STRUCTURAL ASSESSMENT
Hanover High School

PURPOSE

The purpose of this report is to describe in broad terms the structure of the existing building, to comment on the condition of the existing building, and on the feasibility of renovation and expansion of the facility.

SCOPE

1. Description of existing structure
2. Comments on the existing condition
3. Comments on the feasibility of renovation and expansion

BASIS OF THE REPORT

This report is based on an inspection performed on December 18, 2001, and a review of the available drawings for the addition prepared by Korslund, Le Normand & Quinn, Inc. Architects located in Norwood, MA dated November 1962; and the elevator addition drawings prepared by Strekalovsky & Hoit, Inc. Architects located in Hingham, MA dated February 1990. No drawings were available for the original building constructed in 1957,

During our site visit, we did not remove any finishes or take measurements so our understanding of the structure is limited; and we are unable to comment on any structural capacity of the existing structures.

BUILDING DESCRIPTION

The structure for the 1962 addition has traditional cast-in-place concrete spread foundations (with one (1)T.S.F. bearing capacity) supporting steel columns, load bearing masonry, and exterior cast-in-place concrete grade beams.

The steel structure has wide flange columns supporting steel joists, paper backed wire mesh, and two and one-half inch (2 ½") concrete at the second floor level and steel joist form board and poured two-inch (2") gypsum at the roof level.

The exterior walls generally consist of full height metal windows with solid panels of brick and block back up masonry between the windows. The back up to both the brick at the first floor sill level and the second floor spandrel panel is block (possibly cinder or pumice).

EXISTING CONDITIONS

The main structure is in sound condition with no obvious signs of any foundation settlement.

There are, however, a number of distressed areas at the exterior brick, noted as follows:

1. West Elevation at the Original Building: There is severe distress and cracking to the brick at the southwest corner due to the lack of vertical control joints and subsequent thermal movement. The same distress is exhibited at the far end of the original building at the intersection with the expansion.

2. East Elevation around the Locker Rooms: Again, the lack of control joints has caused severe movement to the horizontal joint above the windows.

3. A number of joints at the sills have decayed and need attention.

4. The precast veneer above the faculty parking lot entrance (southwest corner) shows movement at the high level.

5. At the rear North elevation there is cracking to the brick above the lintels at the boiler room and maintenance areas.

6. There is a slight misalignment to the precast elements at the auditorium corners.

7. The bearing locations for the lintels above the unit ventilators in the exterior exhibit stress and movement at certain locations.

8. The vertical expansion joint filler and treatment between the 1962 addition and the original building has failed.

9. There appear to be condensation problems at the cantilevered second floor lecture room soffit.

FEASIBILITY OF RENOVATION AND EXPANSION OF THE STRUCTURE

Any proposed renovation of the school will need to address the following concerns with regard to the existing structure.

1. Remedial work needs to be carried out to the deficiencies to the skin of the building as described above.

2. Any proposed replacement of the full height window/panel systems on the exterior wall. The masonry up to the sill height should be brought up to current provisions as contained in Chapter 34 of the Massachusetts State Building Code. (i.e. the masonry could be reinforced with Light Gage Metal studs on the interior or reinforcement inserted in the block or horizontal steel girts added between the columns.).

3. Removal of interior masonry walls may also reduce the lateral resistance capacity of the structure and, depending on the extent, various proportional structural upgrades would be necessary to satisfy Chapter 34 of the Massachusetts State Building Code. Careful consideration should be given to planning to avoid removal or compensate the removal with additional appropriate masonry partitions.

SEISMIC PROVISIONS

As a minimum, the existing structure needs to be assessed in accordance with the Massachusetts State Building Code requirements for compatibility with seismic hazards, which would possibly entail "tying" the structural elements to both the floor and roof.

Interior masonry walls would need to be connected to the structure and large stone-pre-cast elements would need to be examined and adequately connected to the main structural elements. While these structural requirements may be easily performed, access can lead to major disruption of cabinetry, mechanical, electrical, plumbing lines, etc.

SUMMARY

Other than the exterior brick issues, the existing structures are in reasonably sound condition with no obvious signs of failure or distress, however, potential renovations, e.g. window replacement and interior removal, may have a significant affect on budget estimates and should be identified early in the study.

We would recommend that any proposed additions be kept structurally separate from the existing with no vertical expansion.

Considering any proposed schemes for upgrading the school, the following should be noted.

1. Minor renovation relating to mechanical, plumbing, electrical, and current code issues:

   Assuming that no structural elements (i.e. steel framing or masonry walls) are removed or modified, then in accordance with Massachusetts State Building Code Chapter 34 where, due to the cost of construction likely exceeding 50 percent of the assessed property value, seismic hazards need to be addressed. This will entail restraining all elements, such as walls and parapets to the structure.

2. Renovation & Expansion including removal and relocation of load bearing and non-load bearing walls:

   Care needs to be taken that the 'return' on space requirements does not force extreme costs related to seismic upgrading.

   Expansion as stated above should be horizontal and structurally separated from the existing building by the use of expansion joints.