



NORTH SLOPE

BOROUGH SCHOOL DISTRICT

— *Striving For Excellence* —



NUIQSUT TRAPPER

SCHOOL

— *Striving For Excellence* —

**NUIQSUT
AREAWIDE 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 Nuiqsut. 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 and the NSBSD. The survey included a walk-through of each building to evaluate condition of the existing mechanical and electrical systems. 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
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B. BUILDING SUMMARY

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

Table 1: Buildings Surveyed

<u>Village</u> Nuiqsut	<u>Building Name</u> Trapper School
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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

TRAPPER 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 2nd and 3rd 2024 to review the current conditions of the building with the conditions of the building identified in the report from 2017.

The boilers are failing and need to be replaced ASAP. In 2022 the waste piping was demolition and replaced; the existing lift stations were reused. The lift stations are in fair condition. The condition of the waste piping is unknown due to restrictions on utilidor access but appears to be damaged. Water and waste are leaking into the vacuum sewer service barrel and is being vacuumed out via a pumper truck.

Plumbing

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

The condition of the waste piping is poor. There are five lift stations that provide coverage for the building. The lift stations vary in condition from not functional to fair condition. The copper waste piping is deteriorating and beginning to leak. A design to replace the forced waste system has been completed but replacement of the gravity fed piping was not included in the design and should also be replaced. No observed leaks or pipe deterioration on the potable water piping.

The condition of the domestic plumbing piping is fair. The plumbing fixtures vary in condition from fair to good. The piping under the lavatories does 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 two hot water generators that are in fair condition. They were installed in the year 2000. The hot water generators should be scheduled for replacement because they are approaching the end of their life expectancy.

The natural gas and fuel oil piping is original from the construction of the building and is in fair condition.

2024 Update

The lift station issue noted above have been partially resolved, all the lift stations were operational.

The sanitary sewer system was demolished and re-built in 2022 however its condition is unknown. The utilidor is compromised and some of the water and waste piping has suffered freeze damage. Currently the vacuum service barrel is being heated with a large portable diesel heater. The vacuum service barrel is also being pumped out via a pumper truck.

One of the hot water generators in the addition mechanical room 202 has been replaced.



Photo M1 – School Hot Water Generators



Photo M2 - Typical Condition of Restroom Sinks



Photo M3 – Service Barrel Heating



Photo M4 – Service Barrel Flooding

Heating

The heating system consists of two dual fuel cast iron sectional boilers that run primarily on natural gas. The boilers are rated at 2,452,000 BTU/hr gross output each. The boilers were installed in 1998. The boilers are in fair condition. The boilers are piped in a primary only system with three sets of system pumps. Each pump set has two pumps of equal capacity piped in parallel for redundancy. The building heating pumps are constant volume. The piping as configured does not ensure even flow to each boiler and it does not provide minimum return water protection or minimum flow to the boilers. The piping configuration can lead to condensation of flue gases due low temperature, overheating of glycol solution and uneven system heating as each boiler receives part of the flow regardless of boiler operation. The piping system should be replaced with a primary/secondary pumping system with variable flow secondary pumps. The primary/secondary pumping system would ensure adequate flow to each boiler, allow control system to flow water only through operating boiler and would provide energy savings with the variable speed secondary pumps. The variable speed secondary pumps would operate to match actual system demand, saving energy and improving overall system performance. Glycol was a coffee color and had 51% propylene mixture. The piping in the boiler room consists of steel and copper piping.

Terminal heating equipment in the building includes finned tube in the classrooms and offices, unit heaters in the storage and mechanical rooms and cabinet unit heaters in the entry areas. Several of the heaters have failed controls and cause over heating in the rooms. The teachers open the windows to cool the rooms. The finned tube enclosures and elements are in fair condition. The control valves, circuit setters and isolation valves should all be replaced when the control system is upgraded.

The natural gas and fuel oil piping is original from the construction of the building and is in fair condition.

2024 Update

The boilers are failing and need to be replaced ASAP. Boiler B-1 was running during our visit; however, both are leaking glycol and are on the verge of failure. The glycol is also in poor condition and needs to be replaced along with the boilers.

The waste heat system from the Power Plant is reportedly not working, which we assume is an issue at the power plant. Additionally, the waste heat system from the Power Plant has a direct connection to the boiler plant in lieu of a heat exchanger. Typically, we would use a heat exchanger to separate the school boiler system from the power plant to ensure that a failure in one location does not compromise the other system. The waste heat issue needs to be further researched.

Circulation pumps CP-13 through CP-16 have been replaced with Wilo pumps which are in good condition.

There is evidence of a substantial glycol leak in the fan room.



Photo M3 – Primary Heating Pumps



Photo M4 - Failed Finned Tube Valve



Photo M5 – Leaking Boilers

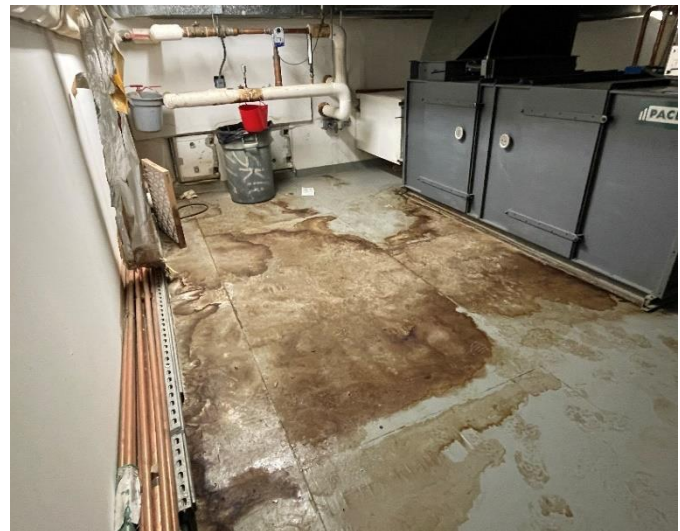


Photo M6 – Leak at Fan Room

Ventilation

Ventilation for the school is provided by twelve air handlers distributed throughout the building. The air handlers vary in age and condition from good to poor. AHU-1 through AHU-7 is in poor condition and need to be replaced. The other air handlers are in good shape and only need new controls. The air handlers have hydronic heating coils and mixing dampers for economizer cooling and ventilation. It is likely that the air handlers are not providing current ASHRAE ventilation requirements due to failed controls.

The school has a commercial grade kitchen with associated exhaust hoods and fire suppression. The kitchen equipment is in good condition.

The original pool heat recovery ventilation system has been replaced in the last few years, but the new system was partially disassembled and non-functional during the inspection.

2024 Update

The exhaust in Men's Locker 149A and Boys 132 is very noisy and needs further research. In general, the ventilation system in the original school is very old and needs to be remodeled.

The low grilles in the gym are damaged and need to be replaced with heavy duty grilles.



Photo M7 – Good Condition Air Handler



Photo M8 – Poor Condition AHU

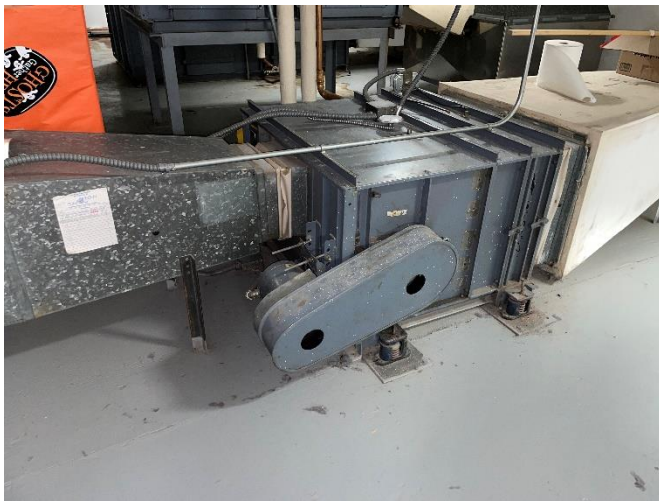


Photo M9 – Poor Condition AHU



Photo M10 – Grille in Gym

HVAC Controls System

The control system utilized throughout the original building is primarily the originally installed pneumatic system. The 1998 addition has an electric DDC that is outdated. Many if not most of the pneumatic controllers are non-functional. Both the original school and 1998 addition HVAC control system needs to be replaced with a modern BACnet based DDC system for proper temperature control and energy management.

2024 Update

The control system remains the same and has not been updated. This is a critical issue, replacing the control system should lead to substantial energy savings.



Photo M9 – Pneumatic Air Compressor



Photo M10 - Failed Finned Tube Valve



Photo M11 – Pneumatic Thermostat

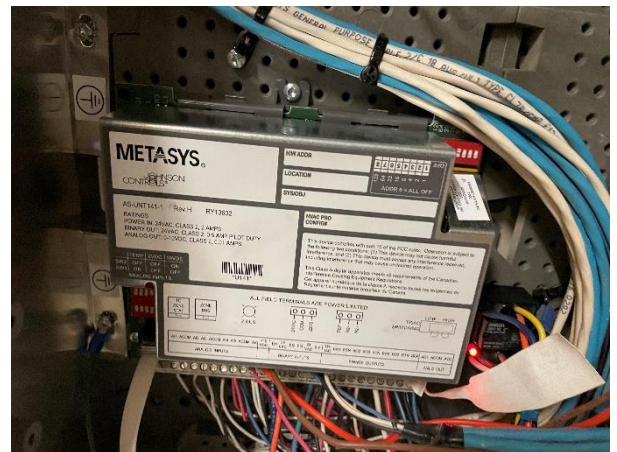


Photo M12 – Control Panel

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

There are no changes to the fire protection system.

Natatorium

The natatorium is out of service. The deck drains do not comply with code, the liner is at the end of its life expectancy, the chemical system and associated controls are not operable, and the mechanical code does not meet code required ventilation. The natatorium equipment, drains, chemical feed system and ventilation system need to be upgraded.

2024 Update

There are no changes to the Natatorium.



Photo M13 – Out of Commission Swimming Pool



Photo M14 – Pool Equipment Room

Electrical Systems

Overview

The school was visited on May 2nd and 3rd, 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. There have been minor changes to the power systems described below. All other systems are similar to the previous report. Overall, most of the electrical systems are in need of repair or replacement.

Power

The school electrical power service is supplied by the utility from three pole-mounted 50kVA transformers located on the Northwest side of the school (*Photo E1*). The service is fed overhead to an exterior CT enclosure, meter base, and 1,200A,208V,3-pole disconnect on the exterior wall of the school (*Photo E2*). The main feeder was then routed into the building to a 1,200A,208V,3-pole Automatic Transfer Switch in

the main electrical room. The transfer switch serves an adjacent 1,200A, 120/208V, 3 ϕ , 4W switchboard 'MDP' and is fed from a 175kW generator. The switchboard 'MDP' is a Square D QED Power Style switchboard. (*Photo E3*) The distribution section serves all the normal power panelboards located throughout the facility and has spare capacity for additional breakers.

Backup Power: The entire school is provided with standby power via a 175kW, 208V, 3ph, 4W diesel-fired engine generator set – Cummins #175DGFB (*Photo E4*). The generator is located in the same room as the MDP, has been installed sometime in the past 20 years, and is in reasonable shape.

2024 Update

There are no changes to the report.



Photo E1 – Utility Service Drop



Photo E2– Electrical Service Entrance



Photo E3 – Main Distribution Panel '2NMDP'



Photo E4– Generator

Wiring and Cabling Systems

The typical branch wiring system in the facility consists of ½" electrical metallic conduit with copper building wire and a separate insulated green equipment grounding conductor. A few circuits left from the original construction used the conduit as a ground. (Photo E5)

The wiring devices in the facility consist of ivory NEMA 5-20R receptacles and 20A,120V light switches with stainless steel wallplates. Many in high use areas are heavily worn and in need of replacement. (Photo E6)

Motor starters in the original part of the building are past their useful life. (Photo E7)

2024 Update

It is reported that any time there is a power outage they have a pump burn out. Recommend using a Surge Protective Device (SPD). There is an older SPD device on the MDP which needs maintaining and probably replacement of sacrificial parts. Alternately a new SPD device could be installed on the branch circuit panels or part of the motor starter when those are replaced.



Photo E5 – Typical Panelboards (1997 remodel)



Photo E6– Typical receptacle



Photo E7– Older Panel and Motor Starters



Photo E8– Typical Surface Raceway

Lighting

In general, the school is illuminated with T8 lamps and Compact Fluorescent Lamps (CFL's) fixtures inside the building and with High Pressure Sodium wallpacks and downlights outside the building. The interior fixtures are in varying degrees of condition. The fixtures that are installed in the later remodels are in fair to good shape. The fixtures from the original installation are in average to poor shape.

Most of the classrooms are illuminated with 3-lamp T8 recessed lights with inboard/outboard switching. (Photo E9)

The gymnasium is illuminated with enclosed 5-lamp T5HO fixtures that were installed in 2009. Lighting levels are good. (Photo E10)

The cafeteria is illuminated with recessed CFL cans and pendant MH luminaires. (Photo E11)

The exterior lighting includes HPS wallpacks around the building perimeter and HPS recessed can lights in the soffits. (*Photo E12*)

Most of the emergency lights tested are not operational. The exit signs are self-illuminating (nuclear) type and are either expired or approaching the expiration date.

Lighting Controls

The interior common area lighting is routed through the Johnson Controls Metasys system. Classroom lighting is typically controlled at the room entrance with two switches for inboard/outboard controls. There are a few motion sensors in storage rooms and other small areas.

The exterior lighting is also controlled by the Metasys system. However, it is not shutting off during the day.

2024 Update

No update to the report.



Photo E9– Typical Classroom Lights

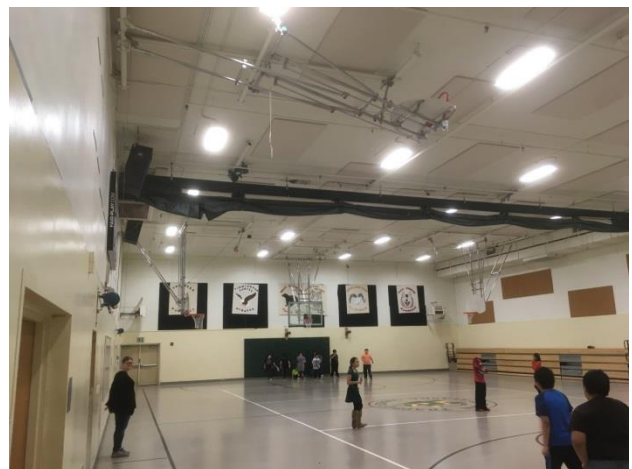


Photo E10– Gymnasium Lights



Photo E11– Cafeteria/MPR Lighting



Photo E12– Typical Exterior Lighting

Telecommunication Systems

The building is fed from the utility by an overhead drop from the Northwest side of the school to the main TTB. *(Photo E13)*

The main telephone service runs underneath the building to a Telephone Terminal Board located in the telecom/mech room 118. The telecommunications system cabling generally consists of Category 5 cabling run in conduit or surface raceways to surface or recess mounted computer jacks. There are two 7ft tall racks in Room 141 that contain telecommunication patch panels and network equipment for the entire facility. *(Photo 14)* There are also some newer PoE switches that serve Wireless Access Points with Category 6 cabling located throughout the school for a wireless network system.

There is a reasonable amount of hardwired network drops in the facility. A typical classroom has 3 outlets with (4) Cat 5 cables each (12 total cables) per classroom.

2024 Update

No update to the report.



Photo E13– Overhead Telecom Service Drop



Photo E14 – Main Telecom Rack

Fire Alarm System

The fire alarm system consists of a zoned Class ‘B’ fire alarm System. The Fire Alarm Control Panel ‘FACP’ is located in the principal’s office and is a Johnson Controls Metasys Fire Alarm control panel which was installed in 1997. *(Photo E18)* There is an annunciator map in the main vestibule and a remote digital annunciator in the Maintenance Office. *(Photo E19)* The fire alarm initiating devices include pull stations at the exits, smoke detectors throughout the building, heat detectors in the mechanical and kitchen areas, duct smoke detectors on the air handlers, kitchen hood suppression system, and sprinkler flow/tamper switches. The signaling devices consist of fire alarm horn/strobes in the corridors, classrooms, and public spaces as well as an alarm dialer. The system is past its useful life and was in alarm at the time of inspection. The maintenance staff reported difficulty finding parts.

2024 Update

Arctic Fire and Security has recently updated the FACP with a new Notifier system along with annunciation devices. Original smoke detectors remain which are compatible with the new system controller. The new FACP is ready to be upgraded to the new code required voice evacuation system.



Photo E18– Main FACP

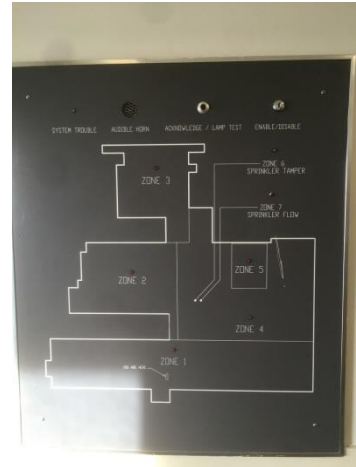


Photo E19 – Annunciator in Vestibule

Intercom, Master Clock and Bell System

The school has a rack-mounted intercom/bell system that is located in the principal’s office. It is a Rauland #MCX300 intercom system and is past its useful life. It was original to the building in 1978. (Photo E20)

The clock system was recently upgraded to a wireless clock system by Primex Wireless. There are battery-operated 12” round clocks throughout the facility. (Photos E21, E22)

2024 Update

The wireless clock system is no longer in use and has largely been abandoned in place.



Photo E20– Intercom Headend



Photo E21– Typical Clock/Speaker

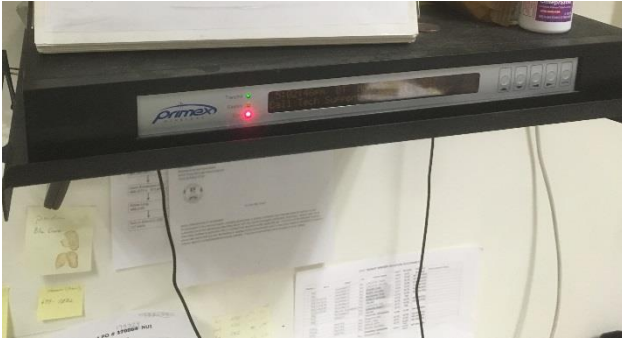


Photo 22– Wireless Clock Headend

Gymnasium Sound System

This system is also original to the building in 1978 and consists of the following headend equipment (Photos E23, E24):

- QSC #USA 850 Amplifier
- Rane #ME 15 Graphic Equalizer
- Shure #M68TCA Microphone input
- Biamp 8/300 Mix Pak Plus+ Powered Mixer
- Rauland #Spectrum-Master In-Wall Amplifier

All of the sound system components are discontinued with either no support or limited support from the manufacturers.

There are microphone inputs and two large JBL speakers in the Gymnasium.

2024 Update

No update to the report.



Photo E23– Gym Sound System Rack



Photo E24– Gym Sound System In-Wall Amp

Security Systems

There is a security camera system distributed throughout the school, however only 6 of the cameras were operational. The headend equipment is located in maintenance office and consists of a Lillin #PDR-6160A 16-channel DVR multiplexer. (Photo E25) The equipment is still serviceable, but the inoperable cameras need to be repaired/replaced. There is also a PC with monitor in the Maintenance3 Office corner that also appeared to be connected to the security camera system. (Photo E26).

2024 Update

No update to the report.



Photo E25– CCTV Camera Headend



Photo E26– Security System Computer

Classroom Multimedia Systems

The classroom multimedia systems typically only consist of a Smartboard. There are no teacher voice amplification systems in any of the classrooms.

2024 Update

No update to the report.

End of Trapper 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	Repair/remodel within 3 years
3	Repair/remodel within 3-10 years

See attached Deficiency Code Matrix for detailed information.

B. MASTER DEFICIENCY INDEX

<u>Discipline /Record #</u>	<u>Deficiency Code</u>	<u>Priority</u>	<u>Building</u>	<u>Deficiency Title</u>	<u>2024 Update</u>
M1	1	1	Trapper School	Corroding piping and failed lift stations	<i>Waste Piping has been replaced but is leaking in utilidor.</i>
M2	1	1	Trapper School	No exhaust, no intrinsically safe equipment	<i>No change noted.</i>
M3	2	2	Trapper School	Outdated pneumatic controls	<i>No change noted.</i>
M4	1	2	Trapper School	Old boilers and non-recommended piping layout.	<i>Boilers have failed and need to be replaced ASAP.</i>
M5	6	2	Trapper School	Fuel oil pumps failing	<i>No change noted.</i>
M6	4	3	Trapper School	Freezer condensers utilize obsolete refrigerant	<i>No change noted.</i>
M7	4	2	Trapper School	Dust Collector does not meet code	<i>No change noted.</i>
M8	6	2	Trapper School	Inefficient fixtures	<i>No change noted.</i>
M9	6	3	Trapper School	Pool unused, equipment failed.	<i>No change noted.</i>
M10	6	3	Trapper School	Insufficient combustion air	<i>No change noted.</i>
M11	6	3	Trapper School	Hot water generators will need replacing	<i>No change noted.</i>
M12	6	2	Trapper School	Air handler in poor shape	<i>No change noted.</i>
M13	6	2	5 Plex	Boilers are not piped in an efficient manner	<i>No change noted.</i>
M14	6	3	All Housing	Abandoned equipment	<i>No change noted.</i>
M15	6	3	Housing Bldg 1125	Lack of maintenance	<i>No change noted.</i>
M17	1	1	Trapper School	Domestic water leaking in utilidor.	<i>No change noted.</i>
M18	2	2	Trapper School	Waste heat HX not operational	<i>New Item</i>
M19	6	2	Trapper School	Replace RA Grilles in Gym	<i>New Item</i>
E1	1	1	Trapper School	Fire alarm system parts are obsolete	<i>New Item</i>
E2	6	2	Trapper School	Intercom headend system is obsolete	<i>FACP upgraded to addressable and minimum upgrades for a voice evac system.</i>

E3	6	3	Trapper School	Lighting control system near end of useful life	No change noted.
E4	6	2	Trapper School	Cat 5, Cat 5e cabling are nearly obsolete.	No change noted.
E5	2	3	Trapper School	Existing T8, CFL and HPS lighting not as energy efficient as new LED	No change noted.
E6	6	2	Trapper School	Security system not operable or in use.	No change noted.
E7	1	1	Trapper School	Most of the EM lighting was inoperable or expired.	No change noted.
E8	6	3	Trapper School	Electrical gear from original construction obsolete.	No change noted.
E9	6	2	Trapper School	Electrical wiring in pool room is corroded	No change noted.
E10	6	2	Trapper School	Gym sound system headend system is obsolete	No change noted.
E11	6	2	Trapper School	Motors are experiencing damage and issues related to power quality issues.	No change noted.
E12	7	2	Trapper School	Current clock system is no longer functioning.	New Item