### NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPUS

### Facilities Conditions Assessment Mechanical And Electrical Petoskey, Michigan



PBA Project No. 2019.0114.00

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PETER BASSO ASSOCIATES INC CONSULTING ENGINEERS TROY, MICHIGAN

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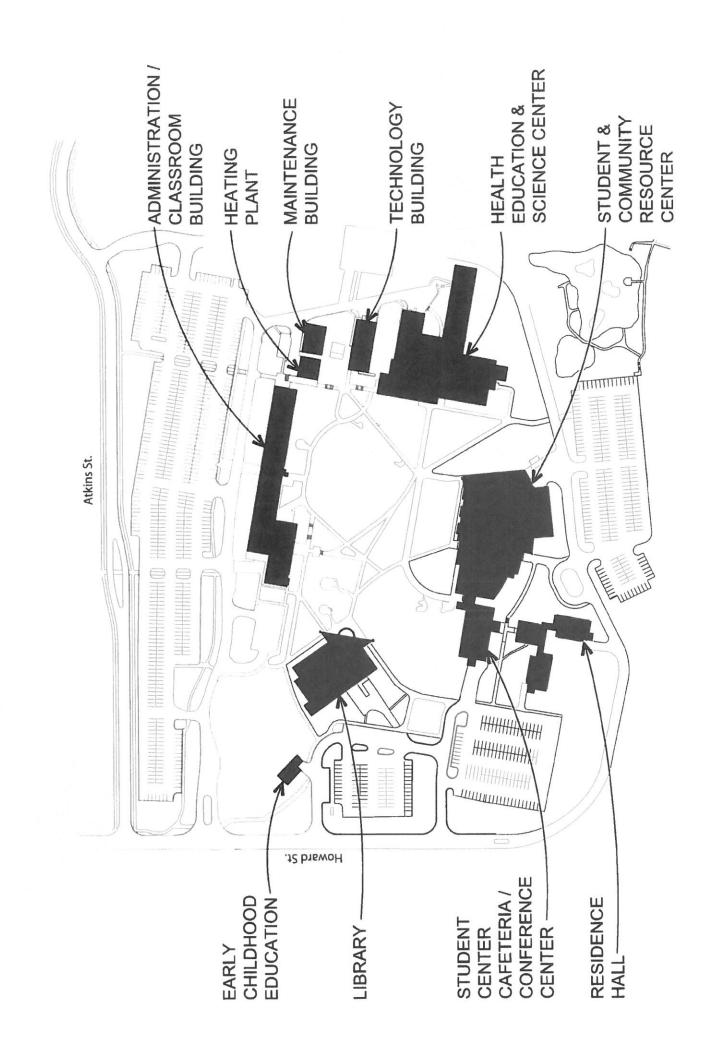
# North Central Michigan College 2019 Five Year Master Plan Summary (Preliminary) (Mechanical and Electrical Intems) Facility Infrastructure, System Improvements and Energy Conservation

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Bullding	Year	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.	S	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.	П	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.	N	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 Totals  Administration and Classroom Building Totals  Heating Plant Totals			reaching or have past there life expectancy.  Does not include building wide HVAC piping.	-	Systems nave past there userul life.	\$377,391
P. 0.	in a constant of the constant		Provide additional heating, cooling ventilation and air conditioning zone control to areas that have been modified from original.	е	Areas have ben modifiled architecturally but not mechanically which is causing temperature issues in the space.	\$157,346
Administration and Classroom Building Totals Heating Plant 1962 2010 Heating Plant Totals	Report	52,000	Replace existing original electrical distribution equipment.	1	Systems have past there useful life.	\$71,156
Administration and Classroom Building Totals  Heating Plant Totals			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.	н	Energy savings and to meet current energy codes.	Work in process, cost needs to be updated
Heating Plant 1962 2010						\$605,893
1962			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.	\$13,818
Heating Plant Totals	See Facilities	2,300	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
Heating Plant Totals			Provide heating and ventilation in control room	1	Occupied area is required to be ventilated and heated.	\$10,839
Heating Plant Totals			Replace existing original electrical distribution	2	Systems have past there useful life.	\$3,826
Heating Plant Totals			Upgrade lighting in all applicable areas.	3	Energy savings and to meet current energy codes.	\$12,752
						\$64,189
			Optimize the number of air changes in building to save energy	2	Many room of the building have large air change rates during occupied and unoccupied times. The reduction of air change rates will substually reduce operating costs and save energy.	\$36,400
Science Center 2010 N/A	۵/۶ ۲	0	Demand Ventilation - install CO2 sensors to large occupant spaces.	1	Reduce energy and utility costs	In progress
Health Education & Science Center Totals						\$36,400
Complete Library Building 1984 renovation in 2016	See Facilities Report	19,550	All mechanical and electrical systems have been replaced in 2016	0	N/A	OS
Library Building Totals						\$0

ion 2 2 1 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3						Replace existing HVAC Equipment that are		Systems have past there useful life 30 years old.	
Pacieties   Auto-						reaching or have past there life expectancy.			6189 617
Repair/Modify existing the water heating   Incorrect piper gartangement/piping failure.						Does not include building wide HVAC piping.	7		/16/8815
Replace existing or have past there the septentary of the caseful	Maintenance Building	1973		See Facilities	3,400	Repair/Modify existing Hot water heating piping. Current hot water piping system not functioning properly.	-	Incorrect piping arrangement/piping failure.	\$34,619
Externd chilled water to existing Dorm Building   The Dorm Building is not currently cooled   Fepipere existing purbling factors and the second purply of the past there is expectancy.   The Dorm Building is not currently cooled   The Dorm Building is not currently life.   The Board Building is not current life.   The Board Bu						Replace existing plumbing fixtures that are reaching or have past there life expectancy. Does not include the building wide plumbing	ın	Systems have past there useful life.	\$15,835
Extend chiled water to existing Dorm Building   The Dorm Building is not currently cooled   The Dorm Building is not currently in a second building in a second building with a second building in a second building with a second building in a second building with a second building in a second building is not current and current tenergy codes.   The Dorm Building is not current to building with a second building in all applicable areas.   The Dorm Building is not current to building with a second building in all applicable areas.   The Dorm Building is not current to building with a second building in all applicable areas.   The Dorm Building is not current to building with a second building in all applicable areas.   The Dorm Building is not current to building with a second building in all applicable areas.   The Dorm Building is not current to building with a second building in all applicable areas.   The Dorm Building is not current to building with a second building is not current to building with a second building is not current to building with a second building is not current to building with a second building is not current to building with a second building is not current to building with a second building is not current to building in all applicable areas.   The Dorm Building is not current to building with a second building with a second building with a						Replace existing original electrical distribution equipment.	2	Systems have past there useful life.	\$23,846
Facehold chilled water to ensiting Durmbung fixtures that are reaching crished easily plumbing fixtures that are reaching crished easily proper fire alignment.    Report   Plumbing Systems have past there useful life easily proper fire alignment.   Chearance in the safety of eaction systems coverages.   Chearance in the safety of eaction systems coverages.   Chearance easily plumbing fixtures that are refreshing or have past there useful life.	Maintenance Building T	otals							\$262,817
Replace existing plumbing fixtures that are reaching to have past there life expectancy. Does not include the building wide plumbing plumbing plumbing plumbing plumbing plumbing plumbing plumbing may be storage terms in front of electrical and plumbing may be past there useful life.   Clearance issue.   Clearance						Extend chilled water to existing Dorm Building room fan coil Units	-1	The Dorm Building is not currently cooled	Refer to campus wide scope
Provide the controlled the building wide plumbing piping replacement.   Clearance issue.   Provide enement in front of electrical   1   Clearance issue.   Provide enement lighting in public areas including new   3   Building improvement.						Replace existing plumbing fixtures that are		Plumbing Systems have past there useful life	
Remove storage items in front of electrical 1 Clearance issue.  Report Diggrade lighting in public areas including new 3 Building improvement.  Dissement lighting.  Verify proper fine alarm notification and detection systems coverages.  Replace existing original electrical distribution 2 Systems have past there useful life.  Provide emergency egress lighting.  Replace existing Cafeteria and Kitchen HVAC 2 Systems have past there useful life.  Provide emergency egress lighting.  Replace existing plumbing fixtures that are resching or have past there life expectantly.  Report Diggrade the building wide plumbing provide plumbing by pinnig replacement.  Replace existing plumbing wide plumbing provide solutions in all applicable areas.  Provide automatic lighting controls.  Replace existing plumbing controls.  Replace existing plumbing wide plumbing provide plumbing pl						reaching or have past there life expectancy.  Does not include the building wide plumbing piping replacement.	2		\$40,183
Proport   Upgrade lighting in public areas including new   3   Building improvement	Recidence Hall	1968	2010	See Facilities	35,000	Remove storage items in front of electrical equipment.	1	Clearance issue.	Procedure & Housekeeping
Verify proper fire a larm notification and detection systems coverages.   Replace existing original electrical distribution   2   Systems have past there useful life.				Report		Upgrade lighting in public areas including new basement lighting.	m	Building improvement.	\$159,400
Replace existing original electrical distribution   2   Systems have past there useful life.						Verify proper fire alarm notification and detection systems coverages.	-	Life safety.	See campus fire alarm item
Replace existing Cafeteria and Kitchen HVAC 2 Systems have past there useful life 30 years old.  Equipment. Demand Ventilation - install CO2 sensors to large occupant spaces.  Report Report Provide automatic lighting controls in all applicable areas.  Provide byotoceli lighting control. Replace existing original electrical distribution applicable areas.  Provide byotoceli lighting control. Replace existing original electrical distribution applicable areas.  Provide byotoceli lighting in all applicable areas.  Provide byotoceli lighting in all applicable areas.  Replace existing original electrical distribution applicable areas.  Replace existing original electrical distribution applicable areas.  Systems have past there useful life.  Energy savings and to meet current energy codes.  Systems have past there useful life.  Energy savings and to meet current energy codes.  Systems have past there useful life.  Energy savings and to meet current energy codes.						Replace existing original electrical distribution equipment.	2	Systems have past there useful life.	Update Costs
Replace existing Cafeteria and Kitchen HVAC 2 Systems have past there useful life 30 years old.  Equipment.  Demand Ventilation - install CO2 sensors to large occupant spaces.  Replace existing plumbing fixtures that are reaching or have past there life expectancy.  Report Does not include the building wide plumbing piping replacement.  Provide automatic lighting controls in all applicable areas.  Provide photocell lighting control.  Replace existing original electrical distribution 2 Systems have past there useful life.  Fine gy savings and to meet current energy codes.  Fine gy savings and to meet current energy codes.  Systems have past there useful life.  Fine gy savings and to meet current energy codes.  Replace existing original electrical distribution 2 Systems have past there useful life.  Replace existing original electrical distribution 3 Energy savings and to meet current energy codes.						Provide emergency egress lighting.	1	Life safety.	See campus generator item
Replace existing Cafeteria and Kitchen HVAC Equipment.  Demand Ventilation - install CO2 sensors to large occupant spaces.  Report Report Provide automatic lighting controls in all applicable areas.  Provide bilditude in all applicable areas.  Repurement Equipment  Systems have past there useful life.  Finergy savings and to meet current energy codes.  Systems have past there useful life.  Finergy savings and to meet current energy codes.  Systems have past there useful life.  Finergy savings and to meet current energy codes.	Residence Hall Totals						600		\$199,583
Demand Ventilation - install CO2 sensors to large occupant spaces.  Replace existing plumbing fixtures that are reaching or have past there life expectancy.  Provide automatic lighting controls in all applicable areas.  Replace existing original electrical distribution  Provide by toccell lighting control.  Replace existing original electrical distribution  Rep						Replace existing Cafeteria and Kitchen HVAC	7	Systems have past there useful life 30 years old.	\$336,482
Replace existing plumbing fixtures that are reaching or have past there life expectancy.  Report 18,500 Does not include the building wide plumbing piping replacement.  Provide automatic lighting controls in all applicable areas.  Provide photocell lighting control.  Replace existing original electrical distribution 2 Systems have past there useful life.  Guipment.  Systems have past there useful life.						Demand Ventilation - install CO2 sensors to large occupant spaces.	5	Reduce energy and utility costs	
Replace existing plumbing fixtures that are reaching or have past there life expectancy.  Report Does not include the building wide plumbing piping replacement.  Provide automatic lighting controls in all applicable areas.  Provide photocell lighting control.  Replace existing original electrical distribution and the past there useful life.  Systems have past there useful life.  Shystems have past there useful life.  Finergy savings and to meet current energy codes.  Systems have past there useful life.							-		In progress
Report Provide automatic lighting controls in all applicable areas. Replace existing original electrical distribution Replace existing original electrical distribution Replace elighting in all applicable areas.  Report Report Replace existing original electrical distribution Replace existing original electrical electric	Chardont Contor					Replace existing plumbing fixtures that are		Systems have past there useful life.	
piping replacement.  Provide automatic lighting controls in all applicable areas.  Provide photocell lighting control.  Replace existing original electrical distribution 2 Systems have past there useful life.  Upgrade lighting in all applicable areas.  Biping savings and to meet current energy codes.	Cafeteria/Conference	1968	2000	See Facilities Report	18,500	reaching or have past there life expectancy.  Does not include the building wide plumbing	S		\$29,347
Provide automatic lighting controls in all applicable areas.  Provide photocell lighting control.  Replace existing original electrical distribution 2 Systems have past there useful life.  Lighting in all applicable areas. 3 Energy savings and to meet current energy codes.	Center			8		piping replacement.			
Provide photocell lighting control.  Replace existing original electrical distribution  2 Systems have past there useful life.  equipment.  Upgrade lighting in all applicable areas.  3 Energy savings and to meet current energy codes.						Provide automatic lighting controls in all applicable areas.	8	Energy savings and to meet current energy codes.	\$35,387
Replace existing original electrical distribution 2 Systems have past there useful life.  equipment.  Upgrade lighting in all applicable areas. 3 Energy savings and to meet current energy codes.						Provide photocell lighting control.	4	Energy savings.	\$6,376
Upgrade lighting in all applicable areas.						Replace existing original electrical distribution	2	Systems have past there useful life.	\$35,259
						Upgrade lighting in all applicable areas.	8	Energy savings and to meet current energy codes.	\$306,686
	Condont Contor Cafeteri	-/Confer	ance Center To	talc					\$749,537

					Replace existing ductwork located in gymnasium with fabric ductwork.	en .	Ductwork was not property 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.	п	System failure, unions leak.	\$22,510
Student and			See Facilities	Š	Demand Ventilation - install CO2 sensors to large occupant spaces.	H	Reduce energy and utility costs	in progress
Community Resource	7007	I	Report	92,000	Pravide photocell lighting control.	4	Energy savings.	\$22,954
	***				Provide automatic lighting controls in all applicable areas.	ю	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 Buildout (per Ernst)			\$0
					Move Bookstore and make aerobics area (per Emst)			\$0
Student and Community Resource Center Totals	Resource C	enter Totals						\$909,792
					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.	'n	Systems have past there useful life.	\$21,592
Technology Building	1973	2001	See Facilities Report	2,660	Replace existing original electrical distribution equipment.	2	Systems have past there useful life.	\$30,796
					Provide automatic lighting controls in all applicable areas.	8	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)			0\$
	-				Addition to Building (per Ernst)			\$0
Technology Building Totals	ls							\$186,310
Total								\$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.

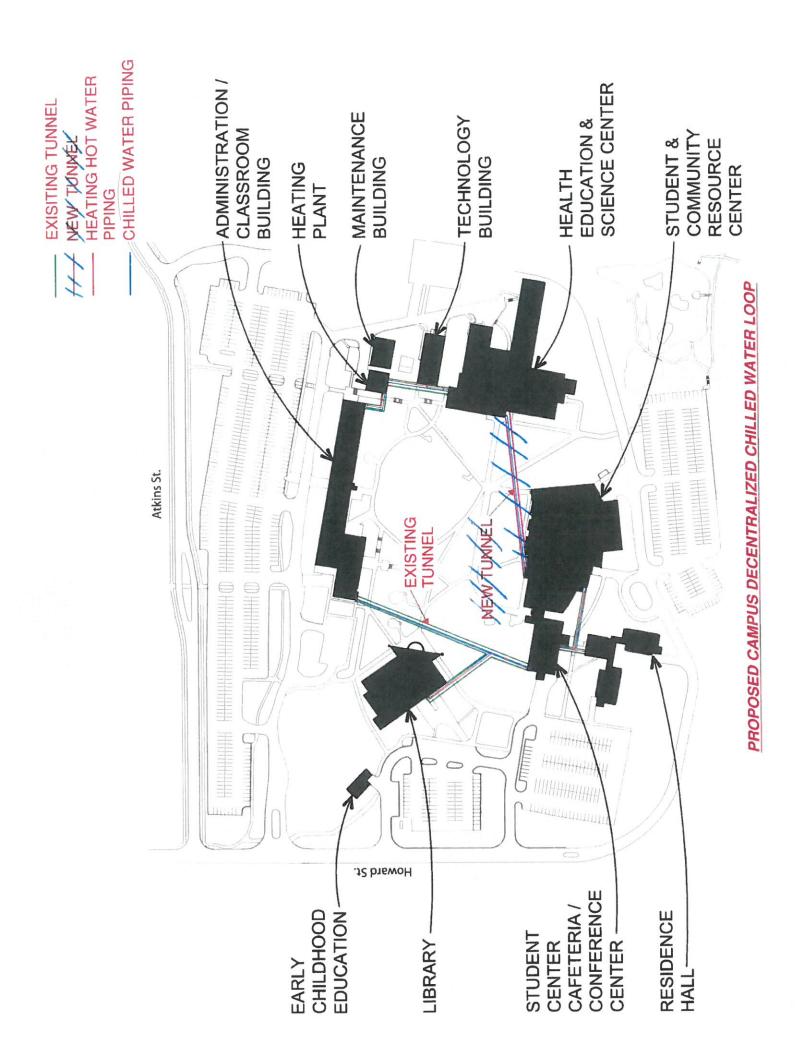
There is a mixture of voltages in the buildings. Some buildings contain both 480/277V and 208/120V systems, while other buildings are entirely 208/120V.

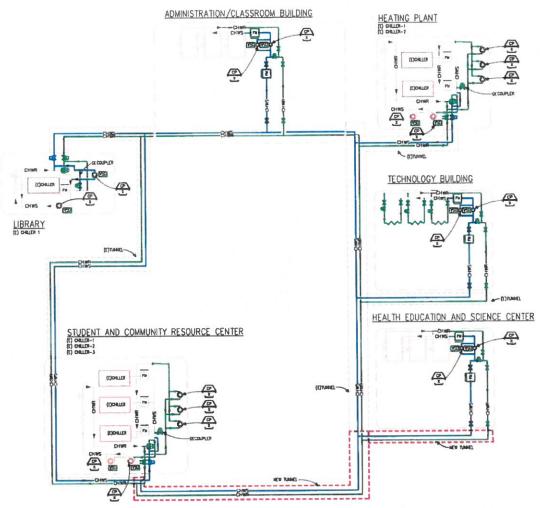
### **Emergency Power:**

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

Exisitng exterior site lighting has been converted to LED fixtures.





PROPOSED CAMPUS DECENTRALIZED CHILLED WATER LOOP SCHEMATIC DIAGRAM NO SCALE

Campus

NORTH CENTRAL MICHIGAN COLLEGE PSTOSKY CAMPINS BUILDING CONTONENT LIFE ERECTANCY DAR UPANE AGGS 2018 Nen infratructure support space = 215,250 seft

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Consumer for the Calaby	808	Ges generator, ATS, distribution		\$218,784	\$218,784 Bared on 100kW units for L5 only	1,041,921	1,088,921 2	2029 25	N/A									1	-	-	1	1	-	1	+	+	1	1	
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### 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.

# Administration and Classroom Building

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CARABUS BUILDING COMPONENT LIFE EXPECTANCY Building Square Footage: 52,000 Sq. Ft. Date Updated: 04-04-2019

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 in good condition, operates efficiently and as designed, little wear

Equipment or system is rearing, or at the end of its useful life based on condition and/or industry standards

2004
=
Renovated
1965.
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Built
Building

Date Upd.	Date Updated: 04-04-2019			The second second														7							
					Fadilih	Facility Improvement or Energy		Saving Modification																	
Building	Building Built in 1965. Renovated in 2004			Note Repla	creat costing	Note Replacment costing period based on 5 year	S year look out.	er.										-						1	
	Inflation Factor at	3%	/YR Beginning is 2019	te 2019		1 000	1.080	1.061	1 093	1.126	1.159	1.194 1.7	1.230 1.267	67 1.305	344	4 3.384	1.426	1.469	1.513	1.558	1.605	1.653	1.702	1.734	1.806
		See Une Cost	Projected Cost for Year	bassalbri	ni <del>shi kilasi</del> sass	o bad bad sets the sets of the	2020	2021	2022	2023	2024	2025	2026 2027	27 2028	2029	9 2030	2031	2032	2033	2034	2035	2036	7692	2038	2039
Mechanic	Mechanical Systems  A chanding Init AHU-10 (2004)		- september	2029	32	2029					i		+	-											
2 Air	Air Handling Unit AHU-11 (2004)	date		2029	25 20	2029									Ц										
3 Air	Air Handling Unit AHU-14 (2004)	1	*******	2029	25 20	5028								_	1										
4 Air	Air Handling Unit AHU-17 (2004)		Taxable Taxabl	2029	25 20	5028						_			Ц				_						
SAIT	Air Handling Unit AHU-18 (2004)			2029	25 20	2029						_		_	Ц										
6 Air	Air Handling Unit AHU-19 (2004)		-	2029	25 20	5029								_				_							
7 Infi	Inline Pump CP-10 (2004)	7,165	7,145	2019	10 20	2014						_	_	_	_	_		_							
60 FE	Inline Pump CP-11 (2004)	7,145	7,145	2019	10 20	2014								_									_		
9 (4)	Inline Pump CP-14 (2004)	7,145	7,145	2019	10 20	2014					_					_	-								
30 Inli	Inline Pump CP-17 (2004)	7,145	7,145	2019	10 20	2014		_							_	_		_							
11 Inl	Inline Pump CP-18 (2004)	7,145	7,145	2019	10 20	2014								_	_			_							
12 Indi	Inline Pump CP-19 (2004)	7,145	7,145	2019	10 20	2014						-		_		_									
П	Inline Pump CP-100 / 100A (2004)	7,145	7,145	2019	10 20	2014								_											
14	Cabinet Unit Heaters (10) (1965)	100,905	100,905	2019	30 16	1995						_				_	_								
15 Ev	Exhaust Fans (4) (1965)	20,043	20,043	2019	20 1	1975											_	_							
П	Exhaust Fan Penthouse (1965)	5,011	5,011	2019	25 11	1990		_							_									_	
П	Temperine Coils (5) 1965	33,325	33,325	2019	25 1	1990							_			_									
81	Convectors (17) (1965)	46,359	46,359	2019	25 1	1990									_	_			22.71						
	Unit Heaters (5) (1965)	13,571	13,571	2019	20 1	1985									_										
11	Terminal Units (9) (1965)	63,468	63,468	2019	20 1	1985																			
11	New required Terminal Units with ductwork to meet new space	1	276 526	8100	4/1	472								_			_								
П	conditions (18)	38 319	38.319	#	4	1995									_		_	_							
23	Unit Ventilator (22) (2004)	1		2019	15 2	6102											_								
24 0	Chiller ACCH-1 & 2 (2004)	-	1	2024	20 2	2024							_	_											
25 P.	Pumps 31, 32, 33, 34 (2004)	-	-	2024	20 2	2024							_	_		_		_							
26 Sg	Spiit Systems A.C. (2) (2004)	-		2019	15	2019								_	_	_		_							
27 0	Compressor (1965)	6,376	6,376	2019	20	1985									_		_	_	_	<u> </u>					
28	LaVs (Qty, 17)	18,142	18,142	2019	H	1995													_						
20	Multi-person sinks (Qty. 4)	31,116	31,116	2019	30	1995	9	_							_										
П	Service Sink (Ctry. 4)	5,702	5,702	2019	30	1995	8								_	-									
31 4	Water closet (Qty. 27)	170718	31,021	1	H	1995		_					_		_		_	_			030				
32 6	Urinals (Qty. 11)	25,640	25,640	H	30	1995									_	_		_							
33 0	Drinking Fountains "Single" (Oty. 5)	10,221	10,221	H	30	1995						_				_	_	_							
3.6	Double Sink (Oty. 4)	10,176	10,176	2019	30	1995	-					1	1				-	°	°	0	0	0	0	0	0
	Future Cash Flow:	666,756			Yearly	Yearly Totals: 656,756	26 0	-	0	0	333 063	796 141 8	R20.025 RA	R44.676 869	869.965 89	896,064 922,946	95	6	1,0	-		1,069,947 1,102,045	1,135,107	1,169,160 1,204,235	1,204,235
				early Totals I	With Inflation	Factor: boo,	+	198 /0/,381	+	+	200.00	+			+-	١	-	1 2032		2034		2036	2037	2038	2039

# Administration and Classroom Building

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPLIS BUILDING COMPONENT LIFE EXPECTANCY Out Updated De-45 2019

[Equipment or system is as pool consistent, operation of statistics and a strategies, both securification of the confidence of the confide

Built in 1965. Renovated in 2004
= :
= :

52,000 sqft					Inflation Factor of	338	/YR Beginning in 2019	610Z ul 2		1,000	7030	1901	1.093 1.126		1159 1134	34 1230	30 1.267	1308	1344	1384	1.676	1.469	1313	1334	1603	1683	1.702	7.754	1.806
	100	ă	1	Mandacturer	Mone	Stara) gene (tue (cos)	rro) betselorf we'r rot betsshed	ni sili lehedi	Expected End of United	SIDE	DIO	100	2000	2623 20	2034 2025	23	1507 3027	100	87.02	900	HI I	7102	6802	MOS	2035	2016 21	2637 20	20.00	E E
Shetrical Systems							+		1001				100000000000000000000000000000000000000														-	-	
1.1. (1963)	Transformer	15 KVA	(SQD) N	(SQD) Newer (20067)		1461	,	Н	#		I																_		
7.4.	Transformer	500 KVA	W (dbs)	(SQD) Newer (20067)	(Primary) 12470V-208/120V	58,498	22 088 3	2031 75	1002					1	I		+	_								-	-	_	
DP-P8	Dist Penelboard		N (QDS) 40	[500] Newer (2006?)		12 114	11771 2	2031 25	2031								-	_	_	L	L								
Panel X	Load Center		MO (002)		MIO	4559	4359 2	2019 25	1990			70		_	-	1	_	_	1						_		_		
RP.14	Panelboard		42 (SQD) N	42 (SQD) Newer (2006?) M	MIO	5.420	1,727	1021 25	1602																	_		_	
6.00	Panelboard		42 (SQD) h	42 (SGD) Newer (20067) N	MID	5,470	1,717	1011 23	2031				1												-		_		
10001		225.4	(343) 03		ANO, 2 tubs	7,843	7 842 2	5018 25	1990				_	_		_													
741	Penelboard	225A	42 (SPE)	1	MLD	5.420	\$ 420	22 8107	0641					_	_	_	_		_										
明治に		125A	42 (FPE)		Starage in front of equipment	8.430	5,470	3019 35	1990					_															
20.00	Dist. Paneltoard		(FPE)			12,314	12.114 2	22 6102	1990						_				_							_			
144		225.8	42 (FPC)		Mio	5.470	3.420	25 5101	1990								_										_		
Boxel.	Panelboard		42 (995)		MLO	5,470	3,420	2019 25	1990					_		-	_									_	_		
T man	Paselboard		A2 (FPE)		MLO, Signs of damage, very poor	029%	5,420	2019 23	1998						- 1	_	_									-			
Parel O	Panelboard		42 (195)		Mio	5.420	5.420	52 6101	19790					_													_		
Panel F	Panelboard		(344) 09		MLC), 2 tubn	7.842	7,940	22 6101	1950									_									_		
Panel C	Panelboard		42 (1991)		MID	8 470	5,420	2019 23	1990					_														-	
Parel C	Panelboard		42 (99%)		MLD, Penthouse	9.42b	\$ 620	2019 25	3 1990				_	7.05														_	
Original lighting in most of building	Ughwag		Varies		Settaff n Si 93/19ft	661.73	464,173	A/H 6102	A N/A					_			_	- (4)											
Complete lighting controls for balance of bldg	Controls				40% 19th + 51.92/19th	76,512	76.512	2019 N/A	A N/A	-++			+	+	+	ľ	ľ		0		116.778	0	0	0	0	0	0	0	0
					Future Cash Flow:	717,334	-		Yearly Totals:	616,401	0	0	0	0	200 573	1	75.8 (785. 780.828	126 804 267	13 828.991	653.242	+	1,046,088	1,077,469	1,109,793	1,143,067	1,177,179 1,212,701	12,701 1.24	1,249,082 3,286,554	16.5
							L Kanth 1	OCHE WITH HE	Yearly Totals With Inflation Patter.	010,001	200	+	+	+	+	H	3495	t	₽	2010	3031	2013	2033	2034	2035	2036	2037	2038	2039

### 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 PETOXEK CAMPUS BUILDING COMPONENT LIFE EXPECTANCY Building Square Foodage: 2,300 Sq. Ft. Date Undated: 94-04-2019

Building Built in 1965. Renovated in 2010

	Equipment or system is in good condition, operates efficiently and as designed, little wear
Equipment or system is in bir condition, should be regularly monitored due to ago, and maintenance should be performed as required Equipment or system in nastring, or at the end of its sustful life based on condition and/or industry standards.  [Spailty improvement or Energy Saving Woolfcaston	
Equipment or system is nearing, or at the end of its useful life based on condition and/or industry standards. [Spoilty innocement or Enemy Saving Modification]	Eminment or outson is in fair condition, should be regularly monitored due to ago, 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. Excilin innocement or Enemy States Modification	
(Secility Innovement) or Energy Saving Modification	Equipment or system is nearing, or at the end of its useful life based on condition and/or industry standards
Earlift Inorovement or Energy Saving Modification	
	Facility Improvement or Energy Saving Modification

	Inflation Factor at	紫	/YR Beginning in 2019	Ing in 2019		1.000	1 030	1001	1.093	1.140	4.422	4.45	-	4.60	1.305	7.344	1.304	- Carrie	-							
		fees Une Cost	Projected Cost for Year baleabal		Years Years Engected End	of Useful Ufe	2020	20071	2022	2033	2024	2025	2026	7202	2028	2029	2030	2031	2032	2033	25.02	2035	2036	2037	2038	2039
arthursternt Swetparte	Switzette																									
1 Boilers	Boilers (8) 2009	1	1	6202	30 2029							L														
2 Domes	Donnestic water heater (2004)	-	estates	2019	15 2018							_														
3 Unit H	Unit Heaters (2)(1965)	5,428	5,428	2019	20 1985																					
To Company	Circulation Gramme (8) 2010	1		2020	10 2020	-																				
- Ciletin					H																			_		
5 Basem	Basemounted Pumps (3) (2013)	1		2033	20 2033					L			L													
6 Split sy	Split sytem AC (1998)	8,390	8,390	2019	15 2013																					
7 Blowe	Blower coil unit (2004)		ļ	2029	25 2029		The state of the s																		-	
8 Provid	Provide ventilation to boiler room	22,954	12,954	2019	N/A N/A																					
9 Provid	Provide heating and ventialtion to control room office	10,839	10,839	2019	N/A N/A			_																		
Т												_														
10 Retro	Retro Commission mechanical & electrical systems	10,839	10,839	2019	N/A N/A																		1	1	1	1
H				1		1	ľ	1	0	c	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Future Cash Flow:	58,450		1	Yearry locals	+	1	62,010	63.870	RC 786	67.760	69.792	71.886	74,043	76,264	78,552	80,909	83,336	85,836	88,411	91,063	93,795	609'96	99,507	102,493	105,567
			Yearly	Totals With	Yearly Totals With Inflation Factor:	1	+	+	03,000	2000	2024	3000	3000	7505	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	Total Pr.	Total Projected Cost:	58,450			2019	2020	2021	2022	5707	\$707	4045	4020	100					-							

**Heating Plant** 

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPUS BUILDING COMPONENT LIFE EXPECTANCY Date Updated On 65 2019

### 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.

# Maintenance Building

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPUS BUILDING COMPONENT LIFE EXPECTANCY Building Square Footage: 3,400 Sq. Ft. Date Updated 94-04-2019

**Building Built in 1973** 

Equipment or settem is in fise condition, should be regularly monitored due to age, and maintenance should be performed as required Equipment or system is nearing, or as the end of its useful life based on condition and/or industry standards.
Focially improvement or levery Saving Modification
Note Study-period based on 5 years. Equipment or system is in good condition, operates efficiently and as designed, little wear

reflection Factor at	3%	/YR Beginn	/YR Beginning in 2019		1 000	1 030	1001	1.093	1.126	1.159	1.194 1	1.230 1.267	57 1.305	5 1.344	1.384	1.426	1.469	1.513	1.558	1.605	1.653	1.702	1.754	1.806
	fred Cost	rojected Cost or Year		ri shi lihezi eresi eresi eresi	shi luhasu	2020	1702	2022	2023	2024	2025	2026 2027	2028	8 2029	2030	2031	2032	2633	2034	2035	2036	2037	2038	2039
Amiland Contains			1		-						_		_	_										
Air Handler Unit AHU-1 (1973)	52,484	52,484	2019	25 1998							_													
Air Handler Unit AHU-2 (1973) (Not Functioning)	52,484	52,484	2019	25 1998							_						_							
Unit heaters (4) (1973)	10,857	10,857	2019	20 1993								_	_											
Convector (3) (1973)	8,181	8,181	2019	20 1993					-	_	_	_	_											
Exhasut Fan (1) (1973)	5,011	5,011	2019	15 1988										_		2							<u> </u>	
Exhaust Fan w / hood (1973)	6,954	6,954	2019	15 1988					_				_	_										
Air Compressor (1973)	6,376	6,376	2019	20 1993																10.750				
Inline Pump (1973)	7,145	7,145	2019	15 1988						_					_									
Infine Pump (1973)	7,145	7,145	2019	15 1988				_			_		-7/1											
Temperature Controls	31,880	31,880	2019	20 1993							-			_			_					-		
Current Piping system is causing operational lissues and needs to be modified.	34,619	34,619	2019	N/A N/A								_												
(an's (Qfy. 3)	3,202	3,202	2019	30 2003							-				_		n e							
Service Sink (Qty. 1)	1,426	1,426	2019	30 2003					_															
Water doset (Qty. 2)	2,298	2,298	2019	30 2003															-					
Urinals (Qty. 2)	4,662	4,652	2019	30 2003								_	_											
Drinking Fountains "Single" (Qty. 1)	2,044	2,044	2019	30 2003								_	_	_	_									
Shower (Qhy. 1)	2,204	2,204	2019	30 2003					1	1	1	+	+	+	+	-		ľ	6	c	o	0	0	0
Estine Cath Flow	238 971			Yearly Totals:	hr: 238,971	0	0	0	0	+	+	+	+	+	+	+	15	361 466	1	303.478	394 987	1	37	431.608
			Totals Wit.	Yearly Totals With Inflation Factor:	or: 238,971		253,524	261,130	268,964	+	+	+	-	803 321,157	157 330,791	+	+	301,400	+	2035	2036	+	+	2039
Total Pi	Total Projected Cost:	238,971			2019	2020	2021	2022	2023	2024	2025	7079	7707	9707	1	1								

# Maintenance Building

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPUS BUILDING COMPONENT LIFE EXPECTANCY Date Updated GA-05-3019

Building Built in 1973. Renovated in 2001

Equipment or system is in fair condition, should be regularly monitored due to age, and maintenance should be performed as required	performed as required
Equipment or system is nearling, or at the end of its useful We based on condition and/or industry standards	

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### 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 of 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 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 PETOSEY CAMPUS BUILDING COMPONENT LIFE EXPECTANCY Building Square Footage: 35,000 Sq. Ft. Date Updated: 94-04-2019

Buildin

Equipment or system is in fair condition, should be regularly monitored due to ago, and maintenance should be performed as required Equipment or system is nearing, or at the end of its useful ble based on condition and/or industry standards Equipment or system is in good condition, operates efficiently and as designed, little wear Facility improvement or Energy Saving Modification riod based on 5 years.

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A	1 Air Handling Unit AHU-29 (1973)	57,341	57,341 2019	25	1998							_	_	_		_		_	_			_			
2 Air	Air Handling Unit AHU-32 (1973)	57,343	57,341 2019	25	1998								_						_	_					
S Air	Air Handling Unit - Directors apt (1973)	11,123	11,123 2019	25	1998															-			-		
8	Roof Top Unit RTU-xx (2000)	-	2020	20	2020										_					_					
1	falloe Pump CP-cc [1973]	7,145	7,145 2019	20	1993						_	_				_				_					
1	folios Pump CP-xx(1973)	7,145	7,145 2019	20	1993											_		-			_				
1	Inline Pump CP-px (1973)	7,145	7,145 2019	20	1993	100												16,7211		_	_				
3	Cabinet Unit Heaters (10) (1973)	68,416	68,416 2019	30	2003												_		-	_					
1 3	Exhaust Fans (4) (2009) serves suite wings	1	2034	22	2034		No. of London	STATE OF			Control of the contro							+	1			_			
01	Exhaust Fans (2) (1973) Serves Cortidors	10,021	10,021 2019	25	1998										_										
T	Int Heater (5) (1973)	34,208	34,208 2019	3 20	1993					_			_				_				_			_	_
T	Enned Tube ( 250 Feet) (1973)	39,342	39,342 2019	30	2003												-	_	_					_	
П	Solit system for IT closet (2009)	-	2019	3 10	2019	A CONTRACTOR								-			1	_	_	-	_			_	
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11	Linit Ventilator (3) (1973) located in lounge	50,782	50,782 2019	9 15	1988									_	_		_		-	_					_
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17 Te	Temperature Controls (Included in equipment replacement)	1	2019	+	N/A										-		-		-			+	+	-	
18 (4	LaV's (qty. 88) (2009)	93,914	169,619 2039	9 30	2039								-	-	-		ŀ	H	+		-		L		L
Т	Single sink (qty. 3)	5,739	5,739 2019	30	2003										_										
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П	Service Sink (aty. 8)	11,404	11,404 2019	9 30	2003													_	_		_				
П	Drinking Fountain (aty. 3)	10,937	10,937 2019	9	2003				-								-	-	-		-	+	_	_	1
П	Water Closet (qty, 48) (2009)	55,149	99,605 2039	9 30	2039		The state of the s												H		-		_	_	L
П	Urinals (qty. 2)	4,662	4,662 2019	30	2003										-			_		_					
7 25	Tub (qty. 1)	4,897	4,897 2019	30	2003												-	-	-	1	+	+	+	_	
26 5	Showers (qty. 42)	92,578	167,205 2039	39 30	2039						Section 1			-				H	H		+	+	+	ľ	436.430
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Residence Hall

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPUS BUILDING COMPONENT LIFE EXPECTAN

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ansformer (2005)	Transformer	150 KVA	-	500		8361	12.715	2074 25	25 2034						İ		Ì		I	t	T		+	ļ		_			
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oad center in Michenette					to month air a fit out family	150 400	150 400	2019 M	M'A N'A													_							
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### 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 and Community Resource Center

NORTH CENTRAL MICHIGAN COLLÉGE PETOSKEY CRANBUS BUILDING COMPONENT LIFE EXPECTANCY BUIldING SQUARE FOOLAGE: 85,200 Sq. Ft. Date Updatest: 04-04-2019

| Equipment or system is in good condition, sperits efficiently and as designed, little wear

[Equipment or system is in late condition, should be regularly monitored due to ago, and menterance should be performed as required

[Equipment or system is nearing, or at the end of it useful life based on condition and/or industry standards.

[Equipment or system is nearing, staving Modification.

Note Study perrod based on 5 years.

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1	Inflation Factor at	3%	/YR Begin	/YR Beginning in 2019		10	1.000	.030 1.061	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1126	1.159	9 1.194	1 230	1.267	1.305	1.344	1.384	1,975	1.403	1,313	1230	F.00.7				
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440	Downstic Water Heater (2000)	38,974	38,974	2019	15 203	2015			-			_	_										500			
Ho	Creculation Pump CP-15 (2000)	7,145	7,145	2019	15 20	2015					_	_														
H°	Modular Water cooled Chiller CH-1,2 (2000)	436,350	436,350	2019	15 20:	2015					_															
Ho	Cooling Tower (2)	199,433	199,433	2019	15 20	2015					_															
115	Air Handler Unit AHU-1 (2000)	1		2025	25 20.	2025		-	H	_	H	Ш		_	_	_				10.00						
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+	Cabinet Unit Heat (6) (2000)	1	1	2030	30 20	2030					-		-	_	_										name	
+-	Air Compressor (Pneumatic controls)	i	-	2020	20 20	2020					_		_	_		_	_									
+-	Radiant Ceiling Panel (90 ft)(2000)	*******		2030	30 20	2030								_	L	L	L									
+	Terminal Units (29)	******		2020	20 20	2020				_	_															
4	Tempering Coils (16)			2020	20 20	2020							_		_	_										
1	Unit Heaters (4)			2020	20 20	2020			_		_															
-	Temperature Controls (included in equipment replacement)	1	****	2020	20 20	2020																				
-	Replace leaking Dielectric fitting on existing terminal Units (60 Units)	22,510	22,510	2019	N/A N	N/A				_	_		_			_										
1	Lav's (qty.31)	33,083	45,795	2030	30 26	2030					-		_	+	ļ	ļ	1									
T	Water Closets (qty, 22)	25,276	34,989	2030	30 20	2030							ł	4	-	1	l									
	Urinals (qty. 9)	20,978	29,039	2030	30 21	2030				-	i		+	_	ļ	-										
	Service Sink (qty.2)	2,851	3,946	2030	30 2	2030					+		+	+	-	_			_							
T	Showers (qty. 5)	11,021	15,256	2030	30 2	2030				+		1	+	_	-	ļ	L									
	Drinking Fautains (qty. 6)	12,265	16,977	2030	30 2	2030			I	-	I	1	1	+	-	-	Ц	1	-	ľ	1	-		0	c	l°
1	Future Cash Flow:	w: 842,313			Yearly Totals:		Н	4	+	+	+	00.4107	0 0 000	17 933 404	961 406	+	146,002	38 1,200,936	6 1236,964	1,274,073	1,3	1,3	-	r	1,477,000	
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		Dod Server										1	١													

## Student and Community Resource Center

NORTH CENTRAL MICHIGAN CO PETOSKEY CAMPUS BUILDING COMPONENT LIFE EX Date updated 04-05-2019 Building Built in 2000 85,200 soft

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The content of the	YOUR PROPERTANCY					Conjument or system is in the condition, should be regulate recodutered their to age and manuscript by performed in creatives		
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4000         1000 <th< td=""><td></td><td>Panelboard</td><td>RDDA</td><td></td><td></td><td>45,540 2025 75</td><td></td><td>_</td></th<>		Panelboard	RDDA			45,540 2025 75		_
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ucc.         control c		Dist Panelboard				63.552 1025 25		
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Teach With Indian Period February 1551 7 14.15 10.00 1	- Anna				Puture C	\$54,051 Teach Table 73,952 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1,113,478 1,146,68	2
						14-17-7-16-14 With Inflation Festion 73,547 No.15 78,466 86,320 853,45 No.17 00000 85,322 05,33 0000 5011 2011 7013 2014	2037 2034	٦

### STUDENT CAFETERIA / CONFERENCE CENTER BUILDING MECHANICAL FOUIPMENT 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.

# Student Cafeteria / Conference Center

	•		-	EGEND																					
NOR	NORTH CENTRAL MICHIGAN COLLEGE				Equi	pment or syste	Equipment or system is in good condition, operates efficiently and as designed, little wear	ndition, opera	tes efficiently a	nd as design	ed, little wear							T							
BUILL	PETOSKEY CAMPUS BUILDING COMPONENT LIFE EXPECTANCY				Equi	Equipment or syste	em is in fair con	stion, should	be regularly mo	mitored due	t or system is in fair condition, should be regularly monitored due to age, and maintenance should be performed as required	ntenance shoul	d be performe	d as required											
Build	Building Square Footage: 18,500 Sq. Ft.						and the second	to be and an	ity market life by	pred on cond	spanned of its useful life based on condition and for industry standards	ustry standards						Π							
Date	Date Updated: 04-04-2019				Equi	proment or syst	em is nearing, o	200																	
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Mech	Mechanical Systems				+	-		_	_	_	_							-	-						
1	Kirchen Hood and Exhaust systems (2) (1992)	124,304	124,304	2019	+	2012		_																	
2	Xitchen Exhaust air make up (1992)	72,784	72,784	2019	+	2012																_			
2	Cafeteria roof top units (4) (1992)	103,593	103,593	2019	20	2012		-										-			_	_	-		
4	Dishwasher exhaust fan (1992)	7,524	7,524	2019	20	2012														_		_			
s	Circulation Pump #102 (13 GPM), #106 (21 GPM)	7,145	7,145	2019	10	1978																_		_	
9	Cabinet Unit Heat (1) (1968) serves entry	6,842	6,842	6102	30	1998											1								
7	Cabinet Unit Heat (1) (2000)	-	-	2030	200	2030																	_	_	
00	Terminal Units (11) 2000		ı	2025	25	2025													_	_				_	
6	Finned Tube (120 Feet) (2000)			2030	30	2030	10000																	_	
02	Ar Handler Unit AHU-5 (2000)			2025	25	2025															_	_	_		
=	Water Cooled Chiller (2000)			2020	20	2020			_											_			_		
27	Cooling Tower (2000)		-	2020	20	2020					_								-	_					
13	Base Mounted Pumps 11 & 12 (2000)			2020	20	20202			_		_		_								_	_			
14	Inline Pumps (2) (2000)	14,290	14,290	2019	10	2010		_		_										-	_	_			
51	Domestic Water Heaters (3) Being replaced			2019	24				_																
36	Temperature Controls (included in equpment replacement			2019	N/A	N/A													all sill						
17	Lav's (qty. 6)	6,403	6,403	2019	90	1998		_												_	_				
18	Water Closets (qty. 6)	5,894	6,894	2019	30	1998																			
19	Urinal's (qty. 3)	6,993	6,993	2019	30	1998								_											
20	Service Sink (qty.3)	1,426	1,426	2019	30	1998															_				
2.1	Double Sinks (gry. 3)	7,632	7,632	2019	30	1998	C) A	-		-	+	-	1					,				0	0	0	
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### Student Cafeteria / Conference Center

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PETOSKEY CAMPUS									Equipment or	system is in fa-	ir condition, the	Equipment or system is in fair condition, should be regularly monitored due to ago, and muintenance should be performed as required	fy monitored	due to age, se.	a meintenance	e should be a	reformed as ten	print											
0.00									Equipment or	ystem is near	ing or at the er	Equipment or system is asseting, or at the end of its useful life based on condition and/or industry standards	He based on	condition and	(or industry of	andards													
Authors Built in 1958 Removated to 2000													-					-				_							
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3 Panel-M	Panettoare				۱	+	۰	4	1943		-	_	_					_											
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5 Panel EM1	Penelboard	120/2087	12 (FPE)		Old. Equipment on plan/not oneline	4	н	Н	1433				-	-	-	1	-	+											
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14 Parad N	Panelboard		30 (198)		Equipment on plan/hot oneline	5,470	5,420 20	2019 23	1661			-	-	-	-	7		_	_		_							5577	
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16 Unwade lighting					18:500 sqft x 516:59/sqft	306,686	100 646 30	3019 N/A	N/A				_			_	_	_	_		-								
17 Provide lighting control					18,500 sqft x \$1.91/sqft	35,347	15.187 NO	2019 N/A	M.A								_	_			_								
18 Daylight harveyting					allowance		6376 70	7019 Fu/A	N.A			-	-	-	+	-	1	1	+	-	-	+	ľ	1				1	1
			1		Future Cash Row:	546,233		T,	Yearly Totals: 383,708		0				0	0	0	0		0	433,721	100 100	1	1	876 X41	918 208	928.874	957.872	986.537
			-				Yearly Tet.	the With built	tion Factor.		395,219	407,076 63	619,288 41	433,867 44	444,823 458,168	4,168   47	471,913 486,070 500,652	070 500,	652 515,674		+			624,043	1			+	2089

### 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.

### **Technology Building**

NORTH CENTRAL MICHIGAN COLLEGE PETOSKEY CAMPUS BUILDING COMPONENT LIFE EXPECTANCY Building Square Footage: 5,660 Sq. Ft. Date Updated: 04.04-2019

Building Built in 1973. Renovated in 2001

Equipment or system is in fair condition, should be regularly monitored due to ago, and maintenance abould be performed as required Equipment or system is rearing, or at the end of its useful life based on condition and/or industry standards.

Recitly improvement or Genery Saving Modification.

Note: Study-period based on 5 years. Equipment or system is in good condition, operates efficiently and as designed, Ettle wear

Inflation Factor at	actor at 3%		/YR Beginning in 2019	916		1,000	1.030	1061	1.093 1.	1.126	1.159 1.	1.194 1.2	1.230 1.2	1.267 1.305	1.344	1.384	1,426	4.403	4.913	1,338	4.003			H	
		Base Une Cost (2019)	Projected Cost for Yest Indicated	ni situ lulsetu rway	to bn3 barraqu3 atU lufatU	5078	2020	2023	2022 20	202	2024 20	2025 20	2026 20	2027 20	2028 2029	9 2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Mechankal Systems			2021	30	2021						_		_		_			_				_			
Air Cooled Condensing Unit ACU-1 (2001)		-	H	+1		l	I				_	_		-			_		_						
Air Cooled Condensing Unit ACU-2 (2001)	-		- 2021	20	2021					_	_	_			_	_			_						
Blower Coil Units BCU-1 [2001]			- 2021	02	2021			The second		_													_		
Blower Cail Units BCU-2 (2001)	-		1202	20	2021				-									_	_						
Tempering Cods TC-1 thru TC-7 (2001)	mente		- 2026	22	2026																				
Exhaust Fan EF-1 (2001)			2026	52	3026										_		_								
Inline Pump CP-1 (2001)	6,124	4 6,124	2019	10	2011		-	_				_		_	_										
Inline Pump CP-2(2001)	6,124	14 6,124	2019	10	2011			_							_		_	14.4	_						
Inline Pump CP-3(2001)	6,124	24 6,124	2019	10	2011		_		_			_		_		_									
Finned Tube (190 Feet) (1973)	715,61	726,92 72	27 2019	30	2003						_	_				_			_						
Unit Ventilator (5) (1973) (Off Une)	51,031	31 51,031	31 2019	02	1993										-				_	_					
Cabinet Unit Heat (2) (1973)	20,412	12 20,412	12 2019	30	2003	1				_	_	_				_	-	_	_	-					
AC Unit (1973)	5,217	71 5,217	17 2019	15	1988								_				<u> </u>								
Lav's (Oty. 4)	4,269	69 4,269	69 2019	30	2003		_	_	_	_	_			_	-										
Service 5:nk (Qty. 1)	1,426	1,426	26 2019	30	2003													_							
Water closet (Qty. 8)	161,6	161'6 161	910 2019	30	2003	See Lines			_	T			_							_					
Uninals (Qty. 2)	4,662	62 4,662	62 2019	30	2003				_		_	-			_		_	_		_					
Drinking Fountains "Single" (Qty. 1)	2,044	44 2,044	44 2019	30	2003			-	-	1	+	+	+	+	+	1	ľ	-	-	6	c	0	0	0	0
Fature Cash Flow:		145,950		Year	Ц	Н	Н	+	+	+	+	+	+	0	200	104.144 302.038	30	2	22	22	23	241,732	248,469	255,923	263,601
			Yearly Totals With Inflation Factor:	With Inflatic	_		150,328	80	-	+	169,196 1	1/42/1	179,500	+	+	+	+	+	+	H	+	2036	2037	2038	2039
			-			2000	2010	1000	2002	2002														-	The Personal Property lies

<b>Technology Building</b>					DEGEND	Q																			
NORTH CENTRAL MICHIGAN COLLEGE							quipment or	ystem is in g	Equipment or system is in good condition, operates efficiently and as designed, little wast	serates efficien	thy and as des	dgned, little wa							T						
PETOSKEY CAMPUS BUILDING COMPONENT LIFE EXPECTANCY	ř.						daipment or	ystem is in fa	Equipment or system is in fair condition, should be regularly monitored due to ags, and meintenance should be performed as required	uld be regular?	y manitored d	fue to age, and	maintenance	hould be per	prined as requ	pau									
Date Updated D4-05-2019							quipment or	ystem is near	Equipment or system is nearing, or at the end of its usuful life based on condition and/or industry standards	d of its useful i	ife based on c	ondition and/o	r industry stan	dards											
							acility Improv	ement or En	Facility Improvement or Energy Saving Modification	fication															
Building Built in 1973. Renovated in 2001	1				Note	Study-period	Note Study-period based on 5 years	2																1	
			Inflation Factor at	3%	/YR Beginning in 2019	2018		1 000	1 090 1	1 061 1 093	353 1126	1159	1194	1.230	1367	1 305	1 344	1.384	1 426	1469	1 513 1	1558 1605	1 653	1,702	1 754
		25	Manufacture	fetos fetos	Projected Cost for Veer bestschool	ni situ lutacu resr	to and batased	2019	2020	2021	202	A503 E503	2028	\$202	7202	8702	6202	2030	1602	3032	2013	2034 20	8E02 SE02	187	103
Cleaning Conterns					H	Н				_		_													
1 (RP-CAD (1973)	Panelboard 100A	NC.		4 081	4 081 2019	9 25	1998			_		_									_				
2 RDF DE (1987)	Panelboard 225A	×	30 ITE with Main Breaker	6.631	6,631 2019	19 25	2012		īŦ		_	_	_								_	_	_		
3 RP-C (1973) (2)	Panelboard		60 FPE, 2 tube	7,842	7,842 20	2019 25	1991			_									-				_		
4 RP-MP (1973)	Panelboard 100A	NG.		4,081	4,081 20	2019 25	1998			_															
5 RP-CNC (1987)	Panelboard 100	100A 42 CKT	зище	4.081	4,081 2019	19 25	2012		_	_										_			-		
6 RP-HP (1973) surface	Panelboard 300	300A 42CKT	ищ	4,051	4,081 20	2019 25	1998				-			-							_	_			
7 Upgrade lighting			5K saft x 514 03/19ft	70 136	70,136 20	2019 25	N/A	١	_	-	_		_	_	_								_		
8 Upgrade lighting control			5K 19ft x \$1.91/19ft	P35 6	9.584 20	2019 25			+	+	+	+	+	ľ	1	·			6	e	0	0	0	0	0
			Future Cash Flow:	110,495		Ye	4	110.496	+	+	+	+	201010	130 000	Į:	1	148 498	152.958	157,541	6	167,135 17	172,149 177	377,314 182,633	188,112	193.7
					Yearly Tota	Yearly Totals With Inflation Factor	-	110,496	113,611	117,225 126	120,742 124	124,364 128,095	+	+	+	+	2079	2030	2031	+	+	+	2035 2035	7602	203