

ENGINEERING REPORT

REVIEW OF THE FORSYTH FACTORY BUILDING 31 YOUNG STREET, KITCHENER, ONTARIO

Prepared for:
City of Kitchener
City Hall P.O. Box 1118
200 King St. West
Kitchener, Ontario N2G 4G7

Prepared by:
Sze Straka Engineers
Structural Division of MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario N2B 3X9

January, 2006

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TABLE OF CONTENTS

Letter of Introduction	
Introduction.....	1
Background.....	1
Observations.....	3
Critical Issues.....	4
Evaluations.....	5
Conclusions.....	7
Appendix "A" Limitations	
Appendix "B" Kappeler Masonry Corporation, Masonry Review Report	
Appendix "C" Overall Building Layout Showing Phases of Construction	
Appendix "D" Photographs	

January 9, 2006
Job # 30595

Mr. Laurier Proulx
City of Kitchener
City Hall P.O. Box 1118
200 King St. West
Kitchener, Ontario N2G 4G7

**RE: REVIEW OF THE FORSYTH FACTORY BUILDING
31 YOUNG STREET, KITCHENER, ONTARIO**

Dear Mr. Proulx:

As requested, Sze Straka Engineers, Structural Division of MTE Consultants Inc. visually examined the structure for the Forsyth Factory Building at the corner of Young and Duke Streets in Kitchener. We have enclosed 3 copies of our Engineering Report for your review.

This report was carried out in a very short period of time. The purpose of this report is to emphasize the safety issues in terms of structural integrity, speed of deterioration, damage to the building and to identify immediate and short term safety hazards.

Please let us know if you require further assistance on this matter.

Yours truly,

SZE STRAKA ENGINEERS

Yulun Sze, Ph.D, P.Eng.

BJD/nem

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REVIEW OF THE FORSYTH FACTORY BUILDING 31 YOUNG STREET, KITCHENER, ONTARIO

Introduction

Several bricks had fallen from the west wall of the Forsyth Factory building along Young street. This was a safety concern to the public.

Laurier Proulx, of the City of Kitchener Facilities Management Division, requested MTE/Sze Straka Engineers and Kappeler Masonry Corporation review the situation. Brian Dyce and Yulun Sze from MTE/Sze Straka Engineers and Dick Kappeler, an experienced and very knowledgeable masonry contractor met with Mr. Proulx at the building on December 22, 2005. A report prepared by Dick Kappeler is also included in Appendix B.

Mr. Proulx arranged two fire trucks with telescopic ladders from the City of Kitchener Fire Department to allow a closer look at the building facade and the areas of most concern.

Background

The original building was constructed in the early 1900's with several additions added in over the next 40 years. Refer to the building sketch in Appendix C for the various phases of construction. Phase 1 is the original building and Phase 5 is the latest addition. Phase 3 was demolished in 2001.

The property also includes a house in the northwest corner that was partially enveloped by Phases 4 and 5.

Phases 1 and 2 are three storey wood framed structures with multi-wythe load bearing brick exterior walls. Interior wood columns and beams support the wood floor and roof joists and decking.

Phase 4 is a three-storey building with mainly multi-wythe load bearing brick exterior walls. Interior steel columns and beams support the wood floor and roof joists and decking.

Phase 5 is a three-storey building with a partial fourth storey. The building is constructed of a steel frame with masonry brick and precast concrete exterior facade. The roof and floors are wood decking on steel joists, beams and columns.

The building has been vacant since the early 1990's. Ownership has changed a couple times since becoming vacant. The City of Kitchener obtained possession of the building around 2000. Several attempts to develop the building to convert this property for residential or office use were proposed with various developers. One model residential suite was constructed on the second floor of Phase 1.

Various engineers, architects and developers have documented the feasibility of renovating the building, the Heritage Status of the building, the deterioration of the building and the repair of the damaged areas and have prepared a number of studies. Some sample structural analyses were carried out in the past as per previous reports.

MTE/Sze Straka Engineers has been involved several times over the past 12 years to assist architects and developers for various proposals of development and to review the structure. MTE/Sze Straka Engineers has also worked for the City of Kitchener to review the condition of the building, the damage and the deterioration of the building.

One of the most critical issues is the structural condition of the building, which has deteriorated exponentially in the last few years.

Observations

The exterior of the building was observed from the ground and the areas of most concern were closely looked at to examine the walls with the fire truck ladder.

Bricks were missing from the arched lintels above two-second floor windows in the southwest corner of Phase 1 (refer to photo 1 in Appendix D). Several bricks were loose at these locations and could fall. The loose bricks were removed by hand with little effort to reduce the safety hazard of more bricks falling.

Excessively wide cracks in the brick extended from the ground floor up to the parapet in the southwest corner of the building (refer to photos 2-23). Some of the cracking occurred where mortar joints had been previously repaired.

The wood sill of one of the third floor windows was pushed out from the wall one at end by approximately 3" (refer to photos 24 and 25). This sill was removed so that it would not fall to the sidewalk below.

One ground floor lintel on the south face at the southwest corner of the Phase 1 is bowed out approximately 1 ½" (refer to photo 26).

The brick on the south face of Phase 1 and 2 at ground floor level is badly deteriorated. Many of the bricks are spalled and crushed. There is also cracking in the masonry along this area (refer to photos 27-30).

The east wall of Phase 2 had bowed out at the second and third floors in the past and was partially repaired in 2000. Tie rods had been placed to tie the exterior load bearing brick wall to the interior columns and attempt to plumb the wall. In April 2005 one of the tie rods bracing the wall broke. It was immediately repaired.

During the visit on December 22, the wall was severely bowed (refer to photo 31) and had noticeably deteriorated even since the April visit. The wall was cracked vertically in numerous locations (refer to photos 32-35). The wall had cracked horizontally, kinking the wall and shifting outwards approximately 1" (refer to photo 36). It appears that this wall is continuing to be pushed outwards at the floor levels despite the tie rods bracing the wall.

Some precast concrete facade panels on Phase 5 are damaged. The reinforcing steel has rusted and spalled the face of the concrete exposing the reinforcing steel (refer to photos 37 and 38).

We had a quick walk through the interior of the building. No detailed review of the condition of the structure was done at this time. It was apparent that water is entering the building envelope. It was noted in a previous report that the roof drains had once been disconnected allowing the roof water to flow freely throughout the building. The wood flooring has swelled from the presence of water and made it dangerous to walk in many areas (refer to photos 39-41).

In the area that had started to be renovated into a model residential suite the building showed signs of movement as the windowsills has popped up (refer to photo 42). The area showed signs that water was still entering the building as some ceiling areas had fallen and the hardwood flooring has swelled (refer to photos 43 and 44).

A report prepared by Dick Kappeler is also included in Appendix B.

Critical Issues

The issues noted are based on our site review on December 22, 2005 and previous reports.

1. Excessively wide cracks in the load bearing brick exterior walls
2. Loose masonry due to the cracks and movement of the structure
3. Bricks which are falling down
4. Wall movement and bulging especially noted on the east face of Phase 2
5. Deteriorated brick
6. Broken joist as noted in a previous report
7. Swollen and buckling floor

8. Due to the swelling of the wood floors the column beam joints and the beam or joist joints with the exterior wall have moved and disintegrated. The bearing condition has been compromised as noted in a previous report.
9. Roof leakage and building envelope damage
10. Broken tie rods bracing the exterior masonry walls
11. Rusted reinforcing steel in the precast facade panels causing the panels to crack, spall and chip off the face of the concrete.
12. Temperature change allowing the building to experience numerous freeze thaw cycles
13. Snow loading on compromised and deteriorated structure
14. Rain water ponding as noted in previous reports

Evaluations

With long discussions between Laurier Proulx, Dick Kappeler, Brian Dyce and Yulun Sze the following evaluations have been made:

- The building interior must be stabilized and dried out along with the repairs and reconstruction. This could take as long as a couple years to fully accomplish. The possibility of replacing the interior structure would avoid the drying out period and provide more flexibility in design and use of the space.
- The beam column connections and the joist and beam connections to the masonry walls have shifted and in some areas may be beyond repair.
- The east wall of Phase 2 and the west wall of Phase 1 appear to be the most critical areas of concern. The east wall of Phase 2 wall has moved outwards causing extensive cracking and shifting of the wall. The floor structure connections to the wall cannot be reinstated once the building interior has dried out and shrunk back. With the present condition and position the wall will not have the structural capacity even if repaired and reconditioned. We do not recommend the reuse of this wall therefore it must be rebuilt.

- With the excessive cracking and fallen brick on the west wall of Phase 1 we do not recommend a patch repair of the masonry. We recommend that this wall be fully rebuilt.
- It is possible to take down the damaged walls, clean the existing brick and rebuild the walls to the appearance of the existing façade to retain the historical appearance of the building.
- In our opinion the criteria for restoration of the building is to maintain the historical appearance, to rebuild or reinstate the structural integrity and capacity for long term use and a service life expectancy of minimum 50 years

Conclusions

It was agreed that the City of Kitchener barricades the areas of greatest concern immediately to eliminate the potential safety hazard of bricks falling to the public.

Since the deterioration is exponentially increasing the building may collapse in an unpredictable time period and could be very soon. Decisions on the fate of the building and the provision of funding must be made as soon as possible to cause an expeditious response to the present safety concerns. The falling bricks indicate the building is experiencing a severe mode of failure. The next mode of failure could be the collapse of the walls. If these concerns are not addressed soon the situation will become worse and the barricades will have to be extended further into the streets and parking areas. This will still not ensure 100% safety.

It is our opinion that the structure has reached the stage that repair and restoration of the building is far more expensive than building a new building and will take a much longer time. We estimate the restoration construction cost to be double the cost of new construction. To repair and reintegrate the building structure to reasonably sound condition we estimate would cost approximately \$9 million. With restoration the building will require continual maintenance. The existing structure becomes negative value for possible development.

SZE STRAKA ENGINEERS

Brian Dyce

Yulun Sze Ph.D, P.Eng.

APPENDIX "A"

LIMITATIONS

Limitations

This report has been prepared by Sze Straka Engineers (Sze Straka) at the request of **The City of Kitchener**. The material in it reflects the best judgment of Sze Straka in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Sze Straka accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This assessment does not wholly eliminate uncertainty regarding the potential for existing or future costs, hazards or losses in connection with a property. No physical or destructive testing and no design calculations have been performed unless specifically recorded. Conditions existing but not recorded were not apparent given the level of study undertaken. We can perform further investigation on items of concern if so required. Only the specific information identified has been reviewed. The consultant is not obligated to identify mistakes or insufficiencies in the information obtained from the various sources or to verify the accuracy of the information. The Consultant may use such specific information obtained in performing its services and is entitled to rely upon the accuracy and completeness thereof.

Responsibility for detection of or advice about pollutants, contaminants or hazardous materials is not included in our mandate. In the event the Consultant or any other party encounters any hazardous or toxic materials, or should it become known to the Consultant that such materials may be present on or about the jobsite or any adjacent areas that may affect the performance of the Consultant's services, the Consultant may, at its option and without liability for consequential or any other damages, suspend performance of its services under this Agreement until the Client retains appropriate consultants to identify and abate or remove the hazardous or toxic materials and warrants that the jobsite is in full compliance with all applicable laws and regulations.

Budget figures are our opinion of a probable current dollar value of the work and are provided for approximate budget purposes only. Accurate figures can only be obtained by establishing a scope of work and receiving quotes from suitable contractors. Any time frame given for undertaking work represents an educated guess based on apparent conditions existing at the time of our report. Failure of the item, or the optimum repair/replacement process, may vary from our estimate. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their Officers, Agents and Employees in excess of the fee paid for professional services.

APPENDIX "B"

KAPPELER MASONRY CORPORATION
MASONRY REVIEW REPORT

APPENDIX "C"

OVERALL BUILDING LAYOUT SHOWING PHASES OF CONSTRUCTION

APPENDIX "D"

PHOTOGRAPHS