

September 30, 2011

11145

Bill Post
Town Manager
Town of Bowdoinham
13 School St
Bowdoinham, ME 04008

RE: Supplemental Structural Evaluation of roof framing at Bowdoinham Recycling Facility

Dear Bill,

At your request, I have performed a limited supplemental evaluation of the existing roof framing of the Recycling Building located at 243 Post Rd in Bowdoinham, Maine. The purpose of this evaluation is to revise the approximate allowable uniform snow load capacity of the existing roof framing based on additional field measurements provided by the owner, and obtained during our site visit of 9/28/11. Also, a recommendation for the allowable depth of snow that the roof can support before manual snow removal is provided.

Building Description

The building at 243 Post Road is a wood framed, 2-story agricultural building adapted for use as the Town of Bowdoinham Recycling facility and storage of miscellaneous items. The building footprint measures approximately 35ft wide by 290ft long (10,150 sf +/-).

It is our understanding that a portion of this building experienced a partial roof collapse during this past winter. Some of the roof has since been repaired and reinforced. An analysis of the reinforced area is included in this evaluation.

See our original report dated 5/27/11 for further description of the building framing.

Today, the 2009 International Building Code (IBC) specifies that the minimum design uniform snow load for new buildings similar to the Recycling Barn in Bowdoinham, ME to be 46 psf ($P_g=60$ psf, $C_t=1.2$, $P_s=46$ psf). However, the IBC 2009 also specifies that gable roofs must be designed for an unbalanced snow load. Unbalanced snow accumulation is described as snow blowing from the windward side of a pitched roof onto and accumulating on the leeward side. For the Recycling Barn, the code specified unbalanced snow accumulation is 60 psf for a distance of 9ft from the ridge.

The following Table 3 lists the results of my revised and expanded analysis:

Table 3 – Theoretical Member Snow Load Capacities (summarized)

Member	Span (clr) ft	Spacing (o.c)	Est. Dead Load (psf)	Allowable Uniform Snow Load (psf)
Upper (1) 2x6 Rafter	7.33ft +/-	36"	7 +/-	32 +/- Does Not Meet Code
Lower (1) 2x6 Rafter	10.66ft +/-	36"	7 +/-	11 +/- Does Not Meet Code
Lower (1) 2x6 Rafter with diagonals	3.5ft and 6.5ft +/-	36"	7 +/-	20 +/- Does Not Meet Code
Lower (2) 2x6 Rafter at re-built area	10.66ft +/-	36"	7 +/-	30 +/- Does Not Meet Code
Lower (2) 2x6 Rafter at re-built area with diagonals	3.5ft and 6.5ft +/-	36"	7 +/-	44 +/- Nearly Meets Code
(2) 2x6 Girt	11'-9" +/-	N/A	10 +/-	0 +/- Does Not Meet Code
(2) 2x6 + (2) 2x8 Girt	11'-9" +/-	N/A	10 +/-	18 +/- Does Not Meet Code
(2) 2x8 Girt at re-built area	11'-9" +/-	N/A	10 +/-	6 +/- Does Not Meet Code
(3) 2x6 Beam	11'-9" +/-	N/A	10 +/-	19 +/- Not Ok
(5) 2x6 Beam	11'-9" +/-	N/A	10 +/-	30 +/- Not Ok

Comparing the results of the allowable snow load analysis with the code specified design snow load requirements, it is clear that multiple framing elements do not meet the 2009 IBC code. In fact, much of the framing has an allowable snow load capacity less than half that required by code.

Three elements are of particular concern: The lower (1) 2x6 rafter (multiple) without diagonal bracing, the (2) 2x6 girts at the north side, the (2) 2x8 girts (new) at the south side re-built area. These elements are theoretically overstressed when exposed to very minimal, or no snow loads. Visually these elements show signs of excessive permanent deformation, indicative of their relatively low structural capacity. I recommend these elements be sistered or reinforced to increase their snow load capacity prior to the 2011-2012 winter season. All reinforcing design should be completed by a Maine Licensed Engineer.

In order for this structure to remain in a safe and serviceable condition over the long term, I recommend comprehensive structural reinforcement be designed and implemented for the entire facility. At a minimum, a qualified and insured third party roof maintenance contractor should be retained to provide roof snow load monitoring and removal services during the winter months. I recommend that when the depth of heavy, wet snow on the roof exceeds 6-8" that snow removal operations be implemented. Snow monitoring and removal is not a long-term solution.

The findings as reported in this letter are based solely on my analysis of the limited field measured structural elements. I reserve the right to change the findings and recommendations outlined herein and incorporate any new, previously un-foreseen or unknown information that may be discovered.

Sincerely,

A handwritten signature in cursive script, appearing to read "Aaron S. Wilson".

Aaron S. Wilson, P.E.
Vice President
Associated Design Partners, Inc.