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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
Mast Way Elementary School
Oyster River Cooperative School District
Lee, NH

Dear Mr. Rozycki,

At your request, Emanuel Engineering, Inc. visited the Mast Way Elementary School located at 23 Mast Road, Lee, NH on February 26, 2015, to investigate possible roof problems due to snow loads on the roof. Dave Emanuel and I met with you and members of your custodial staff on site.

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.

Room:	Observations – Comments:
5	Observed the interior face of the masonry exterior wall vertical cracks. Vertical cracks are indicative of thermal expansion. Believed to be unrelated to current snow load conditions. No distress or damage was observed on the structural elements of the roof.
7	Masonry crack found on interior face of exterior wall. Crack space filled with dust and paint. Unrelated to current snow load conditions.

Corridor wall at exit door	Masonry crack found at juncture of old and new construction. Wall with exit door is not a bearing wall. Unrelated to current snow load conditions.
Common room - storage closet wall	Cracks in drywall. Wall framing was constructed and attached to roof deck without proper deflection track. Roof movement caused drywall wall cracks. No structural damage observed.

The school was built in the early 1980's with a renovation and expansion in 1994.

The current ground snow load for the Town of Lee, NH per the ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures", is 55 PSF. It is our understanding that Lee 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 42 PSF for flat roofs.

Depending on elevation change between adjacent roofs, the snow load increases due to snow drifts on low roofs. It is not known if provisions regarding drift load were incorporated into the roof design. These provisions were in effect based on the 1993 BOCA Building Code and it is suspected that they were implemented. However, further analysis would be necessary to determine if drifting snow loads were considered.

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 42 PSF.

Recommendations & Conclusions

- Without further additional review and calculations, we recommend that snow depths on the Mast Way Elementary School roof not exceed 24 inches.
- As snow removal crews were working at the time of the field inspection, we recommend that snow removal be continued to remove the excess snow at this time and to prepare for the next winter storm.
- All roof drains shall be kept free of snow during extreme snow events to allow for snow melt.
- No building drawings were available to review design loads.

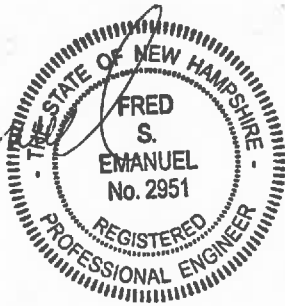
- Drywall cracks may be repaired but will reoccur when excessive snow loads occur on the roof unless the metal framing is modified using proper deflection tracks a the top of wall above the observed cracks.

Please see attached photographs and floor plan 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 (17pages)
 Floor plan (1 page)



Room 5



**Room 5 - vertical crack indicative of shrinkage /
contraction of exterior wall**

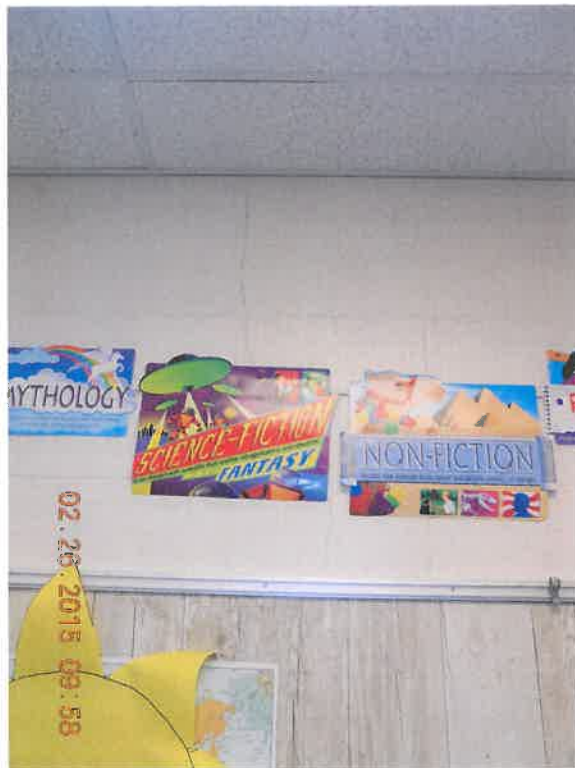




Room 5 - crack extends to point of support



Room 5 - no structural roof damage



Room 5 - exterior wall crack #2



Room 5 - no roof damage



Room 7 - wall crack



Room 7 - no structural damage observed



Corridor wall crack at exit door



Corridor wall crack at exit door and above ceiling



Natural shrinkage. New wall meets old.



Old meets new





Commons wall crack

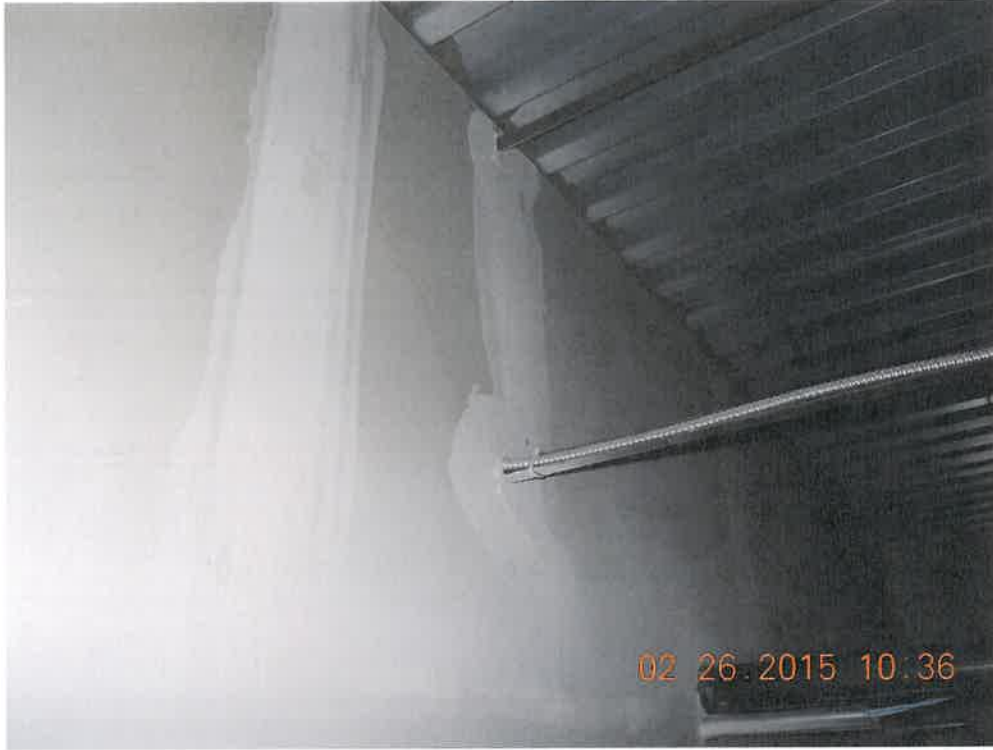


Wall attaches to roof deck





No signs of structural damage



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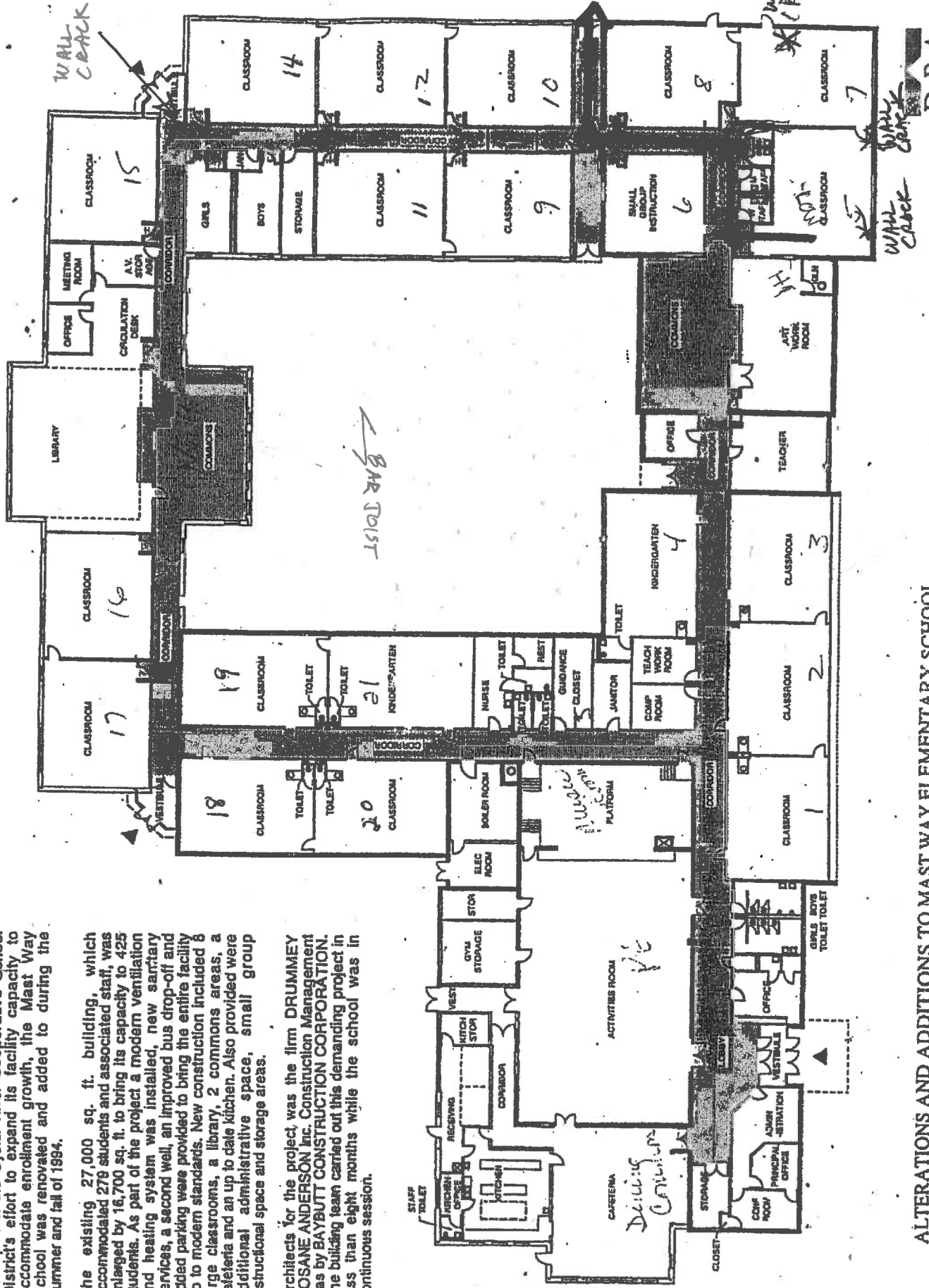
2/26/15
Rm 5

MARKT ROAD
LEE, NH

As a part of the Oyster River Cooperative School District's effort to expand its facility capacity to accommodate enrollment growth, the Mast Way School was renovated and added to during the summer and fall of 1994.

The existing 27,000 sq. ft. building, which accommodated 276 students and associated staff, was enlarged by 16,700 sq. ft. to bring its capacity to 425 students. As part of the project a modern ventilation and heating system was installed, new sanitary services, a second well, an improved bus drop-off and added parking were provided to bring the entire facility up to modern standards. New construction included 8 large classrooms, a library, 2 commons areas, a cafeteria and an up to date kitchen. Also provided were additional administrative space, small group instructional space and storage areas.

Architects for the project was the firm DRUMMEY ROSANE ANDERSON Inc. Construction Management was by BAYBUTT CONSTRUCTION CORPORATION. The building team carried out this demanding project in less than eight months while the school was in continuous session.



ALTERATIONS AND ADDITIONS TO MAST WAY ELEMENTARY SCHOOL