

Mechanical and Electrical Systems

Existing Conditions Narrative

Central Offices Madison, Connecticut

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served by a 2" domestic water main fed from Connecticut Water Company. This water service currently serves all of the building's domestic water needs. The water distribution system is original to the building renovations in 1994.
2. Natural Gas:
 - a. Existing Natural Gas Service: The building is currently served by natural gas fed from the local utility's distribution system. Equipment which the gas main currently serves includes the boilers and water heater.
3. Sanitary:
 - a. Existing Sanitary Service: The building's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the building. The sanitary waste piping discharges to a septic tank and leaching field.
4. Storm:
 - a. Existing Storm System: Building is served primarily by gutters.

PLUMBING FIXTURES AND SPECIALTIES

1. Existing plumbing fixtures are as follows:
 - a. In general, fixtures are original to the building renovations in 1994 and are in good condition.
 - b. Water closets are floor mounted; tank type, vitreous china; original to the building.
 - c. Lavatories are wall hung vitreous china. Faucets are installed with single lever handle faucets.

- d. Urinals are wall mounted with flush valves.



DOMESTIC HOT WATER SYSTEMS

1. Existing Domestic Hot Water System: The domestic hot water is generated by an A.O. Smith gas fired water heater. The water heater is original to the building renovations in 1994 and is in fair condition. The age of the water heater is approaching typical life expectancy and may need to be replaced soon.

B. FIRE PROTECTION NARRATIVE

APPLICABLE CODES AND STANDARDS

The sprinkler systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. NFPA 13, Latest Version

FIRE PROTECTION SYSTEM

1. The building is fully sprinklered and is served by a 6" water main with reduced pressure backflow preventer. There is one alarm check valve at the water service. The sprinkler system is original to the building renovations in 1994 and is in good condition.

C. MECHANICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1

EXISTING SYSTEMS

1. Boiler Plant: The building is heated by a four section Slant Fin Caravan modular boiler which uses propylene glycol and is interconnected with the heat pump loop.



2. Air Conditioning Plant: The building is cooled by an Imeco forced draft, cooling tower located outside. The tower is closed coil type which uses propylene glycol and is interconnected with the heat pump piping loop. The sump is drained in the fall for winterizing. The cooling tower is showing signs of rust. A magnetic water treatment system was added to the closed loop part of the system during summer of 2009. The age of the cooling tower is approaching typical life expectancy and may need to be replaced soon



3. HVAC Distribution and controls:
 - a. The temperature control systems throughout the building is an Alerton DDC system; original to the building renovations in 1994.
 - b. Toilet rooms and misc spaces are served by dedicated exhaust systems.

- c. The IT room is served by a ductless split air conditioning unit.
- d. The building is primarily served by forty one (41) water cooled heat pumps. The heat pumps are ducted supply air and return air and provide mechanical ventilation through roof mounted air intake hoods. The units are located in “crawl spaces”. The age of the heat pumps is approaching typical life expectancy and many parts to fix the units are becoming difficult to find or have long lead times. Many of the units will most likely need to be replaced over the next few years.



D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition
7. ASHRAE 90.1

EXISTING SYSTEMS

1. The building is served by a Westinghouse distribution panel, rated at 600 amperes, 480Y/277volts, 3-phase. This panel is fed from an 800 amp disconnect switch located at the Town Gym. The feeders from the Town Gym to the Town Hall are installed underground. The service equipment at the Town Gym consists of a 1200 amp main disconnect switch and distribution gear to the Town Gym, Town Hall and Arts Barn. The service equipment and distribution panels are in good condition.



2. Emergency Generator: The generator located adjacent to the Town Gym is a 350 KW Kohler with a 550 gallon diesel tank. The generator provides backup power to the Town Gym, Town Hall and Arts Barn.
3. Lighting, in general, consists primarily of fixtures with acrylic lenses and T8 fluorescent lamps.
4. Site lighting has good coverage with pole mounted fixtures and bollards.
5. The fire alarm system is an EST zoned system. There are manual fire alarm pullstations throughout the building.

E. MEP SYSTEMS CONCLUSION

In general, the MEP systems were installed when the building was renovated in 1994 and are in good condition. Certain components as mentioned above are approaching typical life expectancy and some units may need to be replaced soon. In particular, the cooling tower and many of the heat pumps are showing signs of age.

Town of Madison									
Capital Needs Survey Form									Total Floor Area (sf):
Central Offices									22,600
Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.									
SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1 Poor, 5 Excellent)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - General								N/A	
Division 15 -Plumbing									
Water Distribution System			1994					No short term recommendations.	
Plumbing Fixtures			1994					No short term recommendations.	
Water Heater	4	3	1994	2017	22,600	\$0.5	\$11,300		
Division 15 - HVAC									
Cooling Tower	2	2	1994	2017	22,600	\$3.5	\$79,100	Replace existing tower	
Hot Water Boilers	3	3	1994	2024	22,600	\$2.5	\$56,500	Replace existing boilers	
General HVAC includes	4	3	1994	2016	22,600	\$5.5	\$124,300	Replace equipment as it fails	
Heat Pumps									
Exhaust Systems									
Temperature Control Systems									
Division 16 - Electrical									
General Electrical maintenance	4	4	1994	2019	22,600	\$2	\$45,200		
Lighting									
General upgrades	4	4	1994	2019	22,600	\$2	\$45,200		
Lighting Controls	3	3	1994	2012	22,600	\$3	\$67,800	Occupancy sensors, daylighting	
							\$ 429,400		
							\$ 19	per sf	

Mechanical and Electrical Systems

Existing Conditions Narrative

**Daniel Hand High School
Madison, Connecticut**

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served by a water main fed from Connecticut Water Company. Much of the water distribution system is original to the building.
2. Natural Gas:
 - a. Existing Natural Gas Service: The building is currently served by natural gas fed from the local utility's distribution system. Equipment which the gas main currently serves includes the boilers and water heaters.
3. Sanitary:
 - a. Existing Sanitary Service: The School's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the School. The sanitary waste piping discharges by gravity to a sewage ejector sump pump located at the exterior of the building. The waste is pumped to a water treatment building on the site. The effluent then discharges to a leaching field.
4. Storm:
 - a. Existing Storm System: Building is served by roof drains and gutters.

PLUMBING FIXTURES AND SPECIALTIES

1. Existing plumbing fixtures are as follows:
 - a. In general, plumbing fixtures are original to the building and are in good condition.
 - b. Water closets and urinals are wall hung, vitreous china with manual flush valves. Consideration is to change the manual flush valves to electronic w/infrared sensors
 - c. Lavatories are combination of wall hung vitreous china and “Bradley wash stations” with electronic faucets.



DOMESTIC HOT WATER SYSTEMS

1. Existing Domestic Hot Water Systems: The domestic hot water is generated by gas fired AO Smith Duramax water heaters. There are two sets of water heaters, each with two gas fired heating sections and storage tanks(s). The water heaters are original to the building and are in good condition.



B. FIRE PROTECTION NARRATIVE

APPLICABLE CODES AND STANDARDS

The sprinkler systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. NFPA 13, Latest Version

FIRE PROTECTION SYSTEM

1. The building is fully sprinklered and is served by an Aurora fire pump with capacity of 500 gpm at 115' head with 25 HP motor. The sprinkler system is original to the building and is in good condition.



2. Ceiling mounted sprinklers are generally concealed type throughout the school.
3. The floors are zoned through installation of floor control valves with flow switches at each floor.
4. The bridge / connector is served by a dry system with a dedicated dry alarm check valve.

C. MECHANICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. ASHRAE 90.1
7. State Department of Education School Construction Program

EXISTING SYSTEMS – BOILER PLANT

1. Boiler Plant: The boiler plant is located in a roof mounted “penthouse” and consists of two (2) H.B. Smith 450 Mills, 19 section boilers; each with nominal capacity of 196 boiler horsepower. The boilers are fitted with dual fuel Power-flame burners. Fuel oil is pumped up to a day tank in the penthouse where it is distributed to the boilers.



2. The hot water pumping system is a primary/secondary pump arrangement. The secondary pumps are served by VFD's.
3. The boiler plant system is original to the building and is in good condition.

EXISTING AIR HANDLING SYSTEMS

1. Most of the school is air-conditioned and is served by roof mounted York / JCI packaged rooftop units with DX cooling and hot water coils. All of the RTU's are original to the building and are reaching the end of their statistical useful life. Present concerns with these units included premature failure of compressors and infiltration of cold air down through the dampers; even when the dampers are closed.



2. Ductwork distribution to spaces below includes VAV boxes with hot water coils.
3. "Local" air conditioning is also provided at specific areas such as computer labs with ductless split units.
4. Lab fume hoods are served by upblast fans with VFD's.
5. Temperature control system throughout the building is an Alerton DDC system

D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2009 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. The building is served by an electrical service rated at 4000 amperes, 480Y/277volts, 3-phase. The service equipment, main transformer and main distribution panels are original to the building and are in good condition.
2. Lighting consists of a combination of T5 fixtures, T8 fixtures and CFL “can” type fixtures. Lighting at classrooms and corridors is served by occupancy sensors. Future energy efficient enhancements include converting fixtures over to LED and controlling light fixtures through daylight harvesting.
3. Emergency lighting is handled by an emergency generator (see notes below).
4. The fire alarm system is a Notifier addressable system. There are manual fire alarm pull stations throughout the building.



5. The fire pump and emergency power systems are fed from a 350 KW emergency generator with self-contained fuel oil supply and transfer switch located in the adjacent electrical room.



E. MEP SYSTEMS CONCLUSION

In general, the systems are original to the building and are in good condition. The packaged rooftop units are reaching the end of their useful life.

Town of Madison									
Capital Needs Survey Form									Total Floor Area (sf):
Daniel Hand High School									205,000
Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.									
SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1 Poor, 5 Excellent)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - Electrical									
Site - Lighting									
Well Water System								Not included in our review	
Site - General								N/A	
Division 15 -Plumbing									
Plumbing Fixtures and Distribution System			2000					No short term recommendations.	
Water Heater									
Division 15 - HVAC									
Hot Water Boilers			2000					No short term recommendations.	
Ventilation Systems Including:	3	3	2000	2020	205,000	\$5	\$1,025,000	Replace rooftop units including upgrade to control interface	
Unit Ventilators									
Air Handling Equipment									
Exhaust Systems									
Temperature Control Systems									
Division 16 - Electrical									
Overall Electrical Renovations - includes:			2000					No short term recommendations.	
Electrical Service									
Distribution and Local Panels									
Lighting									
Emergency Lighting									
Misc Low Voltage Systems									
Fire Alarm System									
Added Elect Cost for A/C Systems									
							\$ 1,025,000		
							\$ 5	per sf	

Mechanical and Electrical Systems

Existing Conditions Narrative

Island Avenue Elementary School Madison, Connecticut

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served by a domestic water main fed from Connecticut Water Company. This water service currently serves all of the school's domestic water needs including the portable classrooms. The water distribution system is original to the building.
2. Natural Gas:
 - a. Existing Natural Gas Service: The building is currently served by natural gas fed from the local utility's distribution system. Equipment which the gas main currently serves includes the boilers and water heater.
3. Sanitary:
 - a. Existing Sanitary Service: The School's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the School. The sanitary waste piping discharges to a septic tank and leaching field.
4. Storm:
 - a. Existing Storm System: Building is served by a combination of gutters and roof drains with internal rain leaders.

PLUMBING FIXTURES AND SPECIALTIES

1. Grease trap: Refer to 2004 Underground Storage Tank Report done by Flagship Environmental LLC, 2004.
2. Existing plumbing fixtures are as follows:
 - a. At the original 1950 section of the building, the water closets are floor mounted; flush valve, vitreous china; original to the building. Portable classrooms are newer fixtures.

- b. Lavatories at main building are wall hung vitreous china. Faucets are installed with two twist handle faucets.



- c. Urinals at the main building are floor mounted with flush valves. Under new construction these are not allowed to be installed by the State of CT Department of Public Health. They are grandfathered in and are allowed to remain.



DOMESTIC HOT WATER SYSTEMS

1. Existing Domestic Hot Water System: The school's domestic hot water is generated by a Smith boiler/tank system; natural gas fired. The water heater system was installed in 2008 and is in good condition.



B. FIRE PROTECTION NARRATIVE

FIRE PROTECTION SERVICE

1. There is no central fire protection system (sprinklers) currently at the facility.

C. MECHANICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. Boiler Plant: The building is heated by two, dual fuel Columbia MPH-50 steam boilers each with a capacity of 2,100 Mbh input. This boiler plant system including the boiler feed pumps, piping in the basement and steam traps throughout the building were installed in 2008 and are in good condition.



2. Buried Fuel Tanks: Refer to 2004 Underground Storage Tank Report done by Flagship Environmental LLC, 2004.
3. Original 1950 section of the building:
 - a. Steam supply and return piping in the main building is original to the building. The piping is primarily distributed throughout the building through a tunnel system.
 - b. Heating and Ventilating (H&V) systems consist of finned tube radiation, radiation in convectors and exhaust systems at toilet rooms. Ventilation at classrooms is accomplished by operable windows (natural ventilation) and a nominal amount of exhaust through a ducted exhaust system.
 - c. "Cafetorium" is served by a heating and ventilating unit which is about 20 years old.
 - d. Temperature controls at individual rooms are local, pneumatic controls. Temperature control system serving the boiler room and core H&V systems is an Alerton DDC system installed in 2008.
4. Air conditioning is provided at specific areas such as administrative areas, library, nurse's offices and computer lab with combination of window air conditioners and ductless split units.
5. Portable classrooms are air conditioned and are served by Trane packaged roof top units (RTU's) which are electric heat and electric cooling. At the portable classrooms constructed in 1994, the RTU's were replaced in 2006. The RTU's at the portable classrooms constructed in 1998 are original equipment.

D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2009 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. The Original 1950 section of the building is served by an electrical service rated at 400 amperes, 208Y/120volts, 3-phase. This service equipment consists of a 400amp main disconnect switch, distribution section and metering per utility company requirements. The service equipment is original to the building and is in fair condition.



2. Each section of the portable classrooms (two sections) is served by a separate electrical service rated at 400 amperes, 208Y/120volts, 3-phase.

3. There are a number of electrical panels located throughout the facility. These panelboards are original to the facility. The condition of these panelboards is good to poor. The majority of the panelboards do not have spare circuit breakers available for new circuits to be added, or have space to add new circuit breakers.
4. Lighting at classrooms, corridors and administrative areas consists primarily of fixtures with acrylic lenses and T8 fluorescent lamps. The Cafetorium is served by T5 fluorescent fixtures and the portable classrooms are served by T8 fluorescent fixtures with motion sensors. Lighting throughout the facility is in good condition and light levels are within recommended levels. Fixtures within the corridors are reaching the end of their useful life. There are plans to replace the ceilings in the corridors. The light fixtures should be replaced at this time.
5. Site lighting has fair to good coverage with pole mounted fixtures and building mounted fixtures.
6. The fire alarm system is a Notifier system with a Fire Lite dialer. There are manual fire alarm pullstations throughout the building and smoke detectors within the corridors.
7. Emergency lighting is handled by 2-head emergency lighting fixtures with integral battery packs.

E. MEP SYSTEMS CONCLUSION

In general, the systems at the 1950 section of the building are original to the building and are 60+ years old, thus have met their useful life expectancy. The heating plant is newer (2008). Expansion of the Alerton DDC system is recommended. Ventilation is not a full mechanical ventilation system as designed in new construction. At the newer portable classrooms, RTU's should be scheduled for replacement. The following capital needs survey form highlights the major systems in need of replacement and their respective capital costs to implement.

Town of Madison									
Capital Needs Survey Form							Orig Building	Portables	Total Floor Area (sf):
Island Avenue Elementary School							27,148	8,900	36,048
Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.									
SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - Electrical									
Site - Lighting									
Site - General								N/A	
Division 15 -Plumbing									
Water Main									
Overall Plumbing Renovations - includes:	3	2	1950	2017	27,148	\$14	\$380,072		
Water Distribution System									
Plumbing Fixtures									
Water Heater			2008					No short term recommendations.	
Division 15 - HVAC									
Steam Boilers			2008					No short term recommendations.	
Overall HVAC Renovations - includes:	3	2	1950	2017	27,148	\$25	\$678,700		
Ventilation Systems									
Air Handling Systems									
Exhaust Systems									
Temperature Control Systems									
Air Conditioning Systems - added cost	4	3		2017	27,148	\$25	\$678,700	Upgrade to add A/C throughout. Does not include steel framing, roofing, misc arch, etc	
Air Conditioning Systems - 1998 portables	4	3	1998	2018	4,200	\$10	\$42,000	Replace RTU's at 1998 portable classrooms	
Division 16 - Electrical									
Overall Electrical Renovations - includes:	3	2	1950	2017	27,148	\$15	\$407,220		
Electrical Service									
Distribution and Local Panels									
Lighting									
Emergency Lighting									
Misc Low Voltage Systems									
Fire Alarm System									
Added Elec Cost for A/C Systems	4	3		2017	27,148	\$7	\$190,036	Upgrade to 1000A - 480Y/277V	
							\$2,186,692		
							\$ 61	per sf	

Mechanical and Electrical Systems

Existing Conditions Narrative

**J.M. Jeffrey Elementary School
Madison, Connecticut**

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served by a 2" domestic water main fed from Connecticut Water Company. This water service currently serves all of the school's domestic water needs including the portable classrooms. The water distribution system is original to the building.
2. Natural Gas:
 - a. Existing Natural Gas Service: There is only natural gas service to the portable classrooms.
3. Sanitary:
 - a. Existing Sanitary Service: The School's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the School. The sanitary waste piping discharges to a septic tank and leaching field.
4. Storm:
 - a. Existing Storm System: Building is served primarily by gutters.

PLUMBING FIXTURES AND SPECIALTIES

1. Existing plumbing fixtures are as follows:
 - a. At the original 1957 section of the building, the water closets are floor mounted; tank type, vitreous china; original to the building. Portable classrooms are newer fixtures.

- b. Lavatories at main building are wall hung vitreous china. Faucets are installed with two lever handle faucets.



- c. Urinals at the main building are floor mounted with flush valves. Under new construction these are not allowed by the State of CT Department of Public Health. They are grandfathered in and are allowed to remain.



DOMESTIC HOT WATER SYSTEMS

1. Existing Domestic Hot Water System: The domestic hot water is generated by multiple electric water heaters with varying capacity and storage. In the boiler room there is an abandoned storage tank. The water heaters are fairly new and in good condition.



B. FIRE PROTECTION NARRATIVE

FIRE PROTECTION SERVICE

1. There is no central fire protection system (sprinklers) currently at the facility.

C. MECHANICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. Boiler Plant: The building is heated by (2) fuel-oil fired, hot water boilers. One boiler is original to the building (1957) with a new burner (2007) and one boiler is a replacement boiler (1988); respectively H.B. Smith 450 Mills, 12 section and Weil McLain; each with nominal capacity of 3,000 Mbh output. There are four hot pump zones.



2. Buried Fuel Tanks: Refer to 2004 Underground Storage Tank Report done by Flagship Environmental LLC, 2004.
3. Heating and Ventilating (H&V) systems:
 - a. At original 1957 section of the building, classrooms are served by finned tube radiation for heat. Ventilation at classrooms is accomplished by operable windows (natural ventilation) and a nominal amount of exhaust through a ducted exhaust system.
 - b. At the 1988 building addition, classrooms are served by unit ventilators for heat and mechanical ventilation.
 - c. "Cafetorium" and gymnasium are served by H&V units and exhaust fans.
 - d. Temperature controls throughout the building are pneumatic controls served by an air compressor and air dryer located in the boiler room.
4. Air conditioning is provided at specific areas such as administrative areas, library, nurse's offices and computer lab with combination of window air conditioners and ductless split units. Four classrooms at the original 1957 section of the building are served by air conditioning units also.
5. Portable classrooms are air conditioned and are served by Trane packaged roof top units (RTU's) which are gas heat and electric cooling. The RTU's are original equipment when the classrooms were constructed in 2000.

D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2009 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. The main building (areas except portable classrooms) is served by upgraded General Electric gear; rated at 600 amperes, 208Y/120volts, 3-phase. This service equipment consists of a 600 amp main disconnect switch, distribution section and metering per utility company requirements. The newer equipment, circa 1990, feeds distribution panels original to the building including a main panel rated at 400 amperes. The service equipment is good condition; the distribution panels are in fair condition.



2. The portable classrooms are served by a separate electrical service rated at 400 amperes, 208Y/120volts, 3-phase.
3. There are a number of electrical panels located throughout the facility. These panelboards are original to the facility. The condition of these panelboards is good to poor. The majority of the panelboards do not have spare circuit breakers available for new circuits to be added, or have space to add new circuit breakers.
4. Lighting at classrooms, corridors and administrative areas consists primarily of fixtures with acrylic lenses and T8 fluorescent lamps. The Cafetorium and gymnasium are served by T5 fluorescent.
5. Site lighting has fair good coverage with pole mounted fixtures and building mounted fixtures.
6. The fire alarm system is a Notifier system with a Fire Lite dialer. There are manual fire alarm pullstations throughout the building and smoke detectors within the corridors.
7. Emergency lighting is handled by 2-head emergency lighting fixtures with integral battery packs.

E. MEP SYSTEMS CONCLUSION

In general, the systems at the 1957 section of the building are original to the building and are 55+ years old, thus have met their useful life expectancy. The building's temperature controls system is all pneumatic and conversion to a DDC system is recommended. Ventilation is not a mechanical ventilation system in all areas of the building, which is typically preferred. The following capital needs survey form highlights the major systems in need of replacement and their respective capital costs to implement.

Town of Madison									
Capital Needs Survey Form							Orig Building	Portables	Total Floor Area (sf):
JM Jeffrey Elementary School							45,749	6,650	52,399
Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.									
SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - Electrical									
Site - Lighting									
Site - General								N/A	
Division 15 -Plumbing									
Water Main									
Overall Plumbing Renovations - includes:	3	2	1957	2017	45,749	\$14	\$640,486		
Water Distribution System									
Plumbing Fixtures									
Water Heaters			varies				\$0	No short term recommendations.	
Division 15 - HVAC									
Overall HVAC Renovations - includes:	3	3	2000	2020	6,650	\$10	\$66,500	Replace packaged RTU's at Portable Classrooms	
Overall HVAC Renovations - includes:	3	2	1957	2017	45,749	\$28	\$1,280,972		
Hot Water Boilers									
Ventilation Systems									
Air Handling Systems									
Exhaust Systems									
Temperature Control Systems									
Air Conditioning Systems - added cost	4	3		2010	45,749	\$25	\$1,143,725	Upgrade to add A/C throughout	
Division 16 - Electrical									
Overall Electrical Renovations - includes:	3	2	1957	2017	45,749	\$15	\$686,235		
Electrical Service									
Distribution and Local Panels									
Lighting									
Emergency Lighting									
Misc Low Voltage Systems									
Fire Alarm System									
Added Elec Cost for A/C Systems	4	3		2017	45,749	\$7	\$320,243	Upgrade to 1000A - 480Y/277V	
							\$ 4,138,161		
							\$ 79	per sf	

Mechanical and Electrical Systems

Existing Conditions Narrative

**Walter C. Polson Middle School
Madison, Connecticut**

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served by a water main fed from Connecticut Water Company. Much of the water distribution system is original to the building.
2. Natural Gas:
 - a. Existing Natural Gas Service: The building is currently served by natural gas fed from the local utility's distribution system. Equipment which the gas main currently serves includes the boilers and water heaters.
3. Sanitary:
 - a. Existing Sanitary Service: The School's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the School. The sanitary waste piping discharges by gravity from the school and is treated at a water treatment building on the site. The effluent then discharges to a leaching field.
4. Storm:
 - a. Existing Storm System: Building is served by roof drains and gutters. The flat sections of the building are not served by a secondary overflow drainage system.

PLUMBING FIXTURES AND SPECIALTIES

1. Existing plumbing fixtures are as follows:
 - a. Many of the plumbing fixtures are in poor condition and not water conserving type fixtures.
 - b. Many of the water closets are floor mounted; vitreous china with manual flush valves.

- c. Lavatories are wall hung vitreous china. Faucets are installed with two lever handle faucets.
- d. Some of the urinals are floor mounted with flush valves. Under new construction these are not allowed to be installed by the State of CT Department of Public Health. They are grandfathered in and are allowed to remain.



DOMESTIC HOT WATER SYSTEMS

1. Existing Domestic Hot Water System: The domestic hot water is generated by two gas fired AO Smith water heaters during the summer. These heaters are off during the winter and hot water is generated at a storage tank fed from the hot water boilers. The water heaters are fairly new and in good condition.

B. FIRE PROTECTION NARRATIVE

FIRE PROTECTION SERVICE

1. There is no central fire protection system (sprinklers) currently at the facility.

C. MECHANICAL NARRATIVE

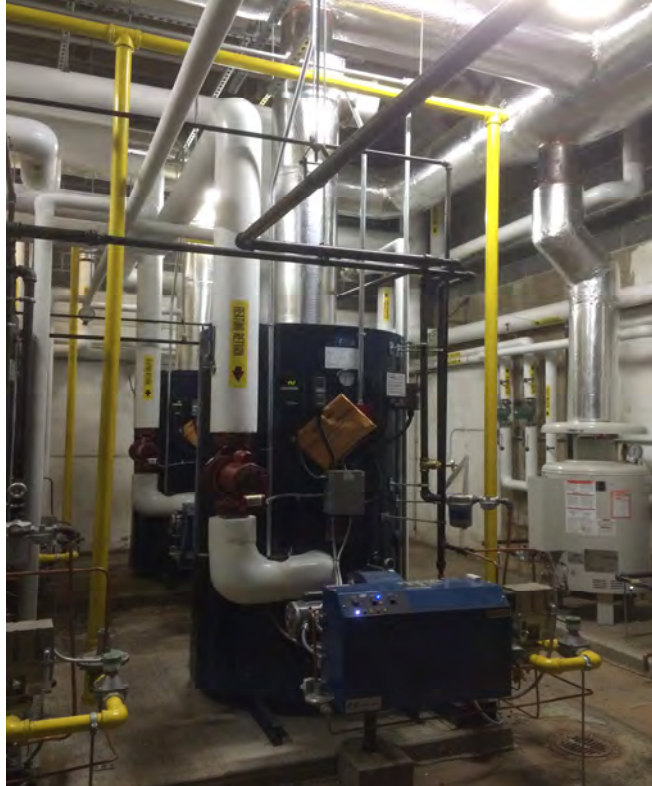
APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. ASHRAE 90.1
7. State Department of Education School Construction Program

EXISTING SYSTEMS – BOILER PLANT

1. Boiler Plant: The building is heated by four (4) Triad GOPS2000 hot water boilers each with a capacity of 2,000 Mbh input. The boilers are fitted with dual fuel Power-flame burners. The boilers were installed in 2013 and are in good condition.



2. The hot water pumping system is a primary/secondary pump arrangement. The primary pumps are in line pumps that were installed when the boilers were replaced in 2013. The secondary pumps are older, but have been retrofitted with VFD's for energy efficiency. Most of the piping distribution throughout the school is original to the building, circa 1965.

EXISTING AIR HANDLING SYSTEMS

1. Approximately half of the school is air-conditioned. The areas which are not air conditioned are served by combination of heating and ventilation units, exhaust systems with nominal makeup air, fin tube radiation and cabinet unit heaters. Most of this equipment is original to the building and is in fair to poor condition.
2. The areas of the school which are air conditioned are served by custom "penthouses" as shown below which house four Lennox gas fired AHU's with DX coils. Compressor condensers serving the DX coils are hung off the sides of the penthouse. These units were installed in 1997 and are at the end of their useful life. Replacement parts are difficult to find and at times custom parts need to be made to keep them operating.



3. "Local" air conditioning is also provided at specific areas such as computer labs with ductless split units.
4. Temperature controls throughout the building are pneumatic controls served by an air compressor and air dryer located in the boiler room.
5. Access to roof is through a small, elevated door. Access is difficult and is not compliant with current building codes.

EXISTING SYSTEMS - AUDITORIUM

1. The Auditorium and Sound & Light Booth are presently served by heating and ventilation equipment located in two mechanical rooms at the upper level adjacent to the sound booth. One room houses a return/exhaust fan. The other room houses a supply fan and hot water heating coil. The system is a ducted supply air with a return air system that is partially a plenum system. The ventilation system does not have mechanical cooling capabilities, however it appears to be able to take advantage of "free cooling" when outside air temperatures allow the economizer cycle to work. The equipment was installed in 1965.
2. The temperature controls serving the H&V equipment are outdated, pneumatic controls, however if new equipment is installed it can take advantage of new RCMS Automated Logic DDC system installed in the area.

D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2009 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. Lighting at the gymnasiums, auditorium and stage consists of relatively newer T5 light fixtures. Theatrical lighting is outdated technology.
2. Lighting at classrooms, corridors and administrative areas consists of older fixtures, however many of them are being retrofitted with energy efficient LED lamps.
3. There are a number of electrical panels located throughout the facility. These panelboards are original to the facility. The condition of these panelboards is good to poor. The majority of the panelboards do not have spare circuit breakers available for new circuits to be added, or have space to add new circuit breakers.
4. The fire alarm system is a Notifier addressable system. There are manual fire alarm pull stations throughout the building and smoke detectors within the corridors.

5. Emergency lighting is handled by 2-head emergency lighting fixtures with integral battery packs.
6. The building is served by an electrical service rated at 2000 amperes, 480Y/277volts, 3-phase. The service equipment, main transformer and main distribution panel are reaching the end of their useful life.



E. MEP SYSTEMS CONCLUSION

In general, the systems are original to the building and are 50+ years old, thus have met their useful life expectancy. The heating plant and water heaters were recently replaced (2013). The following capital needs survey form highlights the major systems in need of replacement and their respective capital costs to implement

Town of Madison									
Capital Needs Survey Form									Total Floor Area (sf):
Walter C. Polson Middle School									149,014

Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.

SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1 Poor, 5 Excellent)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS
Division 2 - Site Construction								
Site - Electrical								
Site - Lighting								
Well Water System								Not included in our review
Site - General								N/A
Division 15 -Plumbing								
Plumbing Fixtures and Distribution System	3	2	1965	2018	149,014	\$14	\$2,011,689	
Water Heater			2013					No short term recommendations.
Division 15 - HVAC								
Hot Water Boilers			2013					No short term recommendations.
Ventilation Systems Including:	3	2	1965	2018	149,014	\$28	\$4,172,392	Upgrade/replace heating & ventilation equipment
Unit Ventilators								
Air Handling Equipment								
Exhaust Systems								
Temperature Control Systems								
Air Conditioning Systems	4	3		2018	149,014	\$27	\$4,023,378	Upgrade to add A/C throughout
Division 16 - Electrical								
Overall Electrical Renovations - includes:	2	2	1965	2018	149,014	\$15	\$2,235,210	General electrical upgrades
Electrical Service								
Distribution and Local Panels								
Lighting								
Emergency Lighting								
Misc Low Voltage Systems								
Fire Alarm System								
Added Elect Cost for A/C Systems	4	3		2018	149,014	\$7	\$1,043,098	Upgrade to 2500A - 480Y/277V
							\$ 13,485,767	
							\$ 91	per sf

Mechanical and Electrical Systems

Existing Conditions Narrative

**Robert H. Brown Middle School
Madison, Connecticut**

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served by a local central well water system.
2. Natural Gas:
 - a. Existing Natural Gas Service: The building is currently served by natural gas fed from the local utility's distribution system. Equipment which the gas main currently serves includes the boilers and water heaters.
3. Sanitary:
 - a. Existing Sanitary Service: The School's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the School. The sanitary waste piping discharges by gravity to a sewage ejector sump pump located at the exterior of the building. The waste is then pumped to a leaching field.
4. Storm:
 - a. Existing Storm System: Building is served by roof drains and gutters.

PLUMBING FIXTURES AND SPECIALTIES

1. Existing plumbing fixtures are as follows:
 - a. Many of the plumbing fixtures are in fair to poor condition and not water conserving type fixtures.
 - b. Many of the water closets are floor mounted; vitreous china with manual flush valves.

- c. Lavatories are wall hung vitreous china. Faucets are installed with two lever handle faucets.
- d. Some of the urinals are floor mounted with flush valves. Under new construction these are not allowed to be installed by the State of CT Department of Public Health. They are grandfathered in and are allowed to remain.



DOMESTIC HOT WATER SYSTEMS

- 1. Existing Domestic Hot Water System: The domestic hot water is generated by a Triangle Tube gas fired water heater with storage tank. The water heater was installed in 2003 and is in good condition

B. FIRE PROTECTION NARRATIVE

FIRE PROTECTION SERVICE

- 1. There is no central fire protection system (sprinklers) currently at the facility.

C. MECHANICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. ASHRAE 90.1
7. State Department of Education School Construction Program

EXISTING SYSTEMS – BOILER PLANT

1. Boiler Plant: The boiler plant consists of two (2) H.B. Smith 28A, 8 section boilers; each with nominal capacity of 59 boiler horsepower. The boilers are fitted with dual fuel Power-flame burners. Fuel oil is pumped from an above ground fuel storage tank outside the building via a duplex fuel oil pump set in the boiler room.



2. The hot water pumping system is a primary/secondary pump arrangement. The secondary pumps are served by VFD's.
3. The boiler plant system was installed in 2003 and is in good condition.

EXISTING AIR HANDLING SYSTEMS

1. Most of the school is air-conditioned and is served by McQuay roof mounted air handling units with remote compressor / condensers and AAON packaged rooftop units (RTU's). The units were installed in 2003 and 2013 respectively and are in good condition.



EXISTING SYSTEMS – MISC. MECHANICAL

1. Ductwork distribution to rooms includes VAV boxes with hot water coils.
2. Hot water heating at individual spaces includes fin tube radiation, radiant ceiling panels, and cabinet unit heaters.
3. “Local” air conditioning is also provided at specific areas such as computer labs with ductless split units.
4. Temperature control system throughout the building is an Alerton DDC system.

D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2009 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. Lighting consists of a combination of T5 fixtures, T8 fixtures and LED fixtures. Lighting at classrooms is served by occupancy sensors. Future energy efficient enhancements include converting fixtures over to LED and controlling light fixtures through daylight harvesting.
2. Emergency lighting is handled by a variety of battery pack dual head emergency fixtures and battery pack fixtures powered from a central DC source.
3. The fire alarm system is a Notifier addressable system. There are manual fire alarm pull stations throughout the building.

4. There are a number of electrical panels located throughout the facility. Most of them were replaced during the 2003 and 2013 renovations and are in good condition.
5. The building is served by an electrical service rated at 3000 amperes, 480Y/277volts, 3-phase. The Federal Pacific main switchgear is old (circa 1970) and at the end of its useful life. In addition replacement parts are getting difficult to find.



E. MEP SYSTEMS CONCLUSION

In general, new MEP systems were installed when the building was partially renovated in 2003 and 2013. These systems are in good condition. Certain components such as plumbing fixtures and the main electrical switchgear were not replaced during these renovations and are approaching the end of their useful life. One area of the building (approximately 13,000 sf) has not been renovated yet.

Town of Madison									
Capital Needs Survey Form						Previously Reno'd (sf)	Area Left to Renovate	Total Floor Area (sf):	
Robert H. Brown Middle School						89,037	13,000	102,037	
Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.									
SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1 Poor, 5 Excellent)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - Electrical									
Site - Lighting									
Well Water System								Not included in our review	
Site - General								N/A	
Division 15 - Plumbing									
Plumbing Fixtures and Distribution System	3	3		2018	20,000	\$10	\$200,000		
Water Heater			2003					No short term recommendations.	
Division 15 - HVAC									
Hot Water Boilers			2003					No short term recommendations.	
HVAC at most of the building			2003/13					No short term recommendations.	
HVAC at Areas of Building not recently renovated includes:	3	3		2018	13,000	\$45	\$585,000	Upgrade/replace HVAC	
Air Handling Equipment									
Exhaust Systems									
Temperature Control Systems									
Division 16 - Electrical									
Electrical at most of the building			2003					No short term recommendations.	
Electrical at Areas of Building not recently renovated includes:	3	3		2018	13,000	\$10	\$130,000	Upgrade/replace Elec.	
Distribution and Local Panels									
Lighting									
Emergency Lighting									
Misc Low Voltage Systems									
Fire Alarm System									
Replace Main Elec Switchgear	2	2		2018	102,037	\$2	\$204,074		
							\$ 1,119,074		
							\$ 11	per sf	

Mechanical and Electrical Systems

Existing Conditions Narrative

Kathleen Ryerson Elementary School Madison, Connecticut

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served from CT Water Company.
2. Natural Gas:
 - a. Existing Natural Gas Service: The building is currently served by natural gas fed from the local utility's distribution system.
3. Sanitary:
 - a. Existing Sanitary Service: The School's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the School. The sanitary waste piping discharges to a septic tank and leaching field.
4. Storm:
 - a. Existing Storm System: Building is served by a combination of gutters and roof drains with internal rain leaders.

PLUMBING FIXTURES AND SPECIALTIES

1. Existing plumbing fixtures are as follows:
 - a. Water closets are floor mounted; tank type, vitreous china.
 - b. Lavatories are vitreous china. There are a variety of types of faucets.

DOMESTIC HOT WATER SYSTEMS

1. Existing Domestic Hot Water System: The Schools domestic hot water is generated by a natural gas fired water heater. A Bock Model EZ80-199N water heater was installed summer of 2009.

B. FIRE PROTECTION NARRATIVE

FIRE PROTECTION SERVICE

1. There is no central fire protection system (sprinklers) currently at the facility.

C. MECHANICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. Boiler Plant: The building is heated by two, dual fuel H.B. Smith hot water boilers which were installed summer of 2009.
2. Buried Fuel Tanks: Refer to 2004 Underground Storage Tank Report done by Flagship Environmental LLC, 2004.
3. Heating and Ventilation (H&V) systems at the classrooms consist of unit ventilators along the perimeter wall and relief air/exhaust grilles connected to central exhaust systems.



4. Air conditioning is provided at specific areas such as administrative areas, library, nurse's offices and computer lab with combination of window air conditioners and ductless split units.
5. Misc. HVAC notes:
 - a. (H&V) systems also consist of a ducted air handling unit at the Multi-Purpose Room and cabinet heaters and fin tube radiation at other commons areas.
 - b. Temperature controls at individual rooms are local, pneumatic controls. Temperature control systems serving the boiler room were upgraded to an Alerton DDC system during summer of 2009.

D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements, including the Bureau of School Facilities.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2009 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition
7. ASHRAE 90.1
8. State Department of Education School Construction Program

EXISTING SYSTEMS

1. The building is served by an electrical service rated at 600 amperes, 208Y/120volts, 3-phase. This service equipment consists of a 600 amp main disconnect switch, distribution section and metering per utility company requirements. The service equipment is original to the building and is in fair condition.



2. The underground electrical feeder was replaced in 2003.
3. There are a number of electrical panels located throughout the facility. These panelboards are original to the facility. The condition of these panelboards is good to poor. The majority of the panelboards do not have spare circuit breakers available for new circuits to be added, or have space to add new circuit breakers.
4. Lighting at classrooms, corridors and administrative areas consists primarily of fixtures with acrylic lenses and T8 fluorescent lamps. The Multi-Purpose Room is served by T5 fluorescent fixtures. Lighting throughout the facility is in good condition and light levels are within recommended levels.
5. Site lighting has fair coverage with pole mounted fixtures and building mounted fixtures.
6. The fire alarm system is a Notifier system with a Fire Lite dialer. There are manual fire alarm pullstations throughout the building and smoke detectors within the corridors.
7. Emergency lighting is handled by 2-head emergency lighting fixtures with integral battery packs.

E. MEP SYSTEMS CONCLUSION

In general, the systems are original to the building and are 45+ years old, thus have met their useful life expectancy. The heating plant, water heater and controls at the heating plant were recently replaced (summer 2009). Expansion of the Alerton DDC system is recommended. The following capital needs survey form highlights the major systems in need of replacement and their respective capital costs to implement.

Town of Madison									
Capital Needs Survey Form									Total Floor Area (sf):
Kathleen Ryerson Elementary School									38,523
Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.									
SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1 Poor, 5 Excellent)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - Electrical									
Site - Lighting									
Well Water System								Not included in our review	
Site - General								N/A	
Division 15 -Plumbing									
Plumbing Fixtures and Distribution System	3	3	1968	2018	38,523	\$14	\$520,061		
Water Heater			2009					No short term recommendations.	
Division 15 - HVAC									
Hot Water Boilers			2009					No short term recommendations.	
Ventilation Systems Including:	3	2	1968	2018	38,523	\$25	\$963,075	Upgrade/replace unit ventilators (UV's)	
Unit Ventilators								(assumes no state funds due to UV's)	
Air Handling Equipment									
Exhaust Systems									
Temperature Control Systems									
Air Conditioning Systems	4	3		2018	38,523	\$25	\$963,075	Upgrade to add A/C throughout	
Division 16 - Electrical									
Electrical Feeder			2003					No short term recommendations.	
Overall Electrical Renovations - includes:	2	3		2018	38,523	\$15	\$577,845	General electrical upgrades	
Electrical Service									
Distribution and Local Panels									
Lighting									
Emergency Lighting									
Misc Low Voltage Systems									
Fire Alarm System									
Added Elect Cost for A/C Systems	4	3		2018	38,523	\$7	\$269,661	Upgrade to 1000A - 480Y/277V	
							\$ 3,293,717		
							\$ 86	per sf	

Mechanical and Electrical Systems
Existing Conditions Narrative

**Town Campus Learning Center
Pre-Kindergarten School
Madison, Connecticut**

10/6/15



Prepared By
Consulting Engineering Services, Inc.
811 Middle Street, Middletown, Connecticut 06457
CES Project No. 2014376.00

A. PLUMBING NARRATIVE

APPLICABLE CODES AND STANDARDS

The plumbing systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Plumbing Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1

PLUMBING UTILITIES

1. Domestic Water:
 - a. Existing Domestic Water Service: The building is currently served by a 2" domestic water main fed from Connecticut Water Company. This water service currently serves all of the school's domestic water needs. The water distribution system is original to the building.
2. Natural Gas:
 - a. Existing Natural Gas Service: The building is currently served by natural gas fed from the local utility's distribution system.
3. Sanitary:
 - a. Existing Sanitary Service: The School's sanitary sewer system provides sanitary waste drainage for plumbing fixtures located throughout the School. The sanitary waste piping discharges to a septic tank and leaching field.
4. Storm:
 - a. Existing Storm System: Building is served by gutters.

DOMESTIC HOT WATER SYSTEMS

1. Existing Domestic Hot Water System: The domestic hot water is generated by a 40 gallon, gas fired water heater.

PLUMBING FIXTURES AND SPECIALTIES

1. Existing plumbing fixtures are as follows:

- a. Urinals are wall mounted with flush valves original to the building.
- b. Water closets are floor mounted; tank type, vitreous china; original to the building.



- c. Lavatories are wall hung, vitreous china original to the building.



B. FIRE PROTECTION NARRATIVE

FIRE PROTECTION SERVICE

1. There is no central fire protection system (sprinklers) currently at the facility.

C. MECHANICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2003 International Mechanical Code
5. 2009 International Energy Conservation Code
6. NFPA, Latest Version
7. ASHRAE 90.1

EXISTING SYSTEMS

1. HVAC Systems: The spaces are served by multiple Trane packaged rooftop units with gas heat and electric air conditioning capabilities. There are a few locations where there is electric heat to supplement the rooftop units. The units are single zone, constant volume type.
2. The HVAC distribution systems consist of ductwork to ceiling diffusers in each room. The toilet rooms are served by a ducted exhaust system.
3. Temperature controls consist of local Trane thermostats (electric type).

D. ELECTRICAL NARRATIVE

APPLICABLE CODES AND STANDARDS

The electrical power, interior lighting, and fire alarm systems will be reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2005 Connecticut State Building Code
2. 2005 Connecticut State Fire Safety Code
3. 2003 International Building Code(IBC)
4. 2009 International Energy Conservation Code
5. 2005 National Electrical Code, NFPA 70 (NEC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition

EXISTING SYSTEMS

1. The building is served by an electrical service rated at 800 amperes, 208Y/120volts, 3-phase. This service equipment consists of an 800 amp main disconnect switch, distribution section and metering per utility company requirements. The service equipment is original to the building and is in good condition.



2. There are a number of electrical panels located throughout the facility. These panelboards are original to the facility and are in good condition.
3. Lighting at classrooms, corridors and administrative areas consists primarily of fixtures with acrylic lenses and T8 fluorescent lamps. Lighting throughout the facility is in good condition and light levels are within recommended levels.
4. Site lighting: There are no site lights around the building.
5. The fire alarm system is a Notifier system with a Fire Lite dialer. There are manual fire alarm pullstations throughout the building and smoke detectors within the corridors.
6. Emergency lighting is handled by 2-head emergency lighting fixtures with integral battery packs.
7. Security: The building is served by a Gemini security system.

E. MEP SYSTEMS CONCLUSION

The MEP systems are original to the building and are thus only 15+ years old. The equipment is in good condition and there are no immediate recommendations to replace or upgrade MEP systems in the near future. We recommend a DDC panel be installed in the building to monitor space temperatures. If the temperature in the building drops below 45 degrees F, the DDC system can signal the Town's maintenance personnel of potential freezing problems.

Long term planning should include replacement of the rooftop units in approximately 5 years.

Town of Madison									
Capital Needs Survey Form									Total Floor Area (sf):
Town Campus Learning Center									12,854
Note: The "System Priority Rating" (1 to 4 rating) and "Condition of the Existing System Rating" (1 to 5 rating) are to be reviewed together to assist in prioritizing replacement and/or upgrades. As an example, we recommend line items with a System Priority rating of 1 and Existing Conditions rating of 1 be prioritized for replacement and/or upgrades.									
SYSTEM	System Priority 1 to 4 (1-Highest Priority, 4-Lowest Priority)	Condition of the Existing System 1 to 5 (1 Poor, 5 Excellent)	Last Major Reconstruction (Year)	Projected Replacement (Year)	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - Electrical									
Site - Lighting									
Well Water System								Not included in our review	
Site - General								N/A	
Division 15 -Plumbing									
Plumbing Fixtures and Distribution System			2000					No short term recommendations.	
Water Heater									
Division 15 - HVAC									
Hot Water Boilers			2000					No short term recommendations.	
Ventilation Systems Including:	3	3	2000	2020	12,854	\$7	\$83,551	Replace rooftop units including upgrade to control interface	
Unit Ventilators									
Air Handling Equipment									
Exhaust Systems									
Temperature Control Systems									
Division 16 - Electrical									
Overall Electrical Renovations - includes:			2000					No short term recommendations.	
Electrical Service									
Distribution and Local Panels									
Lighting									
Emergency Lighting									
Misc Low Voltage Systems									
Fire Alarm System									
Added Elect Cost for A/C Systems									
							\$	83,551	
							\$	7	per sf