Stantec Consulting Services Inc.
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September 13, 2016

Attention: Nicolas Sparacio, AICP
Community Development Director
City of Manitowoc
900 Quay Street
Manitowoc, Wisconsin 54220-4543

Reference: Mirro Building Structural Condition Assessment
Stantec Project No. 193703139

Dear Mr. Sparacio,

As requested, Stantec has performed a structural condition assessment of the existing buildings on the Mirro site, to assess whether any immediate structural safety concerns exist. While the demolition of the buildings is currently being planned, additional environmental contamination assessment and abatement must be completed first. This report describes the buildings' structural systems, the scope and methods of this structural assessment, and the findings and recommendations resulting from the assessment.

Because potentially serious structural safety hazards were identified during the assessment, and due to the localized nature of those hazards, all of the hazardous areas identified were immediately barricaded with CAUTION tape, some with boards and plywood found on the site, and the areas highlighted with orange marking paint to warn others. In addition, an interim memo was issued to the City, dated July 25, 2016, that described the observations and provided notice of the hazards. This report is intended to provide additional detail and follow-up information to permit City staff to locate the areas and replace the barricade tape if more robust barricade materials are desired, or if it is damaged or removed.

Representative photographs are included in Appendix A to illustrate the types of hazards observed, and floor plan sketches in Appendix B outline each of the hazardous areas observed.

1.0 BACKGROUND

The vacant multi-story partially-demolished former industrial buildings currently located at 1512 Washington Street were developed for industrial use in the manufacturing of aluminum goods by 1906, with additional redevelopment occurring between 1912 and 1927, and again between 1927 and 1956. IJ Spirtas Manitowoc, LLC, purchased the property in 2006 and subsequently razed the 3-story facility previously located on the northeast corner of the property, along with several smaller buildings, in March 2014. However, the Wisconsin Department of Natural Resources (WDNR, 2016) noted that the demolition was not completed, since demolition waste was left on site. EJ Spirtas Manitowoc, LLC, continued partial demolition of the remaining multi-story former industrial buildings to remove recyclables (e.g. copper pipes, scrap metal, wooden flooring, etc.). To prevent further unsafe work practices, the City placed a "stop work" order on the property on January 22, 2015.

Given the partially-demolished state in which the buildings were left, the vacant buildings contain various hazards that workers and others entering the buildings must be aware of. During the previous demolition, areas of the floor were removed from ground floor to roof to create "chutes" for demolition debris removal. The openings are fairly large, and access is generally restricted by barricades consisting of wooden boards and planks. While several hazardous areas were identified due to structural concerns, many more nonstructural safety hazards exist. Entry to the building should be restricted to only personnel with proper Personal Protective Equipment and those who are aware of the safety hazards.

2.0 SCOPE OF ASSESSMENT

The scope of the assessment was limited to a visual walk-through examination of the existing buildings, above grade, to evaluate the condition of the structural components and materials, and to note any observed signs of structural distress or potential safety concerns. Because the buildings are slated for demolition, no attempt was made to evaluate the structures' potential future design life if either building were to be renovated. It was also not intended to document, in detail, features and details of the structural components for determining load capacity, or quantifying the extent of material deterioration and strength loss. Accordingly, no sampling and testing of structural materials was performed to quantify the strength of any existing materials.

Since the previous demolition work was halted while the project was only partially completed, there are several hazards, structural and nonstructural, that pose potential safety risks to personnel on site. These primarily include trip and fall hazards, and unsecured building materials overhead. While these hazards were not the focus of this structural condition assessment, some of them have been identified and CAUTION tape barricades were erected around them on site to warn others.

3.0 DESCRIPTION OF BUILDINGS

Following the partial demolition and removal previously performed on the Mirro site, there are essentially two distinct buildings remaining, connected by a short, 2-story link. The buildings, while similar in some ways, were constructed at different times and are very different building types. Due to the differences in construction materials used, one building shows little or no signs of deterioration or structural safety concerns, while multiple areas of severe deterioration and localized collapse were observed in the other.

Figure No. 1 – Building Locations on Mirro Site

Due to the significant differences between the two buildings, they will be described, and the findings discussed, separately.

Reference: Mirro Building(s) Structural Condition Assessment

3.1 South Building

The building situated at the south end of the site occupies a footprint area of approximately 71,000 square feet. It is older than the north building, and is constructed of steel beams and columns, with laminated 2x timber floors, spanning (1-way) between beams. The majority of the south building is 7 stories in height, with the northern 3-bay portion stopping at 5 stories. The entire building has a clay brick façade. The roofs are essentially flat, sloping slightly to internal roof drains. See Photo Nos. 1 and 2 in Appendix A, attached.

Maximum permitted Live Load signs were posted in various areas throughout the building, indicating that the maximum allowable floor loading was 250 pounds per square foot (psf). See Photo No. 3.1-1.

Photo No. 3.1-1: Floor Load Posting

This indicates that this, and all similar floor framing, was designed for heavy industrial loads, so that even with some loss of strength due to material deterioration, the structure may have sufficient reserve strength for pedestrian live loads.

Fortunately, for the purposes of this assessment, having the existing wood strip flooring removed throughout the building during the previous demolition exposed the structural timber decking to view. The strip flooring absorbed and trapped moisture, likely exacerbating the rot, wood fiber damage, and strength loss observed.

The majority of the deterioration and structural safety concerns observed involved rotted wood floor decking. Having unobstructed visual access to all areas of the floors helped significantly while delineating the localized problem areas very closely, with very good confidence.

3.2 North Building

The north building, covering the northwest portion of the site, is constructed of cast-in-place concrete and is 6 stories in height with a plan area of approximately 30,000 square feet (180,000 square feet total). The structural system consists of cast-in-place concrete flat plate slabs, with large (30" diameter) concrete columns, column capitals and drop panels. See Photo Nos. 10 through 12, in Appendix A.

Unlike the south building, the wood strip flooring had not been removed from the north building, and much of the building remains, with only the windows having been removed. Posted signs, in more than one location, indicate a maximum live load of 250 psf.

Unlike the South Building, the north building is constructed of concrete, which does not rust or rot and is still in very good condition, despite exposure to the elements. In addition, it has continuous, 2-way concrete floor slabs spanning between columns. This continuity provides load redistribution, contributing to its structural strength.

See Photo Nos. 11 through 14.

4.0 METHODS OF ASSESSMENT

The purpose and focus of this condition assessment was to identify areas within the building(s) that may pose a structural safety hazard to personnel working on the site. Therefore, the assessment consisted of visual examination of structural and nonstructural components exposed to view, sometimes followed by tactile examination, sounding, or probing with hand tools.

The walk-through visual assessment was performed over a 2-day period, July 19 and 20, 2016. Virtually all areas of the building(s) were accessible to view from floor level. Both structural and nonstructural components were viewed to identify areas of distress, such as water staining, cracking, or sagging, etc., that may be indicative of an underlying structural problem. Fortunately, much of the demolition performed previously involved removing the interior building finishes, leaving the structural components directly exposed to view.

Both buildings have flat roofs, which commonly have leaks, and interior roof drains, which are a common source of water intrusion and subsequent material damage. While these areas are typically subjected to close examination, it was immediately apparent that, particularly for the South Building, the damage caused by leaking roof drains was serious and extensive. Nearly all of the severely deteriorated structural components noted were in close proximity to a roof drain.

It must be noted that nonstructural safety hazards, such as unbarricaded floor openings, were not the focus of this assessment, but they were noted and temporary barricades erected, if they were observed.

5.0 FINDINGS AND RECOMMENDATIONS

In general, from the observations made during the walk-through assessment, it was apparent that the south building contained multiple, but localized, structural deficiencies that posed safety hazards to personnel working on the site, while the north building had essentially none. Areas of timber roof and floor deck on several levels in the south building, particularly those near roof drains, had collapsed onto floors below. These areas, on the 2nd through 7th floor, have been identified on Figures 1 through 6 in Appendix B, and are discussed below.

In contrast, the nearly all-concrete framing of the north building has weathered the exposure during its vacancy with relatively little or no structural deterioration. While no safety concerns were noted, a description of the observations made is provided below.

5.1 South Building

Of the two buildings, the south building, by far, exhibited the most significant material deterioration and has the most potentially hazardous areas requiring restricted access. The simple, 1-way spans of the timber floor system keep these problem areas localized and fairly isolated, so areas adjacent to the restricted areas are considered safe.

It was apparent that areas of the building near leaking roof drains had experienced significant water saturation and damage. Moss, and even ferns in some areas, was observed growing in and on the wood floor deck where the water saturation was the worst. The loss of strength was so significant that the floor had collapsed under its own weight in many areas. These areas were barricaded with CAUTION tape and warnings marked with orange spray paint. The structural steel beams and columns supporting the timber floor planks did not appear significantly corroded, and did not appear to have lost any material section or strength.

A large area of the roof over the southwest corner of the south building had collapsed. See Photo No. 9. Once the roof was breached, rain and snow were allowed to enter, which has caused significant deterioration – to the point of collapse – on many levels directly below. In other areas, such as the north side of 2nd Floor, the cause of the deterioration and collapse was not readily apparent, but the damage to the structure was significant. See Photo Nos. 3 and 4.

The boundary of each of the unsafe floor areas was documented and noted, in the event that the CAUTION tape or paint markings are disturbed. These areas are shown in the plan views of each floor level in Figure Nos. 1 through 6 in Appendix B.

5.2 North Building

As a construction material, cast-in-place concrete is nonferrous and inorganic, and therefore does not rust or rot. Although the windows had been removed or were broken on several floors of the North Building, and so were exposed to extensive moisture intrusion, the structural concrete floor slabs and columns were in excellent condition and appeared to have lost little if any strength during the time the building had been vacant. Buckled wood strip flooring, peeling paint, and small calcium deposits in hairline cracks on ceilings (stalactites) were evidence that the building interior had been subjected to considerable moisture intrusion. See Photo Nos. 12, 15 and 16. Fortunately, no rust staining, which may indicate corrosion of reinforcing steel within the structural floor slab, was observed.

Given that the floor live load capacity of 250 psf was posted in several locations throughout the building, and there are no indications that the building has suffered any loss of structural strength or stability, no areas are considered to be off limits from workers and others who take proper precautions from nonstructural hazards.

5.3 Demolition

We met with a representative of Veit Companies, Herb Pundsack, while at the site to discuss the issues related to demolition of the buildings. Concerns included protection of traffic and pedestrians on the adjacent streets, the impact of contamination on potential recycling and reuse of the demolition debris, staging and logistics, etc. The demolition can be approached from the open northeast quadrant of the site, with the buildings being progressively removed with a high-reach demolition machine with grapple. Chain link fence fabric screens and blankets suspended from booms can contain debris, and water spray nozzles can significantly reduce fugitive dust.

The northeast quadrant of the site contains several existing utility tunnels, some with collapsed roof slabs and filled with demolition debris from previous demolition operations. The extent of contamination is this area has not yet been assessed. Much preparatory work would be necessary to permit safely staging the building demolition from this area of the site.

The south building, being constructed of a combination of concrete, brick, steel beams and columns, and (contaminated) timber floor decking, would not permit much of the demolition debris to be recycled. Most, if not all, of the materials would be hauled to a Construction and Demolition Debris (C & D) landfill. Therefore, the demolition would be relatively straight forward, but the waste disposal costs would be relatively high.

Reference: Mirro Building(s) Structural Condition Assessment

The north building is nearly all cast-in-place reinforced concrete. Depending upon the level of reinforcement, which is anticipated to be relatively high due to the high industrial-level floor loadings, the demolition will be more difficult than the south building. However, if the remaining lead-based paint is removed, the concrete can be crushed and reused on site or stockpiled for future use, greatly reducing the hauling and landfill costs.

Preparing a detailed cost estimate for the building demolition is beyond the scope of this report. However, if a composite unit cost of $7.50/sf is applied to each, the cost for demolition of the north building is on the order of $1.4 million, and the south building approximately $3.5 million, for a total of about $5 million. That is construction cost only, and does not include environmental abatement costs or soft costs such as engineering.

6.0 CONCLUSION

The condition assessment performed at the Mirro Building site identified several localized areas of potential structural safety concern in one of the two buildings that remain, the one that covers the south half of the block. Temporary barricades of CAUTION tape and other ad hoc physical barriers were immediately erected around those areas considered to be unsafe, and they were documented in this report for future reference, if needed.

No indications of material deterioration or loss of structural strength or stability were observed in the second building, to the north, and postings for the heavy design floor loads indicated that the structure design is robust. Therefore, no restrictions on access due to structural concerns were noted.

No unusual problems were observed so that, with ordinary precautions being taken, demolition and removal of both buildings should be relatively straight forward for experienced demolition contractors.

We would be pleased to discuss the details of this report. Please contact either Kevin Kimmes, at (262) 888-3706, or me, at (651) 604-4766, if you have questions or comments.

Regards,

STANTEC CONSULTING SERVICES INC.

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Attachment: Appendix A – South Building Restricted Area Plans
Appendix B – Selected Photographs

c. Harris Byers, Kevin Kimmes - Stantec

APPENDICES

Design with community in mind

APPENDIX A - PHOTOS

Photo No. 1 – South Building: View Looking Southwest

Photo No. 2 – South Building: View Looking Northwest

Photo No. 3 – South Building: 2nd Floor Timber Decking Collapse

Photo No. 4 – South Building: Barricade Tape and Plywood Restricting Access

Photo No. 5 – South Building: Timber Decking Collapse at 3rd Floor

Photo No. 6 – South Building: Timber Decking Collapse at 4th Floor

Photo No. 7 – South Building: Timber Decking Collapse at 5th Floor

Photo No. 8 – South Building: Restricted Area at 6th Floor Collapse

Photo No. 9 – South Building: Roof Deck Collapse in Southwest Corner

Photo No. 10 – North Building, View Looking Northwest

Photo No. 11 – North Building: Cast-In-Place Concrete Columns and Floor Slabs

Photo No. 12 – North Building: Cast-In-Place Concrete Column Capital and Drop Panel

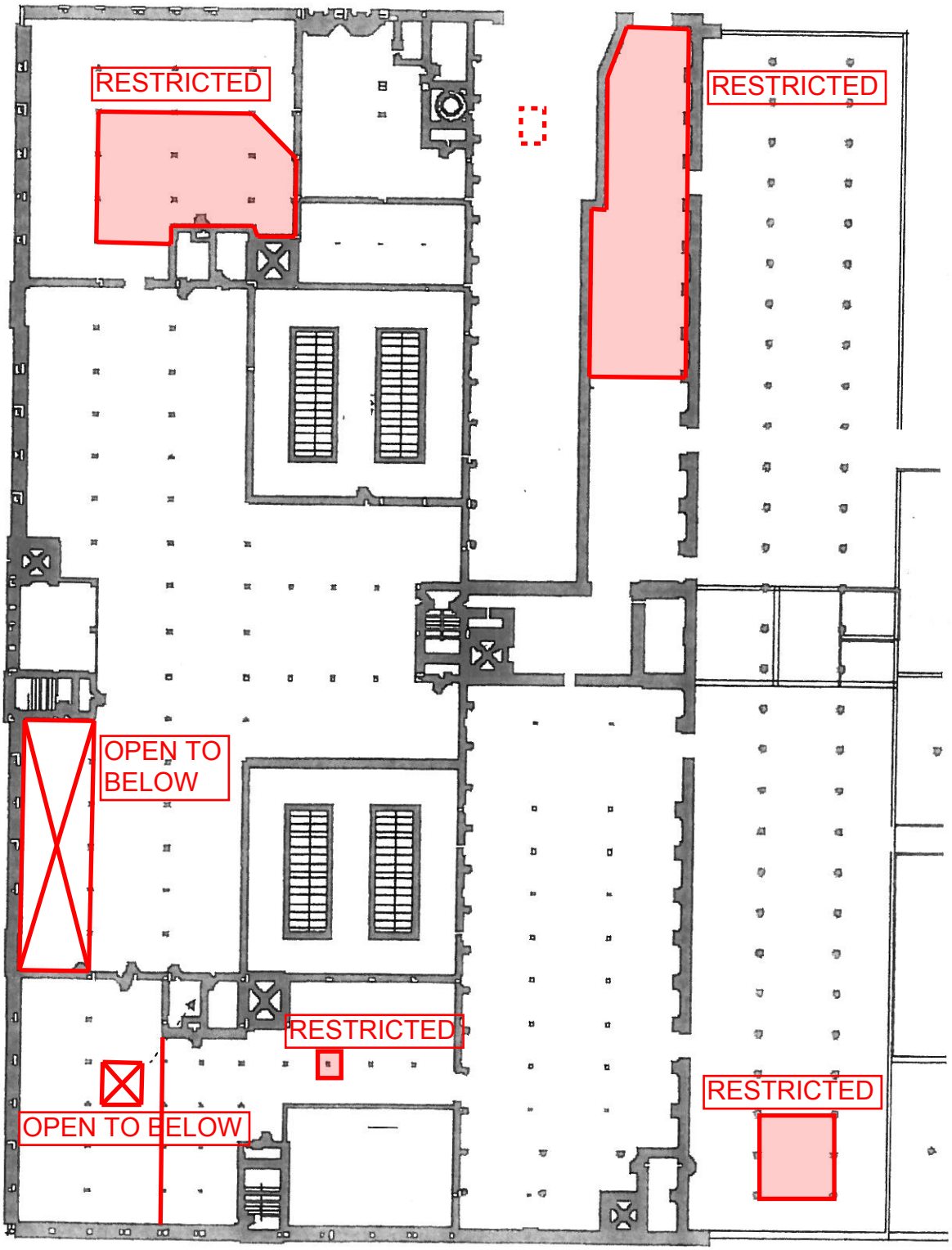
Photo No. 13 – North Building: Existing HVAC Equipment

Photo No. 14 – North Building: Maximum Floor Live Load Posting

Photo No. 15 – North Building: Hollow Clay Roof Tile Debris on 6th Floor

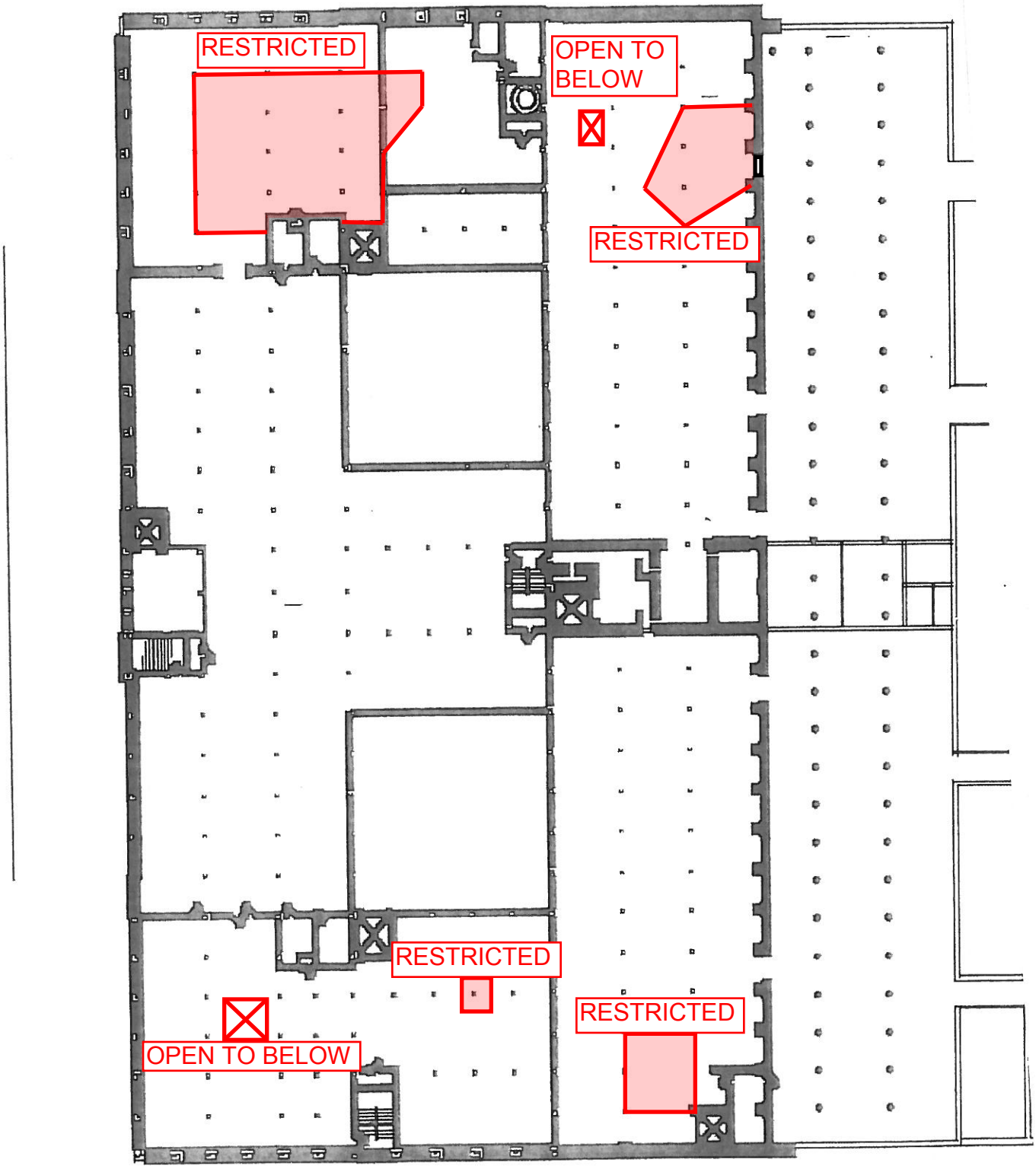
Photo No. 16 – North Building: Deteriorated Hollow Clay Roof Tile

APPENDIX B - FIGURES



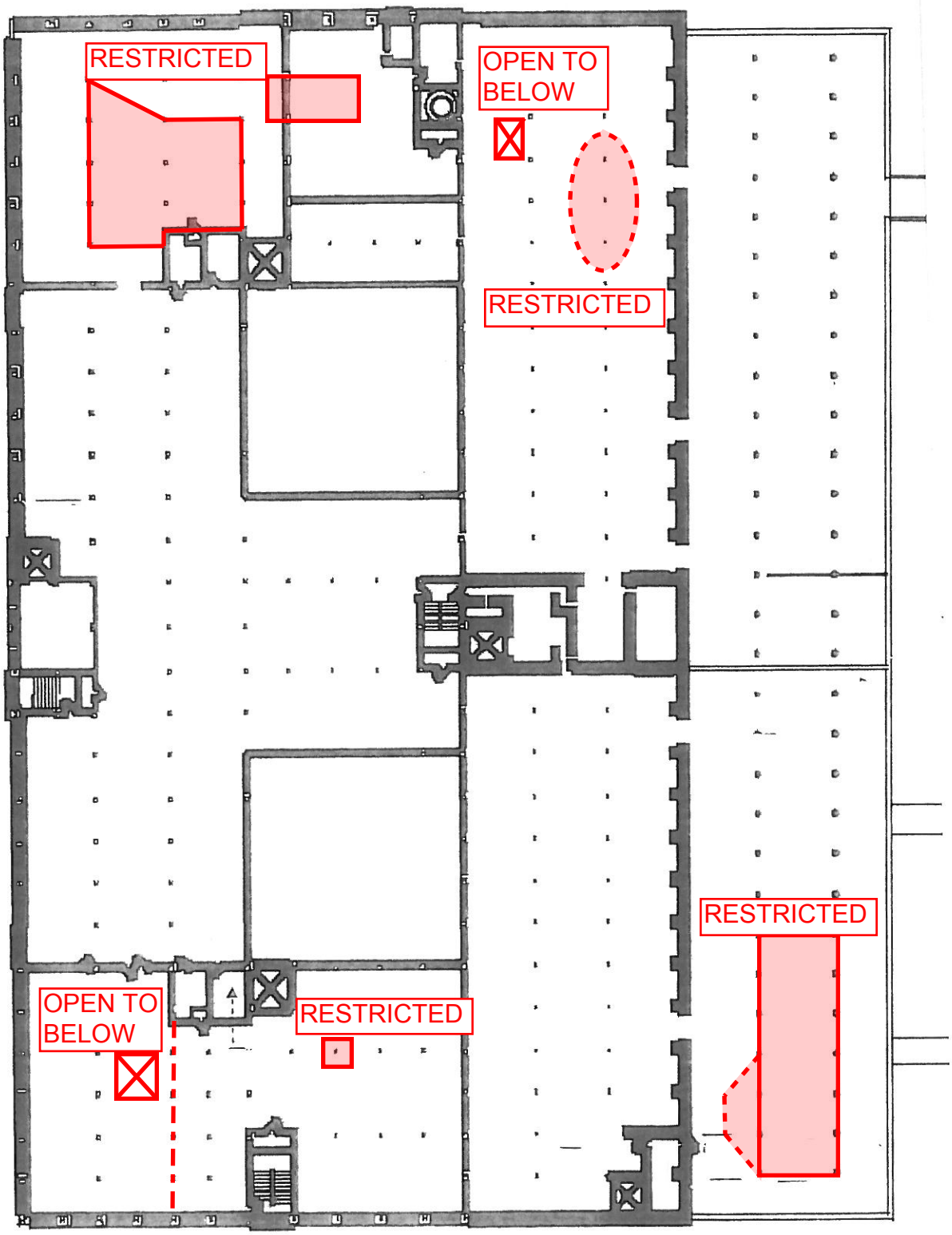
2nd FLOOR

Figure 1



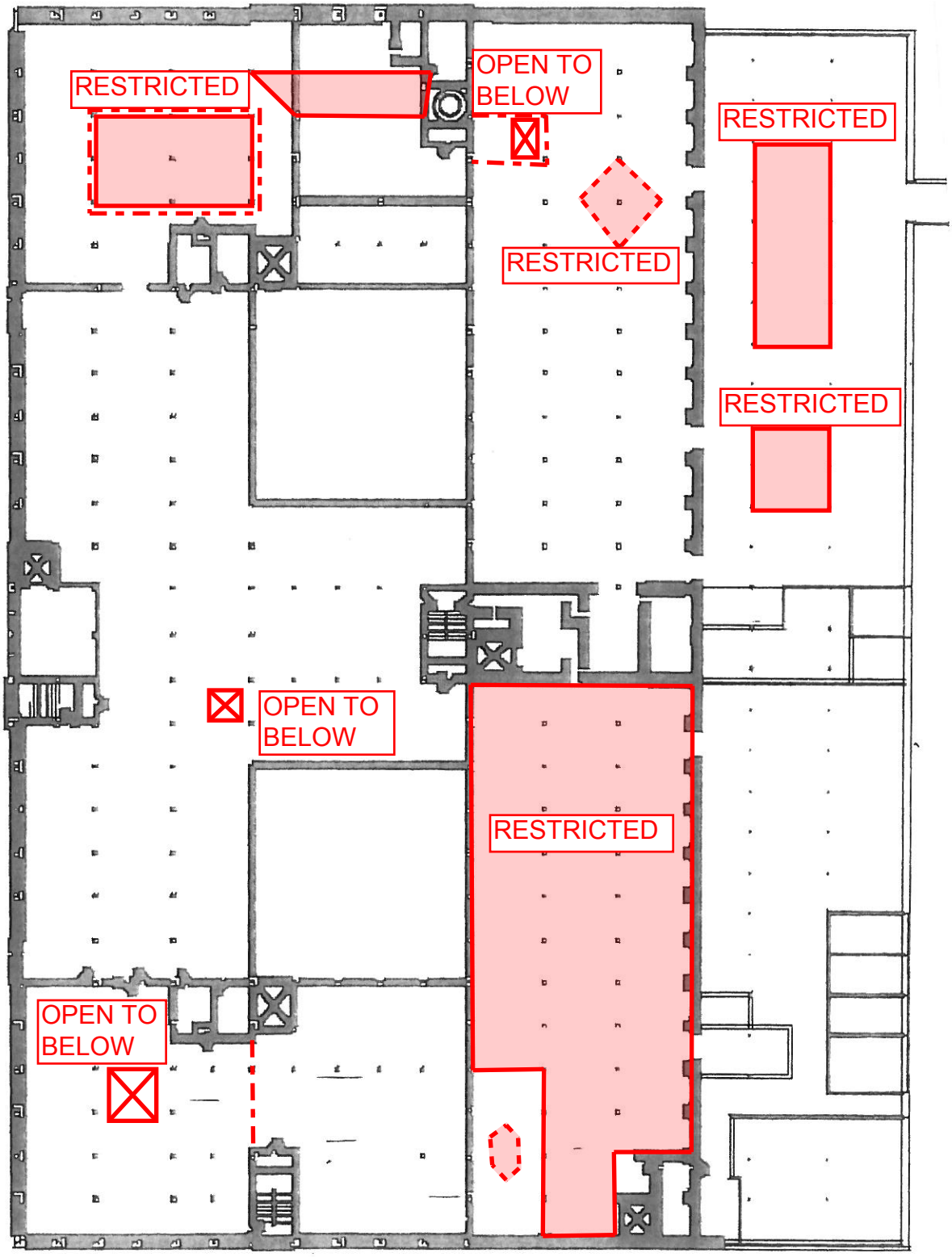
3rd FLOOR

Figure 2



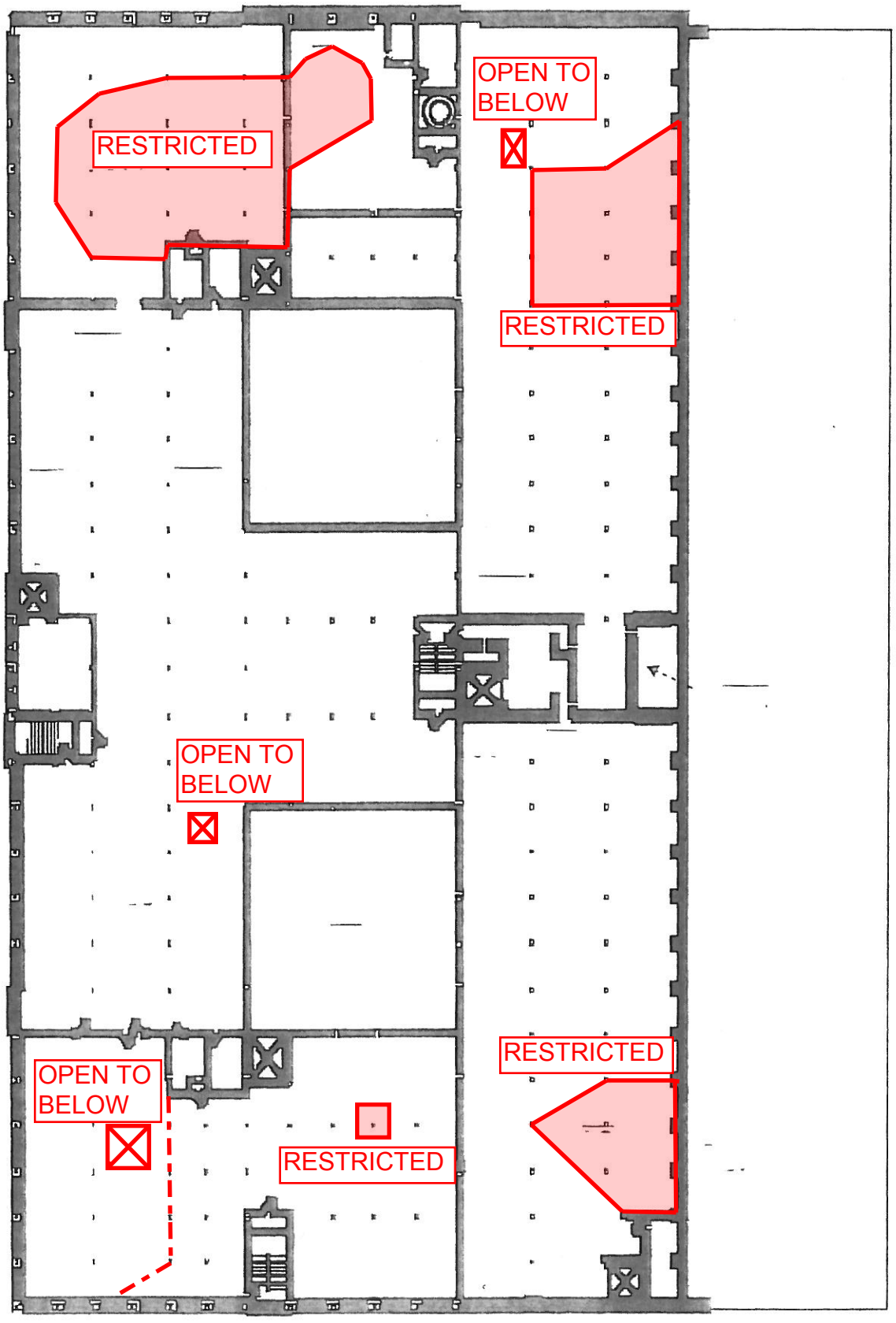
4th FLOOR

Figure 3



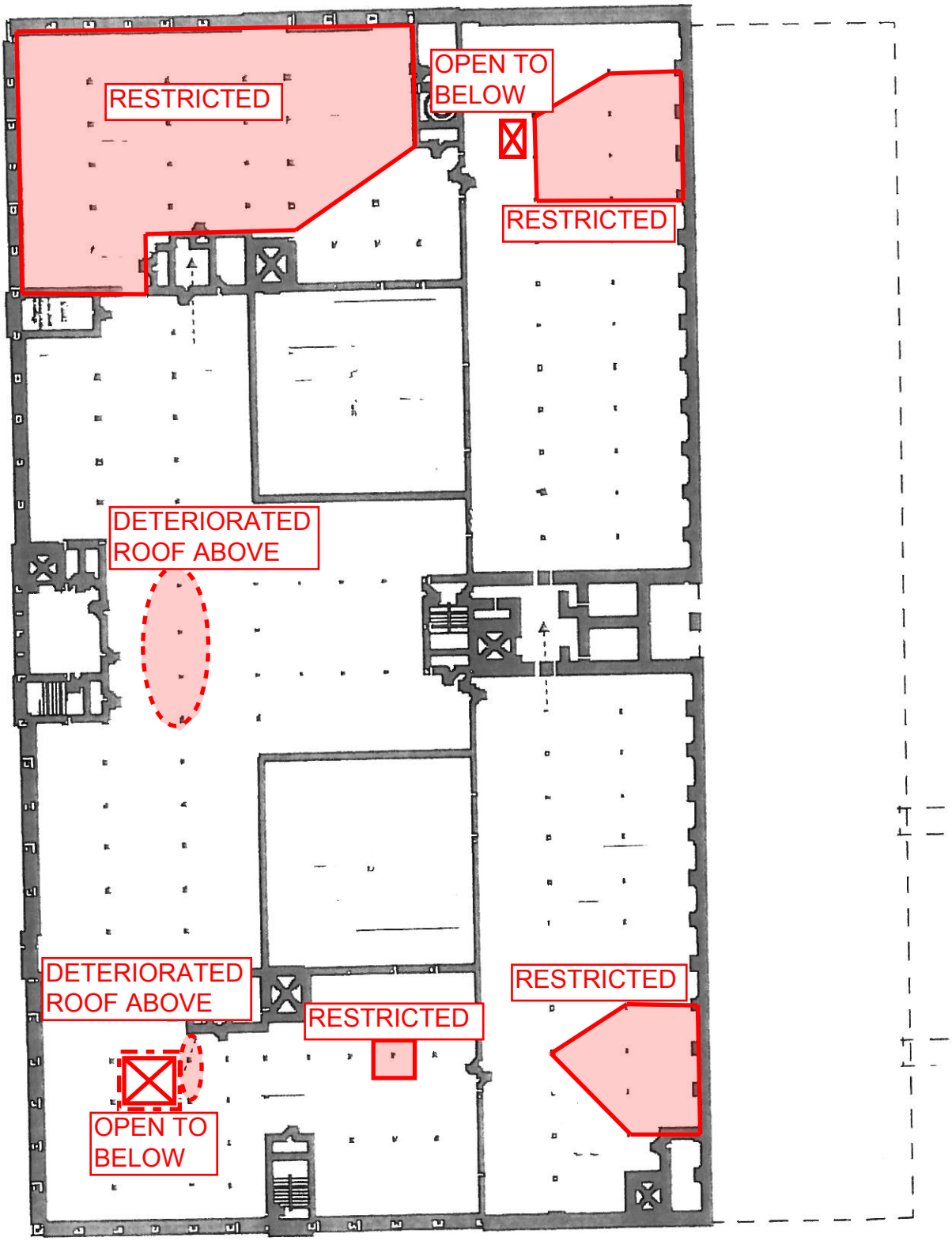
5th FLOOR

Figure 4



6th FLOOR

Figure 5



7th FLOOR

Figure 6