9/29/2023

Winter Park Train Station

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) performed an ASHRAE Level 2 facility energy audit of the Winter Park Train Station as a part of its 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 construction drawings dated June 14, 2013, 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 C 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) and Facility Improvement Measures (FIMs). 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 station is a one-story civic building of approximately 2,598 square feet, which includes an overhang covered porch. An aerial view of the Train Station is shown below.

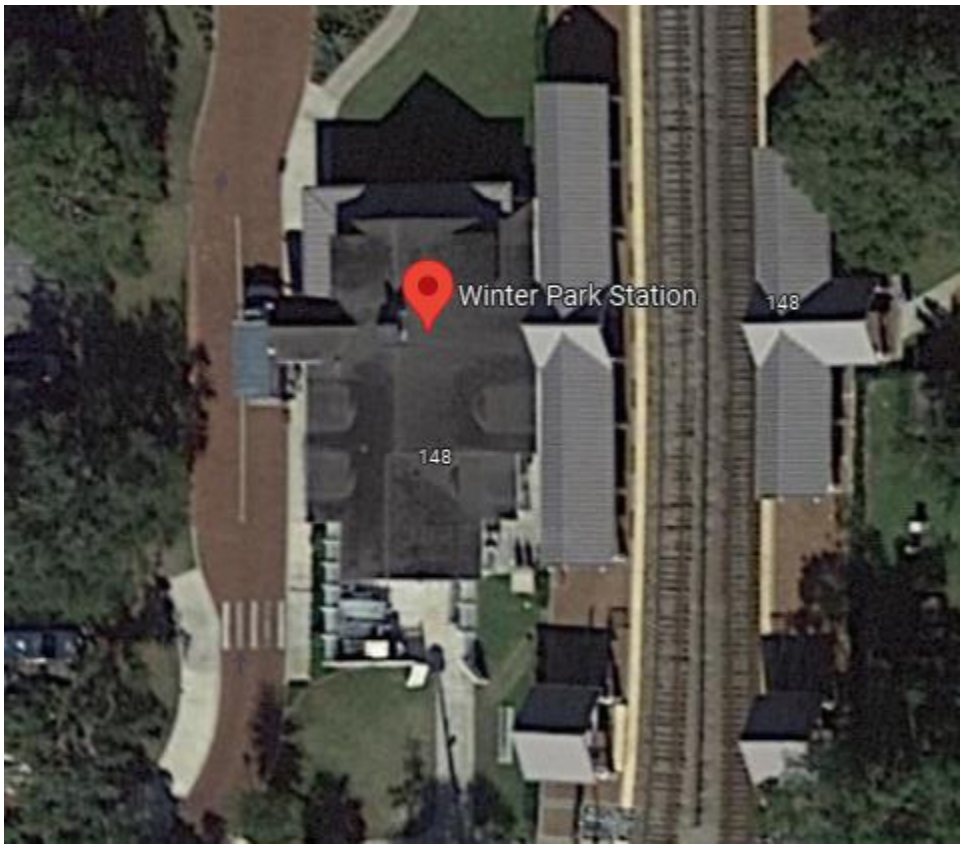


Figure 1: Aerial View of the Winter Park Train Station

The Train Station building includes a seating area, restrooms, an office, a breakroom, a ticketing space, an accounting office, and a luggage area, among other support spaces such as a janitor room and electrical room.

Mechanical Systems

The Winter Park Train Station is served primarily by split-system fan coil units installed in 2013. Mechanical system information was obtained via a combination of resources, including information gathered during TLC's audit walk-through of the building and construction document review. It is important to note that the drawings provided to TLC (dated June 14, 2013), did not include mechanical equipment schedules or

layout. 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.

Equipment Type (ie, AHU = Air-Handling Unit) | Equipment ID Number

Split-System Air Conditioners

Air conditioning for the majority of the building is provided by three (3) split-system air conditioning systems, of which two (2) are 15-SEER and one (1) is 16-SEER. The units are single-speed and enable when cooling or heating is called for by each unit's respective thermostat. All areas within the building are provided with conditioning via these split-systems.

Exhaust Fans

Each restroom within the building is provided with exhaust via small ceiling-mounted exhaust fans that operate in conjunction with the restroom lights.

Building Controls

The building is not currently controlled by a centralized Building Automation System (BAS). The building systems are currently controlled in a standalone manner with their own individual controls. The air conditioning systems are controlled via the unit thermostats, and lighting in the main waiting area is controlled via wall switches. The audit team noted that lighting in the office areas and restrooms are controlled via ceiling-mounted occupancy sensors.

Lighting Systems

Interior lighting throughout the facility is predominantly linear fluorescent fixtures utilizing T8 lamps, with some spaces including CFL downlights. The lighting is controlled manually in the open public areas and occupancy controls are included in smaller enclosed office and restroom spaces.

Domestic Water Fixture (Plumbing) Systems

Sinks within the train station are provided with hot water via instantaneous electric water heaters. Each water heater can provide up to 4800 watts to increase water temperature.

Building Envelope

The building envelope systems date to the original 2013 construction of this facility, with wall construction consisting of stucco over tilt-up concrete panels. The facility includes a peaked roof with asphalt shingles. There is significant glazing in the public areas of the train station which are provided with shading via a metal overhang covering the majority of the perimeter. There is a roll-up door allowing staff to park golf carts and other small vehicles within the building. During the audit, no issues were observed with the building envelope construction.

Key Operating Parameters

The building is currently operating from 9:00am to 8:00 pm every day of the week.

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 (CoWP). Electrical utility consumption 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)	39,915
Annual Electrical Cost	-

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

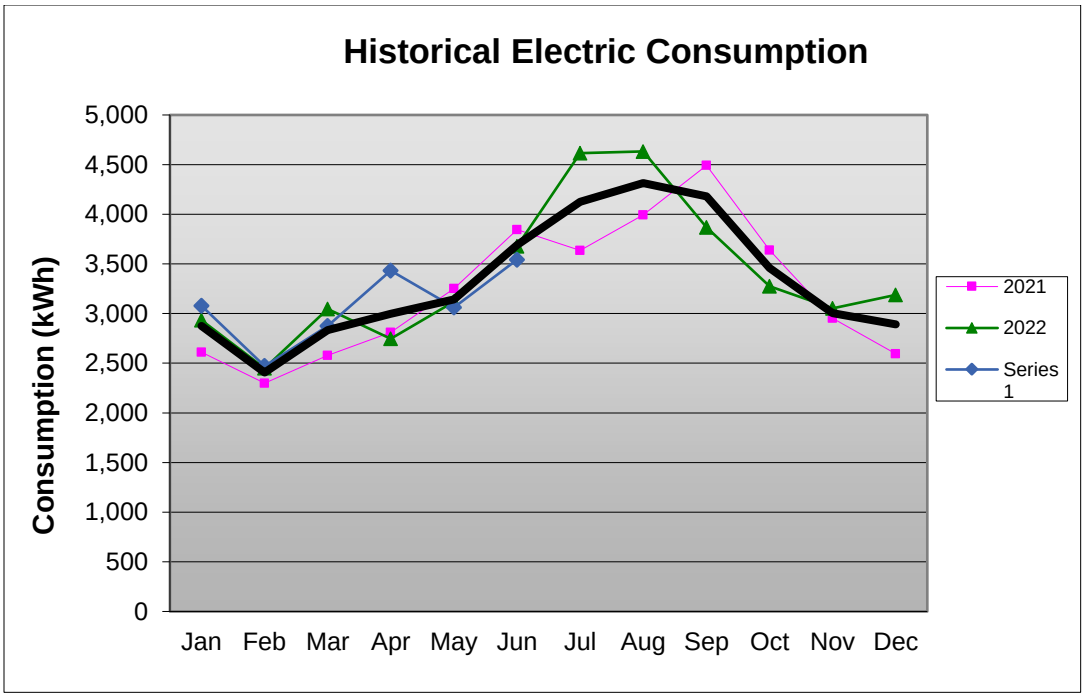


Figure 2: Train Station Electric Consumption

Table 2: Train Station Electricity Consumption Data

Date	Consumption (kWh)	Demand (kW)
Jan-21	2,612	21.28
Feb-21	2,299	21.14
Mar-21	2,578	20.47
Apr-21	2,811	22.22
May-21	3,251	23.11
Jun-21	3,846	26.16
Jul-21	3,637	25.43
Aug-21	3,995	13.05
Sep-21	4,492	13.05
Oct-21	3,640	12.36
Nov-21	2,954	10.38
Dec-21	2,595	10.38
Jan-22	2,932	10.64
Feb-22	2,449	11.26
Mar-22	3,045	10.77
Apr-22	2,746	11.56
May-22	3,120	11.76
Jun-22	3,678	13.11
Jul-22	4,616	12.38
Aug-22	4,633	13.256
Sep-22	3,867	13.256
Oct-22	3,274	13.256
Nov-22	3,053	13.256
Dec-22	3,189	13.256

Date	Consumption (kWh)	Demand (kW)
Jan-23	3,077	14.918
Feb-23	2,471	14.918
Mar-23	2,875	14.918
Apr-23	3,432	14.918
May-23	3,061	14.918
Jun-23	3,543	14.918

Benchmarking

TLC compared energy consumption utilizing a common benchmark to gauge how the building compares to similar ones nationally. The main 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. The facility was entered into Energy Star Portfolio Manager as a transportation terminal/station.

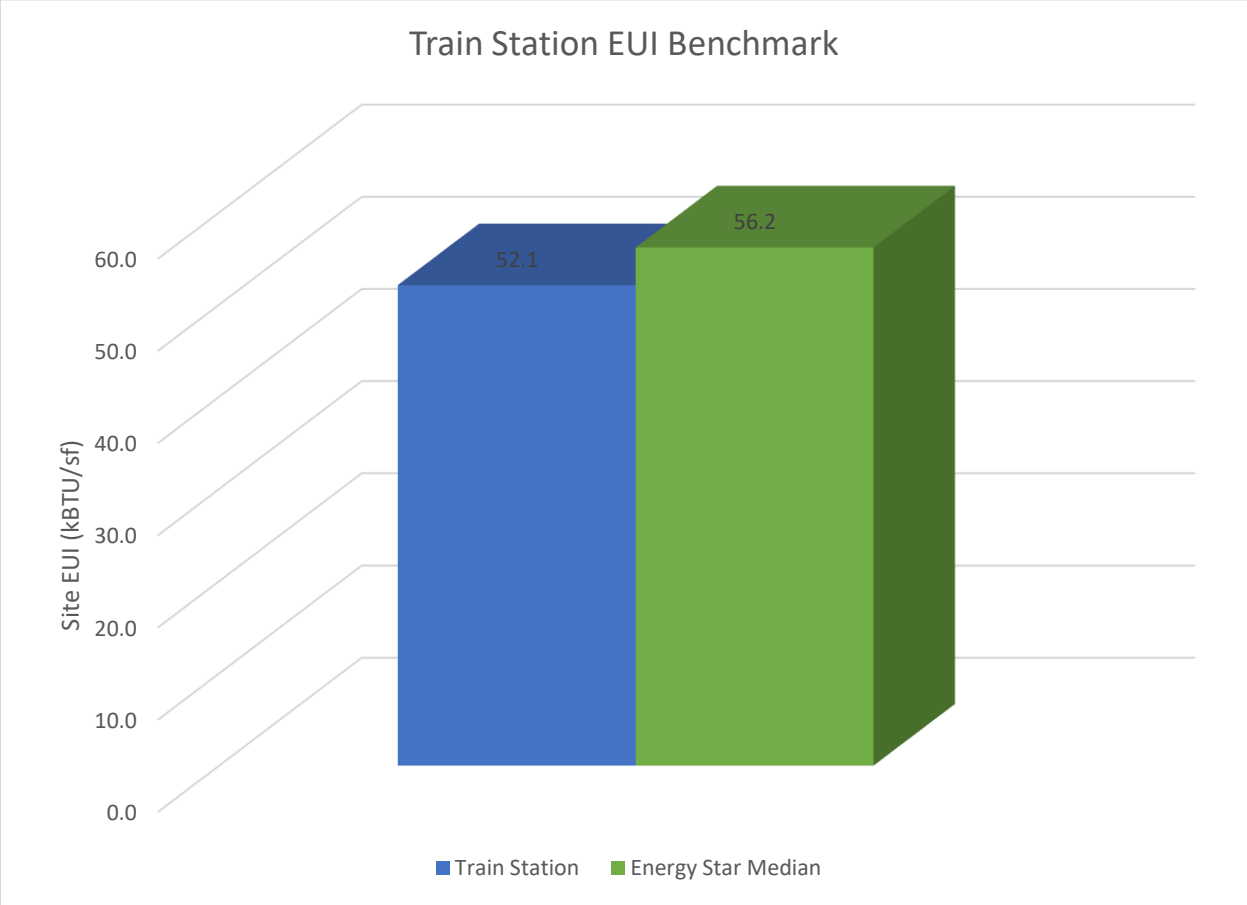


Figure 3: Train Station Energy Performance Comparison

Based on most recent 24 months of utility data, a comparison can be drawn between the Train Station and the average energy use intensity (EUI) of similar buildings throughout the United States. The median EUI for a transportation terminal/station in the United States is 56.2 kBTU/sf, and the calculated EUI of the Train Station is 52.1 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 energy conservation measures detailed in this report will serve to further decrease the EUI of the Train Station building.

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 $0.1126/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	$0.1126/kWh

Energy Saving Opportunities

The operation and condition of equipment at the Train Station was observed to offer a few different avenues for improvement. Improvements can be made by replacing older lighting technologies 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)
Lighting Improvements	ECM	Low Cost	6,349	$715	$618	0.9
HVAC Controls	FIM	Capital Improvement	--	--	$687	--
Totals			**6,439**	**$715**	**$618**	**0.9**

*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

The facility was observed to have approximately equal quantities linear fluorescent fixtures with T8 lamps and 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. While it is possible that these measures may decrease energy consumption, this has not been quantified as their purpose is focused on performance and reliability.

HVAC Controls

Existing thermostats are all localized in the same area. Installation of remote sensors in separate conditioned areas will allow for more accurate conditioning of these spaces by the units by which they are served. As the train station is open to the public, TLC recommends providing either installation of a locked cover for the thermostats or disabling the local setpoint change function.

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	2,598sf	Provided value
Existing Lighting Power Density	Entire building	1.12 W/sf	Typical value for T8 and CFL lamps throughout
Proposed Lighting Power Density	Entire building	0.6 W/sf	Typical value for LED lamps throughout
Annual Burn Hours	Entire building	4,745	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
Train Station	Water Heater	Instant Flow Water Heater	Restrooms		1	4800.0	Watts	Chronomite Labratories	SR-20L/240	840192	
Train Station	Condensing Unit	Condensing Unit		CU-2	1	5.0	Tons	Trane	4TTR6060B1000AA	13362RTN2F	2013
Train Station	Condensing Unit	Condensing Unit		CU-3	1	2.5	Tons	Trane	4TTR5030E1000BA	13154KX45F	2013
Train Station	Air Handler	Air Handling Unit		AHU-3	1			Trane			
Train Station	Air Handler	Air Handling Unit			1			Trane			

Appendix B – Site Walkthrough Photos

C-1: Train Station Entrance

C-2: Exterior Light Fixtures

C-3: Seating Area

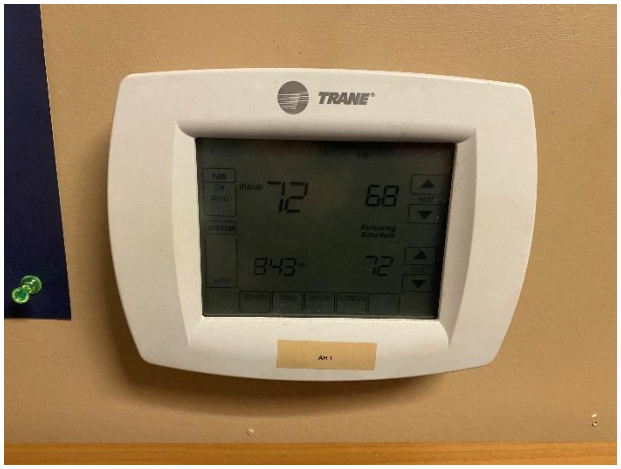
C-4: Instant-Flow Water Heater

C-5: Sink Faucet

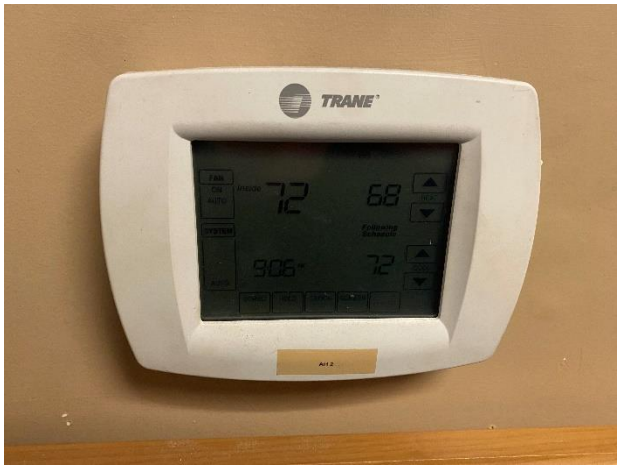
C-6: Condensing Unit

C-7: AHU-3

C-8: Air Handling Units



C-9: Thermostat (Photo 1)



C-10: Thermostat (Photo 2)

C-11: Interior Lighting Fixtures

C-12: Dual-Flush Toilet

 C-13: Electrial	