

## **Groton Heights School – Electrical Evaluation**

**TO:** Amy Vaillancourt, Project Manager  
Harley Langford, Project Manger

**FROM:** Ron Maniscalco, P.E.

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On Monday December 14<sup>th</sup> Tighe & Bond conducted a site visit at the Groton Heights School in Groton, Connecticut. The school has been out of service since 2007. The building electrical service is still active. The building has had periodic maintenance during the time the school was out of service. Below are our observation of the building.

### **1 Existing Conditions**

#### **1.1 Electrical Service Entrance**

The existing electrical service originates at the overhead utility pole #22-1 on Smith Street. From the pole service goes underground to a pad mounted utility transformer located on the east side of the building. From the pad mounted transformer there are two 480 volt underground electrical services that enter the building. Each service has a dedicated utility meter that has been enclosed with a lockable metal cover.

The main service to the building is protected by a 200 amp fused disconnect switch with 200 amp fuses in the boiler room. From the fused disconnect switch the conductors enter a 150 kVA floor mounted transformer located in the boiler room. This is the only electrical power transformer in the building. It appears that the building was originally fed with a 120/208 volt three phase service. In the year 2000 the electrical service was upgraded to 480 volts. The transformer and the fused disconnect switch are both 15 years old and well maintained.

The second electrical service is dedicated to the 60 HP electric fire pump. The second service is protected by a 600 amp circuit breaker and directly feeds the fire pump controller. The 600 amp circuit breaker, the fire pump controller and the fire pump are all located in the building boiler room. The building's fire pump system was added in 2000. The 600 amp circuit breakers, the fire pump controller and the fire pump are all 15 years old and well maintained.

There are riveted hard plastic labels on both the 200 amp fused disconnect and the 600 amp circuit breaker. These labels indicate that there are two separated sources of power to the building.

There are no generators, transfer switches, solar panels, wind turbines or inverters at the building. The only source of electrical power is the utility pad mounted transformer.

#### **1.2 Electrical Distribution**

The building receives 120/208 wye power from the 150kVA transformer. The secondary side of the transformer is protected by a 400 amp fused disconnect with 400 amp fuses. This fused disconnect appears to be approximately 50 years old. However it is very well maintained.

On the load side of the 400 amp fused disconnect switch there are two taps. These taps enter an electrical wireway and power to two distribution panelboards labeled Panel #1 and Panel #2. Each panelboard has 200 amp main circuit breaker. These panelboard provide general

lighting and receptacle power throughout the building. The panelboards also provide power to the water heater, window A/C units and the boilers. Panel #1 has a 100 amp three-pole circuit breaker that feeds the gymnasium panelboard. Panelboard #2 has a 60 amp three-pole circuit breaker that feeds the second floor panelboard.

The building was built in the early 20<sup>th</sup> century before electricity was common in schools. The masonry walls required that the electrical wiring be run in surface mounted conduit. There are some floor mounted receptacles limited to the office areas.

### **1.3 Electrical Fire Pump**

The 60 HP electrical fire pump is located in the boiler room. It is powered from a dedicated electrical service to the building. Refer to section **1.1 Electrical Service Entrance** above.

There are flow and tamper switches on the riser and valves. These alarms are tied into the local fire alarm panel. Refer to section **1.8 Fire Alarm** below.

### **1.4 General Power**

The building was built in the early 20<sup>th</sup> century before electricity was common in schools. The masonry walls required that the electrical wiring be run in surface mounted conduit with surface mounted boxes for switches and receptacles. There are some floor mounted receptacles limited to the office areas.

Areas with open sinks and water fountains have ground fault interrupt duplex receptacles with local test and reset switches. There are no exterior power receptacles around the building. There are three 20 amp 220V receptacles located in the center of the second floor hallway.

The building does not have a kitchen or cooking area. There are no receptacles on the exterior of the building.

### **1.5 Lighting**

Lighting throughout the building is power from 120 volt sources.

#### **1.5.1 Interior Lighting**

The interior spaces are illuminated with multiple pendant mounted fluorescent lighting fixtures. In the classrooms, these fixtures are mostly four lamp stem mounted 2'x4' wrap around fixtures. On the basement level there is one classroom that has two-lamp stem mounted 1'x4' "ice cube tray" type lighting fixtures. In the hallways, boiler room and gymnasium, there are two lamp pendant mounted 1'x8' industrial strip fixtures. On the stage there are two lamp grid mounted lighting fixtures with "egg-crate" baffles.

In small offices with a grid ceiling, two lamp lensed troffers with T8 lamps were installed. There are also some areas with incandescent lamps.

The interior lighting is controlled with local wall mounted toggle switches. In the classrooms there are two switches for dual level lighting. One switch controls the lighting fixtures closest to the windows. The other switch controls the light closest to the interior wall. There are no photocells or occupancy sensors in the building.

### **1.5.2 Exterior Lighting**

On the exterior of the building there are high pressure sodium light fixtures mounted above most of the exterior doors. The lights are controlled by a time clock in the boiler room. They are fed from circuit #24 in Panelboard #1

There are no security lights on the exterior of the building. The flag pole does not have a flood light.

### **1.5.3 Exit and Emergency Lighting**

The exit signs in the building are ADA self-diagnostic type. They are hard wired to a dedicated exit sign circuit (Panel#1, 9) and have a self-contained nickel-cadmium battery backup. The exit signs are illuminated with LED bars. Many of exit signs have been vandalized.

Emergency lighting is provided by dual head battery powered wall packs. The emergency lights are functioning and in good condition.

## **1.6 Grounding and Lightning Protection**

The building electrical service entrance is grounded to the incoming domestic water service. There are no other grounding rods in the building. The building does not have a grounding counterpoise.

The building does not have lightning protection.

## **1.7 Telephone and Data**

The building is serviced with a 25 pair telephone service originating from pole #22-1. The building has a standard "plain-old-telephone-service" (POTS) that is terminated in a box in the boiler room. There are 110 punch-down blocks for telephone service to other areas of the building.

There appears to be the remnants of the telephone headend equipment in the office areas. The POTS lines are in place but the equipment has since been removed.

## **1.8 Fire Alarm**

The building has a Simplex non-addressable fire alarm panel in the first floor hallway. There are currently five zones in the building. There is one zone for each of the three floors, one zone for the gym and one zone for the sprinkler system. The fire alarm system is powered from Panelboard #2, circuit #18. The fire alarm panel has been maintained throughout the time the building has been unoccupied. The last service dated indicated on the control panel was November 23<sup>rd</sup>, 2015.

The fire alarm system contacts the local fire department through a coil in a Gamewell master box located on the southeast corner of the building. Adjacent to the master box is a Knox Box that houses a building master key. The building does not have a remote annunciator for the fire alarm system.

On floor, the only fire alarm initiation devices are manual pull stations located at each exterior door. There are no smoke detectors or heat detectors. There are also no duct smoke detectors in the system. There are no fire alarm lights or strobes mounted on the exterior of the building.

Fire alarms in the building are annunciated with eight non-ADA horn-strobes locate throughout the building. There is no fire alarm speakers or voice evacuation microphones in either the gymnasium or the main school building.

The front doors are equipped with electromagnetic door holders. The door holders are designed to close in the event of a fire alarm.

The entire building is protected by a sprinkler system. Each valve in the sprinkler system is monitored by a tamper switch that is wired to the trouble signal input of the fire alarm control panel. There are no sprinkler system floor assembly valves on the upper floors.

There are also flow switches mounted in the sprinkler system risers. The flow switches send an alarm signal to the fire alarm control panel. There are no sprinkler system flow switches on the floors. On the exterior of the building there is a sprinkler system electronic bell to indicate water flow.

## **1.9 Security System**

Security at the building is provided by a Fire Burglary Instrumentation (FBI) Inc. intrusion detection system. The FBI system is has a XL-4B monitoring panel located in the boiler room. There is also an autodialer mounted on the wall adjacent to the monitoring panel. The system is currently monitored by Alarm Guard Inc.

There is only intrusion detection at the building. This is accomplished with magnetic door contacts mounted in the interior frame of each of the egress doors. There no contactors on the windows.

There are no motion sensors located in the interior of the building.

Access control systems such as card readers or keypads were not observed during the inspection either inside or outside the building. The Town has since indicated that a card reader is located at one entry stairway.

There are no security cameras located either inside or outside the building.

## **1.10 Paging System**

When the building functioned as a school, each room had an overhead paging system. The headend of the paging system has since been removed. Currently only the classroom speakers and playground horn speakers remain. The wiring appears to be removed.

## **1.10 Emergency Call**

There are no Area of Refuge communication stations in the stairwells.

There are no Call-for-Aid pull cords or dome lights in the single occupancy bathrooms.

## **2 Assessments**

The following is Tighe & Bond's assessment of the electrical equipment in the building.

### **2.1 Electrical Service and Distribution**

The building's existing electrical service and distribution panelboards are up to date and well maintained. The existing 200 amp 480 volt service has ample capacity for the existing loads and for future growth. There is capacity in the electric service to add an electrical elevator

operated by a 20 hp motor with a 27 amp draw, as is commonly used in a building of this size.

In general the electrical branch wiring is new and installed in surface mounted EMT conduit. However the boiler room equipment and many of the lighting fixtures have older conductors and should be replaced

## **2.2 Electrical Fire Pump**

The existing electrical fire pump is in good condition and well maintained.

## **2.3 Lighting**

The existing lighting fixtures are outdated and should be replaced with more efficient lighting. The conductors should also be replaced as they have reached the end of their useful life.

The existing exit signs are LED units and are in fair condition. However, the vandalized fixtures should be replaced. The existing emergency lights in the main building are in good condition. The existing emergency lights in the gymnasium are old and should be replaced.

The exterior lights are older and the lenses have yellowed. Some lighting fixtures have been vandalized. During the site visit we were unable to verify if the time clock and exterior fixture properly operate.

## **2.4 Telephone Service**

The existing telephone service is very basic. The service will support a facility with simple needs.

## **2.5 Fire Alarm**

The existing fire alarm system is suitable for the basic needs of the building. Additional modification to the fire alarm system may be necessary depending upon the future use of the building.

## **2.6 Security & Paging**

The existing security system is minimally suitable for securing the shell of the building. Access is still possible through the windows. A zoned security system may be a future option depending upon the future use of the building.

The existing paging system is not functional and should be removed.

## **3 Recommendations**

The following is Tighe & Bond's recommendations for the electrical equipment upgrades in the building. The items are in order of priority.

### **3.1 Exit and Emergency Lighting**

It is recommended that the vandalized and antiquated lighting fixtures be replaced with new ADA compliant fixtures.

### **3.2 Emergency Area of Refuge Call Stations**

If the future use of the building requires public access, two-way communication area of refuge call stations should be installed in the stairwell landings.

### **3.3 Lighting Upgrades**

Remove and replace the existing interior and exterior lighting with energy efficient lighting fixtures. Properly dispose of the housings, wiring, and ballasts. Any ballast containing PCB's shall be disposed of as hazardous waste.

### **3.4 Upgraded Telephone Service**

The existing telephone service should be upgraded to accommodate the future use of the building.

### **3.5 Lighting Controls**

Provide energy saving room occupancy sensors in each of the occupied rooms. These could include ceiling, wall, or fixture mounted dual technology motion sensors. It is recommended dual level lighting be installed in stairwells and corridors.

### **3.6 Lightning Protection and Grounding Systems**

The building is atop one of the highest points in Groton. There is a 135 foot tall monument nearby which has historically been struck by lightning. A lightning analysis should be conducted for the building.

If the future use of the building will require office, computer or other electronic equipment, the grounding system should be upgraded.

## **4 Conclusions**

The electrical equipment at the former Groton Height School is good condition. The electrical service has ample capacity for a renovation and future growth. The exiting lighting is out dated and should be replaced. Modifications to the low voltages systems (fire alarm, security, telephone, etc.) will depend on the future use of the building.

## Appendix A – Photos



Electrical Service Entrance



Utility Meters



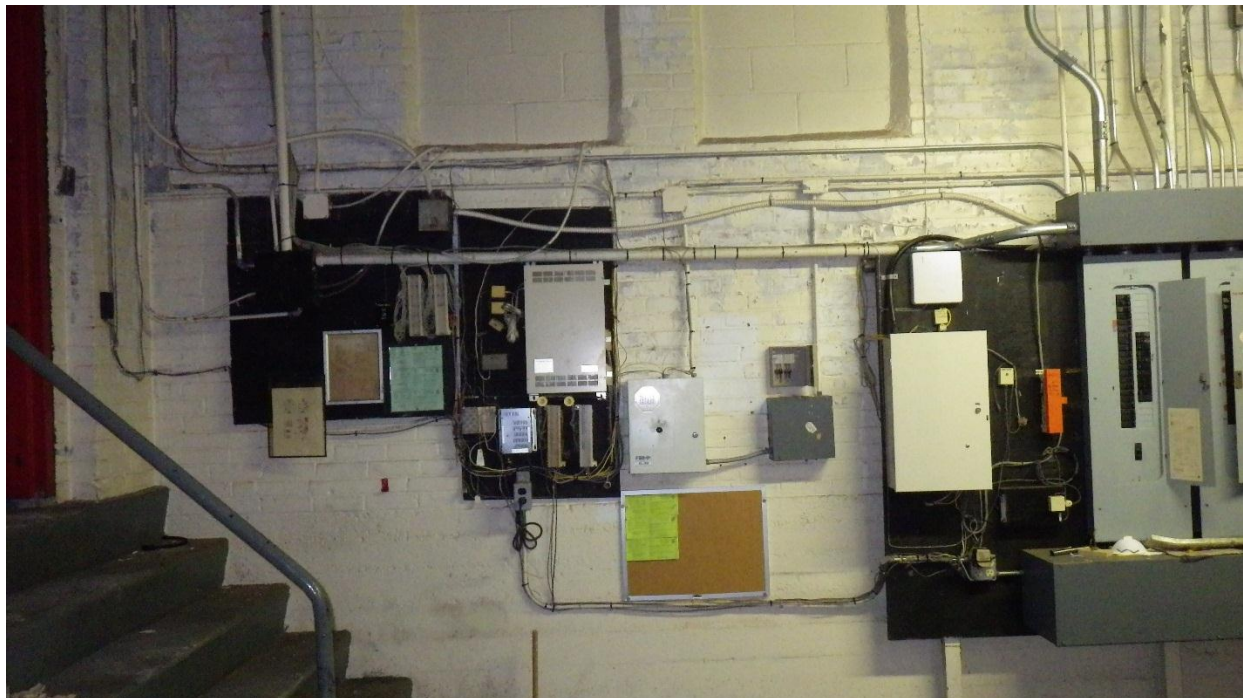
Fire Pump



Fire Alarm



Typical Lighting Fixtures



Telephone and Security Headend Line Up





Typical Classroom Lighting