



# Energy Conservation and Demand Management Plan (2019 - 2023)

Annual Update 2021 Report



## Overview

This report provides an update of the Energy Conservation and Demand Management Plan (ECDMP) (2019 – 2023) and the progress made during the Nov 2020 – Nov 2021 period and highlights the future steps to conserve energy. Energy consumption data obtained for various facilities of City of Cornwall is included in Appendix A.

Energy consumption by City owned facilities was reduced in 2020 as a result of the global pandemic and newly introduced energy efficient projects. The goal of the first year was to develop reporting and energy reduction strategies whereas the next few years will be to work on projects to meet those goals.

## Bigger Picture

The goal is to continuously reduce the energy requirement of our facilities through implementation of smart technologies, engineering standards, control (by-law) and through the purchase of the highest efficiency equipment available through the municipal procurement process. The overall target for City of Cornwall was set to reduce the energy consumption by an average of 10% per year during 2019 – 2023 ECDMP.



## Energy Consumption at City of Cornwall's Facilities

Municipalities are required to report the energy consumption data every year as per Ontario's Regulation 507/18. The most recent and up to date available data is presented below in Figure 1 which shows the annual consumption of electricity and natural gas at various facilities of City of Cornwall (2011 – 2020). Electricity and natural gas consumption have decreased by 6% and 13% respectively in 2020 when compared to 2019. The reduction in overall energy consumption is due to the different ongoing and completed energy conservation projects along with the exceptional global circumstances like COVID-19. The list of projects completed or continuing at various facilities of City of Cornwall are listed in Appendix A.

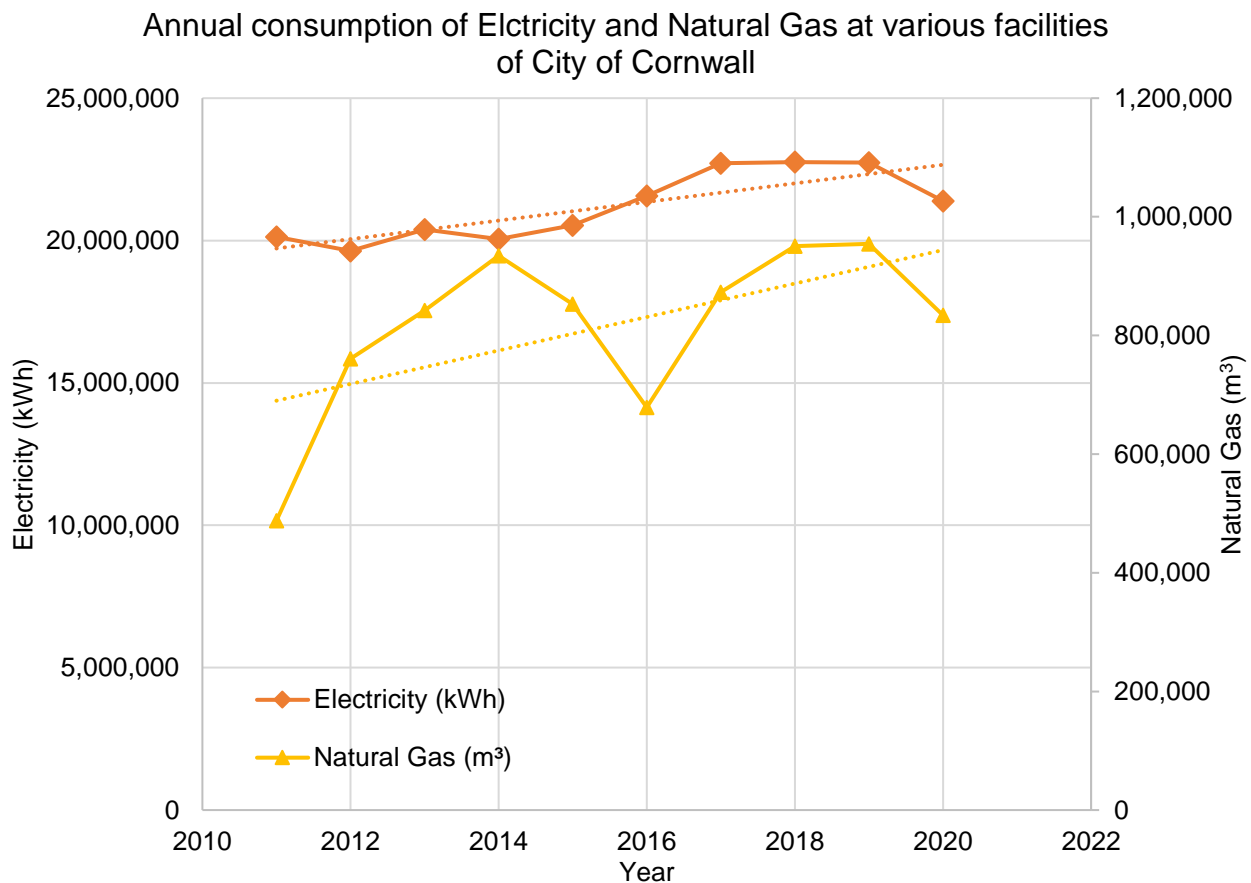


Figure 1: Annual consumption of Electricity and Natural Gas at various facilities of City of Cornwall

## Green House Gas (GHG) Emissions

Green House Gas (GHG) emissions data is presented in Figure 2 for City owned facilities from 2011 – 2020. The reduction in natural gas consumption and the switch to cleaner form of energy i.e., electricity is indicated resulting in the downward trend in GHG emissions. There is an 8% reduction in GHG emission (year over year from 2019 – 2020) for City of Cornwall owned buildings and 11% reduction in GHG emissions (year over year from 2019 – 2020) including vehicles.

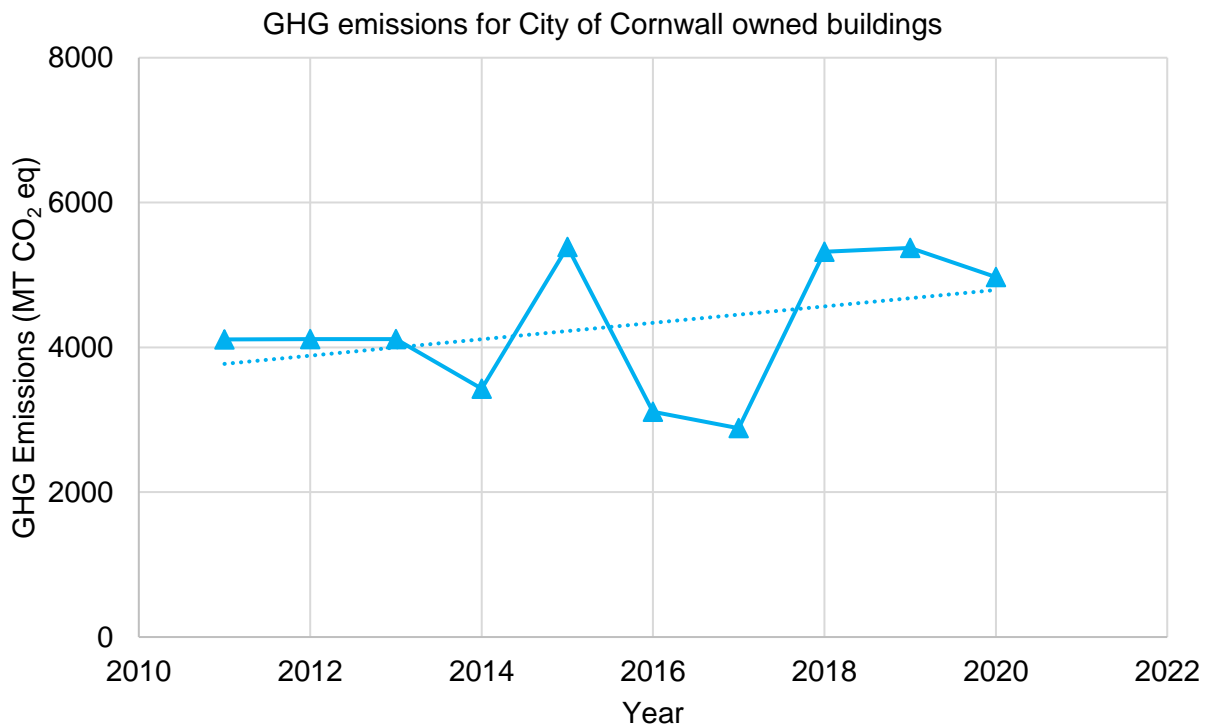


Figure 2: GHG emissions for City of Cornwall owned facilities from 2011 – 2020

Figure 3 shows the relative contribution of the GHG emissions for various energy consumption sources. The relative contributions have not changed significantly from 2019 to 2020 indicating that there is improvement overall. In 2020, one electric car and one hybrid car were added to the fleet of vehicles. Starting from 2022, Transit buses due for replacement will start to be replaced with hybrid buses. The Transit Division have currently ordered 2 such buses to be purchased.

■ Vehicles 
 ■ Building Heat and Hot Water 
 ■ Landfill Flare 
 ■ WWTP Flare 
 ■ Electricity

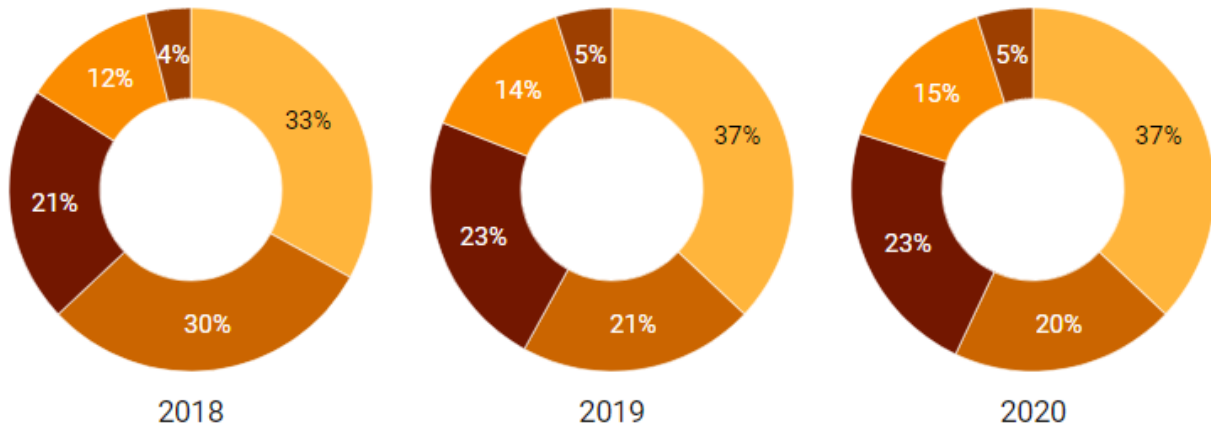


Figure 3: Relative contributions of GHG emissions for various energy consumption sources during the last three years

### ECDM 2021 Focus

As a pilot project, two smart meters (figure 4) are installed at the Water Purification Plant (WPP) to monitor the real time energy consumption for two different high lift pumps (one older centrifugal pump and one new turbine pump). The objective is to develop understanding about the effectiveness of this pilot project and the communication of real time energy consumption data to a cloud-based website through an independent and secured internet connection. The energy consumption data is available after every five minutes and can be presented on the dashboard for viewing.

Similar smart meters will be installed on various other City’s facilities to monitor the energy consumption in real time. The installation of these smart meters will allow decision making to meet the overall objective of reducing the energy consumption by 10% every year.

Additionally, the following projects are completed or in progress at various facilities of City of Cornwall:



Figure 4: Smart meters installed at Water Purification Plant (WPP) for tracking real time energy consumption

### Wastewater Treatment Plant (WWTP)

- A new impeller design is used for raw sewage pump #1 which allowed to run the lead pump at a broader range. This change prevented the second duty pump from being engaged to keep up with the City's daily demand and there will be an estimated savings of \$68,000 this year.
- Changed all outdoor and hazardous area lights to LED.
- Added motion/heat sensing room occupancy switches.
- Optimized the air flow to turn off the second duty blower. This will help in conserving the energy consumption.
- Lowered the digester operating temperature by 1°C to reduce the boiler cycle. This optimized Methane train and conserved Natural Gas and electricity.
- New water bottle fill station saves plastic bottles and energy.
- Split loads on some breakers thus distributing the branch loading allowing less amps to be draw during peak times.
- Replacement of electrical motors with high efficiency motors to reduce the electrical consumption.

- Replaced magnetic starters on our digester recirculation pumps with Variable Frequency Drive thus lowering the speed of the pumps and amperage draws by 25 amps each.
- A heat study is being conducted at WWTP to estimate the amount of heat energy can be captured and reused for building from the process waters.

### **Facilities Section**

- Full HVAC system unit replacement, boiler replacement, mixing box upgrades, and partial building commissioning at Justice Building.
- Additional insulation at EMS Building Roof above Apparatus Bay (West half of roof).
- New exterior door is installed at Cornwall Museum.
- New exterior doors at Reg Campbell and Terry Fox outdoor pools.
- Upgraded to LED lighting from T12 magnetic ballasted fixtures at Clock tower.
- Glen Stor Dun Lodge (GSDL) is replacing several air handling units this year which will provide improved energy efficiency and comfort.
- Upgraded to LED lighting at Benson Center – arenas and fieldhouse.
- Upgraded to LED lighting at King George Park field.
- Upgraded to LED lighting at Cornwall Civic Complex – arena, Salon B, Lower concourse, and Aquatic Centre.

### **Cornwall Transit**

- New electric baseboard heaters installed in the front offices.
- New windows with inserts are installed (18 windows) at Transit Garage which offer improved energy efficiency and are also operable for improved ventilation.
- Outside walls of front office are re-insulated.
- New water fountain installed in the lunchroom to refill bottles.
- Replacing the old lights with new LED bulbs.
- Added motion sensing room occupancy switch in stock room.

- Continuing forward in effort toward zero emissions by conducting a feasibility study with Canadian Urban Transit Research & Innovation Consortium (CUTRIC).

### **Water Purification Plant (WPP)**

- Installed two new smart meters to measure and track the energy consumption for two high lift pumps.
- Replaced 54 old (175 Watts/bulb) lights with new LED lights (61 Watts/bulb) at different locations at the plant with expected annual energy savings of more than \$4,000/year.
- Replaced one sluice gate for water conservation, seven additional sluice gates will be replaced in 2021 – 2022.
- Installed new and efficient HVAC units in maintenance office, cafeteria and maintenance shop.
- New water fountain installed to fill the bottles which will save plastic bottles and energy.



Figure 5: New and efficient LED lights installed at Water Purification Plant (WPP)



## **Additional Items in ECDM**

A final report entitled Water Conservation And Servicing Master Plan was presented to the City Council on September 21, 2021. Council has approved the universal installation of water meters. Consumption-based billing is scheduled to commence in 2025. The next step is to issue a request for proposal (RFP) for project management services including design, procurement and management associated with this initiative.

A co-digestion (process whereby energy-rich organic waste materials are added to wastewater digesters with excess capacity) study report was presented to the City Council in March 2021. Ontario Clean Water Agency (OCWA) is currently working on its design and engineering for a co-digester and apply for federal funding. The council will be updated about the financial plan and the next steps for this project.

The Procurement policy of City of Cornwall includes Environmentally Responsible (Green) Procurement.

The City has included Leadership in Energy and Environmental design (LEED) certification as part of Requests for Proposal (RFP) terms of reference associated with the design of three new buildings (Fire Hall, Municipal Works Administration Building, Municipal Works Multi-Use Building).

The City of Cornwall has joined the Canadian Urban transit Research and Innovation Consortium (CUTRIC). This consortium is providing insights and assistance with the concept of creating a green mobility hub for the biogas and/or green hydrogen at the WWTP as part of the Co Digestion study. Pairing biogas and/or green hydrogen with a mobility solution creates a significant GHG reduction, although more importantly brings greater financial resources to the Co Digestion project.

The City of Cornwall as part of its Climate Change and Action Plan is developing a municipal GHG inventory. This inventory will measure climate change risks and the projects which will significantly reduce GHG emissions, achieve net zero Carbon goal and create greater sustainability for the City of Cornwall.

## Appendix A

Facility Description	Electricity (kWh)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Benson Centre - Indoor Ice Rinks	2,236,176	2,846,361	2,891,351	2,922,480	2,894,122	3,041,523	2,932,200	3,000,293	3,273,959	2,990,947
Benson Centre - Gyms, Indoor courts	248,464	283,060	321,261	324,720	321,569	337,947	325,800	333,366	363,773	332,327
Boundary Road Reservoir	281,137	219,424	314,417	267,600	214,119	237,005	252,240	254,887	244,565	239,304
Boys and Girls Club	23,161	10,494	24,047	23,322	22,571	16,937	17,222	17,609	22,705	22,272
Champs Boxing Club	4,569	25,897	33,068	37,340	9,797	7,410	27,210	35,126	35,670	26,405
City Hall	338,777	309,171	291,505	292,763	257,744	246,956	240,600	258,861	257,821	234,939
Cornwall Band Shell	10,641	22,516	32,933	33,285	34,251	26,403	37,902	43,680	42,248	44,029
Cornwall Civic Complex - Aquatic Centre	883,496	1,149,165	1,342,053	1,340,544	1,293,781	803,689	1,434,998	1,511,481	1,345,664	1,153,492
Cornwall Civic Complex - Arena	3,352,547	2,907,112	2,829,227	2,826,045	2,707,007	3,557,994	3,025,168	3,186,404	2,836,839	2,431,716
Cornwall Civic Complex - Finance	425,734	346,096	377,242	376,818	363,673	395,345	403,368	424,867	378,257	324,239
Cornwall Civic Complex - Salons	106,423	173,031	188,603	188,391	181,819	197,654	201,665	212,414	189,111	162,104
Elevated Storage Tank	72,360	63,895	66,683	72,175	58,596	62,240	67,224	68,220	68,813	63,484
Emergency Medical Services (EMS) Station	274,140	295,623	311,849	325,800	333,000	503,032	324,000	327,983	327,276	327,105
Fire Station #1	178,860	177,957	184,493	199,860	181,137	182,275	194,820	205,959	192,383	178,038
Fire Station #2	162,388	140,392	147,586	138,809	133,114	131,258	116,611	122,012	124,297	130,538
Guindon Park - Maintenance Workshop	34,993	36,298	28,848	42,979	22,429	28,999	29,678	29,678	30,731	47,863
Justice Building - Police Station	24,614	1,101,885	1,096,183	1,000,272	1,053,922	197,256	987,023	963,005	1,057,076	1,058,272
Justice Building - Social Services	1,061,012	259,972	268,098	343,528	267,590	67,745	338,977	330,729	257,074	241,852
Justice Building										1,515
Optimist Park Garage	364,388	126,879	126,385	124,581	140,469	129,875	122,149	142,419	119,857	78,421

<b>Police Sub-Station</b>	25,800	36,298	40,417	42,377	26,213	25,724	36,670	36,267	34,423	30,132
<b>Public Library</b>	803,520	813,071	818,046	770,952	734,223	768,021	772,688	771,988	706,784	705,600
<b>Public Works - Administration Building</b>	201,015	196,126	213,335	223,526	206,369	207,104	213,415	227,628	231,026	220,973
<b>Public Works - Carpenter Shop</b>	41,265	34,510	37,539	39,332	36,313	36,442	37,553	40,054	40,651	38,883
<b>Public Works - Municipal Works Garage</b>	168,960	121,426	128,379	132,102	138,308	214,450	152,781	131,814	125,296	121,066
<b>Public Works - Purchasing</b>	1,897	1,883	2,229	2,526	2,436	1,703	3,289	4,296	4,433	4,351
<b>Public Works - Road Shop</b>	24,243	21,966	23,224	23,898	25,020	15,365	18,426	15,897	15,110	14,600
<b>Public Works - Stores</b>	26,163	25,980	30,750	34,854	33,602	23,500	45,371	59,265	61,158	60,022
<b>Public Works - Traffic Shop</b>	6,662	3,669	3,991	4,182	3,861	4,222	5,063	4,369	4,152	4,012
<b>Public Works - Water &amp; Sewer Shop</b>	46,920	37,453	44,789	44,789	48,009	127,405	3,993	4,259	4,322	4,134
<b>Sewage Pumping Station - 11th Street</b>	20,101	865	1,609	248	28,304	32,800	33,329	29,329	45,900	43,140
<b>Sewage Pumping Station - Harbour Road</b>	6,662	5,560	3,988	5,552	5,867	10,015	11,875	10,875	12,052	19,517
<b>Sewage Pumping Station - James Street</b>	9,763	8,893	10,378	12,150	10,802	12,795	13,325	11,325	18,630	15,149
<b>Sewage Pumping Station - Pitt Street</b>	2,435	2,555	3,222	3,056	2,836	3,333	3,957	2,957	3,755	2,608
<b>Sewage Pumping Station - Saunders Drive</b>	9,198	9,156	12,317	17,242	26,872	23,249	251,119	25,119	33,360	35,460
<b>Transit Station - Administration</b>	19,658	18,965	18,869	18,335	16,800	17,283	1,800	17,437	13,676	12,639
<b>Transit Station - Garage</b>	340,582	328,570	326,913	317,665	291,070	299,439	301,110	302,101	236,942	218,985
<b>Wastewater Treatment Plant - Pumping Station</b>	1,444,229	1,322,924	1,445,889	2,352,000	3,663,935	1,509,900	1,749,600	1,614,192	1,927,203	1,709,920
<b>Wastewater Treatment Plant</b>	3,151,500	2,365,379	2,733,313	1,481,700	1,249,939	4,326,675	4,402,260	4,287,658	4,420,189	4,561,132
<b>Water Purification Plant - Zebra Mussel Facility</b>	40,028	45,959	46,655	3,551,760	3,394,642	56,012	64,996	64,855	65,199	61,954
<b>Water Purification Plant</b>	3,655,440	3,701,742	3,523,888	53,058	55,812	3,636,972	3,474,000	3,581,843	3,532,563	3,377,050
<b>Wood House Museum</b>	4,028	38,670	41,899	43,255	43,774	44,233	42,166	41,976	35,700	36,240
<b>Total</b>	<b>20,133,949</b>	<b>19,636,850</b>	<b>20,387,474</b>	<b>20,055,871</b>	<b>20,535,716</b>	<b>21,568,185</b>	<b>22,717,640</b>	<b>22,754,495</b>	<b>22,740,643</b>	<b>21,386,429</b>

Facility Description	Gas (m3)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Benson Centre - Indoor Ice Rinks		239,228	265,437	253,652	250,383	215,575	267,667	295,905	319,884	285,862
Benson Centre - Gyms, Indoor courts		3,885	29,493	28,184	27,820	23,953	29,741	32,878	35,543	31,762
Boundary Road Reservoir	11,197	9,371	11,768	12,947	14,071	10,549	12,253	14,075	13,845	13,990
Cornwall Civic Complex - Aquatic Centre	15,247	22,124	21,403	21,375	19,644	11,763	27,105	33,079	23,018	27,570
Cornwall Civic Complex - Arena	57,858	55,969	45,121	45,061	41,412	24,795	57,141	69,736	48,526	58,121
Cornwall Civic Complex - Finance	7,347	6,663	6,016	6,008	5,522	3,306	7,619	9,298	6,470	7,750
Cornwall Civic Complex - Salons	1,837	3,331	3,008	3,004	2,761	1,653	3,809	4,649	3,235	3,874
Emergency Medical Services (EMS) Station		78,265	77,572	61,621	65,274	54,146	49,460	46,714	47,078	44,482
Fire Station #1	17,915	22,210	25,964	25,696	26,578	17,794	22,339	25,526	29,193	21,856
Fire Station #2	41,579	28,159	15,877	15,305	19,000	26,266	25,130	24,216	29,628	21,360
Justice Building - Police Station	2,920	17,710	12,067	139,665	15,476	12,466	14,866	4,991	63	932
Justice Building - Social Services	1,003	6,915	4,808	4,796	5,315	4,281	5,105	1,714	22	320
Optimist Park Garage	9,188	8,374	9,858	11,118	9,187	8,231	10,926	11,629	11,217	6,084
Police Sub-Station	1,104	1,415	1,165	1,551	1,964	1,340	2,127	2,283	2,123	2,307
Public Works - Administration Building	5,733	3,643	4,209	4,485	3,216	3,943	4,063	4,702	5,934	4,177
Public Works - Carpenter Shop	884	592	684	729	522	640	660	764	964	679
Public Works - Municipal Works Garage	22,379	27,160	36,197	40,703	35,777	14,828	23,133	37,876	40,313	21,206

<b>Public Works - Purchasing</b>	385	441	438	459	492	422	710	480	505	306
<b>Public Works - Road Shop</b>	5,314	4,116	7,264	8,563	6,637	6,259	7,699	3,969	9,670	8,536
<b>Public Works - Stores</b>	3,439	6,084	6,039	6,339	6,789	5,817	9,793	6,623	6,965	4,215
<b>Public Works - Traffic Shop</b>	3,440	3,989	5,149	6,175	4,988	4,443	4,745	5,264	5,496	4,033
<b>Public Works - Water &amp; Sewer Shop</b>	11,581	11,749	12,972	12,428	10,422	12,089	11,171	13,514	13,244	9,572
<b>Transit Station - Administration</b>	4,481	4,064	3,792	4,614	5,937	4,495	4,518	4,503	4,126	4,027
<b>Transit Station - Garage</b>	77,641	70,404	65,705	79,935	102,857	77,880	78,284	78,016	71,492	69,767
<b>Wastewater Treatment Plant - Pumping Station</b>	7,958	6,095	7,346	5,450	5,187	8,024	8,740	9,096	8,171	7,459
<b>Wastewater Treatment Plant</b>	51,375	31,227	44,977	19,889	48,711	33,345	56,808	80,697	86,277	62,941
<b>Water Purification Plant</b>	125,988	87,694	117,696	114,688	117,113	90,455	127,114	128,086	129,441	108,555
<b>Wood House Museum</b>		47	158	158	158	212	210	212	1,993	2,540
<b>Total</b>	<b>487,793</b>	<b>760,924</b>	<b>842,183</b>	<b>934,598</b>	<b>853,213</b>	<b>678,970</b>	<b>872,936</b>	<b>950,495</b>	<b>954,436</b>	<b>834,283</b>