Staff Report
Life Safety Issues for Existing Buildings
December 11, 2007

Background

The majority of downtown buildings now standing were constructed in the late 1800's and early 1900's. Photographs of this period show the original architectural detailing of the period - arched windows, tall and narrow windows on upper floors, cast iron street level storefronts with generous display windows, ornate brickwork at the very tops of the buildings. Subsequent photos taken in the 40's and 50's show new brick facades installed on many buildings to achieve a more modern look. The old tall and narrow windows were reduced to smaller rectangles, the arched tops were replaced with flat steel lintels, and the ornate brickwork was covered with a more uniform pattern across the second story above the storefronts. At street level, the old cast iron fronts were replaced with broad expanses of aluminum framed display windows and other updated materials. These facades are still in place, interrupted periodically by the few remaining original facades, and others that have been more recently updated.

During the same 100 years, interior alterations were made to these buildings as businesses moved in and out or buildings changed ownership and tenants. Many alterations were made by carpenters and laborers with varying levels of technical knowledge or engineering skills. Few projects were designed and overseen by architects or engineers, and fewer still received any building safety inspections by the City. Much of the work was done prior to the existence of City permits and inspections.

Four Sites Identified

Currently the building official is working with four buildings in downtown Ames. The four buildings were identified by a recent inspection of a remodeling project, a routine bar and restaurant inspection, and the building official's observations made during a public "loft tour." Initial observations have revealed conditions that warrant additional investigation. The observed conditions, such as cracking of mortar joints on brick storefronts, may be only superficial or may result from serious underlying structural deterioration.

As the primary public building safety resource for the City, the Fire Department Inspection Division is authorized to initiate appropriate inquiries in cases where code compliance or life safety issues exist. The Division has opened discussions with four affected building owners on Main Street. To date, these buildings are in various stages of a process ranging from a detailed inspection and issuance of verbal or written directives by the Division, to a detailed inspection and written notice by the building official directing further investigation by a structural engineer.

The four buildings identified by Inspections have one or more of these specific problems in common:

- Storefront brickwork at second stories is deteriorated to varying degrees - from stairstep cracking and separation at mortar joints, to measurable movement away from the building and toward the sidewalk with visible spaces between the brick façades and adjacent wood window frames.
- Interior load-bearing walls that originally supported floors and roofs were improperly removed at some time in the past. The roofs and floors of these buildings are carrying excessive loads that will result in eventual failure if not addressed.
- Exterior brick walls at the rear of most buildings thus far investigated, have deteriorated inside and out due to rain, snow, and ice infiltration to the extent that, in some locations, mortar joints have failed and bricks are now only loosely stacked in portions of the walls. In some cases, foundations beneath these walls are failing.

Additional Investigation Warranted:
The four cases have triggered an informal "sidewalk" survey of other downtown buildings to determine whether they are isolated instances or may be indicative of a general trend. This cursory exterior survey has revealed certain conditions common to some downtown buildings. As stated above, these conditions may be superficial or may be serious.

Example Case Study:
The case example below is similar to three others the Inspections Division is currently investigating. Staff believes they may be indicative of others that will be discovered as the Division proceeds.

1. Problems observed as a part of the biannual restaurant inspection
2. Building official conducts inspection with staff assistance.
3. Building official sends written findings to building owners. Notifies owners of identified problems and requests they engage a structural engineer to evaluate the building.
4. Structural engineer #1 is hired by the owner to look at problems with the front wall. Structural engineer #1 identifies significant structural concerns as typified by the following quote from his report:

   Observations:
   "The masonry front wall has questionable stability. The steel lintel over the eastern opening has corroded to an extent that its capability to support the masonry is questionable. Several courses of brick above the opening have rotated out of the plane of the wall...This suggests rotation of the beam...

   This movement has resulted in fracturing of the masonry interior wall that is perpendicular to the front wall...The upper west corner of the front wall also shows movement within the plane of the wall."

   Recommendations:
   "...this wall must be removed and replaced. Further deterioration of the wall could result in collapse of the masonry. It is impossible to accurately predict when collapse may take place, therefore, I recommend that remedial action be taken as soon as possible."
5. Structural engineer #1 advises a more complete evaluation of the structure should be conducted.
6. Building Official David Brown contacts the owner and requests a more comprehensive evaluation to include all structural components.
7. Structural engineer #2 is hired by the building owner to look at all structural components of the building. Structural engineer #2 identifies structural concerns as typified by the following quote from his report:

   Observations:
   "The walls are in progressive failure in numerous locations. The front of the building has a lintel [beam] which is currently rotated out of plane by about 3 inches...There is a major structural crack on the interior wall that is perpendicular to the front wall...There are other cracks that need to be monitored, [this] one in the center of the building on the second floor is the most significant and is of greatest concern."
   Recommendations:

"This crack should be monitored for movement, if it moves more than one quarter inch, it is in accelerated failure mode and needs immediate repair....There are numerous areas of distress that need to be addressed. The most critical are tying back of the front lintel [beam] to the structure. Once the front wall is properly tied back to the perpendicular bearing wall, the lintel can be secured to the floor system. This would require removal of the interior finishes to determine a secure system to tie the lintel beam to. The next item would be repair of the back wall..."

8. Staff meets with the city attorney and determines that significant questions have not been answered. The decision is made for the City to hire its own structural engineer.

9. Structural engineer #3 is hired by the City. Structural engineer#3 is to determine how eminent is the danger and, if the danger is not immediately dangerous to life and safety, recommend a timeframe for corrective action. Structural engineer #3 identifies structural concerns as typified by the following quote from his report:

   Observations:

   "There appears to be a large beam header over the opening that has rotated and displaced a large section of the brick façade. From the inside one can see a large gap that has developed between the floor and masonry wall. The front wall is also pulling away from the perpendicular walls."

   Recommendations:

   "In our opinion, the front wall has issues that need to be addressed in the next 1 to 3 years...The movement in the wall is obvious. The movement has been occurring over several years and will continue and it is experiencing severe distress. It is not a condition of imminent collapse. However, steps should be taken to prevent and correct a dangerous situation...

   A plan should be developed to address the problems with the masonry walls. This plan should be implemented within the next two years or sooner. This plan should contain a follow-up inspection once a year to check for rapidly changing conditions."

Process Model

1. Identify code and life safety concerns through complaint or proactive sources.
2. Seek voluntary resolution.
3. When necessary, direct building owner to retain professional services for detailed evaluations. Seek voluntary resolution.
4. When necessary, City hires outside professional services. Utilize results to establish schedule for voluntary compliance.
5. When necessary after voluntary resolution has not been obtained or in cases where eminent danger exists, utilize available legal remedies to obtain protective measures.

Purpose of Council Roundtable Discussion

1. Make council members aware of significant enforcement actions presently underway or in initial stages for the older commercial areas of Ames downtown and Campustown.

2. Identify to Council the process used by the Inspections Division to identify and resolve life safety concerns in older commercial buildings.

3. Seek Council's input and support for process used by the Inspections Division to identify and resolve life safety concerns in older commercial buildings.