

Fairfield Board of Education

Proposed

Capital & Non-Recurring Projects

2021 – 2022

**Districtwide HVAC Retro-Commission:
Rebalance of School Mechanical Systems**



**Fairfield Ludlowe High School
Building Automation System Upgrade**

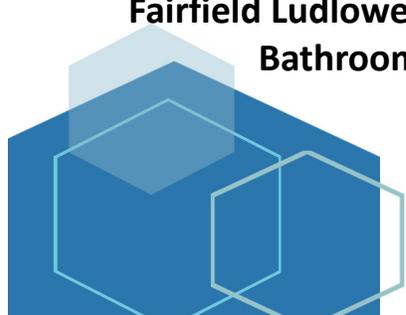


**Fairfield Ludlowe High School Student
Bathroom Renovation**



Burr Full Roof Replacement

Approved by the Board of Education
on
January 28, 2021



January 11, 2021

Dear Board of Education Members:

This booklet provides an overview of the following 2021-2022 Proposed Capital Non-Recurring and Capital Project Requests:

Capital Non-Recurring Projects:

1. Districtwide HVAC Retro-Commissioning

Capital Projects:

1. Fairfield Ludlowe High School Student Bathroom Project
2. Burr Elementary School Roof Replacement Project
3. Fairfield Ludlowe High School-Building Automation System Upgrade

I have included all of the above projects in the Fairfield Public Schools' Facilities Plan. Information for each project is provided using the 12-point format devised by the Town of Fairfield and includes:

- Justification and background information;
- A cost estimate that includes previous project information, verbal quotations, and/or written proposals;
- Photographs of projects in existing conditions; and
- Photos of expected new conditions.

We hope you find this information helpful, and we are confident it will answer many of your questions as we begin the budget discussions. Thank you for your continued support.

Sincerely,



Michael Cummings
Superintendent of Schools

**Fairfield Public Schools
2021-2022
Capital & Non-Recurring Projects**

Table of Contents

<u>Location</u>	<u>Project</u>	<u>Estimated Cost</u>	<u>Page</u>
Non-Recurring Projects			
Districtwide	Retro-Commissioning: Rebalance of School Mechanical Systems	\$ 625,000	1
Capital Projects			
Burr Elementary School	Full Roof Replacement Project	\$ 1,542,150	9
Fairfield Ludlowe High School	Student Bathroom Project	\$ 2,111,000	15
Fairfield Ludlowe High School	Building Automation System Upgrade	\$ 1,750,000	19
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Total		\$ 6,028,150	

Non-Recurring Projects

Districtwide

Retro-Commissioning: Rebalancing of School Mechanical Systems

\$ 625,000

Background: The COVID-19 pandemic has necessitated the need to evaluate and make changes to the schools' mechanical systems. The proposed work is based on the recommendations of ASHRAE and guidance from the State of Connecticut.

The American Society of Heating and Air Conditioning Engineers (ASHRAE) focuses on building systems, energy efficiency, indoor air quality, refrigeration, and sustainability within the industry. ASHRAE has published over 4000 standards for the design and maintenance of indoor environments. ANSI/ASHRAE Standards Standard 62.1-2016 and 62.2-2016 are written in enforceable mandatory language to facilitate adoption into building codes.

Their position regarding the transmission of SARS-CoV-2 and the operation of HVAC systems during the COVID-19 pandemic is that the transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the process of heating, ventilating, and air conditioning systems, can reduce airborne exposures. Ventilation and filtration provided by heating, ventilating, and air conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air.

This project's primary goal is to evaluate existing ventilation and filtration air systems at the Fairfield Public School buildings, make recommendations for improvement, and implement the recommendations.

Due to the sudden emergence of the COVID-19 pandemic, adequate ventilation and air filtration in densely occupied interior spaces are essential to reduce the spread of airborne particles that transmit SARS-CoV-2. This virus causes COVID-19 disease, as well as other airborne contaminants. Since the SARS-CoV-2 virus developed suddenly over a few months, prior knowledge of how this virus spread was initially unavailable. Current building codes are not yet updated to reduce the transmission of the SARS-CoV-2 particles. However, the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE), a governing body for the design, operation, and maintenance of HVAC systems, has been investigating the transmission of SARS-CoV-2 through HVAC systems. They have made recommendations on adapting existing HVAC systems to minimize the virus' transmission, causing the COVID-19 disease. This project aims to determine the current effectiveness of ventilation and air filtration for occupied spaces within school buildings in relation to ASHRAE recommendations to reduce the transmission of the SARS-Cov-2 virus. In areas where ventilation or filtration does not meet either code requirements or ASHRAE SARS-CoV-2

mitigation recommendations, Van Zelm will make recommendations on how to meet those requirements or recommendations.

Purpose & Justification: The State of Connecticut issued a Guidance for School Systems for the Operation of Central and Non-Central Ventilation Systems during the COVID-19 Pandemic document dated June 22, 2020. The first recommendation in it to Commission the building mechanical systems.

With the schools now open and occupied, there is a need for immediate results. Van Zelm's approach to this project is to make changes that increase the quantity of outside air as we perform each building's study. Therefore, implementing the ventilation and operational improvements will begin shortly after the project's start rather than at the end of the project.

The study will analyze the existing HVAC units throughout the buildings, with respect to how well these units may prevent the transmission of airborne viruses. The units' performance will be compared to guidance released by ASHRAE on air distribution systems' operation to minimize the transmission of airborne contaminants.

Detailed Description:

- Commissioning work will be performed at all schools except Mill Hill and Holland Hill, which have been excluded at the request of Fairfield Public Schools. Testing, Adjusting, and Balancing (TAB) work will be performed at all schools within the scope.
- The project aims to verify system operation and improve the ventilation and air filtration of the mechanical systems.
- The amount of code required for ventilation air will be calculated and documented.
- The ventilation air quantity will be increased to the extent possible while still allowing the HVAC units to control the environmental conditions in the areas served.
- The TAB contractor will measure and verify the airflow of each unit.
- All COVID related changes will be documented so that the systems can be restored to pre-pandemic (code required) values in the future.

Estimated Cost: The cost of this funding request is \$625,000.

Long Range Costs: There should be no additional long-range costs. Pandemic related changes would be considered short term, and there may be potentially long term savings through energy conservation measures.

Demand on Existing Facilities: This project would increase the equipment's mechanical efficiency due to the repair and implementation of deferred maintenance. The energy consumption will likely increase due to extended run times and increased ventilation air.

However, other energy-saving opportunities may be proposed to offset some of the increases and have lasting savings.

Security, Safety, and Loss Control: This project would increase safety for the school district by increasing the air filtration capability and outside air quantity to the building where possible.

Environmental Considerations: This project is intended to reduce the possible transmission of airborne pathogens related to viruses such as SARS-Cov-2.

Funding, Financing & Office of School Construction Grants Review (OSCG&R): This project would not proceed without funding approval. There are no State or Federal regulations that require this project to be undertaken. This project is not eligible for reimbursement through OSCG&R.

Schedule, Phasing & Timing: This project's schedule would have all the work completed as soon as possible. Work in classrooms or offices will need to be scheduled around building occupancy.

Other Considerations: This work will be bid out by the Town Purchasing Department and performed by an outside professional licensed contractor.

Alternates to The Request: The alternate to this request would be to do nothing or reduce the level of services provided.

Districtwide

**Retro-Commissioning
Rebalancing of the School Mechanical Systems**

\$ 625,000

Details

Consultant for Professional Services

Prepared by: Van Zelm Engineers

Breakdown:

Retro-Commissioning (RCx) Services to be provided to investigate mechanical systems related to improving ventilation and air filtration. Implementation of recommendations shall be done concurrently with the RCx work to expedite the improvement in the environmental conditions. Testing, Adjusting, and Balancing (TAB) will be performed as part of the overall process work performed in the following schools.

Burr Elementary School 1960 Burr Street Fairfield, CT 06824 203-255-7385	Osborn Hill Elementary School 760 Stillson Road Fairfield, CT 06824 203-255-8340
Dwight Elementary School 1600 Redding Road Fairfield, CT 06824 203- 255-8312	Riverfield Elementary School 1625 Mill Plain Road Fairfield, CT 06824 203-255-8328
Jennings Elementary School 31 Palm Drive Fairfield, CT 06825 203- 255-8316	Roger Sherman Elementary School 250 Fern Street Fairfield, CT 06824 203-255-8330
McKinley Elementary School 60 Thompson Street Fairfield, CT 06825 203-255-8318	Stratfield Elementary School 1407 Melville Avenue Fairfield, CT 06825 203-255-8332
North Stratfield Elementary School 190 Putting Green Road Fairfield, CT 06825-1199 203-255-8322	Fairfield Ludlowe High School 785 Unquowa Road Fairfield, CT 06824 203- 255-7201
Fairfield Woods Middle School 1115 Fairfield Woods Road Fairfield, CT 06825 203-255-8334	Tomlinson Middle School 200 Unquowa Road Fairfield, CT 06824 203- 255-8336
Roger Ludlowe Middle School 689 Unquowa Rd, Fairfield CT 06824 203-255-8345	Fairfield Warde High School 755 Melville Avenue Fairfield, CT 06825 203-255-8354

The following steps will be undertaken to complete the study:

1. Review the existing HVAC documentation for the buildings noted above.
2. Meet with facilities staff and review any problems or concerns with existing HVAC systems.
3. Review/develop summary spreadsheets indicating, by building, HVAC system type, age, heating/cooling service, airflow, filtration, outside air quantity, exhaust capability, etc.
4. Undertake fieldwork to observe the condition, operation, and controls of all existing HVAC systems. Document condition and any observed operational issues.
5. Remote monitoring of the Building Automation Systems (BAS).
6. Review existing industry standards regarding the transmission of infectious disease via HVAC systems and recommendations to minimize transmission potential related to observed conditions.
7. Calculate the required ventilation quantities for each space if design documents are not available with this information. Information will be given to TAB Contractor to allow for proper air balancing (water balancing has not been included).
8. Engage the services of a TAB Contractor.
9. Develop and evaluate options to improve indoor air quality and minimize the potential for transmission of infectious disease with a minimum impact on environmental comfort, including:
 - Improved filter efficiency
 - Alternative filtration approaches (bi-polar ionization, electrostatic, etc.)
 - Increase airflow and/or ventilation rates
 - Demand-controlled ventilation
 - Ultraviolet sterilization/Bi-Polar Ionization
10. Implement increased ventilation to the extent possible.
11. Coordinate work with BAS, TAB, and Mechanical Contractors.
12. Review options with Fairfield Public School staff and develop final recommendations.
13. Develop a summary report with all findings, recommendations, and conclusions.

\$ 250,000

Testing, Adjusting, and Balancing Contractor

Prepared by: Van Zelm Engineers

Breakdown:

Carry a budget for the TAB Contractor to measure and adjust airflows at the direction of the RCx Provider.

1. Measure and adjust HVAC unit airflows as required.
2. Measure and adjust the diffuser airflows as required.

\$ 325,000

Controls Contractor

Prepared by: Van Zelm Engineers

Breakdown:

Carry a budget for the Building Automation Contractor to make programming changes in the direction of the RCx Provider.

1. Work directly with RCx Provider to adjust the HVAC controls.
2. Implement programming changes to revise the sequence of operations as directed by the RCx Provider.

\$ 30,000

Contingency

Prepared by: Van Zelm Engineers

Breakdown:

Carry a contingency for unforeseen conditions requiring mechanical repair work.

\$ 20,000

Total

\$ 625,000



Districtwide Retro-Commissioning: Rebalance of the School Mechanical Systems

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Capital Projects

Burr Elementary School

Full Roof Replacement Project

\$ 1,542,150

Background: Burr Elementary school was a newly constructed building in 2004. With a roof warranty that expired in May of 2019. The roof has been showing signs of failing for approximately one year. We have had several roofing contractors out to look at and make repairs to the roof. With the continuation of water penetration, we feel the best next step is to replace the roof.

Purpose & Justification: Failure to replace this roof may result in water infiltration to the building. If the water gets into the building, it will likely result in an internal air quality (IAQ) issue, creating a potential health issue in the building.

Detailed Description: This expenditure would cover the total cost of the project. This includes all labor and material to remove roofing down to the metal decking. Once removed, a new roofing system will be installed.

Estimated Cost: The cost of this funding request is \$1,542,150. This number was arrived at by working with a roofing contractor who has been awarded several town bids for similar projects along with a professional licensed engineering firm in CT, using the industry standard.

Long Range Costs: Once completed, the new roof will carry a warranty for 20 years. There will be minor upkeep and cleaning requirements.

Demand on Existing Facilities: This project would reduce the cost of maintaining the roof as it would reduce service calls caused by water intrusion.

Security, Safety, and Loss Control: This project would enhance safety by the hardening of the building shell. A compromised roofing system can allow moisture into the building, creating numerous IAQ concerns.

Environmental Considerations: The IAQ is compromised when a roof has a continued leaking failure.

Funding, Financing & SDE Reimbursement: This project would not proceed without funding approval. This project will be assigned to the Town's special standing building committee and will apply for funding reimbursement from the state's Office of School Construction Grants Review (OSCG&R) program.

Schedule, Phasing & Timing: The schedule is to have all this work done in the summer of 2021 and completed for school to open in September of 2021.

Other Considerations: The work will be bid out by the Town Purchasing Department and performed by outside professional licensed contractors.

Alternates to the Request: The alternate to this request is to do nothing. This alternative will delay the needed repairs to the roofing system and could affect the ability of the school to operate safely.

Burr Elementary School

Full Roof Replacement

\$ 1,542,150

Details

Licensed Contractor to Provide Labor and Materials

Prepared by: Silktown Roofing

Breakdown:

Set-up safety for associates to perform their scope of work, and to protect the occupants of the property.

Remove the existing roofing system down to the existing metal deck.

Install new pressure treated wood blocking to the height of the new perimeter edges.

Install new Polyisocyanurate insulation including ¼" per foot-tapered system with an average R-36 value to be in compliance with 2015 IECC guidelines.

Install new two-ply SBS Modified Bitumen roofing membrane system in cold applied adhesive with a granulated cap sheet.

Install all flashings per manufacturer's specification.

Remove and replace existing drain bowl assemblies.

Install new extruded metal siding with Kynar finish over masonry walls within the depressed rooftop mechanical area.

Install new extruded metal edges with Kynar coated color cover plate that has been pretested and approved per ANSI -SPRI ES-1 specifications. (Color will be selected from standard color selections)

Install new expansion joints to replace existing.

Fabricate and install new counter flashings as needed for proper termination.

Clean up and dispose of all debris from the above scope of work.

Provide a 20-year No Dollar Limit (NDL) warranty that includes the cost of both labor and material to repair any leaks or material failures during the warranty period.

\$ 1,341,000

Consultant for Professional Services

Prepared by: Fairfield Public Schools Central Office

Breakdown:

Architect will provide the following professional services related to the scope of work described in this proposal:

Review original Contract Documents and previous reports as such documents relate to conditions described in the Scope of Work and are supplied to architect by the Fairfield Public Schools.

Visit the site to verify existing conditions and construction details. Coordinate with a Contractor retained by The Town of Fairfield Public Schools to perform exploratory openings so as to examine concealed conditions.

Based upon the results of architects' field verification activities and the established scope of work, provide a proposed roof replacement system and scope of work for review and approval by the Fairfield Public Schools and Building Committee.

Meet with the CTDAS Office of School Construction Grants and Review for a pre-review evaluation meeting to review requirements for submission of the project.

Based on the agreed upon scope of work, prepare Contract Documents consisting of drawings and specifications, setting forth in detail the requirements for construction of the project.

Meet with the CTDAS Office of School Construction Grants and Review to review the 100% Contract Documents (Plan Completion Test) for comments and approval.

Respond to CTDAS Office of School Construction Grants and Review comments as required.

Assist in the preparation of the necessary bidding information, bidding forms, conditions of the Contract and Form of Agreement between Owner and Contractor.

Assist the Town of Fairfield Public Schools in obtaining bids.

Prepare an agenda for a pre-bid conference at the site.

Conduct a pre-bid conference at the site.

Prepare minutes from the pre-bid conference.

Respond to contractor questions and prepare addenda, as necessary.

Assist the Fairfield Public Schools in evaluating bids and in awarding construction contract.

Conduct a meeting with a representative from the Fairfield Public Schools, Building Committee, and the Contractor prior to the commencement of the work, to review the Contractor's proposal for compliance with the requirements of the Contract Documents.

Review and take appropriate action on Contractor's submittals such as shop drawings, product data and samples, to establish their conformance with the design concept expressed in the Contract Documents; forward to the Town of Fairfield Public Schools, for review and record, written warranties and related documents required by the Contract Documents and assembled by the Contractor.

Visit the site four (4) times during construction to become familiar with the progress and quality of work and to determine if the work is being performed is in general compliance with the Contract Documents.

Conduct meetings in conjunction with site visits to assess the progress of the work. Prepare field observation reports following site visits to document progress and quality of the Contractor's work.

Authorize minor changes in the work if they are necessary and do not involve adjustment to the contract sum or extension of the contract time.

Review and certify amounts due the Contractor.

Visit the site to develop a punch list and again to conduct a final inspection with the Manufacturer's representative.

Determine the date of final completion.

Certify Contractor's requisition for Final Payment based upon the final inspection indicating the work is in general compliance with the requirements of the Contract Documents.

\$ 67,050

Contingency

Prepared by: Fairfield Public Schools Central Office

Breakdown:

Carry a contingency for unforeseen conditions during demolition of old roofing materials down to the existing roof deck.

\$ 134,100

Total

\$ 1,542,150



Burr Elementary School – Full Roof Replacement

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Fairfield Ludlowe High School

Fairfield Ludlowe High School Student Bathroom Renovations

\$2,111,000

Background: Fairfield Ludlowe High School was initially constructed in 1950 and underwent renovations and additions in 1963, 1972, 1995, 2005, and 2015. Over the years, the bathrooms have received cosmetic makeovers, but have not received complete renovations in over seventy years of operation. The bathrooms are becoming more challenging and cost-prohibitive to keep up and running.

Purpose & Justification: The Fairfield Ludlowe High School bathrooms have a failing infrastructure. The piping in the bathrooms has become older and brittle, causing leaks and increasing the cost to keep them open and running safely for students. Also, many of the bathrooms do not meet the newer code requirements for ADA compliance. Many of the fixtures are showing signs of age and chipping, making them dangerous for students (along with the chipping of the paint on the tiles) and the paint chipping off the tiles.

Detailed Description: This expenditure would cover the total cost of the architectural design, permits, construction and renovation, and Certificate of Occupancy.

Estimated Cost: The cost of this funding request is \$2,111,000. This number was arrived at using industry standards for construction pricing and working with Colliers International, our project owners representative for many of our school projects.

Long Range Costs: The only long-range cost would be routine maintenance of student bathrooms.

Demand on Existing Facilities: This project would decrease the demand on facilities by having all new lower maintenance equipment, including, but not limited to, fixtures and behind the wall piping.

Security, Safety, and Loss Control: The newly renovated bathrooms would increase safety by offering new piping and fixtures, decreasing water leaks and possible injuries from old broken, cracked fixtures. Security would also be incorporated in the design safe for locks down and student activities, providing new piping and fixtures that would decrease water leaks and possible injuries from broken and cracked fixtures. The new designs incorporate enhanced safety features during lockdowns and student activities.

Environmental Considerations: This project will include a look at all environmental impacts and the ability to make the bathrooms energy efficient while keeping them operational for the constant daily use they receive.

Funding, Financing & Office of School Construction Grants Review (OSCG&R)): This project would not proceed without funding approval. There are no State or Federal regulations that require this project to be undertaken. This project is not eligible for reimbursement through OSCG&R.

Schedule, Phasing & Timing: This project's schedule would be to have all the work completed during the summer recess of 2021, allowing for occupancy for the 21-22 school year with fully functioning bathrooms.

Other Considerations: This work will be bid out by the Town Purchasing Department and performed by a licensed professional contractor.

Alternates to The Request: The alternative to this request would be to keep performing regular maintenance and repairs to failing infrastructure at a higher cost to the Board of Education Operating Maintenance Budget.

Fairfield Ludlowe High School

Student Bathroom Renovations **\$ 2,111,000**

Details

Architectural Firm:

TBD \$234,600

Licensed Contractor to Provide Labor and Materials

TBD/ By Town bidding process

Break Down

Renovation
Demolitions
Removal and disposal of all materials
FFE \$1,641,000

Contingency \$209,700

Unforeseen Hazardous Materials \$25,700

Total **\$ 2,111,000**



Fairfield Ludlowe High School – Student Bathroom Renovation

Fairfield Public Schools

Fairfield Ludlowe High School-Building Automation System Upgrade

\$ 1,750,000

Background: The school currently has a 1999 vintage JCI Metasys® Building Automation System (BAS) with a standard array of controlling devices. Some of the main control components include:

- Network Control Units (NCU)
- Metasys System Devices (DX-9100)
- Unitary Controllers (UNT)
- Variable Air Volume Modular Assembly (VMA)

As part of a recent project to address network security concerns, the existing XP Metasys workstation and global controllers were replaced with new Automated Logic communication gateways, system integrators and new WebCRL operators front end software. The new system integrators, known as the “S4 BACnet-N2 Router”, is a 3rd party integration device that allows legacy JCI N2 controllers to communicate with and be controlled by Automated Logic.

Please note: this S4 overlay system was always meant to be an interim solution to the network security concern. It was always anticipated that a new BAS system would be installed in the future to address the condition and age of the end devices.

Purpose & Justification:

The Building Automation system is a key component in the management of information and performance of the wide variety of Mechanical Systems that the Facilities Department is responsible for maintaining. It should provide an optimum interface and control to all building Mechanical Systems.

It is worth noting that vanZelm Engineers had thoroughly evaluated the current condition and effectiveness of the JCI control system, as far back as 2009.

The existing JCI control system, as it stands, should be replaced. Some of the reasons are as follows:

1. Service Life: as with most systems, there is a service life for a BAS (typically no more than 15-20years).
2. Parts: It has become increasing difficult and costly to obtain replacement parts for the system. This poses a significant risk to the School should a major failure occur with the BAS.
3. Performance: Existing Equipment Controllers become less reliable and are very limited in their ability to incorporate changes in control sequences of operations that could save energy, improve comfort and address building ventilation.
4. Energy Usage: the limited functionality of the current system does not allow for complex control strategies related to energy conservation. A full BAS Upgrade would allow the

school to take advantage of the modern BAS to potentially achieve significant energy savings.

5. Standalone HVAC system: there are also various pieces of HVAC equipment currently in place that are essentially “stand-alone” systems, with little or no connectivity to the BAS. Upgrading the BAS would allow for this equipment to be connected to the BAS, which would greatly improve the operation and troubleshooting of these HVAC systems.

Detailed Description:

1 Design Phase

Engineer will prepare bid documents for the purpose of identifying the necessary components in need of upgrading.

2 Construction Phase

Once project has been awarded, the successful bidder will systematically install new components throughout the school based on an agreed phasing schedule under the guidance and direction of Owners Project Manager.

3 Commissioning Phase

As each phase of the project has been completed by the installing Contractor, the Cx Agent will ensure that the completed system performs to standards set forth in the design documents and that the Owner’s Operations and Maintenance Personnel are fully trained in system operation.

Estimated Cost: The cost of this funding request is \$ 1,765,000.

Long Range Costs: The long range costs will yearly Preventative Maintenance/Service Contracts. Other potential long range costs could include Mechanical costs associated with valve and or damper replacement, duct cleaning, air balancing and ultimately old equipment upgrade or replacement.

Demand on Existing Facilities: This completed project would allow for easier access and use of the BAS by the facilities department. The overall space condition monitoring the school by the Facilities group, will be greatly improved.

Security, Safety, and Loss Control: This project would increase safety for the school district by allowing for improved control strategies that deal with indoor air quality.

Environmental Considerations: This project is intended to improve the overall environment conditions in the school.

Funding, Financing & OSCG&R: This project would not proceed without funding approval. There are no State or Federal regulations that require this project to be undertaken. This Project is not eligible for reimbursement through OSCG&R.

Schedule, Phasing & Timing: The schedule for this project would have all the work completed as soon as possible. Work in classrooms or offices will need to be scheduled around building

occupancy. If funded this project would run through summer of 2021 and complete in summer for 2022.

Other Considerations: This work will be bid out by the Town Purchasing Department and performed by an outside professional licensed Building Automation System Contractor.

Alternates to The Request: The alternate to this request would be to do nothing and continue to support antiquated equipment.

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Fairfield Public Schools

Fairfield Ludlowe High School-Building Automation System Upgrade

\$ 1,765,000

Details

Breakdown:

Design Services to be provided to address the removal of the existing Building Automation System (BAS) and the installation of a new modern, up to date system.

Work to be performed in the following schools:

Fairfield Ludlowe High School 785 Unquowa Road Fairfield, CT 06824 203- 255-7201	
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The following steps will be undertaken to complete the BAS upgrade:

1 Design Phase

Budget costs for Engineer Services related to the design phase of the project:

- a. Conduct site visits to confirm As-Built conditions.
- b. Prepare bid documents for the purpose of identifying the necessary components in need of upgrading.
- c. Provide simple floor plans to depict the locations of the equipment and identify the extent of the BAS upgrade.
- d. Provide updated sequences of operation for all systems affected by the upgrade project.
- e. Design of power feeds to new components associated with the BAS replacement.
- f. Work with Utility Company for rebates and incentives.
- g. Attend pre-bid meetings and address Requests for Information.

\$ 55,000

Building Automation System Contractor

Breakdown:

Budget costs for Contractor to upgrade BAS.

- 1. Prepare phasing schedule.
- 2. Provide shop drawings to Engineer for review and approval.
- 3. Install new BAS and communication trunks devices.
- 4. Modify sequences of operation per design documents.
- 5. Create new graphics as required.
- 6. Point to point checkout for all new points.
- 7. Work with Engineer to fully test all upgraded systems.

\$ 1,500,000

Breakdown:

Key commissioning elements include:

- Conduct Commissioning Meetings and Issues Minutes.
- Perform Installation Inspections.
- Develop custom Functional Test Procedures.
- Schedule Functional Performance Testing with BAS Contractor.
- Provide Commissioning Personnel to conduct Functional Performance Testing of all modified equipment and systems throughout the School.
- Maintain Issues Log and Support Correction of Deficiencies.
- Review of the Contractor provided O&M manual and as-built drawings prior to training of the Owner's O&M Personnel.
- Assist with Owner Training.
- Prepare and issues of a final Commissioning report detailing the process and results.

\$ 64,000

Contingency

Breakdown:

Carry a contingency for unforeseen conditions requiring mechanical repair work.

\$ 131,000

Total

\$ 1,769,000