Livingston School District
Riker Hill Elementary School

## RIKER HILL ELEMENTARY SCHOOL

## HVAC

### M-01 Heating Plant:

**Observations:**
The existing hot water boilers have recently been upgraded. (4) hot water boilers (circa 1999) manufactured by Raypak has been installed. A primary/secondary pumping system serves the building. The boilers are controlled by a Johnson-Metasys DDC system. The combustion air intake arrangement and sizing does not comply with current codes. The space heating boilers produce domestic hot water in the winter months, while a stand-alone water heater produces hot water during the summer months. The newer boiler breeching connects to the original masonry chimney. Also, the vents from the gas regulators have been manifolded together. Proper venting requires individual vents.

***Recommendations:***
*The combustion air arrangement and sizing should be reviewed and consideration should be given to bring the installation up to current standards. Since the boilers utilize a positive pressure flue venting system, the chimney should be fitted with a metal chimney liner for protection of the building occupants. In addition, the boiler gas venting should be corrected.*

### M-02 Heating & Ventilating Systems:

**Observations:**
Classrooms - Most classrooms are served by hot water unit ventilators with supplemental fin-tube radiation. The units are original to the building and appear to be in fair to poor condition and have well exceeded their expected operating life. Scattered throughout the school are window air conditioners to provide cooling to select rooms. Operating along with the unit ventilators, are exhaust fans, which assist in maintaining building pressure. Some fans were not energized and some appeared in need of repair.

Newer classrooms are served by self-contained heating/cooling units manufactured by Airedale. SGI's are served split-system type units, also manufactured by Airedale.

Kitchen – The kitchen contains newer cooking hoods, however, the hoods are connected to older, non-compliant metal ductwork.

Multi-Purpose Room - The room is served by a hot water heating & ventilating (H&V) unit in the basement area below. The unit is original to the building and appears to be in fair condition, though it has exceeded its' expected operating life.

Media Center - The media center utilizes hot water unit ventilators and window air conditioners.

Miscellaneous Areas – The nurse's office is served by hot water baseboard, but does not have any ventilation air to the space. Also, the main circulation corridors utilize hot water cabinet unit heaters, but currently receive no ventilation to the space.

***Recommendations:***
*Spaces such as classrooms and multi-purpose room should have the HVAC equipment replaced since it has been in service long after its expected operating life. The new equipment will replace the existing equipment in-kind, except that additional outdoor ventilation air will be introduced per today's codes and the new equipment will be fitted with microprocessor controllers to integrate with a building control system. Areas that receive little or no ventilation must be upgraded as required. Exhaust fan maintenance should be addressed by repairing units where possible and replacing those in bad repair. The non-compliant kitchen ductwork should be replaced.*

## M-03 Cooling Systems:

**Observations:**
Newer Classrooms – Circa 2002 classrooms are served by self-contained heating/cooling units manufactured by Airedale. SGI's are served split-system type units, also manufactured by Airedale.

Office Areas – The administration area and faculty room are cooled with window air conditioners.

Media Center – The media center is cooled with window air conditioners.

MDF Closet - The room containing the school's computer server does not have any independent cooling system. The room was quite warm at the time of our visit.

***Recommendations:***
*Though no immediate upgrades are required, consideration should be given to eliminate the thru-the-wall units with split systems or rooftop units. The new rooftop units will be more efficient, provide better ventilation, acoustics and temperature control throughout the areas. We believe, however, that an independent cooling system should be added to protect the server room. Consideration should also be given to provide cooling to the classrooms, activity room, media center and multi-purpose room. Vertical, self-contained heating/cooling units are recommended for the classrooms, while multiple rooftop units with heating/cooling are recommended for the larger spaces (media center, multipurpose, activity room).*

## M-04 Temperature Control Systems:

**Observations:**
With the exception of the boilers, the control of the heating, ventilation and temperature control of the spaces is accomplished via a pneumatic control system, which is interconnected via P/E switches to a newer DDC system. The DDC system provides global start/stop of the HVAC equipment. The temperature control air compressor was operating excessively, indicating the system may have air leaks. The system appears to be marginally adequate for task at hand.

***Recommendations:***
*While the present system may be functional and familiar to the operating, staff, we recommend that a complete upgrade of the existing pneumatic temperature control system be initiated. A new system of direct digital controls*

*(DDC) should be employed. The DDC system will automate the operation of the HVAC equipment, aid in maintenance efforts, signal trouble alarms and reduce overall building energy usage. The new DDC system should be based on Johnson-Metasys (or another compatible company), which is currently in use in the District. The system will be networked to a district-wide monitoring system*

## M-05 Plumbing:

***Observations:***

The main domestic water service enters the building in the front southwest corner of the building in a storage room. Service size is 4" and there is no backflow prevention.

Domestic water heating is provided by a large horizontal indirect heated storage tank which is heated with boiler water. There is a separate gas fired summer water heater to provide hot water during boiler shut down periods.

Natural gas enters the building in the Boiler Room and supplies the boilers and a kitchen domestic type range/oven. The gas regulator vents from the four boilers rise vertically into one larger manifold that runs to the outside. The vents lines should run independently to the outside per code. Gas also serves a domestic range/oven in the adjacent kitchen.

The school Kitchen has a 2-compartment sink with a recessed in floor grease interceptor on the waste line. The kitchen also has a dishwasher with a hot water booster heater and a rinse sink in the

There is an open waste sump pit with pump located in the lower mechanical room behind the multi-purpose room stage.

The toilet rooms in the southwest and the south wing do not have ADA compliant fixtures. The toilet rooms in the northern wing do have designated ADA fixtures with sensor operated flush valves but the piping below the lavatory sink is not insulated. The nurse's office toilet room fixtures are in good condition but are not ADA compliant.

The only ADA compliant drinking fountains are at the far north wing of the building.

Kindergarten classes have individual toilet rooms with juvenile water closets. These classrooms also have counter sinks with drinking bubblers outside of the toilet room. These counter sinks are showing age and the faucets and bubblers are quite worn.

The three Art Room sinks at the far north section of the building have solids interceptors on the waste lines.

Roof drainage appears to be in good condition and functioning properly.

***Recommendations:***
*All toilet rooms should be modified for ADA accessibility. Toilet rooms that have been modified should be corrected for the proper clearances and insulations.*

*All toilet room faucets, traps and flush valves should be replaced due to the age and wear and for conservation purposes.*

*Classroom sinks should have the old faucets and drinking bubblers replaced in the kindergarten classrooms.*

*Drinking fountain locations should have an ADA compliant fixture.*
*All sanitary/waste pits are to be sealed and properly vented to the outside.*

*The open waste water sump requires a cover and proper venting to the outside.*

*The gas regulator vents should be re-piped independently outside to meet code requirements.*

## M-06 Fire Protection:

***Observations:***

There is no fire protection system in this facility with the exception of a chemical suppression system in the kitchen hood.

***Recommendations:***
*All storage and boiler rooms should have a limited fire sprinkler protection.*

## ELECTRICAL:

## E-01 Service Entrance:

**Observations:**
A JCP&L utility pole # JC814LVT, at the property line on Blackstone Drive, runs primary voltage underground to a 480/277V, 3 phase, 4 wire pad mounted 300 kVA transformer. From the transformer the service enters the basement electrical room via underground conduit. Recently installed G.E. Spectra series switchgear backfeeds the old 400A service. The new service entrance is 1600A MCB, 120/208V, 3 phase, 4 wire. Two spaces exist in the new MDP. JCP&L is the utility company serving electrical power under account #1214949118. In June of 2007 the max demand was 115.5 kw/139A.

***Recommendations:***
*None at this time.*

*Should it be decided to fully or partially air-condition the subject building then the electrical service entrance will have to be replaced/upgraded. (500 KVA minimum)*

## E-02 Distribution:

**Observations:**
Local panelboards distribute power to lighting, devices and equipment. Most older vintage 208V panelboards were found to be loaded to circuit breaker capacity and lacking spares or spaces. Newer computer panels have been

installed in the addition areas. A 225kVA “K” rated transformer was seen installed on the line side of the computer distribution panel (CDP) to mitigate harmonics.

Distribution grade TVSS was seen installed on the recently installed CDP. A few space exist in the CDP.

***Recommendations:***
*Any addition to the original section will require new panelboard placement.*

## E-03 Devices:

**Observations:**
Local receptacles were sparse as the building is 1965 vintage. Currently additional power has been provided via power poles and surface mounted raceway.

***Recommendations:***
*As the building is block wall construction any renovation would likely require surface mounted raceway and outlets built into new partition walls.*

## E-04 Normal Lighting:

**Observations:**
The majority of the building is served via linear fluorescent fixtures with T-8 lamps. 2x4 and 2x2 recessed prismatic troffers are used in most office areas, newer classrooms and some corridors. Surface or pendant mounted prismatic wrap fixtures are used in older classrooms and utility areas with fluorescent industrials/shrouded lamps in the boiler room etc. The Multi-purpose room is illuminated via 2 lamp fluorescent industrials with wire guards. Limited direct/indirect fluorescent is used in computer use areas and such. The activity room lighting is a 1 lamp fluorescent industrial with wire guard.

***Recommendations:***
*Multi-purpose room and activity room lighting is deficient, replace.*

## E-05 Emergency lighting:

**Observations:**
Emergency lighting is supported by the use of local and remote unitized battery packs with local and remote unitized heads.

***Recommendations:***
*Coverage seems deficient. Employ the services of a lighting professional to meter and record emergency lighting levels and add battery ballasts to existing fixtures to supplement existing conditions.*

## E-06 Exit Lighting:

**Observations:**
Exit lighting was provided by mostly battery backed up fixtures. Units were seen with a mixture of incandescent and replacement L.E.D. sticks.

***Recommendations:***
*Replace exit signs with factory L.E.D. units as the L.E.D. light sticks do not meet NFPA 101 required face illuminances.*

## E-07 Egress Lighting:

**Observations:**
Egress lighting was deficient at this facility.

***Recommendations:***
*Provide and install combination normal and emergency light fixtures incorporating local or remote battery ballasts.*

## E-08 Exterior Security lighting:

**Observations:**
Wall mounted H.I.D. fixtures are located around the perimeter. H.I.D. with reflector cone post tops were seen at walkways and small parking areas for pedestrian traffic.

Cobra Head style H.I.D. fixtures were seen in large parking lots.

***Recommendations:***
*H.I.D. cannot be used for emergency lighting. See E-07.*

## E-09 Fire Alarm:

**Observations:**
A recently installed EST Panel serves as the F.A.C.P. It is a digital addressable system. It is located in the main office with an annunciator at the entrance vestibule for firefighter diagnosis. Manual pull stations (MPS) were seen to be located at the exits without covers to prevent nuisance alarms. Smoke detectors were seen throughout.

***Recommendations:***
*Provide and install stopper II covers over pull stations to prevent nuisance tripping.*

## E-10 Tele/data:

**Observations:**
Telephone enters through the original electric room where the demarc exists. The services are fiber optic (FO), CATV, and Copper phone lines. Voice over internet protocol (VOIP) is distributed through a Meridian system and utilizes Cisco IP handsets. Copper is distributed to the desktop for telephone and computer services via surface mounted raceways and power poles where block walls exist and in partitions where available.

The telephone service is provided by Verizon PRI-T1, digital circuits and various copper POTS lines. The telephone service is distrubed to users over combined voice and data network via Cisco Unity Servers.

***Recommendations:***
*Verify TIA/EIA standards were used for distance limitations, cable mapping, etc. Verify TVSS devices were used on utility and emergency links (faxes, 911, F.A.C.P. dialer, etc.)*

## E-11 Clock/Speaker/Intercom:

**Observations:**
An Institutional Systems Service (ISS) central clock system was seen located in the Main office. Standard time clock/speaker combinations were seen located throughout. A Multicom 2000 intercom system was also located in the Main office.

***Recommendations:***
*No recommendations at this time.*

## E-12 Security:

**Observations:**
A camera is located at the main entrance with a weatherproof call-in button and speaker. An LG VCR was located in the Main office to record the main entrance activity. A Radionics Alpha II system keypad was seen for security system interaction. Motion detectors were seen at interior corridor spaces and ground floor classrooms.

***Recommendations:***
*No recommendations at this time.*