Minuteman Regional High School
758 Marrett Road
Lexington, MA 02421

Electrical Existing Conditions Report

Executive Summary:

The electrical systems for the Minuteman Regional High School are generally of the original vintage. The site is primary metered with the meter located in the main Electric Room. The primary service enters the school underground via a pad mounted transformer. Primary switches and pad mounted transformer is located outdoors in a fenced in area at the back of the school. The 4000 ampere, 277/480V, 3 phase, 4 wire switchboard manufactured by FPE is old and in poor condition.

A new service switchboard from the existing pad mounted transformer with a secondary voltage of 277/480 volt, 3 phase, 4 wire should be provided. The interior secondary transformer and 120/208 volt, 3Ø, 4 wire switchboard should also be replaced.

Panelboards located throughout the facility should be replaced with new housed in electric closets.

The facility has two outdoor Onan 45KW propane stand-by emergency generators. The generators are old, rusted and in poor condition.

Various areas of this facility are currently provided with emergency lighting from the two generators. Exit signs in general were incandescent and fluorescent and were in poor condition. Exit signs shall be replaced with new energy efficient LED type with additional units provided as required to meet the latest codes. New generator should be provided for all life safety systems including lighting and exit signs, standby loads such as heating system, walk-in freezers and coolers, telecommunication systems, etc. Dedicated emergency electric rooms needs to be provided with properly rated assemblies.

The fire alarm system consists of a Faraday control panel and exterior master box. The system is a conventional type with horn/strobes, pull stations and limited smoke detectors and heat detectors throughout the building. This building is not sprinklered. Most areas do not have any fire alarm detector coverage or fire alarm horn/strobe units. System is antiquated and does not meet the latest code requirements. Most shop areas area provided with heat or smoke detectors with emergency pushbutton operator (EPO) switches.

The security system consists of control panel in the breakroom keypads and door contacts only. We recommend that a new integrated electronic security system be provided for the entire facility consisting of passive infrared sensors in all corridors and perimeter spaces with windows at grade level, closed circuit television system, CCTV with cameras and monitors and card access proximity readers at designated doors. Currently facility has two CCTV cameras and no card access system. The existing security system is antiquated and does not provide sufficient coverage of building perimeter spaces.

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The typical classroom consists of surface fluorescent wraparounds individually switched with one row over markerboard also separately switched, clock, wall phone, speaker, one (1) CAT5 data drop at teacher's station and two (2) duplex receptacles. Additional receptacles should be provided to accommodate the needs of the space. The existing intercom/paging is a Paso system providing all call functions throughout the building. The system is located in the mail room across from the administration area. Some shops have in-floor walker duct raceway system.

Recommend that a new lighting system be provided for the entire facility with new energy efficient code compliant luminaires. An automated lighting control system for both interior and exterior lighting should be provided.

Due to the age of most equipment including the fire alarm system and with the exception of the primary switches, it is our recommendation that all electrical systems be replaced with new energy efficient code compliant integrated systems suitable for the needs of the school.

Electrical Distribution System:

The site is primary metered. The primary service originates on a utility pole and runs underground to an exterior pad mounted cubicle. Adjacent to the primary switch cubicle is a pad mounted transformer which feeds a switchboard rated at 4000 amperes, 277/480 volt, 3 phase, 4 wire and is housed in the main electrical room in the basement of building. The switchboard sits on concrete housekeeping pad. The switchboard manufactured by FPE has a 3000A fused bolted pressure switch with ground fault interrupter, GFI protection. The branch devices consist of fusible distribution switches.

The switchboard feeds a series of panelboards located throughout the school. The switchboard also feeds a 500KVA, 480V to 120/208V, 3Ø, 4W transformer which feeds a 1600A switchboard.

This switchboard also feeds automatic transfer switch for normal/emergency panelboards.

The switchboard although in fair condition is over 30 years old and is at the end of its expected life span. The panelboards range from fair to poor condition.

Although the site is primary metered it appears that the primary switch cubicle and pad mounted transformer is owned by the Utility Co.

Standby Generator:

The emergency system consists of two 45Kw/56.25Kva, 277/480 volt, 3 phase, 4wire propane gas generators within exterior enclosures. The generator manufacturer is Onan with (1) 100 ampere main breaker that feeds a 100 ampere automatic transfer switch housed in the electric room.

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The automatic transfer switch manufacturer is Onan and feeds normal/emergency panelboards located throughout the facility.

The emergency system is in violation of current codes as it does not maintain separation of emergency and standby loads. The equipment including the automatic transfer switch and panelboards are not housed within dedicated spaces with properly rated assemblies.

Emergency Lighting and Exit Signs:

The emergency lighting consists of the same normally on fixtures connected to the two generators in corridors, stairwells and other circulation spaces.

Most exit signs are incandescent or fluorescent and are in poor condition.

Interior Lighting:

Corridor lighting consists of surface 1'x 4' fixtures with prismatic lens with (2) T8 lamps and electronic ballasts. Lighting control consists mainly of local switches.

Typical classroom consists of (3) rows of surface fixtures, with prismatic lens with (2) T8 lamps and electronic ballasts. Lighting controls consist of single pole switch by the entrance installed in the classroom.

Shop lighting consists mainly of continuous rows of 8' suspended industrial strips with (2) 8' T8 lamps and electronic ballasts. Some shops also utilize HID lighting as supplementary. Lighting controls consist of a local switch within each shop.

Labs consist of multiple rows of surface fixtures, with prismatic lens with (2) T8 lamps and electronic ballasts similar to classrooms. Controls are typically local switches.

Media center consists of mainly continuous rows of pendant fluorescent fixtures with prismatic lens with (2) T8 lamps and electronic ballasts controlled with local switches.

Cafeteria consists of mainly surface cylinders with HID lamps and fluorescent cove lighting.

Kitchen, locker rooms, etc. consists of fluorescent vaportight surface fixtures with (2) T8 lamps and electronic ballasts.

Toilets range from 2' x 4', 3 recessed with T8 lamps and electronic ballasts and 1' x 4', surface with T8 lamps with electronic ballasts.

Offices and support spaces generally consists of 1 x 4 fixtures and 2 x 4 recessed with prismatic lens with (2) T8 lamps and electronic ballasts. Spaces are generally single switched.

Mechanical spaces typically have 4' strips with (2) T8 lamps and electronic ballasts.

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Gymnasium consists of metal halide high bay luminaires. Fixtures do not appear to have quartz restrike lamps for instant-on. Fixtures are switch controlled with local key switches. Redundant incandescent fixtures located adjacent to every other HID fixture are connected to the generator.

Pool consists mainly of upgraded pendant cylinder fixtures with compact fluorescent lamps as well as pendant HID high bays with glass lens. Fixtures appear to be switch controlled via multipole relays. A system of sparsely located incandescent high bay fixtures exist connected to the generator.

Exterior Lighting:

Exterior lighting consists of pole mounted HID fixtures as well as building mounted floods, time clock controlled.

Fire Alarm:

The existing fire alarm system consists of a conventional Faraday fire alarm control panel located in the janitor's office room. System smoke detector coverage consists of mainly smoke detectors adjacent to corridor smoke doors only. Horn/strobe units exist mainly in corridors and are generally not of the ADA type. Some ADA compatible horn/strobe units have been added within one wing but mounting heights exceed ADA guidelines.

System transmission is via IMSA cable and a master box located in the main vestibule.

The fire alarm system is obsolete.

The building is not sprinklered.

Recommendations

Interior Lighting:

The interior lighting is generally outdated and is not conducive to an environment where the use of VDT's is ever/more present. Classroom/labs would benefit from a system of indirect suspended luminaires with T5 high output lamps with electronic ballasts.

Fixtures along exterior walls with natural light contribution could be fitted with dimming ballasts automatically adjusted via daylight dimming sensors used for daylight harvesting. A system of multiple switches would be utilized to allow the instructor flexibility but livened by an occupancy sensor that turns all lights off when the space is unoccupied.

Corridor lighting and other circulation spaces are currently manually controlled. The facility would benefit from an automated lighting programmable control system that will turn off lights on predetermined schedules to suit the needs of the facility. The automated control system could interface with the proposed facility's energy management system as required. Daylighting controls should be installed on non-emergency lighting in spaces where daylight harvesting is feasible.

Media center and other large spaces with natural daylight contribution could benefit from a system of dimmable fixtures along perimeter walls automatically adjusted via daylight dimming sensors.

Toilets with constant-on lighting or locally switched could be automatically controlled with occupancy sensors for normal only lights that turns off these lights when space is unoccupied.

Individual offices could be retrofitted with a wall mounted occupancy sensor to turn off fixtures when space is unoccupied.

Larger enclosed support spaces should be provided with remote mount occupancy sensors.

Gymnasium could be retroffited with new metal halide high bays with pulse start high-low ballasts with dual level controls. A reduced number of same fixtures will be provided with quartz restrike ballasts connected to normal/emergency lighting and monitored with supervisory relays when switched off.

A system of surface prismatic troffers with (4) or (6) T5 high output lamps and electronic ballasts multi-switched could also be considered for gym. Wire guards to be provided in either case in gym

Pool area should be provided with non-corrosive energy efficient fixtures as well as new emergency lighting.

Electrical Distribution System:

The electrical distribution system in general is old and the condition ranges from good to poor. The distribution equipment although relatively well maintained is over 30 years old and at the end of its useful life.

With the switchboards being of the fusible type and being in poor condition we recommended that they be replaced. A system of computer grade panelboards with double neutrals and surge suppression devices fed from K-Rated transformers would enhance the power quality and mitigate harmonic effects generally caused by such equipment. Original panelboards should be replaced and added to meet the needs of the facility.

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Standby Generator:

The existing generators are marginally sized for this facility. The life safety system including emergency lighting, exit signs, generator, feeders, etc. is in violation of today's codes. It is recommended that a new generator be provided located on the exterior of the facility adequately sized for life safety needs as well as other essential loads. One generator to sized to provide emergency power for the entire facility.

Dedicated automatic transfer switches are required to feed emergency lighting and exit signs from panelboards within fire rated dedicated spaces fed with fire rated feeders such as MI Cable or equivalent assembly.

Other essential loads including kitchen coolers and freezers, freeze protection including boilers and pumps, sewage ejector and sump pumps, telecommunications systems, lifts, etc. would be on separate transfer switches.

Wiring Devices

Receptacles are sparsely located within instructional spaces and are inadequate for a modern day facility for computer and electronic related loads.

Fire Alarm System:

It is recommended that this facility be provided with a new fully addressable fire alarm system that meets code and is ADA compliant. Smoke detectors should be provided in egress corridors, stairwells, electric rooms, etc.

Audible/visual devices should be provided in egress corridors, classrooms, labs, shops and other large open areas such as kitchen, cafeteria, gymnasium, etc. System to interact and provide auxiliary functions including smoke door closure, HVAC shutdown, kitchen hood interface, etc. and allow for supervision of future sprinkler system. The existing system shall remain fully operational until the new system is fully functional. Installation may be phased.

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Plumbing/Fire Protection Existing Conditions

Executive Summary

The Minuteman Regional High School has received minimal maintenance on the plumbing systems and equipment over its occupied years. Even with adequate maintenance, systems will gradually deteriorate due to scale and poor water conditions. Although most of the systems are working adequately at this time, the major equipment and systems are near the end of their useful life. Along with aging systems, many of the systems are not up to current codes. If it is anticipated that major modifications are planned for this building then the plumbing systems should be considered for an overall upgrade and a complete fire protection system installed.

Fixtures:

Fixtures are generally original, indicating the time of there original installation. Some fixtures have been replaced to try to meet the accessibility codes.

The water closets are wall mounted vitreous china, flush valve type with siphon jet action. Fixtures are generally in fair condition.

The urinals are wall hung vitreous china, flush valve type with siphon jet action.

The lavatories are wall hung vitreous china. The faucets are metering type with hot and cold water controls and spouts.

The locker room showers appear to be in fair condition. Some modifications have been made due to failure of the shower valves.

The janitor's sinks are cast iron wall hung with stainless steel rim. The faucets are wall hung but have no vacuum breakers. These fixtures are in poor condition.

Water System:

The building is supplied with two domestic water services, one from the north and the other from the south. The north side domestic water service is a 4" service with a meter and backflow preventer. The south side domestic water service is a 6" service with a meter and backflow preventer. The domestic water pressure is between 90 – 100 psi.

The domestic hot water is provided by two P.K. steam fired storage tank type water heaters. Of the two heaters, the one heater does not operate. There is a master thermostatic mixing valve on the system. There are two abandoned geothermal tanks and one abandoned solar hot water tank. Both of these systems are abandoned in place. There are a few electric point-of-use hot water tanks through out the building serving remote locations.

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Drainage System:

The sanitary and storm drainage piping systems are cast iron. The exposed piping is visibly in good condition.

The science waste is drained with copper piping directly into the sanitary system. There is no separate science waste piping system or neutralization for the science waste.

The sanitary drainage system is piped to a municipal sewer system.

The roofs are drained by roof drains and interior piping that exits the building and connects to the municipal storm system. There is no secondary roof drainage system.

The floor drains in the trade areas of the school are piped to an exterior gasoline/oil separator prior to discharging into the municipal sewer system.

Natural Gas and Propane Gas Systems:

The building has a natural gas service that feeds the two heating boilers only. There are (3) 1,000 gallon, above ground propane tanks on the property, two on the north side and one on the south side of the building. Propane is provided for an exterior generator, the kitchen equipment and the trade shops.

Compressed Air System:

There is a central compressor in the boiler room that supplies the carpentry and automotive shops with multiple compressed air drops. Each compressed air drop is provided with a quick connect fitting.

Kitchen:

The kitchen equipment is generally aged but in working condition which indicates the vintage of the time of installation. The cooking equipment is all propane fired. There is a three pot sink in the main kitchen that has a point-of-use grease interceptor. There is also a three pot sink in the restaurant kitchen that has no grease interceptor.

Fire Protection:

There is no fire protection sprinkler system installed in the main building; however, there is a limited area fire protection sprinkler system in the wood shop that is supplied off of the domestic water system.

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HVAC Existing Conditions Report

Boiler Room:

The boiler room is provided with two individual Kewanee fire tube boilers. Each boiler was installed during the original construction in approximately 1974 and operates on low pressure steam. Steam from each boiler is distributed to a single overhead header which serves as a central distribution point for two domestic hot water heaters, one steam absorption chiller, and two steam to hot water heat exchangers for the building heating system. Each boiler is provided with dual low water cut offs as well as all operating and safety controls. The condition of each boiler shell was noted to be very good considering their age. It was not possible to view the internal fire tubes; however, considering the very good maintenance that the boilers have received it would not appear to contain tube perforation or fire box damage. Historical data does suggest that boilers of this nature should have a life expectancy of approximately 40 years considering normal maintenance, however, with continued very good maintenance additional service life will be achieved.

At the rear of the boilers is a blowdown separator which is mounted on the wall. This separator receives blowdown sediment from each boiler and is mixed with city water for cooling prior to discharge to city sewer. The blowdown separator is provided with discharge aquastats and operating controls and does appear capable of operating; however, in speaking with maintenance personnel it appears to have been abandoned in-place. This is a concern if this is the case which would suggest that system sediment could be collecting within the steam system and possibly reducing heat transfer and overall power plant efficiency.

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On the interior side of the boiler room adjacent to the boilers is a floor mounted condensate return/boiler feed water system. The system is made up of single uninsulated steel storage tank with one single boiler feed water pump for each boiler with a common standby pump. The entire system was noted to be in very good condition and operating as intended. Slight surface soiling was noted on the tank and it also appears that one of the three pumps was recently replaced.

Heating hot water is generated by two steam to hot water heat exchangers which generates approximately 200° supply water to the building. Each heat exchanger is provided with automatic control valves which regulate hot water supply temperature through supply line aquastats. Hot water is distributed to the heating system by a constant flow primary and standby base mounted end section pump for distribution to various zones throughout the building. Both pumps were noted to be in good condition and operating as intended. The insulation on the heat exchanger tube bundle was noted to be in good condition; however, because of the covering it was not possible to inspect the shell or the tubes. Maintenance personnel have indicated that the equipment has not been problematic in the past.

Heating hot water piping is schedule 40 black steel which appears is insulated with fiberglass insulation with an all service jacket. From an outward standpoint much of the insulation was noted to be in good condition considering its age. Various section of the pipe should be removed and examined internally for the presence of corrosion, however, based on the overall condition of the entire power plant and the general maintenance it has received it does not appear that corrosion would be a concern at this time.

Steam and condensate piping is schedule 40 black steel which appears is insulated with fiberglass insulation with an all service jacket. From an outward standpoint much of the insulation was noted to be in good condition considering its age. Various section of the pipe should be removed and examined internally for the presence of corrosion, however, based on the overall condition of the entire power plant and the general maintenance it has received it does not appear that corrosion would be a concern at this time. The condensate piping in the area of the condensate return and boiler feed water system was not insulated.

The breeching from the boilers appears to be of the single wall welded black steel design and is insulated with what appears to be calcium silicate insulation (or asbestos) with a canvas jacket. Samples of this material should be tested for the presence of asbestos and remediated if noted positive. The breeching was provided with a single cleanout at the end of the common breeching. The chimney is of the premanufactured steel and refractory type and appears to be of adequate height to maintain proper draft. The entire installation of breeching and chimney was noted to be in good condition and operating as intended.

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#4 fuel oil was originally provided throughout the boiler room through an overhead schedule 40 black steel piping system from exterior buried tanks, however, fuel oil is no longer used since natural gas was provided in recent years. As we understand it the tanks were removed but the fuel oil transfer pumps and piping remain in place abandoned.

Combustion air for the boiler room is provided by an air handling unit which is suspended from the ceiling in the boiler room. This air handling unit is provided with a direct source of outside air from a wall mounted intake louver. The air handling unit is of the recirculation design with a minimum outside air requirement equal to the combustion air requirement of the boilers. The air handling unit is provided with a hot water coil with face and bypass control. Supply air is provided to the space through an uninsulated galvanized sheet-metal distribution system which travels the length of the boiler room. The outside air duct between the louver and the inlet of the air handling unit is insulated with rigid fiberglass insulation. The entire system was noted to be slightly soiled however does appear to operate satisfactorily.

The automatic temperature controls for the entire building are through a central pneumatic automatic temperature control system. The system is provided with a single air storage tank with remote dual compressors and dual motors mounted on a concrete pad adjacent to the air storage tank itself. Located adjacent to the air storage tank is a wall mounted refrigerated air dryer which is provided with an oil and water separator. It does appear that the system is generating day and nite control pressures which allows for nite set back control and at the time of our visit pneumatic air was being generated for distribution to all control devices. Comments from maintenance personnel does suggest that the automatic temperature control throughout the building are somewhat antiquated which could relate to failing control devices throughout. Both the refrigerated air dryer and the compressed air storage tank are provided with manual blow down lines and appear to operate. The original compressors were recently abandoned in-place and were replaced with the two slab mounted compressors adjacent to the storage tank.

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Although the pneumatic system is considered to be in good condition, considering the relatively antiquated nature of all of the control devices, consideration should be given to a complete upgrade to include a new direct digital automatic temperature control system at this time.

Also located within the boiler room is a low-pressure steam absorption chiller. The chiller is the original installed in 1972 and provides a chilled water supply to the entire building. Located at the rear of the chiller are two base mounted condenser water pumps which communicate to a roof mounted PVC cooling tower. The single condenser water pump is of the horizontal split case design and communicates to the cooling tower through an uninsulated schedule 40 black steel piping system. The cooling tower appears to have been replaced within the last three years. Maintenance personnel have indicated that the new cooling towers continue to leak and the units are showing a general state of disrepair with numerous warped structural panels and leaking piping. Chilled water is distributed by a single horizontal split case distribution pumping system. Chilled water is provided to the entire building through a fiberglass insulated schedule 40 piping system. Both the condenser water piping system and chilled water piping system appear to be in very good condition and maintenance personnel has indicated that they have not been problematic in the past. It does appear that proper chemical treatment is being provided for the cooling tower. The absorption chiller is a very uneconomical operating chiller which requires the steam boilers to run throughout the summer months to create the cooling energy required within the chiller. Consideration should be given to a complete upgrade of the chiller, however, the condenser water and chilled water piping and pumps are capable of being reused. It does appear that the cooling tower is in need of replacement.

The building is also provided with two geothermal cooling systems which utilizes ground water for condensing cycles. Each unit appears to be approximately 20 years old and appeared to be isolated two specialized areas within the building. The cooling systems do not connect to the central chilled water plant. Both systems are completely abandoned in-place and are no longer used.

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Air Distribution Systems:

The entire heating ventilation and air-conditioning system originates in (10) roof mounted mechanical penthouses. Each mechanical Penthouse is provided with either one or two floor mounted air handling units each of which are provided with a combination of supply fans, chilled water cooling coil, hot water heating coil, filter section, and a combination return air outside air mixing box. Each air handling unit receives a direct source of outside ventilation air from a continuous intake louver which runs the entire length of each mechanical Penthouse. Located on the opposite wall is also a continuous louver which is utilized for relief and exhaust air. It was noted that the intake louvers primarily on the intake side had been modified to allow for entrance doors into each space. It appears that the louvers were modified in the field and were not supported adequately allowing the louver blades to be unsupported vertically at each side of the door. It was also noted that the fresh air intake and the relief air connections to the louvers did not meet adequate design standards allowing the effective free area of the louvers to be minimized due to the very short connection of sheet metal. The outside air intake ductwork was insulated with rigid fiberglass insulation much of which was noted to have surface damage. The supply air in return air ductwork was not insulated. The air handling units whether they are air-conditioning or heating and ventilation, all units were noted to have extensive surface contamination and soiling, limited to extensive damage on the fan casings, and generally suggesting that they have reached their maximum serviceable life.

Each air handling unit is provided with an in-line return air fan which returns air from each of the occupied spaces directly to its associated supply air handling unit. All ductwork associated with the return air systems are uninsulated galvanized sheet-metal. Each system is provided with return air and exhaust air dampers which allow the return air could be recycled back to the air handling unit or discharged to the exterior through the wall mounted louver. It was noted that the relief air connections to the louvers did not meet adequate design standards allowing the effective free area of the louvers to be minimized due to the very short connection of sheet metal.

Supply air ductwork to the individual occupied areas traveles vertically through central shafts to the respective zones which they serve. All supply ductwork provides air at a constant supply air presumably at approximately 55° (for those units with cooling) and approximately 70° (for those

units without cooling). All supply air travels in a medium pressure high velocity distribution ducting system which terminates in each occupied area at a ceiling mounted velocity reduction terminal unit.

Each terminal unit is a static velocity reduction box which is of galvanized sheetmetal, internally lined with acoustic liner. Each velocity reduction box is also provided with a hot water heating coil which ties into the recirculating hot water distribution system. Each coil is provided with a modulating hot water valve controlled by a pneumatic wall mounted thermostat.

At the discharge of each velocity reduction terminal unit, is a small length of uninsulated galvanized sheetmetal ductwork with a single supply diffuser for providing ventilation and temperature air to each occupied area. All ceiling diffuses were noted to have surface soiling with overall condition consistent with their age of approximately 35 years.

All supply ductwork was soiled on the exterior however was not damaged and appeared capable of reuse. All velocity reduction terminal units, discharge ductwork beyond the velocity reduction terminal units, and supply diffusers have reached their maximum serviceable life and should be replaced.

In a number of locations additional spaces were created utilizing full height partitions however, the mechanical systems were not modified adequately to address the proper amount of ventilation and supply air to these newly created spaces. As a result many of the spaces are considered non code compliant with the result and deficiency in ventilation air. In addition, supply diffusers were located incorrectly very close to adjacent walls resulting in draft conditions.

Public Toilet Areas:

The individual public toilet areas are provided with a combination of ceiling and wall mounted exhaust registers generally located in the area of the plumbing fixtures. All exhaust registers were noted to be slightly soiled and in some damaged. The exhaust system is made up of galvanized sheet metal ductwork which terminates with roof mounted exhaust fans. Limited ventilation control is being maintained throughout all toilet spaces and it does appear that the exhaust fans are running; however, we cannot be certain if the air volumes

are in compliance with building code conditions at this time. Considering the approximate 30 year age of all systems and general poor performance consideration should be given to an overall upgrade at this time.

It was noted that there was no mechanical make up air provided for any of the toilet spaces. It appears that all make up air for the spaces is through the combination of undercut does and door louvers. This could be contributing to the poor ventilation control noted.

Kitchen:

The kitchen and culinary arts area is provided with heating and ventilation air for the general space provided from a roof mounted air handling unit located within mechanical Penthouse number 3. The air handling unit is typical to all remaining units described above, however, the distribution system is of the low velocity low-pressure design. This system is not provided with any velocity reduction terminal units. The overall condition of all ductwork, equipment, and supply diffusers is generally typical and reaching their maximum serviceable life.

In addition to the above, the kitchen is provided with two additional air handling units which are located at the ceiling of the kitchen itself. Each air handling unit is provided with a supply fan, hot water heating coil with face and bypass control, and a direct source of outside air through wall mounted intake louver. Each unit is of the 100% outside air design and are intended as makeup air for a centrally located exhaust hood located within the kitchen. The overall condition of all ductwork, equipment, and supply diffusers is generally typical and reaching their maximum serviceable life.

The exhaust hood is of the canopy style stainless steel design which is ducted directly through a dedicated exhaust system to roof mounted exhaust fans. The overall condition of the hood was noted to be good and clean and was provided with cleanable cartridge filters, and vaportight incandescent lighting.

A secondary kitchen is located adjacent to the primary kitchen which was at one time used as a McDonald's restaurant. The secondary kitchen is provided with a first-class kitchen preparation area including stainless steel exhaust hood with roof mounted exhaust fan, and a gas-fired rooftop make up air unit. The exhaust hood is noted to be in excellent condition and is of the proper size and height for the area served. The rooftop unit is showing signs of surface contamination due to

weather influences however as we understand it the unit does operate satisfactorily. The restaurant is no longer in service and the entire system has been abandoned in place.

Gymnasium, Pool, and Locker Areas:

The gymnasium, locker rooms, and pool area are all served by two common air handling units located in mechanical penthouses 1& 2. Each air handling unit is of the ventilation and heating design and are typical all air handling units described above.

The gymnasium is provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.

The locker rooms are provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.

The pool area is provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building. Air distribution for the pool area utilizes a side wall supply registers located approximately 16 feet above the floor which discharge horizontally across the pool area. All supply registers were noted to have surface soiling and contamination and generally have reached their maximum serviceable life.

Located along the exterior wall of the pool is a continuous length of fin tube radiation located beneath the slab. Although the amount of heat provided is adequate to a set draft, convective air currents are reduced due to the location of the fin element obstructing make up air from entering the fin element. As a result overall output of the heating is dramatically reduced. It was also noted that there was extensive soiling and contamination on the discharge grille in fin tube elements.

Vocational Training Area:

All vocational training areas are all served by individual air handling units located within the roof mounted mechanical penthouses as described above. All air handling equipment is noted to be in similar condition as the remainder of the building.

All vocational training areas are provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.

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Also located within this space were various hot water horizontal unit heaters generally intended for space heating. As we understand it two of the three unit heaters do not operate at this time and generally one heater is maintaining all temperature control. All unit heaters were noted to be dirty and contaminated and generally in need of replacement.

The woodworking area is provided with a dust collection system and through the communication of a spiral wound galvanized exhaust system, conveys all woodworking particulate between machinery and an outside mounted dust collection unit. This dust collection unit is of the 100% recirculation type and all exhaust from the space is distributed back to the space at the in-line filters. The outside dust collection unit is extremely rusty and antiquated and at the time of our visit the system was not operating. Consideration should be given to an overall upgrade at this time.

The welding area is provided with a series of welding benches located at one side of the space. Each welding bench is provided with a flexible exhaust captures system which collects in an overhead common exhaust duct which communicates to a space mounted centrifugal exhaust fan. The exhaust system does operate and appears to be sized with common industrial ventilation standards. Because of its use the system is extremely contaminated and upgraded the system is recommended.

The automotive repair area is provided with an underfloor vehicle capture exhaust system which through the use of flexible hoses connected to the exhaust tailpipes of the vehicles ventilates exhaust gases to the exterior of the building. The sheet-metal ductwork which is located between the floor and the fan is damaged and vented. It does appear that the system is sized in accordance with common industrial ventilation standards, however, considering its age in use and upgraded the system is recommended.

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Administration Area:

The administration area is served by a single air handling unit located within the roof mounted mechanical penthouses as described above. All air handling equipment is noted to be in similar condition as the remainder of the building.

The administration offices are provided with typical velocity reduction terminal units which are typically located throughout the entire building. All equipment was noted to be in similar condition to the remainder of the building.

The administration area has suffered from a lack of air-conditioning capacity which could be related to an undersized air handling unit, undersized cooling coil within the air hand unit, a poor balancing. As a result, secondary air conditioning units in the form of window air-conditioning units and wall mounted air-conditioning units have been installed in the offices to compensate for the deficiency. At approximately 6 locations windows style air-conditioning units are mounted in interior wall with the condensing sections discharging condensate and heat into an adjacent circulating corridor. This resulting condition is causing the communicating corridor to overheat and impose an additional air-conditioning load into this corridor. The entire condition should be upgraded.

Entrances, Vestibules, and Corridors:

The main entrances and vestibules were all provided with hot water cabinet unit heaters adjacent to each doorway. It was noted that generally all heaters were slightly damaged, dirty, and contaminated, however as we understand it do operate and maintain reasonable heating control at all entrances and doorways. All units are generally in need of cleaning and considering the 35 year age and general state of disrepair consideration should be given to an overall

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Communicating corridors throughout the entire building were provided with a limited amount of ventilation of which does not appear adequate to meet the current building code requirements. No exhaust systems were provided however should be considered to improve overall air quality.