9/29/2023

Winter Park
Tennis Center Tower

ASHRAE Level II Energy Audit

15 lightyears
Energy Testing | Solar Power | Green Certification

TLC | ENGINEERING SOLUTIONS

Table of Contents

Executive Summary

TLC Engineering Solutions (TLC) and 15 Lightyears performed an ASHRAE Level 2 facility energy audit of the Winter Park Azalea Lane Tennis Tower 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 drawings dated June 31, 1993, 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. 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

ASHRAE Level II Audit of the Azalea Lane Tennis Tower
1075 Azalea Ln, Winter Park, FL 32789

Gloria Eby
Natural Resources and Sustainability Director
geby@cityofwinterpark.org
Office: 407.599.3471

Lisa Pearcy
CEO, 15 Lightyears
lpearcy@15lightyears.com
Office: 855.438.1515

Eric McEwen
Principal, TLC Engineering Solutions
eric.mcewen@tlc-eng.com
Office: 407-487-1240
Cell: 904-635-0129

General Facility Description

The Azalea Lane Tennis Tower is a two-story civic building of approximately 1,336 square feet. An aerial view of the Azalea Lane Tennis Tower is shown below.

Figure 1: Aerial View of the Azalea Lane Tennis Tower

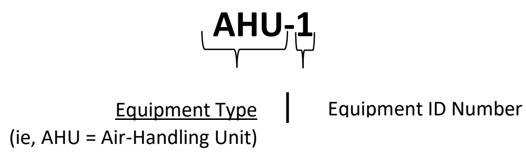
The first level of the building houses the women's toilets and showers, the men's toilets and showers, and a mechanical room. The second level of the building is dedicated office space.

Mechanical Systems

The Azalea Lane Tennis Tower features relatively new mechanical systems. The building utilizes split-system DX air conditioning units and exhaust fans. Mechanical system information was obtained via a combination of resources, including information gathered during TLC's audit walk-through of the building and the construction drawings provided by the City of Winter Park. 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 majority of the building is provided by two (2) mini-split air conditioning systems and one (1) split system air conditioning system. The units are controlled locally via standalone thermostats located within the occupied spaces.

Exhaust Fans

Exhaust fans have been installed in a sidewall configuration, providing general exhaust for restrooms/locker rooms located within the building.

Building Controls

The building is not currently controlled by a centralized Building Automation System (BAS). The HVAC equipment operates in a standalone manner, with each unit operating via a thermostat located in the space. Exhaust fans are energized and de-energized via the wall switch that controls the restroom lights.

Lighting Systems

Interior lighting throughout the facility is predominantly fluorescent fixtures. The lighting is controlled manually with no occupancy controls. Exterior lighting is provided via LED fixtures that are controlled via time clocks.

Domestic Water Fixture (Plumbing) Systems

The building is served by one (1) electric water heater. The water heater has a capacity of 80 gallons, and can use up to 4500 Watts.

Building Envelope

The building envelope systems date to the original 1993 construction of this facility. The building façade is plaster over block wall construction, and includes operable sliding windows. The roof is sloped with a peak in the center of the building and the attic beneath includes batt insulation above the second floor ceiling. No issues were noted with the observed areas of building envelope during the audit walkthrough.

Key Operating Parameters

The building is open 7am to 10pm on weekdays, and 7am to 6pm on weekends.

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 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 provided with electricity and water utilities by the City of Winter Park. Electrical utility consumption and demand values were provided for the months of January 2021 through June 2023. The monthly consumption profile is as expected, where values increase in the warmer months due to cooling needs. No billing statements were provided, but a blended rate for kWh savings was determined based on published rates. 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)	51,930
Annual Electrical Cost	-

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

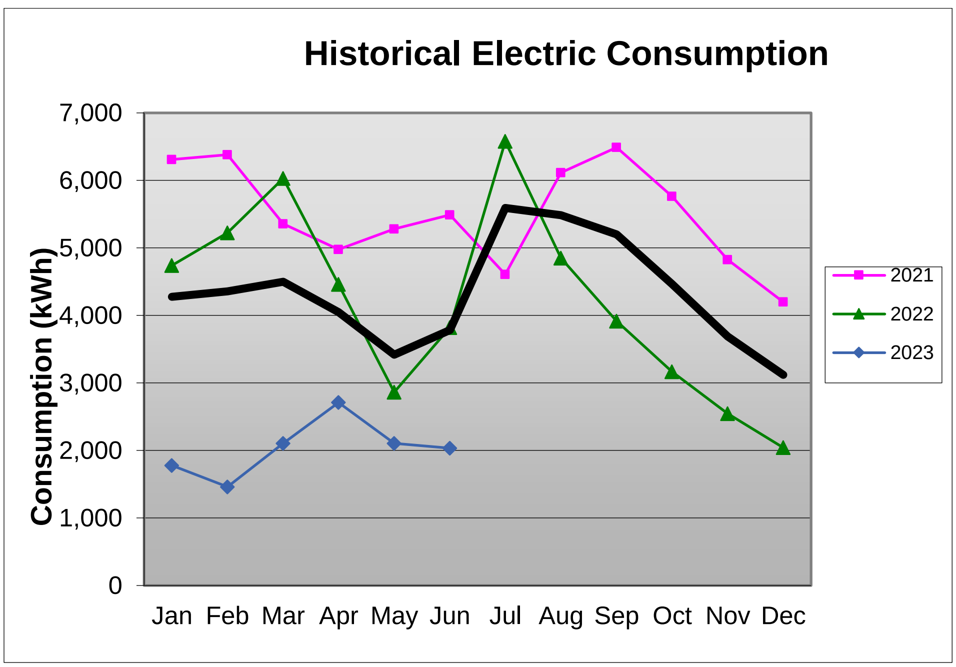


Figure 2: Azalea Lane Tennis Tower Electric Consumption

Table 2: Azalea Lane Tennis Tower Electricity Consumption Data

Date	Consumption (kWh)	Demand (kW)
Jan-21	6,311	68.50
Feb-21	6,383	69.50
Mar-21	5,358	67.54

Date	Consumption (kWh)	Demand (kW)
Apr-21	4,977	60.10
May-21	5,281	60.11
Jun-21	5,488	60.20
Jul-21	4,607	62.56
Aug-21	6,116	33.14
Sep-21	6,489	33.10
Oct-21	5,764	33.10
Nov-21	4,827	30.92
Dec-21	4,199	30.97
Jan-22	4,741	26.86
Feb-22	5,226	31.46
Mar-22	6,029	30.40
Apr-22	4,461	30.40
May-22	2,865	30.40
Jun-22	3,823	30.22
Jul-22	6,578	31.36
Aug-22	4,850	32.00
Sep-22	3,914	32.00
Oct-22	3,166	32.00
Nov-22	2,547	32.00
Dec-22	2,042	32.00
Jan-23	1,777	32.04
Feb-23	1,462	32.04
Mar-23	2,107	32.04
Apr-23	2,710	32.04
May-23	2,107	32.04
Jun-23	2,034	32.04

Benchmarking

TLC compared energy consumption utilizing a common benchmark to gauge how the Tennis Tower 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 its nature as a tennis facility, the building was entered into Energy Star Portfolio Manager as a recreation/athletic center.

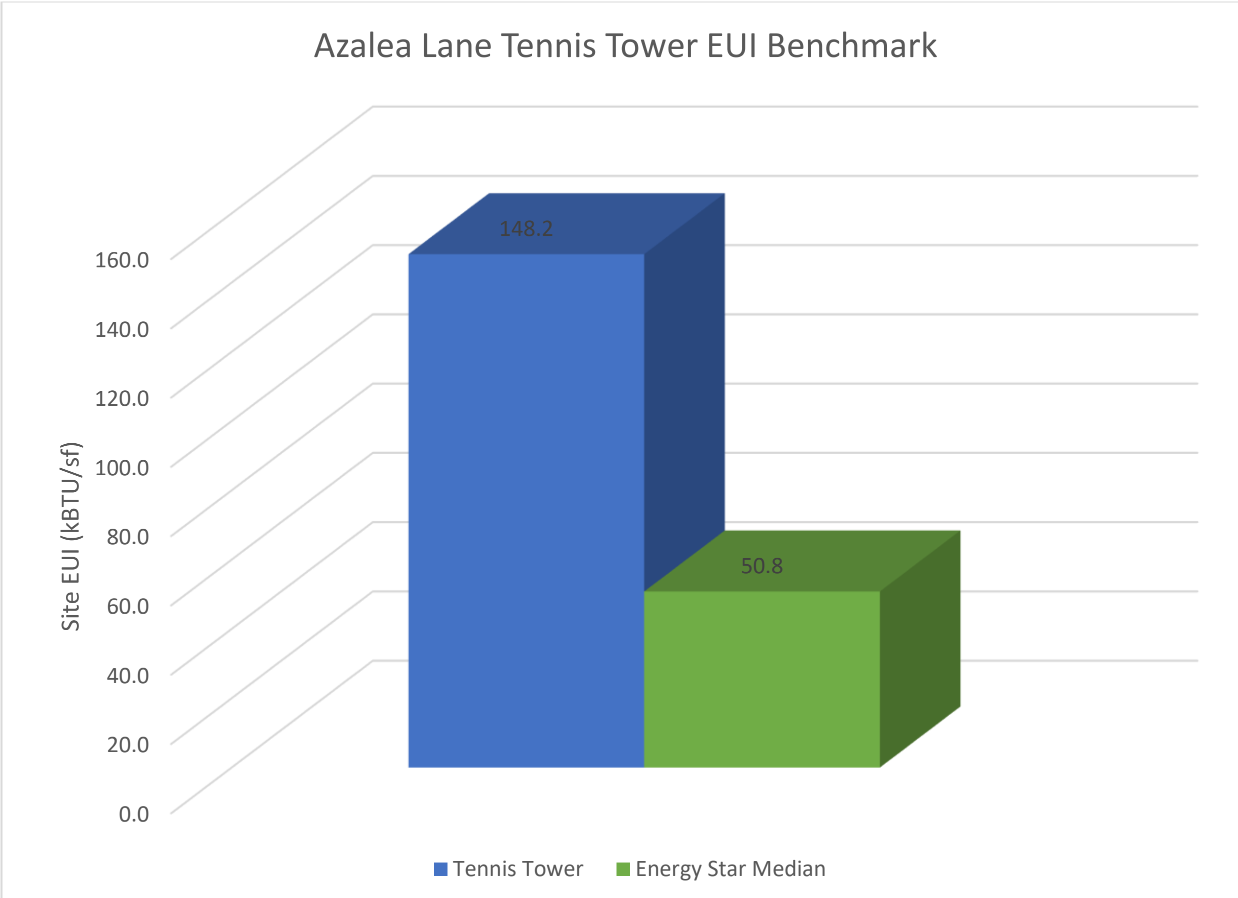


Figure 3: Azalea Lane Tennis Tower Energy Performance Comparison

Based on most recent 24 months of utility data, a comparison can be drawn between the Tennis Tower 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 Tennis Tower is 148.2 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 significantly higher than the median, which could be partially due to high-intensity exterior lighting required for tennis court operation at night. 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 $0.1410/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	$0.1410/kWh

Energy Saving Opportunities

The operation and condition of equipment at the Azalea Lane Tennis Tower 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 as well as optimizing the control sequences and settings. 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)
Interior Lighting Improvements	ECM	Low Cost	2,696	$380	$1,008	2.7
Exterior Lighting Improvements	ECM	High Cost	273,312	$38,537	$112,721	2.9
HVAC Controls Optimization	ECM	Low Cost	1,029	$145	$885	6.1
Totals			**277,037**	**$34,463**	**$114,614**	**3.33**

*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.

HVAC Controls Optimization

General Description

The scope for this ECM involves optimizing the building HVAC controls through one or multiple controls strategies. For this project, the controls strategy recommended would be occupancy scheduling with setback temperatures.

Consistent occupied and unoccupied temperature settings will be implemented based on the building type and their needs. Occupied schedules for the HVAC controls will be set up to dictate the hours when the building is considered occupied versus unoccupied. Whenever a building enters unoccupied mode, the building HVAC controls will utilize the unoccupied settings in lieu of the occupied settings.

Site Specifics

Even though the building is not a 24/7 facility, the thermostats have been found to be set to 72F at all times. This facility would benefit from the implementation of controls schedules based on its hours of operation of M-F 7am – 10pm and 7am – 6pm on weekends. HVAC controls will be given setback temperature settings to use during unoccupied conditions. Operating portions of the building at setback temperatures will result in energy savings due to the HVAC systems not having to operate as often to condition these areas when unoccupied.

Interior 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

The facility was observed to have predominantly linear fluorescent fixtures with T8 lamps. 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.

Exterior Lighting Improvements

General Description

This measure involves converting older style exterior lighting fixtures, such as metal halides, to modern LED lighting fixtures and lamps. Unless a building has been built or renovated in the past few years, metal halides are common to find for exterior fixtures and highbay fixtures in large assembly spaces. Metal Halide lighting fixtures 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.

Existing metal halide lighting fixtures will be replaced/retrofitted with new LED lighting fixtures. This will greatly reduce the energy required to illuminate the exterior of the building. 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 metal halides. Because LED light fixtures have longer burn hour life, this will reduce the material and time cost of replacing burned out lamps.

Site Specifics

The facility was observed to have metal halide fixtures for its exterior lights. 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.

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.

HVAC Controls Optimization

Savings for this measure have been based on a reduction in cooling energy due to setting back non-critical portions of the building that are not always occupied. The following table shows the major inputs used in the calculation of savings for this measure.

Table 5: Controls Optimization Major Inputs

Input Name	Bldg./Area Affected	Input Value	Basis of Input
% Cooling Energy Reduction	Entire building	5%	Engineering judgment

Calculations:

Savings for this measure were based on calculating the annual cooling energy and saving a percentage of it. The existing annual cooling energy was calculated from the electric utility baseline as the sum of all the electrical consumption for each month exceeding the lowest month's consumption. The following formula was used to calculate existing annual cooling energy.

$$Existing\ Cooling\ kWh = Annual\ Total\ kWh - (12 \times Baseload\ Month\ kWh)$$

Interior 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: Interior Lighting Improvements Major Inputs

Input Name	Bldg./Area Affected	Input Value	Basis of Input
Building Area	Entire building	1,336sf	Provided value
Existing Lighting Power Density	Entire building	1.0 W/sf	Typical value for T8 lamps throughout
Proposed Lighting Power Density	Entire building	0.6 W/sf	Typical value for LED lamps throughout
Annual Burn Hours	Entire building	5,044	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.

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

Exterior 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 7: Exterior Lighting Improvements Major Inputs

Input Name	Bldg./Area Affected	Input Value	Basis of Input
Quantity of Fixtures	Exterior Lights	104	Existing quantity of fixtures
Existing Fixture Wattage	Exterior Lights	1000 W	Typical value for Metal Halide fixtures
Proposed Fixture Wattage	Exterior Lights	400 W	Typical value for exterior LED fixtures
Annual Burn Hours	Exterior Lights	8,760	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.

$$Energy\ Usage = \frac{Quantity\ of\ Fixtures \times Fixture\ Wattage \times Hours}{1{,}000}$$

Appendix A – Mechanical Equipment

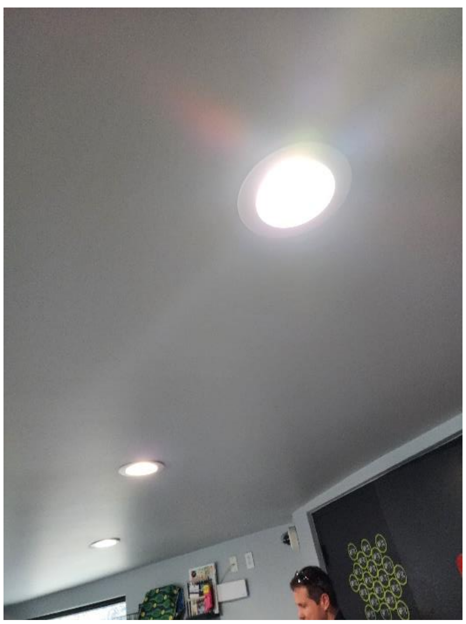
The following table shows a listing of all recorded major equipment in the building.

Building	Type	Equip	Location Served	Tag	Qty	Capacity	Units	Make	Model	Serial Number	Year
zalea Tennis Towe	FCU	Fan Coil Unit			1		HP	Daikin	FTX36NVJU		
zalea Tennis Towe	AHU	Air Handler			1	1/3	HP	Goodman	ARUF37C14AD	2010326604	2020
zalea Tennis Towe	WH	Water Heater - 80 Gallon			1	4500.0	Watts	AO Smith	LTE-80D 200	2025119791671	2020
zalea Tennis Towe	CU	Condensing Unit			1	3.0	Tons	Lennox	MPB036S4M-1P	S6920D11664	2020
zalea Tennis Towe	CU	Condensing Unit			1	3.0	Tons	Goodman	GSX140361KF	2011002844	2020
zalea Tennis Towe	CU	Condensing Unit			1	3.0	Tons	Daikin	RK36NMVJUA	E002848	2020
zalea Tennis Towe	FCU	Fan Coil Unit			1		HP	Lennox	MWMA018S4-2P	S6920B13233	2020

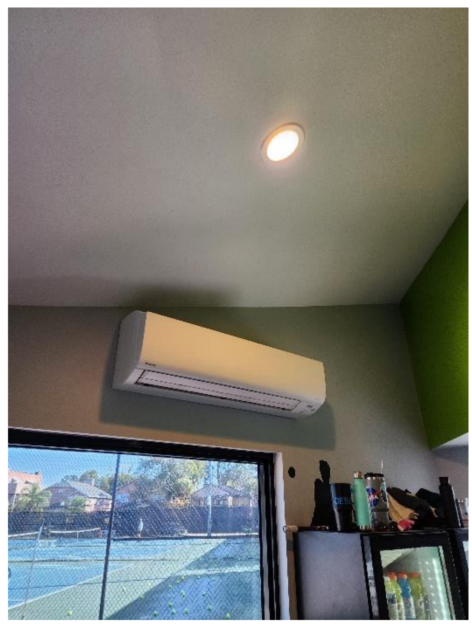
Appendix B – Site Walkthrough Photos

C-1: Exterior of Tennis Tower

C-2: Exterior Lighting



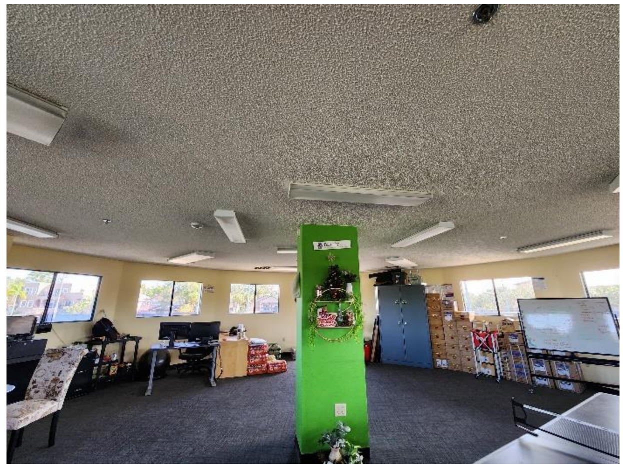
C-3: Interior Lighting



C-4: Daikin FCU

 C-5: Water Heater and Goodman AHU	 C-6: Condensing Units
 C-7: Lennox FCU	 C-8: Linear Lighting

C-9: Showers



C-10: Tennis Tower Level 2