SMYRNA Middle School

Certificate of Necessity

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Project No.: 18047
August 09, 2019

SMYRNA School District

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EXECUTIVE SUMMARY

1.1 Property Information and General MEP systems Condition

Smyrna Middle School is located at 700 Duck Creek Parkway, Smyrna, DE. The School was originally constructed in 2002 with a major renovation in 2006. The 4-pipe HVAC systems were added to the Central Plant chilled water and heating water distribution in 2009. The original boilers and chilled water equipment have been disconnected and shut-down, but remain in place.

SMYRNA MIDDLE SCHOOL BUILDING INFORMATION	
Address	700 Duck Creek Parkway, Smyrna, DE
Year Constructed, Renovations/Additions	2002, 2009
Building Area	120,694 SQ-FT
System Types	4-Pipe system served by The Central Plant.
Survey Date	11-Jul-18
Point of Contact	Scott Holmes

Most of the original equipment is due for replacement or repair immediately. Equipment installed during the 2006 renovation is in fair-good condition overall and appears to be well-maintained.

1.2 Anticipated Lifecycle Replacement

ANTICIPATED LIFECYCLE REPLACEMENT	
Priority	**System / Equipment / Component / Repair**
Immediate	Energy Recovery Units, Air Handling Units, DX Split-Systems, Fans, Make-Up Air Units, Exterior Disconnect Switches at exterior HVAC units that are replaced
Short-Term	Remove Abandoned Equipment
Mid-Term	DX Split Systems, Unit Heaters, Fan Coil Units, Fans, Interior and Exterior Lighting, Special Systems
Long-Term	Pumps, Air Handling Units, Energy Recovery Units, Terminal Units, Split Systems, Unit Heaters, Air Separators, Expansion Tanks, Controls, Switchboards, Panelboards, Generator, Automatic Transfer Switch (ATS), Receptacles, Wiring, Fire Alarm

1.3 Cost Estimates

COST ESTIMATE			
#	**Description**	**Estimated Project Cost**	
1	ERU-5 Maintenance Required	$	3,000.00
2	ERU-1/2 (A/B) Study and Replacement	$	351,500.00
3	RTU-1 thru 9 Replacement (excluding RTU-6)	$	1,049,050.00
4	Kitchen HVAC Replacements	$	457,600.00
5	Copper Domestic Piping Replacement with Uponer PEX	$	686,000.00
6	New Domestic Hot Water System	$	121,000.00
7	Proposed Technology Improvements	$	374,000.00
	Total	**$**	**3,042,150.00**

2 SCOPE AND METHODOLOGY

2.1 Scope

The scope of this report is to assess the condition of existing MEP systems and provide the Smyrna School District a means to prioritize upgrades.

2.2 Methodology

Gipe Associates has made assessments and recommendations based on (4) main factors which include:

- Onsite surveys of equipment by visual inspection
- Review of the existing MEP drawings provided by the Smyrna School District
- Interviews with Maintenance Staff to identify chronic system issues, regular maintenance schedules and historical system operation
- American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Service Life Database (https://xp20.ashrae.org/publicdatabase/)

From these sources, judgements are made to assess equipment condition and determine the expected useful life remaining for MEP systems for this geographical location and use type. Condition assessments have been grouped in order of priority as defined below.

2.3 Condition Assessment Priority Definitions

Code	Priority	Description
P-01	Immediate	Items that are currently overdue or that will be required within the next year (FY19). Equipment condition is either non-operational, in poor condition or not meeting performance needs.
P-02	Short-Term	Items that will be required within the next 2-3 years (FY20-FY22). Equipment condition is fair, signs of wear but still satisfactory as-is, additional maintenance and repair may be required as it continues to age.
P-03	Mid-Term	Items that will be required within the next 4-5 years (FY23-FY25). Equipment condition is good, performing satisfactory and expected to reach its estimated service life with regularly scheduled maintenance.
P-04	Long-Term	Items that will be required 5-10 years in the future (FY26+). Equipment condition is good – excellent, and has many years of useful service life remaining.

The next section describes all major systems, equipment, capacities and condition assessments with a priority code.

3 MECHANICAL AND PLUMBING SYSTEMS

The majority of mechanical/plumbing equipment appear to be functioning adequately but are either overdue for replacement or approaching their estimate useful service life.

Interviews with maintenance staff reported the following issues:

- ERU-1 (labeled ERU-A in the BAS) has had chronic problems with coils cracking and leaking after multiple repairs and a full coil replacement.
- Kitchen HVAC units are under-performing and require frequent maintenance. The AHU, MAU's and exhaust fans need to be replaced.
- The chilled water distribution from the main plant is underserving the building. This issue has been accounted for in the Central Plant Certificate of Necessity Report.
- RTU-6 is under-performing and requires frequent maintenance. The unit is scheduled to be replaced this summer (2018).
- Copper domestic piping is prone to corrosion due to water chemistry in Smyrna. Other schools in the district have experienced this and replaced piping with Uponer Cross-linked Polyethylene piping, commonly abbreviated PEX.

Currently, there are no planned construction projects to expand or renovate the Middle School in any major way.

All systems and equipment are maintained by in-house staff. All service records, engineering drawings and installation manuals have been maintained and filed on-site.

3.1 Heating, Ventilating and Air Conditioning (HVAC)

The building utilizes a 4-pipe HVAC system with primary chilled and hot water pumped from the Central Plant to secondary pumps located in mechanical rooms onsite. Original boilers and chilled water units have been disconnected and shut-down but remain in place. Air handlers are located throughout the building in mechanical mezzanines and on the roof.

The newer East Wing of the building has 4-pipe variable air volume (VAV) systems to distribute conditioned air to classrooms and administrative offices. Ventilation is provided by Energy Recovery Units (ERU) to recover energy from building exhaust and utilizes the same to pre-condition outside air. Hydronic heating water is also circulated to reheat coils and fin-tube radiators.

Original building classrooms rely on 4-pipe Unit Ventilators (UV) for space conditioning and ventilation.

Large specialty spaces such as the Gym and Cafeteria have dedicated 4-pipe Air Handling Units (AHUs).

The following tables group all of the building's mechanical equipment and provide a condition assessment priority code.

ABANDONED CENTRAL HEATING SYSTEM		
System or Unit Type		Service Life Estimate (years)
Boiler(s), Hot Water		**25**
P-02	Quantity	3
	Capacity	1,357 MBH input each
	Performance Efficiency	79.9%
	Fuel	Dual: Natural Gas and #2 Oil
	Plant Heating Capacity	3,252 MBH
	Location	Boiler Room
	Service	N/A (Abandoned)
	Nameplate Date	2006

ABANDONED CENTRAL COOLING SYSTEM		
System or Unit Type		Service Life Estimate (years)
Chiller, Air-Cooled Screw		**23**
P-02	Quantity	1
	Capacity	225 Tons
	Performance Efficiency	1.25 kW/ton
	Compressor Qty	2
	Refrigerant	R-134A
	Location	Roof
	Service	N/A (Abandoned)
	Nameplate Date	2002
Closed Circuit Cooler, Galvanized Metal		**22**
P-02	Quantity	1
	Capacity	83.3 Tons
	Location	Roof
	Service	N/A (Abandoned)
	Nameplate Date	2002

HYDRONIC DISTRIBUTION		
Equipment Type		Service Life Estimate (years)
Pump(s), Base-mounted		**20**
P-04	Quantity	2
	Capacity	15 HP
	Control	Variable Speed, 2-way Control Valves
	Location	Mechanical Room
	Service	Heating Secondary Circulation
	Nameplate Date	2006
P-04	Quantity	2
	Capacity	25 HP
	Control	Variable Speed, 2-way Control Valves
	Location	Mechanical Room
	Service	Chilled Water Secondary Circulation
	Nameplate Date	2006

AIR DISTRIBUTION SYSTEMS		
Equipment Type		Service Life Estimate (years)
Air Handling Unit(s), Variable Volume		**24**
P-04	Quantity	2
	Capacity	16,025; 17,500 CFM
	Location	East Wing Mechanical Mezzanine
	Service	East Wing 1st and 2nd Floor
	Nameplate Date	2006
Air Handling Unit(s), Constant Volume		**24**
P-01	Quantity	7
	Capacity	630 - 5,900 CFM
	Location	Roof
	Service	Cafeteria, Locker Rooms, Computer Lab, Media Center, TV Studio, District Offices, Kitchen
	Nameplate Date	2002
Air Handling Unit(s), Energy Recovery		**24**
P-04	Quantity	2
	Capacity	6,650; 7,925 CFM
	Location	Roof, Mechanical Mezzanine
	Service	East Wing, Multipurpose Room
	Nameplate Date	2006
P-01	Quantity	1
	Capacity	3,300 CFM
	Location	Roof
	Service	Cafeteria
	Nameplate Date	2006
P-01	Quantity	2
	Capacity	3,390; 11,045 CFM
	Location	North Wing Mezzanine, South Wing Mezzanine
	Service	North and South Wing
	Nameplate Date	2002

TERMINAL UNITS		
Equipment Type		Service Life Estimate (years)
Air Terminal, VAV box		**20**
P-04	Quantity	38
	Capacity	350 - 1600 CFM
	Location	Ceiling Plenum
	Service	East Wing 1st and 2nd Floor
	Nameplate Date	2006
Air Terminal, Unit Ventilator		**20**

P-04	Quantity	40
	Capacity	750 - 1,250 cfm
	Location	Exterior Walls
	Service	Classrooms in Original Building
	Refurbished Date	2013
Air Terminal, Fan Coil Unit		**20**
P-04	Quantity	7
	Capacity	375 - 750 CFM
	Location	Above Ceiling, Ceiling Mounted, Wall Mounted
	Service	Stairwells, Office, Teachers Lounge
	Nameplate Date	2006
P-03	Quantity	15
	Capacity	200 - 1,000 cfm
	Location	Above Ceiling, Ceiling Mounted, Wall Mounted
	Service	Corridors, Vestibules, Offices, Storage
	Nameplate Date	2002

SUPPLEMENTAL UNITS		
Equipment Type		Service Life Estimate (years)
Split DX Unit, air-cooled		**17**
P-01	Quantity	2
	Capacity	117; 283 MBH
	Refrigerant	R-410A
	Condensing Unit Location	Roof
	Service	Gym, Admin Office
	Nameplate Date	2002
P-04	Quantity	3
	Capacity	9 - 17 MBH
	Refrigerant	R-410A
	Condensing Unit Location	Roof
	Service	Offices
	Nameplate Date	2013
P-03	Quantity	2
	Capacity	24 MBH
	Refrigerant	R-410A
	Condensing Unit Location	Roof
	Service	Offices
	Nameplate Date	2006
Unit Heater, Hot Water		**20**
P-04	Quantity	4
	Capacity	1,225 CFM each

	Service	Mechanical Mezzanines
	Nameplate Date	2006
P-03	Quantity	17
	Capacity	1,225 CFM each
	Service	Mechanical Mezzanines, Mechanical Room, Storage, Maintenance
	Nameplate Date	2002
Radiant Heater, Hot Water		**25**
P-04	Quantity	20 Linear Feet
	Capacity	2,113 - 1,788 BTU/ft
	Service	Admin Area
	Nameplate Date	2006

VENTILATION SYSTEMS		
System or Unit Type		Service Life Estimate (years)
Make-Up Air Unit, Gas Heat		**15**
P-01	Quantity	2
	Capacity	3,840; 5,120 CFM
	Location	Roof
	Service	Kitchen
	Nameplate Date	2002
Fan, Centrifugal		**20**
P-03	Quantity	13
	Capacity	150 - 2,800 CFM
	Location	Roof, Ceiling Mounted, Inline
	Service	General Exhaust, Elec/Mech, Restroom, Kiln, Storage, Elevator Machine Room, Maintenance
	Nameplate Date	2002
P-01	Quantity	1
	Capacity	600
	Location	Roof
	Service	Dishwasher
	Nameplate Date	2002
P-04	Quantity	3
	Capacity	825 - 3,200 CFM
	Location	Mechanical Mezzanine
	Service	Restrooms, Attic Ventilation, Storage
	Nameplate Date	2006

CONTROL SYSTEM		
System or Unit Type		Service Life Estimate (years)
Controls, Direct Digital (DDC)		**25**
P-04	Location	Central BAS is located in Central Plant
	Service	All major equipment is connected to BAS Control Panels
	Nameplate Date	2009

Planned Improvements

The following items have been identified by the maintenance staff as approved projects that will be completed in the near term:

- RTU-6 replacement is planned for Summer 2018 and was excluded from our cost estimates.

Deferred Maintenance and Replacement

The following items have been identified either during the survey effort or by the maintenance staff as items that require immediate repair or replacement:

- During the site survey ERU-5 serving the cafeteria (see Photograph 1) was noticeably loud, the noise was characteristic of a worn fan motor bearing or shaft (likely the exhaust fan). The unit should be serviced and inspected for any additional damage.

Photograph 1: ERU-5 on Roof

- ERU-1 (labeled ERU-A in the BAS) has had chronic problems with coils cracking and leaking after multiple repairs and a full coil replacement. This points to a possible system design flaw that needs investigation before replacing ERU-1 and ERU-2 (see Photograph 2).

Photograph 2: ERU-2 in Mechanical Mezzanine

- All RTU's original to the building should be replaced. Two of the units are converted DX Split Systems, RTU-2/CU-2A (see Photograph 3) and RTU-7/CU-7. The unit casing's and disconnect switches are rusted and CU-2A condensing fans are vibrating excessively. Further, the systems are charged with R-22, a refrigerant that the EPA is phasing out and will be illegal to produce in 2020. These units should be replaced with packaged DX units.

Photograph 3: Typical Rooftop Unit Split System

The remaining 4-pipe RTU's (see Photograph 4) are similarly rusted and in poor condition. RTU-6 is slated to be replaced this summer but it is suggested that all units (RTU-1 thru 9) be replaced before they begin to fail and require extensive repair.

Photograph 4: Typical RTUs on Roof

- The Kitchen make up air units (KSU-1/KSU-2) and dishwasher exhaust fan EF-3 have had maintenance issues in the past and are in poor condition. These systems are original to the building and need to be replaced.

Photograph 5: Typical Make Up Air Unit and Dishwasher Exhaust Fan

Abandoned Equipment

The original Boilers, Air-Cooled Chiller and Closed Circuit Cooler have been abandoned in place. It is recommended that these units be removed before they begin deteriorating and become a safety risk. These units may still be useful to the Smyrna School District if they can replace older systems currently in use in other buildings, however a further more detailed assessment would be needed to ensure these units are fit for refurbishment and reuse.

Anticipated Lifecycle Replacement

The following list summarizes all major mechanical equipment in fair – excellent condition that will eventually require replacement, refurbishment or repair once they age past their estimated useful life.

- Pumps
- Energy Recovery Units
- Split DX Systems
- Unit Heaters
- Exhaust Fans
- Air Separators
- Expansion Tanks

Future Use and Replacement Recommendations

Long-Term HVAC System Recommendations

Ideally, ventilation systems and space conditioning systems are decoupled. This approach provides the most effective control over space temperature, humidity, and indoor air quality with minimal energy consumption. However, depending on life cycle costs and maintenance preferences, replacement in-kind should also be considered.

Unit Ventilators

Unit Ventilators (UV) were standard HVAC equipment for school classrooms built in the 1990's and earlier, however they have several disadvantages that are well documented compared to modern HVAC system solutions which include:

- Source of noise within the classroom
- Valuable floor space is occupied within the classroom
- Outdoor air control limitations
- Humidity control limitations

Some, if not all of these issues have been documented at SHS.

We strongly recommend refraining from UVs for all new construction and major renovations going forward. As described in the section above, a decoupled design approach is ideal.

However, since there is already a central cooling and heating plant in place with useful remaining service life, it is unrealistic to recommend a complete system replacement. The best compromise is to modify existing UV controls to only provide space cooling (no ventilation) with economizer function. New Energy Recovery Units (ERU) would be installed on the roof or in mechanical mezzanines. This system modification maximizes the use of existing equipment while decoupling ventilation and should be considered a mid-term solution until the next major renovation.

In the next section of our report we review the existing Plumbing systems and equipment.

3.2 Domestic Water Plumbing Systems

PLUMBING SYSTEMS		
Plumbing System		**Description**
P-01	Water Supply Piping	Copper/Galvanized Steel (4" Service)
P-04	Waste/Sewer Piping	Cast Iron
P-04	Vent Piping	Cast Iron/Copper
P-04	Fire Protection	Wet Pipe Sprinkler System (8" Service)
P-04	Water Meter Location	Mechanical Room

PLUMBING EQUIPMENT		
System or Unit Type		Service Life Estimate (years)
Domestic Hot Water Heater, natural gas		**15**
P-01	Quantity	1
P-01	Input Capacity	150 MBH
P-01	Storage Capacity	200 Gallons (2 tanks)
P-01	Expansion Tank?	Yes
P-01	Location	Mechanical Room
P-01	Service	Building HW
P-01	Nameplate Date	2009
Pump(s), Inline		**18**
P-04	Quantity	1
P-04	Input Capacity	1/6 HP
P-04	Location	Mechanical Room
P-04	Service	Domestic Hot Water Recirculation
P-04	Nameplate Date	2009
Pump(s), Sump		**17**
P-04	Quantity	1
P-04	Input Capacity	1/2 HP
P-04	Location	Elevator Pit
P-04	Service	Elevator Pit
P-04	Nameplate Date	2006

PLUMBING FIXTURES		
Typical Plumbing Fixture		**Flush Rating / Flow Rate**
P-04	Water Closet	1.6 GPF
P-04	Urinal	1.0 GPF
P-04	Lavatory	2.2 GPM
P-04	Janitor Sink	4.0 GPM
P-04	Kitchen Sink	2.2 GPM
P-04	Drinking Fountain	0.25 GPM

Planned Improvements

There are no planned improvements for the plumbing system.

Deferred Maintenance

The following items have been identified either during the survey effort or by the maintenance staff as items that require immediate repair or replacement:

- Copper domestic piping is prone to corrosion due to water chemistry in Smyrna. Other schools in the district have experienced this and replaced piping with Uponer PEX (cross-linked polyethylene). It is recommended that the Middle School do the same.
- The domestic hot water heating system is undersized. Maintenance staff has reported inadequate water temperatures in kitchen. It is recommended that the system be replaced with a new larger water heater, mixing valve, recirculation pump and hydronic specialties.

Anticipated Lifecycle Replacement

The following list summarizes all major plumbing equipment in fair – excellent condition that will eventually require replacement, refurbishment or repair once they age past their estimated useful life.

- Water Heaters
- Recirculation Pumps
- Expansion Tanks
- Thermostatic Mixing Valves
- Plumbing Fixtures
- Piping Systems and valves

4 ELECTRICAL SYSTEMS

4.1 Electrical Service

Equipment Type					
Overhead Conductors			Underground Conductors		X
P-04	Transformer	(1) 1,000kVA @ 480V, (1) 750kVA @ 208V, both Customer Owned			
	Utility Company	Town of Smyrna			
	Service Size	(1) 2,000A @ 480V, (1) 1,600A @ 208V			
	Meter	Primary Meter	Location	Mounted next to utility pole at back of middle school property	
	Main Service Ground	Yes			
	Main Switchboard	(1) MDS – 2,000A (1) DS – 1,600A	Main Distribution Panelboard		
	Manufacturer	Square D	Installation Date		8/2002

Equipment Type		
Panelboard(s)		
P-04	Type	Distribution – HCP, Branch Panelboards – NF or NQ
	Manufacturer	Square D

The building has a 2,000A, 277/480V, three phase switchboard and a 1,600A, 120/208V, three phase switchboard located in the main electrical room. Based on information we received from the Town of Smyrna, the peak demand for the building in the last 12 months is 324 kW which converts to 390 Amperes (A). The existing two main switchboards have a combined maximum capacity of 2,880A. With the school having a primary meter located ahead of the pad mounted transformers that serve the school, we are not able to determine the peak demand on each switchboard. However, it appears that the existing switchboards have adequate space and capacity to support additional load.

There are no immediate or significant repairs that need to be made to the electrical service or panelboards. The switchboard and panelboards throughout the school are manufactured by Square D and were installed in 2002 or 2007 and appear to be in fair to good condition.

4.2 Emergency Power

Equipment Type		
Emergency Power		
P-04	Gen - Manufacturer	Kohler
	Size	200kW
	Fuel Type	Diesel
P-04	ATS (Manufacturer)	Kohler – (1) 400A Standby

The generator is located on a concrete pad at the back of the building with a PMH-5 switch, and the two pad mounted transformers. The generator was installed in 2002 and according to our conversation with the maintenance staff the generator is self-tested once each week. The generator is installed in a weather-proof enclosure and has a diesel tank under the same. There do not appear to be any immediate or significant repairs that need to be made to the generator.

4.3 Lighting Systems:

Equipment Type		
Lighting		
P-03	Interior Lighting	Type: Linear Fluorescent, T8, T5; Metal Halide
P-03	Exterior Lighting	Type: Wall mounted and parking lot poles with Metal Halide lamps
P-04	Emergency Lighting	Type: Light fixtures throughout the building are fed from emergency circuit.
	Illuminated Exit Signs	Yes
P-04	Lighting Switches (Mounting Height)	46” to center of switch
P-04	Lighting Switches (Mounting Height) ADA Compliant	Yes

4.4 Power

Equipment Type		
Power		
P-04	GFCI receptacles at required locations	Yes
	Duplex receptacles (Grounding or no)	Grounding
	Duplex receptacles at HVAC equipment	Yes
P-04	Building Wire	Copper
P-04	Step-down transformer	Good condition
P-04	Interior disconnects	Good condition
P-01	Exterior Disconnects on Roof	Replace exterior disconnects for all HVAC units that are replaced. Otherwise exterior disconnect switches to remain.

4.5 Special Systems

Equipment Type		
Special Systems		
P-03	Telephone Entrance	MDF Room
	Cable TV Service	Yes
	Fiber/Data on site	Yes
	Data racks (Location or spare capacity)	MDF Room, IDF rooms – Yes spare capacity
	Data Cabling	CAT 5
	CCTV	Yes
	Security (Manufacturer)	Honeywell
	Intercom (Aiphone)	Yes located at the front entry doors.
	Card Reader(s)	Yes

While the lighting systems are not in immediate need of replacement, as part of general improvements to the building, changing from fluorescent and metal halide light sources to LED light sources would result in energy savings. During our walk-through of the building it was noted that a couple of the Metal Halide (MH) pendant gym lights have been replaced with LED pendant gym lights as the MH lights need replacement. Some of the exterior lights are beginning to show signs of wear due to the weather and will probably need to start being replaced within the next 4-5 years. Installing lighting controls such as occupancy sensors in the classrooms throughout the building could also increase energy savings as the current building does not have an automatic means to turn off the lights in that space when that space is unoccupied. It was noted that occupancy sensors had been installed in the bathrooms, but not in other areas of the building. The current lighting controls do not comply with the current edition of ASHRAE 90.1. Routine and periodic maintenance of the lighting system is recommended.

There are no immediate or significant repairs that need to be made to the building receptacles. Many of the exterior disconnects are showing signs of rusting, so we would recommend that new NEMA 4X, stainless steel disconnects be provided for all exterior HVAC equipment that is replaced. The technology department has some planned improvements for buildings special systems as outlined below in the planned improvements section of this report.

4.6 Fire Alarm System

Equipment Type			
Fire Alarm System			
P-04	**Item**	**Yes**	**No**
	Horns or Bells		X
	Strobe Lights	X	
	Voice Evacuation	X	
	Battery Back-up	X	
	Automatic Dialer	X	
	Smoke Detectors	X	
	Outdoor Bell	X	
	Duct Detectors	X	

	Smoke Dampers	X	
	Manual Stations at Exit	X	
	ADA compliant	X	
	Location of FACP	Room next to Mechanical Room	
	Manufacturer	Notifier by Honeywell	
	Date of Installation	2016 – Head End, 2002, 2007 - Devices	
Annunciator			
P-04	Remote Annunciator	No, but Voice Command Center	
	Voice Command Center (Graphic or Alphanumeric)	Alphanumeric	
	Voice Command Center Location	Front Lobby	

There are no immediate or significant repairs that need to be made to the building fire alarm system. Routine and periodic testing and maintenance of the fire alarm system is recommended.

Planned Improvements

- Upgrade fiber cabling between MDF and IDF rooms to OM4.
- Upgrade cabling between data closets and network drops to Category-6 copper cabling.
- Add wireless access points to non-educational (cafeteria, gym, guidance office) spaces. (cost estimate based on approx. 15)
- Provide uninterruptible power supply (UPS) at all access door control panels. (cost estimate based on approx. 20)
- Add (6) additional interior cameras in areas designated by the school administrators.

Deferred Maintenance

- Replace exterior disconnect switches for all exterior HVAC units that are replaced.

General Improvements

- Replace interior and exterior lighting with LED fixtures
- Provide lighting controls throughout the building to automatically turn lights off in spaces that are empty.

Anticipated Lifecycle Replacement

The following list summarizes all major equipment that is currently in fair – excellent condition that will eventually need replacement:

- Switchboard(s)
- Panelboard(s)
- Step-down Transformers
- Generator
- Automatic Transfer Switch (ATS)
- Lighting
- Receptacles
- Fire Alarm Panel
- Security System
- Video Cameras

APPENDIX A

FACILITY PHOTOGRAPHS

Photo #1	Primary Chilled and Heating Water Pipe Entrances

Photo #2	Secondary Heating and Cooling Pumps

Photo #3	Fire Protection Zone Piping and Backflow Preventer

Photo #4	Exterior

Photo #5	Domestic Hot Water Heaters

Photo #6	Domestic Water Entrance

Photo #7	Abandoned Boilers

Photo #8	Typical Indoor AHU in Mechanical Mezzanine

Photo #9	Typical Roof Mounted Condensing Unit

Photo #10	Typical Bathroom Lavatory

Photo #11	Typical Horizontal Unit Ventilator

Photo #12	Typical Vertical Unit Ventilator

Photo #13	Typical Science Classroom Sink

Photo #14	Abandoned Closed Circuit Cooler

Photo #15	Typical Finned Tube Radiator

Photo #16	Typical 4-Pipe Rooftop Air Handling Unit

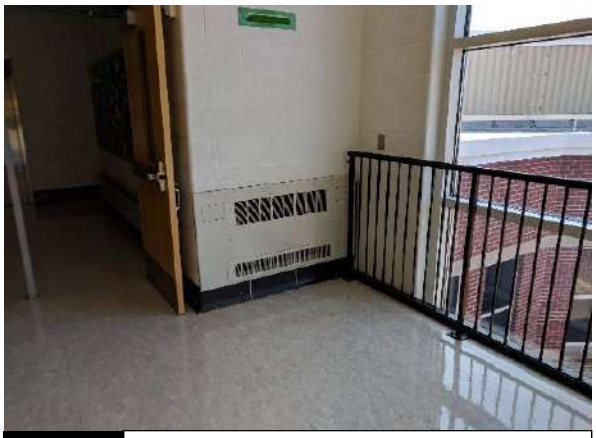

Photo #17	Typical Cabinet Heater

Photo #18	Typical Bathroom Hand Sinks

Photo #19	Abandoned Air Cooled Chiller

Photo #20	Typical Bathroom Urinals

Photo #21	Typical RTU

Photo #22	Typical Rooftop Exhaust Fan

Photo #23	Typical Kitchen Ventilation Unit

Photo #24	Typical Rooftop ERU

Photo #25	Typical Indoor ERU

Photo #26	ERU-2

Photo #27	CU-2a Typical Split DX Outdoor Condensing Unit

Photo #28	Typical 4-Pipe RTU

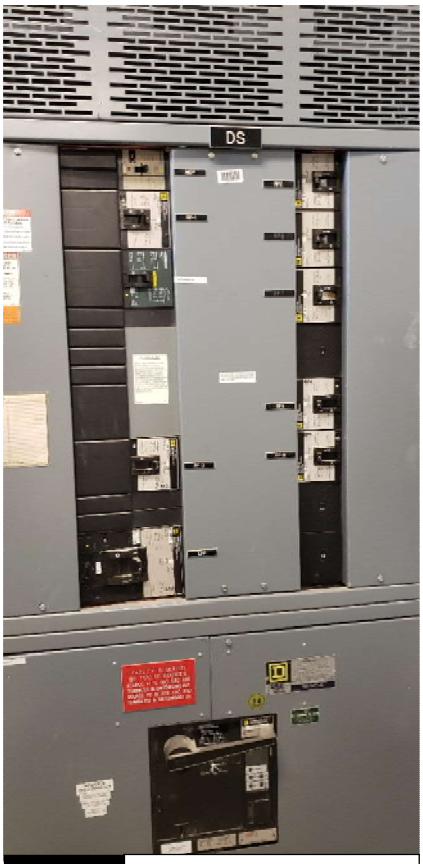

Photo #1	208V, Switchboard DS

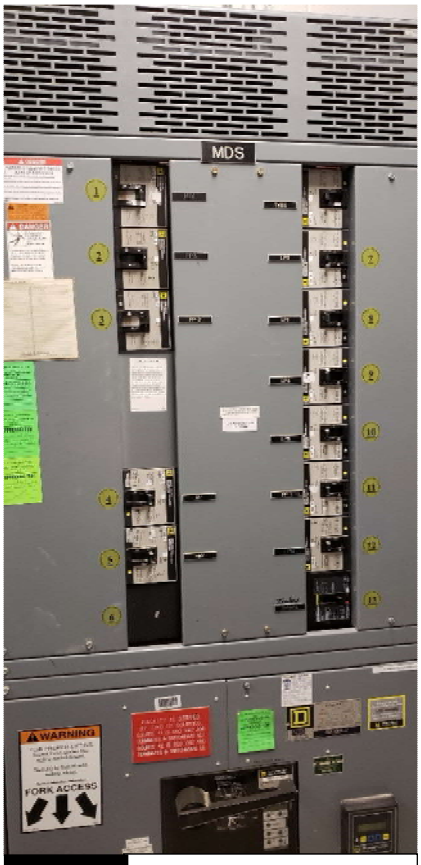

Photo #2	480V, Switchboard MDS

Photo #3	Typical Square D Branch Panelboard

Photo #4	PHM-5 Switch, 208V and 480V Transformers, and 200kW Generator

Photo #5	Automatic Transfer Switch

Photo #6	Typical Classroom in 2007 Addition Wing

Photo #7	Fire Alarm Control Panel

Photo #8	Voice Command Center at Front Lobby

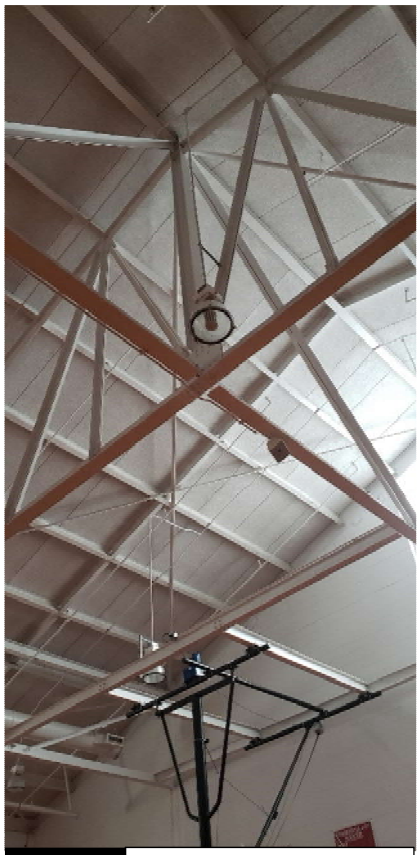

Photo #9	Gym Light Replaced with LED lamp

Photo #10	Gym Light with Metal Halide Lamp

Photo #11	Exterior Disconnect Switch that needs to be replaced

Photo #12	Exterior Disconnect Switch that needs to be replaced

APPENDIX B

COST ESTIMATE

Gipe Associates, Inc.
CONSULTING ENGINEERS
Mechanical | Electrical | Plumbing

8719 BROOKS DRIVE
EASTON, MARYLAND
PHONE: 410-822-8688
FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: SMYRNA MIDDLE SCHOOL
GAI PROJECT NO: 18047
DATE: 07/27/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 1
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

1 - ERU-5 FAN MOTOR REPAIR	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
ERU-5 FAN MOTOR REPAIR ALLOWANCE	1.0	LS	$ 1,000.00	$ 1,000.00	$ 2,000.00	$ 2,000.00	$ 3,000.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 1,000.00	$ 2,000.00	$ 3,000.00
TOTAL BASE BID:	**$ 1,000.00**	**$ 2,000.00**	**$ 3,000.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$1000.00 PER S.F.**	**$2000.00 PER S.F.**	**$3000.00 PER S.F.**

GRAND TOTAL COST ESTIMATE SUMMARY

ADDITIONAL PROJECT COST ITEM DESCRIPTION (APPLIES TO BASE BID ONLY)	PERCENTAGE (%)	% X TOTAL BASE BID	REMARKS
CONTRACTOR OVERHEAD	0.0%	$ -	
CONTRACTOR PROFIT	0.0%	$ -	
GENERAL CONDITIONS	0.0%	$ -	
BUILDER'S RISK INSURANCE	0.0%	$ -	
PERMIT FEES	0.0%	$ -	
CONTRACTOR INSURANCE	0.0%	$ -	
PAYMENT BOND	0.0%	$ -	
PERFORMANCE BOND	0.0%	$ -	
TOTAL ADDITIONAL PROJECT COST ITEMS		**$ -**	
GRAND TOTAL CONSTRUCTION COST (BASE BID + ADDITIONAL PROJECT COSTS)		**$ 3,000.00**	**$3000.00 PER S.F.**

Gipe Associates, Inc.
CONSULTING ENGINEERS
Mechanical | Electrical | Plumbing

8719 BROOKS DRIVE
EASTON, MARYLAND
PHONE: 410-822-8688
FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: SMYRNA MIDDLE SCHOOL
GAI PROJECT NO: 18047
DATE: 07/27/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 50,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

BASE BID COST ESTIMATE

2 - ERU-1/2 STUDY AND REPLACEMENT	QUANTITY NO. OF UNITS	QUANTITY UNIT OF MEASURE	MATERIAL PER UNIT	MATERIAL TOTAL	LABOR PER UNIT	LABOR TOTAL	TOTAL COST
DUCTWORK DEMOLITION	1.0	LS		$ -	$ 3,000.00	$ 3,000.00	$ 3,000.00
ERU REMOVAL	2.0	EA		$ -	$ 3,000.00	$ 6,000.00	$ 6,000.00
PIPING DEMOLITION	1.0	LS		$ -	$ 3,000.00	$ 3,000.00	$ 3,000.00
INDOOR ERU UNIT (12,000 CFM)	1.0	EA	$ 80,000.00	$ 80,000.00	$ 20,000.00	$ 20,000.00	$ 100,000.00
INDOOR ERU UNIT (3,300 CFM)	1.0	EA	$ 45,000.00	$ 45,000.00	$ 15,000.00	$ 15,000.00	$ 60,000.00
DUCTWORK FOR ERU	1.0	LS	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 40,000.00
FREEZE PROTECTION PUMPS	4.0	LS	$ 900.00	$ 3,600.00	$ 2,800.00	$ 11,200.00	$ 14,800.00
CHILLED WATER AND HEATING WATER PIPING, VALVES AND FITTINGS	2.0	EA	$ 2,000.00	$ 4,000.00	$ 3,000.00	$ 6,000.00	$ 10,000.00
DUCT DETECTORS	4.0	EA	$ 300.00	$ 1,200.00	$ 500.00	$ 2,000.00	$ 3,200.00
AHU ATC CONTROLS	2.0	EA	$ 9,000.00	$ 18,000.00	$ 12,000.00	$ 24,000.00	$ 42,000.00
PIPING INSULATION	2.0	EA	$ 2,000.00	$ 4,000.00	$ 3,000.00	$ 6,000.00	$ 10,000.00
DUCT INSULATION	2.0	EA	$ 2,000.00	$ 4,000.00	$ 4,000.00	$ 8,000.00	$ 12,000.00
CONDENSATE PIPING	2.0	EA	$ 500.00	$ 1,000.00	$ 750.00	$ 1,500.00	$ 2,500.00
TESTING AND BALANCING	2.0	EA		$ -	$ 9,000.00	$ 18,000.00	$ 18,000.00
COMMISSIONING	2.0	EA		$ -	$ 5,000.00	$ 10,000.00	$ 10,000.00
ELECTRICAL DISCONNECTS	2.0	EA	$ 1,000.00	$ 2,000.00	$ 500.00	$ 1,000.00	$ 3,000.00
MOTOR CONTROLLERS	4.0	EA	$ 500.00	$ 2,000.00	$ 500.00	$ 2,000.00	$ 4,000.00
CONDUIT AND WIRE	2.0	EA	$ 1,700.00	$ 3,400.00	$ 2,200.00	$ 4,400.00	$ 7,800.00
FIREALARM INTERFACE OF DUCT DETECTORS	4.0	EA	$ 300.00	$ 1,200.00	$ 250.00	$ 1,000.00	$ 2,200.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 189,400.00	$ 162,100.00	$ 351,500.00
TOTAL BASE BID:	**$ 189,400.00**	**$ 162,100.00**	**$ 351,500.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$3.79 PER S.F.**	**$3.24 PER S.F.**	**$7.03 PER S.F.**

GRAND TOTAL COST ESTIMATE SUMMARY

ADDITIONAL PROJECT COST ITEM DESCRIPTION (APPLIES TO BASE BID ONLY)	PERCENTAGE (%)	% X TOTAL BASE BID	REMARKS
CONTRACTOR OVERHEAD	0.0%	$ -	
CONTRACTOR PROFIT	0.0%	$ -	
GENERAL CONDITIONS	0.0%	$ -	
BUILDER'S RISK INSURANCE	0.0%	$ -	
PERMIT FEES	0.0%	$ -	
CONTRACTOR INSURANCE	0.0%	$ -	
PAYMENT BOND	0.0%	$ -	
PERFORMANCE BOND	0.0%	$ -	
TOTAL ADDITIONAL PROJECT COST ITEMS		**$ -**	
GRAND TOTAL CONSTRUCTION COST (BASE BID + ADDITIONAL PROJECT COSTS)		**$ 351,500.00**	**$7.03 PER S.F.**

Gipe Associates, Inc.
CONSULTING ENGINEERS
Mechanical | Electrical | Plumbing

8719 BROOKS DRIVE
EASTON, MARYLAND
PHONE: 410-822-8688
FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: SMYRNA MIDDLE SCHOOL
GAI PROJECT NO: 18047
DATE: 07/27/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 60,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

BASE BID COST ESTIMATE

3 - (7) RTU REPLACEMENTS	QUANTITY NO. OF UNITS	QUANTITY UNIT OF MEASURE	MATERIAL PER UNIT	MATERIAL TOTAL	LABOR PER UNIT	LABOR TOTAL	TOTAL COST
DUCTWORK DEMOLITION	7.0	EA		$ -	$ 1,000.00	$ 7,000.00	$ 7,000.00
RTU REMOVAL	7.0	EA		$ -	$ 1,500.00	$ 10,500.00	$ 10,500.00
PIPING DEMOLITION	7.0	EA		$ -	$ 1,000.00	$ 7,000.00	$ 7,000.00
ROOFTOP AHU UNIT	6.0	EA	$ 35,000.00	$ 210,000.00	$ 15,000.00	$ 90,000.00	$ 300,000.00
CHILLED WATER AND HEATING WATER PIPING, VALVES AND FITTINGS (ROOFTOP AHU)	6.0	EA	$ 2,500.00	$ 15,000.00	$ 5,000.00	$ 30,000.00	$ 45,000.00
FREEZE PROTECTION PUMPS	14.0	EA	$ 900.00	$ 12,600.00	$ 2,800.00	$ 39,200.00	$ 51,800.00
ROOFTOP PACKAGED UNIT	2.0	EA	$ 75,000.00	$ 150,000.00	$ 10,000.00	$ 20,000.00	$ 170,000.00
HEATING WATER PIPING, VALVES AND FITTINGS (PACKAGED RTU)	2.0	EA	$ 2,500.00	$ 5,000.00	$ 3,000.00	$ 6,000.00	$ 11,000.00
DUCTWORK FOR AHUS	7.0	EA	$ 10,000.00	$ 70,000.00	$ 10,000.00	$ 70,000.00	$ 140,000.00
DUCT DETECTORS	16.0	EA	$ 300.00	$ 4,800.00	$ 500.00	$ 8,000.00	$ 12,800.00
AHU ATC CONTROLS	7.0	EA	$ 10,000.00	$ 70,000.00	$ 14,000.00	$ 98,000.00	$ 168,000.00
PIPING INSULATION	7.0	EA	$ 2,000.00	$ 14,000.00	$ 3,000.00	$ 21,000.00	$ 35,000.00
DUCT INSULATION	7.0	EA	$ 2,000.00	$ 14,000.00	$ 3,000.00	$ 21,000.00	$ 35,000.00
CONDENSATE PIPING	7.0	EA	$ 500.00	$ 3,500.00	$ 750.00	$ 5,250.00	$ 8,750.00
TESTING AND BALANCING	7.0	EA		$ -	$ 4,500.00	$ 31,500.00	$ 31,500.00
COMMISSIONING	7.0	EA		$ -	$ 3,000.00	$ 21,000.00	$ 21,000.00
ELECTRICAL DISCONNECTS	7.0	EA	$ 1,000.00	$ 7,000.00	$ 500.00	$ 3,500.00	$ 10,500.00
MOTOR CONTROLLERS	14.0	EA	$ 500.00	$ 7,000.00	$ 500.00	$ 7,000.00	$ 14,000.00
CONDUIT AND WIRE	14.0	EA	$ 1,700.00	$ 23,800.00	$ 2,200.00	$ 30,800.00	$ 54,600.00
FIREALARM INTERFACE OF DUCT	16.0	EA	$ 300.00	$ 4,800.00	$ 250.00	$ 4,000.00	$ 8,800.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 611,500.00	$ 530,750.00	$ 1,142,250.00
TOTAL BASE BID:	**$ 611,500.00**	**$ 530,750.00**	**$ 1,142,250.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$10.19 PER S.F.**	**$8.85 PER S.F.**	**$19.04 PER S.F.**

GRAND TOTAL COST ESTIMATE SUMMARY

ADDITIONAL PROJECT COST ITEM DESCRIPTION (APPLIES TO BASE BID ONLY)	PERCENTAGE (%)	% X TOTAL BASE BID	REMARKS
CONTRACTOR OVERHEAD	0.0%	$ -	
CONTRACTOR PROFIT	0.0%	$ -	
GENERAL CONDITIONS	0.0%	$ -	
BUILDER'S RISK INSURANCE	0.0%	$ -	
PERMIT FEES	0.0%	$ -	
CONTRACTOR INSURANCE	0.0%	$ -	
PAYMENT BOND	0.0%	$ -	
PERFORMANCE BOND	0.0%	$ -	
TOTAL ADDITIONAL PROJECT COST ITEMS		**$ -**	
GRAND TOTAL CONSTRUCTION COST (BASE BID + ADDITIONAL PROJECT COSTS)		**$ 1,142,250.00**	**$19.04 PER S.F.**

Gipe Associates, Inc.
CONSULTING ENGINEERS
Mechanical | Electrical | Plumbing

8719 BROOKS DRIVE
EASTON, MARYLAND
PHONE: 410-822-8688
FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: SMYRNA MIDDLE SCHOOL
GAI PROJECT NO: 18047
DATE: 07/27/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 2,500
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

4 - KITCHEN HVAC SYSTEM REPLACEMENT	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
DEMOLITION	3.0	EA	$ -		$ 3,000.00	$ 9,000.00	
NEW KITCHEN HOOD	2.0	EA	$ 10,000.00	$ 20,000.00	$ 10,000.00	$ 20,000.00	$ 40,000.00
NEW KITCHEN HOOD DUCT	2.0	EA	$ 5,000.00	$ 10,000.00	$ 4,000.00	$ 8,000.00	$ 18,000.00
GREASE WRAP DUCT INSULATION	2.0	EA	$ 3,500.00	$ 7,000.00	$ 3,000.00	$ 6,000.00	$ 13,000.00
NEW VARIABLE SPEED KITCHEN VENTILATION CONTROLS (MELINK)	2.0	EA	$ 12,000.00	$ 24,000.00	$ 6,000.00	$ 12,000.00	$ 36,000.00
KITCHEN EXHAUST FAN (VARIABLE SPEED)	2.0	EA	$ 3,000.00	$ 6,000.00	$ 2,500.00	$ 5,000.00	$ 11,000.00
KITCHEN MAKE-UP AIR UNIT WITH GAS HEAT (VARIABLE SPEED)	2.0	EA	$ 25,000.00	$ 50,000.00	$ 10,000.00	$ 20,000.00	$ 70,000.00
HVAC UNIT FOR SPACE CONDITIONING	1.0	EA	$ 45,000.00	$ 45,000.00	$ 20,000.00	$ 20,000.00	$ 65,000.00
DUCTWORK	4.0	EA	$ 10,000.00	$ 40,000.00	$ 10,000.00	$ 40,000.00	$ 80,000.00
GAS PIPING	2.0	EA	$ 750.00	$ 1,500.00	$ 2,200.00	$ 4,400.00	$ 5,900.00
HYDRONIC PIPING	1.0	EA	$ 6,000.00	$ 6,000.00	$ 12,000.00	$ 12,000.00	$ 18,000.00
DUCTWORK INSULATION	4.0	EA	$ 3,000.00	$ 12,000.00	$ 3,000.00	$ 12,000.00	$ 24,000.00
PERFORATED SUPPLY PLENUMS	2.0	EA	$ 2,000.00	$ 4,000.00	$ 1,000.00	$ 2,000.00	$ 6,000.00
NEW ROOF CURB	3.0	EA	$ 500.00	$ 1,500.00	$ 500.00	$ 1,500.00	$ 3,000.00
ATC INTEGRATION OF KITCHEN VENT. SYSTEM	3.0	EA	$ 6,000.00	$ 18,000.00	$ 6,000.00	$ 18,000.00	$ 36,000.00
NEW HOOD FIRE SUPPRESSION SYSTEM	2.0	EA	$ 2,000.00	$ 4,000.00	$ 1,500.00	$ 3,000.00	$ 7,000.00
INTERLOCK WITH GAS SOLENOID VALVE	2.0	EA	$ 500.00	$ 1,000.00	$ 1,000.00	$ 2,000.00	$ 3,000.00
ELECTRICAL DISCONNECTS	2.0	EA	$ 1,000.00	$ 2,000.00	$ 500.00	$ 1,000.00	$ 3,000.00
MOTOR CONTROLLERS	2.0	EA	$ 500.00	$ 1,000.00	$ 500.00	$ 1,000.00	$ 2,000.00
CONDUIT AND WIRE	4.0	EA	$ 1,700.00	$ 6,800.00	$ 2,200.00	$ 8,800.00	$ 15,600.00
FIREALARM INTERFACE OF HOOD DETECTORS	2.0	EA	$ 300.00	$ 600.00	$ 250.00	$ 500.00	$ 1,100.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 260,400.00	$ 206,200.00	$ 457,600.00
TOTAL BASE BID:	**$ 260,400.00**	**$ 206,200.00**	**$ 457,600.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$104.16 PER S.F.**	**$82.48 PER S.F.**	**$183.04 PER S.F.**

GRAND TOTAL COST ESTIMATE SUMMARY

ADDITIONAL PROJECT COST ITEM DESCRIPTION (APPLIES TO BASE BID ONLY)	PERCENTAGE (%)	% X TOTAL BASE BID	REMARKS
CONTRACTOR OVERHEAD	0.0%	$ -	
CONTRACTOR PROFIT	0.0%	$ -	
GENERAL CONDITIONS	0.0%	$ -	
BUILDER'S RISK INSURANCE	0.0%	$ -	
PERMIT FEES	0.0%	$ -	
CONTRACTOR INSURANCE	0.0%	$ -	
PAYMENT BOND	0.0%	$ -	
PERFORMANCE BOND	0.0%	$ -	
TOTAL ADDITIONAL PROJECT COST ITEMS		**$ -**	
GRAND TOTAL CONSTRUCTION COST (BASE BID + ADDITIONAL PROJECT COSTS)		**$ 457,600.00**	**$183.04 PER S.F.**

Gipe Associates, Inc.
CONSULTING ENGINEERS
Mechanical | Electrical | Plumbing

8719 BROOKS DRIVE
EASTON, MARYLAND
PHONE: 410-822-8688
FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: SMYRNA MIDDLE SCHOOL
GAI PROJECT NO: 18047
DATE: 07/27/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 120,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

5 - PEX REPLACEMENT	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
PIPING DEMOLITION	1.0	LS		$ -	$ 40,000.00	$ 40,000.00	$ 40,000.00
DOMESTIC COLD PEX	1.0	LS	$ 85,000.00	$ 85,000.00	$ 95,000.00	$ 95,000.00	$ 180,000.00
DOMESTIC HOT PEX	1.0	LS	$ 75,000.00	$ 75,000.00	$ 85,000.00	$ 85,000.00	$ 160,000.00
DOMESTIC RECIRC PEX	1.0	LS	$ 35,000.00	$ 35,000.00	$ 45,000.00	$ 45,000.00	$ 80,000.00
VALVES, FITTINGS, TOOLS	1.0	LS	$ 70,000.00	$ 70,000.00	$ 50,000.00	$ 50,000.00	$ 120,000.00
PIPING INSULATION	1.0	LS	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 50,000.00
ADDITIONAL PIPE HANGERS	1.0	LS	$ 15,000.00	$ 15,000.00	$ 15,000.00	$ 15,000.00	$ 30,000.00
FIRESTOP COLLARS	1.0	LS	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 20,000.00
DOMESTIC HOT WATER BALANCING	1.0	LS		$ -	$ 6,000.00	$ 6,000.00	$ 6,000.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 315,000.00	$ 371,000.00	$ 686,000.00
TOTAL BASE BID:	**$ 315,000.00**	**$ 371,000.00**	**$ 686,000.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$2.63 PER S.F.**	**$3.09 PER S.F.**	**$5.72 PER S.F.**

GRAND TOTAL COST ESTIMATE SUMMARY

ADDITIONAL PROJECT COST ITEM DESCRIPTION (APPLIES TO BASE BID ONLY)	PERCENTAGE (%)	% X TOTAL BASE BID	REMARKS
CONTRACTOR OVERHEAD	0.0%	$ -	
CONTRACTOR PROFIT	0.0%	$ -	
GENERAL CONDITIONS	0.0%	$ -	
BUILDER'S RISK INSURANCE	0.0%	$ -	
PERMIT FEES	0.0%	$ -	
CONTRACTOR INSURANCE	0.0%	$ -	
PAYMENT BOND	0.0%	$ -	
PERFORMANCE BOND	0.0%	$ -	
TOTAL ADDITIONAL PROJECT COST ITEMS		**$ -**	
GRAND TOTAL CONSTRUCTION COST (BASE BID + ADDITIONAL PROJECT COSTS)		**$ 686,000.00**	**$5.72 PER S.F.**

Gipe Associates, Inc.
CONSULTING ENGINEERS
Mechanical | Electrical | Plumbing

8719 BROOKS DRIVE
EASTON, MARYLAND
PHONE: 410-822-8688
FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: SMYRNA MIDDLE SCHOOL
GAI PROJECT NO: 18047
DATE: 08/07/19
PREPARED BY:

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 120,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 1
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

6 - DOMESTIC HOT WATER HEATER REPLACEMENT	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
DEMO WATER HEATER	1.0	EA	$ 2,500.00	$ 2,500.00	$ 3,000.00	$ 3,000.00	$ 5,500.00
NEW DOMESTIC WATER HEATERS	2.0	EA	$ 15,000.00	$ 30,000.00	$ 5,000.00	$ 10,000.00	$ 40,000.00
GAS PIPING CONNECTION	2.0	EA	$ 500.00	$ 1,000.00	$ 1,000.00	$ 2,000.00	$ 3,000.00
NEW DOMESTIC WATER PIPING	2.0	LS	$ 2,500.00	$ 5,000.00	$ 3,500.00	$ 7,000.00	$ 12,000.00
DOMESTIC WATER EXPANSION TANK	2.0	EA	$ 2,000.00	$ 4,000.00	$ 1,000.00	$ 2,000.00	$ 6,000.00
INTAKE AND VENT PIPING	2.0	EA	$ 1,000.00	$ 2,000.00	$ 1,000.00	$ 2,000.00	$ 4,000.00
INTAKE AND VENT TERMINATIONS	2.0	EA	$ 500.00	$ 1,000.00	$ 2,500.00	$ 5,000.00	$ 6,000.00
ELECTRICAL CONNECTION/DISCONNECT	2.0	EA	$ 500.00	$ 1,000.00	$ 2,500.00	$ 5,000.00	$ 6,000.00
START UP AND TESTING	2.0	EA		$ -	$ 1,000.00	$ 2,000.00	$ 2,000.00
ATC CONTROLS	2.0	EA	$ 1,500.00	$ 3,000.00	$ 2,500.00	$ 5,000.00	$ 8,000.00
TESTING AND BALANCING	2.0	EA		$ -	$ 1,500.00	$ 3,000.00	$ 3,000.00
RECIRCULATING PUMP AND TRIM	2.0	EA	$ 2,000.00	$ 4,000.00	$ 3,000.00	$ 6,000.00	$ 10,000.00
PIPING INSULATION	2.0	EA	$ 1,500.00	$ 3,000.00	$ 2,500.00	$ 5,000.00	$ 8,000.00
COMMISSIONING	2.0	EA		$ -	$ 2,000.00	$ 4,000.00	$ 4,000.00
EMERGENCY KILL SWITCHES	2.0	EA	$ 750.00	$ 1,500.00	$ 1,000.00	$ 2,000.00	$ 3,500.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 58,000.00	$ 63,000.00	$ 121,000.00
TOTAL BASE BID:	**$ 58,000.00**	**$ 63,000.00**	**$ 121,000.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$0.48 PER S.F.**	**$0.53 PER S.F.**	**$1.01 PER S.F.**

GRAND TOTAL COST ESTIMATE SUMMARY

ADDITIONAL PROJECT COST ITEM DESCRIPTION (APPLIES TO BASE BID ONLY)	PERCENTAGE (%)	% X TOTAL BASE BID	REMARKS
CONTRACTOR OVERHEAD	0.0%	$ -	
CONTRACTOR PROFIT	0.0%	$ -	
GENERAL CONDITIONS	0.0%	$ -	
BUILDER'S RISK INSURANCE	0.0%	$ -	
PERMIT FEES	0.0%	$ -	
CONTRACTOR INSURANCE	0.0%	$ -	
PAYMENT BOND	0.0%	$ -	
PERFORMANCE BOND	0.0%	$ -	
TOTAL ADDITIONAL PROJECT COST ITEMS	0.0%	**$ -**	
GRAND TOTAL CONSTRUCTION COST (BASE BID + ADDITIONAL PROJECT COSTS)		**$ 121,000.00**	**$1.01 PER S.F.**