ENERGY MANAGEMENT CONSULTANTS INC.

11/21/23

2024 Infrastructure and Energy Reduction Project

Prepared for:
School Administrative Unit (SAU) 19
11 School St
Goffstown, NH 03045

Prepared by:
Energy Management Consultants, Inc.
55 Industrial Way
Portland, ME 04021

EMC ENERGY MANAGEMENT CONSULTANTS INC.

About Us

February, 2022
The Lisbon School District selected EMC to complete a turn-key LED conversion for all of our facilities, inside and out. EMC didn't just replace old for new, they took the time to make sure each space had the right application. We would highly recommend EMC for your energy reduction needs.
-Richard Green, Ed.D
Superintendent of Schools

For nearly 30 years, Energy Management Consultants has been implementing successful energy reduction projects throughout New England. We are based out of Portland, ME and have EMC Project Managers, Engineering support and Developers that reside in MA, ME, NH and VT.

The EMC Objective…

The primary focus of our design-build turnkey upgrades is to allow our customers to continue to focus on their business at hand. Once we have completed our assessment and obtained approval for our lighting and Facility Improvement recommendations, we handle every aspect of the project:

- **Material Management:** ordering, receiving, storing, taking inventory & disposing of all Project related waste.
- **Incentives:** As a preferred contractor by the utility, EMC is uniquely involved in all aspects of maximizing your utility incentives. We will handle all aspects of ensuring you receive every incentive dollar available to you!
- **Project Management:** overseeing electrical subcontractors providing on time, on budget installation.
- **Project Timeline:** setting start and completion dates to meet customer's needs
- **Project Tracking:** scheduling reviews and reporting project progress on a weekly basis
- **Problem Solving:** addressing and resolving any issues that may arise in a timely manner
- **Follow Through:** completing final walkthroughs with utility personnel and client to ensure complete satisfaction of customer expectations

Energy Management Consultants, Inc.
55 Industrial Way
Portland, Me. 04103

Phone: 207-767-1313
Fax: 207-767-1513
E-Mail: www.emcinc-online.com

ENERGY MANAGEMENT CONSULTANTS INC.

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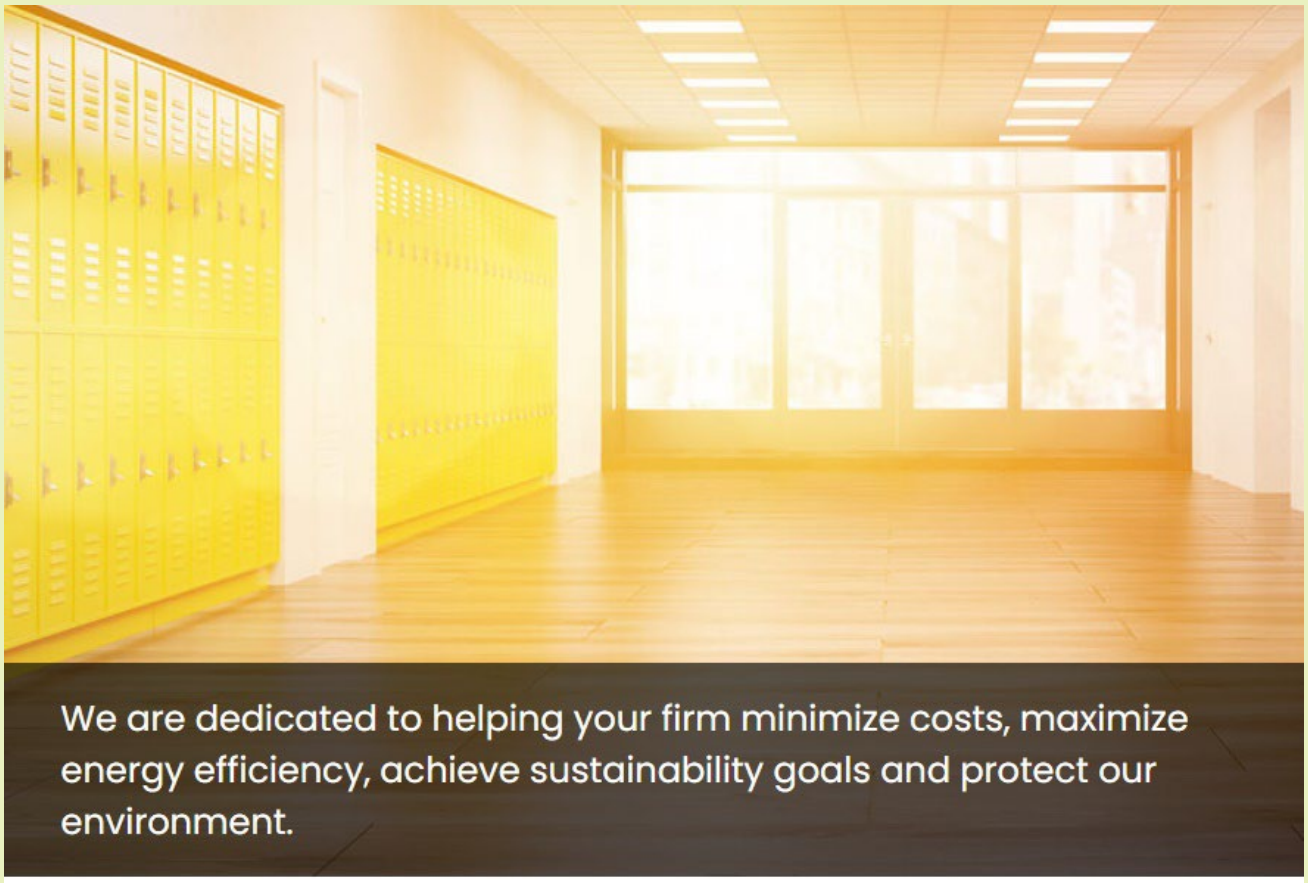
General Firm Information

- Corporate Office: Energy Management Consultants, Inc. (EMC)
  55 Industrial Way
  Portland, ME 04103
  207.767.1313 Office
  207.767.1513 Fax
  www.emcinc-online.com
  Structure: C-Corporation

- Primary Contact: Tom Seekins, Co-President/Partner
  207.553.0277 Mobile
  tseekins@emcinc-online.com



General History & Qualifications

EMC is a turnkey energy service company based out of Portland, Maine. EMC has completed projects throughout the Northeast Region and into other regions throughout the US. The founders of EMC came from both a lighting and engineering background proving to be a great approach for an energy service company. The corporation became established in 1993 and has since flourished in assisting our customers to achieve sustainability goals and reduce energy consumption in all commercial and industrial markets. Throughout the years, EMC's primary focus has been lighting upgrade however, we have expanded our services to include other aspects of energy conservation such as utilizing advanced networked lighting controls, Building Automation systems, improving HVAC efficiencies, motors and drives replacements, compressed air flow improvements and cooling systems upgrades. Our services now include additional electrification measures such as electric vehicle (EV) charging stations as well.
EMC is a team of (15) dedicated personnel including Project Developers, Project Engineers, Project Managers and Operational Support. Below is a list of employees and their roles. In lieu of each individuals' primary roles, all team members are cross trained and able to handle tasks of others when necessary.

Tom Seekins	Co-President/Partner
Kayla Kunath	Co-President/Partner
Kirsten Norton	Project Coordinator
Erik Rodstrom, PE	Senior Energy Engineer/Professional Engineer
Eric Hanian	Project Developer
Jeff Hanson	Project Developer
Eric McCue	Project Developer/Project Manager
Carl Edin	Project Developer/Master Electrician
Joe Griffin	Project Developer/ HVAC Specialist
Gabe Doiron	Project Manager
Steve Howland	Project Manager
Brett Charleston	Project Manager/Master Electrician
Dan Labrie	Project Manager
Adam Polansky	Technology Manager/Mechanical Engineer
Janet Thomas	Project Support Administrator
James Bailey	Project Manager

EMC's personnel hold Certified Energy Manager (CEM), Certified Measurement and Verification Professional (CMVP), Tridium Niagara N4, and Lighting Certified (LC) certificates. In addition, Registered Professional Engineer for the State of Maine, Master Electricians License under the State of Maine, New Hampshire and Massachusetts, Master Oil, Gas, and Universal Refrigeration Licenses under the State of Maine and New Hampshire.

Existing Equipment Inventory

Building	Equipment Item	Make/Model	Qty	Age (years)	Service Life* (years)
Bartlett Elementary					
	Boiler	Weil McLain 78	2	18	35
	Domestic Hot Water Tank				25
	Domestic Recirc Pump	Taco 009	1		10
	HW Loop Pump	Various	7	Various	20
	Glycol Recirc Pump	Taco ZXM101050A	2		10
	Air Handler Unit AHU-1	York AVY24B3XH21A	1	16	20
	Energy Recovery Ventilator ERV-3	Greenheck ERH-45H		15	20
	Exhaust Fan	Various	4	Various	20
	Building Automation	Honeywell XL500	4	~20	16
Goffstown High School					
	Boiler	Buderus G515/12	4	16	35
	Boiler Primary Pump	Grundfoss Model B 96439643	7	9	10
	HW Loop Pump	Bell & Gossett	2		20
	Domestic Hot Water Tank	State Industries EN6-55-DORT 100	1	6	25
	Domestic Hot Water Tank	State Industries PCE-40-2OLSA 110	1	6	25
	Domestic Hot Water Tank	State Industries EN6-40-DORS 110	1	1	25
	Domestic Recirc Pump	Grundfoss	1		10
	Heating Ventilator (HV)	McQuay RDS800CYY	15	21	20
	Air Conditioner (AC)	AAON RK-10-3-F0-000	6	21	20
	Air Conditioner (AC)	AAON RK-8-3-FQ-000	1	21	20
	Air Conditioner (AC)	York	1	18	20
	Unit Ventilator	AAF U.AVS.5.S15		20	20
	Exhaust Fan	Various		Various	20
	Building Automation	Honeywell Comfort Point	50	~20	16
Glen Lake School					
	Boiler	Weil McLain 680	1	17	35
	Boiler	Laars	1	2	25
	HW Loop Pump	Armstrong	2	17	20
	Domestic HW Heater	Bradford White GS6-75-CRRS 401	1	3	15
	Unit Ventilator	Trane BCHC836A1A0A1B01FO	1	17	20
	Building Automation	Honeywell Comfort Point	23	~10	16
Maple Ave Elementary					
	Boiler	MACH C-3000P	1	8	25
	Boiler	Weil McLain BL-1288-WS	1	25	35
	HW Loop Pump	Taco	2		20
	Domestic HW Heater		1		15
	Unit Ventilator (UV)		12	33	20
	Heating Ventilator HV-1	McQuay RDS802BY	1	33	20
	Building Automation	Honeywell XL500	4	~20	16
Mountain View Middle					
	Boiler	Weil McLain 1488	2	10	35
	HW Loop Pump	Taco BB3008	2	33	20
	Domestic HW Heater	Rinnai C199I	2	7	15
	Domestic HW Tank	Vaughn S120	2	10	25
	Roof Top Unit RTU-1	McQuay	1	24	20
	Roof Top Unit RTU-2	McQuay	1	24	20
	Heating Ventilator HV-1		1	33	20
	Heating Ventilator HV-2		1	33	20
	Heating Ventilator HV-3		1	33	20
	Fan Coil FC-1		1	33	20
	Unit Ventilator	American Air Filter AGBDAEAAA	53	33	20
	Exhaust Fan		18		20
	Building Automation	Honeywell Comfort Point	79	~10	16

Building	Equipment Item	Make/Model	Qty	Age (years)	Service Life* (years)
SAU Office					
	Boiler	Buderus G215/7	1	6	35
	Hot Water Zone Pump	Grundfos UPS-15-58-FRC	11	6	10
	IF Water Heater	HTP SSU-45	1	9	
	IF Water Heater	HTP SSU-119	1	6	
	Building Automation	Honeywell THM5320R	8	~10	16

**Service life based on ASHRAE Service Life Estimates table below. Highlighted color is a result of the ASHRAE service life estimate and building occupant and service staff feedback.*

ASHRAE Service Life Estimates

(years represent the median service life estimate)

Equipment Item	Years	Equipment Item	Years	Equipment Item	Years
Air Conditioners		**Air Terminals**		**Condensers**	
Window unit	10	Diffusers, grills, and registers	27	Air-cooled	20
Residential single or split package	15	Induction and fan-coil units	20	Evaporative	20
Commercial through-the-wall	15	VAV and double-duct boxes	20	**Insulation**	
Water-cooled package	15	**Air Washers**	17	Molded	20
Heat Pumps		**Ductwork**	30	Blanket	24
Residential air-to-air	15	**Dampers**	20	**Pumps**	
Commercial air-to-air	15	**Fans**		Base-mounted	20
Commercial water-to-air	19	Centrifugal	25	Pipe-mounted	10
Roof-top air conditioners		Axial	20	Sump and well	10
Single-zone	15	Propeller	15	Condensate	15
Multizone	15	Ventilating roof-mounted	20	**Reciprocating engines**	20
Boilers, Hot-Water (Steam)		**Coils**		**Steam turbines**	30
Steel water-tube	24	DX, water, or steam	20	**Electric motors**	18
Steel fire-tube	25	Electric	15	**Motor Starters**	17
Cast iron	35	**Heat Exchangers**		**Electric transformers**	30
Electric	15	Shell-and-tube	24	**Controls**	
Burners	21	**Reciprocating Compressors**	20	Pneumatic	20
Furnaces		**Packaged Chillers**		Electric	16
Gas- or oil-fired	18	Reciprocating	20	Electronic	15
Unit heaters		Centrifugal	23	**Valve actuators**	
Gas or electric	13	Absorption	23	Hydraulic	15
Hot-water or steam	20	**Cooling Towers**		Pneumatic	20
Radiant heaters		Galvanized metal	20	Self-contained	10
Electric	10	Wood	20		
Hot-water or steam	25	Ceramic	34		

Data in this table is based on data from the ASHRAE Handbook – HVAC Applications 2019, Section 38.3, Table 4 - Comparison of Service Life Estimates. https://ashrae.org/

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Capital Planning Matrix

MEASURE	TITLE	BARTLETT	GHS	GLEN LAKE	MAPLE AVE	MVMS	SAU OFFICE
1.0	**Equipment Replacement**						
1.1	Heating Plant Improvements	✓	✓	✓	✓	✓	✓
1.2	Domestic Hot Water Upgrade	✓					✓
1.3	ERV Wheel Replacement	✓					
1.4	Add VFD to Motors	✓		✓			
1.5	Air Handler Replacement		✓		✓	✓	
1.6	Terminal Equipment				✓	✓	
2.0	**Indoor Air Quality**						
2.1	Add Building Ventilation	✓					✓
3.0	**Building Automation**						
3.1	Building Automation Upgrade	✓	✓	✓	✓	✓	✓
3.2	District Wide Building Automation Integration	✓	✓	✓	✓	✓	✓
3.3	Access Control Upgrades	✓	✓	✓	✓	✓	✓
3.4	Security Camera Upgrades	✓	✓	✓	✓	✓	✓
4.0	**Building Envelope**						
4.1	Basement Insulation and Air Sealing						✓
4.2	Attic Insulation and Air Sealing						✓
4.3	Miscellaneous Exterior Weatherization	✓				✓	✓
4.4	Window Replacement	✓	✓		✓	✓	
4.5	Door Improvements	✓	✓		✓	✓	
4.6	Replace Roofing	✓	✓	✓	✓	✓	
5.0	**Sustainability**						
5.1	VRF Heat Pumps						✓
5.2	Roof Mounted Solar Array	✓	✓	✓	✓	✓	✓
5.3	EV Charging Stations	✓	✓	✓	✓	✓	✓
6.0	**ADA Compliance**						
6.1	Bathroom Renovation	✓	✓		✓	✓	
6.2	Elevator Replacement		✓				
7.0	**Life Safety**						
7.1	Fire Suppression Improvements					✓	
7.2	Fire Alarm Upgrades					✓	
8.0	**Facility Infrastructure**						
8.1	Replace Existing Lights with LED	✓	✓	✓	✓	✓	✓
8.2	Electrical Panel Replacement		✓				
8.3	Building Transformer Replacement		✓			✓	

8.4	Building Generator		✓			✓	
8.5	Septic System Repairs					✓	
8.6	Flooring Improvements		✓			✓	
8.7	Ceiling Tile Replacement		✓		✓		
8.8	Concrete Repairs		✓				
9.0	**Miscellaneous**						
9.1	Asphalt Paving	✓	✓	✓		✓	
9.2	Hazardous Material Remediation		✓		✓		✓
9.3	LED Message Board			✓	✓	✓	
9.4	Furniture Replacement		✓				
9.5	Sound System		✓				
9.6	Space Repurposing		✓				
9.7	Theater Storage Expansion		✓				
9.8	Theater Lighting Upgrades		✓				

✓ High Priority (0-2 years) ✓ Priority (2-4 years) ✓ Recommended (4+ years)

Capital Planning Details

1.0 Equipment Replacement

1.1 Heating Plant Improvements

Upgrading from older low-efficiency boilers to high-efficiency ones offers several compelling benefits. Older boilers tend to be less reliable due to their age and wear and tear, leading to frequent breakdowns and costly repairs. In contrast, high-efficiency boilers are built with modern technology, offering enhanced reliability and reduced maintenance expenses, thereby ensuring uninterrupted heating. Redundancy is critical. Older boiler systems often lack backup systems, leaving the building vulnerable to heating failures during the cold months. Replacement boilers would come equipped with redundancy features and backup systems, providing peace of mind in case of a primary system failure. Additionally, the transition to high-efficiency boilers can result in substantial utility savings. Modern boilers operate with significantly higher efficiency, meaning they convert more of the energy input into usable heat, reducing energy bills and lowering your carbon footprint. Finally, high-efficiency boilers often qualify for various energy efficiency incentives and rebates, further improving their cost-effectiveness while promoting environmental sustainability.

Glen Lake School Aging Boiler

Bartlett Elementary ☑ High Priority (0-2 Years)

(2) cast iron Weil McLain natural gas boilers are operating at an average of 83% efficiency. Boilers would be replaced with (2) natural gas high-efficiency condensing boilers. The new system would include outside air temperature reset, automatic lead/lad operation, and building automation integration capabilities. The numerous single speed zone pumps serving different circuits of the hot water system would be combined into a variable speed duplex pump arrangement with automatic lead/lag changeover for complete redundancy. Scope would also include cleaning and sealing the boiler room floor to create a cleaner working environment.

Bartlett Elementary School Boilers

Glen Lake School ☑ Priority (2-4 Years)

One of the boilers was recently replaced. An aging boiler still remains which should be slated for replacement. This boiler still has some years of life left but a replacement based on efficiency gains of a condensing gas boiler should be

considered. This would save energy costs while operating this boiler. A new modulating boiler would also provide more consistent temperatures for the hot water loop providing smoother operation of the system. Scope would also include cleaning and sealing the boiler room floor to create a cleaner working environment.

Goffstown High School ☑ High Priority (0-2 Years)

The High School is currently heated with four Buderus dual-fuel capable boilers which can operate on either oil or propane. The boilers are low efficiency compared to the technology available in high efficiency condensing boilers and for this reason it is recommended that they are replaced. It has been noted that the 2" propane supply line frosts up during the winter and causes the boilers to trip often. The propane supply piping and tanks will be studied during the development of this measure to ensure the propane supply piping is properly sized so that this does not happen. Another reason to replace these boilers is to remove the underground oil tank which has proven very difficult to get inspections completed for. With the new propane boilers, the oil tank could be removed.

Goffstown High School Boiler System

Maple Avenue Elementary ☑ High Priority (0-2 Years)

One of the existing boilers has been replaced. The remaining boiler has been tagged out of service and the requirement for the fire department to be notified before attempting to use the boiler. This leaves the school without heating redundancy while solely relying on a single boiler. The older boiler has reached its life expectancy and should be replaced. By replacing it with a high efficiency modulating boiler, efficiency gains would be realized which would lower the school's energy costs associated with the heating system. A new modulating boiler would also provide more consistent temperatures for the hot water loop providing smoother operation of the system. Scope would also include cleaning and sealing the boiler room floor to create a cleaner working environment.

Maple Avenue Elementary Aging Boiler

Mountain View Middle School ☑ High Priority (0-2 Years)

The two boilers at the Mountain View Middle school are cast iron Weil McLain boilers. These boilers are in average condition and appear to have no operational issues. The efficiency of these boilers is much lower than modern high-efficiency condensing boilers and should be considered for replacing for this reason. Energy

savings associated with highly efficient boilers for this school should result in good savings based on current consumption. New variable frequency pumps would be part of this scope which would further reduce the energy required to operate this heating plant.

Mountain View Middle School Boiler

SAU Office Priority (2-4 Years)

A single cast iron Buderus oil boiler serves the building. This boiler is operating at an average of 86% efficiency and provides no redundancy in the event of a failure. The boiler would be replaced with (2) propane high-efficiency condensing boilers. Existing hot water circulation pumps would remain. Scope would include completing the piping that was started for the second indirect domestic hot water tank. Scope would also include cleaning and sealing the boiler room floor to create a cleaner working environment.

SAU Office Boiler

1.2 Domestic Hot Water Improvements

Improving domestic hot water generation offers several significant benefits. Added reliability ensures uninterrupted access to hot water, particularly important in schools and kitchens. Upgrading hot water generation systems often leads to increased energy efficiency, translating into utility savings cutting down on monthly heating bills. These upgrades can enhance user comfort through better temperature control and consistent hot water supply.

Bartlett Elementary High Priority (0-2 Years)

The domestic hot water in this school is served by an electric hot water heater during the summer months when the boilers are off and a tankless coil in the boilers during the months when the boilers are operational. A natural gas high-efficient condensing direct-fired water heater would replace the two existing means of hot water generation which will operate with a much greater overall efficiency than the existing system year-round.

SAU Office Priority (2-4 Years)

The SAU Office has an existing indirect fired domestic hot water heater that is heated by operating the oil-fired boiler. There is also another larger hot water tank in place next to the boiler which has not been piped in completely or properly. This larger tank installation should be re-piped to properly supply the building with hot water. The larger tank likely supplies adequate domestic hot water for the building so that the smaller tank could be removed.

1.3 ERV Wheel Replacement

The energy wheel in an Energy Recovery Ventilator (ERV) is a critical component in a building's HVAC system designed to improve energy efficiency. It functions by transferring heat and moisture between the ventilation stream and exhaust stream, allowing for the recovery of conditioned air which reduces the load on heating and cooling systems saving energy and utility costs.

Bartlett Elementary ☑ High Priority (0-2 Years)

The wheel for ERV-1 was found to be in very poor condition and should be replaced. Inspections found that the wheel was very dirty which will cause a high pressure drop across the wheel and drastically reduces the ventilation airflow for the cafeteria/gym space. The wheel was also found to be delaminating along the edges of the wheel. If this deconstruction continues, pieces of the wheel could be pulled into the fan causing a fan failure. These conditions also reduce the energy recovery efficiency of the unit which results in higher utility costs than normal.

Bartlett Elementary School ERV-1 Energy Wheel

1.4 Add VFDs to Motors

Adding Variable Frequency Drives (VFDs) to a motor provides several key benefits. VFDs reduce wear and tear on the motor by allowing for gradual startup and stopping, minimizing mechanical stress and extending the motor's lifespan. They offer modulating control, enabling precise adjustment of motor speed to match the required load, which enhances system performance and efficiency. VFDs significantly improve energy efficiency by varying the motor's speed according to demand. By reducing the motor's speed when full power is not required, VFDs can result in substantial energy savings.

Bartlett Elementary ☑ Priority (2-4 Years)

The supply and exhaust fan motors serving ERV-1 are single speed and are controlled off of an associated contactor. When the unit is enabled to run, the fans slam on causing the duct work to bow in and out which creates excessive noise and wear and tear on the motors and belts driving the fans. By adding VFDs, the fans would be able to soft-start, alleviating all the previous symptoms. The VFD speeds can also be changed in response to CO2 which would allow a lower volume of ventilation air introduced to the space when there are a low level of occupants which would save in energy costs associated with conditioning the ventilation air and the lower amperage the fans would be operating at.

Glen Lake School Hot Water Pumps

Glen Lake School ☑ High Priority (0-2 Years)

The existing main hot water loop pumps at Glen Lake School do not have VFDs powering them. The pump

motors are rated to handle VFDs and it is recommended that VFDs are installed. This will provide the system with soft-start capabilities and the ability to reduce speeds during warmer months when full flow is not required. Reducing the pump speed will reduce the electrical consumption associated with these large pumps.

1.5 Air Handler Replacement

Air handlers are located in either a mechanical room, down on the ground or mounted on the roof of a facility. While there are many different types of air handlers, their general purpose is the same. An air handler uses fans to distribute air through a building to different zones and terminal equipment. This air is conditioned with heating (and sometimes cooling) to satisfy the temperature requirements of the spaces. The air handlers are also tasked with introducing ventilation air into the building while exhausting a proportional amount of air outside. Modern air handlers utilize energy recovery systems to recover the energy from the conditioned exhaust air to preheat (or precool) the incoming ventilation air which helps save energy. The use of VFDs and CO2 sensors also allow the ventilation air to be modulated in response to the indoor air quality so that the building isn't excessively ventilated when the occupancy load does not require it.

Goffstown High School ☑ High Priority (0-2 Years)

The air handling units at the High School are past their useful life and are showing signs of deterioration. These units provide heating, cooling and ventilation throughout the building and should be replaced proactively to ensure a quality indoor environment for the students and faculty. Much of the roof mounted equipment has insulation that has degraded to the point that it is hanging off the ductwork and laying on the roof. This increases the energy load of the unit since some of the energy is being transferred to the ambient air where there is the lack of insulation. The insulation would be replaced as part of the equipment replacement to restore the required insulation value of the duct. Overall, new equipment serving ventilation to the building would incorporate energy recovery, optimal start scheduling, demand control ventilation and variable frequency drives on the fans to optimize the energy expended with this equipment.

Goffstown High School Air Handling Unit Past Its Useful Life

Maple Avenue Elementary High Priority (0-2 Years)

The heating ventilator unit located on the roof has passed its useful life and is in very poor condition. The controls associated with this unit are pneumatic which are also in poor condition and are likely not controlling temperatures accurately. This old control system is also not capable of modern high-efficiency sequence of operations such as demand control ventilation based off CO2 in the building. By replacing this equipment with an energy recovery ventilator, VFDs and new controls, a great amount of energy can be saved while also improving the temperature control of the building. Overall, new equipment serving ventilation to the building would incorporate energy recovery, optimal start scheduling, demand control ventilation and variable frequency drives on the fans to optimize the energy expended with this equipment.

Maple Avenue Elementary Air Handler with Pneumatic Actuator

Mountain View Middle School High Priority (0-2 Years)

The air handling equipment at the Middle School is comprised of (2) roof top units (RTU) and (3) heating ventilators (HV). The RTUs serve the office spaces with heating, cooling, and ventilation air while the HV units serve heating and ventilation to general spaces and interior rooms that are not served directly by the classroom unit ventilators. All of these air handlers have hit their life expectancy and should be replaced before an equipment failure occurs. In general, new equipment serving ventilation to the building would incorporate energy recovery, optimal start scheduling, demand control ventilation and variable frequency drives on the fans to optimize the energy expended with this equipment.

Mountain View Middle School Roof Top Unit in Poor Condition

1.6 Terminal Equipment

The replacement of outdated classroom terminal HVAC equipment with modern alternatives presents a host of advantages for educational environments. Modern systems feature improved energy efficiency, leading to substantial cost savings on utility bills. Advanced technology in modern HVAC units allows for more precise temperature control and air distribution, ensuring a consistently comfortable learning atmosphere for students and teachers. Furthermore, these upgraded systems often come equipped with sophisticated air purification and filtration features, promoting superior indoor air quality, and mitigating potential health concerns. The integration of smart controls and sensors not only enhances operational efficiency but also enables proactive monitoring and maintenance, reducing downtime and overall maintenance costs.

Maple Avenue Elementary ☑ High Priority (0-2 Years)

The classroom unit ventilators in Maple Avenue Elementary are past their useful life and should be replaced with a modern model of the same footprint. These units serve the classroom with heating and ventilation. Modern units couple with a new control system have energy reducing features such as variable speed fan motors, demand control ventilation based off CO2, and optimal start scheduling which all reduce energy consumption and provide a better classroom environment than the equipment currently in use.

Mountain View Middle School ☑ High Priority (0-2 Years)

The classroom unit ventilators in the Mountain View Middle School are past their useful life and should be replaced with a modern model of the same footprint. These units serve the classroom with heating and ventilation. Modern units couple with a new control system have energy reducing features such as variable speed fan motors, demand control ventilation based off CO2, and optimal start scheduling which all reduce energy consumption and provide a better classroom environment than the equipment currently in use.

Mountain View Middle School Classroom Unit Ventilators

2.0 Indoor Air Quality

2.1 Add Building Ventilation

Good indoor air quality in a school environment adds many benefits for the students and faculty. When coupled with a high-efficiency energy recovery ventilation system the costs associated with operating ventilation equipment is greatly reduced. Such a system not only ensures the continuous circulation of fresh, clean air but also effectively removes pollutants, allergens, and other airborne contaminants. This combination not only supports the health and well-being of students and staff but also fosters an optimal learning environment by reducing CO2 levels promoting better concentration and ultimately enhancing the overall educational experience. Conditioning outside air to ventilate a building has an inherent cost associated with it An energy recovery system uses the air that is exhausted from the building to precondition the ventilation air being introduced into the building. This modern type of system greatly reduces energy consumption compared to a system with no energy recovery. Finally, demand control ventilation based on CO2 levels can limit the amount of outside air that is consumed to limit the amount of air that requires conditioning. This added control sequence further reduces the energy requirements of the ventilation system by reducing the associated costs with conditioning the air and the lower fan speeds.

Bartlett Elementary High Priority (0-2 Years)

Besides the cafeteria/gym space, the school does not have a ventilation system that meets the modern standards for fresh air. The existing system consists of a general building exhaust system with exhaust louvers in the classrooms. With this system, the exhaust fans draw air out of the building drawing fresh air into the building. While this does provide fresh air into the building, it does so by exhausting air without energy recovery which is inefficient. This configuration also keeps the entire building in a negative which then draws unconditioned air through the building envelope and a blast of air anytime someone opens an exterior door. During the cold winter period this can create cold drafts throughout the building. It does also not guarantee that the ventilation is being properly distributed throughout the building. A roof mounted dedicated outdoor air system (DOAS) can be installed to provide conditioned ventilation air to all of the classrooms through a new ductwork system. Demand control ventilation will monitor CO2 levels to reduce the fan speeds and required ventilation air when increased ventilation is not required.

SAU Office Priority (2-4 Years)

The SAU office does not currently have any source of fresh air ventilation. Although there are operable windows for ventilation during the warm weather months, this method is not an option during the winter. A dedicated outdoor air system could be installed in the attic space which could provide the minimum outside air required for all occupied spaces. CO2-based demand control ventilation could be installed in higher capacity rooms such as the conference room so that more outside air would be provided on high CO2 levels. Proper ventilation would provide a much higher quality workspace for the occupants while meeting standard ventilation requirements.

3.0 Building Automation

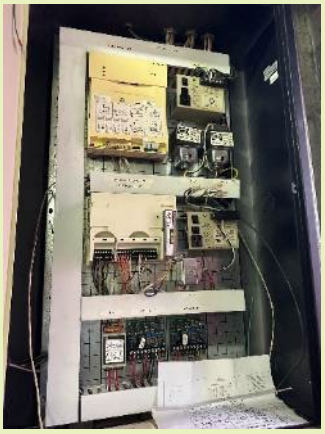
3.1 Building Automation Upgrade

Adding building automation to a building without an existing system or upgrading an existing system to a modern building automation system has many benefits. These systems can significantly enhance energy efficiency by intelligently regulating heating, cooling, and ventilation, resulting in substantial cost savings for the school district. Improved automation allows for better control over indoor climate conditions, ensuring a comfortable and conducive learning environment for students and staff throughout the year. Building automation systems provide real-time data and diagnostics, enabling proactive maintenance and reducing downtime. This can extend the lifespan of school facilities and reduce repair costs and emergent conditions which may shut down a school. Features such as long-term data archiving, email/text alarming, remote access can add a lot of value on the maintenance side of things keeping the school's HVAC system running smoothly. A building automation system can also integrate with a building's lighting system, access controls and IP cameras to create a "single pane of glass" that a user can use to access any system that their username allows them to on one single platform. A big part in specifying a building automation system is the ability to have an open system that allows the Client to have numerous options when requiring service and support. The Niagara platform made by

Tridium is the industry leader in open systems and has been adopted by most of the relevant players in the building automation markets. This is the platform that would be specified as part of this project. As part of the building automation upgrades performed, the latest energy saving control logic and strategies would be implemented so that each piece of equipment functions with optimal energy consumption. It can also be expected that the environmental conditions of the building are more consistent with a more capable control system ensuring an ideal learning environment.

Bartlett Elementary ☑ High Priority (0-2 Years)

Bartlett Elementary School has a very old Honeywell building automation system that has long surpassed its useful life. The existing system is likely hard if not impossible to get replacement parts for. The proprietary nature of this control system leaves little options for the district to source competitive pricing if they needed to source a replacement controller. Although direct digital controls (DDC) serve the major equipment within the building, much of the building is still served by an ancient pneumatic controls system. Pneumatic systems are inherently standalone systems which offer zero insight into how the system is operating and if any problems are present. Also, a pneumatic system requires an air compressor which results in costly operation and maintenance. It is recommended that the existing Honeywell CBUS controllers and all pneumatic devices be removed, and a new BACnet DDC controls system be installed to fully automate the building. This would create an open architecture and remove all proprietary controllers from the building. The Niagara existing JACE 8000 controller should be upgraded to the latest version of software and firmware.



Bartlett Elementary School Boiler Room Controller

Goffstown High School ☑ High Priority (0-2 Years)

The existing control system in the High School is a Honeywell Comfort Point system. This system is proprietary and greatly limits the district's ability to have it serviced from multiple vendors. There are about 50 controllers on site communicating on the LON protocol. LON is considered a legacy communications protocol which has been surpassed by ASHRAE's BACnet protocol which is used by every control manufacturer at this point. It is recommended that the existing controllers be replaced with BACnet controllers with a new BACnet communications bus extended throughout the school. This would create an open architecture and remove all proprietary controllers from the building. The existing Niagara JACE 600 controller should be replaced with the latest model JACE 8000 (soon to

Goffstown High School Controllers

be 9000) with the latest version of software and firmware installed.

Glen Lake School ☑ High Priority (0-2 Years)

The existing control system in Glen Lake School is a Honeywell Comfort Point system. This system is proprietary and greatly limits the district's ability to have it serviced from multiple vendors. There are about 23 controllers on site communicating on the LON protocol. LON is considered a legacy communications protocol which has been surpassed by ASHRAE's BACnet protocol which is used by every control manufacturer at this point. It is recommended that the existing controllers be replaced with BACnet controllers with a new BACnet communications bus extended throughout the school. This would create an open architecture and remove all proprietary controllers from the building. The existing Niagara JACE 600 controller should be replaced with the latest model JACE 8000 (soon to be 9000) with the latest version of software and firmware installed.

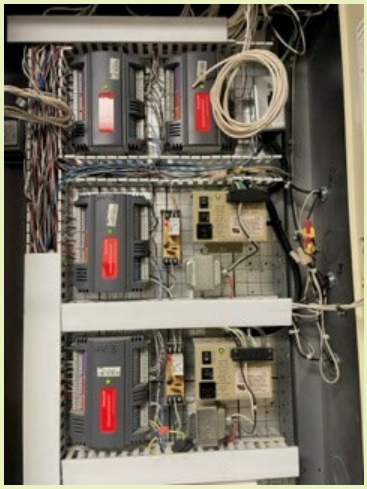
Maple Avenue Elementary ☑ High Priority (0-2 Years)

Maple Avenue Elementary Controls

Much of the HVAC system in this school is still served by an aging pneumatic control system which is greatly passed the end of its useful life. Pneumatic control systems are inherently simplistic with the operations they can perform and costly to operate due to the need for an air compressor to continually operate. Modern building automation systems allow the latest in energy reduction strategies to be utilized in the sequence of operations of the systems being served. This translates to energy savings associated with the HVAC system which is typically a large portion of the building's energy usage. It is recommended that the existing Honeywell CBUS controllers and all pneumatic devices be removed, and a new BACnet DDC controls system be installed to fully automate the building. This would create an open architecture and remove all proprietary controllers from the building. The existing Niagara JACE 8000 controller should be upgraded to the latest version of software and firmware.

Mountain View Middle School ☑ High Priority (0-2 Years)

The existing control system in the Middle School is a Honeywell Comfort Point system. This system is proprietary and greatly limits the district's ability to have it serviced from multiple vendors. There are about 79 controllers on site communicating on the LON protocol. LON is considered a legacy communications protocol which has been surpassed by ASHRAE's BACnet protocol which is used by every control manufacturer at this point. It is recommended that the existing controllers be replaced with BACnet controllers with a new BACnet communications bus extended throughout the school. This would create an open architecture and remove all proprietary controllers from the building. The existing Niagara JACE 600 controller should be replaced with the latest model JACE 8000 (soon to be 9000) with the latest version of software and firmware installed.



Mountain View Middle School Controllers

SAU Office ☑ High Priority (0-2 Years)

The SAU Office does not currently have a building automation system. The heating system currently operates via Honeywell thermostats which wirelessly communicate with modules in the basement boiler room. While this does provide heating control, there is no way to monitor the system or receive alarms when something is not working. A new Niagara based automation system would be installed to properly monitor and control the building. This includes monitoring the boiler and domestic hot water temperatures and boiler status and fault conditions.

SAU Office Controls

3.2 District Wide Building Automation Integration

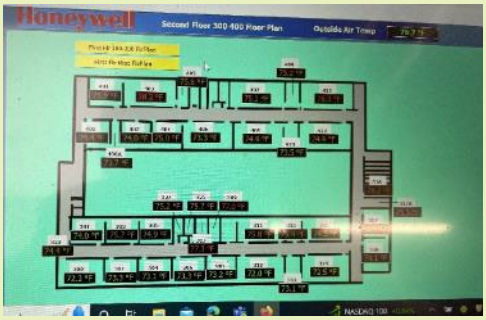
A district wide building automation system is the ultimate tool in monitoring and proactive maintenance for the associated buildings. By bringing all the buildings into one system, the maintenance staff can quickly and efficiently check on all the buildings with a single login. Dependent on local IT Department policies, the system can be accessed remotely so that when an alarm is received, nearly instant response to putting eyes on the issue is possible, even afterhours. Since most modern systems are web-friendly, no software is required to access the system. This allows the maintenance staff to utilize tablets or phones to assist them in operating the

Goffstown School District Building Automation System Graphics

system while they are out in the field, such as operating a valve while they are at the valve confirming proper operation. By integrating multiple building together alarms, historical trend data, user management, graphic displays and reporting are all under the same single system. This allows many efficiency gains for the user and the system. For school systems, this allows a single "snow day button" to shutdown the schools from their normal occupancy schedule saving in utility costs associated with maintaining higher temperatures and conditioning the outside air.

All School Buildings ☑ High Priority (0-2 Years)

The District currently has a Niagara based building automation system which ties all of the schools together into a server. This communication is done via the Niagara JACE controller located in each building. The server should be upgraded to the latest software version to ensure all cyber security patches are present. Depending on the current version, new features are likely available for use. The graphics would be revamped, which would give the system a more modern look and feel while adding better navigation across the system's graphical user interface. All the new controllers installed in the buildings as part of the building automation upgrade measure would be added to these new graphics. All alarms and trending would be integrated from each building into the server for long term archiving.



Goffstown High School Building Automation System Graphics

SAU Office ☑ High Priority (0-2 Years)

With the addition of a new building automation system for the building, the building should be added into the existing centralized building automation server so that it could be centrally managed and monitored with all other buildings in the district. Graphics, historical trends, and alarming would all be created so that this building was integrated similar to the other buildings on the server.

3.3 Access Control Upgrades

A modern access control system makes securing and monitoring a building an easy task. Access control cards allow specific people access to only where they need to be and also provide timestamps every time they unlock a door. When tied into the building automation system, access cards can easily be turned on and off when employees no longer work at the building. Doors can be secured and monitored for open/close status and could be locked down with a single push of a button in a scenario that requires that. Alarms for door being opened after hours, doors being propped open, and access gained to locations when there should not be access is easily generated by the building automation system giving a user notification of the event and even a video feed if the video system was also integrated into the building automation system.

All Buildings ☑ Priority (2-4 Years)

The schools across SAU 19 have various access control systems including many doors

which require keys. The District would benefit from a centralized access control system that would allow faculty to have monitored access to the buildings and rooms which they have permission to access. This would be accomplished by issuing access cards specific to each person. The centralized access control system would have user-based permissions allowing specific buildings, zones or doors to be accessed only during the allowed schedule. Door contacts would allow monitoring of exterior doors and would track when they are opened and could be set to trigger a notification/alarm when they are left propped open, which is a security risk. When integrated with the camera system, this type of alarm could call up a specific camera with a vantage point of the door allowing a user to see what is happening at the door during the time of the notification. Access cards could be granted on a temporary basis for rooms such as mechanical and maintenance rooms for service technicians to have access to perform their work but no access to spaces outside of their privileged area.

3.4 Security Camera Upgrades

Security cameras are an important part of securing a school and keeping the students and faculty safe. To be effective, cameras must be located with specific vantage points to properly monitor and provide a clear depiction of the area being monitored. Modern IP enabled camera systems allow for high resolution video to be streamed to a network video recorder (NVR) for long-term archiving of video. When being paired with a new building automation system, the camera system can be seamlessly integrated into the building automation environment for a clean "single pane of glass" experience across multiple appliances. For instance, the same floorplan view that shows temperatures across the building can also show camera locations across the building with or without live feeds. A single click on a camera could bring up the live feed in a new window with access to rewind the video to review a previous incident. With access control also integrated into the building automation system, an alarm could be triggered when an exterior door is propped open with a live video feed automatically displayed.

All Buildings ✓ Recommended (4+ Years)

Bartlett Elementary School Security Cameras

There appears to be many instances where duplicate cameras were installed over the years with similar lines of sight. Identifying what cameras could be deemed unnecessary would help limit the number of devices that the school needs to maintain. If the cameras are analog cameras, the existing cameras would be updated to modern digital high resolution IP cameras. It is also recommended to connect the cameras to the building automation system for a "single pane of glass" user experience. With the video cameras integrated into the building automation system, users can navigate from HVAC, access controls, lighting and video in a single user interface and login. User logins will dictate if they have access to the specific portions of the system so that the system is kept to a "need to a need to know" basis. For instance, an HVAC technician would only receive access to the HVAC system while the higher-level personnel would have access to everything or maybe only certain buildings. This would be completely customizable.

4.0 Building Envelope

4.1 Basement Insulation and Air Sealing

Insulating and air sealing the basement of a building offers several advantages. First and foremost, it enhances energy efficiency by preventing heat loss during the colder months and minimizing heat gain in the summer. This leads to cost savings on heating and cooling bills. Additionally, improved insulation and air sealing contribute to a more comfortable indoor environment, reducing temperature fluctuations and drafts. This investment can also extend the lifespan of the building by mitigating moisture-related issues, such as mold growth and structural damage.

SAU Office ☑ High Priority (0-2 Years)

The SAU Office basement is within the building envelope but is not insulated in any way. The basement has the distinct "musty" smell of an older residential basement which is an indication of high humidity. Although the space is not typically occupied, most of the paper file storage for the school district is shelved in the basement. With the lack of proper insulation and air sealing, the basement is subject to being a high-humidity environment which could damage the paper files. Insulating the basement will indirectly keep the floor of the floor above a warmer temperature which will create a more comfortable environment in the occupied areas above which will also save on heating costs. The exterior foundation would be insulated with spray foam paying close attention to any pipe or wire penetrations, windows, and cracks.

SAU Office Basement Conditions

4.2 Attic Insulation and Air Sealing

Attic insulation is a very important part of building insulation and creating a tight building envelope. A typical attic is insulated on the floor of the attic creating a boundary layer between the extreme hot and cold temperatures that the attic may experience throughout the year. With a compromised boundary, the building is forced to make up for the heating and cooling loads introduced by the attic to the spaces below. Common areas of concern are proper level of insulation along the attic floor, in the lower eaves of the roof, and penetration of wires, vents and other piping that is improperly sealed.

SAU Office ☑ High Priority (0-2 Years)

The SAU Office has minimal attic insulation and poor air sealing throughout. The eaves were noticed to have almost no insulation which may cause ice dams on the roof during the winter which could cause water to infiltrate under the shingles of the roof and cause water damage inside the building. Adding a proper layer of cellulose insulation across the floor and potentially spray foaming the eaves would add a highly efficient insulation value to the attic of the building.

SAU Office Attic Insulation

4.3 Miscellaneous Exterior Weatherization

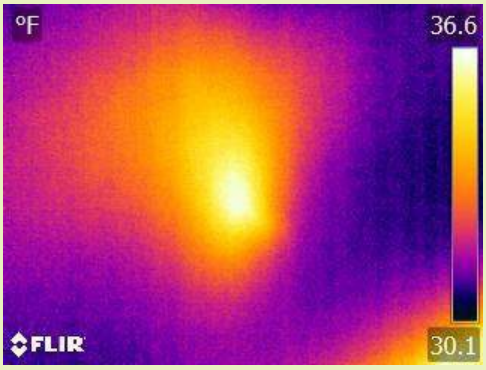
Making miscellaneous exterior weatherization repairs to a building can significantly enhance its energy efficiency, leading to reduced utility bills and a smaller carbon footprint. By sealing any cracks or gaps, it helps to prevent moisture infiltration, thus safeguarding the structure from potential damage caused by weather elements. Additionally, these repairs can improve the overall comfort within the building by maintaining a more consistent indoor temperature, reducing drafts, and minimizing outside noise. Lastly, such measures can contribute to the longevity of the building, preventing costly repairs and ensuring its durability over time.

Barlett Elementary ☑ High Priority (0-2 Years)

Bartlett Elementary would benefit from the sealing of various points throughout the building envelope and is highly recommended to tighten up the building. The window sealant in many areas needs replacing. This includes resealing the ineffective areas of sealant on the frame to wall and glass to frame on some windows to stop air infiltration. This also includes sealing penetrations of pipes and wires and sealing of expansion joints and wall cracks where required.

Mountain View Middle School ☑ High Priority (0-2 Years)

Mountain View Middle School would benefit from the sealing of various points throughout the building envelope and is highly recommended to tighten up the building. The window sealant in many areas needs replacing. This includes resealing the ineffective areas of sealant on the frame to wall on some windows to stop air infiltration. This also includes sealing penetrations of pipes and wires and sealing of expansion joints and roof wall seams where required.



Mountain View Middle School Pipe Vent Through Wall Showing Thermal Loss

SAU Office ☑ High Priority (0-2 Years)

Overall, for the age of the building, the SAU office is in good condition. However, it was noticed during the exterior portion of the site walk that there are a few areas of concern regarding weatherization. Most of the concerns are associated with the soffit of the building. This area shows signs of peeling paint, rotting wood, and even an open hole in one section. The open hole is most concerning since this is a direct entry for small animals and insects to get into the building. There were multiple yellow jacket nests around the building and eventually an infestation of the attic may occur. The hold is also the most susceptible to weather getting into the unprotected portion of the building. The brick foundation also has some portions requiring some mortar repair. The bricks in some areas are just sitting with large voids around them lacking mortar. These areas should be repaired to maintain the integrity of the building.

SAU Office Hole in Soffit

4.4 Window Replacement

Replacing windows in a school can offer several significant advantages. It can enhance the learning environment by allowing more natural light to enter classrooms, thereby reducing the need for artificial lighting, and creating a more pleasant atmosphere for students and teachers. Modern energy-efficient windows can help to regulate indoor temperatures, leading to reduced energy costs for the school and a smaller carbon footprint, contributing to a more sustainable future. Additionally, updated windows can improve the overall aesthetic appeal of the school, giving it a more contemporary and inviting look that can positively impact the school's reputation and appeal to potential students and their families. Moreover, new windows can also contribute to better sound insulation, minimizing external noise disturbances and creating a more conducive environment for learning and concentration.

Bartlett Elementary Priority (2-4 Years)

Many of the windows at Bartlett Elementary have been replaced over the recent years and there are still many remaining windows to replace. The windows that have been identified as having the largest efficiency gains associated with them are windows like the front windows as shown in the photo. This floor to ceiling window unit severely lacks quality insulative properties as modern energy efficient models would offer. Due to the size of these windows, there would be noticeable temperature improvements in the classroom spaces which have these windows. With better insulated windows (and most of the wall) the heating system would also not be required to produce as much heat which would save on heating plant energy consumed. It is recommended to replace the remaining windows in this school with a highly efficient window option.

Bartlett Elementary Front Windows

Goffstown High School High Priority (0-2 Years)

Many of the windows at the High School have been replaced over the recent years and there are still many remaining windows to replace. Some of the older windows have begun to lose seals which severely degrades the windows ability to insulate the outside temperature from the inside. This causes cool temperatures near the windows during the winter months and puts an extra load on the heating system which increases the costs associated with the heating plant. To stay ahead of window failures, it is recommended to complete a window replacement for the remainder of the school. This will ensure that energy is not being wasted due to faulty windows and will ensure a better indoor environmental comfort level for the students.

Goffstown High School Windows

Maple Avenue Elementary ☑ High Priority (0-2 Years)

The Maple Avenue Elementary School has recently received new windows and most of them are in great condition. There is a section of windows that is of concern, however. The window section shown in the photo generally does not provide enough insulation value in the winter months for the existing heating that is available in the space. This causes cool temperatures in the spaces adjacent to this area and puts an extra load on the heating system. At first, adding additional heat was a logical solution. A deeper review of the windows determined that some of the window seals have failed, which is indicative of moisture buildup in some of the windows. Overall, this window structure has replacement options that can provide much better temperature resistance (R-Value) which would potentially eliminate the need for additional heat in the space (and the added costs to generate and distribute that heat). It is recommended that this window section be replaced with a more energy-efficient option.

Maple Avenue Elementary Windows Cause Cold Conditions in Vicinity

Mountain View Middle School ☑ High Priority (0-2 Years)

The windows in the Mountain View Middle School are original to the building and some of them have begun to fail over the years. Some of the windows have lost their seals and moisture can be found between the panes of glass. Other windows have failed in ways that prevent the user from safely operating the window without it wanting to fall out of its track. Since all the windows are the same age, they are likely in similar conditions and for this reason it is recommended to replace all the windows which will provide energy efficiency gains with the increased R-Value found in modern windows. If replacing all the windows at once is too much to take on financially, it is recommended to at least replace the windows that have already failed as phase 1 with a plan in place to phase a complete window replacement over the next few years.

Mountain View Middle School Existing 30-Year-Old Windows

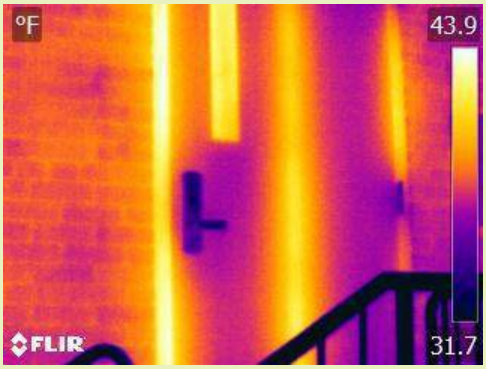
4.5 Door Improvements

Replacing doors and making door improvements in a school can significantly enhance safety and security measures, providing a robust defense against potential security threats. Upgrading doors can also contribute to better energy efficiency, reducing heating and cooling costs, thus leading to long-term financial savings for the school. Furthermore, modernizing doors can improve the overall aesthetic appeal of the

school, creating a more welcoming and conducive learning environment for students and staff. Additionally, by investing in durable and soundproof doors, the school can effectively minimize distractions, fostering an optimal setting for focused learning and academic success.

Bartlett Elementary ☑ High Priority (0-2 Years)

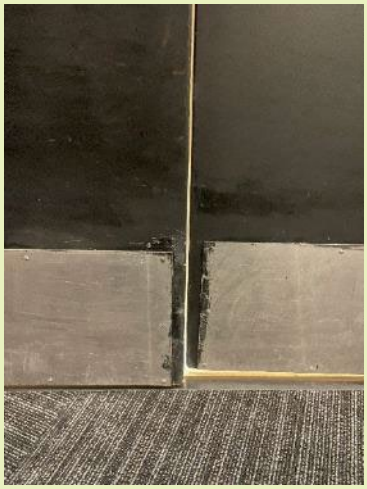
The exterior doors at Bartlett Elementary, for the most part, are structurally and cosmetically in good condition. The air sealing around the doors is what is lacking for most of the doors. A good air seal is vital to keep the outside air out and the conditioned air in. When air sealing has been compromised or does not exist altogether, this threshold between indoors and outdoors approaches zero. On cold windy days the areas in proximity to the doors will feel drafty and cool. This will cause the heating system to heat more than should be required while raising energy consumption. By adding weather stripping around the doors, door sweeps and astragal (the seal between the doors), the doors will perform much better and help lower the energy consumption of the building.



Bartlett Elementary Exterior Door Heat Loss

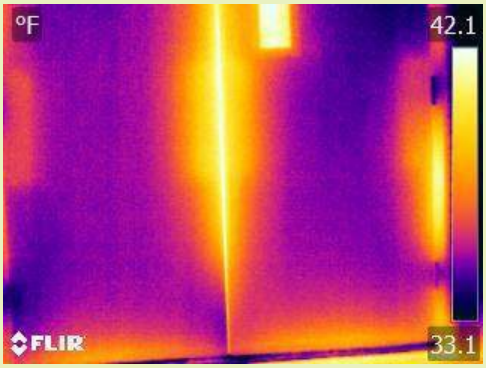
Goffstown High School ☑ High Priority (0-2 Years)

Many of the exterior doors in the High School have been replaced in previous years. About 11 doors remain to be replaced. These remaining doors have various condition levels. Some of them have large air gaps around them which will cause a significant amount of air infiltration. This will likely cause the area to be drafty and cold during the winter months, which will put an unnecessary load on the heating system. The four (4) access doors for the auditorium are also in poor shape and should be replaced. While these doors are not all exterior doors, the condition of the doors are poor. They show excessive signs of wear and use, and some have large gaps between them.


Goffstown High School Exterior Door Showing a Large Air Gap

Maple Avenue Elementary ☑ High Priority (0-2 Years)

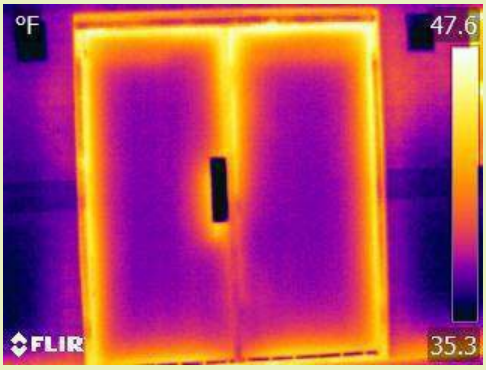
The exterior doors at Maple Avenue Elementary, for the most part, are structurally and cosmetically in good condition. The air sealing around the doors is what is lacking for most of the doors. A good air seal is vital to keep the outside air out and the conditioned air in. When air sealing has been compromised or does not exist altogether, this threshold between indoors and outdoors approaches zero. On cold windy days the areas in proximity to the doors will feel drafty and cool. This will cause the heating system to heat more than should be required while raising energy consumption. By adding weather stripping around the doors, door sweeps and astragal (the seal between the doors), the doors will perform much better and help lower the energy consumption of the building.



Maple Avenue Elementary Exterior Door Heat Loss

Mountain View Middle School ☑ High Priority (0-2 Years)

The exterior doors at Mountain View Middle School, for the most part, are structurally and cosmetically in good condition. The air sealing around the doors is what is lacking for most of the doors. A good air seal is vital to keep the outside air out and the conditioned air in. When air sealing has been compromised or does not exist altogether, this threshold between indoors and outdoors approaches zero. On cold windy days the areas in proximity to the doors will feel drafty and cool. This will cause the heating system to heat more than should be required while raising energy consumption. By adding weather stripping around the doors, door sweeps and astragal (the seal between the doors), the doors will perform much better and help lower the energy consumption of the building. Some doors will also receive sealant for miscellaneous cracks.



Mountain View Middle School Exterior Door Heat Loss

4.6 Replace Roofing

A roof that is in poor condition puts the structure at risk. A compromised roof may lead to potential structural and interior space damage compromising the safety and integrity of the building. Upgrading to a new roof also allows for the installation of proper R30 insulation as required by the state. Proper insulation is crucial for energy efficiency and maintaining a comfortable learning environment. The addition of insulation reduces heating and cooling costs while enhancing the overall sustainability of the school.

Bartlett Elementary ☑ High Priority (0-2 Years)

There are numerous sections of roofing that are well beyond its usable life. The roofing material has dried out and is cracking leaving the weatherproofing protection in jeopardy. The flashing and edges are also in poor condition and should be replaced. Any existing roof penetrations that are no longer used would be removed and properly sealed. The insulation thickness in one part of the roof was only about 1-1.5" thick. This is well below the 5.2" thickness to achieve an R30 rating required by the state energy code. Insulation would be added above the roof deck while the roof membrane was being replaced. Proper pitches would be installed under the new membrane to direct water towards the existing roof drains to prevent pooling of water.

Bartlett Elementary School Upper Roof

Goffstown High School ☑ Priority (2-4 Years)

With some immediate repairs, this roof should last another 5-10 years. Some seams are showing signs of drying out which will lead to cracking and leaking. These seams should be repaired. This is mostly seen around roof patches and other penetrations such as around roof mounted HVAC equipment. The flashing on the chimney needs to be replaced or at least sealed with caulking. The roof drains need to be cleaned as leaves, pine needles and moss have mostly clogged some of the drain grates. One of the roof drain grates appears to be missing and should be replaced before the drainpipe becomes clogged with debris. The large satellite dish on the roof is mounted via cinderblock ballast with an extra layer of rubber matting under the blocks to protect the EPDM from damage. While this is all fine, the rim of the dish is sitting on the unprotected EPDM. When the wind blows the dish likely moves and will wear out the unprotected roofing eventually causing a failure to the material. The dish should be repositioned to be self-supported without laying on the unprotected EPDM. When this roof is replaced, the roof pitching should be improved to help remove the standing water that was present during one of the walk throughs. While a core sample of the roof was not taken in time for this report, it is expected that some insulation will be required to meet R30 requirements and should be added when the roof is replaced.

Goffstown High School Roof Showing Signs of Deterioration

Glen Lake School ☑ Priority (2-4 Years)

About 75% of the roof on this school is a flat EPDM rubber membrane roof with the remaining 25% being a pitched asphalt shingle roof. The asphalt shingle roof appears

to be in good condition. The EPDM roof is showing signs of it approaching its end of life and should be watched closely for signs of failure with frequent surveys. This roof still has a few years left of usable life but should be on the short list for replacement soon before there are failures causing water damage to the interior spaces.

Maple Avenue Elementary Chimney Condition

Maple Avenue Elementary ☑ High Priority (0-2 Years)

The EPDM roof on this school has reached its end of life and it is recommended that it be replaced with a new membrane. While the existing membrane is removed, insulation would be added to ensure that the new roof met the latest state energy codes requiring R30 insulation ratings of the roof. The chimney on the roof is in very bad shape and should be repaired. The bricks and mortar are failing and pieces of both have started to crumble off the chimney and onto the roof. It is likely that the bricks would have to be replaced at this point, at least the bricks in the corners which show the worst degradation.

Mountain View Middle School ☑ High Priority (0-2 Years)

The roof at Mountain View Middle School has proved troublesome over the years with constant issues having to be addressed. The ballasted rubber roof should be replaced with a fully adhered EPDM membrane roof. During this installation, the existing rock ballast would be removed along with the existing membrane. Depending on the level and condition of the insulation under the existing membrane, insulation would be added to ensure the roof met the R30 requirements for insulation.

Mountain View Middle School Roof Section

Sustainability

5.0 Sustainability

5.1 VRF Heat Pumps

Variable refrigerant flow (VRF) technology offers enhanced energy efficiency by providing precise control over heating and cooling in individual zones, ensuring optimal comfort levels while minimizing energy consumption. The adaptability of VRF systems accommodates the diverse heating and cooling needs of different areas within the building, promoting a more customized and efficient climate control solution. The retrofitting process is often less disruptive than a complete overhaul, making it a cost-effective option for updating an older infrastructure. Additionally, VRF heat pumps offer the capability for simultaneous heating and cooling, enhancing

overall system flexibility. This integration not only improves comfort for occupants but also reduces operational costs over time, contributing to a more sustainable and modernized environment.

SAU Office ☑ Priority (2-4 Years)

The SAU office would benefit from the installation of a VRF heat pump system throughout the building. It was noted during a warm weather walkthrough that there were many window mounted air conditioners throughout the building. The need for these window air conditioners could be replaced with a VRF system that would provide cooling throughout the building. When the season changes and heating is required, the VRF system would also provide the required heating for the spaces. This would take most of the load off the existing hot water boiler system and is a much more efficient form of heating. The hot water heating system would stay installed as is to provide backup heating should the VRF system have a problem. The zoning would be improved in each room with VRF so that the occupants could adjust their specific room temperature setpoint to their liking. This system would be integrated into the building automation system so that it could be monitored and alarmed of any malfunctions.

5.2 Roof Mounted Solar Array

Installing a solar array into a school infrastructure brings many benefits, with significant emphasis on environmental sustainability and long-term financial savings. Notably, the decision to add solar becomes particularly opportune after a roof replacement, as it ensures the roof will not have to be replaced during the life of the panels. The energy savings associated with solar power are substantial, offering the District the potential to generate its own electricity and, in some cases, even feed excess energy back into the grid. Over time, this translates into considerable cost savings on electricity bills, providing additional funds for educational resources and programs. Beyond financial advantages, embracing solar energy instills a sense of environmental consciousness among students and the community, fostering a commitment to sustainability that extends well beyond the classroom.

All Buildings ☑ Recommended (4+ Years)

All the Goffstown District buildings are great candidates for solar panels to be installed on their roofs. Installing a roof mounted array versus a ground mounted array saves the ground real estate for other uses. Each solar array would be sized to produce about 105% of the electrical consumption of the school to ensure that the power produced from the solar panels was enough to cover the entire school. Because of this, the size of the array will be dependent on what other energy saving measures are completed or will be completed in the future. Another aspect to consider is installing a larger than needed array utilizing all available roof space. In this scenario, the school would produce excess energy which could be put back onto the grid producing revenue or even to produce an energy credit to be used by other buildings in the town. A detailed discussion on the appropriate sizing would be had to ensure the District understood what to expect out of each solar array system. The system has options to integrate into a building automation system which is recommended so that the production, faults, and other metrics can be tracked over time and issues with the system can be identified for repair.

5.3 EV Charging Stations

Incorporating electric vehicle (EV) charging stations at a school not only supports environmental sustainability but can also generate revenue, adding a financial dimension to its benefits. By opening these charging stations to the public, the school can tap into a growing market of electric vehicle owners seeking convenient and accessible charging options. This revenue stream can be directed towards various educational initiatives, facility upgrades, or sustainability projects, enhancing the overall financial health of the institution. The dual impact of promoting green transportation and generating revenue underscores the multifaceted advantages of integrating EV charging stations within the school's infrastructure.

All Buildings ✓ Recommended (4+ Years)

It is recommended that a dual port level 2 EV charging station be added to the front of each building. Adding these chargers to the buildings will help the District convey their commitment to sustainability to the community. The chargers would also be an opportunity to provide a revenue source for the school by charging the users for the use of the kWh consumed by their vehicle. When combined with onsite solar generation, the revenue can really add up. This movement may begin a desire to lean towards an electric bus fleet down the road.

6.0 ADA Compliance

6.1 Bathroom Renovation

An ADA-compliant bathroom refers to a restroom that adheres to the standards outlined in the Americans with Disabilities Act (ADA). These guidelines are designed to ensure that individuals with disabilities have equal access to public facilities. Such bathrooms typically include features like grab bars, wider doorways, freely accessible sinks, and appropriate stall dimensions to accommodate wheelchairs. The absence of these facilities in schools poses a significant problem as it creates barriers for students with disabilities, hindering their ability to navigate the school environment independently and with dignity. Without ADA-compliant bathrooms, students with mobility challenges face unnecessary difficulties and may require assistance that could compromise their privacy and independence. This lack of accessibility can contribute to feelings of exclusion and segregation, impeding their educational and social experiences within the school community.

Bartlett Elementary ✓ Priority (2-4 Years)

The bathrooms at Bartlett Elementary had no glaring ADA deficiencies but would benefit from a remodel based on the overall condition. Many of the fixtures are showing signs of wear. The flooring and wall tiling is very dated and could be replaced to bring a more modern and cleaner look for the young students using the facilities. The heating pipe insulation in a few locations was in poor condition and should be reinsulated to protect the children

Bartlett Elementary Bathroom

from burns associated with accidentally touching the hot heating pipes.

Goffstown High School Priority (2-4 Years)

The boy's bathroom outside the gym is original to the building and should be modernized. This should be accomplished like the girl's bathroom in the same vicinity. ADA compliance should be implemented during this renovation to make sure that the facility stays accessible to students and faculty with disabilities. Based on culture changes over the years, it is recommended to modify the Boys Locker Room showers from having an open multi-user shower to private stall showers. The same shower room footprint could be used to install shower stalls. At least one of the stalls should be ADA compliant.

Goffstown High School Group Shower

Maple Avenue Elementary Priority (2-4 Years)

The boy's and girl's bathrooms (total of four bathrooms) are mostly original to the building. These bathrooms are in poor condition and lack many of the features required by a modern ADA compliant bathroom. The bathrooms lack proper turning radius requirements for a wheelchair and free space requirements required for a wheelchair user access to the toilets, sink and dispensers. To gain the space required, the bathrooms would require full renovation including the entrance which could be redesigned to allow for more space within the bathrooms. The second set of bathrooms, while in much better ADA compliance, could also use a facelift. These bathrooms show signs of repair over the years. The single user faculty bathroom is small and very outdated which could use a remodel. It is recommended to add another staff bathroom based on location and bathroom to staff ratios. Creating a new staff bathroom meeting ADA requirements would be recommended.

Maple Avenue Elementary Bathroom Stall not ADA Compliant

Mountain View Middle School Priority (2-4 Years)

Similar to some of the other schools the boy's and girl's bathrooms are mostly original to the building. These bathrooms are in poor condition and many of the partitions, toilets, sinks, and dispensers are in need of replacement due to condition. Many lack the features required by a modern ADA compliant bathroom. The bathrooms lack proper turning radius requirements for a wheelchair and free space requirements required for a wheelchair user access to the toilets, sink and dispensers. To gain the space required, the bathrooms would require a full renovation. Based on culture changes over the years, it is recommended to modify the Boys Locker Room showers from having an open multi-user shower to private

stall showers. The same shower room footprint could be used to install shower stalls. At least one of the stalls should be ADA compliant.

6.2 Elevator Replacement

Replacing an older elevator with a new one that complies with ADA (Americans with Disabilities Act) requirements in a school brings about numerous benefits. Firstly, it ensures inclusivity by providing equal access to all students, staff, and visitors, regardless of physical abilities. The ADA-compliant elevator features spacious interiors, tactile buttons, and audible signals, catering to individuals with mobility challenges, visual impairments, or other disabilities. This not only enhances the overall accessibility of the school but also fosters a more inclusive and diverse learning environment. Additionally, modern elevator technology typically incorporates energy-efficient features, reducing operational costs and contributing to the school's sustainability goals.

Bartlett Elementary Recommended (4+ Years)

The elevator in Bartlett Elementary is an older model elevator built into a cement wall. The access to the elevator and the elevator cab does not meet the current ADA requirements for entrance and turning radius clearances. It is recommended to replace the elevator and entrance with a modern elevator ensuring that everything is within the requirements of ADA.

Bartlett Elementary Elevator

7.0 Life Safety

7.1 Fire Suppression Improvements

An operating fire suppression system is of paramount importance in a school setting, serving as a critical line of defense against the devastating consequences of fires. The system, encompassing elements such as fire alarms, sprinklers, and fire pumps, plays a pivotal role in ensuring the safety of students, staff, and the entire school community. In the event of a fire, a properly functioning fire suppression system can swiftly detect and contain the flames, minimizing property damage and, most importantly, preventing potential loss of life. The fire pump system is crucial as it ensures an adequate and reliable water supply for the sprinkler system to effectively combat fires. Regular maintenance and keeping the fire pump system operational are imperative to guarantee its readiness in the face of an emergency, underscoring the need for a proactive approach to fire safety in educational institutions. A well-maintained fire suppression system not only safeguards physical assets but also provides peace of mind, fostering a secure learning environment for students and staff alike.

Mountain View Middle School Priority (2-4 Years)

The fire pump house at the Mountain View Middle School is a small outbuilding located adjacent to the school. This building houses a diesel fire pump and all the associated piping and controls to activate the fire pump upon a sprinkler in the school activating. The fire pump draws water from an underground fire cistern which holds water on standby specifically for fire suppression. The fire cistern has been identified as requiring a replacement to maintain certified operation of the fire suppression system. It is recommended that this fire cistern is replaced with a new tank meeting NFPA 22 Tank Standards as well as local codes and standards.

Mountain View Middle School Fire Pump House

7.2 Fire Alarm Upgrades

A modern fire alarm panel that is serviceable and non-proprietary is necessary for optimal safety and operation. Serviceability ensures regular maintenance, reducing the risk of malfunctions, while a non-proprietary system allows flexibility and integration with various devices, promoting cost-effective solutions and futureproofing. In essence, these features contribute to the reliability and adaptability of the fire detection system, ensuring the safety of occupants and property protection.

Mountain View Middle School Fire Alarm Panel

Mountain View Middle School Priority (2-4 Years)

In feedback from the school maintenance personnel, the existing Mircom fire alarm panel should be replaced. The existing alarm panel has limited local support which makes it difficult to maintain and make modifications to. It is recommended to replace the panel with a different brand which will be more conducive to multiple local support companies able to work on the panel in the future.

8.0 Facility Infrastructure

8.1 Replace Existing Lights with LED

Upgrading old lighting to energy-efficient LED lights with advanced controls in a school environment offers a multitude of advantages. First, it significantly reduces energy consumption, leading to substantial cost savings on electricity bills, allowing schools to allocate more resources to education. Second, advanced lighting controls provide the flexibility to customize lighting levels, creating optimal learning conditions, and enhancing student focus and productivity. Daylight harvesting will automatically dim lights that are adjacent to sunlit window while maintaining the desired lighting level in the room. Additionally, the extended lifespan of LED bulbs reduces maintenance

requirements, freeing up staff time and ensuring a consistently well-lit and eco-friendly school environment for many years. Furthermore, implementing advanced control systems with upgradeable capabilities allows for "futureproofing", allowing buildings to meet new code requirements and take advantage of future technologies and capabilities more easily.

Bartlett Elementary ☑ High Priority (0-2 Years)

The Bartlett School main building currently contains multiple luminaire types with T8 fluorescent technology. In most cases these are surface mount and pendant mount fixtures that will be replaced with new flush mount volumetric LED troffer fixtures in a new layout and include advanced wireless controls. Where these new fixtures are being installed the existing 1950's era cloth wiring will be replaced to meet current electrical codes. Additionally, there are surface mount wrap fixtures that will be replaced with their LED fixture equivalents and include advanced wireless controls. In areas where existing flush mount troffer fixtures exist, LED retrofit kits with advanced wireless controls will be installed. Cove lights and storage areas with strip and wrap fixtures will be retrofitted with LED kits without advanced controls due to the low-cost benefit. Finally, Existing LED fixtures within the building will remain as is. This includes the gymnasium and exterior. The Gymnasium LED fixtures have advanced wireless controls. The Bartlett School modular building also contains multiple luminaire types with T8 fluorescent technology as well as compact fluorescent technology. Classroom 317 contains flush mounted troffer fixtures and will be replaced with an LED troffer kit that contains advanced wireless controls. All other areas with T8 technology will have LED retrofit kits without wireless controls due to the cost/benefit. The compact fluorescent lights will be replaced by the equivalent LED lamps.

Bartlett Elementary T8 Lighting

Goffstown High School ☑ High Priority (0-2 Years)

The High School contains multiple luminaire types with T8 fluorescent, Compact Fluorescent and other legacy technologies. The majority of the fixtures in the school are flush mounted troffer fixtures with T8 fluorescent lamps. These troffer fixtures will be replaced with LED volumetric retrofit kits containing advanced wireless controls. Additionally, there are pendant mount fixtures utilizing T8 fluorescent technology that will be replaced with new LED fixture equivalents and include advanced wireless controls. Existing recessed fixtures with compact fluorescent lamps, to be replaced with new LED recessed lights. Maintenance, restrooms,

Goffstown High School T8 Lighting

storage areas and other utility rooms containing industrial, strip, and wall mounted fixtures with T8 fluorescent technology will be retrofit using LED bar-kits. The locker rooms surface mount and vapor tight fixtures with T8 fluorescent technology to be replaced with LED vapor tight fixtures utilizing the existing motion sensors and controls. Classrooms, such as the wood shop, that contain industrial fixtures with T8 fluorescent technology will be replaced with LED wrap fixtures containing advanced wireless controls. Finally, existing LED fixtures remain as is. This includes the Gymnasium, Auditorium, and most of the exterior. The proposed Bluetooth controls to match gymnasium and auditorium NLight Air system.

Glen Lake School ☑ High Priority (0-2 Years)

The Glen Lake School main building currently contains multiple luminaire types with Compact Fluorescent (CFL) and T8 fluorescent technology. The pendant mounted fixtures throughout the school will be replaced by new LED pendant mount fixtures with advanced wireless controls. Additionally, flush mounted troffer fixtures will be retrofit with an LED volumetric kit with advanced wireless controls. Recessed compact fluorescent fixtures, to be replaced with new LED recessed fixtures. Wall mounted fixtures in halls and restrooms along with low run hour areas such as storage and mechanical spaces wrap fixtures will be retrofit, with LED drivers and bar kits. The Glen Lake modular building also contains T8 fluorescent flush mount troffer fixtures as well as lights that have already been converted to LED. The flush mount troffers will be replaced with LED retrofit kits containing advance wireless controls. The existing LED lights will not be replaced.

Maple Avenue Elementary ☑ High Priority (0-2 Years)

The Maple Avenue School main building currently contains multiple luminaire types with T8 fluorescent technology. In most cases these are surface mount and pendant mount fixtures in classrooms, offices, halls, and library, that will be replaced with new flush mount volumetric LED troffer fixtures in a new design layout and include advanced wireless controls. Additionally, there are surface mount wrap fixtures in low run hour areas such as storage, custodian and mechanical rooms that will be replaced with their LED fixture equivalents. In areas where existing flush mount troffer fixtures exist, LED volumetric retrofit kits with advanced wireless controls will be installed. Non-linear fixtures (drums, cylinders, canopy, etc.) will be retrofit with their LED equivalent without the addition of advanced wireless controls. The kitchen vapor tight fixtures are to be replaced with new LED vapor tight fixtures. Finally, existing LED fixtures remain as is. This includes the gymnasium and exterior fixtures. The Gymnasium LED lights have advanced wireless controls. Maple Avenue has two modular buildings. Modular building A contains a majority of surface mounted wrap fixtures to be retrofitted with LED bar kits without advanced wireless controls. The remainder of the fixtures will be replaced with LED lamps as appropriate except for the exterior

Maple Avenue Elementary T8 Lighting in Bathroom

wall pack fixtures that will be replaced with new LED equivalents. The second modular building (Building B) contains exclusively recessed troffer fixtures with T8 fluorescent technology. These will be retrofitted with LED kits containing advanced wireless controls.

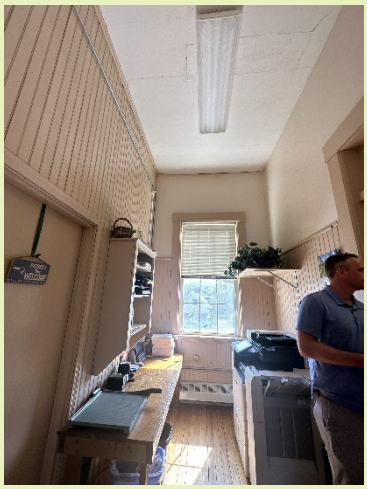
Mountain View Middle School ☑ High Priority (0-2 Years)

Mountain View Middle School contains multiple luminaire types with T8 fluorescent, Compact Fluorescent, and other legacy technologies. Most of the fixtures (~75%) in the school are flush mounted troffer fixtures with T8 fluorescent lamps. These troffer fixtures will be replaced with LED volumetric retrofit kits containing advanced wireless controls. Additionally, there are surface mount fixtures utilizing T8 fluorescent technology that will be replaced with new LED fixture equivalents and include advanced wireless controls. Recessed can fixtures with compact fluorescent lamps, to be replaced with new LED recessed fixtures. Maintenance rooms, restrooms, storage, utility rooms and other low run hour areas containing industrial, strip, and wall mounted fixtures with T8 fluorescent technology to retrofit with LED bar-kits. Finally, existing LEDs remain as is. This includes the gymnasium and exterior fixtures. The Gymnasium LED fixtures have advanced wireless controls. Proposed advanced Bluetooth controls to match existing controls.

Mountain View Middle School

SAU Office ☑ High Priority (0-2 Years)

The SAU Office contains multiple luminaire types with T8 fluorescent, Compact Fluorescent, and other legacy technologies. In areas where flush mount troffer fixtures exist, they will be retrofitted with LED kits containing advanced wireless controls. Additionally, there are pendant mounted fixtures with T8 fluorescent technology. In most cases these will be replaced with equivalent LED pendant mount fixtures with advanced wireless controls. In a few areas where drop ceilings exist, the existing pendant fixtures will be removed and new flush mount recessed troffer fixtures with advanced wireless controls will be installed. Similarly, in rooms containing surface mount wrap fixtures on a drop ceiling, new flush mount LED troffer fixtures with advanced wireless controls will be installed. Corridors, maintenance rooms, restrooms, storage areas and other utility rooms containing surface mount wrap, industrial, strip, and wall mounted fixtures with T8 fluorescent technology will be retrofit using LED bar-kits. These kits replace the internal lamps with LED bars. The fixtures will not be installed with advanced controls due to the low-cost benefit. Finally, existing LEDs within the



SAU Office T8 Lighting

building will remain and will not be replaced.

8.2 Electrical Panel Replacement

The replacement of an outdated electrical panel in a school, especially one from a manufacturer that has gone out of business, offers important advantages for both safety and functionality. In the absence of available replacement parts and breakers, the risk of system failures and the inability to address potential issues increases significantly. By upgrading to a modern electrical panel, the school not only gains access to readily available components but also benefits from advanced safety features and technologies. A new panel ensures compliance with current safety standards, reducing the likelihood of electrical hazards and promoting a secure environment for students and staff.

Goffstown High School ☑ High Priority (0-2 Years)

The High School has numerous electrical distribution panels throughout the facility. There are many different manufacturers for the various panels. The specific manufacturer that is being recommended for replacement are the panel manufactured by Federal Pacific. While the Federal Pacific panel was historically very popular, they ended up going out of business. Since replacement parts and breakers are no longer made, servicing the panels is very difficult. The company's products also do not have a stellar safety record with breakers that don't trip causing fires when components overheat during an electrical fault. This product has no place in a school filled with children and should be replaced. This measure will replace all the Federal Pacific panels with modern UL listed panels meeting all current national electric code (NEC) requirements.

Goffstown High School Electrical Distribution Panel

8.3 Building Transformer Replacement

Upgrading transformers enhances energy efficiency, resulting in cost savings and reduced environmental impact. Newer transformers are designed with advanced technologies that minimize energy loss during transmission, contributing to a more sustainable and economically efficient operation. Moreover, modern transformers often come equipped with improved safety features, reducing the risk of electrical failures, and enhancing overall system reliability. Upgrading also allows for the integration of smart technologies and monitoring systems, providing better control over energy usage, and facilitating proactive maintenance. Ultimately, the replacement of building transformers in a school not only ensures a more resilient and reliable electrical infrastructure but also aligns the District with their energy conservation goals.

Goffstown High School Building Transformer

Goffstown High School ☑ High Priority (0-2 Years)

There are seven (7) building step-down transformers in the High School that are being recommended for replacement. These transformers step down the primary 480V service to 120/208V power which feeds various electrical distribution panels across the school. The condition of the transformers somewhat varies but all are recommended for replacement due to their age, condition, and nameplate efficiency rating.

Mountain View Middle School ☑ High Priority (0-2 Years)

There are eleven (11) building step-down transformers in Mountain View Middle School that are being recommended for replacement. These transformers step down the primary 480V service to 120/208V power which feeds various electrical distribution panels across the school. The condition of the transformers somewhat varies but all are recommended for replacement due to their age, condition, and nameplate efficiency rating.

Mountain View Middle School Building Transformer

8.4 Building Generator

Replacing aging building generators in a school can yield multiple benefits. A dependable generator ensures reliable power backup during emergencies, safeguarding the learning environment from disruptions caused by power outages. Additionally, modern generators are often more energy-efficient, leading to reduced operational costs and a more sustainable energy footprint. The installation of new generators can provide an opportunity to incorporate advanced technology, enabling better monitoring through a building automation system and control of power usage,

ultimately enhancing the overall efficiency and functionality of the school's power infrastructure.

Goffstown High School Priority (2-4 Years)

The High School currently does not have an emergency backup generator. The addition of a generator to a school brings invaluable benefits, particularly in regions with cold weather environments where power outages can pose significant challenges. A generator serves as a reliable backup power source, ensuring uninterrupted electricity supply during inclement weather or unforeseen outages. In cold climates, where severe winter storms can disrupt regular power grids, having a generator becomes crucial for maintaining a warm and safe learning environment. It enables the school to continue its operations, powering heating systems to prevent freezing temperatures indoors, maintaining lighting for safety, and preserving essential electronic systems. The generator's ability to kick in seamlessly during power failures guarantees the school community's well-being by providing a consistent power supply, allowing for continued educational activities even when external conditions are adverse. The addition of a generator has been a thought of the District for many years and it is a recommended addition. All aspects of a new generator would be included in this scope of work such as the generator, electrical wiring, transfer switches and sitework.

Mount View Middle School Priority (2-4 Years)

The generator and the associated transfer switch are quite past their usable life. Although the exact age is not clear at this point, the school would benefit from a new model that would have the added benefits listed above. It is recommended that a new generator be installed along with a new transfer switch. The new generator should be sized larger than the existing unit so that there is enough capacity for the kitchen equipment to be tied in. If there was other critical equipment that was also not tied into the existing system, capacity and the wiring infrastructure would be included to support that equipment as well.

Mountain View Middle School Generator

8.5 Septic System Repairs

A functioning septic system and leach field are crucial for maintaining a healthy and hygienic environment in a school. They play a pivotal role in effectively treating and disposing of wastewater, preventing contamination of the surrounding soil and groundwater. However, an old septic system can pose significant health risks due to potential leaks and inadequate waste treatment, leading to the spread of harmful pathogens and pollutants. Therefore, replacing an outdated septic system becomes imperative to ensure the safety and well-being of the school community, as well as to comply with environmental regulations and standards.

Mount View Middle School High Priority (0-2 Years)

The existing septic system is 30+ years old which is nearing its end of life. Although

the exact condition of the system has not been determined at the time of the report, it is highly likely that the system will show signs of its age. If the septic system were to fail, the school would be in trouble. The use of the toilets and sinks would not be available and the District would likely have to rent portable toilet rooms which could be located outside the school. The kitchen staff would have to cook and clean with alternate means as well. This scenario would likely be expensive and would come without warning. Given the age of the septic system, it is recommended that it is replaced before a pending failure occurs. During the design and engineering of this measure, all of the options associated with replacing and repairing the system will be discussed with the District to continue with the best path forward.

8.6 Flooring Improvements

Replacing dirty and worn carpets enhances the overall aesthetic appeal, creating a more conducive and welcoming learning environment. It also significantly improves indoor air quality by eliminating accumulated dust and allergens trapped in old carpets, fostering a healthier atmosphere for students and staff. Lastly, addressing potential hazards such as asbestos in tile flooring ensures the safety of the school community, emphasizing the importance of investing in a secure and modern infrastructure.

Goffstown High School Carpet Showing Signs of Wear and Tear

Goffstown High School Priority (2-4 Years)

The high school has numerous flooring improvements that should be made. The carpet in the Main Office suite and Info Center is dirty, stained, and quite worn. The flooring in this area should be replaced with a more durable option such as the floating laminate flooring used in the Student Services area. The tiles located in the 100 Wing Hall are approaching 20 years old and show signs of wearing and should be replaced. In the Tech Hallway as well as Room 101, 103 and 105 there is asbestos containing tiling which should be abated and replaced. This is further discussed in the hazardous material section later.

Mountain View Middle School High Priority (0-2 Years)

The locker room floors in the middle school are epoxy coated concrete floors. The epoxy has begun to show signs of delamination which is likely due to the age and number of times it has been cleaned. The failing material makes it difficult to clean properly without causing more damage. This flooring needs to be stripped down to bare concrete, the concrete prepared, and a new flooring material applied. Since this is a locker room, anti-slip media will also be applied to the flooring to meet the requirements of slip protection while still allowing the flooring to be cleaned easily.

8.7 Ceiling Tile Replacement

Replacing ceiling tiles that are damaged and in poor condition contribute to a more conducive and positive learning atmosphere. New ceiling tiles enhance aesthetic appeal, creating a brighter and cleaner environment that promotes a sense of pride and professionalism. Functionally, updated tiles contribute to improved acoustics,

reducing noise levels and fostering a quieter space conducive to concentration. Modern ceiling materials often incorporate energy-efficient features, leading to cost savings in heating and cooling expenses. Ultimately, investing in the replacement of deteriorating ceiling tiles not only revitalizes the physical appearance of the school but also positively impacts the overall well-being and productivity of both students and staff.

Goffstown High School Recommended (4+ Years)

Some of the ceiling tiles in the High School don't sit flush with the suspended ceiling grid. While the tiles appear to be clean and free of damage, they appear warped in the corners causing gaps throughout the ceiling. This condition is very noticeable walking down the hallways and gives the sense of a low-quality facility. It is possible that the ceiling grid is too tight, and this problem can be remedied without replacement but instead repair. In general, it is recommended to replace any ceiling tiles that show less than ideal conditions as it has a large impact on the perceived condition of the school.

Goffstown High School Ceiling Tiles Curling in the Corners

Maple Avenue Elementary Recommended (4+ Years)

It was observed that in one of the classrooms the ceiling tiles had an instance of a large gap between a transition between ceiling tile heights. In this instance, with heat rising, some of the classroom heat is escaping up into the ceiling plenum space. This is putting an unnecessary load on the heating system in this space which raises the heating system operational cost. It is recommended that this area is repaired for energy and aesthetic reasons.

Maple Avenue Elementary Ceiling Tiles with Large Gap

8.8 Concrete Repair

Addressing cracks, spalls, and other damage not only enhances the overall aesthetics but also prevents further deterioration, prolonging the lifespan of the structure. Additionally, timely concrete repairs contribute to a safer environment, reducing the risk of accidents and liability concerns, thus underscoring the importance of proactive maintenance for the longevity and safety of the facility.

Goffstown High School Loading dock area concrete in need of repairs

Goffstown High School Priority (2-4 Years)

The loading dock area has concrete that is showing signs of deterioration with large spalling and visible rebar. Without making repairs to this area, the concrete will continue to degrade, and the entire structure would likely need to be replaced which would be much more expensive.

9.0 Miscellaneous

9.1 Asphalt Paving

A well-maintained parking lot has many benefits. A parking lot that is in good condition helps with the overall depiction of the school for regular occupants and visitors. A parking lot with a smooth surface helps reduce tripping and falls from people traveling from their vehicles to the building. With conditions poor enough, safe ADA accessibility may also become compromised. Once pavement starts to deteriorate, drainage may also become a problem. Poor drainage may cause excessive icy conditions in the winter. With cracks and pieces of asphalt missing, water can get in and under the asphalt. This can also cause the cracks to increase in size when freezing and thawing water is present. Poor drainage and cracks can also cause undermining of the asphalt surface which further deteriorates the overall condition of the surface. With a fresh new surface, parking spaces, crosswalks and traffic guidance is much more easily seen and can often be looked at for optimization leading to a better utilization of the parking area.

Bartlett Elementary Priority (2-4 Years)

The parking lot is showing signs of normal wear and tear and is a candidate for a fresh topcoat of asphalt. The surface has been sealed and maintained over the years as it has many patches and sealant areas throughout the surface. The number of patched areas is so widespread that it may cause distractions to the important markers such as traffic flow directions, crosswalks, and space markers. Plant-growth was noticed in some of the cracks which indicates larger surface cracks that require attention.

Bartlett Elementary School Parking Lot

Goffstown High School Priority (2-4 Years)

Portions of the school's entrance road, walkways and parking lot are showing various signs of deterioration in the asphalt. While the walkways appear to be in decent condition when dry, there are low spots which do not allow water to drain properly and large puddles form. The entrance road is missing large sections of asphalt along the curb which will also cause water to pool and presents a tripping hazard as well. The rest of the parking lot has numerous cracks and patches that have been made over the years. All these conditions may cause water to pool in the winter months which would create hazardous icy slip conditions which put the visitors at risk of potential injury. It is recommended to repave and stripe these areas while providing adequate attention to drainage.

Goffstown High School Pavement Showing Signs of Deterioration

Glen Lake School Priority (2-4 Years)

The portion of the driveway entrance by the road is a low point of the surrounding asphalt. This causes water to pool in this area. During the winter months, this location becomes a hazardous condition when the water becomes ice causing concern for vehicles pulling into the school and pedestrians crossing the street in that area. Infilling the asphalt to provide the proper pitch for natural draining with the addition of a drainage system would alleviate this condition a provide a safe entrance condition for the school year-round. There are also some cracks in some areas that are presenting a trip hazard. These areas should be repaired with a patch of asphalt. Repaving the driveway is an option as well to prevent patchwork areas.

Glen Lake School Roadway Entrance Pooling

Mountain View Middle School Priority (2-4 Years)

The main parking lot and access road are showing various signs of deterioration. There are multiple spots in the parking lot where portions of the asphalt are missing and water pools. Not only does this create tripping hazards but it is also subject to icy slip conditions in the winter months which puts the visitors at risk of potential injury. The access road has numerous cracks in the asphalt which will fill with water and freeze which will further accelerate deterioration. The stripping throughout the property is faded to the point where some of the lines are hard to see. It is recommended that the asphalt in the parking lot and access road be replaced with new stripping.

Mountain View Middle School Parking Lot Deterioration

9.2 Hazardous Material Remediation

Hazardous material such as asbestos and lead paint were widely used in construction before the 1980's. These materials can pose a severe health risk if disturbed and ingested or inhaled by an individual. Asbestos was a popular material in building insulation and adhesives used in flooring and roofing products. For academic buildings with hazardous materials, special mitigation plans and periodic testing need to be completed to help ensure the building occupants are not being affected. This introduces a recurring cost and inconvenience on the Client to deal with. If funding is available, all hazardous material within a building should be properly abated so that a healthy environment can be more easily maintained.

Goffstown High School High Priority (0-2 Years)

There are reports of asbestos in the flooring material of the Tech Hallway as well as rooms 101, 103, and 105. Previous abatement efforts have removed much of the remaining asbestos except for these areas.

Maple Avenue Elementary High Priority (0-2 Years)

There are reports of asbestos in the insulation under the sinks in some of the classrooms as well as in some closets. This hazardous material should be abated to avoid students and faculty from disturbing the material and presenting severe health hazards once the material is airborne.

SAU Office Priority (2-4 Years)

The SAU office contains asbestos throughout the attic spaces, especially in the wallboard material. Lead paint is also potentially present. Because of this, the space cannot be properly utilized. A hazardous material survey should be completed to identify all the material that should be removed. With this space cleaned and renovated, the office would gain a great space for storage and potential office space build out.

9.3 LED Message Board

Implementing a new LED message board at a school's entrance offers several advantages, including enhanced communication of important announcements and events. The interactive displays boost student and community engagement, promoting active participation in school activities and fostering a vibrant school culture. This approach is cost-effective and time-efficient, as it eliminates the need for constant printing and distribution of physical signage. The boards can be easily customized to display various content types, creating visually appealing and dynamic displays for visitors. Ultimately, the modern and professional appearance of the LED message board contributes to a positive first impression and helps to establish a centralized hub for school-related information.

Glen Lake School ✓ Recommended (4+ Years)

The existing message board for this school requires one of the employees to manually update the sign's message. This static message is limited to the number of characters available based on the size of the sign. This often results in single cryptic messages that have limited detail. A new digital sign would allow the school to rotate through different messages and graphics allowing better communication between the school and the community.

Glen Lake School Message Board

Maple Avenue Elementary ✓ Recommended (4+ Years)

The existing message board for this school requires one of the employees to manually update the sign's message. This static message is limited to the number of characters available based on the size of the sign. This often results in single cryptic messages that have limited detail. A new digital sign would allow the school to rotate through different messages and graphics allowing better communication between the school and the community. This sign is also showing signs of aging which takes away from the vibrant image of the school.

Maple Avenue Elementary Message Board

Mount View Middle School Recommended (4+ Years)

The existing message board for this school requires one of the employees to manually update the sign's message. This static message is limited to the number of characters available based on the size of the sign. This often results in single cryptic messages that have limited detail. A new digital sign would allow the school to rotate through different messages and graphics allowing better communication between the school and the community. This sign is also showing signs of aging which takes away from the vibrant image of the school.

Mountain View Middle School Message Board

9.4 Furniture Replacement

New furniture contributes to the overall aesthetic appeal of classrooms and other spaces, creating a more inviting and comfortable atmosphere for students and educators alike. Functionally, updated furniture provides a safer and more conducive setting for learning, reducing the risk of accidents or injuries associated with worn-out pieces. Improved ergonomics can enhance students' posture and focus, promoting better academic performance. Upgrading school furniture also reflects a commitment to investing in the well-being and success of students, fostering a sense of pride and motivation within the school community. Ultimately, the benefits extend beyond mere aesthetics, positively influencing the overall educational experience for both students and teachers.

Goffstown High School Priority (2-4 Years)

The high school library furniture is old and is falling apart. The laminate coatings of the wooden shelves have been delaminating for some time now. Staff and maintenance have both stated the need to replace it and refresh the library's look. New shelving, circulation desk, tables and chairs, information desk, study desks, PC desks, etc. will help improve the look and learning environment of the library as well as reduce maintenance and upkeep each year.

Goffstown High School Library Furniture in Poor Condition

9.5 Sound System

Upgrading the sound system in a school brings many benefits that significantly enhance the overall educational environment. First and foremost, a modernized sound system ensures clear and crisp audio delivery, fostering improved communication between educators and students. This clarity is important in large auditoriums or classrooms, ensuring that every student can hear lectures, presentations, and announcements without distortion. Furthermore, a high-quality sound system can play a crucial role in school events, assemblies, and performances, providing an enriched

and immersive experience for both participants and audiences. Overall, investing in a state-of-the-art sound system not only improves the technical aspects of communication but also contributes to a positive and dynamic educational atmosphere.

Goffstown High School Priority (2-4 Years)

Portions of the sound system in the Goffstown High School were not recently not functional. The gym and auditorium were repaired which left only the cafeteria with a non-working sound system. The sound system should be replaced with similar scope that was done in the other spaces. This issue was brought up by the school faculty.

9.6 Space Repurposing

Repurposing underutilized spaces within a school can yield numerous benefits. By reimagining the use of neglected space, schools can optimize their limited resources and square footage. This repurposing can also lead to the creation of innovative and multifunctional areas that cater to diverse educational needs. For instance, transforming a seldom-used corridor into a collaborative learning hub or a disused storage room into a technology center can enhance the overall educational experience for students. Moreover, repurposing spaces allows schools to adapt to evolving academic approaches, facilitating the integration of modern teaching methods and technologies. The process encourages creativity and efficiency in space utilization, ultimately contributing to a more vibrant and adaptable educational institution.

Goffstown High School Recommended (4+ Years)

The Step Room in Goffstown High School is no longer utilized as it once was. This is a great opportunity to recapture the space and utilize it to fill a present need of the school. In this case, the Step Room could be renovated and converted into a presentation room with new seating and a projector system. This would allow the room to be utilized by the faculty and students in various learning scenarios.

9.7 Theater Storage Expansion

Goffstown High School Recommended (4+ Years)

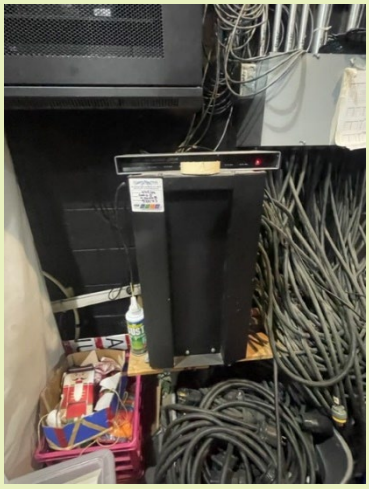
The Theater storage area in the Goffstown High School is currently undersized which causes problems for the production crew. To accommodate more space for storage, a new structure could be built off the back of the Theater on the existing concrete slab. This estimated 30’ x 60’ heated space would include an exterior overhead door and have double doors into the back of the Theater to accommodate large production items. Any other requirements for this space, such as shelving and other storage options would be closely discussed with the school so that the direct needs of the space can be met.

9.8 Theater Lighting Upgrades

Goffstown High School Recommended (4+ Years)

Currently the Goffstown High School Theater lighting is very limited in what it is capable of undertaking. The biggest issue is the ability to dim as required by the

stage crew. It is recommended to replace the existing lighting controller with a new controller that meets the current and future needs of the stage crew.



Goffstown High School Lighting Controller

END OF REPORT