FINAL REPORT

BUILDING EVALUATION

LINDENHURST FIRE DEPARTMENT

Wellwood Avenue

Lindenhurst, NY 11757

Project No. 2733

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SUMMARY OF FINDINGS:

On 11 November 2010 an initial inspection of the Lindenhurst firehouse located on South Wellwood Avenue was conducted. As a result of this initial inspection, I have generated the following "preliminary" report of findings for your review.

The structure in question was constructed in 1923 and was subsequently damaged by a major fire in 1978. As a result of the fire, the four exterior walls were the only remaining portions of the original building that remained, and were retained, as part of the reconstruction in 1979-1980. The north, south and west exterior walls of the structure are comprised of a combination of eight inch concrete masonry units and terra cotta block, with a masonry skim coat applied over the majority of the north and south walls. The east wall of the structure is a brick structure, with integral brick arches and terra cotta projecting lintels and other details.

The inspection started in the west mechanical room with a review of the boiler and associated mechanical components. The boiler is an oil fired Peerless unit, with no nameplate data visible. The boiler was found to be in extremely poor condition, with a significant hole in the front as seen in the photo below:

In addition, the P&T relief valve had a significant leak, there was minimal pipe insulation and the boiler flue pipe was not pitched back to the boiler. Finally, there have been a series of puff-backs from the boiler along with the unit having on-going operational problems (repeated boiler shutdowns were observed during the course of this inspection).

The roof was inspected next, with access gained through the fire department's aerial truck. The roof surface was found to be in very poor condition, with significant "soft spots" noted throughout the roof. It is unclear, until further exploratory investigations are conducted, as to whether the poor roof condition extends into the roof deck, making the roof structure completely unsafe. As a result of the initial observations of the roof there is great concern that the existing roof deck may have extensive damage resulting from water intrusion. This opinion is supported by observations made of the roof deck sagging under portions of the antenna frame and sagging of the roof deck between adjoining roof rafters (as seen in the photo below).

The building had one roof mounted HVAC unit that was installed on a roof curb, without "cant strips". This same method of roof curb installation was applied to two small toilet exhaust fans and one gooseneck. The kitchen hood exhaust fan was installed with a proper curb and the associated "cant strip".

Along the north and south sides of the building combination masonry and terra cotta parapets have been installed, with the parapet sections at the northeast and southeast corners increasing in height to follow a framed mansard roof line along the east side of the building. These northeast and southeast portions of the parapet are in extremely poor condition and currently represent a structural safety concern to individuals at grade. These sections of parapet were found to have terra cotta caps that have decayed to such an extent that significant portions of the structure have fallen to the roof and grade below. In addition, cracks were discovered in the parapets that were found to translate completely through the masonry structure (from the inside surface to the outside surface) suggesting that entire portions of the parapet have now become unstable and at risk of complete collapse (see photos below):


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11.11.2010 12:54

The inspection continued with the inside of the structure in the attic and second floor. The gypsum wallboard attached to the underside of the roof framing was found to have significant water damage throughout its surface, supporting the opinion that extensive water intrusion has occurred throughout the roof structure. In addition it was observed that the CMU block located under the northeast parapet (and within the attic space) was cracking, suggesting that the shifting in the loads of the parapet have radiated down into the lower supporting block wall.

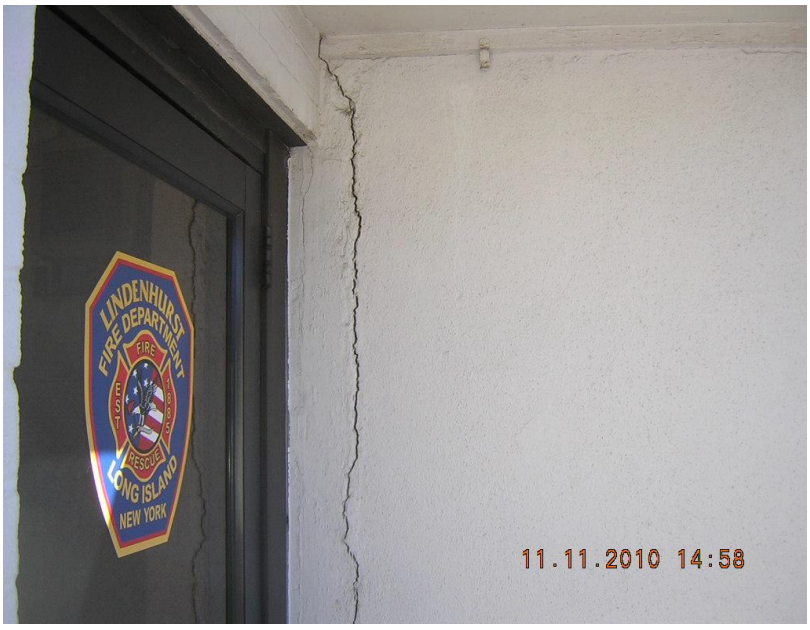
The room located to the far west end of the attic was examined, along with the exterior exit stair and supporting steel frame. Portions of the steel frame had completely failed as a result of rust, with a section of the railing surrounding the top platform becoming unstable. As a result of this discovery, the fire department staff was advised to post this room as inaccessible, due to the lack of any safe, secondary means of egress from the space.

The far east wall was examined from the large meeting room on the second floor. This brick structure was found to be in a state of severe disrepair, with missing mortar, shifted bricks, failed brick arches and shifting roof rafters (as a result of the shifting bricks).

The kitchen was inspected and the hood filters were found to be in need of significant cleaning. No ansul system was installed and the posting on the hood states that the last formal cleaning took place in January 2001. In addition, the two-compartment sink was found to have been installed with direct waste connections made to the grease trap, as opposed to indirect drains from each of the two basins into a local floor sink as is normally required by SCDHS.

The emergency exit from the main meeting room (out the west end of the space) was found to consist of a steel stair with no integral landing or platform at the top of the stair. The stair was constructed with five-inch deep treads and risers that ranged from three inches in height to 12-7/8" in height. While the tread and riser sizes do not comply with the current New York State Uniform Fire Prevention and Building Code requirements (nor the requirements in place at the time of reconstruction of the building in 1980), they also clearly represent a significant safety issue due to the irregularity in riser sizes and inadequate tread depth.

The emergency generator room was inspected and found to be in a state of significant differential settlement in relation to the existing base building structure. The junction of the generator room and the base building exterior wall consists of a significant opening in the joining surfaces, with the largest portion of the crack at the top of the wall and the smallest at the bottom of the wall. The crack is of such width that one can clearly see through the crack to the opposite side of the wall. This type of crack is indicative of a differential settlement of the adjoining structures, with the generator room pulling off the main building (see photo below):



Finally, the exterior of the building was examined with specific attention given to the south side of the structure. At the far east end of the south wall, significant vertical cracks were discovered that include one portion that measured approximately 26 inches long and varied from 1/8" to 1-1/4" in width. In addition, tapping on the wall in this region resulted in "hollow" sounds suggesting that the underlying structure has fractured. Furthermore, at the far west end of the south wall, additional cracks were discovered, with one portion of the crack resulting in a hole approximately 2-1/2" by 6". In both cases, the holes appear to be in regions where the base building structure consists of terra cotta block, with the exterior core of the blocks being the region of failure. Finally, at the east end of the wall, the significant vertical cracks appear to be located at a point where the terra cotta structure has been installed adjacent to an existing brick structure (see photos below).

With significant signs of water damage found on the interior of the south wall, extensive shifting found on the exterior of the south wall and major cracks discovered at the east and west ends of the structure, it is clear that the potential exists for a significant structural failure in this building. Additional investigation must be conducted (including, but not limited to, the evaluation of portions of the block wall in regions were "hollows" are heard, exposure of the steel columns within the block walls to verify the existence of any significant rust and decay and monitoring of the cracks for further movement so as to determine what immediate action is necessary for the structure) so as to determine the extent and magnitude of the structural failures.

All of these failures in the exterior walls, as well as the parapet and roof, suggest that significant water damage due to infiltration and intrusion (often resulting in structural failures due to freeze-thaw cycles) has, and is, occurring. The extent of this damage can only be assumed at this point without the aid of further extensive investigation, moisture testing and monitoring.

This report reflects the findings of the inspection on 11 November 2010. Further inspections will be conducted, with possible testing by outside agencies, at a later date.

As a completion to my 11 November 2010 initial inspection of the Lindenhurst firehouse located on South Wellwood Avenue, I visited the site on 22 December and 30 December 2010 and 3 January 2011 to examine some of the base building structural issues. As a result of these additional inspections, I have generated the following "secondary" report of findings for your review.

The inspection on 22 December was conducted to examine the underside of the roof deck that was inaccessible during my initial inspection of 11 November. At the time of this inspection, large sections of the meeting room ceiling had been removed along with portions of the GWB attached to the underside of the roof structure. The existing roof structure (comprised of 2x8 rafters at 16" o.c. and approximately 16'-0" in span) appeared to be in very good condition. There were no visible signs of rot or decay, nor any signs of structural failure as seen in the photo below:

While the existing roof structure appeared to be in good condition, it should be noted that the roof rafters are under sized for their existing span (maximum projected bending stresses may reach values that exceed the maximum allowable for typical doug-fir lumber by upwards of 56%). Furthermore, the fire department was advised to remove all remaining ceiling structure and underlying GWB so as to allow the existing roof structure and sheathing to "dry out" (as a reminder, in my initial inspection it was noted that the roof deck, from the exterior roof side, was in extremely poor condition, with concern that water had infiltrated the roof insulation or sheathing).

On 30 December and 3 January, site visits were conducted to observe the condition of the existing steel columns located within the south wall of the building. A contractor retained by the owner removed portions of the existing terra cotta block and any associated in-fill material so as to allow for an examination of the steel columns for any signs of potential failure or decay. Two columns were partially exposed to allow for a visual inspection of the outside (south facing) column flange and, to a very limited degree, the column web. The flange was found to have a significant amount of rust (with partial material degradation on the outside edges of the flange), but with no apparent through rust decay of the column flange, as seen in the photos below:

The rust and decay in the column flange may be addressed through future sandblasting of the steel and the welding of a steel plate to the outside of the existing flange surface.

Next, the terra cotta and CMU blocks were examined (where made visible through the removal of material to examine the steel columns). The horizontal crack the runs east and west, approximately halfway up the north and south walls, may be attributed to the differential movement between the terra cotta and CMU blocks (this crack aligns closely with this change in building material as may be seen in the photo below).

The lack of any apparent vertical or horizontal reinforcement in either block will result in the lack of stability in bending (as would occur during extreme wind loading or transverse loadings due to seismic conditions) and will additionally create a potential "hinge" at the point of transition between the two block materials, resulting (in part) in the horizontal crack that may be observed. Finally, the installation of "fill material" between the inner and outer flanges (adjoining the web) and on the outside of the outer flange, has created additional vertical cracks (at locations near the steel columns) due to the shifting of this unstable material, as may be seen in the photo below:

With the movement in the original block, and the shifting of the new CMU block, it appears that the stucco finish applied over the exterior surface varies extensively in its overall thickness. This variation in material thickness will also result in additional cracks as the material shifts with changes in expansion or loading.

Finally, a re-examination of the east brick wall of the building was conducted so as to determine the extent to which this material has become (or originally was) unstable. The existing bricks, as outlined in my original report, have experienced extensive fire damage as a result of the fire in the 1970's. This has caused the mortar joints to become loose, resulting in loose masonry units. The amount and degree to which this will impact the building structure (and the roof framing directly since this brick wall supports the roof rafters on the east end) can already be seen through the failure of one of the original arches.

As a result of these examinations, it is recommended that the north, south and east walls of the structure be removed and rebuilt as new. The ability to repair these structures (particularly the north and south walls) borders on impossible due to the mix in material, the differential movement in these materials and the lack of any allowance for changes in movement in the original design and construction (i.e., expansion joints with backer rod, vertical and horizontal reinforcement, etc.). Furthermore, due to the extent of the fire damage on the east wall, and the magnitude of the unknown in the specific condition (or composition) of the mortar material, it would be ill advised to assume that this masonry wall may be salvaged.

Lastly, with the changes in current NFPA requirements, and the need for new and improved apparatus for fire districts, the ability to adapt the existing structure to these new requirements is not practical. Any plan to widen or raise the equipment bay doors to allow for wider or taller apparatus borders on the impossible due to the limitations of the existing internal structure and architecture (i.e., height of the apparatus bay ceiling, placement of internal columns, etc.). As such, provisions would need to be made to obtain new apparatus with the understanding that the width and height of the existing bay doors will need to be maintained at close to their current dimensions.

This report reflects the findings of the final inspections of 22 December and 30 December 2010 and 3 January 2011.

Very truly yours,

Kevin Koubek, P.E./