9/28/2023

Winter Park Library

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 Library 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 original design drawings dated October 22, 2019, current utility bills from December 2021 through December 2022, subsequent project documentation, and visited the site in January 2023 in order 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, selected trends were viewed through the Building Automation System (BAS) and extensive photo documentation of the conditions of the facility were obtained. 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 (ECM's) and evaluated all BAS trends. The combination of all the walkthrough and post-walkthrough activities led to the development of the Energy Conservation Measures (ECM's) list. The following table summarizes the recommended ECMs for the Winter Park Library. A complete description and analysis of each ECM can be found later in this report.

Project Information & Contacts

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General Facility Description

The Winter Park Library is a 3-story (including the basement) library, civic building of approximately 45,000 SF that went into service in December 2021. Below is an aerial view of the building.

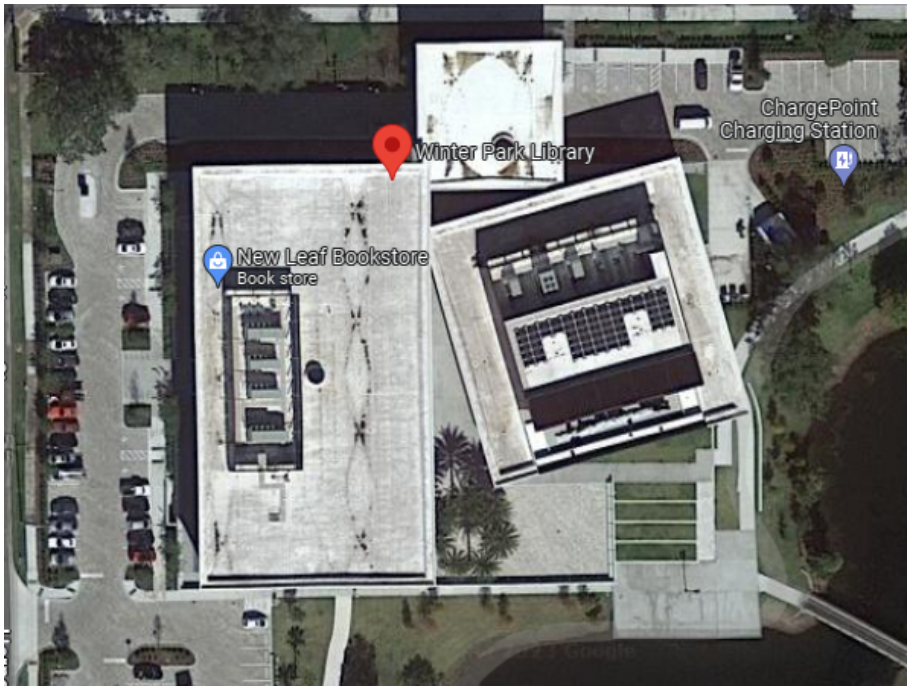


Figure 1: Aerial View of the Winter Park Library

The side view of the building can be seen on the cover of this document. The following is a floor-by-floor general description of the building areas. The basement hosts the stage, green room, and storage space.

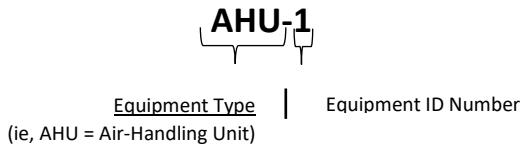
The first level hosts the library, computer lab, kitchen, storage, and more. The second level hosts the library, community room, collaboration rooms, ballroom, and other areas.

Mechanical Systems

The Winter Park Library features a new mechanical system with all new equipment. Overall, the building utilizes Air Handling Units, a Makeup Air Handling Unit, Exhaust Fans, VAV Terminal Units, a Unit Heater, and Split Systems. Mechanical system information came from a combination of resources, including information gathered during TLC's audit walk-through of the building and building automation system review, final design drawings provided by the Winter Park Library (dated October 22, 2019). 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 library is provided by four (4) packaged direct-expansion (DX) rooftop air handling units. Each unit serves approximately one-half of the floor plate on a single floor. Each unit is equipped with a variable frequency drive (VFD) to allow supply air to modulate based on changing load conditions, as well as staged and modulating compressors to control cooling capacity. Additionally, each unit is provided with an energy recovery wheel, to provide increased performance and efficiency. Areas served by the AHUs include library stacks, presentation area, the maker space, etc.

Exhaust Fans

Exhaust fans were observed on the rooftop, providing general exhaust for restrooms and break rooms located within the library. Additionally, the electrical equipment spaces are provided with exhaust via dedicated fans.

VAV Terminal Units

Variable Air Volume (VAV) boxes are duct devices that modulate flow to different thermal zones based on changing loads. The VAVs are part of the ductwork distribution from the AHUs and serve the various meeting rooms, stacks, and study areas throughout the building.

Split Systems

Several spaces within the library are conditioned via standalone DX split air conditioning systems. These units are cooling-only and provide temperature control in spaces such as electrical and telecom rooms.

CRAC Unit

The materials stored within the library's archives area are sensitive to changes in temperature and humidity. To provide the required environmental controls, a Stulz computer room air conditioning (CRAC)

unit was installed, including DX cooling, hot gas reheat, and electric heat. These elements are operated as needed to ensure that the temperature and humidity in the archive space stay within tolerance.

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. It was observed during the onsite audits that exhaust fans are manually set to run at all times.

Lighting Systems

Interior lighting throughout the facility is predominantly linear fluorescent fixtures utilizing T8 lamps. Exterior lighting was observed to be always on, including during the day when it is not needed.

Domestic Water Fixture (Plumbing) Systems

The building is served by one (1) electric water heater. The water heater is located on the first floor and provides hot water to restrooms and sinks located throughout the building. The water heater has 50-gallon storage capacity with a 12 kW, 277V electric heater.

Lavatory fixtures include motion sensors and low operating flows to reduce water consumption onsite.

Building Envelope

The building envelope systems were newly installed during the construction of the building in 2020-2021. The building enclosure was designed with materials meant to blend with the surrounding area, while maintaining a focus on efficiency and resilience. As the building was designed and constructed with sustainability in mind, and the building has not been in operation for very long, there were no opportunities for improvement related to the building envelope.

Key Operating Parameters

The building is currently occupied every day from 9am until 9pm. However, building controls sequences have the building in an occupied mode from 6:30am until 10pm. Having the building enter occupied mode before the building is truly occupied allows for the building to warm up or cool down to reach occupied temperatures.

Site Visit

The site was audited by TLC engineers with support from 15 Lightyears in early 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. During the site observation, the audit team asked questions about the conditions onsite that have caused concerns or issues in the past, as well as insight into the maintenance practices and priorities of the facilities management team.

Utility Analysis

Historical Utility Data

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 $0.0990/kWh. 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)	1,031,139
Annual Electrical Cost	--

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

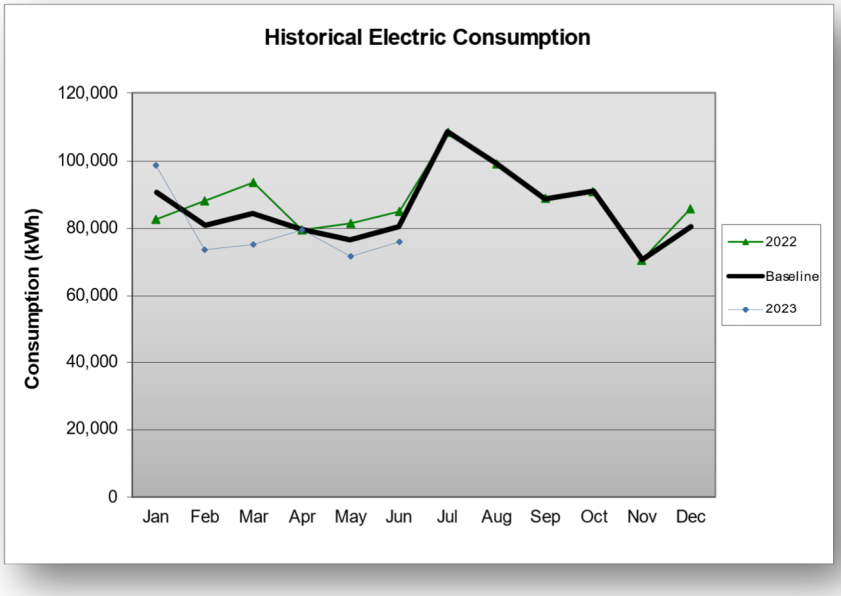


Figure 2: New Library Electric Consumption

Table 2: New Library Electricity Consumption Data

Date	Consumption (kWh)	Demand (kW)
Dec-21	113,000	185
Jan-22	124,288	186
Feb-22	-	191
Mar-22	140,739	195
Apr-22	119,566	211

Date	Consumption (kWh)	Demand (kW)
May-22	122,940	211
Jun-22	128,028	211
Jul-22	163,593	211
Aug-22	149,283	211
Sep-22	133,753	211
Oct-22	136,946	211
Nov-22	106,321	211
Dec-22	125,288	211
Jan-23	98,683	211
Feb-23	73,522	211
Mar-23	75,120	211
Apr-23	79,692	211
May-23	71,886	211
Jun-23	75,865	211

Benchmarking

TLC compared energy consumption and energy costs to two (2) common benchmarks to gauge how the building compares to similar ones both regionally and nationally. The first benchmark is the Energy Star Portfolio Manager rating. The second benchmark 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. Based on these scores, certain aspects of the buildings were scrutinized more heavily than others.

These benchmarks for energy usage are nationally recognized and in the case of Portfolio Manager, accommodate location factors. Using the utility billing information and observing the system operation allows the energy profiles to be broken down to greater detail. The facility was modeled in Portfolio Manager as a Library building.

The current energy consumption was entered into Portfolio Manager. Based on most recent 12-months of utility data, the chart below compares the Winter Park Library to the average energy use intensity (EUI) of similar buildings throughout the United States.

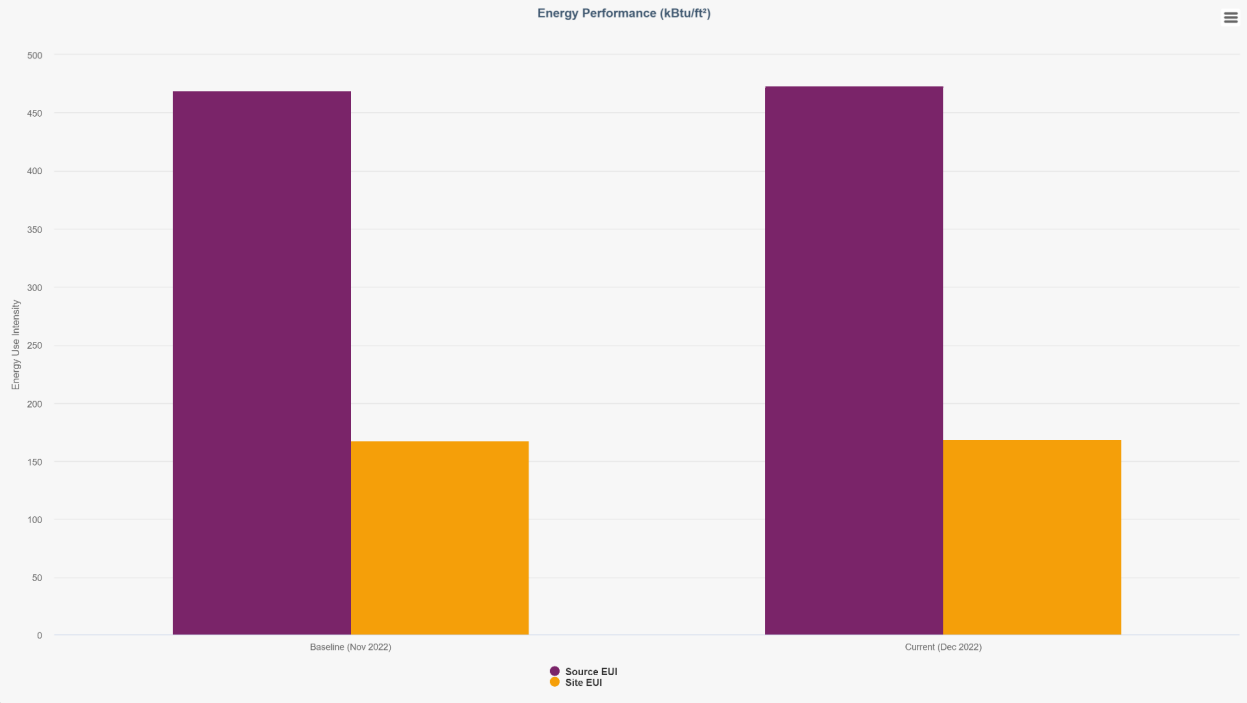


Figure 3: Library Energy Performance Comparison

Accounting for local weather conditions, the site energy use intensity of the Library of 169 kBTU per square foot is approximately 1 percent higher than the baseline comparison value of 167.4 kBTU per square foot. This is to be expected, as the building is newly constructed and was designed with sustainable principles in mind.

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 $0.099/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	$0.099kWh

Energy Saving Opportunities

The operation and condition of equipment at the New Library is typically in fair condition given the age of the equipment. There are some controls sequences on the building systems that were observed to be opportunities to save energy. The following table summarizes the recommended ECMs for this facility that should be considered for future projects.

Table 5: ECM Summary

Energy Savings Measure	kWh Savings	Total $ Savings	Cost $	Payback
AHU Controls	39,400	$3,900.60	$25,000	6.4
Exterior Lighting Controls	1,380	$136.62	$7,500	54.9
Total	**40,780**	**$4,037.22**	**$60,500**	**15.0**

AHU Controls

General Description

This measure proposes to install or update AHU controls. Over time, the control sequences for HVAC equipment such as air handling units will be modified from its original intent. It is also common for the building operation requirements to change, or for manual overrides to be put in place. These changes can result in HVAC systems consuming excess energy and not meeting their original design intent. By optimizing the controls, the HVAC systems can either be returned to their original design intent or can be optimized further than originally intended due to changes to the building operational needs.

Site Specifics

The New Library building HVAC systems are currently in good condition but are not operating in an optimized manner, impacting their capacity to maintain proper temperatures, pressure, and humidity in the building. During the audit, it was observed that RTU-2 is exhausting more air than in the original design. This led to an in-depth look at the building pressurization of all the AHUs and exhaust fans serving the building.

This measure proposes to balance the airflows for the AHUs and exhaust fans to their original design airflows. This will result in the building being positively pressurized, which has the benefit of reducing infiltration, improving thermal comfort, and saving energy.

Exterior Lighting Controls

General Description

This measure encompasses the installation of various lighting controls such as remote wireless controllers, dimming modules, and exterior photocells. Light fixtures within the existing system currently lack such controls options and are controlled only by manual on-off switches or simple timers. These methods are less efficient and may regularly allow conditions for lighting energy to be wasted running at their full output levels or during daylight outdoors. New lighting controls systems will be implemented for exterior areas. These changes allow for more efficient usage of light fixtures.

Site Specifics

For the New Library building, there is an opportunity for lighting controls optimization as the existing exterior lighting fixtures have been observed to be always operating. Lighting controls will be provided for the exterior lighting so that they only operate during the night. Note that lighting controls may come with some annual maintenance savings. Because the burn hours will be reduced, the fixtures will not burn out as quickly and will not be replaced as often. No maintenance savings are included in the calculations at this time but may be calculated in a future phase of the project.

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.

AHU Controls

Further controls optimization opportunities were identified for the AHUs serving the building. RTU-1 was observed to have a cooling coil discharge air temperature of 68°F and was not dehumidifying. While it is possible that the unit was in transition to dehumidification mode when observed, humidity was noted as a known issue by building personnel. The City should continue to monitor the operation of equipment and HVAC controls to ensure proper operation. If consistent issues are noted, investigation through a retro-commissioning effort by a third-party engineer or commissioning authority is recommended to optimize performance of the building systems.

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.

AHU Controls

Savings for this measure have been based on reducing the amount of infiltration into the building. The following table shows the major inputs used in the calculation of savings for this measure.

Table 1: AHU Controls Major Inputs

Input Name	Bldg./Area Affected	Input Value	Basis of Input
Infiltration Reduction	Entire Building	8,395 cfm	Comparison of current building air balance to design air balance
Heating Efficiency	AHU-1 thru 4	1.0 COP	Electric strip heat
Cooling Efficiency	AHU-1 thru 4	0.93 kW/ton	Manufacturer info and typical degradation
Cooling Setpoint/Setback	AHU-1 thru 4	72°F/80°F	Engineering judgment
Heating Setpoint/Setback	AHU-1 thru 4	70°F/60°F	Engineering judgment
Controls Occ. Schedule	AHU-1 thru 4	6:30a-10p daily	Onsite audit

Calculations:

Savings for this measure were based on calculating the heating and cooling energy due to the infiltration air that would be eliminated because of this measure. For each hour of the year, the outside air temperature was compared to the setpoints and balance points to determine whether the building HVAC equipment was in cooling, heating, economizer, or drift mode. The amount of infiltration reduction for each hour was determined based on the existing infiltration, reduction percentage, and the building schedule.

The energy savings for each hour were calculated with the following formulas. The cooling equation was only used for hours that the equipment was in “cooling” mode, while the heating equation was only used for hours that the equipment was in “heating” mode. There were no savings for hours when the equipment was in “economizer” or “drift” mode.

$$Cooling\ Savings = \frac{1.08 \times Airflow \times \Delta T \times Efficiency}{12000 \times Sensible\ Heat\ Ratio}$$

$$Heating\ Savings = \frac{1.08 \times Airflow \times \Delta T}{Efficiency}$$

In the formulas above, the cooling savings were in kWh and the heating savings were in BTU. The airflow was the infiltration reduction in CFM and ΔT was the difference in the outside air temperature and the cooling setpoints or heating balance points, depending on the calculation. The cooling efficiency was in

kW/ton and the heating efficiency was a percentage. The heating savings were then converted to either kWh for electrically heated systems or therms for fuel-fired equipment.

Exterior Lighting Controls

Savings for this measure have been based on a reduction in the burn hours of exterior lighting fixtures. The following table shows the major inputs used in the calculation of savings for this measure.

Table 2: Exterior Lighting Controls Major Inputs

Input Name	Bldg./Area Affected	Input Value	Basis of Input
Number of Fixtures	Fixture Type "WE"	14	As-built drawings
Fixture Wattage	Fixture Type "WE"	23 W	As-built drawings
Existing Burn Hours	Fixture Type "WE"	8,760 Hrs	Lights always on
Proposed Burn Hours	Fixture Type "WE"	4,380 Hrs	Lights on at night only

Calculations:

Savings for this measure were comprised of energy savings. The energy savings were the difference in the existing and proposed kWh for the exterior lighting fixtures at the building. The energy usage in kWh for a particular light fixture was calculated using the following formula:

$$Energy\ Usage = \frac{Burn\ Hours \times Fixture\ Wattage}{1{,}000}$$

In the formula above, burn hours represents the annual hours that the light fixture was estimated to be energized.

Appendix A – Lighting Line by Line

The following table shows a listing of all recorded fixtures in the building. This is not a comprehensive list of all fixtures but details a good representation. This includes only permanent fixtures and does not include any construction lighting.

ID CODE	DESCRIPTION	MAKE/MODEL	EQUIVALENT MAKE/MODEL	VOLTAGE	TYPE	VA	COMMENTS	FIXTURE WATTAGE*	TOTAL QUANTITY
J	4' LED STRIP FIXTURE	Alphalite ILL-4H(32S)/840	COLUMBIA MPS4, DAYBRITE FSSEZ, SLG TS	277 V	LED 4000 K	25 VA		22.5	**16**
JE	SAME AS TYPE "J" WITH 90 MINUTE BATTERY PACK	Alphalite ILL-4H(32S)/840-EM1400	COLUMBIA MPS4, DAYBRITE FSSEZ, SLG TS	277 V	LED 4000 K	25 VA		22.5	**16**
QE	LINEAR LED WALL MOUNTED FIXTURE, WITH 90 MINUTE BATTERY PACK	METALUX 4SWLED-LD4-60HL-LW-UNV-L835-CD2-SVPD2-U	COLUMBIA MPS4, HEW SLF, LITHONIA	277 V	LED 4000 K	40 VA		36	**10**
TA	3" DIA. MONOPOINT MOUNT LED FIXTURE, 0-90 DEG TILT, 360 DEG ROTATION, DIFFUSION LENS, DIE CAST AL HOUSING, POWDER COAT FINISH, CEILING MOUNTED, 1663 LM, 92 CRI, 0-10V DIMMING, MATTE BLACK	LF Illumination LANIE TRA20B-M-19C-9230-V-DMU-BB OPT-TRA20B-P-DFL OPT-TRA20B-HXL	ELITE,PH60-132T-277	277 V	LED 3000 K	19 VA		17.1	**127**
TA-1	SAME AS TYPE TA-1 WITH WIDE BEAM SPREAD	LF Illumination LANIE TRA20B-M-19C-9230-V-DMU-BB OPT-TRA20B-P-DFL	1101SWHC-1101F264WU PH60-218Q-G24q-2-SG-WW-EB-UNV ELITE, HH6PL-2X18-E-MVOLT-6507-SHZ-WH	277 V	LED 3000 K	19 VA	PROVIDE DETAILED FABRICATION DRAWINGS WITH SUBMITTAL	17.1	**82**
TA-2	SAME AS TYPE TA WITH NARROW BEAM SPREAD AND 26W LUMEN PACKAGE	LF Illumination LANIE TRA20B-M-26C-9230-V-DMU-BB OPT-TRA20B-P-DFL	ELITE	277 V	LED 3000 K	26 VA	PROVIDE DETAILED FABRICATION DRAWINGS WITH SUBMITTAL	23.4	**52**
TC/TCE	PENDENT MOUNT DIRECT/INDIRECT LINEAR FIXTURE (TCE type with Emergecy Battery Pack)	Pinnacle EX3DI-A-BW-830(MOD 60% output)-830-**-mounting U-OL2-1-**(finish)	LITECON	277 V	LED 3000 K	100 VA		90	**21**
TC-2	SAME AS TYPE TC WITH HO LUMEN PACKAGE	Pinnacle EX3DI-A-BW-830-830-**-mounting U-OL2-1-**(finish)	LITECON	277 V	LED 3000 K	100 VA		90	**4**
TD	HORIZONTAL DOWNLIGHT	Spectrum Lighting SR3MOXT10LDS101/RA3F30KMDMWSO	FUSION ER3, QUANTALIGHT RL3A	277 V	LED 3000 K	20 VA		18	**25**
TD-1	HORIZONTAL DOWNLIGHT	Spectrum Lighting SR3MOXT10LDS101/RA3F30KMDMWSO	FUSION ER3, QUANTALIGHT RL3A	277 V	LED 3000 K	20 VA		18	**2**
TDE	SAME AS TYPE "TD" WITH 90 MINUTE BATTERY PACK	Spectrum Lighting SR3MOXT10LDS101/RA3F30KMDMWSO EM	FUSION ER3, QUANTALIGHT RL3A	277 V	LED 3000 K	20 VA		18	**20**
TF	REGRESSED LINEAR PERIMETER LED FIXTURE	Pinnacle EVL-830-continuous-SF(S)-U-OL1-1-**-W	PRULITE BOI	277 V	LED 3000 K	100 VA		90	**9**

ID CODE	DESCRIPTION	MAKE/MODEL	EQUIVALENT MAKE/MODEL	VOLTAGE	TYPE	VA	COMMENTS	FIXTURE WATTAGE*	TOTAL QUANTITY
TG	RECESSED SNAP IN LED LIGHT MODULE MOUNTED IN HANDRAIL, STATIC WHITE, 75 DEGREE HYPERBOLIC DISTRIBUTION, POLYCARBONATE LENS, FLAT FACE WITH COUNTERBORE FOR FLUSH FINISH, BLACK FINISH, STAINLESS STEEL, 90 LUMENS PER MODULE	ALPHABET ZETA750 SNAP HYP #750S-30K-HYP-PC-FF-BLACK FINISH		277 V	LED 3000 K	50 VA	PROVIDE DETAILED FABRICATION DRAWINGS WITH SUBMITTAL. JUNCTION BOXES SHOWN ON PLAN FOR CONNECTION TO POWER SUPPLY ABOVE ACCESSIBLE CEILING.	45	**2**
TM/TME	RECESSED LINEAR LED FIXTURE (TME has 90 min batter pack)	Pinnacle EV3D-A-830(MOD 60% output)-**-Mounting-U-OL1-1-(Finish)	LITECON 3L	277 V	LED 3000 K	100 VA		90	**39**
TN/TNE	LINEAR RECESSED MOUNTED LED (TNE with 90 min batter pack)	Selux L10-1B30-30-LW-SF2-*-BK-UNV-DIM	LITECON 2L	277 V	LED 3000 K	100 VA	PROVIDE DETAILED FABRICATION DRAWINGS WITH SUBMITTAL. * LENGTH PER PLAN.	90	**124**
TU	TRACK LIGHTING FIXTURE	LF Illumination LANIE TRA20B-G-19C-9230-V-DMU-BB OPT-TRA20B-P-DFL OPT-TRA20B-HXL	ELITE LTG ET	277 V	LED 3000 K	23 VA		20.7	**34**
TU-1	SAME AS TYPE TU WITH VERY WIDE 51 DEG BEAM SPREAD	LF Illumination LANIE TRA20B-G-19C-9230-V-DMU-BB OPT-TRA20B-P-DFL OPT-TRA20B-HXL	ELITE LTG ET	277 V	LED 3000 K	23 VA	PROVIDE DETAILED FABRICATION DRAWINGS WITH SUBMITTAL	20.7	**38**
VE	LINEAR LED WALL MOUNTED FIXTURE, WITH 90 MINUTE BATTERY PACK	METALUX 4VT2-LD5-4-FR50-277-EL10W-L840-WL	COLUMBIA, HEW SLF, SLG LTG VTC	277 V	LED 4000 K	30 VA		27	**6**
WE	EXTERIOR WALL PACK, ROUND REVEALS, ELECTRONIC LED DRIVER, TYPE III DISTRIBUTION WITH BACK LIGHT CONTROL, BLACK FINISH, WITH 90 MINUTE BATTERY PACK	COOPER INDUSTRIES INVUE ENV-E01-LED-E1-BL3-BK-BBB	ALL CY1, SLG LTG WFM	277 V	LED 4000 K	25 VA	MOUNT AT 7'-0" AFF	22.5	**14**
X1	RECESSED EDGE LIT LED EXIT SIGN, CEILLING MOUNTED, GREEN LETTERS, CLEAR/MIRROR BACKGROUND AND SINGLE/DOUBLE FACE, WITH 90 MINUTE BATTERY PACK	EMERGI-LITE LSNX-4*-N-G-**-***	MULE/ORL PVT, BEGHELLI, LITHONIA		LED	1 VA	REFER TO PLANS FOR FACES (*) AND CHEVRONS (***), ** PROVIDE CLEAR WITH SINGLE FACE AND MIRROR WITH DOUBLE FACE	0.9	**26**
X2	WALL MOUNTED EDGE LIT LED EXIT SIGN FIXTURE, GREEN LETTERS, CLEAR/MIRROR BACKGROUND AND SINGLE/DOUBLE FACE, WITH 90 MINUTE BATTERY PACK	EMERGI-LITE LXN-*-N-G-**-***-C	MULE/ORL PVT, BEGHELLI, LITHONIA		LED	1 VA	REFER TO PLANS FOR FACES (*) AND CHEVRONS (***), ** PROVIDE CLEAR WITH SINGLE FACE AND MIRROR WITH DOUBLE FACE	0.9	**4**

ID CODE	DESCRIPTION	MAKE/MODEL	EQUIVALENT MAKE/MODEL	VOLTAGE	TYPE	VA	COMMENTS	FIXTURE WATTAGE*	TOTAL QUANTITY
X4	SURFACE END MOUNTED EDGE LIT LED EXIT SIGN FIXTURE, GREEN LETTERS, CLEAR/MIRROR BACKGROUND AND SINGLE/DOUBLE FACE, WITH 90 MINUTE BATTERY PACK	EMERGI-LITE LXN-*-N-G-**-***-C (SURFACE END MOUNT)	BEGHELLI, LITHONIA, DUALLITE		LED	1 VA	REFER TO PLANS FOR FACES (*) AND CHEVRONS (***), ** PROVIDE CLEAR WITH SINGLE FACE AND MIRROR WITH DOUBLE FACE	0.9	**8**

*-Fixture Wattage assumes 90% efficiency of VA for wattage

Appendix B – Mechanical Equipment

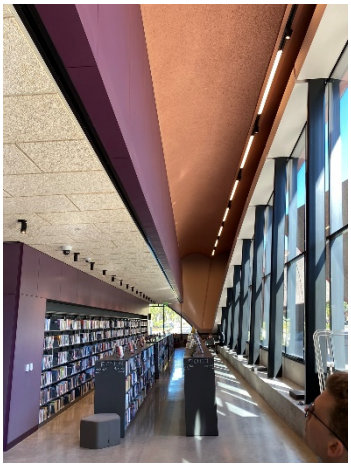
The following table shows a listing of all recorded major equipment in the building. This includes the Atkins chiller room in the Dyer building basement.

Type	Equip	Location Served	Tag	Capacity	Units	Make	Model	Serial Number	Year
Rooftop Unit	Packaged DX RTU	1st Floor North	RTU-1	45.0	Tons	Trane	OAND540A4-D0B400LW-00000AL7GJ2C55E0B5A0	OA305959-1-1	2020
Rooftop Unit	Packaged DX RTU	1st Floor South	RTU-2	45.0	Tons	Trane	OAND540A4-D0B400LR-00000AL7JL2C55E0B5A0	OA305959-2-1	2020
Rooftop Unit	Packaged DX RTU	2nd Floor North	RTU-3	30.0	Tons	Trane	OAKD360A4-D0B400JR-00000AL7HE2C45E0B5A0	OA305959-3-1	2020
Rooftop Unit	Packaged DX RTU	2nd Floor South	RTU-4	22.0	Tons	Trane	OAKD264A4-D0B400JR-00000AL7HE2C45E0B5A0	OA305959-4-1	2020
CRAC Unit CU	DX Computer Room AC	Archives Room	CRCU-1	2.0	Tons	Stulz	TR-OHS-024-RCU-O	10316845	2020
Exhaust Fan	EF	1 Floor North Electrical Room	EF-1	1/6	HP	Greenheck	G-103HP-VG-4-X	17344319	2020
Exhaust Fan	EF	Elev. Machine Room	EF-2	1/3	HP	Greenheck	G-123-V6-5-X	17344396	2020
Exhaust Fan	EF	North General Exhaust	EF-3	1/4	HP	Greenheck	G-099-VG-4-X	17344440	2020
Exhaust Fan	EF	South General Exhaust	EF-4	1/4	HP	Greenheck	G-099-VG-4-X	17344485	2020

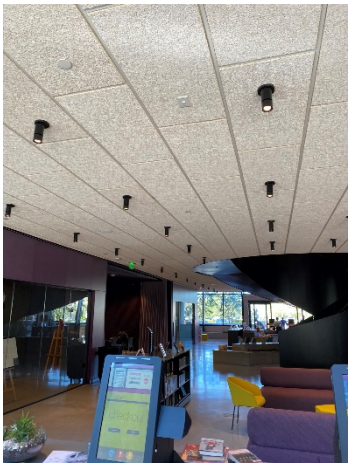
Exhaust Fan	EF	1st Floor South Electrical Equipment	EF-5	1/6	HP	Greenheck	G-095-VG-6-X	17344497	2020
Exhaust Fan	EF	Basement Lula Machine Room	EF-6	1/6	HP	Greenheck	G-095-VG-7-X	17344519	2020
Condensing Unit	SSCU	Telecom Equipment 1.123	SSCU-1	1.89	Tons	Mitsubishi Electric	PUY-A24NHA7	0XU21625A	2020
Water Heater	Electric Heat Water Heater	Fire Riser Room	UH-1	400.0	CFM	AO Smith	DEN-52 110	2108123309146	2020
Condensing Unit	SSCU	Telecom 2.108	SSCU-3	1.42	Tons	Mitsubishi Electric	PUY-A18NKA7	0ZU17730A	2020
Condensing Unit	SSCU	Main Electrical 2.109	SSCU-2	1.89	Tons	Mitsubishi Electric	PUY-A24NHA7	0XU21629A	2020
Exhaust Fan	EF	1st Floor Elevator Equipment Rm	EF-8	1/4	HP	Greenheck	G-143-VG-5-X	17340323	2020
Rooftop Unit	Packaged DX RTU	Ballroom East	RTU-6	20.00	Tons	Trane	OAKD240A4-D1B400JN-D3D00AP7HE2C45E0B5A0	OA306149-2-1	2020
Rooftop Unit	Packaged DX RTU	Core Area	RTU-5	4.58	Tons	Trane	OANG055C3-DOB100000-T1AN00001-31D000030-A01C00A00-AA1A00000-01AE00000	OA304149-1-1	2020
Rooftop Unit	Packaged DX RTU	Ballroom West	RTU-7	20.00	Tons	Trane	OAKD240A4-D1B400JN-D3D00AP7HE2C45E0B5A0	OA306149-3-1	2020
Exhuast Fan	EF	1st Floor General Exhaust	EF-7	1/2	HP	Greenheck			2020
Exhaust Fan	EF	1st Floor Kitchen Grease Exhaust Hood	EF-9	1/5	HP	Greenheck			2020

Exhaust Fan	EF	2nd Floor General Exhaust	EF-10	1/2	HP	Greenheck		2020
Fan Coil Unit	Indoor Fan Coil Unit	Telecom Equipment 1.123	SSAC-1	2.00	Tons	Mitsubishi Electric	PKA-A24KA7	2020
Fan Coil Unit	Indoor Fan Coil Unit	Main Electrical 2.109	SSAC-2	2.00	Tons	Mitsubishi Electric	PEAD-A24AA7	2020
Fan Coil Unit	Indoor Fan Coil Unit	Telecom 2.108	SSAC-3	1.50	Tons	Mitsubishi Electric	PKA-A18HA7	2020

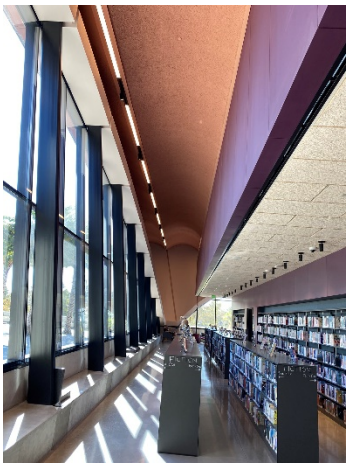
Appendix C – Site Walkthrough Photos



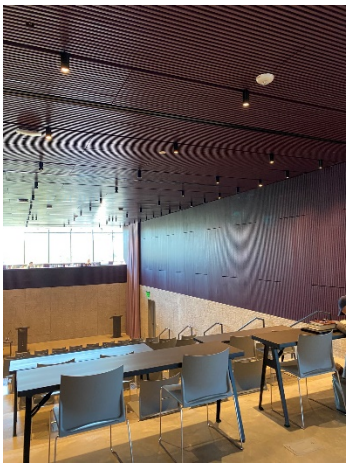
C-1: Library Stacks (1)



C-2: Commons and Central Stair



C-3: Library Stacks (2)



C-4: Stage and Performance Area

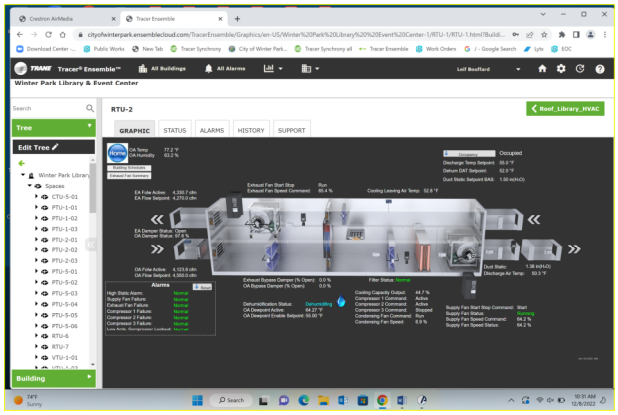
C-5: RTU-2 (1)

C-6: RTU-2 (2)

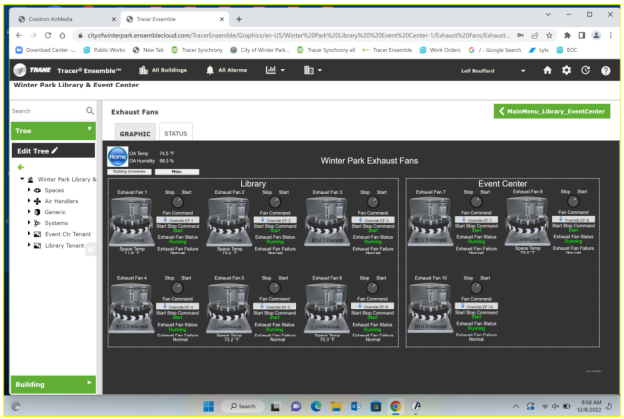
C-7: RTU Cooling Coil (Typical of 4)

C-8: RTU Filter and Energy Recovery Wheel Section

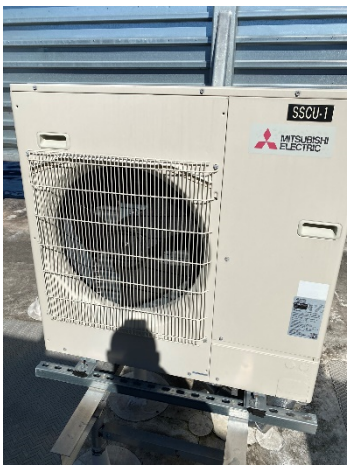
C-9: RTU Filter Detail



C-10: RTU-2 BAS Graphics



C-11: Winter Park Library Exhaust Fan Summary



C-12: Split System Condensing Unit SSCU-1

C-13: SSCU-1 Nameplate

C-14: Exhaust Fan EF-3

C-15: Computer Room AC Condensing Unit CRCU-1

C-16: Level 2 Stacks Area

C-17: Level 2 VAV Temperature Sensor/Thermostat

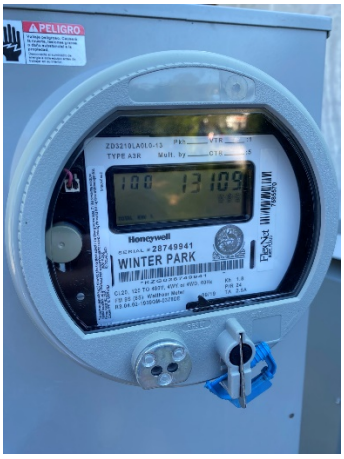
C-18: VTU-3-13 Temperature and CO2 Sensors

C-19: Level 2 Open Office Lighting

C-20: Electric Water Heater Nameplate Information

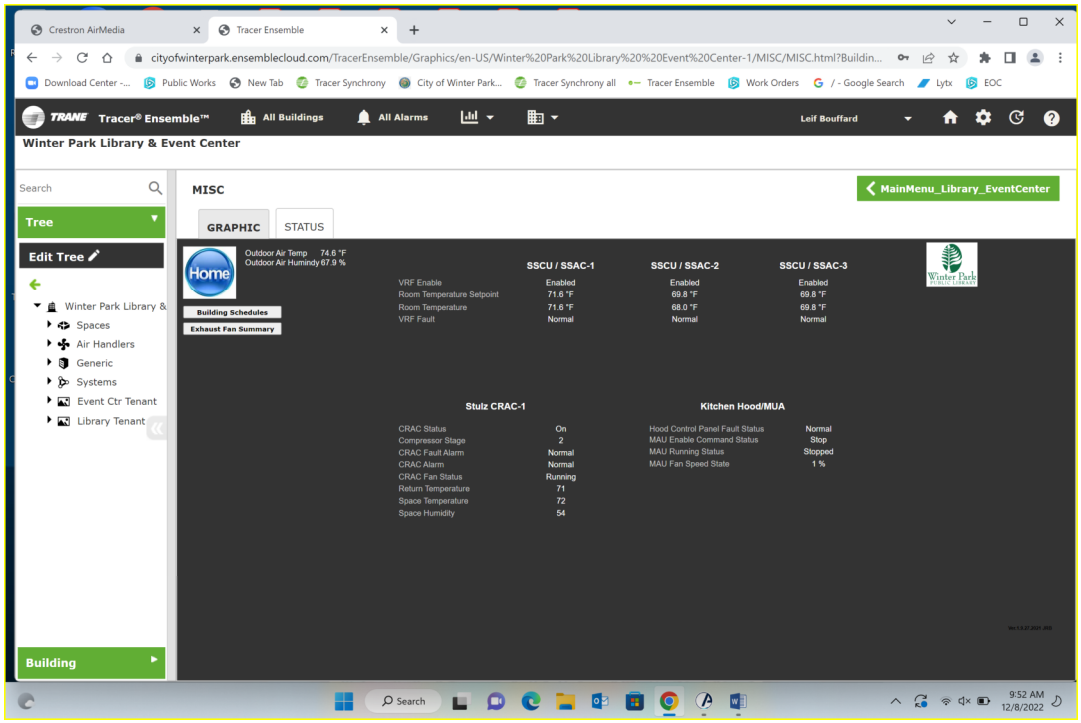
C-21: Hot Water Recirculation Pump

C-22: CRAC Unit Setpoints



C-23: Electrical Meter Readings

C-24: Transfer Switch Readings



C-25: SSAC and CRAC Unit BAS Summary