

January 26, 2012

Mr. James Scully
Superintendent of Schools
City of Haverhill
4 Summer Street
Haverhill, Massachusetts 01830

Subject: Hunking School - Emergency Repairs to Prevent Concrete Column Collapse

Dear Mr. Scully:

In reference to the AECOM letter "Hunking School Preliminary Review, November 14, 2011", attached, AECOM is recommending that the City take corrective action to shore the floor of the north wing of the Hunking School. As a minimum, it is recommended that the columns that have experienced surface spalling of the concrete cover and significant corrosion of the reinforcing steel be reinforced. The advanced state of deterioration of several basement support columns poses the potential for collapse of sections of the north wing floor and roof. In addition, the deteriorated columns are typically adjacent to each other which pose serious risk of collapse of a central portion of the wing adjacent to the gymnasium. If a column does experience failure, the load from that column is transferred to adjacent columns by the connecting concrete beams causing additional stress in the adjacent columns and a possible progressive collapse of the entire structure.

The existing 13 1/2 inch diameter columns are 16 feet on center. Several columns in a row have experienced spalling of the concrete cover extending to the depth of all four rebar. This leaves a 9 inch square core of the column that is effectively unreinforced due to the spalling. The actual condition of the concrete in the remaining 9 inch column is unknown. The American Concrete Institute Code (ACI) and Massachusetts State Building Code do not permit unreinforced concrete columns, of the remaining concrete column core size, greater than about two feet tall. These columns are almost six feet tall which significantly exceeds the allowable code height for the conditions.

AECOM has calculated the stress in the remaining concrete column section. The results of the stress calculations and the limiting height provisions of the codes both indicate that the concrete columns, as they currently exist, do not comply with the code requirements. Furthermore, the stress calculation comparisons were based on the concrete compressive strength shown on the original construction documents which was stated to be 3000 psi, but the actual concrete strength is unknown. It is possible that the compressive strength of the concrete columns is not as high as the stated values due to the deterioration that has occurred.

Due to the advanced state of deterioration and clear code deficiencies AECOM recommends that these columns be reinforced to prevent collapse. Major snow loads are still a real possibility even in light of the mild winter. These emergency repairs do not address the deterioration of the concrete floor joists that has occurred, but it is less likely that failure of a portion of the floor due to collapse of some of the floor joists will immediately lead to overall collapse of the structure.



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Please contact me if you have any questions.

Sincerely yours,

A handwritten signature in black ink that reads "Bob Hajjar". The signature is written in a cursive style with a large, sweeping initial 'B'.

Bob Hajjar, P.E.
Project Manager