

**FACILITIES ASSESSMENT
FOR THE
GORHAM RANDOLPH SHELBURNE
COOPERATIVE SCHOOL DISTRICT**

**ED FENN SCHOOL
MIDDLE SCHOOL/HIGH SCHOOL
GORHAM, NH**

JUNE 22, 2006



HEB ENGINEERING
NORTH CONWAY, NH

ALLIED ENGINEERING
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ED FENN SCHOOL FACILITIES REPORT JUNE 22, 2006

INTRODUCTION

This report is intended as an analysis of existing School Facilities to identify the condition and life expectancy of the mechanical and electrical systems, structural conditions, and physical architectural elements of the buildings. Building Envelope (BE), Fire Safety (FE), Handicapped Accessibility (HC) elements are also considered. The current codes in effect in NH, IBC 2000, and NFPA 2003 were used in reviewing the facilities.

LIST OF ABBREVIATIONS

VAT= Vinyl Asbestos Tile
VCT= Vinyl Composition Tile
ACT= Acoustical Ceiling Tile

Recommendations for improvements follow each section.

BASIC INFORMATION

Site: Approximately 13 Acres

Year Constructed: 1956, Addition in 1969, 1 Story Building

Gross SF: 31,266sf

Construction Type: IIB, non-combustible, unprotected steel framing, masonry infill, cementitious roof deck.

Occupancy
NFPA 101 Chapters 13 and 15
IBC 302 E: Educational with accessory A: Assembly at multipurpose room (A3)

Allowable Area: E: 14,400sf
IBC 506 as modified by A: 8,400sf
state of NH:

Using the most restrictive allowable area to calculate area modifications per 506.2- street frontage increase as follows:

$150\% \times 8,400\text{sf} = 12,600 + 8,400 \text{ base} = 21,000\text{sf}$ allowable floor area.

BUILDING ENVELOPE

The following notes are based on review of existing documents and on site observations, previous reports, and input from building users. No intrusive investigations have been made.

Roof: Roofs are internally drained, tar and gravel, original systems that have been re saturated and patched. Evidence of leaking at flashing points was observed as well as finding stained ceiling tiles at the interior.

It is not known by this writer if the roof contains asbestos or has been tested for asbestos content.

The roof system should be replaced.

Exterior Walls: The brick masonry is in excellent condition with no observed cracking. Some minor brick repointing needs to be completed in various areas but it is very minor. Recaulking at window sills needs to be done. There was one corner where a plow had taken a chunk out of the foundation but otherwise all is in decent condition.

Brick Chimneys: There are two brick faced (and lined) chimneys; one for the original building and one for the addition. Both have severe cracking and deterioration. Both should be rebuilt with appropriate flue liners, masonry surround, flashing, caps and veneer.

Exterior Doors & Windows:

Exterior windows have been replaced but there are reports of difficulty in operation as well as drafty conditions. Some areas had plastic sheets installed on the inside to prevent drafts. No other obvious failures were observed.

Exterior doors appear to be sound in most locations. Some do exhibit rusting at the base and should be replaced as well as all of the weather-stripping should be renewed.

Interior:

Walls: 4" CMU in most locations- non rated, in good condition without signs of cracking at the interior. Some stress cracking at exterior walls at window openings.

Interior corridors are required to have one hour rating in non sprinklered buildings and these walls do not meet the rating criteria.

Floors: Mostly new VCT throughout with some areas of carpet such as the library, music and office area. All appear to be in good condition.

Ceilings: Two systems observed: existing 12"x12" fiberboard ceilings (original) and 2 x 4 suspended ACT.

The original 12"x12" fiberboard ceilings do not meet the class "C" minimum fire rating and it is recommended that the original tiles be removed.

The suspended ACT tiles are in good condition in most areas. Stained tiles from roof leaks should be replaced regularly.

Casework/ Equipment:

Existing casework in classrooms shows some wear but mostly in good condition for the limited amounts.

Curtains at stage, if not treated for fire resistance in accordance with NFPA 701, should be treated or replaced.

Handicapped Accessibility:

Lever handles have been installed on doors and most areas are accessible. There is a lack of handicapped accessibility at classroom toilets, nurse's office, administration offices and faculty toilets. At least one accessible student toilet and one faculty toilet should be available.

FIRE SAFETY

As noted under basic information, the allowable floor area for this building is 21,000sf. The existing area is 31,266sf.

One way of increasing the allowable area is by providing a rated separation between the assembly space (multi-purpose room) and the rest of the school. This would allow for the allowable floor area of 14,400sf to be used in the street frontage modification calculations.

Another means to increasing the area is by installing an automatic sprinkler system (full coverage). This would allow an increase of 200%. Combined with the street frontage modification the allowable area would be 37,800sf using this calculation.

It was also noted that the existing corridor walls are 4" CMU and this does not meet the one hour required egress rating. Existing classroom doors are also not rated (20 min required) nor do they have closers. With the installation of a complete sprinkler system, the corridor walls would become smoke partitions only and the door ratings would be reduced as well.

Egress travel distances meet requirements.

Installation of a full coverage automatic sprinkler system will bring the existing facility into code compliance.

STRUCTURAL EVALUATION REPORT
of
EDWARD FENN ELEMENTARY SCHOOL
GORHAM, NEW HAMPSHIRE

Prepared for:
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May 16, 2006

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**STRUCTURAL EVALUATION REPORT
OF
EDWARD FENN ELEMENTARY SCHOOL
GORHAM, NH
prepared for
BANWELL ARCHITECTS**

Background

H.E. Bergeron Engineers (HEB) performed a “walk-through” structural inspection and evaluation of the Edward Fenn Elementary School in Gorham, New Hampshire. The purpose of the structural evaluation was to assess the physical condition and structural capacity of the school building in order to facilitate future programming for the elementary school. The inspection and evaluation were conducted in accordance with our agreement dated May 16, 2006. The Ed Fenn Elementary school is a single story steel frame building with concrete masonry block infill, constructed in 1955 and 1968.

Methodology

The evaluation consisted of a “walk-through” site visit to inspect and verify as-built construction of the roofs, and an analysis to determine the capacity of the roof structures. The analysis results for roof components were then compared to current code snow load requirements. No material samples were taken and no laboratory testing was performed.

§ *Building Code*

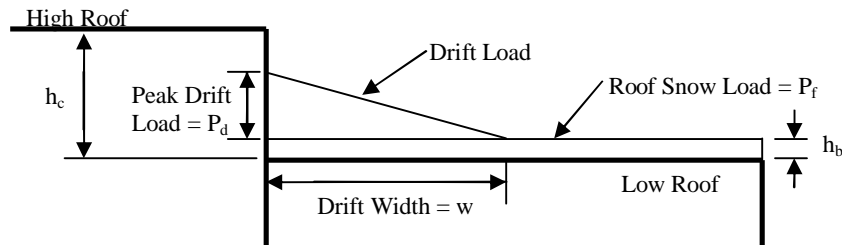
The current building code adopted by the state of New Hampshire is the *International Building Code 2000* (IBC 2000). Since the Town of Gorham has not adopted any other building codes, IBC 2000 was used for our analysis.

§ *Snow Loads*

For snow loads applied to the roof, the IBC 2000 references the American Society of Civil Engineers *Minimum Design Loads for Buildings and Other Structures, 1998 edition* (ASCE 7-98). Figure 7-1 of the ASCE 7-98 indicates that a site-specific case study is required to establish the ground snow load (Pg) for Gorham, NH. The U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) has prepared a study of the ground snow loads for every town in NH. From this report (ERDC/CRREL TR-02-6), the ground snow load for the Gorham area is 100 psf at an elevation of 1400 feet. The Ed Fenn School elevation is approximately 790 feet; therefore the report states that an adjusted ground snow load of 85 psf should be considered.

The building, as constructed, has two different height flat roofs. For this reason, the following snow load sections of ASCE 7-98 also apply: (section 7.3) Flat Roof Snow Loads and (section 7.7) Drifts on Lower Roofs. For the drift loads both windward and

leeward directions were considered and worst-case applied to the balanced snow loads.



The following snow loads and drift loads for the roofs were calculated using the above-mentioned codes:

- Flat Roof Snow Load: **$P_f = 60$ psf**
Drift (west & east of gym): **$P_d = 105$ psf ($w = 17'$)**
Drift (north of gym): **$P_d = 85$ psf ($w = 14'$)**

Field Inspection

A “walk-through” inspection of school was performed on April 12, 2006 by Jason Ross of HEB and David Lauren of Banwell Architects. The school principal, Paul Bousquet, was on-site to answer questions and provide access to the building.

Roof:

The original building was constructed in 1955 and an addition was constructed in 1968. As was typical for schools of this time period, the building was constructed using steel beams and columns with concrete masonry unit (CMU) infill. Steel columns, which are W-shaped support steel beams at the roof level. Open-web steel joists span between these roof-beams and support what appears to be Tectum roof deck with tar, felt, and gravel roofing. This appears to have been a substitution during construction since the design drawings call out “Insulrock” decking which is slightly different than Tectum. Two layers of ceilings are suspended from the bottom chords of the joists.

Tectum is an effective roof decking material providing that it stays dry. However, if the panels get wet, the fibers in the panels swell and the structural capacity decreases. It appears that the roofing felt and gravel is part of the original construction. It also appears to have been re-saturated with bitumen at least once. Several areas of stained ceiling tiles were observed throughout the building, indicating that there have been leaks in the roof. Since there are two layers of ceiling tiles, it was impossible to inspect the bottom of the Tectum decking in order to assess the condition of the panels.

Further inspection will be required to determine the overall condition of the deck panels.

Chimneys:

Several cracks and decomposing mortar were observed on both of the chimneys. The mortar on the face of the original building also showed signs of weathering.

Foundation:

A crack was observed in the southeast corner of the foundation and masonry walls of the 1968 wing. It appears that there has been some settling in the soil under the foundation. Also, several areas of exposed concrete in the foundation of the 1968 wing show signs of weathering. The face of the concrete has started to flake off.

Walls:

Diagonal bracing in the walls for lateral load (wind & seismic) resistance does not appear on the structural drawings and none was observed. Lateral loads appear to be resisted by the masonry infill acting as shear walls. It is not known if the CMU walls are reinforced and/or filled with grout. It is likely, given the date of the construction, that they are not reinforced.

Diagonal cracks were observed in the CMU walls at the corners of the windows in the original part of the building. In these areas, it appears that the steel beams, acting as headers over the windows, bear on the concrete block walls. The diagonal cracks may be due to expansion and contraction of dissimilar materials or they could be related to insufficient bearing length of the steel beam headers. Further investigation is needed here.

Roof Analysis & Results

Current code snow loads and drifts on the roof are shown above. The original design drawings do not state what loads the roofs were designed for. From the original drawings, the roof joists are evenly spaced throughout the building and they are not spaced closer together on lower roofs, in areas where snowdrift would be anticipated. Based on this observation, it appears that the original design did not account for drifting snow.

The following dead loads were assumed for the roof capacity calculations:

Main Roof:

2" Insulrock decking	5.4 psf	
3-ply felt & gravel roofing	5.6 psf	
Wood furring suspended ceiling	2.5 psf	
Steel channel suspended ceiling	2.0 psf	
<u>Mechanical allowance</u>	<u>4.0 psf</u>	
Total	19.5 psf	<u>Used 20 psf</u>

Gymnasium Roof:

2" wooden decking	5.0 psf	
1" rigid insulation	1.5 psf	
3-ply felt & gravel roofing	5.6 psf	
<u>Mechanical allowance</u>	<u>4.0 psf</u>	
Total	16.1 psf	<u>Used 17 psf</u>

§ **Roof Deck**

Specific design information for Insulrock decking could not be found, but we know that Insulrock was the brand name for a gypsum based fiber panel that was produced in the 1960's. It appears that during construction, Tectum was substituted for Insulrock. From the Tectum Roof Deck Design Guide, the snow load capacity of a 2" thick tectum plank deck, supported at 32" on center, is approximately 60 pounds per square foot. Providing that the material has not been damaged by water, this is an acceptable snow load capacity for the main roof. The material is not sufficient for the areas of high snow drift loads around the gymnasium.

§ **Roof Joists**

The steel roof joists were evaluated through the use of load tables that were compiled by the Steel Joist Institute. The SJ-series joists called out on the plans were produced from 1929 through 1958. The J-series joists called out on the plans were produced from 1961 through 1978. Current publications from joist manufacturers do not have the either of these series joists listed. Therefore, a special publication called the *Steel Joist Institute (SJI) 60-Year Manual (1928-1988)*, was used to determine the allowable loads for these joists.

From the load tables, it appears that all of the joists over the classroom areas were designed for a 50-psf design snow loading. This was most likely the accepted design value of the time. As previously mentioned, there is no evidence that snow drifting was taken into account. This is only about 83% of today's design snow load requirement on the flat roofs, and as low as 30% of the design snow load requirement in the drift areas. Since they are so short, the joists over the hallway areas have a capacity of approximately 156 psf and are sufficient for today's flat roof and drift loads.

Calculations, based on the National Design Specification for Wood Construction, show that the timber beams in the gymnasium are slightly undersized for the current required snow load. The 6"x12" beams have a snow load capacity of 55 psf and the 6"x14" beams have a snow load capacity of 59 psf. This is slightly less than the flat roof snow load requirement of 60 psf.

§ **Roof Beams**

The steel roof beams were evaluated using their allowable resisting moment (M_r) as specified in the American Institute of Steel Construction (AISC) Allowable Stress Design Manual, 6th edition (ASD). A36 steel was assumed ($F_y = 36$ ksi) having an

allowable bending stress of 23.8 ksi. The allowable snow load was calculated for the existing beams.

Results from the analysis show that the capacity of the structural steel beams along the corridor varies from 58 to 62 psf. This is acceptable for the flat roof snow loads, but is insufficient for the areas of drifting. The steel beams above the exterior windows of the building have adequate capacity to carry the snow loads; however some of the beams may have an inadequate bearing length which is causing diagonal cracks in the masonry walls.

The steel beams in the gymnasium have a capacity of 63 psf. This is greater than the current required snow load.

§ *CMU Gym Walls*

The un-reinforced CMU walls in the Gymnasium were analyzed for wind load. From the design drawings, there are beams through the center of the wall which cut the effective height of the walls to ten feet. Based on IBC 2000, the required wind load capacity for buildings with a mean roof height of 30 feet or less, located in areas in the Exposure B category, is 12.8 psf. The allowable horizontal uniform load for the vertical walls, comprised of un-reinforced 8-inch concrete blocks composite with 4-inch face bricks, is 20 psf. This is greater than the required wind load so no reinforcement is required.

Recommendations

§ *Roof deck*

Further inspection of the roof deck is required to determine the overall condition of the Tectum panels. Providing that there is no significant water damage, the existing panels meet the code requirement for the normal flat roof snow loads. Additional reinforcing of the roof deck panels should be installed in the snow drift areas around the gym. This can be accomplished by either reducing the deck span or replacing the deck panels with a stronger roofing material.

If, upon further inspection, it is determined that there is significant water damage to the panels, we will recommend the complete replacement of the roof deck panels.

§ *Roof joists*

From the analysis, it appears that the roof joists were designed for the required code snow load at the time the building was designed, 50 psf. During the past 52 years there have been no reported problems with the roof structure and there do not appear to be any joists in the main roof, except for the snow drift areas, which were seriously under-designed. Based on these results, we recommend leaving the roof joists as they are on the main roof and inspecting periodically. We recommend installing additional joists in the snow drift areas, east and west of the gymnasium, in order to meet the current code snow drift requirements.

§ **Roof beams**

The steel roof beams also appear to have been designed for the required code snow load at the time the building was designed, 50 psf. As with the joists, there have been no reported problems with the roof structure and there does not appear to be any beams that are seriously under-designed. Also, masonry partition walls have been installed under all of the corridor beams, which has significantly increased the capacity of the roof beams. Based on these results, we recommend leaving the roof beams as they are currently installed in the majority of the building.

If, upon further investigation, it is determined that there is insufficient bearing at the ends of the steel headers, we recommend adding additional supports under the ends of the steel headers where there are signs of cracking in the masonry.

§ **Masonry**

In the areas where there is cracking and deterioration of the grout on the exterior walls, we recommend repointing the masonry as needed in order to prevent further damage. Additional investigation of inside of chimneys is required in order to determine the extent of cracking.

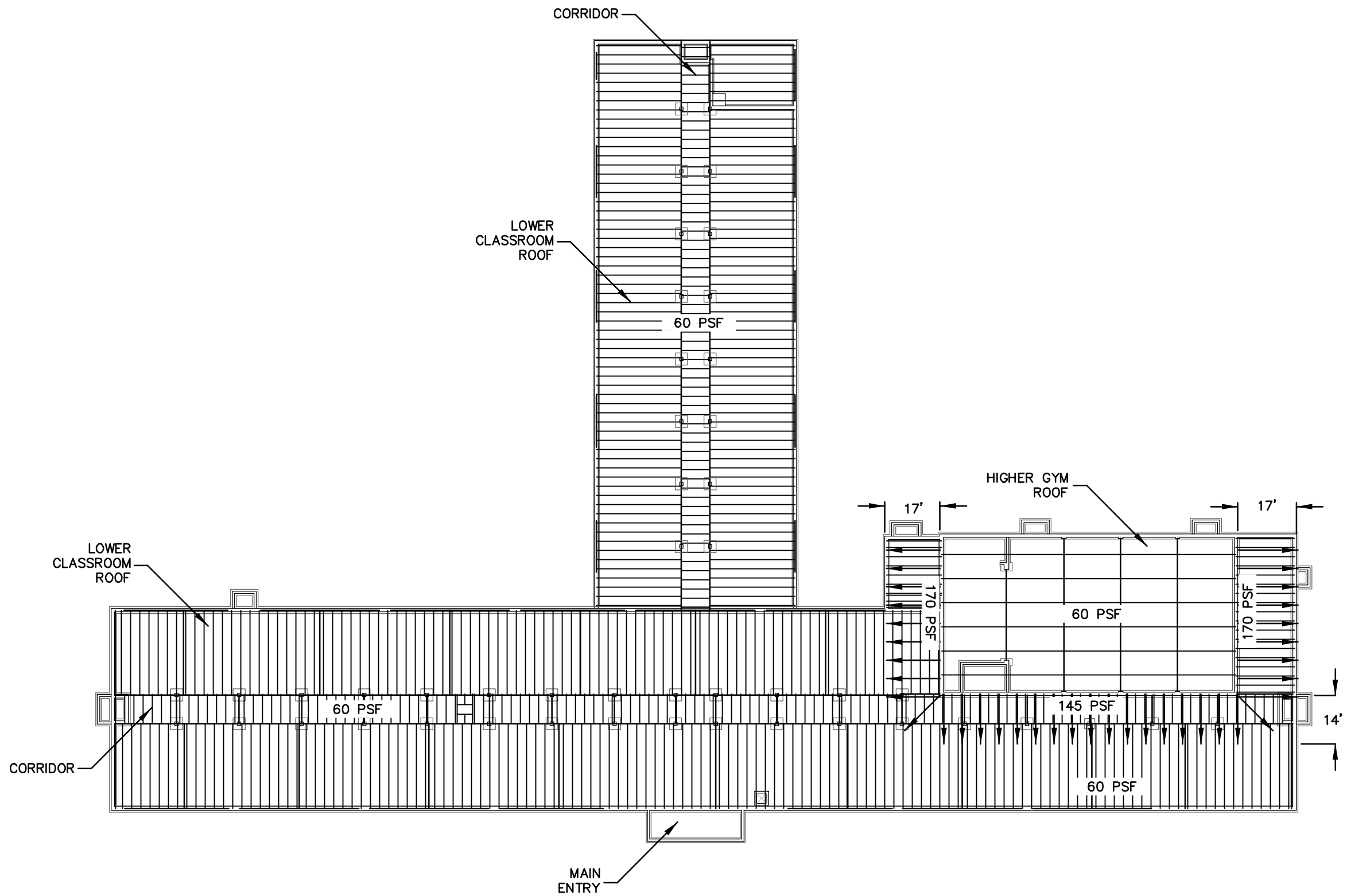
§ **Foundation**

After reviewing the original boring logs, it is our opinion that there is good soil under the foundation and any settling of the building has already occurred. We recommend monitoring the southeast corner of the addition for further movement. We also recommend repairing any weathered concrete to prevent further damage.

Disclaimer:

The opinions stated in this report are based on a “walk-through” inspection, limited to visual observation and review of existing plans and reports. Limited structural calculations were performed. No physical or material testing was performed. This report is to be used for the purpose intended and no additional guarantees or warranties are given or implied.

We hope you find this report meets your needs. If you have any further questions please let us know.



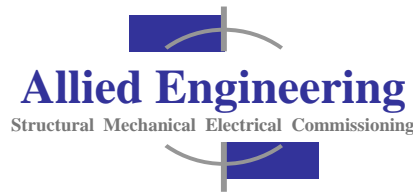
PLAN REFERENCES:

1. "ELEMENTARY SCHOOL BUILDING FOR THE SCHOOL DISTRICT OF THE TOWN OF GORHAM, N.H.", IRVING W. HERSEY ASSOCIATES, JUNE 20, 1955.
2. "ADDITIONS & ALTERATIONS TO THE FENN SCHOOL", W.H. JONES & SON ARCHITECTS, JULY 19, 1968.

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CODE SNOW LOADING PLAN
 ED FENN ELEMENTARY SCHOOL
 GORHAM, NH
 PREPARED FOR
 BANWELL ARCHITECTS

FIGURE 1		SCALE	1/32"=1'
SURVEYED BY	..	FIELD BOOK	.
DRAWN BY	JCR	DATE	5/18/06
CHECKED BY	HEB	DRAWING #	2006-040



Ed Fenn School

The original mechanical systems have been upgraded throughout the years in the original 1955 building and in the 1969 addition.

HEATING SYSTEMS Original 1955 Building - Heating is provided by a single 1972-vintage American Standard oil-fired boiler series 1B-J1. Rated boiler capacity is 2,272,000 BTUH output. A four-zone circulator pump system supplies hot water to hot water fined tube radiation in each class room and Hot water unit heaters serve the Cafeteria and Kitchen.

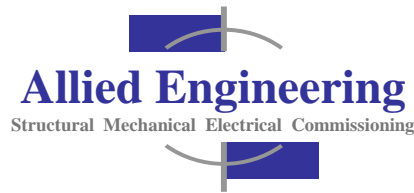
Boiler hot water temperature supplied to the building is controlled by a 3-way automatic control valve which modulates in accordance with outside air temperature.

Replace the heating system with new boiler, pumps, hot water fined tubing, unit heaters and hydronic specialties.

The 1969 Addition - Heating is provided by a single Weil McLain Model # 1088 oil fired boiler, recently installed in 1998. Rated boiler capacity is 2,132,000 BTUH output. A two-zone circulator pump system supplies hot water to hot water fined tube radiation in each class room. By-pass piping was installed in 1995 to provide standby use of either boiler if one boiler was out of service.

This 1969 Addition boiler system is code compliant and appears to have ample capacity to serve a new ventilation system. The boiler system does not need to be replaced at this time.

Replace existing hot water fined tube.



The combustion air system does not meet code and would need to be replaced.

VENTILATION SYSTEM

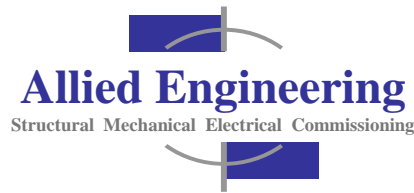
Kitchen ventilation system has been up graded in the past few years with a new rooftop exhaust fan, rooftop supply fan and new kitchen hood with fire suppression system.

The kitchen exhaust system is code compliant and appears to have ample capacity. The kitchen exhaust system dose not need to be replaced at this time.

Replace the supply fan with a gas fired make-up unit.

An air exchange of outdoor air with the air already in a building can be divided into two broad classifications, ventilation and infiltration. Ventilation is the intentional introduction of air from the outside into a building. There are common types of ventilation: (definitions from ASHRAE): Mechanical Ventilation: The intentional movement of air into and out of a building using fans and intake and exhaust vents. Natural Ventilation: The intentional flow of air through open doors, windows, grilles, and other planned building envelope penetrations, and it is driven by natural and/or artificially produced pressure differentials. Infiltration is the uncontrolled flow of outdoor air into a building through cracks or other unintentional openings through the normal use of exterior doors for entrance and egress.

Modern schools are provided with mechanical ventilation and are pressurized to reduce or eliminate infiltration. Mechanical ventilation has the greatest potential for control of air exchange



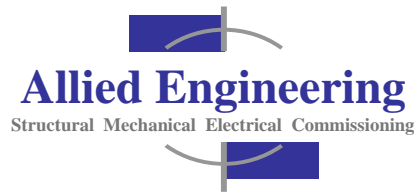
when the system is properly designed, installed, and operated; and should provide acceptable indoor air quality (IAQ) when ASHRAE Standard 62 requirements are followed. Natural ventilation, such as through operable windows, is not desirable from the point of view of comfort or energy conservation or comfort. Infiltration is not reliable for ventilation purposes because it depends on weather conditions, building construction, and maintenance.

Original 1955 Building – There are no dedicated mechanical ventilation systems introducing outside air in to the space. Ventilation is provided by operable windows with operation of (4) rooftop exhaust fans serving classrooms and toilets.

Replace existing exhaust fans and provide new rooftop heat recovery units. The current ventilation standard for schools requires 15 cfm of outside air per occupant. With 25 occupants per classrooms the required outside airflow is thus 375 cfm. The new ventilation system would duct proper amounts of fresh air to each classroom.

The 1969 Addition – There are no dedicated mechanical ventilation systems introducing outside air in to the space. Ventilation is provided by operable windows with operation of (4) rooftop exhaust fans serving classrooms, corridor and toilets.

Replace existing exhaust fans and provide new rooftop heat recovery units. The current ventilation standard for schools requires 15 cfm of outside air per occupant. With 25 occupants per classrooms the required outside airflow is thus 375 cfm. The



new ventilation system would duct proper amounts of fresh air to each classroom.

FUEL OIL TANKS

(1) 10,000 gallon underground oil tank with double wall construction and leak detection monitoring system, this system was installed in 1999.

The oil tanks are code compliant and do not need to be replaced at this time.

HEATING CONTROLS

The heating control system is pneumatic with two way control valves controlled by pneumatic thermostats. The system was upgraded in 1995.

Replace existing pneumatic controls and provide new automatic temperature control system and building management system to serve the new heating and ventilation systems in the building.

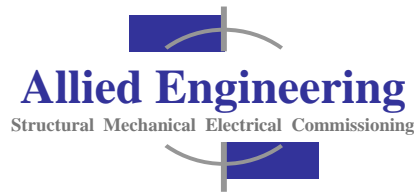
PLUMBING SYSTEM

The existing plumbing system is original to the original 1954 building and the 1969 addition. Plumbing fixtures appear to be original also domestic water and sanitary piping is also original to the building.

Replace existing plumbing fixtures and domestic water piping and sanitary piping through out the building.

DOMESTIC HOT WATER

Domestic hot water is provided from single oil fired water heater with 70 gallon capacity and 157 gph recovery and appears to have been installed in 1988.



The domestic water heater appears to be code compliant and appears to have ample capacity. The domestic system does not need to be replaced at this time.

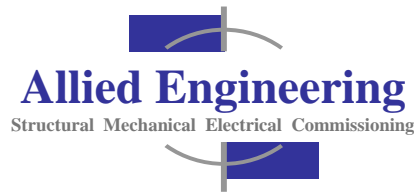
SPRINKLER There is currently no system of automatic sprinklers within this facility. Oftentimes, installation of an automatic sprinkler system will reduce some otherwise required architectural rating issues. An analysis of the code requirements is being performed under other sections of this report. In the event that a sprinkler system is deemed necessary or cost effective, Allied would recommend installation of a wet pipe system for complete coverage of occupied areas in accordance with NFPA 13 requirements.

Provide a new wet fire protection system.

MAINTENANCE

The systems reviewed were “big picture” items. Detailed investigations of sub-systems were not reviewed in detail. The following is a list of some items that should be checked. The items listed are generic and not intended to comment on current maintenance procedures. Please consider the following comments and recommendations:

Verify that the following maintenance tasks are being performed: It is important to regularly maintain boiler water level controls, such as low water cutoffs and water feeders. These important safety devices prevent the burner from firing while the water level is too low. These controls must be blown down to remove sludge and ensure smooth operation of the float. We recommend periodic cleaning, maintenance, and replacement of worn parts. Qualified personnel should perform all maintenance. The safety relief device is the most important device on a boiler or domestic hot



water heater. These devices must be checked regularly. When testing safety valves on steam boilers, use caution.

Annual boiler efficiency audits, including combustion tests should be performed.

A backflow preventer survey should be performed. Backflow preventers are important to avoid contaminating potable water with dirty water.

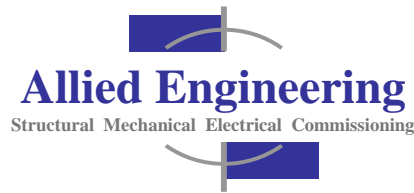
Any standing or stagnant water must be eliminated. Places to check include mechanical rooms, air handler drain pans, fresh air intakes, and locker rooms. Make sure all building leaks are repaired. Damaged (wet) building materials should be checked for microbial contamination.

Temperature controls should be periodically calibrated and adjusted.

Domestic hot water should be checked for proper temperatures, 140F in kitchen and 110F at lavatories. Excessive temperatures can be a safety concern.

The chimneys should be inspected annually.

ELECTRICAL SERVICE AND MAIN DISTRIBUTION The electrical service is a three-phase 208Y/120V 4-wire system rated 600 amps. It originates from a Public Service Of New Hampshire (PSNH) utility pole some 40 feet underground to the school's Main Service disconnect, a 600-amp rated enclosed circuit breaker (CB). From the load side of this main disconnect, a 600-amp feeder runs within a wireway to feed a 300 amp CB



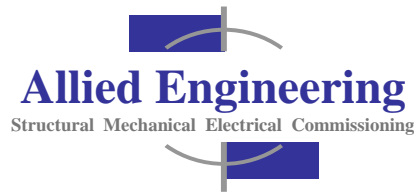
that supplies the original building's Main Distribution Panel (MDP) via a tap. The 600 amp feeder is tapped 3 more times to feed panels A, B and J located in the 1969 addition.

The feeders for all branch circuit panels were updated during a late 1990's electrical renovation. Also during this time the original building MDP was replaced with a 600 amp main circuit breaker (MCB) switchboard, now labeled as MDP-1.

If a major renovation with full mechanical upgrades were planned this existing system would need to be upgraded to have adequate capacity to meet the demand the new loads would create. We suggest the removal of the 600 amp main CB and replace with a new properly rated service entrance and MDP for the additional loads proposed. The new MDP would refeed all the existing branch circuit panels including MDP-1 and any new panels created for the additional loads.

Upgrade electrical service and distribution

PANELS AND BRANCH CIRCUITS There are several branch circuit panels throughout the building ranging from when the original building was built, to the 1969 renovation and one that appears to be installed during the mid 1990's (Panel J). Branch circuits that originate from these panels are either routed in conduit or metal raceway systems where exposed. Considering the vintage of the building, we suspect that non-metallic sheathed cables (romex) are used in some areas where concealed. The 2005 edition of the *National Electrical Code* (NEC) prohibits installing romex cable above accessible suspended ceilings, but existing installations are not required to be updated unless significant renovations are



undertaken.

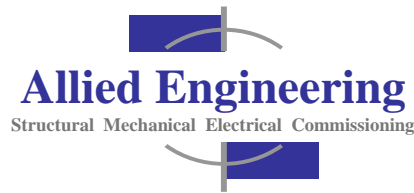
Within the 1969 addition boiler room, all conduits appear to be properly fire stopped where they penetrate the fire-rated walls.

It is recommended that all six existing branch circuit panels be replaced and wired back to either the new MDP or MDP-1. The only two panels to remain are panels J and the new boiler room panel (located in the original boiler room). All other panels located in the original building and the 1969 addition have exceeded the useful life expectancy. Any branch circuits affected would be replaced and wired to meet the current edition of the NEC. Also with proposed mechanical HVAC upgrades, equipment connections and wiring will be required along with ceiling device removals and reinstallations if these upgrades are pursued.

Upgrade branch circuit panels and wiring:

Mechanical equipment branch circuit panels and wiring:

FIRE ALARM SYSTEM The fire alarm system is a Honeywell zoned system consisting of 8 zones with 4 spare, with an annunciator and dialer. The fire alarm system notification horns and strobes were recently upgraded to meet spacing and height requirements of NFPA 72. However these mounting heights do not meet the Americans With Disabilities Act (ADA) Standards for accessible design, which state that visual appliances be located 80" above the finished floor or 6" below the ceiling, whichever is lower. We also observed that there were isolated spacing issues in the corridors for the existing strobe units. The kitchen fire suppression system is connected to activate the system upon hood activation and



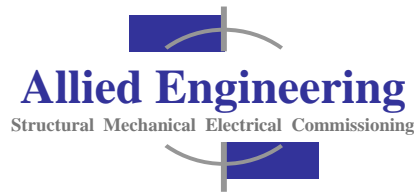
close the gas valve to the stove; this system appears to meet current NFPA requirements. However, the recent addition of an electric steamer does not have its source disconnected under hood activation. Pull stations were observed at all exits from the building. Smoke detectors are located within the corridors and heat detectors in the boiler rooms.

We recommend that during a major renovation the updating of the fire alarm to meet NFPA spacing requirements should coincide for horn and strobe placement. Currently the mounting height does not comply with ADA recommendations and we feel that an equivalent facilitation assessment should be determined by the local Authority Having Jurisdiction (AHJ).

Fire alarm modifications and upgrades

INTERIOR LIGHTING The existing lighting was upgraded approximately 10 years ago to T-8 lamps and what we assume are electronic ballasts. The corridor and classrooms are lit using wraparound fixtures with 2-lamps per cross section; this is standard for all area except a few non-public spaces where some incandescent lamps still remain. The gymnasium is lit using HID low-bay luminaires, and what appear to be metal halide lamps. Overall the building illumination seems to be adequate for the corridor and office spaces. The classrooms seem to have adequate illumination with plenty of natural daylight and local control over each row of luminaires within the space.

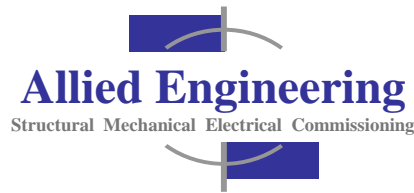
As part of any significant building renovation, we recommend the addition of a building wide lighting control system consisting of a



master time clock control panel which will allow for individual rooms/areas to be controlled automatically, but still provide local override and control. The use of local occupancy sensors for areas to small or cost prohibitive for building wide connection will be used for local auto-off control. This will allow the building owner to conserve energy lost from lighting unoccupied areas and allow for more global control of lighting. We also suggest the incorporation of local daylighting controls in the classrooms to allow for maximum use of the natural daylight already present, this will allow for an additional decrease in energy use from lighting. Also we recommend removing all old and obsolete incandescent luminaires still in use. Although a building wide lighting control system is not required under The State Of New Hampshire energy codes, we feel it is in the best interest of the building owner to help reduce energy costs.

Exit and emergency lighting has also been updated, we assume during the same time as the rest of the building luminaire upgrades. They consist of a typical battery pack with 2 heads located throughout the corridors. Exit signs consist of LED illumination with integral battery backup. Also observed were non-illuminated exit signs that would need to be upgraded. No emergency lighting units were observed in any of the bathrooms or boiler rooms. In general exit signs comply with current codes for spacing and visibility requirements.

We recommend the addition of emergency lighting units and LED exit signs to the areas currently not code compliant and the adjusting of spacing and placement of the existing units as required to comply with current life safety requirements.



*Add building wide lighting control and daylighting
Emergency lighting upgrades and minor lighting upgrades:*

PHONE, CATV, INTERCOM, CLOCK AND SECURITY SYSTEMS The telephone overhead service drop connects to the building near the gymnasium and runs along the roof to where it terminates in the main boiler room in the 1969 addition. The CATV follows the same path as the telephone but enters through the original building boiler room until it terminates in the hub room. We believe this service is for internet access only.

The phone system is 8EXT Digital Super Hybrid system with a TVS50 Voice Processing system. This system is fairly new and appears fully functional and has not exceeded its useful life expectancy.

The intercom system is an Aiphone NEM-40A, this system allows for room to room communication and privacy with the use of a handset within the classroom. This unit has 8 spare ports for expansion and has not exceeded its useful life expectancy.

The bell controller is an American Sonachron. This unit is relatively new and has not exceeded its useful life expectancy.

The existing clock system doesn't seem to be controlled by a master clock system. The existing system has not exceeded its useful life expectancy.

There is currently no security system present in this building.

We recommend the existing intercom system; bell controller and clock system are adequate for present needs and will support

ED FENN SCHOOL

SUMMARY OF IMPROVEMENTS

The list of improvements for consideration are as follows:

1. Install a full automatic sprinkler system to bring building into compliance for allowable area, and area separation.
2. Replace roof system. Type/options to be determined. Upgrade to structural steel and roof deck in specific locations may be required depending on solution.
3. Install ventilation equipment to bring facility into compliance with air change regulations.
4. Improvements to electrical infrastructure as outlined to support new air handling equipment.
5. Provide handicapped accessible toilets.
6. Rebuild chimneys.
7. Remove fiberboard ceiling tiles and replace water stained ceiling tiles.
8. Confirm stage curtain compliance.
9. Replace original boiler and fin tube radiation.
10. Replace combustion air system.
11. Install new automatic temperature control system.
12. Replace plumbing fixtures, sanitary and water piping.
13. Upgrade of fire alarm system.
14. Upgrade emergency lighting.
15. Install security system.

Other items for consideration would include:

- Window replacement.

MIDDLE SCHOOL/HIGH SCHOOL FACILITIES REPORT

June 22, 2006

BASIC INFORMATION

Site: Approximately 4 Acres (includes two adjacent house properties)

Year Constructed: 1924, 1929, 1959, 1969, 1997 (elev).
3 stories + 1 story

Gross SF: 66,260sf (Footprint= 38,228sf)

Construction Types:
IBC Table 601 1924 III B Masonry bearing/combustible floor/roof
unprotected.
vs.
1964 IIB Non combustible, unprotected

Occupancy: Chapters 13 + 15
NFPA 101 E: Educational, with accessory A:
IBC 302 Assembly at gym and cafeteria
(A 3)

Allowable Area: E: Base = 14,400 for Type III B
IBC 506 as A: Base = 8,400 for type IIB construction.
Modified by State of
NH

Street frontage increase modification:
Approximately 25% of excess frontage (to be confirmed with Fire Marshall's Office)= 50% allowable
increase.

$8,400\text{sf} \times 50\% = 4,200\text{sf}$ plus base of $8,400\text{sf} = 12,600\text{sf}$ allowable area.

BUILDING ENVELOPE

The following notes are based on review of existing documents, on site observations, previous reports, and input from building users. No intrusive investigations have been made.

Roof: Roofs are internally drained, tar and gravel, original systems that have been re-saturated and patched. The roofs leak in several areas and flashings are in need of repair.

It is not known by this writer if the roof contains or has been tested for asbestos content.

The roof system should be replaced.

Exterior Walls: The brick veneer is in good condition for the most part. Some repointing needs to be done to prevent water infiltration in various areas but it is minor. Window sills need recaulking. No cracking of brick was observed with the exception of the repair work done at the corner of the gym/locker room area and the chimney that needs repair.

Brick Chimney: The brick chimney has a substantial crack in the brick as well as mortar deterioration. The chimney should be rebuilt with a proper flue liner, masonry surround, flashing, cap and veneer.

Exterior Doors & Windows:

Exterior windows are a mix of types:

Single pane, aluminum frame windows (non thermally broken) and clad wood replacement windows.

Some windows are located at grade level which has the potential for water/snow infiltration.

There are complaints regarding the clad wood replacement windows as being difficult to operate in some cases and drafty.

Window replacement of all windows should be considered but especially the aluminum frame single pane windows.

Exterior doors seem to be in good serviceable condition.

Interior:

Walls: Combination of painted CMU and plaster veneer walls. All seem to be in good condition and wearing well. No ratings on walls and doors are determinable.

Floors: A combination of some carpet (limited) newer VCT and some VAT (stair treads, some corridors).

There has been a replacement effort to change out VAT to VCT.

Wood floor at gym shows signs of deterioration.

Ceilings: Combination of painted gypsum board or plaster and suspended acoustical tiles-stained tiles from water damage should be replaced regularly.

Casework/
Equipment:

Various degrees of wear of existing equipment but for the most part, it should be replaced.

Existing slate chalkboards in several classrooms should be considered for replacement with markerboards due to allergens associated with airborne dust particles from chalk.

Handicapped
Accessibility:

Lever handles have been installed in doors and most areas are accessible. There are some door clearance issues that are difficult to address due to existing conditions. Toilet rooms need to be upgraded to accommodate accessibility clearances.

An elevator was installed in 1997 to make the levels accessible.

The ramp from the cafeteria to the music room is approximately 45' long without a landing exceeding the 30' maximum distance. Missing handrails on one side mounted at 19" AFF.

Stairs: There are five main stairs in the building and two serving the locker room area:

There are no stairs that comply with current life safety codes in regards to enclosures and being area of refuge, discharge to the exterior (except the front door stair) railings, balusters and guards. Proper redesign and new stair enclosures should be a high priority for this facility as it is a major life safety feature that is currently inadequate.

Atrium: The atrium area does not meet the criteria under NFPA section 8.6.6 and needs to be modified to address compliance issues.

Fire Safety:As noted under basic information the allowable floor area for this structure is 12,600sf and each of the floors exceed this amount.

Area separations need to be introduced to help bring the building into compliance. Also, the installation of a full coverage automatic sprinkler system will go a long way in addressing compliance issues as far as wall and door ratings, egress, allowable area increases, and fire separation. In any renovation plans or addition or redesign, careful code review and planning will need to be undertaken to bring this facility into compliance.

STRUCTURAL EVALUATION REPORT
of
GORHAM MIDDLE HIGH SCHOOL
GORHAM, NEW HAMPSHIRE

Prepared for:
Banwell Architects
6 South Park Street
Lebanon, NH 03766

May 16, 2006

Prepared by:

H.E. Bergeron Engineers, P.A.
PO Box 440
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603-356-6936
HEB Job No. 2006-040

**STRUCTURAL EVALUATION REPORT
OF
GORHAM MIDDLE HIGH SCHOOL
GORHAM, NH
prepared for
BANWELL ARCHITECTS**

Background

H.E. Bergeron Engineers (HEB) performed a “walk-through” structural inspection and evaluation of the Gorham Middle High School in Gorham, New Hampshire. The purpose of the structural evaluation was to assess the condition and capacity of the school building in order to facilitate future programming for the middle/high school. The inspection and evaluation were conducted in accordance with our agreement dated May 16, 2006. The Gorham Middle/High School is a three story steel frame building with concrete masonry block infill, it is unknown when the original building was constructed, but additions were constructed in 1958 and 1968. Repairs of the cafeteria, science wing, and main building roofs were made in December, 2003, based on an inspection report prepared by H.E. Bergeron Engineers dated October 22, 2003.

Methodology

The evaluation consisted of a “walk-through” site visit to inspect and verify as-built construction of the roofs, and an analysis to determine the capacity of the roof, floor, and wall structures. The analysis results for roof, floor, and wall components were then compared to current code load requirements. No material samples were taken and no laboratory testing was performed.

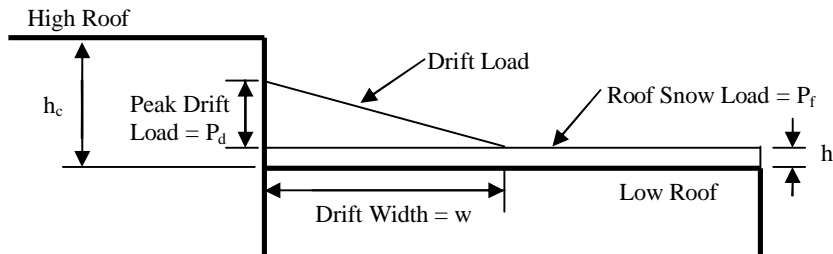
§ *Building Code*

The current building code adopted by the state of New Hampshire is the *International Building Code 2000* (IBC 2000). Since the Town of Gorham has not adopted any other building codes, IBC 2000 was used for our analysis.

§ *Snow Loads*

For snow loads applied to the roof, the IBC 2000 references the American Society of Civil Engineers *Minimum Design Loads for Buildings and Other Structures, 1998 edition* (ASCE 7-98). Figure 7-1 of the ASCE 7-98 indicates that a site-specific case study is required to establish the ground snow load (P_g) for Gorham, NH. The U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) has prepared a study of the ground snow loads for every town in NH. From this report (ERDC/CRREL TR-02-6), the ground snow load for the Gorham area is 100 psf at an elevation of 1400 feet. The elevation of Gorham Middle High School is approximately 790 feet; therefore the report states that an adjusted ground snow load of 85 psf should be considered.

The building, as constructed, has several different height flat roofs. For this reason, the following snow load sections of ASCE 7-98 also apply: (section 7.3) Flat Roof Snow Loads and (section 7.7) Drifts on Lower Roofs. For the drift loads both windward and leeward directions were considered and worst-case applied to the balanced snow loads.



The following snow loads and drift loads for the roofs were calculated using the above-mentioned codes:

Flat Roof Snow Loads: **$P_f = 60$ psf (high roofs)**
 $P_f = 65$ psf (low roofs)
Drift Loads: **$P_d = \text{varies from } 100 - 130$ psf**
 See the attached Snow Load Diagram

§ *Floor Live Loads*

From IBC 2000, table 1607.1, the following are the minimum uniformly distributed live loads for school buildings.

Classrooms **40 psf**
Corridors above first floor **80 psf**
First floor corridors **100 psf**

Field Inspection

A “walk-through” inspection of school was performed on April 20, 2006 by Jason Ross of HEB and David Lauren of Banwell Architects. The school principal, Keith Parent, was on-site to answer questions and provide access to the building.

Roof:

The original school building appears to have been constructed using load bearing masonry walls with timber floor and roof structures. At some point, a gymnasium was added onto the rear of the building. This addition was constructed using steel beams and columns with concrete masonry unit (CMU) infill. The roof has timber joists and a wooden deck. There is also a sloped, cast-in-place concrete seating area. No drawings of the original buildings have been located.

Additions to the building were constructed in 1958 (science wing, locker room, and cafeteria/kitchen) and in 1968 (3-story classroom wing and Ann Lary wing). As was typical for schools of this time period, the building additions were constructed using steel beams and columns with concrete masonry unit (CMU) infill. Steel columns, which are W-shaped, support steel beams at the floor and roof levels. The floors consist of open-web steel joists that support a 4-inch thick reinforced concrete deck. Open-web steel joists span between the roof-beams and support what appears to be Tectum roof deck with felt and gravel roofing. This appears to have been a substitution during construction since the design drawings call out "Insulrock" decking, which is slightly different than Tectum. In the cafeteria and kitchen areas, two layers of ceilings are suspended from the joists.

Tectum is an effective roof decking material providing that it stays dry. However, if the panels get wet, the fibers in the panels swell and the structural capacity drops. Several areas of stained ceiling tiles were observed throughout the building, indicating that there have been leaks in the roof. Since there are two layers of ceiling tiles, it was impossible to inspect the bottom of the Tectum decking in order to assess the condition of the panels. Further inspection will be required to determine the overall condition of the deck panels.

Chimneys & Foundation:

Several cracks and decomposing mortar were observed on the chimney. Some of the mortar on the face of the original building also showed signs of weathering. The walls of the locker-room on the northeast side of the gym show cracking and bowing. It appears that there has been some settling in the soil under the foundation.

Walls:

Diagonal bracing for lateral load resistance does not appear on the structural drawings and none was observed. Lateral loads appear to be resisted by the masonry infill acting as shear walls. It is not known if the CMU walls are reinforced and/or filled with grout.

Floors:

The floor framing in original building could not be accessed in order to determine the type and sizes of the members. Also, drawings of the original building could not be located. Further inspection will be required to determine the adequacy of the floor structure.

The suspended walkway between the original building and the 3-story 1968 classroom wing was observed, but there were no access points to observe the actual connections and bearing points.

Analysis & Results

Current code snow loads and drifts on the roof are shown above. The original design drawings do not state what loads the roofs were designed for. From the original drawings, the roof joists are evenly spaced throughout the building and they are not spaced closer together on lower roofs, in areas where snowdrift would be anticipated. Based on this observation, it appears that the original design did not account for drifting snow.

The following dead loads were assumed for the roof capacity calculations:

Original Roof:

3-ply felt & gravel roofing	5.6 psf
Rigid insulation	2.0 psf
Decking (1" thick wood)	3.0 psf
Ceiling Allowance	4.0 psf
<u>Mechanical allowance</u>	<u>3.0 psf</u>
Total	17.6 psf

Gymnasium Roof:

3-ply felt & gravel roofing	5.6 psf
Rigid insulation	2.0 psf
Decking (1" thick wood)	3.0 psf
Lath & Plaster Ceiling	10.0 psf
<u>Mechanical allowance</u>	<u>3.0 psf</u>
Total	23.6 psf

1958 Addition Roofs:

3-ply felt & gravel roofing	5.6 psf
Light weight concrete	12.0 psf
2" Tectum decking	3.5 psf
Wood suspended ceiling	2.5 psf
Steel suspended ceiling	2.0 psf
<u>Mechanical allowance</u>	<u>3.0 psf</u>
Total	28.6 psf

1968 Addition Roofs:

3-ply felt & gravel roofing	5.6 psf
Rigid Insulation (2" urethane)	2.0 psf
3" Tectum decking	5.3 psf
Steel suspended ceiling	2.0 psf
<u>Mechanical allowance</u>	<u>3.0 psf</u>
Total	17.9 psf

§ *Roof Deck*

Original Building & Gymnasium:

The roofs of the original building and the gymnasium have 1" thick timber decking with rafters spaced at 16" o.c. The snow load capacity of 1" timber decking supported at 16" o.c. is approximately 400 pounds per square foot. This is much higher than the required snow loads.

Building Additions 1958 & 1968:

In general, additions to the building have tectum plank decks that bear on steel bar joists. From the Tectum Roof Deck Design Guide, the snow load capacity of a 3" thick tectum plank deck, supported at 45" on center, is approximately 60 pounds per square foot. Also, the snow load capacity of a 2" thick tectum plank deck, supported at 32" on center, is approximately 60 pounds per square foot.

Providing that the material has not been damaged by water, this is an acceptable capacity for some of the roof areas. The material is not sufficient for the areas of high snow drift loads.

§ **Roof Joists**

Original Building:

The roof of the original building was constructed with full sawn 2"x12" rafters spaced at 16" o.c. and supported on load bearing masonry walls. The shorter span areas over the interior classrooms and corridors have a snow load capacity of approximately 50 pounds per square foot. The classrooms on the northwest and southeast ends of the building were reinforced with additional rafters in 2003 and have a snow load capacity of approximately 60 pounds per square foot.

Gymnasium:

The gym roof was constructed with wooden rafters supported on steel beams and girders. The rafters at the southwest end of the gym are 2x8's spaced at 16" o.c. and have a snow load capacity of approximately 50 psf. The rafters in the central area of the gym are 2x6's spaced at 16" o.c. and have a snow load capacity of approximately 50 psf. The rafters at the northeast end of the gym are 3x16's spaced at 16" o.c. and have a snow load capacity of approximately 50 psf.

Building Additions 1958 & 1968:

Steel bar joist are the typical roof construction throughout most of the additions. These steel roof joists were evaluated through the use of load tables that were compiled by the Steel Joist Institute. Since the additions to the building were constructed during several different time periods, there are several different designations of joists used in the design drawings. The SJ-series joists were produced from 1929 through 1958, L-series joists were produced from 1953 through 1961, S-series joists were produced from 1958 through 1961, and J-series joists were produced from 1961 through 1978. Current publications from joist manufacturers do not have any of these series joists listed. Therefore, a special publication, the *Steel Joist Institute (SJI) 60-Year Manual (1928-1988)*, was used to look-up the allowable loads for these joists.

From the design tables, it appears that the joists over the science wing and the cafeteria/kitchen were designed for a 35 pound per square foot design snow loading, but were temporarily reinforced in 2003 to a capacity of approximately 70 pounds per square foot. The joists over the locker room area were designed for approximately 45 pounds per square foot. The joists over the Ann Lary wing and the front classroom wing were designed for a 50 pound per square foot design snow loading. There is no evidence that snow drifting was taken into account in the original design of any of these roofs.

§ **Roof Beams**

The steel roof beams were evaluated using their allowable resisting moment (Mr) as specified in the American Institute of Steel Construction (AISC) Allowable Stress Design Manual, 9th edition (ASD). A36 steel was assumed (Fy = 36 ksi) having an

allowable bending stress of 23.8 ksi. The allowable snow load was calculated for the existing beams.

Results from the analysis show that the snow load capacity of the structural steel roof beams varies from 50 to 80 psf. This is acceptable for the flat roof snow loads, but is insufficient for the areas of drifting.

The steel girders in the gym that are spaced at 15 feet on center have a snow load capacity of 80 psf. The northeastern girder has a snow load capacity of 44 psf.

§ *Floor Structure*

The plans for the original building could not be located and the floor framing members were not accessible without some minor demolition. Further investigation will be required to determine the capacity of these floors.

Plans for the 1968, 3-story addition were reviewed and the floor framing members were easily observed. From the analysis, it appears that the floor joists in the corridors have a live load capacity of approximately 130 pounds per square foot and the classroom joists have a live load capacity of approximately 80 pounds per square foot. The steel beams along the corridors and along the outside of the classrooms both have a live load capacity of approximately 80 pounds per square foot. All of these live load capacities meet or exceed the requirements of IBC-2000.

§ *Suspended Walkway*

The plans for the 1968, 3-story addition, show the framing of the suspended walkway. The walkway consists of a 4 inch thick reinforced concrete slab that is connected to the face of the original building and is suspended from the roof structure with ¾" diameter steel tie rods. From the analysis, it appears that the walkway was designed for a live load capacity of 80 pounds per square foot.

§ *CMU Gymnasium Walls*

The un-reinforced CMU walls in the Gymnasium were analyzed for wind load. Based on IBC 2000, the required wind load capacity for buildings with a mean roof height of 30 feet or less, located in areas in the Exposure B category, is 12.8 psf. The allowable horizontal uniform load for the vertical walls, comprised of un-reinforced 8-inch concrete blocks composite with 4-inch face bricks, with an exposure of 10 feet, is 20 psf. This is greater than the required wind load, so no reinforcement is required. The allowable horizontal uniform load for the vertical walls, comprised of un-reinforced 8-inch concrete blocks composite with 4-inch face bricks, with an exposure of 20 feet, is 5 psf. This is less than the required wind load, so reinforcement or replacement of these tall walls is required.

Recommendations

§ Roof deck

Timber Rafters in Original Building & Gymnasium:

From the analysis, it appears that the timber roof decking in the original building and in the gym roof is more than adequate to support the required flat roof and snow drift loads. *We recommend leaving this material in place without any modifications.*

Tectum Deck Panels in 1958 & 1968 Roofs:

Further inspection of the roof deck is required to determine the overall condition of the deck panels. Providing that there is not significant water damage, the existing panels are acceptable for the normal flat roof snow loads. *We recommend installing additional reinforcing of the roof panels in the areas of heavy snow drifts.* This can be accomplished by either reducing the deck span or replacing the panels with a stronger roofing material.

If it is determined that there is significant water damage to the panels, *we recommend completely replacing the roof panels.*

§ Roof Joists

Timber Rafters in Original Building & Gymnasium:

From the analysis, it appears that the timber rafters were designed for the required code snow load at the time the building was designed, approximately 50 psf. This is only slightly less than the current flat roof snow load requirements. Since the rafters are not significantly under designed, *we recommend leaving the rafters as they are on the main roof and inspecting them periodically.* *We recommend installing additional rafters in the heavy snow drift areas in the gym,* in order to meet the current snow drift requirements.

Steel Bar Joists in 1958 & 1968 Roofs:

From the analysis, it appears that the roof joists in the science wing and the cafeteria/kitchen were originally designed for a snow load of approximately 35 psf and were temporarily reinforced in 2003 to a snow load capacity of approximately 70 pounds per square foot. These capacities are adequate for the flat roof snow loads. Unfortunately, these roofs are in the areas with the highest snow drift loads. They are also the areas that have had the most problems throughout the years with water damage. The locker room roof has a snow load capacity of approximately 45 pounds per square foot. Taking all of these issues into account along with the fact that the repairs in 2003 were intended to be temporary, until a permanent solution could be reached, *we recommend, if the building is to continue in use, completely removing these areas of roof, redesigning them for current snow loads, and replacing them.*

From the analysis, it appears that the roof joists in the Ann Lary wing and the front classroom wing were designed for the required code snow load at the time these

additions were designed, approximately 50 psf. During the past 38 years there have been no reported problems with the roof structures in these areas and there do not appear to be any joists, except for the snow drift areas, which were seriously under-designed. Based on these results, *we recommend leaving the roof joists as they are in the Ann Lary wing and the front classroom wing and inspecting them periodically. We recommend installing additional joists in the heavy snow drift areas, in order to meet the current snow drift requirements.*

§ **Roof beams**

1958 & 1968 Building Additions:

Most of the steel roof beams also appear to have been designed for the required code snow load at the time the building was designed, approximately 50 psf. As with the joists, there do not appear to be any beams that are seriously under-designed. Also, masonry partition walls have been installed under many of the beams, which has significantly increased the capacity of the roof beams. Based on these results, *we recommend leaving the roof beams as they are currently installed in the majority of the building. We recommend replacing or reinforcing the under-sized girder in the gymnasium. Other isolated areas with high snow drift loads may need to be reinforced.*

§ **Floors**

From the analysis, it appears that the floors in the 1968 addition all meet or exceed the IBC-2000 floor loading requirements. *We recommend leaving the floor framing as currently installed. No additional reinforcing is required.*

Additional investigation is required to determine the adequacy of the floors in the original building.

§ **Suspended Walkway**

The design of the suspended walkway depends on several $\frac{3}{4}$ " diameter rods that hang from a beam in the roof. If one of these rods or one of the welded connections were damaged in any way, the whole structure could become unstable and dangerous. These issues are reinforced by the catastrophic failure of a similar walkway at the Kansas City, Hyatt Regency Hotel in 1981. The walkway is also supported by anchor bolts in the original masonry. The design values of the old masonry are difficult to determine.

Although the analysis of the suspended walkway shows that it was designed to hold the required code floor loads, *we recommend either removing and replacing the structure or performing further detailed inspection and non-destructive testing of the structure.*

§ **Masonry**

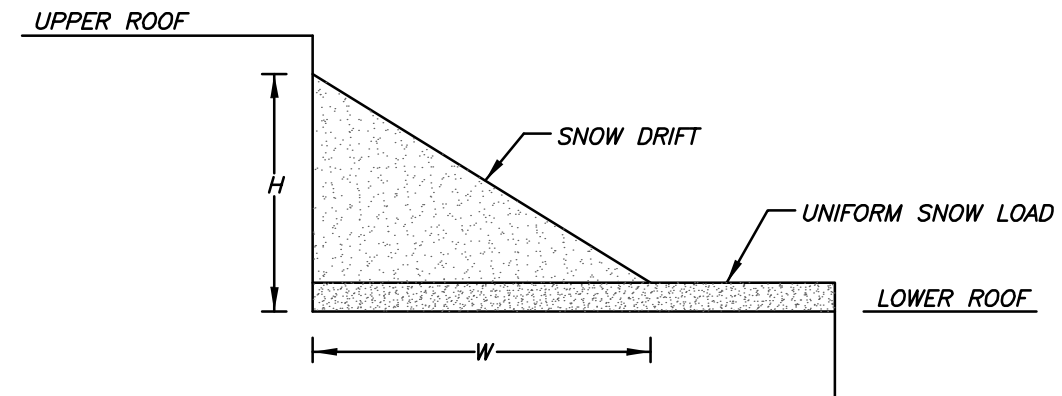
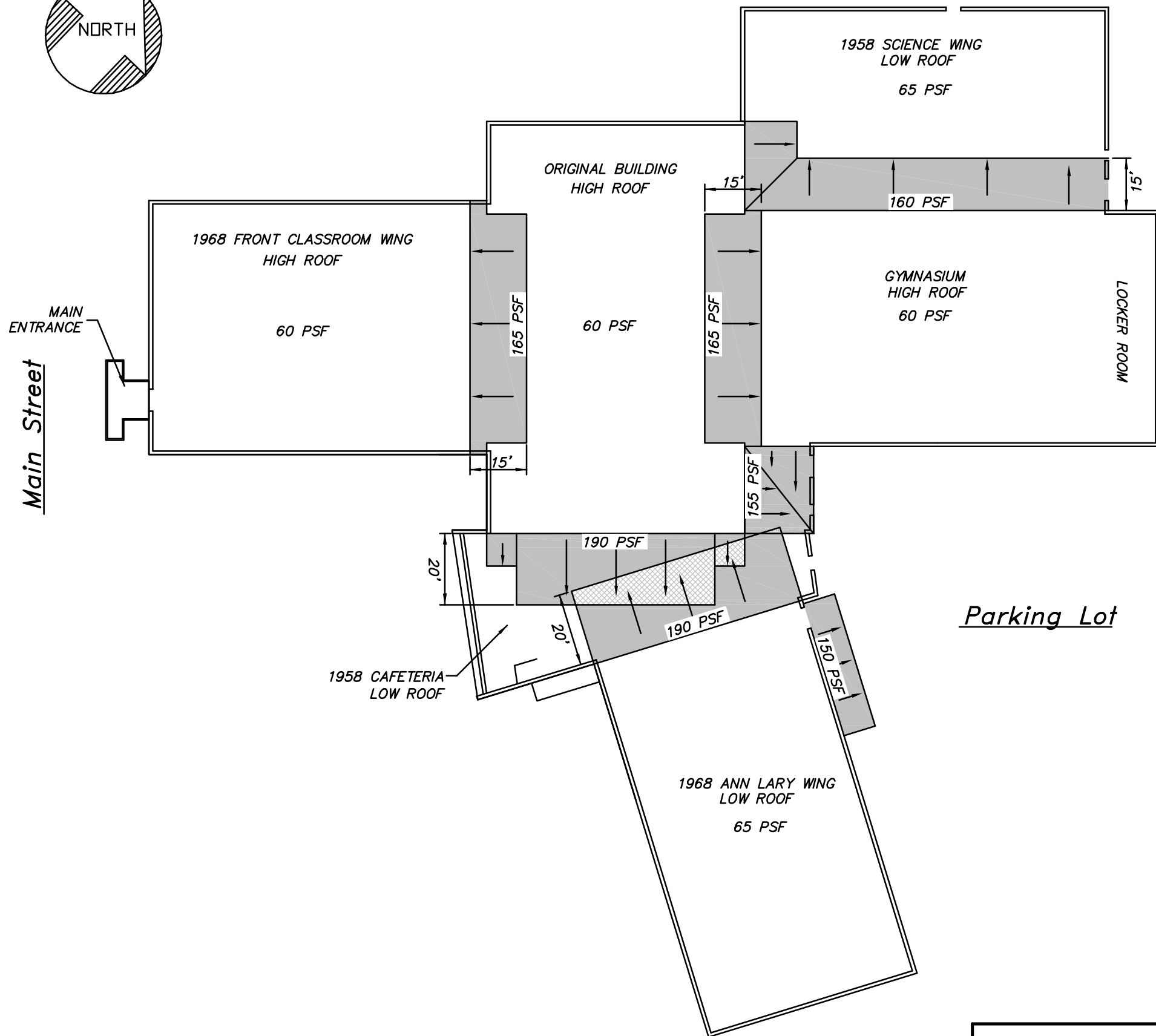
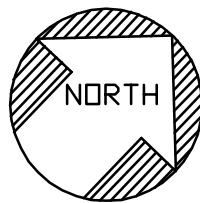
In the areas where there is cracking and deterioration of the grout on the exterior walls, *we recommend re-pointing the masonry as needed in order to prevent further damage.* Additional investigation of inside of chimneys is required in order to determine the extent of cracking.

Based on the low wind load capacity and the fact the one wall is bowing, *we recommend reinforcing or replacing the tall masonry walls on the southeast side of the gym and the locker room to resist wind loads.*

Disclaimer

The opinions stated in this report are based on a walk-through inspection, limited to visual observation and review of existing plans and reports. Limited structural calculations were performed. No physical or material testing was performed. This report is to be used for the purpose intended and no additional guarantees or warranties are given or implied.

We hope you find this report meets your needs. If you have any further questions please let us know.



SNOW DRIFT DIAGRAM

LEGEND:

- SNOW DRIFTING AREA DIRECTION
- ** PSF POUNDS PER SQUARE FOOT (DESIGN SNOW LOAD)
- SNOW DRIFTING AREA BOTH DIRECTIONS
- $x \cdot x'$ LENGTH OF DRIFT

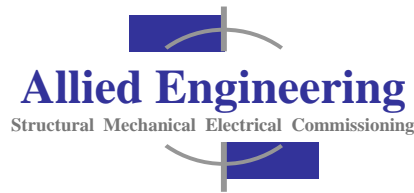
NOTES:

1. CODE SNOW LOAD FOR HIGH FLAT ROOF = 60 PSF
2. CODE SNOW LOAD FOR LOWER FLAT ROOF = 65 PSF
3. GROUND SNOW LOAD = 85 PSF

PLAN REFERENCES:

1. "ADDITIONS AND ALTERATIONS TO HIGH SCHOOL BUILDING FOR THE SCHOOL DISTRICT OF THE TOWN OF GORHAM, NEW HAMPSHIRE", IRVING W. HERSEY ASSOCIATES, APRIL 25, 1958.
2. "ADDITIONS AND ALTERATIONS TO GORHAM HIGH SCHOOL, GORHAM, NH", W.H. JONES & SON ARCHITECTS, JULY 19, 1968.
3. "AS-BUILT ROOF REPAIRS OF GORHAM MIDDLE/HIGH SCHOOL", H.E. BERGERON ENGINEERS, PA, JANUARY 13, 2004.

	H.E. BERGERON ENGINEERS, P.A. NORTH CONWAY, N.H. (603) 358-6936		CODE SNOW LOADING PLAN GORHAM MIDDLE/HIGH SCHOOL GORHAM, NH PREPARED FOR BANWELL ARCHITECTS	FIGURE 1	SCALE 1/32"=1'	
				SURVEYED BY .. FIELD BOOK ..		
				DRAWN BY JCR DATE 5/16/06		
				CHECKED BY HEB DRAWING # 2006-040		



Middle School/High School

The original mechanical systems have been upgraded throughout the years in the original 1924 building and in the 1958 and 1968 additions.

HEATING SYSTEMS Original 1924 Building and 1958 and 1968 additions - Heating is provided by a two 1994-vintage HB Smith oil-fired boiler model # LO-28A-10. Rated boiler plant total capacity is 4,055,600 BTUH output. A five-zone circulator pump system supplies hot water to hot water fined tube radiation in each class room. Boiler hot water temperature supplied to the building is controlled by a 3-way automatic control valve which modulates in accordance with outside air temperature.

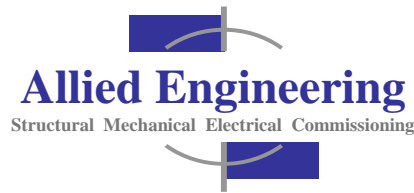
Hot water unit heaters serve Cafeteria, Gymnasium, Kitchen, and Industrial art areas.

This boiler system is code compliant and appears to have ample capacity for new ventilation. The boiler system does not need to be replaced at this time.

Replace existing hot water fined tubing radiation.

The combustion air system does not meet code and would need to be replaced.

VENTILATION SYSTEM Kitchen ventilation system is original to the 1958 addition And is exhaust only with no make-up air, the hood has been upgraded with a fire suppression system.

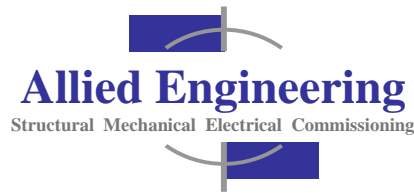


The kitchen exhaust system is under capacity and needs to be upgraded with a new hood and gas fired make-up air system.

An air exchange of outdoor air with the air already in a building can be divided into two broad classifications, ventilation and infiltration. Ventilation is the intentional introduction of air from the outside into a building. There are common types of ventilation: (definitions from ASHRAE): Mechanical Ventilation: The intentional movement of air into and out of a building using fans and intake and exhaust vents. Natural Ventilation: The intentional flow of air through open doors, windows, grilles, and other planned building envelope penetrations, and it is driven by natural and/or artificially produced pressure differentials. Infiltration is the uncontrolled flow of outdoor air into a building through cracks or other unintentional openings through the normal use of exterior doors for entrance and egress.

Modern schools are provided with mechanical ventilation and are pressurized to reduce or eliminate infiltration. Mechanical ventilation has the greatest potential for control of air exchange when the system is properly designed, installed, and operated; and should provide acceptable indoor air quality (IAQ) when ASHRAE Standard 62 requirements are followed. Natural ventilation, such as through operable windows, is not desirable from the point of view of comfort or energy conservation or comfort. Infiltration is not reliable for ventilation purposes because it depends on weather conditions, building construction, and maintenance.

Original 1924 Building and 1958 and 1968 additions – There are no dedicated mechanical ventilation systems introducing outside air in to the space. Ventilation is provided by operable windows



with operation of rooftop exhaust fans serving classrooms and toilets.

Replace existing exhaust fans and provide new rooftop heat recovery units. The current ventilation standard for schools requires 15 cfm of outside air per occupant. With 25 occupants per classrooms the required outside airflow is thus 375 cfm. The new ventilation system would duct proper amounts of fresh air to each classroom.

FUEL OIL TANKS

(1) 10,000 gallon underground oil tank with double wall construction and leak detection monitoring system, this system was installed in 1987.

The oil tanks need to be inspected to verify they are code compliant and may need to be replaced at this time.

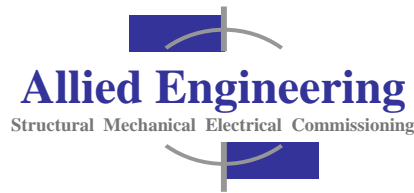
HEATING CONTROLS

The heating control system is pneumatic with two way control valves controlled by pneumatic thermostats.

Replace existing pneumatic controls and provide new automatic temperature control system and building management system to serve the new heating and ventilation systems in the building.

PLUMBING SYSTEM

The existing plumbing system is original to the original 1924 building and the 1958 and 1968 addition. Plumbing fixtures appear to be original also domestic water and sanitary piping is also original to the building.



Replace existing plumbing fixtures, domestic water piping and sanitary piping through out the building.

DOMESTIC HOT WATER Domestic hot water is provided from tank less hot water coils mounted in each section of the boiler and appears to have been installed in 1994.

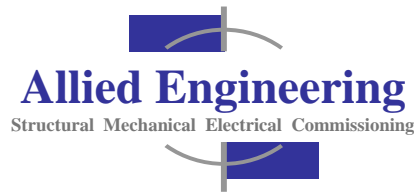
The domestic water heater dose not appears to have ample capacity. The domestic water heating system dose not meet the needs of the building and need to be replaced.

SPRINKLER The only area in the building that has automatic sprinkler system is the central stair tower the rest of the building is currently not system of automatic sprinklers within this facility. Oftentimes, installation of an automatic sprinkler system will reduce some otherwise required architectural rating issues.

An analysis of the code requirements is being performed under other sections of this report. In the event that a sprinkler system is deemed necessary or cost effective, Allied would recommend installation of a wet pipe system for complete coverage of occupied areas in accordance with NFPA 13 requirements.

Provide a new wet fire protection system.

MAINTENANCE The systems reviewed were “big picture” items. Detailed investigations of sub-systems were not reviewed in detail. The following is a list of some items that should be checked. The items listed are generic and not intended to comment on current maintenance procedures. Please consider the following comments and recommendations:



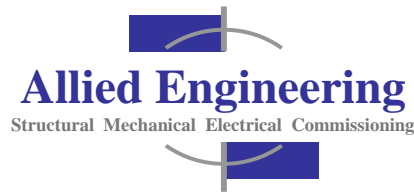
Verify that the following maintenance tasks are being performed: It is important to regularly maintain boiler water level controls, such as low water cutoffs and water feeders. These important safety devices prevent the burner from firing while the water level is too low. These controls must be blown down to remove sludge and ensure smooth operation of the float. We recommend periodic cleaning, maintenance, and replacement of worn parts. Qualified personnel should perform all maintenance. The safety relief device is the most important device on a boiler or domestic hot water heater. These devices must be checked regularly. When testing safety valves on steam boilers, use caution.

Annual boiler efficiency audits, including combustion tests should be performed.

A backflow preventer survey should be performed. Backflow preventers are important to avoid contaminating potable water with dirty water.

Any standing or stagnant water must be eliminated. Places to check include mechanical rooms, air handler drain pans, fresh air intakes, and locker rooms. Make sure all building leaks are repaired. Damaged (wet) building materials should be checked for microbial contamination.

Temperature controls should be periodically calibrated and adjusted.



Domestic hot water should be checked for proper temperatures, 140F in kitchen and 110F at lavatories. Excessive temperatures can be a safety concern.

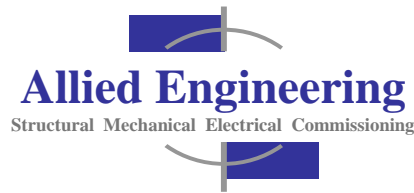
The chimneys should be inspected annually.

ELECTRICAL SERVICE AND MAIN DISTRIBUTION The electrical service is a three-phase 208Y/120V 4-wire system rated 800 amps. It originates overhead from a Public Services Of New Hampshire (PSNH) utility pole some 60 feet from the Boiler/Electric room in the northeast parking lot. This overhead service feeds a Square D E1 series I-line Main Distribution Panel (MDP) installed in 1998. From here the MDP feeds all building branch circuit panels, these feeders were also upgraded in 1998. The MDP also feeds the elevator installed in 1997.

If a major renovation with full mechanical upgrades were planned this existing system would need to be upgraded to have adequate capacity to meet the demand the new loads would create. We suggest the removal of the 800 amp MDP and replace with a properly rated service entrance and MDP for the additional loads proposed. From here we recommend refeeding all the existing branch circuit panels as required and all new panels required for the additional mechanical loads.

Upgrade electrical service and distribution:

PANELS AND BRANCH CIRCUITS There are several branch circuit panels throughout the building. Panel PLBR located adjacent to the MDP was installed new during the 1998 upgrades. The original 1924 building panels on the first floor (CC1) and second floor (CC2) were replaced during



the 1998 upgrade and were also part of the feeder upgrades. The two panels CC1 and CC2 are Square D type NQOD 225 amp rated 208Y/120V. The original branch circuits remained.

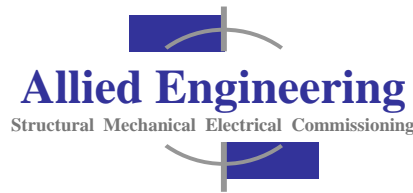
Branch circuits that originate from the existing panels are either routed in conduit or metal raceway systems where exposed. Considering the vintage of the building, we suspect that non-metallic sheathed cables (romex) are used in some areas that are concealed. The 2005 edition of the *National Electric Code* (NEC) prohibits installing romex cable above accessible suspended ceilings, but existing installations are not required to be updated unless significant renovations are undertaken. Many ungrounded 2-prong receptacles were observed in the original 1924 building, but also where recent work had occurred grounded 3-prong receptacles had been installed.

It is recommended that during a major upgrade all branch circuit panels not upgraded within the last 10-15 years be upgraded to meet current NEC requirements and that all of there existing branch circuits whenever feasible be upgraded to meet current NEC requirements. Also, the removal of all ungrounded receptacles and their replacement with grounded receptacles for all areas where this condition exists, mainly in the original 1924 building. Also with proposed mechanical HVAC upgrades equipment connections and wiring will be required if these upgrades are pursued.

Upgrade branch circuit panels and wiring

Upgrade devices and wiring

Mechanical equipment connection and wiring



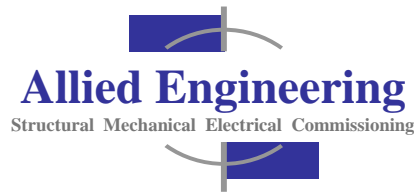
FIRE ALARM SYSTEM The fire alarm system is a Honeywell addressable system installed in 2003 to replace an older system that suffered a catastrophic failure and was non-repairable. Currently the fire alarm system is only isolated to certain areas of the building, mainly the main egress stairwell that connects the 1924 and 1968 building. The current kitchen hood does not meet current code requirements and will not pass inspection.

We recommend that the entire building be installed with initiation and notification devices to the existing control panel to meet NFPA and Life Safety requirements along with Americans With Disabilities Act (ADA) Standards for accessible design. We also recommend proper monitoring of any new kitchen hood work. Due to the magnitude of this work, we believe reusing the existing devices located in the main egress stairwell area that connects the 1924 and 1968 building to be unfeasible.

Complete building wide addressable fire alarm system:

INTERIOR LIGHTING The existing lighting was upgraded approximately 10 years ago to T-8 lamps and what we assume are electronic ballasts. The corridor and classrooms are typically lit using wraparound fixtures with 2-lamps per cross section. This is standard for most areas except non-public spaces, shop areas and others. The gymnasium is lit using HID low-bay luminaires, and what appear to be metal halide lamps. The overall types of luminaires vary from recessed troffers, wraparounds and industrial louvered.

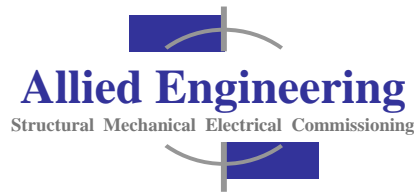
Overall the building illumination is non-uniform and varies greatly from addition to addition. Some classrooms have the ability for daylight harvesting while other could benefit, but may be cost



prohibited.

We recommend the addition of a building wide lighting control system consisting of a master time clock control panel and remote relay panels which will allow for individual rooms/areas to be controlled automatically, but still provide local override and control. The use of occupancy sensors for areas too small or cost prohibitive for building wide connection will also be used for local auto-off control. These areas are mainly storage, janitors' closets, and other frequently used areas. This will allow the building owner to conserve energy lost from lighting unoccupied areas and allow for more global control of lighting. We also suggest the incorporation of local daylighting controls in the classrooms determined to have adequate amounts of natural light, this will allow for an additional decrease in energy use from lighting. Although a building wide lighting control system is not required under The State Of New Hampshire energy codes, we feel it is in the best interest of the building owner to help reduce energy costs. With the proposed mechanical upgrades and associated ceiling work involved, it makes sense to remove 75-80% of the existing luminaires. This approach was taken due to the overall cost of removal, storage and repair during construction outweighs the impact of new fixture cost and installation. This will allow for a redesign of the luminaire layout to help even out the overall illumination into a soft and inviting visual experience.

The majority of exit signs are non battery back up and do not meet current life safety code requirements. The emergency lighting consists of a typical battery pack with 2 heads located throughout the corridors and other egress areas. Certain units



have been updated in areas and are non-existent in others. They do not meet current illumination and spacing requirements, except for the main egress stairwell that connects the 1924 and 1968 building.

We recommend the addition of a complete emergency lighting system, including LED exit signage with integral battery backup for egress and life safety in all areas required by code. This system will supplement the existing emergency units currently present and integrate into the main egress stairwell that connects the 1924 and 1968 building.

Add building wide lighting control and daylighting

Lighting upgrades

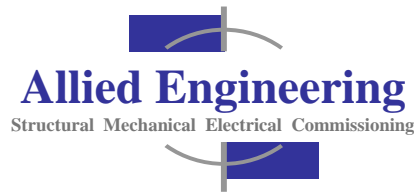
Emergency lighting upgrades

PHONE, CATV,
INTERCOM, CLOCK AND
SECURITY SYSTEMS

The CATV entrance is brought overhead from a Main street utility pole to the southwest corner of the building. From there it is run along the exterior of the building where it enters into the original 1924 building and terminates in the hub room. We believe this service is for internet access only. The telephone system is located on the ground floor of the 1968 wing in a utility closet.

The phone system is 8EXT D1232 Digital Super Hybrid system with a TVS90 Voice Processing system. This system is fairly new and appears fully functional and has not exceeded its useful life expectancy.

The intercom system is a Bogen Multicom 2000, this system allows for room to room privacy communication with the use of a



handset within the classroom. This unit has not exceeded its useful life expectancy.

The master clock system is a Simplex 2350 system. Upon system clock failure a battery or electric clock is used due to system age. This unit has exceeded its useful life expectancy.

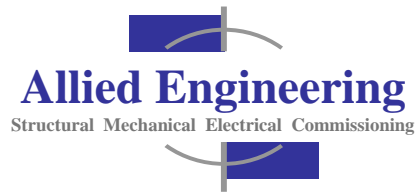
The security system is a GE Interlogix Storesafe system with three cameras, 2 at the main rear doors and 1 at the front entry. This system is in good working order and has not exceeded its useful life.

We recommend an installation of a new master clock system to replace the existing system. The intercom system is adequate for present needs and would be expanded as required to meet all renovation requirements. The security system can be expanded for any Owner required coverage areas.

New master clock system

TEL/DATA/CATV The existing tel/data cabling (category 5 or greater) is routed
INFRASTRUCTURE throughout the building in various manners, mainly using unused ductwork and chases. With the prospect of major mechanical upgrades it would require the removal of all the existing wiring from old duct work and chases. The existing racks located in the hub room have adequate room for expansion, but may require an additional rack if more hardware is required.

We recommend the installation of a new category 6 or greater cabling system to be installed building wide. The new cabling would be given dedicated cable paths using cable tray, conduit



sleeves and fire stop systems (where fire rated partitions are penetrated). Local hub rooms would need to be provided within 300 feet of the furthest outlet. These hub rooms would be connected back to the main server room utilizing a multi-mode fiber backbone.

Complete building tel/data/catv system

MIDDLE SCHOOL/HIGH SCHOOL

SUMMARY OF IMPROVEMENTS

Similar improvements as with the Ed Fenn School should be considered here with regard to the installation of:

1. Full automatic sprinkler system.
2. Ventilation equipment.
3. Replacement of roof systems and structural upgrades.
4. Upgrade in electrical service and distribution system.
5. Replacement of windows.
6. Replace fin tube radiation.
7. Replace combustion air system.
8. Replace fuel oil tanks.
9. Replace pneumatic control system with automatic temperature controls.
10. Replace existing plumbing fixtures, domestic water piping and sanitary piping.
11. Upgrade domestic water heating system.
12. Install new addressable fire alarm system.
13. Upgrade lighting including emergency lights.
14. Install new master clock system.
15. Install complete tel/data/CATV system.
16. Install security system

Unlike the Ed Fenn School though, there are more serious Life Safety issues and structural concerns that need to be addressed. Based on the process that we have recently completed in terms of the draft educational area program, and the structural report by HEB, I would recommend the following:

- A. Demolish the Existing Science Room Wing
This area needs to have substantial upgrade to the roof for snow drift conditions. It is inaccessible except via passing through the assembly space. Installation of ventilation systems would be difficult due to the low floor to ceiling height and also because it is partly below grade. Removal of this area may necessitate improvements to the existing gym wall for lateral bracing.
- B. Demolish the Cafeteria and Kitchen Area:
This area also needs substantial improvements to the structure because of snow drift conditions. It is poorly suited for its function as well.
- C. Consider Demolishing of the Ann Lary Wing
Depending on the final area program for educational needs, this area of the site and adjacent house may be better suited as a multiple story configuration.
- D. Existing Gym:
The existing wall at the locker room area needs to be repaired or consider removing this part of the building (locker rooms only) depending on program requirements and space needs.

The gym needs to be improved structurally as well as including floor replacement and wall bracing for wind loads. Depending what its future use is to be, will dictate how to best achieve the improvements.

ED FENN SCHOOL MIDDLE SCHOOL/HIGH SCHOOL

S U M M A R Y

Both the Ed Fenn School and the Middle School/High School facility share similar shortcomings in the area of structural reinforcement for snow drift conditions, lack of full automatic sprinkler systems, lack of proper ventilation systems and a need for electrical systems upgrades. The MS/HS has additional issues surrounding egress, and more serious structural concerns with the low roofs of the science wing, cafeteria and kitchen area, and the settlement in the foundations and wall movement at the locker rooms. Additionally both buildings are in need of complete roof systems replacements.

The buildings are neat and clean and the custodial staff does an excellent job in maintaining the facilities. The buildings infrastructure (mechanical and electrical systems, finishes, windows etc) have a limited life (25-30 years in many instances) and require upgrading periodically to ensure efficient operation and compliance. Changes to building codes also sometimes necessitate alterations to structure or other various components of the building. Undertaking the changes in this report will provide for the extended life and use of the buildings so long as proper annual maintenance and care are attended to as well.

ED FENN SCHOOL (GORHAM, NH)
EDUCATIONAL PROGRAM
SF ANALYSIS

DRAFT #2

June 6, 2006

Core Capacity: 350 students
 Grades: K-5

Program Area	EXISTING			NH Min SF	PROPOSED			Remarks
	Quantity	Area	Total		Quantity	Area	Total	
Kindergarten	1	1,008	1,008	1,000	1	1,008	1,008	includes toilet room
Storage			0				0	in room cabinets
Classrooms	11	864	9,504	900 sf 36sf/person	10	864	8,640	
Storage			0				200	
Special Ed			0				0	
Title 1	1	430	430		1	430	430	
PT/OT		430	430		1	430	430	
Speech/Reading	1	320	320		1	320	320	
Resource Room	1	864	864		1	864	864	
Test		90	90		1	90	90	
Art	1	864	864	900 sf 36sf/person	1	864	864	
Storage			0		1	80	80	
Music		864	864	Choral 800	1	864	864	
				Instrumental 1000	0	0	0	
Storage			0		1	100	100	
Practice			112		1	150	150	
Phys Ed / MPR			2,925	110 sf/student	1	6,000	6,000	New space
Storage / Office			100		1	300	300	
Locker/Change	2	200	400		2	200	400	
Library			1,728	1800 sf	1	1,728	1,728	*40sf/pupil of 10% of Core capacity

Program Area	EXISTING			NH Min SF	PROPOSED			Remarks
	Quantity	Area	Total		Quantity	Area	Total	
Group Instruction			0		0	0	0	
Circ Desk / General Reading			0				0	
Workroom			0		0	0	0	
Storage/Equip Room			0		0		0	
Office			0		0	0	0	
Food Service								
Kitchen			440		1	440	440	
Storage			280		1	280	280	
Servery			0				0	Part of MPR
Stage	1		684		1	684	684	
Cafeteria			0		1	2,925	2,925	Use existing MPR for "Cafetorium"
Custodial							0	
Storage	1	375	375		1	375	375	
Work			0		1	400	400	
Computer			864		1	864	864	
Storage			0				0	
IT / Small Group			288		1	288	288	
Admin								
Main Office	1	180	180		1	360	360	
Storage	1	25	25		1	120	120	
Principal	1	112	112		1	196	196	
Faculty	1		864		1	864	864	
Workroom	0		0				0	part of Faculty Room
Conference	1	336	336		1	336	336	
Faculty Toilets	2	18 / 12	30				130	existing are not handicapped
Guidance			162	*100	1	250	250	*plus storage
Nurse / Health			162	as appropriate				
Waiting					1	60	60	
Toilet			15		1	75	75	

Program Area	EXISTING			NH Min SF	PROPOSED			Remarks
	Quantity	Area	Total		Quantity	Area	Total	
Exam			0		1	80	80	
Storage			30		1	80	80	
Office			0		1	120	120	
Misc.								
Mechanical	2	300 / 414	714		2	300 / 414	714	
Toilets	2	208	416		2	208	416	
Custodial Closets	1	72	72		1	72	72	
Central Receiving/Storage		-	0				900	
Total SF Net			25,688				33,497	
Total SF Gross			31,269				40,000 to 47,000	
Conversion Factor			1.2				1.2 - 1.4	

Proposed	40,000	47,000
Existing	31,269	31,269
Difference	8,731	15,731

**GORHAM MIDDLE HIGH SCHOOL
EDUCATIONAL PROGRAM
SF ANALYSIS**

DRAFT #2

June 6, 2006

Core Capacity: 400 students (150 MS, 250 HS)
Grades: 6-12

Program Area	EXISTING						TOTAL EXISTING AREA	NH MINIMUM MS/HS	PROPOSED						TOTAL PROPOSED AREA	REMARKS
	#	SF ea MS	Area MS	#	SF ea HS	Area HS			Quantity MS	@ sf ea	Area MS	Quantity HS	@ sf ea	Area HS		
General Classroom	6		4,257	9		6,983	11,240	MS 900 HS 800 36sf/person	6	826	4,956	8	800	6,400	11,356	
	3	675	2,025	1	800	800										
	2	826	1,652	4	675	2,700										
	1	580	580	2	826	1,652										
				1	1,131	1,131										
				1	700	700										
Storage at 69 wing															400	2 rooms at 200 sf ea.
Science Classroom								45sf/p in lab 60 sf/p in lab/cr combination								45sf, no more than 24p
Sci/Gen.	1	675	675				675		1	1,100	1,100	2	1,100	2,200	3,300	
Storage/Prep/Lab		340	340				340		1	100		2	100	100	300	
Biology/Anatomy/Physics				1	800	800	800				0	2	1,440	2,880	2,880	2 labs shared for all sciences
Storage/Prep							0				0	2	100	200	200	
Chemistry/Physical Sci				1	1,460	1,460	1,460				0					
Storage/Prep				2	92 / 96	188	188				0					
Gen Science Lab				1	1,100	1,100	1,100				0					Greenhouse/Atrium ?
Storage/Prep				1		80	80				0					
Art							0	60 sf/p (1200)								
Classroom				1			988				0	1	1,200	1,200	1,200	
Clay/Ceramics				1			475				0	1	400	400	400	
Darkroom				0			0				0			0	0	
Storage				1			120				0	1	200	200	200	

Program Area	EXISTING						TOTAL EXISTING AREA	NH MINIMUM	PROPOSED						TOTAL PROPOSED AREA	REMARKS
	#	SF ea MS	Area MS	#	SF ea HS	Area HS		MS/HS	Quantity MS	@ sf ea	Area MS	Quantity HS	@ sf ea	Area HS		
Music								25sf/p								
Instrumental				1			1,404	1,000		0	1	1,404	1,404	1,404		
Choral							0	800		0			0	0		
Practice							0			0	4	80	320	320		
Storage				1			238			0			0	0		
Music							0			0	1	50	50	50		
Instrument							0			0	1	125	125	125		
Uniforms							0			0			0	0		
Equipment							0			0	1	250	250	250		
Office							0			0	1	120	120	120		
							0			0			0	0		Toilets to be located nearby
Phys Ed																
Gym				1			6,111			0	1	9,000	9,000	9,000		
Bleacher Capacity																500 seats
Multi-Purpose							0							0		
Weight Training				1			225			0	1	600	600	600		
Fitness/Classroom							0			0	1	800	800	800		
Trainer							0			0	0	0	0	0		Work into Locker Area
AD							0			0			0	0		
Locker Rooms				2			2,950			0			0	0		
Office							0			0	2	100	200	200		
Showers & Toilets							0			0	2	400		800		
Lockers							0			0	2	600	1,200	1,200		
Team Rooms							0			0	2	300	600	600		
Lobby							0			0	0	0	0	0		Double up use with Café
Public Toilets							0			0	2	250	500	500		
Concession							0			0	1	250	250	250		
PE Storage							0			0	1	900	900	900		
Library / Media				1			1,932	*1800sf min					0	0		*(40sf/p x 10% core population)
Seating Capacity							0	40					0	0		
Collection/Reading Area							0			0	1	1,400	1,400	1,400		
Circulation Desk /Office							0	200					0	200	200	

Program Area	EXISTING						TOTAL EXISTING AREA	NH MINIMUM	PROPOSED						TOTAL PROPOSED AREA	REMARKS
	#	SF ea MS	Area MS	#	SF ea HS	Area HS		MS/HS	Quantity MS	@ sf ea	Area MS	Quantity HS	@ sf ea	Area HS		
Classroom / Distance Learning				1			700			0	1	800	800	800		
Small Group Study							0			0	1	150	150	150		
Office							0			0	0	0	0	0		
Workroom							0			0	0	0	0	0		
Storage							0			0	1	500	500	500		
Toilet							0			0	1	75	75	75		
Food Service																
Kitchen				1			280			0	1	900	900	900		
Storage							0			0	1	600	600	600		
Office							0			0	1	100	100	100		
Toilet							0			0	1	75	75	75		
Custodial Closet							0			0	1	50	50	50		
Servery							0			0	1	200	200	200		
Cafeteria				1			1,800			0	1	3,000	3,000	3,000	Seating Capacity = 3000 ÷ 15 = 200	
Storage							0			0	1	400	400	400		
"Cafetorium"							0			0			0	0		
Seating Capacity							0			0			0	0		
Stage				1			560			0	1		1,000	1,000		
Backstage							0			0	1		1,000	1,000		
Storage							0			0	1		1,000	1,000		
AV Room							0			0			0	0		
Industrial Arts																
Shop				1			1,920			0			1,800	1,800		
Classroom				1			480			0			0	800		
Office				1			120			0			0	100		
Storage				2			580			0			0	600		
Family & Consumer Sci																
Multi-Purpose Room/Lab				1			1,320			0	1	1,320	1,320	1,320		
Office							0			0			0	0		
Storage				1			80			0	1	80	80	80		

Program Area	EXISTING						TOTAL EXISTING AREA	NH MINIMUM	PROPOSED						TOTAL PROPOSED AREA	REMARKS
	#	SF ea MS	Area MS	#	SF ea HS	Area HS		MS/HS	Quantity MS	@ sf ea	Area MS	Quantity HS	@ sf ea	Area HS		
Business/Technology																
Classroom						0			0	1	800	800	800			
Computer Lab				1	600	600	600		0	1	1,400	1,400	1,400			
IT Office						0			0	1	300	300	300			
Storage						0			0	1	80	80	80			
						0			0			0	0			
Administration																
General Office/Recept						384			0	1	400	400	400			
Workroom/Mail						0			0	1	200	200	200			
Principal						168			0	1	250	250	250			
Assistant Principal						0			0	1	196	196	196			
Conference						0			0	1	360	360	360			
Admin. Assistant						0			0			0	0			
SRO Office						0			0			0	0			
IT Office						0			0			0	0			
General Storage / File						0			0	1	450	450	450			
File Room						0			0			0	0			
Academic Support Rm						0			0	1	200	200	200			
Guidance																
General Office / Recept				1		450			0	0	0	0	0			
Guidance Counselors				2		288			1	280	280	1	280	280	560	
Resource Room						0			0	1	300	300	300			
Storage						0			0	1	80	80	80			
Nurse / Health				1		450			0			0	0			
Waiting						0			0			0	80			
Office						0			0			0	120			
Exam						0			0			0	80			
Sick Bay						0			0			0	120			
Toilet				2		140			0	2	70	140	140			
Storage						0			0			0	100			

