VanBoxmeer & Stranges Ltd.
STRUCTURAL ENGINEERS

458 Queens Ave
London, Ontario
N6B 1X9
P: (519) 433-4661
vbands@vbands.com

4802 Portage Rd, Unit 1
Niagara Falls, Ontario
L2A 6E3
P: (905) 357-2030
al@vbands.com

May 07, 2019
VB&S #: **19158**

JAM Properties
180 Cheapside Street
London, Ontario
N6A 1Z8
Attn: Mr. Archie Leach

JAM Properties
Structural Review and Comments
123 Queens Avenue
London, Ontario

Dear Mr. Leach:

After our discussions with you, we understand our scope to be limited to a visual inspection only of the structure and provide an opinion on its integrity. It must be noted that only a visual review of the building was completed and that destructive testing and "tapping" of the concrete was not completed. It was determined by visual inspection and given the state of the building and that additional testing would not be required.

This letter serves as a summary of our structural review of the building at 123 Queens Avenue. We herewith provide a quick summary of our review of the existing structure.

1.1 Building Construction

The existing reinforced concrete structure is a 3 storey building with basement constructed in the early 1900's. It is reported that the building was completed some time between 1916 and 1922. This building is believed to be one of the first cast in place concrete structures in London. The first being the Harrison-Pensa building located immediately to the west of 123 Queens Ave. It was reported that the building was a former coal powered heat plant while selling steam heat to the other buildings in the downtown area. See Stantec Heritage Impact Assessment report dated March 26, 2019 (File No:160940616).

1.2 Roof/Floor Construction

The roof and floor framing is constructed for the most part using cast in place concrete. **See Photo No 01.** There have been subsequent floor additions to the building by adding Hambro Joist and concrete system. **See Photo No 02.** These joists were exposed and not fire rated.

Photo No 01: Typical Floor Construction

Photo No 02: Added Hambro Floor System

1.2 Foundation Construction

The foundation walls are constructed of cast in place concrete. There many openings in the foundation walls that have been infilled with brick. **See Photo No 03.**

Photo No 03: Concrete Foundation Walls

2.0 Observations

2.1 Exterior Beams/Lintels

The exterior walls have openings mostly used for windows. However, there are openings at the west side of 123 Queens Avenue facing the lane way that are large framing the opening over the loading doors. **See Photo No 04.** The northmost beam is a transfer beam supporting the bearing wall located between the windows. This beam is carrying a lot of load and it appears to be distressed.

The bottom of the beams are delaminated where the concrete below the main reinforcing steel has broken away from the main body of the beam. The delamination has exposed the reinforcing and the reinforcing is corroding. The delamination of the beams is typical of all large exterior beams along the west face of the building including the beam in the link portion between 450 Talbot and 123 Queens Avenue. **See Photo No 05.**

Photo No 04: Delaminated Concrete Beams

Photo No 05: Delaminated Concrete Beam at Link

The existing reinforcing bars are square non-deformed bars used in construction during that time period. The bars along the bottom of the beams are completely exposed for

approximately 65% of the length of the beam. The reinforcing has lost its bond within the concrete beams and the bars are now ineffective.

Missing in the beams in building of this period, are steel reinforcing stirrups that are a design Code requirement in new concrete beams designed today. We have not completed a design review of the beams however, experience would have us believe that this beam if reviewed would not be adequate to resist the applied loads.

2.2 Exterior Suspended Slab

The suspended slab in the link connecting 123 Queens Avenue is exposed to view. **See Photo No 06.** The underside of the concrete slab is severely delaminated exposing the reinforcing bars. Approximately 70% of the reinforcing bar is exposed and corroded. Given the large amount of concrete delamination, bar corrosion and bar exposure, we believe that this slab has lost a majority of original design capacity.

Photo No 06: Suspended Link Slab (Exterior)

2.3 Interior Excavation

There are signs that during a former renovation, an excavation was completed for what may have been an elevator. We were informed that this excavation could also be the remnants of a demolition of the original smoke stack. **See Photo No 07.** The depth of the excavation extends below the level of the existing footing. This excavation is undermining the footing and should be infilled if the opening is to remain.

Photo No 07: Excavation of the Interior (east Side)

2.3 Interior Upper Beams

The interior upper beams are all delaminated in varying degrees. Similar to the exterior beam, the concrete at the bottom of the beam has delaminated and has completely spalled and will continue to spall over time. **See Photo No 08.** There are no signs of any stirrups in any of the concrete beams.

Photo No 08: Typical Interior Upper Beam

2.4 Interior Basement Beams

Access was gained into the basement and in particular at the south end of the building.

This portion of the floor is constructed of a series of concrete beams and slabs. **See Photo No 09.** It appears that this portion of the floor supported the old boiler. Of all of the beams in the building, it is the beams in this area appear to be the most compromised. The bottom of the beams in the southern half have delaminated and the reinforcing bars being corroded the most. It is presumed that continual humidity and moisture has contributed to the condition of these beams.

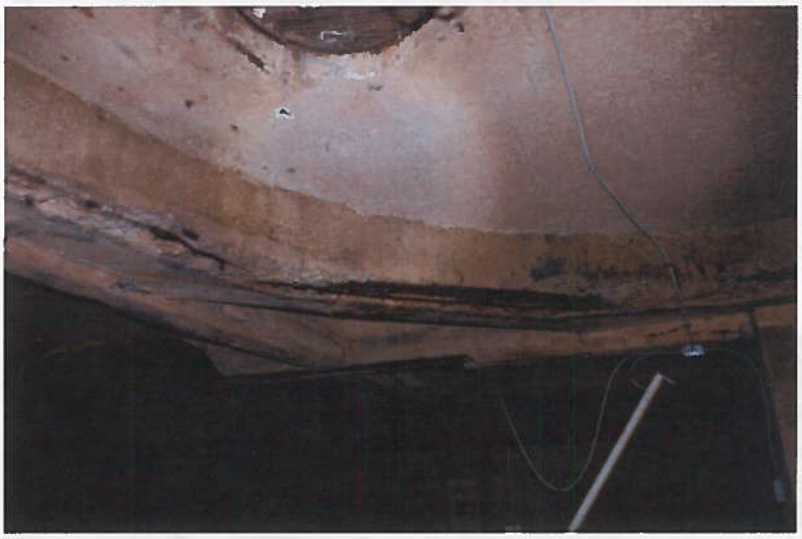

Photo No 09: Interior Basement Beams (south end)

2.4 Interior Suspended Slabs

The interior suspended slabs are all showing signs of concrete delamination. While the concrete has not all spalled, there is evidence that the reinforcing has corroded, the steel expanded and a crack has cracked developed along the length of the bar. There are areas similar to the exterior slab on photo No 05 where the concrete is completely spalled exposing the concrete reinforcing. **See Photo No 10 and 11.**

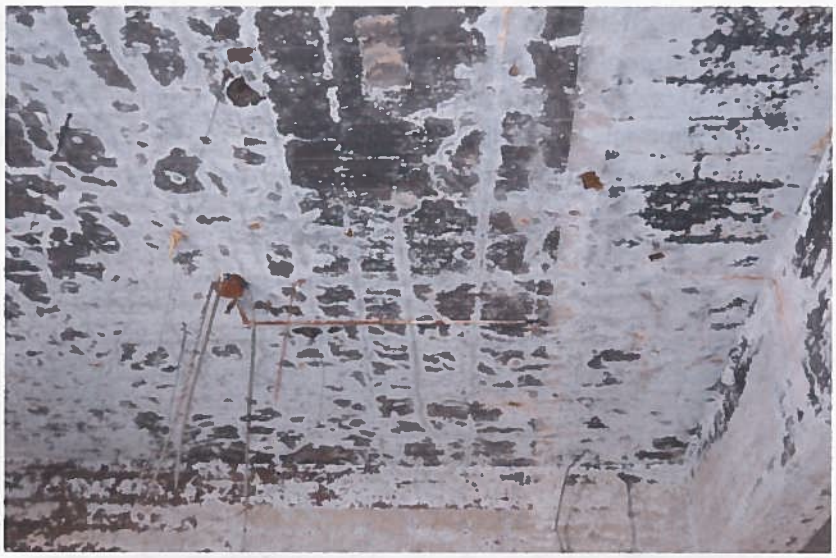

Photo No 10: Interior Suspended Slab (cracked along rebar)

Photo No 11: Interior Suspended Slab (Delaminated Concrete)

3.0 Comments

3.1 Building Structure

The concrete building is severely deteriorated. Virtually every concrete floors beams, wall and pier is showing severe signs of deterioration. Based on our experience, and the cracking observed in the slabs, this would prove that the in-situ concrete would prove to be delaminated and not performing as originally designed.

The interior of the building has been exposed to decades of cycles of freeze thaw cycles over time, and in particular the horizontal surfaces. At the time the concrete was placed, the concrete mix was not designed to incorporate air-entrainment which would have limited the concrete damage from freeze-thaw.

3.2 Building Restoration

As this was a cursory review of the building, we would need to complete a full review and analysis of every floor, beam, and walls structure. This would require destructive testing to determine the extent of the delamination and corroded reinforcing bar. Restoring this building would not seem to be an economical option.

Should the concrete be found to be delaminated throughout the depth of the slab and beam, which as noted above we believe to be, this would require that the entire slab and reinforcing be removed and replaced including the reinforcing. Removal of a floor to complete the restoration would require bracing of any wall that was deemed to be capable of remaining, as the wall would lose the lateral restraint provided by the floor.

All reinforcing steel that is corroded would need to be fully exposed back to sound steel. A new piece of reinforcing would then be installed and lapped with the non-corroded bar with the appropriate lap length. Given the extent of the corrosion, this would involve so much labour that it would be uneconomical.

We do believe that based on what we have seen, demolition would be the most practical solution for this building. Trying to remediate the concrete would involve the complete demolition and replacement of floors, beams and concrete that not much of the historical building would remain and be recognized as original.

We thank you for the opportunity to submit this report. If you have any questions, please do not hesitate to call.

Regards,
VanBoxmeer & Stranges
Engineering Ltd.

Rick Stranges, P. Eng.
Vice-President
RAS/ras