

Bob Mollette

ENGINEERING REPORT

**REPORT OF THE INSPECTION
AND A STRUCTURAL CONDITION ASSESSMENT
OF THE CITY OF PORTSMOUTH, OHIO MUNICIPAL BUILDING
LOCATED AT 728 SECOND STREET**

Submitted To:
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November 6, 2006

INTRODUCTION

On September 28, 2006 LOCK ONE, INC. was retained by Mr. Bill Beaumont of the City of Portsmouth, Engineering Department to conduct an inspection and assess the **Structural Condition** of the City Municipal Building.

BACKGROUND

1. The Municipal Building was completed circa 1935.
2. The occupants have experienced a myriad of roof and wall leaks during the past several years. These leaks have resulted in water damage to the interior finishes and office equipment.
3. Cracks in the concrete basement (ground floor) walls at openings have been a matter of concern for years.

INSPECTION

On October 13, 2006, I conducted a visual inspection of the Municipal Building. I was assisted by Mr. Tony Lauro, P.E. We were provided with a set of building plans by Mr. Bill Beaumont of the Portsmouth City Engineering Office. These plans were a valuable tool for purposes of orientation and as a reference during my assessment.

During the inspection observations were noted and photographs were taken to document the observations. Measurements were also taken and recorded. Roof repair was being performed at the time of the inspection. The roofers were able to show us the areas with the worst leakage.

Some of the photographs are contained in Appendix A of this report. The plans and our measurements were utilized to prepare Exhibit 1, which is a roof plan contained in this report. Areas of concern are highlighted on Exhibit 1.

OBSERVATIONS

During the inspection the following observations were noted.

1. The building is a 3 story brick masonry structure with concrete floors and roof. The lowest floor is at or below grade. The enclosed area of the building is 8284 square feet. The front wing is 107' long (along 2nd Street) x 53' deep. The rear wing is 60' long x 37' wide. (See Photo Nos. 1, 6, 7, 8, 9 & 10 and Exhibit 1)
2. Steel panels have been installed on the stone facing of the parapet and frieze above the main entry. The west most panel is bulged out from the plane of the wall. It is attached to the brick masonry parapet by through bolts. The center panel consists of corrugated steel sheets. The method of attachment is not visible. (See Photo Nos. 1, 2, 3, 4 & 5)
3. The front area of the roof (above the main courtroom) is raised 3 feet above the balance of the roof. The front parapet extends approximately 6 feet above the raised roof. The high parapet is 34'-4" long with a 5'-8" long counterfort wall at each end. (See Photo Nos. 11, 12, 13 & 14 and Exhibit 1)
4. The mortar joints of the rear of the high parapet wall are cracked and deteriorated. Several joints have been calked with an asphaltic material. The exposed mortar of the joints is soft and can be penetrated with a knife blade. (See Photo Nos. 15, 16, 17, 18 & 19).
5. The mortar joints at the ends of the counterfort walls are also cracked and deteriorated. The joints between the brick withes have separated. (See Photo No. 26)
6. As noted above, the stone facing of the high parapet above the main entry has been stabilized via the installation of steel panels on the exposed faces. The condition of the stone facing attachment to the parapet is not possible to determine. The bulge in the steel panel on the west portion of the parapet is cause for concern.

Additionally, a joint of the corrugated steel panel (center of the parapet) has pulled open. (See Photo Nos. 20, 21, 22, 23 & 24).

7. The capstone atop the parapet has many deteriorated joints. Some joints have been calked with an elastomeric material. The calking of many of the repaired joints has failed due to tearing and debonding from the stone. The design of the capstone is faulty in that 1 ¼" ledge is exposed at the exterior of the parapet (See Detail on Exhibit 1). (See Photo Nos. 25, 27, 28, 29, 30, 31, 36 & 51).
8. A masonry chimney is located at the southwest corner of the building. Two steel clamps have been installed on the chimney in order to stabilize the vertical cracks in the masonry joints. (See Photo Nos. 33, 34 & 35)
9. Some of the capstones on the west wall of the rear wing are tilted and misaligned. The flashing behind the most severely tilted capstones has been pulled away from the face of the capstone. This area has been open to the elements and the attachment hardware has corroded and pulled out from the side of the stone. The stone has deteriorated due to exposure to the elements. The masonry joints below this area have also deteriorated due to water penetration behind the flashing. (See Photo Nos. 38, 39, 40, 41 & 42)
10. Brick masonry joint deterioration was also noted at the following locations: upper rear wall of the west wing; south wall of the stair penthouse; upper rear wall at the east corner; east center and west corner, upper north corner and center portion of the west wall; and the upper center and north corner of the east wall (See Photo Nos. 43, 45, 46, 54, 55, 56, 57, 60, 62, 63, 73 & 74)
11. The roofers pointed that the flashing at the base of the west wall of the stair penthouse had been in bad repair. (See Photo Nos. 44, 52 & 53)
12. The masonry of the front parapet east counterfort wall is deteriorated and has excessive joint cracks. (See Photo Nos. 47 & 48)

13. The stone facing has deteriorated joints that have been caulked. The elastomeric caulking has torn and pulled away from the stone. Several stones have begun to pull away from the wall. The stone facing is generally flaking and spalling. (See Photo Nos. 49, 50, 55, 61, 63, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76 & 77)
14. The lower wall is constructed of reinforced concrete. Cracks are present at most door and window openings of these walls. Many of the cracks have been caulked in the past. The cracks have then reappeared. (See Photo Nos. 58, 59 & 77)
15. Water damage to the interior wall and ceilings is evident throughout the building. The majority of the damage is present at locations adjacent to exterior walls and at window openings. Other areas of damage include those below roof flashings (stair penthouse, raised courtroom, etc.). (See Photo Nos. 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90 & 91)
16. Cracks are visible on the tile of the first floor lobby. Generally, these cracks radiate outward from the elevator shaft opening. (See Photo Nos. 92 & 93)

FINDINGS

After a review of my observations made during the visual inspection, I have arrived at the following findings.

1. The stone facing of the high parapet above the main entry appears to be unstable. The original anchorage and the steel panels of the stone facing may not be adequate to hold the stonework on the masonry substrate of the parapet. The condition of the parapet capstone will allow the continued water entry into the wall masonry and further degrade the remaining integrity and structural stability of the high parapet wall and its stone facing. **This condition presents a structural hazard to the building occupants and to the public.**
2. The parapet capstone system has a defect in that an exposed ledge is present around the periphery of the building. This ledge does not facilitate the runoff of water

from the top of the walls. This configuration allows water to find its way into the masonry assembly of the walls. The presence of water in the wall masonry leads to joint damage resulting from freezing and expansion. A secondary defect of the capstone design is the lack of joint laps. The failure of a capstone mortar joint results in water entry into the wall masonry.

3. The general condition of the decorative stone facing of the exterior walls includes; partial loss of anchorage to the wall, flaking and spalling, joint deterioration, and failure of caulking repairs. The loss of the integrity of the capstone system has exacerbated the deterioration of the stone facing.
4. The deterioration of the brick masonry has been largely a result of water entry into the top of the wall. A secondary cause is the lack of control joints in the masonry. Control joints allow for the movement of the building wall, due to thermal contraction and expansion, without the formation of joint cracks.
5. The cracks in the reinforced concrete lower walls are also primarily due to the lack of control joints. The cracks are the result of thermal movement, forming at openings because those locations are the weakest sections.
6. The 1st floor cracks are also due to lack of control joints. The observed pattern of the crack radiation from the elevator shaft opening is a normal result (sans control joints) of concrete curing shrinkage.

RECOMMENDATIONS/CONCLUSIONS

1. The condition of the high parapet stone facing and its masonry substrate present a hazard to the building occupants and the public. The high parapet stone facing and the masonry substrate should be removed. The removal will require that a new modified low parapet and cap system is installed. Optionally, a protective tunnel structure, capable of withstanding the impact of falling stone, could be erected as a temporary measure. **At a minimum, the front entry should be closed and**

barricaded to the occupants and the public. This measure will require that adequate, alternate egress paths and exits be established.

2. **Proper repair of the building is probably not economically feasible.** While I have not prepared cost estimates, the required scope of repair work is extensive and costly. A minimum scope of repair work would involve, but not be limited to the following items.
- a) Work on the high entry parapet as described in number 1 above.
 - b) Installation of a new parapet cap system
 - c) Removal and replacement of some or all of the decorative stone work.
 - d) Cleaning and repointing of a signification portion of the exterior brick masonry.
 - e) Additional roof repairs that may be required.
 - f) Interior restoration work.

SUMMARY

Unless further detail or additional engineering effort is requested, the writer considers the above as complete and sufficient per the scope of engineering work requested and will provide no further technical assistance.

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10/6/06 SEAL