STRUCTURAL ASSESSMENT

Engineering Ventures, Inc. conducted a preliminary structural review of the Charlotte Central School building. The purpose of this review is to assess the overall structural code compliance of the building and to consider the feasibility of incorporating additions and renovations to the facility. The following report details the findings of our site visits, investigation of the available set of plans, and preliminary analysis of the existing main structural members.

Our evaluation was limited to the observation of the main structural components of the building readily exposed to view, and the information available in plans provided to us. An exhaustive check of framing capacity is beyond the scope of this report.

Observations/Assumptions:

1. The school facility is made up of a collection of buildings of varying ages that have been built and/or added to over the years from 1938 through 1996.
2. Information concerning the structures was obtained from partial plan sets of original structural design drawings. The plan sets are as follows:
    a. 1938 Building – presently the library - original plan information is not available for this structure.
    b. 1949 Grade School Building – designed by a Burlington, VT architectural firm dated 7/48 (the title block on the plans is faded such that the writing is illegible)
    c. 1969 Addition to Charlotte Elementary School – J. Henderson Barr, A.I.A Architects dated October, 1967
    d. 1987 Gymnasium – original plan information is not available for this structure.
    e. 1996 Additions and Renovations to Charlotte Central School – Banwell, White, Arnold, Hemberger & Partners, Inc. Architects dated 3/96

    Additionally, partial sets of the architectural, electrical, mechanical and site drawings were also available for certain buildings.
3. The 1938 building is a two story structure (most likely wood framed) that presently houses the cafeteria in the basement level and the library on the 1st floor level.
4. The 1949 building is a two story structure with full basement. The structural systems consist of cinder block bearing walls and 6" Flexicore precast floor and roof plank. The original exterior walls were finished with stucco. Presently the exterior of the building is covered with an EIFS system (Exterior Insulation Finishing System). The original drawings indicate tar and asphalt roof covering. It is reported however that it was re-roofed with a Trocal PVC roof system.
5. The 1969 building is a one story steel frame with concrete masonry unit (CMU) bearing and shear walls with CMU masonry veneer. The steel frame and bearing walls supports a flat precast concrete plank roof. According to the architectural plans, the exterior walls of the '67 building are constructed primarily as a cavity wall consisting of 4" CMU veneer, 4" insulated cavity, and 4" interior CMU veneer. The roof above is supported by steel beams and columns within the exterior wall. The interior corridor walls act as shear walls and support the concrete plank roof.
6. The 1987 construction includes the addition of a steel framed gymnasium to the east end of the '69 building.

7. The 1996 building consists of the addition of a second story and a gymnasium to the '69 building and turning the existing gymnasium into a multi-purpose room. The structure utilizes braced steel framing and CMU shear walls. The exterior walls are a combination of metal stud walls with stucco and CMU. The drawings indicate that the roof construction consists of steel framing and metal deck with standing seam roof over the program building and fully adhered PVC membrane over the gymnasium. Modifications were required to the '69 building to accommodate steel chevron bracing in the exterior CMU walls. Foundations consist of poured concrete frost walls with column piers and spread footings.
8. The foundations for the buildings are poured concrete frost walls with slab on grade construction.
9. Evaluation is based on the 1996 BOCA Building Code as adopted by the State.

Findings/Recommendations:

Existing Buildings:

1. '38 Building
    a. There are no existing plans of this building for review. The exterior of the building appears to be in generally good condition. The interior of the building appears to be in generally good condition Items of note are that sections of the roof gutters/downspouts are missing and the remaining sections are deteriorated. The shed roof over the kitchen/storage area on the south side of the building was reported to lack sufficient heat to keep pipes from freezing. Evidence of damage from leaky pipes and/or repair efforts was evident in the ceiling of this area.
2. '49 Building:
    a. The exterior of this building is in very poor condition. This building uses an EIFS system that exhibits large cracks (1/8"-1/4") in the finish. On the south side of the building there is a large vertical crack in the middle of the building from the roof to the entrance canopy. Beneath the finish, the styrofoam panels are installed in a running bond pattern and the crack in the finish follows this pattern. The crack extends from the roof to the entrance canopy. Similar cracks are evident beneath the corners of the windows on both the east and west sides of the building at each floor level.
    b. The flashing/caulking at the windows has deteriorated and is allowing weather elements to penetrate beneath the flashing/finish.
    c. The exterior corners of the EIFS system have large chunks of insulation missing at the ground level.
    d. There are large holes in the finish on the east wall.
    e. The roof flashing (wall cap) appears loose along the perimeter of the building.
    f. The mechanical room floor was wet and a sump pump (running intermittently) was required to keep up with the water seeping in through the floor and walls.
    g. The interior of the building (classrooms, hallways, stairwells) appear to be in good condition. No evidence of the concerns of the exterior (cracks in finishes, etc.) was observed on the interior structure.
3. '69 Building:
    a. The exposed portion of the steel columns in the exterior walls has deteriorated paint (bubbled, chipped, etc.).

b. There is evidence of surface rust at various locations on the steel beams that support the precast concrete plank of the second floor (originally the roof of the '69 addition).
c. It is reported that classrooms in the west wing have moisture/dampness infiltrating through the slab on grade. At the time of this report, the carpet of one classroom was damp to the touch and fans were set up in an attempt to dry it out.
d. There is a small crack in the masonry of the east stairwell. The crack is in the mortar joint of the south east corner of the stairwell where the interior wall intersects the exterior wall at the steel column location. This crack should be monitored for additional movement and if the condition worsens, this office should be notified for further investigation.

4. '87 & 96 Building:
   a. The EIFS façade of the gymnasium is in poor condition. It is evident that students have been bouncing balls off the side of the building leaving pock marked damage and cracks in the finish thus allowing weather elements to infiltrate.
   b. The concrete steps on the east entrance are cracked and chipped. There are missing chunks of concrete on the corners and nose of the steps to the degree that the reinforcing steel is exposed.
5. Lateral Load Resistance (Seismic):
   a. Lateral forces in the '38 building are most likely resisted by the timber framing as evidenced by exposed knee braces at the ceiling level of the library and framed shear wall construction. While no detailed analysis of this building has been completed, the system likely meets the requirements of the current code.
   b. Lateral forces in the '49 building are resisted by the masonry bearing/shear walls (cinder block walls). The original drawings indicate that the walls are plain masonry walls (no reinforcing). The current code would not allow plain, unreinforced bearing/shear walls. This code element is based on a potential collapse during an earthquake due to the brittle nature of masonry walls.
   c. A preliminary check of seismic loads on the '49 building indicates that stresses in the shear/bearing walls appear to be marginal if not overstressed relative to what is allowed by the current code. Modifications to this structure will require a code analysis and potential seismic upgrades.
   d. The plans for the '96 building indicate that both a wind and seismic analysis prescribed by the 1987 BOCA Building Code was incorporated in the design of the '96 additions. This would have included an analysis of the affects of the additions on the '67 and '87 buildings. While no detailed analysis of this building has been completed, the system likely meets the requirements of the current code.
   e. Further review of the lateral load resisting systems is warranted if new design concepts include changing/adding to the original structures. Modifications to the lateral resisting systems is not required if any proposed changes do not increase the seismic force in the resisting element by more than 5 percent.

Renovations:

Roof Framing: The addition of new equipment on the roofs would require further evaluation. Heavy equipment (more than a few hundred pounds) would likely require reinforcing.

Additions:

Foundations: Soil borings, testing, and a geotechnical report should be anticipated to fully evaluate soils in the location of new buildings.