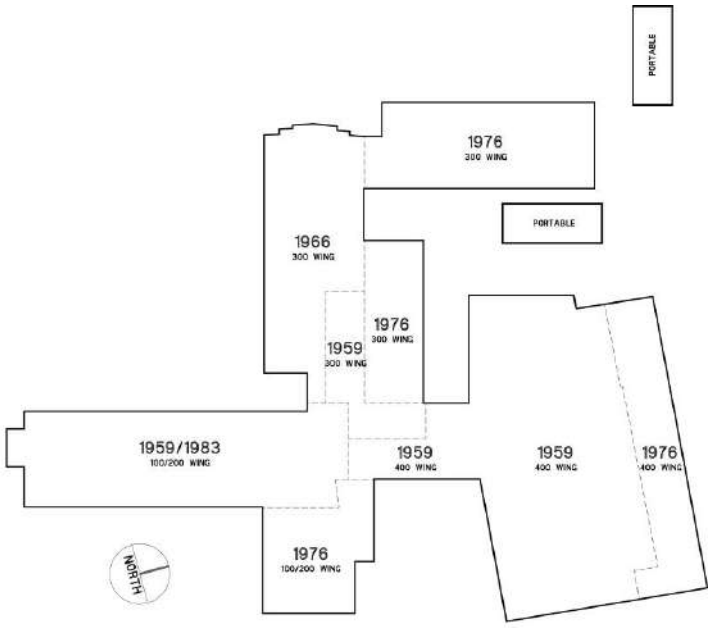
Brunswick Junior High School

Overview

BJHS Main Entrance

The current Brunswick Junior High School was originally opened in 1959. Additions and/or renovations were completed in 1966, 1976 and 1983. The 1959 building included the admin wing, a classroom wing and the gym. The 1966 addition added a single story classroom wing to the west that includes the current music room. The 1976 project included renovations to the entire building plus four additions. The additions included a two story wing to the front of the building for special ed and science on the first floor and the library on the second floor; the industrial arts wing; locker rooms and an expanded cafeteria. The original two story classroom wing was fully renovated in 1983 after fire damaged the wing. Refer to the key plan below. Although there have been some upgrades and maintenance repairs over the years, no further major renovations or additions have been done to the school since 1983.

BJHS Key Plan



Brunswick Junior High School

BJHS Site
(North is to the top)

The school is a one and two story building, of approximately 98,380 sf, that is primarily of steel frame and masonry construction. It is located on what is now a relatively flat site of about 29± acres that is shared with the adjacent Coffin Elementary School, which is located to the right (east) of BJHS in the photo above. The site also includes two athletic fields used by the junior high – one to the north and one to the west of the building. Refer to Tab 7 for existing plans.

In addition to the main building, there are also two double portables. One is located between the arts wing and the cafeteria (center in the picture above). The second portable (shown below the first portable) has since been relocated, for code reasons, to the upper left of the end of the arts wing. Refer to the key plan on the previous page.

The school currently houses approximately 536± students in grades 6, 7 and 8. The student population was as high as 650 to 700 students but has decreased significantly in the last few years primarily due to the closing of the Brunswick Naval Air Station. The expectation, however, is that enrollment will slowly increase in the future as the Naval Air Station is redeveloped. Any planning for future renovations or additions to the junior high school should take growth in the student population into consideration.

Architectural

Building Exterior

The exterior of the building is predominantly of brick veneer. There are a few locations of wood siding but it is limited. Overall, the brick is in good condition although some areas need to be cleaned and repointed where moisture has caused discoloration of the brick (potential mold issues) and deterioration of the mortar from water draining over the roof edge and down the face of the wall. Correcting the roof drainage should be a priority to eliminate the continuing moisture problems, which will only continue to be detrimental to the brick veneer as well as to the windows.

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Staining of brick at south wall of Gym

(Note: Wall panels at gym were installed in 2000)

There have been a variety of window types used relative to the different additions and renovations. Aluminum windowall was used on the original 1959 building along with the 1966 classroom addition. The 1976 additions and the 1983 renovations used non-clad wood windows. There is glazed aluminum storefront at the main and gym entrances. All glazing appears to be insulated glass. It has been reported that much of the original windowall is leaking. In addition, some of the wood windows are rotting. This is particularly evident at the clerestory windows of the 1976 classroom addition. The windows in the gym are translucent wall panels – Kalwall - that were installed in 2000. Replacement of the original windowall and the rotting wood windows should be a priority and are currently included in the capital improvement budget. Replacement of the remaining wood windows in the two story wing, although not a high priority, should be considered for a future project.

Original 1959 Windowall

Brunswick Junior High School

Rotting wood windows

1976 clerestory windows (Note: wood siding above windows)

The majority of the exterior doors and frames are hollow metal and are original to their respective construction. A few of the original hollow metal doors and frames have been replaced with aluminum doors and frames, such as at the gym entrance, FLS and the art room. The current main entrance is also aluminum.

Aluminum Entrances

Main Entrance

Gym Entrance

Many of the exterior hollow metal doors and frames that are not in protected locations are showing signs of rust and deterioration of the finish. The hollow metal doors and frames that are in the worst condition should be considered for replacement. Those doors that are currently unprotected and most vulnerable to damage caused by moisture and rusting may want to be replaced with heavy duty aluminum doors and frames. Other doors and frames that are in more protected locations may be able to be repaired and repainted depending on the level of rust damage.

Exterior Hollow Metal Doors & Frames

1976 Arts Wing

1966 Classroom Wing

Brunswick Junior High School

All of the roofs are of a single-ply rubber membrane that is fully adhered typically over a base of rigid insulation. The one exception is the roof on the two-story classroom wing, which includes a layer of stone for ballast that is typically installed over top of the loose laid membrane to keep the membrane in place. The roof on the classroom wing was done in 1983 during the fire restoration.

Fully adhered rubber membrane roof

1966 wing looking east

1976 arts wing looking north

The roofs all drain internally to roof drains that are installed in sumps. There was a reroofing project done in 1992 that originally included installation of tapered insulation to improve drainage to the drains but apparently much of the tapered insulation was deleted around the outer areas of roof that has resulted in those areas being flat with no pitch. It is not known why areas of the tapered insulation were deleted. The lack of tapered insulation over much of the roof is a contributing factor to water draining over the edge of the roof and down the face of the building impacting the windows and the brick. Consideration should be given to correcting this condition in the near future to eliminate the drainage problems by adding a raised curb or parapet or reroofing the affected areas and adding tapered insulation.

Typical roof drains set in sumps

The non-ballasted membrane roofs appear to be about 15 to 20 years old. However, some of the roofs have been renovated within the last 10 years with an extended 15 year warranty. While there have been reports of occasional leaks, it is understood that they have been repaired at the time they occur.

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Building Interior

The interior of the building has been reasonably maintained over the years even though very little has been updated since the last renovations in 1976 and 1983.

There are a variety of flooring materials used throughout the school, including carpet, vinyl asbestos tile, vinyl composition tile and ceramic tile. Carpeting is installed in many of the corridors and in some classrooms. The older office areas and classrooms have vinyl asbestos tile. The newer classrooms have vinyl composition tile. Toilet rooms are generally ceramic tile although some of the toilet rooms have had the ceramic tile replaced in recent years with porcelain tile. The main entrance lobby is concrete slab.

In many instances, the carpet in the Admin area and in the 1966 wing was installed over the original vinyl asbestos tile. Some of the areas that originally had vinyl asbestos tile have had vinyl composition tile installed directly over the asbestos tile thus encapsulating it. A few areas have had the asbestos tile removed and replaced with new flooring. The carpets in most areas are past their useful life and should be considered for replacement. At the time the carpeted areas are replaced, whether it is with new carpet or vinyl composition tile, the original asbestos tile should be removed at that time.

Interior Finishes – Suspended Ceilings, Painted Masonry Walls, Carpeted Floors and Wood Doors & Frames

1959 Admin & Classroom Corridor

1966 Classroom Corridor

The gym floor is wood and generally in good condition but is in need of refinishing to restore it to its original condition. The adjoining small gym has a resilient floor and is in reasonable condition. The fitness room and locker rooms are painted concrete while the toilet and shower areas are ceramic tile.

Gym Spaces

Main Gym – Wood Floor

Small Gym – Resilient Floor

The interior walls vary from concrete masonry, brick and gypsum wallboard depending on when it was constructed or renovated. Most of the walls have a painted finish which is generally in good condition. The middle section of classrooms added in 1976 have demountable metal walls that are original to the addition and it does not appear that they have ever been moved since originally installed. The west wall of the main gym, common with the stage, is wood paneled.

Suspended acoustical tile ceilings are the predominant ceiling type throughout many areas of the school such as classrooms and corridors. The ceilings in the music room, chorus room, art classrooms and the gymnasium all have an exposed steel structure. The music room and gym have an exposed acoustical deck (Tectum) while the chorus and art rooms have an exposed metal deck. The 1976 classroom and the small gym additions have an exposed wood structure with an acoustical deck. The main entrance and lobby have a suspended metal ceiling.

Painted Metal Deck in Art/Chorus

Metal Ceiling in Lobby

Most of the suspended ceilings are in reasonably good shape. Some of the ceilings in the 1966 classrooms have some tile that have been displaced and may just need some readjustment. The painted finish on the exposed metal deck in the chorus and art rooms is peeling off and needs to be stripped and refinished. The peeling is probably attributable to incompatibility between the metal deck and the paint. The metal ceiling in the lobby has loose sections and the original integrated lights are no longer used. This ceiling should be considered for replacement.

Interior doors are generally wood throughout and have a stained finish. Wood doors with painted wood frames were used in the 1959 and 1966 portions of the school. Wood doors with painted hollow metal frames were used in the 1976 addition and 1983 renovations. The interior doors are in reasonably good shape. Most all of the interior doors have been retrofitted with lever type hardware for ADA compliance.

A number of classrooms have operable or movable partitions between them. Some classrooms have an accordion partition that is quick and easy to operate but lacks adequate acoustical properties. Other classrooms have operable panel

walls that are more difficult to operate, take up more room, but offer better acoustical separation between the rooms. The major drawback to either type of partition is that the wall space is typically not usable, except for some pin-up space, and they do not allow for power or data on them. Some of the operable panel partitions are not operated as they have had equipment attached to them making them inoperable. It was reported, however, that some teachers like the option of opening two rooms for collaborative teaching and therefore make full use of the operable partitions.

Operable Partition (Fixed) - 1983

Demountable Metal Wall - 1976

In the 1966 classroom addition, settlement of the floor slab within the individual classrooms has occurred. It was reported that settlement started shortly after the addition was completed. The settlement is more significant towards the western end of the wing where as much as 5" of settlement has occurred in one classroom. For additional information, refer to the structural portion of this report.

Site

As noted previously, the school shares a 29± acre site with the Coffin Elementary School and the school department's bus garage. Both schools share driveways and parking. Between the schools footprint and the adjoining athletic fields, a majority of the site is utilized by the junior high school.

The shared driveways, which are used by both buses and parent vehicles, have raised concerns about student safety, particularly for the younger kindergarten and first grade students at the Coffin School. Reconfiguration and separation of the driveways to separate bus and parent use and to separate traffic from each school is highly recommended. Although the hours are staggered between the two schools there is substantial traffic congestion in the morning and afternoon hours when school is starting and letting out.

Brunswick Junior High School

Shared Main Driveway

Coffin School (left), Boiler House (middle left) & Junior High School (right)

There is one large parking lot shared by staff and visitors for both schools that accommodates approximately 109 vehicles. There is some designated parking along the main driveway in front of the junior high school and adjacent to the boiler house. Between the two schools, there are a total of about 169 parking spaces including designated handicap spaces. It has been reported that the total number of spaces currently provided is inadequate during certain events.

According to the Brunswick Zoning Ordinance, the amount of off-street parking needed for the two schools would be what is "appropriate to the circumstances". A reasonable amount of parking would likely be one per teacher and staff person, plus a few visitor spaces. This calculates to approximately 100 spaces for the needs of the Junior High School. This amount of parking would require four ADA accessible parking spaces. There are presently three accessible parking spaces north of the Jr. High main entry walk, with an accessible ramp to the walk. There are also two accessible spaces on the main drive next to the Boiler Building, with an accessible ramp on the south end of the Jr. High entry walk. These five accessible spaces are a sufficient ratio for up to 150 standard parking spaces.

Cars also park along the shoulder of the main entrance drive from Columbia Avenue in non-marked spaces. The parking along the drive and at the building entrance should be discouraged with signage, since it contributes to traffic congestion. The main entrance drive is the primary route for the buses to drop off and pick up students for both schools. After buses complete their routes for the Junior High, they make a second run for students attending the Coffin School, staggering discharge times to minimize parent traffic congestion.

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Overall, the driveway and parking pavements are in acceptable serviceable condition, without significant deterioration. A program of patching cracks with hot-applied flexible crack sealer will help prolong the pavement life by keeping water from saturating the cracks and accelerating break-up. Currently there is no fire truck access drive around the west and south sides of the building. Historically, the maintenance crews have plowed a roadway around the building on the grass during the winter. A gravel or paved access drive approximately 10 feet wide would be recommended around the building. There are also approximately four doorways around the building that open on to lawn areas with no walkway. In the winter these doors must be accessed with a shoveled path away from the building for emergency exit. Gravel or paved walks should be constructed to each exterior door to facilitate snow removal and emergency exiting, and perhaps could be combined with a new fire lane.

Main Drive at Parking Lot

Shared Parking Lot

There is some site lighting around the building and in the parking lot but may be in need of improvement. There are wall packs mounted on the building at various locations It is reported that lighting at the back of the gym could be increased and that the parking lot is poorly lit at night.

There are two primary athletic fields that serve the junior high school but their usage is limited. The field to the north is used for field hockey, while the field to the west is used for soccer. Both fields are in good shape. Softball, baseball and lacrosse are held off-site with softball and baseball being held at Edwards Fields adjacent to the Jordan Acres School and lacrosse being held at Crimmins Fields. The school does not have a football program.

Athletic Field (Field Hockey) at North Side of Site

Accessibility

The original building, and all the subsequent additions and renovations, pre-date the implementation of ADA. However, the law, originally passed in 1991, requires any public accommodation, such as a school, to make modifications to ensure reasonable adjustments have been made or implemented to accommodate those with disabilities. As of March 15, 2012, the 2010 edition of ADA is in effect in Maine.

The majority of the building and the respective functions are on one level. The second floor of the classroom wing and the library are accessible by an elevator from the main lobby, however, the elevator at the second floor level can only be accessed through the library itself. In addition, the current elevator, which was installed in 1976, does not meet current ADA requirements for cab size, door width and controls. A new elevator, of proper size, should be installed in a location that can directly access both floors without having to go through another space.

The music room and the stage are also at different levels than the first floor. Two vertical lifts have been installed – one at each location – to provide access to those two functions. It does not appear that the lifts are used frequently as both are blocked by furniture.

Elevator & Vertical Lift

Elevator in Main Lobby

Vertical Lift in Music Room

None of the student toilet rooms and most of the staff toilets rooms are not handicap accessible. A couple of single user toilets have had modifications made to them to provide limited accessibility but they are not fully compliant as they lack proper clearances, fixtures, pipe protection and grab bars. The existing toilet rooms should be fully renovated to provide compliant and accessible fixtures, paths of travel and maneuvering clearances. New fixtures would also offer water

savings.

Drinking fountains are also of the wrong type and configuration. The existing drinking fountains should be replaced with new fixtures that are mounted at the correct height, have the proper clearances and the proper controls.

Student & Staff Toilet Rooms

Non-Compliant Student Toilet Room

Non-Compliant "Handicap" Toilet Room

The main entrances to the building – main lobby and gym lobby – are accessible with no level change at the doors. Most doors throughout the building are compliant for proper width, adequate clearances and lever type hardware. However, doors equipped with closers should be checked for proper opening force. Transitions between different floor materials appear to be acceptable.

ADA compliant signage identifying all occupied spaces is lacking.

Code

Current codes in effect in Maine: 2009 IBC (Building Code), 2009 NFPA 101 Life Safety Code. A few of the major code deficiencies are as follows:

- The building is only partially sprinklered. The two-story classroom wing is fully sprinklered and only portions of the 400 wing are fully sprinklered. In an unsprinklered building, corridor walls are required to be a minimum of 1-hour rated and doors opening into the corridor are required to be rated and self-closing. The unsprinklered sections of the building do not comply with these requirements. When a building is fully sprinklered, corridor walls do not need to be rated and must only prevent the passage of smoke from adjoining spaces. In addition, the doors opening into the corridor do not need to be rated nor self-closing. It should be considered a priority to complete the sprinkler system throughout the building.
- The second floor requires two means of egress to the exterior. The main stairs in the lobby is one of two means of egress from the second floor however it does not meet code requirements for a having a rated enclosure that is continuous between floors and exits directly to the outside. The stairs are open to the lobby, are unprotected at the first floor and exit into a non-rated space. Either a new protected second means of egress should be added or the existing stairs should be fully enclosed and provided with a protected means of egress to the exterior.

- § Both the fire alarm system and the emergency lighting system need to be upgraded to current code requirements. Refer to the electrical section of this report.

Educational Adequacy

Utilizing the state average of 152 sf per student for recent state and locally funded middle schools, the design capacity for Brunswick Junior High is estimated to be about 647 students based on a gross building area of 98,380 sf. Current student enrollment is about 536± students. This would indicate that the existing building is under capacity or underutilized. However with two double portables still in use today indications are that the existing building is lacking sufficient area to properly accommodate all of the required programs.

The school is organized by team with two teams per grade level. Working within the constraints of the existing building, the teams attempt to be clustered together. The only exception to this currently is one 7th grade classroom that is located in the 6th grade wing. This could possibly be corrected by relocating the guidance suite out of the 7th grade classroom wing.

The size and number of general classrooms appears to be adequate. Current guidelines suggest classrooms be about 800 sf. Most of the classrooms tend to be slightly below that figure. Most of the science rooms are adequate but lack appropriate prep and storage areas in a reasonable location for each class to access.

The music room is one large room that appears to be adequately sized. It accommodates both classroom and practice space. The music room is adjacent to other classrooms where noise transfer would be a problem. The floor level of the music room is lower than the rest of the building and thus must be accessed by stairs or a vertical lift. There is an adjacent office but the program lacks proper storage for instruments. There have been reported leaks at the foundation and floor, which is below grade, and at the roof in the same general area.

The chorus room and classroom are located down the hall in one of the former industrial arts rooms. The chorus room shares space with the art program and an ESL program. The chorus room lacks any storage and is undersized for the program. Ideally the music and chorus programs should be adjacent to one another.

The art program consists of two undersized high bay studio spaces that have been sub-divided from a former industrial arts room. There is adequate storage, however the kiln and some storage is located in the same space as the chorus room.

The library, which is located on the second floor, provides an abundance of

space for student use, both study and stack areas. The office and workroom is however undersized for a library of this size. One of two computer labs plus the computer office is located within the library. Access can only be made through the library. As stated previously, the one elevator in the building lands directly in the library. When it was designed, it probably allowed public access to the library after hours directly from the main lobby and was not considered as a means of handicap access to and from the second floor. Use of the elevator appears to be unrestricted with staff and students using frequently during normal school hours.

The following highlights some of the programming areas that need to be addressed:

- Eliminate the two double portables and provide appropriate space within the building for foreign language, gifted and talented, and alternative education programs.
- Locate foreign language classrooms together.
- Reorganize and expand the administrative area to provide adequate space and to improve the operation and security of the building.
- Relocate the guidance area to a more accessible and centralized location. This may be tied into an expanded administrative area.
- Provide a full-service kitchen by expanding into the adjacent Special Education classroom.
- Provide additional program space for Special Education programs that would include the displaced program noted above and more appropriate space for the Functional Life Skills program.
- Develop a fully integrated fine arts wing with proper space for the art and music programs. This may include adding space and reconfiguring the existing space.
- Review the arrangement of the classrooms to better support the organization of the team model.

Brunswick Junior High School

Existing Structural Systems

Structural Systems Description

Roof Framing

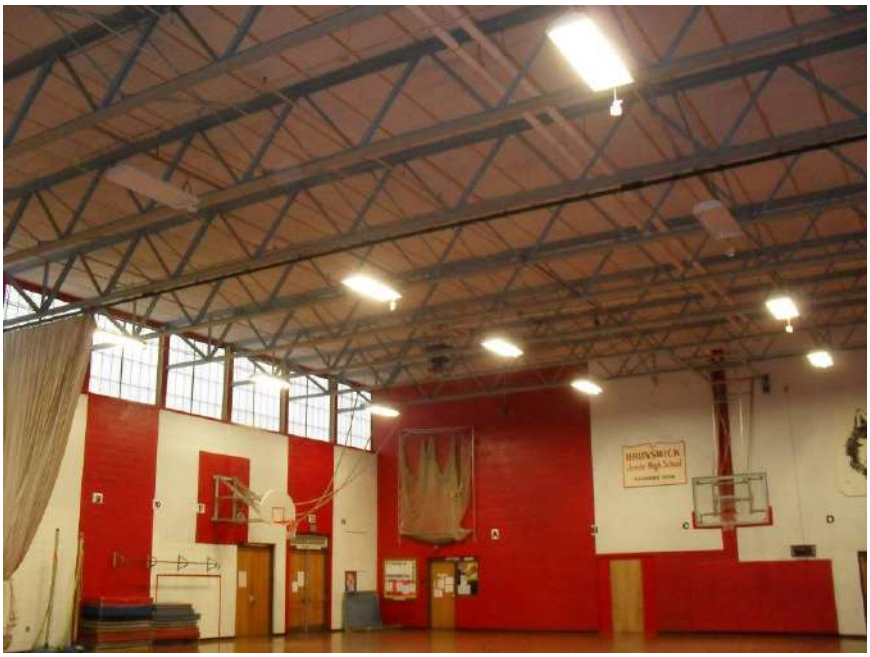
The existing roof framing varies throughout the school depending on the year of construction. The majority of the framing consists of open web steel joists supported by steel beams and masonry bearing walls.

Typical Roof Framing

The roof framing in the gymnasium consists of Tectum decking and steel bulb tees spanning to open web long-span steel joists. Although the spacing could not be verified, it appears that they are approximately 6 feet on center and span to steel wide flange columns which are supported by the masonry bearing walls on both sides of the gym.

Brunswick Junior High School

Roof Framing at Gym



There are also areas of the building that have Tectum roof decking and glued-laminated wood beams.

Glulam Roof Framing

Brunswick Junior High School

Foundations

The building foundations consist of reinforced concrete walls and perimeter strip footings. The interior columns are supported by concrete spread footings.

Findings

Due to the various ceiling materials, the majority of the roof framing was not visible during our site visit. No demolition was performed to expose any framing. In general the structure appears to be sound, and no obvious deterioration or damage was visible. It should be noted that no structural analysis was performed to determine adequacy of any members.

According to documents obtained, it appears that several roof areas were reinforced as a result of a re-roofing project completed in 1995. Additional framing members were installed in low roof areas to accommodate the snow drift loads that are created at high/low roof conditions.

Noticeable slab settlement has occurred in the 1966 classroom wing. The severity of the settlement varies, but it appears to be greatest at the far end of the wing near the music room.

A laser level was used to help determine the magnitude of the settlement in several classrooms. In classroom 312 the measurements revealed as much as 5" of settlement in some areas of the room.

Slab Settlement in Classroom Floor

It is our understanding that the floor settlement has been present for a very long time, and the flooring and wall base trim have been adjusted accordingly.

The slab settlement was likely due to poor compaction of the subgrade below the interior slabs. There are several ways to address the issue. One method would be to remove all floor finishes and place a leveling material on the slabs to bring them back to the correct elevation. This solution likely won't work since the extra weight of the new material will likely cause additional settlement to occur. We could also attempt to pressure-inject flowable grout under the slabs to raise them, but because the slabs have settled, it would suffer severe cracking if they are elevated as much as 5". The only real long-term solution would be to remove the existing slabs and properly compact and possibly replace the subgrade material prior to pouring new slabs. This would be very costly and an unwise investment for a building of this age and condition.

Brunswick Junior High School

Existing Mechanical Systems

System Summary

The current Brunswick Junior High School was originally opened in 1959. Additions were added in 1966, 1976 and 1983. The 1959 building included the admin wing, a classroom wing and the gym. The 1966 addition added the single story classroom wing to the west that includes the music room. The 1976 work included four additions and renovations to the entire building. The additions included a two-story wing for special education and the library, the industrial arts wing, locker rooms and an expanded cafeteria. Due to a fire, the original two story classroom wing was fully renovated in 1983. No further major renovations or additions have been done since then.

In approximately 2006, the dedicated Coffin and Jr. High boiler rooms were abandoned and replaced with a central plant that serves both Coffin and the Jr. High School today. The centralized boiler plant was originally designed around No. 2 oil, with future plans to burn natural gas. Around 2008, natural gas was delivered to the site and the boilers were reset to burn natural gas.

System Description

The three boilers that were installed in 2006 are manufactured by Buderus. Each of the boilers is equipped with dual fuel Riello burners. Boiler number one has a gross rating of 1,951 mbh and a net rating of 1,697 mbh. The remaining two boilers have a gross rating of 2,822 mbh and a net rating of 2,454 mbh. When the boilers were converted to burn natural gas a few years ago, the oil piping coming into the boiler room from an underground oil tank were cut, capped and abandoned in place.

Figure 1 – Cast Iron Boilers

The boilers produce a maximum of 180 degree heating hot water which is distributed throughout both Coffin and the Jr. High school. A three way valve located in the central boiler room is designed to reset the heating water temperature based on outdoor air temperatures. Each of the two schools is served by a pair of dedicated end suction base mounted pumps installed in October of 2008 which are also located in the central boiler room. The four 3 hp pumps are manufactured by Taco with model numbers FI3007. They are each rated for 285 gpm at 30 ft of head. Each of these pumps is also provided with a dedicated variable speed drive. A set of 5" steel HWS & R lines exit on the opposite side of the boiler room that run underground to each of the two schools.

Figure 2 - HWS&R mains exiting the boiler room feeding the BJHS

Figure 3 - HWS&R mains exiting the boiler room feeding Coffin

The natural gas piping enters the boiler room at the side of the room facing Coffin. The 4" steel gas entrance enters into the back side of the boiler room then braches off to feed each of the boilers. The gas mains for each boiler are 3", with a 2" line connecting to the burners.

Figure 4 - Gas entrance into boiler room

Figure 5 - Three way boiler reset water control valve

The hot water supply and return piping enters the Junior High School in the corner closet adjacent to the Special Ed classroom area. From this room the HWS & R piping is distributed throughout the entire school, feeding terminal heating devices such as unit ventilators, fin tube radiation, cabinet unit heaters, duct-mounted heating coils and hung unit heaters.

Figure 6 – Corner of building where HWS&R enters JHS

Brunswick Junior High School

The primary heating source for each of the classrooms in the existing facility is currently being accomplished with fin tube radiation and/or unit ventilators. Common spaces like corridors, vestibules and entryways are being heated by convectors or cabinet unit heaters.

Over the recent several years (2006 to present), the primary ventilation system for the 200 wing classrooms, a portion of the 300 classroom wing and the cafeteria was upgraded with the installation of 9 rooftop energy recovery units and one inside energy recovery unit. These units range in airflow capacity from 1,500 cfm down to 380 cfm. These units are all manufactured by Renewaire except for the Cafeteria unit, which is manufactured by Cook. A significant amount of the ductwork serving the 200 wing is exposed to the elements and located on the roof. The ductwork serving the 300 wing area is located within the facility however it is exposed along the common corridor. During the 1983 renovation of the classroom wings (100 and 200), new ceiling hung unit ventilators were provided. Outside air was brought into the backs of the UV's via ducts that were connected to exterior wall louvers. Independent barometric pressure relief dampers and louvers were provided to account for relieving the air to the outside. Some of the ductwork associated with a couple of these units is exposed with exposed heating coils and associated piping. A five ton Trane rooftop cooling only unit was also recently provided for the Administration area of the facility. Its ductwork is primarily exposed within the space.

Figure 7 - Typical rooftop energy recovery unit

Brunswick Junior High School

The primary source for domestic hot water is provided by a natural gas fired direct vent hot water heater. The water heater is manufactured by Munchkin. The model number is 399VWHPS R2. Its input capacity is 399.9 mbh. The DHW is connected to three 115 gallon Superstor tanks. This water heater is relatively new and should last for several years to come. There is a DHW recirculation loop throughout the facility. The recirculation pump is located adjacent to the storage tanks. Reports are that the pump still takes significant time to get hot water out to the more remote parts of the school. Further investigation revealed that during the 1983 construction work in the 100 and 200 wings, the DHW recirculation loop piping was actually disconnected. We believe that if the piping in this area is reconnected to the primary recirculation loop, the time in which it takes to get DHW down to the ends of the 100, 200 and 300 wings will be dramatically reduced. There are also a couple other isolated electric water heaters located within the school. One in the health sciences wing and one in the Special Ed wing.

Figure 8 – Primary Domestic Water Heater Nameplate

Figure 9 - Three 115 gallon DHW Superstor tanks.

The temperature controls in the facility are a combination of pneumatic and DDC control. Reports are that this system has not provided consistent temperature control throughout the facility. Some areas are quite warm while others can be quite cool. The system as installed is Siemens and is also being serviced by Siemens.

Figure 10 – Exist Pneumatic Control Panel

The kitchen which is located directly off the cafeteria is only used as a warming kitchen. It is equipped with a couple of commercial ovens and a commercial dishwasher. During the end of 2011 and the first of 2012, a new roof mounted energy recovery unit was installed to provide a higher level of ventilation. A duct mounted hot water heating coil is located in the supply duct main just as it drops through the suspended ceiling outside the Ala Carte area of the cafeteria. The duct work is all exposed in the cafeteria. At the time of our site visit, the system had not been activated and automated by the control system. At the time of this writing, we have been told that it is now completely automated and operational.

Figure 11 – Kitchen Ovens and Dishwasher Hood

The sprinkler system enters the building in the storage area adjacent to the kitchen. The line size coming in is 4". Based on conversations with staff and site observations, only the common areas are served by this sprinkler system such as the kitchen area, corridors and other sporadic areas around the school. Occupied spaces such as classrooms and offices are not outfitted with adequate sprinkler systems.

Figure 12 – Sprinkler Entrance

The plumbing fixtures appear to all be original. The water closets are approximately flushing at 3.5 gallons per minute and the urinals are flushing at 1.25 gallons per minute. No handicap fixtures were noted throughout the school.

Figure 13 - Typical Water Closet

Figure 14 - Typical Urinal Bank

Recommendations

Temperature Controls

Remove all of the pneumatic control system and accessories. Opinion of probable cost - $25,000.

There are reports that the school has experienced areas where the temperature is not consistent. We believe that most of these issues can be resolved with modifications to the control strategies. We recommend removing any remaining pneumatic system control which includes all controllers, air compressor, dryers, tubing, actuators, sensors and all other associated accessories. These areas are primarily in the gymnasium wing. The Siemens Apogee DDC system should be expanded to cover the entire facility. This control system will be expanded by Siemens and will all be mapped back to the main head end in the Facility Director's office. Opinion of probable cost - $50,000.

Replace the electric controls in room 403 with DDC. Opinion of probable cost - $2,500.

Gym Ventilation System

The existing gymnasium area does not currently have any type of ventilation system (natural or mechanical). We would recommend that a new ducted heating and ventilation system be designed and provided for this area. This system would all be automated through the DDC system. Opinion of probable cost - $325,000.

Heating Terminal Units

The only area where we saw any real need for terminal unit replacement was in the original parts of the building that have not been renovated to date. If the school is renovated, we would recommend replacing the baseboard radiation enclosure covers, as quite a few of them are damaged. We would also recommend that each of the areas that are reported to be under heated, be evaluated for terminal unit capacity versus actual load for the spaces as well as potential control issues. Opinion of probable cost – $25,000.

Boiler room

The existing boiler stacks are original and were not replaced with the boiler installation in 2006. Recommend replacing boiler stacks. Opinion of probable cost - $28,000

Sprinkler

Because the building is not completely covered by the sprinkler system, we would recommend expanding coverage throughout the entire facility. Opinion of probable cost - $2.00 per square foot of area not currently covered.

Plumbing

Since all of the plumbing fixtures appear to be original, we would recommend replacing them with low flow fixtures. Even though there are several handicap stalls located throughout the facility the plumbing fixtures located within the stalls are not handicap accessible and will also be required to be brought up to comply with ADA requirements. Additional modifications will be required to make all lavatories and toilets accessible as well. Opinion of probable cost - $1,000 per fixture.

Reconnect DHW recirculation loop piping in the connecting corridor area of the 100, 200 and 300 wings. Opinion of probable cost - $24,000.

The existing gas fired domestic water heater located on the Mezzanine above the stage is not currently DDC automated. Recommend providing full automation. Opinion of probable cost – $12,000.

Brunswick Junior High School

Existing Electrical Systems

Electrical Service & Distribution

The Brunswick Junior High School is served by three 50kVA (150kVA total) transformers located in a locked vault. This 208V-3Ø-4W service is fed from an underground primary distribution system originating at the utility pole in front of the school. Information from Central Maine Power indicates that the maximum demand to date has been 136 kW.

Transformer Vault & CMP Metering Cab.

The existing electrical service consists of multiple main disconnects that have been added over the years as the school has been expanded. The original electrical service was rated for 400A at 208/120V, and is located in an electrical room that backs up to the transformer vault. This room is very small and does not provide the clearances required by the NEC. Also located in this room are the main disconnects for the following 1976 additions; "Shop/Home Economics" (600A-208/120V), "Media-Center/Library" (400A-208/120V) and the "Gym/Cafeteria" (100A-208/120V). All main disconnects are circuit breaker type, the main distribution panel is switch and fuse. As the school has expanded distribution panels have been added and are fairly well distributed. This provides efficient electrical service to loads throughout the school. Sub-panels serving branch circuits are scattered throughout and are of many different manufactures/types, most of which are no longer manufactured.

Brunswick Junior High School

Main Disconnects:

Typical panel (L6) located in corridor near Gymnasium.

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Sub-Panel (LG) located in Gym Storage

Sub-Panel (L5) located in Stage area

Sub-Panel (PM) in Shop Wing

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Sub-Panel (PW) in Shop Wing

Distribution equipment (MDP1) in Media Center wing. (FPE switch & fuse)

Distribution equipment (MDP2) in Shop wing. (FPE switch & fuse)

Analysis

- The equipment that comprises the service entrance is in violation of the National Electric Code because of lack of required clearances.
- Also, there may be a mistake in the labeling of the mains for MDP1 and MDP2, this should be verified.
- The capacity of the existing service is currently limited by the transformers located in the vault to 150kVA, this is very low for a building of this size (98k SF +/-). Totaling the capacities of the main disconnects (Original - 400A@208V/3Ø), (Shop - 600A@208V/3Ø), (Library - 400A@208V/1Ø), (Gym - 100A@208V/1Ø) shows the service is rated for approximately 432kW. Maximum demand to date from CMP indicates that this service is loaded at 136kW, typical power factor may be .9+/-. Therefore, if this service is loaded at 151kVA +/-, transformers in the vault are fully loaded.
- Most of the existing sub-panels appear to be original (installed when the respective additions were built), between 30 and 40+ years old. Much of the equipment is from manufacturers that are no longer in business and other equipment has been discontinued and is no longer supported by replacement parts.
- The panels located in the Shop/Home Economics wing are relatively new and in good condition.

Recommendations

The existing service entrance equipment should be upgraded, reducing the number of mains and providing required clearances and additional capacity if necessary. All of the older sub-panels should be replaced with new panels providing additional circuit capacity and maintainable equipment. Additional transformer capacity will be required if additional loads are added to the building.

Brunswick Junior High School

Lighting

The Brunswick Junior High School is served primarily by lensed fluorescent fixtures; recessed troffers, corridor wraps, pendant wraps, etc… There are high-bay fluorescent fixtures in the Gymnasium, vapor-tight fixtures in the Locker rooms and a few bare strip fixtures in corridors and utility spaces. The majority have recently been upgraded to T8 lamps and electronic ballasts. There are occupancy sensors controlling lighting fixtures in most classrooms and offices. The Gymnasium has occupancy sensors on each fixture, controlling each fixture On/Off independently. The Main Lobby has many recessed fixtures (previously exterior) that have been discontinued and are no longer operational. Most areas appear to be properly illuminated with fixtures spaced at a reasonable distance. There are some rooms in the two-story, 1959/1983 Wing that have "cove" lighting that could be operated more efficiently. All exterior fixtures appear to utilize metal halide lamps and are a combination of wall packs, flood lights and canopy fixtures.

Typical Lighting Fixtures

Surface wraps & discontinued recessed. (Main Lobby)

Brunswick Junior High School

Lens troffers
(Corridors)

Pendant Wraps
(Office)

Brunswick Junior High School

Romex - passing through ceiling tile.

High-Bay fluorescent (Gymnasium)

Brunswick Junior High School

Vapor-Tight & Occupancy Sensor (Locker Rooms)

Pendant Wraps (1976 Classrooms)

Recessed Parabolic (Computer & Library)

Brunswick Junior High School

CFL Sconce
(Library Stair)

Industrial fixtures
(Shop Areas)

Brunswick Junior High School

Flood Lights at front of school

Canopy lights

Brunswick Junior High School

Exterior Wall Pack (Typical)

Analysis

The existing lighting fixtures throughout the facility have been upgraded to T8 lamps and electronic ballasts (T5 lamps in Gymnasium), are in relatively good condition and appear to provide adequate illumination. Most spaces have automatic controls to shut off lights when spaces are not occupied. Few, if any rooms/spaces appear to be candidates for day lighting controls, as there are many tall trees around the school. None of the exterior fixtures are full-cutoff, this creates a lot of glare and could lead to light trespass complaints from neighbors.

Recommendations

- General maintenance only is required for most lighting throughout the school, as most fixtures are properly spaced and operating efficiently.
- The few fixtures in public spaces that have bare lamps exposed should be replaced with new fixtures with lamps protected by lens.
- Lighting levels in the Library stair should be supplemented as the existing fixtures do not provide enough light (immediately) for safe passage. It takes a while for the CFL lamps to come up to temperature and even then lighting levels are very low.
- Cove type lighting in classrooms should be reviewed closely and most likely be eliminated to provide a more efficient installation.
- Exterior lighting should be considered for replacement with more efficient LED full cutoff fixtures.
- Romex is not approved for use other than as building wiring. All fixtures being fed with romex through ceiling tiles should be retrofitted with cords through canopies and junction boxes. It is a code violation to run wiring through building finishes.

Brunswick Junior High School

Emergency Lighting

This school is primarily served with central emergency battery units and remote emergency heads and exit signs; there is no emergency generator. Some self-contained emergency battery units with integral emergency heads are being used to supplement the remote emergency lighting heads. Many of the existing exit signs were identified as being in a state of disrepair.

Exit Sign (Gymnasium)

Exit sign in disrepair

Brunswick Junior High School

No Exit Signs are visible (approaching Main Lobby)

Remote heads and exit signs (typical)

Emergency Battery Unit

Brunswick Junior High School

Analysis

There are many areas throughout the school that do not appear to have sufficient emergency lighting and exit signage coverage. Life Safety codes require an average of 1 foot-candle of illumination throughout all paths of egress. The spacing of the existing emergency lighting units appears too great to be able to provide the required illumination. Life Safety codes also require that all areas have two properly marked means of egress. In some locations no exit signs can be seen at all. The Main Lobby and the 1976 Library wing are examples of areas not meeting this code requirement. In discussions with the Custodial Staff we have learned that routine testing of the emergency lighting units is being done. It is critical to continue this practice to assure proper operation of equipment during a power outage/emergency. It was noted, that much of the existing equipment appears to be original, some of which is in an advanced state of deterioration and should be replaced.

Recommendations

A complete upgrade of the emergency lighting and exit signage should be planned. The entire facility should be reviewed with properly spaced emergency lighting being installed in all paths of egress and exit signs being installed so that all paths of egress and required egress doors are properly marked.

Power Outlets-General Wiring

There are wall mounted grounded receptacles located throughout the school but there are many areas that do not have a sufficient quantity to provide receptacle service where needed. In many locations extension cords and plug strips are being used to overcome the lack of receptacles. The NEC does not allow extension cords to be used for permanent connection of equipment. Extension cords have been identified as a fire hazard and plug-strips increase the probability of over-loading circuits. No exterior outlets were observed in the site survey.

Surface receptacle has been added, but, plug-strip is still required to provide power for charging station.

Brunswick Junior High School

Plug-strip being used to serve desk area.

Wiring hazard and 120V wires entwined with data wiring can cause interference.

Surface mounted handy box and conduit (left-most) is fed with "free-air" THHN. This is a code violation.

Brunswick Junior High School

Romex wiring and open junction box.

Open box with discontinued wiring?

Analysis

Additional receptacles are required throughout the school to provide service where needed. In many locations this has been done, but, it appears (from the use of cords/power strips) there are many more areas that need additional receptacles. Exterior receptacle outlets should be added as needed to provide service for maintenance purposes. Also, it was noted that Romex has been used throughout this facility; current codes do not allow the use of this wiring method in this type of construction. If wiring is added to this school in the future, it should be done with an approved non-combustible material type. Also, the NEC requires the removal of all discontinued wiring. And as wiring/circuits are revised and no longer needed they should be removed completely back to the source.

Recommendations

Evaluate all spaces in detail to determine exactly where additional receptacles are required. This exercise will most likely require adding additional branch circuit panel boards to additional dedicated circuits. Strategically located exterior receptacles should be added as required for maintenance.

Fire Alarm

The fire alarm control panel is a Simplex 4005 and is located in the Main Electric room in the 1959 Wing; this system is still supported by the Manufacturer. The system communicates with Seacoast Security using an integral dual-line dialer. If/when an alarm condition is reported Seacoast contacts the Brunswick Fire Department. Occupant notification is accomplished with audio/visual units located in corridors and most toilets and classrooms. However there are many rooms/spaces in the 1959/1983 and 1976 Shop and Library Wings that do not have the required notification devices. Pull stations are located at many egress doors, but, there are others that do not have pull stations. No system smoke detectors were noted during our building survey.

Fire alarm control panel
In Main Electric room

Brunswick Junior High School

Annunciator in Main Lobby

Sprinkler System flow switch

Audio/Visual appliance in Boys Toilet

Analysis

The fire alarm control panel appears to be in good condition and is still supported by the Manufacturer. This control panel should provide adequate service until the entire system can be upgraded. There many locations throughout the school that are not properly covered by the existing audio/visual appliances. Also, there are many egress doors that do not have a pull station within five feet.

Recommendations

In the short term, audio/visual devices should be provided in all occupied spaces and pull stations should be provided at all egress doors. Long term plans should be to provide an addressable system, this upgrade will provide years of reliable service. The distribution and exact locations of system components should be updated as required to properly cover all areas and to accommodate any renovations. For Educational occupancies it is not necessary to provide smoke and heat detectors throughout, only very specific areas require these devices.

Voice/Data

Description

The internet connection to this school is fiber that enters adjacent to the Main Electric room and is then routed overhead (internally) to the Data Room. The phone system is by Avaya and is rack mounted in a Data Room that was carved out of a Classroom in the 1959 400 Wing. This system appears to be in service-able condition and is connected to the other school phone systems. Also, at this same location there is data networking and CCTV equipment, both rack and shelf mounted. This space is extremely small and difficult to work within. Voice/data outlets appear to have been added throughout the school as needed, with cabling strung and run haphazardly. In locations where multiple PC's are located, wireless hubs have been installed.

Brunswick Junior High School

Fiber Splice Boxes
(Main Electric Room)

Telephone Wiring
(Main Electric Room)

Brunswick Junior High School

Fiber Splice Box
(Data Room)

Phone System
(red cabling) CCTV
DVR's below.

Brunswick Junior High School

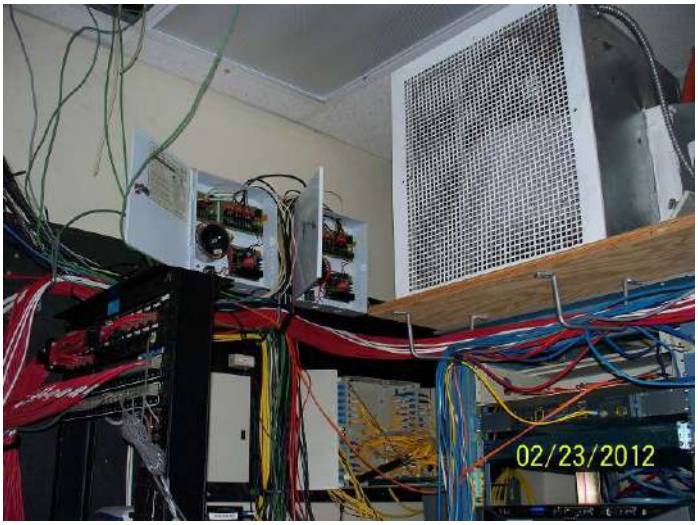
Data Networking patch panels and switches.

Back-Up batteries.

Brunswick Junior High School

Wiring passing through ceiling. (line and low voltage running parallel)

Shelf mounted ventilation fan.



Brunswick Junior High School

Data Room AC unit.

Remote rack in Shop Wing.

Brunswick Junior High School

Wireless hub (typical)

Network wiring parallel to line voltage wiring.

Data wiring through floor in Computer Room.

Computer Lab

Analysis

The existing space being used as a Data/Communications Room is very small and is completely full of equipment, not leaving any space at all for expansion. This room is so congested that proper clearances for working on equipment are not available. The existing phone system appears functional and should provide somewhat reliable service, providing the room does not over heat causing equipment failures. Voice/data infrastructure in the building is a combination of wired and wireless with most cabling being run concealed in the wall and above ceilings. There are some instances where data cables run through ceiling tiles to termination points; these cables are very susceptible to damage. Also, it appears that most spaces are lacking sufficient "drops" for telephone and data when compared to modern schools.

Brunswick Junior High School

Recommendations

Additional space should be allocated for voice/data/communications equipment to provide clear space for maintenance of existing equipment as well as space for future expansion. Connectivity should be upgraded to Cat 6, with additional jacks added in all rooms as necessary.

Intrusion Detection System

The existing intrusion detection system is made up of multiple 8-zone panels (located in the Custodial Office) and monitors exterior doors with magnetic switches and selected spaces with infrared motion detectors. All zones are remotely annunciated in a closet near the Main Lobby. The system is serviced by Northeast Security. Building occupants report that access to the building is very limited.

Security Panels (Custodial Office)

Security Panels and power supplies

Brunswick Junior High School

Remote Annunciators

Analysis

The existing system is outdated and should be replaced completely with a new system. An access control system with swipe card access should be included if necessary.

Recommendations

To provide the level of security required in schools today, a modern access control system should be installed that will monitor when people enter the school. It would also prevent unwanted people from entering the school.

Clock System

There is currently no working clock system in this school. There are many clocks throughout the school but none are synchronized. The old clock system is no longer functional.

Brunswick Junior High School

Lathem control panel in Main Office

Analysis

The existing "system" of clocks in not functional.

Recommendations

Install a new synchronized central clock system.

Intercom System

The existing intercom system is by Dukane and is located in the Main Office. This system interfaces with the phone system for classroom call-in and does class change with tones over speakers.

Main Console

Brunswick Junior High School

Typical wall-mounted classroom phone

Typical classroom speaker

Analysis

The existing Intercom system head end is functional and in good condition, discussion with office staff indicates system is functioning properly.

Recommendation

May consider upgrading intercom system with new central clock system, upgrade of intercom system probably not required at this time.

CCTV Surveillance Sys.

The existing camera system head end equipment is rack mounted in the Data Room. Cameras are located throughout the facility, both interior and exterior. All exterior doors are monitored and many selected interior and exterior areas are being monitored. The system is being installed and maintained by the on-site safety officer.

Brunswick Junior High School

Head-End equipment

Typical CCTV camera (Main Lobby)

Brunswick Junior High School

Typical CCTV camera (Gym Storage)

CCTV Camera in corridor and exposed wiring.

Exterior CCTV camera in courtyard

Analysis

The existing CCTV camera system is quite complete and appears to be very functional. It is located in a room that is very small, and needs more space. Much of the wiring has been strung down the halls and runs through the suspended ceiling system. This creates a potential for damage to the cables and is very insecure.

Recommendations

This system should be evaluated for inclusion into a complete access control system with remote monitoring. Wiring for this system should be addressed to increase security and improve reliability.

Door Lock Down System

There is no door lock down system. Visitors are to report to the main office upon entering the building.

Analysis - Not applicable.

Recommendations

Add a door lock down system to the building if necessary.

Card Access System

There is no door card access system.

Analysis - Not applicable.

Recommendations

Add a card access system to the building if necessary.