

WHITMAN MIDDLE SCHOOL

Building Assessment



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Executive Summary

The Whitman Town Administrator and the Faculty of Whitman Middle School agreed to allow students from Wentworth Institute of Technology an opportunity to perform this building assessment. The students and Wentworth Institute would like to thank the town for this opportunity; we are very grateful for all of the support provided during our visits to the campus and in the research process, which was aided by the school district's Facility Director.

The findings of this report include a number of future projects that should be completed ranging from low cost and short term to high cost and long term. There is a specific project listing including the priority and cost/time categorization found in **Appendix 1**. The highest priority projects include corrections that involve code violations or safety related issues.

The most pressing issues identified in this report include:

Mold and moisture related problems found primarily in the gymnasium. This problem likely requires replacing the roof and improvements to the HVAC system.

Heating units in the building are far past their useful life and need to be replaced.

Fire and Life Safety issues need to be addressed including storage space and corrections to wall penetrations and fire alarms.

Damages stemming from the moisture problem in the gymnasium have lead to replacement of floor sections in the past. When the problem is resolved and the roof is replaced, the gym floor will also need to be replaced as mold has likely been growing under the floor for some time.

Overall, the building is still in good condition. A general renovation of the conditions identified in this report would help to extend the life of the building. Replacement of common use items such as lockers, plumbing fixtures, and HVAC equipment would make conditions in the school better for all occupants and town activities.

Project Description

This building assessment is providing information on the need for renovations of the Whitman Middle School, Whitman-Hanson School District. The report contains information on the conditions, state of repair, and life cycle status of the building and its systems. An assessment team from Wentworth Institute of Technology's Facility Planning and Management program compiled all information contained in this report. The school district's Facility Director, Ernie Sandland, along with the Operations Department, supported the assessment team by providing most of the records and data to make this report possible.

The assessment team conducted its observations of the facility during March 2015. All planning and coordination for on site visits were made with the school's Principal, George Ferro, and Town Administrator, Frank Lynam. The Office of the Selectman in Whitman conducted Criminal Offender Record Information checks for the team on February 27, 2015.

The assessment team consisted of three members of the 2015 class at WIT. The members were:

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Existing Conditions

The construction of Whitman Middle School was completed in 1972 when the school began serving the community's student population. The 100K ft² building is home to 59 Faculty and Staff members and supports over 550 students. The facility is available for use by the community to support recreational activities in the gymnasium and outdoor athletic fields. Both the fields and gymnasium receive heavy usage associated with the town's various sports and arts related organizations.

There are 34 classrooms in the building along with dedicated space for band, music, TV studio, nurse's station, and family/consumer science activities.

The building supports cafeteria, auditorium, and storage areas, which receive heavy usage. The cafeteria is a full service cooking and serving kitchen with walk in refrigeration units, sanitation stations, and cooking equipment. The cafeteria provides breakfast and lunch services year round. All 550 students are served lunch daily during the school year. Breakfast is served daily for those students who are authorized. The food program is continued during the summer months for students who participate in the appropriate programs.

The school's library, media center and administrative offices are housed in an addition to the original building, which was completed in 2000. The addition is the only portion of the facility that is supported by air conditioning units, which are located on the roof directly above those spaces. All areas of the facility are supported by heating and ventilation systems.

The athletic fields include four baseball/softball fields along with soccer and football fields. There are support buildings located alongside the athletic fields that provide restrooms and kitchen facilities for planned events. The fields are sitting on fill, which has been placed over former wetlands. The faculty reported drainage problems with the field, which cause occasional flooding; the drainage conditions could not be assessed due to snow cover across the area.



Site Conditions

Walkways

The walkways around the main entrance are in need of repair. There are a number of places where the concrete is experiencing heaves and depressions during the cold weather. The catch basins are most noticeable. There are severe depressions around the catch basins creating tripping hazards. Cracks in the concrete are noticeable around the campus grounds.



Parking Lot

Overall, the parking lot is sufficient in size for the school. There is ample space to support daily activities at the school. There are spaces to accommodate the town's athletic events, which occur regularly during the spring, summer and fall. The pavement should be considered for resurfacing in the near future but this need does not seem critical at the time of this report.



Fields

There are four baseball/softball fields along with several soccer and football fields surrounding the facility. The school district's maintenance department maintains the fields. The maintenance department has reported drainage problems across the grounds. The fields are located on former wetlands and the drainage may not have been adequately addressed during the fill and construction process. There are storage and utility sheds on the grounds to support the local athletic leagues. There is a small wood construction building to provide restrooms and kitchen service alongside the baseball fields. The condition of support structures is generally good.

Security

The overall security around campus is good. There are security cameras covering the entire perimeter of the school. Lighting at night is sufficient to deter activity in remote corners of the facility. Inside the school, there are cameras to monitor activity in common areas. The security cameras are monitored inside the administrative offices. The camera's DVR is inside the server room, which has direct fiber connection to the main IT hub for the school district.



There is a security guard on duty during school hours. The security guard has an office space on site. The guard identified a few concerns to be noted. The roof has been accessible to potential vandals and small animals. There are two known access points for the roof. The first is a gas main on the west side of the building. The gas main runs from ground level up to approximately two feet below the roof. People are able to scale this main and gain access to the roof. The second is vegetation along the south side of the building. Some of the vegetation has been allowed to grow close to the building. The vegetation can be used by rodents and people to gain access to the roof. The guard also noted that security of the student's belongings while attending gym class is poor. The lockers and baskets available to the students are in poor condition and need to be updated. Finally, the guard identified the age of the camera system as a concern; there have been great improvements in the technology available for this purpose, which would enhance the ability to identify people who would vandalize the facility.



Some positive observations by the security guard included general access and traffic direction at the main entrance. The facility's doors are properly secured. The front entry uses an electronic locking mechanism to allow people through the front door after identifying them both visually and by intercom connection with the administrative office. Once inside, traffic is directed toward the administrative office by physical barrier. The office personnel greet and log all visitors to the school. Additionally, visitors are required to have an identification card, which they wear on a lanyard.

For additional insight on the security of the facility, there is an assessment authored by the school's armed security guard. The assessment includes additional information on recommendations contained in this report including the tree work and replacement of fencing. The assessment was written as part of the course requirement for Crime Prevention Through Environmental Design (CPTED).

Exterior Lighting

The school grounds have LED light posts covering the parking areas and metal halide lights mounted to the exterior walls of the structure. All of the lights appear to be in good working order. There are two light poles in the parking lot that require repair. The two poles appear to have been struck by plowing equipment. The wood poles do not seem to have been broken, however they are leaning and need to be placed upright again. Additionally, there is an issue with the photocell sensor for at least one of the light poles; one of the LED poles is remaining lit during daylight hours. This should be a minor repair, as all other lights seem to be responding properly to the control mechanisms.



The amount of light created around the school at night is sufficient for the grounds and does not create a nuisance for the neighboring properties. There is sufficient vegetation around the perimeter of the school grounds to prevent the light from bleeding over excessively.

Interior Lighting

The majority of the lighting in the school is the 4' T8 fluorescent fixtures and 2' T8 fluorescent fixtures. The atrium area has recessed CFL fixtures (approximately 29). They are 32-watt fixtures and each fixture has 2 lamps in them (except for the recessed CFLs which have 1). All the lights and ballasts seem to be operating properly. There was sufficient lighting through out the school.

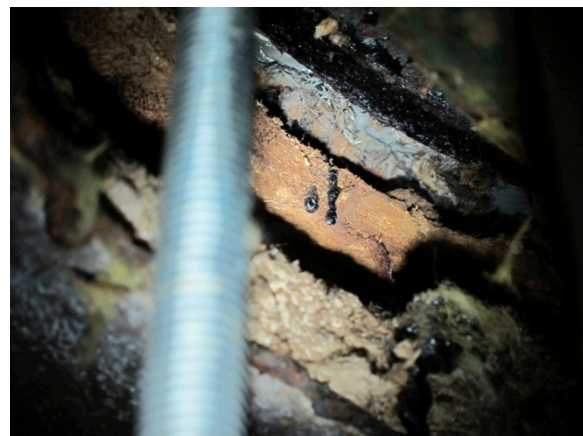
Our recommendation is to keep the current lighting system in place. Given the age of the building, we do not recommend considering upgrading to LED lighting. The lighting in the school is fairly efficient. The amount of money to replace the existing system with LED lighting would not provide an appropriate ROI at this point.

Structural Conditions

Roof

The building has a built up roof. The materials currently include remains from three roof layers. The original rooftop consisted of a metal deck supported by steel framing. The metal deck was covered with a fiberboard layer followed by a tar and gravel top. The tar and gravel roof was part of the original 1972 construction. When the original roof began to fail, a new layer was added over the top.

The second layer of roofing material included a rigid insulation layer followed by a membrane cover. This layer was added sometime midway between 1972 and the renovation that was completed in 2000. The third roof layer was added during the 2000 renovation. The third roof layer added another base of rigid insulation and a new membrane cover.



Recently, there have been numerous problems developing with the building's roof. There was a core sample taken from the roof to help identify the multiple layers and test for potential problem sources. Lab testing confirmed decomposition occurring within the layers of roofing material. The most likely source is the fiberboard that

was part of the original roof. Observations made at the penetration points for roof drains and vent stacks indicate significant moisture build up at this layer. One such penetration point showed signs of mold growth. The problems seem to be most severe in the gymnasium.

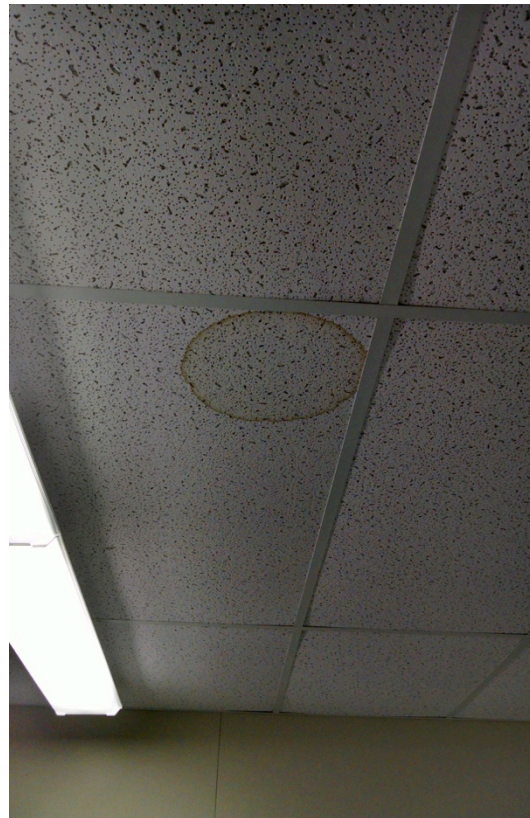
Inside the gymnasium, particularly during summer months, there is a bad odor. Due to the lack of a dropped ceiling in the gym, temperature differences hitting the interior metal deck and the top of the roof are more significant. This differential is more conducive to moisture buildup and is most likely accelerating decomposition of the fibrous material in the roof.

Appendix 2 of this report is a summary that answers two questions:

1. What is the testing and analysis history associated with the roof?
2. What action is being taken until the problem can be corrected?

Ceilings

The ceilings throughout the building are mainly 2'x4' acoustical ceiling tile (ACT) in a dropped grid system. The grid system hangs 4' below the deck. There is sufficient space above the ACT for utility usage. Some of the tiles showed clear signs of moisture leaking or condensing above and saturating the material. The items most commonly associated with leaks were the roof drains. Roofing seals around the drains were clearly leaking and creating damage to the interior ceiling materials. Inspection around the roof drain connections revealed more evidence of decomposition of the wood deck at the base of the roofing materials. A moisture meter was used on the exposed wood and it was found to contain more than 30% moisture.



Walls

Interior

Interior walls in the Whitman Middle School are all in good condition. Most of the walls are CMU block. Other than regular maintenance, the interior walls should be checked for any moisture damage, especially where indicated by any stained ceiling tiles or roof leaks. The walls in the gymnasium may be especially susceptible to moisture damage due to the high levels of humidity seen in the gym.

Exterior

The exterior walls are unpainted brick on a concrete foundation. Most of the building is one floor and there is one main length of construction that is two floors. The 2000 renovation added a portion of the building at the main entry. The condition of masonry work around the addition is good. There were no signs of weathering, cracks, or spalling along the addition. Conditions of the 1972 construction were fair. There were signs of weathering in the masonry.



The exterior surfaces had cracks, spalling, and stains. The mortar joints around the original construction showed signs of moisture penetration and chunks of the mortar were missing. The brick surfaces were spalling in some places with frequent stains and small cracks. The expansion joint fillings were dried out and separating from the masonry. These joints are no longer weather proof. The concrete foundation surfaces were also spalling with some small cracks, and there were larger spots of missing chunks in some places. The penetration points for ventilation had larger gaps forming around the edges.

There was some damage found to the gutters and roof flashing around the newer construction near the nurse's office. A section of the gutter has broken and was hanging down from the side of the building. Along that same edge, there was a section of the flashing



that was deformed and bent upward. This damage appeared to be the result of some impact. The source was not obvious.

Repointing of the older masonry may be needed. The expansion joints should be replaced. There should be repairs made to the concrete foundation, particularly around high use places such as the loading docks behind the kitchen area. Finally, some attention should be given to the vegetation at the southeast corner of the building. Some branches are touching the building and providing easy access to the roof for rodents or vandals.



Windows and Doors

The windows and doors are in overall good condition. All hardware is in place and the windows appear to operate properly. The panic bars on exit doors operate without any apparent problems. The window shades also appear to function properly in most cases. All of these systems were installed during the renovation in 2000. The weather stripping and seals around many of the doors and windows are failing.



Large portions of weather stripping are missing or obviously broken. The most noticeable places are around the entry doors. This problem can also be observed around the windows throughout the building. The obvious ramifications of this problem are loss of heating efficiency. The selected glass for all windows has a U-Value of .58; the thermal transmittance for windows in this region should be lower than the selected product. The local climate is better suited for a U-Value between .17 and .39. Replacement of the windows and doors would provide a reduction in heating costs. The window shades offer some protection from solar heat gain during the warmer months.

The window shades are constructed from vinyl coated polyester yarns. This fabric has good solar heat control properties and should achieve a life span of 20-25 years. These shades were installed during the 2000 renovation and should not out live their usefulness for 5-10 years.

Floors

The school has already targeted the gymnasium as an area for improvement. Due to the construction methods used in repairing the roof, the gym has a very high moisture level, which is detrimental to the maple floor in the gym.



We used a meter to measure the amount of moisture in the floorboards of the gym. The measurement was 11%, which indicates between 60 and 75 percent humidity. The elevated humidity is causing the boards to swell and create the noticeable heaves along the gym floor. The humidity is also conducive to mold growth in the gymnasium. The indoor humidity should be maintained at 30 to 60 percent in order to reduce the possibility of mold growth.

The gym was re-floored in 2000 using a Neo-Shok floating absorption system. The flooring includes a 6 mil polyethylene vapor barrier, multiple layers of plywood subfloor, maple flooring, and then an oil finish. Underneath the plywood subfloor, there is a layer of “Neo-Shok” padding. Although installed over a vapor barrier, there is potential for moisture buildup in the Neo-Shok level of the flooring system, especially given the high levels of humidity in the gym. The gym floor has already undergone some repair and patchwork due to moisture damage. There are also evident ‘dead-spots’ where the floor does not have any bounce, which means the floor no longer functions properly. Please refer to **Page 2 of Appendix 3** for additional information on the humidity requirements for Neo-Shok flooring.

Mechanical Electrical Plumbing (MEP)

Boilers / Water Heater

There are two Burnham commercial grade low-pressure boilers in place. The pair are programed to operate alternately. During peak demand periods, the second unit will turn on to augment the supply. The two boilers were manufactured in 2007. They were purchased and brought on line during 2009. The systems meet ASHRAE standard 90.1 and meet combustion efficiencies up to 85 percent. Given the current age of the two boilers, these systems should be usable for 15 or more years. The pair are currently working properly and provide excellent efficiency.

The water heater is a 75-gallon gas-burning model. The system has an 80 percent thermal efficiency. This system was manufactured in 2008 and put in place as a temporary fix when a larger system began to fail. At this time, the unit appears to be in good working order.



Both of these systems use natural gas available from the town. The boiler is able to operate on fuel oil as an alternative if required. There is a fuel oil tank left in place from the original boilers, which is the supply for the new system if it were needed.

The amount of hot water required at any given time may be within the capacity for a tank-less water heating system. The flow rate could be achieved by placing two to three units in succession to meet the requirement. From an efficiency perspective, selecting a tank-less gas water heating system would be a good long-term solution. If not incentivized, this type of system would not have a good ROI; there is an \$800 incentive available to Massachusetts' gas utility customers, which may offset a considerable portion of the cost. If utilized, the incentive would make the upgrade well worth the investment. At this time the incentive is good for systems put into use during the 2015 calendar year. If this option should be pursued, the system selected must satisfy a $>.94$ energy factor rating on the electronic control components.



Pneumatic Building Controls

The building is currently using a pneumatic system to communicate commands from the controllers (thermostats) to the cabinet heaters located throughout the facility. There is a single source of compressed air located adjacent to the boiler room and near the backup power generator. The two compressor motors work



alternately and can be observed turning on every 2-3 minutes; the persistent running is indicative of leakage in the pneumatic lines.

Today, most of these systems are being replaced by direct digital control systems. The pneumatic controllers are able to operate in harsh conditions, but they require regular maintenance in order to stay within calibration limits. The down side to converting is the cost associated with installing digital thermostats and circuits to support the new equipment.

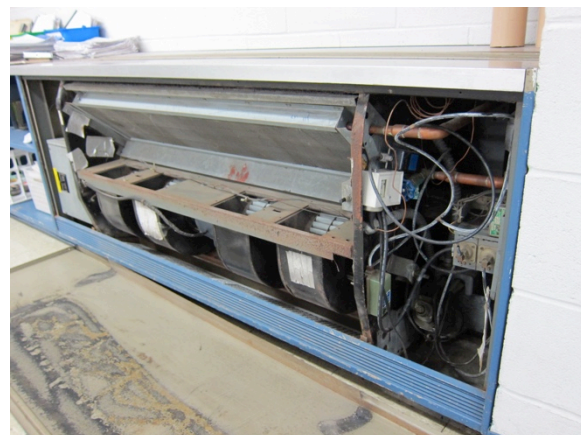
The cabinet heaters and pneumatic controls have been a persistent source of trouble in the building. Work requests related to the system have become routine and the cost of labor associated with repairs has been increasing over recent years. Additionally, the parts needed for repairs of the pneumatic system are quickly becoming more difficult to find; these components are not generally produced today.



During the next planned renovation of the facility, both the controllers and the heating cabinets should be scheduled for replacement. The new equipment would reduce maintenance costs and provide more dependable heating throughout the facility. When this conversion takes place, consideration should be given to placement of the new circuits. The new circuits should be designed to fail in the open position allowing the heat to remain on in the event of power loss. Additionally, the controllers will require a transformer to reduce the 120-volt house system to the lower voltage digital systems.

Cabinet Unit Heaters (CUH)

The Cabinet Unit Heaters are Nesbitt Aire syncretizers. The units were part of the original construction. These units have outlived their expected useful life. There have been routine trouble calls associated with these units across the facility. Reactive maintenance costs associated with these units are accounting for increasing portions of the facility's budget. In addition to the reactive maintenance costs, the pneumatic controls are subject to



persistent air leaks, which have lead to constant running of the electric motors. The wasted energy is surely costing the school district more money than the replacement costs over time. The units could easily be replaced by updated equipment that is readily available from the same manufacturing company.

Lifts

There are two lifts in the school. The first is a hydraulic elevator that provides service from the first floor to the second. It was original to the building's construction in 1972. The maintenance manuals and service records show routine preventative maintenance (PM); the elevator appears to be in excellent working condition. Upon inspection of the elevator room, it seemed to be extremely clean and well maintained. If the upkeep is continued, this system should continue to provide reliable service.

The second lift is designed for wheelchair access to the stage area. The lift was brought on line during the 2000 renovation. We were unable to find service records on this system. The system does not appear to be on the same PM program as the first elevator. Our recommendation would be to tie the two lifts together in one maintenance program. The second lift appears to operate correctly.



AC Units

There are currently 7 rooftop air conditioning units used in the school. These units have ductwork throughout the main office and the front of the school, but do not connect to the rest of the rooms. These AC units were all installed in 2000 and are near the end of their useful life. Rooftop AC units typically have a life span of 15-20 years. We recommend replacing two of these rooftop units every year for the next few years. The total replacement cycle should take only 3 1/2 years. Staggered replacement cycle will reduce the impact on the school's budget. Spreading the replacement of these units over a few years should also help smooth out any spikes in the yearly maintenance costs.

Four of the A/C units are identical. During the replacement cycle, we also recommend keeping the compressors on hand as this is often the first component to fail. Maintaining some of the parts will allow for easier, faster, and less expensive maintenance repairs if one unit should fail before it is scheduled for replacement.

Attached to this report is an estimate for the replacement of the rooftop AC units from New England Refrigeration & Heating, Inc. The total cost for replacement of the rooftop units is \$42,000; the units cost \$22,414 and the total installation accounts for the remainder. By spreading the replacement over a few years, the impact to Whitman Middle's budget can be reduced. One drawback to a staggered replacement plan is the additional costs for items such as the use of a crane for each of the replacements. Spreading the replacement out will increase the total labor and expenses. Please see **Appendix 4** for AC unit specifications.

Air Handlers

The large air handlers, located in the gym and the smaller exercise room, appear to be in good condition. We had limited access to the roof during our assessment due to the snow and further inspection of the air intakes on the roof should be completed.

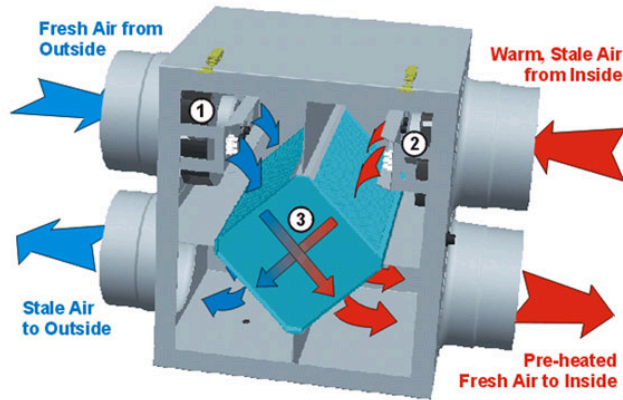


Both air handlers do suffer from small dents in their piping and ductwork. Although much of this is negligible, larger dents may cause issues with airflow in the ducts and water flow in the pipes. Any dent significant enough to impact the efficiency of the air handler should be repaired. The air handler in the gym may also be working harder to maintain occupant comfort, given the high levels of humidity in the gymnasium. Any steps taken to reduce the moisture levels in the gym would reduce loads on the air handler.

The two air handlers in the gymnasium are the only heat source. They take in fresh air from outside, heat it (if necessary) and pump the warm air into the room. The air handlers appear to be in good shape. The entire gym is controlled by one thermostat in the corner of the room. Occupant comfort is a concern in the gym, and this room could benefit greatly from having sensors and occupancy monitors installed. The pneumatic control system in the school is old and shows visible wear, and the school would benefit greatly from digital controls. Digital controls would offer better occupant comfort, more efficient use of resources, and centralized control when necessary.

In the exercise room, the same style air handler is hung from the ceiling. This unit is also in good shape, and only requires routine maintenance. If not already in place, a regularly scheduled preventive maintenance plan should be put into effect. The exercise room's air handler could also benefit from a digital control system and variable frequency drive.

One recommendation that may help resolve the moisture build up in the gym is to install a Heat Recovery Ventilator (HRV). A HRV would help expel the moisture that is accumulating in the upper level of the gym. This system would also improve the efficiency of the heating. The system recovers heat from the air that is being exhausted. The heat warms any air coming into the system before the air passes through the heating coils. The current system relies on natural air pressure to exhaust heat and moisture from the space. An active air exhaust system would improve the conditions that are contributing to the existence of mold.



Electrical

The electrical rooms are original to the construction of the building in 1972. It did not see renovations during the 2000 remodel. The panels are old but do not appear to be rusted or corroded. There are older panels in each of the electrical rooms that are not used anymore but have been left in place. There are also miscellaneous items restricting access to the panels in both electrical rooms.



The electrical room adjacent to the elevator seems to be used more for storage than it is for housing the electrical panels. This practice poses safety and fire hazards. The stored items are mostly combustible and add to the fire load of the room. If a fire were to occur, the items would accelerate its growth and spread. The second issue with all of the stored items is access to the panels. Access to the panels is critical during an emergency; there should be nothing hindering access when the electricity needs to be cut off. The final safety issue found in the electrical rooms is missing fire-stop to seal off the room from all other areas. There are gaps at the point where the wall meets the roof deck. There are also missing seals around

conduit penetrations through the walls in some places. These issues are code violations per **Appendix 5** and should be addressed as soon as possible.

Our recommendations are: remove any panels that are not in service, create appropriate storage for items required on campus, and examine all walls and barriers for appropriate fire prevention measures. After reviewing the space usage throughout the facility, there is clearly a need for additional storage capacity. A permanent or moveable storage locker would be appropriate for the school. There are many options for these types of containers. An



appropriately watertight system may be suitable for storing the file cabinets and other items consuming space inside the building. The fire-stop was found to be in the planned scope of work during the last renovation, but it was only partially completed in the electrical room by the elevator. There is no fire-stop in the electrical room by the boiler.

Back Up Power

The current backup power plant is an Onan generator. The system is a 30 KW generator that was manufactured in 1970. The system is setup to operate emergency lights and heating systems. All other building systems shut down in the event of power loss. The system uses natural gas available from the town as a source of fuel.

In the town of Whitman, it is not uncommon for the power grid to shut down during weather events. The typical duration of power loss ranges from minutes to several hours. During major weather events, it is not uncommon to lose power for 1-3 days.

South Shore Generators in Wareham, MA has been the service provider for the current system. The maintenance is up to date, but the system is not routinely tested. The service contractor has provided an assessment of the system specifications required to replace the existing system. If the town chooses to install a backup power system that would keep the school operating during a power failure, the project would likely run near \$100,000 to complete. This type of change would require significant electrical costs in addition to the cost of a new generator.

Plumbing

The plumbing throughout the facility is generally in good condition. Valves are identified, reachable, and operating. There were two plumbing joints that showed a heavy layer of patina forming on the copper around the connection; the patina developing at these points is an indication of minor leakage, but no visible leaks were seen.

The boiler plumbing was insulated and marked to indicate direction of flow. There are points where the insulation is coming apart. In the gymnasium, there is minor damage to the insulation elbows that appear to be the result of students hitting the pipes with balls. An inspection of the boiler lines and repairs on sections of insulation should be completed.

Fixtures

The fixtures in the building are of varying ages. There are many fixtures that were originally installed in 1972. Few of the fixtures have been replaced over the years. Water fountains like the one outside of the entry to the cafeteria, should be considered for replacement. The type of compressor inside is outdated and should be replaced with the latest technology. Water fountains are now available that run on refrigerant type R410a. Selecting one that offers a bottle refill point would reduce the number of plastic bottles placed in the trash or recycling.



The restrooms are in need of updated fixtures. The ADA compliant water closets were put in place during the 2000 renovation; most of the restroom fixtures are from the original construction. Sink fixtures are mostly operating but many of them should be updated to reduce flow rates. The water closets should also be updated to more efficient models. These changes will reduce overall water consumption at the school.

Cafeteria

Appendix 6 contains cut sheet information on this section.

Freezers & Coolers

Most of the coolers in the kitchen are in good shape. The district purchased a new 2-door freezer and 2-door cooler recently, which see heavy day-to-day use. These units are manufactured by Traulsen and are in excellent condition.

The milk coolers are much older, but still appear to be in good condition. Other than some aesthetic issues, the milk coolers require no additional maintenance or repairs. The chest freezers also appear to be in good condition. Each of these systems are at the end of their expected useful life and may require replacement at some point; more efficient models could save the district money on utility costs. The newer units are much more energy efficient and operate on R410a coolant, which is the latest standard for the refrigeration industry.

Ovens, Steamers, and Proofers

These items pose the most problems for the Whitman Middle School kitchen. According to the kitchen director for the Whitman-Hanson School District, the majority of reactive maintenance costs are spent on the ovens and steamers. The steamer system includes one 3-door pressure unit and two kettle steamers; each of these items is connected to one boiler. The 3-door unit currently leaks and poses a safety threat. The district spends approximately \$600-\$2,000 per year on maintenance vendors for this unit; the facilities staff also provides emergency maintenance. Similar units can cost upwards of \$20,000 with the price decreasing slightly for a 2-door steamer unit. The payback on a new steamer unit would be long, but the importance of this replacement lies in the safety issues. A leaking steamer can be dangerous due to released steam or scalding water.

There are three ovens in the kitchen: one has top and bottom convection units, one includes a stovetop range, and one is a simple one-door convection oven. One of these ovens is in poor condition, and requires outside maintenance costs of \$500-\$1,000/year. A new electric convection oven from Market Forge with similar specifications costs just under \$5000 new; the cost jumps to \$9000 for a double oven.

The Whitman Middle School kitchen has one proofer; the proofer was bought three years ago. This unit is in excellent condition and does not require replacement or any heavy maintenance.

Garbage Disposals & Dishwashers

There are two garbage disposals in the kitchen: The first is located near the main dishwasher; the second is on a sink at the back end of the kitchen. The main garbage disposal handles the bulk of the work. National Disposer Company, division of the Hobart Manufacturing Company, currently owned by Illinois Tool Works, manufactured both disposals. The disposal unit on the front service shows considerable wear and should be replaced soon. The kitchen staff at Whitman Middle School is concerned about the longevity of the disposal and they have suggested swapping the two units. The unit swap would place the heavier workload on the unit with less wear and delay replacement costs.

The kitchen includes one main dishwasher that appears to be in excellent condition. The dishwasher is a Hobart Energy Star compliant model and is serviced regularly by B&G Restaurant Equipment & Supplies. The dishwasher is in no need of service other than routine maintenance.

Automation and Alarms

The school district is currently using Metasys Building Automation System software at the high school where the Facility Director is able to monitor and control systems for each of the buildings in the district. This technology is controlling many of the systems for the high school, but not for the Whitman Middle School. The middle school is tied into the system, but the extent of control is very limited. The Facilities Department is able to monitor and control the boiler from their remote office at the high school.

Control over the boiler allows the department to ensure the building's heat is running as appropriate. The system also has select alarms that are tied in; the alarms keep the department informed on failures of key systems.



Fire and Life Safety

The fire alarm system seems to be excellent quality. The annunciator panel is a Simplex 4010, which works great with mid sized facilities. It has many features such as being able to detect faulty or dirty detectors, which allows for a proactive maintenance schedule to be followed. The panel is located next to the school's PA system and adjacent to the front entrance. The system is easily accessible and allows the fire department to quickly locate the problem area.



Simplex 4010 Panel

All sprinkler heads are free and clear of any obstruction; there were no signs of leaking. There is no mold build up on any of the heads. The standpipes and fire department pre-connects were free and clear of any obstructions allowing quick tie in for the fire department. The couplings did not seem to be rusted or damaged. The room where the water supply connected to the sprinkler system had some clutter in it; the room seemed to be used as



a storage area for some musical equipment. Our recommendation is to have the musical equipment and all other clutter removed. There should be nothing obstructing the path of fire department officials in an emergency situation.

As previously mentioned, the fire-stop in the electrical room is of great concern and life safety hazards should be address immediately. It is in violation of the following codes:

- A. ASTM E814 - Methods for Fire Tests of Penetration Fire-stops.
- B. NFPA 101 - Life Safety Code.
- C. NFPA 70 – National Electrical Code.
- D. ICBO – Uniform Building Code.
- E. BOCA – Basic/National Building Code.
- F. SSBCCI – Standard Building Code.
- G. UL 1479 – Fire Tests of Through-Penetration Fire-stops.
- H. UL Fire Resistance Directory – Penetration Fire-stops System (XHE2) and Fill, Void or Cavity Materials.

When selecting a contractor to do the work, he or she must be compliant with all codes and use the accepted industry standards found in the NFPA Codes Section 15015. A copy of the document can be found in **Appendix 7** of this report.

Immediate Concerns

This report has identified a number of items that should be considered for repairs or replacement. In this section, we would like to highlight a few items that should be considered a priority. These items are directly related to the safety of everyone who uses or visits the campus.

There are wall penetrations in the facility that are not sealed properly. The gaps provide a means for fire to spread rapidly across what should be fire rated walls. A thorough inspection should be done to identify each of these points.

There was a fire alarm found that is detached from the electrical box, which supports the unit. A thorough inspection should be done to identify any other alarms that may be out of service.

There is a damaged wood utility pole in the parking area at the front of the school near the main entrance. The pole appears to have been struck by plowing equipment. The pole is leaning and could potentially fall.

The gutter and roof flashing above the south wall of the nurse's office are damaged. If left as is, this damage could cause more costly water damage to the roof structure. Additionally, the broken gutter parts could fall from the roof creating a hazard for anyone near by.

There is a moisture and mold problem in the gymnasium. Our conclusion is that there is mold and decomposition across the built up roof in addition to the problem in the gym. Our recommendation is that a professional mold remediation company should be hired to further evaluate the problem and recommend an appropriate procedure.

The leaking pressure steamer unit poses a safety threat. Leaking steamers under pressure can spew steam or hot water, causing burns, and are even at some risk of explosion.

Appendix 1

Project Prioritization Chart

Item Description		Type of Issue					Priority
		Fire	Safety	IAQ	ROI	Maint.	
Low Cost & Short Term	Wall Penetration Filler	X	X				1
	Check and Repair Fire Alarms	X	X				1
	Vegetation Removal/Trimming		X				2
	Sensor/Timing System Correction on LED Parking Lights				X		2
	Create Maintenance Log on ADA Lift in Auditorium					X	3
	Exchange Garbage Disposals in Cafeteria				X	X	3
Moderate Cost & Short Term	Repair Light Pole in Parking Lot		X			X	1
	Repair Gutter South Side of Entry (Nurse's Station)		X			X	1
	Tank-less Water Heating System				X		2
Higher Cost & Short Term	Add Storage Capacity on Site		X		X	X	1
	New Fencing Around Equipment at South End		X			X	1
	Replace 3 Door Steamer in Kitchen (Leaking Pressure)		X		X	X	1
	Updated Security Camera System		X				2
	Assessment of Drainage Issues Around Fields					X	2
	Replace Oven in Cafeteria				X	X	2
	Replace Fixtures in Rest Rooms				X	X	2
	Replace Water Fountains					X	3
High Cost & Long Term	Roof Replacement		X	X		X	1
	Heat Recovery Ventilator in Gym (Moisture Issue)			X	X	X	1
	Paving the Parking Areas		X				1
	Concrete Repairs on Walkways and Loading Docks		X				1
	Replace Gym Floor (Moisture and Mold Damage)			X		X	1
	Replace Cabinet Unit Heaters Throughout Building			X	X	X	1
	Window Replacement				X		2
	Direct Digital Control System for HVAC					X	2
	Schedule Replacement of Rooftop AC Systems					X	3
	Replace/Expand Emergency Power System		X			X	3
	Mortar Repointing					X	3

Priority 1 projects should be considered as soon as possible.

Priority 2 projects are somewhat less important.

Priority 3 projects are not as important as others.

Appendix 2

Gymnasium History & Mitigation Information

WMS Gym Roof

Question 1:

Whitman Hanson Regional School District has been witnessing signs of moisture and leaks coming from the Whitman Middle School gym roof. We hired a professional roofer to repair torn membrane in the roof, but the leaks persisted. We engaged the services of an infrared thermographic roofing specialist who performed an infrared survey, which scanned the entire gym roof area two times. The results indicated 1,134 sq. ft. (13%) of suspected wet insulation of the 8,684 sq. ft. gym roof. In November 2013, we started to observe dark spots increase, musty odor and it appears the roof system is still compromised allowing water to infiltrate different areas of the gym. Further investigation into the gym roof was performed by an environmental company hired by the district. The findings and observations of the indoor air quality test showed elevated levels of mold and myxomeycetes/perconia/smut (it is known for decaying building materials) which required additional testing. The district hired a certified roofing company who then performed four test cores. The results were three layers of roofing systems. The first layer was 1972 decomposed wood fiberboard insulation built up tar/asphalt roof with a gravel surface roofing system; the next layer was a 1/2" fiberboard insulation, EPDM (rubber) membrane roofing system; and the top layer polyiso insulation with mechanically attached PVC roofing system. As a result from all tests, the 1972 roofing material is compromised and in order to resolve, the entire roofing system needs to be removed and replaced with a new roofing system.

Question 2:

Until the existing roofing systems are replaced we will continue to repair on-going leaks and treat the under-side deck for mold and myxomeycetes/perconia/smut. Due to the 1970 era fiberboard insulation decomposing, it will continue to omit musty odors and mold growth. To avoid poor indoor air quality and prevent additional mold growth due to the water infiltration, we have taken the following steps:

We have applied biocide to the underside of the roof deck every four months. After biocide is applied, we gather air quality samples and this process will be repeated as many times as needed to stay within the EPA recommended IAQ standards.

Appendix 3

NeoShok Flooring Specifications

SECTION 09642 – WOOD GYMNASIUM FLOORING**PART 1 - GENERAL****1.1 DESCRIPTION****A. Related work specified under other sections.****1. CONCRETE SUBFLOORS - SECTION 03_ _ _**

- a. Slab depression is:
64 mm for 20 mm flooring
70 mm for 26 mm flooring
- b. The general contractor shall furnish and install the concrete subfloor depressing the slab sufficiently to accommodate the floor system. The slab shall be steel troweled and finished smooth to a tolerance of 3 mm in any 3 meter radius by the general contractor. High spots shall be ground level, and low spots filled in with approved leveling compound by the general contractor to the full approval of the installer (Flooring Contractor).

2. MEMBRANE WATERPROOFING - SECTION 07_ _ _

- a. Concrete subfloors on or below grade shall be adequately waterproofed beneath the slab and at the perimeter walls and on earth side of below grade walls by general contractor using suitable type membrane.

3. THRESHOLDS - SECTION 08_ _ _**4. GAME STANDARD INSERTS - SECTION 11_ _ _****1.2 REFERENCES****A. MFMA - Maple Flooring Manufacturers Association****B. DIN - Performance Standard DIN 18032, Part 2.****1.3 QUALITY ASSURANCE****A. Manufacturer**

1. Manufacturer of resilient flooring shall be a firm specializing in manufacturing products specified in this section.
2. Manufacturer of flooring and subfloor components must be ISO 9001:2000 Certified to assure quality control of materials provided.
3. Basis of design shall be "NeoShok" sports floor system as provided by **Connor Hardwood Courts, www.connorfloor.com, (800-833-7144)**.
4. Materials other than those listed must be approved 10 days prior by written addendum. Materials from non-approved manufacturers will not be accepted.

B. Installer (Flooring Contractor)

1. The complete installation of the flooring system, as described in the scope of these specifications, shall be carried out by an experienced installer (Flooring Contractor), and the work shall be performed in accordance with most recent installation instructions of the manufacturer.
2. Installer (Flooring Contractor) shall be liable for all matters related to installation for a period of one year after the floor has been substantially installed and completed.

C. Performance Testing

1. Flooring system shall have been independently tested and evaluated for Athletic Performance according to the International Standard DIN 18032, Part 2.
2. Independent DIN testing laboratory shall have Scientific Body Membership in the International Association of Sports Surface Sciences (ISSS). Test equipment shall have been calibrated and certified through the ISSS.
3. DIN testing engineer shall be an ISO 17025 System member rated for each performed test conducted.
4. Flooring system shall have been independently tested and evaluated for Engineering Performance according to the Structural Testing and Engineering Measures (STEM).

1.4 SUBMITTALS**A. Specification - Submit Connor NeoShok specification sheets.****B. Sample - Submit one sample of specified system, if requested by architect.****C. Maintenance Literature - Upon completion of floor installation, send to owner, attendants or individuals in charge and responsible for the upkeep of the building a CARE CARD. This card spells out care and maintenance instructions including temperature and humidity ranges for areas where flooring is installed.**

1.5 WORKING CONDITIONS

- A. The wood flooring specified herein shall not be installed until all masonry, painting, plaster, tile, marble and terrazzo work is completed, and overhead mechanical trades and painters have finished in the wood floor areas. The building shall be enclosed and weathertite.
- B. The concrete subfloor shall be determined dry by industry standard testing procedures, free of foreign materials and turned over to the installer (Flooring Contractor) broom clean. Moderate room temperature of 18 degrees Celsius or more shall be maintained a week preceding and throughout the duration of the work. Humidity conditions within the building shall approximate the humidity conditions that will prevail when the building is occupied.
- C. Permanent heat, light and ventilation shall be installed and operating during and after installation, maintaining a range of temperature and humidity compatible with the expected low and high moisture content of the flooring. The wood moisture content range is determined by the flooring contractor based on the facility's mechanical controls and/or geographical location.
- D. Flooring must be stored in a dry, well-ventilated area, not in contact with masonry, to acclimate to building conditions and shall be installed at moisture content compatible with the normally expected environmental range of temperature and relative humidity achieved while the facility is occupied.
- E. General Contractor shall lock floor area after floor is finished to allow proper cure time. If general contractor or owner requires use of gym after proper cure time, he shall protect the floor by covering with non-marring Kraft paper or red rosin paper with taped joints until acceptance by owner of complete gymnasium floor.
- F. Working conditions as described above shall be followed. Variations and substitutions shall be submitted for approval to the architect who shall advise Connor of the same.

1.6 HUMIDITY CONTROL

- A. Since all wood flooring will expand and contract as relative humidity varies, it is important to minimize extremes between low and high. Hardwood flooring is manufactured at moisture content most compatible with a 35%-50% relative humidity range. Geographical regions and available mechanicals determine the typical range of temperature and humidity for each facility. Maintaining a 15% fluctuation between highest and lowest average indoor relative humidity provides limited shrinkage and growth. Facility managers should make use of available HVAC systems to prevent excessive tightening and shrinkage of flooring.

1.7 WARRANTY

- A. Connor warrants that the materials it has supplied will be free from manufacturing defects for a period of one year. The foregoing warranty is in lieu of and excludes all other warranties not expressly set forth herein, whether express or implied in operation of law or otherwise, including, but not limited to, any implied warranties of merchantability or fitness. This warranty is expressly limited to the flooring materials (goods) supplied by Connor. This warranty does not cover floor damage caused (wholly or in part) by fire, winds, floods, moisture, other unfavorable atmospheric conditions or chemical action, nor does it apply to damage caused by ordinary wear, misuse, abuse, negligent or intentional misconduct, aging, faulty building construction, concrete slab separation, faulty or unsuitable subsurface or site preparation, settlement of the building walls or faulty or unprofessional installation of Connor flooring systems.
- B. Connor shall not be liable for incidental or consequential losses, damages or expenses directly or indirectly arising from the sale, handling or use of the materials (goods) or from any other cause relating thereto, and their liability hereunder in any case is expressly limited to the replacement of materials (goods) not complying with this agreement, or at their elections, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such materials (goods), whether such claims are for breach of warranty or negligence. Any claim shall be deemed waived by buyer unless submitted to Connor in writing within 30 days from the date buyer discovered, or should have discovered, any claimed breach.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Vapor Barrier** – 0.2 mm polyethylene.
- B. **Resilient Pads**
 - 1. Connor NeoShok pads, 19 mm thick, hemispherical, two stage, polyurethane, Red-70D durometer.
 - 2. Optional NeoShok pad - (specify above or delete) -
 - a. Connor NeoShok Black-50D durometer (aerobic or dance floors)
 - b. Connor NeoShok Blue-60D durometer.
- C. **Subfloor** - 2 layers of 12 mm plywood sheathing, Exposure 1.
- D. **Flooring** (Connor Laytite Maple)

1. 20 mm X 57 mm, Second & Better Grade, Northern Hard Maple Flooring, TGEM, MFMA Grade marked and stamped as manufactured by Connor Hardwood Courts, Amasa, MI.
 2. Optional sizes and grades (specify above or delete) -
 - a. Sizes – 20 mm X 38 mm, 26 mm X 38 mm, 26 mm X 57 mm
 - b. Grades – First Grade, Third Grade
 3. Treating (specify or delete) - Flooring shall be treated with WOODLIFE-3 preservative.
 4. SMARTWOOD^{cm} (specify or delete) - Hard maple flooring shall be certified as harvested from managed forest in compliance with the SmartWood^{cm} program of the Rainforest Alliance.
- E. Fasteners**
1. Flooring fasteners – 51 mm barbed cleats or coated staples.
 2. Subfloor fasteners – 25 mm staples or equivalent.
- F. Finish Materials** - Connor oil modified polyurethane seal and finish or equal.
- G. Game Lines** - Game line paint shall be compatible with finish.
- H. Wall Base** – 76 mm X 102 mm, heavy duty, molded, vented cove base with pre-molded outside corners.
- I. Protective Floor Cover** (specify or delete) – Provide Connor “Court Cover” protective floor cover, 914 mm X 1.829 meter tiles, 100% Invista type 6,6 nylon, available in standard colors (Green Abalone, Mauve, Paradise, Rainforest).

PART 3 - EXECUTION

3.1 EXECUTION

- A.** Inspect concrete slab for proper tolerance and dryness. Report any discrepancies to general contractor and architect in writing.
- B.** Concrete slab shall be broom cleaned by general contractor.
- C.** Installer (Flooring Contractor) shall document all working conditions provided in General Specifications prior to commencement of installation.

3.2 INSTALLATION

A. Subfloor

1. Cover concrete with poly, sealing and lapping joints a minimum of 152 mm.
2. Subfloor
 - a. Install lower layer of subfloor perpendicular to finish maple flooring spacing all edges 6 mm and stagger joints 1.219 meters. Provide 38 mm expansion voids at perimeter and at all vertical obstructions. The underside of first layer shall have NeoShok pads attached 305 mm on center (32 per sheet) and 152 mm from edges on all sides. Install solid blocking at doorways, under bleachers in the stacked position, and below portable goals.
NOTE: Provide red 70D durometer pads under bleachers in the extended position.
 - b. The second layer of subfloor shall be laid at a 45-degree angle over the first layer, spacing all edges 6 mm stagger joints 1.219 meters. Provide 38 mm expansion voids at perimeter and at all vertical obstructions. Attach second layer of subfloor with fasteners 305 mm on center.

B. Maple Flooring

1. Install maple flooring by power nailing or stapling approximately 305 mm on center with end joints properly driven up.
2. If required, size joints between flooring strips to allow for intermediate expansion in accordance with local humidity conditions.
3. Provided 38 mm expansion voids at perimeter and at all vertical obstructions.

3.3 FINISHING

A. Maple Flooring

1. Machine sand with coarse, medium, and fine paper to a smooth, even and uniform surface.
2. Remove sanding dust from entire surface by tack or vacuum.
3. Inspect entire area of floor to insure that surface is acceptable for finishing, clean and completely free from sanding dust.
4. Apply two (2) coats of approved seal and two (2) coats of approved finish per manufacture's instructions.
5. Buff and clean floor between coats.
6. Games Lines: Apply game lines as indicated on drawings, between seal and first coat of finish.

3.4 BASE INSTALLATION

- A. Install vent cove base to walls with base cement or screws. Use pre-molded outside corners and mitered inside corners.

3.5 CLEANING

- A. Remove excess and waste materials from the area of work.

END OF SECTION 09642

August 1, 2006
NeoShok 090-M
Master Rev A

Appendix 4

Air Conditioning Specifications

PROPRIETARY AND CONFIDENTIAL PROPERTY OF Trane U.S. Inc. dba Trane

DISTRIBUTION TO OTHER THAN THE NAMED RECIPIENT IS PROHIBITED

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Prepared For:

Jacqueline Lowe

New England Refrigeration & Heating, Inc.

Date: March 10, 2015

Proposal Number: A5-34760-1 / Oppy # 1880173

Job Name: Whitman Middle School

Engineer: N/A

Delivery Terms:

Freight Allowed and Prepaid - F.O.B. Factory

Payment Terms:

Net 30 Days

Tag Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop (Qty: 6)

Item	Tag(s)	Qty	Description	Model Number
A1	No Tag	4	3 Ton R410A PKGD Unitary Gas/Electric	YSC036E4ELA--D0000000000000000000000000
A2	No Tag	1	4 Ton R410A PKGD Unitary Gas/Electric	YSC048E4ELA--D0000000000000000000000000
A3	No Tag	1	5 Ton R410A PKGD Unitary Gas/Electric	YSC060E4ELA--D0000000000000000000000000

Product Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

All Units

DX cooling, gas heat
 Standard efficiency
 Convertible configuration
 Major design sequence
 460/60/3
 Electro mechanical controls 3ph
 Low gas heat 3ph
 Economizer Dry Bulb 0-100% with Barometric Relief
 Curb adapter Voyager 3-5 ton std eff (Fld)

Item: A1 Qty: 4

3 Ton

Item: A2 Qty: 1

4 Ton

Item: A3 Qty: 1

5 Ton

Items Not Included - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

- Disconnects, Power Exhaust, Protective Coatings, Thermostats, Smoke Detectors, External Vibration Isolation, Start-up and Labor Warranty unless listed under Product Data.

Clarifications and Exceptions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

- Availability: Allow 15 days for production + 3-4 days trucking / delivery

Total Net Price (Excluding Sales Tax)\$ 22,414.00

Tax Status: Taxable <input type="checkbox"/> Exempt <input type="checkbox"/>	IF EXEMPT PLEASE SUBMIT COMPLETED TAX EXEMPTION CERTIFICATE WITH YOUR SIGNED PROPOSAL OR WITH YOUR PURCHASING DOCUMENTS, KEEP YOUR ORIGINAL ON FILE IN THE OFFICE. YOU WILL BE CHARGED TAX IF A VALID EXEMPTION CERTIFICATE IS NOT ON FILE BEFORE EQUIPMENT, PARTS OR SERVICES ARE PROVIDED. SEE WWW.TAXSITES.COM/STATE-LINKS.HTML FOR TAX FORMS.
---	--

Nicholas Fluet - Trane U.S. Inc. dba Trane

50 Vision Blvd.
 East Providence, RI 02914-1220
 Phone: (401) 434-3145
 Cell:
 Fax: (401) 434-8537

This proposal is subject to your acceptance of the attached Trane terms and conditions.

TERMS AND CONDITIONS - COMMERCIAL EQUIPMENT

"Company" shall mean Trane Canada ULC for sales in Canada and Trane U.S. Inc. for sales in the United States.

1. Acceptance. These terms and conditions are an integral part of Company's offer and form the basis of any agreement (the "Agreement") resulting from Company's proposal (the "Proposal") for the sale of the described commercial equipment and any ancillary services (the "Equipment"). COMPANY'S TERMS AND CONDITIONS ARE SUBJECT TO PERIODIC CHANGE OR AMENDMENT. The Proposal is subject to acceptance in writing by the party to whom this offer is made or an authorized agent ("Customer") delivered to Company within 30 days from the date of the Proposal. If Customer accepts the Proposal by placing an order, without the addition of any other terms and conditions of sale or any other modification, Customer's order shall be deemed acceptance of the Proposal subject to Company's terms and conditions. If Customer's order is expressly conditioned upon Company's acceptance or assent to terms and/or conditions other than those expressed herein, return of such order by Company with Company's terms and conditions attached or referenced serves as Company's notice of objection to Customer's terms and as Company's counter-offer to provide Equipment in accordance with the Proposal and the Company's terms and conditions. If Customer does not reject or object in writing to Company within 10 days, Company's counter-offer will be deemed accepted. Customer's acceptance of the Equipment will in any event constitute an acceptance by Customer of Company's terms and conditions. This Agreement is subject to credit approval by Company. Upon disapproval of credit, Company may delay or suspend performance or, at its option, renegotiate prices and/or terms and conditions with Customer. If Company and Customer are unable to agree on such revisions, this Agreement shall be cancelled without any liability.

2. Title and Risk of Loss. All Equipment sales with destinations to Canada or the U.S. shall be made as follows: FOB Company's U.S. manufacturing facility or warehouse (full freight allowed). Title and risk of loss or damage to Equipment will pass to Customer upon tender of delivery of such to carrier at Company's U.S. manufacturing facility or warehouse.

3. Pricing and Taxes. Following acceptance without addition of any other terms and condition of sale or any other modification by Customer, the prices stated are firm provided that notification of release for immediate production and shipment is received at Company's factory not later than 3 months from order acceptance. If such release is received later than 3 months from order acceptance date, prices will be increased a straight 1% (not compounded) for each 1 month period (or part thereof) beyond the 3 month firm price period up to the date of receipt of such release. If such release is not received within 6 months after the date of order acceptance, the prices are subject to renegotiation or at Company's option, the order will be cancelled. Any delay in shipment caused by Customer's actions will subject prices to increase equal to the percentage increase in list prices during that period of delay and Company may charge Customer with incurred storage fees. In no event will prices be decreased. The price of Equipment does not include any present or future foreign, federal, state, or local property, license, privilege, sales, use, excise, value added, gross receipts or other like taxes or assessments. Such amounts will be itemized separately to Customer, who will make prompt payment to Company. Company will accept valid exemption documentation for such from Customer, if applicable. All prices include packaging in accordance with Company's standard procedures. Charges for special packaging, crating or packing are the responsibility of Customer.

4. Delivery and Delays. Delivery dates are approximate and not guaranteed. Company will use commercially reasonable efforts to deliver the Equipment on or before the estimated delivery date will notify Customer if the estimated delivery dates cannot be honored, and will deliver the Equipment and services as soon as practicable thereafter. In no event will Company be liable for any damages or expenses caused by delays in delivery.

5. Performance. Company shall be obligated to furnish only the Equipment described in the Proposal and in submittal data (if such data is issued in connection with the order). Company may rely on the acceptance of the Proposal, and in submittal data as acceptance of the suitability of the Equipment for the particular project or location. Unless specifically stated in the Proposal, compliance with any local building codes or other laws or regulations relating to specifications or the location, use or operation of the Equipment is the sole responsibility of Customer. If Equipment is tendered that does not fully comply with the provisions of this Agreement, and Equipment is rejected by Customer, Company will have the right to cure within a reasonable time after notice thereof by substituting a conforming tender whether or not the time for performance has passed.

6. Force Majeure. Company's duty to perform under this Agreement and the Equipment prices are contingent upon the non-occurrence of an Event of Force Majeure. If the Company shall be unable to carry out any material obligation under this Agreement due to an Event of Force Majeure, this Agreement shall at Company's election (i) remain in effect but Company's obligations shall be suspended until the uncontrollable event terminates or (ii) be terminated upon 10 days notice to Customer, in which event Customer shall pay Company for all parts of the Work furnished to the date of termination. An "Event of Force Majeure" shall mean any cause or event beyond the control of Company. Without limiting the foregoing, "Event of Force Majeure" includes: acts of God; acts of terrorism, war or the public enemy; flood; earthquake; tornado; storm; fire; civil disobedience; pandemic insurrections; riots; labor/labour disputes; labor/labour or material shortages; sabotage; restraint by court order or public authority (whether valid or invalid); and action or non-action by or inability to obtain or keep in force the necessary governmental authorizations, permits, licenses, certificates or approvals if not caused by Company; and the requirements of any applicable government in any manner that diverts either the material or the finished product to the direct or indirect benefit of the government.

7. Limited Warranty. Company warrants the Equipment manufactured by Company for a period of the lesser of 12 months from initial start-up or 18 months from date of shipment, whichever is less, against failure due to defects in material and manufacture and that it has the capacities and ratings set forth in Company's catalogs and bulletins ("Warranty"). **Equipment manufactured by Company that includes required start-up and sold in North America will not be warranted by Company unless Company performs the Equipment startup.** Exclusions from this Warranty include damage or failure arising from: wear and tear; corrosion, erosion, deterioration; modifications made by others to the Equipment; repairs or alterations

Appendix 5

Electrical Code Information

fast facts

advancing safety, health, and workplace rights in the legislative branch

Electrical Panel Accessibility and Enclosure of Live Parts

September 2009

When an employee receives a shock from an electrical circuit or appliance in the workplace, shutting off the source of power may be the only safe method of preventing the individual from contacting the electric source. Electrical panels contain circuit breakers designed to trip and stop the flow of current to specific circuits and appliances. Easy access to electrical panels is essential for the protection of employees in the workplace, and panels should never be blocked or inaccessible. To promptly respond to an emergency, it is also critical that circuit breakers are clearly labeled with accurate and up-to-date directories.

Potential Hazards



Figure 1: Blocked Electrical Panel

Blocking electrical panels that house circuit breakers as shown in Figure 1 is a violation of both Occupational Safety and Health Administration (OSHA) regulations and National Fire Protection Association (NFPA) codes. These regulations require accessibility to the front of electrical panels to have a minimum of three feet of clearance and a minimum width to be the width of the equipment or 2.5 feet, whichever is greater. This assures that in case of an electrical emergency, there is a clear working space in front for quick access to the circuit breakers. Having up-to-date directories of circuit breakers also saves time.

The three electrical panels shown in Figure 1 lack the required three foot clearance. The table blocking the panels further delays access in the event of an electrical emergency.

Electrical panels contain multiple junctions of live wires and other components, and they are required to be accessible at all times. Panels are also required to have a “dead front,” per 29 CFR 1910.305(d). NFPA 70 describes a dead front as an area of the panel “without live parts exposed to a person on the operating side of the equipment.” All live components must be covered in



Figure 2b: Same electrical panel after abatement. This panel now has a “dead front.”

this way so that anyone using the circuit breaker is safe from electric shock. The large electrical panel shown in Figure 2a displays the hazard of a missing dead front. Not only are all the live components in this panel exposed, but the panel door’s lock is broken so that anyone might open the panel. Electrical panel boxes in commercial buildings should be locked and accessible by trained personnel only. This panel is located in a large dishwashing area, where a wet floor might result in electrocution. Such hazards present imminent danger and should be corrected immediately. Figure 2b shows the same electrical panel with a new dead front.

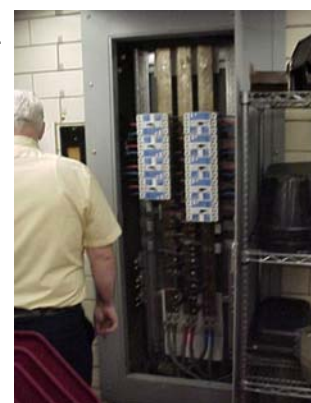


Figure 2a: Electrical panel with missing dead front

fast stats

Damage Caused by Power Switch Gear or Overcurrent Protection Device (Circuit Breaker) in office properties. 2000-2004 annual average

- 40 fires (1%)
- 6 civilian (non-firefighter) injuries (18%) and no deaths

Source: NFPA Fire Analysis and Research, May 2007

Injuries and Losses in Private Industry Related to Electric Parts in 2007

- 112 fatal occupational injuries
- 4960 nonfatal occupational injuries
- 0.5 injuries per 10,000 employees
- 1220 employees (24.6%) unable to work for 31 days or more because of injuries from electric parts

Source: US Department of Labor Bureau of Labor Statistics. "Electric parts" is a classification for unattached electric parts which primarily carry or generate electrical currents. This includes electric wiring, generators, transformers, controls, switchboards, alternators, coils, etc.

Codes and Standards Related to Electrical Panels

- The OSHA standard (29 CFR 1910.303 (g)) requires sufficient access and working space around all equipment serving 600 volts or less. For equipment serving between 120 volts and 250 volts, the regulations require a minimum of three feet of clearance. The width of the working space in front shall be 30 inches minimum or width of the equipment.
- The OSHA standard (29 CFR 1910.305 (d)) requires a dead front on electrical panel boards.
- The National Electrical Code (NFPA 70 110.26) requires a minimum of three feet of clearance for all electrical equipment serving 600 volts or less.
- The National Electrical Code (NFPA 70 110.27) requires live parts of electrical equipment operating at 50 volts or more to be guarded to prevent accidental contact by approved enclosures.



Peter Ames Eveleth
General Counsel

Mary-Margaret Smith
Editor

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Appendix 6

Cafeteria Equipment Specifications

E

ALTAIR II DOUBLE ELECTRIC BOILERLESS CONVECTION STEAMER

JOB NAME: _____

ITEM NO.: _____

NO. REQUIRED: _____

MODELS

- ☐ **Altair II - 8** - two Altair II-4 (four pan) steamers
- ☐ **Altair II - 10** - one Altair II-4 (four pan) and one Altair II-6 (six pan) steamer
- ☐ **Altair II - 12** - two Altair II-6 (six pan) steamers

DESCRIPTION

Altair II is a Market Forge convection/circulating boilerless steam oven with automatic water-fill, featuring internally preheated water for fast recovery, clean water reservoir system, and rear drain. Altair II models are efficiently heated by electrical elements external to the water reservoir. Four-pan steamers have 8 kW; six-pan steamers have 9.8 kW per compartment.

COOKING COMPARTMENT

Operation occurs from steam generated in the cooking compartment. The steamer cavity has a convection fan that increases steam velocity and provides efficient steam distribution throughout the cavity. Cooking compartment is constructed of cast aluminum with a food-grade non-stick hard anodized finish. The cooking compartment acts as a heat sink, allowing for heat retention, quick recovery, and reduced energy consumption.

STANDARD FEATURES

Controls:

- 4-Position Cooking Mode Selector: Off and Three Cooking Positions that are preset at the factory or can be set to customer specifications up to 230°F (110°C)
- Pulls out for easy service access
- Clean Probe Indicator Light
- Heating Indicator Light
- 60-Minute Timer

Construction:

- 304 Stainless, #4 Finish (Cabinet)
- 356 Aluminum Cast Cooking Compartment with Hard-Anodized Finish

Other:

- Manual Front Drain Valve
- Internally Preheated Incoming Water for Quick Recovery
- Clean Water Reservoir System Keeps Food Out of the Water
- Condensate Trough Plumbed to Drain at Rear
- Redundant Safety Systems
- UL/CUL Safety & Sanitary (NSF-4)
- One-Year Parts and Service

Doors: The door is insulated. Safety shut-offs are provided by a hidden magnetic door switch, low water/high limit heat switch, temperature probe, water sensing probe and water-fill timer.



Altair II - 8

Altair II - 10

Altair II - 12

SHIPPING WEIGHT

- ☐ Altair II - 8 - 450 lbs (204 kg)
- ☐ Altair II - 10 - 475 (215 kg)
- ☐ Altair II - 12 - 500 (227 kg)

OPTIONS & ACCESSORIES

(at additional charge)

■ Pans & Covers

- ☐ 12" x 20" pan cover
- ☐ 12" x 20" x 1" solid pan
- ☐ 12" x 20" x 1" perforated pan
- ☐ 12" x 20" x 2-1/2" solid pan
- ☐ 12" x 20" x 2-1/2" perforated pan
- ☐ 12" x 20" x 4" solid pan
- ☐ 12" x 20" x 4" perforated pan
- ☐ 12" x 20" x 6" solid pan
- ☐ 12" x 20" x 6" perforated pan

■ Stands, Racks & Casters

- ☐ MSS - Mobile stand w/slide out shelf and under shelf
- ☐ SSS - Stationary stand w/slide out shelf and under shelf
- ☐ STSS - 12" tall stationary stand (Altair II-8 only)
- ☐ STSM - 16-5/8" tall mobile stand (Altair II-8 only)
- ☐ Pan rack assembly for MSS and SSS
- ☐ Set of 4 casters, 2 with brakes
- ☐ Prison package, includes lockable stainless steel hinged control cover, tamper proof screws, (2) 4" adjustable front flanged feet
- ☐ Heat and water side shield
- ☐ Drain kit
- ☐ Water hose kit - 60" line with quick disconnect



MARKET FORGE
INDUSTRIES INC.



E

ALTAIR II DOUBLE ELECTRIC BOILERLESS CONVECTION STEAMER

DETAILS & DIMENSIONS

ELECTRICAL CHARACTERISTICS

ELECTRICAL (4 PAN STEAMER) 60 Hz			
Voltage	pH	kW	Amps
208	1	8	38.5
240	1	8	33.3
208	3	8	22.2
240	3	8	19.3
480	3	8	9.6

ELECTRICAL (6 PAN STEAMER) 60 Hz			
Voltage	pH	kW	Amps
208	1	9.8	47.1
240	1	9.8	40.8
208	3	9.8	27.2
240	3	9.8	23.6
480	3	9.8	11.8

CAPACITY

Pans	Altair II-8	Altair II-10	Altair II-12
12" x 20" x 2.5"	8	10	12
12" x 20" x 4"	4	6	8
12" x 20" x 6"	2	3	4

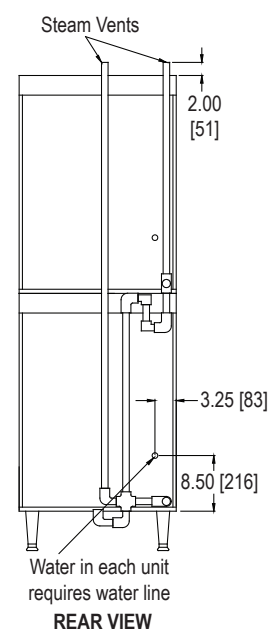
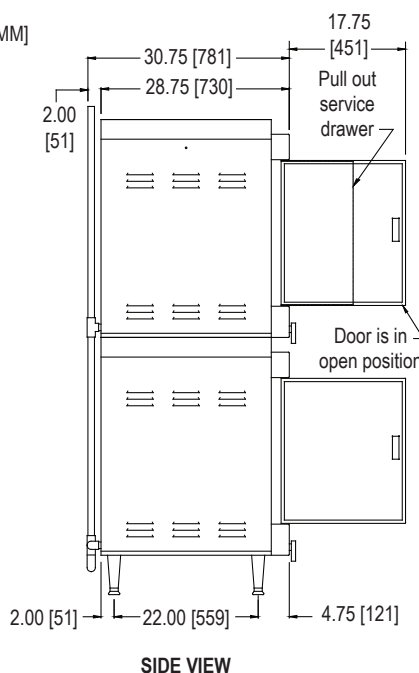
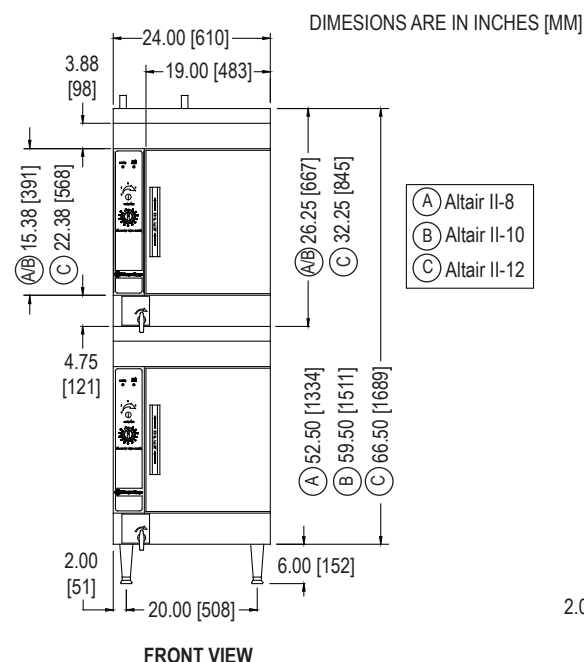
NOTES:

- Each single compartment has a separate rear exiting drain plumbed directly into the stacked steamers main drain/vent line.
- Each compartment, stacked or single, requires a separate water connection.
- Water pressure should be 25 PSI minimum - 50 PSI maximum.
- 4" clearance left mandatory, right and rear is recommended.
- Location near a floor drain is recommended.
- Refer to electrical characteristics chart for voltage requirements of each steamer.
- Each compartment requires a separate electrical connection.

CONNECTIONS FOR ALL ALTAIR II SIZES

- Water in: 3/4" male garden hose
- Trough drain: 1/2 MNTP
- Drain out: 1" FNPT

FOOD SERVICE EQUIPMENT
Electric Boilerless Steamer



The manufacturer reserves the right to modify materials and specifications without notice.

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SPEC SHEET: 14-0066 Rev B (12/14)



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E

ETP-10E ECO-TECH PLUS® ELECTRIC ATMOSPHERIC STEAMER

JOB NAME: _____

ITEM NO.: _____

NO. REQUIRED: _____

MODEL

- ☐ ETP-10E - (2) five pan electric atmospheric steamers

DESCRIPTION

The Eco-Tech Plus Atmospheric Steamer from Market Forge Industries is a stainless steel atmospheric steamer with two cooking compartments, each with an independent close-coupled atmospheric 10kW electric steam generator.

Benefits: The Eco-Tech Plus incorporates a water management system that reduces the amount of water used to condense generated steam, resulting in substantial savings on energy-related costs.

Industry First! The ETP-10E is the only Atmospheric Twin Generator Steamer that comes complete with a self contained water filter system. The built-in system eliminates the hassle of where to put the filter.

The ETP-10E's ENERGY STAR rating may qualify for rebates in your state. Consult your local utility company for details.

Construction: Eco-Tech Plus cooking compartments and cabinet are stainless steel with unitized body construction. Cabinet will be mounted on four 6" adjustable stainless steel flanged feet. Cooking compartments have removable left, right, and rear body panels. Each cooking compartment has a positive, fully insulated, slam-action door constructed of Type 316 stainless steel. Door gasket is a one-piece, NSF Approved silicone rubber gasket mounted on the inside of the door. Compartments are equipped with door interlock switches that automatically cut off power to the contactors when the doors are opened.

TECHNICAL SPECIFICATIONS

Cooking Compartments:

- Stainless steel pan support racks
- Type 316 stainless steel liner
- The front edge of the bottom compartment contains a condensate drip trough that drains automatically to a water management tempering tank

Operation:

- One powerful 10kW steam generator per compartment (20 kw required for entire unit)
- Generators are held in the "ready" mode for quick response to heavy-demand situations
- Generator chambers are mounted at the rear of the steamer cavity and close-coupled to the steam compartment
- Standard automatic water level control, low-water cutoff, safety relief valve, and preheat thermostat (190°F) and high limit.
- Each generator includes an access port for Total Concept delimer/descaler



Controls:

- Separate controls for each compartment
- On/off power switch and 60-minute electromechanical timer
- Exclusive mode selector gives the operator the option of using each cooking cavity as a holding cabinet

CAPACITY

- (9) 12" x 20" x 1" deep pans
- (5) 12" x 20" x 2-1/2" deep pans
- (3) 12" x 20" x 4" deep pans

SHIPPING WEIGHT

- 425 lbs (193 kg)

OPTIONS & ACCESSORIES

(at additional charge)

■ Pans & Covers

- ☐ 12" x 20" pan cover
- ☐ 12" x 20" x 1" solid pan
- ☐ 12" x 20" x 1" perforated pan
- ☐ 12" x 20" x 2-1/2" solid pan
- ☐ 12" x 20" x 2-1/2" perforated pan
- ☐ 12" x 20" x 4" solid pan
- ☐ 12" x 20" x 4" perforated pan
- ☐ 12" x 20" x 6" solid pan
- ☐ 12" x 20" x 6" perforated pan
- ☐ Total Concept Descaler
- ☐ Prison package, includes lockable stainless steel hinged control cover, tamper proof screws
- ☐ 60" water hose kit with quick disconnect



MARKET FORGE
INDUSTRIES INC.



E

ETP-10E ECO-TECH PLUS® ELECTRIC ATMOSPHERIC STEAMER

DETAILS & DIMENSIONS

ELECTRICAL CHARACTERISTICS

MODEL	kW	Phase	Amps Per Line						
			208V	220V	240V	380V	416V	480V	600V
ETP-10E	20	3	55.5	52.5	48.1	30.4	27.8	24.1	19.2

SERVICE CONNECTIONS

EC	Electrical Connection - 1 1/8" hole for electrical connection. Rating specified on data plate. Total Amps: 2
CW1	Cold Water - 3/8" (10mm) NPT, Maximum 50 PSI, Minimum 25 PSI.
D	Drain - 1-1/2" NPT tube to open floor drain

INSTALLATION CLEARANCE

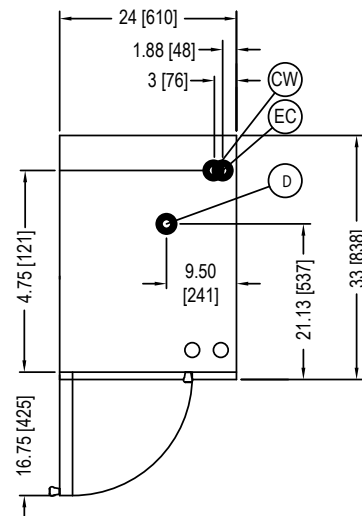
Left Side	Right Side	Rear
3	6	6

NOTE: Allow 6" 152 mm of space on the right side if height of adjoining wall or equipment exceeds 29" 737 mm.

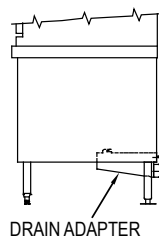
NOTE: All service connections are made at the rear of the unit, in the 6" high space between the floor and the bottom of the cabinet.

Drain: 1-1/2" O.D. pipe coupled to drain connection using the drain adapter supplied. Do not make solid connection to floor drain. PVC and CPVC pipe are not acceptable materials for drains. Before connecting water to this unit, have water supply analyzed to make sure that hardness is no greater than 2.0 grains per gallon and a pH level is within the range of 7.0–8.5. Equipment failure caused by inadequate water quality is not covered under warranty.

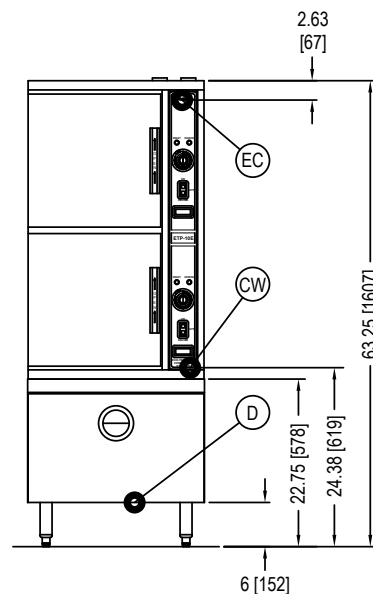
DIMENSIONS ARE IN INCHES [MM]



**REAR FLANGED
FOOT DETAIL**
2 EQUALLY SPACED
Ø7/16" [11] HOLES
ON 2.5 [63] B.C.



DRAIN ADAPTER



The manufacturer reserves the right to modify materials and specifications without notice.

FOOD SERVICE EQUIPMENT
Atmospheric Steamer

E

SPACE SAVING SERIES, FULL SIZE ELECTRIC CONVECTION OVEN

JOB NAME: _____

ITEM NO.: _____

NO. REQUIRED: _____

MODELS

- ☐ **8000** - Single full size, standard depth electric convection oven
- ☐ **8092** - Double stack full size, standard depth electric convection oven

DESCRIPTION

The Market Forge Space Saver Electric Standard Depth Convection Oven is designed to have a small foot print. This space saving oven reduce energy costs and provide superior cooking with five racks and even heat distribution.

Design engineered air circulation system combined with 9kW per oven adds up to more product in less time. This oven has energy savings in mind at all times.

The 8000 Single and 8092 Stacked Convection Ovens provide many standard features that are optional in other brands: Standard features include; 3-heating elements for 9kW, two-speed motor -1/2 HP, electrical thermostat adjustable from 150° to 500°F, two speed motor (to select best air circulation for desired results), glass door (right hand side), two interior lights, 5 chrome plated racks with 11 positions and stainless steel stand.

Oven shall be constructed of stainless steel on front, sides and top. Oven doors swing open 135° for easier access for loading and unloading. Stainless steel handle adds to the rugged construction and beauty in your kitchen. If you are looking for superior quality and commitment to performance, you can rely on the Space Saver Series Convection Ovens.

CAPACITY

Each oven compartment will accommodate (5) 18" x 26" x 1" Sheet Pans

SHIPPING WEIGHT

- ☐ **8000** - 495 lbs (225 kg)
- ☐ **8092** - 940 lbs (426 kg)



8000

8092

OPTIONS & ACCESSORIES

(at additional charge)

- ☐ Stainless Steel Bottom Shelf (Single Ovens Only)
- ☐ Glass Door (Left Hand Side)
- ☐ Bottom Storage Racks for Sheet Pans (Single Ovens Only - Must be ordered with shelf)
- ☐ Casters Set of 4, 2 with Brakes and Strain Relief
- ☐ 480 Volt, 3 Phase Operation
- ☐ Extra Oven Racks
- ☐ Prison Package



MARKET FORGE
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SERVICE CONNECTIONS

EP	Power Supply - 1-3/8" (44mm) Ø access holes for power supply wires. Use wire suitable for at least 90°C. Normal amps per line wire per oven: 9kW
----	---

Installation Clearance: When installing ovens against combustible or non-combustible surfaces (*rear or side walls*) 0" clearance is required.

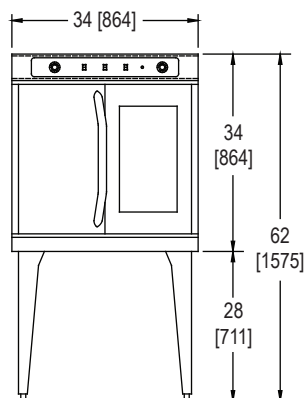
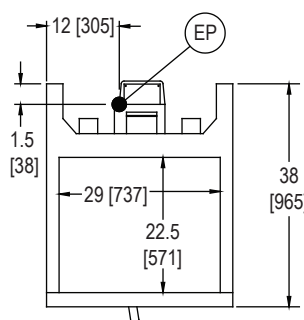
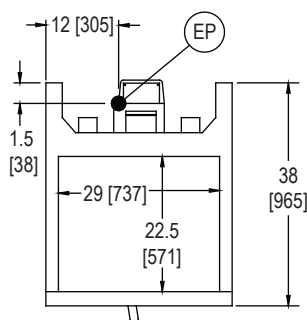
Oven Interior Dimensions: 24" High x 29" Wide x 22-1/2" Deep (61mm High x 737mm Wide x 572mm Deep)

ELECTRICAL SPECIFICATIONS

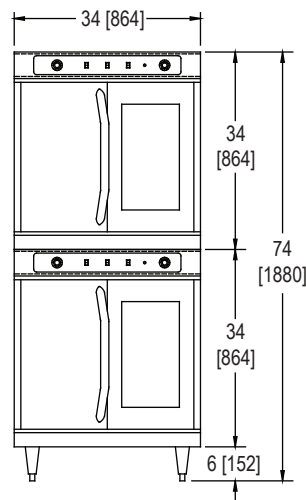
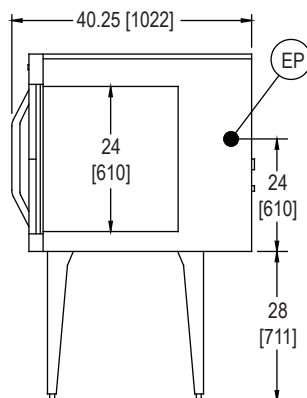
VOLTS	AMPS	
	1 PHASE	3 PHASE
208, 60Hz	43	25
240, 60Hz	38	22
480, 60Hz	-	11

Details of other electrical systems available upon request.

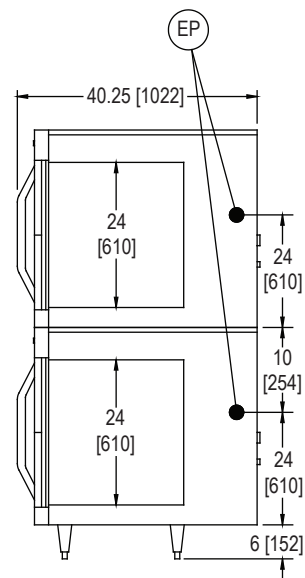
DIMENSIONS ARE IN INCHES [MM]



MODEL 8200



MODEL 8292



It is our policy to build equipment which is design certified by ETL and N.S.F. However, a continuing program of product improvement makes it necessary to submit new models to the agencies as they are developed and consequently not all models bear the appropriate agency labels at all times.

The manufacturer reserves the right to modify materials and specifications without notice.

D

DIRECT STEAM COMPARTMENT STEAM COOKER

JOB NAME: _____

ITEM NO.: _____

NO. REQUIRED: _____

MODELS

- ☐ **2AM36D** - (2) compartment, modular base, direct steam, pressure cooker
- ☐ **3AM36D** - (3) compartment, modular base, direct steam, pressure cooker

DESCRIPTION

Market Forge direct connected steam cooker with stainless steel cooking compartments. Inner door of aluminum with stainless steel facing, removable for cleaning without tools. Door wheel screw Acme type with replaceable bushing, all threads concealed. Compartment doors self latching.

Exterior finish shall be polished stainless steel

Timing of cooking compartments shall be by:

- ☐ Automatic controls which show a visible signal during cooking cycle, shut off and exhaust steam, drain condensate from cooking compartment, and sound an audible signal at end of cooking cycle. Audible signal shall continue to sound until manually shut off (optional at extra cost).
- ☐ Manual mechanical timer for each compartment that sounds an audible signal at end of cooking cycle (standard).

OPERATION SHALL BE BY:

Direct connected steam supply shall have a minimum incoming pressure of 15 PSI. Unit shall be equipped for operation at 5 PSI (.33 kg/cm²). 1BHP required per compartment. Cooker shall be mounted on modular cabinet base. All piping shall be enclosed. Pressure reducing valve and ball float trap come standard.

CAPACITY

Each cooking compartment shall have:

- ☐ Lift-out four track shelf uprights and one pull-out shelf which shall hold (2) 12" x 20" x 2 1/2" pans OR (2) 12" x 20" x 4" pans.
- ☐ Lift-out universal pan supports which shall hold (8) 12" x 20" x 2 1/2" pans OR (4) 12" x 20" x 4" pans.

SHIPPING WEIGHT

- ☐ **2AM36D** - 690 lbs (313 kg)
- ☐ **3AM36D** - 835 lbs (379 kg)



2AM36D

3AM36D

OPTIONS & ACCESSORIES (at additional charge)

■ Pans & Covers

- ☐ 12" x 20" pan cover
- ☐ 12" x 20" x 1" solid pan
- ☐ 12" x 20" x 1" perforated pan
- ☐ 12" x 20" x 2-1/2" solid pan
- ☐ 12" x 20" x 2-1/2" perforated pan
- ☐ 12" x 20" x 4" solid pan
- ☐ 12" x 20" x 4" perforated pan
- ☐ 12" x 20" x 6" solid pan
- ☐ 12" x 20" x 6" perforated pan
- ☐ Automatic timer control
- ☐ Spray hose for washdown
- ☐ Extra stainless steel removeable pull-out self
- ☐ Universal pan supports
- ☐ 6" adjustable flanged feet
- ☐ Prison package, includes lockable stainless steel hinged control cover, tamper proof screws, (4) 6" adjustable flanged feet



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D

DIRECT STEAM COMPARTMENT STEAM COOKER

DETAILS & DIMENSIONS

SERVICE CONNECTIONS

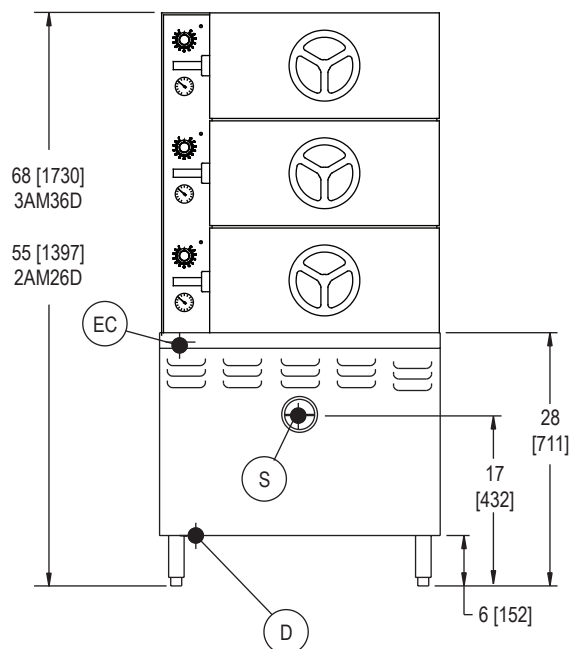
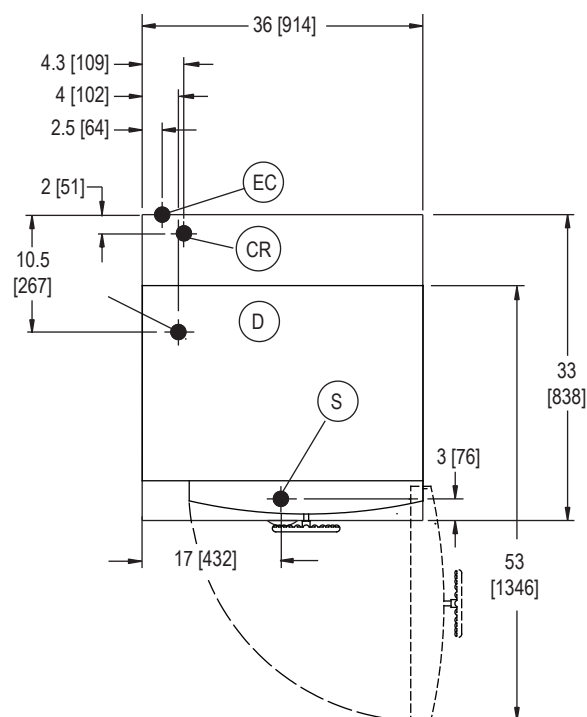
S	Steam Supply: 3/4" (19mm) NPT Shall have a minimum incoming pressure of 15 PSI. Pressure reducing valve will reduce incoming pressure (up to 200 PSI) to required 5 PSI (0.4kg/cm2). NOTE: Steam supply must be food grade quality.
D	Drain - Pipe full 1" (25mm) NPT to flush floor drain capable of receiving water flowing at a maximum rate of 5 gallons (19 liters) per minute. DO NOT MAKE SOLID CONNECTION TO FLOOR DRAIN. INSTALL NO ELBOWS IN DRAIN LINE.
EC	Electrical Connection - 120 Volts AC, 60 Hz, single phase, and a 9 foot Power Cord/NEMA 5-15.
CR	Condensate Return - Optional

NOTES: Allow 12" (305mm) spacing on left and 6" (152mm) spacing on right if height of adjoining wall or equipment exceeds 29" (737mm).

PVC and CPVC pipe are not acceptable materials for drains.

CAUTION: Before connecting water to this unit, have water supply analyzed to make sure hardness is no greater than 2.0 grains and Ph level is within the range of 7.0 - 8.5. Water which fails to meet these standards should be treated by installing a filter or conditioner. **EQUIPMENT FAILURE CAUSED BY INADEQUATE WATER QUALITY IS NOT COVERED UNDER WARRANTY.**

DIMENSIONS ARE IN INCHES [MM]



The manufacturer reserves the right to modify materials and specifications without notice.

FOOD SERVICE EQUIPMENT
Compartment Steam Cooker

Appendix 7

Fire & Life Safety Code Information

SECTION 15015

PENETRATION FIRESTOPPING

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. The requirements of the GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, GENERAL REQUIREMENTS, apply to the Work of this SECTION.
- B. Coordinate work of this Section with the work of the following Sections to properly execute the work in order to maintain the hourly ratings of the walls and floors.
 - 1. Concrete Work
 - 2. Masonry Work
 - 3. Construction Joint Firestopping and Joint Sealers
 - 4. Drywall
 - 5. Mechanical and plumbing
 - 6. Electrical

1.2 Description

- A. This SECTION describes the requirements for furnishing and installing firestopping for fire-rated construction. This includes all openings in fire-rated floors, walls and other rated elements of construction, both blank (empty) and those accommodating items such as cables, conduits, pipes, ducts, etc.

1.3 INCORPORATED STANDARDS

- A. ASTM E814 - Methods for Fire Tests of Penetration Firestops.
- B. NFPA 101 - Life Safety Code.
- C. NFPA 70 – National Electrical Code.
- D. ICBO – Uniform Building Code.
- E. BOCA – Basic/National Building Code.
- F. SSBCCI – Standard Building Code.
- G. UL 1479 – Fire Tests of Through-Penetration Firestops.
- H. UL Fire Resistance Directory – Penetration Firestops System (XHE2) and Fill, Void or Cavity Materials.

QUALITY ASSURANCE

- A. Firestopping systems (materials and design) shall conform to both Flame (F) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
- B. Unless specified and approved, no pipe insulation shall be removed; all insulation shall remain intact, continuous and undamaged when firestopped.
- C. The work of this section shall be performed by a company which specializes in stalling UL Classified penetration seals required for this Project, with a minimum of five years of documented successful experience and shall be performed by skilled Workmen thoroughly experience in the necessary crafts.

1.5 SUBMITTALS

- A. Submit per Section 15010.
- B. Submit manufacturer's product literature and installation procedures for each type of Firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance and limitation criteria and test data. Submit cured samples of firestop materials.
- C. Shop drawings: Show typical installation details for the methods of installation. Indicate which firestop materials will be used where and applications requirements to meet Specific jobsite conditions.
- D. Product Data: Shall be clearly marked to indicate all technical information which specifies full compliance with requirements of this section and Contract Documents, including the following:
 - 1. Copy of UL illustration of each proposed system indicating manufacturer's approved modifications.
 - 2. Each condition requiring penetration seals in proposed UL systems materials, anchorage, methods of installation and actual adjacent construction.
- E. Applicator's Qualification Statement: Shall include a list of projects indicating required experience.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in the manufacturer's original, unopened containers or packages with the manufacturer's name, product identification, lot number, UL label, and mixing and installation instructions as applicable.
- B. Store materials in the original, unopened containers or packages, and under conditions recommended by the manufacturer.
- C. All firestop materials shall be installed prior to expiration of shelf life.

1.7 PROJECT CONDITIONS – Conform to Manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.

1.8 PROJECTION – Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Materials and products required for work of this section shall not contain asbestos or polychlorinated biphenyls (PCB).
- B. (3M) Minnesota Mining and Mfg. Co.
- C. Specified Technologies, Inc. (STI) – SpecSeal & Pensil
- D. Or equal.

2.2 General – Provide and install firestopping materials to meet applicable codes and installation requirements for each firestopping application. Products using caulking, putties, wrap strips, mortars, composite boards and/or mechanical devices shall be used as appropriate for the specific condition.

2.3 When caulking is used, provide and install flexible caulking materials. Cured firestop materials 1/8 thick shall be able around a 1" mandrell without breaking.

2.4 Do not use any firestop products which re-emulsify, leach active intumescent ingredients or dissolve when placed in water after curing. Product must withstand the passage of cold smoke, either as inherent property of the system or by the use of a separate product included as part of the UL system or device, and designed to perform this function.

2.5 PENETRATION SEALS

A. General:

- 1. Penetration seals (firestopping material) shall be asbestos-free and capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ASTM E814 and UL 1479.
- 2. Materials shall meet and be acceptable for use by all three model building codes, Basic/National Building Code, Building Code and Standard Building Code, per National Evaluation Service, Inc. report # NER-243.
- 3. Materials shall meet requirements of NFPA 101 and NFPA 70.
- 4. Materials shall be suitable for the firestopping of penetrations made by steel, glass, plastic and insulated pipe, conduit, bus duct, noninsulated pipe and ductwork.
- 5. On insulated pipe, fire-rating classification must not require removal of insulation.

6. The rating of penetration seals shall not be less than the rating of the time-rated floor or wall assembly.

B. 2-hour Rated Concrete Floor:

1. Penetrants: Multiple pipes.
2. Firestop: 3M CP 25 Caulk, self-leveling.
3. UL System: No. 93.

C. 2-hour Rated Concrete Floor:

1. Penetrants: Maximum 30" dia. Metal pipe/conduit.
2. Firestop: 3M CP 25 Caulk.
3. UL System: No.319

D. 1-2 –Hour Rated Gypsum Board Wall:

1. Penetrant: Metal pipe/conduit.
2. Firestop: 3M FS Wrap/Strip and 3M CP 25 Caulk.
3. UL System: No. 147

E. 2-Hour Rated Gypsum Board Wall:

1. Penetrant: Metal pipe/conduit.
2. Firestop: 3M CP 25N/S Caulk.
3. UL System: No. 147.

F. 3-Hour Rated Concrete Wall:

1. Penetrant: Metal duct, maximum 2' square and maximum dimension of 30".
2. Firestop: 3M CS-195 Composite Sheet and 3M FS-105 Wrap/Strip and CP25 caulk.
3. UL System: No. 105.

G. Walls Below Grade:

1. Penetrants: Pipe sleeves.
2. Seal: Thunderline "Link Seal" casing seal.

PART 3 - EXECUTION

3.1 INSPECTION – Examine the areas and condition where Firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the Architect.

3.2 CONDITIONS REQUIRING FIRESTOPPING

- A. General – Provide firestopping for conditions specified whether or not firestopping is indicated, and if indicated, whether such material is designed as insulation, safing, or otherwise.
- B. Penetrations
 - 1. Penetrations include conduit, cable wire, pipe, duct or other elements which pass through one or both outer surfaces of a fire rated floor, wall or partition.
 - 2. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space if any between sleeve and wall opening.
- C. Provide firestopping to fill miscellaneous voids and openings in fire-rated construction as specified herein.

3.3 INSTALLATION

- A. General
 - 1. Installation of Firestops shall be performed by a applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
 - 2. Apply Firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
 - 3. Provide sprinkler piping with NFPA 13 required annular space using insulation and firestop to allow movement.
 - 4. Coordinate with plumbing, mechanical, electrical and other trades to assure that all pipe, conduit, cable, and other items which penetrate fire-rated construction have been permanently installed prior to installation of Firestop.
- B. Field Quality Control
 - 1. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.
 - 2. Follow safety procedures recommended in the Material Safety Data Sheets.
 - 3. Finish surfaces of firestopping which is to remain exposed in the completed work to a uniform and level condition.
 - 4. All areas of work must be accessible until inspection by the applicable Code Authorities.
 - 5. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

3.4 WARRANTY

- A. Comply with General Conditions, and include but not be limited to:
 - 1. Repairs and replacement of penetration seals which fail in joint adhesion, cohesion, abrasion, resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability, or appear to deteriorate in any other manner not clearly specified in submitted manufacturer's data as an inherent quality of the material for exposure indicated.

3.5 CLEANING

- A. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.
- B. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.

END OF SECTION

