Oyster River Cooperative School District

Facilities & Program Analysis

OYSTER RIVER HIGH SCHOOL

OYSTER RIVER MIDDLE SCHOOL

MOHARIMET ELEMENTARY SCHOOL

MAST WAY ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

FACILITY
&
PROGRAM ANALYSIS

Oyster River High School
Todd Allen, Principal

Oyster River Middle School
Jay Richard, Principal

Moharimet Elementary School
Dennis Harrington, Principal

Mast Way Elementary School
Kristen Gallo, Principal

SAU # 5
Oyster River Cooperative School District

Leon Levesque
Interim Superintendent

Susan Caswell
Business Administrator

Randy Loring
Facilities Director

Davis Goudreau Architects Inc.
Portsmouth, New Hampshire

Petersen Engineering Inc.
Portsmouth, New Hampshire

Engineered Building Systems, Inc.
Derry, New Hampshire

December 2011

DGA DAVIS GOUDREAU ARCHITECTS

DAVIS GOUDREAU ARCHITECTS

December 21, 2011

Leon Levesque, Interim Superintendent
SAU # 5 – Oyster River Cooperative School District
36 Coe Drive
Durham, New Hampshire 03824

Re: ORCSD Facilities Report

Dear Superintendent Levesque:

Davis Goudreau Architects Inc. is pleased to submit this Facility Assessment in compliance with the School District's RFP for A/E facility and program analysis services for the ORCSD's school buildings and sites.

The goals of the report are as follows:

Facility Analysis

1. To compare present building conditions with current building codes and standards.
2. To determine if present systems have additional capacity for renovations and additions.
3. To provide budget estimates on up-grading existing facilities and to meet building code requirements.

Program Analysis

1. To verify present space use.
2. To compare present space use with Educational Rules and Guidelines.
3. To determine student classroom capacity.

The school facilities assessment conducted by Davis Goudreau Architects (DGA) is based on observations by members of the architectural and engineering team. Multiple site visits and interviews with building users were conducted by the team. The architectural, engineering and programming components of this assessment are found in Tabs 1, 2, 3 & 4.

Additionally, DGA conducted general building code analyses using the IBC (2009 edition) and the NFPA Life Safety 101 Code (2006 edition). The facilities were also reviewed for general compliance with the American's with Disabilities Act (ADA), 2010. Engineering codes used in the analyses include the IMC (2009 edition), the IPC (2009 Edition), and the NEC (2009 edition), with updates. The electrical engineers are Engineered Building Systems, Derry, NH and the mechanical engineers are Petersen Engineering, Portsmouth, NH.

Thank you for the opportunity to provide these services to the School District. If there are any questions or comments, please feel free to contact our office. We look forward to continuing to assist the School District in their future efforts with respect to this work.

Sincerely,

Gary L. Goudreau, LEED AP

TABLE OF CONTENTS

DAVIS GOUDREAU ARCHITECTS

Executive Summary

Oyster River Cooperative School District Facilities Report

Facility Analysis

The scope of this facility analysis, as identified in the Oyster River Cooperative School District's RFP, was to compare existing building conditions at both elementary schools, Middle School and High School with currently adopted codes and standards; determine if present systems have additional capacity for renovations and additions; and to provide budget estimates for upgrading each facility to meet the minimum code requirements identified as deficient. The intent of this report is not to cite violations to any given code, but to document existing conditions as understood and interpreted by DGA and its consultants.

Davis Goudreau Architects (DGA) has reviewed drawings and reports for the District's existing facilities as presented to us. Some of the information is accurate, while some is outdated. We have endeavored to provide as accurate a picture of current facilities as the scope of our services allows, but do not represent this information to be accurate "as-built" documentation.

During the course of our work, we have reviewed existing infrastructure for site, building, mechanical, electrical, plumbing, and fire protection systems. The Codes we have used for our analysis are the NFPA 101 Life Safety Code (2003 edition), the International Codes for Building, Mechanical, Electrical and Plumbing (2009 editions), the National Electrical Code (2009 edition), NFPA Codes for fire alarm and sprinkler, as well as the Americans with Disabilities Act (ADA) 2010 edition.

Where requirements can be found identified in more than one code reference, DGA has identified compliance with the most restrictive, with the exception of means of egress requirements, where the State Fire Code has identified NFPA's requirements as taking precedence over those of the International Building Code (IBC). As most systems relating to building compliance with the International Energy Code (IEC) are concealed, we have not made determinations about the District's facilities compliance with R-values for wall, roof or window systems.

Site conditions reviewed at the various schools include drainage, traffic patterns (pedestrian and vehicular), as well as ADA accessibility for parking and building entry. Building conditions reviewed relate to code issues such as allowable building size, means of egress, accessibility, as well as fire and smoke-resistive construction. Refer to the appropriate mechanical, electrical and plumbing reports for the scope of systems reviewed in each of those respective disciplines.

The facility analyses are presented school by school in Table format, with columns that identify the Code reference number, the Code item described by that reference, our finding on that issue, our recommendation for compliance (if needed), and the associated opinion of cost of compliance (if any) for that item. There is duplication (as mentioned above) of some code topics from one Code entity (NFPA, IBC, NEC, etc.) to another. Most duplication from one entity to the other provides for uniform compliance requirements, while others (such as smoke resistive construction or elevator lobbies) will be more restrictive in one than another. Where these instances occur, and are not uniform in their compliance requirements, our report identifies the most restrictive (while making reference to the lesser restrictive) to provide clarity to our findings and recommendations. The table analyses are complimented by drawings and photos where required for additional corroboration and/or clarification.

We have prefaced each school's analysis with a summary of our findings and/or concerns. It should be noted that not all compliance requirements are definitive in and of themselves. Most codes allow the Authority Having Jurisdiction (AHJ) to surpass Code-required minimums with more stringent requirements where deemed necessary (or where identified in related State Code amendments), or conversely allow existing conditions to remain if deemed safe or otherwise acceptable (albeit not in compliance with the letter of the code but meeting its intent). Additionally, ADA accessibility compliance will require some understanding of the total amount of each renovation scope in order to determine what amount of the total cost of the renovation will be expected to be spent on accessibility-related improvements. Typically accessibility improvements are not required to exceed 20% of the total cost of the renovations planned. Additionally, given our limited knowledge of the history of these facilities, there are some recommendations in this report that require the School District to either verify or follow-up on.

In some instances, more updated codes (although they may not be currently adopted by the State of New Hampshire) can be less restrictive than their predecessors on some matters. One such instance is the NFPA 101 Life Safety Code 2003 requirement that corridor smoke partitions (which must resist the passage of smoke during an event) have doors that are self-closing or automatically closing (upon initiation of the fire alarm or sprinkler system). The 2009 edition of that code requirement allows an exception in Educational occupancies whereby the doors do not need to be self-closing if the building is sprinkled. This is a condition where the AHJ may allow a variance knowing that the State Fire Code may soon adopt the 2009 edition of the NFPA 101 Life Safety Code. In this instance, the implication for cost savings at all four schools is significant if many doors do not need to have closers installed on them.

It is important to note that the budget estimates in this report are presented in today's dollars and represent an opinion of probable cost based on historical experience, rather than actual bid pricing from contractors or subcontractors. They are intended to represent a reasonable quantity of work, an aggregate of various scopes of work in order to achieve some level of economy of scale. Estimate values will vary based on the size of each project when bid, the contract delivery method (Construction Management, GC Bid, Design/Build, etc.), and economic/market conditions at the time of bidding.

Site

Each school's site was looked at in terms of pedestrian and vehicular circulation and conflicts, numbers of parking spaces and ADA code compliance, and drainage. Standards for minimum and maximum sizes of school sites, as determined by the State and DOE, are indicated below.
For sites where more than one level of school is located, the limits for the highest level shall govern.

Elementary School:

Minimum – Five contiguous acres of buildable land plus one acre for every 100 pupils in the educational capacity of the facility or fraction thereof.

Maximum – Ten contiguous acres of buildable land plus one acre for every 100 pupils in the educational capacity of the facility or fraction thereof.

Middle School:

Minimum – Ten contiguous acres of buildable land plus one acre for every 100 pupils in the educational capacity of the facility or fraction thereof.

Maximum – Twenty contiguous acres of buildable land plus one acre for every 100 pupils in the educational capacity of the facility or fraction thereof.

High School:

Minimum – Fifteen contiguous acres of buildable land plus one acre for every 100 pupils in the educational capacity of the facility or fraction thereof.

Maximum – Thirty contiguous acres of buildable land plus one acre for every 100 pupils in the educational capacity of the facility or fraction thereof.

DGA does not have specific site data on wetlands, steep terrain and other unusual site features so "buildable" acreage is indeterminate.

Program Analysis

The scope of the program analysis was to visit each of the four schools and verify the present use of individual spaces, to compare the present use of spaces with the NH Dept. of Education rules and guidelines and to determine student classroom capacity by calculating an accurate count of pupil stations.

NHDOE Recommended Space Allowances for New Hampshire Schools

* Indicates minimum requirements as specified in NH Code of Administrative Rules Ed 321. Others are recommended minimums.

The minimum sizes below are the recommended minimum amount of space for the smallest programs. In most cases the SF/Pupil number multiplied by the largest expected number of pupils in one class period should govern the total size. Spaces such as gymnasiums, music rooms etc. may also be used for co-curricular activities which may require a larger size space than necessary for academic instruction.

Subject	SF/Pupil	Minimum Total SF
General Purpose Classroom		
Elementary & Middle School	36*	900*
High School	32*	800*
Separate Science Laboratory	45*	900*
Combination Science Lab/classroom	60*	1200*
Library/Media Center (40 sf/pupil for 10% of design capacity)		1800*
Art		
Elementary	36	900
Middle/High	60	1200
Music		
Instrumental	25	1000
Choral	15	800
Physical Education		
Elementary	110	700

Middle	125	3800
High	150	5000
Technology Education Laboratories	75	1500
Family and Consumer Sciences	75	1500
Computer Laboratory	30	750

A spreadsheet has been developed to compare the existing school sf of program space with the recommended minimums as set forth by the NHDOE. The State guidelines incorporate minimum room sizes as published in the NH Code of Administrative Rules Ed. 321.

Inventory of Rooms and Present Program Use

The design team made trips to each school to verify existing conditions floor plans and note any discrepancies that were found. Over the years slight changes have been made to walls and doors, but for the most part rooms were as we expected to find them.

Interviews were conducted with staff and administrators to accurately depict how rooms in each school are being used. At the Mast Way and Moharimet Elementary Schools rooms have specific grade levels assigned to them. There are also specialized program uses where students circulate to particular rooms, such as art and music. For the most part students are assigned to particular homerooms.

At the Oyster River High School and Oyster River Middle School rooms are given a specific program uses as well, but students continually circulate through them during the school day.

Accompanying drawings to the report illustrate the floor plans for each school, the square footages for each space and the current assigned use for each space.

Calculating Accurate Count of Pupil Stations

Pupil stations were calculated at each school. The pupil count was taken in general classrooms, science rooms, art rooms and music rooms only.

The information was included on the same programming spreadsheet as mentioned above. At the elementary schools the current pupil stations were counted in each room. In the middle school and the high school an average class size was given to calculate pupil count. The School District's class size policy was also listed for comparison.

Mechanical Facilities Report

Petersen Engineering has conducted an analysis of mechanical systems (HVAC, Plumbing & Fire Protection) serving the existing school buildings in the Oyster River Cooperative School District. The primary goals of this study were to review systems in terms of code compliance and capacities for expansion. Multiple recommendations have been provided for upgrades for compliance with current building codes, for reliability in service and for energy efficiency.

The Middle School requires numerous mechanical system upgrades for code compliance, including but not limited to a new boiler plant, supplemental ventilation systems (including a make-up air system for the kitchen), guards for rooftop equipment and select plumbing fixture replacement. Additional recommendations include replacement of a significant amount of mechanical infrastructure due to age and condition of equipment and components. A retro-commissioning process is strongly

recommended for system controls as well as the implementation of a regular preventative maintenance program.

The primary concerns identified for the High School relate to system controls and long term reliability of the systems. Mechanical systems are relatively large and complex in comparison to other schools in the district, requiring a significant ongoing maintenance effort. It appears that preventative maintenance to date has been somewhat limited. Primary recommendations include control system upgrades for demand control ventilation, retro-commissioning of control systems and the implementation of a regular preventative maintenance program.

Moharimet Elementary School requires replacement of existing classroom ventilation systems to meet current code requirements (also recommended due to age of existing systems). A make-up air system is required for the kitchen. Roof guards need to be added for select rooftop equipment. General recommendations include a boiler plant replacement, DDC controls upgrade, retro-commissioning and the implementation of a regular preventative maintenance program.

Mast Way Elementary School requires a few ventilation system modifications for code compliance including the addition of a make-up air system for the kitchen. General recommendations include replacement of central ventilation equipment due to age and condition, boiler plant replacement, retro-commissioning and the implementation of a regular preventative maintenance program.

Electrical Facilities Report

Engineered Building Systems has conducted an analysis of electrical systems (electrical distribution, fire alarm, lighting) serving the existing school buildings in the Oyster River Cooperative School District. The primary goals of this study were to review systems in terms of code compliance and capacities for expansion.

In general, this report section included code reviews, ADA compliance, emergency power, elevators (middle & high schools), control systems, lightening protection, security, paging & clock systems, data systems, surge protection and carbon monoxide detection.

Spreadsheets were developed for code compliance and efficiency and maintenance recommendations, with associated budget costs.

Food Service

DGA toured each school with the School District's Food Service Director and a sales engineer from Perkins, a provider of kitchen equipment for schools. The results of the walkthrough, as well as budget costs, are reported in the individual school executive summaries.

OYSTER RIVER HIGH SCHOOL

DAVIS GOUDREAU
ARCHITECTS

DAVIS GOUDREAU ARCHITECTS

Executive Summary for Building & Site

Oyster River High School

Accessibility Overview:

The High School is in general compliance with the accessibility requirements of the 2010 ADA guidelines. We note that although there are platform lifts in the Multi-purpose room and the auditorium, these lifts were not operated or tested at the time of our review. There are two elevators in the school; both appear to be fully compliant and appear to be rated for fire fighter service (allowing them to serve as an accessible means of egress).

The majority of toilet facilities comply with this accessibility regulation. There are some minor issues with heights of drinking fountains and grab bars, as well as incorrect mounting heights on some elements, lack of proper grab bars at toilets, assistive listening system signage (at Auditorium), some stall doors that are not self-closing, and lack of protection on supply and waste piping for lavatories. There are multiple lab-style classrooms that have counters and some with sinks that do not comply with maximum heights for same.

The remedial work to correct these deficiencies should be addressed with any future renovations planned for the school, with the qualifier that it does not need to exceed 25% of the value of that work at the time it is done. Some items may be able to be corrected immediately by maintenance staff such as mounting heights of paper towel dispensers.

Building/Fire Code Review:

The area of the largest floor of the school (127,148 sf) is above the allowable maximum (40,320 sf) based on Table 503 from the State Building Code (including allowances for sprinkler and accessible frontage, and reductions for 3 stories). As such, the building needs to be divided into a minimum of four separate "buildings" through the use of fire walls (3). There appears to be multiple fire area separations through the use of fire separation assemblies, but they do not appear to qualify as "fire walls", therefore the entire floor area would be considered "one building" by Code. DGA does not have the historical knowledge of the types of construction used at the school over the course of various additions, consequently, we cannot confirm the presence of firewalls (or lack thereof) with certainty. More extensive investigation (and perhaps exploratory demolition) would need to be undertaken to confirm the presence of adequate fire wall separation.

Corridor walls do not need to be fire rated (unless they are part of another type of fire resistive wall requirement (i.e. stairs of elevator shaft), but they do need to resist the passage of smoke. At this time, that would mean adding closers to some corridor doors that currently do not have them in order that they be "self-closing" or "automatic closing". It is our recommendation to seek a waiver on this item given that the 2009 edition of the NFPA 101 Life Safety Code allows an exception for sprinkled buildings in an Educational occupancy. Most walls appear to extend to the structure above (the ceilings); therefore the ceiling would not be relied upon to be the smoke resistive membrane. In fact, there are return air grilles in the open locker areas connected to corridors that are unducted, indicating that the space above the ceiling is being used as a plenum for return air. This would preclude it from being used as a smoke resistive membrane.

Assembly occupancies (rooms with occupant loads over 50), require a 1-hour fire-resistive wall

separating them from the surrounding spaces. The dining room does not comply since it has four large glazed windows that appear to be unprotected (glass is unrated, no sprinkler water curtain).

The multi-purpose room and library also have unprotected window and/or door assemblies that require attention. The gym and auditorium appear to comply with this separation requirement.

There are some locations where doors & frames require fire-resistive ratings, but the rating could not be verified because labels have been painted over, and at least one removed (which voids the rating).

The gymnasium, based on its area, would be limited by Code to a maximum of 1,686 occupants. The room appears to be posted for 1,729. The District should confirm that AHJ (local building inspector and fire marshal) are comfortable with exceeding the limit imposed by this code section. Likewise, the auditorium should be posted for a maximum occupancy load of 650 given that there are only a pair of 3'-0" doors at the main entry/exit.

Deficiencies in means of egress for the school appear to include: 1) rated stair assemblies with glazed walls facing the corridors and 2) one stair that is identified as an exit stair (with a lighted exit sign above the second floor door) that does not empty into an exit passageway, lobby, or directly outside. The glazed walls of the stair, although wired glass, are too large to qualify for a rated assembly. It is possible that they are allowed to qualify as a result of dual sprinkler head coverage on each side of the wall, known as a "water curtain", which can protect the glazing from failure for the requisite amount of time. If so, there should be some documentation on record with the State Fire Marshal's office (and/or local fire department) attesting to its acceptance for this purpose.

The elevators appear to be rated for fire fighter service, however we did not witness them operating under stand-by power which is code-required, and they are not separated from the rest of the floor with rated assemblies creating a lobby.

Site Review:

Bus circulation is directed around the back of the building (west side of the site) along the fire lane/bus/deliveries route, which allows for separation from pedestrians and cars. There appears to be adequate queuing for buses at drop-off and pick-up. Congestion typically occurs at the point where buses turn off Coe Drive onto the bus loop at the south side of the building. At this junction, students and staff are exiting the parking lots as pedestrians circulate through the site, creating a safety concern as well as delays to the bus schedule.

Student and staff parking is sufficiently met by lots on the north, south and east sides of the building. Parent pick-up/drop-off occurs along the lane at the front of the building. Traffic backup is not a major concern at the main entrance, as morning drop-offs tend to be staggered.

Parking for staff and visitors is separate and signed. ADA accessible parking is adequate in number, properly signed and located. Curb cuts, where they exist, should have tactile warning pads where they lead into traffic. Currently there is colored concrete with score lines approximately 4" on center, which does not technically comply.

Drainage around the building and site appears to be functioning properly.

DAVIS GOUDREAU ARCHITECTS

Programming:

The Oyster River High School underwent an addition and renovation project in 2003-2005. It is built in three floor levels. The first floor has a main corridor running north-south (on the floor plan) with core functions to the right side, and classrooms, administrative suite, library, guidance and study skills to the left. The second floor consists primarily of classrooms and student locker space. The third floor consists of classrooms. With few exceptions, the high school spaces meet the minimum State standards.

- The library is 4700sf. The school enrollment is 680 pupils. Minimum standards are 40sf/pupil for 10% of the State allowable design capacity. Allowable design capacity = 1183 x 10% = 118.3 pupils x 40sf/pupil = 4720sf. The library is sized correctly.
- The gymnasium is 11817 sf., dining is 6238sf, and combined art classrooms are 2771sf.
- Maximum allowed seating in the Auditorium is 650, with 529 fixed seats, 12 additional ADA seating, and room on the stage for seating 109.
- Refer to the following spreadsheet for individual room uses, square footages and pupil counts.

Food Service:

Blodgett Combi oven is not getting up to temperature. Long cooking times. Suggest having a service company to examine stove to make sure oven is firing correctly.

Victory two door refrigerator has had several service calls for repair. Suggest vacuuming out the dust and dirt from the compressor every month. This will take considerable strain off of the compressor.

Walk in freezer unit has failed twice. A considerable amount of food has been lost when the freezer is down. The alarm system did not notify the foodservice operators. Suggestion is to have the alarm serviced so it will work correctly.

Soiled dish table in dish room needs a stainless steel perforated pan to cover pre-rinse sink. This pan will catch and prevent food from entering drain. Cost: $300

FACILITY

ANALYSIS

OYSTER RIVER HIGH SCHOOL

DAVIS GOUDREAU
ARCHITECTS

ADA 2010 Checklist – Oyster River School District

Oyster River High School

ADAAG Section	Requirement Description	Finding	Recommendation	Cost Estimate
203.5	Areas used only by maintenance personnel shall not be required to comply with these regulations, or to be on an accessible route.	Noted.		
203.9	Spaces and elements within employee work areas shall only be required to comply with 206.2.8, 207.1 (means of egress) & 215.3 (alarm system).	Noted.		
206.2.3	At least one accessible route shall connect each story and mezzanine in multi-story buildings and facilities.	The Mezzanine in the Library is not accessible.	Determine whether students and staff have access, or just staff.. If just staff, then 203.9 applies and nothing needs to be done.	No cost at this time.
206.2.8	Common use circulation paths within employee work areas shall comply with 402 (accessible path), EXCEPT where work areas are less than 1000 sf and defined by permanently installed partitions, counters, casework, or furnishings.	Noted.		
206.6	Elevators provided for passengers shall comply with 407. In buildings permitted by 206.7 to use a platform lift, elevators complying with 408 shall be permitted.	High School complies.	No action needed.	
206.7	Platform lifts shall comply with 410. Platform lifts shall be permitted as a component of an accessible route in an existing building or facility. Standby power shall be provided per 207.2.	Noted. Lifts were not tested during our review.	District should confirm stand-by power is provided for platform lifts at both stage locations, and regularly tested.	No cost.
208.2	Parking spaces (per 502) shall be provided in accordance with Table 208.2.	High school parking lot complies. Six spaces are required (one to be van accessible), seven are provided (three are van accessible).		

Table 208.2	1-25 spaces: 1 accessible space.			
	26-50 spaces: 2 accessible spaces.			
	51-75 spaces: 3 accessible spaces.			
	76-100 spaces: 4 accessible spaces.			
	101-150 spaces: 5 accessible spaces.			
	151-200 spaces: 6 accessible spaces.	High school parking lot provides 172 spaces excluding the accessible ones.		
	201-300 spaces: 7 accessible spaces.			
	301-400 spaces: 8 accessible spaces.			
208.2.4	For every 6 required accessible spaces, one VAN accessible space shall be provided.	High school complies.		
211.2	No fewer than 2 drinking fountains shall be provided. One shall comply with 602.1 through 602.6 and the other shall comply with 602.7.	Noted.		
	EXCEPTION: Where a single drinking fountain complies with 602.1 through 602.6 and 602.7, it shall be permitted to be substituted for 2 separate fountains.	Noted.		
211.3	Where more than the minimum number of drinking fountains are provided, 50% shall comply with 602.1-602.6, and 50% shall comply with 602.7.	High school does not comply, there are 7 low and 3 high fountains.	Two drinking fountains would need to be raised to comply with the 50% requirement, or additional drinking fountains added to equal the ratio. It would be acceptable (under alternative means of compliance) to install bottled water stations.	Raise drinking fountains: $800 per fixture.
213.2	Where toilet rooms are provided, each toilet room shall comply with 603. EXCEPTION: In alterations where it is technically infeasible to comply with 603, altering existing toilet rooms shall not be required where a single unisex toilet room complying	Noted.		

	with 213.2.1 is provided and located in the same area as the existing inaccessible toilet room.			
213.3.1	Where toilet compartments are provided, at least one shall comply with 604.8.1. At least one shall comply with 604.8.2 where six or more toilet compartments are provided.	Noted.		
213.3.2	Where toilets are provided, at least one shall comply with 604.	Noted.		
213.3.3	Where more than one urinal is provided, at least one shall comply with 605.	Noted.		
213.3.4	Where lavatories are provided, at least one shall comply with 606 (and shall not be located in a toilet compartment).	Noted.		
213.3.5	Where mirrors are provided, at least one shall comply with 603.3	Noted.		
213.3.6	Where showers are provided, at least one shall comply with 608.	Noted.		
216.2	Interior and exterior signs identifying permanent rooms and spaces shall comply with 703.1, 703.2 and 703.5.	Noted.		
216.4.1	Doors at exit passageways, exit discharge, and exit stairways shall be identified by tactile signs complying with 703.1, 703.2 and 703.5	High school complies.	No action needed.	
216.5	Parking spaces complying with 502 shall be identified by signs complying with 502.6.	High school complies.	No action needed	
216.10	Each assembly area required by 219 to provide assistive listening systems shall provide signs informing patrons of the availability of the system complying with 703.7.2.4.	No signs were identified. It is believed that this system is required for the Auditorium.	Provide signs complying with 703.7.2.4.	$300.
219.2	In each assembly area where audible communication is integral to the use of the space, an assistive listening system shall be provided.	It is not known if this system is available for the Auditorium. It is believed that it is required.	Need to verify this system with Administration.	

	EXCEPTION: Not required where audio amplification is not provided.			
Table 219.3	The number of assistive listening system receivers required is based on the following seating capacities:			
	50 or less: 2			
	51-200: 2 plus 1 per 25 seats over 50.			
	201-500: 2 plus 1 per 25 seats over 50			
	501-1000: 20 plus 1 per 33 seats over 500.	This is the category that the Auditorium falls into.	Provide as required if system does not currently exist.	$7,000 for 6 transmitters and 24 headsets.
221.1	Assembly areas shall provide wheelchairs spaces, companion seats, and designated aisle seats complying with 802.	High school complies.		
221.2.1.1	Wheelchair spaces shall be provided per Table 221.2.1.1.	Noted.		
Table 221.2.1.1	4-25 seats: 1 space			
	26-50 seats: 2 spaces			
	51-150 seats: 4 spaces			
	151-300 seats: 5 spaces			
	301-500 seats: 6 spaces			
	501-5000 seats: 6 plus 1 for each 150 between 501 to 5000.	This is the category the Auditorium falls into.		
221.2.3	Wheelchair spaces shall provide lines of sight complying with 802.2. Wheelchair spaces shall be dispersed, with choices of seating locations and viewing angles.	High school complies.		
221.3	At least one companion seat complying with 802.3 shall be provided for each wheelchair space.	There is room for the required number of companion seats. Most would have to be loose chairs (companion seats are allowed to be fixed where only one wheelchair space is located).	Provide loose chairs where and when required by wheelchair patrons' guests.	No cost assuming chairs exist.
221.4	At least 5% of the total number of aisle seats provided shall comply with 802.4, and shall be seats located	There are 76 aisle seats, so 4 seats must comply with 802.4.	Six aisle seats complying with 802.4 are provided.	

	closest to accessible routes.			
308.2.1	Unobstructed forward reach shall be 48” high max. and 15” min. AFF.	Paper towel holders in the following toilet rooms have lever handles higher than 48”: MBT1, MBT2, MBT3, WBT1, WBT2, WBT3, C228, C229, C231, C232, T217.	Relocate towel dispensers to the proper height.	Lower dispenser: $200.
308.3.1	Unobstructed side reach (parallel approach) shall be 48” high max., and 15” min. AFF.	Same finding as above.	Same recommendation as above.	
410.1	Platform lifts (including inclined stairway chairlifts) shall not be attendant operated and shall provide unassisted entry and exit from the lift.	Lifts were not operated at the time of our review.	District should confirm that these lifts can be used by those they are intended for (either staff, students or public/visitors) without an attendant.	No cost.
502.2	Accessible standard parking spaces shall be 96” wide min. Accessible van spaces shall be 132” wide min. except they may be 96” wide if the access aisle is also 96” wide.	High school complies.	No action needed.	
502.3	Access aisles serving standard accessible parking and van spaces shall be 60” wide min. and shall adjoin an accessible route. Two parking spaces shall be permitted to share a common access aisle.	High school complies.	No action needed.	
602.4	Spouts shall be 36” max. AFF, except 30” for children’s use and as per 602.7.	See Item 211.3 above.	See Item 211.3 above.	See Item 211.3 above.
602.7	Spouts for standing persons shall be between 38” and 43” AFF.	See Item 211.3 above.	See Item 211.3 above.	See Item 211.3 above.
604.5	Grab bars for toilets shall comply with 609. They shall be provided on the side wall closest to the fixture, and on the rear wall. NOTE NH requires a third grab bar, a vertical one 18” long, bottom mounted between 39”– 41” AFF, and located between 39”-41” from the rear wall.	None of the accessible toilets with grab bars have the vertical 18” grab bar.	Provide these required grab bars at 32 accessible toilets.	Vertical grab bars: $150 per 18” grab bar.

604.8.1.2	Toilet stall doors shall be located 4" max. from the front corner of the partition (diagonally furthest from the fixture) to the hinge side of the door. They shall be 32" clear min., self-closing, and not swing into the required floor clearance for the fixture.	Doors at the following accessible toilet rooms/stalls are not self-closing: C228, C229, MBT3, WBT2 & WBT3.	Provide closers on room doors, self-closing hinges on stall doors.	Surface mounted door closer: $400 per door, self-closing hinges: $150 per stall door.
606.4	Lavatory and sink faucets shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.	Faucet handles at lab sinks in eight classrooms are not the lever or wrist-blade variety. It is not known if these can be operated by a student or staff member with impaired hand coordination.	Replace faucets with lever handles or other type that can be operated as required.	$150 per lavatory/sink.
608.4	A folding or non-folding seat shall be provided in a transfer-type shower compartment.	Showers in toilet rooms A142A & A154A did not have folding seats.	Provide movable seats (plastic chairs) when required.	$50 per chair.
802.3.2	Companion seats shall be permitted to be movable.	Noted.		
802.4.1	Where armrests are provided on seating, designated aisle seats shall have folding or retractable armrests on the aisle side of the seat.	High school complies.		
802.4.2	Each designated aisle seat shall be identified by a sign or marker.	High school complies.		

IBC 2009 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Section 410 (Chapter 4)	**Stages & Platforms**			
410.2	A Platform is defined as a raised area within a building used for worship, the presentation of music, plays or other entertainment…and similar purposes wherein there are no overhead hanging curtains, drops, scenery or stage effects other than lighting and sound.	The multi-purpose room in the high school falls into this category.		
	A Stage is defined as a space within a building utilized for entertainment or presentations, which includes overhead hanging curtains, drops, scenery or stage effects other than lighting and sound.	The Auditorium falls into this category.		
410.3.1.1	Stage areas shall be measured to include the entire performance area and adjacent backstage and support areas not separated from the performance area by fire-resistance-rated construction. Stage height shall be measured from the lowest point on the stage floor to the highest point of the roof or floor deck above the stage.	Noted.		
410.3.4	Where the stage height is greater than 50', all portions of the stage shall be completely separated from the seating area by a proscenium wall with not less than a 2-hour fire-resistance rating extending continuously from the foundation to the roof.	Auditorium stage height is approximately 40'-0".	Compliance not required.	
410.3.5	Where a proscenium wall is required to have a fire-resistance rating, the stage opening shall be provided with a fire curtain complying with NFPA	The Auditorium appears to comply with fire curtain requirements.		

	80 OR an approved water curtain complying with Section 903.3.1.1, OR in facilities not utilizing the provisions of smoke-protected assembly seating, a smoke control system complying with Section 909 OR natural ventilation designed to maintain the smoke level at least 6' above the floor of the means of egress.			
410.3.7	Emergency ventilation shall be provided for stages larger than 1,000 sf in floor area, or with a stage height greater than 50'. Such ventilation shall comply with Section 410.3.7.1 OR 410.3.7.2.	The Auditorium stage is larger than 1,000 sf.		
410.3.7.1	Two or more roof vents constructed to open automatically by approved heat-activated devices and with an aggregate clear opening area of not less than 5% of the area of the stage shall be located near the center and above the highest part of the stage area. Manual operation must also be provided.	The roof over the stage has 5 smoke vents in place. This appears to comply.	The District should confirm that these vents open automatically by heat detectors.	No cost.
410.3.7.2	Smoke control per Section 909 shall be provided to maintain the smoke layer interface not less than 6' above the highest level of the assembly seating or above the top of the proscenium opening where a proscenium wall is provided in compliance with section 410.3.4			
410.4	Permanent platforms shall be constructed of materials as required for the type of construction of the building in which the platform is located. Where the space beneath the permanent platform is used for storage or any purpose other than equipment, wiring or plumbing, the	The space beneath the platform is not accessible, no storage below.	Rated floor assembly not required.	

	floor assembly shall not be less than 1-hour fire-resistive-rated construction.			
410.5.1	The stage shall be separated from dressing rooms, scene docks, property rooms, workshops, storerooms and compartments by fire barriers constructed per section 707. The min. rating shall be 2 hours for stage heights greater than 50', 1-hour for stages less than 50'.	The wall behind the stage in the Auditorium has rated door assemblies in it, appears to comply.	No action needed.	
410.6	Stages shall be provided with an automatic fire extinguishing system in accordance with Chapter 9. Sprinklers shall be installed under the roof and gridiron, and under all catwalks and galleries over the stage. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such stages. EXCEPTIONS:	Noted.		
	1) Sprinklers are not required under stage areas less than 4' in height that are utilized exclusively for the storage of chairs & tables, provided the concealed space is separated from the adjacent spaces by 5/8" (min.) Type X gypsum board.	The space below the stage is inaccessible. Compliance is not known.		
410.7	Standpipe systems shall be provided in accordance with section 905.	Standpipes are present at both sides of the stage.	No action needed.	

IBC 2009 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 7	**Fire & Smoke Protection Features**			
706.1	Each portion of a building separated by one or more *fire walls* that comply with the provisions of this section shall be considered a separate building.	Given the requirement of Table 503 in the State Building Code Amendment, the maximum allowable area per floor is 40,320 sf (including increases for sprinkler and frontage, and reductions due to 3-stories). Existing building footprint on the first floor (largest floor) is 127,148 sf. The largest fire area is estimated to be approximately 56,000 sf.	The building needs to be divided into four "buildings", separated by *firewalls*, so that no floor plan area exceeds 40,320 sf. Currently the building appears to be divided into multiple fire areas (not buildings) since the fire resistive assemblies are not *firewalls* by the definition provided in the Code (see 706.2). This would be cost-prohibitive as a retrofit in order to comply with the definition of firewall. This should be reviewed with the Authority Having Jurisdiction (AHJ).	A definitive cost estimate for this work is not possible without more investigation into the construction of the current fire-resistive walls, in order to know how many qualify as fire walls, and what is lacking in those that don't.
706.2	*Fire walls* shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the fire wall for the duration of the time indicated on the fire resistance rating of the wall.	Existing fire resistive assemblies do not comply with this definition. The building has been partitioned into fire areas, not separate buildings as required.		
706.3	Fire walls shall be of any approved non-combustible materials.	Noted.		
Table 706.4	Fire resistance ratings for fire walls for Assembly and Educational use groups of Type II construction shall be 2-hours.	Noted.		
706.8	Each opening through a fire wall shall be protected per section 715.4 and shall not exceed 156 sf in area, EXCEPT there is no limit on size for sprinkled buildings.	Noted.		

708.4	Shaft enclosures shall have a fire resistance rating of 1-hour min. where connecting less than 4 stories, but shall not be less than the rating of the floor assembly penetrated (up to 2-hours).	Noted.		
708.14.1	An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects MORE than 3 stories, EXCEPT they are not required where the building is sprinkled.	The High school is 3 stories.	No action needed.	
709.3	Fire partitions shall have a fire resistance rating of not less than 1-hour, EXCEPT corridor walls permitted to have ½-hour per Table 1018.1 (However NFPA 101 shall be used for means of egress requirements).	Noted.		
710.3	A 1-hour fire-resistance rating is required for smoke barriers.	Noted.		
711.3	Unless required elsewhere in this code, smoke partitions are not required to have a fire-resistance rating.	This condition applies to the high school for corridors.		
711.4	Smoke partitions shall extend from the floor to the underside of the floor or roof above, or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.	Noted.		
711.5.1	Doors in smoke partitions shall not include louvers.	Noted.		
711.5.3	Where required elsewhere in this code, doors in smoke partitions shall be self or automatic closing by smoke detection per section 715.4.8.3.	Noted.	See NFPA 101 Life Safety Section 15.3.6 recommendation.	
715.4.8	Fire doors shall be self or auto closing.	Noted.		
715.4.8.1	Unless otherwise specifically permitted, single fire doors and both leaves of double doors shall be provided with an active latch bolt that will secure the door when it is closed.	Noted.		

IBC 2009 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 11	**Accessibility**			
1103.2	Sites, buildings, structures, facilities, elements and spaces shall be exempt from this chapter to the extent specified in this section (see 1103.2.2)			
1103.2.2	Existing buildings shall comply with section 3411.	This is the condition at the high school.		
Chapter 34	**Existing Structures**			
3411.1	The provisions of sections 3411.1 through 3411.9 apply to maintenance, change of occupancy, additions and alterations to existing buildings.	Noted.		
3411.6	A building, facility or element that is altered shall comply with the applicable provisions in Chapter 1 of this Code and ICC A117.1, unless technically infeasible. Where compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent feasible.	Noted.	DGA has used the ADA 2010 Edition which is based, in part, on A117.1 for determining accessibility compliance.	
	Accessible means of egress required by Chapter 10 are not required to be provided in existing buildings and facilities.	Noted. NFPA concurs.		
3411.7	Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities or drinking fountains serving the primary function, EXCEPT:	Noted.	Determination of cost percentage cannot be made until the time of alteration where complete scope of work is determined.	
	1) The costs of providing the accessible route are not required to exceed 20% of the costs of the alterations affecting the			

	area of primary function.			
3411.8.3	Platform lifts complying with ICC A117.1 and installed in accordance with ASME A18.1 shall be permitted as a component of an accessible route.	Noted.		

IBC 2009 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 30	**Elevators & Conveying Systems**			
3002.1	Elevator hoistway enclosures shall be shaft enclosures complying with section708.	Noted.		
3002.3	An approved pictorial sign of a standard design shall be posted adjacent to each elevator call station on all floors instructing occupants to use exit stairways and not to use elevators in case of fire. The sign shall read "In fire emergency, do not use elevator, use exit stairs", EXCEPTION:	High school complies with this.	No action needed.	
	1) The emergency sign shall not be required for elevators that are part of an accessible means of egress complying with section 1007.4.	Noted.		
3006.4	Elevator machine rooms and machinery spaces shall be enclosed with fire barriers constructed per section 707. The rating shall not be less than the rating required for the elevator shaft EXCEPT:	Noted.		
	1) Where machine rooms do not abut and have no openings to the hoistway enclosure they serve, the fire barriers shall be permitted to be reduced to 1-hour fire-resistance rating.			
	2) In buildings 4 stories or less, where machine rooms do not abut and have no openings to the hoistway enclosure they serve, the machine room is not required to be rated..			

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 6	**Classification of Occupancy**			
6.1.2	Assembly; for requirements see chapter 13 (Existing Occupancy Use)			
6.1.2.2	Occupancy for assembly by fewer than 50 persons in another occupancy (and incidental to that occupancy) shall be classified as part of the other occupancy.	For the high school, the assembly classification would include Auditorium A134, Gymnasium A138, Music/Choral/Band A130, Dining A121, Multi-purpose Rm A110 and Library C131.	Confirm this finding with Authority Having Jurisdiction (AHJ).	
Table 6.1.14.4.1(a)	Required separation of occupancies; Assembly of up to 1000, a 2-hr separation is required (reduced to 1-hr for sprinkled buildings).	Dining A121, Multi-purpose A110 and Library C131 do not have continuous 1-hr rated walls around them.	Replace four windows in Dining facing corridor C102 with code compliant glazing assemblies or provide fire shutters. At Multi-purpose A110, provide rated door/frame assemblies at platform lift door, double-door leading to corridor C113 and double doors into Art Storage A122A. At Library C131, provide rated window & door assemblies at Library Storage C129 and Work Room C131A.	Fusible-link fire shutters - $2,300 each. Add $1,000 each to connect them to the fire alarm to close automatically upon detection. Multipurpose room doors (including demo & patching) $5,000 - $6,000. Library doors & windows (includes demo & patching) - $4,000.
Chapter 7	**Means of Egress**	NFPA 101 Life Safety egress requirements override IBC 209 requirements per State Fire Code.		
7.1.3.1	Exit access corridors serving more than 30 persons shall be separated by 1-hr construction unless:			
	a) Does not apply to existing buildings unless occupancy changes.	This is the condition for the high school.		
7.1.3.2.1	Where exits are required to be separated, the rating shall be 1-hr for	There are many instances where stair walls that face the corridors	Consult with AHJ to determine if this system was deemed	Indeterminate at this time.

	3-stories or less, 2-hr for 4-stories or more (except 1-hr for existing buildings).	are composed of wired glass assemblies that do not comply with the prescriptive requirement of a rated glazing system. They have been supplemented with a sprinkler water curtain (2 heads on each side of the glass wall).	equivalent to the code prescribed glazing assembly for rated walls.	
7.1.3.2.1 (4)	Openings in the rated wall shall be protected by fire door assemblies equipped w/ closers per 7.2.1.8.	As a general rule, there are many door/frame assemblies that have a continuous UL Labeled hinge without a rating indicated. The hinge obscures areas of the door and frame typical used for affixing a rated label to. Without removing these hinges, the actual rating of the door/frame assembly is unknown. Additionally, assemblies without the continuous hinge often have labels painted over, so rating is unknown. One double-door assembly (adjacent to Kitchen Office A123B) has a label removed from the frame which voids the rating.	Spot check several assemblies by removing continuous hinge to see if labels are affixed under them. For assemblies where labels are painted over, spot check by using a paint removal product.	Indeterminate at this time.
7.1.3.2.2	An exit enclosure shall provide a continuous protected path of travel to an exit discharge.	Stair S105-S205 does not comply, it empties into an unprotected corridor system. This stair is not needed to meet the requirements of egress, but it has a lighted exit sign on the 2nd floor leading users to think it is a protected means of egress.	Consult with Authority Having Jurisdiction (AHJ), either the State Fire Marshal or local Fire Chief to determine if lighted exit sign above 2nd floor door into stair should remain.	$250 if removed.
7.2.1.5.1	Door leaves shall be readily opened from the egress side while the building is occupied.	The door leading from Kitchen A123 to Storage room A123E has a lighted exit sign above it but the door was locked at the time of our review. Additionally this door leads through a storage room before leading to an exterior door.	Consult with the AHJ to determine if this lighted exit sign should remain given the door is sometimes locked, and may be deemed to exit through a room more hazardous than the one the occupant is leaving.	$250 if removed.
7.2.1.5.2	Locks, if used, shall not require the	See above for Storage room door.		

	use of a key, a tool, or special knowledge or effort to open.			
7.2.6.2	An exit passageway shall be separated from the remainder of the building per 7.1.3.2.	This does not occur at Stair S105/S205 as noted above, so stair is not a legitimate egress stair.	See recommendation above.	
7.2.6.3	An exit passageway shall have the same fire resistance rating as the stair it is connected with.	See above for Stair S105/S205.		
7.2.13.3	When used as a means of egress, every floor served by an elevator shall have an elevator lobby. Barriers forming this lobby shall have a minimum 1-hr fire resistance rating and shall be a smoke barrier per Section 8.5.	None of the elevators in the high school have separated lobbies with rated enclosures, however they qualify as an accessible means of egress with fire fighter service capabilities. IBC 2009 708.14.1 exempts buildings 3 stories or less as well as fully sprinkled buildings from this lobby requirement, however, the State Fire Code states that NFPA 101 Life Safety Code takes precedent for requirements of a means of egress.	Consult with the AHJ to determine if these elevator lobbies need to be constructed given the IBC 2009 exemption. Accessible means of egress are not required in existing facilities, so this requirement may not apply.	If required, budget $4,000 per floor to include two rated door assemblies on magnetic hold-open, rated wall assemblies for each door, and demo & patch of finishes (adjustments to fire alarm, sprinkler & lighting not included).
7.2.13.4	Elevator lobby doors shall be 1-hr fire resistance rated, and shall be self-closing.	See above finding.	See above recommendation.	
7.2.13.5	Elevator lobby doors shall close upon activation of smoke detection directly outside the elevator lobby adjacent to or on each door opening. Upon detection, all elevator lobby doors serving that elevator shall close.	See above finding.	See above recommendation.	
7.2.13.7	Elevator operation shall be supplied by both normal and standby power, protected to ensure minimum 1 hour operation during a fire.	DGA did not witness stand-by power operation of elevator at the time of our review.	School District to confirm this feature is in place and periodically tested.	No cost.
7.2.13.8	Elevator cars shall be provided with 2-way communication to a central control point.	High school elevators have phones/2-way communication. DGA did not operate this function in the elevator.	The school district should verify phones communicate with a central control point.	No cost.
7.2.13.9	Elevators shall be provided with fire	High school appears to comply.		

	fighters' emergency operations per ASME A17.1/CSA B44.			
7.5.1.5	Exit access shall have no dead ends unless permitted by occupancy chapters.	Chapter 15, Section 15.2.5.2 allows a 50' dead end for sprinkled buildings.	Corridor outside of Custodial C227 complies.	
7.5.1.6	Exit access from rooms shall be allowed to be through adjoining rooms, provided that such rooms are accessory to the area served, EXCEPT:			
7.5.2.1	Access to an exit shall not be through kitchens, storerooms, restrooms, workrooms, closets or similar spaces, or other rooms subject to locking, unless permit by occupancy chapter.	This condition currently exists from Kitchen A123 through Storage A123E given the lighted exit sign above the door between these two rooms.	See previous recommendation above for this condition.	
7.5.4.1	Accessible means of egress not required in existing buildings	Noted.		
7.10.1.4	Tactile signage requirements of 7.10.1.3. shall not apply to existing buildings, provided that occupancy classification does not change.	Noted. However, ADA 216.4.1 requires it without this exception.	See ADA review.	

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 8	**Features of Fire Protection**			
8.3.3.3	Unless otherwise specified, fire doors shall be self-closing or automatic closing per 7.2.1.8.	Noted.		
Table 8.3.4.2	Fire protection ratings for opening protective in fire barriers, fire-rated smoke barriers and fire-rated smoke partitions shall be as follows:	Noted.		
	Elevator hoistways:			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	Vertical shafts (stairs):			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	½-hour wall; 20 min door			
	Fire Barriers:			
	2-hour wall; 90 min door			
	1-hour wall; 45 min door			
	Exit Access Corridors:			
	1-hour wall; 20 min door			
	½ hour wall; 20 min door			
	Smoke Barriers:			
	1-hour; 20 min door			
	Smoke Partitions:			
	1/2 –hour; 20 min door			
8.3.5.1	Penetrations through fire barriers for electrical, mechanical, plumbing and	Noted.		

	communication systems shall be protected by a firestop system or device.			
8.4.1	Smoke partitions, where required, shall be provided to limit the transfer of smoke.	Noted.		
8.4.2(2)	They shall be permitted to extend from the floor to the underside of a monolithic or suspended ceiling system where the following conditions are met:	Noted.		
	(a) The ceiling system forms a continuous membrane.			
	(b) A smoke tight joint is provided between the top of the smoke partition & the bottom of the suspended ceiling.			
	(c) The space above the ceiling is not used as a plenum.	High school open locker areas on two floors have plenum return ceilings – so this area would not qualify for smoke rated ceiling.		
8.4.3.1	Doors in smoke partitions shall:			
8.4.3.2	Comply with 7.2.1, AND			
8.4.3.3	Not include louvers, AND			
8.4.3.5	Shall be self-closing or auto closing per 7.2.1.8	There are doors in corridors that do not have closers.	See recommendation in section 15.3.6.	
8.4.4.1	Penetrations in smoke partitions for electrical, mechanical, plumbing and communication systems shall be protected by a system or material that is capable of limiting the transfer of smoke.	Noted.		

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 13	**Existing Assembly Occupancy**			
13.1.7.1	The occupant load for the assembly use shall be determined on the basis of the occupant load factors of Table 7.3.1.2 that are characteristic of the use of the space, or determined as the maximum probable population of the space under consideration, whichever is greater.	Noted.		
13.1.7.1.1	In areas less than 10,000 sf, the occupant load shall not exceed 1 person / 5 sf.	Noted.		
13.1.7.1.2	In areas in excess of 10,000 sf, the occupant load shall not exceed 1 person in 7 sf.	The gymnasium is approximately 11,800 sf, which would set the maximum occupant load at 1,686. The room is posted for 1,729 with bleachers closed and no furniture.	The District should confirm that AHJ is comfortable with exceeding the limit imposed by this code section.	No cost.
13.1.7.1.3	The AHJ shall be permitted to establish the occupant load as the number of persons for which the existing means of egress is adequate, provided that measures are established to prevent occupancy by a greater number of people.	Noted.	See recommendation above.	
13.2.1	All means of egress shall be in accordance with Chapter 7 and this chapter.	Noted.		
13.2.3.6.1	The main entrance/exit of the assembly area shall be of a width that accommodates one half of the total occupant load, and shall be at the level of exit discharge, or shall lead to a stair or ramp leading to a street.	Gymnasium complies at maximum posted occupancy. Occupant load must be held to a maximum of 650 people for the Auditorium given only 2 exit doors at the main entry (total of 6’ of egress)..	The District should verify with AHJ for this posting at the auditorium.	No cost.
13.2.3.6.5	In assembly occupancies where there	Dining area and multipurpose	Egress capacity complies.	

	isn't a well-defined main entrance/exit, exits shall be permitted to be distributed around the perimeter of the building, provided that the total exit width is at least 100% of that required for the permitted occupant load.	room fall into this category.		
13.2.4.1	The number of exits shall be per Section 7.4, UNLESS permitted by the following:	Noted.		
13.2.4.2	Occupant loads of 600 or less shall have 2 separate means of egress	Noted.		
13.2.4.3	Occupant loads between 600 and 1000 shall have 3 separate means of egress.	Noted.		
13.2.5.1	Means of egress shall be per Section 7.5	Noted.		
13.2.5.1.2	Dead-end corridors shall not exceed 20'.	Noted.		
13.2.6	Total length of travel from any point to an exit shall not exceed 200' in any occupancy, UNLESS:	Noted.		
	(1) Travel distance shall not exceed 250' in occupancy that is fully sprinkled.	This is the condition for the High school.		
13.4.5.7.1	The proscenium opening of every legitimate stage shall be provided with a curtain to intercept hot gases, flames, smoke, and to prevent flame from a stage fire from being visible in the auditorium for a 5-minute period.	Auditorium appears to comply with fire curtain system installed. The multi-purpose room does not qualify as a stage but rather a "platform" per IBC 2009 Section 410.2. It does, however, have an expired certificate of flame retardancy (2009).	Multipurpose room curtain needs to be re-certified. The District should contact the issuing agency.	Budget $600 to re-apply retardant to curtain – does not include transportation of curtain to & from facility. Budget $400 for transport.
13.4.5.7.3	The curtain shall be automatic closing without the use of applied power.	Auditorium appears to comply with fire curtain system installed.	The District should confirm this capability with curtain system installer.	
13.4.5.12.1	Stages over 1000 sf in area shall be equipped with 1 ½" hose lines for first aid fire fighting at each side of the stage.	Auditorium complies. The multi-purpose room platform also complies with this.		

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River High School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 15	**Existing Educational Occupancies**			
15.1.2.2.1	Assembly occupancy (auditoria & gymnasia) to comply with Chapter 13.	Noted.		
15.1.7.1	The occupant load is to be determined by Table 7.3.1.2.	Noted.		
	Assembly – fixed seating: actual number of seats.			
	Assembly – concentrated w/o fixed seats: 7 nsf/occ.			
	Assembly – less concentrated w/o fixed seats: 15 nsf/occ.			
	Kitchen: 100 gsf/occ.			
	Library stack area: 100 gsf/occ.			
	Library reading area: 50 nsf/occ.			
	Exercise rooms with equipment.: 50 gsf/occ.			
	Stages: 15 nsf/occ.			
	Classroom: 20 nsf/occ.			
	Shops/Labs/Vocation rooms: 50 nsf/occ.			
	Storage: N/A			
15.2.1.1	Means of egress shall be per Chapter 7 & Section 15.2	Noted.		
15.2.2.3	Stairs shall comply with 7.2.2	Noted.		
15.2.2.6	Ramps shall comply with 7.2.5	Noted.		
15.2.3.1	Capacity of a means of egress shall comply with 7.3	Noted.		
15.2.3.2	Minimum corridor clear width shall be 6’-0”.	Noted.		
15.2.4	Not less than 2 separate exits shall be	Noted.		

	provided on every story and accessible from every part of every story and mezzanine.			
15.2.5.2	Dead end corridors shall not exceed 20', except 50' where sprinkled.	Noted.		
15.2.5.3	Common path of travel shall not exceed 100' in sprinkled bldg.	Noted.		
15.2.5.5	Doors that swing into the exit access corridor shall not interfere with corridor travel (see 7.2.1.4.3)	Noted.		
15.2.6.1	Travel distance to an exit shall not exceed 150' from any point in a building unless permitted below:	Noted.		
15.2.6.2	Travel distance shall not exceed 200' in educational occupancies protected by sprinkler.	High school complies.		
15.2.6.3	Approved existing travel distance shall be permitted to continue in use.	Noted.		
15.2.11.1.1	Every room or space greater than 250sf and used for classroom or other educational purpose, or normally subject to student occupancy shall have not less than one outside window for emergency rescue that complies with the following unless permitted otherwise by 15.2.11.1.2:	Noted.		
	a) 20" clear width, 24" clear height and 5.7 sf in area.			
	b) The window sill shall not be more than 4" above the floor, with an operating latch no more than 54" above the floor.			
15.2.11.1.2	The requirements of 15.2.11.1.1 shall not apply to the following:	Noted.		
	a) Sprinkled buildings.	High school qualifies for this exception.		
15.3.2.3	Stages & platforms shall be protected in accordance with Chapter 13.	Noted.		
15.3.6	Corridors shall be separated from the rest of the building by 30-minute rated walls per Section 8.3, unless	Noted.		

	permitted by the following:			
	b) For sprinkled buildings, corridor walls need not be rated provided they form smoke partitions per Section 8.4	Some doors do not have closers. Spot checking walls above ceilings indicated walls extend to underside of structure above (not an exhaustive inspection however). There are unducted return grilles in the ceiling that would preclude the ceiling serving as a smoke partition in open locker areas C141, C142, C237 & C238 along with associated adjacent corridors.	NFPA 101 Life Safety 2003 requires the corridors serve to limit the transmission of smoke, and further that doors be automatic closing in these walls. NFPA 2009 allows for doors not to be self-closing for sprinkled buildings. Given that the State is moving toward adoption of the 2009, it would be worth applying for a waiver of this requirement before investing the money to add closers to those doors that don't currently have them, and/or to install ducted returns where plenum returns currently exist.	If AHJ requires doors to be self-closing, budget $400 per door for surface mounted closer. Note: some doors from other findings & recommendations may overlap with these doors. Some may be renovated at different times than others. Care should be taken to avoid duplication.
	e) Lavatories shall not be required to be separated from corridors providing the building is fully sprinkled.	High school qualifies for this exception.		
15.3.7.1	Educational occupancies shall be subdivided into compartments by 1-hour rated smoke partitions complying with Section 8.4 where one or both of the following exist:	Noted.		
	a) The max. area of a compartment exceeds 30,000 sf.			
	b) The length or width of the building exceeds 300'			
15.3.7.2	The requirement of 15.3.7.1 shall not apply to the following:			
	a) Where all classrooms have exterior access in accordance with 7.5.3.			
	b) Fully sprinkled buildings.	High school qualifies for this exception.		

PROGRAM

ANALYSIS

OYSTER RIVER HIGH SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Dec-11								
Oyster River High School				2011-2012 Enrollment = 680				
PROGRAM ANALYSIS				Total Building Gross SF = 183,652 sf				
	Room Number	**Room Name**	**Type**	**Actual Sq. Footage**	**DOE Guideline Sq. Footage**	**Current Pupil Stations**	**Allowable DOE Pupil Stations**	**ORCSD Class Size Guidelines**
FIRST	V101	Vestibule	Circulation	335				
FLOOR	V102	Vestibule	Circulation	434				
	V103	Vestibule	Circulation	80				
	V104	Vestibule	Circulation	164				
	L101	Lobby	Circulation	468				
	S101	Stair	Circulation	291				
	S102	Stair	Circulation	286				
	S103	Stair	Circulation	244				
	S104	Stair	Circulation	286				
	S105	Stair	Circulation	227				
	S106	Stair	Circulation	238				
	S107	Stair	Circulation	186				
	S108	Stair	Circulation	186				
	Cor101	Corridor	Circulation	1352				
	Cor102	Corridor	Circulation	967				
	Cor103	Corridor	Circulation	2001				
	Cor104	Corridor	Circulation	248				
	Cor105	Corridor	Circulation	1203				
	Cor106	Corridor	Circulation	230				
	Cor107	Corridor	Circulation	372				
	Cor108	Corridor	Circulation	1279				
	Cor109	Corridor	Circulation	992				
	Cor110	Corridor	Circulation	260				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	Cor111	Corridor	Circulation	1247				
	Cor112	Corridor	Circulation	138				
	A103	Mechanical	Utility	1820				
	A104	Electrical Room	Utility	457				
	A105	Sprinkler	Utility	140				
	IA101	Industrial Arts	Classroom	478	800			
	IA102	Industrial Arts	Shop	2101	1500			
	IA102A	IA Office	Office	111				
	A106	Athletic Director	Office	205				
	A107	Data Closet	Server	102				
	A109	Fire Command	Utility	101				
	A110	Multi-Purpose	Common	3644				
	A110A	Platform	Multipurpose	1037				
	A110B	Storage	Multipurpose	153				
	A120	Art	Classroom	1025	1200	14	17	22
	A120A	Dark Room	Art	287				
	A121	Dining Area	Common	6238				
	A122	Drawing/Painting	Classroom	980	1200	14	16	22
	A122A	Art Storage	Storage	242				
	A122B	Art Storage	Storage	236				
	A123	Kitchen	Food Service	1762				
	A123A	Dishwasher	Kitchen	161				
	A123B	Kitchen Office	Kitchen	110				
	A123C	Mop Storage	Kitchen	39				
	123D	Toilet	Toilet	57				
	123E	Storage	Storage	601				
	A124	Pottery	Classroom	766	800	13	13	n/a
	A124A	Kiln Room	Art	128				
	A126	Elec./Mech.	Utility	890				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	A127	Storage	Storage	601				
	A128	Music (choral)	Classroom	910	800	12	60	n/a
	A129	Ship/Receiving	Utility	805				
	A130	Music (instrumental)	Classroom	1932	1000	30	77	n/a
	A130A	Office	Office	147				
	A130B	Practice Room	Breakout	76	48	1	1	n/a
	A130C	Music Storage	Storage	292				
	A130D	Storage	Storage	513				
	A130F	Practice Room	Breakout	146	48	2	3	n/a
	A130G	Practice Room	Breakout	76				
	A130H	Music Office	Office	144				
	A130J	Green Room	Theater	78				
	A131	Athletic Training	Office	325				
	A131A	Closet	Storage	23				
	A131B	Toilet	Toilet	25				
	A132	Stage	Auditorium	2353				
	A134	Auditorium	Common	4582				
	A134A	Control Room	Utility	287				
	A134B	Stair	Circulation	66				
	A134C	Stair	Circulation	66				
	A134D	Stair	Circulation	148				
	A134E	Stair	Circulation	148				
	A134F	Light Mezzanine B	Auditorium	37				
	A134G	Light Mezzanine	Auditorium	37				
	A134H	Lift	H/C Access	21				
	A135	Weight Room	Common	830				
	A137	Conc.	Concesions	168				
	A137A	Ticket	Office	28				
	A138	Gymnasium	Common	11817	5000			
	A138A	Storage	Gym	584				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	A138B	Emer. Mgt	Office	96				
	A139	Athletic Storage	Storage	440				
	A142	Office	Office	148				
	A142A	Toilet	Toilet	60				
	A143	Office	Office	148				
	A144	Mens Lockers	Common	1126				
	A145	Toilet	Toilet	68				
	A146	Showers	Showers	114				
	A147	Showers	Showers	114				
	A148	Toilet	Toilet	68				
	A149	Womens Lockers	Common	1126				
	A150	Toilet	Toilet	68				
	A151	Showers	Showers	114				
	A152	Showers	Showers	114				
	A153	Toilet	Toilet	68				
	A154	Office	Office	148				
	A154A	Toilet	Toilet	60				
	A155	Office	Office	148				
	A156	Data Closet	Server	188				
	A157	Electrical Clst	Utility	95				
	A159	Womens Toilet	Toilet	464				
	A159	Mens Toilet	Toilet	265				
	A160	Janitor	Utility	84				
	A161	Laundry	Utility	84				
	A162	Stair	roof	53				
	C103	Waiting	Nurse	147				
	C103A	H/C Toilet	Nurse	103				
	C104	Nurse Suite	Office	160				
	C104A	Exam	Nurse	131				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	C104B	Storage	Nurse	150				
	C105	SRO	Security	144				
	C106	Janitor	Utility	69				
	C107	Women	Toilets	182				
	C108	Men	Toilets	182				
	C120	Conference	Conference	700				
	C120A	Storage	Conference	59				
	C121	Teacher	Lounge	782				
	C121A	Storage	Teacher	150				
	C121B	Data Closet	Utility	86				
	C123	Learning Lab	Classroom	1186	800			
	C124	Media Room	Classroom	930	800			
	C124A	Editing Suite	Media	338				
	C124B	Control Room	Media	129				
	C124C	Storage	Media	41				
	C125	SPED	Small Group	796				
	C126	Guidance	Reception	470				
	C126A	Conference	Conference	248				
	C126B	Guidance Office	Office	154				
	C126C	Guidance Office	Office	150				
	C126D	Guidance Office	Office	149				
	C126E	Guidance Office	Office	154				
	C126F	Guidance Storage	Storage	123				
	C126G	Closet	Storage	12				
	C127	Computer Lab	Classroom	775	750	22	25	22
	C128	Work Area	Common	286				
	C128A	Office	Office	114				
	C128B	Office	Office	155				
	C128C	Testing	Small Group	101				
	C128D	Office	Office	155				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	C129	Library Storage	Storage	373				
	C130	Study	Small Group	460				
	C131A	Work Room	Breakout	136				
	C131B	Library Storage	Storage	114				
	C132	Study	Small Group	535				
	C133	Speech	Small Group	286				
	C134	Study	Small Group	460				
	C135	OT/PT	Skills	374				
	C136	Study	Small Group	495				
	C137	Study Skills	Small Group	450				
	C137A	Toilet	Toilet	64				
	C138	Janitor	Utility	106				
	C139	Elevator	Circulation	55				
	C140	EMR	Circulation	64				
	C141	Locker Area	Students	1075				
	C142	Locker Area	Students	907				
	C143	Data	Server	81				
	C144	Electrical	Utility	261				
	C145	Men	Toilet	150				
	C146	Women	Toilet	150				
	C147	Janitor	Utility	45				
	C148	Elec Clst	Utility	106				
	C149	Men	Toilet	179				
	C150	Women	Toilet	179				
	C151	Women	Toilet	65				
	C152	Men	Toilet	65				
	L150	Economics	Classroom	1206	800	22	30	22
	L150A	Prep	Workroom	218				
	L150B	Storage	Lab Storage	140				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	L151	Life Sciences	Lab	1196	1200	19	20	22
	L152	Biology	Lab	1196	1200	19	20	22
	L152A	Prep	Workroom	218				
	L152B	Storage	Lab Storage	140				
	T101	Preschool	Classroom	830	1000			
	T102	Preschool	Classroom	828	1000			
	T103	PEP	Small Group	385				
	T104	English	Classroom	833	800	16	25	22
	T105	English	Classroom	833	800	16	25	22
	T106	English	Classroom	827	800	16	25	22
	T107	Foreign Language	Classroom	827	800	17	25	22
	T108	Foreign Language	Classroom	833	800	17	25	22
	T109	Foreign Language	Classroom	833	800	17	25	22
	T110	World Language	Office	385				
	T111	Foreign Language	Classroom	830	800	17	25	22
	T112	Foreign Language	Classroom	830	800	17	25	22
SECOND	S201	Stair	Circulation	291				
FLOOR	S202	Stair	Circulation	286				
	S203	Stair	Circulation	244				
	S204	Stair	Circulation	286				
	S205	Stair	Circulation	227				
	S206	Stair	Circulation	238				
	S207	Stair	Circulation	186				
	S208	Stair	Circulation	186				
	Cor201	Corridor	Circulation	260				
	Cor202	Corridor	Circulation	230				
	Cor203	Corridor	Circulation	1680				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	Cor204	Corridor	Circulation	248				
	Cor205	Corridor	Circulation	1203				
	Cor206	Corridor	Circulation	1279				
	Cor207	Corridor	Circulation	992				
	C206	Mechanical	Utility	237				
	C216	Computer Science	Classroom	1340	750	18	40	
	C218	IT Workshop	Internet	313				
	C220	Study Skills	Small Group	604				
	C221	Computer Lab	Classroom	1012	750	21	33	
	C223	Health	Classroom	750	800	21	25	
	C224	Office	Workroom	350				
	C225	Tech/File Servers	Utility	572				
	C226	Consumer Science	Classroom	1450	1500	9	20	22
	C226A	Kitchen	Consumer Sci	502				
	C226B	Storage	Consumer Sci	106				
	C227	Janitor	Utility	69				
	C228	Women	Toilet	182				
	C229	Men	Toilet	182				
	C230	Elevator	Circulation	55				
	C231	Mens	Toilet	65				
	C232	Womens	Toilet	65				
	C233	Electrical	Utility	342				
	C237	Locker Area	Common	1023				
	C238	Locker Area	Common	857				
	C239	Loft	Utility	256				
	C240	Loft	Utility	256				
	C241	Storage Mezz	Storage	1140				
	L250	Chemistry	Lab	1202	1200	18	20	22
	L250A	Prep	Workroom	218				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	L250B	Storage	Lab Storage	140				
	L251	Chemistry	Lab	1196	1200	18	20	22
	L252	Biology	Lab	1197	1200	18	20	22
	L252A	Prep	Workroom	218				
	L252B	Storage	Lab Storage	140				
	L253	Biology	Lab	1206	1200	18	20	22
	T201	Social Studies	Classroom	830	800	18	20	22
	T202	Social Studies	Classroom	830	800	18	25	22
	T203	Project Room	Small Group	385				
	T204	Social Studies	Classroom	833	800	18	26	22
	T205	Social Studies	Classroom	833	800	18	26	22
	T206	Social Studies	Classroom	827	800	18	25	22
	T207	English	Classroom	827	800	16	25	22
	T208	English	Classroom	833	800	16	26	22
	T209	English	Classroom	833	800	16	26	22
	T210	Project Room	Small Group	385				
	T211	English	Classroom	830	800	16	25	22
	T212	English	Classroom	830	800	16	25	22
	T213	Women	Toilet	179				
	T214	Custodial	Utility	64				
	T215	Elevator	Circulation	55				
	T216	Men	Toilet	60				
	T217	Women	Toilet	60				
	T218	Elec Clst	Utility	106				
	T219	Janitor	Utility	106				
	T220	Men	Toilet	179				
THIRD	S302	Stair	Circulation	286				
FLOOR	S303	Stair	Circulation	244				
	S304	Stair	Circulation	286				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	Cor301	Corridor	Circulation	992				
	Cor302	Corridor	Circulation	230				
	T301	Social Studies	Classroom	830	800	18	25	22
	T302	Math	Classroom	830	800	17	25	22
	T303	Project Room	Workroom	385				
	T304	Math	Classroom	832	800	17	26	22
	T305	Math	Classroom	832	800	17	26	22
	T306	Math	Classroom	826	800	17	25	22
	T307	Math	Classroom	826	800	17	25	22
	T308	Math	Classroom	832	800	17	26	22
	T309	Math	Classroom	832	800	17	26	22
	T310	Project Room	Workroom	385				
	T311	Math	Classroom	830	800	17	25	22
	T312	Social Studies	Classroom	830	800	17	25	22
	T313	Elevator	Circulation	55				
	T314	Elec Clst	Utility	106				
	T315	Janitor	Utility	106				
	T316	Staff Toilet	Toilet	64				
	T317	Men	Toilet	179				
	T318	Women	Toilet	179				
		Totals		**147205sf**		**783 Pupils**	**1183Pupils**	
				Net SF		**Current**	**Max. NHDOE**	
				of Building		**Stations**	**Allowance**	

MECHANICAL

ENGINEERING

OYSTER RIVER HIGH SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Oyster River High School
Facility Analysis – Mechanical Systems

Table of Contents

Appendix

I. Introduction

Petersen Engineering has reviewed available record drawings and surveyed the mechanical systems serving the Oyster River High School in Durham, NH. The intent of this report is as follows:

1. Evaluate existing mechanical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing mechanical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Short term recommendations are provided to address items that don't conform to current building code requirements. In addition, longer term recommendations are provided for improvements in system performance, durability, reliability, maintainability and energy efficiency.

II. Findings

A. Heating Systems

Heating Hot Water Generation:
Heating is provided to the building by a central heating plant with three natural gas-fired steel fire tube boilers (Cleaver Brooks Model CB-150), each with 5021 MBH output capacity and minimum 82% thermal efficiency. The mechanical room is located on the west side of the building.

Two 600 GPM variable volume pumps provide heating hot water distribution to the school with steel and copper piping. The pumps operate in a parallel configuration, each with its own variable frequency drive.

A dedicated make-up air handling unit (AHU-15) provides combustion air for the boilers. It is our understanding that this make-up air system has been problematic in operation due to freeze stat trips and equipment lock-out. Dampers are typically locked open to provide combustion air.

All central plant piping and heating infrastructure was installed during the 2004 renovations, along with all HVAC equipment and piping in the facility.


Heating Plant – Three Fire Tube Boilers (2004 Installation)

Heating Distribution:

Hot water heating coils are provided for central ventilation systems, which consist of twenty (20) central air handling units, mostly installed on the roof.

Air-based heating is provided for typical classrooms, as well as for the gym, auditorium, cafeteria and all other occupied spaces. Individual zone heating coils are provided with variable volume or constant volume terminal units for temperature control. Larger spaces with dedicated air handling units (Gym, Cafeteria, etc.) include temperature control by modulation of the supply air temperature from the main air handlers.

Cabinet unit heaters and finned tube radiators are used at entrances and select perimeter spaces but the majority of building heat is provided by the air handling systems.

Code Compliance:
No issues identified with design provisions.
The make-up air handling system that provides combustion air for the boilers (AHU-15) requires repairs and/or control upgrades to ensure reliable operation for compliance with International Fuel Gas Code Section 304.9 (combustion air provisions by mechanical means).

Capacity for Expansion:
Total boiler plant capacity of 15,000 MBH includes spare capacity to support future expansion. We estimate that an additional 50,000 square feet of occupied space could reasonably be served by the existing boiler plant. With some control modifications to existing systems to take in to account actual occupancy patterns, it is possible that further expansion area could be served by this plant.

B. Ventilation Systems

Ventilation is provided to the building by twenty (20) central air handling systems, mostly installed on the roof. The systems serving the Art and Music areas, Stage, Auditorium and Corridor spaces are installed at interior locations.

Ten (10) central air handling systems include energy recovery wheels the extract heat energy from the exhaust air stream. It appears that energy recovery wheels have been used where feasible and appropriate.

Variable frequency drives are provided for supply and exhaust fan motors in several air handlers to allow variable volume operation. It appears the variable volume capabilities have been included where feasible and appropriate. Several air handling systems are configured with constant volume terminals that may be able to undergo control modifications to scale back airflows when spaces are not occupied or lightly occupied to save fan energy: These systems are as follows:

AHU-4: 28,000 CFM air handling system serving classrooms in Area B
AHU-7: 11,000 CFM air handling system serving science classrooms in Area C
AHU-17: 8,000 CFM air handling system serving art and music classrooms

Several large air handling systems are configured for operation at two levels (low event and high event). These systems may benefit from control retrofits to modulate outside air dampers based on measured CO2 levels, resulting in significant energy savings potential: These systems are as follows:

AHU-10: 6,000/11,000 CFM air handling system serving the Cafeteria
AHU-13: 10,000/24,000 CFM air handling system serving the Gym
AHU-16: 5,300 CFM air handling system serving the Multi-Purpose Room (1,000 and 3,000 CFM outside air settings)
AHU-19: 5,000/10,500 CFM air handling system serving the Auditorium

Typical Rooftop Air Handling Unit and exposed ductwork (2004 Installation)

Maintenance:

It is our understanding that air handling systems are tended to on a quarterly basis by the District's maintenance department, primarily to change filters. Siemens is on site generally one day per quarter to address control system issues. Multiple repairs have been required for air handling system components, including a significant overhaul to the energy recovery unit serving the three story "Tee" section of the building in 2010 (AHU #4).

Due to the vast number of air handling systems and relative complexity of systems, it does not appear that adequate resources have been allocated to maintain equipment per the manufacturer's requirements. It appears that keeping up with filter changes is a challenge and is not likely that other important preventative maintenance measures (lubrication, belt changes, calibration, etc.) can be adequately addressed.

Crushed, dirty filters at Industrial Arts Air Handler (AHU-9)

Capacities:
Required ventilation rates have been calculated for comparison to provided air flow rates per the available design drawings – Refer to Appendix A for summary of calculations.

Code Compliance:
Ventilation rates generally comply with current code requirements per the design drawings. Economizers and energy wheels are included for air handling systems in accordance with the 2009 IECC requirements.

2009 IECC Section 503.2.5.1 requires Demand Control Ventilation for spaces larger than 500 square feet and with an average occupant load of 40 people per 1000 square feet of floor area. Air handling systems serving the Cafeteria, Gym, Multi-Purpose Room, Auditorium and Stage require control modifications for full compliance with this requirement (typically accomplished with CO2 sensors and DDC control system programming).

Demand Control Ventilation is defined by the IECC as “a ventilation system capability that provides for the automatic reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is less than the design occupancy”.

Capacity for Expansion:
The existing ventilation systems are in operation near the half way point of typical expected useful lifecycle (15-years for roof top equipment, 20-years for interior equipment). The existing systems are sized for the areas served and do not have spare capacity. New air handling equipment would be required to support expansion spaces.

C. Air Conditioning Systems

Multiple areas of the school are provided with air conditioning by DX coils in air handlers, connected to compressor/condenser refrigeration units on the roof. The following air handlers include air conditioning capabilities:

AHU-1: 9,000 CFM air handling system serving the Media Center
AHU-3: 2,000 CFM air handling system serving the Guidance Offices
AHU-6: 9,000 CFM air handling system serving Area C (Teacher's Room, Work Room, etc.)
AHU-8: 3,400 CFM air handling system serving Area C (Admin. Offices)
AHU-18: 7,000 CFM air handling system serving the Stage
AHU-19: 5,000/10,500 CFM air handling system serving the Auditorium

Several small DX air conditioning systems installed for select areas.


Typical Rooftop Condensing Unit for A/C

Maintenance:
Refer to section under "Ventilation Systems" for general discussion.
A/C Condensing units require regular routine maintenance. Due to the vast number of mechanical system components and relative complexity of systems, it does not appear that adequate resources have been allocated to maintain this equipment per the manufacturer's requirements. The equipment is operating in mid life cycle. Without regular preventative maintenance, there is an increased likelihood of mechanical failures as equipment ages.

Code Compliance:
No issues identified.

Capacity for Expansion:
Extent of installed air conditioning is limited to select areas – new systems would be required for expansion if desired.

D. Control Systems

HVAC Controls include a complete Siemens Building Automation System (BAS) installed during the 2004 renovations

- Full DDC controls are installed for heating, ventilation and air conditioning equipment, including monitoring capabilities through a DDC control interface
- It is our understanding that no software and hardware updates have been performed since the original installation.

Code Compliance:
No issues identified.

Capacity for Expansion:
Installed DDC control system is expandable to allow for future expansion. Software and hardware updates would likely be required to integrate existing system with new controllers.

E. Plumbing Systems

Domestic Water Service:

Domestic water service is provided by the local municipal water utility with a 4-inch service that enters at the Sprinkler Room on the west side of the building (adjacent to the heating plant).

Domestic hot water is generated by two gas-fired boilers (500 MBH input each) with a 375-gallon storage tank, located in the main mechanical room on the west side of the building.

Sanitary Sewer and Storm Drains:

Above and below grade sanitary sewer piping was installed during the 2004 renovations. A few below grade storm drain lines remained in service in the older section of the school (1964 construction).

Sanitary sewer and storm drain exits are provided at various locations, including a 4" grease drain line dedicated to the kitchen area, routed to a grease trap on the site.

Plumbing Fixtures:

Plumbing fixtures throughout the facility were installed during the 2004 renovations.

Code Compliance:
Lavatory faucets do not meet current plumbing code requirements for maximum allowable flow (0.5 GPM per IPC 2009 Table 604.4).

Capacity for Expansion:
Domestic water – the domestic water entrance appears to have reasonable flexibility to support future expansion.

Sanitary Sewer- Multiple sewer exits and pipe sizing appear to have reasonable flexibility to support future expansion. However, new sewer exits would likely be required to support additions depending on location and available pitch for piping to tie in to existing systems.

F. Fire Protection Systems

Fire protection service is provided by a dedicated 6-inch water entrance with backflow prevention assembly, zone valves and trim. The service enters the building in the Sprinkler Room on the west side of the building (adjacent to the heating plant). The valve assembly appears to be well maintained and in reasonable operating condition.

Full coverage sprinkler distribution is installed throughout with 9 zones.

A chemical fire suppression system is provided for the grease hood in the kitchen.

Code Compliance:
Providing completion of pump installation, fire protection systems appear to comply with current NFPA 13 requirements.

Capacity for Expansion:
The fire protection system is capable of supporting moderate future expansion – per NFPA 13 each sprinkler zone can support up to 52,000 SF of floor area for multiple floors. A new fire protection entrance may be considered for future expansion depending on location of addition in relation to feasible connection points to the existing sprinkler risers.

III. Recommendations – Code Compliance/Short Term

A. Heating Systems

Boiler Room Make-up/Combustion Air (AHU-15):
Make necessary repairs as well as control system modifications as necessary to ensure reliable operation of AHU-15 to supply combustion air to the boilers.

B. Ventilation Systems

Demand Control Ventilation:
Provide control system modifications for air handling systems serving the Cafeteria, Gym, Multi-Purpose Room, Auditorium and Stage to satisfy IECC requirement for Demand Control Ventilation, typically modifying “high event” and “low event” settings for these air handling systems. Provide CO2 sensors and DDC control components to allow for modulation of outside air dampers based on CO2 measurement within each of these spaces.

C. Plumbing Systems

Add 0.5 GPM aerators to single faucet lavatories throughout the school.

IV. Recommendations – Long Term

A. Control Systems

Provide updates to existing DDC control system to include current software, hardware, etc. to ensure compatibility as systems continue to age and require maintenance or replacement.

Provide full re-commissioning of all HVAC system controls by third party commissioning agent. Include allowance to replace faulty components discovered during commissioning process and to implement required control upgrades discovered during process.

The following excerpt is from EPA Energy Star website for K-12 Schools under Buildings & Plants:
http://www.energystar.gov/index.cfm?c=business.EPA_BUM_CH10_Schools

"Energy savings and other benefits. Problems uncovered during commissioning tend to have energy implications. Most concern HVAC systems—in particular, air distribution systems. At a typical 100,000-ft2 school, retrocommissioning can uncover about $10,000 to $16,000 in annual energy savings, on average. The amount of savings will depend on the types of problems that are identified and the remedies that are implemented."

B. Plumbing Systems

Install low-flow plumbing fixtures throughout with automatic flush valves and faucets

- 1.28 gallon-per-flush toilets
- 0.125 gallon-per-flush urinals
- 0.5 gallon-per-minute lavatory faucets

Note: Timeline is out several years since existing plumbing fixtures are relatively new and meet current code requirements with 0.5 gpm aerators added to lavatories.

C. Preventative Maintenance (HVAC Systems)

Regular preventative maintenance contract is strongly recommended for all mechanical systems with preventive maintenance contractor specializing in mechanical systems.

V. Budget Estimates

Refer to attached summary tables

Oyster River Cooperative School District

Oyster River High School – Short Term/Code Compliance Recommendations for Mechanical Systems

Code Section	Requirement Description	Finding	Recommendation	Budget
IEGC 2009 Section 304.9	Minimum volume of airflow required for proper combustion of fuel burning appliances	Existing Make-up air systems (AHU-15) provides required combustion air – however, unit is typically out of service	Provide repairs and/or control system modifications to AHU-15 to allow for reliable service of combustion air to boilers	$8,000
IECC 2009 Section 503.2.5.1	Demand Control Ventilation required for spaces over 500 square feet with occupant load of 40 people per 1000 square feet of floor area.	Air Handling Systems serving the Cafeteria, Gym, Multi-Purpose Room, Auditorium and Stage require Demand Control Ventilation	Provide control system modifications to allow CO2 based control of ventilation for AHU's #10, 13, 16, 18 and 19.	$40,000
IPC 2009 Section 604	Maximum flow rates for plumbing fixtures per Table 604.4 (0.5 gpm for lavatories)	Lavatory faucets do not meet maximum flow rate requirements. Fixtures should be able to be retrofitted with 0.5 gpm aerators	Add 0.5 gpm aerators to existing single faucet lavatories (approx. 51 units)	$5,000

Oyster River Cooperative School District

Oyster River High School – Long Term Recommendations for Mechanical Systems

System Description	Finding	Recommendation	Budget
HVAC Controls	Existing DDC system has not included regular software updates	Provide updates to DDC components to ensure compatibility as systems continue to age and require maintenance or replacement	$10,000
HVAC Controls	Make repairs/upgrades/adjustments to allow for proper scheduling and energy efficient operation of systems	Provide retro-commissioning process for all HVAC controls by 3rd party commissioning agent, including necessary system repairs	$120,000
Plumbing Fixtures	Plumbing fixtures do not meet current standards for highest efficiency	Install 1.28 gpf toilets, 0.125 gpf urinals and 0.5 gpm lavatories throughout with automatic sensor valves and faucets (timeline is out several years since existing fixtures are relatively new)	$140,000
HVAC Preventative Maintenance	Mechanical systems appear to lack regular preventative maintenance	Establish regular preventative maintenance contract with company specializing in mechanical systems	$40,000/year

Appendix A – Ventilation Calculations
Oyster River High School

Osyter River High School Ventilation Table

Room	Area (SF)	Occupants (2009 IMC)	Outdoor Air Req'd (2009 IMC)	Outdoor Air - Design	Exhaust Air Req'd (2009 IMC)	Exhaust Air - Design	Notes
First Floor							
Library C131	4775	48	813	2100	0	0	
Study Skills C137	455	3	42	200	0	0	
Toliet C137A	65	N/A	0	0	70	100	1
OT/PT C135	375	2	33	160	0	100	
Library Storage C131B	120	N/A	14	30	0	0	1
Speech C133	285	2	27	100	0	0	
Work Rm C131A	145	6	77	36	0	0	
Electrical Rm C144	185	N/A	0	0	0	350	1
Data Room C143	160	N/A	0	40	0	0	1
Corridor Cor112	140	N/A	8	0	0	0	1
Men C145	150	N/A	0	0	210	300	1
Library Storage C129	370	N/A	44	60	0	0	1
Women C146	150	N/A	0	0	210	300	1
Janitor C147	50	N/A	0	0	50	100	1
Computer Lab C127	800	20	296	384	0	0	
Corridor Cor110	265	N/A	16	0	0	0	1
Vestibule V103	80	N/A	0	0	0	0	1
Corridor Cor111	1240	N/A	74	360	0	0	
Study C136	495	18	239	162	0	0	
Study C134	460	17	225	162	0	0	
Study C132	535	19	254	162	0	0	
Study C130	460	17	225	162	0	0	
Office C128D	150	1	14	20	0	0	
Testing C128C	100	N/A	12	16	0	0	1
Work Area C128	280	2	27	50	0	0	
Office C128B	155	1	14	64	0	0	
Office C128A	110	1	12	36	0	0	
Guidance Storage C126F	120	1	12	20	0	0	
Guidance Office C126E	150	1	14	36	0	0	
Guidance Reception C126	150	1	14	50	0	0	
Guidance Office C126D	150	1	14	36	0	0	
Guidance Office C126C	150	1	14	50	0	0	
Guidance Office C126B	150	1	14	36	0	0	
Conference C126A	460	23	143	70	0	0	
Closet C126G	10	N/A	1	0	0	0	1
Editing Suite C124A	337	9	130	70	0	0	
Physics L153	1230	31	531	940	820	940	4, 7
Prep L152A	220	6	100	200	147	200	4

Storage L152B	135	N/A	16	120	0	0	1
Biology L152	1230	31	531	940	820	940	4, 7
Life Science L151	1230	31	531	940	820	940	4, 7
Storage L150B	135	N/A	16	120	0	0	1
Prep L150A	220	6	100	200	147	200	4
Economics L150	1230	44	588	940	0	940	
Corridor Cor105	1132	N/A	68	240	0	0	1
Media Room C124	920	23	340	360	0	0	
Storage C124A	40	N/A	5	32	0	0	1
Control Room C124B	128	4	55	40	0	0	
Corridor Cor106	250	N/A	15	80	0	0	1
Locker Area C142	905	28	194	176	0	0	
Data C143	80	N/A	0	32	0	0	1
Electrical C144	260	N/A	0	120	0	0	1
Mechanical C145	240	N/A	0	60	0	0	1
Mens C147	65	N/A	0	0	70	100	1
Womens C146	65	N/A	0	0	70	100	1
Corridor Cor104	255	N/A	15	80	0	0	1
Conference C120	730	37	229	175	0	0	
Storage C120A	60	N/A	7	13	0	0	1
Men Cor104	48	N/A	0	0	70	100	1
Women AD107	48	N/A	0	0	70	100	1
Break Area AD106	315	8	59	75	0	0	
EMR AD109A	44	N/A	0	0	0	150	1
Storage AD109	93	N/A	11	13	0	0	1
SRO C132	140	1	13	35	0	0	
Corridor Cor103	1840	N/A	110	352	0	0	1
SPED C125	800	28	376	360	0	0	
Corridor Cor107	370	N/A	22	80	0	0	1
Locker Area C141	1110	34	237	224	0	0	
Learning Lab C123	1175	59	366	576	0	0	
Teacher C121	775	4	67	396	0	0	
Storage C121A	145	N/A	17	36	0	0	1
Men C136	185	N/A	0	0	350	400	1
Women C135	185	N/A	0	0	350	400	1
Janitor C134	67	N/A	0	0	67	150	1
Corridor Cor102	390	N/A	23	250	0	0	1
Corridor Cor101	1280	N/A	77	800	0	0	1
Office AD110	130	1	13	30	0	0	
HC Toilet C103A	101	N/A	0	0	120	225	1
Foyer AD105	300	N/A	18	70	0	0	1
Waiting Area C103	150	5	34	0	0	0	
Nurse Suite C104	160	1	15	40	0	175	

Exam C104A	130	2	50	33	0	140	
Principal AD104	230	2	24	58	0	0	
Storage C104B	150	N/A	18	20	0	90	1
Secretary AD103	830	5	75	75	0	0	
Waiting AD103A	170	6	40	75	0	0	
Assistant Principal AD102	205	2	22	100	0	0	
Testing AD103B	32	N/A	4	13	0	0	1
Assistant Principal AD101	205	2	22	100	0	0	
Vestibule V101	300	N/A	0	0	0	0	1
Fire Command A109	190	N/A	0	80	0	0	1
Athletic Director A106	210	2	23	0	0	0	
Data A107	120	N/A	0	100	0	200	1
Storage A110B	215	N/A	26	80	0	0	1
Multi Purpose A110 & Patform A110A	4680	250	2156	3000	0	0	6, 8
Art Storage A122A	242	N/A	29	40	0	0	1
Dark Room A120A	320	N/A	0	200	320	500	1
Art Classroom A120	1030	21	395	336	481	480	4
Art Storage A122B	230	N/A	28	60	0	0	1
Drawing & Painting A122	980	20	376	336	457	480	4
Music Classroom A128	900	32	374	320	0	0	
Electrical/Mechanical A126	888	N/A	0	0	0	0	1
Kiln Room A124A	130	3	53	120	0	400	
Pottery A124	740	15	283	300	345	320	4
Practice Room A130A	175	7	81	40	0	0	
Practice Room A130B	85	3	35	32	0	0	
Vestibule A126A	45	N/A	3	20	0	0	1
Music, Choral & Band A130	1900	67	784	840	0	0	
Practice Room A130F	150	6	69	40	0	0	
Practice Room A130G	75	3	35	32	0	0	
Music Storage A130H	300	N/A	36	60	0	0	1
Storage A130D	515	N/A	62	112	0	0	1
Green Room A130J	75	N/A	9	32	0	0	1
Music Office A130H	180	1	16	40	0	0	
Corridor Cor117	650	N/A	39	120	0	0	1
Stage A132	2400	168	1824	1400	0	0	
Auditorium A134	5800	870	4698	7500	0	0	8
Control Room A134A	265	7	102	188	0	0	
Storage A134B	265	N/A	32	188	0	0	1
English T106	840	30	401	375	0	0	
English T105	840	30	401	375	0	0	
English T104	840	30	401	375	0	0	
PEP T103	384	14	186	160	0	0	
Corridor Cor109	1034	N/A	62	300	0	0	1

Foreign Language T107	840	30	401	375	0	0	
Foreign Language T108	840	30	401	375	0	0	
Foreign Language T109	840	30	401	375	0	0	
World Language T110	384	14	186	160	0	0	
Preschool Program T101	840	30	401	375	0	0	
Preschool Program T102	840	30	401	375	0	0	
Janitor C138	105	N/A	0	0	105	225	1
Men MBT1	155	N/A	0	0	280	300	1
EMR C140	65	N/A	0	0	0	150	1
Electrical Closet C137	106	N/A	0	0	0	125	1
Women WBT1	155	N/A	0	0	280	300	1
Foreign Language T111	840	30	401	375	0	0	
Foreign Language T112	840	30	401	375	0	0	
Corridor Cor108	1290	N/A	77	240	0	0	1
Vestibule V102	436	N/A	26	0	0	0	1
Electrical Room A104	440	N/A	0	0	0	900	1
Sprinkler Room A105	135	N/A	0	0	0	0	1
Mechanical Room A103	2020	N/A	0	8400	0	0	1
IA Storage IA102B	310	N/A	37	200	0	200	1
IA Office IA102A	110	1	12	100	0	100	
IA Classroom IA101	475	17	227	400	0	400	
Industrial Art IA102	2100	42	798	4300	0	4400	
Corridor Cor102	490	N/A	29	250	0	0	1
Dining Area A121	6325	443	4461	11200	0	10600	8
Storage A123E	605	N/A	73	300	0	0	1
Shipping & Receiving A129	800	N/A	96	100	0	0	1
Laundry A161	80	3	30	0	0	100	
Toilet A123D	60	N/A	0	0	70	100	1
MOP Storage A123C	40	N/A	5	0	0	0	1
Kitchen A123 & Dishwasher A123A	1890	N/A	0	1200	1323	6150	2
Kitchen Office A123B	110	1	12	100	0	0	
Janitor A160	55	N/A	0	0	55	100	1
Women A159	460	N/A	0	0	770	1200	1
Men A158	260	N/A	0	0	350	600	1
Electrical Closet A157	95	N/A	0	100	0	0	1
Corridor Cor114	1260	N/A	76	600	0	0	1
Mens Lockers A144	565	N/A	0	1100	283	0	3
Toilet A148	70	N/A	0	0	100	510	1
Showers A147	110	N/A	0	0	100	510	1
Showers A146	110	N/A	0	0	100	510	1
Toilet A145	70	N/A	0	0	100	510	1
Mens Lockers A144	565	N/A	0	1100	283	0	3
Toilet A142A	60	N/A	0	0	50	160	1

Office A142	150	1	14	100	0	100	
Office A143	150	1	14	100	0	100	
Corridor Cor115	250	N/A	15	0	0	0	1
Womens Lockers A149	565	N/A	0	1100	283	0	3
Toilet A150	70	N/A	0	0	100	510	1
Showers A151	110	N/A	0	0	100	510	1
Showers A152	110	N/A	0	0	100	510	1
Toilet A153	70	N/A	0	0	100	510	1
Womens Lockers A149	565	N/A	0	1100	283	0	3
Toilet A154A	60	N/A	0	0	50	160	1
Office A154	150	1	14	100	0	100	
Office A155	150	1	14	100	0	100	
Data Closet A156	195	N/A	0	0	0	380	1
Toilet A131B	25	N/A	0	unknown	50	unknown	1
Althetic Training A131	325	N/A	98	500	0	500	1
Vestibule V105	165	N/A	0	0	0	0	1
Em. Management Room A138B	100	1	11	50	0	0	
Athletic Storage A139	455	N/A	55	300	0	0	1
Storage A138A	575	N/A	69	400	0	0	1
Gymnasium A138	11870	534	6712	24000	0	22000	5, 8
Weight Room A135	820	N/A	246	700	0	700	1
Conc A137	172	1	15	150	0	0	
Ticket A137A	30	1	7	0	0	0	
Lobby L101	385	N/A	23	300	0	0	1
Corridor Cor116	1600	N/A	96	600	0	0	1
Second Floor							
Mezzanine C241	1150	N/A	69	300	0	0	1
Social Studies T206	840	30	401	375	0	0	
Social Studies T205	840	30	401	375	0	0	
Social Studies T204	840	30	401	375	0	0	
Project Room T203	384	14	186	160	0	0	
Corridor Cor207	1034	N/A	62	300	0	0	1
English T207	840	30	401	375	0	0	
English T208	840	30	401	375	0	0	
English T209	840	30	401	375	0	0	
Project Room T210	384	14	186	160	0	0	
Social Studies T201	840	30	401	375	0	0	
Social Studies R202	840	30	401	375	0	0	
Janitor R219	105	N/A	0	0	105	225	1
Men MBT2	155	N/A	0	0	280	300	1
Custodial T214	65	N/A	0	0	65	150	1
Electrical Closet T218	106	N/A	0	0	0	125	1

Women WBT2	155	N/A	0	0	280	300	1
Foreign Language T211	840	30	401	375	0	0	
Foreign Language T212	840	30	401	375	0	0	
Corridor Cor206	1290	N/A	77	240	0	0	1
Kitchen C226A	805	N/A	0	280	564	0	1
Storage C226B	110	N/A	13	unknown	0	unknown	1
Consumer Science C226	1220	43	576	653	0	unknown	
Corridor Cor201	350	N/A	21	80	0	0	1
Locker Area C238	872	27	187	176	0	0	
Women T216	58	N/A	0	0	70	100	1
Tech Coord & File Services CC225	558	3	48	360	0	0	
Men T216	58	N/A	0	0	70	100	1
Health C223	750	27	360	720	0	0	
Computer Lab C221	1010	26	381	990	0	0	
Men C229	185	N/A	0	0	350	400	1
Women C228	185	N/A	0	0	350	400	1
Janitor C227	67	N/A	0	0	67	150	1
Office C224	350	2	31	120	0	0	
Corridor Cor203	1595	N/A	96	320	0	0	1
Corridor Cor202	310	N/A	19	80	0	0	1
Locker Area C237	1010	31	216	176	0	0	
Electrical C233	330	N/A	0	120	0	450	1
Mens C231	65	N/A	0	0	70	100	1
Womens C232	65	N/A	0	0	70	100	1
Mechanical C206	238	N/A	0	60	0	0	1
Study Skills C220	595	3	51	225	0	0	
IT Workshop C218	305	2	28	135	0	0	
Computer Science C216	1345	7	116	600	0	0	
Loft C239	255	N/A	15	0	0	0	1
Loft C240	255	N/A	15	0	0	0	1
Corridor C205	1132	N/A	68	240	0	0	1
Biology L253	1230	31	531	940	820	1100	4, 7
Projects L252B	135	1	13	120	0	0	
Prep L252A	220	6	100	200	147	200	4
Biology L252	1230	31	531	940	820	1100	4, 7
Chemistry L251	1230	31	531	1940	820	1025	4, 7
Chem Storage L250B	135	N/A	0	0	90	150	1, 4
Prep L250A	220	6	100	200	147	200	4
Chemistry L250A	1230	31	531	1940	820	1025	4, 7
Penthouse D2.03	2050	N/A	0	0	0	0	1
Third Floor							
Math T306	840	30	401	375	0	0	

Math T305	840	30	401	375	0	0	
Math T304	840	30	401	375	0	0	
Project Room T303	384	14	186	160	0	0	
Corridor Cor301	1034	N/A	62	300	0	0	1
Math T307	840	30	401	375	0	0	
Math T308	840	30	401	375	0	0	
Math T309	840	30	401	375	0	0	
Project Room T310	384	14	186	160	0	0	
Social Studies T301	840	30	401	375	0	0	
Math T302	840	30	401	375	0	0	
Janitor T315	105	N/A	0	0	105	225	1
Men MBT3	155	N/A	0	0	280	300	1
Staff Toilet T316	65	N/A	0	0	70	100	1
Electrical Closet T314	106	N/A	0	0	0	125	1
Women WBT3	155	N/A	0	0	280	300	1
Math T311	840	30	401	375	0	0	
Social Studies T312	840	30	401	375	0	0	
Corridor Cor302	1290	N/A	77	240	0	0	1

1. Required ventilation rate (typically exhaust only, if any) dependent upon floor area
2. Designed EA includes (3) kitchen hood EFs (1610 CFM, 2975 CFM & 450 CFM) & dedicated EF (1115 CFM)
3. EA included in adjacent open space(s)
4. IMC required exhaust rate based on net occupiable floor area (2/3 room floor area)
5. Assumed 30% bleacher area & 70% actual gym/sport area
6. Occupancy assumed instead of IMC default occupancy value
7. Room equiped with dedicated fume hood(s) - not included in designed EA calculation
8. Ventilation system designed for two stages/levels of ventilation - "low event" & "high event"

ELECTRICAL

ENGINEERING

OYSTER RIVER HIGH SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Oyster River High School
Facility Analysis – Electrical Systems

Table of Contents

I. Introduction

Engineered Building Systems has reviewed available record drawings and surveyed the electrical systems serving the Oyster River High School in Durham, NH. The intent of this report is as follows:

1. Evaluate existing electrical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing electrical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Recommendations are provided to address items that don't conform to current building code requirements. In addition, recommendations are provided for improvements in system performance, maintainability and energy efficiency.

II. Findings

A. Building AC Electrical Power Distribution System

Building electrical power emanates from a PSNH pad mounted distribution transformer located in a fenced enclosure behind the building. The pad mounted transformer appears to be rated for 1000 KVA with an input voltage of 13,800 volts delta and an output voltage of 277/480 volts wye. The primary service entrance conductors for the transformer run underground from pole # PSNH to the PSNH pad mounted transformer. The secondary service entrance conductors for the building run underground from the pad mounted distribution transformer to the main switchboard located in the first floor main electric room #A104.

The main switchboard is rated for 2000 amperes @ 277/480 volts, three phase, four wire and is located in the building main electrical room. The existing 2000 ampere main switchboard consists of two sections : Section one consists of a 2000A main circuit breaker equipped with ground fault protection, phase loss protection and surge protection. Section two consists of a 2000A distribution section with feeder circuit breakers for remote panelboards, mechanical loads, standby system ATS, life safety system ATS, dimmer rack, kitchen loads, etc. The main switchboard and remote panelboards that we observed were in good condition, there appeared to be spares or spaces available for future circuits.

The existing electrical distribution equipment is in good condition. The manufacturer of the distribution equipment; General Electric, is presently still manufacturing electrical switchgear, so spare or replacement parts are readily available.

The main electric room is presently utilized as the standby and emergency distribution equipment room as well. There is adequate clearances in the main electric room and the egress door opens outward. Panic hardware exists on the egress door as required by N.E.C. Article 110.26(C)(2).


Photo #1

The 2000 ampere service @ 277/480 volts, three phase, four wire allows for a recommended maximum connected load of 1330.0 KW or approximately 7.5 watts per square foot (based on 80% maximum loading of service rating, divided by 178,000 usable square feet) The peak kilowatt demand for this facility was 431.0KW (or 518 amperes) in June of 2011. This equates to approximately 2.4 watts per square foot of peak electrical usage. The service capacity for this building is more than adequate to handle present and future building electrical needs and there are spaces available in the existing main switchboard distribution section for additional feeder breakers.

B. Metering Arrangement

All building electrical loads in the main building are single point primary metered via PSNH meter #(unknown). The building electrical meter is located in the fenced enclosure adjacent to the pad mounted transformer.

C. Emergency or Standby Power Distribution Systems

The building is equipped with an emergency and standby distribution system consisting of an exterior diesel fired 300KW, 375KVA outdoor generator which feeds two automatic transfer switches in the main electrical room. ATS #1 and distribution panel EQHDP are rated for 800 amperes at 277/480 volts and feed normal/emergency power to the kitchen panel and equipment panels located throughout the building. ATS #2 and distribution panel ELSHDP are rated for 200 amperes at 277/480 volts and provide normal/emergency power to lighting panels located throughout the building. The emergency distribution system appears to be in good to excellent condition, however the maintenance personnel mentioned that one of the transfer switches has had issues with not transferring from generator load to utility load.

D. Fire Alarm System

The main building is presently equipped with an addressable, low voltage fire detection and signalling system with voice evacuation (Notifier NFS-640). The existing Fire Alarm System consists of a main control panel and voice evacuation located in the Fire Command Center room A109 which is located off of the main Entry Lobby at the first floor. The outlying devices include remote system indicating and initiating devices including manual pull stations located at egress points throughout the building. Audio visual horn/strobe units are also strategically located

throughout the complex and smoke or heat detectors are located in corridors and open areas of the building. The audio/visual device coverage appears to comply with current NFPA 72 spacing requirements. There is a digital communicator which is located in the fire command center room. The digital communicator is tied into the fire alarm system and will notify the monitoring company of any "alarm" and/or "trouble" signals in the system.

E. Elevator Recall and Control

There are smoke detectors located in each floors elevator lobby for the elevator recall and control to the elevator control panel, however, the elevator installer/manufacturer would need to confirm that their control panel has appropriate components to perform the required control and recall functions.

F. Americans With Disabilities Act Compliance

It appears that most, if not all, of the buildings electrical controls and fire alarm devices are in compliance with the height and access requirements of the Americans with Disabilities Act and the State of New Hampshire Architectural Access Barrier Board requirements.

G. Interior Lighting

The facility is predominately illuminated via fluorescent lighting fixtures. Most lighting fixtures are equipped with T8 lamps and electronic ballasts. In general, lighting levels are good to excellent. There are a few spaces in the building where different color temperature lamps are in use within the same room.

H. Exterior Lighting

Metal halide shoebox type, lensed, pole mounted luminaires illuminate the main parking lot and access drives around the building. These fixtures appear to be in good condition. As we performed our inspection during the daylight hours, we cannot comment on the adequacy of the exterior lighting levels however, there does appear to be enough luminaires to provide adequate security lighting.

I. Automatic Lighting Control Systems

Most of the classrooms, offices, storage rooms, etc. are equipped with either wall or ceiling mounted occupancy sensors to provide automatic controls as required by the 2009 Edition of the International Energy Conservation Code, Section 505. All interior lighting systems appear to be equipped with manual controls as well. The corridor lighting is not presently equipped with automatic controls.

J. Emergency and Exit Lighting Systems

The building is equipped with an emergency lighting and exit lighting system as required by NFPA Life Safety Code 101, and the 2009 edition of the International Building Code. There appears to be an adequate number of normal/emergency lighting fixtures located throughout the egress paths and they are in good condition. In general, there are an adequate number of exit signs to indicate the paths of egress, and they appear to be in good condition. However, we did not observe any exit signage in the classrooms and mechanical rooms. Exterior areas of refuge at building exit discharges are equipped with emergency lighting as required by IBC Article 1006.

K. Lightning Protection System

The building is not equipped with a lightning protection system. The National Fire Protection Association (NFPA) and the Lightning Protection Institute (LPI) recommend that all buildings be protected against loss by lightning. However, the installation of a lightning protection system is not required by the National Electrical Code. The risk assessment index would classify this building as a moderate risk, taking into account the site conditions and the height of the building.

L. Grounding Electrode and Equipment Grounding System

We could not visually inspect the main grounding electrode system because it was not readily apparent during our visual inspection. This grounding electrode system should be tested every five years to insure that the proper resistance levels are maintained.

The electrical distribution system branch circuits and feeders appear to be equipped with an insulated equipment grounding conductor, which provides an effective conductive path to ground for the electrical system.

M. Security System

The building is equipped with a centralized low voltage security system consisting of motion sensors in the corridors and classrooms. There is an activation keypad located in the main entry lobby. There are also perimeter door contacts on egress doors. The system appears to be in good operating condition.

N. Paging System

There is a centralized paging system which consists of a master amplifier located at the main reception desk and remote ceiling mounted speakers located throughout the corridors, classrooms, library, gym, multi-purpose room etc. Paging is done over the telephone system handsets. The paging system appears to be in good condition.

O. Clock Program System

There is a centralized clock program system. The controller is located in the nurses office and the system appears to be in good condition.

P. Data Systems

The main server rack is located in the MDF room located in Data room A156. There are remote server racks located throughout the building. Data cabling is category 6 and the server rack, patch panels and data wiring all appear to be in excellent condition and fairly new.

Q. Carbon Monoxide Detection System

We did not observe a carbon monoxide detection system in this facility. The State of New Hampshire requires carbon monoxide detection systems in permanent and transient residential buildings that are equipped with fossil fuel burning appliances or equipment, but does not presently require carbon monoxide detection systems in non-residential facilities. Carbon monoxide is an odorless, colorless, tasteless toxic gas that can lead to death in a matter of minutes at high concentration levels and children are especially susceptible to carbon monoxide poisoning. There are fossil fuel fired mechanical systems and appliances in this facility.

R. Surge Protective Devices

There is a main surge protective device (SPD) at the main switchboard for the facility. We did not observe any downstream surge protective devices installed at any other points on the interior electrical distribution system. Surge protective devices (SPD) will protect the electrical distribution system and sensitive electronic devices or equipment from externally or internally generated surges or spikes.

III. Recommendations - Code Compliance

Refer to attached summary table.

IV. Recommendations - System Performance, Energy Efficiency and Maintenance

Refer to attached summary table.

V. Equipment Replacement Schedule

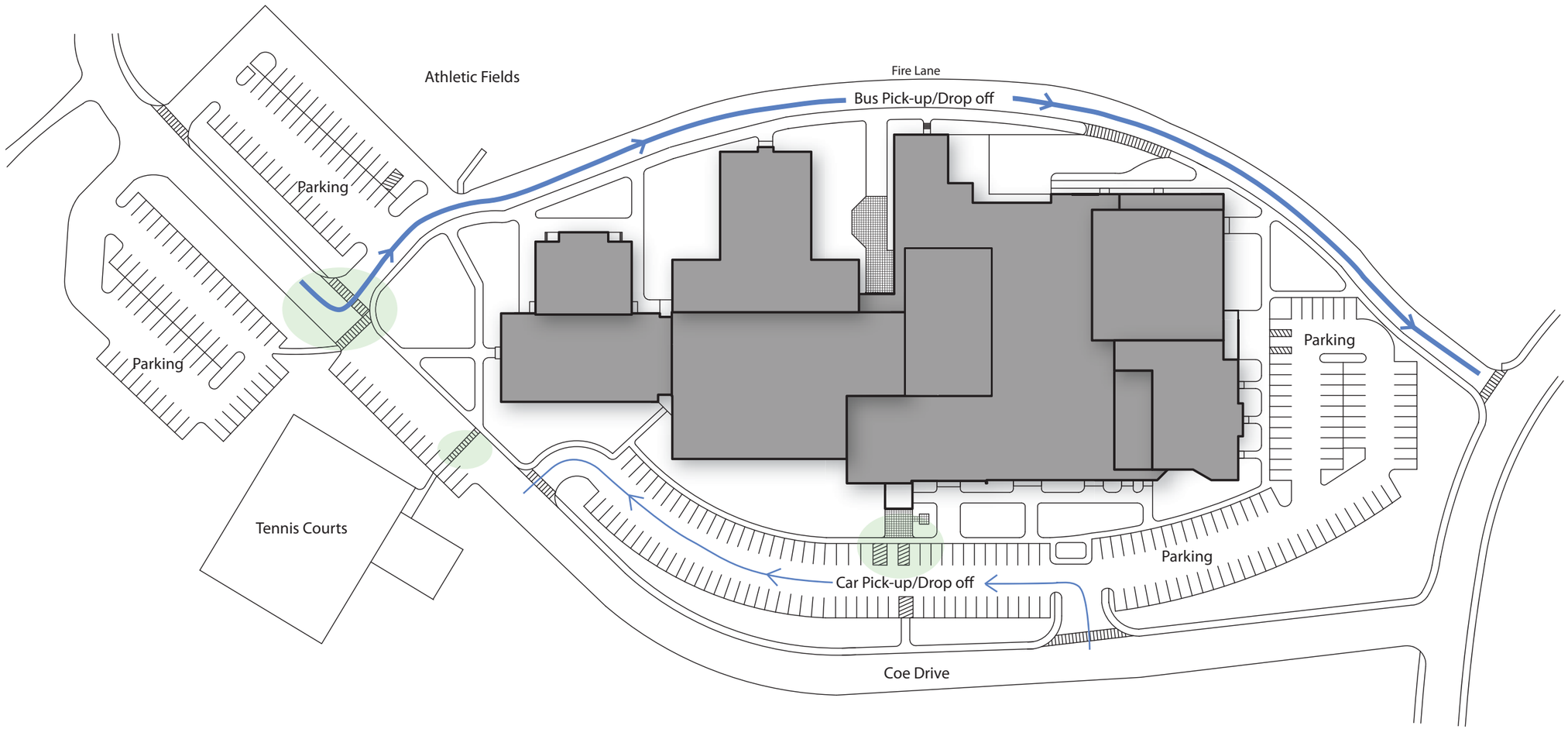
Equipment	Life Expectancy	Age (Years)	Remarks
Interior Light Fixtures	40 years	>10	See Note #1
Fluorescent Lamps	4-5 years	>10	See Note #2
Incandescent Lamps	6 months	>10	See Note #3
Exterior Light Fixtures	20 years	>10	See Note #4
H.I.D. Lamps	4-5 years	>10	See Note #2
Ballasts	15-20 years	>10	See Note #5
Emergency Battery Units	5-10 years	>10	See Note #6
Exit Signs	10-20 years	>10	See Note #6
Main Switchboard	30 years	>10	See Note #7
Panelboards	30 years	>10	See Note #8
Transformers	25 years	>10	See Note #8
Safety Switches	30 years	>10	See Note #9
Motor Starters	25 years	>10	See Note #9
Fire Alarm System	30 years	>10	See Note #10
Smoke Detectors	10 years	>10	See Note #10

Notes:

1. Interior lighting fixtures should be replaced and upgraded as areas are renovated. Replacement costs should be allocated into construction budgets rather than maintenance budgets.
2. Fluorescent lamps should be replaced in groups rather than on an individual failure basis.
3. Incandescent lamps have a limited life expectancy and should be replaced on an individual failure basis.
4. Exterior lighting fixtures should be replaced as needed or at end of useful life.
5. Electronic ballasts should be replaced on an individual failure basis until they reach 20 years in age, then group replacement is recommended.
6. Emergency battery units and exit signs should be tested on a semi-annual basis and replaced as needed if testing indicates pending or previous failure.

7. The main switchboard should be infrared tested every five years. The ground fault protection system and the distribution circuit breakers should be tested on an annual basis.
8. Panelboards and transformers shall be infrared tested every 5 years.
9. Replace at component end-of-life.
10. The Fire Alarm System and backup batteries should be tested as required by the local Fire Department and NFPA 72.

Oyster River High School
55 Coe Drive
Durham, NH



1 SITE PLAN
SCALE: 1:100

OYSTER RIVER MIDDLE SCHOOL

DAVIS GOUDREAU
ARCHITECTS

DAVIS GOUDREAU ARCHITECTS

Executive Summary for Building & Site

Oyster River Middle School

Accessibility Overview:

The Middle School is in general compliance with the accessibility requirements of the 2010 ADA guidelines. We note that although there are stairway lifts in the main corridor and a platform lift for access to the platform of the Music room, these lifts were not operated or tested at the time of our review. There are two elevators in the school, one of which is fully compliant and appears to be rated for fire fighter service (allowing it to serve as an accessible means of egress).

There are a number of toilet facilities that have been renovated for ADA compliance, but there are still some that do not comply. There are some issues with protruding objects, insufficient signage, incorrect mounting heights on some elements, incorrect door hardware, movable obstructions to required door clearances, insufficient clear width of doors, lack of proper grab bars at toilets, and lack of protection on supply and waste piping for lavatories.

There are 2 instances where ramps are non-compliant, one because of lockers occurring on one side where a wall rail should be, and one (on the topmost floor) where the ramp narrows to a landing (this is also a Code problem). There are science classrooms with counters and sinks that do not comply with maximum heights for same. The remedial work to correct these deficiencies should be addressed with any future renovations planned for the school, with the qualifier that it does not need to exceed 25% of the value of that work at the time it is done. Some items may be able to be corrected immediately by maintenance staff such as mounting heights of paper towel dispensers.

Building/Fire Code Review:

The area of the largest floor of the school (59,360 sf) is above the allowable maximum (38,016 sf) based on Table 503 from the State Building Code (including allowances for sprinkler and accessible frontage, and reductions for 3 stories). As such, the building needs to be divided into a minimum of two separate "buildings" through the use of fire walls. There appears to be a separation that may qualify for this type of wall construction, but some exploratory demolition will be needed to confirm this.

Corridor walls do not need to be fire rated, but they do need to resist the passage of smoke. At this time, that would mean adding closers to many corridor doors that currently do not have them in order that they be "self-closing" or "automatic closing". It is our recommendation to seek a waiver on this item given that the 2009 edition of the NFPA 101 Life Safety Code allows an exception for sprinkled buildings in an Educational occupancy. It will also require that the ceiling plane be relied upon to resist the passage of smoke given that some walls either do not fully extend to the underside of structure above, or some penetrations are not properly sealed. The Middle School's ceiling systems appears to be a good candidate to serve this function – no breaches in the ceiling plane were noted, and no unducted grilles were found in the ceilings.

There are some locations where doors & frames require fire-resistive ratings, but the rating could not be verified because labels (if they are present) have been painted over. Some fire-resistive walls around egress stairs have unsealed or improperly sealed penetrations through them (above

the ceilings). The gym will need to be posted for a maximum occupancy of 650 since there is only a pair of 3'-0" doors leading from the main entry to the room.

Deficiencies in means of egress for the school include: 1) several stairs with hand and guard rails that do not comply, 2) several stairs that are wider than 60", requiring a middle rail be installed, and 3) an elevator lobby on 3 floors that shares the same shaft as the rated egress stair adjacent to it. The lobby elevator appears to be rated for fire fighter service, however we did not witness it operating under stand-by power which is code-required.

There were some deficiencies in signage requirements for both Code and ADA. Additionally, four classrooms on the topmost floor have exposed spray-foam insulation on the ceilings. Code requires this product to be thermally protected in habitable spaces. This insulation should be tested for the presence of an intumescent coating, unless the District has written documentation that such a coating was applied at the same time the insulation was installed.

Site Review:

Bus circulation through the site is limited to the back of the school (east side of the site) where a marked bus lane provides space for queuing and pick-up/drop-off. A "no idling" policy has been implemented to avoid exposure to exhaust fumes. The area is monitored by staff during pick-up/drop-off times to assure the bus lane is kept clear.

Circulation routes through the front of the site on the south and west sides of the building are reserved for parent pick-up/drop-off and staff. A stopping lane and a thru-lane are clearly marked along the route on the west side. However, congestion occurs at the main entrance where vehicles converge with other vehicles and pedestrians approaching from the south. Students crossing Coe Drive meet vehicles picking up or dropping off students on the corner of Garrison Ave and Dennison Road as well as those exiting from the main entrance lanes.

Parking is accommodated by town owned, public spaces along the street adjacent to the school (Dennison Road) used by staff, leaving some parking spaces empty in the school lot at the rear of the site. There appears to be adequate queuing for buses at drop-off and pick-up. Parking for staff and visitors is separate and signed. ADA accessible parking is adequate in number, properly signed and located, in the lot at the main entrance, but the striped aisle is non-compliant. Curb cuts, where they exist should have tactile warning pads where they lead into traffic.

Currently there are no drainage issues to note. Perimeter drainage and catch basins are in working order. There is no water infiltration into the building.

Programming:

The Oyster River Middle School is a four story building. The lowest level is small and houses boiler and electric rooms with some miscellaneous storage. The remainder of this basement level is crawl space or is unexcavated.

The first major level is designated the Ground Floor and consists primarily of two classroom wings, the gymnasium, a multipurpose room with stage, instrumental music and a kitchen/cafeteria core. The buses loop in the rear parking lot and this floor is a primary access for bus riders.

- The 6288sf gym is fairly new construction. State guidelines recommended 125sf/pupil for a gym class. Therefore a maximum phys. ed. class size would be 50 pupils.
- The cafeteria and cafeteria annex are 3715sf combined. The school currently runs four (4) lunch periods which seem to be adequate for the population. There are an adequate number of tables for student seating.
- Two instrumental music room are used for music classes and band. In Rm 132 6th grade band is split into two groups Mon-Thurs and then come together in the Multipurpose Room 134 on Fridays. Individual music classes of 15-20 pupils are also taught in this room. In Instrumental Room 131 the 7-8th grade jazz band meets as well as individual music classes. There are between 90-100 pupils in jazz band, meeting in a space with a recommended occupancy of 46 pupils. The multipurpose room is 2576sf which is sized for 103 pupils in a band practice.
- Refer to the following spreadsheet for individual room uses, square footages and pupil counts.

The main level is designated the First Floor and is the primary public access into the building. It houses two main classroom wings, an administrative core, nurse's suite, library and specialized rooms.

- The library is 3450sf. Recommended size is 40sf/pupil for 10% of total design capacity population: 929 students x 10% = 92 x 40sf = 3680sf. The library is adequate in size for the current student enrollment.
- The nurse's suite is adequate for the minimum spaces required. The suite is 595sf. For a design population of between 750-1000 students the minimum sf should be 625sf.
- Refer to the following spreadsheet for individual room uses, square footages and pupil counts.

The top level, called the Second Floor, consists of four classrooms, bathrooms and an office.

- Refer to the following spreadsheet for individual room uses, square footages and pupil counts.

Food Service:

Soiled dish table in dish room needs a stainless steel perforated pan to cover pre rinse sink. This pan will catch all food and prevent food from entering drain. Cost: $300

Beverage Air 48" sandwich prep unit has had many service calls for this older refrigerator. Suggestion is to replace refrigerator with new unit. Cost $2,600

FACILITY

ANALYSIS

OYSTER RIVER MIDDLE SCHOOL

DAVIS GOUDREAU ARCHITECTS

ADA 2010 Checklist – Oyster River School District

Oyster River Middle School

ADAAG Section	Requirement Description	Finding	Recommendation	Cost Estimate
203.5	Areas used only by maintenance personnel shall not be required to comply with these regulations, or to be on an accessible route.	Noted.		
203.9	Spaces and elements within employee work areas shall only be required to comply with 206.2.8, 207.1 (means of egress) & 215.3 (alarm system).	Noted.		
206.2.3	At least one accessible route shall connect each story and mezzanine in multi-story buildings and facilities.	Noted.		
206.2.8	Common use circulation paths within employee work areas shall comply with 402 (accessible path), EXCEPT where work areas are less than 1000 sf and defined by permanently installed partitions, counters, casework, or furnishings.	Noted.		
206.6	Elevators provided for passengers shall comply with 407. In buildings permitted by 206.7 to use a platform lift, elevators complying with 408 shall be permitted.	Middle School complies.	No action needed.	
206.7	Platform lifts shall comply with 410. Platform lifts shall be permitted as a component of an accessible route in an existing building or facility. Standby power shall be provided per 207.2.	Noted. Lifts were not tested during our review.	District should confirm stand-by power is provided for platform lifts at both stage and stairway locations, and regularly tested	No cost.
208.2	Parking spaces (per 502) shall be provided in accordance with Table 208.2.	Noted.		
Table 208.2	1-25 spaces: 1 accessible space.			
	26-50 spaces: 2 accessible spaces.	The Middle School provides 48	The number of accessible	

		parking spaces onsite (exclusive of 4 accessible spaces).	spaces exceeds compliance.	
	51-75 spaces: 3 accessible spaces.			
	76-100 spaces: 4 accessible spaces.			
	101-150 spaces: 5 accessible spaces.			
	151-200 spaces: 6 accessible spaces.			
	201-300 spaces: 7 accessible spaces.			
	301-400 spaces: 8 accessible spaces.			
208.3.1	Accessible parking spaces shall be located as close to the accessible entry as possible.	Complies.		
211.2	No fewer than 2 drinking fountains shall be provided. One shall comply with 602.1 through 602.6 and the other shall comply with 602.7.	Noted.		
	EXCEPTION: Where a single drinking fountain complies with 602.1 through 602.6 and 602.7, it shall be permitted to be substituted for 2 separate fountains.	Noted.		
211.3	Where more than the minimum number of drinking fountains are provided, 50% shall comply with 602.1-602.6, and 50% shall comply with 602.7.	The Middle School does not comply. There are a total of 6 fountains, 1 is high (gym), 5 are low (throughout the remainder of the first and second floors).	Two drinking fountains would need to be raised to comply with the 50% requirement, or additional drinking fountains added to equal the ratio. It would be acceptable (under alternative means of compliance) to install bottled water stations at two locations.	Raise drinking fountains: $800 per fixture.
213.2	Where toilet rooms are provided, each toilet room shall comply with 603. EXCEPTION: In alterations where it is technically infeasible to comply with 603, altering existing toilet rooms shall not be required where a single unisex toilet room complying with 213.2.1 is provided and located in the same area as the existing inaccessible toilet room.	Noted.		

213.3.1	Where toilet compartments are provided, at least one shall comply with 604.8.1. At least one shall comply with 604.8.2 where six or more toilet compartments are provided.	Noted.		
213.3.2	Where toilets are provided, at least one shall comply with 604.	Noted.		
213.3.3	Where more than one urinal is provided, at least one shall comply with 605.	Noted.		
213.3.4	Where lavatories are provided, at least one shall comply with 606 (and shall not be located in a toilet compartment).	Noted.		
213.3.5	Where mirrors are provided, at least one shall comply with 603.3	Noted.		
213.3.6	Where showers are provided, at least one shall comply with 608.	Noted.		
216.2	Interior and exterior signs identifying permanent rooms and spaces shall comply with 703.1, 703.2 and 703.5.	Signage not consistent. Most signage missing Braille.	A comprehensive signage package should be specified and bid out by the District covering all permanent rooms.	Range $5,000 - $7,500.
216.4.1	Doors at exit passageways, exit discharge, and exit stairways shall be identified by tactile signs complying with 703.1, 703.2 and 703.5	Tactile exit signage is missing	Provide tactile signage at exits (approximately 18 signs)	See above.
216.5	Parking spaces complying with 502 shall be identified by signs complying with 502.6.	Middle School complies.	No action needed.	
216.8	Where existing toilet rooms do not comply with 603, directional signs indicating the location of the nearest accessible toilet room shall be provided. The accessible toilet rooms shall be identified by the International Symbol of Accessibility.	There are 3 toilet rooms that do not comply in a significant way. There are more with smaller infractions.	Signage should be placed at all toilet rooms as required by this section (18 locations). This should be part of the scope identified in Section 216.2 above.	See above.
217.2	Where public telephones are provided, at least one wheelchair accessible telephone complying with 704.2 shall be provided.	Noted.		

217.4.2.1	Where at least one public pay telephone is provided on a floor of a public building, at least one public TTY (text phone) shall be provided.	The telephone in Corridor C204 does not appear to comply with this feature.	The District should verify with the phone vendor that this feature is included.	Price determined by vendor contract.
307.2	Objects with leading edges from 27"-80" AFF shall not protrude more than 4" horizontally into the *circulation path.*	There are numerous areas where objects protrude. They include: Pay phone in Corridor C204, and fire dept. valve cabinets in corridors C108, C109, & C205. Defibrillator cabinet protrudes in Corridor C110.	Lowering item to 27" above the floor will make it comply. If this is not practical, extending a shroud from the object to a distance within 27" from the floor would comply.	$400 per shroud.
308.2.1	Unobstructed forward reach shall be 48" high max. and 15" min. AFF.	Classroom 124 has a paper towel dispenser with handle at 57" above floor. Gas shut-off in classrooms 202 & 207 are at 60" above floor. Staff phones in various classrooms (7) off Corridors C202 & C203 are above 48" (60"-72"). Toilet room 234 has a vending machine with operating handle above 48".	Lower towel dispenser to proper height. Seek waiver to keep gas shut-offs at current height. This may be problematic if staff member is in a wheelchair however. Lower staff phones and vending machine to 48".	Lower dispenser: $200, Lower phone: $200. Lower vending unit $200.
308.3.1	Unobstructed side reach (parallel approach) shall be 48" high max., and 15" min. AFF.	Same as above.	Same as above.	
309.4	Operable parts of objects shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.	Operable handle of vending machines in Toilet rooms 151 & 234 may not comply. Doors at the following locations do not have lever handles: Closets 123, 125, 127, 128, 129 & 130.	Provide ADA vending unit. Replace door hardware with lever handle sets at these 6 doors.	ADA vending unit $750 per unit. Lever handsets: $250 per door.
404.2.2	At least one of the active leaves of doorways with two leaves shall provide 32" clear width. In alterations, a projection of 5/8" shall be allowed for the latch side stop.	There is a pair of doors from Classroom 203 that are both 30" wide.	Replace with a new pair of doors, one 36" wide, one 24" wide.	$750 (assumes reusing existing frame).
404.2.3	Door openings shall provide a clear width of 32" inches min. with the door open 90 degrees.	Door access to Toilet room 152 is only 29" clear.	Replace with 36" door and swing out.	$1000.
404.2.4	Min. maneuvering clearances at doors shall comply with Table 404.2.4.1.	Pull side clearance for both doors in Classroom 105 non-compliant (need 18" min.). Staff toilet	Rework doors to swing them out into corridor to make them compliant.	$500 per door.

		rooms 143 & 144 do not comply.		
405.7	Ramps shall have landings at the top and bottom of each ramp run. Ramps with curved or angled walls (or rails) create a compound slope that does not meet ADA requirements.	Ramp on uppermost floor in Corridor C302 is non-compliant, ramp runs into sidewalls at bottom of ramp with angled railings. Also, landing is not supposed to be less than the width of the ramp.	Problem may be technically infeasible to remedy. Some selective demolition will need to be done to ascertain if side walls could be removed to eliminate the problem.	Price indeterminate.
405.8	Ramps with a rise greater than 6" shall have handrails complying with 505.	Noted.		
407.4.1	Existing elevator car configurations that provide a min. of 16 sf of clear floor area, and also provide a clear depth of 54" min. and clear width of 36" min. shall be permitted.	Elevator by Lobby L201 complies.	No action needed.	
410.1	Platform lifts (including inclined stairway chairlifts) shall not be attendant operated and shall provide unassisted entry and exit from the lift.	Stair lifts in Corridors C104 and C106, and platform lift in Music Rm. 132 were not operated at the time of our review.		
502.2	Accessible standard parking spaces shall be 96" wide min. Accessible van spaces shall be 132" wide min. except they may be 96" wide if the access aisle is also 96" wide.	Middle School complies	No action needed.	
502.3	Access aisles serving standard accessible parking and van spaces shall be 60" wide min. and shall adjoin an accessible route. Two parking spaces shall be permitted to share a common access aisle.	Access aisle does not line up with curb cut.	Restripe aisle and accessible spaces to line up with curb cut.	$500.
502.3.3	Access aisles shall be marked so as to discourage parking in them.	See above.		
505.2	Handrails shall be provided on both sides of stairs and ramps.	Ramp in Corridor C202 has a railing on only one side, lockers on the other.	Remove lockers and add wall rail.	$1300.
602.7	Spouts for standing persons shall be between 38" and 43" AFF.	See item 211.3 above.	See item 211.3 above.	See item 211.3 above.
603.2.3	Doors shall not swing into the clear floor space required for any plumbing fixture. EXCEPTION: Where the	Staff toilet rooms 143 & 144 have doors which swing into the clearance for the lav. Toilet room	Rework doors to swing out to make compliant.	$500 per door.

	toilet room is for individual (single person) use, and a clear floor space of 30" x 48" min. is provided within the room beyond the arc of the door swing, doors shall be permitted to swing into the clear floor space of any fixture.	211E has door swinging into fixture clearance for lav.		
603.3	Mirrors above lavatories or countertops shall be 40" max. AFF to the reflecting surface. Mirrors not above lavs or counters shall be mounted 35" AFF max.	Toilet rooms 141, 152, 234 & 238 mirror is above 40".	Lower mirrors to proper height.	$200 per mirror
604.3.1	Clearance around a toilet shall be 60" min. perpendicular to the side wall and 56" min. perpendicular to the rear wall (for adult wall hung toilet) and 59" for adult floor mounted or children's toilet (see 604.8.1.1)	Toilet rooms 143, 144, 151 & 211E do not comply. Toilet/changing room 155 is currently being used for storage, no fixture clearance achieved.	Enlarging rooms 143 & 144 to comply would be technically infeasible at their location, swing doors out for fixture clearance. Remove 2nd toilet from stall in 151 to comply. Relocate lav outside toilet room 211E to comply. Remove stored items from room 155.	Reverse door swing $500 per door. Remove toilet from stall and cap, patch floor: $500. Relocate lav: $800.
604.5	Grab bars for toilets shall comply with 609. They shall be provided on the side wall closest to the fixture, and on the rear wall. NOTE NH requires a third grab bar, a vertical one 18" long, bottom mounted between 39"– 41" AFF, and located between 39"-41" from the rear wall.	Noted. None of the toilet rooms in the school have the vertical 18" grab bar.	Add 18" vertical grab bar to all toilet rooms/stalls that need them (18 locations).	Vertical grab bar: $150 each.
604.5.1	The side wall grab bar shall be 42 inches long min., located 12" max. from the rear wall, and extend 54" min. from the rear wall.	Toilet stalls in rooms 157 & 162, and toilet room 211E missing side grab bars.	Install missing grab bars.	Vertical grab bars: $150 per 18" grab bar, $250 per horizontal grab bar.
604.5.2	The rear wall grab bar shall be 36" long min. and extend from the centerline of the toilet 12" toward the closest side wall, and 24" in the other direction.	Toilet room 151 missing rear wall grab bar. Toilet stalls in rooms 157 & 162, and toilet room 211E missing rear grab bars.	Install missing grab bars.	Vertical grab bars: $150 per 18" grab bar, $250 per horizontal grab bar.
604.8.1.2	Toilet stall doors shall be located 4" max. from the front corner of the partition (diagonally furthest from the	Doors at the following accessible toilet locations are not self-closing: staff toilet room 144,	Install door closers or self-closing hinges (on stall doors) as appropriate.	Surface mounted door closer: $400 per door, self-

	fixture) to the hinge side of the door. They shall be 32" clear min., self-closing, and not swing into the required floor clearance for the fixture.	stall in 141, stall in 237, toilet room 222D, and stall in 233.		closing hinges: $150 per stall door.
605.2	Urinals shall be stall type or wall hung with the rim 17" max. from the floor. Urinals shall be 13 ½" deep min. measured from the outer face of the rim to the back of the fixture.	Per 213.3.3 above, the following rooms have multiple urinals and need to have one comply (all are above 17" rim height): Toilet rooms 152, 233, & 238. Additionally, each of these urinals must be centered about a 30" clear width of floor clearance.	Lower one urinal in each toilet room to 17" from floor to rim, and center in 30" clear floor area.	$800 per fixture.
606.2	Floor clearance at lavs to be per 305. Knee clearance below a lavatory or sink shall be 27" min. (above the floor) for persons older than 12", and 24" min. for ages 6-12.	The following rooms had lavs that were too low: Toilet rooms 233, 234 & 237. The following rooms had items intruding on lav floor clearance: Toilet room 151 vending machine intrudes, Toilet rooms 157 & 162 have paper towel dispensers intruding.	Raise one lav in each room to proper knee clearance height. Relocate vending machine and paper towel dispensers outside of the 30"x48" floor clearance for the lavs.	$800 per fixture. See 309.4 above for vending unit. Relocate towel dispenser: $200 per unit.
606.3	Lavatories and sinks shall be installed with the front of the rim or counter 34" max. above the floor.	Classroom 104, 105, 124, 128, 202, 207, 212, 214, 226 & 227 have counters with sinks that are above the 34" limit.	Lower portion of one counter & sink in each room (10 locations).	$1,500 per counter/sink.
606.4	Lavatory and sink faucets shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.	Lavs in the following locations do not comply: Classrooms 104, 105, 124, 128, toilet rooms 141, 142, 158, 163 & 237	Provide faucets operable with closed fist at these 9 locations.	$150 per lavatory.
606.5	Water supply and waste pipes under lavatories and sinks shall be insulated or otherwise protected from contact with the user.	None of the supply or waste lines beneath the lavs are insulated or otherwise shielded from user's knees.	Provide insulation kit for each accessible lav (18 locations).	$100 per lavatory.
608.3.1	Grab bars in transfer-type showers shall be provided across the control wall (wall with faucet and head) and back wall to a point 18" from the control wall.	Showers do not have grab bars.	Provide pair of grab bars for both showers.	$250 per horizontal grab bar
608.4	A folding or non-folding seat shall be provided in a transfer-type shower compartment.	Shower rooms 158 & 163 do not have seats.	Provide movable seats (plastic chairs) when required.	$50 per chair.

608.6	A shower spray unit with a hose 59" long min. that can be used as a fixed position or hand-held shower shall be provided. Alternatively, a fixed shower head located at 48" max. above the floor shall be permitted in facilities that are not medical care, long-term care, transient lodge guest room or residential unit in nature.	Showers in rooms 158 & 163 do not comply.	Provide proper plumbing for shower head at both locations.	$750 per shower.
703.4.1	Tactile characters on signs shall be located 48" min. above the floor to the lowest characters and 60" max. above the floor to the highest characters.	See 216.2 above.	See recommendation in section 216.2 above.	See 216.2 above.
703.4.2	Where tactile signs are provided at a door, they shall be located alongside the door on the latch side (centered in 18" x 18" space). Where there is no wall space on the latch side of the door, signs shall be located on the nearest adjacent wall.	See 216.2 above.	Same as above.	See 216.2 above.

IBC 2009 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Section 410 (Chapter 4)	**Stages & Platforms**			
410.2	A Platform is defined as a raised area within a building used for worship, the presentation of music, plays or other entertainment…and similar purposes wherein there are no overhead hanging curtains, drops, scenery or stage effects other than lighting and sound.	The multi-purpose room in the Middle school falls into this category.		
410.4	Permanent platforms shall be constructed of materials as required for the type of construction of the building in which the platform is located. Where the space beneath the permanent platform is used for storage or any purpose other than equipment, wiring or plumbing, the floor assembly shall not be less than 1-hour fire-resistive-rated construction.	The space beneath the platform is not accessible, no storage below.	Rated floor assembly not required.	

IBC 2009 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 7	**Fire & Smoke Protection Features**			
706.1	Each portion of a building separated by one or more fire walls that comply with the provisions of this section shall be considered a separate building.	Given the requirement of Table 503 in the State Building Code Amendment, the maximum allowable area per floor is 38,016 sf (including increases for sprinkler and frontage, and reductions due to 3-stories). Existing building footprint on the first floor (largest floor) is 59,360 sf.	The building needs to be divided into two "buildings", separated by *firewalls*, so that no floor plan area exceeds 38,016 sf. Currently the building appears to be divided into two buildings along the line between Stair S104 and Cafeteria 119. Exploratory demolition (selective) would be needed to confirm if this is the case, unless the Authority Having Jurisdiction (AHJ) has a record of the wall complying with this requirement. The school district should verify with the AHJ if this is the case.	A definitive cost estimate for this work is not possible without more investigation into the construction of the current fire-resistive wall, in order to know what is lacking, if anything, and what is needed for it to comply.
706.2	Fire walls shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the fire wall for the duration of the time indicated on the fire resistance rating of the wall.	See finding above.	See recommendation above.	
706.3	Fire walls shall be of any approved non-combustible materials.	Noted.		
Table 706.4	Fire resistance ratings for fire walls for Assembly and Educational use groups of Type II construction shall be 2-hours.	Noted.		
706.8	Each opening through a fire wall shall be protected per section 715.4 and shall not exceed 156 sf in area, EXCEPT there is no limit on size for sprinkled buildings.	Noted.		

708.4	Shaft enclosures shall have a fire resistance rating of not less than 1-hour where connecting less than 4 stories, but shall not be less than the rating of the floor assembly penetrated (up to 2-hours).	Noted.		
708.14.1	An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects MORE than 3 stories, EXCEPT they are not required where the building is protected throughout by an automatic sprinkler system. **See also Section 3002.8 – Elevators shall not be in a common shaft enclosure with a stairway.	The Middle school is 3 stories.	See recommendation per Section 3002.8.	
709.3	Fire partitions shall have a fire resistance rating of not less than 1-hour, EXCEPT corridor walls permitted to have ½-hour per Table 1018.1 (However NFPA 101 shall be used for means of egress requirements).	Noted.		
710.3	A 1-hour fire-resistance rating is required for smoke barriers.	Noted.		
711.3	Unless required elsewhere in this code, smoke partitions are not required to have a fire-resistance ratings.	This condition applies to the middle school for corridors.		
711.4	Smoke partitions shall extend from the floor to the underside of the floor or roof above, or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.	Noted.		
711.5.1	Doors in smoke partitions shall not include louvers.	Noted.		
711.5.3	Where required elsewhere in this code, doors in smoke partitions shall be self or automatic closing by smoke detection per section 715.4.8.3.	Noted.	See NFPA 101 Life Safety Section 15.3.6 recommendation.	
715.4.8	Fire doors shall be self or auto closing.	Noted.		

715.4.8.1	Unless otherwise specifically permitted, single fire doors and both leaves of double doors shall be provided with an active latch bolt that will secure the door when it is closed.	Toilet rooms 137 & 138 are part of a rated stair assembly but do not have latching hardware as required (push-pull currently).	See recommendation for NFPA 101 Life Safety 2003 Section 7.1.3.2.1 (7).	

IBC 2009 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 11	**Accessibility**			
1103.2	Sites, buildings, structures, facilities, elements and spaces shall be exempt from this chapter to the extent specified in this section (see 1103.2.2)			
1103.2.2	Existing buildings shall comply with section 3411.	This is the condition at the middle school.		
Chapter 34	**Existing Structures**			
3411.1	The provisions of sections 3411.1 through 3411.9 apply to maintenance, change of occupancy, additions and alterations to existing buildings.	Noted.		
3411.6	A building, facility or element that is altered shall comply with the applicable provisions in Chapter 1 of this Code and ICC A117.1, unless technically infeasible. Where compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent feasible.	Noted.	DGA has used the ADA 2010 Edition which is based, in part, on A117.1 for determining accessibility compliance.	
	Accessible means of egress required by Chapter 10 are not required to be provided in existing buildings and facilities.	Noted. NFPA concurs.		
3411.7	Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities or drinking fountains serving the primary function, EXCEPT:	Noted.		
	1) The costs of providing the accessible route are not required to exceed 20% of the costs of the alterations affecting the		Determination of cost percentage cannot be made until the time of alteration	

	area of primary function.		where complete scope of work is determined.	
3411.8.3	Platform lifts complying with ICC A117.1 and installed in accordance with ASME A18.1 shall be permitted as a component of an accessible route.	Noted.		

IBC 2009 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 30	**Elevators & Conveying Systems**			
3002.1	Elevator hoistway enclosures shall be shaft enclosures per section708.	Noted.		
3002.3	An approved pictorial sign of a standard design shall be posted adjacent to each elevator call station on all floors instructing occupants to use exit stairways and not to use elevators in case of fire. The sign shall read "In fire emergency, do not use elevator, use exit stairs", EXCEPTION:	Middle school does not comply at elevator at Lobby L101..	Provide signage as required. See recommendation for ADA 216.2.	
	1) The emergency sign shall not be required for elevators that are part of an accessible means of egress complying with section 1007.4.			
3002.7	Elevators shall not be in a common shaft enclosure with a stairway.	Middle school does not comply.	Construct rated enclosure (with rated door assemblies) separating Stair S103/203/303 from elevator lobbies.	Range $10,000.
3006.4	Elevator machine rooms and machinery spaces shall be enclosed with fire barriers constructed per section 707. The rating shall not be less than required for the elevator shaft EXCEPT:	Noted.		
	1) Where machine rooms do not abut and have no openings to the hoistway enclosure they serve, the fire barriers shall be permitted to be reduced to 1-hour fire-resistance rating.	This applies only to elevator at Stair S103/203/303.		
	2) In buildings 4 stories or less, where machine rooms do not abut and have no openings to the hoistway enclosure they serve, the machine room is not required to be rated..	This applies only to elevator at Stair S103/203/303.		

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 6	**Assembly; for requirements see chapter 13 (Existing Occupancy Use)**			
6.1.2.2	Occupancy for assembly by fewer than 50 persons in another occupancy (and incidental to that occupancy) shall be classified as part of the other occupancy.	For the middle school, the assembly classification would include Gymnasium 165, Music/Choral/Band Cafeteria & Annex 119 & 119A, Multi-purpose & Instrumental Music Rooms 132/134, and Library 219.	Confirm this finding with Authority Having Jurisdiction (AHJ).	
Table 6.1.14.4.1(a)	2-hr separation between Assembly (>300 to <1000) and Educational. Reduce to 1-hr if fully sprinkled.	Middle School appears to comply. Door rating for platform lift to Music 132 is unknown as label has been painted	Remove paint from label to verify rating.	No cost if done by maintenance personnel.
Chapter 7	**Means of Egress**	NFPA 101 Life Safety egress requirements override IBC 209 requirements per State Fire Code.		
7.1.3.1	Exit access corridors serving more than 30 persons shall be separated by 1-hr construction unless:			
	a) Does not apply to existing buildings unless occupancy changes.	This is the condition for the Middle School.		
7.1.3.2.1	Where exits are required to be separated, the rating shall be 1-hr for 3-stories or less, 2-hr for 4-stories or more (except 1-hr for existing buildings).	Wall above ceiling at door into Stair S204 does not continue to roof structure above. This would require the soffit above the door (into the stair) to continue the rated assembly.	Cannot confirm rating capability of soffit construction without selective demolition.	Selective demo & patch $500.
7.1.3.2.1 (7)	Openings in the rated wall shall be protected by fire door assemblies equipped w/ closers per 7.2.1.8.	Rating unknown between S101 and C101 since label is painted. Same between S201 and C201 & S104 and C108. Doors between toilet rooms 137/138 and corridor C109 have push pull hardware, but need to positively latch where	Doors or frames without labels should be confirmed as rated or replaced. Paint should be removed from labels to verify rating. Install fusible link louver in door 139. Provide latching hardware for toilet	No cost anticipated on paint removal on labels if done by maintenance staff. Replace hardware on two toilet room doors - $300 per

		rating is required (which it is here), also frame labels are painted over and doors have no labels. Door between room 139 and corridor C109 has louver in it. This assembly needs to be rated so louver must have fusible link feature. See also 6.1.14.4.1(a) above. Office 216A has rated door (into corridor C204) that is missing a closer. Reception 218 & Conference 216B have doors (required to be rated) with painted labels. Double door into Stair S204 requires rating, but labels are painted. Double door into Stair S205 from corridor C205 has painted label, frame does not have label.	room doors. Provide closer on door 216A.	door.. Fusible link louver $500 includes demo of existing louver. Add surface-mounted closer to office 216A - $400.
7.1.5.1	Minimum ceiling height in means of egress not less than 7'-6", with minimum 6'-8" height at projections unless:	Noted.		
	1) 7'-0" ceiling height in existing buildings.	Noted.		
7.1.5.2	The minimum ceiling height shall be maintained for not less than 2/3 of the room, providing the remaining height is 6'-8" minimum.	This is the condition in Stair S204 (top level landing from Library).		
7.1.8	Guards (per 7.2.2.4) shall be provided at open sides of a means of egress that exceed 30" above the adjacent floor or grade below.	Guard rail at Stair S205 is non-compliant (only 36" high). Similarly, handrails are too low at 31". Stair S102-202-302 has non-compliant handrail and no guard rail.	Reconstruct guard and handrails to proper heights at the next renovation project.	Reconfigure handrail & guardrail in S205 - $2,000. Reconfigure handrail & guardrail in S102-S202-S302 - $4,000.

7.2.1.2.1.1 (4)	For existing swinging doors, minimum clear width measurement to be taken with door FULLY open.	Noted.		
7.2.1.2.3.2	Doors in a means of egress shall not be less than 32" clear unless:	Noted.		
	1) Only one of a pair of doors shall be minimum 32".			
	4) In existing buildings, door width not less than 28" clear.	Double door to classroom 203 complies with this, however, ADA requires one of the pair to be 32" minimum clear.	Replace doors (and hardware) with one 36" & one 24" leaf (frame to remain).	$1,000.
7.2.1.4.2	Swing doors in a means of egress shall swing in the direction of egress travel under ANY of the following conditions:	Noted.		
	1) Where the occupant load is 50 or more.	This could be an issue for Music 132 where door leads to stair platform.	Given the Music area opens to Multi-purpose room 134, which has 2 means of egress that swing out, this condition may be acceptable to the Authority Having Jurisdiction (AHJ). The school district should review with AHJ.	No cost at this time.
7.2.2.1.1	Stairs used as a means of egress shall comply with 7.2.2 unless:	Stairs at Corridors C104 & C106 need a center rail given the requirement to have a handrail within 30" of the occupant as they descend. This limits the overall width between rails to 5' maximum. The stairs noted above range from 8'-10' wide (the full width of the corridor). The same holds for Stair in Vestibule V102. Additionally, stairs shall not be used for storage. Stair S103 had equipment stored in it.	Add intermediate rails to the center of stairs. Remove stored item from Stair S103.	Rails @ three stairs - $2,000 - $2,5000 (includes coring into concrete slab and patching floor).
7.2.5.2 (2)	Existing ramps shall be permitted to remain in use (or to be rebuilt) provided they comply with Table 7.2.5.2(b) (min. width 30", max. slope	Noted.		

	1:8, max. height between landings 12') unless permitted by the following:			
	a) Requirements don't apply to industrial equipment access areas.			
	c) Approved existing ramps with slopes not steeper than 1:6 shall be permitted to remain in use.	Middle School qualifies for this.		
	d) Existing ramps not steeper than 1:10 shall not require landings.	This would eliminate the non-compliance with the ramp on the uppermost floor corridor C302 whose landing is narrower than the ramp (see 7.2.5.3.2 (3) & (7) below). However, it would still be non-compliant per ADA 405.7 requirements.		
7.2.5.3.2	Ramp landings shall be as follows:			
	1) Ramps shall have landings at the top, bottom and at door leaves opening onto the ramp.			
	2) Landing slope shall not exceed 1:48.			
	3) The landing width shall not be less than the width of the ramp.	See section 7.2.5.2.(2) above.		
	4) Every landing shall be not less than 60" in the direction of travel unless the landing is an approved existing landing OR:			
	5) Where the ramp is not part of an accessible route, the landing shall be 48" min. in the direction of travel.			
	6) Any changes in travel direction shall be made at a landing, except at existing ramps.			
	7) Ramps and landings shall not decrease in width in the direction of egress travel.	See section 7.2.5.2.(2) above.		
7.2.5.4.2	Handrails complying with 7.2.2.4 shall be provided on both sides of a ramp with a rise greater than 6" (except aisles in assembly occ.)	Ramp in Corridor C202 does not comply. Ramp has railing on one side, lockers on the other.	Remove & relocate lockers; add wall rail.	Relocate lockers $1,000, add wall rail $500.

7.2.6.2	An exit passageway shall be separated from the remainder of the building per 7.1.3.2.	See issues identified with door/frame ratings for Corridors C109 and C204 above.		
7.2.6.3	An exit passageway shall have the same fire resistance rating as the stair it is connected with.	See above.		
7.2.13.3	When used as a means of egress, every floor served by an elevator shall have an elevator lobby. Barriers forming this lobby shall have a minimum 1-hr fire resistance rating and shall be a smoke barrier per Section 8.5.	Elevator in Corridors C105 & C204 is enclosed in protected lobby, and has firefighter service capability. However, IBC 2009 Section 3002.7 does not allow elevators to be in a common shaft enclosure with a stairway.	The District should review this condition with the AHJ since this elevator is part of egress stair S103/S203/S303 to see if a separate rated wall must be provided for the elevator lobby.	Budget $3,000 per floor for each of 3 floors for rated wall/door assemblies, magnetic hold-open on doors, patching of finishes.
7.2.13.4	Elevator lobby doors shall be 1-hr fire resistance rated, and shall be self-closing.	See above.	See above.	
7.2.13.5	Elevator lobby doors shall close upon activation of smoke detection directly outside the elevator lobby adjacent to or on each door opening. Upon detection, all elevator lobby doors serving that elevator shall close.	See above.	See above.	
7.2.13.7	Elevator operation shall be supplied by both normal and standby power, protected to ensure minimum 1 hour operation during a fire.	DGA did not witness stand-by power operation of elevator at the time of our review.	School District to confirm this feature is in place and periodically tested.	No cost.
7.2.13.8	Elevator cars shall be provided with 2-way communication to a central control point.	Midle school elevators have phones/2-way communication. DGA did not operate this function in the elevator.	The school district should verify phones communicate with a central control point.	No cost.
7.2.13.9	Elevators shall be provided with fire fighters' emergency operations per ASME A17.1/CSA B44.	The elevator in Stair S103/203/303 appears to comply.		
7.4.1.1	The minimum number of means of egress shall be 2, except under ONE of the following conditions:	Classrooms 103 & 203 have occupancies higher than 50 people by occupancy calculations. Also, the Library has two means of egress, but only one is available to people in wheelchairs.	Classrooms 103 and 203 should be posted for occupancy of less than 50 persons to avoid needing a second door/exit from the room. Stair landing in S204 could be enlarged to allow a clear floor space for a	Posting would be in the signage budget previously noted elsewhere for the Middle School. Enlarged stair landing (if

			wheelchair (36”x48”). This requirement should be reviewed with the AHJ before expending funds to do the work.	required) - $1,000.
7.5.4.1	Accessible means of egress not required in existing buildings.	Noted.		
7.10.1.4	Tactile signage requirements of 7.10.1.3. shall not apply to existing buildings, provided that occupancy classification does not change.	Noted. However, ADA 216.4.1 requires it without this exception.	See ADA review	

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 8	**Features of Fire Protection**			
8.3.3.3	Unless otherwise specified, fire doors shall be self-closing or automatic closing per 7.2.1.8.	Noted.		
Table 8.3.4.2	Fire protection ratings for opening protective in fire barriers, fire-rated smoke barriers and fire-rated smoke partitions shall be as follows:	Noted.		
	Elevator hoistways:			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	Vertical shafts (stairs):			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	½-hour wall; 20 min door			
	Fire Barriers:			
	2-hour wall; 90 min door			
	1-hour wall; 45 min door			
	Exit Access Corridors:			
	1-hour wall; 20 min door			
	½ hour wall; 20 min door			
	Smoke Barriers:			
	1-hour; 20 min door			
	Smoke Partitions:			
	1/2 –hour; 20 min door			
8.3.5.1	Penetrations through fire barriers for electrical, mechanical, plumbing and	Rated stair walls have penetrations not sealed properly	Seal all penetrations with approved fire sealant.	Misc. repairs to penetrations - $500

	communication systems shall be protected by a firestop system or device.	at Corridors C105 & C107 (above the ceiling at both sets of doors), and above ceiling at double door between C108 & C109.		
8.4.1	Smoke partitions, where required, shall be provided to limit the transfer of smoke.	Noted.		
8.4.2(2)	They shall be permitted to extend from the floor to the underside of a monolithic or suspended ceiling system where the following conditions are met:	Noted.		
	(a) The ceiling system forms a continuous membrane.	Suspended ceiling tiles appeared to comply.	The District should continue to monitor this situation to make sure that ceiling tiles are replaced when moved for work above ceilings, and to repair or replace damaged tiles when damage occurs in order to maintain this ceiling as a continuous membrane resisting the passage of smoke.	No cost at this time.
	(b) The space above the ceiling is not used as a plenum.	DGA did not find any unducted penetrations in the suspended ceiling – Middle school appears to comply with this.		
8.4.3.1	Doors in smoke partitions shall:			
8.4.3.2	Comply with 7.2.1, AND			
8.4.3.3	Not include louvers, AND			
8.4.3.5	Shall be self-closing or auto closing per 7.2.1.8	Most doors in corridor walls do not have closers.	See recommendations in section 15.3.6.	
8.4.4.1	Penetrations in smoke partitions for electrical, mechanical, plumbing and communication systems shall be protected by a system or material that is capable of limiting the transfer of smoke.	See finding 8.3.5.1 above.	See recommendation 8.3.5.1 above.	

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 13	**Existing Assembly Occupancy**			
13.1.7.1	The occupant load for the assembly use shall be determined on the basis of the occupant load factors of Table 7.3.1.2 that are characteristic of the use of the space, or determined as the maximum probable population of the space under consideration, whichever is greater.	Noted.		
13.1.7.1.1	In areas less than 10,000 sf, the occupant load shall not exceed 1 person / 5 sf.	Noted.	Occupant load may further be limited by Section 13.2.3.6.1 below.	No cost.
13.1.7.1.3	The AHJ shall be permitted to establish the occupant load as the number of persons for which the existing means of egress is adequate, provided that measures are established to prevent occupancy by a greater number of people.	Noted.		
13.2.1	All means of egress shall be in accordance with Chapter 7 and this chapter.	Noted.		
13.2.3.6.1	The main entrance/exit of the assembly area shall be of a width that accommodates one half of the total occupant load, and shall be at the level of exit discharge, or shall lead to a stair or ramp leading to a street.	This appears to be the category that the gym falls into. Given the total width of the main entry door assembly is 72” for the gym, an occupant load maximum of 650 can be calculated if half of those (325) must exit through the main entry (using .22” per occupant).	The gymnasium should be posted for a maximum capacity of 650 occupants in order to comply with this requirement.	No cost. Posting covered in signage budget.
13.2.3.6.5	In assembly occupancies where there is not well-defined main entrance/exit, exits shall be permitted to be distributed around the perimeter of the building, provided that the total	Noted.		

	exit width is at least 100% of that required for the permitted occupant load.			
13.2.4.1	The number of exits shall be per Section 7.4, UNLESS permitted by the following:	Noted.		
13.2.4.2	Occupant loads of 600 or less shall have 2 separate means of egress	Middle School complies.	No action needed.	No cost.
13.2.4.3	Occupant loads between 600 and 1000 shall have 3 separate means of egress.	Noted.		
13.2.5.1	Means of egress shall be per Section 7.5	Noted.		
13.2.5.1.2	Dead-end corridors shall not exceed 20’.	Noted.		
13.2.6	Total length of travel from any point to an exit shall not exceed 200’ in any occupancy, UNLESS:	Noted.		
	(1) Travel distance shall not exceed 250’ in occupancy that is fully sprinkled.	This is the condition for the Middle school.		No cost.

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Oyster River Middle School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 15	**Existing Educational Occupancies**			
15.1.2.2.1	Assembly occupancy (auditoria & gymnasia) to comply with Chapter 13.	Noted.		
15.1.7.1	The occupant load is to be determined by Table 7.3.1.2.	Noted.		
	Assembly – fixed seating: actual number of seats.			
	Assembly – concentrated w/o fixed seats: 7 nsf/occ.			
	Assembly – less concentrated w/o fixed seats: 15 nsf/occ.			
	Kitchen: 100 gsf/occ.			
	Library stack area: 100 gsf/occ.			
	Library reading area: 50 nsf/occ.			
	Exercise rooms with equipment.: 50 gsf/occ.			
	Stages: 15 nsf/occ.			
	Classroom: 20 nsf/occ.			
	Shops/Labs/Vocation rooms: 50 nsf/occ.			
	Storage: 500 gsf/occ.			
15.2.1.1	Means of egress shall be per Chapter 7 & Section 15.2	Noted.		
15.2.2.3	Stairs shall comply with 7.2.2	Noted.		
15.2.2.6	Ramps shall comply with 7.2.5	Noted.		
15.2.3.1	Capacity of a means of egress shall comply with 7.3	Noted.		
15.2.3.2	Minimum corridor clear width shall be 6’-0”.	Noted.		
15.2.4	Not less than 2 separate exits shall be	Noted.		

	provided on every story and accessible from every part of every story and mezzanine.			
15.2.5.2	Dead end corridors shall not exceed 20', except 50' where sprinkled.	Noted.		
15.2.5.4	Every room with an occ. Load of more than 50 persons shall:			
	a) Have a minimum of 2 exit access doors.	See previous finding 7.4.1.1	See previous recommendation 7.4.1.1	
	b) The doors shall provide access to separate exits.	See previous finding 7.4.1.1	See previous recommendation 7.4.1.1	
	c) The doors may open to a common corridor providing the corridor leads to 2 separate located in opposite directions.	See previous finding 7.4.1.1	See previous recommendation 7.4.1.1	
15.2.5.5	Every room normally occupied by students shall have an exit access door leading directly to an exit access corridor or exit unless:	Noted.		
	a) The door opens directly to the outside.			
	b) One room shall be permitted to intervene between the student room and an exit access corridor permitting all of the following conditions are met:			
	1) Travel distance shall not exceed 75'.			
	2) The intervening room shall be sprinkled.			
	3) Either the intervening room shall have fire detection (smoke/heat) that activates the building alarm, or the building shall be sprinkled.			
	c) Approved existing arrangements shall be permitted to continue in use.			
15.2.6.1	Travel distance to an exit shall be measured in accordance with 7.6.	Noted.		
15.2.6.2	Travel distance to an exit shall not exceed 150' from any point in a building unless permitted below:	Noted.		

15.2.6.3	Travel distance shall not exceed 200' in educational occupancies protected by sprinkler.	Middle school complies.	No action needed.	
15.2.10	Means of egress shall have signs in accordance with 7.10.	See previous finding ADA 216.2.	See previous recommendation ADA 216.2.	
15.2.11.1.1	Every room or space greater than 250sf and used for classroom or other educational purpose, or normally subject to student occupancy shall have not less than one outside window for emergency rescue that complies with the following unless permitted otherwise by 15.2.11.1.2:	Noted.		
	a) 20" clear width, 24" clear height and 5.7 sf in area.			
	b) The window sill shall not be more than 4" above the floor, with an operating latch no more than 54" above the floor.			
15.2.11.1.2	The requirements of 15.2.11.1.1 shall not apply to the following:	Noted.		
	a) Sprinkled buildings.	Middle school qualifies for this exception.		
15.3.2.3	Stages & platforms shall be protected in accordance with Chapter 13.	Noted.		
15.3.3.2	Interior wall & ceiling finishes shall be permitted as follows:	Classrooms 301, 302, 303, & 304 have spray foam insulation exposed on the ceiling. IBC 2009 requires that this product be thermally protected in habitable spaces.	The school district should verify that this product has a sprayed-on intumescent coating (should have been applied during the construction process).	If documentation is not available, budget $750 for testing 4 samples (with report of findings).
	a) Exits – Class A			
	b) Corridors & lobbies – Class A or B			
	c) Low height partitions not exceeding 60" in height and used in locations other than exits – Class A, B or C.			
15.3.3.3	Interior floor finish – no requirements			
15.3.6	Corridors shall be separated from the rest of the building by 30-minute	Noted.		

	rated walls per Section 8.3, unless permitted by the following:			
	b) For sprinkled buildings, corridor walls need not be rated provided they form smoke partitions per Section 8.4	Most doors between corridors and classrooms do not have closers. Spot checking walls above ceilings indicated walls extend to underside of structure above (not an exhaustive inspection however). There were no unducted grilles observed during our review.	NFPA 101 Life Safety 2003 requires the corridors serve to limit the transmission of smoke, and further that doors be automatic closing in these walls. NFPA 2009 allows for doors not to be self-closing for sprinkled buildings. Given that the State is moving toward adoption of the 2009, it would be worth applying for a waiver of this requirement before investing the money to add closers to those doors that don't currently have them.	If AHJ requires doors to be self-closing, budget $400 per door for surface mounted closer. Note: some doors from other findings & recommendations may overlap with these doors. Some may be renovated at different times than others. Care should be taken to avoid duplication.
	e) Lavatories shall not be required to be separated from corridors providing the building is fully sprinkled.	Middle school qualifies for this exception.		
15.3.7.1	Educational occupancies shall be subdivided into compartments by 1-hour rated smoke partitions complying with Section 8.4 where one or both of the following exist:	Noted.		
	a) The max. area of a compartment exceeds 30,000 sf.			
	b) The length or width of the building exceeds 300'			
15.3.7.2	The requirement of 15.3.7.1 shall not apply to the following:			
	a) Where all classrooms have exterior access in accordance with 7.5.3.			
	b) Fully sprinkled buildings.	The Middle school qualifies.		
15.7.4.3	Artwork & teaching materials shall be permitted to be attached directly to walls per following:			
	b) The materials shall not exceed 50% of the wall area in sprinkled bldgs.	Middle school appears to comply.	No action needed.	

PROGRAM

ANALYSIS

OYSTER RIVER MIDDLE SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Dec-11								
Oyster River Middle School				2011-2012 Enrollment = 607 pupils				
PROGRAM ANALYSIS				Total Building Gross SF = 106,996sf				
	Room Number	**Room Name**	**Type**	**Actual Sq. Footage**	**DOE Guideline Sq. Footage**	**Current Pupil Stations**	**Allowable DOE Pupil Stations**	**ORCSD Class Size Guidelines**
BASE	B01	Storage	Storage	336				
MENT	B02	Equipment Storage	Storage	605				
	B03	Boiler Room	Utility	483				
	B04	Electrical Room	Utility	114				
GROUND	SB02	Stair	Circulation	29				
	S101	Stair	Circulation	270				
	S102	Stair	Circulation	166				
	S103	Stair	Circulation	272				
	S104	Stair	Circulation	256				
	C101	Corridor	Circulation	517				
	C102	Corridor	Circulation	1624				
	C103	Corridor	Circulation	237				
	C104	Corridor	Circulation	458				
	C105	Corridor	Circulation	264				
	C106	Corridor	Circulation	767				
	C107	Corridor	Circulation	238				
	C108	Corridor	Circulation	1685				
	C109	Corridor	Circulation	772				
	C110	Corridor	Circulation	580				
	V101	Vestibule	Circulation	41				
	V102	Vestibule	Circulation	232				
	V103	Vestibule	Circulation	224				
	V104	Vestibule	Circulation	113				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	101	8th Gr Language Arts	Classroom	895	900	18	24	22
	101A	Group Study	Small Group	192				
	102	8th Grade Math	Classroom	895	900	18	24	22
	103	8th Social Studies	Classroom	1000	900	18	25	22
	103A	OT/PT	Small Group	326				
	104	7-8th Gr Consumer Ed.	Classroom	1231	1500	20	16	22
	104A	Dark Room	Breakout	112				
	105	8th Gr Science Classrm	Classroom	1008	1200	18	28	22
	106	5-6th Gr Consumer Ed	Classroom	804	1500	10	22	22
	107	6-8th Gr For. Language	Classroom	980	900	20	25	22
	107A	SPED	Small Group	386				
	107B	Storage	Storage	30				
	108	6-8th Gr For. Language	Classroom	790	900	20	21	22
	108A	Storage	Storage	26				
	109A	Boiler Room	Utility	487				
	109B	Transportation	Office	231				
	110	6-8 Foreign Language	Classroom	682	900	20	18	22
	111A	Maintenance	Storage	350				
	111B	School Storage	Storage	152				
	111C	Elev Mach.	Utility	54				
	114A	Health	Classroom	675	900			
	116	Tech. Ed.	Classroom	1074	1500			
	116A	Tech Ed. Storage	Storage	246				
	117	Kitchen	Utility	1326				
	117A	Dish Wash Room	Utility	180				
	117B	Toilet	Toilet	60				
	117C	Dry Storage	Storage	144				
	117D	Office	Office	57				
	117E	Receiving	Office	270				
	118	SPED Classroom	Classroom	342				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	119	Cafeteria	Food Service	2365				
	119A	Cafeteria Annex	Food Service	1273				
	120	Tech. Ed. Classroom	Classroom	855	900			
	121	7th Grade Social Studies	Classroom	726	900	21	20	22
	122A	Music	Classroom	598	800			
	123	7th Grade Math	Classroom	883	900	21	24	22
	123A	Toilet	Toilet	15				
	124	7th Grade Science	Classroom	958	1200	21	16	22
	124A	Work Room	Breakout	268				
	125	7th Grade Language Arts	Classroom	883	900	21	24	22
	125A	Toilet	Toilet	15				
	126	SPED	Small Group	353				
	126A	Work Room	Small Group	261				
	127	6th Grade Social Studies	Classroom	883	900	20	24	22
	127A	Toilet	Toilet	15				
	128	6th Grade Science	Classroom	860	1200	20	24	22
	128A	Toilet	Toilet	15				
	129	6th Grade Language Arts	Classroom	883	900	20	24	22
	129A	Toilet	Toilet	15				
	130	6th Grade Math	Classroom	892	900	20	24	22
	130A	Toilet	Toilet	15				
	131	Instrumental Music	Classroom	1171	1000	20 (100 band)	46	22
	132	Instrumental Music	Classroom	1045	1000	20 (70 band)	41	
	132A	Practice	Music	96				
	134	Multi-Purpose	Common	2576				
	134A	Storage	Storage	140				
	135	Janitor	Utility	36				
	136	Lift	Circulation	34				
	137	Toilet	Toilet	72				
	138	Toilet	Toilet	72				
	139	Sprinkler Room	Utility	106				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	140	Electrical Room	Utility	50				
	141	Girls Toilet	Toilet	234				
	142	Boys Toilet	Toilet	234				
	143	Toilet	Staff	38				
	144	Toilet	Staff	38				
	150	Elevator	Utility	55				
	151	Girls Toilet	Toilet	208				
	152	Boys Toilet	Toilet	191				
	153	Custodian	Utility	100				
	153A	Electrical Room	Utility	116				
	154	Tutor	Small Group	178				
	154A	Tutor	Small Group	140				
	154B	Tutor	Small Group	175				
	154C	Reading Specialist	Small Group	162				
	155	Staff Change	Toilet	56				
	156	Janitor	Utility	26				
	157	Boys Toilet	Toilet	234				
	158	Boys Shower	Common	177				
	159	Boys Change	Common	524				
	160	PE Office	Office	93				
	161	PE Office	Office	93				
	162	Girls Toilet	Toilet	234				
	163	Girls Shower	Common	177				
	164	Girls Change	Common	524				
	165	Gymnasium	Common	6288				
	166	Elevator	Circulation	55				
	166A	Elevator Mach	Utility	50				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
FIRST	S201	Stair	Circulation	270				
FLOOR	S202	Stair	Circulation	166				
	S203	Stair	Circulation	238				
	S204	Stair	Circulation	268				
	S205	Stair	Circulation	237				
	C201	Corridor	Circulation	561				
	C202	Corridor	Circulation	1451				
	C203	Corridor	Circulation	450				
	C204	Corridor	Circulation	931				
	C205	Corridor	Circulation	2569				
	V201	Vestibule	Circulation	615				
	201	8th Grade Language Arts	Classroom	926	900	18	25	22
	202	8th Grade Science	Classroom	1170	1200	18	19	22
	203	8th Grade Social Studies	Classroom	1070	900	18	25	22
	203A	SPED	Small Group	326				
	204	8th Grade Math	Classroom	814	900	18	22	22
	205	Computer Lab	Classroom	353				
	206	7th Grade Language Arts	Classroom	850	900	21	23	22
	207	7th Grade Science	Classroom	992	1200	21	16	22
	207A	ELS	Classroom	376				
	208	7th Grade Social Studies	Classroom	980	900	21	25	22
	209	7th Grade Math	Classroom	992	900	21	25	22
	210A	Mail Room	Office	101				
	210B	Clay/Kiln	Art	312				
	210C	Workroom	Staff	190				
	211	SPED	Small Group	698				
	211A	Workroom	Staff	345				
	211B	Office	Office	76				
	211C	Art Storage	Storage	90				
	211D	A/V Storage	Storage	91				

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	211E	Toilet	Toilet	36				
	212	Art	Classroom	754	1200	20		22
	214	Art	Classroom	790	1200	20		22
	216A	IT Office	Office	170				
	216B	Conference	Conference	183				
	218	Main Office	Office	460				
	218A	Office	Office	124				
	218B	Office	Office	124				
	218C	Conference	Conference	210				
	218D	Storage	Storage	134				
	218E	Office	Office	91				
	218F	Office	Office	104				
	219	Library	Library	3450	2428			
	219A	Office	Office	100				
	219B	Storage	Office	151				
	219C	Video	Library	220				
	221	Guidance	Office	300				
	221A	Office	Office	78				
	221B	Office	Office	50				
	221C	Office	Office	50				
	221D	Office	Office	121				
	222	Nurse	Office	142				
	222A	Storage	Storage	40				
	222B	Office	Office	69				
	222C	Nurse	Exam	298				
	222D	Toilet	Toilet	46				
	223	5-6th Grade Lang Arts	Classroom	809	900	20	22	22
	224	5-6th Grade Math Classrm	Classroom	894	900	20	24	22
	225	SPED	Small Group	352				
	226	5th Grade Science Classrm	Classroom	898	1200	20	14	

	Room Number	Room Name	Type	Actual Sq. Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines
	227	5th Grade Science Classrm	Classroom	990	1200	18	16	22
	227A	SPED	Small Group	264				
	228	6th Grade Classroom	Classroom	813	900	20	22	22
	229	5th Grade Classroom	Classroom	814	900	18	22	22
	230	5th Grade Classroom	Classroom	808	900	18	22	22
	232	5th Grade Classroom	Classroom	814	900	18	22	22
	233	Boys Toilet	Toilet	240				
	234	Girls Toilet	Toilet	240				
	235	Elevator	Circulation	55				
	236	Air Lock	Circulation	66				
	237	Girls	Toilet	185				
	238	Boys	Toilet	185				
	239	Elevator	Circulation	55				
SECOND	S302	Stair	Circulation	174				
FLOOR	S303	Stair	Circulation	513				
	C302	Corridor	Circulation	465				
	301	5th Grade Classroom	Classroom	655	900	18	18	22
	302	5th Grade Classroom	Classroom	675	900	18	18	22
	302A	Office	Office	230				
	303	5-6th Grade Health	Classroom	620	900	18	17	22
	304	5th Grade Classroom	Classroom	665	900	18	18	22
	305	Boys	Toilet	132				
	306	Girls	Toilet	166				
	307	Elevator	Circulation	55				
	308	Janitor	Utility	18				
		Totals		**93770sf**		**786 pupils**	**929 pupils**	
				Net SF		**Current**	**Max. NHDOE**	
				of Building		**Stations**	**Allowance**	

MECHANICAL

ENGINEERING

OYSTER RIVER MIDDLE SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Oyster River Middle School
Facility Analysis – Mechanical Systems

Table of Contents

Appendix

I. Introduction

Petersen Engineering has reviewed available record drawings and surveyed the mechanical systems serving the Oyster River Middle School in Durham, NH. The intent of this report is as follows:

1. Evaluate existing mechanical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing mechanical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Short term recommendations are provided to address items that don't conform to current building code requirements. In addition, longer term recommendations are provided for improvements in system performance, durability, reliability, maintainability and energy efficiency.

II. Findings

A. Heating Systems

Heating Hot Water Generation:
Heating is provided to the building by two natural gas-fired boiler plants:

Heating Plant #1:
The first boiler plant is located in the basement of the south wing (east end – BOILER ROOM B03), installed in 1995. This plant consists of five cast iron boiler modules with a total output capacity of 1515 MBH (Hydrotherm Model MO-1925A). The boiler plant was originally oil-fired with a 79% Efficiency rating. Each boiler module has been converted to use a natural gas burner with an overall 77% Efficiency rating. Actual operating efficiency is likely considerably lower due to various factors, primarily related to the age and configuration of plant.
Two constant volume pumps provide heating hot water distribution to the south wing of the school with steel and copper piping. Piping mains were installed in 1995, along with re-connection to existing and new heating terminals at that time.


Heating Plant #1 – Modular cast iron boilers (1995 Installation)

Heating Plant #2:
The second boiler plant is located centrally at the ground floor of the south wing, adjacent to the kitchen area (BOILER ROOM 109A). The location is above the original boiler plant location on an in-filled floor. This plant consists of six high efficiency condensing boilers with a total output capacity of 1350 MBH (Laars CB-M2-250N), installed in 2008. Each boiler has a rated efficiency of 89% and is capable of higher efficiencies at lower hot water operating temperatures (typically achieved by using an outdoor reset schedule to use lower hot water temperatures during warmer outdoor conditions).
Two constant volume pumps provide heating hot water distribution to the north wing of the school with steel and copper piping. Original piping mains serving the north wing appear to remain in service (1955 construction), although modifications were made to support the Multi-Purpose room addition in 1979 and subsequently to support the gym and locker room addition in 1995.

Boiler Plant #2 – Modular Condensing Boilers (2008 Installation)

Heating Distribution:
Hot water heating coils are provided for ventilation systems – controls for these coils were updated in 2009.

Typical classrooms use finned-tube radiation with local thermostats and control valves – controls were updated in 2009. Multiple classrooms in the south wing utilize unit ventilators for heating and ventilation (1979 construction with replacement coils in 1995). Finned tube heating elements and enclosures were replaced in select areas of the south wing during 1995 renovations. Heating equipment serving the Multi-Purpose room is original from 1979 construction. The gym and locker rooms are served by packaged roof top equipment, installed in 1995.

Code Compliance:
The boiler equipment that comprises Heating Plant #1 does not meet minimum efficiency requirements of the current energy code. Name plate rating of approximately 77% is lower than the minimum requirement of 80% combustion efficiency per 2009 IECC. Actual operating efficiency is estimated to be lower (perhaps 70%).

Capacity for Expansion:
Total boiler plant capacity of 2900 MBH does not include spare capacity to support an addition to the building. Heating plant #1 is operating in mid term of typical expected useful lifecycle (30 years). A new, high efficiency system would be recommended to coincide with future renovations or additions (in addition to compliance with current energy code requirements).

B. Ventilation Systems

Ventilation is provided to most locations within the building by rooftop energy recovery units (ERV's) installed during 1995 renovations. Supply and exhaust duct networks are routed from each ERV to spaces served.

Typical Energy Recovery Ventilation Unit (1995 Installation)

A packaged roof top air handling unit and ERV provides ventilation for the gym and locker room areas. A CO2 sensor was observed in the gym – it is not clear if this is used for monitoring purposes only or for active control of the ventilation dampers at the packaged rooftop heating and ventilation unit.

The Multi-Purpose Room and Music Rooms (#131, 132 & 134) are served by unit ventilators original to 1979 construction, each with intake air connections to exterior louvers (Room #132 intake is through a rooftop connection). These unit ventilator configurations use modulating intake and return damper arrangements that are generally difficult to control and ineffective for reliable ventilation.


Multi-Purpose Room Unit Ventilator (1979 Installation)

Multiple classrooms in the south wing use unit ventilators installed during 1979 construction. During the 1995 renovations, outside air intake louvers were removed and replaced with ducted connections to ERV systems. Exhaust air grilles were also added to each of these spaces.

No direct make-up air system is provided for the kitchen to supply air during grease hood exhaust fan operation. The grease hood exhaust system has a total of approximately 4,000 CFM airflow. During operation, significant negative pressurization is expected in the kitchen and adjacent areas.

An exhaust grille was observed in the ceiling of the dishwashing area – it appears that a common exhaust fan serves this area as well as the adjacent toilet rooms (TOILET 143 & TOILET 144). There is no exhaust hood for the dishwasher. We were unable to verify whether or not this system is functioning properly

No independent ventilation systems are installed for the two elevator machine rooms. Elevator machine room ELEV MECH 111C is vented to the hoistway with a transfer opening with fire damper while the second machine room (ELEV MECH 166A) has no connection to the hoistway.

The following storage/custodial spaces were noted with ventilation deficiencies:
CUST. 153/ELEC 153A – an exhaust fan has been installed as a means for heat relief and custodial closet ventilation (heat is rejected from an electrical transformer in this space). This fan is currently out of service and in need of repair.

MAINT/STORAGE 111A has no functioning ventilation system. This space is used for storage of cleaning supplies and other chemicals.

No exhaust system is installed for TECH. ED. 116. A small dust collector system is provided for the table saw as well as two re-circulating filtration units.

Capacities:
Required ventilation rates have been calculated for comparison to provided air flow rates per the available design drawings where available. Design information for multiple areas was not available, including but not limited to the Gym, Locker Rooms, Cafeteria, Library, Multiple Office Areas, Tech. Ed. Classroom & Workshop. Field observations indicate that mechanical infrastructure is generally in place to serve these areas although airflow rates are unknown. Measurements and adjustments of outdoor airflow are recommended for these systems by an air balance contractor to confirm that reasonable ventilation rates are being supplied to each zone. Refer to Appendix A for summary of calculations.

Code Compliance:
The energy recovery ventilation systems installed in 1995 conform to current best practice standards of using energy recovery for areas with high ventilation requirements. In addition to the energy recovery benefits, these systems provide good ventilation since they use 100% outside air and exhaust (no re-circulation).

Science classrooms do not meet the exhaust rate requirement of 1 CFM per square foot of occupiable floor area required per IMC 2009 Section 403. These areas include Rooms # 128, 124, 105, 226, 207 & 202. Provided exhaust rates for these areas are typically 60-70 % of calculated requirements.

Multiple classrooms are slightly short of required mechanical ventilation rates per IMC 2009 Section 403 using default occupancy values. These areas include Rooms # 128, 124, 129, 127, 125, 123, 107, 105, 104, 103, 101, 102, 227, 226, 224, 209, 207, 203, 201 & 202. Provided ventilation rates for these areas are typically 70-90% of calculated requirements. With actual occupancies slightly lower than default values and the presence of operable windows, code requirements for ventilation appear to be reasonably satisfied for these areas.

Special Education Classroom SPED 211 appears to be significantly deficient in the amount of ventilation supplied (approx. 30% of required air is delivered). This space appears to have been converted from a prior office use without modifications to the mechanical systems. No operable windows are present.

A Make-up air system is not provided for the kitchen hood exhaust system as required by IMC 2009 Section 508.

A Type II exhaust hood is not provided for the dishwasher per IMC 2009 Section 507.

Ventilation is not provided for the elevator machine rooms per the requirements of IBC 2009 Section 3006. This section requires that an independent ventilation or air conditioning system be provided to protect against the overheating of the electrical equipment. In addition, the second elevator machine room does not include a means for venting of smoke and hot gasses (this function can typically be provided with an exhaust fan system that also controls temperature in the room).

Mechanical Ventilation is not provided for MAINT/STORAGE 111A per IMC 2009 Section 403. This space is used for storage of cleaning supplies and other chemicals.

CUST. 153/ELEC 153A – installed exhaust fan requires repair to comply with IMC 2009 Section 403.

Appropriate guards are not provided for rooftop equipment located within 10-feet of roof edge per IMC 2009 304.11:

- The ERV at the east end of south wing is within 10 feet of roof edge and requires guards for protection of service personnel
- The gym AHU and locker room ERV are located within 10 feet of roof edge at require guards for protection of service personnel

Appropriate access for service of rooftop equipment is not provided per IMC 2009 306.5:

- Permanent approved means of roof access required (typically accomplished through roof hatch with fixed ladder, located within a utility space).
- Permanent ladders are required for access to various roof areas with changes in roof height of more than 30-inches.

Capacity for Expansion:
The existing ventilation systems are in operation beyond the end of typical expected useful lifecycle (15-years for roof top equipment). The existing systems are sized for the areas served and do not have spare capacity. New air handling equipment would be required for future expansion.

C. Air Conditioning Systems

Several small DX air conditioning systems installed for select areas.

Code Compliance:
No issues identified.

Capacity for Expansion:
Extent of installed air conditioning is limited to select areas – new systems would be required for expansion if desired.

D. Control Systems

HVAC Controls include a combination of systems:

- DDC controls installed for heating and ventilation equipment, including monitoring capabilities through a DDC control interface
- Solid state controls are installed for the boiler plants

Code Compliance:
No issues identified.

Capacity for Expansion:
Installed DDC control system utilizes open communication protocol (BACNet) that allows for future expansion.

E. Plumbing Systems

Domestic Water Service:

Domestic water service is provided by the local municipal water utility. There are two 6-inch water entrances, each shared for domestic water and fire protection service. A 2-1/2 inch

domestic water meter and backflow assembly is located in the sprinkler closet in the north wing. A 3-inch domestic water meter and backflow assembly is located in the boiler room at the east end of the south wing. Domestic water entrance equipment appears to be in reasonably good working order. Domestic water piping within the building appears to have been largely replaced during 1995 renovations.

Three domestic hot water heaters serve the school as follows:

1. Heating Plant #1: Indirect-fired storage tank – Approx. 60 gallon HTP "Superstor" (domestic hot water generated with heating boilers, serving classrooms and toilet facilities). Unit appears to be in reasonable working condition.

2. Heating Plant #2: Atmospheric, natural gas-fired water heater – Approx. 85 gallon, Rheem, 250 MBH input, 293 GPH recovery (kitchen service). Unit appears to be in reasonable working condition.

3. Locker Rooms: Atmospheric, natural gas-fired water heater – Approx. 60 gallon, manufactured by Ruud, (located in janitor's closet between locker rooms). Unit appears to be in reasonable working condition.

Sanitary Sewer and Storm Drains:

Sanitary sewer and roof drain systems consist of piping networks from original 1955 and 1959 construction and subsequent 1979 and 1995 renovations. In 2010 multiple sections of above grade cast iron waste and vent piping were replaced in the south wing (identified in Aramark's 2005/2006 Facilities Condition Assessment). Below grade sanitary sewer piping was largely replaced in the south wing in 1995 with a new 6" sewer exit leaving the east end of the south wing. An acid neutralizing tank and lab waste pipe network was also installed in 1995 to serve the science classrooms in the south wing.

A 6" sanitary sewer exit serves the locker room area, installed in 1995.

A 4" sanitary sewer exit was also installed in 1995 for kitchen and bathroom fixtures in the central portion of the school (a 25 GPM above floor grease interceptor discharges to this pipe network)

Plumbing Fixtures:

Plumbing fixtures throughout the facility remain from various periods – select toilet room fixtures were replaced during the 1995 renovations along with hot and cold water piping. Fixtures at the 3rd floor toilet rooms have recently had automatic flush valves installed. Multiple lavatories observed with separate hot and cold faucets, which don't meet current plumbing code requirements for maximum allowable flow (0.5 GPM per IPC 2009 Table 604.4). Lavatories with single faucets also do not appear to meet current plumbing code requirement for maximum allowable flow.


Typical Bathroom Lavatories (age and condition vary throughout the school)

Code Compliance:
Multiple lavatories do not meet 2009 IPC requirements for maximum allowable flow rates (0.5 GPM).

Capacity for Expansion:
Domestic water – the two domestic water entrances appear to have reasonable flexibility to support future expansion.

Sanitary Sewer- Multiple sewer exits and pipe sizing appear to have reasonable flexibility to support future expansion. However, new sewer exits would likely be required to support additions depending on location and available pitch for piping to tie in to existing systems.

F. Fire Protection Systems

Fire protection service is provided by two 6-inch water entrances, each with backflow prevention assembly, zone valves and trim. Valve assemblies appear to be well maintained and in reasonable operating condition.

Full coverage sprinkler distribution is installed throughout.

A chemical fire suppression system is provided for the grease hood in the kitchen.

Code Compliance:
Fire protection systems appear to comply with current NFPA 13 requirements.

Capacity for Expansion:
The fire protection system is capable of supporting moderate future expansion – per NFPA 13 each sprinkler zone can support up to 52,000 SF of floor area for multiple floors. A new fire

protection entrance may be considered for future expansion depending on location of addition in relation to feasible connection points to the existing sprinkler risers.

G. Misc. Systems – Kitchen Refrigeration

It is our understanding that the kitchen refrigeration systems are 20+ years old and that a regular preventative maintenance program has not been implemented for this equipment.

III. Recommendations – Code Compliance/Short Term

A. Heating Systems

Heating Plant #1: Install new condensing boiler plant with variable volume pumping:

- Two high efficiency (Minimum 94% AFUE) condensing boilers with sealed combustion and direct venting
- Boiler controls with outdoor reset schedule and domestic hot water priority override
- Variable volume pumping and associated piping modifications
- Indirect fired domestic hot water tank

B. Ventilation Systems

Provide air balancing process by a certified air balance contractor for existing ventilation systems serving the Gym, Locker Rooms, Cafeteria, Library, Office Areas, Tech. Ed. Classroom & Workshop (refer to Ventilation Calculations for areas with supply ventilation indicated as "unknown"). Take measurements of outdoor airflow to each zone and adjust dampers to provide required ventilation rates to each zone.

Install supplemental exhaust systems for Science Classrooms (#128, 124, 105, 226, 207 & 202)

Install supplemental ventilation system for SPED 211 (likely small energy recovery ventilation unit)

Install dedicated exhaust system for TECH. ED. 116.

Install ventilation systems for the following areas:

- Install dedicated exhaust system for Toilet Rooms and janitor's closet adjacent to dishwashing area (TOILET 143, & TOILET 144)
- Install dedicated exhaust system for MAINT/STORAGE 111A.
- Repair existing exhaust fan serving CUST. 153/ELEC 153A.

Provide independent ventilation system for elevator machine rooms (ELEV MECH 111C & ELEV MECH 166A.) consisting of relief fan and make-up air damper with combination fire/smoke dampers (per IBC 2009 Section 3006)

Kitchen Make-up Air:
Add dedicated make-up air system to provide equal amount of supply air to kitchen hood exhaust when exhaust system is in operation (see Long Term Recommendations for preferred approach in terms of energy efficiency).

Dishwasher Exhaust System

Install a Type II exhaust hood over the dishwasher with dedicated exhaust fan per IMC 2009 Section 507 requirements.

Roof Guards:
Provide guards around equipment located within 10 feet of roof edge per IMC 2009 304.11 requirements:

- ERV at east end of south wing is within 10 feet of roof edge and requires guards for protection of service personnel. Consider re-locating equipment during replacement to maintain minimum 10-foot distance from roof edge to avoid requirement for guards.
- The gym AHU and locker room ERV are located within 10 feet of roof edge at require guards for protection of service personnel.

Roof Access:
Provide a permanent approved means of rooftop access for service of equipment per IMC 2009 Section 306.5 with fixed ladder and roof hatch. Provide permanent ladders to access various roof areas with changes in roof height of more than 30-inches.

C. Plumbing Systems

Replace double faucet lavatories with new wall-hung units with single 0.5 GPM automatic faucets (logical time for replacement concurs with general bathroom upgrades along with new toilets and urinals).

Add 0.5 GPM aerators to single faucet lavatories.

IV. Recommendations – Long Term

A. Heating Systems

Finned Tube Radiation: Replace finned tube radiators at north wing and portions of south wing due to age of equipment and poor condition of enclosures.

B. Ventilation Systems

Rooftop ERV's:
Replace existing rooftop Energy Recovery Ventilation units due to age of equipment (eight (8) units, approx 4,200 CFM each). Clean and seal existing supply and exhaust air branch ductwork to remain in service with process such as Carrier "Aeroseal". Remove existing unit ventilators due to age of equipment.

Gym H&V Unit:
Replace existing rooftop unit serving the gym due to age of equipment.

Multi-Purpose & Music Room Ventilation: Replace unit ventilators with energy recovery ventilators due to age and ineffectiveness of existing equipment. Provide new hot water heating coils and supplemental finned tube radiation to allow for overnight setback without requiring operation of the ventilation systems.

Kitchen: Install new variable volume kitchen hood exhaust fan with make-up air unit:

- New exhaust fan with variable speed motor
- New gas-fired make-up air unit dedicated to the kitchen area (add supply plenum to hood)

- New controls to vary amount of make-up and exhaust air based on cooking activities (controlled by heat sensors under hood)

C. Control Systems

Provide full re-commissioning of all HVAC system controls by third party commissioning agent. Include allowance to replace faulty components discovered during commissioning process and to implement required control upgrades discovered during process.

D. Plumbing Systems

Install low-flow plumbing fixtures throughout with automatic flush valves and faucets

- 1.28 gallon-per-flush toilets
- 0.125 gallon-per-flush urinals
- 0.5 gallon-per-minute lavatory faucets

E. Preventative Maintenance

Regular preventative maintenance contract is strongly recommended for all mechanical systems with preventive maintenance contractor specializing in mechanical systems.

F. Misc. Systems – Kitchen Refrigeration

Replace existing refrigeration equipment for walk-in freezer and refrigerator due to age of equipment and implement a preventative maintenance plan.

V. Budget Estimates

Refer to attached summary tables

Oyster River Cooperative School District

Oyster River Middle School – Short Term/Code Compliance Recommendations for Mechanical Systems

Code Section	Requirement Description	Finding	Recommendation	Budget
IECC 2009 Ch 5 – Table 503.2.3(5)	Appliance minimum combustion efficiency of 80% for gas-fired Boilers	Installed boilers with 77% name plate efficiency rating (Heating Plant #1 – BOILER ROOM B03)	Install new condensing boiler plant with minimum 94% AFUE boilers and variable volume pumping (1500 MBH Capacity, 2 boilers)	$90,000
IMC 2009 Section 403	Required minimum ventilation rates for Educational Occupancies per Table 403.3	Delivered ventilation quantities unknown to Gym, Cafeteria, Locker Rooms, Library, Tech. Ed. Workroom, Tech. Ed. Classroom and multiple office areas (installed infrastructure suggests systems are capable of meeting code requirements)	Provide air balance procedure to verify/adjust supply ventilation rates to Gym, Cafeteria, Locker Rooms, Library, Tech. Ed. Workroom, Tech. Ed. Classroom and multiple office areas.	$25,000
IMC 2009 Section 403	Required minimum ventilation rates for Educational Occupancies per Table 403.3	Science Classrooms deficient exhaust ventilation rates by 30-40%.	Install supplemental exhaust systems for science classrooms (#128, 124, 105, 226, 207 & 202), to be operated by local switches (8 systems, approx. 300 CFM each.)	$25,000
IMC 2009 Section 403	Required minimum ventilation rates for Educational Occupancies per Table 403.3	SPED 211 classroom mechanical ventilation rate deficient by 70%. No operable windows.	Install supplemental ventilation system for SPED 211 (approx. 250 CFM energy recovery ventilation unit	$5,000
IMC 2009 Section 403	Required minimum ventilation rates for Educational Occupancies per Table 403.3 – wood shops require mechanical exhaust at 0.5 CFM per square foot of occupiable floor area	TECH. ED. 116 has no mechanical exhaust system (small dust collector and two re-circ filter units are installed).	Install exhaust system for TECH. ED. #116 (approx. 350 CFM)	$2,500
IMC 2009 Section 403	Required minimum ventilation rates for toilet rooms and support spaces per Table 403.3	Multiple locations lacking functioning mechanical exhaust or with system deficiencies	Install dedicated exhaust system for TOILET 143 & TOILET 144; Install dedicated exhaust system for MAINT/STORAGE 111A; Repair existing exhaust system for CUST. 153/ELEC 153A	$20,000

IBC 2009 Section 3006	Independent ventilation system required for elevator machine rooms	No independent ventilation systems installed for two elevator machine rooms (# 111C & 166A)	Install exhaust fan, fire/smoke damper and ductwork to the exterior for each elevator machine room (# 111C & 166A)	$20,000
IMC 2009 Section 508	Make-up air required for operation of commercial kitchen hood exhaust systems	No mechanical make-up air provisions for kitchen exhaust hood	Provide dedicated make-up air system (gas-fired, approx. 4,000 CFM capacity) with ductwork distribution to the kitchen area (alternately, provide new variable volume exhaust fan and make-up air system – see long term recommendations)	$45,000
IMC 2009 Section 507	Type II hood required to be installed above dishwashers	No Type II hood and exhaust system installed for dishwashing machine	Install a Type II hood over dishwasher with dedicated exhaust fan	$20,000
IMC 2009 Section 304.11	Guards required where equipment requiring service is located within 10 feet of a roof edge	ERV at east end of south wing is within 10 feet of roof edge. Gym AHU and Locker Room ERV are within 10 feet of roof edge	Install permanent roof guards around ERV at east end of south wing and for equipment over locker room area for maintenance personnel protection	$15,000
IMC 2009 306.5	Equipment on roofs over 16 feet requires permanent means of access, typically with fixed ladder and roof hatch. Roof height changes over 30-inches require fixed ladders for access	Access to main roof through removal of bathroom window does not comply with the intent of this code section	Install fixed ladder and roof hatch within a secure area for permanent means of access to roof to service equipment. Install fixed ladders for multiple changes in roof height over 30 inches	$25,000
IPC 2009 Section 604	Maximum flow rates for plumbing fixtures per Table 604.4 (0.5 gpm for lavatories)	Lavatory faucets do not meet maximum flow rate requirements. Some fixtures can be retrofit with 0.5 gpm aerators. Older double faucet units require replacement for code compliance.	Install new lavatories with automatic sensor faucets (0.5 gpm) to replace double faucet lavatories (approx. 16 units). Add 0.5 gpm aerators to existing single faucet lavatories (approx. 18 units).	$35,000

Oyster River Cooperative School District

Oyster River Middle School – Long Term Recommendations for Mechanical Systems

System Description	Finding	Recommendation	Budget
Finned tube radiators and enclosures at north wing and portions of south wing	Existing finned tube radiators and enclosures aging and in service beyond typical useful service lifetime	Replace finned tube radiators and enclosures at north wing and sections of south wing (Approx. 1200 lineal feet FTR)	$125,000
Central ventilation systems	Central ventilation equipment is at end of typical service lifetime	Install new rooftop energy recovery units and ductwork distribution (8 systems, approx 4,500 CFM each); Install new packaged gas rooftop H&V unit for gym	$600,000
Gym Heating and Ventilation (H&V) Unit	Existing packaged rooftop equipment serving the Gym is at end of typical service lifetime	Replace existing Gym H&V Unit	$30,000
Multi-Purpose & Music Room Ventilation Systems	Existing unit ventilators aging and in service beyond typical useful service lifetime	Install new energy recovery ventilation systems and finned tube radiation (3 systems: 1,700 CFM, 300 CFM, 350 CFM; Approx 150 lineal feet FTR)	$95,000
Kitchen Hood exhaust and make-up air systems	Existing System lacking provision for make-up air	In lieu of adding basic make-up air system to meet current code requirements, provide new variable volume exhaust fan and make-up air system (4,000 CFM system)	$60,000
HVAC Controls	Make repairs/upgrades/adjustments to allow for proper scheduling and energy efficient operation of systems	Provide retro-commissioning process for all HVAC controls by 3rd party commissioning agent, including necessary system repairs	$80,000
Plumbing Fixtures	Plumbing fixtures do not meet current standards for highest efficiency	Install 1.28 gpf toilets, 0.125 gpf urinals and 0.5 gpm lavatories throughout with automatic sensor valves and faucets	$100,000
HVAC Preventative Maintenance	Mechanical systems appear to lack regular preventative maintenance	Establish regular preventative maintenance contract with company specializing in mechanical systems	$20,000/year
Kitchen Refrigeration Equipment	Refrigeration equipment aging without history of regular preventative	Replace refrigeration equipment and implement preventative	$30,000

	maintenance	maintenance plan	

Appendix A – Ventilation Calculations
Oyster River Middle School

Osyter River Middle School Ventilation Table

Room	Area (SF)	Occupants (2009 IMC)	Outdoor Air Req'd (2009 IMC)	Outdoor Air - Design	Exhaust Air Req'd (2009 IMC)	Exhaust Air - Design	Notes
Basement							
Storage B01	335	N/A	40	unknown	0	unknown	1
Equipment Storage B02	602	N/A	72	unknown	0	unknown	1
Boiler Room B03	483	N/A	0	unknown	0	unknown	1
Electric Room B04	112	N/A	0	unknown	0	unknown	1
Ground Floor							
Gymnasium 165	6288	N/A	1886	unknown	0	unknown	1
Gym Storage 165A	195	N/A	23	unknown	0	unknown	1
Girls Change 164	350	N/A	0	unknown	175	unknown	1
Girls Shower 163	176	N/A	0	unknown	110	unknown	1
Girls Toliet 162	236	N/A	0	unknown	400	unknown	1
P.E. Office 161	93	1	11	unknown	0	unknown	
P.E. Office 160	93	1	11	unknown	0	unknown	
Janitor 156	26	N/A	0	unknown	26	unknown	1
Staff Change 155	56	N/A	0	unknown	14	unknown	1
Boys Change 159	420	N/A	0	unknown	210	unknown	1
Boys Shower 158	182	N/A	0	unknown	300	unknown	1
Boys Toliet 157	234	N/A	0	unknown	400	unknown	1
Corridor C110	580	N/A	35	unknown	0	unknown	1
Vestibule V104	112	N/A	0	unknown	0	unknown	1
Vestibule V103	225	N/A	0	unknown	0	unknown	1
Instrumental Music 131	1171	20	270	300	0	0	
Toliet 137	73	N/A	0	0	50	75	1
Toliet 138	73	N/A	0	0	50	75	1
Corridor C109	785	N/A	47	0	0	0	1
Corridor C108	1600	N/A	96	0	0	0	1
Sprlr Room 139	105	N/A	0	0	0	0	1
Multi-Purpose Room 134	2576	200	1655	1500	0	1000	3
Storage 134A	145	N/A	17	unknown	0	unknown	1
Instrumental Music 132	1045	37	340	300	0	800	
Practice 132A	95	4	46	unknown	0	unknown	
6th Grade Math 130	892	32	374	350	0	350	
Toilet 130A	15	N/A	0	0	50	unknown	1
6th Grade Science 128	892	23	391	350	595	350	4
Toilet 128A	15	N/A	0	0	50	unknown	1
Work Room 126A	261	10	131	150	0	150	
SPED 126	353	13	172	225	0	225	
6th Grade Science 124	989	25	428	350	659	350	4
Work Room 124A	268	10	132	200	0	200	

6th Grade Launguage Arts 129	883	31	416	375	0	375	
Toilet 129A	15	N/A	0	0	50	unknown	1
Social Studies 127	883	31	416	375	0	375	
Toilet 127A	15	N/A	0	0	50	unknown	1
Launguage Arts 125	883	31	416	375	0	375	
Toilet 125A	15	N/A	0	0	50	unknown	1
Math 123	883	31	416	375	0	375	
Toilet 123A	15	N/A	0	0	50	unknown	1
Social Studies 121	726	26	347	375	0	375	
Girls Toliet 141	230	N/A	0	350	200	350	1
Boys Toliet 142	230	N/A	0	350	200	350	1
Music 122A	310	11	129	125	0	125	
Electric Room 140	50	N/A	0	unknown	0	unknown	1
Vestibule V102	235	N/A	14	unknown	0	unknown	1
Tech Ed Classroom 120	852	30	402	unknown	0	unknown	
Cafeteria 119	967	97	902	unknown	0	unknown	
SPED Classroom	342	12	161	unknown	0	unknown	
Tech Ed. 116	1075	22	414	unknown	358	0	4, 5
Corridor C106	1240	N/A	0	unknown	0	unknown	1
Toliet 143	40	N/A	0	unknown	50	unknown	1
Toliet 144	40	N/A	0	unknown	50	unknown	1
Janitor	28	N/A	0	unknown	28	unknown	1
Dishwash Room 117A	179	N/A	0	unknown	125	unknown	1
Kitchen 117	1326	N/A	0	unknown	928	4000	2
Office 117D	57	1	8	unknown	0	unknown	
Dry Storage 117C	144	N/A	17	unknown	0	unknown	1
Vest V101	42	N/A	0	unknown	0	unknown	1
Toliet 117B	60	N/A	0	unknown	50	unknown	1
Receiving 117A	270	N/A	32	unknown	0	unknown	1
Cafeteria Annex 119A	1367	137	1274	unknown	0	unknown	
Elev Mech 111C	54	N/A	0	unknown	0	unknown	1
Health 114A	675	24	321	375	0	375	
Cust 153 & Electric 153A	215	N/A	0	0	100	400	1
Tutor 154	176	7	91	94	0	94	
Reading Specialist 154C	162	6	79	94	0	94	
Tutor 154A	140	5	67	94	0	94	
Tutor 154B	175	7	91	94	0	94	
Corridor C104	520	N/A	31	0	0	0	1
Maintenance/Storage 111A	350	N/A	42	0	0	0	1
School Storage 111B	150	N/A	18	0	0	0	1
Boiler Room 109A	520	N/A	0	unknown	0	unknown	1
Transportation 109B	225	N/A	27	unknown	0	unknown	1
Storage 107B	30	N/A	4	0	0	0	1
Elev Mech 166A	50	N/A	0	0	0	75	1

Lobby	110	N/A	7	unknown	0	unknown	1
Girls 151	210	N/A	0	0	250	375	1
Foreign Language 110	681	24	281	375	0	375	
Boys Toliet 152	190	N/A	0	375	250	375	1
6-8th Grade Foreign Language 108	790	20	342	375	0	375	
SPED 107A	385	14	186	unknown	0	unknown	
6-8th Grade Foreign Language 107	980	35	468	300	0	300	
8th Grade Science Classroom 105	1000	25	430	300	667	300	4
5-6th Grade Consumer Ed 106	800	28	376	375	0	375	
Dark Room 104A	110	N/A	0	75	110	75	1
7-8th Grade Consumer Ed 104	1240	44	589	375	0	375	
OT/PT 103A	330	12	160	unknown	0	unknown	
Social Studies 103	995	35	469	375	0	375	
Corridor C102	1065	N/A	64	375	0	0	1
Corridor C101	595	N/A	36	0	0	0	1
Language Arts 101	890	32	427	375	0	375	
Group Study 101A	190	7	93	unknown	0	0	
Math 102	890	32	427	375	0	375	
First Floor							
5th Grade Classroom 229	810	29	387	375	0	375	
5th Grade Classroom 227	975	25	426	375	650	375	4
SPED 227A	260	10	131	150	0	150	
SPED 225	355	13	173	225	0	225	
Boys Toliet 233	240	N/A	0	350	350	350	1
Girls Toliet 234	240	N/A	0	350	350	350	1
Language Arts 223	810	29	387	375	0	375	
Corridor C205	1610	N/A	59	0	0	0	1
5th Grade Classroom 232	810	29	387	375	0	375	
5th Grade Classroom 230	805	29	387	375	0	375	
6th Grade Classroom 228	810	29	387	375	0	375	
5th Grade Science Classroom 226	900	23	392	375	600	375	4
Math 224	900	32	428	375	0	375	
Nurse 222	145	2	50	unknown	0	unknown	
Office 222B	70	1	9	unknown	0	unknown	
Storage 222A	42	N/A	5	unknown	0	unknown	1
Toliet 222D	51	N/A	0	unknown	50	unknown	1
Exam 222C	295	3	75	unknown	0	unknown	
Conference 218C	210	11	68	unknown	0	unknown	
Storage 218D	135	N/A	16	unknown	0	unknown	1
Office 218E	90	1	10	unknown	0	unknown	
Corridor 218G	120	N/A	7	unknown	0	unknown	1
Office 218F	105	1	11	unknown	0	unknown	

Office 218B	120	1	12	unknown	0	unknown	
Office 218A	120	1	12	unknown	0	unknown	
Main Office 218	245	2	25	unknown	0	unknown	
Library 219	3595	36	611	unknown	0	unknown	
Corridor C204	1020	N/A	61	unknown	0	unknown	1
Air Lock 236	65	N/A	0	unknown	0	unknown	1
IT Office 216A	170	1	15	unknown	0	unknown	
Conference 216B	182	10	61	unknown	0	unknown	
Video 219 C	220	6	86	unknown	0	unknown	
Office 219A	100	1	11	unknown	0	unknown	
Storage 219B	150	N/A	18	unknown	0	unknown	1
Art Room 214	730	15	281	375	341	375	4
Toliet 211E	35	N/A	0	unknown	50	unknown	1
Work Room 211A	345	13	171	100	0	0	
AV Storage 211D	140	N/A	17	0	0	0	1
SPED 211	698	25	334	100	0	100	
Art Room 212	820	17	318	375	383	375	4
Workroom 210C	190	1	16	115	0	115	
Mail Room 210A	101	N/A	6	unknown	0	unknown	1
210B	340	7	131	188	0	188	
Lobby L201	80	N/A	0	0	0	0	1
Art Storage 211C	90	N/A	11	0	0	0	1
Office 211B	76	1	10	unknown	0	unknown	
Boys Toliet 238	185	N/A	0	0	200	375	1
Girls Toliet 237	185	N/A	0	0	150	300	1
7th Grade Math Classroom 209	990	35	469	375	0	375	
ESL 207A	375	14	185	unknown	0	unknown	
7th Grade Science Classroom 207	1100	28	478	375	733	375	4
Computer Lab 205	440	11	163	200	0	200	
7th Grade Social Studies 208	810	29	387	375	0	375	
7th Grade Language Arts 206	835	30	400	375	0	375	
Corridor C202	1880	N/A	113	375	0	0	1
8th Grade Math 204	820	29	388	375	0	375	
SPED 203A	320	12	158	unknown	0	unknown	
8th Grade Social Studies 203	1055	37	497	375	0	375	
Corridor C201	535	N/A	32	0	0	0	1
8th Grade Language Arts 201	935	33	442	375	0	375	
8th Grade Science Classroom 202	1155	29	498	375	770	375	4
Second Floor							
5th Grade Classroom 302	650	23	269	375	0	375	
Office 302A	230	2	24	200	0	200	
5th Grade Classroom 304	645	23	269	375	0	375	

Corridor C302	590	N/A	35	unknown	0	unknown	1
Stairs S303	543	N/A	33	unknown	0	unknown	1
5-6th Grade Health	596	21	246	375	0	375	
Boys Toliet 305	135	N/A	0	unknown	150	unknown	1
Girls Toliet 306	166	N/A	0	unknown	150	unknown	1
Janitor 308	20	N/A	0	unknown	20	unknown	1
5th Grade Classroom 301	655	23	269	375	0	375	
Corridor C301	250	N/A	15	unknown	0	unknown	1

1. Required ventilation rate (typically exhaust only, if any) dependent upon floor area
2. Designed EA includes kitchen hood EF (estimated 4000 CFM)
3. Occupancy assumed instead of IMC default occupancy value
4. IMC required exhaust rate based on net occupiable floor area (2/3 room floor area)
5. Two re-circulating filtration units installed

ELECTRICAL

ENGINEERING

OYSTER RIVER MIDDLE SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Oyster River Middle School
Facility Analysis – Electrical Systems

Table of Contents

I. Introduction

Engineered Building Systems has reviewed available record drawings and surveyed the electrical systems serving the Oyster River Middle School in Durham, NH. The intent of this report is as follows:

1. Evaluate existing electrical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing electrical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Recommendations are provided to address items that don't conform to current building code requirements. In addition, recommendations are provided for improvements in system performance, maintainability and energy efficiency.

II. Findings

A. Building AC Electrical Power Distribution System

Building electrical power emanates from a PSNH pad mounted distribution transformer located on Coe Avenue. The pad mounted transformer appears to be rated for 500 KVA with an input voltage of 13,800 volts delta and an output voltage of 277/480 volts wye. The primary service entrance conductors for the transformer run underground from pole # PSNH 82-7 to the PSNH pad mounted transformer. The secondary service entrance conductors for the building run underground from the pad mounted distribution transformer to the main switchboard located in the basement level main electric room.

The main distribution panel is rated for 800 amperes @ 277/480 volts, three phase, four wire and is located in the building main electrical room in the basement. The remote panelboards that we observed were in fair to good condition, but some of them were fully loaded and there did not appear to be any spares or spaces available.

The existing electrical distribution equipment ranges from poor to good condition. The manufacturer of the newer distribution equipment; Square D, is presently still manufacturing electrical switchgear, so spare or replacement parts are readily available. The manufacturer of the original electrical distribution equipment (Bulldog) is no longer manufacturing electrical distribution equipment and replacement parts are no longer available.

The 800 ampere service @ 277/480 volts, three phase, four wire allows for a recommended maximum connected load of 532.0 KW or approximately 5.0 watts per square foot (based on 80% maximum loading of service rating, divided by 107,000 usable square feet) The peak kilowatt demand for this facility was 182.0KW (or 219 amperes) in October of 2011. This equates to approximately 1.7 watts per square foot of peak electrical usage. The service capacity for this building is more than adequate to handle present and future building electrical needs and there are spaces available in the existing main switchboard distribution section for additional feeder breakers.

The main electric room B04 is presently utilized as a storage room (see photo #1) below. In violation of N.E.C. Article 110.26(B), all non electrical equipment should be removed from the electrical rooms. The main electric room door swings inward to the room and also is not equipped with panic hardware as required by N.E.C. Article 110.26(C)(2).

B. Metering Arrangement

All building electrical loads in the main building are single point primary metered via PSNH meter #28110123. The building electrical meter is located on the Coe Ave side of the building adjacent to the pad mounted transformer.

C. Emergency or Standby Power Distribution Systems

The building is not equipped with an emergency or standby power distribution system. Upon loss of utility power, all electric utilizing equipment within the facility will shut down, including any computer equipment, HVAC systems, telephone equipment, lighting, kitchen equipment, elevators, pumps, etc.

D. Fire Alarm System

The main building is presently equipped with a conventional zoned, low voltage fire detection and signalling system as manufactured by Fire Control Instruments (FCI). The existing Fire Alarm System consists of a main control panel located in the main Entry Lobby at the first floor and remote system indicating and initiating devices including manual pull stations located at egress points throughout the building. Audio visual horn/strobe units are also strategically located throughout the complex and smoke or heat detectors are located in corridors, classrooms and open areas of the building. The main fire alarm control panel is tied into the Town of Durham Fire Department via the digital communicator. The audio/visual device coverage does not appear to comply with current NFPA 72 spacing requirements and the mounting heights are not ADA or NFPA compliant. The digital communicator is tied into the fire alarm system and will notify the monitoring company of any "alarm" and/or "trouble" signals in the system. There is a graphic annunciator located in the main entry lobby of the building (See photo #2).

Photo #2

E. Elevator Recall and Control

There are smoke detectors located in each floors elevator lobby for the elevator recall and control to the elevator control panel, however, the elevator installer/manufacturer would need to confirm that their control panel has appropriate components to perform the required control and recall functions.

F. Americans With Disabilities Act Compliance

It appears that most of the buildings electrical controls and fire alarm devices are in compliance with the height and access requirements of the Americans with Disabilities Act and the State of New Hampshire Architectural Access Barrier Board requirements. We did observe some lighting control switches that were mounted above the allowed height for switch controls. We also observed that a number of manual stations and audio/visual devices are not mounted at ADA compliant heights.

G. Interior Lighting

The fluorescent lighting fixtures appear to have been upgraded over the years. Most lighting fixtures are equipped with T8 lamps and electronic ballasts. In general, lighting levels are good to excellent. There are a number of spaces in the building where different color temperature lamps are in use within the same room. The gymnasium lighting consists of high bay metal halide fixtures plus linear fluorescent fixtures.

H. Exterior Lighting

H.I.D. type, lensed, wall mounted wallpack luminaires illuminate the main parking lot and access drive around the building. As we performed our inspection during the daylight hours, we cannot comment on the adequacy of the exterior lighting levels The wallpack fixtures appear to be in fair condition, although some of the lenses are yellowed or broken. (See photo #3).


Photo #3

I. Automatic Lighting Control Systems

We did not observe any automatic lighting controls as required by the 2009 Edition of the International Energy Conservation Code, Section 505. All interior lighting systems appear to be manually controlled only.

J. Emergency and Exit Lighting Systems

The building is equipped with an emergency lighting and exit lighting system as required by NFPA Life Safety Code 101, and the 2009 Edition of the International Building Code. For the most part, there appears to be an adequate number of normal/emergency lighting fixtures located throughout the egress paths and they are in good to fair condition. The emergency lighting systems were recently inspected and brought up to code according to the maintenance personnel. However, we did not observe any emergency lighting systems in the electrical room, mechanical room, or in the gymnasium. In general, there are an adequate number of exit signs to indicate the paths of egress, and they appear to be in fair to good condition. However, we did not observe any exit signage in the classrooms and mechanical room and there are some egress corridors where additional exit signage is required. Some of the exit signs in the building are the old incandescent type and should be replaced. Exterior areas of refuge at building exit discharges are not equipped with emergency lighting as required by IBC Article 1006.

K. Lightning Protection System

The building is not equipped with a lightning protection system. The National Fire Protection Association (NFPA) and the Lightning Protection Institute (LPI) recommend that all buildings be protected against loss by lightning. However, the installation of a lightning protection system is not required by the National Electrical Code or NFPA. The risk assessment index would classify this building as a moderate risk, taking into account the site conditions and the height of the building.

L. Grounding Electrode and Equipment Grounding System

We could not visually inspect the main grounding electrode system because it was not readily apparent during our visual inspection. This grounding electrode system should be tested every five years to insure that the proper resistance levels are maintained.

The electrical distribution system branch circuits and feeders appear to be equipped with an insulated equipment grounding conductor, which provides an effective conductive path to ground for the electrical system.

M. Security System

The building is equipped with a centralized low voltage security system consisting of motion sensors in the corridors and classrooms. There is an activation keypad located in the main entry lobby. There are also perimeter door contacts on egress doors. The system appears to be in good operating condition.

N. Paging System

There is a centralized paging system which consists of a master amplifier and microphone located at the main reception desk and remote ceiling mounted speakers located throughout the corridors, classrooms, library, gym, multi-purpose room etc. The system is as manufactured by Bogen Communications and the system appears to be in good condition.

O. Clock Program System

There is not a centralized clock program system. The classroom clocks are battery or line voltage powered.

P. Data Systems

The main server rack is located in the MDF room located adjacent to the main electric room in the basement. There are remote server racks in the first floor sprinkler room. Data cabling is category 6 and the server rack, patch panels and data wiring all appear to be in excellent condition and was upgraded in 2009.

Q. Carbon Monoxide Detection System

We did not observe a carbon monoxide detection system in this facility. The State of New Hampshire requires carbon monoxide detection systems in permanent and transient residential buildings that are equipped with fossil fuel burning appliances or equipment, but does not presently require carbon monoxide detection systems in non-residential facilities. Carbon monoxide is an odorless, colorless, tasteless toxic gas that can lead to death in a matter of minutes at high concentration levels and children are especially susceptible to carbon monoxide poisoning. There are fossil fuel fired mechanical systems and appliances in this facility.

R. Surge Protective Devices

We did not observe any surge protective devices installed at any point on the interior electrical distribution system. Surge protective devices (SPD) will protect the electrical distribution system and sensitive electronic devices or equipment from externally or internally generated surges or spikes.

III. Recommendations - Code Compliance

Refer to attached summary table.

IV. Recommendations - System Performance, Energy Efficiency and Maintenance

Refer to attached summary table.

V. Equipment Replacement Schedule

Equipment	Life Expectancy	Age (Years)	Remarks
Interior Light Fixtures	40 years	Varies	See Note #1
Fluorescent Lamps	4-5 years	Varies	See Note #2
Incandescent Lamps	6 months	Varies	See Note #3
Exterior Light Fixtures	20 years	Varies	See Note #4
H.I.D. Lamps	4-5 years	Varies	See Note #2
Ballasts	15-20 years	Varies	See Note #5
Emergency Battery Units	5-10 years	Varies	See Note #6
Exit Signs	10-20 years	Varies	See Note #6
Main Switchboard	30 years	Varies	See Note #7
Panelboards	30 years	Varies	See Note #8
Transformers	25 years	Varies	See Note #8
Safety Switches	30 years	Varies	See Note #9
Motor Starters	25 years	Varies	See Note #9
Fire Alarm System	30 years	Varies	See Note #10
Smoke Detectors	10 years	Varies	See Note #10

Notes:

1. Interior lighting fixtures should be replaced and upgraded as areas are renovated. Replacement costs should be allocated into construction budgets rather than maintenance budgets.
2. Fluorescent lamps should be replaced in groups rather than on an individual failure basis.
3. Incandescent lamps have a limited life expectancy and should be replaced on an individual failure basis.
4. Exterior lighting fixtures should be replaced as needed or at end of useful life.
5. Electronic ballasts should be replaced on an individual failure basis until they reach 20 years in age, then group replacement is recommended.
6. Emergency battery units and exit signs should be tested on a semi-annual basis and replaced as needed if testing indicates pending or previous failure.
7. The main switchboard should be infrared tested every five years. The ground fault protection system and the distribution circuit breakers should be tested on an annual basis (where applicable).
8. Panelboards and transformers shall be infrared tested every 5 years.
9. Replace at component end-of-life.
10. The Fire Alarm System and backup batteries should be tested as required by the local Fire Department and NFPA 72.

Oyster River Cooperative School District

Oyster River Middle School – Code Compliance Recommendations for Electrical Systems

Code Section	Requirement Description	Finding	Recommendation	Budget
I.E.C.C. 505.2.2.2	Automatic Lighting Controls	Most interior spaces in building lack automatic lighting controls.	Provide wall or ceiling mounted occupancy sensors in all offices, toilets, classrooms, corridors, etc.	$39,000.00 (1)
I.B.C. 2009 907.2.1.1 and NFPA 101 13.3.4.3.4	Assembly areas with occupant loads greater than 1000 shall have an occupant notification system that consists of voice announcements.	The fire alarm system occupant notification system does not include voice evacuation.	Provide a voice evacuation system in the assembly areas of the building if occupant load is greater than 1000.	$18,000.00
I.B.C. 2009 907.5.2.3.2	Employee work areas: Notification appliance circuits shall have 20% spare capacity to accommodate the potential of adding visual devices for hearing impaired employees	Visual devices may need to be added to accommodate hearing impaired individuals	Provide on an "as needed" basis	-0-
I.B.C. 2009 915.0	Emergency responder radio coverage: Required on all new buildings	See recommendation	Have the local fire department test their radio coverage in the building to confirm that their equipment functions properly in the building	-0-
I.B.C. 2009 1006.3	Emergency power for illumination required for exterior landings and area of refuge	There is no exterior emergency lighting at the exit discharges	Provide low voltage or line voltage emergency lighting at each egress exit discharge	$10,000.00
I.B.C. 2009 2702.2.5	Elevators that are part of an accessible means of egress shall be provided with standby power	If the elevator is classified as "an accessible means of egress" then standby power is required		$4,000.00

N.E.C. 2011 110.26(B)	Clear spaces in electric rooms	The main electrical room is presently being used as a storage room for maintenance and janitorial equipment (See photos #2 & #3)	Remove all non-electrical equipment from room	-0-
N.E.C. 2011 110.16	Flash Protection	The main switchboard and main distribution panels (400A or greater) should be labeled to warn maintenance personnel of potential arc flash hazards	Install warning labels as required.	$500.00
N.E.C. 2011 110.26(C)(2) and I.B.C. 2009 1008.1.10	Entrance to working space: Personnel doors for electric rooms with large equipment shall open in the direction of egress	The main electric room door swings inward and is not equipped with panic hardware	Reverse the door swing and provide panic hardware	$3,000.00

(1) Rebates may be available for energy conservation retrofit measures from the local utility company or NHSaves.

Oyster River Cooperative School District

Oyster River Middle School – Electrical System Performance, Energy Efficiency and Maintenance Recommendations

Code Section	Requirement Description	Finding	Recommendation	Budget
N/A	N/A	During our visual inspection we did not observe any surge protection devices (SPD) or systems throughout the electrical distribution system. An SPD system will protect the electrical distribution system and sensitive electronic devices and equipment from externally or internally generated surges or spikes.	Provide surge protective devices at the main service entrance equipment and at the 120/208 volt panels feeding sensitive electronic equipment areas. The SPD system will protect the facility and its equipment from externally generated transients initiated by lightning strikes and/or utility company generated surges or spikes. Also, provide SPD protection on incoming telephone and fiber optic cables or systems.	$12,500.00
N/A	N/A	There are no single phase protection devices on the existing secondary electrical distribution system.	Install single phase protection devices on the main service distribution equipment.	$8,000.00
N/A	N/A	The existing egress pathway and parking lot lighting appears to be inadequate and is not "Dark Skies" compliant. There are also parking areas that are not illuminated at all.	Replace existing non-cutoff and inefficient exterior lighting luminaires with I.E.S. compliant full cutoff luminaires to improve exterior lighting levels and minimize light pollution.	$70,000.00

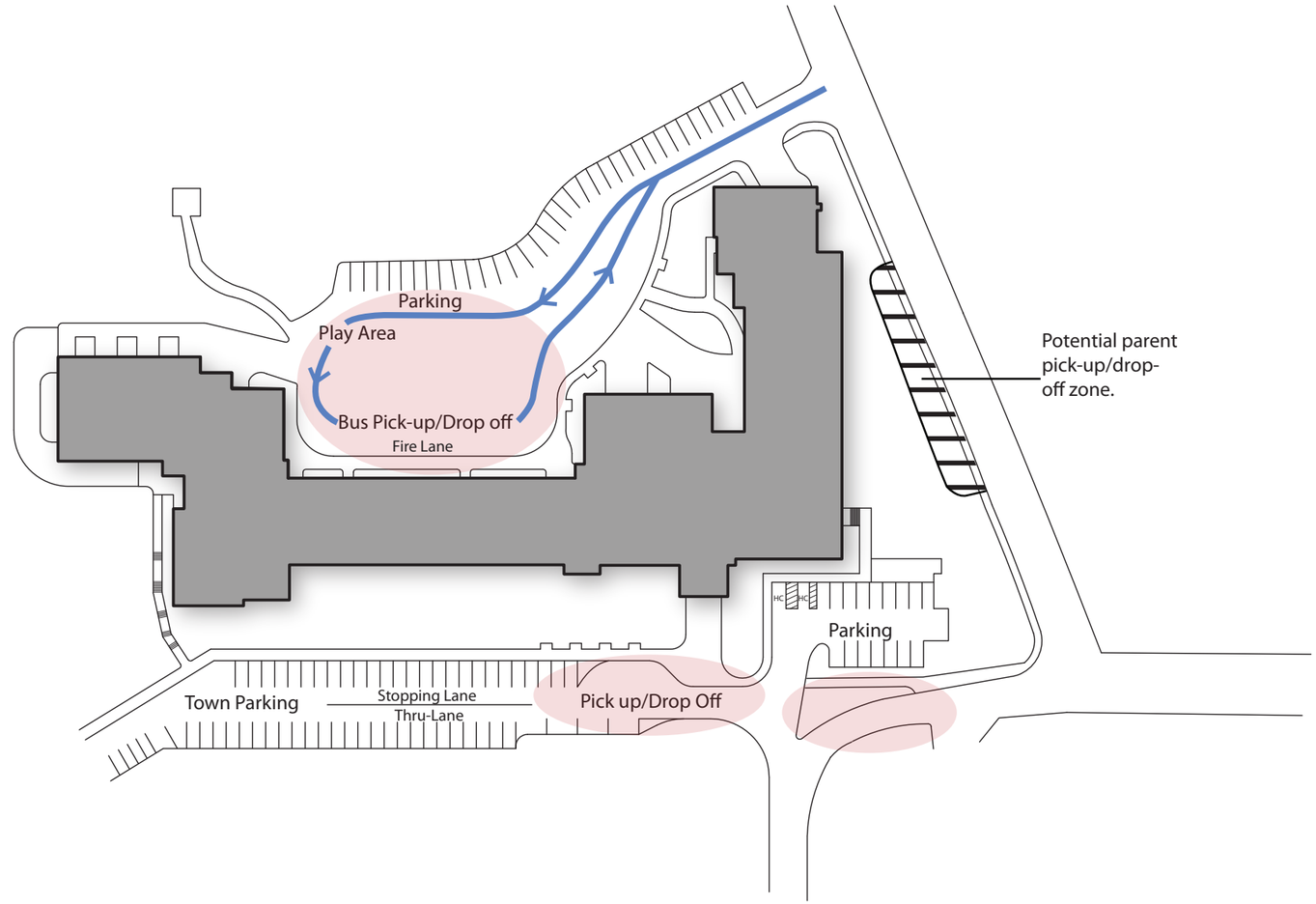
N/A	N/A	The electrical distribution system should be tested every 5 years.	Contract with a testing company to test, clean, and calibrate the main switchboard, and distribution section circuit breakers. Perform a thermo graphic survey on the entire electrical distribution system.	$12,000.00
N/A	N/A	This facility is not equipped with an emergency or standby power distribution system. Upon loss of power the heating system, kitchen equipment, elevators, phone system, etc. de-activate.	Provide an emergency or standby power distribution system to provide onsite power to the buildings heating system, kitchen system, kitchen area refrigerators, select lighting circuits and ejector pump systems.	$95,000.00
N/A	N/A	The building is equipped with fossil fuel burning equipment and/or appliances but is not equipped with a carbon monoxide detection system.	Provide a centralized carbon monoxide detection system with occupant notification in the rooms or areas where fossil fuel fired appliances or equipment is operating	$15,000.00
N/A	N/A	Even though most of the existing fluorescent fixtures are equipped with T8 energy saving lamps and electronic ballasts, the opportunity exists for further energy savings by retrofitting the existing fixtures with lower wattage lamps, or reducing the quantity of lamps, or replacing the existing fixtures in kind with more efficient fluorescent or LED fixtures.	Perform a lighting audit with the assistance of NHSaves and/or and energy efficiency consultant and identify areas of the building where fixtures can be retrofitted or replaced.	T.B.D.

Oyster River Middle School
1 Coe Drive
Durham, NH

Pedestrian/Vehicular circulation conflict area

Bus pick-up/drop-off route

Drainage Issues/Ponding Area



1 SITE PLAN
SCALE: 1:100

MOHARIMET ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

DAVIS GOUDREAU ARCHITECTS

Executive Summary for Building & Site

Moharimet Elementary School

Accessibility Overview:

In general, Moharimet Elementary is in compliance with accessibility requirements of the 2010 ADA guidelines. There are a number of toilet facilities that do not comply fully with ADA requirements. Some alternatives to full compliance at each location could involve providing limited uni-sex accessible toilet facilities in the general vicinity of the non-compliant rooms, or combining two non-compliant rooms into one shared compliant room. There was no Braille noted on the room signage.

There are issues with some incorrect mounting heights on some elements, incorrect door hardware, many instances of movable obstructions to required door clearances, lack of proper grab bars at toilets, lack of protection on supply and waste piping for lavatories, and non-complying ramps and railings . The remedial work to correct these deficiencies should be addressed with any future renovations planned for the school, with the qualifier that it does not need to exceed 20% of the value of that work at the time it is done. Some items may be able to be corrected immediately by maintenance staff such as mounting heights of paper towel dispensers.

Building/Fire Code Review:

The total area of the existing school (43,445 sf) is below the allowable maximum (54,432 sf) based on Table 503 from the State Building Code (including allowances for sprinkler and accessible frontage). As such, the building does not need to be divided into separate "buildings" through the use of fire walls. Corridor walls do not need to be fire rated, but they do need to resist the passage of smoke. At this time, that would mean adding closers to many corridor doors that currently do not have them in order that they be "self-closing" or "automatic closing". It is our recommendation to seek a waiver on this item given that the 2009 edition of the NFPA 101 Life Safety Code allows an exception for sprinkled buildings in an Educational occupancy. It will also require that the ceiling plane be relied upon to resist the passage of smoke given that many walls in the original structure either do not fully extend to the underside of structure above, or some penetrations are not properly sealed. Moharimet's suspended ceiling system appears to be a good candidate to serve this function, providing damage to ceiling tiles or areas around pipe/conduit penetrations are repaired to limit the passage of smoke into the space above the ceiling.

There are some locations where doors & frames require fire-resistive ratings, but the rating could not be verified because labels (if they are present) have been painted over. Some door/frame assemblies do not have ratings around assembly uses such as the Multi-purpose room (where they are needed), while others have insufficient ratings (i.e. 20 minutes where 45 minutes is required). The Library will need to be posted for occupancy less than 50 due to the fact that portions of its walls are only partial height, exposing the Library to the corridor atmosphere. Alternatively, the walls (or glazing) would need to extend to the ceiling plane at a minimum. There were no noticeable deficiencies in means of egress for the school, with the exception that the Multi-purpose room will need to be posted for a maximum occupancy of 650 since there is only a pair of 3'-0" doors leading from the main entry to the room. There was also a piano and some storage racks outside the Library that reduced the corridor below the Code required minimum of 6'-0". There were some minor deficiencies in signage requirements for both Code and ADA.

DAVIS GOUDREAU ARCHITECTS

Site Review:

Traffic flow for buses and cars through the site appears orderly and without problems. There is additional parking located behind a church adjacent to the property where parents drop-off and pick-up students. This is also a parking area for younger staff and interns.

There appears to be adequate queuing for buses at drop-off and pick-up. Several smaller buses were noted to be waiting at the beginning of the loop road around the school.

There are limited designated visitor parking spots located in the staff lot. ADA accessible parking exceed the number required (4 provided, 3 required), but they are located away from the entry sidewalk. There is only one striped aisle where at least 2 are required. Only 2 spaces are signed, 3 are required. Disabled visitors to the school should not need to walk or wheel through a vehicular travel path on their way to the entry. Curb cuts, where they exist should have tactile warning pads where they lead into traffic.

There are several areas of concern regarding drainage on the site. The area on the northeast side of the building is susceptible to deep ponding (up to 12 inches deep) due to roof runoff. Additionally, the area around the rear exit door from the gymnasium is susceptible to erosion runoff and potential infiltration into the gymnasium during high intensity rains. Catch basins at the front of the school building experience backup during moderate to high intensity rains and there is a potential backup down line of the catch basins causing back pressure during extreme rains.

Programming:

The Moharimet Elementary School is comprised of a main wing with classrooms surrounding a library core and two "common" areas, and a core area wing consisting of the main entry, the music room, the multipurpose room and kitchen.

- The library is 2437sf. The current student enrollment is 385. The State design capacity enrollment is 472 pupils. 10% of design capacity = 47 x 40sf/pupil = 2968sf. For the current enrollment the library is of sufficient size. If the student population increases over the next ten years adjacent rooms may need to add library space.
- The Multipurpose Room, used for both Phys. Ed. and as a cafeteria is 3600sf. Access to the kitchen by students is tight and there are 4-5 lunch periods. Future consideration should be given for the addition of a separate cafeteria.
- Refer to the following spreadsheet for individual room uses, square footages and pupil counts.

At Moharimet we verified the existing space conditions shown on our floor plan drawings; we verified that rooms were being used as indicated; and corroborate the room numbers with the school's room number list.

Pupil counts were based on pupils in each general classroom, the art classroom and the music classroom. Kindergarten was counted as an average of AM and PM classes. The results are shown on spreadsheets, along with comparisons to the maximum number of pupils allowed in a classroom and the class size policy of the ORSD.

DAVIS GOUDREAU ARCHITECTS

Food Service:

Dishwasher needs to be replaced. Dishwasher is 20+ years old. New Hobart dishwasher will use half of the water currently being used. Cost: $9.300

Truaulsen two door refrigerator has broken locks. Thermostat has been replaced twice. Door gaskets need to be replaced. Suggestion is to replace. Cost: $3,000

Three compartment sink needs chemicals for cleaning. Suggest adding chemicals and dispenser to bring it up to code. Cost: N/A

Remove existing four open burners and steamer which is not being used and replace with standard six burner range with oven. Cost: $1,800

FACILITY

ANALYSIS

MOHARIMET ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

ADA 2010 Checklist – Oyster River School District

Moharimet Elementary School

ADAAG Section	Requirement Description	Finding	Recommendation	Cost Estimate
203.5	Areas used only by maintenance personnel shall not be required to comply with these regulations, or to be on a n accessible route.	Noted.		
203.9	Spaces and elements within employee work areas shall only be required to comply with 206.2.8, 207.1 & 215.3.	Noted.		
206.2.3	At least one accessible route shall connect each story and mezzanine in multi-story buildings and facilities.	Noted.		
206.2.8	Common use circulation paths within employee work areas shall comply with 402, EXCEPT where work areas are less than 1000 sf and defined by permanently installed partitions, counters, casework, or furnishings.	Noted.		
208.2	Parking spaces (per 502) shall be provided in accordance with Table 208.2.			
Table 208.2	1-25 spaces: 1 accessible space.			
	26-50 spaces: 2 accessible spaces.			
	51-75 spaces: 3 accessible spaces.	Moharimet has 60 spaces (exclusive of accessible spaces). It provides 4 accessible spaces.	The number of accessible spaces exceeds compliance.	
	76-100 spaces: 4 accessible spaces.			
	101-150 spaces: 5 accessible spaces.			
	151-200 spaces: 6 accessible spaces.			
	201-300 spaces: 7 accessible spaces.			
	301-400 spaces: 8 accessible spaces.			
208.2.4	For every 6 required accessible spaces, one VAN accessible space shall be provided.	Noted.		

208.3.1	Accessible parking spaces shall be located as close to the accessible entry as possible.	Spaces have a fire lane and bus drop off lane between them and the sidewalk. Striped aisles are not provided for two of the 4 spaces.	Spaces should be relocated so that passengers do not have to cross a travel/traffic lane. Properly stripe aisles for occupant access.	Paving, striping and signage for 3 spaces (including curb cut and some paved island work): $5,000.
211.2	No fewer than 2 drinking fountains shall be provided. One shall comply with 602.1 through 602.6 and the other shall comply with 602.7.	Noted.		
	EXCEPTION: Where a single drinking fountain complies with 602.1 through 602.6 and 602.7, it shall be permitted to be substituted for 2 separate fountains.	Noted.		
211.3	Where more than the minimum number of drinking fountains are provided, 50% shall comply with 602.1-602.6, and 50% shall comply with 602.7.	Moharimet does not comply. There are three drinking fountains (not counting classrooms) and all are at the low height. All drinking fountains in classrooms are part of the sink faucet, as such they are all of the lower height..	Install a combination hi-lo unit at the Library in Corridor C05 to reach the greatest number of occupants. Alternatively, provided a bottled water station at several locations within the school to comply with the higher range required (38”-43”). No change recommended to classrooms.	Hi-Lo unit: $2,000. Bottled water station: Consult local vendors for pricing.
213.2	Where toilet rooms are provided, each toilet room shall comply with 603. EXCEPTION: In alterations where it is technically infeasible to comply with 603, altering existing toilet rooms shall not be required where a single unisex toilet room complying with 213.2.1 is provided and located in the same area as the existing inaccessible toilet room.	Noted. Toilets in rooms 118A, 119A, 123A, 124A, 128A, 130A, 134A, 138A, 139A, 143, 144A, 155A, & 172 are too small for proper fixture clearances. Toilet rooms 111, 112, 140A & 172 have items stored in them. Toilet room 157A has fixed shelving built over the toilet.	Toilet rooms 155A & 172 may qualify for 203.9 above, whereby no action would be needed. RE: the small classroom toilets, constructing one unisex toilet in each of 2 commons areas would qualify for this exception. Alternatively, combining 2 of each of these smaller toilet rooms (since they back up to each other in pairs) into a single larger, accessible toilet room may be more functional as students would not need to leave their classrooms to use	$4,500 per toilet room renovation (combining two into one).

			them. A review of plumbing code minimum fixtures should be done before decreasing the number. Stored items or fixed shelving should be removed from toilet rooms.	
213.3.1	Where toilet compartments are provided, at least one shall comply with 604.8.1. At least one shall comply with 604.8.2 where six or more toilet compartments are provided.	Noted.		
213.3.2	Where toilets are provided, at least one shall comply with 604.	Noted.		
213.3.3	Where more than one urinal is provided, at least one shall comply with 605.	Noted.		
213.3.4	Where lavatories are provided, at least one shall comply with 606 (and shall not be located in a toilet compartment).	Noted.		
213.3.5	Where mirrors are provided, at least one shall comply with 603.3	Noted.		
216.2	Interior and exterior signs identifying permanent rooms and spaces shall comply with 703.1, 703.2 and 703.5.	Signage not consistent. Most signage missing Braille.	A comprehensive signage package should be specified and bid out by the District covering all permanent rooms.	Range $3,000 - $5,000.
216.4.1	Doors at exit passageways, exit discharge, and exit stairways shall be identified by tactile signs complying with 703.1, 703.2 and 703.5	Tactile exit signage is missing	Provide tactile signage at exits (approximately 8 signs)	See above.
216.5	Parking spaces complying with 502 shall be identified by signs complying with 502.6.	Only 2 signs are currently provided.	Provide another sign mounted on post.	$300
309.4	Operable parts of objects shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.	Noted.		
404.2.3	Door openings shall provide a clear width of 32” inches min. with the door open 90 degrees.	Communicating doors in classrooms 115, 119, 124, 135, 139 & 144 do not comply.	These communicating classroom doors are not needed for egress. If not used regularly	See 213.2 above.

		Doors to toilet rooms 118A, 119A, 123A, 124A, 128A, 130A, 134A, 138A, 139A, 143A & 144A do not comply.	by students or staff, they may remain as is. Toilet rooms listed here are not large enough to admit wheel chairs. When they are renovated, doors can be brought into compliance.	
404.2.4	Min. maneuvering clearances at doors shall comply with Table 404.2.4.1.	There are many instances where movable furniture is placed in the way of the 18" pull-side clearance at classroom doors, classroom toilet doors and communicating doors between classrooms. Fixed obstructions (such as counters) occur at the following doors: 106, 145, 149, 150 & 172.	These movable obstructions will need to be moved when a wheelchair-bound student or staff member is present in these rooms. Door to 172 may be OK if 203.9 above is invoked. Doors 106, 145, 149 and 150 would comply if swing is reversed to swing out of the room since the clearance requirement is for the pull side.	Reverse door swing $500 per door.
404.2.6	The distance between 2 hinged doors in series shall be 48" min. plus the width of the door swinging into the space.	Door at Vestibule V02 and door at room 171 do not comply.	Nothing need be done if 203.9 above is invoked.	No cost.
405.7	Ramps shall have landings at the top and bottom of each ramp run. Ramps with curved or angled walls (or rails) create a compound slope that does not meet ADA requirements.	Ramp at Corridor C05 does not comply. It narrows down from corridor to Vestibule V05 as it descends. This is also a non-compliant Code issue as well.	Reconfigure the angled rails to be straight with the rest of the corridor and return to walls parallel to C05.	$1500.
405.8	Ramps with a rise greater than 6" shall have handrails complying with 505.	Noted.		
502.2	Accessible standard parking spaces shall be 96" wide min. Accessible van spaces shall be 132" wide min. except they may be 96" wide if the access aisle is also 96" wide.	Noted.		
502.3	Access aisles serving standard accessible parking and van spaces shall be 60" wide min. and shall adjoin an accessible route. Two parking spaces shall be permitted to	Aisle does not adjoin an accessible route.	See 208.3.1 above.	See 208.3.1 above.

	share a common access aisle.			
502.3.3	Access aisles shall be marked so as to discourage parking in them.	Noted.		
505.2	Handrails shall be provided on both sides of stairs and ramps.	Ramp from Corridor C01 down to Multi-purpose room 175 does not comply.	Add wall rail to right side (as you descend).	$500.
602.4	Spouts shall be 36" max. AFF, except 30" for children's use and as per 602.7.	See 211.3 above.	See 211.3 above.	
602.7	Spouts for standing persons shall be between 38" and 43" AFF.	See 211.3 above.	See 211.3 above.	
603.2.3	Doors shall not swing into the clear floor space required for any plumbing fixture. EXCEPTION: Where the toilet room is for individual (single person) use, and a clear floor space of 30" x 48" min. is provided within the room beyond the arc of the door swing, doors shall be permitted to swing into the clear floor space of any fixture.	Toilet room 106A does not comply.	Renovate door to swing out.	Reverse door swing $500 per door.
604.3.1	Clearance around a toilet shall be 60" min. perpendicular to the side wall and 56" min. perpendicular to the rear wall (for adult wall hung toilet) and 59" for adult floor mounted or children's toilet (see 604.8.1.1)	See finding 213.2 above for items stored in toilet rooms that impinge on required clearance.	See recommendation for 213.2 above.	
604.5	Grab bars for toilets shall comply with 609. They shall be provided on the side wall closest to the fixture, and on the rear wall. NOTE NH requires a third grab bar, a vertical one 18" long, bottom mounted between 39"– 41" AFF, and located between 39"-41" from the rear wall.	Grab bars are missing in the following accessible toilet rooms: 157A (missing rear bar). Note: grab bars are also missing at toilet rooms that are not otherwise accessible (see finding 213.2 above). The following inaccessible toilet rooms have grab bars that are non-compliant: 119A, 124A, 128A, 130A, 134A & 144A. There are no vertical grab bars in	Add grab bar at 157A. Inaccessible toilet rooms won't need the grab bars since they can't be made to comply without being renovated. Grab bars can be added during those renovations. Add vertical grab bars to all accessible toilets (12 locations).	Vertical grab bars: $150 per 18" grab bar, $250 per horizontal grab bar.

		any accessible toilets.		
604.5.1	The side wall grab bar shall be 42 inches long min., located 12" max. from the rear wall, and extend 54" min. from the rear wall.	See above.	See above.	
604.5.2	The rear wall grab bar shall be 36" long min. and extend from the centerline of the toilet 12" toward the closest side wall, and 24" in the other direction.	See above.	See above.	
604.8.1.2	Toilet stall doors shall be located 4" max. from the front corner of the partition (diagonally furthest from the fixture) to the hinge side of the door. They shall be 32" clear min., self-closing, and not swing into the required floor clearance for the fixture.	The following accessible toilet room doors are not self-closing: 115A, 116A, 135A, 137A, 157A. Doors are not self-closing in the following toilet stalls: 159 & 160.	Doors to toilet rooms shall have closers or self-closing hinges installed. Stall doors should have self-closing hinges installed.	Surface mounted door closer: $400 per door, self-closing hinges: $150 per stall door.
604.9	Grab bar heights in children's stalls shall be 20"-25" for ages 5-8, and 25"-27" for ages 9-12.	Noted.		
605.2	Urinals shall be stall type or wall hung with the rim 17" max. from the floor. Urinals shall be 13 ½" deep min. measured from the outer face of the rim to the back of the fixture.	Urinal in toilet room 159 has its rim above 17"	This is the only urinal in this toilet room. Per 213.3.3 above, a single urinal in the room does not need to comply (must be more than one).	
606.2	Knee clearance below a lavatory or sink shall be 27" min. (above the floor) for persons older than 12", and 24" min. for ages 6-12.			
606.3	Lavatories and sinks shall be installed with the front of the rim or counter 34" max. above the floor.			
606.4	Lavatory and sink faucets shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.	Toilet rooms 111, 112, 159 & 160 do not comply.	Replace faucets with lever handles or other type that can be operated as required.	$150 per lavatory.
606.5	Water supply and waste pipes under lavatories and sinks shall be insulated or otherwise protected from contact with the user.	None of the accessible lavatories had protection over supply and waste piping.	Provide insulation kits (or other form of protection) for all accessible lavs (9 locations).	$100 per lavatory.

610.3	Seats in showers shall comply with Figure 610.3.			
703.4.1	Tactile characters on signs shall be located 48” min. above the floor to the lowest characters and 60” max. above the floor to the highest characters.	See 216.2 above.	See 216.2 above.	
703.4.2	Where tactile signs are provided at a door, they shall be located alongside the door on the latch side (centered in 18” x 18” space). Where there is no wall space on the latch side of the door, signs shall be located on the nearest adjacent wall.	See 216.2 above.	See 216.2 above.	

IBC 2009 Review – Oyster River School District

Moharimet Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Section 410 (Chapter 4)	**Stages & Platforms**			
410.2	A Platform is defined as a raised area within a building used for worship, the presentation of music, plays or other entertainment…and similar purposes wherein there are no overhead hanging curtains, drops, scenery or stage effects other than lighting and sound.	The multi-purpose room in Moharimet school falls into this category.		
410.4	Permanent platforms shall be constructed of materials as required for the type of construction of the building in which the platform is located. Where the space beneath the permanent platform is used for storage or any purpose other than equipment, wiring or plumbing, the floor assembly shall not be less than 1-hour fire-resistive-rated construction.	The space beneath the platform is not accessible, no storage below.	Rated floor assembly not required.	

IBC 2009 Review – Oyster River School District

Moharimet Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 7	**Fire & Smoke Protection Features**			
706.1	Each portion of a building separated by one or more fire walls that comply with the provisions of this section shall be considered a separate building.	Given the requirement of Table 503 in the State Building Code Amendment, the maximum allowable area per floor is 54,432 sf (including increases for sprinkler and frontage). Existing building footprint on the first floor (largest floor) is 43,445 sf.	The building does not need to be divided into separate buildings.	
711.3	Unless required elsewhere in this code, smoke partitions are not required to have a fire-resistance ratings.	This condition applies to Moharimet for corridors.		
711.4	Smoke partitions shall extend from the floor to the underside of the floor or roof above, or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.	Noted.		
711.5.1	Doors in smoke partitions shall not include louvers.	Noted.		
711.5.3	Where required elsewhere in this code, doors in smoke partitions shall be self or automatic closing by smoke detection per section 715.4.8.3.	Moharimet does not comply.	See NFPA 101 Life Safety Section 15.3.6 recommendation.	
715.4.8	Fire doors shall be self or auto closing.	Noted.		
715.4.8.1	Unless otherwise specifically permitted, single fire doors and both leaves of double doors shall be provided with an active latch bolt that will secure the door when it is closed.	Noted.		

IBC 2009 Review – Oyster River School District

Moharimet Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 11	**Accessibility**			
1103.2	Sites, buildings, structures, facilities, elements and spaces shall be exempt from this chapter to the extent specified in this section (see 1103.2.2)			
1103.2.2	Existing buildings shall comply with section 3411.	This is the condition for Moharimet.		
Chapter 34	**Existing Structures**			
3411.1	The provisions of sections 3411.1 through 3411.9 apply to maintenance, change of occupancy, additions and alterations to existing buildings.	Noted.		
3411.6	A building, facility or element that is altered shall comply with the applicable provisions in Chapter 1 of this Code and ICC A117.1, unless technically infeasible. Where compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent feasible.	Noted.	DGA has used the ADA 2010 Edition which is based, in part, on A117.1 for determining accessibility compliance.	
	Accessible means of egress required by Chapter 10 are not required to be provided in existing buildings and facilities.	Noted. NFPA concurs.		
3411.7	Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities or drinking fountains serving the primary function, EXCEPT:	Noted.		
	1) The costs of providing the accessible route are not required to exceed 20% of the costs of the alterations affecting the	Noted.	Determination of cost percentage cannot be made until the time of alteration	

	area of primary function.		where complete scope of work is determined.	

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Moharimet Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 6	**Assembly; for requirements see chapter 13 (Existing Occupancy Use)**			
6.1.2.2	Occupancy for assembly by fewer than 50 persons in another occupancy (and incidental to that occupancy) shall be classified as part of the other occupancy.	For Moharimet Elementary school, the assembly classification would include Multi-purpose room 175 & Library 101.	Confirm this finding with Authority Having Jurisdiction (AHJ).	
Table 6.1.14.4.1(a)	2-hr separation between Assembly (>300 to <1000) and Educational. Reduce to 1-hr if fully sprinkled.	The Library does not comply as it is open to Corridor C05 for most of its length. There are six single-leaf door in the Multipurpose room that are not rated assemblies. There is a single leaf door leading from the Music room (adjacent to Multipurpose) to the corridor with a 20-minute rating. There is a double door leading from Multipurpose to the corridor that is 20-minute rated.	Replace doors & frames with labeled units and proper hardware (closers and latches). Alternatively, the District could have a representative inspect the doors & frames onsite to verify compliance and add labels in the field. Hardware would still need to be made compliant however.	$8,000 - $10,000 (including removal of existing doors & frames).
Chapter 7	**Means of Egress**	NFPA 101 Life Safety egress requirements override IBC 209 requirements per State Fire Code.		
7.1.3.1	Exit access corridors serving more than 30 persons shall be separated by 1-hr construction unless:			
	a) Does not apply to existing buildings unless occupancy changes.	This is the condition for Moharimet.		
7.1.3.2.1 (7)	Openings in the rated wall shall be protected by fire door assemblies equipped w/ closers per 7.2.1.8.	See 6.1.14.4.1(a) above.		
7.1.7.2	Changes in level in a means of egress less than 21” shall be either by ramp (per 7.2.5) or by stair (per 7.2.2).	Moharimet complies.	No action needed.	
7.2.1.2.1.1 (4)	For existing swinging doors,	Noted.		

	minimum clear width measurement to be taken with door FULLY open.			
7.2.1.2.3.2	Doors in a means of egress shall not be less than 32” clear unless:	Noted.		
	1) Only one of a pair of doors shall be minimum 32”.			
	4) In existing buildings, door width not less than 28” clear.	This applies to Moharimet.	ADA is more restrictive, 32” clear still required.	
7.2.1.4.2	Swing doors in a means of egress shall swing in the direction of egress travel under ANY of the following conditions:	Door from Library 101 into Corridor C05 should swing into corridor.	Renovate door to reverse swing.	Reverse door swing, $500 per door.
	1) Where the occupant load is 50 or more.	This is the case for the Library.		
7.2.5.2 (2)	Existing ramps shall be permitted to remain in use (or to be rebuilt) provided they comply with Table 7.2.5.2(b) (min. width 30”, max. slope 1:8, max. height between landings 12’) unless permitted by the following:	Moharimet complies.	No action needed.	
	a) Requirements don’t apply to industrial equipment access areas.			
	c) Approved existing ramps with slopes not steeper than 1:6 shall be permitted to remain in use.	This applies to Moharimet.		
7.2.5.4.2	Handrails complying with 7.2.2.4 shall be provided on both sides of a ramp with a rise greater than 6” (except aisles in assembly occ.)	Ramp from Corridor C01 to Multi-purpose room 175 does not comply.	See ADA recommendation for this ramp.	
7.3.1.2	Occupancy load shall be calculated per Table 7.3.1.2 (see 15.1.7.1)	Noted.		
7.3.3.1	Table 7.3.3.1 Capacity Factors:	Noted.		
	All others: Stairs - .3 inches / occ., level components & ramps - .2 inches / occ.			
7.4.1.2	The number of means of egress shall also be as follows:	Noted.		
	1) Occupant load between 500-1000, not less than 3 means of egress.			

7.5.1.1.2	Exit access corridors shall provide access to minimum 2 approved exits unless single exit is allowed by occupancy chapter.	Noted.		
7.5.1.3.1	Where multiple exits are required, they shall be remotely located from each other and be arranged to minimize more than one being blocked by any one fire or emergency condition.	Noted.		
7.5.1.3.3	In fully sprinkled buildings, the minimum separation distance between exits shall be 1/3 the length of the overall diagonal distance of the space, EXCEPT:	Noted.		
7.5.1.3.5	In existing buildings where more than one exit is required, such exits shall be exempt from the minimum diagonal separation distance, provided that such exits are remotely located.	This applies to Moharimet.		
7.5.1.5	Exit access shall have no dead ends unless permitted by occupancy chapters.	Noted. Chapter 15 allows 50' in a sprinkled building.		
7.5.4.1	Accessible means of egress not required in existing buildings.	Noted.		
7.10.1.4	Tactile signage requirements of 7.10.1.3. shall not apply to existing buildings, provided that occupancy classification does not change.	Noted. However, ADA 216.4.1 requires it without this exception.	See ADA review.	

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Moharimet Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 8	**Features of Fire Protection**			
8.3.3.3	Unless otherwise specified, fire doors shall be self-closing or automatic closing per 7.2.1.8.	Noted.		
Table 8.3.4.2	Fire protection ratings for opening protective in fire barriers, fire-rated smoke barriers and fire-rated smoke partitions shall be as follows:	Noted.		
	Elevator hoistways:			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	Vertical shafts (stairs):			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	½-hour wall; 20 min door			
	Fire Barriers:			
	2-hour wall; 90 min door			
	1-hour wall; 45 min door			
	Exit Access Corridors:			
	1-hour wall; 20 min door			
	½ hour wall; 20 min door			
	Smoke Barriers:			
	1-hour; 20 min door			
	Smoke Partitions:			
	1/2 –hour; 20 min door			
8.3.5.1	Penetrations through fire barriers for electrical, mechanical, plumbing and	Noted.		

	communication systems shall be protected by a firestop system or device.			
8.4.1	Smoke partitions, where required, shall be provided to limit the transfer of smoke.	Smoke partitions are required for corridor walls. Given that many of the walls in the original Moharimet building do not extend to the underside of roof structure above, the ceilings will be the most cost-effective way to resist the passage of smoke. Grilles in ceiling system all appeared to be ducted.	Use the ceiling to serve this function. This is compliant as long as the ceiling system remains intact (without unprotected openings), and the space above the ceiling is not used as a plenum (typically to return air back to the HVAC equipment).	
8.4.2(2)	They shall be permitted to extend from the floor to the underside of a monolithic or suspended ceiling system where the following conditions are met:	Noted.		
	(a) The ceiling system forms a continuous membrane.	There are areas where the existing ceiling tiles have been damaged or cut for conduit and piping to pass through, such that they do not effective limit the transfer of smoke at these compromised locations.	The ceiling tiles shall be repaired or replaced where they do not effective limit the transfer of smoke. Several locations noted were the East Commons area by Classroom 115, Corridor 151 between Guidance 150 & Principal 103A, ceiling area just outside door to Reception 154, and conduit penetrations at ceiling on the right side of Vestibule V01 as you exit.	Misc. repairs $500
	(b) The space above the ceiling is not used as a plenum.	See 8.4.1 above.		
8.4.3.1	Doors in smoke partitions shall:			
8.4.3.2	Comply with 7.2.1, AND			
8.4.3.3	Not include louvers, AND			
8.4.3.5	Shall be self-closing or auto closing per 7.2.1.8	Most doors in corridor walls do not have closers.	See recommendations in section 15.3.6.	

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Moharimet Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 13	**Existing Assembly Occupancy**			
13.1.7.1	The occupant load for the assembly use shall be determined on the basis of the occupant load factors of Table 7.3.1.2 that are characteristic of the use of the space, or determined as the maximum probable population of the space under consideration, whichever is greater.			
13.1.7.1.1	In areas less than 10,000 sf, the occupant load shall not exceed 1 person / 5 sf.	Noted.	Occupant load may further be limited by Section 13.2.3.6.1 below.	No cost.
13.1.7.1.3	The AHJ shall be permitted to establish the occupant load as the number of persons for which the existing means of egress is adequate, provided that measures are established to prevent occupancy by a greater number of people.	Noted.		
13.2.1	All means of egress shall be in accordance with Chapter 7 and this chapter.	Noted.		
13.2.3.6.1	The main entrance/exit of the assembly area shall be of a width that accommodates one half of the total occupant load, and shall be at the level of exit discharge, or shall lead to a stair or ramp leading to a street.	Main entry to the Multi-purpose room is a pair of 3’ doors (72”).	Based of 72” of egress width, the Multi-purpose room should be posted for an occupancy of no more than 650. This should be verified with the Authority Having Jurisdiction (AHJ).	No cost. Posting covered in signage budget.
13.2.3.6.5	In assembly occupancies where there is not well-defined main entrance/exit, exits shall be permitted to be distributed around the perimeter of the building, provided that the total exit width is at least 100% of that required for the permitted occupant	Noted.		

	load.			
13.2.4.1	The number of exits shall be per Section 7.4, UNLESS permitted by the following:			
13.2.4.2	Occupant loads of 600 or less shall have 2 separate means of egress	Noted.		
13.2.4.3	Occupant loads between 600 and 1000 shall have 3 separate means of egress.	Moharimet complies with this requirement.	No action needed.	No cost.
13.2.5.1	Means of egress shall be per Section 7.5	Noted.		
13.2.5.1.2	Dead-end corridors shall not exceed 20’.	Noted.		
13.2.6	Total length of travel from any point to an exit shall not exceed 200’ in any occupancy, UNLESS:	Noted.		
	(1) Travel distance shall not exceed 250’ in occupancy that is fully sprinkled.	This is the condition for Moharimet.		

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Moharimet Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 15	**Existing Educational Occupancies**			
15.1.2.2.1	Assembly occupancy (auditoria & gymnasia) to comply with Chapter 13.	Noted.		
15.1.7.1	The occupant load is to be determined by Table 7.3.1.2.	Noted.		
	Assembly – fixed seating: actual number of seats.			
	Assembly – concentrated w/o fixed seats: 7 nsf/occ.			
	Assembly – less concentrated w/o fixed seats: 15 nsf/occ.			
	Kitchen: 100 gsf/occ.			
	Library stack area: 100 gsf/occ.			
	Library reading area: 50 nsf/occ.			
	Exercise rooms with equipment.: 50 gsf/occ.			
	Stages: 15 nsf/occ.			
	Classroom: 20 nsf/occ.			
	Shops/Labs/Vocation rooms: 50 nsf/occ.			
	Storage: 500 gsf/occ.			
15.2.1.1	Means of egress shall be per Chapter 7 & Section 15.2	Noted.		
15.2.1.2	Rooms for pre-school, kindergarten or 1st graders shall be located on a level of exit discharge, unless permitted by 15.2.1.4	Moharimet complies.	No action needed.	
15.2.1.3	Rooms for 2nd graders shall not be located more than 1-story above the level of exit discharge, unless permitted by 15.2.1.4	Moharimet complies.	No action needed.	

15.2.3.1	Capacity of a means of egress shall comply with 7.3	Noted.		
15.2.3.2	Minimum corridor clear width shall be 6'-0".	Corridor C05 has a piano and storage units in it that reduce the minimum below the 6'-0" required. There is a bench in Corridor C06 that reduces the hall to less than 6'-0". There is a chair and waste barrel that reduce the width of Corridor C04 to less than 6'-0".	The stored items should be removed from the corridors.	No cost if done by District personnel.
15.2.4	Not less than 2 separate exits shall be provided on every story and accessible from every part of every story and mezzanine.	Noted.		
15.2.5.2	Dead end corridors shall not exceed 20', except 50' where sprinkled.	Moharimet complies. Dead end corridor from Vestibule V01 to the entry into the Multi-purpose room measures approximately 40'-0".	No action needed.	
15.2.5.4	Every room with an occ. Load of more than 50 persons shall:	Noted.		
	a) Have a minimum of 2 exit access doors.			
	b) The doors shall provide access to separate exits.			
	c) The doors may open to a common corridor providing the corridor leads to 2 separate located in opposite directions.			
15.2.5.5	Every room normally occupied by students shall have an exit access door leading directly to an exit access corridor or exit unless:	Noted.		
	a) The door opens directly to the outside.			
	b) One room shall be permitted to intervene between the student room and an exit access corridor permitting all of the following conditions are met:			

	1) Travel distance shall not exceed 75'.			
	2) The intervening room shall be sprinkled.			
	3) Either the intervening room shall have fire detection (smoke/heat) that activates the building alarm, or the building shall be sprinkled.			
	c) Approved existing arrangements shall be permitted to continue in use.			
15.2.6.1	Travel distance to an exit shall be measured in accordance with 7.6.	Noted.		
15.2.6.2	Travel distance to an exit shall not exceed 150' from any point in a building unless permitted below:	Noted.		
15.2.6.3	Travel distance shall not exceed 200' in educational occupancies protected by sprinkler.	Moharimet complies.	No action needed.	
15.2.10	Means of egress shall have signs in accordance with 7.10.	See previous finding ADA 216.2.	See previous recommendation ADA 216.2.	
15.2.11.1.1	Every room or space greater than 250sf and used for classroom or other educational purpose, or normally subject to student occupancy shall have not less than one outside window for emergency rescue that complies with the following unless permitted otherwise by 15.2.11.1.2:	Noted.		
	a) 20" clear width, 24" clear height and 5.7 sf in area.			
	b) The window sill shall not be more than 4" above the floor, with an operating latch no more than 54" above the floor.			
15.2.11.1.2	The requirements of 15.2.11.1.1 shall not apply to the following:	Noted.		
	a) Sprinkled buildings.	Moharimet qualifies for this exception.		
15.3.2.3	Stages & platforms shall be protected in accordance with Chapter 13.	Noted.		
15.3.6	Corridors shall be separated from the	Noted.		

	rest of the building by 30-minute rated walls per Section 8.3, unless permitted by the following:			
	b) For sprinkled buildings, corridor walls need not be rated provided they form smoke partitions per Section 8.4	Most doors between corridors and classrooms do not have closers. Spot checking walls above ceilings indicated walls did not extend to underside of structure above in the original building. There were no unducted grilles observed during our review. The ceilings will need to provide the smoke resistance required for the corridors (as opposed to the walls alone).	NFPA 101 Life Safety 2003 requires the corridors serve to limit the transmission of smoke, and further that doors be automatic closing in these walls. NFPA 2009 allows for doors not to be self-closing for sprinkled buildings. Given that the State is moving toward adoption of the 2009, it would be worth applying for a waiver of this requirement before investing the money to add closers to those doors that don't currently have them.	If AHJ requires doors to be self-closing, budget $400 per door for surface mounted closer. Note: some doors from other findings & recommendations may overlap with these doors. Some may be renovated at different times than others. Care should be taken to avoid duplication.
	e) Lavatories shall not be required to be separated from corridors providing the building is fully sprinkled.			
15.3.7.1	Educational occupancies shall be subdivided into compartments by 1-hour rated smoke partitions complying with Section 8.4 where one or both of the following exist:	Noted.		
	a) The max. area of a compartment exceeds 30,000 sf.			
	b) The length or width of the building exceeds 300'			
15.3.7.2	The requirement of 15.3.7.1 shall not apply to the following:			
	a) Where all classrooms have exterior access in accordance with 7.5.3.			
	b) Fully sprinkled buildings.	Moharimet qualifies for this exception.		
15.7.4.3	Artwork & teaching materials shall be permitted to be attached directly to walls in accordance with the following:			

	a) The materials shall not exceed 20% of the wall area in a building that IS NOT sprinkled.			
	b) The materials shall not exceed 50% of the wall area in a building that IS sprinkled.	Moharimet appears to comply.		

PROGRAM

ANALYSIS

MOHARIMET ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Dec-11								
MOHARIMET SCHOOL			Total Enrollment = 385					
PROGRAM ANALYSIS			Total Building Gross SF = 43,780sf					
Room Number	**Room Name**	**Type**	**Room Square Footage**	**DOE Guideline Sq. Footage**	**Current Pupil Stations**	**Allowable DOE Pupil Stations**	**ORCSD Class Size Guidelines**	
C01	Corridor	Circulation	975					
V01	Vestibule	Circulation	55					
C02	Corridor	Circulation	1138					
V02	Vestibule	Circulation	39					
C03	Corridor	Circulation	149					
V03	Vestibule	Circulation	42					
C04	Corridor	Circulation	149					
V04	Vestibule	Circulation	42					
C05	Corridor	Circulation	1036					
V05	Vestibule	Circulation	46					
C06	Corridor	Circulation	149					
V06	Vestibule	Circulation	42					
C07	Corridor	Circulation	149					
V07	Vestibule	Circulation	42					
V09	Vestibule	Circulation	33					
V10	Vestibule	Circulation	33					
101	Library	Library	2062	1540				
102	Conference Room	Conference	216					
103	Testing	Small Group	66					
103A	Principal	Admin	132					
104	Hall	Circulation	70					
105	Reading Specialist	Small Group	147					
106	Nurse	Office	177					
106A	Toilet	Nurse	41					
106B	Rest	Nurse	65					
109	Hall	Circulation						
110	Title 1	Reading	150					
111	Women	Toilet	109					
112	Men	Toilet	52					

Room Number	Room Name	Type	Room Square Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines	
114	Art	Classroom	966	900	19 average	26	22	
114A	Kiln	Art	44					
115	SPED	Workstations	920					
115A	Toilet	SPED	36					
116	Storage	Storage	30					
117	3rd Grade	Classroom	945	900	19	26	20	
117A	Toilet	Toilet	28					
118	2nd Grade	Classroom	920	900	21	25	20	
118A	Toilet	Toilet	15					
119	2nd Grade	Classroom	920	900	21	25	20	
119A	Toilet	Toilet	15					
120	3-4 Grade	Classroom	945	900	21	26	20/22	3rd=7, 4th=14
120A	Toilet	Toilet	15					
121	East Commons	Common	2192					
122	Storage	Storage	30					
123	1st Grade	Classroom	943	900	17	26	20	
123A	Toilet	Toilet	15					
124	1st Grade	Classroom	943	900	18	26	20	
124A	Toilet	Toilet	15					
125	Language	Small Group	130					
126	Library Work	Workroom	375					
128	Kindergarten	Classroom	1120	1000	16	22	18/18	16am/16pm
128A	Toilet	Toilet	15					
129	Hall	Circulation	30					
130	Kindergarten	Classroom	1120	1000	16	22	18/18	16am/16pm
130A	Toilet	Toilet	15					
131	Teacher Work Rm	Workroom	332					
132	Storage	Storage	100					
133	SPED	Office	130					
134	1st Grade	Classroom	943	900	18	26	20	
134A	Toilet	Toilet	15					
135	2nd Grade	Classroom	943	900	21	26	20	

Room Number	Room Name	Type	Room Square Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines	
135A	Toilet	Toilet	42					
136	Storage	Storage	30					
137	1st Grade	Classroom	945	900	18	26	20	
137A	Toilet	Toilet	28					
138	2nd Grade	Classroom	920	900	20	25	20	
138A	Toilet	Toilet	15					
139	4th Grade	Classroom	920	900	23	25	22	
139A	Toilet	Toilet	15					
140	4th Grade	Classroom	945	900	23	26	22	
140A	Toilet	Toilet	28					
141	West Commons	Common	2192					
142	Storage	Storage	30					
143	3-4th Grade	Classroom	943	900	20	26	20/22	3rd=7, 4th=13
143A	Toilet	Utility	15					
144	3rd Grade	Classroom	943	900	19	26	20	
144A	Toilet	Utility	15					
145	Office	Office	130					
146	Custodian	Custodian	130					
147	Server	Storage	140					
149	Resource Room	Small Group	556					
150	Guidance	Office	173					
154	Reception	Office	288					
155	Teachers	Lounge	337					
156	Toilet	Utility	18					
157	OT/PT & ESOL	Small Group	610					
157A	Toilet	Utility	25					
158	Hall	Circulation	91					
159	Mens Toilet	Utility	123					
160	Womens Toilet	Utility	160					
161	Janitor	Utility	130					
162	Music Room	Instrumental	882	1000	19 average	35	n/a	
163	Music Storage	Storage	91					

Room Number	Room Name	Type	Room Square Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines	
164	Storage	Storage	105					
164A	Storage	Storage	87					
164B	Hall	Circulation	41					
165	Elec	Utility	154					
167	Mechanical	Utility	378					
168	Kitchen	Food Service	924					
170	Storage	Kitchen	145					
171	Lockers	Kitchen	26					
172	Toilet	Kitchen	24					
173	PE Teacher	Office	80					
174	Storage	Storage	83					
175	Multi-Purpose	Multi-Purpose	3600					
177	Fourth Grade	Classroom	880	900	23*	25	22	Modular
179	Third Grade	Classroom	880	900	19*	25	20	Modular
	Totals		**42058sf**		**391 Pupils****	**515 Pupils**		
			Net SF		**Current**	**Max. NHDOE**		
			of Building		**Stations**	**Allowance**		
					***Modulars used in pupil counts**			
					****FTE = Full Time Equivilent**			

MECHANICAL

ENGINEERING

MOHARIMET ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Moharimet Elementary School
Facility Analysis – Mechanical Systems

Table of Contents

Appendix

I. Introduction

Petersen Engineering has reviewed available record drawings and surveyed the mechanical systems serving the Moharimet Elementary School in Madbury, NH. The intent of this report is as follows:

1. Evaluate existing mechanical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing mechanical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Short term recommendations are provided to address items that don't conform to current building code requirements. In addition, longer term recommendations are provided for improvements in system performance, durability, reliability, maintainability and energy efficiency.

II. Findings

A. Heating Systems

Heating Hot Water Generation:
Heating is provided to the building by two propane fired cast iron boilers original to the building (1989 installation). Each boiler has an output capacity of approximately 800 MBH and rated efficiency of 80%. Actual operating efficiency is likely considerably lower due to various factors, primarily related to the age of plant.

Two constant volume pumps provide heating hot water distribution to the building with steel and copper piping.

Heating Distribution:
Hot water heating coils are provided for ventilation systems – controls for these coils have recently been updated.

Typical classrooms use finned-tube radiation with local solid state thermostats and control valves.


Cast Iron Boilers (1989 Installation)

Code Compliance:
Installation appears to generally comply with current code requirements. 80% combustion efficiency for the boilers is the minimum requirement per 2009 IECC. Although name plate rating complies with minimum code requirement, actual operating efficiency is estimated to be lower (perhaps 70%).

Capacity for Expansion:
Total plant capacity of 1600 MBH includes some spare capacity that could reasonably support an addition to the building of approximately 20% additional floor area. The existing boiler plant is operating in mid to late term of typical expected useful lifecycle (30 years). A new, high efficiency system would be recommended to coincide with future renovations or additions.

B. Ventilation Systems

Ventilation is provided to the building by air handling units and return fans original to the building (1989 installation). The equipment is primarily located at interior locations (within ceiling space) on either side of the library. Intake and exhaust connections are made through gravity hoods on the roof with control dampers for intake and relief air connections.

A packaged roof top ventilation unit serves the Multi-Purpose Room and Music Room.

Ventilation is provided to the Admin. Area by a packaged rooftop A/C unit.

Significant ventilation control issues associated with poor indoor air quality throughout the school were identified in Aramark's FY 2005/06 Facilities Condition Assessment.
Direct digital controls were added for air handling equipment in 2010 along with CO2 monitoring for classrooms – apparently with significant improvement to indoor air quality.

No direct make-up air system is provided for the kitchen. The grease hood exhaust fan and dishwasher hood exhaust fan total 3,750 CFM airflow (2,750 CFM and 1,000 CFM fans). During

operation, significant negative pressurization is expected in the kitchen and adjacent areas. It appears that some effort has been made to control differential pressure between the kitchen and Multi-Purpose Room by modulating dampers in the rooftop ventilation unit serving the Multi-Purpose Room – however, this control is likely ineffective due to the free connectivity of the two spaces (i.e. sensor will not detect significant differential pressure between the two spaces because they are open to each other through the dishwashing area pass-through window).

Multi-Purpose Room Roof Top Ventilation Unit (1989 Installation)

Typical CO2 sensor – mounted on wall

Capacities:

Required ventilation rates have been calculated for comparison to provided air flow rates per the available design drawings – Refer to Appendix A for summary of calculations.

Code Compliance:
Ventilation rates generally do not meet current code requirements. Per the design drawings, the systems serving the classroom areas appear to be capable of providing code required rates when outdoor air temperatures are above 40°F. During colder conditions, a percentage of air is re-circulated, dropping supply air rates below code-required levels.

No mechanical ventilation observed for READING ROOM 102 ("Octagon Room") and for TEACHER 173.

A Make-up air system is not provided for the kitchen hood exhaust system as required by IMC 2009 Section 508.

Appropriate guards are not provided for rooftop equipment located within 10-feet of roof edge per IMC 2009 304.11:

- Multi-Purpose Room Rooftop unit is within 10 feet of roof edge and requires guards for protection of service personnel

Capacity for Expansion:
The existing ventilation systems are in operation near the end of typical expected useful lifecycle (15-years for roof top equipment, 20-years for interior air handler/fans). The existing systems are sized for the areas served and do not have spare capacity. New air handling equipment would be required for future expansion.

C. Air Conditioning Systems

A packaged rooftop A/C unit provides air conditioning for the Administrative Offices
A through-wall A/C unit provides A/C in OT/PT 157
Mini-split DX wall cassettes are provided for A/C in READING ROOM 102, SPEECH 113, LANGUAGE 125 & OFFICE 145

Code Compliance:
Appropriate guards are not provided for rooftop equipment located within 10-feet of roof edge per IMC 2009 304.11:

- Administration Area roof top A/C unit is within 10-feet of rood edge and requires guards for protection of service personnel

Capacity for Expansion:
Extent of installed air conditioning is limited to select areas – new systems would be required for expansion if desired.

D. Control Systems

HVAC Controls include a combination of systems:

- DDC controls installed for air handling equipment
- Solid state controls for boiler plant
- Local programmable thermostats and control valves for classroom finned tube radiators
- CO2 sensors in classrooms, connected to DDC control system

It was observed in several classroom locations that room temperature readings were significantly higher than set point (during relatively cold weather – approx. 39°F outdoor conditions). This indicates potential issues with programmable thermostats and finned tube control valves or that ventilation air is being delivered too warm by the central systems, overheating these spaces.

Programmable T-stat and CO2 sensor (typical for classrooms)

Code Compliance:
No issues identified.

Capacity for Expansion:
Installed DDC control system utilizes open communication protocol (BACNet) that allows for future expansion.

E. Plumbing Systems

Domestic Water Service:

Domestic water service is provided with a well pump system including packaged pump skid, softener tanks and controls.

A propane-fired tank type water heater (32-gallon storage capacity) is installed in the boiler room with re-circ pump, primarily to serve the kitchen area. The water heater was installed in 2009. Individual point of use electric hot water heaters are provided at bathroom locations throughout the school.

Sanitary Sewer and Storm Drains:

Sanitary sewer and roof drain systems appear to be original 1989 construction, likely cast iron material (plumbing drawings were not available to verify)

Plumbing Fixtures:

Plumbing fixtures throughout the facility remain from the original 1989 construction (although identified in 5-yr Capital Improvement Plan for upgrade to electronic hard wired fixtures/valves for FY10).

Typical lavatory faucet

Code Compliance:
Lavatory faucets do not meet current plumbing code requirements for maximum allowable flow (0.5 GPM per IPC 2009 Table 604.4).

Capacity for Expansion:
Domestic water - well pumping system appears to have reasonable flexibility to support future expansion. Capacity of existing well needs to be verified by the well system provider.

Sanitary Sewer- capacity of leach fields for future expansion requires evaluation by civil engineer.

F. Fire Protection Systems

Fire protection is provided to the building by a 30,000 gallon below grade tank and pump system – it is our understanding that this installation is in progress. Fire Department connections are provided on site.

Full coverage sprinkler distribution is installed throughout, served by a single dry zone valve.

A chemical fire suppression system is provided for the grease hood in the kitchen.

Code Compliance:
Providing completion of pump installation in progress at the time of this evaluation, fire protection systems appear to comply with current NFPA 13 requirements.

Capacity for Expansion:

Fire protection system is capable of supporting future expansion since storage and flow requirements are not dependent on gross area. However, a single zone valve is limited to service of 52,000 square feet – expansion beyond 52,000 total square feet will require an additional zone valve assembly. Installed storage volume of 30,000 gallons can support multiple zone valve assemblies.

G. Misc. Systems – Kitchen Refrigeration

Kitchen refrigeration systems are original to 1989 construction. It is our understanding that a regular preventative maintenance program has not been implemented for this equipment.

III. Recommendations – Code Compliance/Short Term

A. Ventilation Systems

Install heat recovery ventilation systems to replace existing ventilation systems serving classroom areas:

- New rooftop energy recovery units to replace existing supply fan, coil and return fan systems (three systems – approx. 2,000CFM, 5,000CFM and 8,000 CFM units)
- Clean supply and exhaust air ductwork and seal with duct sealing process such as Carrier "Aeroseal"
- New hot water heating coils
- New supply and exhaust ductwork and grilles
- Removal of individual toilet exhaust systems for connection to energy recovery systems
- Include supply and exhaust connections for READING ROOM 102 ("Octagon Room")

It is anticipated that existing temperature control issues noted in several classrooms (overheating) will be resolved by supplying ventilation air to all spaces at neutral conditions (approx. 68°F).

Add small ventilation system for TEACHER 173 – Small ceiling-mounted ERV with sidewall intake/exhaust connections.

Adjust outside air damper position to 20% for Admin. Area rooftop A/C unit to provide adequate ventilation for rooms in this zone.

Kitchen Make-up Air:
Add dedicated make-up air system to provide equal amount of supply air to kitchen hood exhaust when exhaust system is in operation (see Long Term Recommendations for preferred approach in terms of energy efficiency).

Roof Guards:
Provide guards around equipment located within 10 feet of roof edge per IMC 2009 304.11 requirements:

- Multipurpose Room Rooftop unit is within 10 feet of roof edge and requires guards for protection of service personnel

B. Air Conditioning Systems

Roof Guards:
Provide guards around equipment located within 10 feet of roof edge per IMC 2009 304.11 requirements:

- Administration area roof top A/C unit is within 10-feet of rood edge and requires guards for protection of service personnel.

C. Plumbing Systems

Add 0.5 GPM aerators to single faucet lavatories.

IV. Recommendations – Long Term

A. Heating Systems

Install new condensing boiler plant with variable volume pumping:

- Two high efficiency (Minimum 94% AFUE, Approx. 800 MBH output each) condensing boilers with sealed combustion and direct venting
- Variable volume pumping and associated piping modifications

B. Ventilation Systems

Multi-Purpose Room: Install new packaged rooftop energy recovery ventilation unit to replace existing heating and ventilation unit. Install finned tube or steel panel radiators for supplemental heat and to allow for unoccupied set-back conditions without requiring operation of ventilation fans.

Kitchen: Install new variable volume kitchen hood exhaust fan with make-up air unit:

- New exhaust fan with variable speed motor
- New gas-fired make-up air unit dedicated to the kitchen area (add supply plenum to hood)
- New controls to vary amount of make-up and exhaust air based on cooking activities (controlled by heat sensors under hood)

C. Control Systems

Provide DDC controls for classroom heating terminals, including new control valves and digital thermostats, fully integrated with DDC control system.

Provide full re-commissioning of all HVAC system controls by third party commissioning agent. Include allowance to replace faulty components discovered during commissioning process.

D. Plumbing Systems

Install low-flow plumbing fixtures throughout with automatic flush valves and faucets

- 1.28 gallon-per-flush toilets
- 0.125 gallon-per-flush urinals
- 0.5 gallon-per-minute lavatory faucets

E. Preventative Maintenance

Regular preventative maintenance contract is strongly recommended for all mechanical systems with preventive maintenance contractor specializing in mechanical systems.

F. Misc. Systems – Kitchen Refrigeration

Replace existing refrigeration equipment for walk-in freezer and refrigerator due to age of equipment and implement a preventative maintenance plan.

V. Budget Estimates

Refer to attached summary tables

Oyster River Cooperative School District

Moharimet Elementary School – Short Term/Code Compliance Recommendations for Mechanical Systems

Code Section	Requirement Description	Finding	Recommendation	Budget
IMC 2009 Section 403	Required minimum ventilation rates for Educational Occupancies per Table 403.3	Installed classroom ventilation systems are not capable of providing required ventilation rates during cold weather conditions (as outdoor temperatures drop below 40°F systems re-circulate incrementally higher quantities of air). Ventilation equipment is also at end of typical service lifecycle	Install new rooftop energy recovery units and heating coils; Clean and seal ductwork, install new diffusers/grilles and connect to toilet room exhaust grilles (3 systems, approx 2,000 CFM, 5,000 CFM and 8,000 CFM). Provide Supply and exhaust terminals for READING ROOM 102. Install small ERV for TEACHER 173.	$250,000
IMC 2009 Section 508	Make-up air required for operation of commercial kitchen hood exhaust systems	No mechanical make-up air provisions for kitchen exhaust hood	Provide dedicated make-up air system (gas-fired, approx. 2,500 CFM capacity) with ductwork distribution to the kitchen area (alternately, provide new variable volume exhaust fan and make-up air system – see long term recommendations)	$35,000
IMC 2009 Section 304.11	Guards required where equipment requiring service is located within 10 feet of a roof edge	Multi-Purpose Room Rooftop Air Handler and Admin. Area Packaged Rooftop A/C unit are within 10 feet of roof edge	Install permanent roof guards around Multi-Purpose Room Rooftop Air Handler and Admin Area Packaged Rooftop A/C unit	$15,000
IPC 2009 Section 604	Maximum flow rates for plumbing fixtures per Table 604.4 (0.5 gpm for lavatories)	Lavatory faucets do not meet maximum flow rate requirements. Fixtures should be able to be retrofitted with 0.5 gpm aerators	Add 0.5 gpm aerators to existing single faucet lavatories (approx. 8 units)	$1,000

Oyster River Cooperative School District

Moharimet Elementary School – Long Term Recommendations for Mechanical Systems

System Description	Finding	Recommendation	Budget
Heating Hot Water Boiler Plant	Existing boiler plant relatively inefficient and in operation during last third of expected useful lifecycle	Install new condensing boiler plant with minimum 94% AFUE boilers and variable volume pumping (1600 MBH Capacity, 2 boilers)	$90,000
Multi-Purpose Heating and Ventilation System	Existing Rooftop Air Handler is in service beyond typical useful service lifetime. Also, significant opportunities for energy savings by using energy recovery ventilation.	Install new energy recovery ventilation system and hydronic heating terminals (3,000 CFM rooftop ERV with interior hot water coil, steel panel radiators of finned tube radiation)	$70,000
Kitchen Hood exhaust and make-up air systems	Existing System lacking provision for make-up air	In lieu of adding basic make-up air system to meet current code requirements, provide new variable volume exhaust fan and make-up air system (2,750 CFM system)	$50,000
HVAC Controls	Classroom finned tube heating elements use local programmable thermostats	Provide DDC controls for all heating terminals, integrated in to central DDC system to allow set-back control and monitoring by the facilities department.	$60,000
HVAC Controls	Make repairs/upgrades/adjustments to allow for proper scheduling and energy efficient operation of systems	Provide retro-commissioning process for all HVAC controls by 3rd party commissioning agent, including necessary system repairs	$50,000
Plumbing Fixtures	Plumbing fixtures do not meet current standards for highest efficiency	Install 1.28 gpf toilets, 0.125 gpf urinals and 0.5 gpm lavatories throughout with automatic sensor valves and faucets	$40,000
HVAC Preventative Maintenance	Mechanical systems appear to lack regular preventative maintenance	Establish regular preventative maintenance contract with company specializing in mechanical systems	$7,500/year
Kitchen Refrigeration Equipment	Refrigeration equipment aging without history of regular preventative maintenance	Replace refrigeration equipment and implement preventative maintenance plan	$30,000

Appendix A – Ventilation Calculations
Moharimet Elementary School

Moharimet Elementary School Ventilation Table

Room	Area (SF)	Occupants (2009 IMC)	Outdoor Air Req'd (2009 IMC)	Outdoor Air - Design	Exhaust Air Req'd (2009 IMC)	Exhaust Air - Design	Notes
1st Grade Classroom 137	945	24	353	193	0	0	
Toliet 137A	28	N/A	0	0	70	75	1
Corridor C04	125	N/A	8	0	0	0	1
Vest V04	41	N/A	0	0	0	0	1
2nd Grade Classroom 135	943	24	353	193	0	0	
Toliet 135A	15	N/A	0	0	70	50	1
1st Grade Classroom 134	943	24	353	193	0	0	
Toliet 134A	15	N/A	0	0	70	50	1
Kindergarten 130	1120	28	482	193	0	0	
Toliet 130A	15	N/A	0	0	70	50	1
Vestibule V05	41	N/A	0	0	0	0	1
Kindergarten 128	1120	28	482	193	0	0	
Toliet 128A	15	N/A	0	0	70	50	1
1st Grade Classroom 124	943	24	353	193	0	0	
Toliet 124A	15	N/A	0	0	70	50	1
1st Grade Classroom 123	943	24	353	193	0	0	
Toliet 123A	15	N/A	0	0	70	50	1
Corridor C06	125	N/A	8	0	0	0	1
Vest V06	41	N/A	0	0	0	0	1
3-4 Classroom 120	945	24	353	193	0	0	
Toliet 120A	28	N/A	0	0	70	75	1
2nd Grade Classroom 119	920	23	340	193	0	0	
Toliet 119A	15	N/A	0	0	70	50	1
East Commons 121	2080	21	230	386	0	0	
Speech 113	130	1	13	0	0	0	
Language 125	130	1	13	0	0	0	
Library Work Rm 126	375	10	145	0	0	0	
Women 111	93	N/A	0	0	70	125	1
Men 112	87	N/A	0	0	70	120	1
Title 1 Reading 110	150	4	58	214	0	0	
Library 101	2062	21	352	557	0	0	
Reading Room 102	216	3	41	0	0	0	
Server 147	137	N/A	0	0	0	0	1
Cust 146	125	N/A	0	0	125	250	1
Storage 132	98	N/A	12	0	0	0	1
Teachers Work Rm 131	332	2	30	0	0	0	
Corridor C05	1050	N/A	63	129	0	0	1
Office 145	130	1	13	0	0	0	
SPED Office 133	130	1	13	0	0	0	

West Commons 141	2080	21	230	386	0	0	
2nd Grade Classroom 138	920	23	340	193	0	0	
Toliet 138A	15	N/A	0	0	70	50	1
4th Grade Classroom 139	920	23	340	193	0	0	
Toliet 139A	15	N/A	0	0	70	50	1
4th Grade Classroom 140	945	24	353	193	0	0	
Toliet 140A	28	N/A	0	0	70	75	1
Corridor C03	130	N/A	8	0	0	0	1
Vest V03	41	N/A	0	0	0	0	1
3-4 Classroom 143	943	24	353	193	0	0	
Toliet 143A	15	N/A	0	0	70	50	1
3rd Classrom 144	943	24	353	193	0	0	
Toliet 144A	15	N/A	0	0	70	50	1
Resource Room 149	556	N/A	67	129	0	0	1
Guidance 150	173	1	15	20	0	0	3
Corridor C02	1200	N/A	72	150	0	0	1
Principal 103A	132	1	13	27	0	0	3
Hall 104	70	N/A	4	0	0	0	1
Reading Specialist 105	145	4	57	18	0	0	3
Nurse 106	117	2	50	27	0	0	3
Rest 108	65	1	25	5	0	0	3
Toliet 106A	41	N/A	0	0	70	50	1
Art Room 114	966	20	374	193	451	0	2
Kiln Room 114A	45	1	18	0	0	0	
SPED 115	920	23	340	193	0	0	
Toliet 115A	36	N/A	0	0	70	50	1
Vest V07	41	N/A	0	0	0	0	1
Corridor C07	130	N/A	8	0	0	0	1
3rd Grade Classroom 117	945	24	353	193	0	0	
Toliet 117A	28	N/A	0	0	70	75	1
2nd Grade Classroom 118	920	23	340	193	0	0	
Toliet 118A	15	N/A	0	0	70	50	1
Reception 154	322	2	29	38	0	0	3
Teachers 155	337	2	30	48	0	0	3
Toliet Rm 156	15	N/A	0	0	70	50	1
OT/PT 157 & ESL	610	16	233	193	0	0	
Toliet 157A	25	N/A	0	0	70	50	1
Corridor C01	565	N/A	34	0	0	0	1
Vestibule V01	41	N/A	0	0	0	0	1
Hall 158	85	N/A	5	0	0	0	1
Men 159	110	N/A	0	0	140	260	1
Women 160	120	N/A	0	0	140	260	1
Janitor 161	70	N/A	0	0	70	150	1

Music Room 162	882	31	285	429	0	0	
Multi-Purpose Room 175	3600	360	2916	3000	0	0	
Vestibule V10	35	N/A	0	0	0	0	1
Vestibule V09	35	N/A	0	0	0	0	1
Teacher 173	80	1	10	0	0	0	
Storage 174	85	N/A	10	0	0	0	1
Toliet Room 172	20	N/A	0	0	70	50	1
Lockers 171	25	N/A	0	0	6	50	1
Storage 170	150	N/A	18	0	0	195	1
Vestibule V02	36	N/A	0	0	0	0	1
Kitchen 168	970	N/A	0	0	679	3750	4
Mechanical 167	385	N/A	0	0	0	0	1
Electrical 165	145	N/A	0	0	0	0	1
Hall 164B	45	N/A	0	0	0	0	1
Storage 164/164A	80	N/A	10	0	0	0	1
Music Storage 163	205	N/A	25	0	0	0	1

1. Required ventilation rate (typically exhaust only, if any) dependent upon floor area
2. IMC required exhaust rate based on net occupiable floor area (2/3 room floor area)
3. Admin Area - assumed rooftop A/C outside air damper set to 10%
4. Designed EA includes kitchen hood EF (2750 CFM) & dishwasher room EF (1000 CFM)

ELECTRICAL

ENGINEERING

MOHARIMET ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Moharimet Elementary School
Facility Analysis – Electrical Systems

Table of Contents

I. Introduction

Engineered Building Systems has reviewed available record drawings and surveyed the electrical systems serving the Moharimet Elementary School in Madbury, NH. The intent of this report is as follows:

1. Evaluate existing electrical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing electrical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Recommendations are provided to address items that don't conform to current building code requirements. In addition, recommendations are provided for improvements in system performance, maintainability and energy efficiency.

II. Findings

A. Building AC Electrical Power Distribution System

Building electrical power emanates from a PSNH pad mounted distribution transformer located behind some shrubs in the entry courtyard. The pad mounted transformer appears to be rated for 300 KVA with an input voltage of 13,800 volts delta and an output voltage of 120/208 volts wye. The primary service entrance conductors for the transformer run underground from pole # PSNH 318A-4 to the PSNH pad mounted transformer. The secondary service entrance conductors for the building run underground from the pad mounted distribution transformer to the main switchboard located in the first floor main electric room #165. PSNH presently owns and maintains the primary electric service feeder, and the pad mounted transformer, as the building is secondary metered by PSNH. The pad mounted transformer is getting covered by shrubs and bushes. These should be cut back to maintain clearance around the transformer. See photo #1.

Photo #1

The main switchboard is rated for 1200 amperes @ 120/208 volts, three phase, four wire and is located in the building main electrical room. The existing 1200 ampere main switchboard consists of two sections : Section one consists of a 1200A main fusible bolted pressure switch and a 1200 ampere current transformer cabinet. Section two consists of a 1200A distribution section with feeder circuit breakers for remote panelboards and mechanical loads. The remote panelboards that we observed were in good condition, but some of them were fully loaded and there did not appear to be any spares or spaces available.

The existing electrical distribution equipment is in good condition. The manufacturer of the distribution equipment; Square D, is presently still manufacturing electrical switchgear, so spare or replacement parts are readily available.

The main electric room is presently utilized as a storage room (see photos #2 and #3) below. In violation of N.E.C. Article 110.26(B), all non electrical equipment should be removed from the electrical rooms. The main electric room door swings inward to the room and also is not equipped with panic hardware as required by N.E.C. Article 110.26(C)(2).

Photo #2

Photo #3

The 1200 ampere service @ 120/208 volts, three phase, four wire allows for a recommended maximum connected load of 345.0 KW or approximately 8.2 watts per square foot (based on 80% maximum loading of service rating, divided by 42,000 usable square feet) The peak kilowatt demand for this facility over the last 12 months was 76.8KW (or 213 amperes) in December of 2010. This equates to approximately 1.8 watts per square foot of peak electrical usage. The service capacity for this building is more than adequate to handle present and future building electrical needs and there are spaces available in the existing main switchboard distribution section for additional feeder breakers.

There is a temporary classroom building located behind the main building. The temporary classroom building is fed via a 100 ampere 120/240 volt, single phase, three wire service which emanates from a pole mounted 25 KVA transformer located on PSNH pole #318A-4D.

B. Metering Arrangement

All building electrical loads in the main building are single point secondary metered via PSNH meter #58398631. The building electrical meter is located in the main electric room adjacent to the main switchboard.

All building electrical loads for the temporary classroom building are single point secondary metered via PSNH meter #80145402. The electrical meter is located on PSNH pole #318A-4D.

C. Emergency or Standby Power Distribution Systems

The building is not equipped with an emergency or standby power distribution system. Upon loss of utility power, all electric utilizing equipment within the facility will shut down, including any computer equipment, HVAC systems, telephone equipment, lighting, kitchen equipment, pumps, etc.

D. Fire Alarm System

The main building is presently equipped with an addressable, low voltage fire detection and signalling system (Mircom FX-2000). The existing Fire Alarm System consists of a main control panel located in the main Entry Lobby at the first floor and remote system indicating and initiating devices including manual pull stations located at egress points throughout the building. Audio visual horn/strobe units are also strategically located throughout the complex and smoke or heat detectors are located in corridors and open areas of the building. We did not observe any smoke detectors in the classrooms. The main fire alarm control panel is tied into the Town of Madbury Fire Department via the King Fisher master box. The existing master box is located adjacent to the fire alarm control panel at the main entry to the building. The Mircom addressable system appears to have been installed in the last 10 years along with new addressable initiating and indicating devices. The audio/visual device coverage appears to comply with current NFPA 72 spacing requirements. There is a Silent Knight digital communicator which is located in the main electrical room. The digital communicator is tied into the fire alarm system and will notify the monitoring company of any "alarm" and/or "trouble" signals in the system. See photos #4 and #5.

The temporary classroom building is also equipped with a fire detection and signaling system. At the time of our field inspection, we could not locate the fire alarm control panel in this building.


Photos #4 & 5

E. Elevator Recall and Control

Not applicable to this building.

F. Americans With Disabilities Act Compliance

It appears that most of the buildings electrical controls and fire alarm devices are in compliance with the height and access requirements of the Americans with Disabilities Act and the State of New Hampshire Architectural Access Barrier Board requirements. We did observe some lighting control switches that were mounted above the allowed height for switch controls. We also observed that a few manual stations and audio/visual devices are not mounted at ADA compliant heights. See photos #6 and #7



Photos #6 & 7

G. Interior Lighting

The fluorescent lighting fixtures appear to have been upgraded over the years. Most lighting fixtures are equipped with T8 lamps and electronic ballasts. In general, lighting levels are good to fair. There are a number of spaces in the building where different color temperature lamps are in use within the same room. The gymnasium lighting consists of industrial reflector fluorescent fixtures with T12 lamps. A number of these fixtures had burned out lamps.

H. Exterior Lighting

H.I.D. type, lensed, pole mounted floodlight luminaires illuminate the main parking lot and access drive around the building. These fixtures are owned and maintained by PSNH. As we performed our inspection during the daylight hours, we cannot comment on the adequacy of the exterior lighting levels however, there does not appear to be enough luminaires to provide adequate security lighting. The floodlight fixtures appear to be in fair condition. There are two locations where the pole mounted riser conduit has broken away from the junction box, exposing the wiring to physical damage. See photos #8 and #9.


Photo #8


Photo #9

I. Automatic Lighting Control Systems

We did not observe any automatic lighting controls as required by the 2009 Edition of the International Energy Conservation Code, Section 505. All interior lighting systems appear to be manually controlled only.

J. Emergency and Exit Lighting Systems

The building is equipped with an emergency lighting and exit lighting system as required by NFPA Life Safety Code 101, and the 2009 edition of the International Building Code. For the most part, there appears to be an adequate number of normal/emergency lighting fixtures located throughout the egress paths and they are in good to fair condition. We did not observe any emergency lighting systems in the classrooms, electrical room, mechanical room, or in the gymnasium. In general, there are an adequate number of exit signs to indicate the paths of egress, and they appear to be in fair to good condition. However, we did not observe any exit signage in the classrooms and mechanical room and there are some egress corridors where additional exit signage is required. Some of the exit signs in the gymnasium are the old incandescent type and should be replaced. Exterior areas of refuge at building exit discharges are not equipped with emergency lighting as required by IBC Article 1006.

K. Lightning Protection System

The building is not equipped with a lightning protection system. The National Fire Protection Association (NFPA) and the Lightning Protection Institute (LPI) recommend that all buildings be protected against loss by lightning. However, the installation of a lightning protection system is not required by the National Electrical Code. The risk assessment index would classify this

building as a moderate to high risk, taking into account the site conditions and the height of the metal roof peak.

L. Grounding Electrode and Equipment Grounding System

We could not visually inspect the main grounding electrode system because it was not readily apparent during our visual inspection. This grounding electrode system should be tested every five years to insure that the proper resistance levels are maintained.

The electrical distribution system branch circuits and feeders appear to be equipped with an insulated equipment grounding conductor, which provides an effective conductive path to ground for the electrical system.

M. Security System

The building is equipped with a centralized low voltage security system consisting of motion sensors in the corridors and classrooms. There is an activation keypad located in the main entry lobby. We did not observe any perimeter door or window contacts during our site survey. The system appears to be in good operating condition.

N. Paging System

There is a centralized paging system which consists of a master amplifier and microphone located at the main reception desk and remote ceiling mounted speakers located throughout the corridors, classrooms, library, gym, multi-purpose room etc. The system is as manufactured by Bogen Communications and the system appears to be in good condition.

O. Clock Program System

There is not a centralized clock program system. The classroom clocks are battery or line voltage powered.

P. Data Systems

Incoming voice conduits emanate from PSNH pole #318A-4 and run underground into the main electric room 165. The server room is located in room #147. Data cabling is category 6 and the server rack, patch panels and data wiring all appear to be in excellent condition and fairly new. See photos #10 and #11.

Photo #10


Photo #11

Q. Carbon Monoxide Detection System

We did not observe a carbon monoxide detection system in this facility. The State of New Hampshire requires carbon monoxide detection systems in permanent and transient residential buildings that are equipped with fossil fuel burning equipment or appliances, but does not presently require carbon monoxide detection systems in non-residential facilities. Carbon monoxide is an odorless, colorless, tasteless toxic gas that can lead to death in a matter of minutes at high concentration levels and children are especially susceptible to carbon monoxide poisoning. There are fossil fuel fired mechanical equipment and appliances in this facility.

R. Surge Protective Devices

We did not observe any surge protective devices installed at any point on the interior electrical distribution system. Surge protective devices (SPD) will protect the electrical distribution system and sensitive electronic devices or equipment from externally or internally generated surges or spikes.

III. Recommendations - Code Compliance

Refer to attached summary table.

IV. Recommendations - System Performance, Energy Efficiency and Maintenance

Refer to attached summary table.

V. Equipment Replacement Schedule

Equipment	Life Expectancy	Age (Years)	Remarks
Interior Light Fixtures	40 years	Varies	See Note #1
Fluorescent Lamps	4-5 years	Varies	See Note #2
Incandescent Lamps	6 months	Varies	See Note #3
Exterior Light Fixtures	20 years	Varies	See Note #4
H.I.D. Lamps	4-5 years	Varies	See Note #2
Ballasts	15-20 years	Varies	See Note #5

Emergency Battery Units	5-10 years	Varies	See Note #6
Exit Signs	10-20 years	Varies	See Note #6
Main Switchboard	30 years	Varies	See Note #7
Panelboards	30 years	Varies	See Note #8
Transformers	25 years	N/A	See Note #8
Safety Switches	30 years	Varies	See Note #9
Motor Starters	25 years	Varies	See Note #9
Fire Alarm System	30 years	Varies	See Note #10
Smoke Detectors	10 years	Varies	See Note #10

Notes:

1. Interior lighting fixtures should be replaced and upgraded as areas are renovated. Replacement costs should be allocated into construction budgets rather than maintenance budgets.
2. Fluorescent lamps should be replaced in groups rather than on an individual failure basis.
3. Incandescent lamps have a limited life expectancy and should be replaced on an individual failure basis.
4. Exterior lighting fixtures should be replaced as needed or at end of useful life.
5. Electronic ballasts should be replaced on an individual failure basis until they reach 20 years in age, then group replacement is recommended.
6. Emergency battery units and exit signs should be tested on a semi-annual basis and replaced as needed if testing indicates pending or previous failure.
7. The main switchboard should be infrared tested every five years. The ground fault protection system and the distribution circuit breakers should be tested on an annual basis.
8. Panelboards and transformers shall be infrared tested every 5 years.
9. Replace at component end-of-life.
10. The Fire Alarm System and backup batteries should be tested as required by the local Fire Department and NFPA 72.

Oyster River Cooperative School District

Moharimet Elementary School – Code Compliance Recommendations for Electrical Systems

Code Section	Requirement Description	Finding	Recommendation	Budget
I.E.C.C. 505.2.2.2	Automatic Lighting Controls	Most interior spaces in building lack automatic lighting controls.	Provide wall or ceiling mounted occupancy sensors in all offices, toilets, classrooms, corridors, etc.	$39,000.00 (1)
I.E.C.C. 505.4	Exit signs shall not exceed 5 watts per side	Some of the existing exit signs exceed 5 watts per side	Replace existing incandescent or fluorescent exit signs with LED type	$2,000.00 (1)
I.B.C. 2009 907.2.1.1 and NFPA 101 13.3.4.3.4	Assembly areas with occupant loads greater than 1000 shall have an occupant notification system that consists of voice announcements.	The fire alarm system occupant notification system does not include voice evacuation.	Provide a voice evacuation system in the assembly areas of the building if occupant load is greater than 1000.	$18,000.00
I.B.C. 2009 907.5.2.3.2	Employee work areas: Notification appliance circuits shall have 20% spare capacity to accommodate the potential of adding visual devices for hearing impaired employees	Visual devices may need to be added to accommodate hearing impaired individuals	Provide on an "as needed" basis	-0-
I.B.C. 2009 915.0	Emergency responder radio coverage: Required on all new buildings	See recommendation	Have the local fire department test their radio coverage in the building to confirm that their equipment functions properly in the building	-0-
I.B.C. 2009 1006.1	Illumination required: The means of egress shall be illuminated at all times the building space served by the means of egress is occupied	Both times that we visited the school the lighting was turned off in the main egress corridor C01 and the west commons 141	Provide occupancy sensors in these areas to turn lights off when area is unoccupied	$2,500.00
I.B.C. 2009 1006.3	Emergency power for illumination required for exterior landings and area of refuge	There is no exterior emergency lighting at the exit discharges	Provide low voltage or line voltage emergency lighting at each egress exit discharge	$10,000.00

N.E.C. 2011 110.26(B)	Clear spaces in electric rooms	The main electrical room is presently being used as a storage room for maintenance and janitorial equipment (See photos #2 & #3)	Remove all non-electrical equipment from room	-0-
N.E.C. 2011 110.12(A)	Unused openings	We observed a couple of junction boxes, outlet boxes, troughs and panelboard knockouts that need to be closed to afford protection (See photo #4 and #5)	As part of the review and testing of the electrical distribution system, close up any knockouts and install covers on all junction boxes, etc.	$2,000.00
N.E.C. 2011 110.16	Flash Protection	The main switchboard and main distribution panels (400A or greater) should be labeled to warn maintenance personnel of potential arc flash hazards	Install warning labels as required.	$500.00
N.E.C. 2011 110.26(C)(2) and I.B.C. 2009 1008.1.10	Entrance to working space: Personnel doors for electric rooms with large equipment shall open in the direction of egress	The main electric room door swings inward and is not equipped with panic hardware	Reverse the door swing and provide panic hardware	$3,000.00

(1) Rebates may be available for energy conservation retrofit measures from the local utility company or NHSaves.

Oyster River Cooperative School District

Moharimet Elementary School – Electrical System Performance, Energy Efficiency and Maintenance Recommendations

Code Section	Requirement Description	Finding	Recommendation	Budget
N/A	N/A	During our visual inspection we did not observe any surge protection devices (SPD) or systems throughout the electrical distribution system. An SPD system will protect the electrical distribution system and sensitive electronic devices and equipment from externally or internally generated surges or spikes.	Provide surge protective devices at the main service entrance equipment and at the 120/208 volt panels feeding sensitive electronic equipment areas. The SPD system will protect the facility and its equipment from externally generated transients initiated by lightning strikes and/or utility company generated surges or spikes. Also, provide SPD protection on incoming telephone and fiber optic cables or systems.	$12,500.00
N/A	N/A	There are no single phase protection devices on the existing secondary electrical distribution system.	Install single phase protection devices on the main service distribution equipment.	$8,000.00
N/A	N/A	The existing egress pathway and parking lot lighting appears to be inadequate and is not "Dark Skies" compliant. There are also parking areas that are not illuminated at all.	Replace existing non-cutoff and inefficient exterior lighting luminaires with I.E.S. compliant full cutoff luminaires to improve exterior lighting levels and minimize light pollution.	$70,000.00

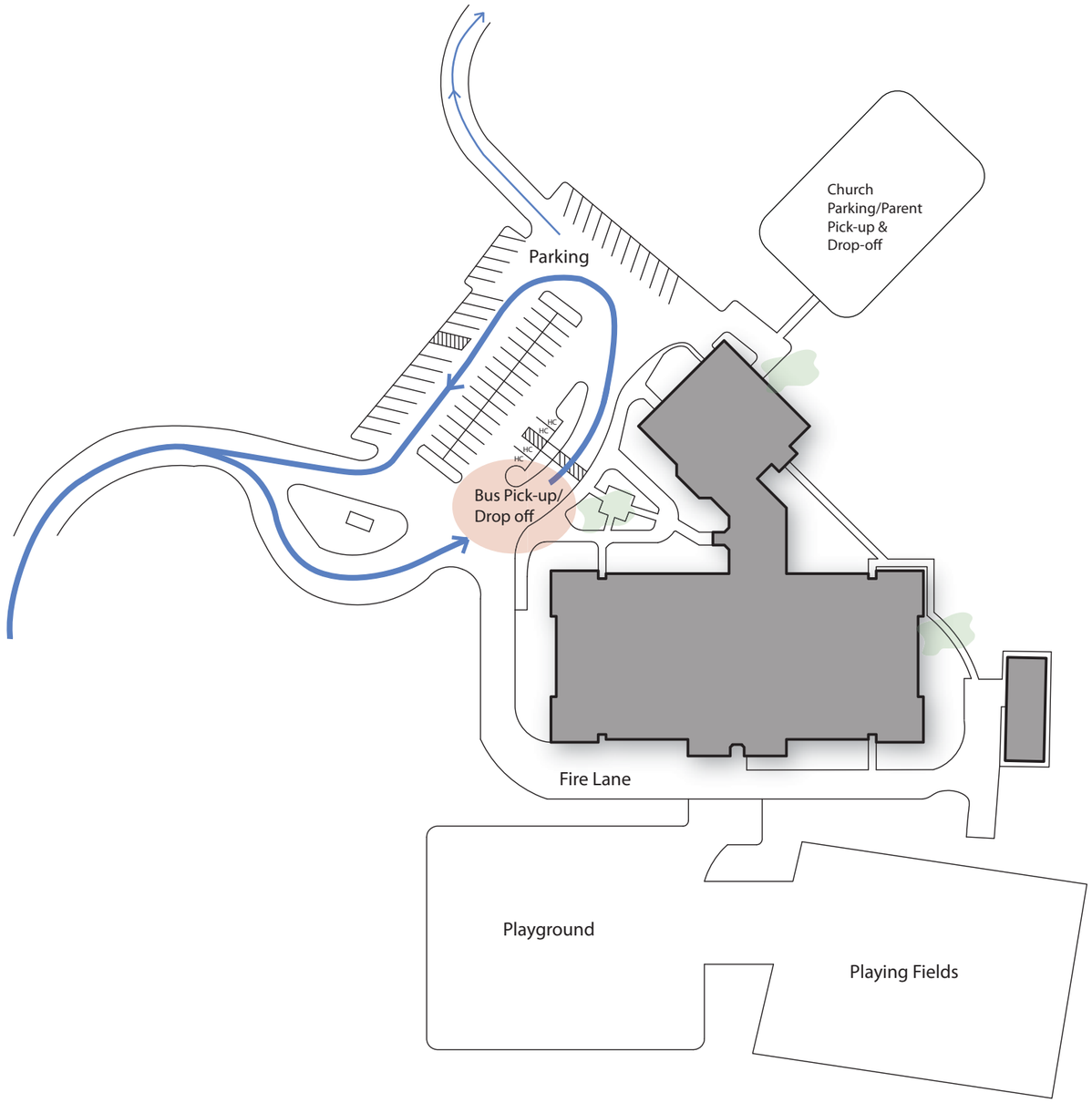
N/A	N/A	The electrical distribution system should be tested every 5 years.	Contract with a testing company to test, clean, and calibrate the main switchboard, and distribution section circuit breakers. Perform a thermo graphic survey on the entire electrical distribution system.	$12,000.00
N/A	N/A	This facility is not equipped with an emergency or standby power distribution system. Upon loss of power the heating system, kitchen equipment, phone system, etc. de-activate.	Provide an emergency or standby power distribution system to provide onsite power to the buildings heating system, kitchen system, kitchen area refrigerators, select lighting circuits and ejector pump systems.	$80,000.00
N/A	N/A	The building is equipped with fossil fuel burning equipment and/or appliances but is not equipped with a carbon monoxide detection system.	Provide a centralized carbon monoxide detection system with occupant notification in the rooms or areas where fossil fuel fired appliances or equipment is operating	$15,000.00
N/A	N/A	Even though most of the existing fluorescent fixtures are equipped with T8 energy saving lamps and electronic ballasts, the opportunity exists for further energy savings by retrofitting the existing fixtures with lower wattage lamps, or reducing the quantity of lamps, or replacing the existing fixtures in kind with more efficient fluorescent or LED fixtures.	Perform a lighting audit with the assistance of NHSaves and/or and energy efficiency consultant and identify areas of the building where fixtures can be retrofitted or replaced.	T.B.D.

Moharimet Elementary School
11 Lee Road
Madbury, NH

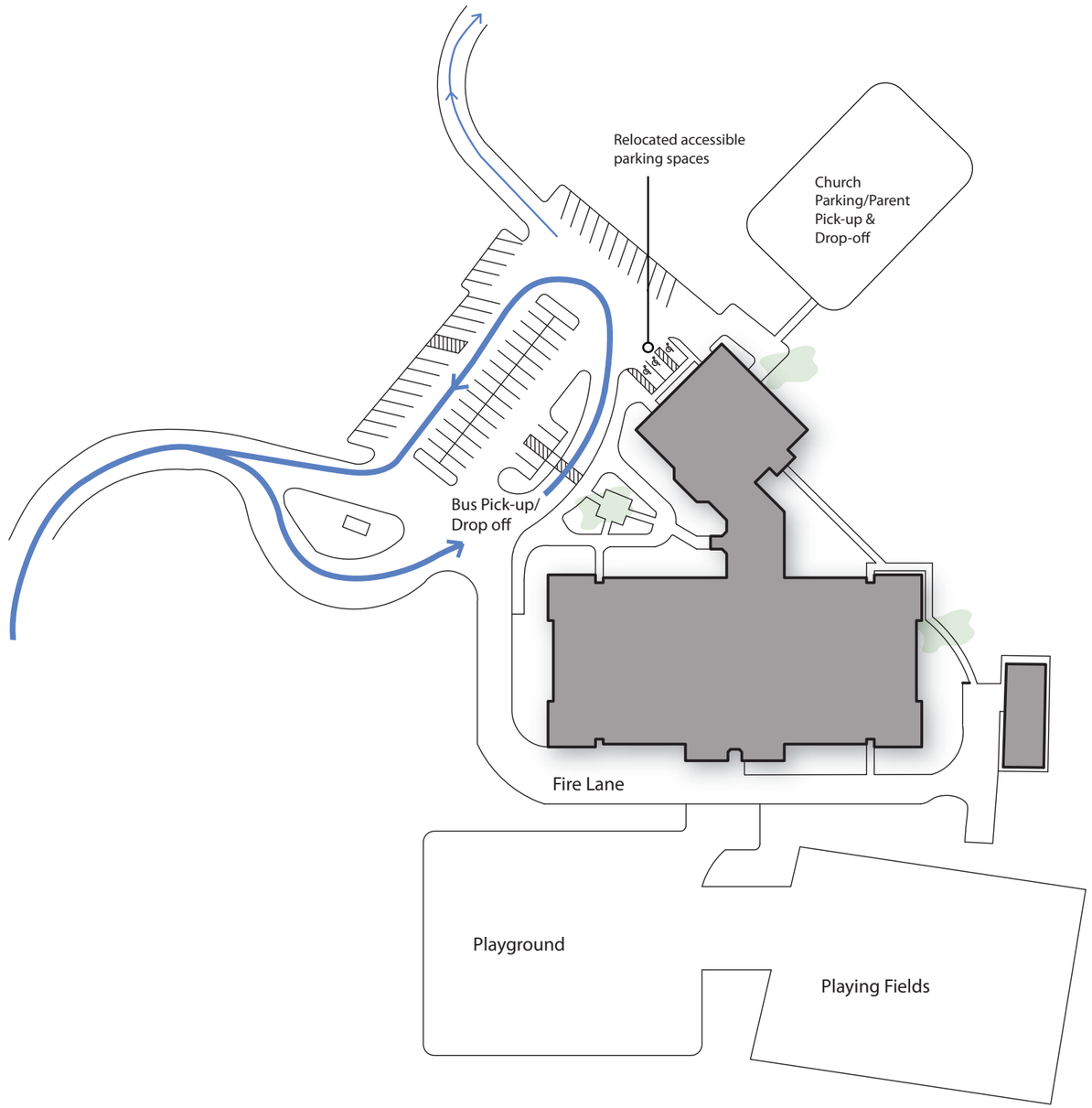
Pedestrian/Vehicular circulation conflict area

Bus pick-up/drop-off route

Drainage Issues/Ponding Area



1 EXISTING SITE PLAN
SCALE: 1:100



2 PROPOSED SITE PLAN
SCALE: 1:100

MAST WAY ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

DAVIS GOUDREAU ARCHITECTS

Executive Summary

Mast Way Elementary School

Accessibility Overview:

In general, Mast Way is in compliance with accessibility requirements of the 2010 ADA guidelines. We note that although there is lift access to the platform of the Multi-purpose room, the lift was not operated or tested at the time of our review. There are a number of toilet facilities that do not comply fully with ADA requirements. Some alternatives to full compliance at each location could involve providing limited uni-sex accessible toilet facilities in the general vicinity of the non-compliant rooms, or combining two non-compliant rooms into one shared compliant room.

There are minor issues with some protruding objects, insufficient signage, incorrect mounting heights on some elements, incorrect door hardware, movable obstructions to required door clearances, lack of proper grab bars at toilets, and lack of protection on supply and waste piping for lavatories. The remedial work to correct these deficiencies should be addressed with any future renovations planned for the school, with the qualifier that it does not need to exceed 20% of the value of that work at the time it is done. Some items may be able to be corrected immediately by maintenance staff such as mounting heights of paper towel dispensers.

Building/Fire Code Review:

The total area of the existing school (45,950 sf) is below the allowable maximum (59,404 sf) based on Table 503 from the State Building Code (including allowances for sprinkler and accessible frontage). As such, the building does not need to be divided into separate "buildings" through the use of fire walls. Corridor walls do not need to be fire rated, but they do need to resist the passage of smoke. At this time, that would mean adding closers to many corridor doors that currently do not have them in order that they be "self-closing" or "automatic closing". It is our recommendation to seek a waiver on this item given that the 2009 edition of the NFPA 101 Life Safety Code allows an exception for sprinkled buildings in an Educational occupancy. It will also require that the ceiling plane be relied upon to resist the passage of smoke given that some walls either do not fully extend to the underside of structure above, or some penetrations are not properly sealed. Mast Way's suspended ceiling system appears to be a good candidate to serve this function – no breaches in the ceiling plane were noted, and no unducted grilles were found in the ceilings.

There are some locations where doors & frames require fire-resistive ratings, but the rating could not be verified because labels (if they are present) have been painted over. Some door/frame assemblies do not have ratings around assembly uses such as the Multi-purpose room (where they are needed), while others have insufficient ratings (i.e. 20 minutes where 45 minutes is required). There were no noticeable deficiencies in means of egress for the school, with the exception that there were some stored items in several corridors by the kitchen that reduced the corridor width below the minimum 6' width required. There were some minor deficiencies in signage requirements for both Code and ADA.

Site Review:

Traffic flow for buses and cars through the site appears orderly, but at times congested for cars. There is overflow parking (unpaved) located behind the church adjacent to the property. There

appears to be adequate queuing for buses at drop-off and pick-up. Parking for staff and visitors is comingled. The District might consider designating some visitor parking close to the entry of the school. ADA accessible parking is non-compliant. There are only 2 paces provided where 3 are required. Additionally the spaces are not signed as required, and they should be adjacent to the sidewalk leading to the front entry. Disabled visitors to the school should not need to walk or wheel through a vehicular travel path on their way to the entry. Curb cuts, where they exist should have tactile warning pads where they lead into traffic.

In general, drainage on the site is adequate. There are three locations where ponding was noticeable, two were on paved areas and one was on soil. Ponding on the pavement by the gravel access to the overflow parking might be alleviated with a shim-coat of paving to raise the elevation of the surface and direct water to the soil along the edge. Ponding by the bus entry could be alleviated by installing a yard drain or catch basin, or raising the pavement with a shim-coat. This additional drain could connect to the one that exists on the opposite side of the bus entry. Ponding over in the soil area by the dumpster is a result of a failed catch basin (filled with sediment or outlet pipe crushed). The extent of drainage piping below grade at this location is unknown. More information is needed to determine the viability and extent of these drainage solutions.

Program:

The Mast Way Elementary School has a core of administrative space, kitchen/cafeteria, multipurpose room and music classroom. The main grouping of classrooms and library are designed around an interior courtyard.

- The library total square footage is 2137sf. 10% of the student design population is: 472 x 10% = 47.2 x 40sf/pupil = 1888sf. The library meets minimum standards and appears adequate for the enrollment population. There is a Commons space across the corridor (932sf) that could be used for future library expansion, if needed.
- The gym is 3285sf and meets minimum standards.
- The cafeteria is 1403sf and is small for the design population. It would need to be expanded in the future if the enrollment population increases.
- Refer to the following spreadsheet for individual room uses, square footages and pupil counts.

At Mast Way the existing space conditions shown on floor plan drawings were verified. Any minor changes to walls and doors were noted. Room usage and room numbers were checked as well.

The pupil count was reached by counting students in general classrooms, the art classroom and the music classroom. Kindergarten was counted as an average of AM and PM classes.

The pupil count results, as mentioned, are shown on the programming spreadsheets, along with comparisons to the NHDOE maximum number of pupils allowed and the class size policy of the Oyster River School District.

Food Service:

Blodgett Combi oven needs water filter. Cost: $600

Dishwasher needs to be replaced. Dishwasher is 20+ years old. New Hobart dishwasher will use half of the water currently being used. Cost: $9.300

Walk in freezer has major problem with floor. Floor is absorbing water when in defrost cycle. This water being retained is contributing to a bad mold problem. Suggestion is to replace entire walk in freezer. (Cooler/freezer are a combined unit). Cost: $15,000

Two compartment prep sink is not up to code. Sink should have coved corners for proper cleaning. Existing sink has right angles on the bottom of the sink which can breed bacteria. Suggestion is to replace sink and faucet. Cost: $1,200

Hot food serving counter. Two of the hot food wells have an electrical problem. When you turn off the hot food wells they still stay hot. Employees need to unplug the unit at the end of the day.

FACILITY

ANALYSIS

MAST WAY ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

ADA 2010 Checklist – Oyster River School District

Mast Way Elementary School

ADAAG Section	Requirement Description	Finding	Recommendation	Cost Estimate
203.5	Areas used only by maintenance personnel shall not be required to comply with these regulations, or to be on an accessible route.	Noted.		
203.9	Spaces and elements within employee work areas shall only be required to comply with 206.2.8, 207.1 (means of egress) & 215.3 (alarm system).	Noted.		
206.2.8	Common use circulation paths within employee work areas shall comply with 402 (accessible path), EXCEPT where work areas are less than 1000 sf and defined by permanently installed partitions, counters, casework, or furnishings.	Noted.		
206.7	Platform lifts shall comply with 410. Platform lifts shall be permitted as a component of an accessible route in an existing building or facility. Standby power shall be provided per 207.2.	Noted. Stairway lift at Music 43 was not tested during our review.	District should confirm stand-by power is provided for this stairway lift, and regularly tested.	No cost.
208.2	Parking spaces (per 502) shall be provided in accordance with Table 208.2.			
Table 208.2	1-25 spaces: 1 accessible space.			
	26-50 spaces: 2 accessible spaces.			
	51-75 spaces: 3 accessible spaces.	Mast Way provides 67 spaces (exclusive of 2 accessible ones). Only two accessible spaces have been provided.	Add an additional designated accessible space.	See below 208.3.1
	76-100 spaces: 4 accessible spaces.			
	101-150 spaces: 5 accessible spaces.			
	151-200 spaces: 6 accessible spaces.			

	201-300 spaces: 7 accessible spaces.			
	301-400 spaces: 8 accessible spaces.			
208.2.4	For every 6 required accessible spaces, one VAN accessible space shall be provided.	Noted		
208.3.1	Accessible parking spaces shall be located as close to the accessible entry as possible.	Spaces have a fire lane and parent drop lane between them and the sidewalk.	Spaces should be relocated so that passengers do not have to cross a travel/traffic lane. Add paving and curb cut, reconfigure parent drop-off spaces with striping.	Paving, striping and signage for 3 spaces (including curb cut): $3500.
211.2	No fewer than 2 drinking fountains shall be provided. One shall comply with 602.1 through 602.6 and the other shall comply with 602.7.	Noted.		
	EXCEPTION: Where a single drinking fountain complies with 602.1 through 602.6 and 602.7, it shall be permitted to be substituted for 2 separate fountains.			
211.3	Where more than the minimum number of drinking fountains are provided, 50% shall comply with 602.1-602.6, and 50% shall comply with 602.7.	Drinking fountains in the non-classroom areas comply. All drinking fountains in classrooms are part of the sink faucet, as such they are all of the lower height.	No changes recommended.	No cost.
213.2	Where toilet rooms are provided, each toilet room shall comply with 603. EXCEPTION: In alterations where it is technically infeasible to comply with 603, altering existing toilet rooms shall not be required where a single unisex toilet room complying with 213.2.1 is provided and located in the same area as the existing inaccessible toilet room.	Noted. Toilets in rooms 4A, 18A, 19A, 20A, 21A, 35, 36 & 47B do not comply.	If Toilet room 24 is used as a unisex toilet for student use, then compliance is achieved for rooms 18A, 19A, 20A & 21A. If not, then these toilet rooms will need to be renovated to be compliant. Room 4A would need to be renovated (relocate lav and swing door out) to comply. Room 47B may qualify for 203.9 above, whereby nothing need be done.	Assuming Rm 24 used as unisex toilet for Classroom 18-21, cost to relocate lav and reverse door swing $3000.
213.3.1	Where toilet compartments are provided, at least one shall comply with 604.8.1. At least one shall	Noted.		

	comply with 604.8.2 where six or more toilet compartments are provided.			
213.3.2	Where toilets are provided, at least one shall comply with 604.	Noted.		
213.3.3	Where more than one urinal is provided, at least one shall comply with 605.	Noted.		
213.3.4	Where lavatories are provided, at least one shall comply with 606 (and shall not be located in a toilet compartment).	Noted.		
213.3.5	Where mirrors are provided, at least one shall comply with 603.3	Noted.		
216.2	Interior and exterior signs identifying permanent rooms and spaces shall comply with 703.1, 703.2 and 703.5.	Mast Way not in full compliance. Some doors to permanent rooms don't have signs (approximately 8), one sign is mounted too high (60" max allowed).	Provide missing signs and relocate high sign to 60" above floor.	$1,000 interior signage package.
216.4.1	Doors at exit passageways, exit discharge, and exit stairways shall be identified by tactile signs complying with 703.1, 703.2 and 703.5	Exits do not have this signage (included in the 8 above).	See recommendation above.	
216.5	Parking spaces complying with 502 shall be identified by signs complying with 502.6.	See 208.3.1 above.	See 208.3.1 above.	See 208.3.1 above.
216.8	Where existing toilet rooms do not comply with 603, directional signs indicating the location of the nearest accessible toilet room shall be provided. The accessible toilet rooms shall be identified by the International Symbol of Accessibility.	Toilet rooms 35 & 36 should be identified with this signage.	Provide as part of recommendation above (216.2).	
307.2	Objects with leading edges from 27"-80" AFF shall not protrude more than 4" horizontally into the *circulation path.*	Wall mounted fin tube heating element protrudes in Corridor C04. Drinking fountain protrudes in Corridor C01.	Fin tube should be raised above 80" or lowered to 27" from the floor. Attaching metal angles to the walls on either side of the drinking fountain (painted wall color) that project beyond 4" and lower than 27" would make this installation compliant.	Lower fin tube: $1500, angles for drinking fountain: $300.

			Alternatively, another display case could be installed on the right side of the fountain to achieve the same result.	
308.2.1	Unobstructed forward reach shall be 48” high max. and 15” min. AFF.	Paper towel dispenser in toilet rooms 23A and 24 have lever handle above 48”. Wall phone is mounted above 48” from the floor.	Lower dispenser and wall phone to 48” max. to lever handle and keypad of phone.	Lower dispenser: $200, Lower phone: $200
308.3.1	Unobstructed side reach (parallel approach) shall be 48” high max., and 15” min. AFF.	Same as above.	Same as above.	
309.4	Operable parts of objects shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.	Door hardware handles at the following doors do not comply: C03A, C03B, 2, 3, 18, 19, 42A & 42B.	Provide lever handle hardware for these doors.	$250 per lockset.
404.2.3	Door openings shall provide a clear width of 32” inches min. with the door open 90 degrees.	The following doors do not comply: 18A, 19A, 20A, 21A, 35 & 36.	Assuming signage is provided at Rooms 35 & 36 to direct users to ADA compliant toilet rooms, nothing need be done with these doors. The remaining doors should be retrofitted with bathroom renovations for these four rooms if unisex toilet noted in 213.2 above is not so designated.	No cost assuming Rm 24 used as unisex toilet for Classroom 18-21.
404.2.4	Min. maneuvering clearances at doors shall comply with Table 404.2.4.1.	There are many instances where movable furniture is placed in the way of the 18” pull-side clearance at classroom doors and communicating doors between them. Clearance is not provided at the following toilet rooms: 35, 47B, 51 & 52.	These movable obstructions will need to be moved when a wheelchair-bound student or staff member is present in these rooms. See note above for room 35. Doors to 51 and 52 may comply if always left open whenever school is in session. Door 47B would comply if swing is reversed to swing out of the room. However, nothing may be required for 47B if 203.9 above is invoked.	No cost if these recommendations can be implemented as noted. Signage price already identified above.
404.2.7	Operable parts on doors shall comply	See 309.4 above.	See 309.4 above.	See 309.4 above.

	with 309.4. They shall be 34" min. and 48" max. AFF.			
410.1	Platform lifts (including inclined stairway chairlifts) shall not be attendant operated and shall provide unassisted entry and exit from the lift.	Stair lift in Music was not operated at the time of our review.	District should confirm that this lift can be used by those it is intended for (staff, students or public/visitors) without an attendant.	No cost.
502.2	Accessible standard parking spaces shall be 96" wide min. Accessible van spaces shall be 132" wide min. except they may be 96" wide if the access aisle is also 96" wide.	Noted.		
502.3	Access aisles serving standard accessible parking and van spaces shall be 60" wide min. and shall adjoin an accessible route. Two parking spaces shall be permitted to share a common access aisle.	Aisle does not adjoin an accessible route. See 208.3.1 above.	See 208.3.1 above.	See 208.3.1 above.
502.3.3	Access aisles shall be marked so as to discourage parking in them.	Noted.		
505.2	Handrails shall be provided on both sides of stairs and ramps.	Mast Way complies.		
603.2.3	Doors shall not swing into the clear floor space required for any plumbing fixture. EXCEPTION: Where the toilet room is for individual (single person) use, and a clear floor space of 30" x 48" min. is provided within the room beyond the arc of the door swing, doors shall be permitted to swing into the clear floor space of any fixture.	Door swings into the fixture clearance in Toilet room 47B.	If 203.9 above is invoked then nothing need be done. Otherwise, 404.2.4 above.	If reversing door swing: $500. No cost if 203.9 is invoked.
603.3	Mirrors above lavatories or countertops shall be 40" max. AFF to the reflecting surface. Mirrors not above lavs or counters shall be mounted 35" AFF max.	Staff toilets 33 & 34, and student toilet rooms 51 & 52 do not comply.	Lower mirrors to required height.	$500
604.3.1	Clearance around a toilet shall be 60" min. perpendicular to the side wall and 56" min. perpendicular to the rear wall (for adult wall hung toilet) and	Toilet rooms 4A, 18A, 19A, 20A, 21A, 35, 36 & 47B do not comply.	See previous recommendations above for these rooms.	

	59” for adult floor mounted or children’s toilet (see 604.8.1.1)			
604.5	Grab bars for toilets shall comply with 609. They shall be provided on the side wall closest to the fixture, and on the rear wall. NOTE NH requires a third grab bar, a vertical one 18” long, bottom mounted between 39”– 41” AFF, and located between 39”-41” from the rear wall.	None of the accessible toilet rooms or stalls have the 18” vertical grab bar. Toilet room 23A does not comply (no grab bars). Additionally, as noted in 213.2 above, there are other toilet rooms that do not comply with this requirement.	Add vertical grab bars to all accessible toilet rooms and stalls (10 locations). Add horizontal and vertical grab bars to room 23A. See also recommendation 213.2 above.	Vertical grab bars: $150 per 18” grab bar, $250 per horizontal grab bar.
604.5.1	The side wall grab bar shall be 42 inches long min., located 12” max. from the rear wall, and extend 54” min. from the rear wall.	See above.	See above.	
604.5.2	The rear wall grab bar shall be 36” long min. and extend from the centerline of the toilet 12” toward the closest side wall, and 24” in the other direction.	See above.	See above.	
604.8.1.2	Toilet stall doors shall be located 4” max. from the front corner of the partition (diagonally furthest from the fixture) to the hinge side of the door. They shall be 32” clear min., self-closing, and not swing into the required floor clearance for the fixture.	The following accessible toilet room stall doors are not self-closing: 37, 39, 51 & 52.	Replace hinges on doors with self-closing type.	$150 per stall door.
604.9	Grab bar heights in children’s stalls shall be 20”-25” for ages 5-8, and 25”-27” for ages 9-12.	Noted.		
605.2	Urinals shall be stall type or wall hung with the rim 17” max. from the floor. Urinals shall be 13 ½” deep min. measured from the outer face of the rim to the back of the fixture.	Urinals in the following rooms are higher than 17” rim: 37 & 52.	Lower one urinal in each of these toilet rooms to appropriate height.	$800 per fixture.
606.5	Water supply and waste pipes under lavatories and sinks shall be insulated or otherwise protected from contact with the user.	None of the lavs in Mast Way comply.	Provide insulation kits on supply and waste piping at accessible lavs (10 locations).	$100 per lavatory.
703.4.1	Tactile characters on signs shall be located 48” min. above the floor to	See 216.2 above.	See 216.2 above.	

	the lowest characters and 60” max. above the floor to the highest characters.			
703.4.2	Where tactile signs are provided at a door, they shall be located alongside the door on the latch side (centered in 18” x 18” space). Where there is no wall space on the latch side of the door, signs shall be located on the nearest adjacent wall.	See 216.2 above.	See 216.2 above.	

IBC 2009 Review – Oyster River School District

Mast Way Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Section 410 (Chapter 4)	**Stages & Platforms**			
410.2	A Platform is defined as a raised area within a building used for worship, the presentation of music, plays or other entertainment…and similar purposes wherein there are no overhead hanging curtains, drops, scenery or stage effects other than lighting and sound.	The multi-purpose room in Mast Way school falls into this category.		
410.4	Permanent platforms shall be constructed of materials as required for the type of construction of the building in which the platform is located. Where the space beneath the permanent platform is used for storage or any purpose other than equipment, wiring or plumbing, the floor assembly shall not be less than 1-hour fire-resistive-rated construction.	The space beneath the platform is not accessible, no storage below.	Rated floor assembly not required.	

IBC 2009 Review – Oyster River School District

Mast Way Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 7	**Fire & Smoke Protection Features**			
706.1	Each portion of a building separated by one or more fire walls that comply with the provisions of this section shall be considered a separate building.	Given the requirement of Table 503 in the State Building Code Amendment, the maximum allowable area per floor is 59,404 sf (including increases for sprinkler and frontage). Existing building footprint on the first floor (largest floor) is 45,950 sf.	The building does not need to be divided into separate buildings.	
711.3	Unless required elsewhere in this code, smoke partitions are not required to have a fire-resistance ratings.	This condition applies to Mast Way for corridors.		
711.4	Smoke partitions shall extend from the floor to the underside of the floor or roof above, or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.	Noted.		
711.5.1	Doors in smoke partitions shall not include louvers.	Noted.		
711.5.3	Where required elsewhere in this code, doors in smoke partitions shall be self or automatic closing by smoke detection per section 715.4.8.3.	Mast Way does not comply.	See NFPA 101 Life Safety Section 15.3.6 recommendation.	
715.4.8	Fire doors shall be self or auto closing.	Noted.		
715.4.8.1	Unless otherwise specifically permitted, single fire doors and both leaves of double doors shall be provided with an active latch bolt that will secure the door when it is closed.	Noted.		

IBC 2009 Review – Oyster River School District

Mast Way Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 11	**Accessibility**			
1103.2	Sites, buildings, structures, facilities, elements and spaces shall be exempt from this chapter to the extent specified in this section (see 1103.2.2)			
1103.2.2	Existing buildings shall comply with section 3411.	This is the condition for Mast Way Elementary.		
Chapter 34	**Existing Structures**			
3411.1	The provisions of sections 3411.1 through 3411.9 apply to maintenance, change of occupancy, additions and alterations to existing buildings.	Noted.		
3411.6	A building, facility or element that is altered shall comply with the applicable provisions in Chapter 1 of this Code and ICC A117.1, unless technically infeasible. Where compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent feasible.	Noted.	DGA has used the ADA 2010 Edition which is based, in part, on A117.1 for determining accessibility compliance.	
	Accessible means of egress required by Chapter 10 are not required to be provided in existing buildings and facilities.	Noted. NFPA concurs.		
3411.7	Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities or drinking fountains serving the primary function, EXCEPT:	Noted.		
	1) The costs of providing the accessible route are not required to exceed 20% of the costs of the alterations affecting the	Noted.	Determination of cost percentage cannot be made until the time of alteration	

	area of primary function.		where complete scope of work is determined.	
3411.8.3	Platform lifts complying with ICC A117.1 and installed in accordance with ASME A18.1 shall be permitted as a component of an accessible route.	Noted.		

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Mast Way Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 6	**Assembly; for requirements see chapter 13 (Existing Occupancy Use)**			
6.1.2.2	Occupancy for assembly by fewer than 50 persons in another occupancy (and incidental to that occupancy) shall be classified as part of the other occupancy.	For Mast Way Elementary school, the assembly classification would include Music/Gymnasium 43/44, Cafeteria 45 & Library 41.	Confirm this finding with Authority Having Jurisdiction (AHJ).	
Table 6.1.14.4.1(a)	2-hr separation between Assembly (>300 to <1000) and Educational. Reduce to 1-hr if fully sprinkled.	Cafeteria has two single leaf doors that do not have labels and do not latch when closed (except when deadbolt is actively thrown. Single egress door out of library is presumably rated. DGA did not field verify as the door was alarmed to sound if opened. There are four single leaf and one set of double doors in the Multipurpose room that are not rated assemblies (missing labels and or closers, or have excess amounts of glazing).	Replace doors & frames with labeled units and proper hardware (closers and latches). Alternatively, the District could have a representative inspect the doors & frames onsite to verify compliance and add labels in the field. Hardware would still need to be made compliant however.	$8,000 - $10,000 (including removal of existing doors & frames).
Chapter 7	**Means of Egress**	NFPA 101 Life Safety egress requirements override IBC 209 requirements per State Fire Code.		
7.1.3.1	Exit access corridors serving more than 30 persons shall be separated by 1-hr construction unless:			
	a) Does not apply to existing buildings unless occupancy changes.	This is the condition for Mast Way Elementary.		
7.1.3.2.1 (7)	Openings in the rated wall shall be protected by fire door assemblies equipped w/ closers per 7.2.1.8.	See 6.1.14.4.1(a) above.		
7.1.7.2	Changes in level in a means of egress less than 21” shall be either by ramp	Mast Way complies.	No action needed.	

	(per 7.2.5) or by stair (per 7.2.2).			
7.2.1.2.1.1 (4)	For existing swinging doors, minimum clear width measurement to be taken with door FULLY open.	Noted.		
7.2.1.2.3.2	Doors in a means of egress shall not be less than 32" clear unless:	Noted.		
	1) Only one of a pair of doors shall be minimum 32".			
	4) In existing buildings, door width not less than 28" clear.	This applies to Mast Way.	ADA is more restrictive, 32" clear still required.	
7.2.1.3.5	In existing buildings, where doors open to the outside, the floor level outside the door shall be permitted to be one step lower, 8" maximum.	There is a 2" drop outside doors from classrooms 7 & 8. This poses a tripping hazard.	Add bituminous pavement to create flush condition at doors.	$1,000
7.2.5.2 (2)	Existing ramps shall be permitted to remain in use (or to be rebuilt) provided they comply with Table 7.2.5.2(b) (min. width 30", max. slope 1:8, max. height between landings 12') unless permitted by the following:	Mast Way complies.	No action needed.	
	a) Requirements don't apply to industrial equipment access areas.			
	c) Approved existing ramps with slopes not steeper than 1:6 shall be permitted to remain in use.	This applies to Mast Way.		
7.3.1.2	Occupancy load shall be calculated per Table 7.3.1.2 (see 15.1.7.1)	Noted.		
7.3.3.1	Table 7.3.3.1 Capacity Factors:	Noted.		
	All others: Stairs - .3 inches / occ., level components & ramps - .2 inches / occ.			
7.4.1.1	The minimum number of means of egress shall be 2, except under ONE of the following conditions:	Noted. The single egress door (2^{nd} means of egress) out of Library 41 does not currently have a lighted exit sign above it.	Install lighted exit sign above door.	$750 (presumes power is available above the ceiling nearby).
	1) A single means of egress shall be permitted where allowed by occupancy chapter.			
7.4.1.2	The number of means of egress shall	Noted.		

	also be as follows:			
	1) Occupant load between 500-1000, not less than 3 means of egress.			
7.5.1.1.2	Exit access corridors shall provide access to minimum 2 approved exits unless single exit is allowed by occupancy chapter.	Noted.		
7.5.1.3.1	Where multiple exits are required, they shall be remotely located from each other and be arranged to minimize more than one being blocked by any one fire or emergency condition.	Noted.		
7.5.1.3.3	In fully sprinkled buildings, the minimum separation distance between exits shall be 1/3 the length of the overall diagonal distance of the space, EXCEPT:	Noted.		
7.5.1.3.5	In existing buildings where more than one exit is required, such exits shall be exempt from the minimum diagonal separation distance, provided that such exits are remotely located.	This applies to Mast Way.		
7.5.1.5	Exit access shall have no dead ends unless permitted by occupancy chapters.	Noted. Chapter 15 allows 50' in a sprinkled building.		
7.5.4.1	Accessible means of egress not required in existing buildings.	Noted.		
7.10.1.4	Tactile signage requirements of 7.10.1.3. shall not apply to existing buildings, provided that occupancy classification does not change.	Noted. However, ADA 216.4.1 requires it without this exception.	See ADA review.	
7.10.5.1	Required exit signs shall be suitable illuminated by a reliable light source.	See 7.4.1.1 above.		

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Mast Way Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 8	**Features of Fire Protection**			
8.3.3.3	Unless otherwise specified, fire doors shall be self-closing or automatic closing per 7.2.1.8.	Noted.		
Table 8.3.4.2	Fire protection ratings for opening protective in fire barriers, fire-rated smoke barriers and fire-rated smoke partitions shall be as follows:	Noted.		
	Elevator hoistways:			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	Vertical shafts (stairs):			
	2-hour wall; 90 min door			
	1-hour wall; 60 min door			
	½-hour wall; 20 min door			
	Fire Barriers:			
	2-hour wall; 90 min door			
	1-hour wall; 45 min door			
	Exit Access Corridors:			
	1-hour wall; 20 min door			
	½ hour wall; 20 min door			
	Smoke Barriers:			
	1-hour; 20 min door			
	Smoke Partitions:			
	1/2 –hour; 20 min door			
8.3.5.1	Penetrations through fire barriers for electrical, mechanical, plumbing and	Noted.		

	communication systems shall be protected by a firestop system or device.			
8.4.1	Smoke partitions, where required, shall be provided to limit the transfer of smoke.	Noted.		
8.4.2(2)	They shall be permitted to extend from the floor to the underside of a monolithic or suspended ceiling system where the following conditions are met:	Noted.		
	(a) The ceiling system forms a continuous membrane.	Suspended ceiling tiles appeared to comply.	The District should continue to monitor this situation to make sure that ceiling tiles are replaced when moved for work above ceilings, and to repair or replace damaged tiles when damage occurs in order to maintain this ceiling as a continuous membrane resisting the passage of smoke.	No cost at this time.
	(b) The space above the ceiling is not used as a plenum.	DGA did not find and unducted penetrations in the suspended ceiling – Mast Way Elementary school appears to comply with this.		
8.4.3.1	Doors in smoke partitions shall:			
8.4.3.2	Comply with 7.2.1, AND			
8.4.3.3	Not include louvers, AND			
8.4.3.5	Shall be self-closing or auto closing per 7.2.1.8	Most doors in corridor walls do not have closers.	See recommendations in section 15.3.6.	
8.4.4.1	Penetrations in smoke partitions for electrical, mechanical, plumbing and communication systems shall be protected by a system or material that is capable of limiting the transfer of smoke.	DGA made spot checks above ceilings – Mast Way appears to comply.	See 8.4.2(2)(a) recommendation above.	

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Mast Way Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 13	**Existing Assembly Occupancy**			
13.1.7.1	The occupant load for the assembly use shall be determined on the basis of the occupant load factors of Table 7.3.1.2 that are characteristic of the use of the space, or determined as the maximum probable population of the space under consideration, whichever is greater.			
13.1.7.1.1	In areas less than 10,000 sf, the occupant load shall not exceed 1 person / 5 sf.	Noted.	Occupant load may further be limited by Section 13.2.3.6.1 below.	No cost.
13.1.7.1.3	The AHJ shall be permitted to establish the occupant load as the number of persons for which the existing means of egress is adequate, provided that measures are established to prevent occupancy by a greater number of people.	Noted.		
13.2.1	All means of egress shall be in accordance with Chapter 7 and this chapter.	Noted.		
13.2.3.6.1	The main entrance/exit of the assembly area shall be of a width that accommodates one half of the total occupant load, and shall be at the level of exit discharge, or shall lead to a stair or ramp leading to a street.	Mast Way complies.	No action needed.	No cost.
13.2.3.6.5	In assembly occupancies where there is not well-defined main entrance/exit, exits shall be permitted to be distributed around the perimeter of the building, provided that the total exit width is at least 100% of that required for the permitted occupant	Noted.		

	load.			
13.2.4.1	The number of exits shall be per Section 7.4, UNLESS permitted by the following:			
13.2.4.2	Occupant loads of 600 or less shall have 2 separate means of egress	Noted.		
13.2.5.1	Means of egress shall be per Section 7.5	Noted.		
13.2.5.1.2	Dead-end corridors shall not exceed 20’.	Noted.		
13.2.6	Total length of travel from any point to an exit shall not exceed 200’ in any occupancy, UNLESS:	Noted.		
	(1) Travel distance shall not exceed 250’ in occupancy that is fully sprinkled.	This is the condition for Mast Way Elementary.		No cost.

NFPA 101 Life Safety Code 2003 Review – Oyster River School District

Mast Way Elementary School

Code Section	Requirement Description	Finding	Recommendation	Cost Estimate
Chapter 15	**Existing Educational Occupancies**			
15.1.2.2.1	Assembly occupancy (auditoria & gymnasia) to comply with Chapter 13.	Noted.		
15.1.7.1	The occupant load is to be determined by Table 7.3.1.2.	Noted.		
	Assembly – fixed seating: actual number of seats.			
	Assembly – concentrated w/o fixed seats: 7 nsf/occ.			
	Assembly – less concentrated w/o fixed seats: 15 nsf/occ.			
	Kitchen: 100 gsf/occ.			
	Library stack area: 100 gsf/occ.			
	Library reading area: 50 nsf/occ.			
	Exercise rooms with equipment.: 50 gsf/occ.			
	Stages: 15 nsf/occ.			
	Classroom: 20 nsf/occ.			
	Shops/Labs/Vocation rooms: 50 nsf/occ.			
	Storage: 500 gsf/occ.			
15.2.1.1	Means of egress shall be per Chapter 7 & Section 15.2	Noted.		
15.2.1.2	Rooms for pre-school, kindergarten or 1st graders shall be located on a level of exit discharge, unless permitted by 15.2.1.4	Mast Way complies.	No action needed.	
15.2.1.3	Rooms for 2nd graders shall not be located more than 1-story above the level of exit discharge, unless permitted by 15.2.1.4	Mast Way complies.	No action needed.	

15.2.3.1	Capacity of a means of egress shall comply with 7.3	Noted.		
15.2.3.2	Minimum corridor clear width shall be 6'-0".	Hall 46 has tables & music stands stored in it that reduce the egress width to less than 6'-0". While not a main egress corridor, Hall 50C has a filing cabinet in it that reduces clear width below Code minimum egress width.	These storage items must be removed to restore Code required egress width.	No cost if done by District personnel.
15.2.4	Not less than 2 separate exits shall be provided on every story and accessible from every part of every story and mezzanine.	Noted.		
15.2.5.2	Dead end corridors shall not exceed 20', except 50' where sprinkled.	Noted.		
15.2.5.4	Every room with an occ. Load of more than 50 persons shall:	Noted.		
	a) Have a minimum of 2 exit access doors.			
	b) The doors shall provide access to separate exits.			
	c) The doors may open to a common corridor providing the corridor leads to 2 separate located in opposite directions.			
15.2.5.5	Every room normally occupied by students shall have an exit access door leading directly to an exit access corridor or exit unless:	Noted.		
	a) The door opens directly to the outside.			
	b) One room shall be permitted to intervene between the student room and an exit access corridor permitting all of the following conditions are met:			
	1) Travel distance shall not exceed 75'.			
	2) The intervening room shall be sprinkled.			
	3) Either the intervening room shall			

	have fire detection (smoke/heat) that activates the building alarm, or the building shall be sprinkled.			
	c) Approved existing arrangements shall be permitted to continue in use.			
15.2.6.1	Travel distance to an exit shall be measured in accordance with 7.6.	Noted.		
15.2.6.2	Travel distance to an exit shall not exceed 150' from any point in a building unless permitted below:	Noted.		
15.2.6.3	Travel distance shall not exceed 200' in educational occupancies protected by sprinkler.	Mast Way complies	No action needed.	
15.2.10	Means of egress shall have signs in accordance with 7.10.	See previous finding ADA 216.2.	See previous recommendation ADA 216.2.	
15.2.11.1.1	Every room or space greater than 250sf and used for classroom or other educational purpose, or normally subject to student occupancy shall have not less than one outside window for emergency rescue that complies with the following unless permitted otherwise by 15.2.11.1.2:	Noted.		
	a) 20" clear width, 24" clear height and 5.7 sf in area.			
	b) The window sill shall not be more than 4" above the floor, with an operating latch no more than 54" above the floor.			
15.2.11.1.2	The requirements of 15.2.11.1.1 shall not apply to the following:	Noted.		
	a) Sprinkled buildings.	Mast Way qualifies for this exception.		
15.3.2.3	Stages & platforms shall be protected in accordance with Chapter 13.	Noted.		
15.3.6	Corridors shall be separated from the rest of the building by 30-minute rated walls per Section 8.3, unless permitted by the following:	Noted.		
	b) For sprinkled buildings, corridor walls need not be rated provided they	Most doors between corridors and classrooms do not have closers.	NFPA 101 Life Safety 2003 requires the corridors serve to	If AHJ requires doors to be self-

	form smoke partitions per Section 8.4	Spot checking walls above ceilings indicated walls extend to underside of structure above (not an exhaustive inspection however). There were no unducted grilles observed during our review.	limit the transmission of smoke, and further that doors be automatic closing in these walls. NFPA 2009 allows for doors not to be self-closing for sprinkled buildings. Given that the State is moving toward adoption of the 2009, it would be worth applying for a waiver of this requirement before investing the money to add closers to those doors that don't currently have them.	closing, budget $400 per door for surface mounted closer. Note: some doors from other findings & recommendations may overlap with these doors. Some may be renovated at different times than others. Care should be taken to avoid duplication.
	e) Lavatories shall not be required to be separated from corridors providing the building is fully sprinkled.	Mast Way qualifies for this exception.		
15.3.7.1	Educational occupancies shall be subdivided into compartments by 1-hour rated smoke partitions complying with Section 8.4 where one or both of the following exist:	Noted.		
	a) The max. area of a compartment exceeds 30,000 sf.			
	b) The length or width of the building exceeds 300'			
15.3.7.2	The requirement of 15.3.7.1 shall not apply to the following:			
	a) Where all classrooms have exterior access in accordance with 7.5.3.			
	b) Fully sprinkled buildings.	Mast Way qualifies for this exception.		
15.7.4.3	Artwork & teaching materials shall be permitted to be attached directly to walls per the following:			
	a) The materials shall not exceed 20% of the wall area in a building that IS NOT sprinkled.			
	b) The materials shall not exceed 50% of the wall area in sprinkled bldgs.	Mast Way appears to comply.		

PROGRAM

ANALYSIS

MAST WAY ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

	Dec-11								
Mast Way School				2011-2012 Enrollment = 325					
PROGRAM ANALYSIS				Total Building Gross SF = 43,700sf					
	Room Number	**Room Name**	**Type**	**Room Square Footage**	**DOE Guideline Sq. Footage**	**Current Pupil Stations**	**Allowable DOE Pupil Stations**	**ORCSD Class Size Guidelines**	
	V01	Vestibule	Circulation	116					
	V02	Vestibule	Circulation	97					
	V03	Vestibule	Circulation	97					
	V04	Vestibule	Circulation	167					
	C01	Corridor	Circulation	895					
	C02	Corridor	Circulation	243					
	C03	Corridor	Circulation	834					
	C04	Corridor	Circulation	400					
	C05	Corridor	Circulation	670					
	C06	Corridor	Circulation	469					
	C07	Corridor	Circulation	501					
	C08	Corridor	Circulation	1072					
	L01	Lobby	Circulation	908					
	1	Kindergarten	Classroom	914	1000	14	20	18	14pm only
	2	First Grade	Classroom	903	900	19	25	20	
	3	Speech/Language	Small Group	918	900				
	4	Kindergarten	Classroom	967	1000	13	20	18	13am/13pm
	4A	Toilet	Toilet	53					
	5	First Grade	Classroom	923	900	19	25	20	
	6	Title 1	Small Group	655					
	7	Second Grade	Classroom	916	900	15	25	20	
	8	Fourth Grade	Classroom	874	900	22	24	22	
	9	SPED Offices	Offices	890					
	10	Third Grade	Classroom	890	900	19	24	20	
	11	Third Grade	Classroom	898	900	22	24	20	
	12	Third/Fourth Gr	Classroom	898	900	23	24	20/22	3rd=12, 4th=11

	Room Number	Room Name	Type	Room Square Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines	
	13	OT/PT	Small Group	235					
	14	Third Grade	Classroom	890	900	21	24	20	
	15	Third/Fourth Gr	Classroom	884	900	22	24	20/22	3rd=11, 4th=11
	16	Fourth Grade	Classroom	886	900	22	24	22	
	17	Second Grade	Classroom	884	900	15	24	20	
	18	Second Grade	Classroom	850	900	14	23	20	
	18A	Toilet	Toilet	12					
	19	First Grade	Classroom	933	900	18	25	20	
	19A	Toilet	Toilet	12					
	20	Second Grade	Classroom	860	900	16	23	20	
	20A	Toilet	Toilet	12					
	21	First Grade	Classroom	944	900	18	26	20	
	22A	Electric Room	Utility	157					
	23	Nurse	Office	253					
	23A	Toilet	Nurse	60					
	23B	Rest	Nurse	102					
	24	Toilet	Staff	74					
	25	Guidance	Admin	253					
	25A	Closet	Storage	12					
	26	Janitor	Utility	190					
	27	Copier/Supplies	Admin	212					
	28	Teacher Workrm	Workroom	209					
	29	Reading	Instructional	151					
	30	Teacher	Lounge	484					
	31	Art	Classroom	1013	900	18 average	28	n/a	
	31A	Kiln	Art	75					
	32	Computer	Classroom	430	750				
	32A	Skills	Small Group	186					

	Room Number	Room Name	Type	Room Square Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines	
	33	Women Toilet	Staff	50					
	34	Men Toilet	Staff	50					
	35	Toilet	Toilet	21					
	36	Toilet	Toilet	21					
	37	Boys Toilet	Toilet	254					
	38	Janitor	Utility	63					
	39	Girls Toilet	Toilet	254					
	40	ESOL	Small Group	76					
	41	Library	Library	1557	1300				
	41A	Circulation Desk	Library	274					
	41B	Office	Library	135					
	41C	Workroom	Library	171					
	41D	IT Server	Utility	76					
	42	Commons	Multipurpose	932					
	43	Music	Instrumental	860	1000	34	40	n/a	
	44	Gymnasium	Assembly	3285					
	44A	Gym Storage	Storage	320					
	44B	Storage	Storage	160					
	45	Cafeteria	Food Service	1403					
	46	Hallway	Circulation	256					
	47	Kitchen	Food Service	617					
	47C	Receiving	Food Service	354					
	47D	Storage	Food Service	100					
	48	Storage	Utility	381					
	49	Main Office	Admin	258					
	49A	Principal	Admin	146					
	49B	Conference	Admin	183					
	50	Office	Admin	87					
	50A	Office	Admin	107					
	50B	Storage	Admin	20					

	Room Number	Room Name	Type	Room Square Footage	DOE Guideline Sq. Footage	Current Pupil Stations	Allowable DOE Pupil Stations	ORCSD Class Size Guidelines	
	50C	Hall	Admin	48					
	51	Girls Toilet	Toilet	158					
	52	Boys Toilet	Toilet	158					
	53	Sprinkler	Utility	336					
	Totals			**41602**		**364 Pupils****	**472 Pupils**		
				Net SF		**Current**	**Max. NHDOE**		
				of Building		**Stations**	**Allowance**		
						**FTE = Full Time Equivilent			

MECHANICAL

ENGINEERING

MAST WAY ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Mast Way Elementary School
Facility Analysis – Mechanical Systems

Table of Contents

Appendix

I. Introduction

Petersen Engineering has reviewed available record drawings and surveyed the mechanical systems serving the Mast Way Elementary School in Lee, NH. The intent of this report is as follows:

1. Evaluate existing mechanical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing mechanical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Short term recommendations are provided to address items that don't conform to current building code requirements. In addition, longer term recommendations are provided for improvements in system performance, durability, reliability, maintainability and energy efficiency.

II. Findings

A. Heating Systems

Heating Hot Water Generation:
Heating is provided to the building by a modular propane-fired boiler plant. The plant consists of six cast iron boiler modules with a total output capacity of 1440 MBH (Hydrotherm Model MR-1800B). The nameplate efficiency rating is 80%. Actual operating efficiency is likely considerably lower due to various factors, primarily related to the age and configuration of plant.

Two variable volume pumps provide heating hot water distribution to the building with steel and copper piping (pumps recently upgraded with variable frequency drives).

Multiple sections of heating piping are not insulated within the boiler room and in the adjacent stage area.

Heating Distribution:
Hot water heating coils are provided for ventilation systems – controls for these coils have recently been updated.

Typical classrooms use finned-tube radiation with local thermostats and control valves. It is our understanding that the zone controls are currently being integrated with the DDC system for monitoring and control of scheduling from a remote interface (internet accessible).


Modular Cast Iron Boilers with atmospheric burners (1991 Date of Manufacture)

Code Compliance:
Installation appears to generally comply with current code requirements. 80% combustion efficiency for the boilers is the minimum requirement per 2009 IECC. Although the name plate rating complies with the minimum code requirement, actual operating efficiency is estimated to be lower (perhaps 70%).

Heating Hot Water Piping requires 1.5-inch thick insulation for smaller pipe sizes and 2-inch thick insulation for pipe sizes larger than 2-inches per 2009 IECC Table 503.2.8. Sections of piping in the boiler room and in the adjacent stage area (MUSIC 43) are not insulated.

Capacity for Expansion:
Total plant capacity of 1440 MBH includes very limited spare capacity to support an addition to the building. The existing boiler plant is operating in mid to late term of typical expected useful lifecycle (30 years). A new, high efficiency system would be recommended to coincide with future renovations or additions.

B. Ventilation Systems

Ventilation is provided to the building by four energy recovery ventilation systems (ERV's), installed during the 1994 renovations and north wing addition (American Energy Exchange Model MRB 85-90). The ERV's are located on the roof.

Exhaust fan systems in service prior to 1994 have been abandoned in place except for a small fan that provides exhaust to Toilet Rooms #51 and #52 (front restrooms) – this fan appears to be out of service.

No mechanical ventilation is provided at the following areas:
STORAGE 44B (area used to store chemicals), Front Offices (Rooms #49, 49A, 49B, L01, 50A & 50B), KITCHEN OFFICE #47A.

GYMNASIUM 44 – two exhaust grilles observed at the front of the stage, connected to an abandoned exhaust fan on the roof. Exhaust is no longer required at these locations due to the installation of a balanced ventilation system for this room in 1994. This duct connection may be contributing to excess air leakage if not fully capped and sealed.

It appears that the exhaust grilles for Toilet Rooms #35 and #36 are not connected to the local ERV system serving the area (perhaps still connected to an abandoned exhaust fan on the roof).

Typical Rooftop Energy Recovery Ventilation Unit (1994 Installation)

No direct make-up air system is provided for the kitchen. The grease hood exhaust fan and dishwasher hood exhaust fan total 4,300 CFM airflow (3,600 CFM & 700 CFM fans). During operation, significant negative pressurization is expected in the kitchen and adjacent areas.

An exhaust grille and ceiling fan was observed in the ceiling of the dishwashing area, connected to a discharge duct to the roof. There is no exhaust hood for the dishwasher.

Kitchen Hood Exhaust Fan and Dishwasher Exhaust Fan Discharge

Several radon vent systems were observed on the north wing – these systems consist of small in-line fans with PVC piping in to the area below the concrete floor slab to de-pressurize the sub-slab area.

Typical Radon Vent System at North Wing – Fan Powered

Capacities:
Required ventilation rates have been calculated for comparison to provided air flow rates per the available design drawings – Refer to Appendix A for summary of calculations.

Code Compliance:
Ventilation rates generally comply with current code requirements per the design drawings. The energy recovery ventilation systems installed in 1994 conform to current best practice standards of using energy recovery for areas with high ventilation requirements. In addition to the energy recovery benefits, these systems provide effective ventilation since they use 100% outside air and exhaust (no re-circulation).

Mechanical ventilation is not provided as required per IMC 2009 Chapter 4 at select areas within the 1960 portion of the building (front offices, kitchen office, chemical storage closet).

A Make-up air system is not provided for the kitchen hood exhaust system as required by IMC 2009 Section 508.

A Type II exhaust hood is not provided for the dishwasher per IMC 2009 Section 507.

Active exhaust does not appear to be provided for Toilet Rooms #35 and #36 per IMC 2009 Chapter 4.

Capacity for Expansion:
The existing ventilation systems are in operation near the end of typical expected useful lifecycle (15-years for roof top equipment). The existing systems are sized for the areas served and do not have spare capacity. New air handling equipment would be required for future expansion.

C. Air Conditioning Systems

Through-wall A/C units are located in the Front Offices, Teachers Lounge and several classroom areas.

Code Compliance:
No issues identified.

Capacity for Expansion:
Extent of installed air conditioning is limited to select areas – new systems would be required for expansion if desired.

D. Control Systems

HVAC Controls include a combination of systems:

- DDC controls have been installed for zone heating terminals – it is our understanding that a DDC controls upgrade is in progress at the time of this evaluation.
- DDC controls will include internet access for monitoring and scheduling control of individual zones.
- Solid state controls for boiler plant.

Older vintage control valves and actuators were observed to be in service at multiple locations.

Older vintage heating zone control valve & actuator

Code Compliance:
No issues identified.

Capacity for Expansion:
Installed DDC control system utilizes open communication protocol (BACNet) that allows for future expansion.

E. Plumbing Systems

Domestic Water Service:

Domestic water service is provided with a well pump system including packaged pump skid, softener tanks and controls.

An indirect-fired tank type water heater (115-gallon storage capacity) is installed in the boiler room with re-circ pump (hot water generated by use of heating hot water boilers). This system primarily serves the kitchen area. Several electric hot water heaters are located throughout the school to provide hot water to plumbing fixtures in bathrooms and classroom areas.

Sanitary Sewer and Storm Drains:

Sanitary sewer and roof drain systems appear to be original to various dates of construction, likely cast iron material. Two 4-inch sewer mains exit the building to a manhole in the courtyard area and are then routed below the building (near the library) and to a septic system to the north.

A dedicated drain line was installed for the kitchen area in 1994 to collect grease laden waste water and route to a grease trap on the site

Plumbing Fixtures:

Plumbing fixtures throughout the facility remain from various periods. Fixtures in the north wing were provided during the 1994 expansion while older fixtures remain in service in older sections of the building. Automatic flush valves were observed at some locations. The lavatory in TOILET 36 is equipped with two faucets (hot and cold).

Lavatories at BOYS TOILET 52

Code Compliance:
Lavatory faucets do not meet current plumbing code requirements for maximum allowable flow (0.5 GPM per IPC 2009 Table 604.4).

Capacity for Expansion:
Domestic water - well pumping system appears to have reasonable flexibility to support future expansion. Capacity of existing well needs to be verified by the well system provider.

Sanitary Sewer- capacity of leach fields for future expansion requires evaluation by civil engineer.

F. Fire Protection Systems

Fire protection is provided to the building by an above grade tank and pump system (approx. 5,000 gallon tank volume based on tank dimensions), recently added within a shed on the north side of the building.

Full coverage sprinkler distribution is installed throughout.

A chemical fire suppression system is provided for the grease hood in the kitchen.

Approx. 5,000-gallon Fire Protection storage tank in shed

Code Compliance:
Fire protection systems appear to comply with current NFPA 13 requirements. Minimum storage volume requirement of 4,500-gallons is satisfied to supply the sprinkler system at flow rate of 150 GPM for 30-minute duration as required by NFPA 13 Table 11.2.3.1.2 (with no hose stream allowance).

Capacity for Expansion:
The fire protection system is capable of supporting future expansion up to 52,000 square foot total - expansion beyond 52,000 square feet will trigger a requirement for additional storage volume as well as an additional valve assembly.

G. Misc. Systems – Kitchen Refrigeration

It is our understanding that the kitchen refrigeration systems are 20+ years old and that a regular preventative maintenance program has not been implemented for this equipment.

III. Recommendations – Code Compliance/Short Term

A. Heating Systems

Pipe Insulation – install pipe insulation where missing for all heating piping in the boiler room and in the adjacent stage area (MUSIC 43). 1.5-inch thickness for smaller pipe sizes and 2-inch thickness for pipe sizes larger than 2-inches per 2009 IEEC Table 503.2.8.

B. Ventilation Systems

STORAGE 44B Exhaust: Add continuously operating exhaust fan to maintain space at a relative negative pressure and to exhaust fumes from chemicals stored in the area.

Bathroom Ventilation: Connect exhaust grilles at TOILET 35 AND TOILET 36 to local ERV exhaust duct and balance exhaust flow to 50 CFM each.

Front Office Ventilation: Add energy recovery ventilation system to provide balanced supply and exhaust ventilation to Rooms #49, 49A, 49B, L01, 50A, 50B, 51 and 52.

Kitchen Office: Add small ventilation system for KITCHEN OFFICE 47A, likely consisting of small ceiling mounted ERV.

Kitchen Make-up Air:
Add dedicated make-up air system to provide equal amount of supply air to kitchen hood exhaust when exhaust system is in operation (see Long Term Recommendations for preferred approach in terms of energy efficiency).

C. Plumbing Systems

Replace double faucet at lavatory in TOILET 36 with new single 0.5 GPM faucet.

Add 0.5 GPM aerators to single faucet lavatories throughout the school.

IV. Recommendations – Long Term

A. Heating Systems

Heating Plant: Install new condensing boiler plant with variable volume pumping:

- Two high efficiency (Minimum 94% AFUE) condensing boilers with sealed combustion and direct venting
- Boiler controls with outdoor reset schedule and domestic hot water priority override
- Variable volume pumping and associated piping modifications
- Indirect fired domestic hot water tank

B. Ventilation Systems

Rooftop ERV's: Replace existing rooftop Energy Recovery Ventilation units due to age of equipment (four (4) units, 4,200 CFM each). Clean supply and exhaust air ductwork and seal with duct sealing process such as Carrier "Aeroseal".

Abandoned rooftop equipment: Remove and cap abandoned exhaust fans to eliminate air migration/heat loss through unsealed openings.

Kitchen: Install new variable volume kitchen hood exhaust fan with make-up air unit:

- New exhaust fan with variable speed motor
- New gas-fired make-up air unit dedicated to the kitchen area (add supply plenum to hood)
- New controls to vary amount of make-up and exhaust air based on cooking activities (controlled by heat sensors under hood)

C. Control Systems

Provide new control valves and actuators to replace aging units serving finned tube radiators throughout the school.

Provide full re-commissioning of all HVAC system controls by third party commissioning agent. Include allowance to replace faulty components discovered during commissioning process and to implement required control upgrades discovered during process.

D. Plumbing Systems

Install low-flow plumbing fixtures throughout with automatic flush valves and faucets

- 1.28 gallon-per-flush toilets
- 0.125 gallon-per-flush urinals
- 0.5 gallon-per-minute lavatory faucets

E. Preventative Maintenance

Regular preventative maintenance contract is strongly recommended for all mechanical systems with preventive maintenance contractor specializing in mechanical systems.

F. Misc. Systems – Kitchen Refrigeration

Replace existing refrigeration equipment for walk-in freezer and refrigerator due to age of equipment and implement a preventative maintenance plan.

V. Budget Estimates

Refer to attached summary tables

Oyster River Cooperative School District

Mast Way Elementary School – Short Term/Code Compliance Recommendations for Mechanical Systems

Code Section	Requirement Description	Finding	Recommendation	Budget
IECC 2009 Table 503.2.8	Minimum piping insulation requirements for heating hot water piping	Piping in boiler room and adjacent stage area (MUSIC 43) missing pipe insulation.	Add pipe insulation to bare heating piping in boiler room and at adjacent stage area (MUSIC 43)	$3,000
IMC 2009 Section 403	Required minimum ventilation rates per Table 403.3	No mechanical ventilation provided for front offices. Exhaust fan serving Toilet Rooms #51 and #52 appears to be out of service	Provide new energy recovery ventilation unit to serve front offices and to exhaust Toilet Rooms #51 and #52 (Approx. 350 CFM capacity)	$20,000
IMC 2009 Section 403	Required minimum ventilation rates for toilet rooms and support spaces per Table 403.3	Several locations lacking mechanical ventilation or functioning mechanical exhaust	Install dedicated exhaust system for STORAGE 44B (chemical storage area); Install small ERV for Kitchen Office #47A; Connect exhaust grilles to existing ERV at Toilet Rooms #35 & #36	$7,500
IMC 2009 Section 508	Make-up air required for operation of commercial kitchen hood exhaust systems	No mechanical make-up air provisions for kitchen exhaust hood	Provide dedicated make-up air system (gas-fired, approx. 3,500 CFM capacity) with ductwork distribution to the kitchen area. (alternately, provide new variable volume exhaust fan and make-up air system – see long term recommendations)	$40,000
IMC 2009 Section 507	Type II hood required to be installed above dishwashers	No Type II hood and exhaust system installed for dishwashing machine	Install a Type II hood over dishwasher with dedicated exhaust fan	$15,000
IPC 2009 Section 604	Maximum flow rates for plumbing fixtures per Table 604.4 (0.5 gpm for lavatories)	Lavatory faucets do not meet maximum flow rate requirements. Fixtures should be able to be retrofitted with 0.5 gpm aerators. Older double faucet units require replacement for code compliance.	Add 0.5 gpm aerators to existing single faucet lavatories (approx. 19 units) Install new 0.5 gpm faucet at lavatory in Toilet Room #30	$2,500

Oyster River Cooperative School District

Mast Way Elementary School – Long Term Recommendations for Mechanical Systems

System Description	Finding	Recommendation	Budget
Heating Hot Water Boiler Plant	Existing boiler plant relatively inefficient and in operation during last third of expected useful lifecycle	Install new condensing boiler plant with minimum 94% AFUE boilers and variable volume pumping (1500 MBH Capacity, 2 boilers)	$90,000
Rooftop Energy Recovery Ventilation Units	Existing ERV's in operation at end of typical useful service lifetime.	Install new energy recovery ventilation systems to replace existing (4 systems: Approx. 4,200 CFM each). Clean and seal existing ductwork.	$200,000
Abandoned rooftop exhaust fans	Abandoned rooftop exhaust fans appear to be contributing to air leakage through roof openings	Remove abandoned rooftop exhaust fans and cap to match existing roof material	$10,000
Kitchen Hood exhaust and make-up air systems	Existing System lacking provision for make-up air	In lieu of adding basic make-up air system to meet current code requirements, provide new variable volume exhaust fan and make-up air system (3,500 CFM system)	$55,000
HVAC Controls	Existing control valves serving finned tube radiators aging	Replace existing control valves serving finned tube radiators throughout as preventative maintenance item	$40,000
HVAC Controls	Make repairs/upgrades/adjustments to allow for proper scheduling and energy efficient operation of systems	Provide retro-commissioning process for all HVAC controls by 3rd party commissioning agent, including necessary system repairs	$50,000
Plumbing Fixtures	Plumbing fixtures do not meet current standards for highest efficiency	Install 1.28 gpf toilets, 0.125 gpf urinals and 0.5 gpm lavatories throughout with automatic sensor valves and faucets	$55,000
HVAC Preventative Maintenance	Mechanical systems appear to lack regular preventative maintenance	Establish regular preventative maintenance contract with company specializing in mechanical systems	$7,500/year
Kitchen Refrigeration Equipment	Refrigeration equipment aging without history of regular preventative maintenance	Replace refrigeration equipment and implement preventative maintenance plan	$30,000

Appendix A – Ventilation Calculations
Mast Way Elementary School

Mast Way Elementary School Ventilation Table

Room	Area (SF)	Occupants (2009 IMC)	Outdoor Air Req'd (2009 IMC)	Outdoor Air - Design	Exhaust Air Req'd (2009 IMC)	Exhaust Air - Design	Notes
Storage 48	164	N/A	20	unknown	0	unknown	1
Closet 49C	7	N/A	1	unknown	0	unknown	1
Conference Room 49B	183	10	61	unknown	0	unknown	
Principal Office 49A	146	1	14	unknown	0	unknown	
Main Office 49	258	2	25	unknown	0	unknown	
Lobby L01	520	N/A	62	unknown	0	unknown	1
Vestibule V01	115	N/A	0	unknown	0	unknown	1
Office 50	87	1	10	unknown	0	unknown	
Office 50A	107	1	11	unknown	0	unknown	
Girls Toliet 51	158	N/A	0	unknown	150	unknown	1
Boys Toliet 52	158	N/A	0	unknown	200	unknown	1
Classroom 1	914	23	340	450	0	450	
Corridor C01	882	N/A	53	0	0	0	1
Classroom 2	903	23	338	450	0	450	
Classroom 3	918	23	340	450	0	450	
Teacher 30	484	3	44	130	0	130	
Corridor C02	235	N/A	14	0	0	0	1
Reading 29	150	1	14	15	0	15	
Computer 32	430	11	162	405	0	405	
Skills 32A	186	5	72	180	0	180	
Art Work Room 31	1013	21	392	450	473	450	2
Kiln 31A	75	2	34	0	0	0	
Classroom 5	923	24	351	450	0	450	
W Staff 33	50	N/A	0	50	50	50	1
M Staff 34	50	N/A	0	50	50	50	1
Toliet 35	20	N/A	0	50	50	50	1, 4
Toliet 36	20	N/A	0	50	50	50	1, 4
Classroom 7	916	23	340	450	0	450	
Corridor C03	392	N/A	24	200	0	225	1
Classroom 8	874	22	325	450	0	450	
Small Group Instruction 6	655	17	249	450	0	450	
Classroom 10	890	23	337	450	0	450	
Classroom 9	890	23	337	450	0	450	
Classroom 11	898	23	338	450	0	450	
Classroom 12	898	23	338	450	0	450	
Corridor C05	940	N/A	56	0	0	0	1
OT/PT 13	227	2	24	50	0	50	
Boys Toliet 37	250	N/A	0	300	200	300	1
Janitor 38	58	N/A	0	40	58	40	1

Classroom 14	890	23	337	450	0	450	
Girls Toliet 39	250	N/A	0	300	200	300	1
Vestibule V02	63	N/A	0	0	0	0	1
Corridor C06	446	N/A	27	0	0	0	1
Classroom 15	884	23	336	450	0	450	
IT Server 41D	76	N/A	0	unknown	0	unknown	1
ESOL 40	76	2	29	unknown	0	unknown	
Circulation Desk 41A	274	2	26	50	0	0	
Office 41B	135	1	13	15	0	0	
Work Room 41C	171	5	71	40	0	0	
Library 41	1557	16	267	450	0	450	
Commons 42	1000	10	110	450	0	450	
Classroom 16	886	23	336	450	0	450	
Classroom 17	884	23	336	450	0	450	
Vestibule V03	72	N/A	0	0	0	0	1
Corridor C07	502	N/A	30	0	0	0	1
Classroom 18	850	22	322	450	0	450	
Classroom 19	933	24	352	450	0	450	
Classroom 20	860	22	323	450	0	450	
Kindergarten 21	944	24	410	450	0	450	
Nurse 23	253	3	75	60	0	60	
Rest 23B	102	2	50	50	0	75	
Toliet 23A	60	N/A	0	50	50	75	1
Toliet 24	76	N/A	0	50	50	75	1
Guidance 25	253	2	25	50	0	60	
Closet 25A	12	N/A	1	0	0	0	1
Janitor 26	185	N/A	0	50	185	60	1
Toliet 4A	52	N/A	0	50	50	60	1
Copier & Supplies	212	1	18	50	106	50	
Teachers Workroom 28	209	2	23	50	0	50	
Kindergarten 4	967	25	424	430	0	430	
Corridor C08	1037	N/A	62	0	0	0	1
Music 43	860	31	362	750	0	see Gymnasium 44	
Gymnasium 44	3285	N/A	986	2250	0	3000	1
Boiler Room 22	384	N/A	0	unknown	0	unknown	1
Electrical Room 22A	165	N/A	0	unknown	0	unknown	1
Storage 44B	160	N/A	19	unknown	160	0	1
Gym Storage 44A	319	N/A	38	unknown	0	unknown	1
Vest V04	168	N/A	0	unknown	0	unknown	1
Kitchen Storage 47D	99	N/A	12	unknown	0	unknown	1
Hall 46	190	N/A	11	unknown	0	unknown	1
Cafeteria 45	1403	141	1310	unknown	0	unknown	
Kitchen 47	608	N/A	0	unknown	426	4300	3

Receiving 47C	258	N/A	31	unknown	0	unknown	1
Kitchen Office 47A	62	1	9	unknown	0	unknown	
Staff Toliet 47B	35	N/A	0	unknown	70	50	1

1. Required ventilation rate (typically exhaust only, if any) dependent upon floor area
2. IMC required exhaust rate based on net occupiable floor area (2/3 room floor area)
3. Designed EA includes kitchen hood EF (3600 CFM) & ceiling EF (700 CFM)
4. Exhaust outlets do not appear to be connected/functional

ELECTRICAL

ENGINEERING

MAST WAY ELEMENTARY SCHOOL

DAVIS GOUDREAU
ARCHITECTS

Mast Way Elementary School
Facility Analysis – Electrical Systems

Table of Contents

I. Introduction

Engineered Building Systems has reviewed available record drawings and surveyed the electrical systems serving the Mast Way Elementary School in Lee, NH. The intent of this report is as follows:

1. Evaluate existing electrical systems in terms of code compliance with current codes and standards.
2. Determine expansion capabilities within existing electrical infrastructure for renovations and additions.
3. Provide budget estimates for required system upgrades to meet current building code requirements.

Recommendations are provided to address items that don't conform to current building code requirements. In addition, recommendations are provided for improvements in system performance, maintainability and energy efficiency.

II. Findings

A. Building AC Electrical Power Distribution System

Building electrical power emanates from outdoor NHEC pole mounted distribution transformers located on NHEC pole #12A-14A2 at the rear of the building. The 3 distribution transformers are rated for 50 KVA each with an input voltage of 13,800 volts delta and an output voltage of 120/208 volts wye. The secondary service entrance conductors for the building run underground from the pad mounted distribution transformer to the main distribution panel located in the first floor main electric room #58A. NHEC presently owns and maintains the primary electric service feeder, and the pole mounted transformers, as the building is secondary metered by NHEC.

Photo #1

The main distribution panel is rated for 800 amperes @ 120/208 volts, three phase, four wire and is located in the building main electrical room. The existing 800 ampere main distribution panel is equipped with feeder circuit breakers for remote panelboards and mechanical loads. The remote panelboards that we observed were in good condition and had plenty of spares or spaces available for future branch circuits.

There are some locations where panelboards are surface mounted in egress corridors, however the panelboards do not appear to impede the path of egress.

The existing electrical distribution equipment is in good condition. The manufacturer of the distribution equipment; Square D, is presently still manufacturing electrical switchgear, so spare or replacement parts are readily available.

The main electric room is presently utilized as a storage room (see photos #2 and #3 below). In violation of N.E.C. Article 110.26(B), all non electrical equipment should be removed from the electrical rooms.

Photos #2 and #3

The 800 ampere service @ 120/208 volts, three phase, four wire allows for a recommended maximum connected load of 230.0 KW or approximately 5.2 watts per square foot (based on 80% maximum loading of service rating, divided by 44,000 usable square feet) The service capacity for this building is more than adequate to handle present and future building electrical needs and there are spaces available in the existing main switchboard distribution section for additional feeder breakers.

There is a second electrical service to the building which also originates from the outdoor NHEC pole mounted transformers. (See photo #4). This overhead secondary electrical service is dedicated for the electric fire pump which is located in the tank room.


Photo #4

B. Metering Arrangement

All building electrical loads in the main building are single point secondary metered via NHEC meter #(unknown). The building electrical meter is located in an exterior meter enclosure on pole #12A-14A2.

All building electrical loads for the electric fire pump are single point secondary metered via NHEC meter #(unknown). The electrical meter is located in the sprinkler room.

C. Emergency or Standby Power Distribution Systems

The building is not equipped with an emergency or standby power distribution system. Upon loss of utility power, all electric utilizing equipment within the facility will shut down, including any computer equipment, HVAC systems, telephone equipment, lighting, kitchen equipment, fire pump, etc.

D. Fire Alarm System

The main building is presently equipped with an addressable, low voltage fire detection and signalling system (Notifier AFP). The existing Fire Alarm System consists of a main control panel located in the main Electrical Room #58A and remote system indicating and initiating devices including manual pull stations located at egress points throughout the building. Audio visual horn/strobe units are also strategically located throughout the complex and smoke or heat detectors are located in corridors and open areas of the building. We did not observe any smoke detectors in the classrooms. The Notifier addressable system appears to have been installed in the last 10 years along with new addressable initiating and indicating devices. The audio/visual device coverage appears to comply with current NFPA 72 spacing requirements. There is an Adenco digital communicator which is located in the main electrical room. The digital communicator is tied into the fire alarm system and will notify the monitoring company of any "alarm" and/or "trouble" signals in the system. See photo #5.

Photo #5

E. Elevator Recall and Control

Not applicable to this building.

F. Americans With Disabilities Act Compliance

It appears that most of the buildings electrical controls and fire alarm devices are in compliance with the height and access requirements of the Americans with Disabilities Act and the State of New Hampshire Architectural Access Barrier Board requirements. We did observe some lighting control switches that were mounted above the allowed height for switch controls. We also observed that a few manual stations and audio/visual devices are not mounted at ADA compliant heights.

G. Interior Lighting

The fluorescent lighting fixtures appear to have been upgraded over the years. Most lighting fixtures are equipped with T8 lamps and electronic ballasts. In general, lighting levels are good to excellent. The gymnasium lighting consists of low bay and high bay metal halide luminaires.

H. Exterior Lighting

H.I.D. type, lensed, pole mounted floodlight luminaires illuminate the main parking lot and access drive in the front of the building. These fixtures are owned and maintained by PSNH. As we performed our inspection during the daylight hours, we cannot comment on the adequacy of the exterior lighting levels however, there does not appear to be enough luminaires to provide adequate security lighting. The floodlight fixtures appear to be in fair condition. There is no lighting in the overflow parking lot.

I. Automatic Lighting Control Systems

With a few exceptions, we did not observe any automatic lighting controls as required by the 2009 Edition of the International Energy Conservation Code, Section 505. Most of the interior lighting systems appear to be manually controlled only. We observed ceiling mounted occupancy sensors in the Break Room and Computer Lab.

J. Emergency and Exit Lighting Systems

The building is equipped with an emergency lighting and exit lighting system as required by NFPA Life Safety Code 101, and the 2009 edition of the International Building Code. For the most part, there appears to be an adequate number of normal/emergency lighting fixtures located throughout the egress paths and they are in good to fair condition. We did not observe any emergency lighting systems in the classrooms, electrical room, mechanical room, or in the gymnasium. In general, there are an adequate number of exit signs to indicate the paths of egress, and they appear to be in fair to poor condition. However, we did not observe any exit signage in the classrooms and mechanical room and there are some egress corridors where additional exit signage is required or are not operating. Exterior areas of refuge at building exit discharges are not equipped with emergency lighting as required by IBC Article 1006.

K. Lightning Protection System

The building is not equipped with a lightning protection system. The National Fire Protection Association (NFPA) and the Lightning Protection Institute (LPI) recommend that all buildings be protected against loss by lightning. However, the installation of a lightning protection system is not required by the National Electrical Code. The risk assessment index would classify this building as a moderate to high risk, taking into account the site conditions and the height of the metal roof peak.

L. Grounding Electrode and Equipment Grounding System

We could not visually inspect the main grounding electrode system because it was not readily apparent during our visual inspection. This grounding electrode system should be tested every five years to insure that the proper resistance levels are maintained.

The electrical distribution system branch circuits and feeders appear to be equipped with an insulated equipment grounding conductor, which provides an effective conductive path to ground for the electrical system.

M. Security System

The building is equipped with a centralized low voltage security system and an IDenticard access control system. We observed motion sensors in the corridors and perimeter door contacts during our site survey. There is an activation keypad located in the main entry vestibule. The system appears to be in good operating condition.

N. Paging System

There is a centralized paging system which consists of a Multicomm 2000 sound system located at the main reception desk and remote ceiling and wall mounted speakers located throughout the corridors, classrooms, library, gym, multi-purpose room etc. The system is as manufactured by Multicomm and the system appears to be in excellent condition.

O. Clock Program System

There is not a centralized clock program system. The classroom clocks are battery or line voltage powered.

P. Data Systems

The main server rack is located in the MDF room located adjacent to the Computer Lab. There are remote server racks in Science Storage room and the Library Storage closet. Data cabling is category 6 and the server rack, patch panels and data wiring all appear to be in excellent condition and fairly new.

Q. Carbon Monoxide Detection System

We did not observe a carbon monoxide detection system in this facility. The State of New Hampshire requires carbon monoxide detection systems in permanent and transient residential buildings in which fossil fuel burning equipment or appliances are present, but does not presently require carbon monoxide detection systems in non-residential facilities. Carbon monoxide is an odorless, colorless, tasteless toxic gas that can lead to death in a matter of minutes at high concentration levels and children are especially susceptible to carbon monoxide poisoning. There are fossil fuel fired mechanical systems and appliances in this facility.

R. Surge Protective Devices

We did not observe any surge protective devices installed at any point on the interior electrical distribution system. Surge protective devices (SPD) will protect the electrical distribution system and sensitive electronic devices or equipment from externally or internally generated surges or spikes.

III. Recommendations - Code Compliance

Refer to attached summary table.

IV. Recommendations - System Performance, Energy Efficiency and Maintenance

Refer to attached summary table.

V. Equipment Replacement Schedule

Equipment	Life Expectancy	Age (Years)	Remarks

Interior Light Fixtures	40 years	Varies	See Note #1
Fluorescent Lamps	4-5 years	Varies	See Note #2
Incandescent Lamps	6 months	Varies	See Note #3
Exterior Light Fixtures	20 years	Varies	See Note #4
H.I.D. Lamps	4-5 years	Varies	See Note #2
Ballasts	15-20 years	Varies	See Note #5
Emergency Battery Units	5-10 years	Varies	See Note #6
Exit Signs	10-20 years	Varies	See Note #6
Main Switchboard	30 years	Varies	See Note #7
Panelboards	30 years	Varies	See Note #8
Transformers	25 years	N/A	See Note #8
Safety Switches	30 years	Varies	See Note #9
Motor Starters	25 years	Varies	See Note #9
Fire Alarm System	30 years	>10	See Note #10
Smoke Detectors	30 years	>10	See Note #10

Notes:

1. Interior lighting fixtures should be replaced and upgraded as areas are renovated. Replacement costs should be allocated into construction budgets rather than maintenance budgets.
2. Fluorescent lamps should be replaced in groups rather than on an individual failure basis.
3. Incandescent lamps have a limited life expectancy and should be replaced on an individual failure basis.
4. Exterior lighting fixtures should be replaced as needed or at end of useful life.
5. Electronic ballasts should be replaced on an individual failure basis until they reach 20 years in age, then group replacement is recommended.
6. Emergency battery units and exit signs should be tested on a semi-annual basis and replaced as needed if testing indicates pending or previous failure.
7. The main switchboard should be infrared tested every five years. The ground fault protection system and the distribution circuit breakers should be tested on an annual basis.
8. Panelboards and transformers shall be infrared tested every 5 years.
9. Replace at component end-of-life.
10. The Fire Alarm System and backup batteries should be tested as required by the local Fire Department and NFPA 72.

Oyster River Cooperative School District

Mast Way Elementary School – Code Compliance Recommendations for Electrical Systems

Code Section	Requirement Description	Finding	Recommendation	Budget
I.E.C.C. 505.2.2.2	Automatic Lighting Controls	Most interior spaces in building lack automatic lighting controls.	Provide wall or ceiling mounted occupancy sensors in all offices, toilets, classrooms, corridors, etc.	$39,000.00 (1)
I.E.C.C. 505.4	Exit signs shall not exceed 5 watts per side	Some of the existing exit signs exceed 5 watts per side	Replace existing incandescent or fluorescent exit signs with LED type	$2,000.00 (1)
I.B.C. 2009 907.2.1.1 and NFPA 101 13.3.4.3.4	Assembly areas with occupant loads greater than 1000 shall have an occupant notification system that consists of voice announcements.	The fire alarm system occupant notification system does not include voice evacuation.	Provide a voice evacuation system in the assembly areas of the building if occupant load is greater than 1000.	$18,000.00
I.B.C. 2009 907.5.2.3.2	Employee work areas: Notification appliance circuits shall have 20% spare capacity to accommodate the potential of adding visual devices for hearing impaired employees	Visual devices may need to be added to accommodate hearing impaired individuals	Provide on an "as needed" basis	-0-
I.B.C. 2009 915.0	Emergency responder radio coverage: Required on all new buildings	See recommendation	Have the local fire department test their radio coverage in the building to confirm that their equipment functions properly in the building	-0-
I.B.C. 2009 1003.3.4	Protruding objects shall not reduce the minimum clear width of accessible routes	There are a few locations where panelboards are located in egress corridors	Confirm that the egress path is not impeded	-0-
I.B.C. 2009 1006.3	Emergency power for illumination required for exterior landings and area of refuge	There is no exterior emergency lighting at the exit discharges	Provide low voltage or line voltage emergency lighting at each egress exit discharge	$10,000.00

N.E.C. 2011 110.26(B)	Clear spaces in electric rooms	The main electrical room is presently being used as a storage room for maintenance and janitorial equipment (See photos #2 & #3)	Remove all non-electrical equipment from room	-0-
N.E.C. 2011 110.16	Flash Protection	The main switchboard and main distribution panels (400A or greater) should be labeled to warn maintenance personnel of potential arc flash hazards	Install warning labels as required.	$500.00

(1) Rebates may be available for energy conservation retrofit measures from the local utility company or NHSaves.

Oyster River Cooperative School District

Mast Way Elementary School – Electrical System Performance, Energy Efficiency and Maintenance Recommendations

Code Section	Requirement Description	Finding	Recommendation	Budget
N/A	N/A	During our visual inspection we did not observe any surge protection devices (SPD) or systems throughout the electrical distribution system. An SPD system will protect the electrical distribution system and sensitive electronic devices and equipment from externally or internally generated surges or spikes.	Provide surge protective devices at the main service entrance equipment and at the 120/208 volt panels feeding sensitive electronic equipment areas. The SPD system will protect the facility and its equipment from externally generated transients initiated by lightning strikes and/or utility company generated surges or spikes. Also, provide SPD protection on incoming telephone and fiber optic cables or systems.	$12,500.00
N/A	N/A	There are no single phase protection devices on the existing secondary electrical distribution system.	Install single phase protection devices on the main service distribution equipment.	$8,000.00
N/A	N/A	The existing egress pathway and parking lot lighting appears to be inadequate and is not "Dark Skies" compliant. There are also parking areas that are not illuminated at all.	Replace existing non-cutoff and inefficient exterior lighting luminaires with I.E.S. compliant full cutoff luminaires to improve exterior lighting levels and minimize light pollution.	$70,000.00

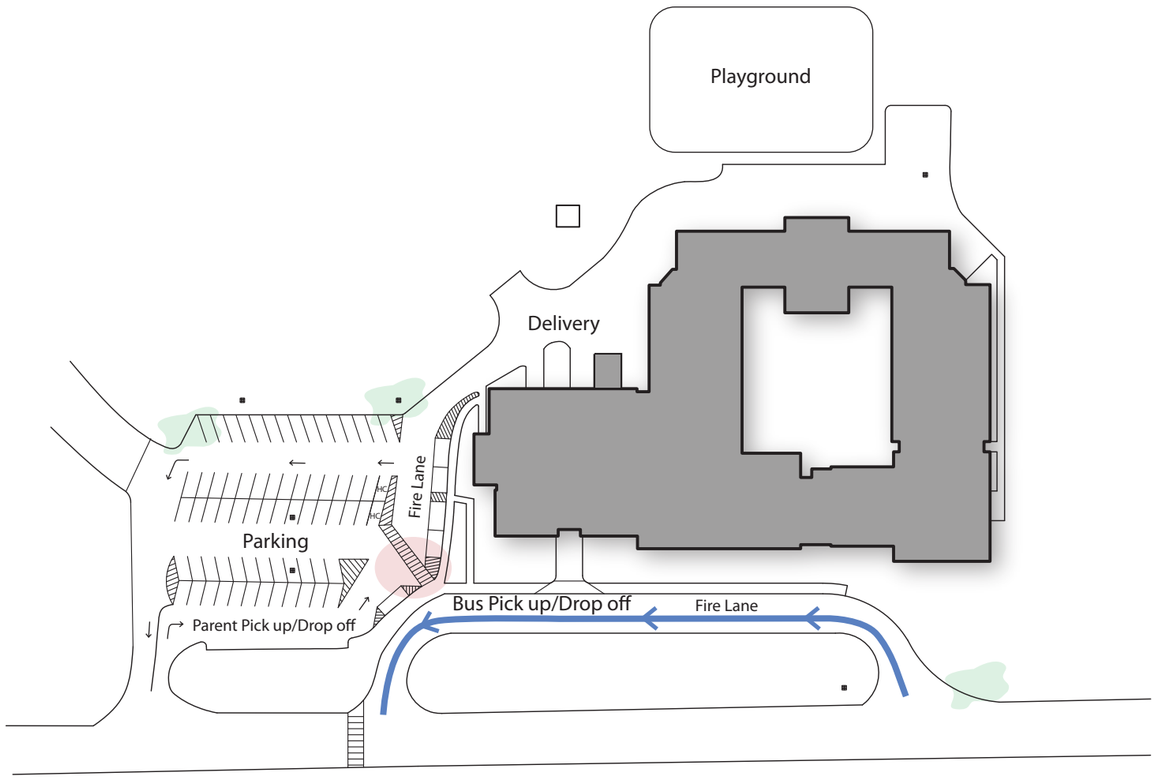
N/A	N/A	The electrical distribution system should be tested every 5 years.	Contract with a testing company to test, clean, and calibrate the main switchboard, and distribution section circuit breakers. Perform a thermo graphic survey on the entire electrical distribution system.	$12,000.00
N/A	N/A	This facility is not equipped with an emergency or standby power distribution system. Upon loss of power the heating system, kitchen equipment, phone system, etc. de-activate.	Provide an emergency or standby power distribution system to provide onsite power to the buildings heating system, kitchen system, kitchen area refrigerators, select lighting circuits and ejector pump systems.	$80,000.00
N/A	N/A	The building is equipped with fossil fuel burning equipment and/or appliances but is not equipped with a carbon monoxide detection system.	Provide a centralized carbon monoxide detection system with occupant notification in the rooms or areas where fossil fuel fired appliances or equipment is operating	$15,000.00
N/A	N/A	Even though most of the existing fluorescent fixtures are equipped with T8 energy saving lamps and electronic ballasts, the opportunity exists for further energy savings by retrofitting the existing fixtures with lower wattage lamps, or reducing the quantity of lamps, or replacing the existing fixtures in kind with more efficient fluorescent or LED fixtures.	Perform a lighting audit with the assistance of NHSaves and/or and energy efficiency consultant and identify areas of the building where fixtures can be retrofitted or replaced.	T.B.D.

Mast Way Elementary School
23 Mast Road
Lee, NH

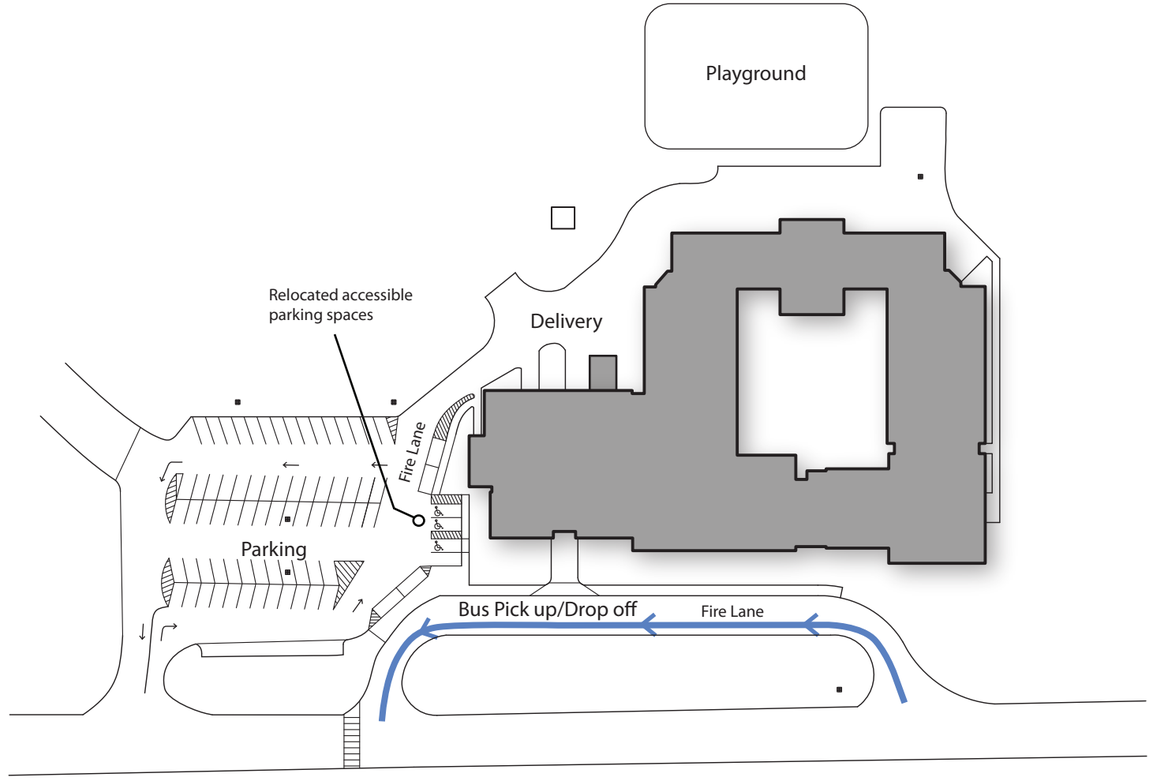
Pedestrian/Vehicular circulation conflict area

Bus pick-up/drop-off route

Drainage Issues/Ponding Area



1 EXISTING SITE PLAN
SCALE: 1:100



2 PROPOSED SITE PLAN
SCALE: 1:100