

## Emergency Damage Assessment

### Elias Brookings School

Springfield, Mass



Prepared by

**Drummey Rosane Anderson, Inc.**

June 22, 2011

## Background

On June 1, 2011 a severe tornado struck portions of western Massachusetts, including the City of Springfield, causing significant property damage. Among the significantly damaged buildings were two public schools in the City—the Mary Dryden Memorial Elementary School on Surrey Road and the Elias Brookings Elementary School on Hancock Street. The city moved quickly the following day to assess the damages, secure the properties and make contingency plans for the teachers and students for the remainder of the school year.

As part of the assessment process, the City engaged the architecture firm of Drummey Rosane Anderson, Inc to assemble a team of architects and engineers to visit the site, assess the damages, develop short-term recommendations for repairs and conceptual options for long-term actions. The study team first visited the site on June 2 and made subsequent visits during the following week. This report summarizes the findings to date.

## Study Team

*Architect:* Drummey Rosane Anderson, Inc.  
Newton Centre, MA  
*Carl Franceschi, AIA, Principal*  
*Vladimir Lyubetsky, Project Manager*

*Structural Engineer:* Engineers Design Group  
Medford, MA  
*Mehul Dhruv, PE, Principal*

*Mechanical/Electrical Engineer:* TMP Consulting Engineers  
Boston, MA  
*Craig Hergenrother, PE , Mechanical Engineer*  
*Mark DeVeau, PE , Electrical Engineer*  
*William Hughes, PE, Plumbing & Fire Protection Engineer*

The City also independently retained the services of a hazardous materials consultant, ATC Associates of West Springfield, MA. Their reports are attached as part of the appendix to this report.

## Acknowledgements

Many members of the Springfield community have mobilized to assist in the reconstruction in the days since the tornado struck. Despite their many responsibilities throughout the City at this time, key City personnel were able to provide the study team with drawings and building information within days, provide access to the sites and accompany the study team during tours of the buildings. We especially recognize Rita Coppola, Director of Capital Asset Construction and David Meehan, Facilities Division of the Dept. of Parks, Buildings and Recreation Management for their time, knowledge and commitment.

## Elias Brookings School

387 Hancock Street  
Springfield, MA



*Photo courtesy of Bing Maps*

*Aerial photo looking west at the Brookings School and surrounding area prior to the tornado*

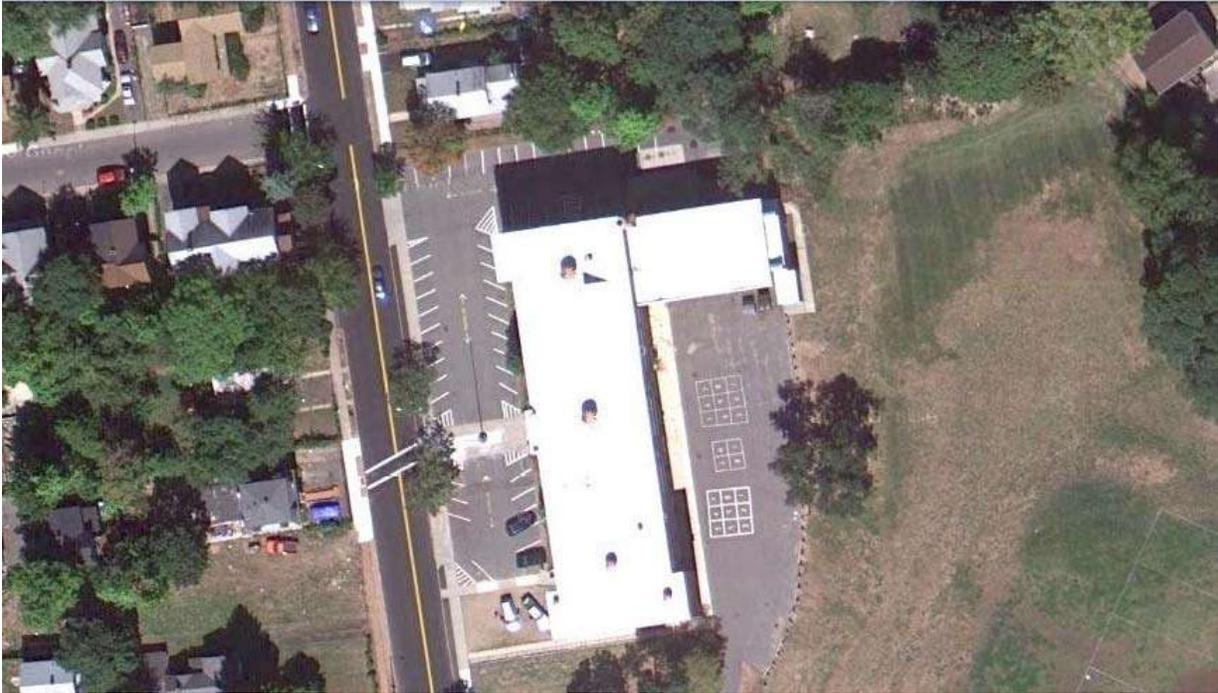
### Pre-Existing Building Description

Constructed: 1925

Area: 58,400 square feet



Site:



The site is located on Hancock Street near the intersection with Hickory Street in the Six Corners neighborhood of Springfield. The building fronts on Hancock Street with paved parking areas fully occupying the front and side yards. A paved play area is located at the rear (east) of the school. A small play area with a play structure is located to the south of the school. The property abuts a city park that contains a larger grass playfield.

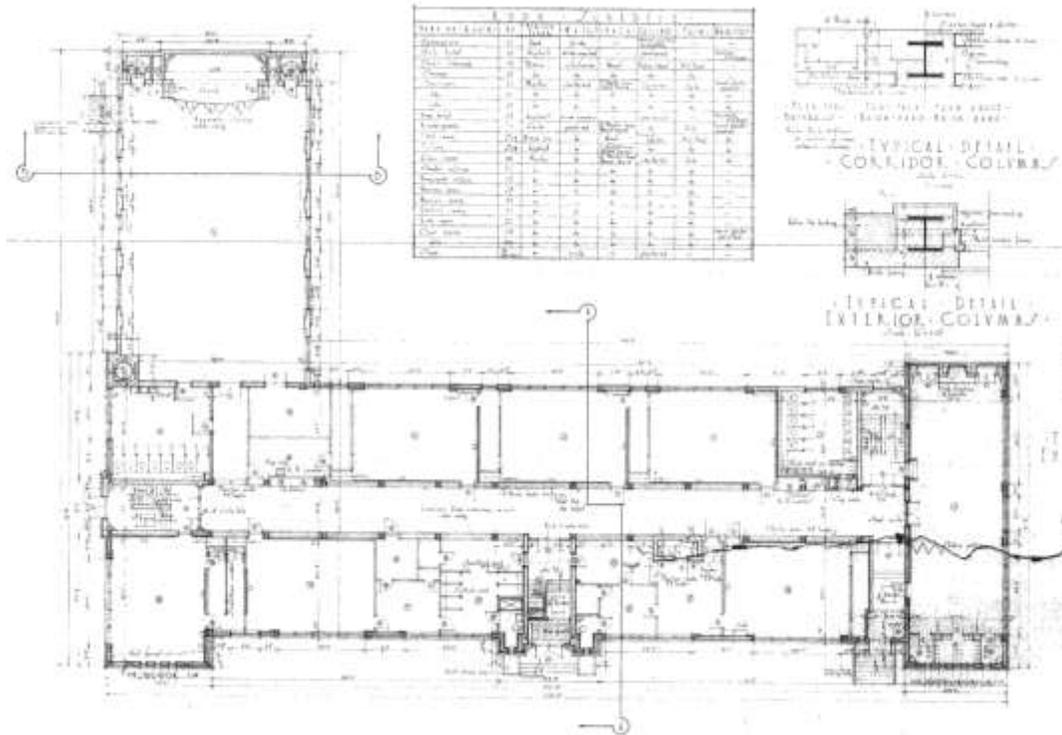
The site gently slopes toward the rear of the property allowing at-grade access from the lower level.

Site utilities are generally connected to Hancock Street.

Configuration:

The existing Building is a three story masonry building with basement constructed of steel and concrete framing. The building is ell-shaped, with one leg being a rectangular classroom portion and the other leg is a gymnasium with lower level classrooms.

The school contains 25 full-size classroom spaces, a gymnasium with stage, library and literacy center, basement cafeteria and kitchen, art room and administrative office spaces. The school also has a unique art museum space adjacent to the main entry that has recently been renovated with updated finishes and lighting.



*First Floor Plan (see Appendix for all existing plans)*

**Structure:**

The basic structure is steel frame supporting cast-in-place concrete ribbed floor slabs with concrete foundation walls and footings. Roof decking at main classroom building is concrete. Roof deck at Gymnasium is gypsum deck on steel bar joists. Basement Floor is concrete slab on grade.

**Exterior envelope:**

The exterior is predominately brick masonry with cast stone trim. Ashlar stone covers the above grade portions of the basement. The entry areas have carved stone surrounds.

There are large areas of windows on all four elevations. The original wood-frame windows have been replaced with “Kalwall” -type fiberglass panels with lower sections of operable, hopper-type windows in aluminum frames.

The low slope roof is covered by a fully adhered PVC membrane that is pitched to internal drains. There is a brick parapet approximately 2'-6" high on around the perimeter, capped by a metal coping. Documentation indicates that the roof was last replaced around 2003.

Interior Materials:

There is terrazzo flooring in the entrance lobby, corridors and toilet rooms. Classroom flooring is Vinyl tile, both 9" x 9" and 12" x 12". There is Wood flooring in the Gym.

Walls in corridors are generally brick wainscot up to 4' with plaster above. Interior walls of classrooms are generally plaster with chalkboards, tackboards and wood casework. Ceramic wall tile in toilet rooms. Interior finish in the gym and stairwells is full-height brick. Many original wood panel doors and frames remain throughout the school.

Ceilings in classrooms and corridors are plaster on metal lath attached to the underside of the structural concrete framing. Gym has suspended 2'x4' acoustic ceiling. Light fixtures are generally surfaced mounted fluorescent types throughout.

**Damages:**

**Structure:**

The most significant damage to the Brookings School is to the exterior envelope- roof, parapet and windows, and to certain interior corridor walls.

*Complete structural report is contained in the Appendix.*



**Roof:**

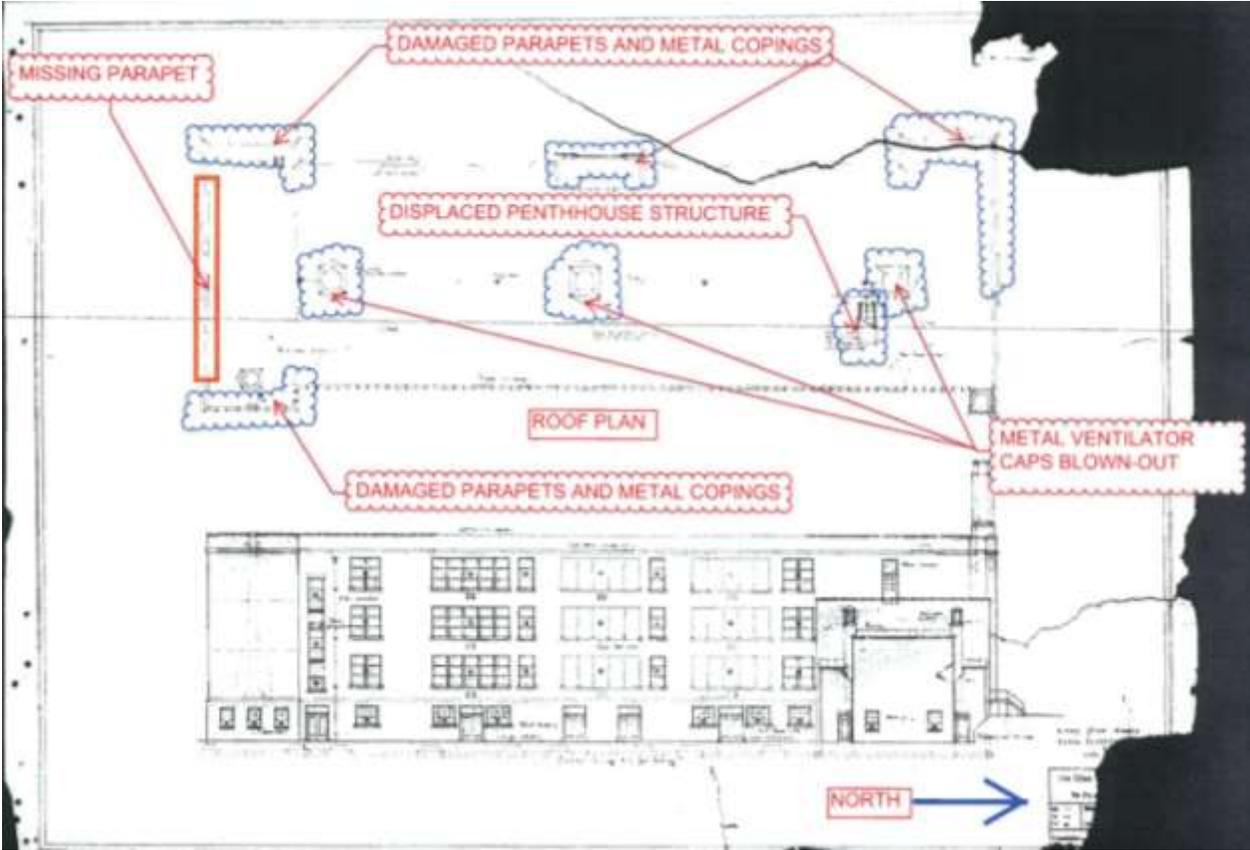
Extensive areas of the roof parapet have been dislodged and removed by the tornado with much of the brick falling to the ground below. In areas where the parapet remains, much of the metal coping and blocking has been damaged, often loosening the top courses of brick.



Near the gymnasium, the roofs of a stairwell and ventilation shaft were completely blown off; in one case taking most of the brick wall with it.



The main roof also suffered damage in several isolated areas caused by wind-blown debris which tore the membrane or was imbedded in the layers of insulation.





Three large sheet- metal ventilator covers were also blown off by the winds. The City's facilities department has temporarily replaced all but one of them by the time of the study team's visit. The roof access penthouse was also severely displaced by the high winds so that it is no longer plumb, it is now a parallelogram.



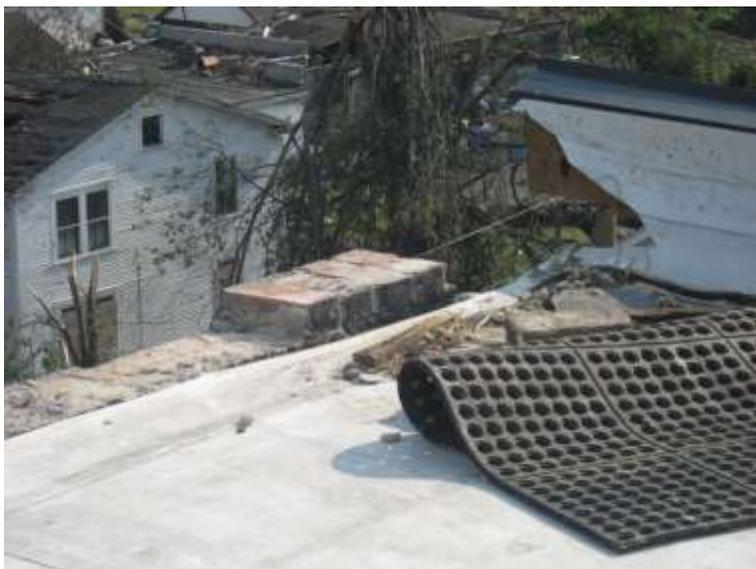
Building envelope:  
Most all of the operable windows (lower sections) on the west and south facades were blown out, although the upper fiberglass panels remained in place. At the southwest corner two entire window frames, approximately (6' x 15') were blown out. At the window frames that remained in place, several had damage to the aluminum frames, including deformations that opened up joints to the exterior.



At the gymnasium, virtually all of the fiberglass arched windows and frames were blown out.

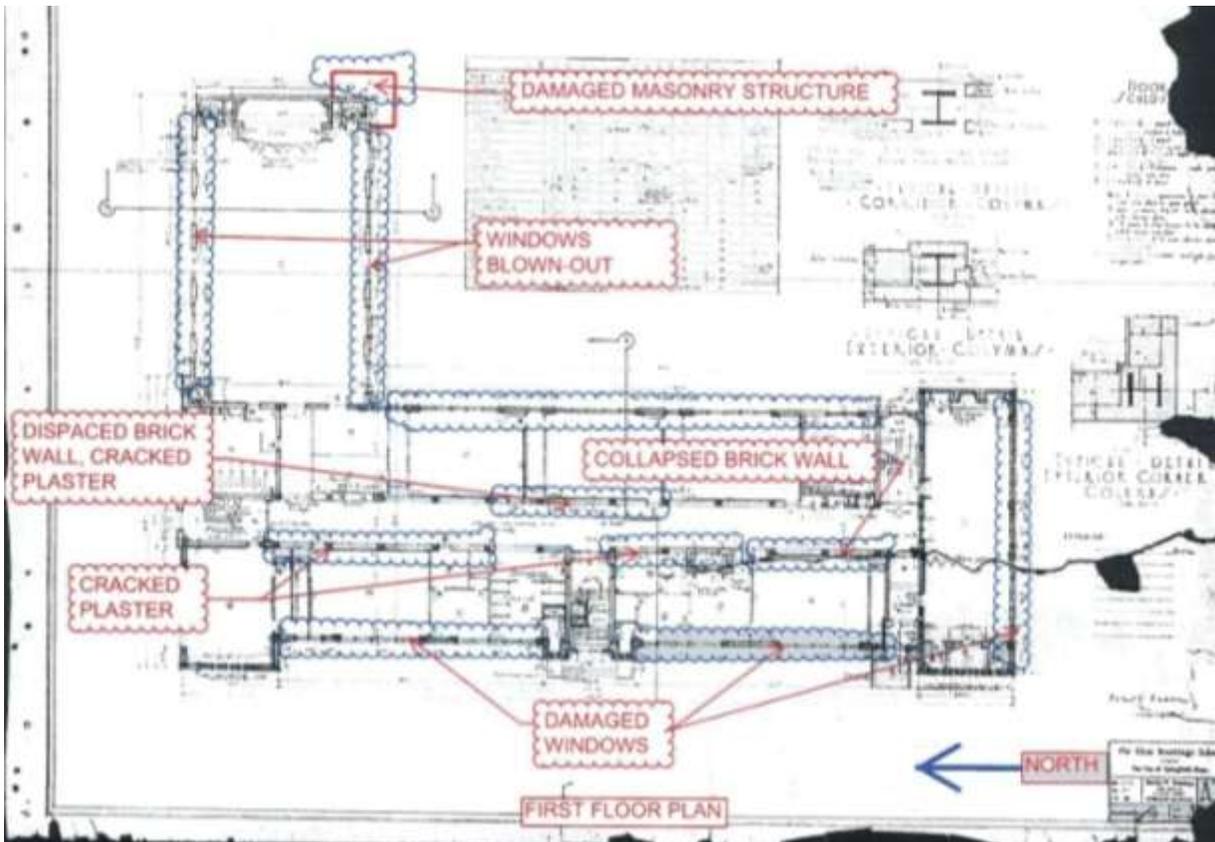


The brick parapets were blown off entirely at the south end of the main building and the lower portions of gym building had large sections of brick removed. These lower structures looked to be disconnected (not toothed-in) to the main gym structure and have been displaced.

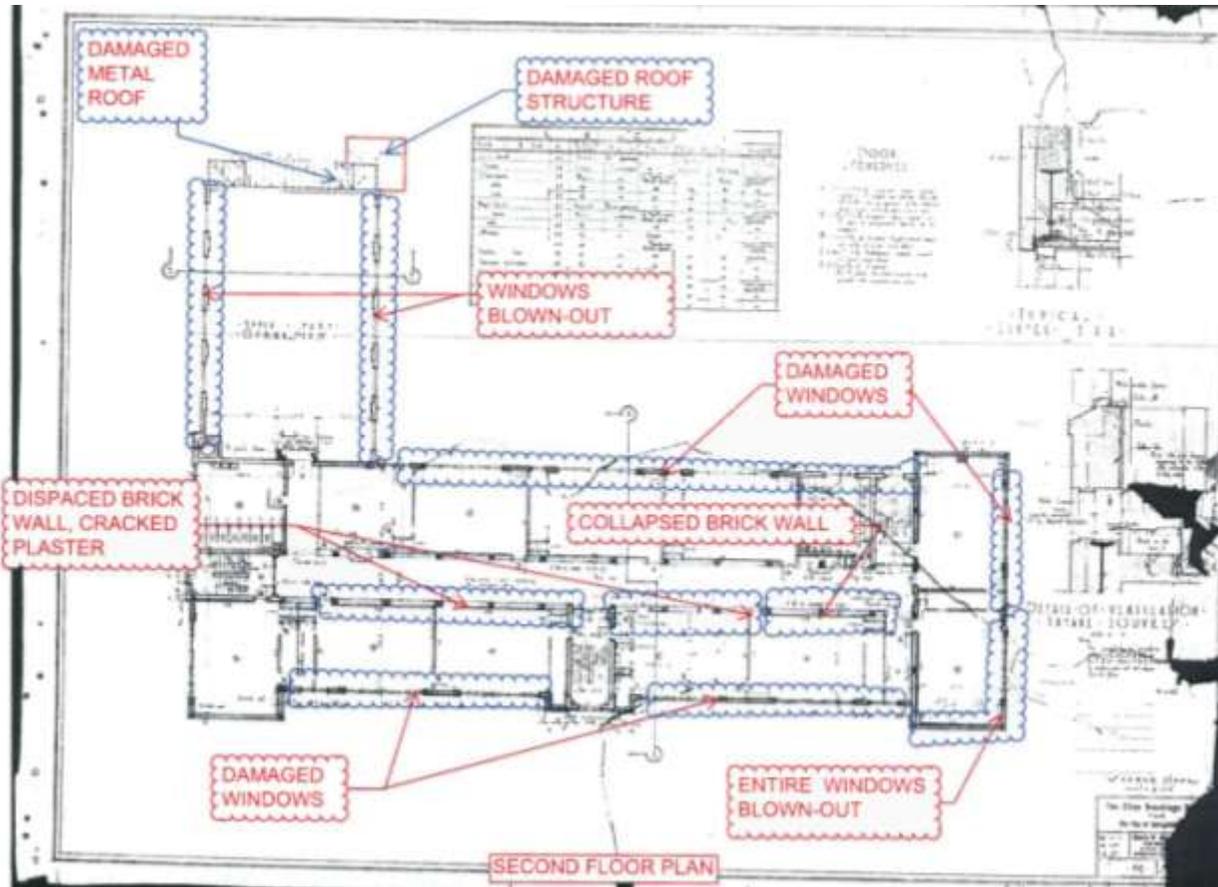


Interiors:

The primary damage to the interior is to the corridor walls which were displaced and in some locations, blown over. Portions of the brick walls had collapsed entirely on two floors along the southern end of the classroom corridor. In most all of the remaining East facing classrooms the interior plaster walls had cracked along a line at the top of the masonry corridor walls.



First Floor Plan (see Appendix for all plans)



*Second Floor Plan (see Appendix for all plans)*

The large classroom at the southern end of the second floor suffered extensive interior damage as this was the classroom that had two corner windows entirely blown out.



Finishes elsewhere in the building did not appear to have sustained any significant damage.

## Mechanical/Electrical Systems:

### Plumbing

The Plumbing systems in the building seem to have suffered minor damages from the tornado. There may be some damage caused to systems that were part of the collapsed corridors, although no leaks were observed or sewer gas smells perceived. Some additional testing is required to confirm the integrity of these systems.



Since power was lost to the building during the storm, certain systems could not be observed to confirm their integrity. The loss of power did cause a failure of the basement sump pump which led to flooding of the basement; about 1"-2" of ground water was standing in the basement at the time of the professional team's visit.

### HVAC

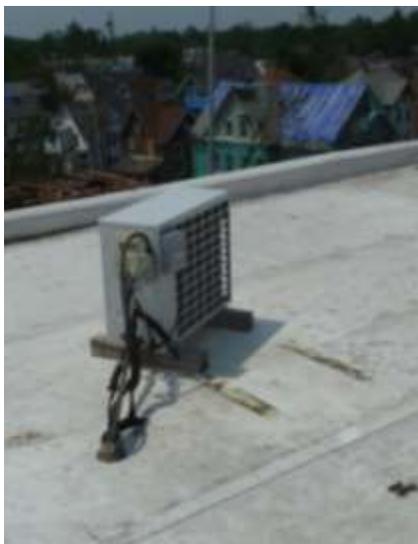
The existing steam radiator piping and pneumatic lines that serve unit ventilators may have been damaged by collapsed windows and corridor walls. Additional testing is needed to confirm the integrity of this system.



The rooftop ventilators, although re-installed, are damaged and probably not salvageable. Also rooftop condensing units appear to have been displaced and are probably damaged.

#### Electrical

The storm damage left the power, lighting and fire alarm systems with what appears to be minimal damage. Some interior walls are buckled or settled resulting in exposed electrical systems in the respective walls. The extent of this damage requires further investigation or testing of the affected systems. Other damage extends to electrically-connected mechanical components that were forcefully dislodged or removed from the roof.



*Complete Mechanical Electrical Report is contained in the Appendix.*

## Recommendations

### Short-Term:

The extent of damage to the Brookings School cannot be reasonably addressed this summer. Therefore the City needs to make alternative plans for the upcoming school year to relocate the students and teachers.

The Building needs to be temporarily repaired to ensure that it is weatherproof and structurally sound and the site made safe for the public. Specifically we would recommend the following steps:

- Stabilize and repair the roof parapet
- Demolish and rebuild the rooftop stair penthouse
- Repair the membrane roof
- Stabilize (or demolish) the east stair enclosure at the gym
- Make all window openings weathertight
- Remove interior debris
- Test the integrity of the plumbing, HVAC and Electrical systems as per the engineers' recommendations

### Construction Costs

The estimated construction costs for the short term work described above (without the lease costs of the temporary classrooms) is in the range of \$80- \$120,000 depending upon the extent of repairs to the MEP systems and type of structural stabilization undertaken, if any.

### Long-Term:

The nature of the damage to the Brookings School does lend itself to a simple repair that would simply re-construct the facility to its prior condition. Even though the basic structure is sound, several systems, such as HVAC, are near the end of their useful life. Several others such as fire alarm and emergency lighting would need to be upgraded to meet current codes. Also any re-built masonry walls would need to meet seismic requirements to be tied to the structure and the remaining building would need to be evaluated for overall structural compliance with current seismic codes. There is also the potential that cost of renovation work might exceed 30% of the building's assessed value, therefore requiring full accessibility upgrades.

Furthermore, although the building has "good bones", the pre-existing condition of the Brookings School was not optimal for a 21<sup>st</sup> century learning environment. Before considering a straightforward reconstruction, the City would benefit by doing an educational analyses of the

current schools capacity, configuration and appropriateness. There are basement spaces that lack natural light and proper ventilation that are being used as cafeteria and for educational purposes. Power distribution and availability of technology throughout the school is less than comparable facilities. Certain facilities, such as the library media center may be undersized.

All of these issues suggest that the prudent course of action at this time would be for the City to perform a feasibility study for the Brookings School to develop and evaluate appropriate conceptual options to address both the physical facility and the educational program. At a minimum these options should include:

- Reconstruction
- Full Renovation
- Renovation and Addition
- New Construction

Although this is a difficult time in the life of the Brookings School, it can be an opportunity to extend its useful life for many years to come.

#### Construction Costs

The estimated construction costs for the long term work described above cannot be determined at this time due to the significant variation in potential options. This cost will be developed as part of the feasibility study process.

Professional fees for a study of this magnitude are typically in the range of \$250-300,000.