9/29/2023

Winter Park Community Center

ASHRAE Level II Energy Audit

15 lightyears

Energy Testing | Solar Power | Green Certification

TLC ENGINEERING SOLUTIONS

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Executive Summary

TLC Engineering Solutions (TLC) and 15 Lightyears performed an ASHRAE Level 2 facility energy audit of the Winter Park Community Center as a part of a contract with the City of Winter Park.

This report is related to the energy-consuming systems only and is intended to fulfill the requirements of an ASHRAE Level 2 Energy Audit, per the guidelines set forth by the ASHRAE document "Procedures for Commercial Building Energy Audits." The purpose was to observe existing conditions and gather information that would enable TLC to render an opinion concerning conditions or deficiencies that could affect efficient use of this facility, and to identify potential areas for improvement. Neither the field visits nor this report is intended to uncover hidden defects or the presence of hazardous materials.

TLC reviewed the draft drawings dated July 19, 2010, current utility bills from January 2021 through December 2022, subsequent project documentation, and visited the site in January 2023 to review the mechanical and electrical equipment, the HVAC and lighting controls systems, and observe each space type and its general energy use intensity. During this time, TLC was granted access to the building automation system to view the operation remotely. In the course of its work, TLC obtained extensive photo documentation of the conditions of the facility. Several of the photographs are included in Appendix B of this report, and the reader is encouraged to thoroughly review the photographs and descriptions, as they are intended to support and supplement the observations described herein.

After the time on site, TLC developed energy saving spreadsheets to assist with the analysis of recommended Energy Conservation Measures (ECMs), Facility Improvement Measures (FIMs), and evaluated BAS trends. The combination of all the walkthrough and post-walkthrough activities led to the development of the ECM and FIM list. A complete description and analysis of each ECM, as well as a table summarizing estimated cost and savings of each measure, can be found later in this report in the Energy Saving Opportunities section.

Project Information & Contacts

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General Facility Description

The Winter Park Public Community Center is a one-story civic building of approximately 37,189 square feet, which includes the community center, gym, basketball courts, pool, and pool support building. An aerial view of the Community Center is shown below.

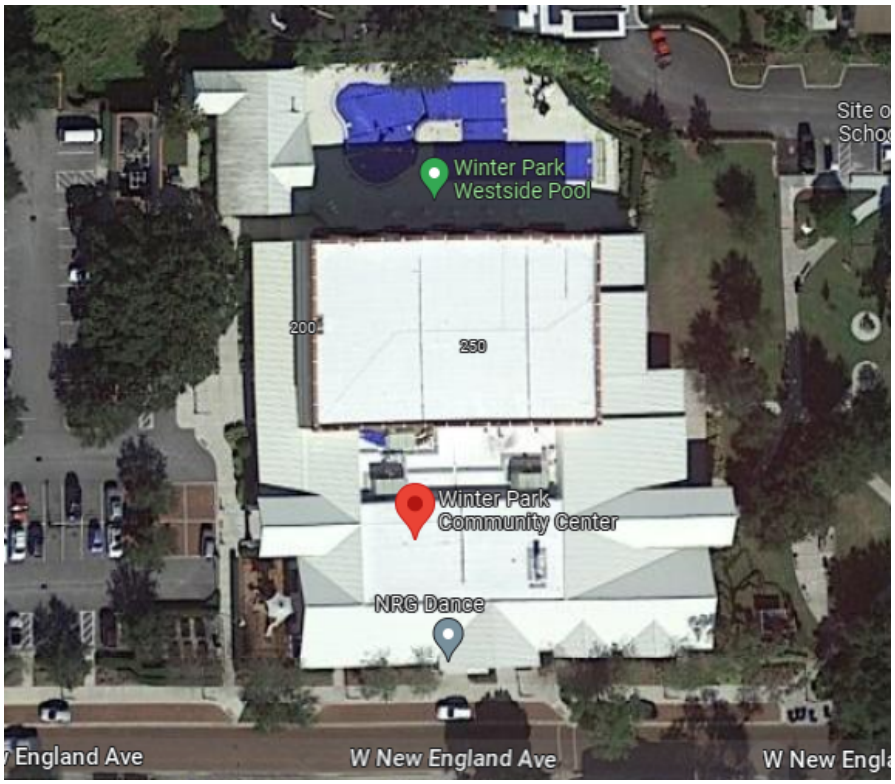


Figure 1: Aerial View of the Winter Park Community Center

The main building includes a large multi-purpose room, a kitchen, offices, a computer lounge, material storage, a fitness room, a classroom, a lounge area, and the gym/events area, etc. The pool area includes a building that contains the pool equipment, bathrooms, and offices.

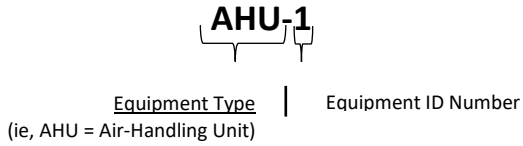
Mechanical Systems

The Winter Park Community Center is served by HVAC systems installed between 2010 and 2019. Building systems include chilled water rooftop air handling units, an air-cooled chiller, a makeup air unit, and exhaust fans. Mechanical system information was obtained from a variety of sources, including information gathered during the audit walk-through of the building and building automation system review, as well as as-built design drawings provided by the City of Winter Park (dated 2010). The below

breakdown of the mechanical systems and areas they serve is TLC's best attempt to consolidate all avenues of information into one master list.

Equipment Naming Convention

The general naming convention used on the mechanical drawings is shown below. Please note, this convention applies to most of the equipment, but not all equipment.



Air Handling Units

Air conditioning for the building is provided by two (2) Fan Coil Units, three (3) Rooftop Units, and one (1) Makeup Air Unit. Each unit serves a specific area. RTU-1 serves the gym, RTU-2 serves the Fitness and Health spaces, and RTU-3 serves the Admin and South spaces. The units are equipped with a variable frequency drive (VFD) to allow supply air to modulate based on changing load conditions, as well as modulating chilled water control valves to control cooling capacity. In addition, the single-zone gym unit includes electric reheat, to enable humidity control in the gym space.

Air-Cooled Chiller

The building HVAC systems are supplied with cooling capacity via an air-cooled chiller attached to an ice storage system. The chiller, manufactured by Carrier, has a capacity of 130 Tons. The chiller includes two refrigeration circuits and VFD-controlled chilled water pumps to modulate chilled water capacity supplied to the building. The chiller is controlled via the building automation system to ensure that the air handling units receive the proper chilled water flow.

The ice storage system is intended to shift energy usage to off-peak times in an effort to reduce energy costs. It consists of two ice storage tanks piped as part of the chilled water system to provide cooling capacity during the day while reducing the required runtime of the chiller.

Exhaust Fans

Exhaust fans were observed on the rooftop, providing general exhaust for restrooms located within the building. Additionally, specialized spaces such as the copy area and the kitchen are provided with exhaust via dedicated fans.

Building Controls

The building is currently controlled by a centralized Building Automation System (BAS) utilizing Direct Digital Controls (DDC). The BAS allows for monitoring, scheduling and setpoint adjustment of the different HVAC systems. The BAS is a Trane Tracer Ensemble system with graphics for the major pieces of equipment. The BAS occupancy schedule shows an occupied period of 5:30 AM to 10:00 PM, when HVAC equipment controls to its occupied temperature setpoints.

Lighting Systems

Interior lighting throughout the facility is predominantly linear fluorescent fixtures utilizing T8 lamps. There are some fixtures that are equipped with incandescent lights. Exterior lighting includes flood lights.

Domestic Water Fixture (Plumbing) Systems

The building is served by one (1) natural gas-fired water heater and one (1) electric water heater. The water heaters are located in designated water heater rooms along with the hot water recirculation pump for the building. The natural gas-fired water heater has a capacity of 157,000 BTU/h. There was limited information available for the electric water heater, as the label was worn.

Building Envelope

The building envelope systems date to the original construction of the facility, consisting of stucco over tilt-up concrete panels. The roof is a combination of a flat built-up roof where the mechanical equipment is located, and a pitched metal roof system. During the audit, no issues or opportunities for energy savings specifically related to the building envelope or glazing were noted.

Key Operating Parameters

The building is currently operated 7am to 9pm on weekdays. On Saturdays, the building is operated from 9am to 6pm. On Sundays, the building is operated 10am to 5pm.

Site Visit

The site was audited by TLC engineers in January 2023. A full evaluation of existing energy-consuming systems, compliant with ASHRAE Standard 211-2019 was performed. During the audit, TLC and 15 Lightyears personnel were escorted by the City of Winter Park Facilities manager, Leif Bouffard. He, as well as any facility staff that were available for comment, were questioned on system operation, condition, and maintenance of the building systems.

Utility Analysis

Historical Utility Data

The building is currently served with electricity and water utilities by the City of Winter Park. Electrical utility consumption values were provided for the months of January 2021 through June 2023. The monthly consumption profile 2022 is as expected, where values increase in the warmer months due to cooling needs. Prior to June 2021, there was a meter not reporting to the City, leading to lower consumption values provided for analysis. No specific utility bills were provided, but a blended rate for kWh savings was determined based on the published rates for consumption and demand. Calculation of the blended utility rate takes into account the non-fixed costs associated with electrical utilities use by the facility, including fuel charges, per-kWh cost, demand charges, etc. Table 3 details the components of the blended rate calculation.

Table 1: Annual Baseline Energy Consumption

Utility	Total
Annual Electrical Consumption (kWh)	587,220
Annual Electrical Cost	-

The following graph and table show the total consumption and demand per monthly billing period for electricity.

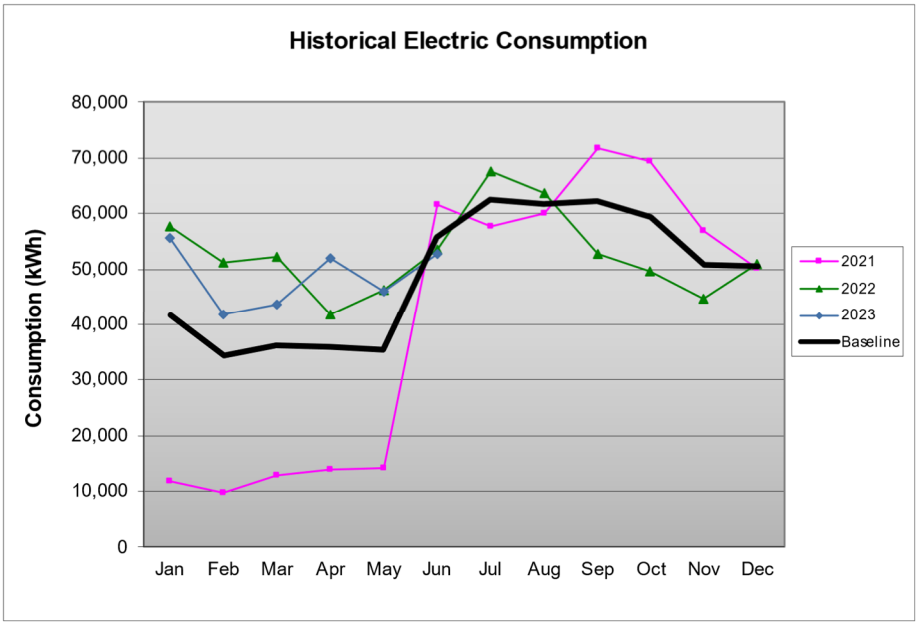


Figure 2: Community Center Electric Consumption

Table 2: Community Center Electricity Consumption Data

Date	Consumption (kWh)	Demand (kW)
Jan-21	11,900	198.60
Feb-21	9,800	200.60
Mar-21	12,780	150.20
Apr-21	13,940	180.20
May-21	14,280	177.60
Jun-21	61,520	293.60
Jul-21	57,680	306.40
Aug-21	60,160	160.80
Sep-21	71,760	160.80
Oct-21	69,360	160.80
Nov-21	57,040	163.20
Dec-21	50,160	163.20
Jan-22	57,760	163.20
Feb-22	51,200	163.20
Mar-22	52,160	112.80
Apr-22	41,760	143.20
May-22	46,240	143.20
Jun-22	53,520	143.20
Jul-22	67,600	156.00
Aug-22	63,600	156.24

Date	Consumption (kWh)	Demand (kW)
Sep-22	52,640	156.24
Oct-22	49,600	156.24
Nov-22	44,720	156.24
Dec-22	51,040	156.24
Jan-23	55,680	156.24
Feb-23	41,920	156.24
Mar-23	43,520	156.24
Apr-23	52,000	156.24
May-23	46,000	156.24
Jun-23	52,640	156.24

Benchmarking

TLC compared energy consumption utilizing a common benchmark to gauge how the Community Center compares to similar buildings nationally. The primary means of comparison is the Energy Use Intensity (EUI), which is used by energy engineers to determine overall energy consumption to a common unit of measure. The Energy Use Intensity measures annual consumption of electricity per square foot, in kBTU/sf/year.

This common benchmark for energy usage is nationally recognized. Using the utility billing information, performing energy analysis and observing the system operation allows the energy profiles to be broken down to greater detail. Due to the athletic facilities contained within the Community Center, the building was entered into Energy Star Portfolio Manager as a recreation/athletic center.

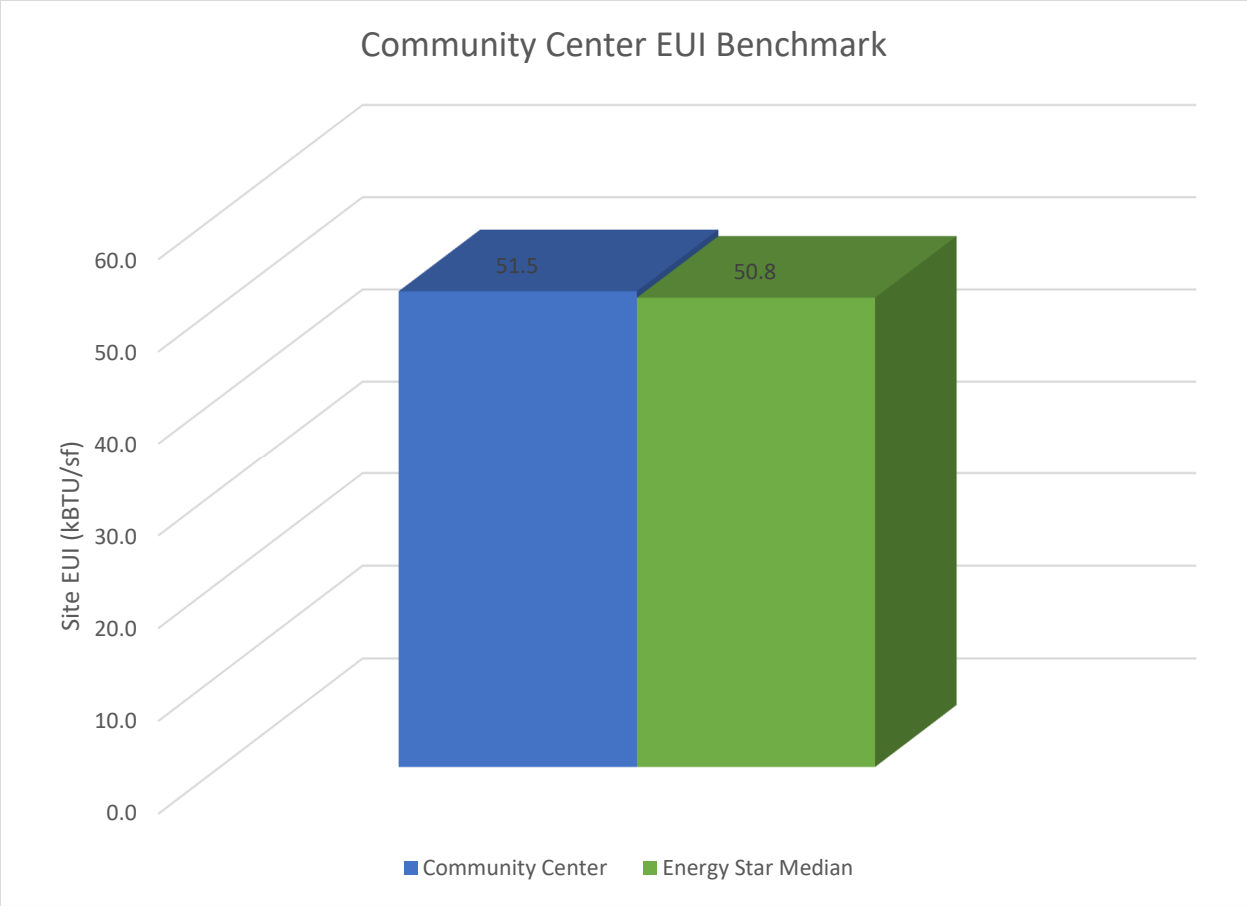


Figure 3: Winter Park Community Center Energy Performance Comparison

Based on most recent 24 months of utility data, a comparison can be drawn between the Community Center and the average energy use intensity (EUI) of similar buildings throughout the United States. The median EUI for a recreation/athletic center in the United States is 50.8 kBTU/sf, and the calculated EUI of the Community Center is 51.5 kBTU/sf. It is worth noting that the median value reported by Energy Star is dependent on the annual responses from building surveys, and that the occupant load of buildings of the same type can vary significantly. The Community Center's EUI is approximately 1.4% higher than the median. The energy conservation measures detailed in this report will serve to further decrease the EUI of the facility.

Utility Rate Analysis

The building is provided with electricity by the City of Winter Park (CoWP), following their Rate Schedule GSD-1, General Service – Demand. The utility rate charges shown below were used to calculate the costs associated with the provided consumption and demand. Energy savings calculated for this building have been assigned a blended rate of $0.1059/kWh, which is the calculated blended rate not including fixed customer charges.

Table 3: Utility Rate Schedule

Description	Charge
Demand Charge	$5.05 per kW of billing demand
Energy Charge	$0.04216 per kWh
Fuel Cost Recovery Factor	$0.02281 per kWh
Gross Receipts Tax	2.5641%
Franchise Fee	6.00%
Electric Utility Tax	10.00%
EL State Sales Tax (Commercial Only)	7.45% (First $5,000)
EL State Sales Tax (Commercial Only)	6.95% (Over $5,000)

Average Rates

As noted above, a blended cost per kWh has been calculated from the rate schedule. Savings for this building have been calculated using the blended rate. The following table details the average rate over the period of analysis.

Table 4: Average Utility Rate

Utility	Average
Electricity	$0.1059/kWh

Energy Saving Opportunities

The operation and condition of equipment at the Community Center building was observed to offer a few different avenues for improvement. This is to be expected given the age of the equipment itself and how long it has been in service. Improvements can be made by replacing the aging equipment. The following table summarizes the recommended ECMs for this facility that should be considered for future projects. In addition, the table distinguishes between measures specifically intended to save energy (ECMs) and facility improvement measures (FIM) that benefit the overall operation of the facility but may not provide significant energy savings.

Table 5: ECM/FIM Summary

Energy Savings Measure	FIM/ECM	ECM Category	Annual kWh Savings	Annual $ Savings	Cost $	Payback (years)
Lighting Improvements	ECM	Medium Cost	48,671	$5,154	$5,760	1.1
RTU Damper Control	FIM	Capital Improvement	--	--	$1,200	--
Totals			**48,671**	**$5,154**	**$5,760**	**1.1**

*ROI calculations exclude capital improvement items, as they are intended more for facility improvement than for energy savings.

The cost and paybacks shown in the table above are estimates based on the information gathered during the auditing process. TLC utilized RSMeans 2023, as well as engineering best practices, to estimate the cost of these suggested measures. Final pricing will vary based on contractors' estimation and final equipment selections. Final payback periods are also dependent on contractor pricing and the facility's negotiated utility price.

Lighting Improvements

General Description

This measure involves converting older style lighting fixtures, such as fluorescent and incandescent, to modern LED lighting fixtures and lamps. Unless a building has been built or renovated in the past few years, it is common to find extensive use of fluorescent and incandescent fixtures throughout the building. Fluorescent and incandescent lighting technologies are a product of their time and often remain without intentional replacement. Older lighting technologies require more wattage to produce the same amount of light as LED fixtures. This also results in a higher heat output from the lamps which raises HVAC cooling costs.

Existing fluorescent and incandescent lighting fixtures will be replaced/retrofitted with new LED lighting fixtures. This will greatly reduce the energy required to illuminate the building. Additionally, cooling systems will have to run less often to offset the heat generated by the lighting. There are several additional benefits to LED lighting technology. LED lighting has longer burn hour life, faster on/off response time, and easier dimming capabilities compared to fluorescent and incandescent technologies. Because LED light fixtures have longer burn hour life, this will reduce the material and time cost of replacing burned out lamps.

Site Specifics

A significant portion of the facility was observed to have linear fluorescent fixtures with T8 lamps as well as CFL fixtures. Existing non-LED lighting will be replaced with new LED lighting on a one-for-one basis. Existing lighting material waste will be disposed of according to local regulations.

Facility Improvement Measures

TLC identified additional Facility Improvement Measures (FIM) that do not provide energy savings but should be addressed. By implementing the recommended FIM, the facility will experience improved equipment reliability, increased thermal comfort for occupants, and be able to operate as originally designed

RTU Damper Control

In the BAS system, feedback on RTU-2 and RTU-3 from their OA and RA dampers did not show consistent readings with regard to their damper positions and flow rates. Additionally, the chilled water valve on RTU shows it being closed in the BAS system despite discharging cold leaving air. These systems are in need of commissioning and possible repair to ensure correct control and operation.

Calculation Methodology – Spreadsheet System Models

Savings for this report were evaluated using spreadsheet building models for the lighting and HVAC systems. The methodologies used for each measure are described separately in this section. Industry Standard methods of evaluation were used and are detailed in this section. Additionally, assumptions made to calculate the energy savings are detailed.

Lighting Improvements

Savings for this measure have been based on a reduction in the lighting energy based on a reduction in lighting installed wattage. The following table shows the major inputs used in the calculation of savings for this measure.

Table 6: Lighting Improvements Major Inputs

Input Name	Bldg./Area Affected	Input Value	Basis of Input
Building Area	Entire building	37,189sf	Provided value
Existing Lighting Power Density	Entire building	0.89 W/sf	Average value for 40% T8 lamps and 20% CFL lamps throughout. Remaining fixtures assumed as LED.
Proposed Lighting Power Density	Entire building	0.6 W/sf	Typical value for LED lamps throughout
Annual Burn Hours	Entire building	4,576	Building schedule

Calculations:

Savings for this measure were comprised of energy savings. The energy savings were the difference in the existing and proposed kWh for all the lighting fixtures in the building. The energy usage in kWh for the building was calculated using the following formula.

$$Energy\ Usage = \frac{Building\ Area \times LPD \times Hours}{1{,}000}$$

Appendix A – Mechanical Equipment

The following table shows a listing of all recorded major equipment in the building.

Building	Type	Equip	Location Served	Tag	Qty	Capacity	Units	Make	Model	Serial Number	Year
Community Cente	Chiller	Air-Cooled Liquid Chiller	All areas	Chiller-1	1	130.0	Tons	Carrier	30RBF08055BLL74C	4419Q90066	2019
Community Cente	RTU	Rooftop Unit	Gym	RTU-1	1	10.0	HP	Trane	*	*	
Community Cente	RTU	Rooftop Unit	Fitness/Health	RTU-2	1	15.0	HP	Trane	*	*	
Community Cente	RTU	Rooftop Unit	Admin/South	RTU-3	1	15.0	HP	Trane	*	*	
Community Cente	MAU	Makeup Unit		GMAU-1	1	3/4	HP	Greenheck	MSX 108 H12 DB	12326948	2011
Community Cente	GEF	Exhaust Fan		GEF-1	1	1/2	HP	Greenheck	CUBE 180HP 5 0	12326415 1101	2011
Community Cente	WH	Water Heater		WH-2	1	*	*	AO Smith	*	*	
Community Cente	WH	Water Heater		WH-1	1	8	GPM	Rinnai	RC80HPi	10.02 001684	2010
Community Cente	FCU	Fan Coil Unit	Gym Offices	FCU-1	1	*	*	*	*	*	
Community Cente	FCU	Fan Coil Unit	Life Guards	FCU-2	1	*	*	*	*	*	

Appendix B – Site Walkthrough Photos

C-1: Air-Cooled Chiller

C-2: Exterior Flood Light

C-3: RTU-3

C-4: RTU-1

C-5: RTU-2

C-6: Makeup Air Unit and GEF

C-7: Incandescent Lighting

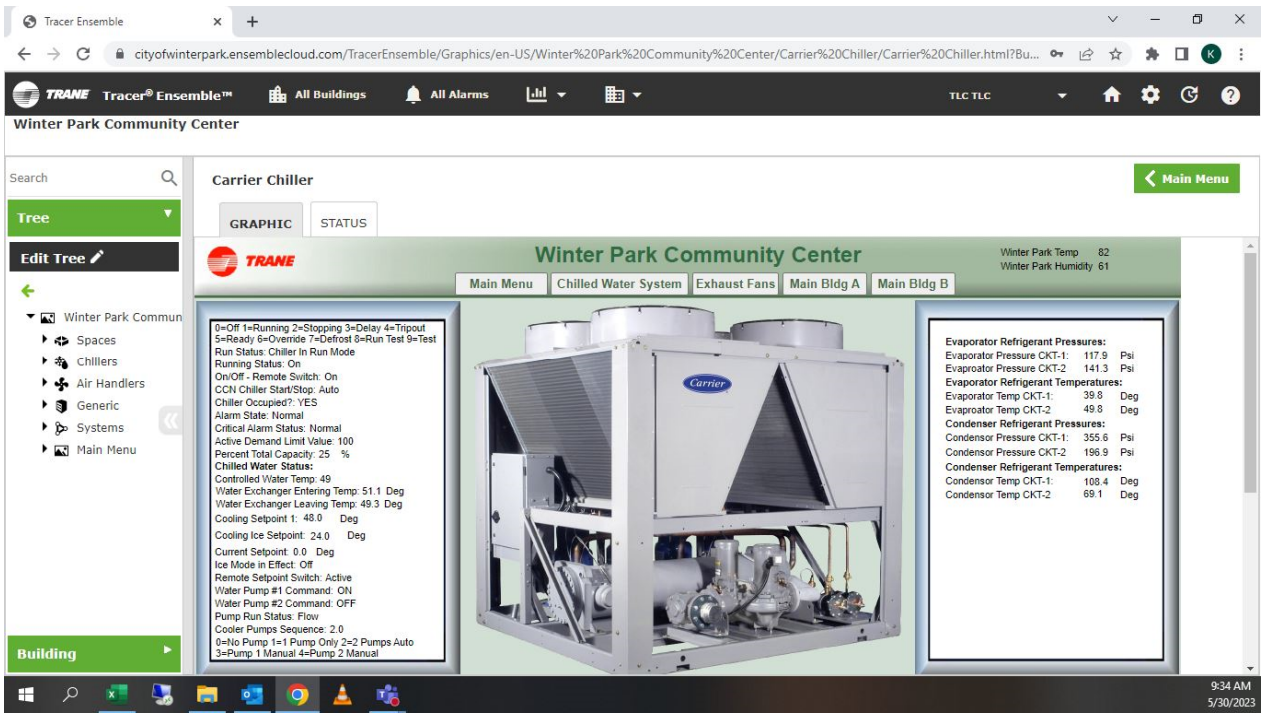
C-8: Flourescent Lighting

C-9: Kitchen Space

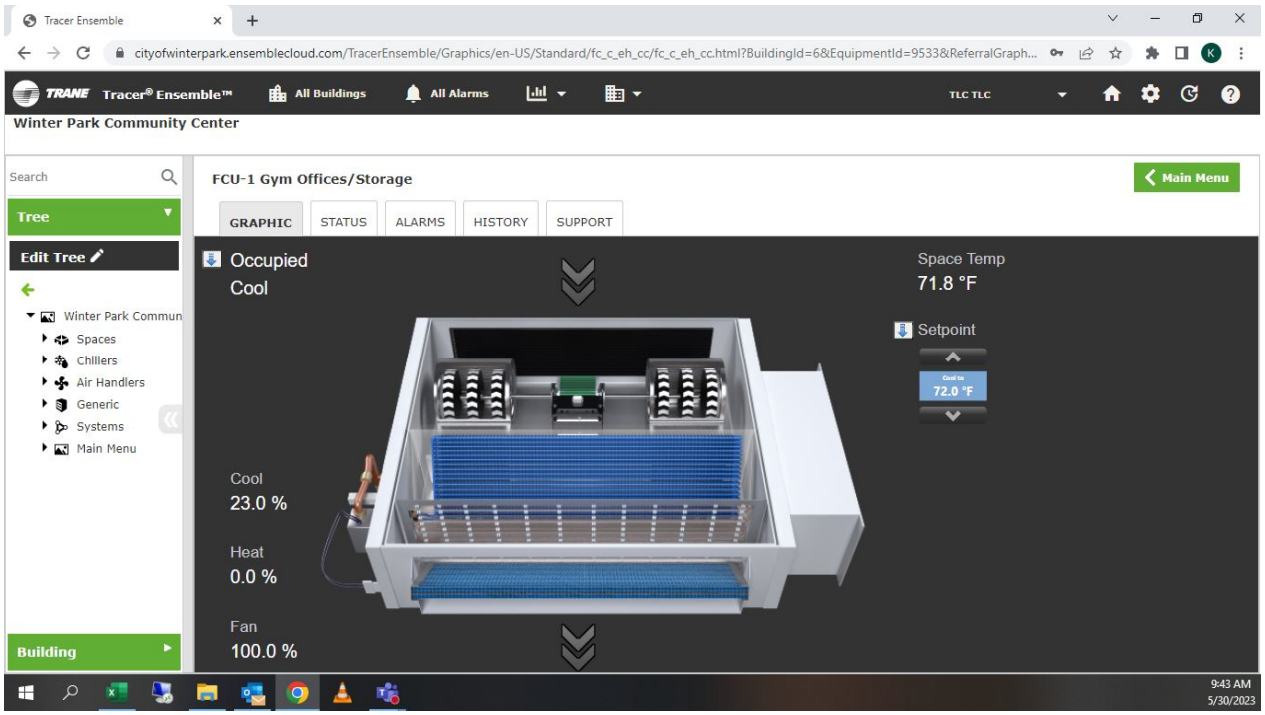
C-10: Electric Water Heater

C-11: Pool Area

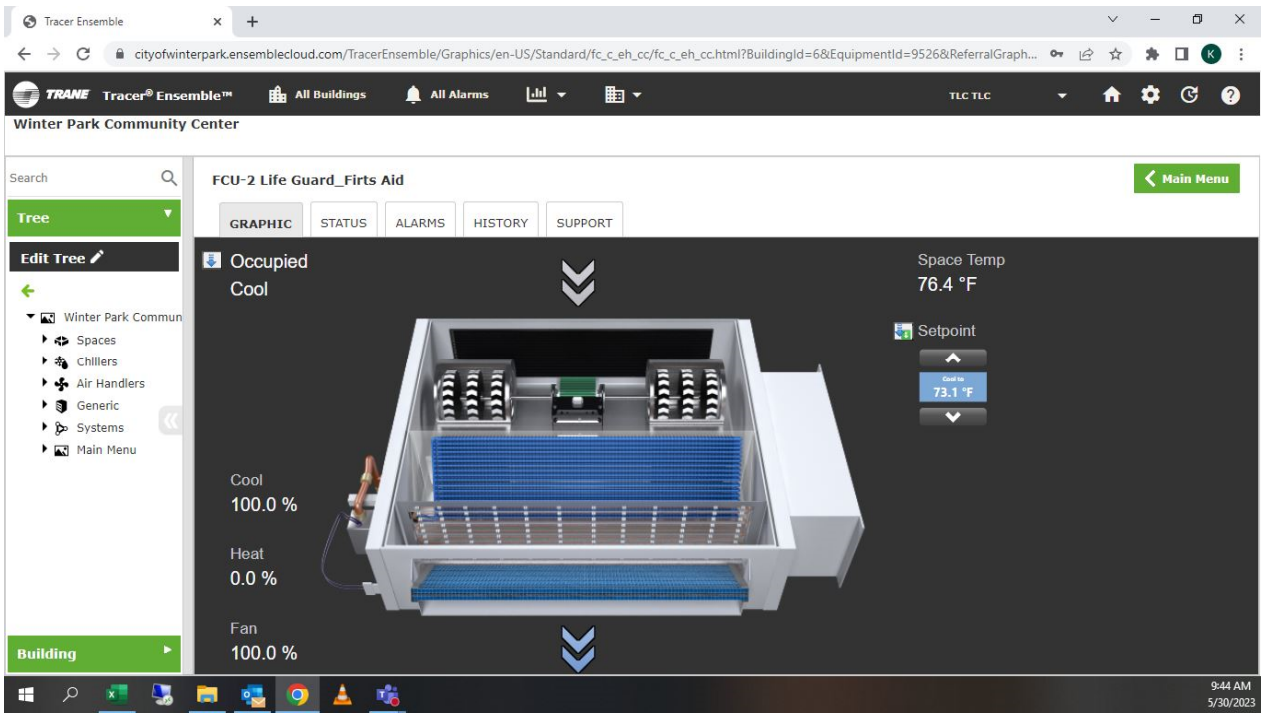
C-12: Gas Water Heater



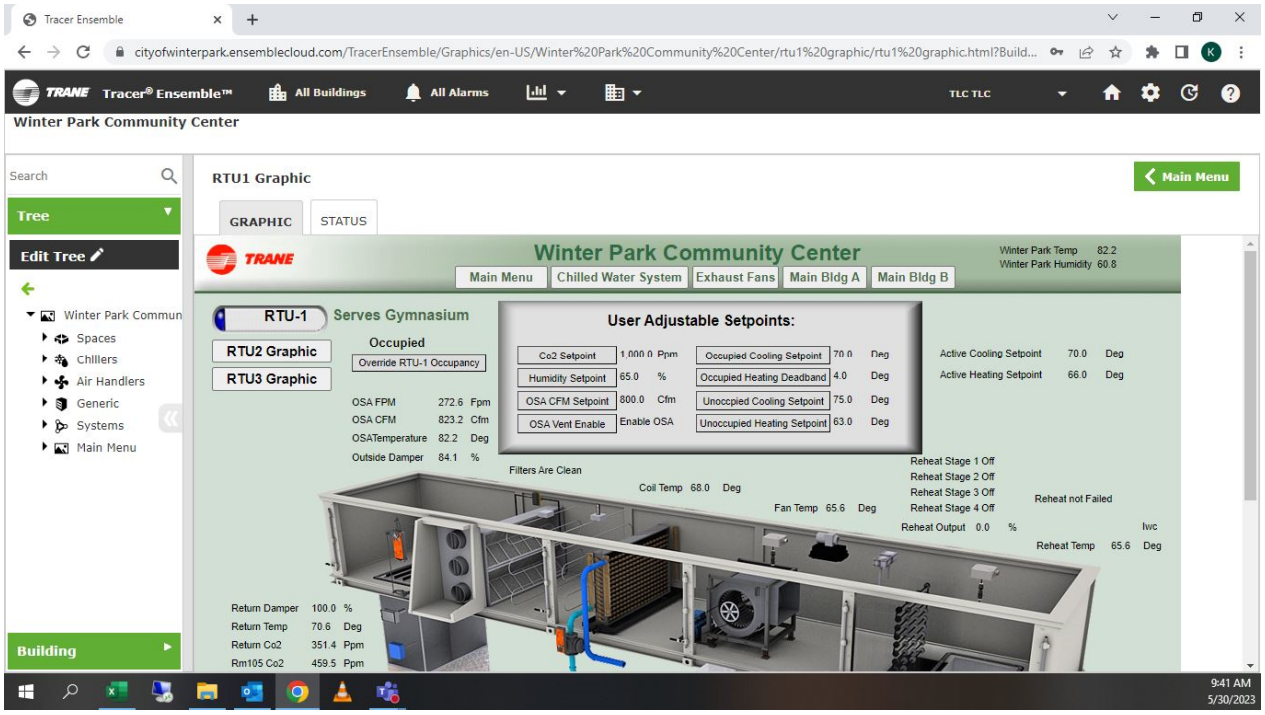
C-13: Air-Cooled Chiller Controls



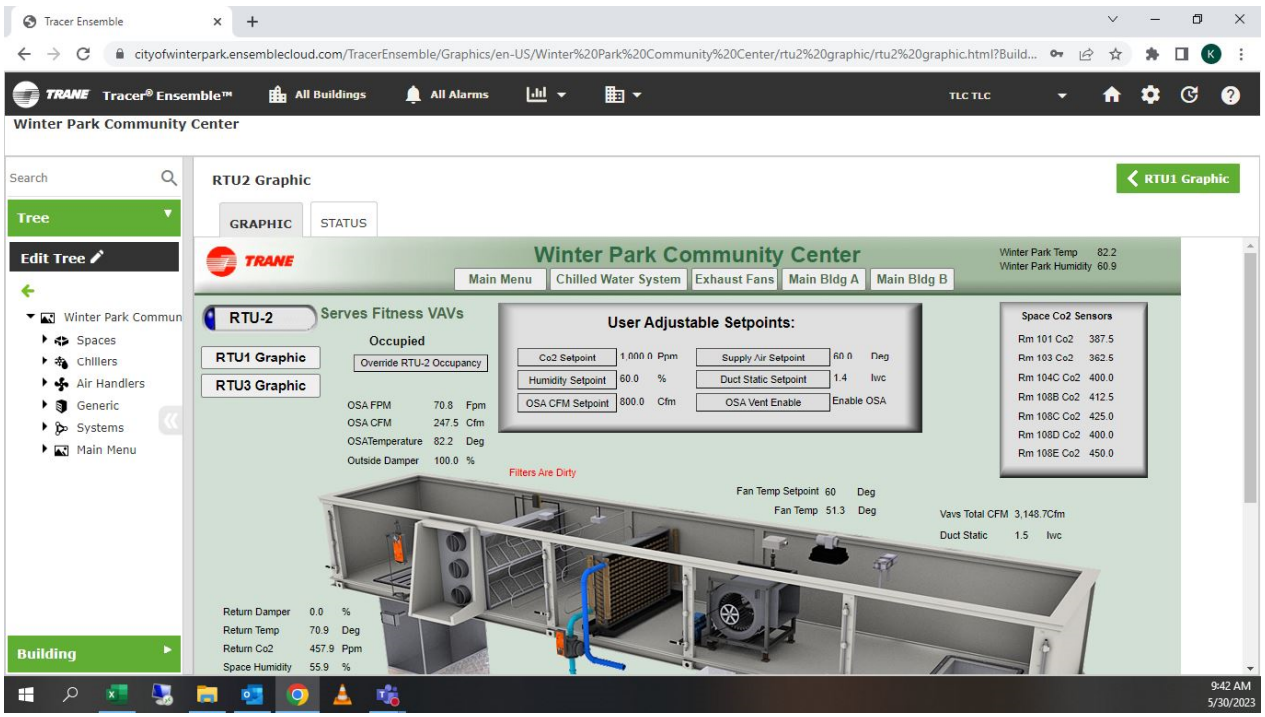
C-14: FCU-1



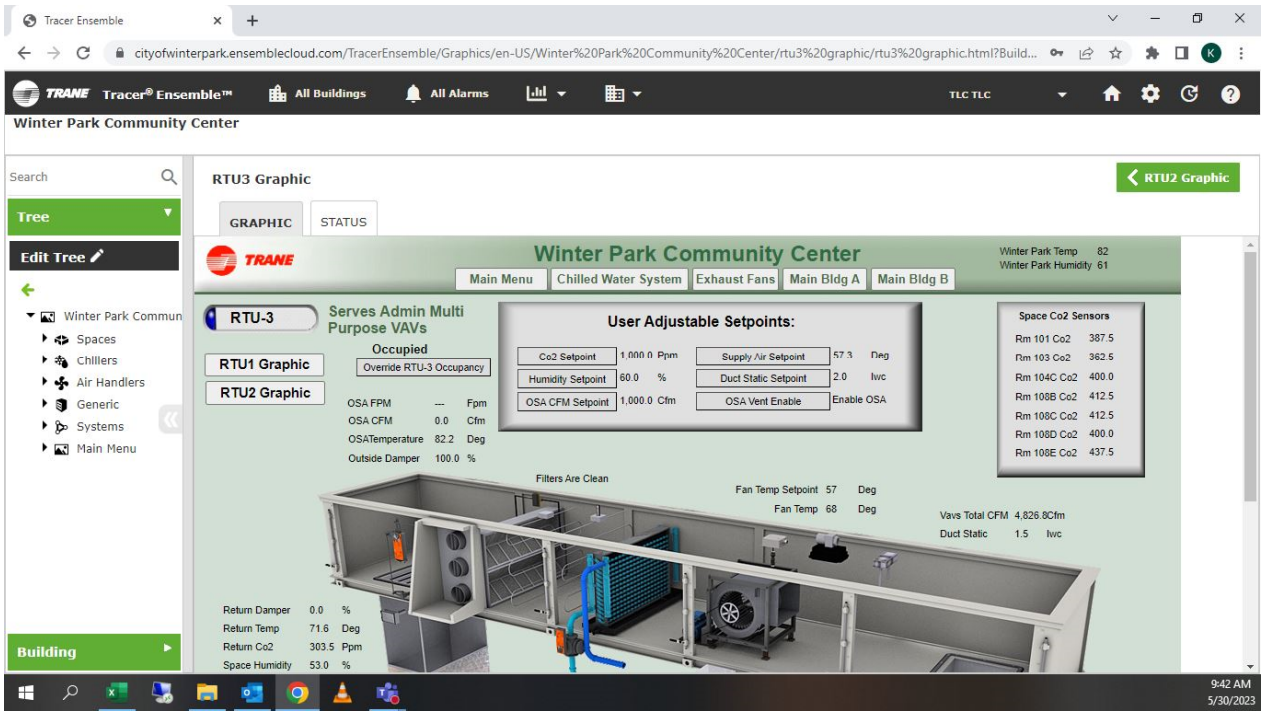
C-15: FCU-2



C-16: RTU1



C-17: RTU2



C-18: RTU3