

# EMANUEL ENGINEERING, INC.

ENGINEERING CONSULTANTS



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March 13, 2015

Mr. Jim Rozycki  
Director of Facilities  
Oyster River Cooperative School District  
36 Coe Drive  
Durham, NH 03824

RE: Roof Snow Loads  
Middle School  
Oyster River Cooperative School District  
Durham, NH

Dear Mr. Rozycki,

At your request, Emanuel Engineering, Inc. visited the Middle School located at 1 Coe Drive, Durham, NH on February 26, 2015, to investigate possible roof problems due to snow loads on the roof. Dave Emanuel and I met with you. This report summarizes our observations and recommendations.

Dave Emanuel, P.E. and I performed a visual site inspection of the facility, in particular where reported noises were heard, sprinkler heads were observed (lower than normal) below the ceiling grid, and reported new drywall or masonry cracking had occurred. A list of the visited areas is below. Each area was visually inspected at the potential reported problem, at the wall / occupied area, and above the ceiling to check for obvious deformation, displacement, distress, or signs of structural failure.

<b>Room:</b>	<b>Observations – Comments:</b>
203	a) Masonry wall crack. Previous repairs visible. Unrelated to current snow load conditions. No distress was observed on the structural framing of the roof. b) Vertical masonry wall cracks along junction of old meets new wall. Unrelated to current snow load conditions.
204	This is an area where low roof meets high roof. No distress or damage observed on the structural elements. Roof deck utilized Tectum panels.

Girl's Bathroom	Damaged Tectum panel found. Pre-existing roofing damaged probably due to water leaks. Not related to snow event.
302 - 303	Spray foam insulation installed on underside of roof deck. Roof framing not observable.
Library workroom	Crack observed above door way. Wall extends to underside of roof deck, thereby not allowing for movement. No structural damage observed.
Library area	Observed wood deck planks supported by steel beams. No structural damage observed.
224	Metal lath and plaster above grid ceiling. Roof was not observable.
Girl's Locker Room	This is a low roof adjacent to a high roof. No structural damaged observed.
Gym	Roof purlins in good condition. No evidence of distress. No structural damage observed.

No building plans were provided. The school has had many renovations and additions over the years.

The current ground snow load for the Town of Durham, NH per the ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures", is 55 PSF. It is our understanding that Durham also currently prescribes a ground snow load of 55 PSF.

The ground snow load is converted to a flat roof design snow load using several adjustment factors. Using the present day 55 PSF ground snow load, translates to a 46 PSF for flat roofs.

Depending on elevation change between adjacent roofs, the snow load increases due to snow drifts and sliding snow onto low roofs.

Based on engineering calculations for the unit weight of snow, it is estimated that approximately 24 inches of snow represents the roof design load of 45 PSF.

**Recommendations & Conclusions**

- Without further additional review and calculations, we recommend that snow depths on the Middle School roof not exceed 24 inches.
- All roof drains shall be kept free of snow during extreme snow events to allow for snow melt.

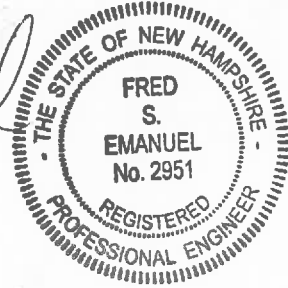
- No structural damage was found relating to snow loads.

Please see attached photographs of the inspection areas. Should you desire further evaluation of the roof or have further questions, we are available to assist you.

Very Truly Yours,



Fred Emanuel, P.E.



Attachments: Photographs (27pages)



02.26.2015 11:05



02.26.2015 11:05





**Old crack noted by mortar repair**



**Old crack repair**





**Vertical crack at renovated wall**





Pre-Algebra/Algebra

Ms. Wil

Room 204

02.26.2015 11:19



02.26.2015 11:21

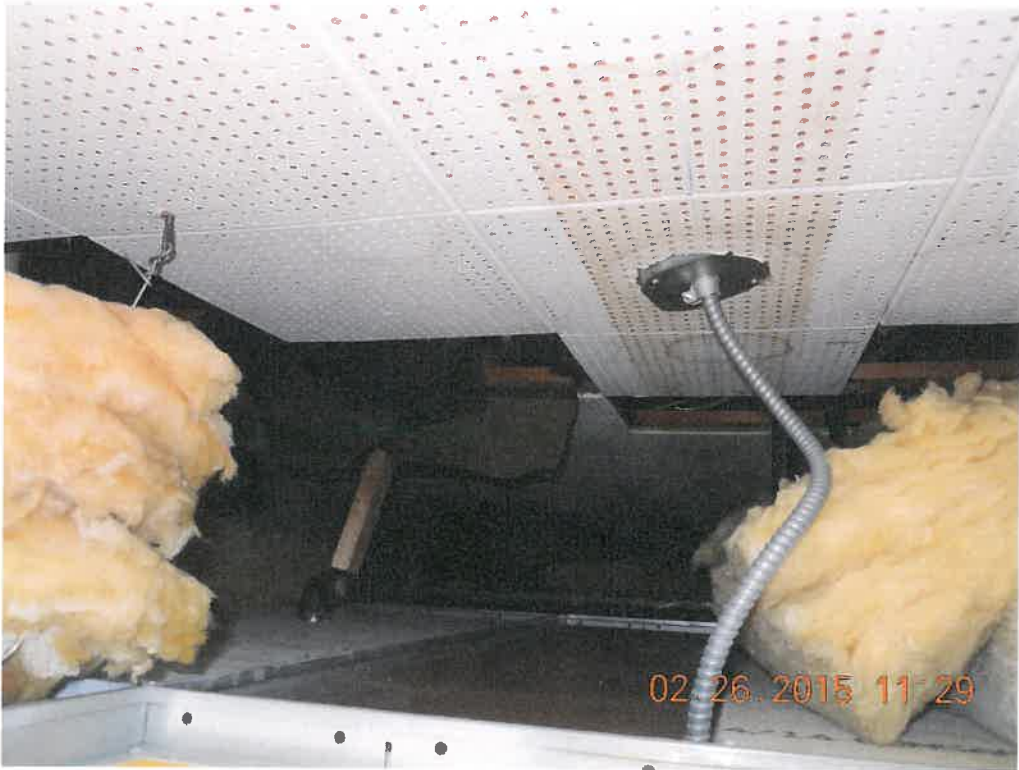


**Room 204 - renovated area**





**Girl's bathroom - damaged Tectum roof deck**







**Room 302 - 303 - foam insulation on roof deck.  
Not able to inspect.**





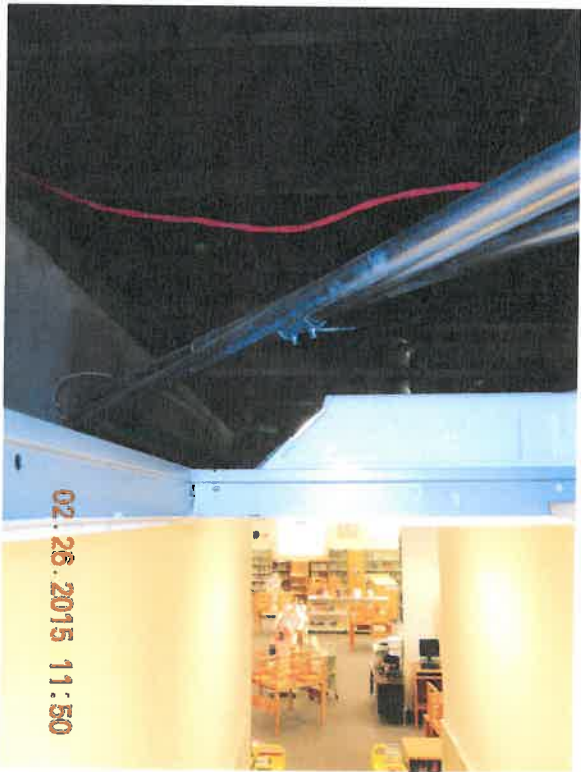
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**Above library work room**



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**Crack above door**



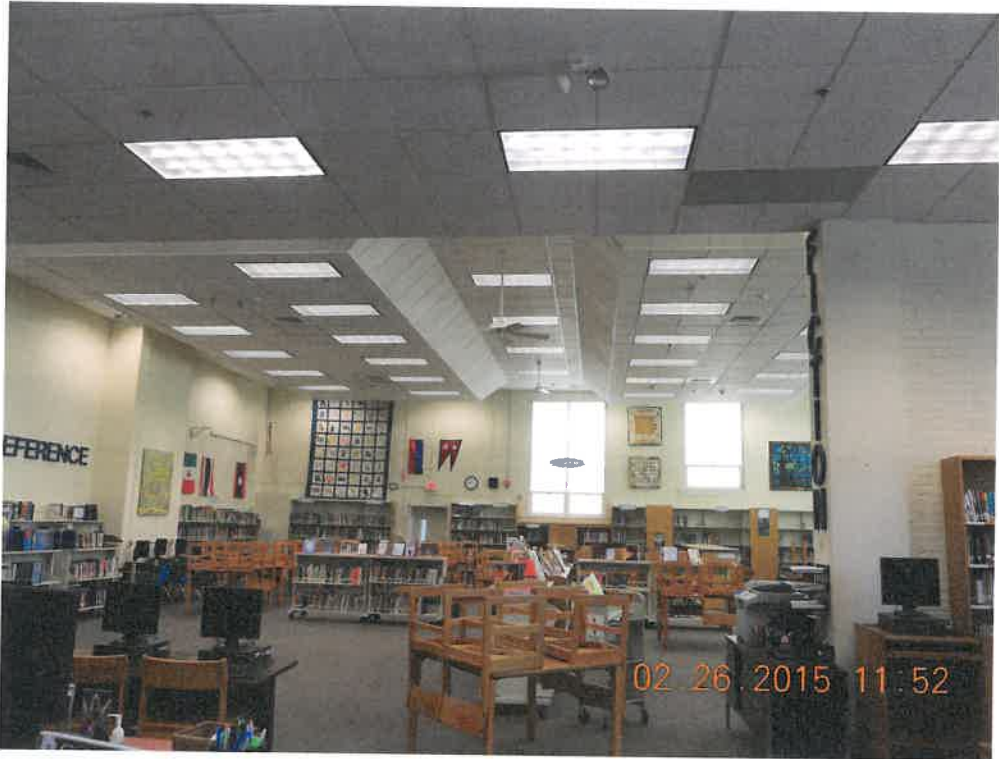
**Above old gym - now library**



**Above library - wood deck and steel beams**



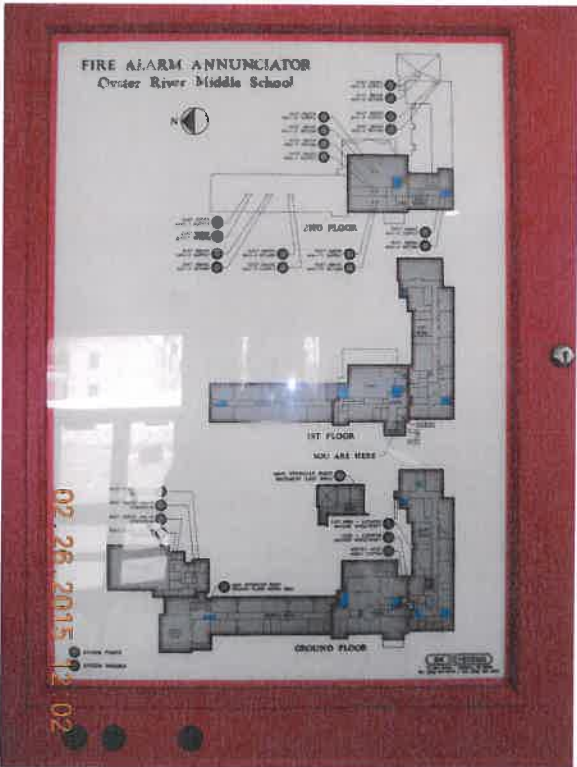


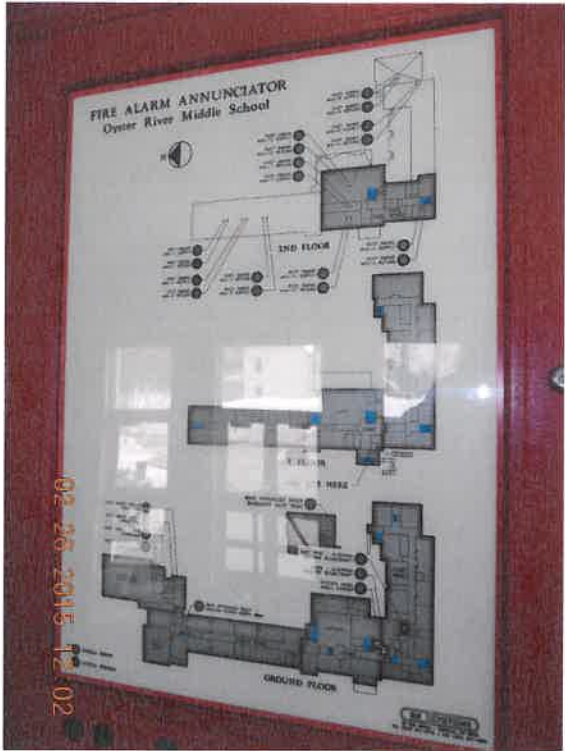














**Room 224 - old ceiling metal lath and plaster. Roof not observable.**





**Girl's locker room next to gym**





**No damage observed**





**Gym - no damage found**







