NORTH SMYRNA
Elementary School

Certificate of Necessity

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Project No.: 18047
August 09, 2019

SMYRNA
School District

CONTENTS

1 EXECUTIVE SUMMARY

1.1 Property Information and General MEP systems Condition

North Smyrna Elementary School is located at 356 N Main Street, Smyrna, DE. The School was originally constructed in the 1960's with several renovations and an addition in 2006. The building's heating and cooling sources are located onsite delivering chilled and hot water to the building equipment.

NORTH SMYRNA ELEMENTARY SCHOOL BUILDING INFORMATION	
Address	365 N Main St Smyrna DE 19977
Year Constructed, Renovations	~1960, 1986, 1993, 2002, 2006, 2016
Building Area	48,300 SQ-FT
System Types	4-pipe system. Central Chiller and Boilers.
Survey Date	17-Jul-18
Point of Contact	Scott Holmes

A significant amount of equipment requires replacement in the original building with the exception of most split-systems which have been replaced relatively recently.

1.2 Anticipated Lifecycle Replacement

ANTICIPATED LIFECYCLE REPLACEMENT	
Priority	**System / Equipment / Component**
Immediate	Backup Boiler, Chiller, Rooftop Units, Split DX System, Energy Recovery Ventilators, Unit Ventilators, Fan Coils, Domestic Hot Water Heater, Recirculation Pump, Panelboard E in Boiler Room, Exterior Disconnect Switches for HVAC unit replacement
Short-Term	PTAC units, Kitchen Make-up Air Unit
Mid-Term	Split DX System, Hydronic Heaters, Fans, Exterior Lighting, Special Systems
Long-Term	Main Boiler, Pumps, Air Handling Units, Packaged DX Units, Split DX Systems, Fan Coil Units, VAV Boxes, Fans, Switchboard, Panelboards, Wiring, Interior Disconnect Switches, Interior Lighting, Fire Alarm

1.3 Cost Estimates

COST ESTIMATE			
#	**Description**	**Estimated Project Cost**	
1	Replace Backup Boiler	$	299,500.00
2	Replace (2) RTUs serving Gym and Cafeteria	$	206,600.00
3	Replace Split DX System serving Area 'C'	$	13,380.00
4	Replace RTU serving Library	$	82,400.00
5	Replace (4) Energy Recovery Ventilators	$	374,400.00
6	Refurbish Unit Ventilators	$	259,000.00
7	Replace (2) FCUs in Connecting Corridor	$	37,750.00
8	Add HVAC unit to new office	$	12,680.00
9	Replace Domestic Water Heater and Recirc Pump	$	76,250.00
10	Replace Air Cooled Chillers	$	591,000.00
11	Replace Panelboard E	$	2,500.00
12	Proposed Technology Improvements	$	38,300.00
	Total	**$**	**1,993,760.00**

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 in the next section.

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 tabulates all major equipment, capacities and condition assessments with a priority code.

3 MECHANICAL AND PLUMBING SYSTEMS

3.1 Heating, Ventilating and Air Conditioning (HVAC)

The main building utilizes a 4-pipe variable primary flow HVAC system distributing chilled and hot water from central boilers and air-cooled chillers. The boilers and pumps are located in the Mechanical Room. The chillers are located in the Mechanical Yard. One variable volume air handler located on the roof serves the newest 'B' wing of the building.

In the original building, classrooms rely on 4-pipe Unit Ventilators (UV) for space conditioning and ventilation. The gym, cafeteria, library, and kitchen each have a dedicated packaged DX unit located on the roof. Various split systems are utilized for conditioning the administrative spaces.

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

HVAC Equipment Tables

CENTRAL HEATING SYSTEM		
System or Unit Type		Service Life Estimate (years)
Boiler(s), Hot Water		**25**
P-01	Quantity	2
	Capacity	3,347 MBH input each
	Performance Efficiency	80.0%
	Fuel	Dual: Natural Gas and #2 Oil
	Plant Heating Capacity	5,356 MBH
	Location	Mechanical Room
	Service	Main Building
	Nameplate Date	1986, 2006

CENTRAL COOLING SYSTEM		
System or Unit Type		Service Life Estimate (years)
Chiller, Air-Cooled Scroll		**18**
P-01	Quantity	2
	Capacity	110; 40 Tons
	Performance Efficiency	1.14; 1.34 kW/ton
	Compressor Qty	2 each
	Refrigerant	R-134A/R-407C
	Location	Mechanical Yard
	Service	Main Building
	Nameplate Date	2003, 2006

HYDRONIC DISTRIBUTION		
Equipment Type		Service Life Estimate (years)
Pump(s), Base-mounted		**20**
P-04	Quantity	4
	Capacity	(2) 15 HP, (2) 10 HP
	Control	Variable Speed, 2-way valves
	Location	Mechanical Room

	Service	Chilled Water Circulation, Heating Water Circulation
	Nameplate Date	2006

AIR DISTRIBUTION SYSTEMS		
Equipment Type		Service Life Estimate (years)
Air Handling Unit(s), Variable Volume		**24**
P-04	Quantity	1
	Capacity	8,200 CFM
	Location	Penthouse
	Service	Area 'B'
	Nameplate Date	2006
Packaged DX Unit, air-cooled, gas heat		**17**
P-01	Quantity	2
	Capacity	151; 185 MBH
	Refrigerant	R-22
	Location	Roof
	Service	Gym/Cafeteria
	Nameplate Date	2002
Packaged DX Unit, air-cooled, gas heat		**17**
P-04	Quantity	1
	Capacity	60 MBH
	Refrigerant	R-410A
	Location	Roof
	Service	Kitchen
	Nameplate Date	2015
Split DX Unit, air-cooled		**17**
P-01	Quantity	1
	Capacity	18.0 MBH
	Refrigerant	R-22
	Location	Condensing Unit on Roof, Indoor Unit above Ceiling
	Service	Area 'C' Administrative Spaces
	Nameplate Date	Unknown
Split DX Unit, air-cooled		**17**
P-04	Quantity	2
	Capacity	36 MBH each
	Refrigerant	R-410A
	Location	Condensing Unit on Roof, Indoor Units above Ceiling
	Service	Area 'C' Administration Spaces
	Nameplate Date	2011 - 2016
Packaged DX Unit, air-cooled		**17**
P-01	Quantity	1
	Capacity	72 MBH
	Refrigerant	R-22
	Location	Roof
	Service	Library
	Nameplate Date	1998

Air Handling Unit(s), Energy Recovery		**24**
P-01	Quantity	4
	Capacity	1,000 - 2,250 CFM
	Location	Roof
	Service	Classrooms
	Nameplate Date	2002

TERMINAL UNITS		
Equipment Type		Service Life Estimate (years)
Air Terminal, Unit Ventilator		**20**
P-01	Quantity	29
	Capacity	750 - 1,500 CFM each
	Location	Exterior walls
	Service	Classrooms
	Nameplate Date	2002
Air Terminal, Fan Coil Unit		**20**
P-01	Quantity	2
	Capacity	450 CFM each
	Location	Corridors
	Service	Corridors
	Nameplate Date	2002
Air Terminal, Fan Coil Unit		**20**
P-04	Quantity	1
	Capacity	1,600 CFM
	Location	Above Ceiling Storage 304 (Area 'C')
	Service	Area 'C' corridor, vestibule, office storage
	Nameplate Date	2016
Air Terminal, VAV box		**20**
P-04	Quantity	8
	Capacity	900 - 1,200 CFM each
	Location	Area 'B' above ceiling
	Service	Classrooms
	Nameplate Date	2006
Unit Heater, Hot Water		**20**
P-03	Quantity	4
	Capacity	170 - 830 CFM each
	Service	Vestibule, Bathroom, Kitchen, Water Service
	Nameplate Date	2002
Air Conditioner, PTAC		**15**
P-02	Quantity	5
	Capacity	9 MBH each
	Service	Administrative Offices
	Nameplate Date	2006

SUPPLEMENTAL UNITS		
Equipment Type		Service Life Estimate (years)
Split DX Unit, air-cooled		**17**
P-04	Quantity	6
	Capacity	9 - 42 MBH
	Refrigerant	R-410A
	Condensing Unit Location	Condensing Unit on Roof, Indoor Units in Space
	Service	Various throughout Building
	Nameplate Date	2011 - 2016
P-03	Quantity	1
	Capacity	24 MBH
	Refrigerant	R-22
	Condensing Unit Location	Roof
	Service	Penthouse Data Closet
	Nameplate Date	2005

CONTROL SYSTEM		
System or Unit Type		Service Life Estimate (years)
Controls, Direct Digital (DDC)		**25**
P-04	Control Panel Location	Mechanical Room
	Service	All major equipment is connected to BAS Control Panels
	Nameplate Date	2003

VENTILATION SYSTEMS		
System or Unit Type		Service Life Estimate (years)
Fan, Centrifugal		**20**
P-03	Quantity	10
	Capacity	1,170 - 5,000 CFM
	Location	Roof
	Service	Classroom Exhaust
	Equipment Nameplate Date	2002
P-04	Quantity	2
	Capacity	200; 1,000 CFM
	Location	Roof
	Service	Dishwasher and Kitchen
	Nameplate Date	2006
Make-Up Air Unit, Gas Heat		**15**
P-02	Quantity	1
	Capacity	3,000 CFM
	Location	Roof
	Service	Kitchen
	Nameplate Date	2006

Planned Improvements

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

- New Radiators are being installed in the connecting corridor this Summer (2018).

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:

- The backup boiler is past its recommended service life and should be replaced. (See Photograph #1)
- The (2) RTUs serving the Gym and Cafeteria have been underperforming and require frequent maintenance due to their age. Both units should be replaced. (See Photograph #2)

Photograph #1 – Backup Boiler in Mechanical Room

Photograph #2 – Cafeteria RTU

- The split system serving administrative spaces is past its recommended service life and should be replaced. The outdoor condensing unit is located on the roof. The indoor unit is located above the ceiling outside of the Teacher's Lounge. (See Photograph #3)
- The RTU serving the library is past its recommended service life and should be replaced. (See Photograph #4)

Photograph #3 – DX Split System Condensing Unit

Photograph #4 – RTU Serving Library

- All (4) Energy Recovery Ventilators have been underperforming and require frequent maintenance due to their age. Energy Recovery Ventilator Units are installed to exhaust classrooms and provide "fresh air" ventilation to corridors. Existing drawings indicate that design airflows and leaving air conditions that are typically not recommended for this application and space type. The cost estimates provided are to replace these units "in-kind" as requested by maintenance staff. **However, we recommend further investigation and possible re-design before replacing these units. (See Photograph #5)**

Photograph #5 – Typical Energy Recovery Unit

- All (4) units should be replaced.
- Per maintenance schedules, all Unit Ventilators are due for refurbishment.
- Replace (2) Fan Coil Units in connecting corridor
- A new split-system HVAC unit is needed for the newly converted office in the Administrative space.
- A second chiller was added because the original chiller was undersized for the building addition in 2006. Maintenance staff has experienced problems with both chillers and it is recommended that they be replaced with one chiller with the capacity to serve the entire school.

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.

- Main Boiler
- Pumps
- Air Handling Units
- Packaged DX Units
- Split DX Systems
- Kitchen Make-up Air Units
- Fans
- Fan Coil Units
- Heating Units
- VAV Boxes
- PTAC Units
- 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.

When existing building systems have reached the end of their lifecycle the following system types are recommended as possible replacements:

1. Air-Cooled Variable Refrigerant Flow (VRF) - Air side heat pump units are located on the roof. Heat pumps are interlocked with ductless type terminal equipment through refrigerant piping. Simultaneous heating and cooling is possible with VRF system. All heat pump equipment utilizes variable speed compressors and fan motors. Decouple energy recovery ventilators would provide both the building exhaust and ventilation airflow. ERV units shall utilize enthalpy wheels and demand controlled ventilation components. Exterior condensing units serving ERV units will be located on the ground. Heat for ERV units will be provided by the central boiler.
2. Ground Source Water-Cooled VRF - Ground coupled heat pumps are connected to the geothermal loop condenser water system. The ground coupled heat pumps are interlocked with ductless type terminal equipment through refrigerant piping. Simultaneous heating and cooling is possible with the VRF system. All heat pump equipment utilizes variable speed compressors and fan motors. Decoupled energy recovery ventilators would provide both the building exhaust and ventilation airflow. ERV units shall utilize enthalpy wheels and demand controlled ventilation components.

It is crucially important to calculate life cycle costs to identify the most cost effective system replacement that is specific to this building.

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 NES.

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 chiller and boiler 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.

3.2 Domestic Water Plumbing Systems

Plumbing Equipment Tables

PLUMBING SYSTEMS		
Plumbing System		**Description**
P-04	Domestic Supply	PEX/Galvanized Steel (4" Service)
	Waste/Sewer Piping	Cast Iron
	Vent Piping	Cast Iron/Copper
	Fire Protection	Wet Pipe Sprinkler System (4" Service)
	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
	Input Capacity	180 MBH
	Storage Capacity	76 Gallon
	Expansion Tank?	Yes
	Location	Mechanical Room
	Service	Entire Building
	Nameplate Date	2000
Pump(s), Inline		**18**
P-01	Quantity	1
	Input Capacity	1/6 HP
	Location	Mechanical Room
	Service	Domestic Hot Water Recirculation
	Nameplate Date	2000

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

- The domestic hot water heater and recirculation pump have aged past their useful service life and are due for replacement. (See Photograph #6)

Photograph #6 – Domestic Water Heater

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.

- Expansion Tanks
- Thermostatic Mixing Valves
- Plumbing Fixtures
- Piping Systems and valves

4 ELECTRICAL SYSTEMS

4.1 Electrical Service

Equipment Type				
Electrical Service				
P-04	Overhead Conductors		Underground Conductors	X
	Transformer	(1) 750kVA @ 208V, Customer Owned		
	Utility Company	Town of Smyrna		
	Service Size	(1) 2,500A @ 208V		
	Meter	Primary Meter		
	Location	On utility pole at North Main Street		
	Main Service Ground	Yes		
	Main Switchboard	(1) MDS1 – 2,500A (1) MDS2 – 1,600A	Main Distribution Panelboard	
	Manufacturer	Square D	Installation Date	MDS1-2006, MDS2-2002

Equipment Type		
Panelboard(s)		
P-04	Type	A Series
	Manufacturer	General Electric (GE)
P-04	Type	NQ
	Manufacturer	General Electric (GE Square D)
P-01	Type	NQC
	Manufacturer	Westinghouse

The building has a 2,500A 120/208V switchboard located in the electrical room located near the building chiller. This switchboard MDS1 which was installed in 2006 has a 1,600A breaker that feeds switchboard MSD2 which was installed in 2002. Based on information we received from the Town of Smyrna, the peak demand for the building in the last 12 months is 220 kW which converts to 611 Amperes (A). The existing main switchboard has a maximum capacity of 2,000A. Based on this information we can say that the existing switchboard has 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 the majority of the panelboards. The switchboards and the majority of the panelboards throughout the school are manufactured by Square D or GE and were installed in 2002 or later and appear to be in fair to good condition. There are a few panelboards that are manufactured by GE and were installed in 1993 but these panelboards still appear to be in fair condition. There is one panelboard in the boiler room that appears to be past its useful service life that we would recommend being replaced as soon as possible. This panelboard is manufactured by Westinghouse and is labeled as panel E, but it is our understanding that the panel is not connected to an emergency source.

4.2 Emergency Power

There is not a generator located at this building. The emergency lighting is controlled by wall mounted fixtures that have an internal battery pack.

4.3 Lighting Systems

Equipment Type		
Lighting Systems:		
P-04	Interior Lighting	Type: Fluorescent, T8,
P-03	Exterior Lighting	Type: Wall mounted and Parking Lot – Metal Halide
P-04	Emergency Lighting	Type: Wall mounted with internal battery
P-04	Illuminated Exit Signs	Yes
P-04	Lighting Switches (MH)	46” to center of switch
P-04	Lighting Switches (MH) ADA Compliant	Yes

4.4 Power

Equipment Type		
Power:		
P-03	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	Interior disconnect switches	Fair to good condition
P-01	Exterior disconnect switches	Replace exterior disconnects for any 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 but no longer used to our knowledge
	Fiber/Data on site	Yes
	Data racks (Location or spare capacity)	MDF Room, IDF rooms – Yes spare capacity
	Data Cabling	CAT 6
	CCTV	Yes
	Security (Manufacturer, location)	Honeywell

	Intercom (Aiphone)	No
	Card Reader(s)	Yes

The majority of the lighting fixtures throughout the school were replaced with 2'x4' fluorescent recessed acrylic lensed type fixtures in 2015. As part of this lighting replacement, occupancy sensors were installed in all areas that the lighting was replaced except for the gymnasium and stage area. The only area that didn't have their lighting fixtures replaced was the 8-classroom addition that was built in 2006. This area still has fluorescent linear fixtures as were originally installed. 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 lighting to LED lighting would result in energy savings. Some of the wall mounted exterior lights particularly the wall mounted and surface mounted square lights under the canopies are beginning to show signs of wear due to the weather and will probably need to start being replaced within the next 2-3 years. Routine and periodic maintenance of the lighting system is recommended.

While the building appears to be in good condition, the recessed receptacles installed in the building are beginning to show signs of aging. Over the years, additional receptacles have been installed using surface metal raceway. We would assume that the building wiring to the recessed receptacles are the same age as the receptacle, so both would probably need replacement within the next 5 years. In addition, the current National Electrical Code (NEC) requires that all child care facilities have tamper resistant receptacles. The code defines a child care facility as a building or portion thereof, for educational, supervisory, or personal care services for more than four children 7 years old or less. So, this elementary school would fit this definition so we would recommend that all non-locking-type 125V, 15 and 20 ampere(A) existing receptacles be replaced with tamper-resistant 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	MDF Room	

	Fire Alarm (Addressable or Analog)	Addressable
	Manufacturer	Notifier
	Date of Installation	2015
Annunciator:		
P-04	Remote Annunciator	Yes
	Annunciator (Graphic or Alphanumeric)	Alphanumeric
	Remote Annunciator 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. While the existing fire alarm is in good condition, it utilizes audible horns and visual strobe notification devices and does not have a voice evacuation system. The 2015 NFPA 101 Life Safety Code requires that any new schools with 100 or more occupants have a fire alarm system utilize an emergency voice/alarm communications system to notify occupants. Even though a change is not required now, if a major renovation was to occur to the existing school, then the existing fire alarm system would need to be upgraded to a voice evacuation system.

4.7 Code Deficiencies

1. Replace all existing building non-locking-type 125V, 15 and 20 ampere receptacles with tamper-resistant receptacles to comply with the current National Electrical Code.
2. Upgrade Fire Alarm system to voice evacuation system to comply with current NFPA 101 Life Safety Code.

Planned Improvements

- Add three (3) internal cameras throughout school in areas designated by school administrators.
- Add one (1) external camera under awning facing office steps.
- Add card readers at doors designated by school administrators/ technology department. (cost estimate based on five (5) devices)
- Add wireless access points to non-educational (cafeteria, gym, guidance office) spaces. (cost estimate based on six (6) devices)
- Provide uninterruptible power supply (UPS) at all access door control panels. (cost estimate based on seven (7) devices)

Deferred Maintenance

- Replace Panelboard E and the associated wiring.
- Replace exterior disconnect switches for all exterior HVAC units that are replaced.

General Improvements

- Replace interior lighting for 8-classroom addition and exterior wall mounted Metal Halide fixtures with LED fixtures.
- Provide lighting controls in the 8-classroom addition 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)
- Lighting
- Receptacles
- Fire Alarm Panel
- Security System
- Video Camera

APPENDIX A

FACILITY PHOTOGRAPHS

Photo #1	Air Cooled Chillers

Photo #2	BAS Control Panel

Photo #3	D Wing Roof Mechanical Equipment

Photo #4	Exterior

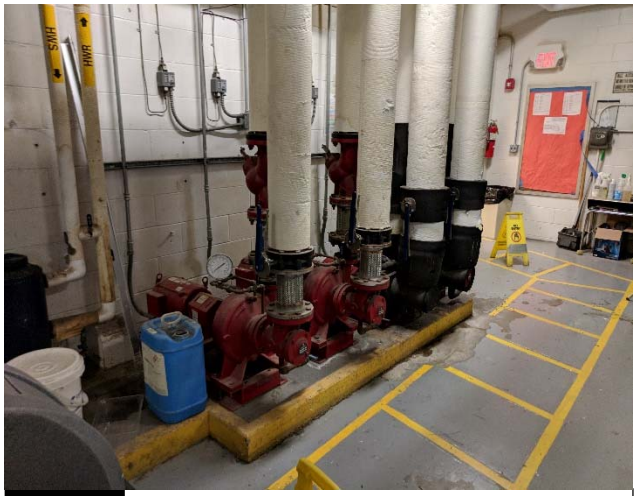

Photo #5	Hot and Chilled Water Pumps in Mechanical Room

Photo #6	Kitchen Mechanical Equipment on Roof

Photo #7	Mechanical Penthouse on Roof

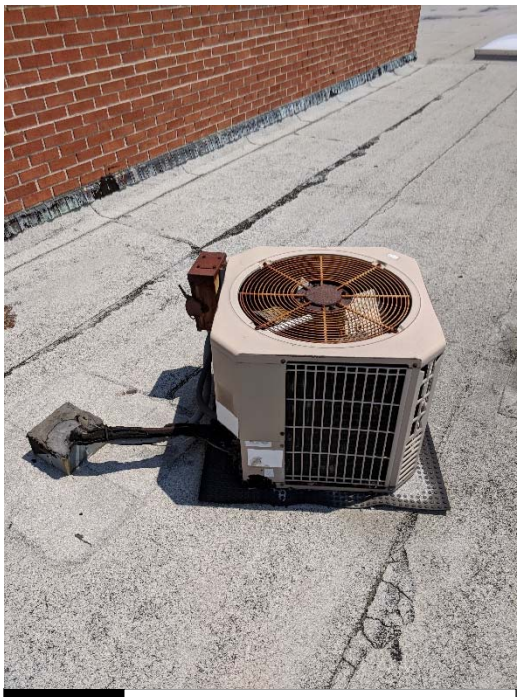

Photo #8	DX Split System Condensing Unit

Photo #9	Backup Boiler in Mechanical Room

Photo #10	Gym RTU

Photo #11	RTU serving Library

Photo #12	Typical Energy Recovery Unit

Photo #13	Cafeteria RTU

Photo #14	Typical Split Indoor Unit

Photo #15	Domestic Water Heater

Photo #16	Typical Unit Ventilator

Photo #17	Typical Water Closet

Photo #18	Typical Bathroom Hand Sinks

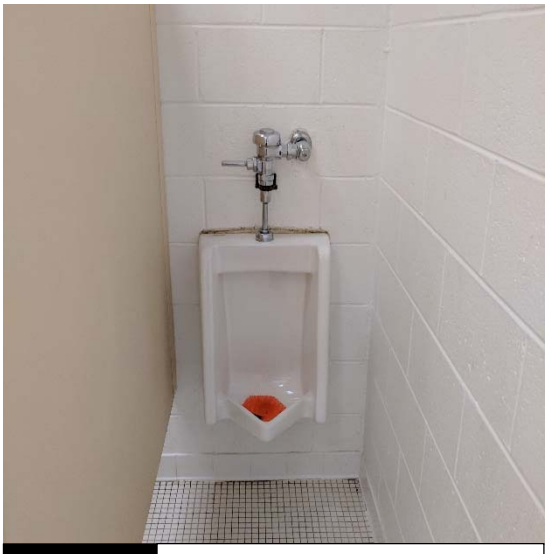

Photo #19	Typical Urinal

Photo #1	Fire Alarm Annunciator Panel

Photo #2	Fire Alarm Control Panel

Photo #3	Motor Control Center

Photo #4	Panelboard E is past useful service life

Photo #5	Panelboard E

Photo #6	Panelboard MDP

Photo #7	Security Keypad and Card Reader

Photo #8	Switchboard MDS1

Photo #9	Switchboard MDS2

Photo #10	Transformer and PMH-3 Switch

Photo #11	Typical 2006 Addition Classroom Lighting

Photo #12	Typical Classroom with Occupancy Sensor

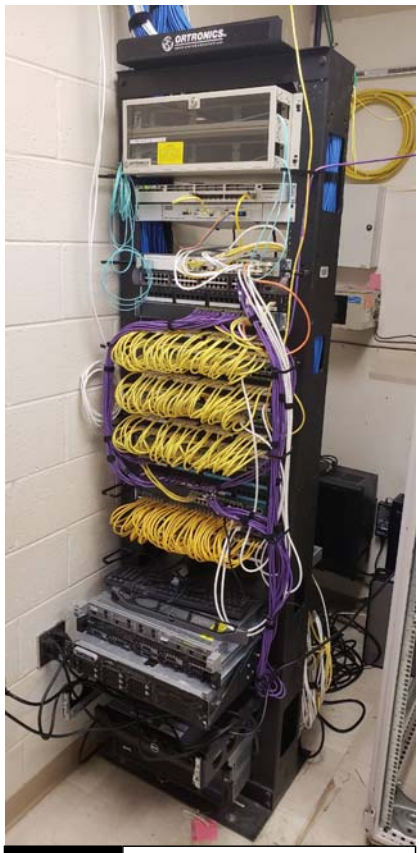

Photo #13	Typical Data Rack

Photo #14	Typical Exterior Video Surveillance

Photo #15	Typical Interior Video Surveillance

Photo #16	Typical Light Switches and Remote Test Switches

Photo #17	Typical Light under Canopy

Photo #18	Typical Panelboard installed in 1993

Photo #19	Typical Surface Mounted Receptacle

Photo #20	Typical VFD

Photo #21	Typical Wall Mounted Emergency Light Fixture

Photo #22	Typical Wall pack

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: NORTH SMYRNA ELEMENTARY SCHOOL
GAI PROJECT NO: 18047
DATE: 08/08/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 55,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

1 - BOILER REPLACEMENT	QUANTITY NO. OF UNITS	QUANTITY UNIT OF MEASURE	MATERIAL PER UNIT	MATERIAL TOTAL	LABOR PER UNIT	LABOR TOTAL	TOTAL COST
BASE BID COST ESTIMATE							
BOILER	1	EA	$75,000.00	$ 75,000.00	$20,000.00	$ 20,000.00	$ 95,000.00
HOT WATER PIPING AND INSULATION	1	LS	$ 15,000.00	$ 15,000.00	$50,000.00	$ 50,000.00	$ 65,000.00
FLUES AND COMBUSTION AIR	1	LS	$ 12,500.00	$ 12,500.00	$8,500.00	$ 8,500.00	$ 21,000.00
GAS PIPING	1	LS	$ 9,500.00	$ 9,500.00	$6,500.00	$ 6,500.00	$ 16,000.00
DUCT AND VENT INSULATION	1	LS	$ 4,000.00	$ 4,000.00	$5,000.00	$ 5,000.00	$ 9,000.00
TESTING AND BALANCING	1	LS		$ -	$10,000.00	$ 10,000.00	$ 10,000.00
ATC CONTROLS	1	LS	$ 10,000.00	$ 10,000.00	$15,000.00	$ 15,000.00	$ 25,000.00
DEMOLITION	1	LS	$ 1,000.00	$ 1,000.00	$7,500.00	$ 7,500.00	$ 8,500.00
COMMISSIONING	1	LS		$ -	$5,000.00	$ 5,000.00	$ 5,000.00
CONDUCTORS AND CONDUITS	1	LS	$ 5,500.00	$ 5,500.00	$5,500.00	$ 5,500.00	$ 11,000.00
DISTRIBUTION PANEL	1	LS	$ 5,500.00	$ 5,500.00	$5,500.00	$ 5,500.00	$ 11,000.00
EQUIPMENT CONNECTIONS	1	LS	$ 10,000.00	$ 10,000.00	$10,000.00	$ 10,000.00	$ 20,000.00
ELECTRICAL DEMOLITION	1	LS		$ -	$3,000.00	$ 3,000.00	$ 3,000.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 148,000.00	$ 151,500.00	$ 299,500.00
TOTAL BASE BID:	**$ 148,000.00**	**$ 151,500.00**	**$ 299,500.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$2.69 PER S.F.**	**$2.75 PER S.F.**	**$5.45 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)		**$ 299,500.00**	**$5.45 PER S.F.**

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PHONE: 410-822-8688
FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: NORTH SMYRNA ELEMENTARY SCHOOL
GAI PROJECT NO: 18047
DATE: 08/08/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 6,500
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

BASE BID COST ESTIMATE

2 - GYM AND CAFETERIA RTU REPLACEMENT	QUANTITY NO. OF UNITS	QUANTITY UNIT OF MEASURE	MATERIAL PER UNIT	MATERIAL TOTAL	LABOR PER UNIT	LABOR TOTAL	TOTAL COST
DUCTWORK DEMOLITION	2.0	EA		$ -	$ 1,000.00	$ 2,000.00	$ 2,000.00
RTU REMOVAL	2.0	EA		$ -	$ 1,500.00	$ 3,000.00	$ 3,000.00
PIPING DEMOLITION	2.0	EA		$ -	$ 500.00	$ 1,000.00	$ 1,000.00
PACKAGED RTU (150; 185 MBH)	2.0	EA	$ 32,000.00	$ 64,000.00	$ 15,000.00	$ 30,000.00	$ 94,000.00
DUCTWORK FOR RTU	2.0	EA	$ 16,000.00	$ 32,000.00	$ 8,000.00	$ 16,000.00	$ 48,000.00
GAS PIPING, VALVES AND FITTINGS	2.0	EA	$ 750.00	$ 1,500.00	$ 2,200.00	$ 4,400.00	$ 5,900.00
DUCT DETECTORS	4.0	EA	$ 300.00	$ 1,200.00	$ 500.00	$ 2,000.00	$ 3,200.00
RTU ATC CONTROLS	2.0	EA	$ 2,000.00	$ 4,000.00	$ 3,000.00	$ 6,000.00	$ 10,000.00
DUCT INSULATION	2.0	EA	$ 3,000.00	$ 6,000.00	$ 3,500.00	$ 7,000.00	$ 13,000.00
CONDENSATE PIPING	40.0	LF	$ 5.00	$ 200.00	$ 10.00	$ 400.00	$ 600.00
TESTING AND BALANCING	2.0	EA		$ -	$ 3,500.00	$ 7,000.00	$ 7,000.00
COMMISSIONING	2.0	EA		$ -	$ 3,500.00	$ 7,000.00	$ 7,000.00
ELECTRICAL DISCONNECTS	2.0	EA	$ 1,000.00	$ 2,000.00	$ 500.00	$ 1,000.00	$ 3,000.00
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	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	$ 114,900.00	$ 91,700.00	$ 206,600.00
TOTAL BASE BID:	**$ 114,900.00**	**$ 91,700.00**	**$ 206,600.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$17.68 PER S.F.**	**$14.11 PER S.F.**	**$31.78 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)		**$ 206,600.00**	**$31.78 PER S.F.**

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Mechanical | Electrical | Plumbing

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

CONSTRUCTION COST ESTIMATE

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

GENERAL PROJECT INFORMATION

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

3 - DX SPLIT SYSTEM REPLACEMENT	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
DX SPLIT SYSTEM REMOVAL	1.0	EA		$ -	$ 500.00	$ 500.00	$ 500.00
PIPING DEMOLITION	1.0	LS		$ -	$ 200.00	$ 200.00	$ 200.00
DUCTLESS INDOOR AHU UNIT	1.0	EA	$ 1,500.00	$ 1,500.00	$ 300.00	$ 300.00	$ 1,800.00
ROOF MOUNTED OUTDOOR UNIT (18MBH)	1.0	LS	$ 3,000.00	$ 3,000.00	$ 300.00	$ 300.00	$ 3,300.00
REFRIGERANT PIPING	1.0	LS	$ 300.00	$ 300.00	$ 300.00	$ 300.00	$ 600.00
PIPING INSULATION	20.0	LF	$ 10.00	$ 200.00	$ 4.00	$ 80.00	$ 280.00
CONDENSATE PIPING	20.0	LF	$ 5.00	$ 100.00	$ 10.00	$ 200.00	$ 300.00
TESTING AND BALANCING	1.0	LS		$ -	$ 500.00	$ 500.00	$ 500.00
COMMISSIONING	1.0	LS		$ -	$ 500.00	$ 500.00	$ 500.00
ELECTRICAL DISCONNECTS	1.0	EA	$ 1,000.00	$ 1,000.00	$ 500.00	$ 500.00	$ 1,500.00
CONDUIT AND WIRE	1.0	LS	$ 1,700.00	$ 1,700.00	$ 2,200.00	$ 2,200.00	$ 3,900.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 7,800.00	$ 5,580.00	$ 13,380.00
TOTAL BASE BID:	**$ 7,800.00**	**$ 5,580.00**	**$ 13,380.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$15.60 PER S.F.**	**$11.16 PER S.F.**	**$26.76 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)		**$ 13,380.00**	**$26.76 PER S.F.**

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CONSTRUCTION COST ESTIMATE

PROJECT: NORTH SMYRNA ELEMENTARY SCHOOL
GAI PROJECT NO: 18047
DATE: 08/08/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 1,200
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

4 - LIBRARY RTU REPLACEMENT	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
DUCTWORK DEMOLITION	1.0	LS		$ -	$ 1,000.00	$ 1,000.00	$ 1,000.00
RTU REMOVAL	1.0	EA		$ -	$ 1,500.00	$ 1,500.00	$ 1,500.00
PIPING DEMOLITION	1.0	LS		$ -	$ 500.00	$ 500.00	$ 500.00
PACKAGED RTU	1.0	EA	$ 26,000.00	$ 26,000.00	$ 10,000.00	$ 10,000.00	$ 36,000.00
DUCTWORK FOR RTU	1.0	LS	$ 10,000.00	$ 10,000.00	$ 5,000.00	$ 5,000.00	$ 15,000.00
GAS PIPING, VALVES AND FITTINGS	1.0	LS	$ 500.00	$ 500.00	$ 1,500.00	$ 1,500.00	$ 2,000.00
DUCT DETECTORS	2.0	EA	$ 300.00	$ 600.00	$ 1,000.00	$ 2,000.00	$ 2,600.00
RTU ATC CONTROLS	1.0	LS	$ 2,000.00	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 5,000.00
DUCT INSULATION	1.0	LS	$ 2,000.00	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 5,000.00
CONDENSATE PIPING	20.0	LF	$ 5.00	$ 100.00	$ 10.00	$ 200.00	$ 300.00
TESTING AND BALANCING	1.0	LS		$ -	$ 3,500.00	$ 3,500.00	$ 3,500.00
COMMISSIONING	1.0	LS		$ -	$ 3,500.00	$ 3,500.00	$ 3,500.00
ELECTRICAL DISCONNECTS	1.0	EA	$ 1,000.00	$ 1,000.00	$ 500.00	$ 500.00	$ 1,500.00
CONDUIT AND WIRE	1.0	LS	$ 1,700.00	$ 1,700.00	$ 2,200.00	$ 2,200.00	$ 3,900.00
FIREALARM INTERFACE OF DUCT 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	$ 44,500.00	$ 37,900.00	$ 82,400.00
TOTAL BASE BID:	**$ 44,500.00**	**$ 37,900.00**	**$ 82,400.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$37.08 PER S.F.**	**$31.58 PER S.F.**	**$68.67 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)		**$ 82,400.00**	**$68.67 PER S.F.**

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FAX: 410-822-6306

CONSTRUCTION COST ESTIMATE

PROJECT: NORTH SMYRNA ELEMENTARY SCHOOL
GAI PROJECT NO: 18047
DATE: 08/08/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 15,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

5 - (4) ERV REPLACEMENTS	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
DUCTWORK DEMOLITION	4.0	EA		$ -	$ 3,000.00	$ 12,000.00	$ 12,000.00
ERU REMOVAL	4.0	EA		$ -	$ 3,000.00	$ 12,000.00	$ 12,000.00
INDOOR ERV UNIT (1,000 CFM)	4.0	EA	$ 35,000.00	$ 140,000.00	$ 12,000.00	$ 48,000.00	$ 188,000.00
DUCTWORK FOR ERV	1.0	LS	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 40,000.00
DUCT DETECTORS	8.0	EA	$ 300.00	$ 2,400.00	$ 500.00	$ 4,000.00	$ 6,400.00
AHU ATC CONTROLS	2.0	EA	$ 9,000.00	$ 18,000.00	$ 12,000.00	$ 24,000.00	$ 42,000.00
DUCT INSULATION	2.0	EA	$ 2,000.00	$ 4,000.00	$ 4,000.00	$ 8,000.00	$ 12,000.00
TESTING AND BALANCING	4.0	EA		$ -	$ 5,000.00	$ 20,000.00	$ 20,000.00
COMMISSIONING	4.0	EA		$ -	$ 4,000.00	$ 16,000.00	$ 16,000.00
ELECTRICAL DISCONNECTS	4.0	EA	$ 1,000.00	$ 4,000.00	$ 500.00	$ 2,000.00	$ 6,000.00
CONDUIT AND WIRE	4.0	EA	$ 1,700.00	$ 6,800.00	$ 2,200.00	$ 8,800.00	$ 15,600.00
FIREALARM INTERFACE OF DUCT DETECTORS	8.0	EA	$ 300.00	$ 2,400.00	$ 250.00	$ 2,000.00	$ 4,400.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 197,600.00	$ 176,800.00	$ 374,400.00
TOTAL BASE BID:	**$ 197,600.00**	**$ 176,800.00**	**$ 374,400.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$13.17 PER S.F.**	**$11.79 PER S.F.**	**$24.96 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)		**$ 374,400.00**	**$24.96 PER S.F.**

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CONSTRUCTION COST ESTIMATE

PROJECT: NORTH SMYRNA ELEMENTARY SCHOOL
GAI PROJECT NO: 18047
DATE: 08/08/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 5,845 (CLASSROOM SQUARE FOOTAGE = 5,845 S.F., KITCHEN/CAFETERIA = 6,254 S.F.)
FACILITY TYPE: EDUCATIONAL - CLASSROOMS
 # OF FLOORS: 1 (BUILDING IS MULTISTORY BUT STUDY AREA INCLUDES BASEMENT ONLY)
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

6 - UNIT VENT REFURBISHMENT	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
REFURBISHMENT OF UNIT VENTILATORS	29.0	EA	$ 1,500.00	$ 43,500.00	$ 2,000.00	$ 58,000.00	$ 101,500.00
TESTING AND BALANCING	1.0	LS		$ -	$ 12,000.00	$ 12,000.00	$ 12,000.00
COMMISSIONING (CONTRACTOR ASSIST)	1.0	LS		$ -	$ 15,000.00	$ 15,000.00	$ 15,000.00
ATC CONTROLS	29.0	EA	$ 2,000.00	$ 58,000.00	$ 2,500.00	$ 72,500.00	$ 130,500.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 101,500.00	$ 157,500.00	$ 259,000.00
TOTAL BASE BID:	**$ 101,500.00**	**$ 157,500.00**	**$ 259,000.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$17.37 PER S.F.**	**$26.95 PER S.F.**	**$44.31 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%	$ -	
CONTRACTOR INSURANCE	0.0%	$ -	
PAYMENT BOND	0.0%	$ -	
PERFORMANCE BOND	0.0%	$ -	
DESIGN CONTINGENCY	0.0%	$ -	
	0.0%	$ -	
	0.0%	$ -	
TOTAL ADDITIONAL PROJECT COST ITEMS		**$ -**	
GRAND TOTAL CONSTRUCTION COST (BASE BID + ADDITIONAL PROJECT COSTS)		**$ 259,000.00**	**$44.31 PER S.F.**

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CONSTRUCTION COST ESTIMATE

PROJECT: NORTH SMYRNA ELEMENTARY 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

7 - (2) FCU REPLACEMENT	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
DUCTWORK DEMOLITION	1.0	LS		$ -	$ 500.00	$ 500.00	$ 500.00
FCU REMOVAL	1.0	LS		$ -	$ 500.00	$ 500.00	$ 500.00
PIPING DEMOLITION	1.0	LS		$ -	$ 300.00	$ 300.00	$ 300.00
FAN COIL UNIT	2.0	EA	$ 1,000.00	$ 2,000.00	$ 2,000.00	$ 4,000.00	$ 6,000.00
DUCTWORK	2.0	EA	$ 2,000.00	$ 4,000.00	$ 2,000.00	$ 4,000.00	$ 8,000.00
CHILLED WATER AND HEATING WATER PIPING, VALVES AND FITTINGS	2.0	EA	$ 1,500.00	$ 3,000.00	$ 1,500.00	$ 3,000.00	$ 6,000.00
FCU ATC CONTROLS	1.0	LS	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 4,000.00
PIPING INSULATION	1.0	LS	$ 750.00	$ 750.00	$ 750.00	$ 750.00	$ 1,500.00
DUCT INSULATION	1.0	LS	$ 750.00	$ 750.00	$ 750.00	$ 750.00	$ 1,500.00
CONDENSATE PIPING	1.0	LS	$ 500.00	$ 500.00	$ 750.00	$ 750.00	$ 1,250.00
TESTING AND BALANCING	1.0	LS		$ -	$ 3,000.00	$ 3,000.00	$ 3,000.00
COMMISSIONING	1.0	LS		$ -	$ 1,200.00	$ 1,200.00	$ 1,200.00
ELECTRICAL CONNECTIONS	2.0	EA	$ 1,000.00	$ 2,000.00	$ 1,000.00	$ 2,000.00	$ 4,000.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 15,000.00	$ 22,750.00	$ 37,750.00
TOTAL BASE BID:	**$ 15,000.00**	**$ 22,750.00**	**$ 37,750.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$6.00 PER S.F.**	**$9.10 PER S.F.**	**$15.10 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)		**$ 37,750.00**	**$15.10 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: NORTH SMYRNA ELEMENTARY SCHOOL
GAI PROJECT NO: 18047
DATE: 07/27/18
PREPARED BY: MEO

GENERAL PROJECT INFORMATION

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

8 - DX SPLIT SYSTEM FOR NEW OFFICE	QUANTITY		MATERIAL		LABOR		TOTAL
	NO. OF UNITS	UNIT OF MEASURE	PER UNIT	TOTAL	PER UNIT	TOTAL	COST
BASE BID COST ESTIMATE							
DUCTLESS INDOOR AHU UNIT	1.0	EA	$ 1,500.00	$ 1,500.00	$ 300.00	$ 300.00	$ 1,800.00
ROOF MOUNTED OUTDOOR UNIT (18MBH)	1.0	LS	$ 3,000.00	$ 3,000.00	$ 300.00	$ 300.00	$ 3,300.00
REFRIGERANT PIPING	1.0	LS	$ 300.00	$ 300.00	$ 300.00	$ 300.00	$ 600.00
PIPING INSULATION	20.0	LF	$ 10.00	$ 200.00	$ 4.00	$ 80.00	$ 280.00
CONDENSATE PIPING	20.0	LF	$ 5.00	$ 100.00	$ 10.00	$ 200.00	$ 300.00
TESTING AND BALANCING	1.0	LS		$ -	$ 500.00	$ 500.00	$ 500.00
COMMISSIONING	1.0	LS		$ -	$ 500.00	$ 500.00	$ 500.00
ELECTRICAL DISCONNECTS	1.0	EA	$ 1,000.00	$ 1,000.00	$ 500.00	$ 500.00	$ 1,500.00
CONDUIT AND WIRE	1.0	LS	$ 1,700.00	$ 1,700.00	$ 2,200.00	$ 2,200.00	$ 3,900.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 7,800.00	$ 4,880.00	$ 12,680.00
TOTAL BASE BID:	**$ 7,800.00**	**$ 4,880.00**	**$ 12,680.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$15.60 PER S.F.**	**$9.76 PER S.F.**	**$25.36 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)		**$ 12,680.00**	**$25.36 PER S.F.**

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CONSTRUCTION COST ESTIMATE

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

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 55,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 2
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

9 - 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	$ 1,500.00	$ 1,500.00	$ 2,000.00	$ 2,000.00	$ 3,500.00
NEW DOMESTIC WATER HEATERS	2.0	EA	$ 15,000.00	$ 30,000.00	$ 2,500.00	$ 5,000.00	$ 35,000.00
GAS PIPING CONNECTION	1.0	LS	$ 500.00	$ 500.00	$ 1,000.00	$ 1,000.00	$ 1,500.00
NEW DOMESTIC WATER PIPING	1.0	LS	$ 2,500.00	$ 2,500.00	$ 3,500.00	$ 3,500.00	$ 6,000.00
DOMESTIC WATER EXPANSION TANK	1.0	EA	$ 2,000.00	$ 2,000.00	$ 1,000.00	$ 1,000.00	$ 3,000.00
INTAKE AND VENT PIPING	1.0	LS	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 2,000.00
INTAKE AND VENT TERMINATIONS	1.0	LS	$ 500.00	$ 500.00	$ 2,500.00	$ 2,500.00	$ 3,000.00
ELECTRICAL CONNECTION/DISCONNECT	1.0	LS	$ 500.00	$ 500.00	$ 2,500.00	$ 2,500.00	$ 3,000.00
START UP AND TESTING	1.0	LS		$ -	$ 1,000.00	$ 1,000.00	$ 1,000.00
ATC CONTROLS	1.0	LS	$ 1,500.00	$ 1,500.00	$ 2,500.00	$ 2,500.00	$ 4,000.00
TESTING AND BALANCING	1.0	LS		$ -	$ 1,500.00	$ 1,500.00	$ 1,500.00
RECIRCULATING PUMP AND TRIM	1.0	LS	$ 2,000.00	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 5,000.00
PIPING INSULATION	1.0	LS	$ 1,500.00	$ 1,500.00	$ 2,500.00	$ 2,500.00	$ 4,000.00
COMMISSIONING	1.0	LS		$ -	$ 2,000.00	$ 2,000.00	$ 2,000.00
EMERGENCY KILL SWITCHES	1.0	LS	$ 750.00	$ 750.00	$ 1,000.00	$ 1,000.00	$ 1,750.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 44,250.00	$ 32,000.00	$ 76,250.00
TOTAL BASE BID:	**$ 44,250.00**	**$ 32,000.00**	**$ 76,250.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$0.80 PER S.F.**	**$0.58 PER S.F.**	**$1.39 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)		**$ 76,250.00**	**$1.39 PER S.F.**

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CONSTRUCTION COST ESTIMATE

PROJECT: NORTH SMYRNA ELEMENTARY SCHOOL
GAI PROJECT NO: 18047
DATE: 08/08/19
PREPARED BY:

GENERAL PROJECT INFORMATION

PROJECT SQUARE FOOTAGE: 55,000
FACILITY TYPE: EDUCATION - CLASSROOMS
 # OF FLOORS: 1
ARCHITECT: FEARN-CLENDANIEL
BASIS FOR ESTIMATE: CERT. OF NECESSITY
SUMMARY: PRELIMINARY ESTIMATE

BASE BID COST ESTIMATE

10 - AIR COOLED CHILLER REPLACEMENT	QUANTITY NO. OF UNITS	QUANTITY UNIT OF MEASURE	MATERIAL PER UNIT	MATERIAL TOTAL	LABOR PER UNIT	LABOR TOTAL	TOTAL COST
155 TON CHILLER	1.0	LS	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 400,000.00
ATC CONTROLS	1.0	LS	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 100,000.00
TESTING/BALANCING	1.0	LS	$ 30,000.00	$ 30,000.00	$ 30,000.00	$ 30,000.00	$ 60,000.00
COMMISSIONING	1.0	LS		$ -	$ 6,000.00	$ 6,000.00	$ 6,000.00
SWITCHBOARD BREAKER	1.0	EA	$ 8,000.00	$ 8,000.00	$ 6,000.00	$ 6,000.00	$ 14,000.00
CONDUCTORS AND CONDUITS	1.0	LS	$ -	$ -	$ -	$ -	$ -
MECHANICAL EQUIP CONNECTIONS	4.0	EA	$ 400.00	$ 1,600.00	$ 350.00	$ 1,400.00	$ 3,000.00
ELECTRICAL DEMOLITION	1.0	LS	$ -	$ -	$ 8,000.00	$ 8,000.00	$ 8,000.00

COST ESTIMATE SUMMARY

DESCRIPTION	MATERIAL	LABOR	TOTAL
BASE BID TOTAL COST	$ 289,600.00	$ 301,400.00	$ 591,000.00
TOTAL BASE BID:	**$ 289,600.00**	**$ 301,400.00**	**$ 591,000.00**
TOTAL BASE BID COST PER SQUARE FOOT:	**$5.27 PER S.F.**	**$5.48 PER S.F.**	**$10.75 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)		**$ 591,000.00**	**$10.75 PER S.F.**