

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPUS

Facilities Conditions Assessment Mechanical And Electrical Petoskey, Michigan



PBA Project No. 2019.0114.00

Prepared By:

**Wayne Kerbelis
Terry Cleis**

July 2019



**PETER BASSO ASSOCIATES INC
CONSULTING ENGINEERS
TROY, MICHIGAN**

TABLE OF CONTENTS

Tab

2019 Five Year Master Plan Summary

Campus Master Plan Summary	1
<u>Campus Overview</u>	2
• Campus Map	
• Campus Mechanical Equipment Description	
• Campus Electrical System Description	
• Electrical Building Component Life Expectancy Schedule	
• Proposed Campus Chilled Water Loop Site Plan	
• Proposed Campus Chilled Water Loop Schematic	
<u>Administration Building</u>	3
• Mechanical Equipment Description	
• Mechanical Building Component Life Expectancy Schedule	
• Electrical Equipment Description	
• Electrical Building Component Life Expectancy Schedule	
<u>Heating Plant</u>	4
• Mechanical Equipment Description	
• Mechanical Building Component Life Expectancy Schedule	
• Electrical Equipment Description	
• Electrical Building Component Life Expectancy Schedule	
<u>Maintenance Building</u>	5
• Mechanical Equipment Description	
• Mechanical Building Component Life Expectancy Schedule	
• Electrical Equipment Description	
• Electrical Building Component Life Expectancy Schedule	
<u>Residence Hall</u>	6
• Mechanical Equipment Description	
• Mechanical Building Component Life Expectancy Schedule	
• Electrical Equipment Description	
• Electrical Building Component Life Expectancy Schedule	
<u>Student and Community Resource Center</u>	7
• Mechanical Equipment Description	
• Mechanical Building Component Life Expectancy Schedule	
• Electrical Equipment Description	
• Electrical Building Component Life Expectancy Schedule	

Student Cafeteria/Conference Center

8

- Mechanical Equipment Description
- Mechanical Building Component Life Expectancy Schedule
- Electrical Equipment Description
- Electrical Building Component Life Expectancy Schedule

Technology Building

9

- Mechanical Equipment Description
- Mechanical Building Component Life Expectancy Schedule
- Electrical Equipment Description
- Electrical Building Component Life Expectancy Schedule

North Central Michigan College
2019 Five Year Master Plan Summary (Preliminary)

(Mechanical and Electrical items)

Facility Infrastructure, System Improvements and Energy Conservation

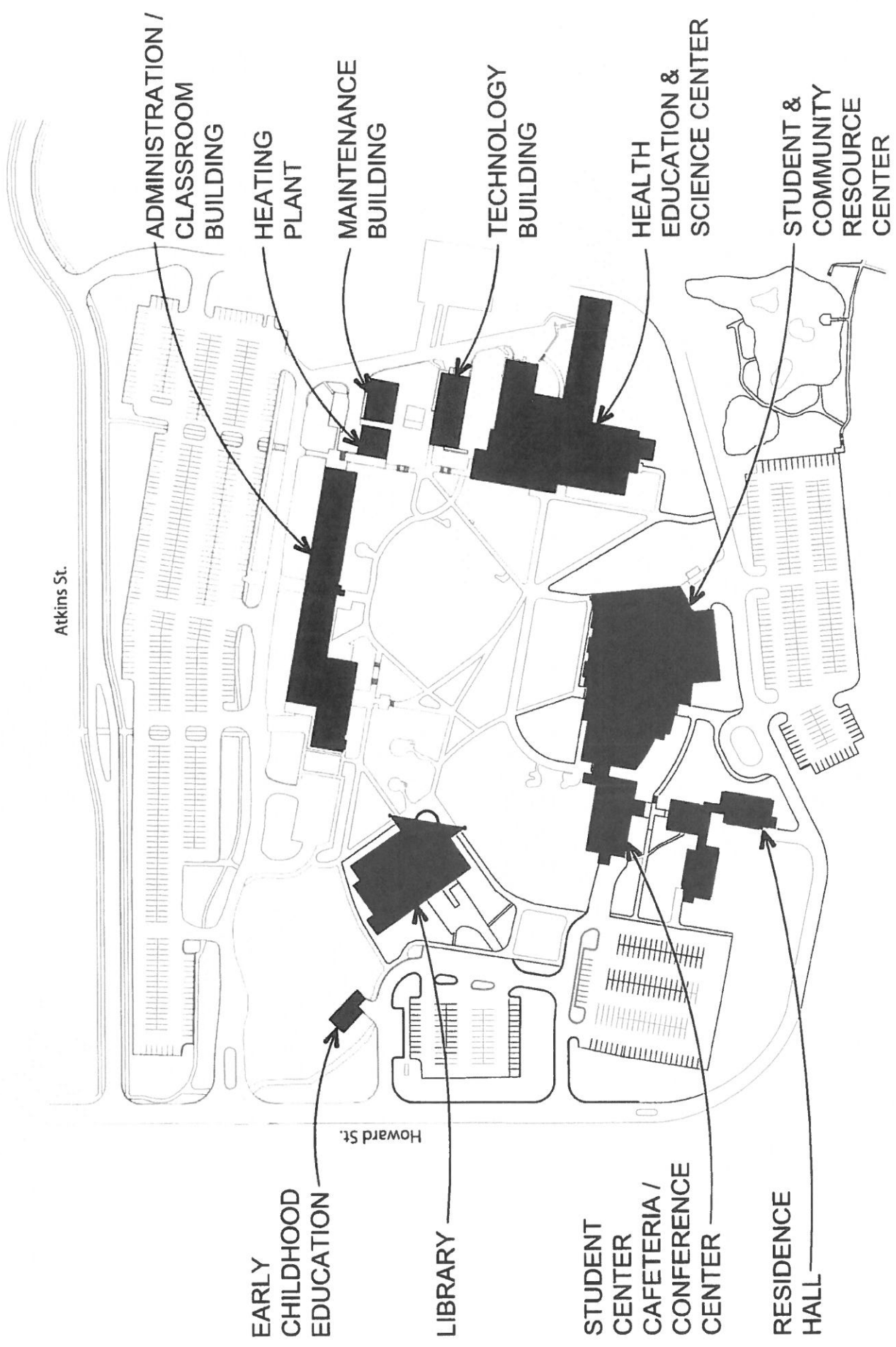
Building	Year Built	Renovations	Equipment Age	Building Square footage	Description	Five year plan Priority	Reason for Work	Opinion Of Probable Cost
					Replace hot water heating piping insulation piping located in Tunnels.	2	Area of system insulation is missing and existing is worn. In addition several area are insulated with asbestos.	\$73,500
					Convert campus chilled water system to campus de-centralized chilled water system and extend cooling to existing Dorm Building.	1	Provided redundancy for campus cooling and substantial energy savings.	\$1,600,000
					Connect to existing campus dewater system (located in Student Center) to irrigate campus landscaping.	5	Provide low cost campus irrigation.	\$75,000
					Complete lighting upgrades to a minimum of fluorescent T8 style long life lamps.	2	Energy savings.	See individual building description
NCMC Campus Wide	Varies	N/A	N/A	N/A	Identify water infiltration through electrical conduits and repair.	1	Allowance	\$10,000
					Add electrical sub-metering to buildings.	5	Campus costs and analysis.	\$191,280
					Separate access control from life safety battery systems, and utilize generator(s) when possible.	1	Allowance	\$31,880
					Add generators for support of emergency lighting and other business critical systems.	2	Improve life safety and protect property.	\$1,083,921
					Completion of campus primary loop system.	5	Alternate power path and flexibility to isolate a building.	\$573,841
					Upgrade campus fire alarm system to allow for mass notification.	1	Safety and security.	Review requirements with existing system
Campus Wide Totals								\$3,639,422

Administration and Classroom Building	1962	2004 and Proposed major renovation in 2019 (note vestibules and restroom maybe pulled out of project due to budget)	See Facilities Report	52,000	Replace existing HVAC Equipment that are reaching or have past their life expectancy. Does not include building wide HVAC piping.	1	Systems have past their useful life.	\$377,391
					Provide additional heating, cooling ventilation and air conditioning zone control to areas that have been modified from original.	3	Areas have been modified architecturally but not mechanically which is causing temperature issues in the space.	\$157,346
					Replace existing original electrical distribution equipment.	1	Systems have past their useful life.	\$71,156
					Upgrade Lighting and provide automatic lighting controls in all applicable areas. Some of the facility is done, and some has been done and later removed. Remove occupancy sensor in electrical room to meet code.	1	Energy savings and to meet current energy codes.	Work in process, cost needs to be updated
Administration and Classroom Building Totals								
Heating Plant	1962	2010	See Facilities Report	2,300	Replace existing HVAC Equipment that are reaching or have past their life expectancy. Does not include building wide HVAC piping.	2	Systems have past their useful life.	\$13,818
					Provide ventilation to boiler room.	1	Current boiler room does not have adequate ventilation to cool building which put electrical and control component in risk of failure.	\$22,954
					Provide heating and ventilation in control room office.	1	Occupied area is required to be ventilated and heated.	\$10,839
					Replace existing original electrical distribution equipment.	2	Systems have past their useful life.	\$3,826
					Upgrade lighting in all applicable areas.	3	Energy savings and to meet current energy codes.	\$12,752
					Heating Plant Totals			
Health Education & Science Center	2010	N/A	N/A	0	Optimize the number of air changes in building to save energy	2	Many rooms of the building have large air change rates during occupied and unoccupied times. The reduction of air change rates will substantially reduce operating costs and save energy.	\$36,400
					Demand Ventilation - install CO2 sensors to large occupant spaces.	1	Reduce energy and utility costs	In progress
Health Education & Science Center Totals								
Library Building	1984	Complete renovation in 2016	See Facilities Report	19,550	All mechanical and electrical systems have been replaced in 2016	0	N/A	\$0
					Library Building Totals			
Library Building Totals								
								\$0

Maintenance Building 1973	---	See Facilities Report	3,400	Replace existing HVAC Equipment that are reaching or have past there life expectancy. Does not include building wide HVAC piping.	2	Systems have past there useful life 30 years old.	\$188,517
				Repair/Modify existing Hot water heating piping. Current hot water piping system not functioning properly.	1	Incorrect piping arrangement/piping failure.	\$34,619
				Replace existing plumbing fixtures that are reaching or have past there life expectancy. Does not include the building wide plumbing	5	Systems have past there useful life.	\$15,835
				Replace existing original electrical distribution equipment.	2	Systems have past there useful life.	\$23,846
				Maintenance Building Totals			
Residence Hall 1968	2010	See Facilities Report	35,000	Extend chilled water to existing Dorm Building room fan coil Units	1	The Dorm Building is not currently cooled	Refer to campus wide scope
				Replace existing plumbing fixtures that are reaching or have past there life expectancy. Does not include the building wide plumbing piping replacement.	5	Plumbing Systems have past there useful life.	\$40,183
				Remove storage items in front of electrical equipment.	1	Clearance issue.	Procedure & Housekeeping
				Upgrade lighting in public areas including new basement lighting.	3	Building improvement.	\$159,400
				Verify proper fire alarm notification and detection systems coverages.	1	Life safety.	See campus fire alarm item
				Replace existing original electrical distribution equipment.	2	Systems have past there useful life.	Update Costs
				Provide emergency egress lighting.	1	Life safety.	See campus generator item
Residence Hall Totals							
Student Center Cafeteria/Conference Center 1968	2000	See Facilities Report	18,500	Replace existing Cafeteria and Kitchen HVAC Equipment.	2	Systems have past there useful life 30 years old.	\$336,482
				Demand Ventilation - install CO2 sensors to large occupant spaces.	1	Reduce energy and utility costs	In progress
				Replace existing plumbing fixtures that are reaching or have past there life expectancy. Does not include the building wide plumbing piping replacement.	5	Systems have past there useful life.	\$29,347
				Provide automatic lighting controls in all applicable areas.	3	Energy savings and to meet current energy codes.	\$35,387
				Provide photoceell lighting control.	4	Energy savings.	\$6,376
				Replace existing original electrical distribution equipment.	2	Systems have past there useful life.	\$35,259
				Upgrade lighting in all applicable areas.	3	Energy savings and to meet current energy codes.	\$306,686
Student Center Cafeteria/Conference Center Totals							
\$749,537							

Student and Community Resource Center	2000	See Facilities Report	85,000	Replace existing ductwork located in gymnasium with fabric ductwork.	3	Ductwork was not properly treated for paint application and paint is peeling of ductwork.	\$150,000
				Replace existing HVAC Equipment that are reaching or have past there life expectancy. Does not include building wide HVAC piping.	2	Systems have past there useful life.	\$714,328
				Replace dialectic unions on hot water heating piping that are currently failing and leaking.	1	System failure, unions leak.	\$22,510
				Demand Ventilation - install CO2 sensors to large occupant spaces.	1	Reduce energy and utility costs	In progress
				Provide photoceall lighting control.	4	Energy savings.	\$22,954
				Provide automatic lighting controls in all applicable areas.	3	Energy savings and to meet current energy codes.	\$51,008
				Gender neutral locker & restrooms (per Ernst)			\$0
				Audio Visual platform over running track (Per Ernst)			\$0
				Classroom Bullidout (per Ernst)			\$0
				Move Bookstore and make aerobics area (per Ernst)			\$0
Student and Community Resource Center Totals							
Technology Building	2001	See Facilities Report	5,660	Replace existing HVAC Equipment that are reaching or have past there life expectancy. Does not include building wide HVAC piping.	2	Systems have past there useful life.	\$124,358
				Replace existing plumbing fixtures that are reaching or have past there life expectancy. Does not include the building wide plumbing piping replacement.	5	Systems have past there useful life.	\$21,592
				Replace existing original electrical distribution equipment.	2	Systems have past there useful life.	\$30,796
				Provide automatic lighting controls in all applicable areas.	3	Energy savings and to meet current energy codes.	\$9,564
				Upgrade lighting in all applicable areas.	3	Energy savings and to meet current energy codes.	\$70,136
				Renovate Restroom (per Ernst) Addition to Building (per Ernst)			\$0
Technology Building Totals							
Total							\$186,310

\$6,653,943



CAMPUS MECHANICAL EQUIPMENT DESCRIPTIONS

General Campus Description

North Central Michigan College's Petoskey Campus was established in 1962 with construction of the Heating Plant and Chemistry Building. NCMC Petoskey Campus has undergone many renovations and additions from 1962 to present including mechanical and electrical systems, infrastructure upgrades, building renovations, and additions.

Campus

Existing Facilities:

Campus Hot Water Heating System - The campus heating hot water system (boilers) located in the Heating Plant was upgraded in 2010 and serves the heating requirements for all the contiguous Petoskey Campus Buildings with the exception of the Early Childhood education Building. Heating hot water is generated by eight high efficiency condensing gas fired heating hot water boilers. Heating hot water distribution system is piped in a primary loop arrangement. Two variable flow primary pumps (one operates continuously while the other is stand-by) circulate heating hot water through the primary loop through the campus tunnel system from the boilers to each of the building(s) heating equipment. Building heating equipment utilize 2-way and 3-way control valves controlled to maintain space temperatures. Heating hot water system is controlled by the campus energy management and control system.

Campus Cooling System – Currently there are currently six electric chillers on campus two are serving the administration and classroom building, two serves the Student center Building, one serves the Student and Community Resource Building and one chiller serves the Libraries. The Technology and Maintenance Building is cooled from individual direct expansion unit with remote condenser units that are located just outside of each of the buildings.

Findings:

The heating hot water piping system is routed in two branch runs from the heating plant. One branch is routed in tunnel and feeds the Administration/Classroom Building, Library, Student Center Cafeteria & Conference Center, Residence Hall and Student & Community Resource Center. The other hot water heating branch is routed in the tunnel and feeds the Maintenance building, Technology Building and Health Education & Science Center. As a result of this configuration the campus is experiencing flow and pumping issues. In addition, extra hot water heating pump energy is required to meet the building demands and future campus expansion is limited by hot water heating flow distribution.

The campus cooling system is currently configured where each campus building has its own individual cooling system. If a chiller fails for any reason cooling is lost to the

building (no back up). In addition, the individual building chillers do not modulate and are cycled to maintain cooling set points as a result the cooling system is less efficient and produced additional wear to the equipment.

Recommendations:

1. Provide additional tunnel and hot water heating piping to form a campus loop. The campus loop will provide improved flow to each building, more efficient hot water distribution and expand capacity in the campus heating system.
2. Provide a de-centralized chilled water campus loop. If the tunnel is expanded in a campus loop the individual campus building chillers can be connected together to common campus cooling system. The benefits of a campus de-centralized chilled water loop system are as follows:
 - Potential electrical cooling energy saving 20%-30%.
 - Provides redundancy in campus cooling systems.
 - If a campus chiller fails another chiller connected to loop will provide cooling.
 - No cooling down time to conditioning campus buildings.
 - Extends life expectancy of chilled water equipment.
 - Reduced maintenance.
 - Improves cooling controllability throughout campus.
 - Installs infrastructure for consolidating campus chillers in future.
 - Provided economical equipment replacement as existing chillers age.
3. As building equipment ages the calibration, comfort control and energy efficiencies diminish. To keep the campus buildings operating at the peak, each building should be retro- commissioned every five years.

CAMPUS ELECTRICAL SYSTEMS DESCRIPTIONS

General Campus Description

North Central Michigan College's Petoskey Campus was established in 1962 with construction of the Heating Plant and Chemistry Building. NCMC Petoskey Campus has undergone many renovations and additions from 1962 to present including mechanical and electrical systems, infrastructure upgrades, building renovations, and additions.

Campus

Power:

The existing 12,470V primary distribution system was upgrade in 2006. The system currently consists of a long radial arm with taps to feed the major buildings. Some of the smaller buildings are fed from systems in the larger buildings.

Completion of the tunnel system will close the loop around campus. When this is achieved, the primary system should be reworked to create a primary loop. This will provide flexibility in how each building is fed, and will allow buildings to be isolated from the rest of the campus while still keeping rest of campus powered.

There is a mixture of voltages in the buildings. Some buildings contain both 480/277V and 208/120V systems, while other buildings are entirely 208/120V.

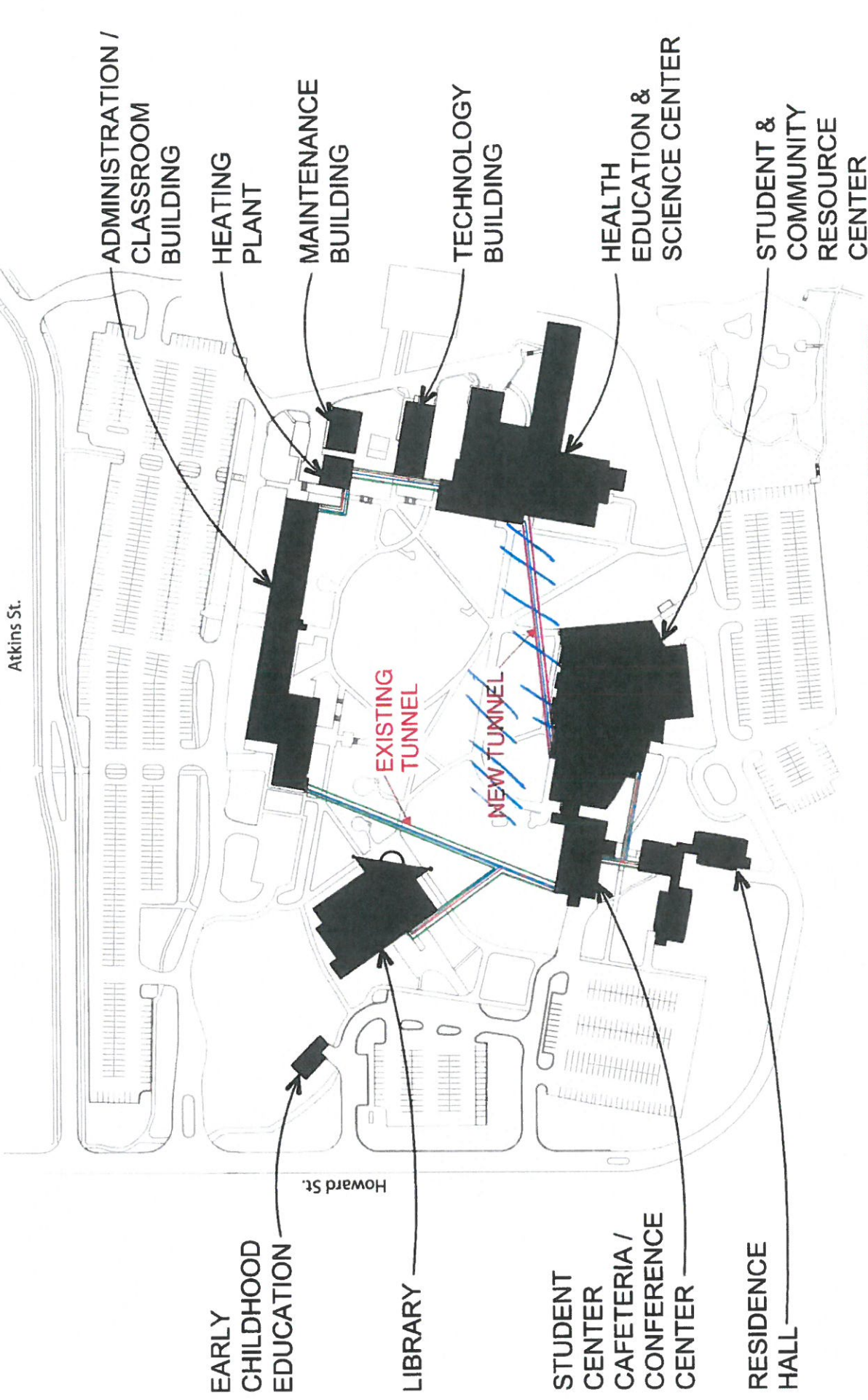
Emergency Power:

Currently there only two generators on Campus and these units are primarily dedicated to backing up telecommunication systems. The emergency egress lighting in all of the buildings consist of emergency fixtures with dedicated battery units. This type of system requires monthly testing of batteries, and ongoing maintenance to insure that all of the units are operating properly. Adding generation capabilities could all many of these fixtures to be removed and could utilize existing fixtures for emergency egress functions. This would replace battery testing, maintenance, and replacement, with generator maintenance and testing. Additional benefits often include better egress lighting coverage, and the ability to provide backup power to selected loads like sump pumps to prevent flooding or boilers to prevent freezing.

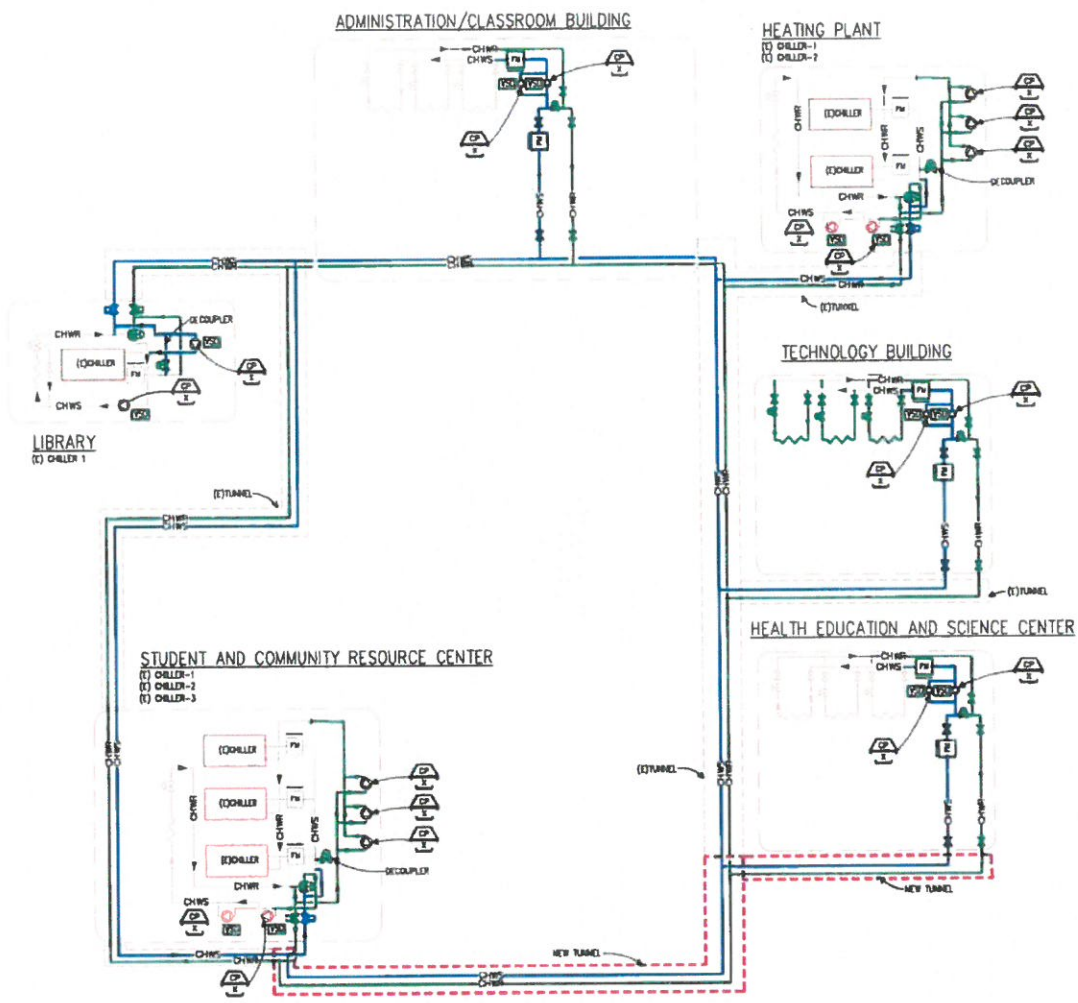
Site

Existing exterior site lighting has been converted to LED fixtures.

- EXISTING TUNNEL
- ~~NEW TUNNEL~~
- HEATING HOT WATER PIPING
- CHILLED WATER PIPING



PROPOSED CAMPUS DECENTRALIZED CHILLED WATER LOOP



PROPOSED CAMPUS DECENTRALIZED CHILLED WATER LOOP SCHEMATIC DIAGRAM
 NO SCALE

ADMINISTRATION / CLASSROOM BUILDING MECHANICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Administration and Classroom Building is located between the Library and Heating Plant. The Administration and Classroom Building was constructed in 1965 and underwent a major renovation of HVAC equipment and alterations to room layout in 2004. Additions to the building have been design and is pending bids in 2019.

Building mechanical equipment is currently served by campus heating hot water system. The building is a two story building that consists of approximately 52,000 square feet. Classrooms and administrative offices are located in the Administration and Classroom Building.

Building Cooling System – Two Air cooled chillers that are located in the basement of the building serving AHU-10, AHU-11, AHU-14, AHU-17, AHU-18, AHU-19, and Unit Ventilators which were upgraded in 2004 and serves the cooling requirements for the Administration and Classroom Building. Chilled Water piping is piped to each of the units located in the plenum space of on each of the floors of the building and serves the AHU's located in the penthouse.

Air Handler Unit AHU-10, located in Mechanical Room 59 of the Administration and Classroom Building; is a constant volume, mixed air system installed in 2004. The system consists of outside air dampers, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection and chilled water cooling coil. The AHU-10 serves the East portion of the building spaces on the Lower Level of the Administration and Classroom Building and supplies air to the spaces thru individual tempering coils and diffusers

Air Handler Unit AHU-11, located in Mechanical Room 56 of the Administration and Classroom Building; is a constant volume, mixed air system installed in 2004. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection and chilled water cooling coil. The AHU-11 serves the West portion of the building spaces on the Lower Level of the Administration and Classroom Building and supplies air to the spaces after passing thru individual tempering coils and diffusers

Air Handler Unit AHU-14, located in Mechanical Room of the Administration and Classroom Building; is a constant volume, mixed air system installed in 2004. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-14 serves the Art/ Ceramics Classrooms on the Lower Level of the Administration and Classroom Building and supplies air to the spaces thru individual tempering coils and diffusers.

Air Handler Unit AHU-17, located in the penthouse; is a constant volume, mixed air system installed in 2004. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-17 serves the Nursing 27 on the Lower Level of the Administration and Classroom Building and supplies air to the space with diffusers.

Air Handler Unit AHU-18, located in the penthouse; is a constant volume, mixed air system installed in 2004. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-18 serves the East portion of the building spaces on the Main Level of the Administration and Classroom Building and supplies air to the spaces after passing thru individual terminal units and to the space with diffusers.

Air Handler Unit AHU-19, located in the penthouse; is a constant volume, mixed air system installed in 2004. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-19 serves Lecture 122 of the building space on the Main Level of the Administration and Classroom Building and supplies air to the space with diffusers.

Unit Ventilators located in each of the classrooms are constant air volume, mixed air systems installed in 2004. Each system consists of a multi speed air volume integral outside air, hot water heating coil, chilled water coil and a multi speed air volume supply air fan. The vertical unit ventilators serve the classrooms through its diffuser integral with the cabinet. Unit ventilators are controlled by the original campus DDC control system.

Exhaust Fan EF-100 is a constant volume exhaust systems with motorized backdraft dampers. EF-100 located in the tunnel, installed in 1965 serves tunnel.

Exhaust Fan EF-101 is a constant volume exhaust systems with motorized backdraft dampers. EF-101 located in the electrical room, installed in 1965 serves electrical room.

Exhaust Fan EF-120 is a constant volume exhaust systems with motorized backdraft dampers. EF-120 located in the tunnel, installed in 1965 serves men's and women's toilet.

Exhaust Fan EF-267 is a constant volume exhaust systems with motorized backdraft dampers. EF-267 located in the penthouse, installed in 1965 serves men's and women's toilet.

Exhaust Fan (Penthouse Exhaust Fan) is a constant volume exhaust systems with motorized backdraft dampers. Penthouse exhaust fan located in the penthouse, installed in 1965 serves penthouse.

Plumbing Fixtures are located in the art spaces, bathrooms and janitors closet in the building. The fixtures in the building consist of Lav's, Double bowl sink, Multi-person sink, Service Sink, Drinking fountains, Water closets, and Urinals. These fixtures were installed in 1965 and have served the building since.

ADMINISTRATION/ CLASSROOM BUILDING ELECTRICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Administration/ Classroom Building are located on the North side of campus near the Atkins Street parking lot. The Administration/ Classroom Building was constructed in 1965 and is a two story building that consists of approximately 52,000 square feet of space. Administration/ Classroom Building consists of classrooms, offices, and specialty classrooms (example: art rooms).

POWER:

The primary power enters the building from the tunnel system. The primary equipment is located in the main electrical room located on the west end of the lower level of the building. This room contains primary distribution equipment, including a primary switches and primary transformer (T4). Most of this equipment appears to be newer and in good condition.

The building electrical distribution system consists mainly of branch circuit panelboard scattered around the building. This equipment is 208/120V. There is a mixture of new and older equipment. Most of the branch circuit distribution equipment appears to be the original building equipment. Many of these panelboards were manufactured by Federal Pacific. Federal Pacific went out of business many years ago, so replacement breakers and parts are difficult or impossible to obtain. If these panel are indeed from the original construction, they are surpassed their expected life expectancy and should be scheduled for replacement.

There appeared to be electric heat in the Stairwells. Alternate heating systems could be explored for these areas.

LIGHTING:

Our understanding is that approximately 90% of the linear fluorescent lamps and their associated ballasts on campus have been changed from T12 to T8. It appears that most of the fixtures have been converted. Most of the lighting in the building is fluorescent with some type of prismatic acrylic lens. Many of these fixtures appear to be quite old and probably from the original construction. Most of the fixtures appear to contain their original prismatic lenses, and these lenses have started to yellow. Most of the light fixtures are surface mounted on the existing lay in ceilings. New fixtures and/or lenses could provide additional light and better color in many spaces. New fixtures could also provide energy savings.

It appears that a large portion of the lighting control consists of manual switch control. Current energy codes call for some sort of automatic lighting control. There are opportunities in this building to add lighting controls for energy code compliance. This could come in the form of occupancy sensors and would also result in energy savings and potential utility rebates. PBA was told that in some areas occupancy sensors were installed but later removed due to complaints about how they operated. A properly designed system using newer technology occupancy should be able to be installed and operate properly.

There are a few opportunities in this building to provide controls for daylight harvesting. These should be explored for potential energy savings.

There is an occupancy sensor for lighting control in the main electrical room. This should be replaced with a standard toggle switch. Code does not allow automatic lighting controls in these types of rooms.

EMERGENCY SYSTEMS:

There is no generator for power to support emergency egress lighting in this building. Some battery EXIT signs and were observed. Proper emergency light levels along paths should be verified. Monthly testing of all local battery lighting units should be documented and reviewed.

AUXILIARY SYSTEMS:

The existing fire alarm system consists of horn and strobe notification devices. These devices are mounted throughout the building. Many of these are ceiling mounted. Some smoke detection devices were noted during the tour of the building, however they were not observed throughout the entire building.

With a horn based fire alarm system, there is currently no means of making announcements or mass notification of building tenants.

The existing voice and data systems are located in closets. The cabling appears to be properly installed and protected. There are existing ceiling mounted WAP devices for wireless connectivity located throughout the building. There is a telecom rack located in a caged area in the penthouse. This should be reviewed to insure that this space meets the temperature requirements and provides a proper environment for this equipment.

HEATING PLANT MECHANICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Heating Plant is located between the Administration and Classroom Building and Maintenance Building. The Heating Plant was constructed in 1965 and underwent a major renovation of mechanical equipment in 2010. The building is a single story building that consists of approximately 2,300 square feet. Boiler Room and Electrical room are located in the Heating Plant.

Building Cooling System – Two Air cooled condenser units that are located on the outside of the building serving the split system in the energy management office and the blower coil unit serving the electrical room which were upgraded in 2004 and serves the cooling requirements for these rooms. Refrigerant piping is piped to each of the units located in the plenum space of on each of the rooms of the building.

Blower Coil Unit BCU-1, located in Electrical Room of the Heating Plant; is a constant volume system installed in 2004. The system consists of outside air dampers, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, Dx cooling coil, and a constant volume supply fan with discharge damper for supply air volume control. The BCU-1 serves the Electrical room of the building space of the Heating Plant and supplies air to the space. BCU-1 is controlled by a combination of temperature controls and the campus DDC control system.

Split system Air conditioner Unit, located in Energy management office of the Heating Plant; is an Air conditioner system installed in 2004 originally from the administration and classroom building. The system consists of a Dx cooling coil, and a constant volume supply fan with discharge damper for supply air volume control. The split system serves the Energy management office of the building space of the Heating Plant and provides cooling to the space. Split system is controlled by a combination of temperature controls and the campus DDC control system.

HEATING PLANT ELECTRICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Heating Plant is located on the Northeast corner of campus next to the Maintenance Building. The Heating Plant was constructed in 1973 and is a single story building that consists primarily of mechanical equipment. There is a small room on the side of the building that contains some primary electrical equipment and some primary and secondary distribution equipment.

POWER:

The main power enters the building from the adjacent primary electrical room. This building is fed from the primary transformer T1 and then through the 300kVA low voltage transformer T2, located in the primary electrical room. The equipment is all newer and in good condition.

The building electrical distribution system consists of branch circuit panelboards. The entire system in this building is 208/120V.

There is storage in front of much of the equipment that needs to be cleared. The code required existing for the main electrical room should be reviewed.

It appears that there is not sufficient clearance in front of the primary equipment. This needs to be reviewed and addressed.

LIGHTING:

Our understanding is that approximately 90% of the linear fluorescent lamps and their associated ballasts on campus have been changed from T12 to T8. It appears that most of the fixtures have been converted.

Most of the lighting is in satisfactory condition. However, the light coverage could be improved and also made more efficient.

EMERGENCY SYSTEMS:

There is no generator set up to supply emergency power to support emergency egress lighting in this building. Some battery EXIT signs and both ceiling and wall mounted Emergency Battery Units (EBUs or "Bug Eyes") were noted throughout the facility. Proper emergency light levels along paths should be verified. Monthly testing of all local battery lighting units should be documented and reviewed.

AUXILIARY SYSTEMS:

The fire alarm system consists of horn and strobe notification devices. These devices are mounted throughout the building. Many of these are ceiling mounted.

With a horn based fire alarm system, there is currently no means of making announcements or mass notification of building tenants.

Heating Plant

NORTH CENTRAL MICHIGAN COLLEGE
 PETOSKEY CAMPUS
 BUILDING COMPONENT LIFE EXPECTANCY
 Building Square Footage: 2,300 Sq. Ft.
 Date Updated: 04/04/2019

LEGEND

	Equipment or system is in good condition, operates efficiently and as designed, little wear
	Equipment or system is in fair condition, should be regularly monitored due to age, and maintenance should be performed as required
	Equipment or system is nearing, or at the end of its useful life based on condition and/or industry standards
	Facility improvement or Energy Saving Modification

Note: Study period based on 5 years.

Building Built in 1965. Renovated in 2010

Item	Inflation Factor at 3%	Yr Beginning In 2019	Base Line Cost (2019)	Projected Cost (2019)	Useful Life in Years	Expected End of Useful Life	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Mechanical System																													
1. Boiler (8/2009)		2019	10	2019	10	2029																							
2. Domestic water heater (2004)		2019	15	2019	15	2034																							
3. Unit heaters (2019)	5,428	2019	20	1965	20	2019																							
4. Circulation Pumps (8/2010)		2020	10	2020	10	2030																							
5. Basement mounted Pump (3/2013)		2013	20	2013	20	2033																							
6. Split system AC (1986)	8,290	2019	15	2019	15	2034																							
7. Blower coil unit (2004)		2019	25	2019	25	2044																							
8. Provide ventilation to boiler room	22,954	2019	N/A	N/A	N/A	N/A																							
9. Provide heating and ventilation to control room office	10,839	2019	N/A	N/A	N/A	N/A																							
10. Retro Commission mechanical & electrical systems	10,839	2019	N/A	N/A	N/A	N/A																							
Future Cash Flow:																													
Future Cash Flow:																													
Total Projected Cost:	58,450						58,450																						
Yearly totals With Inflation Factor:							58,450	60,708	63,010	65,366	67,769	70,222	72,726	75,281	77,889	80,552	83,271	86,046	88,876	91,761	94,701	97,706	100,776	103,911	107,111	110,376	113,706	117,101	120,561
Yearly totals:							58,450	60,708	63,010	65,366	67,769	70,222	72,726	75,281	77,889	80,552	83,271	86,046	88,876	91,761	94,701	97,706	100,776	103,911	107,111	110,376	113,706	117,101	120,561

MAINTENANCE BUILDING MECHANICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Maintenance Building is located near the Heating Plant and Technology Building. The Maintenance Building was constructed in 1973. The building is a single story building that consists of approximately 3,400 square feet and is served hot water heating by the campus heating plant. Equipment Storage and Maintenance and Women's / Men's Toilets are located in the Maintenance Building.

Air Handler Unit AHU-1, located in the plenum space of the Technology Building; is a constant volume, mixed air system installed in 1973. The system consists of an outside air damper, gravity relief hood with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection. The AHU-1 serves the Toilet rooms and the south portion of the Maintenance Area space with diffusers.

Air Handler Unit AHU-2, located in the plenum space of the Technology Building; is a constant volume, mixed air system installed in 1973. The system consists of an outside air damper, gravity relief hood with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection. The AHU-2 serves the Maintenance Area space with diffusers.

Exhaust Fans EF-1 is a constant volume exhaust systems with motorized backdraft dampers. EF-1 located on the roof, installed in 1973 serves Men's and Women's toilet rooms.

Exhaust Fans EF-2 is a constant volume exhaust systems with motorized backdraft dampers. EF-2 located inline of the duct work that serves the hood in the maintenance area.

Unit Heaters - are in place for heating the Maintenance area and Storage room.

Convectors - are located in each of the Toilet areas to heat each of the spaces

Plumbing Fixtures are located in the bathrooms and janitors closet in the building. The fixtures in the building consist of Lav's, Service Sink, Drinking fountains, Water closets, and Urinals. These fixtures were installed in 1973 and have served the building since.

MAINTENANCE BUILDING AND ELECTRICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Maintenance Building is located on the Northeast corner of campus next to the Heating Plant. The Maintenance Building was constructed in 1973 and is a single story building with a small mezzanine that consists primarily of a garage and a shop.

POWER:

The main power enters the building from the nearby primary electrical room. This building is fed with a 400A feeder from the switchboard in the adjacent Heating Plant.

The building electrical distribution system consists of branch circuit panelboards. The entire system in this building is 208/120V.

LIGHTING:

Our understanding is that approximately 90% of the linear fluorescent lamps and their associated ballasts on campus have been changed from T12 to T8. It appears that most of the fixtures have been converted.

Most of the lighting is in satisfactory condition.

EMERGENCY SYSTEMS:

There is no generator set up to supply emergency power to support emergency egress lighting in this building. Some battery EXIT signs and both ceiling and wall mounted Emergency Battery Units (EBUs or "Bug Eyes") were noted throughout the facility. Proper emergency light levels along paths should be verified. Monthly testing of all local battery lighting units should be documented and reviewed.

AUXILIARY SYSTEMS:

The fire alarm system consists of horn and strobe notification devices. These devices are mounted throughout the building. Many of these are ceiling mounted. With a horn based fire alarm system, there is currently no means of making announcements or mass notification of building tenants.

RESIDENCE HALL BUILDING MECHANICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Residence Hall is located on the Southwest side of campus just south of the Student Center Cafeteria. The Residence Hall was constructed in 1973 and is a four story building that consists of approximately 35,000 square feet. The Residents Hall consists of Student Dorms.

Air Handler Unit AHU-29, located in Mechanical Room 607 of the Residence Hall; is a constant volume, mixed air system installed in 1973. The system consists of outside air dampers, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection. The AHU-29 serves the West portion of the building spaces on the Basement Level of the Residence Hall Building and supplies air to the spaces thru individual tempering coils and diffusers.

Air Handler Unit AHU-32, located in Mechanical Room of the Residence Hall; is a constant volume, mixed air system installed in 1973. The system consists of outside air dampers, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection. The AHU-32 serves the South portion of the building spaces on the Basement Level of the Residence Hall Building and supplies air to the spaces thru individual tempering coils and diffusers.

Roof Top Unit RTU-xx, located on the roof of the student Lounge area of the building of the Residence Hall; is a constant volume, mixed air system installed in 1973. The system consists of outside air dampers, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection. The RTU-xx serves the North portion of the building spaces on the First Floor Level of the Residence Hall Building and supplies air to the spaces thru individual tempering coils and diffusers.

Exhaust Fan EF-xx is a constant volume exhaust systems with motorized backdraft dampers.

Exhaust Fan EF-xx is a constant volume exhaust systems with motorized backdraft dampers.

Exhaust Fan EF-xx is a constant volume exhaust systems with motorized backdraft dampers.

Exhaust Fan EF-xx is a constant volume exhaust systems with motorized backdraft dampers.

Plumbing Fixtures are located in the kitchen spaces, bathrooms and janitors closet in the building. The fixtures in the building consist of Lav's, Single bowl sink, Double bowl sink, Service Sink, Drinking fountains, Water closets, Showers, and Urinals. These fixtures were installed in 1973 and have served the building since.

RESIDENCE HALL ELECTRICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Residence Hall is located on the Southwest side of campus just south of the Student Center Cafeteria. The Residence Hall was constructed in 1973 and is a four story building that consists of approximately 35,000 square feet. The Residents Hall consists of Student Dorms.

POWER:

The main power enters the building through the tunnel system. The main equipment is located in the basement of the building. This building is fed from the primary equipment located in the adjacent SCRC building. The power for this building originates from a 150kVA 480V-208/120V transformer located in the basement Main Electrical Room. The main electrical equipment appears to be newer and in good condition.

The building electrical distribution system consists mainly of branch circuit panelboards scattered throughout the building. Many of the panelboards have been replaced with newer Square D panelboards, but the balance of the electrical distribution system consists of older equipment, possibly from the original construction. Any equipment from the original construction has surpassed its anticipated life expectancy and should be scheduled for replacement.

There is storage in front of electrical equipment in several locations in the building. These areas need to be kept clear.

LIGHTING:

Our understanding is that approximately 90% of the linear fluorescent lamps and their associated ballasts on campus have been changed from T12 to T8. It appears that most of the fixtures have been converted to T8 or have been retrofit with newer technology lamps like LED. The light levels and distribution should be improved. New, more efficient light fixtures should be explored.

Many of the light fixtures are showing signs of age. Newer lighting could provide aesthetic and quality improvements as well as save energy.

Most of the observed lighting control consists of toggle switches. Current energy codes call for some sort of automatic lighting control. There are several areas in this building where daylight harvesting opportunities are present.

The lighting in the basement should be all be replaced to save energy and to provide better better quality and quantity of lighting.

EMERGENCY SYSTEMS:

There is no generator set up to supply emergency power to support emergency egress lighting in this building. Some battery EXIT signs and both ceiling and wall mounted Emergency Battery Units (EBUs or "Bug Eyes") were noted throughout the facility. Proper emergency light levels along paths should be verified. Monthly testing of all local battery lighting units should be documented and reviewed.

AUXILIARY SYSTEMS:

This building contains a main telecommunication hub in the basement. The service provider fiber optic systems enter the campus through this room. This room is backed up by generator power.

The fire alarm system consists of horn and strobe notification devices. These devices are mounted throughout the building. Many of these are ceiling mounted. The building contains a sprinkler system.

With a horn based fire alarm system, there is currently no means of making announcements or mass notification of building tenants.

The existing voice and data systems are located in closets. The cabling appears to be properly installed and protected. It appears that there are existing wall and ceiling mounted WAP devices for wireless connectivity located throughout the building.

Residence Hall

NORTH CENTRAL MICHIGAN COLLEGE
 PROCTER CAMPUS
 BUILDING COMPONENT LIFE EXPECTANCY

Date Updated: 04/05/2019

Building Built in 1973 Renovated in 2011

LEGEND

- Equipment or system in good condition, operates efficiently and as designed, low wear.
- Equipment or system in fair condition, should be regularly maintained this life span and maintenance should be performed as required.
- Equipment or system in poor condition, or at the end of its useful life based on condition and/or relative frequency.
- For this equipment or group having classification
- Note: Study period based on 5 years.

Asset/Item	Type	Site	Period	Manufacturer	Notes	Replacement Factor at 5%	YR Equipment in 2018	Equipment Life															
								2000	2005	2010	2015	2020	2025	2030	2035	2040	2045						
1 Unit Substation Section B (2009)	Substation	400M I&O	EP	3500	In-Use corner plate mounting	21.153	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2 Transformer (2009)	Transformer	150E I&O	EP	5000		8.181	17.715	2004	20	2014	20	2014	20	2014	20	2014	20	2014	20	2014	20	2014	
3 Transformer (2009)	Transformer	45 I&O	EP	5000		4.081	6.184	2004	20	2014	20	2014	20	2014	20	2014	20	2014	20	2014	20	2014	
4 Panel FM1 (2009)	Panelboard	305 I&O	EP	42150		5.412	8.444	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
5 Panel 8 (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
6 Panel B (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
7 Panel C (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
8 Panel C (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
9 Panel D (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
10 Panel D (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
11 Panel E (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
12 Panel E (2009)	Panelboard	305 I&O	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
13 Panel F.2	Panelboard	18	EP	18		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
14 Panel G (2009)	Panelboard	305A	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
15 Panel H (2009)	Panelboard	305A	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
16 Panel I (2009)	Panelboard	305A	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
17 Panel K (2009)	Panelboard	305A	EP	42150		4.081	8.185	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	25	2014	
18 Load Center in Substation	Load Center		EP																				
19 Upgrade lighting and controls in common areas						150.000	2018																
Total Reported Cost:						315,184	279,123	188,500	182,430	177,495	172,526	167,556	162,586	157,616	152,646	147,676	142,706	137,736	132,766	127,796	122,826	117,856	112,886
Total Reported Cost:						315,184	279,123	188,500	182,430	177,495	172,526	167,556	162,586	157,616	152,646	147,676	142,706	137,736	132,766	127,796	122,826	117,856	112,886

STUDENT AND COMMUNITY RESOURCE CENTER MECHANICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Student and Community Resource Center is located between the Student Center and Health Education & Science Center. The SCRC was constructed in 2000 and is a two story building that consists of approximately 85,200 square feet. The SCRC consists of conference rooms, offices, a large open multipurpose space, and a bookstore.

Building Cooling System – Two Air cooled chillers that are located in the basement of the building and in the second floor mechanical room serving AHU-1, AHU-2, AHU-3, AHU-4 which were upgraded in 2000 and serves the cooling requirements for the SCRC. Chilled Water piping is piped to each of the units located in the Mechanical space of the building.

Air Handler Unit AHU-1, located in Mechanical Room 216 of the Student and Community Resource Center; is a constant volume, mixed air system installed in 2000. The system consists of outside air dampers, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-1 serves the multipurpose portion of the building spaces of the Student and Community Resource Center and supplies air to the spaces after passing thru individual tempering coil and diffusers.

Air Handler Unit AHU-2, located in Mechanical Room 216 of the Student and Community Resource Center; is a constant volume, mixed air system installed in 2000. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-2 serves the Weight training and Aerobics room and first floor locker rooms the of the building spaces on the upper & lower level of the Student and Community Resource Center and supplies air to the spaces after passing thru individual tempering coil and diffusers.

Air Handler Unit AHU-3, located in Mechanical Room 3 in the basement of the Student and Community Resource Center; is a constant volume, mixed air system installed in 2000. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-3 serves the tutor center and office space on the lower level of the Student and Community Resource Center and supplies air to the spaces after passing thru individual tempering coil and diffusers.

Air Handler Unit AHU-4, located in the Mechanical Room 3; is a constant volume, mixed air system installed in 2000. The system consists of an outside air damper, relief louver with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, chilled water cooling coil. The AHU-4 serves the college store and office space of the building spaces on the lower Level of the Student and Community Resource Center and supplies air to the spaces after passing thru zone specific terminal units and to the space with diffusers.

Plumbing Fixtures are located in the Locker rooms, bathrooms and janitors closet in the building. The fixtures in the building consist of Lav's, showers, Service Sink, Drinking fountains, Water closets, and Urinals. These fixtures were installed in 2000 and have served the building since.

STUDENT AND COMMUNITY RESOURCE CENTER ELECTRICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Student and Community Resource Center (SCRC) is located on the South side of campus adjacent to the Cafeteria and next to the Heath Education and Science Center. The SCRC was constructed in 2000 and is a two story building that consists of approximately 85,200 square feet. The SCRC consists of conference rooms, offices, a large open multipurpose space, and a bookstore.

POWER:

The primary power enters the building from the tunnel system. The primary equipment is located in main electrical room in the basement of the building. This room contains primary distribution equipment, including a primary switches and unit substation containing a primary transformer (T9). There are other large portions of the electrical distribution system located in the tunnels and in various Mech/Elect Rooms throughout the facility. This equipment appears to be a mixture of newer equipment and older equipment.

The building electrical distribution system consists mainly of branch circuit panelboards scattered throughout the building. There is a mixture of both 480/277V and 208/120V branch circuit distribution equipment. There is a mixture of new and older equipment, including some panelboards manufactured by Federal Pacific, who has been out of business for many years. There are also some newer panelboards that were manufactured by Square D.

LIGHTING:

Our understanding is that approximately 90% of the linear fluorescent lamps and their associated ballasts on campus have been changed from T12 to T8. It appears that most of the fixtures have been converted or are newer energy efficient fixtures.

Because of the varied usage of the different spaces in this building, there is a mixture of various types of light fixtures. The light fixtures appear to be in satisfactory condition and are likely providing light base on their original design intentions.

The lighting control systems varied throughout the facility. Current energy codes call for some sort of automatic lighting control.

There are several opportunities for daylight harvesting in this facility. This would save energy and eliminate artificial lighting trying to compete with natural light.

There is existing automatic occupancy sensor lighting control in the main electrical room. Code does not allow for automatic lighting control in this type of space. This should be replaced with a manual control system.

EMERGENCY SYSTEMS:

There is no generator set up to supply emergency power to support emergency egress lighting in this building. Some battery EXIT signs and both ceiling and wall mounted Emergency Battery Units (EBUs or "Bug Eyes") were noted throughout the facility. Proper emergency light levels along paths should be verified. Monthly testing of all local battery lighting units should be documented and reviewed.

AUXILIARY SYSTEMS:

The fire alarm system consists of horn and strobe notification devices. These devices are mounted throughout the building. Many of these are ceiling mounted. Some smoke detection devices were noted during the tour of the building, however they were not observed throughout the entire building.

With a horn based fire alarm system, there is currently no means of making announcements or mass notification of building tenants.

The existing voice and data systems are located in closets. The cabling appears to be properly installed and protected. There are existing ceiling mounted WAP devices for wireless connectivity located throughout the building.

STUDENT CAFETERIA / CONFERENCE CENTER BUILDING MECHANICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Student Cafeteria / Conference Building is located between the Maintenance Building and Health Education and Science Center. The Student Center Building was constructed in 1968 and underwent a major renovation of HVAC equipment and alterations to room layout in 2000. The building is a two story building that consists of approximately 18,500 square feet. Offices, conferences, and Cafeteria are located in the Student Center Building.

Building Cooling System –Air cooled chiller that is located in the first floor mechanical room of the building serving AHU-5 which were upgraded in 2000 and serves the cooling requirements for the Student Center Building. Chilled Water piping is piped to the unit located in the mechanical space on the first floor of the building.

Air Handler Unit AHU-1, located in the Mechanical space of the Student Center Building; is a constant volume, mixed air system installed in 2000. The system consists of an outside air damper, gravity relief hood with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, and Chilled water cooling coil. The AHU-1 serves the building spaces of the Student Center Building and supplies air to the spaces after passing thru room specific terminal unit and diffusers.

Roof Top Unit RTU-1 thru 4, located on the roof of the Student Center Building; is a constant volume, mixed air system installed in 1992. The system consists of an outside air damper, gravity relief hood with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, Dx cooling coil. The RTU-1 thru 4 serves the cafeteria and kitchen of the Student Center Building to the space with diffusers.

Exhaust Fans EF-109 is a constant volume exhaust systems with motorized backdraft dampers. EF-1 located in the mechanical space on first floor, installed in 19xx serves Mechanical Space.

Plumbing Fixtures are located in the Kitchen, bathrooms and janitors closet in the building. The fixtures in the building consist of Lav's, Double Sinks, showers, Service Sink, Water closets, and Urinals. These fixtures were installed in 1968 and have served the building since.

STUDENT CAFETERIA / CONFERENCE CENTER BUILDING ELECTRICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Student Cafeteria / Conference Center are located on the South side of campus adjacent to the SCRC and just north of Residence Hall. The SCC was constructed in 1968 and is a two story building that consists of approximately 18,500 square feet. The SCC consists of cafeteria, kitchen, dining area, meeting rooms, and offices.

POWER:

The main power enters the building from the tunnel system. The main equipment is located in the basement of the building in a space that is part of the tunnel system. This building is fed from the primary equipment located in the adjacent SCRC building. Most of the power for this building originates from a 300kVA 480V-208/120V transformer located in the tunnel space. There are other large portions of the electrical distribution system located in the tunnels and in various Mech/Elect Rooms throughout the facility. This equipment appears to be a mixture of newer equipment and older equipment.

The building electrical distribution system consists mainly of branch circuit panelboards scattered throughout the building. Some of the panelboards are located in the tunnel system. There is a mixture of new and older equipment, including some panelboards manufactured by Federal Pacific, who has been out of business for many years. There are also some newer panelboards that were manufactured by Square D.

LIGHTING:

Our understanding is that approximately 90% of the linear fluorescent lamps and their associated ballasts on campus have been changed from T12 to T8. It appears that most of the fixtures have been converted.

Because of the varied usage of the different spaces in this building, there is a mixture of various types of light fixtures. Some of the light fixtures are showing signs of age.

Most of the observed lighting control consists of toggle switches. In the dining area, these switches are grouped together in a large bank of 12 switches. Current energy codes call for some sort of automatic lighting control. With the large existing window openings, there are several areas in this building where daylight harvesting opportunities are present.

EMERGENCY SYSTEMS:

There is no generator set up to supply emergency power to support emergency egress lighting in this building. Some battery EXIT signs and both ceiling and wall mounted Emergency Battery Units (EBUs or "Bug Eyes") were noted throughout the facility. Proper emergency light levels along paths should be verified. Monthly testing of all local battery lighting units should be documented and reviewed.

AUXILIARY SYSTEMS:

The fire alarm system consists of horn and strobe notification devices. These devices are mounted throughout the building. Many of these are ceiling mounted. Some smoke detection devices were noted during the tour of the building, however they were not observed throughout the entire building.

With a horn based fire alarm system, there is currently no means of making announcements or mass notification of building tenants.

The existing voice and data systems are located in closets. The cabling appears to be properly installed and protected. It appears that there are existing wall and ceiling mounted WAP devices for wireless connectivity located throughout the building.

TECHNOLOGY BUILDING MECHANICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Technology Building is located between the Maintenance Building and Health Education and Science Center. The Technology Building was constructed in 1973 and underwent a major renovation of HVAC equipment and alterations to room layout in 2001. The building is a single story building that consists of approximately 5,660 square feet. Technology classrooms and I.T. repair Lab are located in the Technology Building.

Building Heating System - The campus heating hot water system located in the Heating Plant was upgraded in 2010 and serves the heating requirements for all the contiguous Petoskey Campus Buildings with the exception of the Early Childhood education Building. Heating hot water for the system is generated by eight gas fired heating hot water boilers. Heating hot water distribution system is piped in a primary loop arrangement. Two variable flow primary pumps (one operates continuously while the other is stand-by) circulate heating hot water through the primary loop between the boilers and the building(s) heating equipment. Building heating equipment utilize 2-way control valves controlled to maintain space temperatures. Heating hot water system is controlled by the original campus DDC control system.

Building Cooling System – Two Air cooled condenser units are located outside the building serving BCU-1 and BCU-2 which was upgraded in 2001 and serves the cooling requirements for the Technology Building. Refrigerant piping is piped to each of the Blower coil units located in the plenum space of the building.

Blower Coil Unit BCU-1, located in the plenum space of the Technology Building; is a constant volume, mixed air system installed in 2001. The system consists of an outside air damper, gravity relief hood with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, Dx cooling coil, and a constant volume supply fan with discharge damper for supply air volume control. The BCU-1 serves the west portion of the building spaces of the Technology Building and supplies air to the spaces after passing thru the room specific tempering coil and to the space with diffusers which provides space temperature control. BCU-1 is controlled by a combination of temperature controls and the campus DDC control system.

Blower Coil Unit BCU-2, located in the plenum space of the Technology Building; is a constant volume, mixed air system installed in 2001. The system consists of an outside air damper, gravity relief hood with relief air dampers, filters, hot water heating coil with circulating pump for freeze protection, Dx cooling coil, and a constant volume supply fan with discharge damper for supply air volume control. The BCU-2 serves the East portion of the building spaces of the Technology Building and supplies air to the spaces after passing thru the room specific tempering coil and to the space with diffusers which provides space temperature control. BCU-2 is controlled by a combination of temperature controls and the campus DDC control system.

Unit Ventilators located in each of the classrooms are constant air volume, mixed air systems installed in 1973. Each system consists of a multi speed air volume integral outside air, hot water heating coil and a multi speed air volume supply air fan. The vertical unit ventilators serve the classrooms through its diffuser integral with the cabinet. Unit ventilators are controlled by the original campus DDC control system.

Exhaust Fans EF-1 is a constant volume exhaust systems with motorized backdraft dampers. EF-1 located on the roof, installed in 2001 serves Men's and Women's toilet rooms.

Plumbing Fixtures are located in the art spaces, bathrooms and janitors closet in the building. The fixtures in the building consist of Lav's, Service Sink, Water closets, and Urinals. These fixtures were installed in 1973 and have served the building since.

TECHNOLOGY BUILDING ELECTRICAL EQUIPMENT DESCRIPTIONS

General Building Description

The Technology Building is located on the East side of campus between the Maintenance Building and the Health Education and Science Center. The Technology Building was constructed in 1973 and is an approximately 5,000 sqft single story building that consists of classrooms and labs.

POWER:

The main power enters the building through the tunnel system below the building. The main equipment is located in the tunnel below the building. This building is fed from the primary equipment (Transformer T5) located in the nearby Health Education and Science Center building.

The building electrical distribution system consists of branch circuit panelboards located in the main corridor and in some of the rooms. The entire system in this building is 208/120V. There is mixture of vintages of equipment. There is some Federal Pacific equipment that is likely from the original construction. There is ITE equipment as well. Any equipment from the original construction has surpassed its anticipated life expectancy and should be scheduled for replacement.

LIGHTING:

Our understanding is that approximately 90% of the linear fluorescent lamps and their associated ballasts on campus have been changed from T12 to T8. It appears that most of the fixtures have been converted.

Most of the lighting is in satisfactory condition.

Most of the observed lighting control consists of toggle switches. Current energy codes call for some sort of automatic lighting control.

EMERGENCY SYSTEMS:

There is no generator set up to supply emergency power to support emergency egress lighting in this building. Some battery EXIT signs and both ceiling and wall mounted Emergency Battery Units (EBUs or "Bug Eyes") were noted throughout the facility. Proper emergency light levels along paths should be verified. Monthly testing of all local battery lighting units should be documented and reviewed.

AUXILIARY SYSTEMS:

The fire alarm system consists of horn and strobe notification devices. These devices are mounted throughout the building. Many of these are ceiling mounted. The building contains a sprinkler system.

With a horn based fire alarm system, there is currently no means of making announcements or mass notification of building tenants.

The existing voice and data cabling appears to be properly installed and protected. It appears that there are existing wall and ceiling mounted WAP devices for wireless connectivity located throughout the building.

