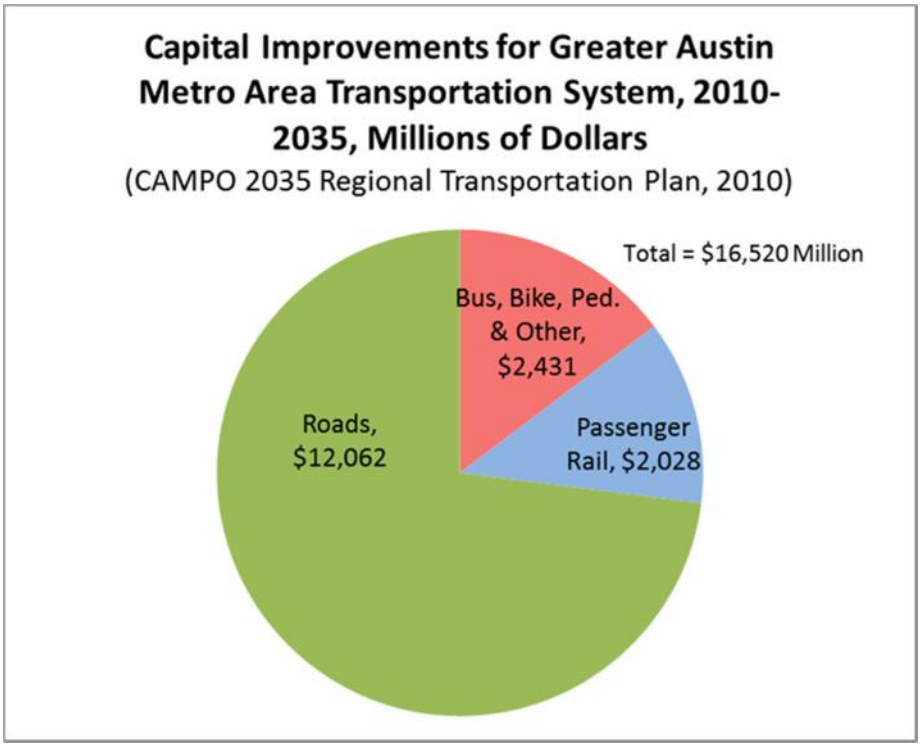
[7] Ibid, page 59.

Unlike the previous CAMPO Plan (Mobility 2030 Plan), the 2035 Plan does not break out local costs for the City of Austin, making it impossible to do a local analysis from the reported data. Since growth-related transportation system costs cannot be obtain for Austin, a regional review of these cost is developed as an indication of what the local costs are likely to be.

Regional Roadway System Cost Analysis

For the five-county Austin Metro Area, Figure 5-2 shows that roadway improvements comprise $12 billion, or 73% of all transportation infrastructure spending. These figures show that spending for new road construction tends to dominate local transportation system costs over transit, pedestrian and bike facilities.

Figure 2-2



In order to perform a regional analysis of transportation costs associated with new housing, it is necessary to make several assumptions. First, it is assumed that 72% of travel demand is generated by residential land uses, with the remaining

demand coming from commercial, industrial and institutional land uses. This share of demand is derived from local and comparative data, as described in the Appendix to this report.

Second, it is assumed that the typical new roadway cost is reflected in a 50-50 mix of urban arterials and suburban arterial roads. This results in an average roadway cost of $4.9 million per lane-mile in 2014 dollars, as shown in Table 2-2 below.

Table 2-2

Roadway Costs per Lane-Mile		
Roadway Types	**2010 Cost per Lane-Mile[1]**	**2014 Cost per Lane-Mile[2]**
Urban Arterial	$5,600,000	$6,551,208
Suburban Arterial	$2,800,000	$3,275,604
Mix of 50-50 Urban-Suburban Arterials	$4,200,000	**$4,913,406**

Notes:
1- 2010 costs from CAMPO 2035 Plan, Appendix, page 32.
2- 2014 costs are based on inflating 2010 costs using the CAMPO 2035 Plan inflation rate of 4% per year.

Based on the mix of roadways shown in Table 2-2 and the **2035 Plan** projection of adding 2,524 lane-miles of roadway to the region, total roadway costs for the 25-year planning period would be approximately $12.4 billion. Using the estimate that 72% of this cost is to serve residential demand, the per-capita cost to serve the 1,525,271 additional residents of the region is $5,854. With an average household size of 2.49 people, the estimated cost per new household is $14,577, as shown in Table 2-3 below.

Table 2-3

Estimated Regional Roadway Cost per New Household

Metric	Value
New Lane-Miles of Roadway Added 2010-2035[1]	2,524
Average 2014 Cost of Roadway (per lane-mile)[2]	$4,913,406
Cost for All New Roadways, 2014$	$12,401,436,623
Share of Cost to Residential Land Uses	72%
Population Increase Over Planning Period	1,525,271
Lane-Miles Added per New Person	0.001655
Roadway Cost per New Person	$5,854
Average Household Size (persons)[3]	2.49
Roadway Cost per New Household	**$14,577**

Notes:
1- Source CAMPO 2035 Plan.
2- Calculated in Table 2-2.
3- Average Austin household size in 2012 based on American Community Survey.

The roadway cost estimate of $14,577 per household includes all funding sources: federal, state, and local. The CAMPO 2035 Plan does not provide a breakout of capital improvement costs borne by local governments, so it is not possible to estimate their share of roadway costs. The previous plan (CAMPO Mobility 2030 Plan) showed local governments paid 22% of these costs, which would amount to $3,207 in local costs per new household. The remaining 78% of costs would be paid by state and federal sources.

This road cost estimate based on the CAMPO 2035 Plan is likely to be low for several reasons. First, no value is included for the existing roadway system capacity (excess capacity) that will be consumed by new development. And second, the roads included in the CAMPO Project List are not adequate to maintain the current levels of service (as shown previously in Table 2-1). 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. Maintaining existing service levels for roadways has become untenable for many major urban areas due to the high cost. Maintaining the existing level of service for the Austin Metro Region would require building about *four times* as many roads as currently planned.[8]

[8] This is based on maintaining the existing roadway lane-miles per capita as reported in CAMPO 2035 Plan.

Level-of-Service Analysis 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 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.[9] This is based on a standard grade scale ranking transportation facilities from A to E, with A being free-flowing traffic, and E being extremely congested roadways that are at or near capacity.

The average daily vehicle trips (ADT) that can be accommodated on a roadway depends on the number of lanes, roadway width, posted speed, and other factors. The City does not provide any specific ADT guidelines for local roadways to achieve LOS D, however it does set ADT ranges for various street designs.[10] Collector and arterial streets range from a maximum ADT per lane of 1,500 for a residential collector street to 8,875 for a major arterial. For the purposes of this study it is assumed that 5,000 ADT per lane is the average maximum under LOS D.[11] This would mean that a 4-lane roadway could accommodate up to 20,000 ADT without exceeding the standard.

According to the CAMPO 2035 Plan, average daily vehicle miles traveled (VMT) per capita in the region was 24.2 in 2010.[12] Applying this same travel demand to new residents results in the need for 0.00484 new lane-miles of roadway per new capita in order to maintain LOS D (24.2/5,000).

Using a roadway cost estimate of $4,913,406 per lane-mile (2014 dollars), and assuming that 72% of future travel demand is generated by residential development (new housing), the cost per new household to maintain LOS D can be estimated at $42,634 (see Table 2-4). This high cost is the primary reason that

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[9] 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.

[10] Austin Transportation Criteria Manual, Section 1.3.2 Classification Design Criteria.

[11] 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).

[12] See *CAMPO 2035 Plan*, Appendix, page 61.

local governments are unable to maintain the level of service of the road system. This LOS-based cost estimate does not distinguish which government entity is funding the improvements (city, county, or state).

Table 2-4

Roadway Cost Based on LOS Analysis Method
Austin, 2014 Dollars

Metric	Value
LOS D Standard, Daily Vehicle Trips per Lane (estimated)	5,000
Daily VMT per Capita (region)[1]	24.2
New Lane-Miles Required per New Capita	0.00484
2014 Cost per New Lane-Mile of Roadway[2]	$4,913,406
Roadway Cost per New Capita	$23,780.89
Percent of Travel Demand Associated with Residential Development[3]	72%
Average Persons per Household	2.49
Estimated Roadway Cost Per New Household[4]	**$42,634**

Notes:
1) The VMT/capita figure used here is likely to be somewhat less in Austin than for the Metro Region.
2) Costs base on 50-50 mix of urban and suburban arterials (See Table 2-2).
3) Residential land uses require an estimated 72% of city services and facilities (see Appendix for details)
4) The cost calculated here does not include the value of existing excess road capacity that will be consumed by new growth.

Actual Expenditure Averaging Method

A final method used to calculate Austin's roadway costs associated with residential growth is to examine actual, recent expenditures. There are several sources of expenditure information. One is the Transportation Bond Programs that have been approved over the recent past and which represent the primary funding mechanism for new and expanded roads. Another is to examine the transportation projects funded in the current ***Austin Capital Improvement Plan***. Both are examined here.

Transportation Bonds

Voter-approved transportation bonds are used to finance most of Austin's new and expanded roadways. These bonds are used only for capital projects. The

bonds are repaid through local property taxes. Bonds were approved for transportation projects in 2006, 2010, and 2012, as shown in Table 2-5. The total value of these bonds in 2014 dollars is $401,378,938. Assuming these bonds address roadway needs from 2006 to about 2016 (10 years), then the average transportation expenditure per year from bond funds is $40,137,894.

Table 2-5

Recent Austin Transportation Bonds

Bond Programs	Total Value in Year Issued	Value in 2014 Dollars (@4%/yr)[1]
2006 Bond Program Proposition 1: Transportation	$103,100,000	$141,099,469
2010 Mobility Bond Fund	$90,000,000	$105,287,270
2012 Bond Program Proposition 12: Transportation and Mobility	$143,299,000	$154,992,198
Total	**$336,399,000**	**$401,378,938**

Note:
1- The 4% annual cost inflation is rate used in CAMPO 2035 Plan.

The portion of bond expenditures devoted to new or expanded roadways could not be determined from available bond-funded project information. For the purpose of making a rough estimate, it is assumed that 60% of these capital costs are for capacity-increasing projects, with the remaining 40% being for other improvements that do not add capacity. As shown in Table 2-6, 72% of the capacity-increasing bond expenditure is assumed to be attributed to residential development, with the remainder attributed to non-residential development (commercial and industrial).

In order to use the most-recent housing construction data, an analysis was performed of building permit reports for the City of Austin from 2009 through 2013 (see Appendix). This was used to calculate the average annual number of new housing units added per year for this 5-year period. Dividing the estimated annual bond-funded roadway expansion costs attributed to residential development by the average number of housing units added per year results in an estimated cost of $3,136 per new housing unit.

Table 2-6

Bond-Funded Capacity-Increasing Roadway Expenditures

Metric	Value
Average Annual Bond Funds Expenditure (2014$)	$40,137,894
Capacity-Increasing Portion (assumed)	60%
Capacity-Increasing Annual Bond Expenditure	$24,082,736
Share to Residential Land Uses (see Appendix)	72%
Annual Roadway Cost attributed to new Residential Development	$17,339,570
Average number of housing units built per year, 2009-13[1]	5,530
Estimated Roadway Expansion Cost per New Housing Unit	**$3,136**

1) Based on building permit data reported in the Appendix

Capital Improvement Plan for Transportation

The City of Austin annually generates a 5-year ***Capital Improvements Program*** (CIP) plan. The latest Fiscal Year 2014 CIP was evaluated for transportation system capital spending. Sixty-two transportation projects are reported in the spending plan.[13] A very brief description is available for each of these projects in the CIP. To estimate the capacity-increasing portion of these projects a crude allocation was used, as shown in Table 2-7. All projects listed as "improvements" were assumed to be 75% capacity-related expenditures. Projects listed as "reconstructions" were assume to be 25% capacity-related. All other projects were not counted as capacity-related. This approach resulted in counting about 36% of capital expenditures as capacity-related.

[13] Source: Project List, Spending Plan, ***Austin CIP for 2013-2014 Fiscal Year***, Volume 2, pages 33-35.

Table 2-7

Percent of CIP Transportation Project Allocated to Capacity-Increasing Capital Expenditures

Project Description	Allocation, %
Improvements	75%
Reconstructions	25%
Sidewalks and Bike lanes	0%
Buildings and Vehicles	0%
Preservation, Standards, and Other	0%

Adding up all the capacity-related expenditures results in a total expenditure of $40,709,850 for FY 2014. For transportation spending it is always better to use multiple years, due to the variation that can occur from one year to the next. Transportation expenditures are also reported in the CIP for the two previous fiscal years, 2012 and 2013. Applying the same criteria to these years resulted in a combined 2-year expenditure of $102,537,090. As shown in Table 2-8, averaging these estimated capacity-related expenditures over the three fiscal years reported, results in an average annual expenditure of $47,748,980 (FY 2012-14).

Table 2-8

Austin CIP Annual Expenditures for Transportation

Transportation Spending Category	FY 2014	FY 2012 & 2013	3-Year Average
All Capital Expenditures for Trans.	$111,956,846	$284,237,894	$132,064,913
Capacity-Related Expenditure (estimated)	$40,709,850	$102,537,090	**$47,748,980**
Percent of Capital for Capacity	36.4%	36.1%	36.2%

As before, 72% of new road capacity is allocated to residential demand, resulting in an average annual cost to serve new housing of $34,379,266. Distributing this cost across the average annual number of new housing units added over the previous 5 years results in a cost per housing unit of $6,217, as shown in Table 2-9. Note that multi-year averages were used for new housing units and transportation spending because transportation spending is usually tied more closely to recent past development than the current year's development.

Table 2-9

CIP Project Analysis Method

(Based on Capacity-Increasing Roadway Project Expenditures)

Metric	Value
Annual Average Expenditure, 2012-2014	$47,748,980
Percent of Travel Demand to Residential Development	72%
Annual Expenditure Associated with Residential Development	$34,379,266
Average number of housing units built per year, 2009-13	5,530
Roadway Cost per New Housing Unit	**$6,217**

Summary of Road Cost Analysis Methods

The results from each method used in this report to evaluate the road costs associated new residential development is summarized in Table 2-10, below. Due to a lack of detailed data available from City and regional planning sources, each estimate required making various assumptions that limit the accuracy. However by considering all the methods reported here, it is reasonable to assume that the actual cost figure is bracketed in these values. Only the Level-of-Service (LOS) method estimates the full cost of maintaining the roadway system at a minimum standard (LOS D). All the other methods reflect a partial funding that represents what local governments and the City of Austin are likely to actually pay for roadway improvements. These other methods do not include the congestion-related costs that will result as the roadway system becomes overburdened and do not include the value of existing excess road capacity that will be consumed.

Table 2-10

Summary of Methods Used to Assess Road Costs Associated with New Housing in Austin, 2014

Method Used	Roadway Costs per New Housing Unit	Funding Entity
Long-Range Planning Estimate (CAMPO)	$14,577	All Governments
Local Portion of Long-Range Plng (estimate)[1]	$3,207	City of Austin
Level of Service (LOS) Method	$42,634	All Governments
Actual Expenditure Method: Road Bonds	$3,136	City of Austin
Actual Expenditure Method: CIP Spending	$6,217	City of Austin

1 This is a rough approximation based on 22% local share report in previous CAMPO 2030 Plan.

In terms of actual spending by the City of Austin, the last two methods provide the most reasonable estimates. Road bonds are the primary source of funding for new roads, however, since other funding sources are also used, the figure of $3,136 may be low. The CIP spending method reflects all revenues sources the City uses to pay for new roads, and therefore the figure of $6,217 reflects more of the actual costs. Both of these methods required making assumptions regarding the allocation of capital costs for road projects between capacity-increasing improvements and system maintenance.

Five-Year Cost Estimate

Assuming the City of Austin's roadway cost per new housing unit is between $3,136 and $6,217, it is possible to estimate the total cost to the City over the past five years based on the number of new housing units that have been built. From 2009 to 2013 a total of 27,651 new housing units have been added. As shown in Table 2-11, the total cost to provide expanded roadways for new housing in Austin over the past five years is between $87 million and $172 million.

Table 2-11

Five-Year Road Cost for New Housing

Cost Estimate	Cost per New Housing Unit	Number Housing Units Added 2009-13	Total 5-Year Cost
Low Cost Estimate[1]	$3,136	27,651	**$86,700,986**
High Cost Estimate[2]	$6,217	27,651	**$171,902,545**

1 Based on actual road bond spending.
2 Based on actual Capital Improvement Plan spending.

Road Funding in Austin

Austin funds its road projects primarily through voter-approved bonds that will be repaid through property tax revenues over the duration of the bond (20 to 30 years). 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.[14] These contributions typically consist of a land dedication for the road right-of-way and are limited to roads that are internal to the subdivision or immediately adjacent the subdivision. The land value is only a small fraction of the total roadway cost. 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 funded in this manner. For the purposes of this study it is assumed that developers may pay some portion of new road costs, but the amount is relatively small and there is no basis for estimating the contribution.

One possible new revenue source to pay for future road projects proposed in the 2035 Plan is to assess transportation impact fees to new development. A roads impact fee is authorized by state statutes, but Austin does not collect any road

[14] See *The Code Of The City Of Austin, Title 25, Land Development, § 25-6-55 Dedication of Right-of-Way*.

fee. A number of Texas cities currently collect a roads impact fee, including Fort Worth.

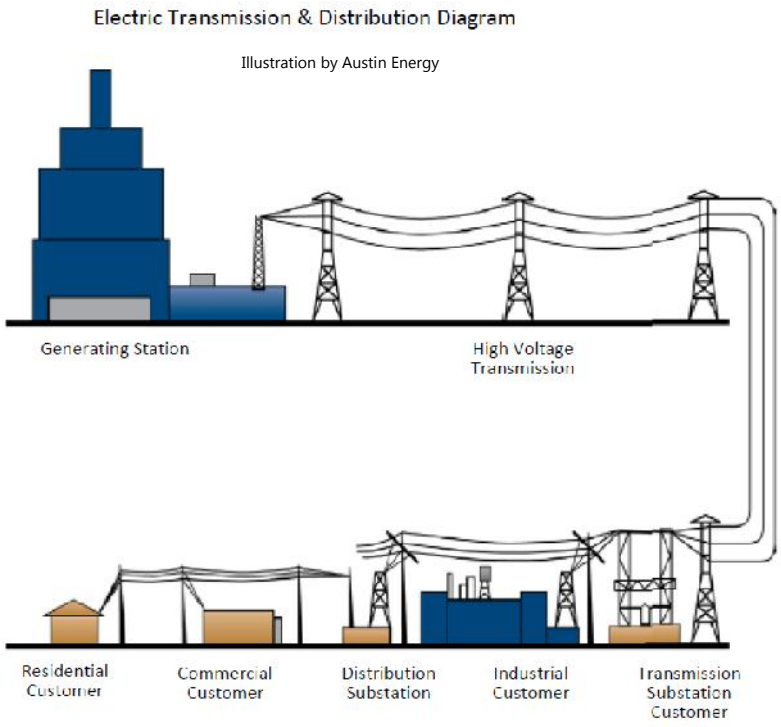
Without a road impact fee, 2014 development will pay for only about 2.7% of the road costs it generates (based on its approximate share of the total property tax base). Using the CIP road cost estimate, a new housing unit would eventually repay about $168 of the $6,217 in road expansion costs, with a net cost of $6,049.

Electric Facilities Costs

New housing requires additional electrical service, which involves power generation capacity, substations, transmission and distribution lines, and the onsite service connection and metering. Austin Energy (AE) is a public utility which is responsible for electric power production, transmission and distribution, and retail power metering and sales.

AE's service area includes all of Austin and an almost equally-sized area around Austin, but outside the city limits. The service area outside Austin includes a number of nearby cities and represents about 50,000 homes and 6,700 businesses, which constitute 14% of AE's customers. According to the latest data from AE (2012), the utility has five power plants, 619 miles of high-voltage transmission lines, 11,400 miles of medium and low voltage distribution lines, and 62 substations. The utility also purchases power from some alternative energy facilities (wind, solar, and biomass).

Figure 3-1



Power Generation Capacity Cost

AE will add various types of new generating capacity to meet the demands of growth. AE's current plans involve building additional generating capacity at the Sand Hill Energy Center. The utility is also planning new wind generation facilities. AE will add some capacity with its energy partners based on 5-year planning.

The lowest-cost type of generation is the gas combined-cycle power plant which uses natural gas to run a gas turbine and the exhaust heat to run a steam turbine. This is assumed to be the primary source of new power generation capacity. However, AE has a goal of having 35% of all generating capacity from renewable energies by 2020. Therefore it is assumed that at least 35% of new capacity will be from either solar or wind energy. Existing AE plans show 1001 MW of wind and 201 MW of solar by 2020, but recent PV price drops will likely increase the solar contribution.[15] For the purposes of this analysis, it is assumed that future generation capacity will be 65% gas combined-cycle, 20% wind, and 15% solar.

The capital cost estimates for each type of generating capacity were obtained from various sources and are shown in Table 3-1. The highlighted values from AE and the National Renewable Energy Laboratories (NREL) were selected for use in this analysis.

[15] *Austin Energy Resource, Generation, and Climate Protection Plan to 2020*, by Austin Energy, 2007, Figure 1.

Table 3-1

Comparison of Energy Facility Capital Costs

	Capital Cost in $/kW of Generating Capacity				
Type of Technology	**AE (2014 $/kW)[1]**	**EIA (2012$)[2]**	**NREL[3]**	**Lazard[4]**	**Open Energy Information Database[5]**
Nat. Gas Combined Cycle	**$1,066**	$1,023		$1,156	$1,090
Solar PV		$4,183	**$3,400**	$1,750	$5,050
Wind		$2,213	**$4,000**	$1,750	$1,980

1) From AE Levelized Cost Handout for the Austin Generation Resource Planning Task Force.
2) US Energy Information Agency, Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants, April 12, 2013.
3) National Renewable Energy Laboratory, Capital Costs for Distributed Generation Energy Technology
4) Lazard is a financial advisory firm that performs an annual "Levelized Cost of Energy Analysis."
5) Median value for range of projects reported in Open Energy Information database.

Using the assumed mix of new generating technologies described previously, the capital costs for each technology can be combined to produce an *effective cost* per new kilowatt of generating capacity added to the Austin Energy system of $2,003 per kW as shown in Table 3-2.

Table 3-2

New Generation Facilities Capital Cost Estimate for Austin

Type of Technology	**Assumed Mix for New Capacity[1]**	**Capital Cost, $/kW of Capacity**	**Cost Share per New kW**
Natural Gas Combined Cycle	65%	$1,066	$693
Solar PV	15%	$3,400	$510
Wind	20%	$4,000	$800
Effective Cost per New kW	100%		**$2,003**

1 Based on AE goal of having 35% of all generating capacity from renewable energies. Existing AE plans show 1001 MW of wind and 201 MW of solar by 2020, but recent PV price drops will likely increase solar contribution.

AE's customers are divided into the following classes: residential, commercial, industrial, and other. There are 376,614 residential customers, which are counted as single-family dwellings, mobile homes, townhouses, or individually metered apartment units. Residential customers consume 34.5% of AE's power, as shown in Table 3-4 below.

Table 3-4

AE Customers and Energy Use by Sector, 2012

Sector	Number of Customers	Percent of Customers	Energy Used 2012, MWh	Percent of Load
Residential	376,614	**89%**	4,381,194	**34.5%**
Commercial	44,006	10%	4,633,557	36.4%
Industrial	82	0%	2,648,487	20.8%
Other (includes gov.)	1,668	0.4%	1,052,909	8.3%
Total	422,370	100%	12,716,146	100%

Source: AE Corporate Reports and Data Library

The necessary generating capacity maintained by an energy utility like AE is determined by the peak demand that the utility must serve. This peak is usually during the summer and is primarily the result of air conditioning demand in residential and commercial buildings. Therefore, the next step in calculating the energy facility cost per new housing unit is to determine the contribution each housing unit makes toward the utility's peak demand. Table 3-5 shows that the residential sector is responsible for 1064 MW of demand, or 41% of the total demand on the utility.

Table 3-5

Peak Power Demand by Sector for Austin Energy

Sector	Peak Demand, MW	Percent of Total Demand
Residential	**1,064**	**41%**
Commercial	997	38%
Industrial	342	13%
Other	209	8%
Total	2,613	100%

Source: Austin Energy *DSM Market Potential Assessment*, Final Report, by DNV KEMA Energy & Sustainability, Oakland, California, June 25, 2012, page 4-42. Data is for 2011.

The residential peak power demand of 1,064 MW is divided among 364,567 customers (meters), as shown in Table 3-6. This results in an average peak demand of 2.92 kiloWatts per housing unit.[16] Based on the capital cost of generating capacity of $2,003 per kW (determined previously), the average cost for generating capacity per housing unit is $5,846, as shown in Table 3-7.

Table 3-6

Residential Power Demand by Building Type

Residential Type	Number of Accounts[1]	Peak Demand, MW[1]	Demand per Account, kW
Single Family	210,250	795	3.78
Multifamily	141,946	231	1.63
Low Income	12,371	38	3.07
All Housing	**364,567**	**1064**	**2.92**

1 - Source: Austin Energy *DSM Market Potential Assessment*, Final Report, by DNV KEMA Energy & Sustainability, Oakland, California, June 25, 2012, pages 4-9 and 4-12.

Table 3-7

Generation Capital Cost Per Housing Unit

Building Type	Demand per Account, kW	Generation Capital Cost per kW[1]	Generation Capital Cost Per Housing Unit
Single Family	3.78	$2,003	$7,574
Multifamily	1.63	$2,003	$3,260
Low Income	3.07	$2,003	$6,153
Average Housing Unit	**2.92**	$2,003	**$5,846**

1 From Table 3-2.

Investments in new power generation capacity are usually large expenditures that are made sporadically every 5 or 10 years. However, it is reasonable to assume

[16] Residential accounts are based on meters, which are assumed to be equivalent to housing units. The is fairly reasonable since most multifamily buildings have individually-metered apartments, however some error may result from this assumption.

that demand for new capacity builds up incrementally with each new housing unit added. That is the approach used here. Alternatively, it can be assumed that new development is consuming excess generating capacity that has already been built. However, this approach requires taking into consideration both the capital cost at the time the generation facility was built, and the financing costs that have accrued since construction.

Transmission and Distribution System Costs

In addition to generating capacity, the utility must increase the electric transmission and distribution (T&D) capacity to serve the needs of new development. Over the long run, this includes high-voltage transmission lines, medium voltage distribution lines, substations, overhead and underground service lines, and other equipment, as shown in Table 3-8. However, over the past 5 years, AE has not added any new transmission lines. The percent change in equipment over the past five years can be compared roughly with the 9.1% increase in the number of AE's residential customers over the same period.

Table 3-8

Austin Electric Transmission & Distribution System Equipment

Distribution System Equipment	FY 2007	FY 2012	5-year Change	% Change, 5 years
Transmission Lines (miles)	619	619	0	0.0%
Transmission Substations	11	12	1	9.1%
Distribution Substations	56	60	4	7.1%
Overhead Primary (miles)	2,363	2,376	13	0.6%
Overhead Secondary (miles)	3,164	3,027	-137	-4.3%
Underground Primary (miles)	2,621	2,964	343	13.1%
Underground Secondary (miles)	2,808	3,031	223	7.9%
Poles	142,939	149,910	6,971	4.9%
Overhead Transformer	42,268	43,094	826	2.0%
Underground Transformer	32,052	34,995	2,943	9.2%
Switch Gear	315	347	32	10.2%
Risers	12,810	14,610	1,800	14.1%
Man Holes	2,070	2,599	529	25.6%
Pull Boxes	30,833	34,901	4,068	13.2%
Service Boxes	46,081	52,789	6,708	14.6%

Source: AE Corporate Reports and Data Library, http://austinenergy.com/wps/portal/ae/about/reports-and-data-library/data-library/.

While no unit costs were available for the distribution system equipment listed in Table 3-8, AE reports that new distribution system expenditures are typically about $55 million per year.[17] This cost figure was used as the best available source. For the purposes of this analysis, distribution system costs are allocated to each customer sector based on power demand in the same way as generation facilities. Residential customer generate 41% of demand and this results in $22.5 million in T&D costs allocated to new residential development. The annual cost for residential development was divided by 6,405, the average number of new residential customers added per year over the last five years reported (2007-12). As shown in Table 3-9, this results in a cost for expanding the T&D system of $3,521 per new housing unit.

[17] Source: Page 7 of *Line Extension Practices, Costs, and Policy*, slide presentation by Larry Weis, Austin Energy General Manager, Austin City Council Committee, August 13, 2013.

Table 3-9

Transmission & Distribution System Costs per New Housing Unit

Metric	Value
Annual Cost for New T&D Facilities[1]	$55,000,000
Share of Cost to Residential Sector[2]	41%
Residential T&D Costs	$22,550,000
Average # of New Residential Customers per Year (2007-12)[3]	6,405
T&D Cost per New Housing Unit	**$3,521**

1 AE Estimate from presentation by Larry Weis, Austin Energy General Manager, *Line Extension Practices, Costs, and Policy*, Austin City Council Committee, August 13, 2013.
2 Based on share of peak demand by sector from Table 3-5.
3 New residential customers (meters) reported by AE. Meters are assumed to correspond with housing units.

AE is proposing to collect more of the local cost of connecting new residential development to AE's system. The utility currently pays for a little less than half of the cost of making the local service connection. In the case of a typical new single-family residential subdivision, AE will pay about $1,976 per housing unit and the developer will pay about $2,255. In the case of a typical New apartment building, AE will pay $508 per new housing unit, while the developer will pay about $659. AE is proposing to have new development pay up to 75% of the cost the utility is currently paying, including the line extension and transformer costs. These cost would be increased gradually over 5 years, starting with just 15% of the costs in 2015.

If the proposed increases in connection charges are fully implemented, it may eventually result in a reduction of about $1,000 in the $3,521 distribution system cost per new house calculated above.

Total Electric Facility Cost

The total cost for electric facilities associated with an average new housing unit in Austin is the power generation facility cost ($5,846) combined with the distribution system cost ($3,521), or $9,367, as shown in Table 3-10.

Table 3-10

Total Electric Facilities Cost per New Housing Unit

Cost Component	Cost per New Housing Unit
Power Generation Facilities	$5,846
Transmission & Distribution System	$3,521
Total	**$9,367**

Financing Energy Facilities

All energy facilities are financed via revenues from customers for the electric service provided by AE. This is referred to as the utility's *rate base*. The rate base is used to pay for both immediate expenditures and for interest on money borrowed via long-term bonds or short-term commercial paper. All short-term commercial paper debt is eventually converted into bonds. Bonds are repaid from the rate base over a period of 30 years, so projects funded with bonds, must have a useful life exceeding 30 years. This is usually the case with large power plants, solar energy facilities, and transmission and distribution facilities.

Credit for Future Payments

The utility rate base is similar in many ways to the property tax base that funds city government. It is a broad-based source of revenue which is derived from all residences and businesses in Austin. All customers pay the same rates regardless of whether they are new or existing customers. However, new residential development creates an additional electrical infrastructure cost of $9,367 per new housing unit, as reported here. This cost will be repaid by all customers via the ratebase, and the new development will pay only a fraction of the cost reflecting its share of the total rate base. The share paid by new development in 2014 is estimated based on the amount of growth projected for 2014, as shown in Table 3-11. Through future bill payments, a new housing unit will pay about $253 of the $9,367 electric facility costs it generates.

Table 3-11

Credit for Future Payments Towards New Facility Costs

Metric	Value
Electric Facility Costs per New Housing Unit	$9,367
Annual Population Growth Rate for 2014[1]	2.7%
New Development Percent of Residential Ratebase	2.7%
Amount of New Capital Cost Paid by New Housing	**$253**

1 Source: Austin Area Population Histories and Forecasts, City Demographer, Department of Planning, City of Austin, January 2014

What About Existing Debt?

AE carries a significant amount of existing debt, as shown in Table 3-12. New customers will join existing customers in repaying this debt. Should new residential development be credited for its future contributions towards retiring this existing debt?

Table 3-12

Austin Energy Outstanding Debt

Type of Debt	FY 2012
Revenue Bonds (millions)	$1,185,690,000
Commercial Paper (millions)	$225,260,000
Total Debt	**$1,410,950,000**

Source: Debt Service Coverage from Finance, Corporate Reports & Data Library, http://austinenergy.com/wps/portal/ae/about/reports-and-data-library/data-library/. 2012 is latest year reported.

The relative contribution by residential customers toward debt repayment is estimated to be approximately the same as their 39% share of the total ratebase, as shown in Table 3-13. It is assumed that residential customers will repay 39% of the $1.4 billion in debt, or $550 million. Based on the total number of residential customers, this amounts to $1,461 in existing debt per residential customer on average (see Table 3-14). A residential "customer" is a residential meter, which is assumed to be equivalent to a housing unit.

Table 3-13

Fiscal Year 2012 Revenue by Customer Class

Customer Class	FY 2012	FY 2012 % of revenue
Residential	**$422,195,183**	**39%**
Commercial	$409,330,445	37%
Industrial	$158,727,132	15%
Other	$91,356,677	8%
Total	$1,081,609,438	100%

Source: AE FY 2012 Annual Report, page 26.

Table 3-14

Existing AE Debt per Residential Customer

Metric	Value
Total Existing Debt (2012)	$1,410,950,000
Percent of Total Revenue from Residential	39%
Debt Repaid by Residential (from revenues)[1]	$550,270,500
Number Residential Customers (2012)	376,614
Debt Repaid Per Residential Customer[2]	**$1,461**

1 Assumes debt repayment is proportional to revenues generated.
2 A customer is a residential meter, which is assumed to be equivalent to a housing unit.

Because all residential customers will repay this debt through their electric bills, there is an equity issue regarding whether new customers should be credited this amount against the new costs they generate of $9,367. The issue is due to the fact that long-established customers – who had no role in generating these debts – are still required to pay for them. Therefore, it would not be equitable to credit new customers for their repayment of existing debt, when long-time customers receive no credit for their repayment. Furthermore, lacking an impact fee for the electrical system, long-time customers will not only be charged for existing debt, they will be charged for future debt as well.

The question of whether there should be a credit for repayment of pre-existing debt is largely "academic" in the context of this analysis, since no fee is going to be collected from new development to offset its costs. If an impact fee were to be collected for electric facilities, then some equitable allowance for existing debt

repayment might be considered.

For the purposes of estimating the net cost for electric facilities to serve a new housing unit, repayment of pre-existing debt is not treated as a credit. New development is credited for the portion of the cost it generates which it will repay through future utility bills ($253). The net cost for electric facilities per new housing unit is therefore $9,114, as shown in Table 3-15.

Table 3-15

Net Electric Facility Cost per New Housing Unit

Metric	Value
Total Electric Facilities Cost per New Housing Unit	$9,367
Credit for Future Payments Towards Cost	-$253
Net Cost Per New Housing Unit	**$9,114**

Summary of Results

The costs for expanding roads, schools, and energy facilities to serve new residential development in Austin are summarized in Table 4-1 below. For each category of infrastructure, a credit is applied which represents the approximate future contribution that all development constructed in 2014 will make towards repaying bonds used to finance the necessary infrastructure. This is based on the relative share of the tax base or rate base that the development represents. The "net cost" is the balance of the costs, which will be paid by existing property owners and electric utility customers through property taxes and utility rates. For the three categories of infrastructure evaluated here, the total net cost per new housing unit is $28,135.

Table 4-1

Summary of Net Infrastructure Costs in Austin

Infrastructure Category	Capital Cost per New Housing Unit	Credit for Future Bond Repayment[1]	Net Cost per New Housing Unit
School Facilities	$13,332	$360	$12,972
Roads[2]	$6,217	$168	$6,049
Energy Facilities	$9,367	$253	$9,114
Totals	$28,915	$781	**$28,135**

1 Based on 2014 development representing 2.7% of tax base and rate base which will repay bonds.
2 Road cost estimate based on Capital Improvement Plan spending.

Appendices

New Housing Units in Austin

This appendix reports on new housing units in Austin obtained from city building permit data. These new housing units were used to compile a complete inventory of all housing units as of 2014, which was not otherwise available. Table A-1 below shows the total new housing units of all types added to the city from 2009 to 2013.

Table A-1

New Housing Units in Austin

Permit Data by Fiscal Year[1]	2009	2010	2011	2012	2013
Single Family Units	1,827	1,666	1,574	2,126	2,544
Duplex Units	240	64	102	255	252
Multi-family Units	1,981	732	1,857	5,265	7,166
Total New Housing Units Added	**4,048**	**2,462**	**3,533**	**7,646**	**9,962**

1) Source: Fodor & Associates from City of Austin building permit data by fiscal year from: http://austintexas.gov/department/monthly-development-process-tracking.

The average number of new housing units added per year for 2009 through 2013 is 5,530 units. This average was used to evaluate annual transportation expenditures for several cost estimating methods. A total of 27,651 housing units were added over this 5-year period.

Data from the 2010 U.S. Census was used as a starting point for calculating the current number of housing units in Austin in 2014. The 2010 Census data is summarized in Table A-2 below.

Table A-2

Austin Housing Units, 2010

Year	2010
Total Population	790,390
Total Housing Units	**354,241**
Occupied Units	324,892
Vacancy Rate	8.29%
Population in Households	770,129
Persons per Occupied Unit	2.37
Person per Unit (all)	2.23

Source: 2010 U.S. Census for Austin

New housing units built in Austin from 2010 to 2013 were added to the 2010 Census estimate to obtain an estimate for the total number of housing units in Austin in 2014 of 377,844 units (Table A-3).

Table A-3

Total Austin Housing Units

Year	2010	2011	2012	2013	2014
Total Population	790,390	812,025	824,205	842,750	865,504
Total Housing Units	354,241	356,703	360,236	367,882	**377,844**

Source: Fodor and Associates. Obtained by added City permit data for all housing units from the previous year (Table A-1) to obtain the next year's housing unit total.

Residential Share of Services

Most public services, like transportation, police, and fire services, are rendered to all people and businesses in the city. The cost of these services can be allocated to residential, commercial, and industrial land uses based on the distribution of people and buildings. Various methods were employed to determine what share of public services and facilities should be allocated to residential uses (houses and apartments) in Austin.

Services like fire protection can be reasonably allocated based on buildings and structures. Police protection can be allocated based on where people are over the 24-hour day. Since people spend most of their time in buildings, building floor area can also be a reasonable proxy for allocating services. Transportation facilities can also be allocated roughly based on building floor area.

For the U.S., residential buildings totaled 223.9 billion square feet in 2009 and comprised about 72% of all building floor area (see Table A-4). Commercial buildings represented 24% of the floor area and, when combined with manufacturing, make up the "non-residential" land use category, comprising 28% of total building floor area.

Table A-4

Relative Share of Residential, Commercial & Industrial Building Floor Area in the U.S.

Thousands of Square Feet

Building Type	Total Floor Area	% of Total
All Residential Buildings 2009	223,900,000	**72.2%**
All Commercial Buildings (adjusted to 2009)[1]	75,773,985	**24.4%**
All Manufacturing Buildings (adjusted to 2009)[1]	10,562,945	**3.4%**
Total	310,236,931	100.0%

Source: Fodor & Associates from U.S. Energy Information Administration survey data for all U.S. buildings.
(1) Data from older surveys was adjusted to the most recent 2009 residential survey based on U.S. population change. The 2003 commercial building data reporting 71,658,000 kft2 was adjusted based on population growth from 2003 to 2009. The same procedure was applied to the 2006 manufacturing survey figure of 10,274,000 kft2. Manufacturing buildings include floor space for enclosed structures.

The relative land area devoted to various land uses can also provide a reasonable

basis for allocating certain public service costs. The 2004 American Planning Association publication, ***Planner's Estimating Guide: Projecting Land-Use and Facility Needs*** cites a study from 1992 allocating land uses for large and small cities.[18] According to this source, residential land uses take up 71-75% of the land area, with the balance in non-residential uses.

According to one Austin municipal report, new development in Austin was projected to use 70% of the land area for residential development and 30% non-residential development.[19]

Another method for allocating public services and facility costs is based on the relative share of property values for each type of land use. As shown in Table A-5, residential property represents 72% of the real estate values for the City of Austin. For the purposes of this analysis it is assumed that 72% of all shared services are devoted to residential land uses.

Table A-5

Austin Property Valuation Method

Land Use Type	Valuation (FY 2014)	Share of Value
Single Family	$43,262,362,068	
Multifamily	$12,628,998,736	
Residential	$55,891,360,804	**72%**
Commercial	$21,774,724,902	**28%**
Total (R+C)	$77,666,085,706	100%

Source: ***2013-14 Approved Budget, Austin TX***, Volume One, page 18.
Note: Vacant land values were not includes, since land requires few services.

Public schools and parks are sometimes treated as the exception, and their costs are allocated entirely to residential land uses. This is the approach used in this analysis, even though it is possible to make a compelling case that these services benefit non-residential land uses as well.

[18] ***Planner's Estimating Guide: Projecting Land-Use and Facility Needs***, by Arthur C. Nelson, Planners Press, American Planning Association, Chicago IL, 2004, 183 pages (p 14).
[19] Service costs were allocated based on 70/30 residential/non-residential land use split for the *SH 130 Infrastructure District Report*, City of Austin, January 26, 2006, page 1-6.

Development Impact Fees in Austin

An "impact fee" is a fee that is implemented by a local government on 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 70th Legislature (SB 336). *Texas Local Government Code*, Chapter 395, authorizes cities to impose and collect impact fees and establishes guidelines. 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 for water and wastewater systems by the Austin Water Utility. There is no stormwater or roadway facilities impact fee. In addition, the Parks and Recreation Department charges a "parkland dedication fee" which functions in a similar manner to an impact fee.

School Facility Cost Data

Table A-6

Cost Data For New AISD School Facilities

Obtained from Austin ISD in Response to Request by Fodor & Assoc.
April 23, 2014

Campus Name	Baldwin ES	Blazier ES	Overton ES	Guerrero-Thompson ES	NCES2	Gorzycki MS	South High School
Construction Start Year	2009	2006	2006	2012	2013	2008	
Facility Opening Date	August 23, 2010	August 27, 2007	August 27, 2007	August 26, 2013	Est. August 11, 2014	August 24, 2009	
Bldg. Construction Costs	$13,974,569	$12,657,313	$16,809,900	$18,065,347	$20,488,824	$30,417,336	
Site Work (Parking etc.)	$216,522	$265,105	$481,514	$374,302	$201,000	$410,239	
Total Facility Cost	$14,191,091	$12,922,418	$17,291,414	$18,439,649	$20,689,824	$30,827,575	
Permanent Bldgs. (gross square feet)	86,896 sq. ft.	82,897 sq. ft.	83,405 sq. ft.	98,485 sq. ft.	143,000 sq. ft.	169,045 sq. ft.	
Cost per Sq. Ft. (Buildings Only)	$160.82 / sq. ft.	$152.69 / sq. ft.	$201.55 / sq. ft.	$183.43 / sq. ft.	$143.28 / sq. ft.	$179.94 / sq. ft.	
Cost per Sq. Ft. (Buildings & Site Paving)	$163.31 / sq. ft.	$156.89 / sq. ft.	$207.32 / sq. ft.	$187.23 / sq. ft.	$144.68 / sq. ft.	$182.36 / sq. ft.	
Student Capacity (designed capacity)	669	598	617	748	1,166	1,323	2,400
Student Attendance (SY 2013/2014)	739	960	700	641	Est. 880	1,266	
Land cost	$0 (donation site)	$525,000		$2,248,346	$7,258,955	$2,585,423	$32,000,000
Land Notes			City of Austin Property Long-Term Land Lease		(land and existing building) Adaptive reuse of existing bldg.		Est. 65 to 100 acres; Land price and capacity are estimates
Land Area (acres)	14.17	15.60	70.34	18.07	7.62	14.17	80.00
Year of Land Purchase		2006		2011	2013	2006	2014
Cost Per Acre of Land (in year purchased)		$33,645		$124,424		$182,458	$400,000