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Structural Analysis of Former Gem City Ice Cream Building, Dayton, Ohio

Introduction

Our firm was contracted by the City of Dayton to perform a current assessment of the condition of the two-story Gem City Ice Cream building complex located at 1005 W. Third Street, Dayton, Ohio in the Wright-Dunbar Historic District. The building has historic significance since the southwest portion of this structure housed the first Wright Brothers Bicycle Shop and the structure is listed on the National Registry of Historic Structures.

Background

This building complex is located approximately two blocks west of the Great Miami River on the north side of West Third Street in a former commercial area which has now become part of the Wright-Dunbar Historic District. The building was constructed in three sections. The first building is located at the southeast corner of the complex. It is a two-story structure with brick exterior walls and a timber internal frame with wood floors and roof structure. The second structure is a reinforced concrete two-story building constructed in the early 1900's and located north of the initial building. The third component is an attached reinforced concrete frame structure located west of the first two structures. The first brick sided building dates back to the middle 1800's and was used as a commercial space on the first floor with storage and living space above. The two newer portions of the building were built as an ice cream manufacturing plant which continued operations for many decades at this site. Ice cream production was suspended in the 1960's and the building was vacated at that time. No regular maintenance occurred on the building after the mid-1960's. The City of Dayton acquired ownership of the building in 1980. As part of the Centennial of the Wright Brothers First Flight in 1903 the City invested major funds to clean out the building for future historic preservation, however, the damage to the structure was excessive and work was suspended. In 2007 the City of Dayton hired Shell and Meyer Associates Inc. Consulting Engineers to structurally evaluate the building and a report was prepared identifying costs and various proposals for future use of the site. No progress has been made towards any future use of the building since that time and our firm was asked to reevaluate the structural condition of the complex as it stands today.

References

References include:

- Three separate visits to the site
- Review of photographs provided by the City of Dayton
- Memorandum from Sheelah Moyer, Senior Development Specialist dated May 4, 2007
- Shell and Meyer Associates, Inc. report dated February 6, 2007.

Structural Deficiencies

Our inspection revealed that the almost two decades of neglect since the deficiencies in the building were last addressed have caused major further problems in the structure. The principal cause of these problems is the lack of protection of the building elements from the weather.

- The building roof has continued to deteriorate at a rapid rate allowing moisture to penetrate into the roof slab concrete and rebar.
- The infill walls between the concrete columns have cracked and settled allowing further moisture into the building.
- The brick infill wall portions on the west side have suffered greatly and have begun to spall and split apart.
- A crack has developed between the front façade brick work and the side brick walls.
- The front building cornice is also becoming loose and could fall to the sidewalk below.
- The lean-to concrete block building on the west side has cracked and shifted and the precast roof panels on this lean-to portion have shifted and are in danger of falling.
- There is cracking on the concrete columns indicative of interior rebar rusting.
- Vehicles have struck some of the first floor columns leaving rebar exposed on the first floor.
- The wood framing including roof and ceiling joists and beams have rotted significantly at the joint between the original building roof and the first phase wall. Unfortunately, the original building roof slopes down toward the wall of the reinforced concrete building and water is trapped in this valley which has eventually entered the wood framing causing rot and settlement.
- Metal doors have rusted shut.
- The plywood covering of windows has been compromised allowing vandals to desecrate and destroy portions of the building.

- The penthouse is in danger of imminent collapse.

Analysis of Concrete Building Frame

The concrete frame portion of the building was designed in the early part of the 1900's. It is deficient per the Shell & Meyer Associates Inc. report of 2007 in that the shear strength of the concrete beams was not fully understood or analyzed. Typically, in today's concrete beam design vertical steel rebar members called stirrups are placed in the beam to carry the shear loading caused by point loads or uneven loading of the beam. If the beam is uniformly loaded across its length shear stress is less of a problem than when point loads caused by passage of vehicles, forklift trucks etc. are applied to the beam. No stirrups were placed in the beams, therefore, even if the structure was in good condition it could not be used for any purposes requiring internal moving or shifting of large loads by forklifts, tow motors, etc.

Demolition Costs

My review of demolition costs with Dayton area contractors shows that costs have risen approximately 45-50% from the original estimates provided to the City over a decade ago. These increases include labor costs, tipping fees at disposal sites, additional safety requirements, etc. Therefore, I believe that the cost of demolition work will be closer to \$200,000.

Conclusions

After inspection of the structure, review of the photos and documents together with structural analysis it is my opinion that salvage of the building is unfeasible. The deterioration is excessive and irreversible in several areas of the building and the only potential area that could be saved is portions of the concrete frame itself. The infill walls, lean-to portions, and original front building in the southeast sector are all beyond salvage. The concrete frame has also significantly deteriorated and could possibly be restored, however, it would severely limit any possible reuse of the structure. Therefore, it is my conclusion that the only practical solution is to raze the structure completely and return it to a Greenfield site for future use. The condition of the building, even in 2007, appeared to be principally flawed and 12+ years of neglect and exposure to the weather has made this building impossible to save.

Summary

In summary, our firm was contracted to analyze the building complex at 1005 W. Third Street, Dayton, Ohio to determine if the building could be salvaged and rehabilitated. It is my professional opinion that this building cannot be salvaged under any circumstances even though

portions of the concrete frame may still be reusable. The wood front section together with the brick façade are totally unsound, rotted and deteriorated. Therefore, in summary, I believe that for safety reasons this building should be dismantled and the materials removed from the site as soon as practical.

Sincerely,

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