NORTH SLOPE
BOROUGH SCHOOL DISTRICT
Striving For Excellence

EBEN HOPSON
MIDDLE SCHOOL
Striving For Excellence

UTQIAGVIK
HOPSON MIDDLE SCHOOL

MECHANICAL AND ELECTRICAL
BUILDING ASSESSMENT AND INVENTORY SURVEY REPORT

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SECTION 1. INTRODUCTION

A. OVERVIEW

This report provides an area wide condition survey of the mechanical and electrical systems in of the buildings owned by the North Slope Borough School District in Utqiagvik. The purpose of the survey was to develop a plan to prioritize and address the issues with the mechanical and electrical systems as money is available. The assessment was performed by a survey team composed of representatives from RSA Engineering Inc. and the NSBSD. The survey included a walk-through of each building to evaluate condition of the existing system. The survey was non-destructive, issues noted in this report were visible during the building walk-through or reported by NSBSD staff. During the walk-through the survey team met with NSBSD staff to discuss issues at the buildings and proceeded to assess the project area to develop recommended upgrades for the facility.

Team Member	Title
Ralph DeStefano, P.E.	Principal Mechanical Engineer, RSA Engineering
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B. BUILDING SUMMARY

The below table includes a list of buildings inspected in this survey:

Table 1: Buildings Surveyed

Village Utqiagvik	Building Name Eben Hopson Middle School

C. REFERENCED CODES AND STANDARDS

The buildings were inspected for conformance of the following adopted codes and standards:

International Existing Building Code 2021
International Mechanical Code 2021
International Fire Code 2021
International Fuel Code 2021
Uniform Plumbing Code 2021
National Electrical Code 2020
ASHRAE 62.1-2019 – Ventilation & Acceptable Indoor Air Quality.
National Fire Alarm Code (NFPA 72), 2019
ADA Standards for Accessible Design 2010
ANSI A117.1 2017: Accessible and Usable Buildings and Facilities
Illuminating Engineering Society (IES) Lighting Standards, latest published version

SECTION 2. SURVEY RESULTS

Eben Hopson Middle School

Note that 2017 reports are included in regular text and updates from 2024 site visits are found in bold italic after each section.

Mechanical Systems

Overview

The school was visited on May 8th, 2024, to review the current conditions of the building with the conditions of the building identified in the report from 2017. The building was constructed in 1993 and overall, the mechanical and plumbing equipment was in good shape. The biggest issue is the lack of ventilation and cooling throughout the school. This is especially true in the corridors which have no ventilation.

Plumbing

Domestic water and sanitary sewer service is provided to the building by the city utility.

The condition of the plumbing piping is fair. The plumbing fixtures vary in condition from fair to good. The lavatories are not insulated and do not have anti-scald valves. None of the lavatories appeared to be ADA compliant. Some of the toilets and urinals have automatic flush valves and others have manual valves. It is recommended that all the toilets and urinals be converted to automatic flush valves. The lavatories and countertops are in poor condition and should be replaced.

Domestic hot water is provided by Amtrol 120-gallon hot water generators. Three of the hot water generators supply 120 deg F water and three supply 140 deg F water. One 115-gallon hot water generator is connected to the 120 deg F system and is heated by waste heat when available.

The natural gas piping is original from the construction of the building and is in good condition.

2024 Update

There are four lift stations in the school all are in fair to poor condition and need to be re-built; this would include new pumps, controls, and piping to the gravity main.

Many of the plumbing fixtures are past their useful life and need to be updated.

The drinking fountains were replaced with bottle fillers and are in good condition.

Photo M1 – Lift Station

Photo M2 – Bottle Filler / Drinking Fountain

Photo 3 – Lavatories in Boys Restroom

Heating

The heating system consists of three natural gas fired cast iron sectional boilers. The boilers are rated at 1,904,000 BTU/hr gross output each. The boilers were installed in 1993. The boilers are in fair condition. The boilers are piped in a primary/secondary system with a modulating 3-way valve on each boiler. There are five secondary system pumps, each pump feeding a different area of the school. The building heating pumps are constant volume. The pumps should have VFDs installed for energy savings and better control. The variable speed secondary pumps would operate to match actual system demand, saving energy and improving overall system performance. Glycol was a clean and had 80% propylene mixture. The glycol mixture is too high and needs to be diluted to 50% to provide better heat transmission from the boilers. The piping in the boiler room consists of steel and copper piping.

The rooms throughout the building are heated by finned tube.

2024 Update

The boilers have leaking sections and are currently scheduled to be re-built this summer.

The heating pumps are at the end of their useful life and parts are hard to find; the heating pumps should be replaced.

Many of the fin-tube heating covers are damaged and need to be replaced.

Entry way cabinet unit heaters are past their useful life and need to be replace.

Photo M4– Boiler mechanical room

Photo M5 – Heating Pumps

Photo 6 – Leaking Heating Pump

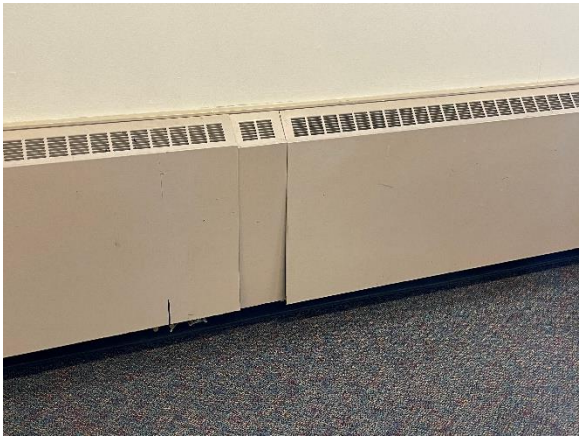

Photo 7– Damaged Fin-Tube Heater

Ventilation

Ventilation for the building is provided by multiple air handlers located in several mechanical rooms in the mezzanine area. Most of the air handlers are constant volume units that feed zone heating coils. AHU-5 is a variable volume unit that feeds several VAV boxes in the office area. The air handlers are in fair condition. The air handlers have hydronic heating coils and mixing dampers for economizer cooling and ventilation. The air handlers need to be evaluated to determine if they are providing current ASHRAE ventilation requirements. The server room is cooled from a VAV box but cannot provide enough cooling and only cools when the air handler is operating. There is an abandoned cooling unit in the room which

should be demolished. A new split system cooling system should be provided to protect the server equipment. The hallways of the school do not have any supply ventilation and the space overheats.

2024 Update

AHU-5 was not operational, the fan motor was tripping the motor electrical overloads. Additionally, AHU-5 is a variable flow unit that uses inlet vanes to control the air flow. The inlet vanes should be locked open and a VFD installed to control the fan motor speed.

The kitchen make-up air unit was not operational and needs to have its bearings replaced.

The school include classrooms and office does not appear to have enough cooling or ventilation to keep the spaces comfortable. Recommend further study to formulate an action plan.

The air flow noise in classrooms 229 through 233 is excessive and should be investigated to determine a remedy.

Boiler room ventilation fan still works but is in poor condition and should be replaced.

Photo M8– AHU-5

Photo M9 – AHU-5 Inlet Vanes

Photo 10– VAV Boxes in Mech Walkway

Photo 11– VAV Box

HVAC Controls

The control system utilized throughout the building is primarily the originally installed pneumatic system with a mix of antiquated Johnson Controls electronic controllers in some mechanical rooms. The Johnson Controls are obsolete and not supported anymore. Some of the heating valves have failed and need to be replaced. The pneumatic control system and Johnson Controls system needs to be replaced with a modern BACnet based DDC system for proper temperature control, ventilation and energy management. The pneumatic control valves and actuators need to be replaced with devices that will integrate in to the new DDC system.

Photo M12– Boiler mechanical room

Photo M13 – Heating Pumps

Photo 14 – Leaking Heating Pump

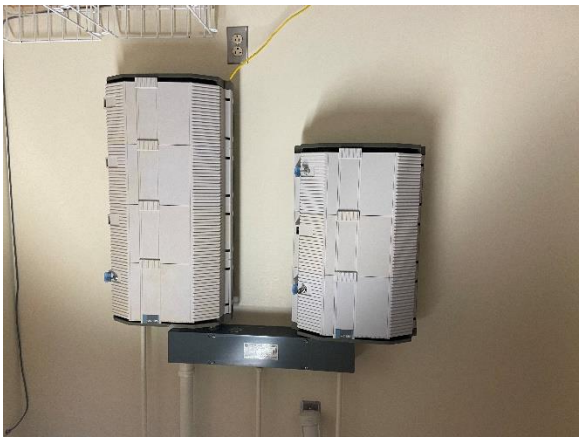

Photo 15– Damaged Fin-Tube Heater

2024 Update

The lack of HVAC control is a major issue. The pneumatic system is very problematic and is causing overheating and using excess energy in the school.

Kitchen

The school has a commercial grade kitchen with associated stove, exhaust hood and fire suppression system. The kitchen stove and hood are not used to prepare meals for the students. The kitchen equipment is in good condition. The condensers for the kitchen freezers are located in the mezzanine return air plenum and have air directed across them to dump their heat into the air stream. The compressors utilize Ozone depleting refrigerants and should be replaced with non –Ozone depleting refrigerant systems and relocated to be out of the return air plenum.

Photo M16- Kitchen condensers located in mezzanine

2024 Update

There are no changes to the kitchen system report.

Fire Protection

The fire protection system is a wet sprinkler system and is supplied from the city water utility. The system is in fair condition.

2024 Update

The fire pump is heavily corroded and needs to be serviced and inspected by a qualified sprinkler technician.

Photo M16– Fire Protection Pump

Electrical Systems

Overview

The school was visited on May 8th, 2024 to review the current conditions of the building with the conditions of the building identified in the report from 2017. The current fire alarm system has been updated to a new addressable system with the ability to upgrade to a voice evacuation system in the future. All other systems have not had any, or minor, updates since the 2017 inspection. The electrical systems were in relatively good shape. Most of the changes needed are either general maintenance, minor updates to comply with current codes, or possible energy saving enhancements such as LED lighting upgrades.

Power

The existing service is fed from a platform-mounted transformer which has (3) 4" non-metallic conduits exiting the transformer enclosure and then transfers to rigid steel conduit below the building. One of the non-metallic conduits is significantly damaged and needs to be replaced (Photo E1).

The service entrance equipment and distribution equipment is older style equipment, but replacement or new parts can be ordered. A panel disconnect is in the working clearance of the main switchgear.

In the boiler room an MCC is being used to house motor starters and controls for large mechanical equipment in the boiler room (Photo E2). The MCC is no longer manufactured, and replacement parts are difficult to obtain. As the existing equipment appears to be functioning no replacement is required but as mechanical equipment is replaced or upgraded, we recommend providing individual motor starters for each equipment.

The school has a standby system which is fed by a 515KW, 480V, 3-phase, 4-wire natural gas generator. The generator and associated equipment is kept in a walk-in arctic enclosure across the driveway from the West loading docks. The generator mounted breaker only has 30" of working clearance which does not meet NEC requirements. This standby system connected to an Automatic Transfer Switch (ATS) housed the main service switchgear (Photo E3). The enclosure has its own standalone clean agent fire suppression system. This standby system is similar to the system installed at Ipalook Elementary school.

Existing contactors are beyond their end of life and can be replaced for the approximately the same cost of rebuilding the existing equipment (Photo E4). The contactors are currently working and do not need to be replaced at this time.

Headbolt heaters are fed from an exterior mounted transformer. The secondary feed of the transformer connects to breaker boxes which are wiring to 3' SO cables with plugs on the ends (Photo E5). The breaker box housings are made of a plastic material which becomes brittle and breaks in the cold weather. The existing breaker boxes may be replaced with a new stainless steel box.

2024 Update

There are no changes to the report.

Photo E1–Service Transformer

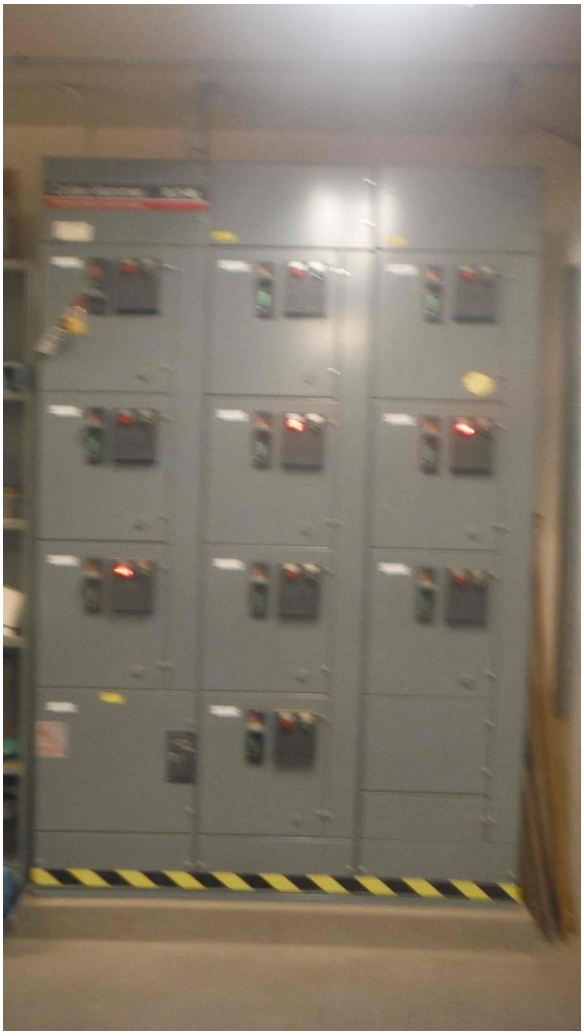

Photo E2– MCC

Photo E3– Main Switchgear and ATS

Photo E4– Headbolt Heater Contactors

Photo E5– Headbolt Heater and Transformer

Lighting

The facility lighting system consists mostly of linear T8 fluorescent fixtures. The gym lighting is high-bay Metal Halide fixtures with LED replacements. The upstairs maintenance access corridors had porcelain base bare lamps where most of the incandescent lamps have been replaced with compact fluorescent. All controls are manual except in common areas and exterior parking lot lighting, where outdated lighting contactors are used with timers or photocells. Controls are mostly manual except in common areas and exterior parking lot lighting, where outdated lighting contactors are used with timers or photocells (Photo E6).

The exterior lighting consists of newer LED pole-mounted area lights mounted on existing poles and HPS lights for building mounted lights.

The exit signs are LED type with internal battery back-up.

The existing emergency lighting system uses emergency lighting units and some inverters. The inverters (Photo E7) provide power for emergency egress lighting. The emergency lighting units are adjustable, dual head fixtures with battery back-up, and halogen or LED lamps. When tested the halogen lamps where inoperable while all LED lamps where functioning. We recommend replacing the halogen fixtures with LED so that adequate emergency egress lighting is available in the facility.

2024 Update

Area LED lights are rusting out and the underground branch circuits are starting to fail, see photo E7a.

Photo E6– Lighting Contactors

Photo E7– Emergency Lighting Inverters

Photo E7a-Area Light

Telecommunication System

The building has a dedicated room for the telecommunication system. The system consists of a fiber optic rack which provides connectivity between racks in the building and other NSB sites in Utqiagvik (Photo E8). The room also has a telecomm rack which is used for Voice Over Internet Protocol (VOIP) phone system and data (Photo E9). This system consists of CAT 5e cabling to data outlets for the Wireless system, administrative offices and classrooms. Based on conversations with IT personnel additional data drops would help in the classrooms considering the data needs of the students. They also explained that the VOIP system in place is not functional at this time. Although the current infrastructure appears to be close to capacity the existing racks have adequate capacity for expansion to allow for additional equipment. Some additional organization and labelling of the existing cabling would help with installation of any new systems.

Wireless Access Points (WAP) in classrooms have cabling taped to the ceiling. We recommend a surface raceway system as a more permanent wiring method and to help protect wiring.

The main Telephone Terminal Board is also in this dedicated room for the main telephone in the system. It also has some existing CAT 3 telephone systems which connect into the existing paging systems (Photo E10).

2024 Update

There are no changes to the report.

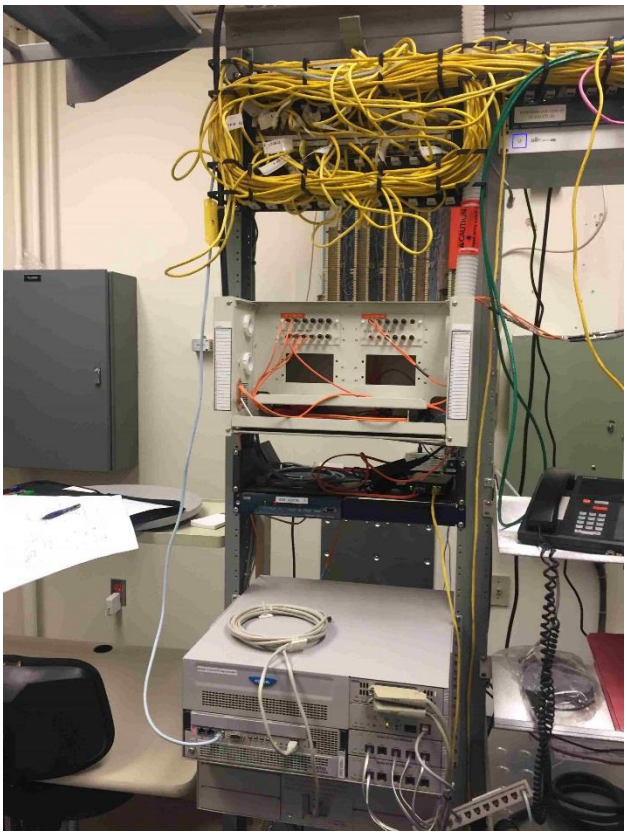

Photo E8– Fiber Optic Rack

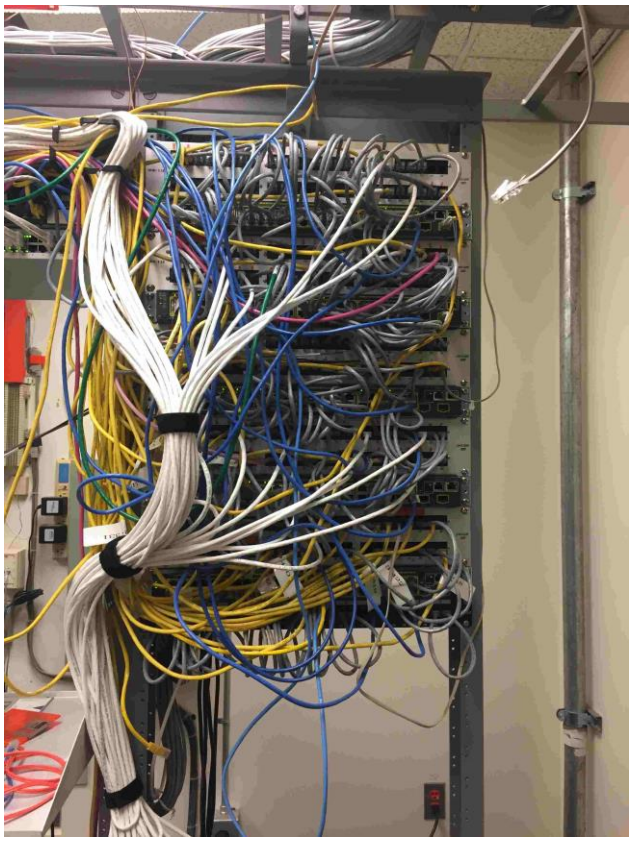

Photo E9– Data Rack

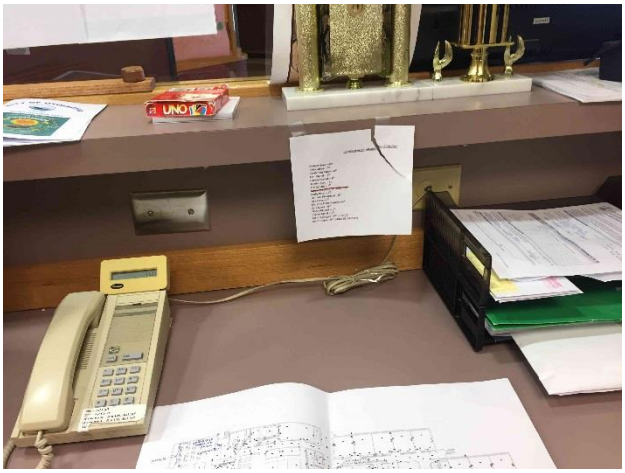

Photo E10– Existing CAT 3 Telephone

Fire Alarm System

The existing fire alarm system is a conventional class B system, Johnson Controls Metasys (Photo E11). In admin and support areas there are a few locations which do not have adequate occupant notification per the current code requirements. This system is old but still functioning and new parts are available through Johnson Controls. An upgrade of the system to an addressable system would improve system reliability and reduce maintenance requirements. With the building fully sprinklered, most of the smoke detectors may be removed when the system is upgraded to an addressable system.

2024 Update

AFS has upgraded the Metasys to a new Notifier control panel which is compatible with the existing smoke detectors while the annunciating system have all been replaced and upgraded. Additional devices and wiring will be required to update to a voice evacuation system, but the new FACP can support this upgrade.

Photo E11– Fire Alarm Control Panel

Intercom, Master Clock and Bell System

The intercom system head-end equipment is located behind the main desk. The equipment still functions as a PA system connected to the CAT 3 telephone systems and speaker systems for use as for paging and

announcements. The music play system is based on cassette tapes and would be cumbersome to integrate with newer music players. As the system is not used this way it may continue to function as possible.

The clock system was recently upgraded to a wireless clock system by Primex. There are battery-operated 12" round clocks throughout the facility. The clock system is tied into the intercom system for use with the bell systems.

2024 Update

There are no changes to the report.

CCTV System

The CCTV system is an analog system using coax cable. As it functions now there is no issues with the existing system. Upgrading to a newer IP system would mean increased resolution cameras and more flexibility for remote connectivity.

2024 Update

There are no changes to the report.

End of Eben Hopson Middle School Survey results

SECTION 3. DEFICIENCY CODES & FINDINGS

This section explains the codification system for categorizing facility deficiencies based upon field survey findings.

A. DEFICIENCY CODES

1 – Health/Life Safety: These deficiencies identify areas where the facility is not constructed or maintained in compliance with provisions of the state mandated life safety aspects of building codes including the codes adopted from the International Code Council (such as the International Building Code) or other standards organizations (such as the National Fire Prevention Association). Deficiencies could include inadequacies in fire barriers, smoke barriers, capacity and means of egress, door ratings, and fire protection equipment not covered in other deficiency codes.

2 – Operating Cost: These deficiencies address the efficiency of lighting, heating systems/fuel types and the thermal enclosures of buildings, processes, and are required for energy conservation and good energy management.

3 – Technical Upgrade: These are items that would upgrade obsolete equipment or systems to the current technology.

4 – Code Upgrade: These are deficiencies related to building code violations where there is no imminent threat to life safety.

5 – Protection of Structure: These are deficiencies that endanger the physical structure of the facility.

6 – Functional Upgrade: These are deficiencies in the plumbing, heating, ventilating, air conditioning, power, lighting, special systems, etc. requiring maintenance due to normal wear and tear that would result in system failure.

7 – Education Program Upgrade: These are items that would improve the ability of the educators to instruct the students.

The deficiencies are further categorized by design disciplines and priority as follows:

Code	Discipline
M	Mechanical
E	Electrical

Priority	Description
1	Highest priority – Life safety or imminent danger
2	Building Code Compliance Issues
3	Energy Efficiency Upgrades

See attached Deficiency Matrix for detailed information.

B. MASTER DEFICIENCY INDEX

Discipline/ Record #	Deficiency Code	Priority	Building	Deficiency Title	*2024 Update*
M1	6	2	Eben Hopson Middel School	Old boilers and non-recommended piping layout.	***The boilers are leaking and need to be repaired/replaced.***
M2	6	3	Eben Hopson Middel School	Lacking automatic flush valves and faucets	***No change noted.***
M3	6	3	Eben Hopson Middel School	Server room gets too hot	***No change noted.***
M4	2	2	Eben Hopson Middel School	Outdated pneumatic controls, many leaks causing compressor to run continuously	***Outdate and non-functional controls causing the school to overheat.***
M5	6	3	Eben Hopson Middel School	Freezers utilize Ozone depleting refrigerant.	***No change noted.***
M6	***3***	***2***	***Eben Hopson Middel School***	***Replace lift stations.***	***New item.***
M7	***6***	***3***	***Eben Hopson Middel School***	***Replace plumbing fixtures.***	***New item.***
M8	***3***	***3***	***Eben Hopson Middel School***	***Replace heating pumps.***	***New item.***
M9	***6***	***3***	***Eben Hopson Middel School***	***Replace entryway heating cabinet unit heaters.***	***New item.***
M10	***1***	***1***	***Eben Hopson Middel School***	***Repair AHU-5***	***New item.***

M11	***6***	***2***	***Eben Hopson Middel School***	***Replace Boiler Room Vent Fan***	***New item.***
M12	***1***	***2***	***Eben Hopson Middel School***	***Inadequate ventilation and cooling.***	***New item.***
M13	***1***	***1***	***Eben Hopson Middel School***	***Repair Fire Pump***	***New item.***
E1	4	2	Eben Hopson Middel School	Fire alarm system is conventional	***FACP upgraded to addressable and minimum upgrades for a voice evac system.***
E2	1	1	Eben Hopson Middel School	EM lighting is insufficient	***No change noted.***
E3	6	2	Eben Hopson Middel School	CAT 5 and 5e Cabling	***No change noted.***
E4	6	2	Eben Hopson Middel School	Theater sound system	***No change noted.***
E5	6	3	Eben Hopson Middel School	Electrical Distribution Gear	***No change noted.***
E6	6	3	Eben Hopson Middel School	Lighting Controls	***No change noted.***
E7	6	3	Eben Hopson Middel School	Intercom Headend	***No change noted.***
E8	2	3	Eben Hopson Middel School	Fixtures source update.	***No change noted.***
E9	6	3	Eben Hopson Middel School	Headbolt heater panel	***No change noted.***
E10	***6***	***3***	***Eben Hopson Middel School***	***Exterior light fixtures and circuits***	***New item.***