
Appendix D: Central Ohio RapidFire Fiscal Assumptions Development and Methodology

Central Ohio RapidFire Fiscal Assumptions Development and Methodology

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prepared for:
Mid-Ohio Regional Planning Commission
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Introduction

The insight2050 project is an effort to prepare Central Ohio for future growth by providing objective metrics that help inform local decision making. The analysis behind the project relies on the “RapidFire” model, developed by consulting-team lead Calthorpe Associates. The RapidFire model measures the impacts of varying land use scenarios on criteria such as land consumption, energy and water use, and greenhouse gas emissions. The insight2050 scenarios also include analysis of specific impacts associated with different future development conditions. Strategic Economics was retained as part of the insight2050 consulting team to develop Central Ohio-specific assumptions to calculate the fiscal impact of the insight2050 scenarios. This report summarizes the methodology and results of the fiscal assumptions development. The report is organized into three main sections and an appendix: Summary of Findings; Key Assumptions and Methodology; Full Results; and Appendix: List of Interviews.

About Fiscal Impact Analysis

Fiscal impact analysis typically measures future revenues and costs to local government as a result of new growth and development. As with all fiscal impact analyses, the assumptions drive the results. Strategic Economics created the assumptions described in this report based on available data; input from Mid-Ohio Regional Planning Commission staff; interviews with planning and finance staff from cities, counties, and townships; state publications; real estate market factors; and appropriate industry standards. However, the analysis is not intended to be predictive of actual outcomes of new development projects, nor to compare total costs to total revenues, as in a fiscal impact analysis based on a specific development project. Rather, this fiscal impact analysis tool is best suited to provide an understanding of the “order of magnitude” revenues and costs of various development scenarios for comparison on a region-wide basis.

This fiscal impact analysis primarily examined impacts to the general fund of local jurisdictions (cities and townships). Therefore, the analysis does not consider impacts to the school districts or other special districts that are funded separately.

In order to measure the fiscal impacts of various land development patterns, Strategic Economics measured the local government costs and revenues incurred from each individual household, resident, worker, or thousand square feet of space which could be integrated with the RapidFire model. This methodology allows the comparison of different development patterns rather than specific development projects.

The analysis is in part derived from the most recent budgets and Comprehensive Annual Financial Reports (CAFRs) of representative Mid-Ohio cities, townships, and counties for fiscal year (FY) 2012-13, and all outputs are reported in 2014 dollars.

Ohio Context

Ohio has a unique local government fiscal structure, which required Strategic Economics to calibrate the fiscal impact engine of the RapidFire model in several ways. First of all, in Ohio, the types of costs and revenues incurred from new growth are different for incorporated places (cities and villages) and unincorporated places (townships outside of cities). For example, incorporated cities and villages receive most of their local revenues from income tax, while unincorporated townships rely primarily on property tax. Strategic Economics therefore developed different methodologies for calculating the revenues for each type of jurisdiction, and created a new approach to calculating income tax revenues across the different scenarios.

Secondly, unincorporated townships and incorporated cities typically provide different levels of services and the mix of services provided may differ as well; this is especially true for rural townships

which generally provide a much lower level of infrastructure and municipal services. For example, most, if not all, townships provide fire protection services, but few provide police services, which is a service category that is typically provided by cities. In order to be able to adequately compare the fiscal impact of the growth scenarios, Strategic Economics assumed that new development in unincorporated townships would receive a mix of services roughly comparable to what is offered in cities through a city's general fund. Budget data from townships and cities was carefully categorized and certain county-level costs (and revenues) were included in order to ensure that the key categories were accounted for across the region and to provide an equivalent set of service categories for comparison purposes. Therefore, the analysis does include sheriff costs related to townships and county sales tax revenues, but does not consider road maintenance costs for cities or counties, or the revenues that often pay for them (gas tax and license fees), because those costs and revenues are typically handled outside of the general fund and because it was not possible to accurately measure townships' share of county costs.

A review of county budget information found that counties maintain roads and bridges in township areas, but that they also maintain certain roads, and more commonly bridges, within cities. Based on the budget information available it was not possible to determine what portion of county expenditures were used for roads/bridges in townships versus cities. Although it is likely that a larger proportion is spent on township roads it would be inaccurate to attribute all of those costs to townships. Many county roads, even if located within townships, also act as regional roads, and some portion of the trips are pass-through, so the costs associated with those trips should not be attributed to townships. For these reasons road maintenance was excluded for both cities and townships. As discussed in the previous section since this is a regional study designed to provide an understanding of the "order of magnitude" revenues and costs of the development scenarios for comparison, it does not include all categories of costs (or revenues), but it is important that the set of costs included for townships match those included for cities in order to allow comparison of development scenarios.

The specific methodologies to calculate the revenue and cost impacts are explained in more detail in the Key Assumptions and Methodology section.

Local Costs and Revenues

The analysis considered the following categories of costs and revenues to local governments (cities and townships): **infrastructure costs** of new facilities to accommodate new development; **operations and maintenance (O&M) costs** for maintaining facilities and provision of municipal services; and **revenues**, including property taxes, income taxes, and sales taxes.

Each of these cost and revenue categories is described in more detail below.

Infrastructure Costs

Infrastructure costs, or the capital costs of building public infrastructure and facilities to serve new development, are one-time costs. The infrastructure costs considered in this analysis include the following major categories:

- Roads: the costs of new local roads required to serve development (excluding state highways and non-local roadways);
- Sewer: the costs of wastewater treatment facilities required to serve development; and
- Water: the costs of water facilities required to serve development.

While the above categories of infrastructure exclude other types of facilities and improvements (police stations, fire stations, community centers, etc.), they encompass the infrastructure costs

associated with new development. Some cities may charge development impact fees for other categories of infrastructure, including general government, police, fire, and parks. Those categories are not charged consistently and typically make up a smaller portion of infrastructure costs associated with new development, and were therefore excluded from this analysis.

Operations and Maintenance Costs

The operations and maintenance costs (O&M costs) represent the cost of providing ongoing services to new development. Strategic Economics calculated O&M costs on a per capita basis based on the general fund expenditures of the representative cities included in the analysis, and/or applicable public safety expenditures of representative townships and counties. O&M costs are broken out into the following major categories:

- General Government: including administrative and legislative functions;
- Fire: including all fire protection services in incorporated and unincorporated areas;
- Community Services: including community, health, and recreation services;
- Engineering and Public Works: including only general fund public works functions; and
- Police and Sheriff: including police and sheriff services in incorporated and unincorporated areas.

Services provided outside of the general fund were excluded, with the exception of applicable public safety expenditures. Similarly, debt service costs were excluded from the analysis.

Revenues

Revenues are calculated on a per-square-foot and per household basis based on statewide averages for some revenue factors and on property value calculations. The methodology for deriving revenue estimates is described in further detail in the Key Assumptions and Methodology section of this report.

Place Types

The RapidFire model allocates growth under different scenarios based on categories of place types that represent certain land use mixes and intensities. Strategic Economics identified sets of cities and townships to represent the Standard, Compact, and Urban place types of the RapidFire model's framework. Further information on the place types and a list of "exemplar" cities used in the analysis are included in the Key Assumptions and Methodology section.

The place types as defined by the RapidFire model and in the fiscal analysis are as follows:

- **Standard** is the least intense place type and is represented by suburban and stand-alone cities that have lower densities and fewer nonresidential uses. For the purposes of conducting the analysis in the Mid-Ohio region, the Standard place type was split into Standard-Incorporated (cities) and Standard-Unincorporated (townships).
- **Compact** is less intense than Urban, but is a walkable development pattern with a mix of single-family small-lot, single-family attached/townhome and multi-family units in addition to a mix of nonresidential uses.
- **Urban** is the most intense of the place types, with a greater share of multifamily and townhouse development, as well as higher density commercial uses.

Summary of Findings

This section summarizes the findings of the fiscal analysis for insight2050. The results are presented for major sources of revenue and major categories of infrastructure and operations and maintenance costs.

Revenue

This section summarizes the revenue results of the fiscal analysis, including:

- Annual income tax and property tax (apportioned to general fund and public safety uses) revenue per thousand square feet of new commercial development.
- Annual property tax revenue apportioned to general fund and public safety uses, per new housing unit.
- Annual county sales tax revenue per housing unit.

The results are broken out for each commercial property type, residential unit type, and place type. This section describes results only; the detailed calculation methodology is described in the Key Assumptions and Methodology section of this report.

Commercial Income Tax and Property Tax Revenue

Income tax is typically the most significant revenue source for cities in Ohio. Since the bulk of income tax is generated in a worker's city of employment, Strategic Economics associated income tax revenue with growth in commercial space. Adjustments were also incorporated to account for worker residence locations and the portion of revenues generated by business profits.

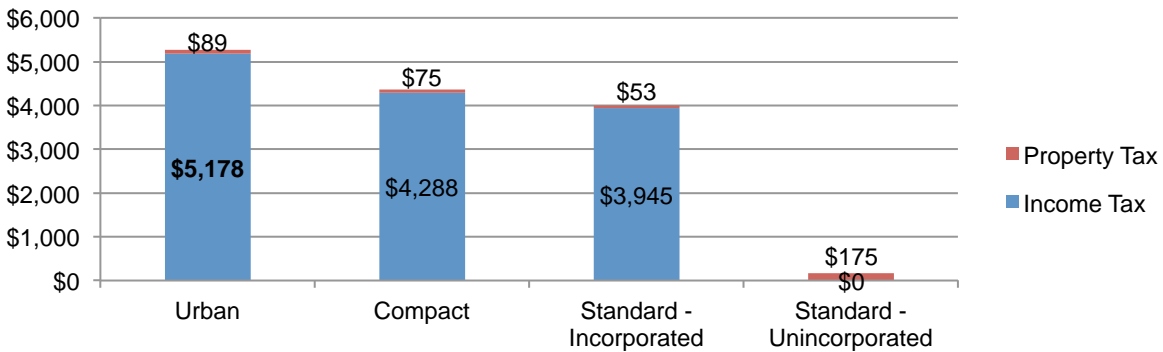
Property tax comprises a relatively small share of city revenues, but is the primary source of funding for townships. Strategic Economics calculated the portion of property taxes dedicated to city and township general funds and public safety costs. General fund and public safety revenue streams were calculated because cities typically fund public safety services out of their general funds, whereas townships must levy additional property taxes to fund public safety services.

Strategic Economics calculated income tax and property tax revenue associated with office, retail, industrial, warehouse, civic/institutional, and "other" commercial land uses for each place type. The analysis includes general fund and public safety services revenues only. The results are presented in **Figures 1-6**. As shown in the figures, there is no income tax revenue from commercial development in unincorporated areas since townships do not levy income tax. On the other hand, unincorporated areas receive relatively high property tax revenues due to the high property tax rates in townships compared to cities. The summary of the findings for each commercial land use is as follows:

- Office development in higher density place types (Urban and Compact) generates higher total income tax and property tax revenues than in lower density place types (Standard-Incorporated and Standard-Unincorporated), as shown in Figure 1. This result is primarily due to higher worker densities, higher property values, and higher property tax rates in exemplar cities representing Urban and Compact place types.
- Retail development generates higher income tax revenues in place types with higher development intensities, as shown in Figure 2. However, retail property tax revenues do not follow the same pattern, largely because retail development in Standard places often commands higher rents and assessed property values than in other locations.

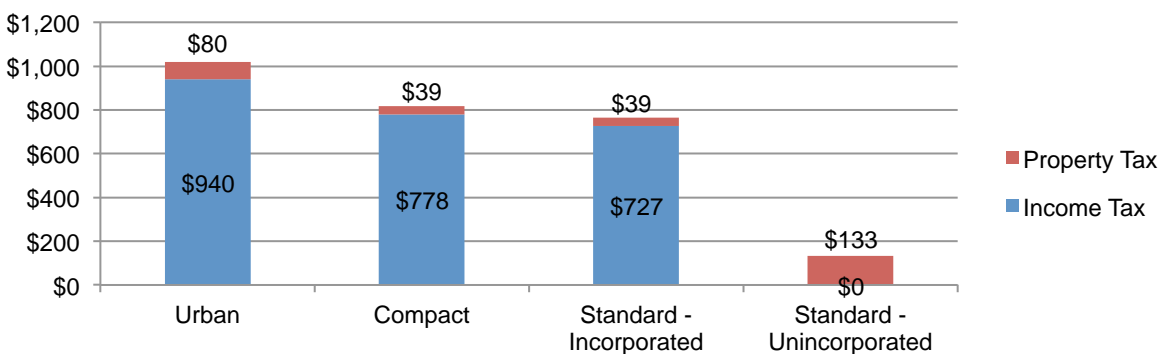
- Industrial and Warehouse developments generate the most overall revenues in the Urban place type, followed by the Standard-Incorporated place type (Figure 3 and Figure 4). The income tax revenues are higher in Standard-Incorporated locations than in Compact cities because of the higher average weighted income tax rates in those places.
- Civic/Institutional income tax revenues are also positively correlated with higher-density place types (Figure 5). As with the office land use, this result is due to higher employee densities in the Urban and Compact place types. Strategic Economics conservatively assumed that these uses do not generate property tax since users of this space are primarily government and non-profit organizations exempt from property tax.
- “Other” commercial land uses not included in the above categories generate slightly higher income tax and property tax revenues in Standard-Incorporated place types compared to Compact place types (Figure 6). This relationship is driven by higher income tax rates and higher assessed property values in Standard-Incorporated cities.

Figure 1: Annual General Fund and Public Safety Income and Property Tax Revenue per 1,000 Square Feet of Office Space, by Place Type



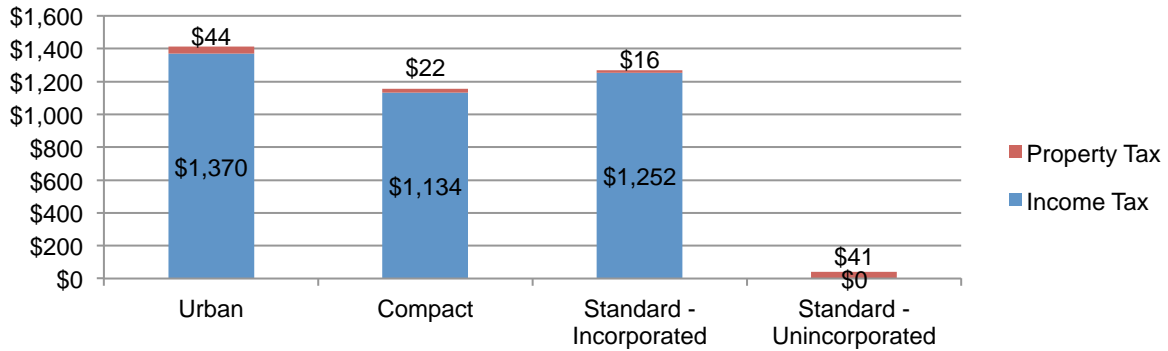
Source: Strategic Economics, 2014.

Figure 2: Annual General Fund and Public Safety Income and Property Tax Revenue per 1,000 Square Feet of Retail Space, by Place Type



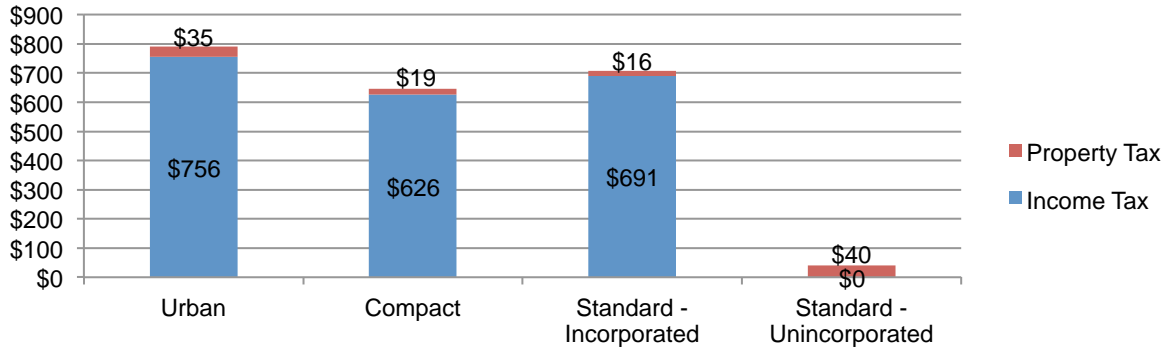
Source: Strategic Economics, 2014.

Figure 3: Annual General Fund and Public Safety Income and Property Tax Revenue per 1,000 Square Feet of Industrial Space, by Place Type



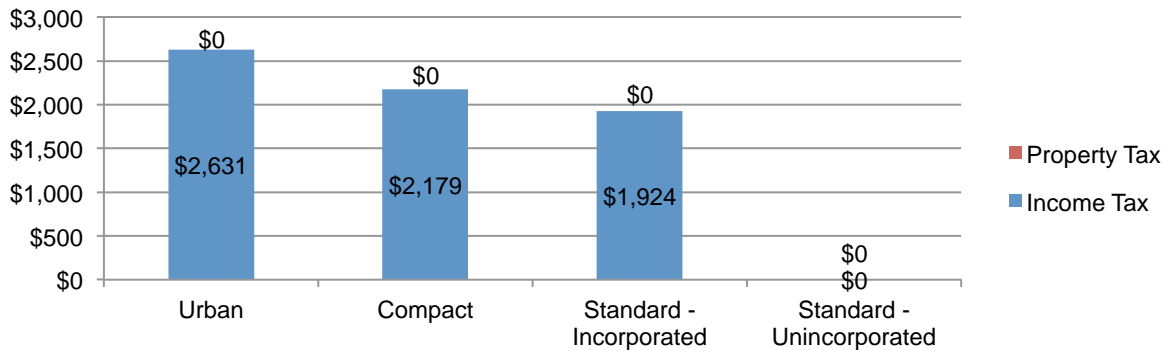
Source: Strategic Economics, 2014.

Figure 4: Annual General Fund and Public Safety Income and Property Tax Revenue per 1,000 Square Feet of Warehouse Space, by Place Type



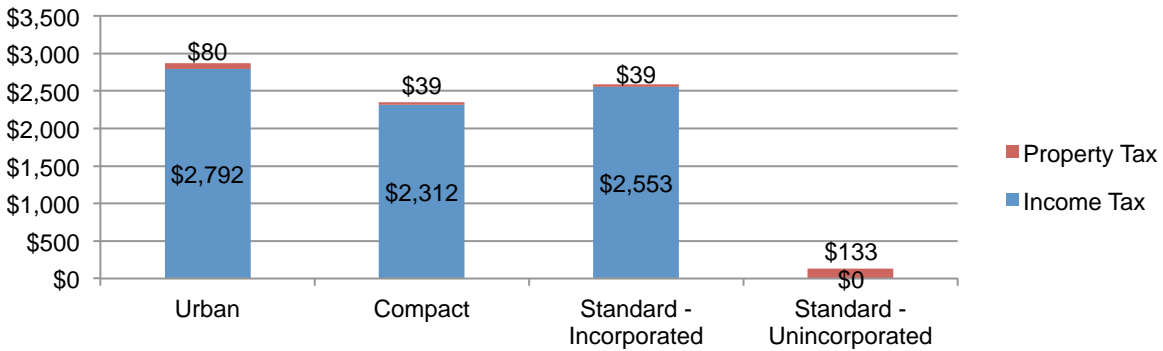
Source: Strategic Economics, 2014.

Figure 5: Annual General Fund and Public Safety Income and Property Tax Revenue per 1,000 Square Feet of Civic/Institutional Space, by Place Type



Source: Strategic Economics, 2014.

Figure 6: Annual General Fund and Public Safety Income and Property Tax Revenue per 1,000 Square Feet of Other Space, by Place Type



Source: Strategic Economics, 2014.

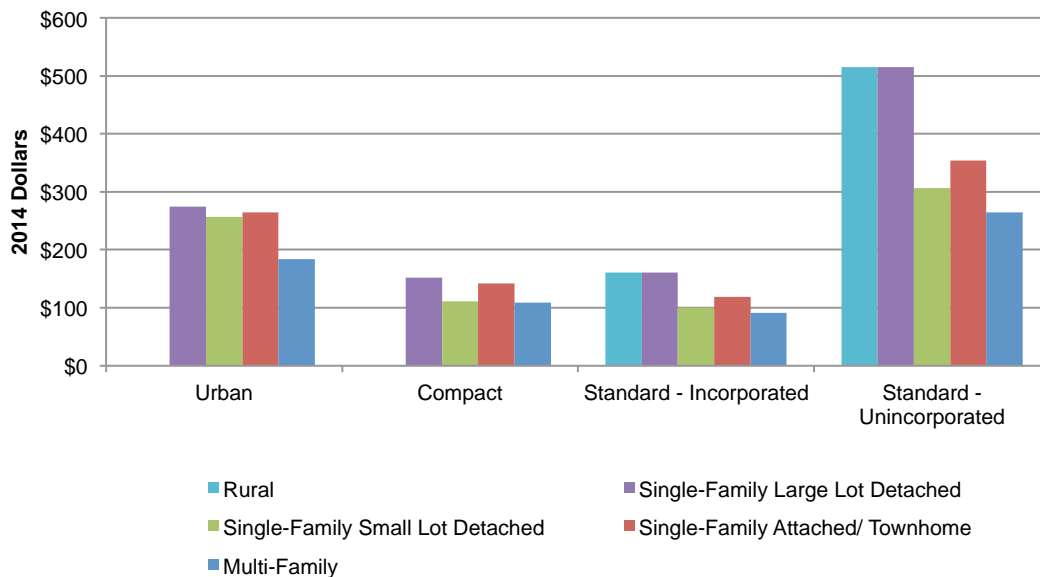
Residential Property Tax Revenue

Strategic Economics calculated property tax revenues generated by residential uses. As with commercial property tax calculations, Strategic Economics calculated the portion of property taxes dedicated to city and township general funds and public safety costs. These revenues were calculated on a per-household basis.

The results are shown in Figure 7 below. As shown, housing units in unincorporated areas generate significantly more property tax revenue compared to incorporated areas. The higher revenue generation is the result of higher property tax rates and higher assessed values per housing unit (due mostly to larger unit sizes) in these locations.

Although property tax revenues are generally lower on a per-unit basis for attached units (multi-family, attached, and small-lot single-family) than for detached units, the total revenues on a per acre basis are likely to be higher for attached housing types.

Figure 7: Annual General Fund and Public Safety Property Tax Revenues per Housing Unit, by Building Type and Place Type*



*The RapidFire model does not include Rural housing types in the Urban and Compact place types.
Source: Strategic Economics, 2014.

Sales Tax Revenue

Strategic Economics calculated annual county sales tax revenue of \$535 per housing unit for every place type. Sales tax revenues fund general county services. The uniform calculation of retail revenues by place type is based on the assumption that average retail spending by households may vary by income, but does not vary significantly by location.

Costs

This section summarizes the costs results of the fiscal analysis, including infrastructure costs, or the capital costs of building public infrastructure and facilities to serve new development, and operations and maintenance costs, or the costs of providing ongoing services to new development. Strategic Economics estimated infrastructure costs, which are one-time costs, based on connection fees assessed in various cities and national information on infrastructure costs that has been adjusted for the Ohio context. As described earlier, the operations and maintenance (O&M) costs are estimated as per capita, per worker, or per household figures based on the general fund expenditures of the representative cities, townships, and counties included in the analysis.

For each category of costs the results are broken out for each commercial property type, residential unit type, and place type. This section provides a summary of the results of the analysis; the detailed calculation methodology and the full results are provided in the Assumptions and Methodology section of this report.

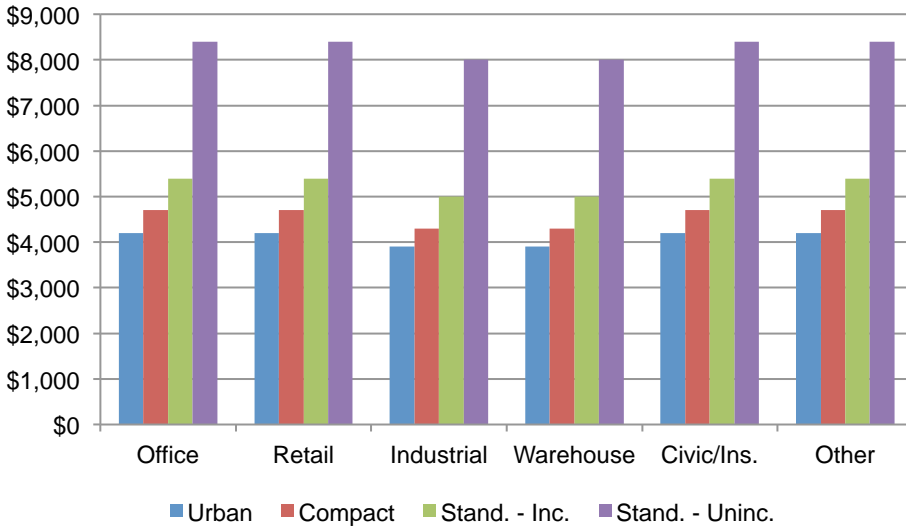
Infrastructure Costs

As described earlier, Strategic Economics calculated infrastructure costs for the following major categories:

- Roads: the costs of new local roads required to serve development (excluding state highways and non-local roadways);
- Sewer: the costs of wastewater facilities required to serve development; and
- Water: the costs of water infrastructure required to serve development.

As shown in Figure 8 and Figure 9, Strategic Economics calculated that infrastructure costs are generally higher in unincorporated places, which is largely due to the higher costs associated with providing sewer and water infrastructure to those areas. The exception is for the rural housing type, where unincorporated places were assumed to have septic systems and well water, and therefore not incur sewer and water infrastructure costs (Figure 9). (The model does not include the rural housing type in the Urban and Compact place types.)

Figure 8: Infrastructure Costs per 1,000 Square Feet of Commercial Space, by Use and Place Type



Source: Strategic Economics, 2014.

Figure 9: Infrastructure Costs per Housing Unit, by Unit Type and Place Type



Source: Strategic Economics, 2014.

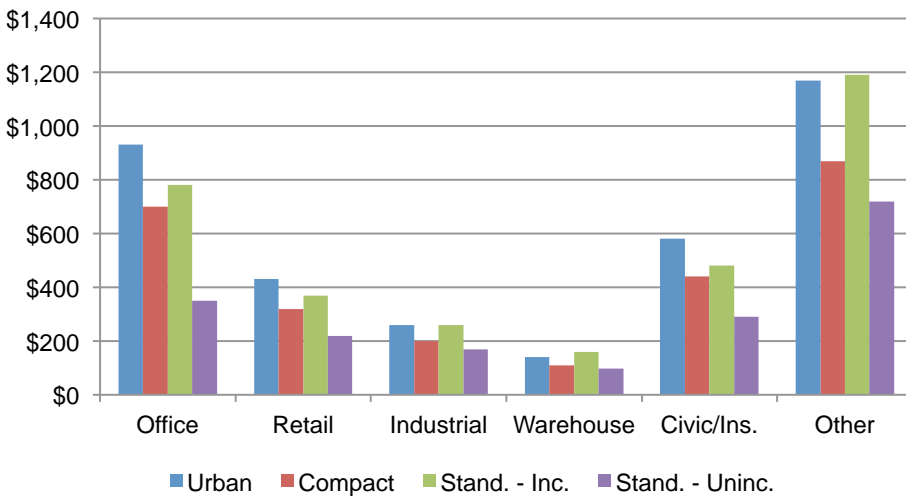
Operations and Maintenance (O&M) Costs

As described earlier, Strategic Economics calculated the local government O&M costs for the following major categories:

- General Government: including administrative and legislative functions;
- Fire: including all fire services in incorporated and unincorporated areas;
- Community Services: including community, health, and recreation services;
- Engineering and Public Works: including only general fund public works functions; and
- Police and Sheriff: including police and sheriff services in incorporated and unincorporated areas.

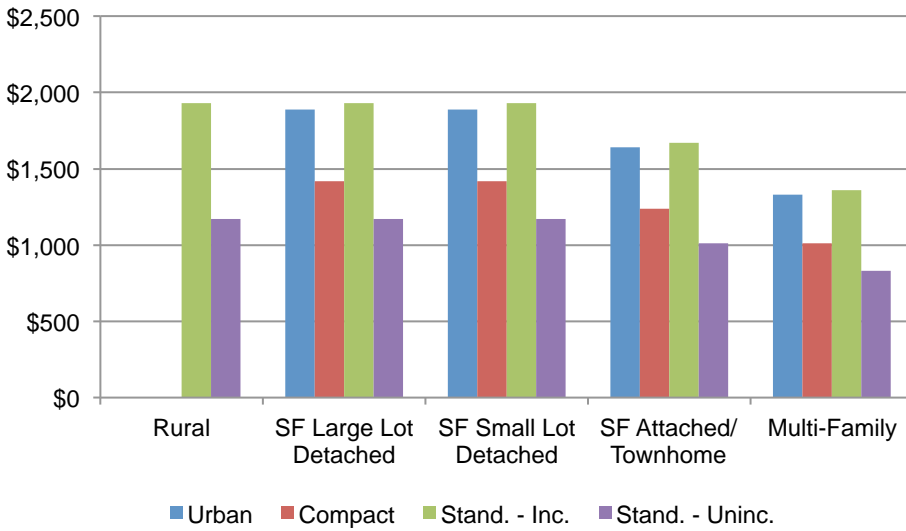
As shown in Figure 10 and Figure 11, Strategic Economics calculated that O&M costs are generally higher in Urban and Standard-Incorporated places and that O&M costs are lowest in unincorporated places. The differences in O&M costs are partly driven by differing levels of service. Incorporated cities often provide a greater level of service than unincorporated places (e.g., providing police services, or a wider array of community programs). In order to provide a comparison for public safety costs, the analysis includes the costs for providing municipal police services for incorporated cities and the costs for providing county-provided sheriff services to unincorporated places. Sheriff costs that are provided on a countywide basis, such as jail costs, were excluded from the analysis.

Figure 10: O&M Costs per 1,000 Square Feet of Commercial Space, by Use and Place Type



Source: Strategic Economics, 2014.

Figure 11: O&M Costs per Housing Unit, by Building Type and Place Type



Source: Strategic Economics, 2014.

Key Assumptions and Methodology

Base Assumptions

As with all fiscal impact analyses, the assumptions drive the results. Strategic Economics created its assumptions based on available data, including population and housing characteristics, municipal revenue and cost factors, real estate market indicators, and commonly applied fiscal impact analysis standards. The analysis uses current averages for costs and revenues to calculate results.

Demographic and Household Characteristics

Strategic Economics used U.S. Census 2008-2012 American Community Survey Estimates for household counts and the renter/owner tenure split in the seven-county Mid-Ohio region.

Figure 12: Households and Tenure

Seven County Region	
Number of Households	697,565
Renter Households	37%
Owner Households	63%

Source: U.S. Census American Community Survey 2008-2012 Estimates.

Strategic Economics used U.S. Census 2008-2012 American Community Survey Public Use Microdata Sample (PUMS) Estimates for persons per household by housing type for the State of Ohio. (PUMS data was not available at the city or county level.)

Figure 13: Persons per Household by Housing Unit Type

Housing Unit Type	Average Household Size
Single Family Attached	2.11
Single Family Detached	2.45
Multi-Family	1.72

Source: U.S. Census American Community Survey PUMS 2008-2012 Estimates.

Place Type Exemplars

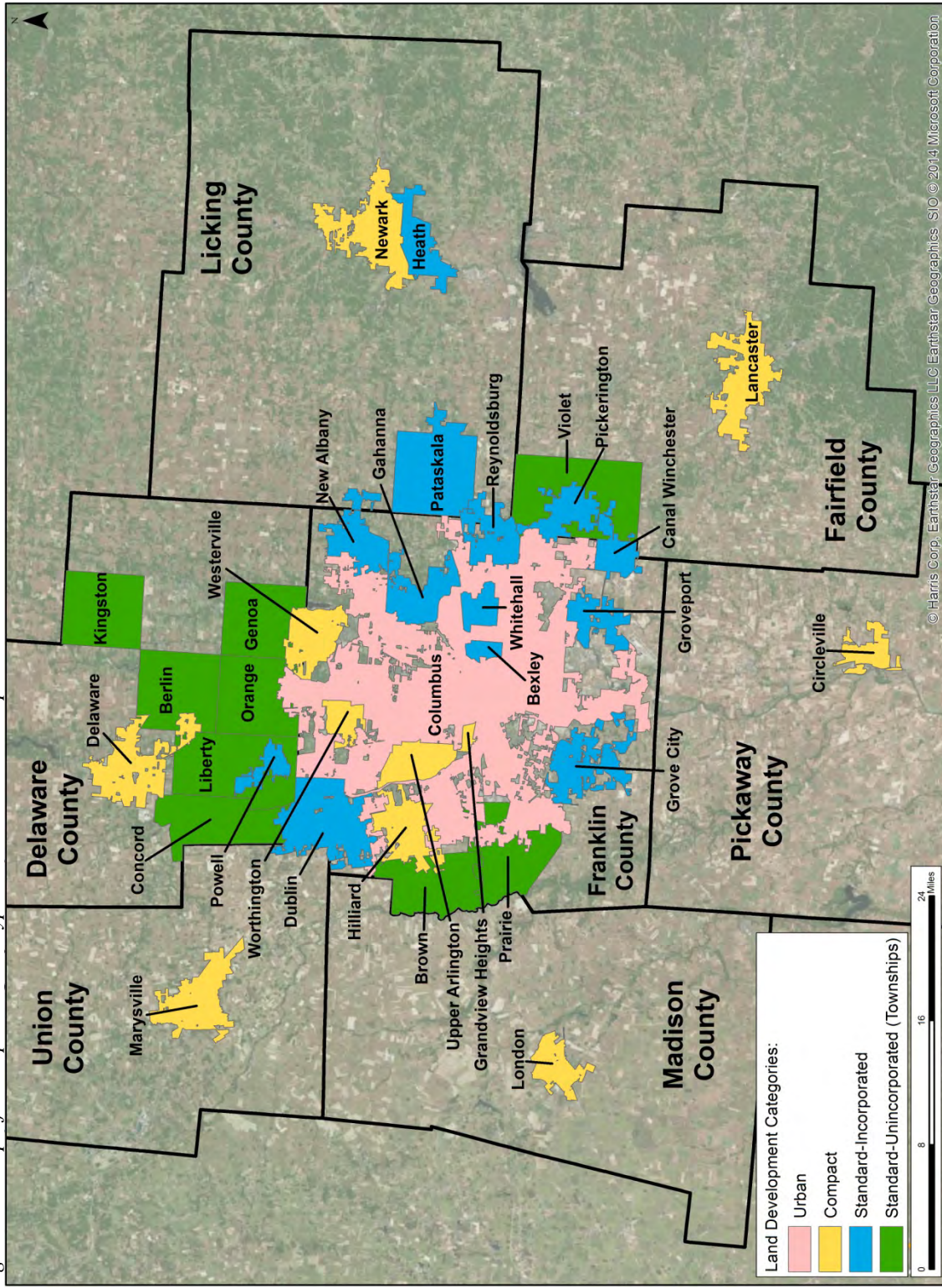
Based on input from Calthorpe Associates, Strategic Economics developed a list of cities and townships to represent the four place types used in the RapidFire model. These “exemplar” cities were selected primarily based on vehicle miles traveled (VMT), intersection density, land use density, and mix of uses. The exemplars were used throughout the fiscal model to calculate existing conditions by place type, though some data was limited for specific exemplar cities. Urban and compact place types are relatively rare in the Columbus region, so the most similar corollary cities were used to represent those categories. The place type assignments are shown in the table below and in the map on the following page.

Figure 14: Place Type Exemplar Cities and Townships

Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Columbus	Circleville	Bexley	Berlin (Delaware County)
	Delaware	Canal Winchester	Brown (Franklin County)
	Grandview Heights	Dublin	Concord (Delaware County)
	Hilliard	Gahanna	Genoa (Delaware County)
	Lancaster	Grove City	Kingston (Delaware County)
	London	Groveport	Liberty (Delaware County)
	Marysville	Heath	Orange (Delaware County)
	Newark	New Albany	Prairie (Franklin County)
	Upper Arlington	Pataskala	Violet (Fairfield County)
	Westerville	Pickerington	
	Worthington	Powell	
		Reynoldsburg	
		Whitehall	

Source: Calthorpe Associates, 2014; Strategic Economics, 2014.

Figure 15: Map of Exemplar Place Type Cities and Townships



Sources: MORPC, 2014; US Census TIGER Line Data, 2013; Strategic Economics, 2014.

Housing Unit Types

As required by the RapidFire model, Strategic Economics calculated the fiscal impacts of four housing types:

- Single-family small lot detached homes (“SF Small Lot Detached”)
- Single-family large lot detached homes (“SF Large Lot Detached”)
- Single-family attached/townhomes (“SF Attached / Townhome”)
- Multi-family housing units (“Multi-Family”)

For purposes of calculating the impacts of new housing units, Strategic Economics assumed that only multi-family housing units will be constructed as both rental and ownership properties.

Average Housing Unit Size and Lot Density

Calthorpe Associates provided housing unit sizes and densities for each housing unit type, by place type, as shown below.

Figure 16: Average Unit Size (Square Feet), by Housing Unit Type and Place Type

	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Rural	n/a	n/a	2,450	2,600
Single-Family Large Lot Detached	2,300	2,300	2,450	2,300
Single-Family Small Lot Detached	1,550	1,550	1,650	1,750
Single-Family Attached/ Townhome	1,650	1,650	1,650	1,700
Multi-Family	1,200	1,350	1,350	1,350

Source: Calthorpe Associates, 2014; Strategic Economics, 2014.

Commercial Land Uses

Strategic Economics calculated the fiscal impacts of six commercial land use types:

- Office
- Retail
- Industrial
- Warehouse
- Civic/Institutional
- Other

Industry Sector Land Use Groupings

Strategic Economics assigned industry sectors to primary land use categories. These groupings were used to weight a variety of factors in the commercial income tax analysis.

Figure 17: Industry Sector Groupings by Commercial Land Use

Land Use	Industry
Office	Information
Office	Finance and Insurance
Office	Real Estate and Rental and Leasing
Office	Professional, Scientific, and Technical Services
Office	Management of Companies and Enterprises
Office	Admin. and Support and Waste Mgmt. and Remediation Svc.
Retail	Retail Trade
Retail	Accommodation and Food Services
Retail	Other Services
Industrial	Utilities
Industrial	Construction
Industrial	Manufacturing
Warehouse	Wholesale Trade
Warehouse	Transportation and Warehousing
Civic/Institutional	State and Local Government
Civic/Institutional	Educational Services
Civic/Institutional	Health Care and Social Assistance
Other	Agriculture, Forestry, Fishing, and Hunting
Other	Mining
Other	Arts, Entertainment, and Recreation

Source: Strategic Economics, 2014.

Commercial Land Use Employee Density

Strategic Economics used employee density assumptions expressed as square feet per employee by commercial land use and place type. The density estimates were roughly based on Arthur Nelson’s “Columbus, Ohio: Metropolitan Area Trends, Preferences, and Opportunities” (which were in turn estimated based on the U.S. Energy Information Administration’s “Commercial Buildings Energy Consumption Survey” of 2006) and further adjusted based on input from Calthorpe Associates.

Figure 18: Square Feet per Employee, by Commercial Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	250	250	300	400
Retail	550	550	650	650
Industrial	900	900	900	900
Warehouse	1,550	1,550	1,550	1,550
Civic/Institutional	400	400	500	500
Other	200	200	200	200

Source: Arthur Nelson, 2014; U.S. EIA, 2006; Calthorpe Associates, 2014; Strategic Economics, 2014.

Property Valuation

The following assumptions were used to calculate the capitalized values of commercial properties. Rental, vacancy, and capitalization rate data were primarily collected from CoStar market data for the first quarter of 2014. Data were adjusted based on additional information from sources including CB Richard Ellis (2014 Market Outlook and market reports for the first quarter of 2014) and Colliers

International (Columbus Research Knowledge Report for the first quarter of 2014). Lease rates for the Urban place type were based on the Downtown or Central Columbus market areas, and lease rates for Compact and Standard-Incorporated values were based on varying subareas of the central Columbus region. Values for Standard-Unincorporated place types were based on values in outlying counties. Operating expenses ratios were based on Strategic Economics' past experience conducting financial analyses and informed by the Institute of Real Estate Managements' 2012 "The Sample: Trends in Office Building Operations" report.

Figure 19: Capitalized Value Assumptions by Commercial Land Use and Place Type

		<u>Urban</u>				
Units		Office	Retail	Industrial	Warehouse	Other
Monthly Rent	Per Leasable SF	\$1.43	\$1.26	\$0.49	\$0.40	\$1.26
Building Efficiency	% Leasable	85%	85%	95%	95%	85%
Vacancy	Percent	5.0%	5.0%	5.0%	5.0%	5.0%
Operating Expenses	Percent	30.0%	30.0%	25.0%	25.0%	30.0%
Capitalization Rate	Percent	9.40%	9.30%	8.00%	8.00%	9.30%

		<u>Compact</u>				
Units		Office	Retail	Industrial	Warehouse	Other
Monthly Rent	Per Leasable SF	\$1.60	\$0.79	\$0.30	\$0.27	\$0.79
Building Efficiency	% Leasable	85%	85%	100%	100%	85%
Vacancy	Percent	9.0%	7.0%	7.0%	6.8%	7.0%
Operating Expenses	Percent	30.0%	30.0%	25.0%	25.0%	30.0%
Capitalization Rate	Percent	9.40%	9.30%	8.00%	8.00%	9.30%

		<u>Standard - Incorporated</u>				
Units		Office	Retail	Industrial	Warehouse	Other
Monthly Rent	Per Leasable SF	\$1.32	\$0.93	\$0.26	\$0.26	\$0.93
Building Efficiency	% Leasable	85%	85%	100%	100%	85%
Vacancy	Percent	9.0%	7.0%	7.0%	6.8%	7.0%
Operating Expenses	Percent	30.0%	30.0%	25.0%	25.0%	30.0%
Capitalization Rate	Percent	9.40%	9.30%	8.00%	8.00%	9.30%

		<u>Standard - Unincorporated</u>				
Units		Office	Retail	Industrial	Warehouse	Other
Monthly Rent	Per Leasable SF	\$1.53	\$1.12	\$0.23	\$0.23	\$1.12
Building Efficiency	% Leasable	85%	85%	100%	100%	85%
Vacancy	Percent	9.0%	7.0%	7.0%	6.8%	7.0%
Operating Expenses	Percent	30.0%	30.0%	25.0%	25.0%	30.0%
Capitalization Rate	Percent	9.40%	9.30%	8.00%	8.00%	9.30%

Source: CoStar, 2014; CB Richard Ellis, 2014; Colliers International, 2014; IREM, 2012; Strategic Economics, 2014.

The following assumptions were used to calculate the capitalized value of residential rental properties. Weighted average rents were calculated based on CoStar data for apartments brought to market in 2009 or later. Rents were weighted based on the distribution of units among exemplar cities within each place type. Rents for the Urban place type were based on newer apartments in Downtown

Columbus only. Capitalization rates were based primarily on the CB Richard Ellis report “Columbus Market Outlook 2014.”

Figure 20: Capitalized Value Assumptions for New Apartment Units

	Units	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Monthly Rent	Per Leasable SF	\$1.59	\$1.04	\$1.01	\$1.01
Building Efficiency	% Leasable	80%	80%	80%	80%
Vacancy	Percent	5.0%	5.0%	5.0%	5.0%
Operating Expenses	Percent	25.0%	25.0%	25.0%	25.0%
Capitalization Rate	Percent	6.75%	6.75%	6.75%	6.75%

Source: CoStar, 2014; CB Richard Ellis, 2014; Strategic Economics, 2014.

Revenue Assumptions and Methodology

This section describes the assumptions and methodology used to calculate the income tax, property tax, and sales tax revenues.

Income Tax Revenue

Strategic Economics used the following steps to calculate general fund income tax revenues per thousand square feet of commercial space:

- 1. Based on industry employment and wage data, a weighted average wage was calculated for each commercial land use.** This weighted average wage by land use was required in order to provide a base of revenue from which employee withholding income tax would be estimated. Strategic Economics calculated the weighted average wage for each land use by dividing total aggregate wages for each land use’s industries by total employment within each land use. The employment and wage data again came from the 2012 QCEW.

Figure 21: Weighted Average Wages by Land Use, Mid-Ohio Region

Land Use	Weighted Average Annual Wage per Worker
Office	\$60,434
Retail	\$24,127
Industrial	\$57,555
Warehouse	\$54,686
Civic/Institutional	\$49,122
Other	\$26,072

Source: U.S. BLS QCEW, 2012; Strategic Economics, 2014.

- 2. Wages per thousand square feet of commercial land uses were calculated for each place type.** In order to provide income tax revenue per thousand square feet of commercial land uses, Strategic Economics needed to estimate total wages per thousand square feet of space. For each commercial land use, Strategic Economics calculated workers per thousand square feet of building area based on square feet per employee assumptions (described in the Base Assumptions section). Strategic Economics then multiplied each average wage by the number of workers per thousand square feet, by land use and place type.
- 3. Weighted average general fund income tax rates were calculated for each place type.** Strategic Economics calculates an income tax rate for each place type in order to calculate

income tax revenue by place type. Strategic Economics gathered all income tax rates for the place type exemplar cities. As necessary, the rates were reduced for cities in which budget research showed a portion of the income tax revenue is allocated to non-general fund uses (for example, only 75 percent of Columbus and Dublin income tax are apportioned to those cities' general funds). A weighted average rate by place type was then calculated based on each exemplar city's share of its respective place type's total employment. Employment data came from the U.S. Census Longitudinal Employer-Household Dynamics (LEHD) dataset for 2011 and income tax rates from the Ohio Department of Taxation.

Figure 22: Weighted Average General Fund Income Tax Rate by Place Type

Place Type	Weighted Average General Fund Rate
Urban	1.875%
Compact	1.437%
Standard - Incorporated	1.680%

Source: Ohio Department of Taxation, 2014; U.S. Census LEHD, 2011; city budgets; Strategic Economics, 2014.

- 4. Employee withholding income tax revenue by place of work was calculated for each commercial land use and place type, per thousand square feet of space.** Strategic Economics multiplied the average income tax rates (calculated in step 4) by the wage per thousand square feet of commercial space (by land use and place type) that was calculated in step 3. This provided employee withholding income tax revenue per thousand square feet of commercial space, by land use type and place type. This represents the wage-based income tax revenue collected by the city in which a given employee works.

Figure 23: Employee Withholding Portion of General Fund Income Tax Revenue per Thousand Square Feet of Commercial Space, by Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	\$4,533	\$3,474	\$3,384	\$0
Retail	\$823	\$630	\$624	\$0
Industrial	\$1,199	\$919	\$1,074	\$0
Warehouse	\$662	\$507	\$593	\$0
Civic/Institutional	\$2,303	\$1,765	\$1,650	\$0
Other	\$2,444	\$1,873	\$2,190	\$0

Source: Strategic Economics, 2014.

- 5. Applicable general fund income tax rates for worker places of residence were calculated based on commute patterns.** Strategic Economics examined worker commute patterns in order to adjust general fund income tax rates for calculating individual filing receipts paid to worker places of residence. Strategic Economics used 2011 LEHD worker commute data for the analysis. Home location data was gathered for the top ten employment cities in the Mid-Ohio region. The top employment cities were then grouped into place types, and the home locations of workers in those cities were aggregated (including workers that live and work in the same place). This produced each home city's percentage of total workers that commute to the employment cities in a given place type. These percentages were used as weighting factors in calculating weighted average income tax rates, credits, and credit limits for the home cities feeding a given place type's employment cities.

Figure 24: Weighted Average Income Tax Rates, Credits, and Credit Limits for Place of Residence of Workers

	Urban	Compact	Standard - Incorporated
Rate	2.34%	2.10%	2.25%
Credit	98.49%	74.33%	95.56%
Credit Limit	2.32%	1.67%	2.19%

Source: LEHD, 2014; Ohio Department of Taxation, 2014; Strategic Economics, 2014.

- 6. Additional general fund income tax individual filing receipts for worker places of residence were calculated for commercial land uses and place types.** Since Columbus is overwhelmingly the largest employment location in the Mid-Ohio region, Strategic Economics applied the Columbus income tax rate as the standard assumed rate for workers' places of employment. The weighted average credit limit for home cities (by place type) was subtracted from this rate to arrive at the income tax rate for payments owed to worker home cities. The rate was appropriately reduced to account for the portion of income tax apportioned to the general fund. Strategic Economics then assumed that 25 percent of workers live and work in different cities and calculated general fund individual withholding income tax receipts by land use and place type, per thousand square feet of commercial space.

Figure 25: Individual Filing Portion of General Fund Income Tax Revenue per Thousand Square Feet of Commercial Space, by Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	\$81	\$382	\$140	\$0
Retail	\$15	\$69	\$26	\$0
Industrial	\$22	\$101	\$44	\$0
Warehouse	\$12	\$56	\$24	\$0
Civic/Institutional	\$41	\$194	\$68	\$0
Other	\$44	\$206	\$90	\$0

Source: Strategic Economics, 2014.

- 7. Additional income tax levied on business profits was calculated for commercial land uses and place types, based on percentage factor of income tax revenues.** Business profit taxes comprise the third and final component of income tax receipts. Strategic Economics applied an additional percent factor to employee withholding revenue to account for the revenue driven by business profits. Based on budget data and other city documents, Strategic Economics gathered the net profits share of withholding income tax receipts for six of the top ten employment cities in the Mid-Ohio region. This factor was then multiplied by previously calculated employee withholding income tax to arrive at business profit income tax revenue for each commercial land use and place type.

Figure 26: Business Profit Portion of General Fund Income Tax Revenue per Thousand Square Feet of Commercial Space, by Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	\$564	\$432	\$421	\$0
Retail	\$102	\$78	\$78	\$0
Industrial	\$149	\$114	\$134	\$0
Warehouse	\$82	\$63	\$74	\$0
Civic/Institutional	\$287	\$220	\$205	\$0
Other	\$304	\$233	\$273	\$0

Source: City budgets; Strategic Economics, 2014.

- 8. Total general fund income tax revenue per thousand square feet was calculated for each commercial land use and place type.** Strategic Economics summed the three calculated sources of general fund income tax revenue to arrive at total general fund income tax revenue per thousand square feet of commercial space, by land use and place type.

Figure 27: Total Annual General Fund Income Tax Revenue per Thousand Square Feet of Commercial Space, by Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	\$5,178	\$4,288	\$3,945	\$0
Retail	\$940	\$778	\$727	\$0
Industrial	\$1,370	\$1,134	\$1,252	\$0
Warehouse	\$756	\$626	\$691	\$0
Civic/Institutional	\$2,631	\$2,179	\$1,924	\$0
Other	\$2,792	\$2,312	\$2,553	\$0

Source: Strategic Economics, 2014.

Commercial Property Tax Revenue

Strategic Economics calculated general fund and public safety property tax revenues per thousand square feet of commercial space via the following steps:

- 1. The capitalized value per square foot of commercial and industrial space was calculated for each commercial land use and place type.** Based on the capitalized value assumptions in the Base Assumptions section of this report, Strategic Economics calculated the capitalized value per square foot of the commercial land uses.

Figure 28: Capitalized Value per Square Foot of Commercial Land Uses, by Place Type

Place Type	Value per Square Foot					
	Office	Retail	Industrial	Warehouse	Civic/ Institutional	Other
Urban	\$101	\$89	\$49	\$40	n/a	\$89
Compact	\$106	\$55	\$31	\$27	n/a	\$55
Standard - Incorporated	\$87	\$64	\$26	\$26	n/a	\$64
Standard - Unincorporated	\$101	\$77	\$24	\$23	n/a	\$77

Source: Strategic Economics, 2014.

- 2. Average general fund and public safety property tax rates were calculated by place type.** General fund and public safety property tax apportionment rates were gathered from the Ohio Department of Taxation 2013 Property Tax Rate Abstract for each place type exemplar city. These rates were averaged for each place type, producing general fund and public safety property tax rates for commercial properties.

Figure 29: Average General Fund and Public Safety Commercial Property Tax Rate by Place Type

Place Type	Rate
Urban	2.5%
Compact	2.0%
Standard - Incorporated	1.7%
Standard - Unincorporated	4.9%

Source: Ohio Department of Taxation, 2014; Strategic Economics, 2014.

- 3. Annual general fund and public safety commercial property tax revenue were calculated per thousand square feet of space, by commercial land use and place type.** Strategic Economics multiplied the capitalized value of commercial land uses (by place type) per thousand square feet by the standard 35 percent assessment rate and the effective general fund and public safety property tax rate. This output the annual general fund and public safety property tax revenue per thousand square feet of commercial space, by land use and place type.

Figure 30: Annual General Fund and Public Safety Commercial Property Tax Revenue per Thousand Square Feet, by Land Use and Place Type

Place Type	Office	Retail	Industrial	Warehouse	Civic/ Institutional	Other
Urban	\$89	\$80	\$44	\$35	\$0	\$80
Compact	\$75	\$39	\$22	\$19	\$0	\$39
Standard - Incorporated	\$53	\$39	\$16	\$16	\$0	\$39
Standard - Unincorporated	\$175	\$133	\$41	\$40	\$0	\$133

Source: Strategic Economics, 2014.

Residential Property Tax Revenue

Strategic Economics calculated general fund and public safety property tax revenues per housing unit via the following steps:

- 1. Average value per ownership housing unit was calculated for each unit type and place type.** Strategic Economics purchased a data report from DataQuick showing median sales values per square foot of residential properties constructed and sold after 2010. The data was broken out for Mid-Ohio cities and included attached residential units, small-lot detached single-family units (less than 7,200 square foot lot), and large-lot single-family units (greater than 7,200 square foot lot). Strategic Economics grouped the cities by their place type exemplar categories, and the median sales per square foot rates were averaged for each unit type by place type. These sales per square foot rates were then multiplied by the average square feet per unit type and place type.

Figure 31: Average Value per New Ownership Housing Unit, by Unit Type and Place Type

Place Type	Rural	SF Large Lot	SF Small Lot	SF Attached/Townhome	Multi-Family
		Detached	Detached		
Urban	n/a	\$308,200	\$288,300	\$297,825	\$216,600
Compact	n/a	\$216,191	\$156,792	\$200,697	\$164,206
Standard - Incorporated	\$266,839	\$266,839	\$165,198	\$196,051	\$160,405
Standard - Unincorporated	\$294,067	\$294,067	\$175,210	\$201,992	\$160,405

Source: DataQuick, 2011-2014; Strategic Economics, 2014.

2. **Capitalized average values per rental multi-family housing units were calculated by place type.** Strategic Economics collected average rental rates per square foot of apartment buildings opened in 2009 or later, in Mid-Ohio cities, from CoStar. The cities were sorted by their exemplar place types, and a weighted average effective rental rate was calculated for each place type. Capitalized values per square foot by place type were calculated using the assumptions described in the Base Assumptions section of this report. These values were then multiplied by the multi-family unit size assumptions described in the Base Assumptions section of this report.

Figure 32: Average Value per New Multi-Family Rental Unit

Place Type	Value per Unit
Urban	\$189,952
Compact	\$139,299
Standard - Incorporated	\$135,604
Standard - Unincorporated	\$135,604

Source: Strategic Economics, 2014.

3. **Average values of multi-family housing units were calculated by place type.** Strategic Economics used U.S. Census data to examine the owner/renter tenure split in the Mid-Ohio region, as shown in the Base Assumptions. This tenure split was used to weight rental and owner property values for each place type and unit type to arrive at a weighted total value per multi-family housing unit.
4. **Average general fund and public safety property tax rates were calculated by place type.** General fund and public safety property tax apportionment rates were gathered from the Ohio Department of Taxation 2013 Property Tax Rate Abstract for each place type exemplar city. These rates were averaged for each place type, producing general fund and public safety property tax rates for residential properties (the rates were nearly identical to the commercial rates).

Figure 33: Average General Fund and Public Safety Residential Property Tax Rate by Place Type

Place Type	Rate
Urban	2.5%
Compact	2.0%
Standard - Incorporated	1.7%
Standard - Unincorporated	5.0%

Source: Ohio Department of Taxation, 2014; Strategic Economics, 2014.

5. Residential general fund and public safety property tax revenues were calculated.

Strategic Economics multiplied the housing unit values (by housing unit type and place type) by the standard 35 percent assessment rate and the effective general fund and public safety property tax rate. This produced annual general fund and public safety property tax revenue per residential unit, by unit type and place type. These amounts do not reflect the ten percent “non-business credit” (formerly the “10% rollback”) or the “owner occupancy credit” (formerly the “2 ½% rollback”) applied to some residential property taxes. While those credits reduce the amount paid by property owners, the state reimburses the lost revenues back to cities and townships (minus a nominal administrative fee). As of 2013, these credits no longer apply to new levies.

Figure 34: Annual General Fund and Public Safety Residential Property Tax Revenue per Unit Type and Place Type

Place Type	Rural	SF Large Lot Detached	SF Small Lot Detached	SF Attached/Townhome	Multi-Family (Rental and Owner)
Urban	n/a	\$274	\$256	\$265	\$184
Compact	n/a	\$152	\$111	\$142	\$109
Standard - Incorporated	\$161	\$161	\$100	\$118	\$91
Standard - Unincorporated	\$515	\$515	\$307	\$354	\$265

Source: Strategic Economics, 2014.

Sales Tax Revenue

Strategic Economics calculated sales tax revenue per housing unit via the following steps:

- 1. Gathered and updated sales tax revenue.** Strategic Economics gathered each county’s 2013 sales tax revenue. In order to account for Franklin County’s increased rate between 2013 and 2014, Strategic Economics converted sales tax revenue to taxable sales and applied the new rate.
- 2. Total sales tax revenue per housing unit was calculated.** Strategic Economics calculated taxable sales per household by dividing total seven-county taxable sales by the number of households in the seven-county region, resulting in annual total sales tax revenue of \$535.19 per future household. This amount was applied as the sales tax revenue per future housing unit.

Cost Assumptions and Methodology

This section describes the assumptions and methodology used to calculate the infrastructure and O&M costs.

Infrastructure Costs

Strategic Economics calculated infrastructure costs for the following major categories:

- Roads, or the costs of new roads required to serve development;
- Sewer, or the costs of wastewater facilities required to serve development; and
- Water, or the costs of water infrastructure required to serve development.

Strategic Economics calculated costs for sewer and water infrastructure using the following steps:

1. **Gathered connection fee data.** Strategic Economics gathered data on sewer and water connection fees for exemplar cities and townships. Very few cities have impact fees in place in Ohio, so impact fee data was not used for any of the infrastructure categories.
2. **Sewer and water infrastructure costs per housing unit and per 1,000 square feet of commercial space were calculated.** Strategic Economics used the connection fees as a proxy for sewer and water infrastructure costs. Per housing unit and per 1,000 square feet of commercial space amounts were calculated for all cities and townships for which data was available. The resulting amounts were averaged by place type. The average for each place type was applied as the sewer and water infrastructure cost per housing unit and per 1,000 square feet of commercial space.

Strategic Economics calculated costs for roads using the following steps:

1. **Gathered data on road costs.** Strategic Economics gathered data on road costs. Local data on road costs by mile and type was not available, so national costs by road type and location type were used. The road costs by road type were applied to the place types used in the analysis. Costs shown in Figure 35 were used in the analysis.

Figure 35: Road Costs Per Mile by Place Type

Road Type	Cost Per Mile
2-Lane Undivided Road – Standard Place Type	\$2 million
2-Lane Undivided Road – Compact Place Type	\$2 million
2-Lane Undivided Road – Urban Place Type	\$4 million

Source: American Road & Transportation Builders Association, 2014.

2. **Gathered data on road miles by unit type and place type.** Strategic Economics used examples from other regions for road miles by unit type and place type (Nashville, TN and San Mateo/Santa Clara counties, CA). Local data on road miles was not available.
3. **Road costs per housing unit and per 1,000 square feet of commercial space were calculated.** Strategic Economics used road costs by mile and place type, and data on road miles by unit type and place type to calculate road costs on a per housing unit and per 1,000 square feet of commercial space basis.

Operations and Maintenance Costs

Strategic Economics calculated O&M costs using the following steps:

1. **Gathered budget data for exemplar cities and townships.** O&M costs are based on actual general fund expenditures for the exemplar cities and townships shown in Figure 14 above.

Strategic Economics gathered budget data for all of the exemplar cities and townships except Berlin and Concord townships. In most cases budget documents were used, but in some cases Comprehensive Annual Financial Reports (CAFRs) were used. Budget data for counties was also collected.

2. Categorized O&M costs by city and township. Strategic Economics used the city and township budget information to compile general fund costs for the following major service areas:

- Community Service
- Engineering and Public Works
- General Government
- Fire
- Police/Sheriff

In order to provide a comparison for public safety costs, the analysis includes the costs for providing municipal police services for incorporated cities and the costs for providing county-provided sheriff services to unincorporated places. Sheriff costs that are provided on a countywide basis, such as jail costs, were excluded from the analysis.

3. Calculated service base. The service base is the population served by a city or township. To calculate O&M costs on a per capita basis, the existing service base – or “daytime population” of residents and workers – was established by applying a “Service Population Factor.” The residential service population was assumed to have a 1.0 factor, while the employment service population was assumed to have a 0.3 factor. Each worker is counted as producing 0.30 of the impacts of a resident for analytical purposes, since workers spend approximately a third of the time of a resident in the city, and are assumed to require fewer services in general (fire, police, etc.).

4. Calculated O&M costs on a per capita basis, per household, and per 1,000 square feet of commercial space. Strategic Economics divided general fund costs for each city and township by the service base for that city or township to calculate a per capita O&M cost. Those per capita costs were then averaged by place type to obtain the per capita cost assumptions for the fiscal model. Figure 36 and Figure 37 show the per capita and per worker costs for O&M by major service category and place type. Strategic Economics applied the average household sizes by housing unit type and employee density assumptions shown in Figure 16 and Figure 18 to calculate, per average costs per household and per 1,000 square feet of commercial space.

Figure 36: Per Capita Operations and Maintenance Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$128	\$169	\$217	\$61
Fire	\$232	\$140	\$134	\$243
Police/Sheriff	\$297	\$156	\$213	\$137
Community Service	\$51	\$61	\$81	\$17
Engineering and Public Works	\$66	\$57	\$145	\$17
Total	\$774	\$583	\$790	\$476

Source: Strategic Economics, 2014.

Figure 37: Per Worker Operations and Maintenance Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$38	\$51	\$65	\$18
Fire	\$70	\$42	\$40	\$73
Police/Sheriff	\$89	\$47	\$64	\$41
Community Service	\$15	\$18	\$24	\$5
Engineering and Public Works	\$20	\$17	\$43	\$5
Total	\$232	\$175	\$237	\$143

Source: Strategic Economics, 2014.

Full Results

This section provides the full results of the fiscal analysis for insight2050. The results are provided by land use and place type for all studied categories of revenues and costs.

Revenue

Revenues Associated with Commercial Space

Figures 39 through 41 show annual general fund revenues for commercial space, by land use and place type.

Figure 38: Annual General Fund Income Tax Revenue* per Thousand Square Feet of Commercial Space, by Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	\$5,178	\$4,288	\$3,945	\$0
Retail	\$940	\$778	\$727	\$0
Industrial	\$1,370	\$1,134	\$1,252	\$0
Warehouse	\$756	\$626	\$691	\$0
Civic/Institutional	\$2,631	\$2,179	\$1,924	\$0
Other	\$2,792	\$2,312	\$2,553	\$0

*Includes withholdings (place of work), individual filings (place of residence), and business profit income taxes.

Source: Strategic Economics, 2014.

Figure 39: Annual General Fund and Public Safety Commercial Property Tax Revenue per Thousand Square Feet, by Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	\$89	\$75	\$53	\$175
Retail	\$80	\$39	\$39	\$133
Industrial	\$44	\$22	\$16	\$41
Warehouse	\$35	\$19	\$16	\$40
Civic/Institutional	\$0	\$0	\$0	\$0
Other	\$80	\$39	\$39	\$133

Source: Strategic Economics, 2014.

Figure 40: Total Combined Annual General Fund and Public Safety Commercial Income & Property Tax Revenues per Thousand Square Feet, by Land Use and Place Type

Land Use	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Office	\$5,267	\$4,363	\$3,997	\$175
Retail	\$1,019	\$817	\$766	\$133
Industrial	\$1,413	\$1,156	\$1,268	\$41
Warehouse	\$791	\$645	\$707	\$40
Civic/Institutional	\$2,631	\$2,179	\$1,924	\$0
Other	\$2,872	\$2,351	\$2,592	\$133

Source: Strategic Economics, 2014.

Revenues Associated with Housing Units

Figures 42 and 43 show annual general fund revenues per housing unit, by land use and place type.

Figure 41: Annual General Fund and Public Safety Residential Property Tax Revenues per Unit Type and Place Type

	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Rural	n/a	n/a	\$161	\$515
SF Large Lot Detached	\$274	\$152	\$161	\$515
SF Small Lot Detached	\$256	\$111	\$100	\$307
SF Attached/ Townhome	\$265	\$142	\$118	\$354
Multi-Family	\$184	\$109	\$91	\$265

Source: Strategic Economics, 2014.

Figure 42: Annual County Sales Tax Revenue per Housing Unit

	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
All Housing Types	\$535	\$535	\$535	\$535

Source: Strategic Economics, 2014.

Costs

Infrastructure Costs Associated with Commercial Space

Figures 44 through 49 show infrastructure costs for each type of commercial land use studied by infrastructure category and place type.

Figure 43: Office Infrastructure Costs per 1,000 Square Feet, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$2,100	\$2,400	\$2,800	\$2,800
Sewer	\$1,400	\$1,200	\$1,200	\$3,300
Water	\$700	\$1,100	\$1,400	\$2,300
Total	\$4,200	\$4,700	\$5,400	\$8,400

Source: Strategic Economics, 2014.

Figure 44: Retail Infrastructure Costs per 1,000 Square Feet, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$2,100	\$2,400	\$2,800	\$2,800
Sewer	\$1,400	\$1,200	\$1,200	\$3,300
Water	\$700	\$1,100	\$1,400	\$2,300
Total	\$4,200	\$4,700	\$5,400	\$8,400

Source: Strategic Economics, 2014.

Figure 45: Industrial Infrastructure Costs per 1,000 Square Feet, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$1,800	\$2,000	\$2,400	\$2,400
Sewer	\$1,400	\$1,200	\$1,200	\$3,300
Water	\$700	\$1,100	\$1,400	\$2,300
Total	\$3,900	\$4,300	\$5,000	\$8,000

Source: Strategic Economics, 2014.

Figure 46: Warehouse Infrastructure Costs per 1,000 Square Feet, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$1,800	\$2,000	\$2,400	\$2,400
Sewer	\$1,400	\$1,200	\$1,200	\$3,300
Water	\$700	\$1,100	\$1,400	\$2,300
Total	\$3,900	\$4,300	\$5,000	\$8,000

Source: Strategic Economics, 2014.

Figure 47: Civic/Institutional Infrastructure Costs per 1,000 Square Feet, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$2,100	\$2,400	\$2,800	\$2,800
Sewer	\$1,400	\$1,200	\$1,200	\$3,300
Water	\$700	\$1,100	\$1,400	\$2,300
Total	\$4,200	\$4,700	\$5,400	\$8,400

Source: Strategic Economics, 2014.

Figure 48: Other Infrastructure Costs per 1,000 Square Feet, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$2,100	\$2,400	\$2,800	\$2,800
Sewer	\$1,400	\$1,200	\$1,200	\$3,300
Water	\$700	\$1,100	\$1,400	\$2,300
Total	\$4,200	\$4,700	\$5,400	\$8,400

Source: Strategic Economics, 2014.

Infrastructure Costs Associated with Housing Units

Figures 50 through 54 show infrastructure costs for each housing unit type studied by infrastructure category and place type.

Figure 49: Rural Lot Per Household Infrastructure Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	n/a	n/a	\$7,625	\$8,125
Sewer	n/a	n/a	\$4,900	\$0
Water	n/a	n/a	\$3,500	\$0
Total	n/a	n/a	\$16,025	\$8,125

Source: Strategic Economics, 2014.

Figure 50: Single Family Large-Lot Per Household Infrastructure Costs, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$5,300	\$5,300	\$6,100	\$6,500
Sewer	\$3,100	\$3,100	\$4,900	\$7,300
Water	\$3,500	\$2,800	\$3,500	\$6,500
Total	\$11,900	\$11,200	\$14,500	\$20,300

Source: Strategic Economics, 2014.

Figure 51: Single Family Small-Lot Per Household Infrastructure Costs, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$3,500	\$3,500	\$3,500	\$3,500
Sewer	\$3,100	\$3,100	\$4,900	\$7,300
Water	\$3,500	\$2,800	\$3,500	\$6,500
Total	\$10,100	\$9,400	\$11,900	\$17,300

Source: Strategic Economics, 2014.

Figure 52: Single Family Attached / Townhome Per Household Infrastructure Costs, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$2,600	\$3,000	\$3,500	\$3,500
Sewer	\$3,100	\$3,100	\$4,900	\$7,300
Water	\$3,500	\$2,800	\$3,500	\$6,500
Total	\$9,200	\$8,900	\$11,900	\$17,300

Source: Strategic Economics, 2014.

Figure 53: Multi-Family Per Household Infrastructure Costs, by Cost Category and Place Type

Infrastructure Type	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
Roads	\$1,500	\$2,200	\$2,900	\$2,900
Sewer	\$1,700	\$1,500	\$1,500	\$4,200
Water	\$900	\$1,400	\$1,700	\$2,900
Total	\$4,100	\$5,100	\$6,100	\$10,000

Source: Strategic Economics, 2014.

Operations and Maintenance Costs Associated with Commercial Space

Figures 55 through 60 show operations and maintenance costs for each type of commercial land use studied by cost category and place type.

Figure 54: Annual Office Operations and Maintenance Costs per 1,000 Square Feet, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$150	\$200	\$220	\$50
Fire	\$280	\$170	\$130	\$180
Police/Sheriff	\$360	\$190	\$210	\$100
Community Service	\$60	\$70	\$80	\$10
Engineering and Public Works	\$80	\$70	\$140	\$10
Total	\$930	\$700	\$780	\$350

Source: Strategic Economics, 2014.

Figure 55: Annual Retail Operations and Maintenance Costs per 1,000 Square Feet, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$70	\$90	\$100	\$30
Fire	\$130	\$80	\$60	\$110
Police/Sheriff	\$160	\$90	\$100	\$60
Community Service	\$30	\$30	\$40	\$10
Engineering and Public Works	\$40	\$30	\$70	\$10
Total	\$430	\$320	\$370	\$220

Source: Strategic Economics, 2014.

Figure 56: Annual Industrial Operations and Maintenance Costs per 1,000 Square Feet, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$40	\$60	\$70	\$20
Fire	\$80	\$50	\$40	\$80
Police/Sheriff	\$100	\$50	\$70	\$50
Community Service	\$20	\$20	\$30	\$10
Engineering and Public Works	\$20	\$20	\$50	\$10
Total	\$260	\$200	\$260	\$170

Source: Strategic Economics, 2014.

Figure 57: Annual Warehouse Operations and Maintenance Costs per 1,000 Square Feet, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$20	\$30	\$40	\$10
Fire	\$40	\$30	\$30	\$50
Police/Sheriff	\$60	\$30	\$40	\$30
Community Service	\$10	\$10	\$20	\$3
Engineering and Public Works	\$10	\$10	\$30	\$3
Total	\$140	\$110	\$160	\$97

Source: Strategic Economics, 2014.

Figure 58: Annual Civic/Institutional Operations and Maintenance Costs per 1,000 Square Feet, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$100	\$130	\$130	\$40
Fire	\$170	\$100	\$80	\$150
Police/Sheriff	\$220	\$120	\$130	\$80
Community Service	\$40	\$50	\$50	\$10
Engineering and Public Works	\$50	\$40	\$90	\$10
Total	\$580	\$440	\$480	\$290

Source: Strategic Economics, 2014.

Figure 59: Annual Other Operations and Maintenance Costs per 1,000 Square Feet, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$190	\$250	\$330	\$90
Fire	\$350	\$210	\$200	\$360
Police/Sheriff	\$450	\$230	\$320	\$210
Community Service	\$80	\$90	\$120	\$30
Engineering and Public Works	\$100	\$90	\$220	\$30
Total	\$1,170	\$870	\$1,190	\$720

Source: Strategic Economics, 2014.

Operations and Maintenance Costs Associated with Housing Units

Figures 61 through 65 show operations and maintenance costs for each housing unit type studied by cost category and place type.

Figure 60: Annual Rural Lot Per Household Operations and Maintenance Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	n/a	n/a	\$530	\$150
Fire	n/a	n/a	\$330	\$600
Police/Sheriff	n/a	n/a	\$520	\$340
Community Service	n/a	n/a	\$200	\$40
Engineering and Public Works	n/a	n/a	\$350	\$40
Total	n/a	n/a	\$1,930	\$1,170

Source: Strategic Economics, 2014.

Figure 61: Annual Single Family Large-Lot Per Household Operations and Maintenance Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$310	\$410	\$530	\$150
Fire	\$570	\$340	\$330	\$600
Police/Sheriff	\$730	\$380	\$520	\$340
Community Service	\$120	\$150	\$200	\$40
Engineering and Public Works	\$160	\$140	\$350	\$40
Total	\$1,890	\$1,420	\$1,930	\$1,170

Source: Strategic Economics, 2014.

Figure 62: Annual Single Family Small-Lot Per Household Operations and Maintenance Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$310	\$410	\$530	\$150
Fire	\$570	\$340	\$330	\$600
Police/Sheriff	\$730	\$380	\$520	\$340
Community Service	\$120	\$150	\$200	\$40
Engineering and Public Works	\$160	\$140	\$350	\$40
Total	\$1,890	\$1,420	\$1,930	\$1,170

Source: Strategic Economics, 2014.

Figure 63: Annual Single Family Attached / Townhome Per Household Operations and Maintenance Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$270	\$360	\$460	\$130
Fire	\$490	\$300	\$280	\$510
Police/Sheriff	\$630	\$330	\$450	\$290
Community Service	\$110	\$130	\$170	\$40
Engineering and Public Works	\$140	\$120	\$310	\$40
Total	\$1,640	\$1,240	\$1,670	\$1,010

Source: Strategic Economics, 2014.

Figure 64: Annual Multi-Family Per Household Operations and Maintenance Costs, by Cost Category and Place Type

Cost Category	Urban	Compact	Standard - Incorporated	Standard - Unincorporated
General Government	\$220	\$290	\$370	\$110
Fire	\$400	\$240	\$230	\$420
Police/Sheriff	\$510	\$270	\$370	\$240
Community Service	\$90	\$110	\$140	\$30
Engineering and Public Works	\$110	\$100	\$250	\$30
Total	\$1,330	\$1,010	\$1,360	\$830

Source: Strategic Economics, 2014.