Impact Fee Program

CANTON







Capital Improvements Element

City of Canton Georgia

Including the following public facility categories:

Fire Protection
Police Services
Parks and Recreation
Road Improvements

March 21, 2019

ROSS+associates
urban planning & plan implementation
in association with **Hatley Plans LLC**

City of Canton
State of Georgia

Resolution No. 2019-10

A RESOLUTION TO ADOPT THE CAPITAL IMPROVEMENTS ELEMENT AMENDMENT CANTON 2040 - 10 YEAR UPDATE

WHEREAS, the City of Canton previously adopted a Capital Improvements Element In 2010; and

WHEREAS, the City of Canton has drafted a Capital Improvements Element amendment; and

WHEREAS, the draft Capital Improvements Element amendment was prepared in accordance with the "Development Impact Fee Compliance Requirements" and the "Minimum Planning Standards and Procedures for Local Comprehensive Planning" adopted by the Board of Community Affairs pursuant to the Georgia Planning Act of 1989, and a duly advertised Public Hearing was held on November 1, 2018, at 6:00 p.m. in the City of Canton City Hall, 110 Academy Street, Canton, Georgia;

BE IT HEREBY RESOLVED that the Mayor and Council does authorize the transmittal of the draft Capital Improvements Element amendment to the Atlanta Regional Commission for Regional and State review, as per the requirements of the Development Impact Fee Compliance Requirements adopted pursuant to the Georgia Planning Act of 1989.

ADOPTED this 21st day of March 2019

Gene Hobgood, Mayor

Attest:

Annie ~~Mullinax, Interim~~ Fortner City Clerk

Approved as to Form and Content: _____

Robert M. Dyer, City Attorney

First Reading	_____	Adopted by Council	_____
Approved by Mayor	_____	Veto by Mayor	_____
Second Vote by Council	_____	Effective Date	_____

Introduction

The purpose of a Capital Improvements Element (CIE) is to establish where and when certain new capital facilities will be provided within a jurisdiction and the extent to which they may be financed through an impact fee program. This Capital Improvements Element addresses parks & recreation, fire protection, law enforcement and road improvements.

As required by the Georgia Development Impact Fee Act ("State Act" of "DIFA"), and defined by the Department of Community Affairs in its *Development Impact Fee Compliance Requirements*, the CIE must include the following for each capital facility category for which an impact fee will be charged:

- a **projection of needs** for the planning period—2018 to 2040;
- the designation of **service areas**—the geographic area in which a defined set of public facilities provide service to development within the area;
- the designation of **levels of service** (LOS)—the service level that is being and/or will be provided;
- a **schedule of improvements** listing impact fee related projects and costs for the twenty-year planning period;
- a description of **funding sources** for the twenty-year planning period;

Impact Fees Authorized

Impact fees are authorized in Georgia pursuant to O.C.G.A. §36-71-1 et seq., the *Georgia Development Impact Fee Act* (DIFA), and are administered by the Georgia Department of Community Affairs under Chapter 110-12-2, *Development Impact Fee Compliance Requirements*, of the Georgia Administrative Code. Under DIFA, the City can collect money from new development based on that development's proportionate share—the 'fair share'—of the cost to provide the facilities needed specifically to serve new development. This includes the categories of public safety and parks. Revenue for such facilities can be produced from new development in two ways: through future taxes paid by the homes and businesses that growth creates, and through an impact fee assessed as new development occurs.

Categories for Assessment of Impact Fees

To assist in paying for the high costs of expanding public facilities and services to meet the needs of projected growth and to ensure that new development pays a reasonable share of the costs of public facilities, Canton is updating its impact fees for public safety facilities (fire and police), parks & recreation, and road improvements. The sections in this CIE provide population and employment

forecasts and detailed information regarding the inventory of current facilities, the level of service, and detailed calculations of the impact cost for the specific public facilities.

The following table shows the facility categories that are eligible for impact fee funding under Georgia law and that are considered in this report. The service area for each public facility category—that is, the geographical area served by the facility category—is also given, along with what the level of service standard, to be established for each facility category, is based.

Overview of Impact Fee Program Facilities

	Fire Protection	Police Services	Parks and Recreation	Road Improvements
Eligible Facilities	Fire stations, fire trucks & general vehicles	Administrative facility space, major equilment	Park acres, recreation components (ballfields, trails etc.).	Road projects serving Canton residents and workers
Service Area	Citywide	Citywide	Citywide	Citywide
Level of Service Standard Based on …	Square footage and number of vehicles per day-night population	Square footage major equipment per day-night population	Number of acres and recreation components per dwelling unit	LOS "D" for entire road network
Historic Funding Source(s)	General Fund, Impact Fees	General Fund, Impact Fees	General Fund, Impact Fees	General Fund, Impact Fees

Terms used in the Overview Table:

Eligible Facilities under the State Act are limited to capital items having a life expectancy of at least ten years, such as land, buildings and certain vehicles. Impact fees cannot be used for the maintenance, supplies, personnel salaries, or other operational costs, or for short-term capital items such as computers, furniture or most automobiles. None of these costs are included in the impact fee system.

Service Areas are the geographic areas that the facilities serve, and the areas within which the impact fee can be collected. Monies collected in a service area for a particular category may only be spent for that purpose, and only for projects that serve that service area.

Level of Service Standards are critical to determining new development's fair share of the costs. The same standards must be applied to existing development as well as new to assure that each is paying only for the facilities that serve it. New development cannot be required to pay for facilities at a higher standard than that available to existing residents and businesses, nor to subsidize existing facility deficiencies.

Funding Sources include both impact fee collections and General Fund tax collections, depending on the proportion of impact fee eligibility. Impact fees will be used to fund all or a portion of eligible impact fee costs. Tax collections include the City's normal annual property tax levy and any special levies for debt instruments (such as bonds) that are intended to provide funding for impact fee projects in whole or in part; the General Fund may be used also as an interim source pending reimbursement from impact fee collections. SPLOST funds may be applied as a primary source of partial funding in accordance with an approved SPLOST program, which is established with each new SPLOST authorization and is not an historically consistent source.

Editorial Conventions

This report observes the following conventions:

- The capitalized word 'City' applies to the government of Canton, the City Council or any of its departments or officials, as appropriate to the context. An example is "the City has adopted an impact fee ordinance".
- The lower case word 'city' refers to the geographical area of Canton, as in "the population of the city has grown".
- The same conventions are applied to the words 'County' and 'county', 'State' and 'state'.
- Single quote marks (' and ') are used to highlight a word or phrase that has a particular meaning or refers to a heading in a table.
- Double quote marks (" and ") are used to set off a word or phrase that is a direct quote taken from another source, such as a passage or requirement copied directly from a law or report.

Numbers shown on tables are often rounded from the actual calculation of the figures for clarity, but the actual calculated number of decimal points is retained within the table for accuracy and further calculations.

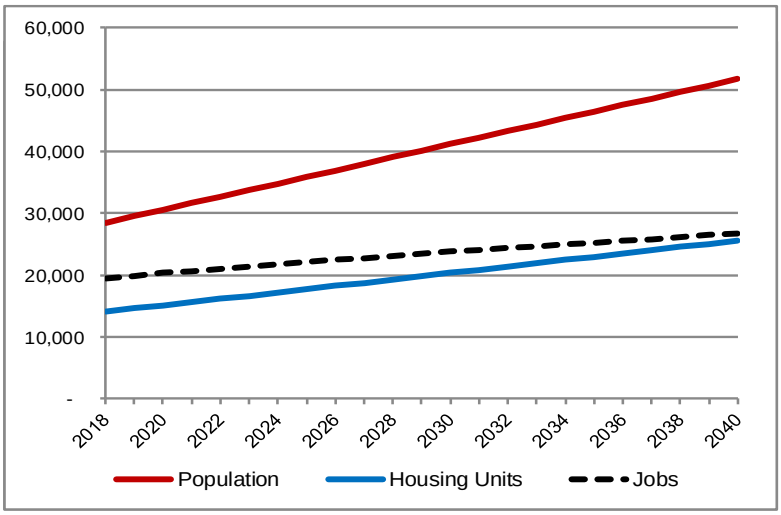
Future Growth

Continuing past trends, Canton is expected to grow at a steady pace with regard to population and housing. Over the coming twenty plus years, the city is expected to almost double its number of residents, increasing by almost 82% over 2018 (and representing 45% of the 2040 population). Housing to meet the demands of these new families and individuals are forecast to add slightly more than 11,500 units.

Employment in Canton is also expected to grow notably, attracting over 7,300 new jobs by 2040 (almost a 38% increase).

Forecasts of Future Growth

Year	Population	Housing Units	Jobs
2018	28,457	14,057	19,405
2019	29,516	14,581	19,858
2020	30,574	15,103	20,311
2021	31,633	15,626	20,662
2022	32,691	16,149	21,012
2023	33,750	16,672	21,363
2024	34,808	17,195	21,713
2025	35,867	17,718	22,064
2026	36,925	18,241	22,415
2027	37,984	18,764	22,765
2028	39,042	19,286	23,116
2029	40,101	19,809	23,466
2030	41,159	20,332	23,817
2031	42,218	20,855	24,107
2032	43,277	21,378	24,397
2033	44,335	21,901	24,688
2034	45,394	22,424	24,978
2035	46,452	22,947	25,268
2036	47,511	23,470	25,558
2037	48,569	23,993	25,848
2038	49,628	24,516	26,139
2039	50,686	25,038	26,429
2040	51,745	25,561	26,719



	Population	Housing Units	Jobs
2018	28,457	14,057	19,405
2040	51,745	25,561	26,719
Increase	23,288	11,504	7,314
Percent	81.8%	81.8%	37.7%

The Appendix to this report details the forecasting methodologies used for the city.

Detailed forecasts of the City's population, housing units and employment are presented in the next section.

Forecasts

In order to accurately calculate the demand for future services for Canton, new growth and development must be quantified in future projections. These projections include forecasts for population, households, housing units, and employment to the year 2040. These projections provide the baseline conditions from which the current (2018) Level of Service calculations are produced. Also, projections are combined to produce what is known as 'day-night population'. This is a method that combines resident population and employees in a service area to produce an accurate picture of the total number of persons that rely on certain 24-hour services, such as fire protection. The projections used for each public facility category are specified in each public facility chapter.

Accurate projections of population, households, housing units, and employment are important in that:

- Population data and forecasts are used to establish current and future demand for services standards where the Level of Service (LOS) is per capita based.
- Household data and forecasts are used to forecast future growth in the number of housing units.
- Housing unit data and forecasts relate to certain service demands that are household based, such as parks, and are used to calculate impact costs when the cost is assessed when a building permit is issued. The number of households—defined as *occupied* housing units—is always smaller than the supply of available housing units. Over time, however, each housing unit is expected to become occupied by a household, even though the unit may become vacant during future re-sales or turnovers.
- Employment forecasts are refined to reflect 'value added' employment figures. This reflects an exclusion of jobs considered to be transitory or non-site specific in nature, and thus not subject to the issuance of building permits and impact fee collections.
- 'Value added' employment data is combined with population data to produce 'day-night population' figures. These figures represent the total number of persons receiving services, both in their homes and in their businesses, particularly from 24-hour operations such as fire protection and law enforcement.

Population and Housing Unit Forecasts

Table 1 presents the forecasts for population for each year from 2018 to 2040 and provides the forecasts for housing units over the same period.

Table 1: Population and Housing Unit Forecasts

	Population	Housing Units
2018	28,457	14,057
2019	29,516	14,581
2020	30,574	15,103
2021	31,633	15,626
2022	32,691	16,149
2023	33,750	16,672
2024	34,808	17,195
2025	35,867	17,718
2026	36,925	18,241
2027	37,984	18,764
2028	39,042	19,286
2029	40,101	19,809
2030	41,159	20,332
2031	42,218	20,855
2032	43,277	21,378
2033	44,335	21,901
2034	45,394	22,424
2035	46,452	22,947
2036	47,511	23,470
2037	48,569	23,993
2038	49,628	24,516
2039	50,686	25,038
2040	51,745	25,561
Increase: 2018-2040	**23,288**	**11,504**

The figures shown on Table 1 are, in essence, mid-year estimates reflecting Census Bureau practice. In other words, the increase in population between 2018 and 2040 would actually be from July 1, 2018 to June 30, 2040.

For a more detailed description of the methodologies used in preparing the population, household and housing unit forecasts, see the Appendix to this report.

Employment Forecasts

Table 2 shows the forecasts for employment growth in Canton, from 2018 to 2040. The employment figures for Canton are based on the city's proportional share of total county employment in 2010. This forecast method is used in that it is expected that Canton will continue to be the major center of employment in the county into the future.

Table 2: Employment Forecasts

	Total Employment	Value-Added Employment
2018	23,808	19,405
2019	24,406	19,858
2020	25,004	20,311
2021	25,450	20,662
2022	25,897	21,012
2023	26,343	21,363
2024	26,789	21,713
2025	27,236	22,064
2026	27,682	22,415
2027	28,128	22,765
2028	28,574	23,116
2029	29,021	23,466
2030	29,467	23,817
2031	29,837	24,107
2032	30,207	24,397
2033	30,578	24,688
2034	30,948	24,978
2035	31,318	25,268
2036	31,688	25,558
2037	32,058	25,848
2038	32,429	26,139
2039	32,799	26,429
2040	33,169	26,719
Increase: 2018-2040	**9,361**	**7,314**

NOTE: Value-Added Employment is Total employment, less farm, forestry and construction workers.

In Table 2, the total employment figures are refined to produce what is referred to as 'value added' jobs. The 'value added' jobs category is a refinement that excludes any employment that is considered to be transitory in nature, such as agricultural and construction employment. This is done to better measure the services being provided by the City, which in this report will be measured and, ultimately, assessed based on structures. Transitory employment does not require a structure to be built to house the employment, and so does not come under the assessment of impact fees.

Service Area Projections

In Table 3 the service area forecasts are presented for a single citywide service area measured in two ways: citywide housing units and citywide day-night population.

Table 3: Service Area Forecasts

	Housing Units	Day-Night Population*
2018	14,057	47,862
2019	14,581	49,374
2020	15,103	50,885
2021	15,626	52,295
2022	16,149	53,703
2023	16,672	55,113
2024	17,195	56,521
2025	17,718	57,931
2026	18,241	59,340
2027	18,764	60,749
2028	19,286	62,158
2029	19,809	63,567
2030	20,332	64,976
2031	20,855	66,325
2032	21,378	67,674
2033	21,901	69,023
2034	22,424	70,372
2035	22,947	71,720
2036	23,470	73,069
2037	23,993	74,417
2038	24,516	75,767
2039	25,038	77,115
2040	25,561	78,464
Increase: 2018-2040	**11,504**	**30,602**

* The residential population plus Value-Added Employment for a 24-hour service population.

The day-night population calculation is a combination of the population projections and future value-added employment information. The use of day-night population in impact cost and impact fee calculations is based upon the clear rational nexus between persons and services demanded.

The day-night population is used to determine Level of Service standards for facilities that serve both the resident population and business employment. The Fire Department, for instance, protects one's house from fire whether or not they are at home, and protects stores and offices whether or not they are open for business. Thus, this 'day-night' population is a measure of the total services demanded of a 24-hour service provider facility and a fair way to allocate the costs of such a facility among all of the beneficiaries.

The figures on Table 3 are the figures that will be used in subsequent public facility category chapters to calculate impact costs and fees.

Fire Protection

Introduction

In 2016, the City and Cherokee County formally consolidated fire protection services through a 50-year Fire and Emergency Services Consolidation Agreement. Effective January 1, 2017 the Cherokee County Fire and Emergency Services Agency began providing fire protection and emergency services for the entire city. These services include fire suppression, rescue, hazardous materials response, fire prevention, investigation, emergency medical services, and administrative services.

Table 4: Fire Protection System Improvements

Description	Square Feet or # Vehicles
Existing System Improvements	
Buildings	
Fire Station 3 (Harmony on the Lake)	9,700
Fire Station 9 (North Canton)	2,050
Fire Station 11 (South Canton)	2,550
Fire Station 16 (Downtown Canton)	2,778
Total Existing Floor Area	**17,078**
*Fire Apparatus**	
Pumper Truck	4
Aerial Truck	2
Rescue Vehicle	1
Ambulance	3
Total Fire Apparatus	**10**
Planned System Improvements	
Buildings	
Fire Station 9 Replacement	10,000
Fire Station 16 Replacement	10,000
Bluffs Parkway Station	10,000
Hwy 20 Station (Station 29)	10,000
Total Planned Floor Area	**40,000**
*Fire Apparatus**	
Pumper Truck	4
Aerial Truck	2
Ambulance	3
Total Planned Apparatus	**9**
Total Existing and Future System	
Total Floor Area	**57,078**
Total Vehicles	**19**

* Vehicles having a service life of 10 years or more.

The capital value of fire protection is based upon fire stations, administrative office space, and fire apparatus. The current inventory of 'system improvements' (buildings and vehicles having a useful life of 10 years or more) includes former Canton Fire Department fire stations that continue to serve the city under the terms of the Consolidation Agreement. Currently, fire protection is provided by facilities with a combined square footage of 17,078 utilizing a total of 10 vehicles, as shown in Table 4. Administrative functions also occupy space within the fire stations. In addition, system improvements are listed that are proposed to serve the growing city for the next 20 years to 2040. These include two fire station replacement projects to better serve existing needs and also meet future growth demands. Both Stations 9 and 16 are proposed to be replaced with significantly larger buildings, and existing square footage will continue to accommodate some fire protection-related functions. In addition, future construction of two

new stations is proposed for Bluffs Parkway and Highway 20.

Service Area

The Fire and Emergency Services Agency operates as a coordinated system, with each station backing up the other stations in the system. The backing up of another station is not a rare event; it is the essence of good fire protection planning. All stations do not serve the same types of land uses, nor do they all have the same apparatus. It is the strategic placement of personnel and equipment that is the backbone of good fire protection. Any new or station would relieve some of the demand on the other stations. Since the stations would continue to operate as 'backups' to the other stations, everyone in the city would benefit by the construction of the new station since it would reduce the 'backup' times the station nearest to them would be less available. For these reasons the entire city is considered a single service area for the provision of fire protection because all residents and employees within this area have equal access to the benefits of the program.

Level of Service

The level of service for fire protection in Canton is measured in terms of number of fire apparatus and the number of square feet of fire station/administrative space, per day/night population in the service area.

Table 5: Level of Service Calculations – Current and Future

Facility	Service Population	Level of Service
Existing Square Feet	2018 Day/Night Population	Square Feet per 2018 Day/Night Population
17,078	47,862	0.356818
Existing Fire Apparatus	2018 Day/Night Population	Apparatus per 2018 Day/Night Population
10	47,862	0.000209
Future System: Floor Area	2040 Day/Night Population	Square Feet per 2040 Day/Night Population
57,078	78,464	0.727442
Future System: Vehicles	2040 Day/Night Population	Apparatus per 2040 Day/Night Population
19	78,464	0.000242

Day/night population is used as a measure in that fire protection is a 24-hour service provided continuously to both residences and businesses in the service area.

Table 5 presents the calculation of the Level of Service (LOS) for both the current inventory of facilities and vehicles, and for the system as proposed to serve the city for the next 20 years. For reasons that will be explained below, the LOS figures based on the future 2040 day-night population are recommended as the adopted Level of Service.

■ Forecasts for Service Area

Future Demand

The applicable Level of Service standards from Table 5 calculates the demand for future facilities to serve new growth and development for both the 'current' LOS and for the system as proposed for the future.

Table 6: Future Demand Calculation

Level of Service	Future Population	New Growth Demand
Square Feet per 2018 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Square Feet Demanded**
0.3568	30,602	10,919
Apparatus per 2018 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Fire Apparatus Demanded***
0.000209	30,602	6.39
Square Feet per 2040 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Square Feet Demanded**
0.7274	30,602	22,261
Apparatus per 2040 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Fire Apparatus Demanded****
0.000242	30,602	7.41

* Seven vehicles would be needed to meet future demand, 6 of which would be 100% eligible for impact fee funding. The seventh would be 39% impact fee eligible.

** Eight vehicles would be needed to meet future demand, 7 of which would be 100% eligible for impact fee funding. The eighth would be 41% impact fee eligible.

As shown previously in Table 4, a total of 40,000 square feet of new space is proposed to adequately serve the city in the future, including both current and future residents and businesses. As a result, each of the two approaches reveals a current shortfall in space serving the current day/night population. If the LOS based on the existing system is used to determine future demand, only 10,919 sf is needed to serve future growth and development (27% of the total proposed), leaving almost three-quarters (72.7%) to be funded by the existing tax base.

Alternately, if funding of the future proposed system is fairly apportioned between current residents and businesses and new growth and development, the portion of the new space requiring funding from the existing tax base falls to less than half (44.3%).

Note that, because only 'whole' vehicles can be purchased, more new vehicles would need to be added to the inventory than are technically demanded by new growth—7 new vehicles to meet the

current LOS calculations and 8 to meet the demands for the future system. Most of these vehicles would be 100% eligible for impact fee funding; the 7th and 8th, respectively, would be partially eligible for impact fee funding, as noted in Table 6. Any additional vehicle would exceed the number needed to meet future demand and is thus is not eligible for impact fee funding.

Future Costs

This Section examines both the total cost of the increased facility floor area and number of fire apparatus needed to provide the proposed fire system of the future, and the extent to which these costs are impact fee-eligible.

The proposed system improvements are listed on Table 7, and are 'scheduled' for construction or acquisition in the appropriate years.

Table 7: Future System Improvement Costs

Year	Buildings			Vehicles		
	Facility	Square Footage	2018 Cost*	Type	Number	2018 Cost**
2018		-	-		-	-
2019	Fire Station 9 Replacement	10,000	$ 3,382,000	Pumper	1	$ 470,000
2020	Fire Station 16 Replacement	10,000	$ 3,500,000	Aerial	1	$ 1,200,000
				Pumper	1	$ 470,000
				Ambulance	1	$ 225,000
2021		-	-		-	-
2022		-	-		-	-
2023		-	-		-	-
2024		-	-		-	-
2025	Bluffs Parkway Station	10,000	$ 3,500,000	Pumper	1	$ 470,000
				Ambulance	1	$ 225,000
2026		-	-		-	-
2027		-	-		-	-
2028	Hwy 20 Station	10,000	$ 3,500,000	Aerial	1	$ 1,200,000
				Pumper	1	$ 470,000
				Ambulance	1	$ 225,000
2029		-	-		-	-
2030		-	-		-	-
2031		-	-		-	-
2032		-	-		-	-
2033		-	-		-	-
2034		-	-		-	-
2035		-	-		-	-
2036		-	-		-	-
2037		-	-		-	-
2038		-	-		-	-
2039		-	-		-	-
2040		-	-		-	-
Totals		**40,000**	**$ 13,882,000**		**9**	**$ 4,955,000**

* Facility cost estimates based on information provided by Cherokee County Fire and Emergency Services Agency.

** Vehicle costs are estimated using current prevailing rates for similar vehicles equipped to local specifications.

The total cost figures from Table 7 are then converted to 'impact fee eligible' costs (in 2018 dollars) based on the percentage that each improvement is impact fee eligible. As noted above, 7 of the vehicles are 100% eligible under the adopted LOS. An eighth vehicle is 41% impact fee eligible, and the ninth vehicle proposed for purchase by the Cherokee County Fire and Emergency Services Agency would not be eligible for impact fee funding. Since only 22,261 square feet (55.7%) of the proposed 40,000 sf are impact fee eligible, the costs of the fire stations proposed to be constructed after Fire Station 16 are reduced accordingly. These calculations are shown on Table 8.

Table 8: Impact Fee Cost Calculations

Year	Costs in 2018 Dollars			Net Present Value*	Costs in 2018 Dollars			Net Present Value*
	Building Costs	% Impact Fee Eligible	Total Impact Fee Eligible		Vehicle Costs	% Impact Fee Eligible	Total Impact Fee Eligible	
2018	$ -		$ -	$ -	$ -	-	$ -	$ -
2019	$ 3,382,000	100%	$ 3,382,000	$ 3,428,525.54	$ 470,000	100%	$ 470,000	$ 476,170.15
2020	$ 3,500,000	100%	$ 3,500,000	$ 3,596,960.06	$ 1,200,000	100%	$ 1,200,000	$ 1,231,713.95
					$ 470,000	100%	$ 470,000	$ 482,421.30
					$ 225,000	100%	$ 225,000	$ 230,946.36
2021	-		-	-	-	-	-	-
2022	-		-	-	-	-	-	-
2023	-		-	-	-	-	-	-
2024	-		-	-	-	-	-	-
2025	$ 3,500,000	24.11%	$ 843,680	$ 928,355.42	$ 470,000	100%	$ 470,000	$ 514,929.77
					$ 225,000	100%	$ 225,000	$ 246,508.93
2026	-		-	-	-	-	-	-
2027	-		-	-	-	-	-	-
2028	$ 3,500,000	0%	-	-	$ 1,200,000	100%	$ 1,200,000	$ 1,367,175.63
					$ 470,000	41.03%	$ 192,818	$ 219,680.47
					$ 225,000	0%	-	-
2029	-		-	-	-	-	-	-
2030	-		-	-	-	-	-	-
2031	-		-	-	-	-	-	-
2032	-		-	-	-	-	-	-
2033	-		-	-	-	-	-	-
2034	-		-	-	-	-	-	-
2035	-		-	-	-	-	-	-
2036	-		-	-	-	-	-	-
2037	-		-	-	-	-	-	-
2038	-		-	-	-	-	-	-
2039	-		-	-	-	-	-	-
2040	-		-	-	-	-	-	-
Totals	**$ 13,882,000**	**55.7%**	**$ 7,725,680**	**$ 7,953,841.02**	**$ 4,955,000**		**$ 4,452,818**	**$ 4,769,546.56**

* Net Present Value (NPV) = 2018 cost estimate for buildings inflated to target year using the ENR Building Cost Index (BCI), and the Consumer Price Index (CPI) for vehicles, all reduced to NPV using the Discount Rate.

The Net Present Value of the cost estimates for new fire stations are calculated by increasing the current (2018) estimated construction costs using the Engineering News Record's 10-year average building cost inflation (BCI) rate, and then discounting this future amount back to 2018 dollars using the Net Discount Rate. For non-construction improvements (fire vehicles), the currently estimated

costs are inflated to their target years using the 10-year average CPI and then reduced using the Net Discount Rate to produce the Net Present Value. (The approaches to calculating NPV are explained in detail in the Cost Adjustments and Credits Chapter of this report.)

Police Services

Introduction

The Canton Police Department provides primary law enforcement throughout the city. Through a variety of active law enforcement, community outreach and educational programs, the Police Department serves the entire population and all businesses within the city.

Service Area

The city is considered a single service area for the provision of primary police services because all residents and employees in the city have equal access to the benefits of the program.

Level of Service

The level of service for police services in Canton is measured in terms of the number of square feet of occupied facility space, the number of major vehicles, and the number of "pursuit management systems"[1] per day-night population in the service area.

Table 9: Law Enforcement System Inventory

Description	Quantity
Existing System Improvements	
Buildings	
Police Department	**10,000**
*Major Vehicles**	**2**
Pursuit Management System	**2**
Planned System Improvements**	
Buildings	
Police Department***	**15,500**
Pursuit Management System	**4**
Total Existing and Future System	
Buildings	
Police Department	**25,500**
Pursuit Management System	**6**

* Vehicles having a service life of 10 years or more.
** Improvements proposed to serve the city through 2040; a definitive number of vehicles is not known at this time.
*** Total project is 25,500 sq.ft.; area shown excludes existing 'replacement' space (10,000 sq. ft.)

Table 9 presents a current inventory of these components. This inventory includes 10,000 square foot in building space (Police Department), 2 vehicles that have a life of at least ten years (administrative use; excludes patrol vehicles), and 2 pursuit management systems.

The table also lists system improvements that are proposed to serve the growing city for the next 20+ years to 2040. These include a larger relocated space for the Police Department in the former City Hall building and 4 additional pursuit management systems. The new Police Department will occupy 25,500

[1] A tracking system whereby a compressed air launcher on a police patrol vehicle deploys a GPS-embedded projectile, which adheres to a suspect's vehicle. Each system has a service life of ten years or more.

square feet of space, effectively replacing 10,000 square feet of existing floor area that the Police Department currently occupies under cramped conditions and adding another 15,000 square feet. By adding 4 pursuit management systems to the inventory, there will be sufficient systems in place for each patrol shift, which can stay in operation from year to year regardless of changes to the fleet of patrol vehicles. Proposed improvements do not include a specific number of major vehicles, as needs may change over time and will be evaluated on an annual basis by the Police Department.

Table 10: Level of Service Calculation

Facility	Service Population	Level of Service
Existing Square Feet	**2018 Day/Night Population**	**Square Feet per 2018 Day/Night Population**
10,000	47,862	0.208934
Existing Vehicles	**2018 Day/Night Population**	**Vehicles per 2018 Day/Night Population**
2	47,862	0.000042
Existing Pursuit Management Systems	**2018 Day/Night Population**	**Systems per 2018 Day/Night Population**
2	47,862	0.000042
Future System: Floor Area	**2040 Day/Night Population**	**Square Feet per 2040 Day/Night Population**
25,500	78,464	0.324990
Future System: Pursuit Management Systems	**2040 Day/Night Population**	**Systems per 2040 Day/Night Population**
6	78,464	0.000076

Table 10 presents the calculation of the Level of Service (LOS) for both the current 'system' inventory, and for the system as proposed to serve the city for the next 20+ years, with the exception of vehicles (as noted in the previous section).

Day/night population is used as a measure in that the Police Department provides continuous, 24-hour service to both residences and businesses in the service area.

For reasons that will be explained below, the LOS figures based on the future 2040 day/night population are recommended as the adopted Level of Service for floor area and the pursuit management system.

■ Forecasts for Service Area

Future Demand

The applicable Level of Service standards from Table 10 are multiplied by the forecasted day/night population increases to produce the expected future demand in Table 11. The 'day/night population increase' figures are taken from Table 3.

Table 11: Future Demand Calculation

Level of Service	Future Population	New Growth Demand
Square Feet per 2018 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Square Feet for New Growth**
0.208934	30,602	6,394
Vehicles per 2018 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Vehicles for New Growth***
0.000042	30,602	1.28
Systems per 2018 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Systems for New Growth****
0.000042	30,602	1.28
Square Feet per 2040 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Square Feet for New Growth**
0.324990	30,602	9,945
Systems per 2040 Day/Night Population	**Day/Night Population Increase (2018-40)**	**Net New Systems for New Growth*****
0.000076	30,602	2.34

* 1 vehicle will be added; it is 100% impact fee eligible.
** 1 system that is 100% eligible for impact fee funding can be added. A second system that is 27.88% eligible can be added
*** 2 systems that are 100% eligible for impact fee funding can be added. A third system that is 34.01% eligible can be added, and a fourth will be 0% impact fee eligible.

Following the format of Table 10, Table 11 calculates the demand for future facilities to serve new growth and development for both the 'current' LOS and for the system (specifically, the facility space and pursuit management system components) as proposed for the future.

As shown previously in Table 9, a total of 25,500 square feet of space is proposed to adequately serve the city in the future, including both current and future residents and businesses. As a result, each of the two approaches reveals a current shortfall in space serving the current day/night population. If the LOS based on the existing system is used to determine future demand, only 6,394 sf is needed to serve future growth and development (41% of the total proposed), leaving over half (58.7%) to be funded by the existing tax base.

Alternately, if funding of the future proposed system is fairly apportioned between current residents and businesses and new growth and development, the portion of the new space requiring funding from the existing tax base falls to just over a third (35.8%).

Note that, because only 'whole' pursuit management systems can be purchased (as opposed to the 2.34 that are technically needed to meet future demand), 2 that are 100% impact fee eligible can be purchased, and a third will be 34.0% eligible. The purchase of a fourth system will bring the

City's total to 6 systems in accordance with the need identified by the Police Department. However, this fourth system exceeds the number needed to meet future demand and will not be eligible for impact fee funding.

With respect to vehicles, one 100% impact fee eligible vehicle will be purchased, as shown on Table 12 in the next section.

Future Costs

This Section examines both the total cost of the increased facility floor area and number of heavy vehicles and pursuit management systems needed to provide the proposed police system of the future, and the extent to which these costs are impact fee-eligible.

The proposed system improvements are listed on Table 12, and are 'scheduled' for construction or acquisition in the appropriate years.

Table 12: Future System Improvement Costs

Year	Facility	Buildings		Major Vehicles		Pursuit Management Systems	
		Square Feet*	2018 Cost**	Number	2018 Cost***	Number	2018 Cost****
2018							
2019	Police Station	15,500	$ 1,519,608			2	$ 12,000
2020						1	$ 6,000
2021				1	$ 350,000	1	$ 6,000
2022							
2023							
2024							
2025							
2026							
2027							
2028							
2029							
2030							
2031							
2032							
2033							
2034							
2035							
2036							
2037							
2038							
2039							
2040							
	Totals	**15,500**	**$ 1,519,608**	**1**	**$ 350,000**	**4**	**$ 24,000**

* Excludes 'replacement space' of the area (10,000 sq.ft.) currently occupied by the Police Department.
** Cost estimate to renovate former City Hall space for the Police Department is based on information provided by the City of Canton.
*** Vehicle costs based on prevailing rates for similar vehicles ("mobile command center") equipped to City specifications.
**** Cost estimates based on prevailing rates for similar systems that have been purchased by the City.

The total cost figures from Table 12 are then converted to 'impact fee eligible' costs (in 2018 dollars) based on the percentage that each improvement is impact fee eligible. As noted above, the proposed heavy vehicle (a "mobile command center") is 100% eligible under the adopted LOS. Two of the pursuit managements systems are fully eligible, and a third is 34.01% impact fee eligible. Only 9,945 square feet (64.2%) of the "new" 15,500 square feet to be added to the "existing" 10,000 square feet is impact fee eligible. These calculations are shown on Table 13.

Table 13: Project Costs to Meet Future Demand

Year	Costs in 2018 Dollars			Net Present Value*	Costs in 2018 Dollars			Net Present Value*	Costs in 2018 Dollars			Net Present Value*
	Building Costs	% Impact Fee Eligible	Total Impact Fee Eligible		Vehicle Costs	% Impact Fee Eligible	Total Impact Fee Eligible		Pursuit Management System Costs	% Impact Fee Eligible	Total Impact Fee Eligible	
2018	$ -		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -
2019	$ 1,519,608	64.2%	$ 975,000	988,412.89	-		-	-	$ 12,000	100%	$ 12,000	$ 12,157.54
2020	-		-	-	-		-	-	$ 6,000	34.01%	$ 2,040	$ 2,094.40
2021	-		-	-	$ 350,000	100%	350,000	$ 363,966.12	$ 6,000	0%	-	-
2022	-		-	-	-		-	-	-		-	-
2023	-		-	-	-		-	-	-		-	-
2024	-		-	-	-		-	-	-		-	-
2025	-		-	-	-		-	-	-		-	-
2026	-		-	-	-		-	-	-		-	-
2027	-		-	-	-		-	-	-		-	-
2028	-		-	-	-		-	-	-		-	-
2029	-		-	-	-		-	-	-		-	-
2030	-		-	-	-		-	-	-		-	-
2031	-		-	-	-		-	-	-		-	-
2032	-		-	-	-		-	-	-		-	-
2033	-		-	-	-		-	-	-		-	-
2034	-		-	-	-		-	-	-		-	-
2035	-		-	-	-		-	-	-		-	-
2036	-		-	-	-		-	-	-		-	-
2037	-		-	-	-		-	-	-		-	-
2038	-		-	-	-		-	-	-		-	-
2039	-		-	-	-		-	-	-		-	-
2040	-		-	-	-		-	-	-		-	-
Totals	**$ 1,519,608**	**64.2%**	**$ 975,000**	**$ 988,412.89**	**$ 350,000**		**$ 350,000**	**$ 363,966.12**	**$ 24,000**		**$ 14,040**	**$ 14,251.94**

* Net Present Value (NPR) = 2018 cost estimate for buildings inflated to target year using the ENR Building Cost Index (BCI), and the Consumer Price Index (CPI) for vehicles and emergency power systems, all reduced to NPV using the Discount Rate.

The Net Present Value of the cost estimate for new Police Department space is calculated by increasing the current (2018) estimated construction costs using the Engineering News Record's 10-year average building cost inflation (BCI) rate, and then discounting this future amount back to 2018 dollars using the Net Discount Rate. For non-construction improvements (mobile command center and pursuit management systems), the currently estimated costs are inflated to their target years using the 10-year average CPI and then reduced using the Net Discount Rate to produce the Net Present Value. (The approaches to calculating NPV are explained in detail in the Cost Adjustments and Credits Chapter of this report.)

Parks and Recreation

Introduction

Public recreational opportunities are available in Canton through a number of parks facilities maintained by the City's Public Works Department. Demand for recreational facilities is almost exclusively related to the city's resident population. Businesses make some incidental use of public parks for office events, company softball leagues, etc., but the use is minimal compared to that of the families and individuals who live in the city. Thus, the parks and recreation impact fee is limited to future residential growth.

Service Area

The parks and recreation facilities maintained by the City are operated as a citywide system. Facilities are provided equally to all residents, and collectively cover a wide range of recreational opportunities, from leisure and picnicking, to organized sports events on baseball fields, to walking or biking on trails. Thus, the entire city is considered a single service area for parks and recreation services provided by the City.

Level of Service

The determination of Level of Service (LOS) standards begins with an inventory of existing City facilities, which is shown on Table 14.

Table 14: Current Inventory of Parks and Recreation Components

Park Facility	Acreage
Boling Park	20.00
Juniper Dog Park	2.73
Etowah River Park	102.96
Heritage Park	48.29
Burge Park	0.85
McCanless Park	2.00
Brown Park	1.00
Cannon Park	0.75
Harmon Park	3.00
Total Park Acres	**181.58**

Recreation Component	Current Inventory
Baseball Field	5
Multi-Purpose Field*	9
Multi-Purpose Court**	10
Playground	7
Picnic Pavilion	4
Gazebo	1
Restroom Building	2
Consessions Stand	1
Storage/Maintenance Building	1
Canoe/Kayak Launch	1
Amphitheater	1
Parking Spaces	528
Walking Trail (miles)	3

* Includes Dog Park, field space used for multiple sports, and open field areas
** Includes tennis, basketball, and racquetball courts

Table 15 provides the current Level of Service in recreation land and facilities per population, converts this to the Level of Service per the number of housing units occupied by that population, and then expresses the Level of Service per housing unit (since impact fees are assessed per housing unit when building permits are issued, not population).

The current Level of Service standards are expressed in terms of the number of people each recreation component serves. To determine the LOS, the number of people served by each component is calculated using the current inventory for the component divided into the current population. Exceptions are outdoor gyms, splash pads, community pavilions, trailheads, and walking trails. The city intends to add 1 outdoor gym, 1 splash pad, and 1 community pavilion to its park system to meet local needs through 2040, resulting in a current LOS of 1 of each of these components per 51,745 residents (the projected population in 2040). The city also plans to add trailheads to its inventory, consistent with its plans to significantly expand its trail network. In these instances, the current LOS is based on the total number of trailheads and the number of miles of trails that are anticipated to serve local needs through 2040. This scenario equates to 1 trailhead per 10,349 residents and 1 mile per 5,000 residents.

Table 15: Current Level of Service Calculations

Component Type	Current Level of Service*	Level of Service per "X" Housing Units**	Level of Service per Each Housing Unit***
Park Acres	1 per 157 Population =	1 per 77.41 Housing Units =	0.012918 for each Housing Unit
Baseball Field	1 per 5,691 Population =	1 per 2,811.40 Housing Units =	0.000356 for each Housing Unit
Multi-Purpose Field	1 per 3,162 Population =	1 per 1,561.89 Housing Units =	0.000640 for each Housing Unit
Multi-Purpose Court	1 per 2,846 Population =	1 per 1,405.70 Housing Units =	0.000711 for each Housing Unit
Playground	1 per 4,065 Population =	1 per 2,008.14 Housing Units =	0.000498 for each Housing Unit
Picnic Pavilion	1 per 7,114 Population =	1 per 3,514.25 Housing Units =	0.000285 for each Housing Unit
Gazebo	1 per 28,457 Population =	1 per 14,057.00 Housing Units =	0.000071 for each Housing Unit
Restroom Building	1 per 14,229 Population =	1 per 7,028.50 Housing Units =	0.000142 for each Housing Unit
Consessions Stand	1 per 28,457 Population =	1 per 14,057.00 Housing Units =	0.000071 for each Housing Unit
Storage/Maintenance Building	1 per 28,457 Population =	1 per 14,057.00 Housing Units =	0.000071 for each Housing Unit
Canoe/Kayak Launch	1 per 28,457 Population =	1 per 14,057.00 Housing Units =	0.000071 for each Housing Unit
Amphitheater	1 per 28,457 Population =	1 per 14,057.00 Housing Units =	0.000071 for each Housing Unit
Parking Spaces	1 per 54 Population =	1 per 26.62 Housing Units =	0.037566 for each Housing Unit
Outdoor Gym	1 per 51,745 Population =	1 per 25,560.65 Housing Units =	0.000039 for each Housing Unit
Community Pavilion	1 per 51,745 Population =	1 per 25,560.65 Housing Units =	0.000039 for each Housing Unit
Splash Pad	1 per 51,745 Population =	1 per 25,560.65 Housing Units =	0.000039 for each Housing Unit
Trailhead	1 per 10,349 Population =	1 per 5,112.13 Housing Units =	0.000196 for each Housing Unit
Walking Trail (miles)	1 per 5,081 Population =	1 per 2,509.95 Housing Units =	0.000398 for each Housing Unit

* LOS is based on the current inventory divided by the current population, with the exception that the level of service for outdoor gyms, community pavilions, splash pads, trailheads, and walking trails is based on the number of each that are anticipated to serve local needs through 2040.
** Converted using average population per housing unit in 2018.
*** "1" divided by the number of housing units for each component under 'Level of Service per "X" Housing Units' column.

These LOS 'per population' standards are then re-calculated as the number of housing units served by each component based on the city's number of people living in an average household (the average household size). Since impact fees are assessed at the time a building permit is issued (and the impact fee will be applied only to residential uses), the LOS then must be converted to a 'per housing unit' basis.

Table 15 shows how the current level of service for each recreation component is converted to a 'per housing unit' basis. To do this, the current LOS shown in the middle columns of 1 per a 'certain number of' housing units for each component is converted to the LOS per housing unit by dividing the number into '1', which produces the number of components serving each housing unit'.

By way of example, the current LOS for playgrounds is 1 per 4,065 people. That number—4,065—is divided by the 2018 average household size to convert 'people' into 'housing units'. The result is the converted standard of 1 playground per 2,008.14 housing units. By dividing the component (1) by the number of housing units it serves results in the portion of a playground that serves 1 housing unit (0.000498).

■ Forecasts for Service Area

Future Demand Table 16 applies the Level of Service calculations from

Table 15 to determine the facilities needed to meet the demand created by the existing residents of the city as well as the future demand for park lands and recreation components that will be generated by new growth and development.

Table 16: Existing and Future Demand

Component Type	LOS Per Housing Unit	Existing Demand (2018)*	New Growth Demand (2018-2040)**
Park Acres	0.012918	181.59	148.61
Baseball Field	0.000356	5.00	4.09
Multi-Purpose Field	0.000640	9.00	7.37
Multi-Purpose Court	0.000711	10.00	8.18
Playground	0.000498	7.00	5.73
Picnic Pavilion	0.000285	4.00	3.27
Gazebo	0.000071	1.00	0.82
Restroom Building	0.000142	2.00	1.64
Consessions Stand	0.000071	1.00	0.82
Storage/Maintenance Building	0.000071	1.00	0.82
Canoe/Kayak Launch	0.000071	1.00	0.82
Amphitheater	0.000071	1.00	0.82
Parking Spaces	0.037566	528.06	432.16
Outdoor Gym	0.000039	0.55	0.45
Community Pavilion	0.000039	0.55	0.45
Splash Pad	0.000039	0.55	0.45
Trailhead	0.000196	2.75	2.25
Walking Trail (miles)	0.000398	5.60	4.58

* 2018 Housing Units = 14,057
** New Units (2018-2040) = 11,504

The current number of housing units (14,057) is multiplied by the level of service (LOS) standard to determine existing demand. Since existing demand is used in the calculation of current LOS standards, existing demand figures on Table 16 are the same as the 'current inventory' figures on Table 14 (with the exception of outdoor gyms, community pavilions, splash pads, and trailheads -- since none currently exist -- and walking trails due to future demand being used in the LOS calculation).

The increase in housing units between 2018 and 2040 (11,504) is multiplied by the same LOS to produce the future demand created by future growth.

Impact Fee Eligibility

New recreation components are eligible for impact fee funding only to the extent that the improvements are needed to specifically serve new growth and development, and only at the level of service applicable citywide. Table 17 shows the number of new recreation components that are needed to satisfy both current and future needs of the city's residents, and the extent to which fulfillment of those needs will serve future growth demand.

The table begins with the current inventory of recreation components, and the 'existing' demand for those components to meet the needs of the current (2018) population based on the current level of service standards (shown on Table 16). The 'excess or (shortfall)' column compares the existing demand to the current inventory for each recreation component. As noted above, 'existing demand' is the same as the 'current inventory' in all but five cases (outdoor gyms, community pavilions, splash pads, trailheads and walking trails).

Table 17: Future Park Facility Impact Fee Eligibility

Component Type	Current Inventory	Existing Demand	Excess or (Shortfall)	New Growth Demand	Net Total Needed	Total Needed*	% Impact Fee Eligible
Park Acres	181.6	181.6	0	148.61	148.61	148.61	100.00%
Baseball Field	5	5.00	0	4.09	4.09	4	100.00%
Multi-Purpose Field	9	9.00	0	7.37	7.37	7	100.00%
Multi-Purpose Court	10	10.00	0	8.18	8.18	3	100.00%
Playground	7	7.00	0	5.73	5.73	6	95.48%
Picnic Pavilion	4	4.00	0	3.27	3.27	3	100.00%
Gazebo	1	1.00	0	0.82	0.82	1	81.84%
Restroom Building	2	2.00	0	1.64	1.64	2	81.84%
Consessions Stand	1	1.00	0	0.82	0.82	1	81.84%
Storage/Maintenance Building	1	1.00	0	0.82	0.82	1	81.84%
Canoe/Kayak Launch	1	1.00	0	0.82	0.82	1	81.84%
Amphitheater	1	1.00	0	0.82	0.82	1	81.84%
Parking Spaces	528	528.00	0	432.16	432.16	432	100.00%
Outdoor Gym	0	0.55	(0.55)	0.45	1.00	1	45.01%
Community Pavilion	0	0.55	(0.55)	0.45	1.00	1	45.01%
Splash Pad	0	0.55	(0.55)	0.45	1.00	1	45.01%
Trailhead	0	2.75	(2.75)	2.25	5.00	5	45.01%
Walking Trail (miles)	3	5.60	(2.60)	4.58	7.18	7.18	63.80%

* For recreation components that can only be built in whole numbers: 'Total Needed' rounded to nearest whole number.
For park acres and walking trails, actual number shown.

If an 'excess' were to exist, that would mean that more components (or portions of components) exist than are needed to meet the demands of the current population, and those 'excesses' would create capacity to meet the recreational needs of future growth. This is not the case in Canton.

Conversely, a 'shortfall' indicates that there are not enough components (or portions of components) to meet the recreational needs of the current population based on the current LOS (e.g., outdoor gym, community pavilion, splash pad, trailheads, and walking trails).

The column on Table 17 labeled 'new growth demand', shows the total demand for recreation components specifically to meet future growth needs (from Table 16), and the 'net total needed' shows all existing and future needs combined. The current 'shortfall' (outdoor gym, community pavilion, splash pad, trailheads, and walking trails) adds to new growth's needs with facilities to bring the current population up to the current level of service required to be available to all—both current and future residents.

For each component except for trail miles and park acreage, the 'total needed' column is rounded to the nearest whole number. This is simply because the City cannot build a portion of a facility, it must build entire facilities. As a result, the '% impact fee eligible' column may reflect a percentage less than 100%.

For example, new growth mathematically demands 1.64 new restroom buildings. The City cannot build a portion of a restroom; it must build an entire facility for it to be usable. Thus 2 restroom buildings need to be added, and the portion of the 2 new buildings that is impact fee eligible (1.64) results in the percentage that is impact fee eligible (81.84%); the remainder is excess capacity available to serve new growth beyond the current planning horizon. As such, the excess capacity could be recouped through impact fees at that time but cannot be charged to new growth between now and 2040.

Conversely, in some cases the 'net total needed' figure is rounded down to the nearest whole number. For example, new growth demand for picnic pavilions is only 3.27. To round that number up to '4' would result in three picnic pavilions being 100% impact fee eligible and the other only 12% eligible. In these cases, it makes more sense from a public expenditures standpoint to fund only three pavilions with impact fees (at 100% eligible) now and to delay the construction of a fourth pavilion until a future date when new impact fee calculations (a revised CIE with a horizon extended beyond 2040) would more fully justify a fourth pavilion.

■ Future Costs

Table 18 is a listing of the future capital project costs to provide additional recreation components in order to attain or address the current level of service standards, using the approach as described above. The figures in the 'components proposed' column are drawn from the 'total needed' column in Table 17.

Recreation component costs are based on previous City expenditures (in 2018 dollars) for similar facilities, where available, or on historic and comparable averages in other Metro-area communities where local estimates are not available.

The 'total cost (2018)' figures on the table are converted to 'new growth share (2018)' dollars based on the percentage that each improvement is impact fee eligible (from Table 17). Note that this

affects several recreation components to the extent that partial components identified in the 'net total needed' column of Table 17 had to be rounded to whole components, creating an 'overage' portion of those component types.

Table 18: Costs of Future Parks and Recreation Components

Component Type	Total Proposed	Net Cost Per Unit*	Gross Cost Per Unit**	Total Cost (2018)	% Impact Fee Eligible	New Growth Share (2018)	Net Present Value***
Park Acres	148.61	$ 32,233	$ 39,324	$ 5,844,029	100.00%	$ 5,844,029	6,834,142.64
Baseball Field	4	$ 294,100	$ 358,802	$ 1,435,208	100.00%	$ 1,435,208	1,932,632.80
Multi-Purpose Field	7	$ 176,500	$ 215,330	$ 1,507,310	100.00%	$ 1,507,310	2,029,724.43
Multi-Purpose Court	3	$ 50,000	$ 61,000	$ 183,000	100.00%	$ 183,000	246,425.47
Playground	6	$ 150,000	$ 183,000	$ 1,098,000	95.48%	$ 1,048,349	1,411,693.70
Picnic Pavilion	3	$ 59,000	$ 71,980	$ 215,940	100.00%	$ 215,940	254,412.55
Gazebo	1	$ 10,274	$ 12,534	$ 12,534	81.84%	$ 10,258	12,085.57
Restroom Building	2	$ 75,000	$ 91,500	$ 183,000	81.84%	$ 149,764	176,446.38
Consessions Stand	1	$ 65,000	$ 79,300	$ 79,300	81.84%	$ 64,898	76,460.10
Storage/Maintenance Building	1	$ 150,000	$ 183,000	$ 183,000	81.84%	$ 149,764	176,446.38
Canoe/Kayak Launch	1	$ 28,620	$ 34,916	$ 34,916	81.84%	$ 28,575	38,478.54
Amphitheater	1	$ 325,000	$ 396,500	$ 396,500	81.84%	$ 324,489	436,952.19
Parking Spaces	432	$ 1,900	$ 2,318	$ 1,001,376	100.00%	$ 1,001,376	1,348,440.16
Outdoor Gym	1	$ 115,000	$ 140,300	$ 140,300	45.01%	$ 63,144	85,029.41
Community Pavilion	1	$ 250,000	$ 305,000	$ 305,000	45.01%	$ 137,270	161,726.89
Splash Pad	1	$ 500,000	$ 610,000	$ 610,000	45.01%	$ 274,541	369,693.07
Trailhead	5	$ 2,500,000	$ 3,050,000	$ 15,250,000	45.01%	$ 6,863,519	9,242,326.84
Walking Trail (miles)							
Heritage Park Trail	*0.36*	Project cost=	$ 120,000	$ 120,000	63.80%	$ 76,561	103,095.85
Etowah River Park Trail Extension	*0.68*	Project cost=	$ 6,500,000	$ 6,500,000	63.80%	$ 4,147,046	5,584,358.65
Etowar River Trail Phase 1	*1.26*	Project cost=	$ 2,250,000	$ 2,250,000	63.80%	$ 1,435,516	1,933,047.23
Etowar River Trail Phase 2	*0.28*	Project cost=	$ 750,000	$ 750,000	63.80%	$ 478,505	644,349.08
Etowar River Trail Phase 4A	*2.61*	Project cost=	$ 11,225,000	$ 11,225,000	63.80%	$ 7,161,629	9,643,757.83
Etowar River Trail Phase 4B	*0.16*	Project cost=	$ 850,000	$ 850,000	63.80%	$ 542,306	730,262.29
Etowar River Trail Phase 5	*0.73*	Project cost=	$ 1,100,000	$ 1,100,000	63.80%	$ 701,808	945,045.31
Etowar River Trail Phase 6	*0.30*	Project cost=	$ 850,000	$ 850,000	63.80%	$ 542,306	730,262.29
Etowar River Trail Phase 7	0.80	Project cost=	$ 2,000,000	$ 2,000,000	63.80%	$ 1,276,014	1,718,264.20
Walking Trails (total miles)	7.18						
			Totals	**$ 54,124,414**		**$ 35,663,123**	**$ 46,865,559.83**

* Cost estimates are based on known or comparable facility costs.
** Includes contingency at 15% and architectural/engineering services at 7%.
*** Construction dates vary. NPV based on CPI or BCI as appropriate, in an average construction year of 2030.

The Net Present Value of the 'new growth share (2018)' cost figure on Table 18 for each component is calculated as follows:

Since the annual 'pace' of component construction over the 2018-2040 period is not known, an 'average' year of 2030 is used for Net Present Value calculations—some improvements will occur earlier for less, and some later at greater cost. All will average out.

To calculate the Net Present Value of the impact fee eligible cost estimate for the construction of the recreation components, the NPVs are calculated by increasing the current (2018) estimated construction costs using Engineering News Record's (ENR) 10-year average building cost inflation

(BCI) rate for buildings (such as recreation centers) and the 10-year average CPI rate for all other projects. All project costs are then reduced to current NPV dollars using the Net Discount Rate.

Road Improvements

Introduction

The information in this chapter is derived from road project information reflecting currently on-going and proposed road projects.

Service Area

The service area for these road projects is defined as the entire city, in that these road projects are recognized as providing primary access to all properties within the city as part of the citywide network of principal streets and thoroughfares. All new development within the city will be served by this citywide network, such that improvements to any part of this network to relieve congestion or to otherwise improve capacity will positively affect capacity and reduce congestion throughout the city.

Level of Service Standards

Level of Service for roadways and intersections is measured on a 'letter grade' system that rates a road within a range of service from A to F. Level of Service A is the best rating, representing unencumbered travel; Level of Service F is the worst rating, representing heavy congestion and long delays. This system is a means of relating the connection between speed and travel time, freedom to maneuver, traffic interruption, comfort, convenience and safety to the capacity that exists in a roadway. This refers to both a quantitative measure expressed as a service flow rate and an assigned qualitative measure describing parameters. *The Highway Capacity Manual, Special Report 209*, Transportation Research Board (1985), defines Level of Service A through F as having the following characteristics:

1. LOS A: free flow, excellent level of freedom and comfort;
2. LOS B: stable flow, decline in freedom to maneuver, desired speed is relatively unaffected;
3. LOS C: stable flow, but marks the beginning of users becoming affected by others, selection of speed and maneuvering becomes difficult, comfort declines at this level;
4. LOS D: high density, but stable flow, speed and freedom to maneuver are severely restricted, poor level of comfort, small increases in traffic flow will cause operational problems;
5. LOS E: at or near capacity level, speeds reduced to low but uniform level, maneuvering is extremely difficult, comfort level poor, frustration high, level unstable; and
6. LOS F: forced/breakdown of flow. The amount of traffic approaching a point exceeds the amount that can transverse the point. Queues form, stop & go. Arrival flow exceeds discharge flow.

The traffic volume that produces different Level of Service grades differs according to road type, size, signalization, topography, condition and access.

Level of Service

The City has set its Level of Service for road improvements at LOS 'D', a level to which it will strive ultimately. However, interim road improvement projects that do not result in a LOS of 'D' will still provide traffic relief to current and future traffic alike and are thus eligible for impact fee funding.

All road improvement projects benefit existing and future traffic proportionally to the extent that relief from over-capacity conditions eases traffic problems for everyone. For example, since new growth by 2040 will represent a certain portion of all 2040 traffic, new growth would be responsible for that portions' cost of the road improvements.

It is noted that the cost-impact of non-Canton generated traffic on the roads traversing the city (cross commutes) is off-set by state and federal assistance. The net cost of the road projects that accrues to Canton reasonably represents (i.e., is 'roughly proportional' to) the impact on the roads by Canton residents and businesses.

The basis for the road impact fee would therefore be Canton's cost for the improvements divided by all traffic in 2040 (existing today plus new growth)—i.e., the cost per trip—times the traffic generated by new growth alone. For an individual land use, the cost per trip (above) would be applied to the number of trips that will be generated by the new development when a building permit is issued, assuring that new growth would only pay its 'fair share' of the road improvements that serve it.

Forecasts for Service Area

Projects that provide road capacity that will serve new growth have been identified by the City and are shown on Table 19. This is not a list of all City road projects. These projects were selected for inclusion in the City's impact fee program because the specific improvements proposed will increase traffic capacity and reduce congestion to some extent, whether through road widening, improved intersection operations or upgraded signalization.

The cost figures shown in the first four columns of Table 19 are in current (2018) dollars. These figures are then calculated in Net Present Value (as discussed in the Cost Adjustments and Credits chapter) and shown in the last column, based on the anticipated year of project expenditure.

Table 19: Road Projects and Estimated Costs

Project Description	Total Cost	Total City Cost*	Impact Fees Expended**	Net City Cost	Projected Year of Completion***	Net Present Value****
SR Business 5 Intersection Improvements	$ 1,647,000.00	$ 1,647,000.00	-	$ 1,647,000.00	2023	$ 1,864,409.50
Reservoir Drive	$ 5,281,474.00	$ 5,281,474.00	-	$ 5,281,474.00	2007	$ 4,020,593.70
Heard Road Extension	$ 1,525,736.00	$ 1,525,736.00	-	$ 1,525,736.00	2025	$ 1,814,956.35
Business Hwy. 5 - Marietta Hwy.	$ 10,000,000.00	$ 10,000,000.00	-	$ 10,000,000.00	2027	$ 12,500,456.54
Bluffs Parkway	$ 2,288,377.00	$ 2,288,377.00	-	$ 2,288,377.00	2006	$ 1,699,390.06
Prominence Boulevard-Keeter Road	$ 3,661,632.00	$ 3,661,632.00	-	$ 3,661,632.00	2021	$ 3,944,421.52
Northside-Cherokee Blvd. (ie Commerce Blvd.)	$ 8,137,257.00	$ 8,137,257.00	$ 110,831.00	$ 8,026,426.00	2011	$ 6,747,383.81
Eastside Connector	$ 8,928,930.00	$ 8,928,930.00	-	$ 8,928,930.00	2025	$ 10,621,508.71
Main and North Streets 2-Way Conversions	$ 3,000,000.00	$ 3,000,000.00	-	$ 3,000,000.00	2025	$ 3,568,683.61
Canton Transportation Plan	$ 150,000.00	$ 150,000.00	-	$ 150,000.00	2020	$ 157,626.90
Reinhardt College Parkway (SR20) Study	$ 130,000.00	$ 130,000.00	-	$ 130,000.00	2019	$ 133,264.02
	$ 44,750,406.00	$ 44,750,406.00	$ 110,831.00	$ 44,639,575.00		$ 47,072,694.73

* Total cost of project less grants or other non-city assistance.

** Impact fees collected prior to 2018 and expended on project.

*** Reservoir Drive, Bluffs Parkway, and Northside-Cherokee Blvd. have been completed. Development credits continue to be granted as impact fees are collected.

**** Net Present Value = 2018 cost estimate inflated to target year using the ENR Construction Cost Index, reduced to 2018 NPV using the Discount Rate.

Eligible Costs

As discussed thoroughly in the Methodology: Trip Generation section of the Technical Appendix, new growth and development will represent 34.2% of the traffic on Canton's road network in 2040. To that extent, new growth's fair share of the road project costs that are attributed to new growth are shown on the following table.

Table 20: Eligible Cost Calculation

Project	Net Present Value	% Impact Fee Eligible*	New Growth Cost
SR Business 5 Intersection Improvements	$ 1,864,409.50	34.2%	$ 637,628.05
Reservoir Drive	$ 4,020,593.70	34.2%	$ 1,375,043.05
Heard Road Extension	$ 1,814,956.35	34.2%	$ 620,715.07
Business Hwy. 5 - Marietta Hwy.	$ 12,500,456.54	34.2%	$ 4,275,156.14
Bluffs Parkway	$ 1,699,390.06	34.2%	$ 581,191.40
Prominence Boulevard-Keeter Road	$ 3,944,421.52	34.2%	$ 1,348,992.16
Northside-Cherokee Blvd. (ie Commerce Blvd.)	$ 6,747,383.81	34.2%	$ 2,307,605.26
Eastside Connector	$ 10,621,508.71	34.2%	$ 3,632,555.98
Main and North Streets 2-Way Conversions	$ 3,568,683.61	34.2%	$ 1,220,489.79
Canton Transportation Plan	$ 157,626.90	34.2%	$ 53,908.40
Reinhardt College Parkway (SR20) Study	$ 133,264.02	34.2%	$ 45,576.29
	$ 47,072,694.73		$ 16,098,861.59

* See the *Methodology: Trip Generation* section in the Technical Appendix.

Community Work Program

5-Year Work Program: Impact Fee Eligible Projects

Project Description	2019	2020	2021	2022	2023	Cost Estimate	Funding Source	Responsible Party
Fire Protection								
Fire Station 9	x					$3,382,000	100% Impact Fees	Cherokee Co. Fire and Emergency Services
Pumper Truck	x					$470,000	100% Impact Fees	Cherokee Co. Fire and Emergency Services
Fire Station 16		x				$3,500,000	100% Impact Fees	Cherokee Co. Fire and Emergency Services
Pumper Truck		x				$470,000	100% Impact Fees	Cherokee Co. Fire and Emergency Services
Aerial Truck		x				$1,200,000	100% Impact Fees	Cherokee Co. Fire and Emergency Services
Ambulance		x				$225,000	100% Impact Fees	Cherokee Co. Fire and Emergency Services
Police Services								
Police Station	x					$1,519,608	64.2% Impact Fees; SPLOST	Canton Police Dept.
Pursuit Management System (2 units)	x					$12,000	100% impact fees	Canton Police Dept.
Pursuit Management System (1 unit)		x				$6,000	34.01% Impact Fees; General Fund	Canton Police Dept.
Mobile Command Vehicle			x			$350,000	100% Impact Fees	Canton Police Dept.

Project Description	2019	2020	2021	2022	2023	Cost Estimate	Funding Source	Responsible Party
Parks and Recreation								
Heritage Park Trail	x					$120,000	63.8% Impact Fees; SPLOST	Canton Public Works Dept.
Heritage Park Outdoor Gym		x				$140,300	45.01% Impact Fees; General Fund; SPLOST	Canton Public Works Dept.
Heritage Park Playground		x				$183,000	95.48% Impact Fees; General Fund; SPLOST	Canton Public Works Dept.
Heritage Park Splash Pad			x			$610,000	45.01% Impact Fees; General Fund; SPLOST	Canton Public Works Dept.
Heritage Park Restroom Building			x			$91,500	81.84% Impact Fees; General Fund; SPLOST	Canton Public Works Dept.
Heritage Park Community Pavilion				x		$305,000	45.01% Impact Fees; General Fund; SPLOST	Canton Public Works Dept.
Etowah River Park Trail Extension	x	x				$6,500,000	63.8% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.
Etowah River Trail Phase 1 (Heritage Park to Cherokee High)	x	x	x			$2,250,000	63.8% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.
Etowah River Trail Phase 2 (Cherokee High to Boling Park)		x	x			$750,000	63.8% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.
Boling Park Trailhead			x	x		$3,050,000	45.01% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.
Etowah River Trail Phase 4A				x	x	$11,225,000	63.8% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.
Etowah River Trail Phase 4B	x	x	x	x	x	$850,000	63.8% Impact Fees; SPLOST; General Fund; Grants	Canton Public Works Dept.
Etowah River Trail Phase 5					x	$1,100,000	63.8% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.

Project Description	2019	2020	2021	2022	2023	Cost Estimate	Funding Source	Responsible Party
Etowah River Trail Phase 6 (Harmon Park Connection)					x	$850,000	63.8% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.
Etowah River Trail Phase 7					x	$2,000,000	63.8% Impact Fees; SPLOST; LWCF; General Fund	Canton Public Works Dept.
Road Improvements								
Reinhardt College Parkway (SR20) Study	x					$130,000	34.2% Impact Fees; SPLOST; General Fund; Cherokee Co.	Canton Community Dev. Dept.
Canton Transportation Plan	x	x				$150,000	34.2% Impact Fees; SPLOST; General Fund	Canton Community Dev. Dept.
Prominence Boulevard-Keeter Road widening	x	x	x			$3,661,632	34.2% Impact Fees; SPLOST; Developer	Canton Community Dev. Dept.
Business Hwy. 5 - Marietta Hwy. widening			x	x	x	10,000,000	34.2% Impact Fees; Grants; Cherokee Co.	Canton Community Dev. Dept.
SR Business 5 Intersection Improvements	x	x	x	x	x	$1,647,000	34.2% Impact Fees; Grants	Canton Community Dev. Dept..
Heard Road Extension	x	x	x	x	x	$1,525,736	34.2% Impact Fees; SPLOST; Developer	Canton Community Dev. Dept.
Eastside Connector		x	x	x	x	$8,928,930	34.2% Impact Fees; Cherokee Co.; SPLOST	Canton Community Dev. Dept.

Appendix: Population Forecasts

Cherokee County Forecasts

We begin with population forecasts prepared by the Atlanta Regional Commission in association with ARC's adopted *The Regional Plan*. Overall, between 2018 and 2040, ARC forecasts the Cherokee County population to increase by over 54%, adding over 138 thousand people.

Table A-1: Cherokee County Population Forecast

	Households	Household Population	Total Population
2015	85,734	231,799	233,231
2016	88,518	238,694	240,160
2017	91,303	245,589	247,089
2018	94,087	252,484	254,019
2019	96,872	259,379	260,948
2020	99,656	266,274	267,877
2021	102,209	272,716	274,354
2022	104,761	279,159	280,831
2023	107,314	285,601	287,309
2024	109,866	292,044	293,786
2025	112,419	298,486	300,263
2026	114,971	304,928	306,740
2027	117,524	311,371	313,217
2028	120,076	317,813	319,695
2029	122,629	324,256	326,172
2030	125,181	330,698	332,649
2031	127,569	336,647	338,625
2032	129,958	342,595	344,601
2033	132,346	348,544	350,578
2034	134,735	354,493	356,554
2035	137,123	360,442	362,530
2036	139,511	366,390	368,506
2037	141,900	372,339	374,482
2038	144,288	378,288	380,459
2039	146,677	384,236	386,435
2040	149,065	390,185	392,411
Increase: 2018-2040	**54,978**	**137,701**	**138,392**

Source: Atlanta Regional Commission, CTP-15 data files.

Since 2000, the population of the cities in the county have grown along with the county, although at varying rates.

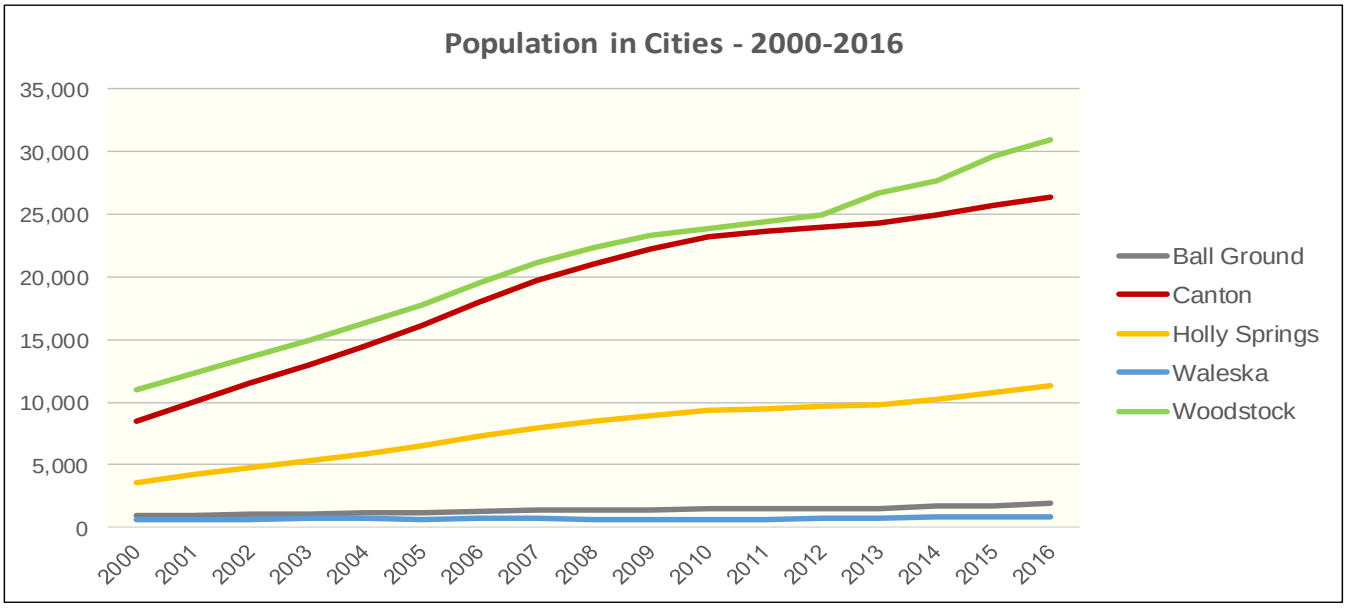
As shown on Table A-2 below, between 2000 and 2016 (the last year for which Census figures are available) the county overall increased its population by 68%, while Canton more than tripled its population with a 211% increase, closely followed by Woodstock at 183%. The effect created by a combination of annexation and households attracted to the incorporated areas can be seen in its impact on the population in the unincorporated area of the county, which grew by only 43%.[2]

[2] Parts of the cities of Nelson and Mt. Park extend into Cherokee County but annual populations estimates for them are not available from the Census Bureau. Their combined population is insignificant, amounting to less than 0.3% of the county in 2010.

Table A-2: City and County Population -- 2000-2016

	County Total*	Ball Ground	Canton	Holly Springs	Waleska	Woodstock	County Balance*
2000	143,777	897	8,458	3,613	624	10,929	119,256
2001	151,189	952	9,978	4,186	670	12,284	123,119
2002	158,682	1,009	11,475	4,767	658	13,631	127,142
2003	165,585	1,061	12,953	5,324	695	14,938	130,614
2004	173,105	1,117	14,468	5,905	711	16,296	134,608
2005	182,128	1,185	16,095	6,547	671	17,793	139,837
2006	193,241	1,266	17,949	7,267	685	19,520	146,554
2007	202,544	1,335	19,659	7,930	688	21,082	151,850
2008	208,271	1,380	21,023	8,455	670	22,273	154,470
2009	212,232	1,413	22,192	8,897	670	23,261	155,799
2010	215,196	1,440	23,237	9,292	649	23,898	156,680
2011	217,737	1,453	23,605	9,466	656	24,424	158,133
2012	220,788	1,471	23,932	9,676	678	24,939	160,092
2013	224,481	1,482	24,276	9,801	698	26,636	161,588
2014	230,578	1,663	24,945	10,258	871	27,635	165,206
2015	235,609	1,725	25,660	10,718	875	29,614	167,017
2016	241,689	1,909	26,340	11,281	879	30,929	170,351

* Includes the portions of Mt. Park and Nelson in Cherokee County, which in 2010 had a combined population of 622, or 0.289% of the total county population.
Source: US Bureau of the Census population estimating program.



The rates at which the various cities grew between 2000 and 2016 are reflected in the progression of percentages of the county total that each city's population represented over the 16-year period. Canton, for instance grew from about 5.9% of the total county population in 2000, to 10.9% by 2016. The overall average for Canton for all years was a little over 9.4% of the county total.

Table A-3: City Population Percentages of County

	Ball Ground	Canton	Holly Springs	Waleska	Woodstock
2000	0.624%	5.883%	2.513%	0.434%	7.601%
2001	0.630%	6.600%	2.769%	0.443%	8.125%
2002	0.636%	7.231%	3.004%	0.415%	8.590%
2003	0.641%	7.823%	3.215%	0.420%	9.021%
2004	0.645%	8.358%	3.411%	0.411%	9.414%
2005	0.651%	8.837%	3.595%	0.368%	9.770%
2006	0.655%	9.288%	3.761%	0.354%	10.101%
2007	0.659%	9.706%	3.915%	0.340%	10.409%
2008	0.663%	10.094%	4.060%	0.322%	10.694%
2009	0.666%	10.456%	4.192%	0.316%	10.960%
2010	0.669%	10.798%	4.318%	0.302%	11.105%
2011	0.667%	10.841%	4.347%	0.301%	11.217%
2012	0.666%	10.839%	4.382%	0.307%	11.295%
2013	0.660%	10.814%	4.366%	0.311%	11.866%
2014	0.721%	10.818%	4.449%	0.378%	11.985%
2015	0.732%	10.891%	4.549%	0.371%	12.569%
2016	0.790%	10.898%	4.668%	0.364%	12.797%
Average Annual	**0.669%**	**9.422%**	**3.854%**	**0.362%**	**10.442%**

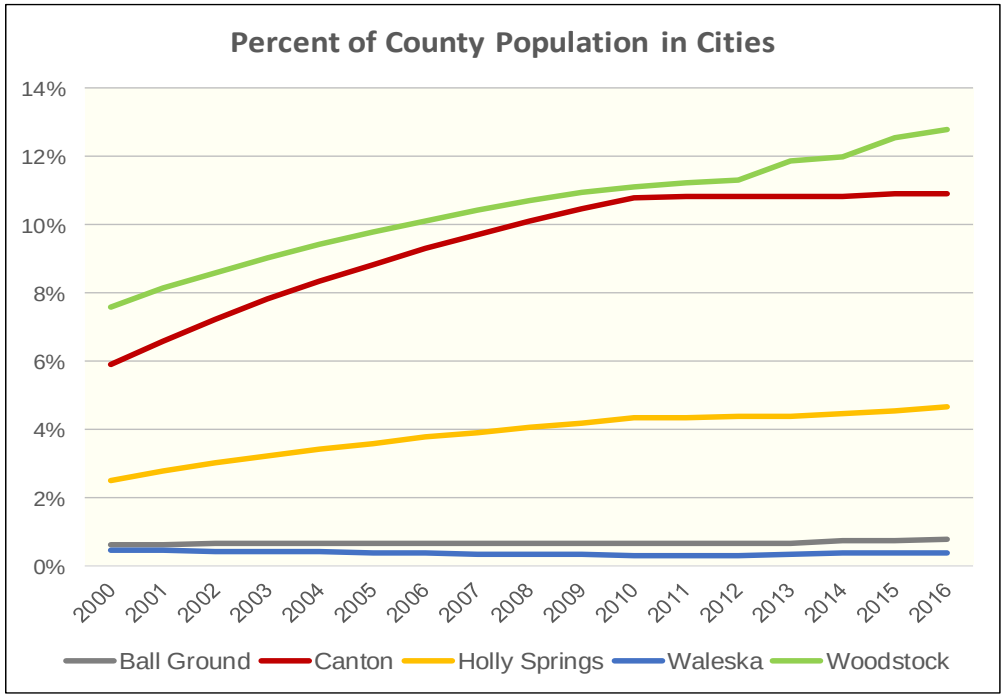


Table A-4 takes the 2000-2016 percentages from Table A-3 and projects them to 2040 using a linear trend algorithm. (Since the projection method changes the actual 2000-2016 figures, they are shaded out on the table.)

Table A-4: City Population Percentage Trends Projected to 2040

	Ball Ground	Canton	Holly Springs	Waleska	Woodstock	Total % In Cities
2000	0.614%	6.945%	2.841%	0.413%	8.057%	18.871%
2001	0.621%	7.261%	2.970%	0.407%	8.362%	19.622%
2002	0.629%	7.577%	3.099%	0.401%	8.668%	20.374%
2003	0.636%	7.893%	3.229%	0.395%	8.973%	21.125%
2004	0.643%	8.209%	3.358%	0.388%	9.278%	21.877%
2005	0.651%	8.525%	3.487%	0.382%	9.583%	22.628%
2006	0.658%	8.841%	3.616%	0.376%	9.888%	23.380%
2007	0.665%	9.157%	3.745%	0.370%	10.193%	24.131%
2008	0.673%	9.473%	3.875%	0.364%	10.498%	24.883%
2009	0.680%	9.789%	4.004%	0.358%	10.804%	25.634%
2010	0.687%	10.105%	4.133%	0.352%	11.109%	26.386%
2011	0.694%	10.421%	4.262%	0.345%	11.414%	27.137%
2012	0.702%	10.737%	4.391%	0.339%	11.719%	27.889%
2013	0.709%	11.053%	4.521%	0.333%	12.024%	28.640%
2014	0.716%	11.369%	4.650%	0.327%	12.329%	29.392%
2015	0.724%	11.685%	4.779%	0.321%	12.634%	30.143%
2016	0.731%	12.001%	4.908%	0.315%	12.940%	30.895%
2017	0.738%	12.317%	5.037%	0.308%	13.245%	31.646%
2018	0.746%	12.633%	5.167%	0.302%	13.550%	32.397%
2019	0.753%	12.949%	5.296%	0.296%	13.855%	33.149%
2020	0.760%	13.265%	5.425%	0.290%	14.160%	33.900%
2021	0.767%	13.581%	5.554%	0.284%	14.465%	34.652%
2022	0.775%	13.897%	5.683%	0.278%	14.770%	35.403%
2023	0.782%	14.213%	5.813%	0.272%	15.076%	36.155%
2024	0.789%	14.529%	5.942%	0.265%	15.381%	36.906%
2025	0.797%	14.845%	6.071%	0.259%	15.686%	37.658%
2026	0.804%	15.161%	6.200%	0.253%	15.991%	38.409%
2027	0.811%	15.477%	6.329%	0.247%	16.296%	39.161%
2028	0.819%	15.793%	6.459%	0.241%	16.601%	39.912%
2029	0.826%	16.109%	6.588%	0.235%	16.907%	40.664%
2030	0.833%	16.425%	6.717%	0.228%	17.212%	41.415%
2031	0.840%	16.741%	6.846%	0.222%	17.517%	42.167%
2032	0.848%	17.057%	6.976%	0.216%	17.822%	42.918%
2033	0.855%	17.373%	7.105%	0.210%	18.127%	43.670%
2034	0.862%	17.689%	7.234%	0.204%	18.432%	44.421%
2035	0.870%	18.005%	7.363%	0.198%	18.737%	45.172%
2036	0.877%	18.321%	7.492%	0.192%	19.043%	45.924%
2037	0.884%	18.637%	7.622%	0.185%	19.348%	46.675%
2038	0.892%	18.952%	7.751%	0.179%	19.653%	47.427%
2039	0.899%	19.268%	7.880%	0.173%	19.958%	48.178%
2040	0.906%	19.584%	8.009%	0.167%	20.263%	48.930%
Average Annual	**0.760%**	**13.265%**	**5.425%**	**0.290%**	**14.160%**	**33.900%**

Source: Linear Trend projection of 2000-2016 percentages to 2040 by year.

Canton Population Analysis

The following Table A-5 shows one approach to projecting Canton's population to 2040. In this case, the population estimates from the Census Bureau for 2000 to 2016 are projected to 2040 using a linear trend algorithm. (As noted for the preceding table, the projection method changes the actual 2000-2016 figures, so they are shaded out on the table.)

Table A-5: Canton Forecast - LinearTrend

	Census Population	Linear Trend Calculated	Census Figures Projected
2000	8,458	10,098	8,458
2001	9,978	11,234	9,978
2002	11,475	12,371	11,475
2003	12,953	13,508	12,953
2004	14,468	14,644	14,468
2005	16,095	15,781	16,095
2006	17,949	16,918	17,949
2007	19,659	18,054	19,659
2008	21,023	19,191	21,023
2009	22,192	20,328	22,192
2010	23,237	21,464	23,237
2011	23,605	22,601	23,605
2012	23,932	23,738	23,932
2013	24,276	24,874	24,276
2014	24,945	26,011	24,945
2015	25,660	27,148	25,660
2016	26,340	28,284	26,340
2017		29,421	27,399
2018		30,558	28,457
2019		31,694	29,516
2020		32,831	30,574
2021		33,968	31,633
2022		35,104	32,691
2023		36,241	33,750
2024		37,378	34,808
2025		38,514	35,867
2026		39,651	36,925
2027		40,788	37,984
2028		41,924	39,042
2029		43,061	40,101
2030		44,198	41,159
2031		45,334	42,218
2032		46,471	43,277
2033		47,608	44,335
2034		48,744	45,394
2035		49,881	46,452
2036		51,018	47,511
2037		52,154	48,569
2038		53,291	49,628
2039		54,428	50,686
2040		55,564	51,745
Increase 2018-2040		**25,007**	**23,288**

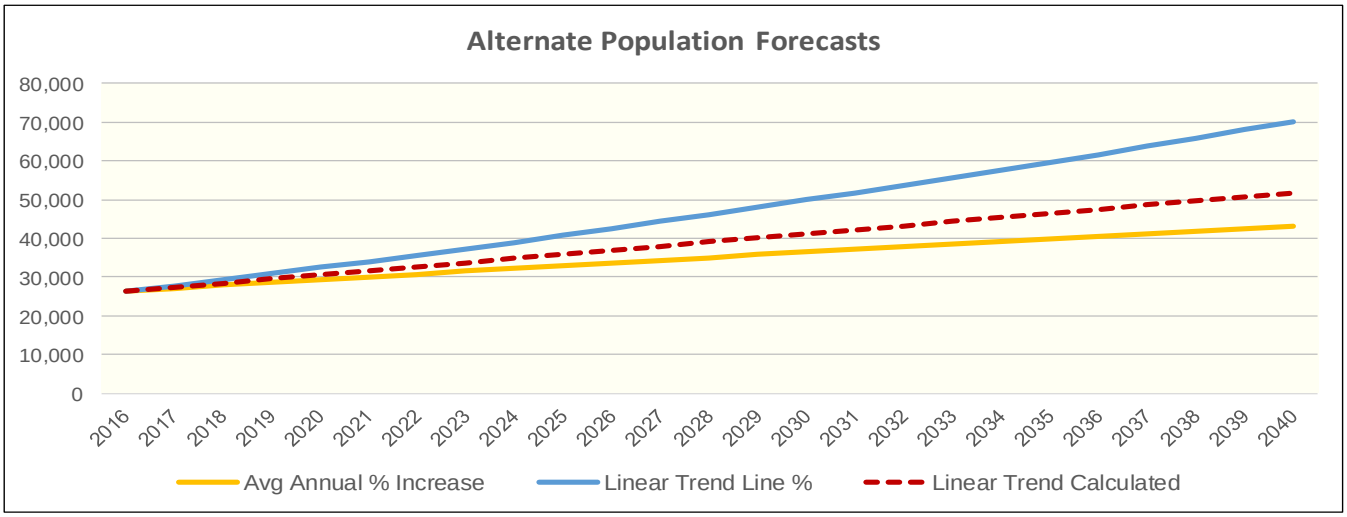
In the last column of Table A-5, the raw projected figures are rectified to the Census figures by reducing the linear trend figures for each year from 2017 to 2040 by the percentage difference between the 2016 projection and the number estimated by the Census Bureau. This difference (93.13%) reduces the projected 2040 population from 55,564 to 51,745.

Two other approaches are shown on Table A-6 on the next page, both based on historic growth rates for Canton.

The left-hand columns show the raw results from the various approaches. In the first column—Avg Annual % Increase—Canton's average percentage shown on Table A-3 (9.422%) is multiplied by the Citywide population each year. The resulting figures are then rectified to the Census 2016 population in the first of the right-hand columns, yielding a 2040 population of 43,039.

Table A-6: Alternate Canton Population Forecasts

	County Total	Raw Data Result			Rectified to 2016 Population		
		Avg Annual % Increase	Linear Trend Line %	Linear Trend Calculated	Avg Annual % Increase	Linear Trend Line %	Linear Trend Calculated
2016	240,160	22,628	28,822	28,284	26,340	26,340	26,340
2017	247,089	23,281	30,434	29,421	27,100	27,813	27,399
2018	254,019	23,934	32,090	30,558	27,860	29,327	28,457
2019	260,948	24,587	33,790	31,694	28,620	30,880	29,516
2020	267,877	25,240	35,534	32,831	29,380	32,474	30,574
2021	274,354	25,850	37,260	33,968	30,091	34,051	31,633
2022	280,831	26,460	39,027	35,104	30,801	35,666	32,691
2023	287,309	27,071	40,835	36,241	31,512	37,319	33,750
2024	293,786	27,681	42,684	37,378	32,222	39,008	34,808
2025	300,263	28,291	44,574	38,514	32,932	40,736	35,867
2026	306,740	28,902	46,504	39,651	33,643	42,499	36,925
2027	313,217	29,512	48,476	40,788	34,353	44,302	37,984
2028	319,695	30,122	50,489	41,924	35,063	46,141	39,042
2029	326,172	30,732	52,542	43,061	35,773	48,017	40,101
2030	332,649	31,343	54,637	44,198	36,485	49,932	41,159
2031	338,625	31,906	56,688	45,334	37,140	51,806	42,218
2032	344,601	32,469	58,777	46,471	37,795	53,715	43,277
2033	350,578	33,032	60,905	47,608	38,451	55,660	44,335
2034	356,554	33,595	63,069	48,744	39,106	57,638	45,394
2035	362,530	34,158	65,272	49,881	39,761	59,651	46,452
2036	368,506	34,721	67,512	51,018	40,417	61,698	47,511
2037	374,482	35,284	69,790	52,154	41,072	63,780	48,569
2038	380,459	35,848	72,106	53,291	41,729	65,897	49,628
2039	386,435	36,411	74,460	54,428	42,384	68,048	50,686
2040	392,411	36,974	76,851	55,564	43,039	70,233	51,745
Increase 2018-2040	**138,392**	**13,040**	**44,761**	**25,007**	**15,179**	**40,906**	**23,288**



The second of the 'Raw Data Result' columns uses the percentages from Table A-4, which were derived from a linear projection of the progression of percentages that Canton's population represented of the county total from 2000 to 2016. These raw numbers were also rectified to the 2016 population count in the middle of the right-hand columns, resulting in a 2040 population of 70,233.

Lastly, the projection figures from Table A-5 are inserted in the table for comparison; that projection ended with a 2040 population for Canton of 51,745.

The results of the three projection approaches are shown on the graph below the body of the table.

Recommended Population Forecast

The population projected using the overall average of the city's percentage of the county total population—at a constant 9.422%--appears to undervalue Canton's potential both for internal growth within the current city limits and for future annexations. In other words, this approach reflects the concept that the city's options will dwindle in the future. Past growth, both in numbers of people and land area, does not support this view.

On the other hand, the idea that the city will continue to increase its population at an increasing rate, reflecting the increasing pace of growth over the past 16 years, appears somewhat optimistic as the city's current area builds out and annexation opportunities lessen (whether as city policy or decreases in land availability).

The third approach—which projects the city's actual population for each year from 2000 to 2016, is both optimistic and achievable.

We therefore recommend that the **'Linear Trend Calculated'** approach be adopted, which will result in almost a doubling of the population from 28,457 in 2018 to 51,745 in 2040. The addition of the 23,288 new residents represents the addition of another 82% of the current population.

Appendix: Housing Forecasts

Projecting the number of housing units expected to be added to Canton between now and 2040 is important because impact fees are collected when building permits are issued. Housing units are therefore used in the calculation of Level of Service (LOS) standards.

Countywide Housing Forecast

Here again we start with the forecasts prepared for Cherokee County by the Atlanta Regional Commission. ARC projects the number of households (which are equivalent to occupied housing units) in order to understand future traffic demands on the county's roads. To these numbers are added the number of vacant housing units, producing a total of all housing units.

Table A-7: Cherokee County Housing Unit Forecast

	Households*	Vacant Units**	Total Housing Units
2015	85,734	1,743	87,477
2016	88,518	833	89,351
2017	91,303	1,856	93,159
2018	94,087	1,913	96,000
2019	96,872	1,969	98,841
2020	99,656	2,026	101,682
2021	102,209	2,078	104,287
2022	104,761	2,130	106,891
2023	107,314	2,182	109,496
2024	109,866	2,234	112,100
2025	112,419	2,286	114,705
2026	114,971	2,337	117,308
2027	117,524	2,389	119,913
2028	120,076	2,441	122,517
2029	122,629	2,493	125,122
2030	125,181	2,545	127,726
2031	127,569	2,594	130,163
2032	129,958	2,642	132,600
2033	132,346	2,691	135,037
2034	134,735	2,739	137,474
2035	137,123	2,788	139,911
2036	139,511	2,836	142,347
2037	141,900	2,885	144,785
2038	144,288	2,933	147,221
2039	146,677	2,982	149,659
2040	149,065	3,031	152,096
Increase: 2018-2040	**54,978**		**56,096**

* Source: Atlanta Regional Commission, CTP-15 data files.
** Based on % of units vacant in 2015 using ARC household estimate and Census estimate of total housing units (2.033%).

Canton Housing Units

Unlike historic population counts, there are no reliable annual estimates of the number of housing units in Canton available. Even the Census Bureau's annual *American Factfinder* numbers are woefully (and unexpectedly) inadequate, clearly undercounting the number of housing units in Canton even for 2010, when the actual Census count was clearly known.

As a result, the Canton housing unit forecast uses a simplified approach, based on the counts from the last (2010) census. At that time, the city's population was recorded as 22,958, and the total number of housing units was found to be 11,341. This yields a ratio of total housing units (including vacant units) to total population of .493989 per resident.

Table A-8, therefore, estimates the number of future housing units by applying the ratio above to the population projected for each year. Overall, this results in 11,504 units being added to the current stock of 14,057. Like the population increase projected for 2040, this represents the addition of about an 82% increase to the current housing supply.

Table A-8: Canton Housing Unit Forecast

	Population	Total Housing Units
2017	27,399	13,535
2018	28,457	14,057
2019	29,516	14,581
2020	30,574	15,103
2021	31,633	15,626
2022	32,691	16,149
2023	33,750	16,672
2024	34,808	17,195
2025	35,867	17,718
2026	36,925	18,241
2027	37,984	18,764
2028	39,042	19,286
2029	40,101	19,809
2030	41,159	20,332
2031	42,218	20,855
2032	43,277	21,378
2033	44,335	21,901
2034	45,394	22,424
2035	46,452	22,947
2036	47,511	23,470
2037	48,569	23,993
2038	49,628	24,516
2039	50,686	25,038
2040	51,745	25,561
Increase: 2018-2040	**23,288**	**11,504**

Note: Total Housing Units based on 2010 Census ratio of total number of housing units to total population, which was: 0.493989023.

Appendix: Employment Forecasts

For nonresidential uses, employment forecasts are important to establishing Level of Service standards and contribute to trip generation projections (discussed later in this Appendix).

Countywide Employment

The Atlanta Regional Commission has provided employment forecasts for the county as a whole, by type of business category. Overall, the number of employed persons is expected to increase from 71,655 in 2015 to 108,760 by 2040 (a 52% increase or half again as many as worked in the county in 2015).

Importantly, not all employees work in business categories that would be subject to impact fees. These include farm workers, government workers, and itinerant construction workers that often work out of their trucks or home offices.

These employees are subtracted from the total work force figures, resulting in the number of workers employed by businesses that are normally subject to impact fees—the total number being called 'value-added' employment.

Table A-9: County Employment Forecasts -- ARC

	2015	2020	2030	2040
Total Employment	**71,655**	**82,494**	**96,544**	**108,760**
Agriculture	33	33	33	26
Mining	163	182	189	195
Utilities	49	49	62	76
Construction	4,705	6,751	8,408	11,106
Manufacturing	3,377	3,457	3,960	4,184
Wholesale Trade	2,171	2,368	2,642	2,824
Retail Trade	11,105	12,257	14,321	15,582
Transportation & Warehousing	991	1,053	1,044	1,074
Information	638	649	657	671
Finance & Insurance	4,284	4,937	5,398	5,713
Real Estate	3,589	4,161	4,880	5,496
Professional	4,526	5,381	6,110	7,212
Management	382	395	407	419
Administrative	6,023	7,107	7,377	7,812
Education	6,468	7,519	10,264	11,438
Health Care	4,699	5,440	6,912	9,006
Arts, Entertainment	1,502	1,619	1,730	1,829
Accommodations & Food Service	8,395	9,877	11,214	12,017
Other Services	3,979	4,011	4,528	4,925
Public Administration	4,576	5,248	6,408	7,155
Value Added Total*	**62,178**	**70,280**	**81,506**	**90,278**

* Excludes Agriculture, Mining, Construction, and Public Administration.
Source: Derived from Atlanta Regional Commission, CTP-15 data by Census Tracts..

Canton Employment Forecast

Employment figures are not provided by ARC for individual cities. Employment forecasts are available from ARC, however, by Census Tract within each county. A portion of the Cherokee County Census Tract map, encompassing the city of Canton, is shown at the end of this section.

The methodology used was to first identify each Census Tract that included any portion of the city. For those that clearly included major concentrations of nonresidential development within the city (such as CT 904, CT 906.01 and CT 906.02), the employment data from ARC was included in whole. Other Census Tracts into which Canton's incorporated area extended but in which nonresidential development in the city was sparse at best compared to the expanse of unincorporated area (or other cities such as Ball Ground), were not included in the city employment estimates. These include CT 903, CT 907.01 and CT 901 (to the north).

The results are shown on Table A-10.

Table A-10: Canton Employment Forecasts

	2015	2020	2030	2040
Total Employment	**22,013**	**25,004**	**29,467**	**33,169**
Agriculture	7	7	7	6
Mining	0	0	0	0
Utilities	28	28	36	44
Construction	656	929	1,134	1,467
Manufacturing	977	1,007	1,140	1,198
Wholesale Trade	687	748	829	877
Retail Trade	4,142	4,539	5,177	5,570
Transportation & Warehousing	239	247	244	247
Information	184	188	196	204
Finance & Insurance	833	951	1,021	1,072
Real Estate	601	686	798	898
Professional	983	1,168	1,321	1,550
Management	50	50	50	51
Administrative	1,204	1,397	1,445	1,526
Education	2,077	2,417	3,331	3,721
Health Care	2,322	2,643	3,514	4,738
Arts, Entertainment	88	94	100	113
Accommodations & Food Service	3,004	3,518	3,930	4,175
Other Services	628	630	685	735
Public Administration	3,303	3,757	4,509	4,977
Value Added Total*	**18,047**	**20,311**	**23,817**	**26,719**

* Excludes Agriculture, Mining, Construction, and Public Administration.
Source: Derived from Atlanta Regional Commission, CTP-15 data by Census Tracts.

As a test, the 2015 total figure compares well to other sources. The 2010 Census reported that 13,542 worked in Canton (based on commuting data) of the county's total employment of 58,319, or 23.22% of the county total. This percentage, applied to the countywide employment calculated by Woods & Poole Economics for 2015 yielded an estimate of 21,852. Assuming that the percentage probably increased somewhat over the past five years, the CT-based estimate of 22,013 appears valid.Also shown on Table A-10 is the number of 'value-added' employees calculated in the same manner as described for

the countywide figures above.

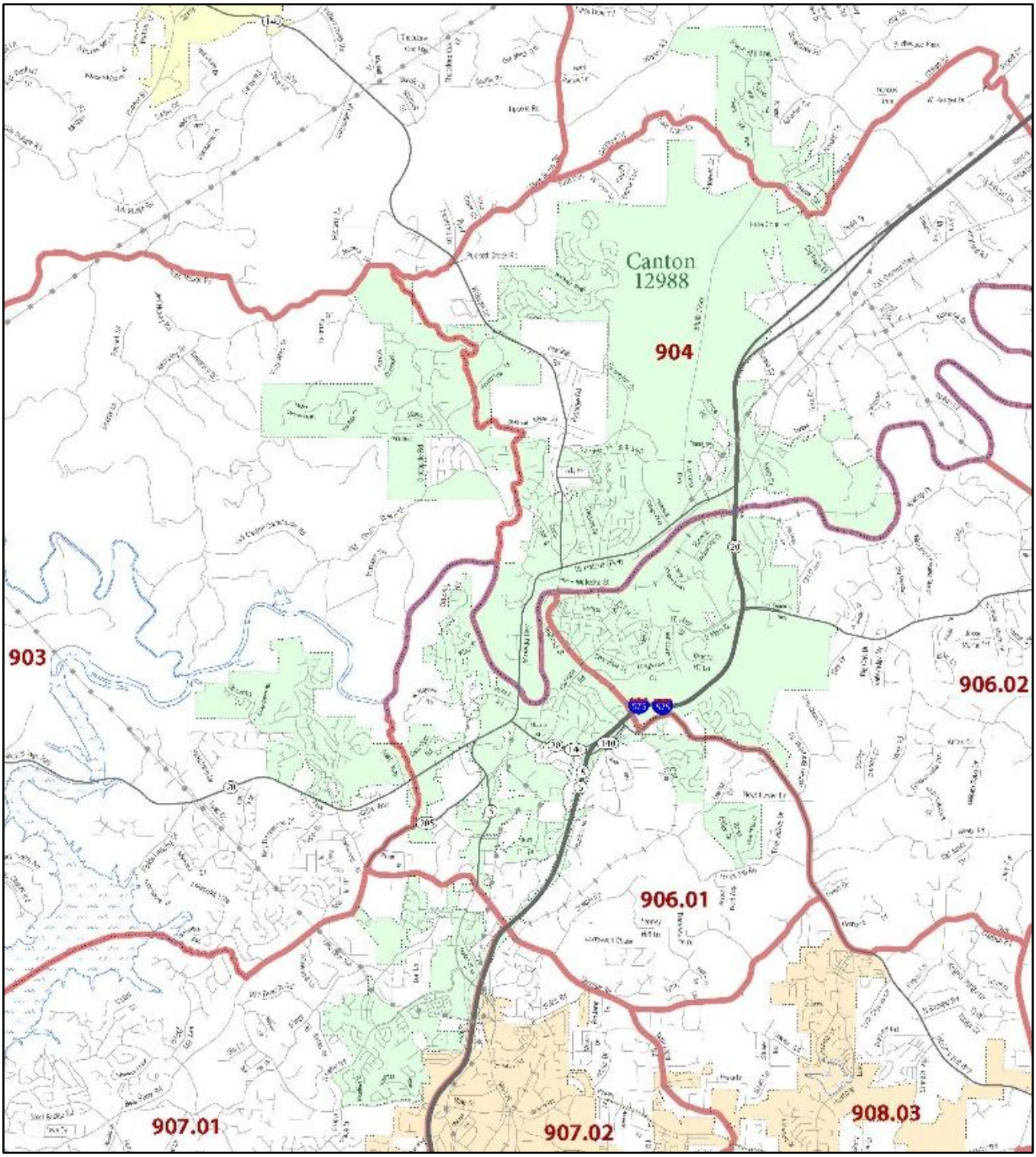
From the benchmark employment data from Table A-10, Table A-11 provides annual estimates of total employment in the city and the value-added employment figures.

Table A-11: Canton Value-Added Employment Forecasts

	Total Employment	Value-Added Employment
2015	22,013	18,047
2016	22,611	18,500
2017	23,209	18,953
2018	23,808	19,405
2019	24,406	19,858
2020	25,004	20,311
2021	25,450	20,662
2022	25,897	21,012
2023	26,343	21,363
2024	26,789	21,713
2025	27,236	22,064
2026	27,682	22,415
2027	28,128	22,765
2028	28,574	23,116
2029	29,021	23,466
2030	29,467	23,817
2031	29,837	24,107
2032	30,207	24,397
2033	30,578	24,688
2034	30,948	24,978
2035	31,318	25,268
2036	31,688	25,558
2037	32,058	25,848
2038	32,429	26,139
2039	32,799	26,429
2040	33,169	26,719
Increase: 2018-2040	**9,361**	**7,314**

Census Tracts

City of Canton



Summary: Canton Growth Forecasts

Combining the previously prepared residential population forecasts with the recommended employment forecasts (for day-night population figures) and the housing unit projections, provides the figures necessary to establish projections for the various types of public facilities by their service areas.

Day-Night population figures are used for Fire Protection and Police Services impact fee calculations, reflecting the 24-hour service demands on these functions. The housing unit forecasts are used as the basis for Parks & Recreation facilities, and in calculating the residential share of Police and Fire services. Road Improvement fees are based on vehicle trips (discussed in the next section).

Table A-12: Canton Impact Fee Growth Forecasts

	Housing Units	Day-Night Population*
2018	14,057	47,862
2019	14,581	49,374
2020	15,103	50,885
2021	15,626	54,144
2022	16,149	57,401
2023	16,672	60,660
2024	17,195	63,917
2025	17,718	67,176
2026	18,241	70,434
2027	18,764	73,692
2028	19,286	76,950
2029	19,809	80,208
2030	20,332	83,466
2031	20,855	66,035
2032	21,378	82,466
2033	21,901	81,966
2034	22,424	81,466
2035	22,947	80,965
2036	23,470	80,465
2037	23,993	79,964
2038	24,516	79,465
2039	25,038	78,964
2040	25,561	78,464
Increase: 2018-2040	**11,504**	**30,602**

* The residential population plus Value-Added Employment for a 24-hour service population.

Appendix: Trip Generation

In order to calculate new growth and development's fair share of the cost of road improvements, it is necessary to establish how much of the future traffic on Canton's roads will be generated by new growth, over and above the traffic generated by the city's residents and businesses today. This Appendix Section describes the process through which this determination is made.

Summary

A Level of Service must be established for road improvements in order to assure that, ultimately, existing development and new growth are served equally. This Section also presents the process through which new growth and development's 'fair share' of road improvement costs is calculated, and tables summarizing the technical portions of this methodology are included.

■ Level of Service

The City has set its Level of Service for road improvements at LOS "D", a level below which most roads in the City operate. Using this LOS maximizes roadway capacity before traffic conditions actually break down (LOS "F").

All road improvement projects benefit existing and future traffic proportionally to the extent that relief from over-capacity conditions eases traffic problems for everyone. For example, since new growth by 2040 will represent a certain portion of all 2040 traffic, new growth would be responsible for that portions' cost of the road improvements.

It is noted that the cost-impact of non-Canton generated traffic on the roads traversing the city (cross commutes) is off-set by state and federal assistance. The net cost of the road projects that accrues to Canton reasonably represents (i.e., is 'roughly proportional' to) the impact on the roads by Canton residents driving to and from their homes, and commuters that come in to work in the city.

The basis for the road impact fee would therefore be Canton's cost for the improvements divided by all traffic generated within the city in 2040 (existing today plus new growth)—i.e., the cost per trip—times the traffic generated by new growth alone. For an individual land use, when a building permit is issued, the cost per trip would be applied to the number of trips that will be generated by the new development, assuring that new growth would only pay its 'fair share' of the road improvements that serve it.

Approach

This methodology proceeds along the following lines:

- Total traffic currently generated by Canton residents and businesses in 2018 on the road system within the city is calculated from trip generation and commuting data. Various data sources are relied upon to determine current conditions, as explained in each appropriate section, below.
- Future Canton-generated traffic from new growth in the city is calculated from housing unit and employment forecasts to 2040.
- The portion of total 2040 traffic that is generated by new housing units and employment in the city establishes the percentage of Canton's cost of the future road improvements that can be included in an impact fee.

Summary Table

The table below shows how the portion of 2040 traffic generated by new growth is calculated. The figures represent all trips generated by land use, including pass-by and diverted trips.

Table T-1: Average Daily Trip Ends Generated by New Growth

	2018	2040	Increase	Percent New Growth Trip Ends
Residential Trips	120,147	218,472	98,325	
Nonresidential Trips	536,522	747,473	210,951	
Less: Internal Commutes*	(11,234)	(15,651)	(4,417)	
Net New Trip Ends	**645,435**	**950,294**	**304,859**	**32.1%**

* Residents who work in Canton. These trips to and from work are included in the residential trips, above.

The next table, below, calculates the Primary Trip Ends generated by existing and future traffic by deleting pass-by and diverted trips, as discussed below.

Table T-2: Primary Daily Trip Ends Generated by New Growth

	Percent Primary Trip Ends*	Primary Trip Ends			Percent New Growth Primary Trip Ends
		2018	2040	Increase	
Residential Trips	100%	120,147	218,472	98,325	
Commercial	51%	250,278	348,681	98,403	
Industrial+Utility	92%	41,075	57,228	16,152	
Less: Internal Commutes	100%	(11,234)	(15,651)	(4,417)	
Net New Primary Trip Ends		**400,266**	**608,730**	**208,464**	**34.2%**

* Derived from'Trip Generation Handbook' chapter, *Trip Generation* , 9th Edition, Institute of Transportation Engineers.

Overall, new residents and businesses located within Canton will generate 34.2% (more accurately, 34.2457198%) of all Canton vehicles on its roads. Thus, new growth's 'fair share' of the cost to the City to provide road improvements to serve current and future traffic cannot exceed this figure.

■ Pass-by and Diverted Trips

The impact of new growth and development on Canton's road network is the increased traffic added to the system, expressed by transportation engineers as 'trips'. Every 'trip' has two ends—a beginning at its origin and an end at its destination (known as 'trip ends'). There are three types of trips, defined as:

A **Primary Trip** (and its trip ends)—a vehicle travelling from its original beginning to its intended final destination. Driving from one's home to ones place of work is an example of a primary trip.

A **Pass-by Trip**—a vehicle travelling along its usual route from its origin to its final destination that stops off at an intermediate location for any reason. A trip from home to work that stops along the way for gas, dropping off a child at daycare, picking up coffee or dinner, or for any other reason, represents a 'pass-by' trip at the intermediate location.

A **Diverted Trip** (previously called a diverted 'link' trip)—a vehicle that diverts from its normal primary route between its origin to its final destination and takes a different route to stop off at an intermediate location for any reason. While a pass-by trip remains on its normal route, a diverted trip changes its route to other streets to arrive at the intermediate stop.

New primary trips add vehicles to the road network. Pass-by and diverted trips involve the same vehicles stopping off between their original beginnings and their final destinations, and therefore do not add new vehicles to the road network—the vehicles were already there on their way to their final destinations.

These different types of trips result in different types of 'trip ends'. On a home-to-daycare-to-work trip, for instance, there are two primary trip ends (home and work) and two pass-by or diverted trip ends: arriving at the daycare center and leaving from there to drive to work, for instance. The net impact on the road network, however, is created by the one vehicle and its two primary trip ends.

Impact fee calculations take note of these pass-by and diverted trip ends as not adding to the overall traffic on the road network and deletes them from the total trip ends reported in ITE's *Trip Generation* manual. While the table above uses overall average percentages of primary trip ends derived from ITE for broad land use categories, the actual percentage for each land use listed on the impact fee schedule for roads is applied to the total trip ends to determine the primary trip ends attributed to that land use.

Although both summary tables above reflect about the same percentage of 2040 traffic that will be generated by new growth, the increase in primary trip ends from the second table will play an important role in calculating the per-trip road impact fee.

Residential Trip Generation

Average trip generation rates published by the Institute of Transportation Engineers (ITE) differentiate between 'single-family detached housing' and 'apartments'. The closest correlations with the US Census definitions are 'single-family units' and 'multi-family units', which are shown on the following table.

Table T-3: Residential Units by Type: 2018 and 2040

	2016*	Percent**	Total in 2018***	Increase 2018-2040	Total in 2040
Single-Family Units	6,328	66.1%	9,292	7,604	16,896
Multi-Family Units	3,245	33.9%	4,765	3,900	8,665
Total	**9,573**	**100.0%**	**14,057**	**11,504**	**25,561**

* Based on American Community Survey report (Census Bureau).
** Percent of 2016 total housing units.
*** See Housing Forecasts section of this Appendix.

The 2016 breakdown of housing units by type on the table above are taken from the most recent *American Community Survey* for Canton (published by the Census Bureau). Although the numbers of units appear low, the percentages are empirically accepted as correct. These 2016 percentages by housing type (single-family and multi-family) are applied to the total number of housing units projected in 2018 (taken from the Housing Forecasts Section of this Appendix). It is assumed that

these percentages will persist into the future, producing a breakdown of the projected 11,504 new housing units forecast for the 2018-2040 period.

The next table, below, calculates the amount of traffic that is generated by the city's housing stock today, and the amount that will be generated in 2040.

Table T-4: Residential Trip Generation: 2018-2040 New Growth Increase

	ADT* Trip Ends	2018 Units	2018 ADT Trip Ends	2040 Units	2040 ADT Trip Ends	Increase 2018-2040	Percent New Growth Trip Ends
Single-Family Units	9.52	9,292	88,460	16,896	160,850	72,390	
Multi-Family Units	6.65	4,765	31,687	8,665	57,622	25,935	
Total		**14,057**	**120,147**	**25,561**	**218,472**	**98,325**	**45.0%**

* Average Daily Traffic (trip ends) on a weekday; Institute of Transportation Engineers *Trip Generation* , 9th Edition. Total includes trips to/from work.

The calculations are made on the basis of 'average daily traffic' on a normal weekday, using average trip generation rates derived through multiple traffic studies (350 for single-family and 86 for apartments) and published by ITE. The rates are expressed for 'trip ends'—that is, traffic both leaving and coming to a housing unit.

Comparing traffic in 2018 to 2040, the future increase in trip ends can be calculated, which will represent 45% of all residential trip ends generated in the city.

It should be noted that the traffic generated includes trips to and from work and, more particularly, residents who work at a business within the city.

Nonresidential Trip Generation

Calculating traffic generated by businesses located in Canton is more problematical than residential trips because there is no breakdown of types of businesses in the city that is readily available. In addition, while employment forecasts have been made in terms of the number of jobs, there is no data available for floor areas, much less by detailed type of use.

The alternate is to view nonresidential traffic generation on a broad 'average' basis. For this, there is data available from ITE for a number of individual uses relating to the total number of trips generated per employee. These trips, of course, include not only trips taken by the employees (to/from work, lunch, etc.) but also customers and others that are attracted to the use, serve it or are served by it in some way.

The Average Daily Traffic (ADT) numbers on the following Table T-5, therefore, are calculated by dividing all trips to a use—employees, customers, deliveries to or from, etc.—by the number of employees alone.

Overall, the average daily trip generation rate of all uses shown on the table is 10.21 trips per employee for 'industrial' uses and 25.31 for all 'commercial' uses. The 'industrial' category includes such uses as manufacturing and assembly, storage and transportation of goods; the 'commercial' category includes all sales and service uses such as stores, offices, motels, banks, amusements and private institutions. The last column shows the average rate for all 'commercial' uses listed, as opposed to the 'industrial' uses shown in the column on its left.

Although the 'overall' averages are useful for projecting total traffic generation, impact fees for particular uses will reflect the actual average trip generation rate for the specific use.

Table T-5: ITE Trips-per-Employee Data

Land Use Category	ITE Code	Land Use	ADT Trip Ends per Employee	Average by Category	Average All Commercial
Port and Terminal (000-099)	30	Intermodal Truck Terminal	6.99	10.21	25.31
Industrial (100-199)	110	General Light Industrial	3.02		
	120	General Heavy Industrial	0.82		
	140	Manufacturing	2.13		
	150	Warehousing	3.89		
	151	Mini-Warehouse	32.47		
	152	High-Cube Warehouse	22.13		
Lodging (300-399)	310	Hotel or Conference Motel	14.34	13.58	
	320	Motel	12.81		
Recreational (400-499)	430	Golf Course	20.52	34.79	
	443	Movie Theater	53.12		
	460	Arena	10.00		
	480	Amusement Park	8.33		
	490	Tennis Courts	66.67		
	491	Racquet/Tennis Club	45.71		
	492	Health/Fitness Center	46.71		
	495	Recreational Community Center	27.25		
Institutional (500-599)	520	Private Elementary School	15.71	29.58	
	530	Private High School	19.74		
	560	Church/Place of Worship	26.24		
	565	Day Care Center	28.13		
	566	Cemetery	58.09		
Medical (600-699)	610	Hospital	4.50	5.26	
	620	Nursing Home	3.26		
	630	Clinic	8.01		
Office (700-799)	710	General Office Building	3.32	4.18	
	714	Corporate Headquarters Building	2.33		
	715	Single-Tenant Office Building	3.70		
	720	Medical-Dental Office Building	8.91		
	760	Research and Development Center	2.77		
	770	Business Park	4.04		
Retail (800-899)	812	Building Materials and Lumber Store	32.12	32.86	
	814	Variety Store	66.70		
	815	Free-Standing Discount Store	28.84		
	816	Hardware/Paint Store	53.21		
	817	Nursery (Garden Center)	21.83		
	818	Nursery (Wholesale)	23.40		
	826	Specialty Retail Center	22.36		
	841	Automobile Sales	21.14		
	850	Supermarket	87.82		
	854	Discount Supermarket	40.36		
	860	Wholesale Market	8.21		
	861	Discount Club	32.21		
	875	Department Store	11.56		
	890	Furniture Store	12.19		
Services (900-999)	912	Drive-in Bank	30.94		

Source: *Trip Generation* , 9th Edition, Institute of Transportation Engineers, where survey results given for key land uses.

We know from the 2010 Census how many people worked in Canton based on commuting patterns. The next table provides a breakdown between commercial and industrial employment in the City and calculates trip ends generated by each.

Tax base valuations give us some clue as to the breakdown. When the city's 'industrial' and 'utility' tax valuations are combined, the figures suggest that almost 82% of all uses are 'commercial' in nature, while over 18% are industrial. These percentages, applied to total employment in the city reported by the Census Bureau, give us the estimated number of employees in 2010 in each category.

Table T-6: Nonresidential Trip Generation: 2010 Census

	Tax Base		Percent of Total	2010 Employees	Avgerage ADT	Total Nonres Trip Ends
Commercial	$ 347,932,174	$ 347,932,174	81.6%	11,054	**25.31**	279,777
Industrial	$ 62,908,394	$ 78,317,674	18.4%	2,488	**10.21**	25,396
Utility	$ 15,409,280					
Total Nonresidential	$ 426,249,848	$ 426,249,848		13,542		305,173
		Internal Commutes*		3,195	times 2 =	(6,390)
					Net Nonres Trips	**298,783**

* Residents who work in Canton. These trips are included in residential trip generation rate.

The table calculates the total number of trips using the average rates for commercial and industrial uses from the ITE Trips-per-Employee Data table (T-5) on the previous page. From the total of all nonresidential trips is deducted the number of trips to/from work generated by city residents, since these trips have already been calculated as part of the residential trip generation rates (i.e., city residents driving to/from work at city establishments).

Lastly, the following Table T-7 calculates the total number of trip ends that will be generated by new nonresidential growth in future traffic on Canton's roads.

Table T-7: Nonresidential Trip Generation: 2018-2040 New Growth Increase

	2018 Employees	2018 Trip Ends	2040 Employees	2040 Trip Ends	2018-2040 Increase	Percent New Growth Trip Ends
Commercial	19,434	491,875	27,075	685,269	193,394	
Industrial+Utility	4,374	44,647	6,094	62,204	17,557	
Total	23,808	536,522	33,169	747,473	210,951	
Less: Internal Commutes at	2.09%	(11,234)		(15,651)	(4,417)	
Net Nonres Trip Ends		**525,288**		**731,822**	**206,534**	**28.2%**

The preceding table shows the number of trip ends currently generated by Canton businesses based on 2018 employment. The trip ends by use are distributed using the same percentages calculated on the previous table. The same calculations are made for the year 2040 based on projected employment in the city, and the difference between 2018 and 2040 represents trip ends generated by future growth and development. This totals 28.2% of all nonresidential 2040 trip ends.

The results of the residential and nonresidential trip generation analyses are combined on the Summary table at the beginning of this Appendix Section for an overall calculation of new growth's share of future traffic generated by Canton residents and businesses. From these figures, pass-by and diverted trip ends are then deleted to determine primary trip ends, which more closely relates to vehicles on the road and thus contribute to traffic congestion.

Terminology

This Methodology uses the term 'average daily traffic' (ADT) for a weekday, which is defined by ITE as the 'average weekday vehicle trip ends', which are "the average 24-hour total of all vehicle trips counted from a study site from Monday through Friday."

Additionally, ITE defines a 'trip or trip end' as "a single or one-direction vehicle movement with either the origin or the destination (exiting or entering) inside a study site. For trip generation purposes, the total trip ends for a land use over a given period of time are the total of all trips entering plus all trips exiting a site during a designated time period".

Lastly, ITE defines 'average trip rate' as "the weighted average of the number of vehicle trips or trip ends per unit of independent variable (for example, trip ends per occupied dwelling unit or employee) using a site's driveway(s). The weighted average rate is calculated by dividing the sum of all independent variable units where paired data is available. The weighted average rate is used rather than the average of the individual rates because of the variance within each data set or generating unit. Data sets with a large variance will over-influence the average rate if they are not weighted.