

### Hot Water

#### *Existing Condition*

- Hot water is generated in the off-season by means of a dedicated, gas fired boiler, 3,000,000 BTU input, to a pair of tanks with steam coils in them (Boiler #1)
- Approximate capacity of each tank is 500 gallons
- Hot water during the heating season is off the main steam boilers
- Both storage tanks are beyond their life expectancies by a wide margin - the steam coils are partially blocked, the control valve is not functioning properly and the bottoms of the tanks are corroded. (pic #1)
- The steam system is jury rigged by means of a remote sensor to an on-off operation
- The hot water distribution system and recirculation system that runs through the Crawl / Tunnel spaces is not insulated (pic #2)
- The distribution system is set up for 130°F delivery
- There are no boosters for the Kitchen pot sinks etc. (there is no dishwasher for the Kitchen)
- In general it appears that the hot water system is the major Plumbing problem in this facility
- Existing Hot water generation and storage will generally keep up with the demand during peak usage (After Sporting events, practices, Public functions etc.) but only minimally - loss of one tank would greatly curtail the available uses of the system
- The Gas Train on the existing Gas fired Boiler dedicated to hot water generation is not up to code and the venting of the various controls is again not up to present code.

#### *Recommendations*

- Replace existing hot water storage tanks with two (2), 400 Gallon storage, 800 Gallon per hour recovery, Dual Fuel (Gas and Steam ) water heaters and connect to the existing distribution system
- Hot water to be stored at 160°F.
- Provide Triplex High - Low Capacity Thermostatic Mixing Valve assembly to distribute general use hot water at 140° ) with tapping on the supply side for future dedicated line (160°F) to kitchen. (Lavatories in toilets to be provided with thermostatic/ limit stop, metered, mixing valve that can be set for a maximum delivery temperature of 110°F (Code mandated for Public Lavatories.).

Picture 1



Picture 2



- Provide an electric, heat maintenance tape system for entire hot water system in lieu of existing circulation system to allow for proper operation of the required low flow Lavatory faucets.
- Insulate the existing Hot Water Distribution piping
- Provide inter - tank circulators for all water heaters to eliminate stacking problem common to heat tape systems
- Install new Electric water heater (estimate at 40-Gallon storage, 4.5 KW) in S wing to serve all Laboratory Hot water requirements (at sinks). Requires separation of Lab hot water supply from existing domestic hot water supply and re-piping as required.
- Install an additional Fail Safe Thermostatic Mixer (for 80°F tempered water) and re-pipe direct to all Emergency Showers and Eyewashes per code. (Hot water supply from the Domestic Hot Water system not the electric water heater for lab sinks)

#### Natural Gas

##### *Existing Conditions*

- The School is fed by what appears to be an intermediate pressure line as there is pressure reduction at the meter set and it also feeds boiler #1 and the Emergency Generators, which typically require a gas pressure of 11" WC. The interior portion of the gas service at the main mechanical room is 4" diameter. (pics #3 & 4)
- The Emergency Generators (4) are presently fed off the same line that feeds the Summer Boiler and appear to also feed the Science wing labs. Present code requires that a dedicated line, from the meter, feed Emergency Generators.
- Boston Gas has been contacted to verify gas pressure available to the site as well as potential for increased gas usage in the future. Whereas the cost of Gas has risen so dramatically along with the relative good condition of the existing Fuel Oil storage tank system at the facility it is not recommended that the proposed Dual Fuel Boilers be connected at this time. With connected dual fuel burners the gas company will not upgrade the area infrastructure system, at their cost, for only the potential of using gas for heating. It appears more prudent to await a change in the heating medium costs as well as making the most of the potential life of the fuel oil system before considering a change over in fuel.

Picture 3



Picture 4



*Recommendations*

- Provide new connections and piping for the Proposed Dual Fuel (Gas and Oil) Fired Boilers and Gas fired Water heaters and re-feed existing gas distribution system to labs
- Provide new regulator gas vents from new water heaters, and proposed Boilers to exterior
- Increase service to the school to accommodate Gas Fired Boilers for the space-heating portion of the building.

**Domestic Cold Water***Existing Conditions*

- Maintenance estimates 70 PSI+ at service entrance
- There is a single 2" Reduced Pressure Backflow Preventer in the Main Mechanical room for a dedicated line that runs to the boiler make-up connections at each boiler, the boiler blow down tank and the water softener system for the boilers.
- The Science labs have outlet vacuum breaker protection only
- Natick requires Reduced Pressure Backflow preventers on the incoming service which is not present at this time
- The incoming service to the school is a 5" line with a compound meter and a 2" by pass meter to which is connected a 1 ½" fire hose for wash down purposes.
- No insulation on the cold or hot water distribution system in the crawl spaces
- The system is in dire need of isolation valves (very few observed and most of them have problems when it comes to shutting down as they are gates and the stems are shearing when operated due to age and a slightly aggressive water condition).
- Piping observed was type L copper - However it was reported that there are numerous pin hole leaks starting to appear in the system over the past two years which is an indication that the piping has passed it's useful life and will now become a maintenance issue.

*Recommendations*

- It is recommended that the water supply be analyzed in order to select the appropriate materials (packing, seals, composition of valve inner components) to maximize the life of these components.
- Install Reduced Pressure Backflow Preventer at Incoming service.
- Install a dedicated Reduced Pressure Backflow Preventer on the Cold water feed to the S wing (Protected cold water) to isolate all labs from the Domestic system and include connection to a new water heater for the S wing to further isolate that portion of the system.
- Remove existing 4" meter in crawl space installed originally for proposed pool
- Replacement of distribution piping (Hot and Cold Water) in the Tunnel / Crawl space along with installation of isolation valves (Ball and Butterfly Valves) on all branches of the Hot and Cold water distribution system within the Tunnel / Crawl space.
- Insulation of all water piping.

**Mechanical Room Drainage System***Existing Conditions*

- The main Mechanical room floor drains, the area way drains and the boiler blow down system all discharge to a duplex sump and are then discharged to a Gas / Sand interceptor in the Parking lot prior to discharge to the Town sewer. The Interceptor is pumped out every three years or so as a precaution - Interceptor portion of the system has not been needed to date based upon observations made during pump out of interceptor.

*Recommendations*

- Replace existing sump pumps and controls
- Separate Area drain piping and re-pipe to a new sump and thence to exterior

### Sanitary Drainage System

#### Existing Condition

- The cast iron Hub and spigot piping in the crawl space areas is starting to deteriorate and leaks are beginning to become a re-occurring maintenance issue - the piping in the tunnel areas is in better condition. (pic #5)

#### Recommendations

- Replace all Cast Iron drain piping within crawl space portions of the building.

### Acid Waste System

#### Existing Condition

- The S wing is presently the dedicated area for Labs that would require treatment of corrosive wastes. Presently all the lab sinks are piped with either mechanical joint Polypropylene (in the crawl space areas) or a Pyrex Glass system for the above floor system to two Limestone chip tanks in the crawl space which in turn discharge to the Sanitary sewer line in the immediate area.
- The chip tanks are routinely inspected and Limestone chips are added as necessary - aside from a layer of floating sediment at the top of the tanks there is typically minimal maintenance required for the tanks due to a reduction of chemicals for teaching purposes

#### Recommendation

- Install pH-monitoring equipment with Chart Recorders on discharge side of Neutralization tanks in Crawl space
- Provide better access to the area of the neutralization tanks for maintenance and monitoring of the system (pic #6)

### Storm Drainage System

- The Outside Area Way drains at the Main Mechanical room presently drain into the Sanitary Sewer system by way of the mechanical room sump pump system. This is a code violation and will have to be redirected to the Storm system.
- The Area Way Drain at the exterior entrance to the Planetarium is clogged and backs up into the stairwell (this drain, we have been told discharges to the Pond out back)
- In addition we were informed that during heavy rains there is considerable infiltration of storm water into the Planetarium seating and rear storage area that appears to be from the foundation wall between the stair access and the corner of the

Picture 5



Picture 6



building. The interior face of the foundation wall is studded out, and visual examination for a crack was not possible.

- No other Storm drainage systems were addressed during the preliminary walk-through

#### ADA / AAB Accessible Fixtures

##### Existing Condition

- None observed during walk-through - Informed the only area that has accessible fixtures is the Nurse's area. Existing toilet facilities for handicapped accessibility are at a minimum within the facility, principally at the Auditorium Lobby area (Men & Women) the upper level of A-wing (Uni-sex toilet) and accessible fixtures in the Nurses room which in itself is not technically accessible.

##### Recommendations

- Adequate Accessible fixtures to be provided under Existing Toilet room renovations

#### Plumbing Fixtures

##### Existing Condition

- All plumbing fixtures observed during walk-through appear to be original to the buildings and will require replacement to comply with current plumbing code as to accessibility under ADA/AAB requirements, Low flow restrictions, and maximum allowable hot water delivery temperature. (pics #7 & 8)
- Individual Master thermostatic mixers in each Shower room presently control showers in the Locker Rooms. Shower rooms for the Boys are gang showers with drainage to the exterior walls in accordance with code. Girl's side is comprised of individual stalls - control of the showerheads and final delivery temperature as well as on-off operation varies in each room. (pics #9 & 10)

##### Recommendations

- Replacement of all fixtures and related controls during renovation along with Replacement of existing showers in locker rooms with 2.5 GPM heads and pressure balanced mixing valves for final, point of use, temperature control

Picture 7



Picture 8



Picture 9



Picture 10



**Emergency Showers and Eyewash Fixtures***Existing Conditions & Recommendation*

- Any existing Emergency Shower / Eyewash system will require replacement to comply with code mandated Tempered water and ADA/AAB accessibility requirements as well as reducing the required tempered water requirement from 30 GPM to 20 GPM for the required 15 minute flow condition.

**Fire Protection***Existing Conditions*

- There is presently no Fire Protection (Sprinkler) system installed in the Facility.

*Recommendations*

- Installation of a new Fire Suppression system (Sprinklers) for the entire facility consisting of an 8" service to the building in the area of the Main Boiler Room on the front side of the facility, to feed three alarm Check Valve assemblies, a second 6" service entrance, with Sprinkler valve room, on the back side of the facility to feed two Alarm Check assemblies.
- Installation of Backflow protection on each new service entrance
- Primary distribution through the Tunnel / Crawl space system
- Cross connection of Fire Department Siamese Connections on the two services
- 13 to 15 internal Wet Sprinkler Zones
- Dry pipe sprinkler system for the loading dock area
- A deluge /standpipe system for the Auditorium stage
- A closed loop exterior 8" service, with isolation valves, around the entire facility, with Fire Hydrants located as required by the Local Fire Chief