

Mechanical and Electrical Systems
Existing Conditions Narrative

Regional School District 13
Korn Elementary School
Durham, CT

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MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION NARRATIVE

APPLICABLE CODES AND STANDARDS

The mechanical, electrical, plumbing, and fire protection 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 with 2009 supplements
2. 2005 Connecticut State Fire Safety Code with 2009 supplements
3. 2003 International Building Code (IBC)
4. 2003 International Plumbing Code (IPC)
5. 2003 International Mechanical Code (IMC)
6. 2009 International Energy Conservation Code (IECC)
7. NFPA, All Latest Adopted Versions
8. ASHRAE 90.1
9. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition.

PLUMBING SYSTEMS:

Existing Plumbing Utilities

1. **Domestic Water:** The building is provided with a domestic water service that enters the building on the northeast corner. The service entrance incorporates an isolation valve, reduced pressure backflow preventer and water hammer arrestors. This service is supplied by a well water system. There are three wells located on the School campus. All three wells are piped to a domestic water pumping station located within a concrete vault near the High School. All wells are metered and manifolded together and discharge into a 15,000 gallon atmospheric tank. Outlet from the atmospheric tank is connected to a tri-plex water pump station. Pump discharges to a 5,000 gallon hydromatic tank. Both hydromatic tank and atmospheric tank bulkhead into the buried vault. System incorporates pump controls, well pump master control station and air compressor. The atmospheric tank has recently been relined. There are leaks developing at the hydro-tank where it penetrates the concrete vault. All components of the system have been installed to meet the requirements of the State of CT Department of Public Health for a central drinking water distribution system. This equipment is in good condition.



Existing Backflow Preventer



Existing Water Hammer Arrestors

2. Propane Tanks: The building is currently served by two above ground propane tanks located on the south side of the building. The tanks have approximately 80 gallons of storage and their age is unknown. The propane tanks serve the kitchen and are in good condition.



Existing propane tanks

3. Sanitary Service: The building is currently provided with multiple sanitary waste water laterals that exit the building and are routed to an existing septic tank and pump station on site. The existing piping material is cast iron. The sanitary service piping is in good working order.
4. Storm Service: The building is currently provided with multiple storm laterals that exit the building and are routed to an existing storm system on site. The existing piping material is cast iron. The storm water service piping is in good working order.

Existing Plumbing Fixtures and Specialties

1. Water closets are wall mounted vitreous china with manual 1.6 GPF flush valves. The fixtures are in good condition and ADA compliant fixtures are provided.
2. Urinals are wall hung, vitreous china, with manual 1 GPF flush valves. The fixtures are in good condition and ADA compliant fixtures are provided.
3. Lavatories are wall hung vitreous china .5 GPM with single lever type faucets. ADA lavatories are provided with insulation wrap for exposed piping below fixture. The fixtures are in good condition and ADA compliant fixtures are provided.
4. Drinking fountains are wall mounted stainless steel water coolers. Some units are single bowl and some are bi-level double bowl units. Most units are in good condition and ADA compliant fixtures are provided.



Existing Electric Water Coolers

- Classroom sinks are stainless steel sinks with single lever faucets. These sinks are in good condition and are ADA compliant in some locations.



Existing ADA Sink

- Janitor sinks are floor mounted mop basins with two lever faucets. Faucets have integral vacuum breakers. Chemical shot feeders are provided in some custodial closets. These sinks are in good condition.
- The Kitchen has a point of use passive type grease interceptor recessed in the floor that serves the existing dishwasher. The grease interceptor cover has been silicone caulked to seal sewer gases. There are no grease interceptors at the existing three pot sink. If there is actual cooking being done and this is not a warming kitchen, a grease interceptor may be required on the three-bay sink. The actual size is based on the number of meals served per day. The silicone caulk on the existing grease interceptor indicates that the seal is compromised and should be replaced.



Existing Passive Grease Interceptor

Existing Plumbing and Piping Systems

1. Sanitary waste and vent piping:

- A. Sanitary waste and vent piping is plain end cast iron with stainless steel clamp and shield assemblies for above ground piping, buried piping is PVC. Waste services exit the building below slab at multiple locations. All sanitary waste is piped to the on-site septic system. Vent piping exits the building through the roof with a 4" diameter pipe and extends a minimum of 12" above the finished roofline.
- B. Floor cleanouts are provided to serve the buried waste system.
- C. Floor drains are provided with water based trap primers.
- D. The sanitary and vent piping is in good condition.

2. Storm piping:

- A. Storm piping is plain end cast iron with stainless steel clamp and shield assemblies for above ground piping. Buried piping is PVC. Storm services exit the building below slab at multiple locations. All storm water is piped to the on-site storm system.
- B. There is no secondary storm pipe system. The existing roof is provided with a gravel stop which is an acceptable means for secondary storm drainage. It was noted that there is ponding at low spots on the roof.
- C. Floor cleanouts are provided to serve the buried storm system.
- D. The storm water piping is in good condition.

3. Domestic hot water, cold water and re-circulating hot water piping is copper with rigid molded noncombustible glass fiber insulation. The insulation is in fair to good condition.



Existing Thermostatic Mixing Valve

4. Propane gas piping within the building is schedule 40 black steel pipe. Shut-off valves and regulators are provided where required. The propane gas supply is regulated at the building exterior prior to the gas piping entering the building. This equipment is in good condition.

Domestic Hot Water Systems

1. Domestic Hot Water System: The Schools domestic hot water is generated by an oil-fired water heater. The water heater is as manufactured by AO Smith, Model COF-199-934, rated 199,000 BTU/HR output. This water heater was installed in 2004. The existing domestic hot water system also incorporates a re-circulating pump, isolation valves and a thermostatic mixing valve. Hot water storage temperature is approximately 140 deg. F. A 140 deg. F. hot water loop is provided to serve the kitchen fixtures and does not incorporate a thermostatic mixing valve. A 110 deg. F. hot water loop serves all other plumbing fixtures throughout the building and incorporates a thermostatic mixing valve. The existing domestic hot water system is in good condition.



Existing Oil Fired Water Heater

Fire Protection

1. The building is currently served by a 6-inch fire protection service and enters the building at the northeast side of the building. The service equipment located within the building incorporates a single alarm valve riser, monitored isolation valve, gauges, bells and drains. The 6-inch main is supplied by a 36,000 gallon on site water storage tank and electric fire pump located within a buried vault. The service equipment located within the vault consists of a 750 GPM, 180psi, 120 HP electric fire pump, jockey pump, controllers, auto transfer switch, test loop, fire department connection, isolation valves, tamper switches and pressure regulating valve. The existing equipment is in fair condition.

2. The existing building is provided with partial sprinkler coverage. Sprinklers are installed in hazardous parts of the building such as the Boiler Room, Janitor's Closets and Storage Rooms.



Existing Fire Service Riser

3. The existing wet pipe fire protection sprinkler system consists of the following:
 - Upright sprinklers with wire guards in Storage Rooms, Boiler Room and Janitor's Closets.
 - Sprinklers are 1/2" orifice, 165 degree F temperature rating, 5.6 K-factor.
 - High temperature sprinklers are installed in the Boiler Room.
4. The existing sprinkler equipment is in good condition. A full NFPA 13 sprinkler system should be installed throughout the entire building.

MECHANICAL SYSTEMS:

Existing Boiler Plant

1. The building is served by (2) Burnham oil fired hot water boilers that were installed during the most recent renovation. This equipment is in good condition.



Existing Boiler

1. The combustion air system is code compliant.
2. Heating hot water is circulated to the air handling units, variable air volume terminal units, radiant ceiling panels, and cabinet unit heaters by two (2) constant volume heating hot water pumps. These pumps are approximately ten (10) years old and are in good condition. Two-way valves are provided at the air handling units, variable air volume terminal units and cabinet unit heaters for temperature control.

- Fuel oil is stored in a 12,500 gallon underground fuel oil storage tank. Duplex fuel oil transfer pumps are located in the boiler room providing oil to the boilers and the domestic hot water heaters. The entire fuel oil transfer system is provided with a leak detection system. The fuel oil transfer system is approximately two (2) years old and is in very good condition.



Fuel Oil Pumps

- Cooling is provided to the building via an air cooled Trane RTAC chiller located on the roof. The chiller is rated at 90 tons and utilizes R134A as the refrigerant. The chiller is approximately ten (10) years old and is in good condition.
- The chilled water distribution system is a constant volume primary, variable volume secondary system. A constant volume primary pump circulates chilled water through the chiller while variable frequency drive secondary pumps circulate the chilled water to the building. The chilled water pumps are approximately ten (10) years old and are in good condition.
- Heating, ventilation and air conditioning is provided to the majority of the school via roof mounted air handling units with hot water and chilled water coils. The air handling units distribute air to the classrooms via variable air volume terminal units which modulate the air flow to the classrooms to maintain classroom temperature. Variable frequency drives are provided for the air handling units to reduce supply air flow during low load periods. The air handling units are approximately ten (10) years old and in good condition.
- The classrooms are provided with ceiling radiant heating panels which heat the space and reduce drafts from the windows. The variable air volume terminal units supply heating and cooling supply air to diffusers within each classroom. Each classroom is provided with a temperature sensor and a carbon dioxide sensor. This equipment is in good condition.

8. Exhaust is provided for the building by several roof mounted exhaust fans which are approximately ten (10) years old and in good condition.
9. Cabinet unit heaters are provided in the corridors and entrance vestibules for heating. All cabinet unit heaters are approximately ten (10) years old and are in good condition.

Building Management System

1. The building systems are controlled by a Siemens direct digital control system that is approximately ten (10) years old. This system is in good condition. Region 13 personnel noted that there are currently no issues with the control system.



Control System Compressor

ELECTRICAL SYSTEMS

Existing Electrical Service

1. The building is served by a 1600A, 208/120V, 3-phase, 4-wire, main electrical service with circuit breaker distribution, CT compartment and integral TVSS. The main switchboard is located in the Main Electrical Room. This equipment is (10) years old and in good condition.



Main Electrical Switchgear



Main Electrical Switchgear

2. The primary electrical service is fed from a pad mounted utility company transformer located behind the school.
3. The adjacent tennis courts are powered from this facility.



Tennis Court Disconnect Switch

4. The building is backed-up by a small propane fired emergency generator. This equipment is within a room accessed from the outside of the building. This equipment is approximately (30) years old and is not reliable.
5. There are a number of panelboards located throughout the building. All of the distribution equipment was replaced during the last renovation project. The panelboards are in good condition.
6. Lighting throughout the facility consists of a number of type of light fixtures including surface mounted 2x2 acrylic lensed fixtures, recessed acrylic lensed fixtures, recessed parabolic fixtures, fluorescent hi-bay fluorescent fixtures in the Gymnasium, and pendant mounted fixtures, etc. All of these fixtures are in good condition, however, new higher efficient types of technology such as LED lighting is now available which should be considered for replacement of existing fixtures to reduce energy consumption.



Pendant Lighting



Gymnasium Lighting

7. Motion detectors have been installed in most of the areas in the building. This equipment is in good working condition.



Typical Motion Detectors

8. The fire alarm system consists of an Edwards EST-2 fire alarm control panel, remote annunciator, and manual fire alarm pull stations and horn strobes, some smoke detectors, and duct smoke detectors. The fire alarm control panel and other peripheral devices are in good condition.



Fire Alarm Control Panel



Typical Fire Alarm Pull Station and
Audio-Visual Device

9. The exit signs throughout the building are plastic fluorescent type with integral batteries. These units are in good condition.
10. The emergency lighting in the building consists of self-contained two-head emergency battery units and of using the light fixtures in the specific area fed from the emergency generator as emergency lighting. This equipment is (10) years old and in good condition.



Typ. Emergency Lighting Fixture



Typ. Emergency Lighting Fixture

11. The site lighting consists of pole mounted shoe-box fixtures, wall mounted flood lights on the exterior of the building or surface mounted fixtures in vestibules or covered entrances. Some of these fixtures are new and in good condition. Other fixtures are in good condition.
12. Security features in the building consist of interior and exterior cameras, motion detectors, and intercom stations at various access points around the building. All of this equipment is in good condition.
13. Data/technology consists of wired computer stations throughout the building. There are also projectors in most of the classrooms. This equipment is in good condition

RECOMMENDATIONS

- Provide isolation valves on the hot and cold water distribution system.
- Provide full sprinkler coverage throughout the building.
- Replace existing water closets with high efficiency, low flow, 1.28 Gallons Per Flush (GPF) water closets.
- Replace existing urinals with high efficiency, low flow, .125 GPF urinals.
- Replace lavatory faucets with low flow .5 GPM faucets.
- Provide emergency generator.
- Replace gasket on existing grease interceptor.
- Develop a plan for replacement of the chiller and associated pumps, the air handling units and associated exhaust fans, and the boilers as this equipment will likely require replacement in the next five (5) to ten (10) years.

Regional School District 13 - Durham/Middlefield/Rockfall									
Capital Needs Survey Form									
Korn ES									
May 12, 2014									
						29,478	29478		
SYSTEM	System Priority 1 to 4 (1-Health & Safety, 2-High, 3-Medium, 4-Low)	System Rating 1 to 5 (1 Poor, 5 Excellent)	Last Major Reconstruction (Year)	Projected Replacement (Year)Based on 20Year Service Life	Quantity	Unit Price	Current Replacement Cost	REMARKS	
Division 2 - Site Construction									
Site - Electrical									
Site - Lighting	1	3	2011	2031	11	\$ 2,500.00	\$ 27,500.00	some wall packs already replaced	
Building Mounted Fixtures									
Pole Mounted Fixtures									
Site - Fuel Tanks - Oil	2	5	2010	2030	1	\$ 50,000.00	\$ 50,000.00	12,500 gallon underground storage tank	
Division 21/22/23 - Mechanical									
Water Main	1	3	2003	2023	1	\$ 50,000.00	\$ 50,000.00	Partial cost of water vault replacement	
Water Distribution System	1	3	2003	2023	1	\$ 50,000.00	\$ 50,000.00	This is an exception to the 20 year service life. Typically the piping lasts much longer. Partially replaced in 2003	
Plumbing Drainage System	1	3	2003	2023	1	\$ 60,000.00	\$ 60,000.00	This is an exception to the 20 year service life. Typically the piping lasts much longer. Partially replaced in 2003	
Fire Protection System	1	3	2003	2023	29,478	\$ 4.50	\$ 132,651.00		
Plumbing Fixtures / Equipment	1	3	2003	2023	29,478	\$ 6.00	\$ 176,868.00		
Water Heaters	1	3	2004	2024	1	\$ 7,500.00	\$ 7,500.00		
Boiler	2	3	2003	2023	2	\$ 25,650.00	\$ 51,300.00		
Heating Hot Water Pumps	2	3	2003	2023	2	\$ 13,462.50	\$ 26,925.00		
Chiller	4	4	2003	2023	1	\$ 133,500.00	\$ 133,500.00	90T, R-22 Trane split barrel	
Chilled Water Pumps	4	3	2003	2023	2	\$ 15,000.00	\$ 30,000.00		
Ventilation Systems	2	3	2003	2023	29,478	\$ 25.00	\$ 736,950.00		
Air Handling Systems - General	2	3	2003	2023				Inc w/ vent sys	
Air Handling Systems - Admin	2	1	2003	2023	1	\$ 12,400.00	\$ 12,400.00		
Terminal Units	3	3						Inc w/ vent sys	
Exhaust Systems - General	4	3	2003	2023				Inc w/ vent sys	
Exhaust Systems - Kitchen Hood	2	1	1990	2013	1	\$ 5,212.50	\$ 5,212.50		
Control Systems	3	3	2003	2023	29,478	\$ 5.00	\$ 147,390.00	Landis & Gyr (Siemens) DDC	
Cold Rooms								None noted.	
Indoor Air Quality								No issues noted.	
Division 26 - Electrical									
General Electrical (Starters, VFD's, etc...)									
Electrical Service / Distribution	3	4	2003	2023	1	\$ 100,000.00	\$ 100,000.00		
Transformer					1	\$ -	0	Utility company owned	
Lighting - General	2	4	2003	2023	29,478	\$ 6.00	\$ 176,868.00		
Emergency Lighting	1	3	2003	2023	29,478	\$ 1.50	\$ 44,217.00		
Communication Systems	1	3	2003	2013	29,478	\$ 2.00	\$ 58,956.00		
Technology Systems	2	3	2003	2013	29,478	\$ 2.00	\$ 58,956.00		
Fire Alarm System	1	3	2003	2023	29,478	\$ 2.50	\$ 73,695.00		
Clock System	4	3	2003	2023	29,478	\$ 1.00	\$ 29,478.00		