

# ABS Consulting

14 November 2011

Mr. Jerry Altman  
Ballpark Lofts III, LLC  
2207 Washington Ave.  
St. Louis, Missouri 63103

Subject: *Cupples Station Building 7 Condition Assessment Review,  
1014 Spruce St. (Spruce & 11<sup>th</sup> St.), St. Louis, Missouri*

ABS Project: 2675837

Dear Jerry:

I performed a visual review walkdown of the subject building with you on 3 November 2011, per your request, and followed up with an exterior review of the south facade from the adjacent parking garage on 5 November 2011. The purpose of this review was to review the extent of reported deterioration of existing structural timber floor and roof framing and decks. This letter report summarizes my findings from this review.

## ***Existing Construction***

Building 7 roof and floor framing consists of heavy timber post, beam and deck construction. Single span beams and girders are typically supported on cast iron plinths at each interior supporting column, wood bolsters at each interior roof column, and masonry pockets with cast iron bearing plates at exterior building walls. Beam connections are made to girders by pairs of cast iron seat-type hangers at each beam end.

Floor and roof decks typically consist of 2½" thick, double-span tongue and groove deck planks oriented perpendicular to, and supported by, floor beams. Roof beams are nominally 8" wide x 11" deep, and floor beams are nominally 12" wide x 15" deep. Roof girders are nominally 9" wide by 11" deep, and floor girders are nominally 14" wide by 15" deep. Beams span 17' wide nominal bays in the north-south direction, and girders span 15' wide nominal bays in the east-west direction.

Unreinforced masonry (URM) bearing walls are 7-stories high around the exterior of the wood framing system, with a center URM wall running north-south between the north and south exterior walls. Therefore, the center wall divides the wood framing system into two equal halves on the east and west sides of the center wall.

## ***Condition Assessments***

A condition assessment of Cupples Station Building 7 was originally performed by ABS Consulting (formerly EQE International) during the Fall of 2000. The assessment reviewed conditions of existing timber framing, masonry, and foundations, and made recommendations for repairs to restore deteriorated members and areas.

ABS Consulting updated the original assessment report in November 2002, and again in November 2003. The updated reports included floor and roof plans showing the extent of timber framing deterioration, noting areas in which conditions had deteriorated since the original report, and summarizes the approximate quantities by level of deterioration.

The previous field assessments were limited to visual review of the topsides of floor decks, and the underside of the roof deck, with spot checks of existing timber framing from the underside of floor decks. Masonry and foundation conditions assessed in our previous reports were not updated. The presence of plastic sheeting at the underside of floor framing at most floors, installed as part of remediation efforts, limited direct visual review of framing and deck from the underside. Since that time, the majority of the plastic sheeting has either fallen or been taken down, although it is still present in some framing bays. During our previous field assessments, the condition of timber beams and columns was checked wherever visible in bays immediately adjacent to existing masonry walls, for the purpose of identifying bays in which timber framing deterioration would likely impact the layout for lateral bracing of masonry walls.

### ***Accessible Areas***

Due to extensive wood framing deterioration present in the building at this time, the latest visual review of floor and roof decks was limited to areas where horizontal and vertical access is currently available. Due to partial collapses that have occurred on both sides of the center wall, horizontal access is limited to selected areas of the First Floor level. Vertical access is limited to the center stair shaft. Previous recommendations for installation of improved support of stair framing in the stair shaft have been installed, but existing wood framing deterioration, particularly at the upper floor landings, is to the point of limiting safe vertical access to those levels.

Framing plans from the 2000 report have been marked-up with this information, and are included in Appendix A. Photos of representative conditions are included in Appendix B.

### ***Existing Conditions***

The original assessment review noted extensive areas of deteriorated floor and roof deck, as well as timber framing deterioration, due to long-term exposure to water infiltration. The primary source of water infiltration was identified as roof leaks, although some water infiltration was occurring through broken windows. Deterioration was so severe in the southeast quarter of the building that timber deck and framing had partially collapsed from the roof down to the first floor level, and the roof was open to the weather. Since the roof is sloped down from north to south, water from the portion of the roof north of the collapsed area ran down into the structure, accelerating the decay of timber framing members. Other areas of the structure were also exhibiting signs of severe decay from water infiltration, such as the bay immediately north of the stairwell on the west side of the center wall. This area had also partially collapsed down several levels into the structure. Various areas of the roof deck and supporting framing were also exhibiting signs of severe distress from decay.

The condition assessment update in 2002 noted widespread worsening of decay at every level of the structure, due to continued exposure to water infiltration. Recommendations were made to post caution tape around severely deteriorated areas. However, at that time, at least one bay of floor and roof deck immediately adjacent to masonry walls remained relatively intact, except for the bay immediately north of the stairwell on the west side of the center wall. The floor and roof deck adjacent to masonry walls, and supporting framing, form structural sub-diaphragms that provide out-of-plane support for masonry walls to resist lateral forces. Likewise, the in-plane shear strength of the walls provides lateral support for the post-and-beam timber framing on the interior of the structure. Therefore, the structural stability of the walls and floor framing are each dependent on the structural integrity of the other.

The 2003 visual review found widespread worsening of decay since the 2002 condition assessment update, due to continued water infiltration and exposure to weather. Framing plans from that review were also developed to show deteriorated areas, with general levels of deterioration shown on framing plans.

Framing plans from the 2000 reivev have been used as backgrounds for the current condition review, and are included in Appendix A with current levels of general deterioration marked on top in red for comparison to the 2000 review. The current levels of deterioration shown on the framing plans depict significantly worsened conditions, with virtually every area of all floor and roof decks having experienced increasing deterioration and/or partial or total collapse. Representative photos of conditions found during the current review are found in Appendix B

Areas of concern generally include the following:

1. Timber framing bays on the east side of the center wall have experienced significant areas of partial or total collapse from the roof level down into the basement. These areas are shown on the framing plans in Appendix A and in photos B-1 through B-4.
2. Timber framing bays on the west side of the center wall, immediately adjacent to the stair shaft, have experienced significant areas of partial or total collapse from the roof level down into the basement. In addition, timber framing adjacent to the west wall at the Seventh Floor and Roof levels has partially collapsed. These areas are shown on the framing plans in Appendix A and in photos B-5 through B-7. An imminent collapse hazard is present due to the column supporting the Sixth Floor framing north of the stair shaft having slipped off the bearing plinth below, as shown near the right edge of Figure B-6.
3. Strength of timber floor and roof decks in areas that have not partially or completely collapsed is moderately to severely compromised for resisting both gravity loads and lateral wind and earthquake loads transferred from exterior walls.
4. Severe fungal attack of virtually all wood framing continues to accelerate unchecked. Therefore, partial and/or complete collapse of additional framing bays inside the structure may be expected to occur at any time.

5. Loss of lateral support for unreinforced masonry walls due to partial or complete timber framing collapses, as well as weakened conditions of remaining timber bays, has likely significantly affected the lateral stability of these walls. Unbraced walls, such as the east wall shown in Figure B-1, is currently very slender due to the loss of lateral support. Compounding this condition is the presence of a vertical crack through the masonry spandrels at this location, which has compromised the structural capacity of the brick arches over the window opening. A noticeable gap has opened up between the top of the Seventh Floor window frame and the brick arch above, possibly indicating vertical downward displacement of the brick spandrel below and a falling hazard posed by the window frame..
6. Cracking patterns noted during review of exterior walls indicate that lateral tension exists in the east, south and west walls. Cracks extend vertically through spandrels and arches, weakening both the in-plane and out-of-plane capacity of these wall to resist lateral loads. Crack patterns seem to indicate a general rotation of the south wall outward at the top, away from the structure. This condition is likely caused by leaking gutters and downspouts at the south wall, the low point of the sloped roof, which are possibly contributing to decay of wood piles supporting the south building wall. Vertical downward displacement of the south wall may also be occurring.
7. Due to the conditions noted above, gravity and/or lateral load capacity of both local structural elements, including both walls and timber framing, is moderately to severely compromised and continues to deteriorate. In addition, global stability of portions of the structure, such as the east, south and west walls and supported/supporting timber framing, are increasingly at risk of experiencing significant damage and/or partial collapse during a significant lateral loading event such as a wind storm or moderate earthquake.
8. City of St. Louis Revised Code Chapter 24.04 includes the following definition:
  - a. "Sound" means that visible portions of exterior walls and roofs appear capable of continuing to support their current loads for six months or more.

Based on that definition, considering the extensive partial or total collapse of a significant number of the framing bays in both the east and west sides of the structure, the weakened condition of remaining timber framing, and the loss of lateral bracing the timber framing provides to the unreinforced masonry walls, a significant portion of the Building 7 structure do not meet this definition and should be considered to be "unsound."

## ***Recommendations***

Conditions noted herein pose numerous serious safety concerns in the Cupples Station Building 7 structure. Continued water infiltration has exacerbated previously deteriorated conditions, and has led to the development of potentially unstable conditions that threaten the structural stability of significant portions of the structure. Deterioration has proceeded to the point that overall structural stability is compromised and continues to decline at an accelerating pace.

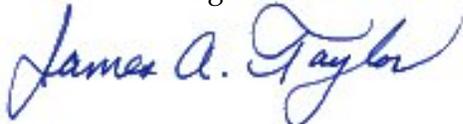
Loss of lateral stability is becoming increasingly dangerous to public safety, since public streets and/or sidewalks are present immediately adjacent to building walls on the north, west, and south sides of the structure. Imminent collapse of deteriorated framing throughout the structure, from the roof to the basement, may result in increased immediate lateral instability of adjacent unreinforced masonry walls, posing potentially dangerous falling hazards to adjacent public ways below. Restrictions on access to public areas around all sides of the building are in place and should be maintained. Partial collapse of the east and/or south walls of Building 7 may also result in structural damage to Building 8, as well as structural damage to the parking garage to the south.

***These lateral stability concerns require immediate attention and action. Deterioration of internal timber framing appears to be so severe that partial or overall structure stability may be potentially threatened, posing serious public safety concerns. Provisions to protect public safety, such as installation of temporary lateral bracing of masonry walls in bays adjacent to deteriorated timber framing, should be installed. Repairs to the structure, or lateral bracing, should be designed by a qualified, registered Professional Engineer, and installed by a qualified contractor. In lieu of repairing the structure, demolition may also be considered.***

***Other conditions inside the structure pose serious hazards to personnel safety. Portions of existing wood-framed stairs, which provide the only vertical access in the structure for personnel, are significantly deteriorated and pose a potential falling hazard. Likewise, deteriorated framing in the bays immediately adjacent to the stairwell have collapsed, and additional collapses are likely. Therefore, we strongly recommend that personnel access to the structure be severely restricted to qualified personnel until repairs to stabilize these conditions are designed by a licensed Professional Engineer, and installed by a qualified contractor.***

We appreciate the opportunity to be of service for this project. Please contact us if you have any questions, or need additional information.

Sincerely,  
ABSG Consulting Inc.



James A. Taylor, P. E., S.E.  
Technical Manager

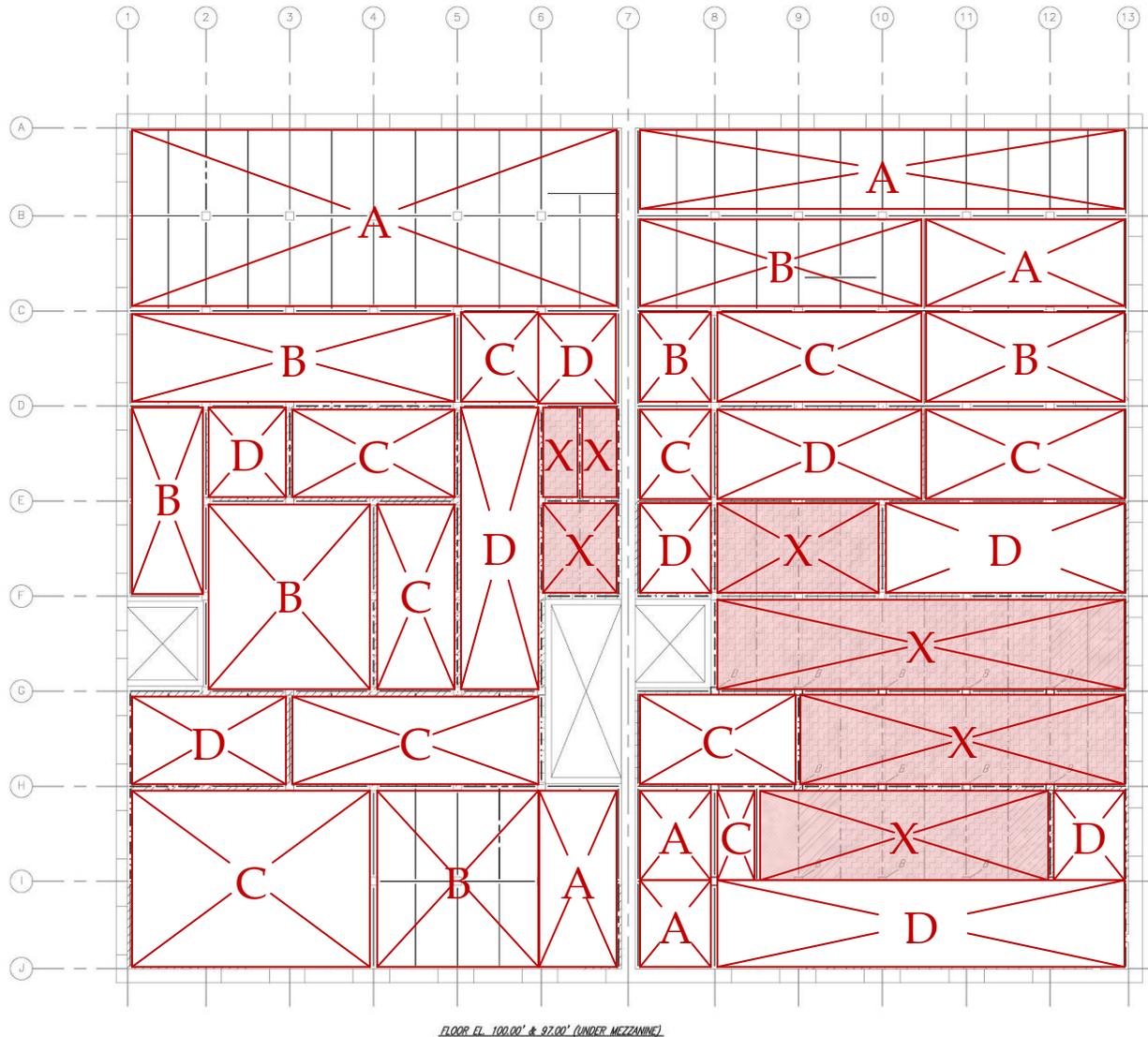
Enclosure: Appendix A (Framing Plans)  
Appendix B (Representative Photos)

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Cupples Building 9

## Appendix A - Framing Plans

### ***Framing Plans and Legend***

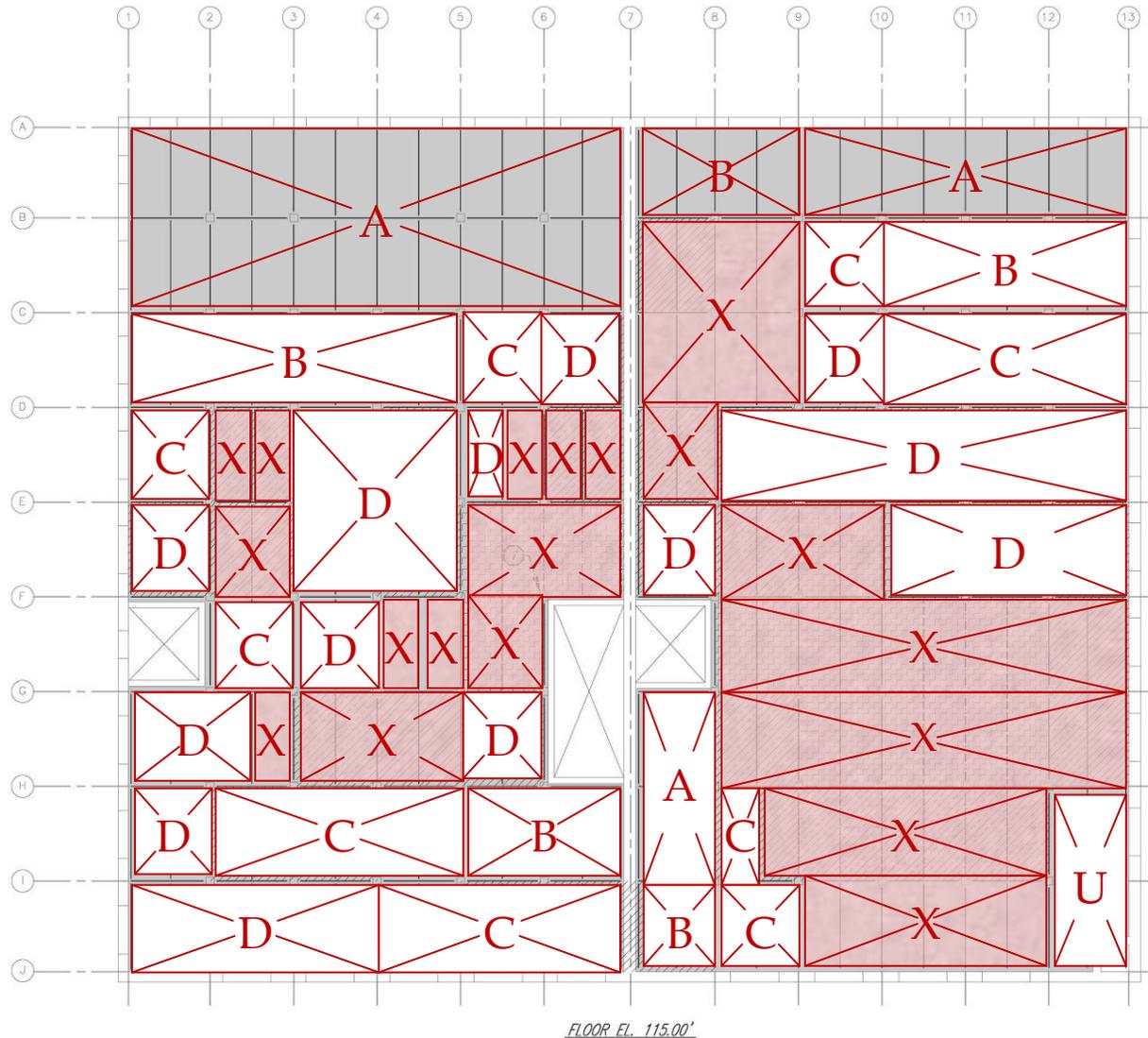
The following framing plans were developed for previous review of framing conditions performed by Jim Taylor of ABS Consulting in 2000. The legend of conditions found during the 2000 review is included on each page. Framing review general conditions found in 2011 are superimposed on these plans in red to illustrate the extent of deterioration that has occurred over the 11-year period between the reviews.



LEGEND	
	= EXISTING FRAMING CONDITION, UNCHANGED OR UNKNOWN.
	= FRAMING CONDITION CATEGORY A
	= FRAMING CONDITION CATEGORY B
	= FRAMING CONDITION CATEGORY C
	= FRAMING CONDITION CATEGORY D
	= DECK CONDITION CATEGORY A
	= DECK CONDITION CATEGORY B
	= DECK CONDITION CATEGORY C
	= DECK CONDITION CATEGORY D
	= APPROX. AREA COVERED BY PLASTIC SHEETING, ACOUSTICAL TILE OR SUSPENDED CEILING @ UNDERSIDE OF FLOOR DECK
	= COLUMN CONDITION CATEGORY "X"

2011 Condition Review	
Category	Description
<b>A</b>	< 25% deteriorated
<b>B</b>	25% - 50% deteriorated
<b>C</b>	50% - 75% deteriorated
<b>D</b>	75 - 100% deteriorated
<b>X</b>	collapsed framing
<b>U</b>	Undetermined: inaccessible area

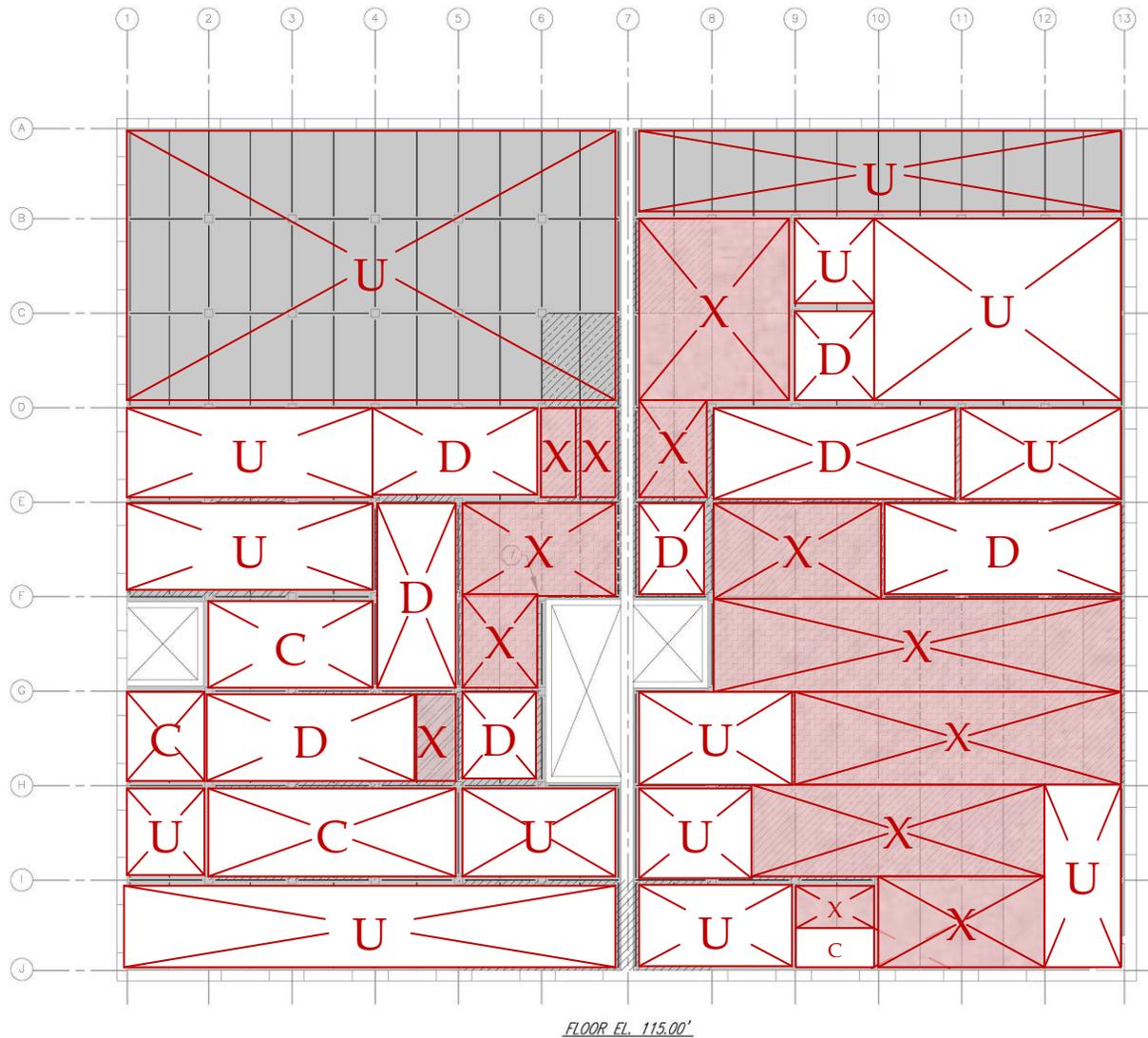
Figure A-1 - First Floor Framing Plan - 2000 and 2011 (red)



LEGEND	
	= EXISTING FRAMING CONDITION, UNCHANGED OR UNKNOWN.
	= FRAMING CONDITION CATEGORY A
	= FRAMING CONDITION CATEGORY B
	= FRAMING CONDITION CATEGORY C
	= FRAMING CONDITION CATEGORY D
	= DECK CONDITION CATEGORY A
	= DECK CONDITION CATEGORY B
	= DECK CONDITION CATEGORY C
	= DECK CONDITION CATEGORY D
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2011 Condition Review	
Category	Description
<b>A</b>	< 25% deteriorated
<b>B</b>	25% - 50% deteriorated
<b>C</b>	50% - 75% deteriorated
<b>D</b>	75 - 100% deteriorated
<b>X</b>	collapsed framing
<b>U</b>	Undetermined: inaccessible area

Figure A-2 - Mezzanine Framing Plan - 2000 and 2011 (red)



**LEGEND**

- = EXISTING FRAMING CONDITION, UNCHANGED OR UNKNOWN.
- - - = FRAMING CONDITION CATEGORY A
- · - · - = FRAMING CONDITION CATEGORY B
- · · - · = FRAMING CONDITION CATEGORY C
- · · · - = FRAMING CONDITION CATEGORY D
- ▨ = DECK CONDITION CATEGORY A
- ▩ = DECK CONDITION CATEGORY B
- ▧ = DECK CONDITION CATEGORY C
- ▦ = DECK CONDITION CATEGORY D
- = APPROX. AREA COVERED BY PLASTIC SHEETING, ACOUSTICAL TILE OR SUSPENDED CEILING @ UNDERSIDE OF FLOOR DECK
- = COLUMN CONDITION CATEGORY "X"

2011 Condition Review	
Category	Description
<b>A</b>	< 25% deteriorated
<b>B</b>	25% - 50% deteriorated
<b>C</b>	50% - 75% deteriorated
<b>D</b>	75 - 100% deteriorated
<b>X</b>	collapsed framing
<b>U</b>	Undetermined: inaccessible area

Figure A-3 - Second Floor Framing Plan - 2000 and 2011 (red)

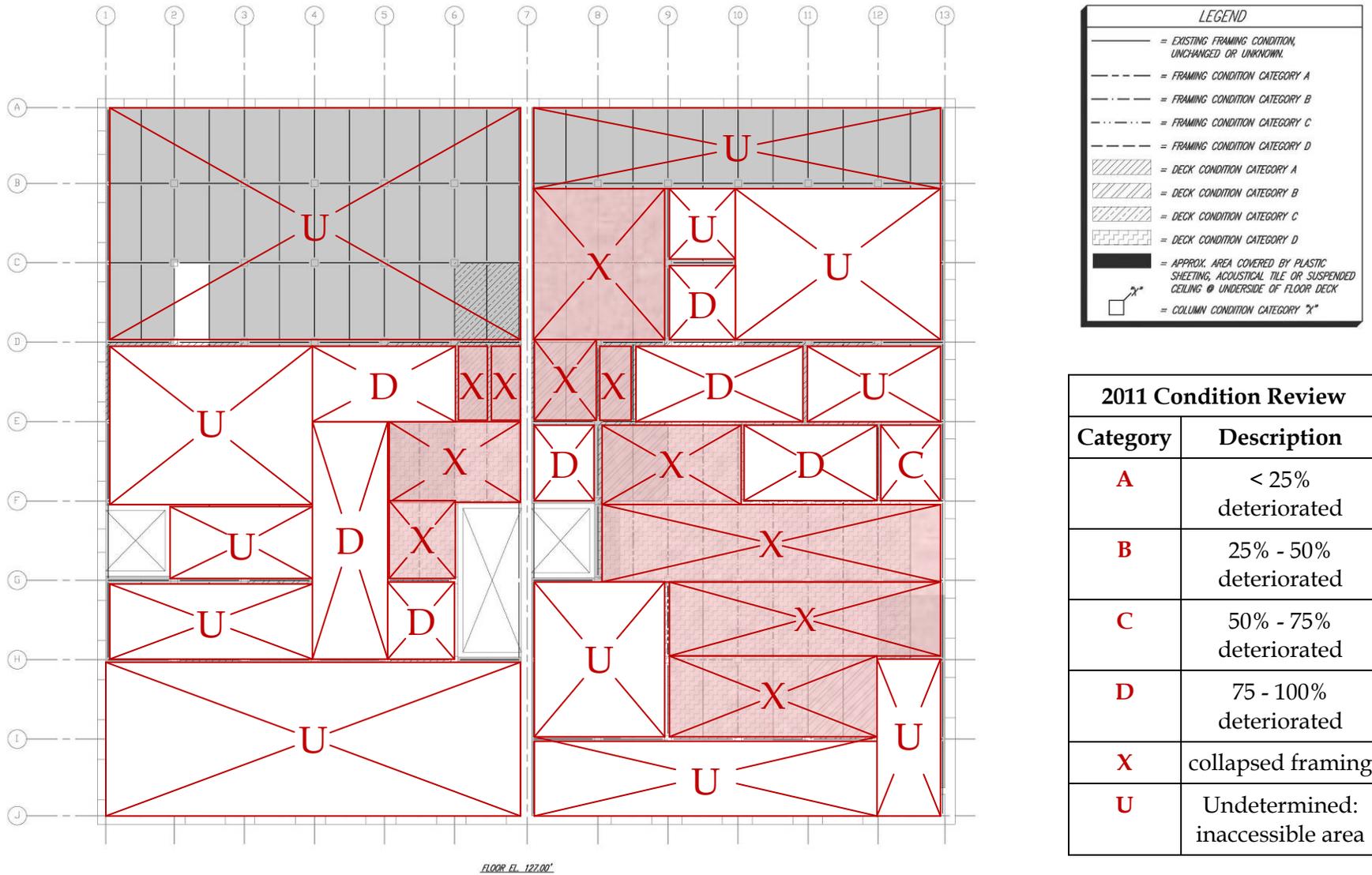


Figure A-4 - Third Floor Framing Plan - 2000 and 2011 (red)

2011 Condition Review	
Category	Description
<b>A</b>	< 25% deteriorated
<b>B</b>	25% - 50% deteriorated
<b>C</b>	50% - 75% deteriorated
<b>D</b>	75 - 100% deteriorated
<b>X</b>	collapsed framing
<b>U</b>	Undetermined: inaccessible area

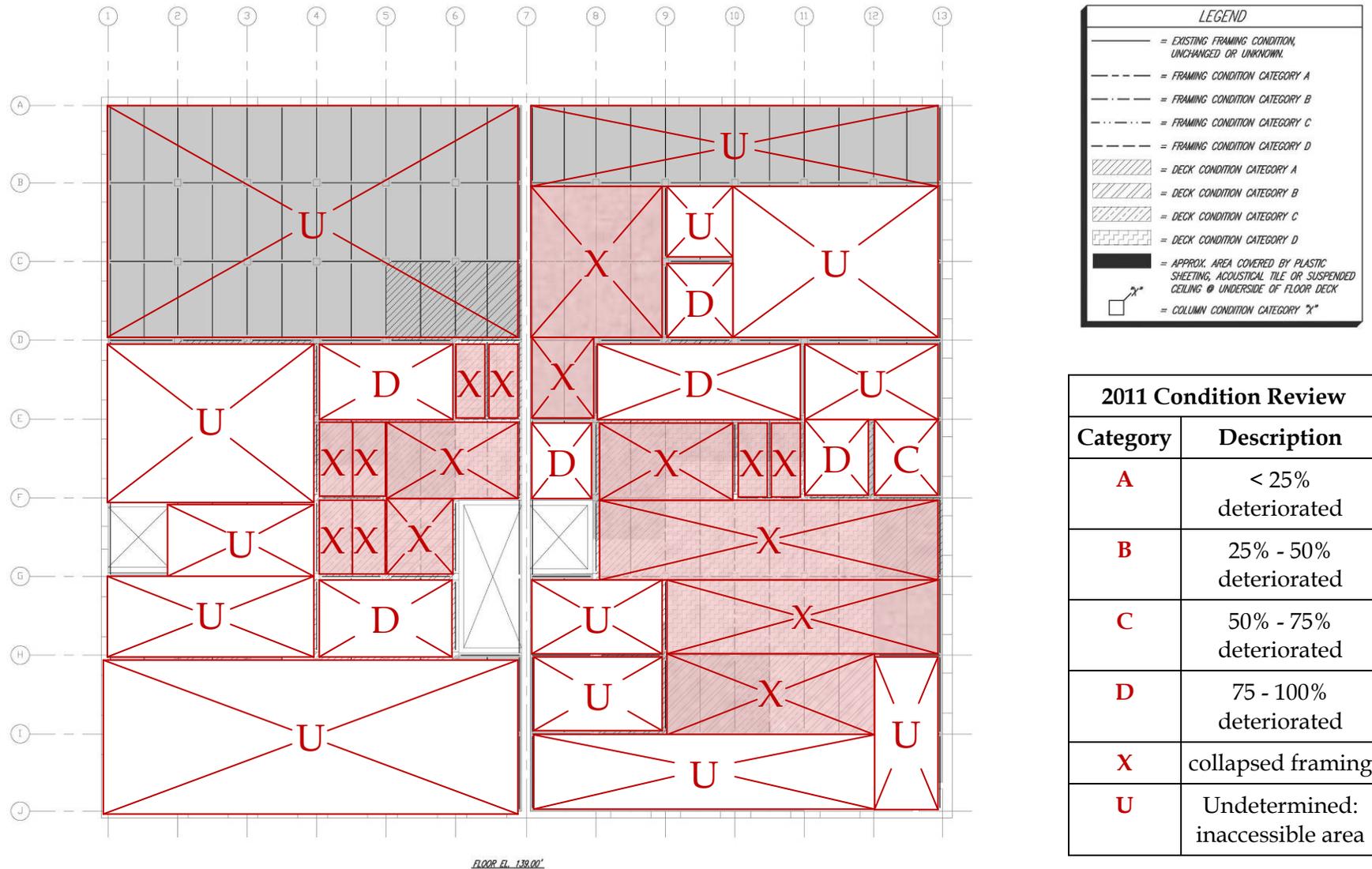
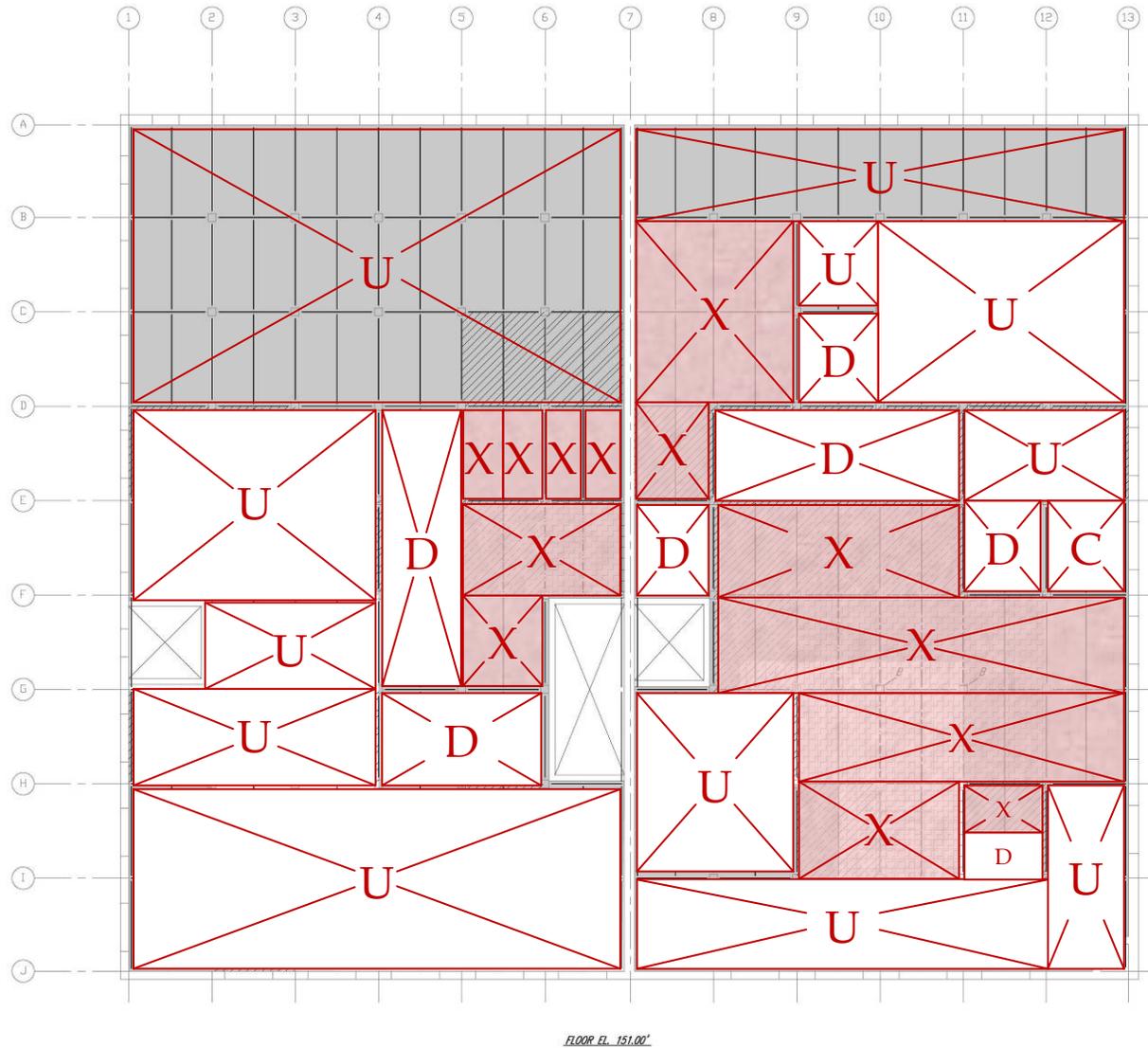


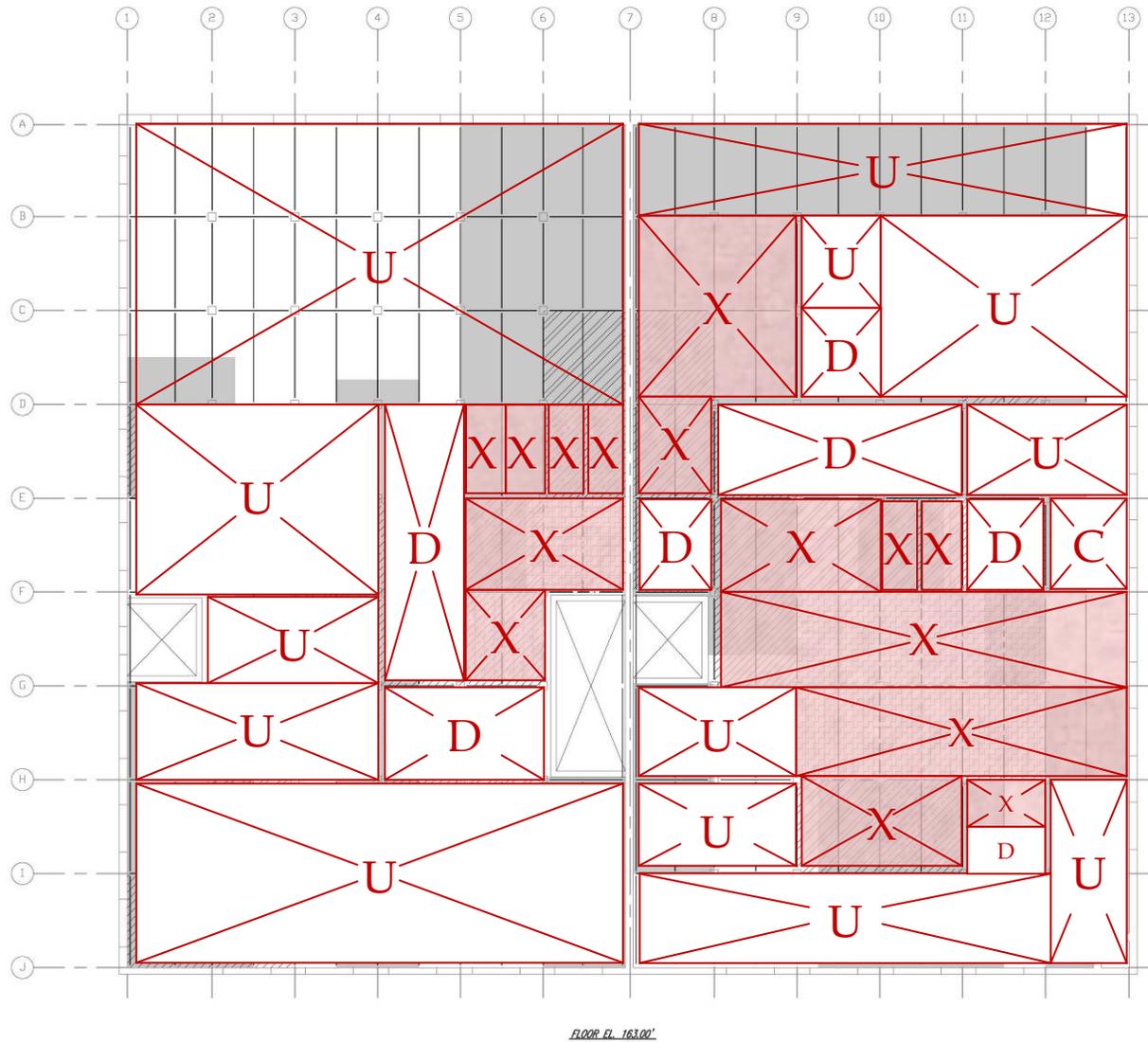
Figure A-5 - Fourth Floor Framing Plan - 2000 and 2011 (red)



LEGEND	
	= EXISTING FRAMING CONDITION, UNCHANGED OR UNKNOWN.
	= FRAMING CONDITION CATEGORY A
	= FRAMING CONDITION CATEGORY B
	= FRAMING CONDITION CATEGORY C
	= FRAMING CONDITION CATEGORY D
	= DECK CONDITION CATEGORY A
	= DECK CONDITION CATEGORY B
	= DECK CONDITION CATEGORY C
	= DECK CONDITION CATEGORY D
	= APPROX. AREA COVERED BY PLASTIC SHEETING, ACOUSTICAL TILE OR SUSPENDED CEILING @ UNDERSIDE OF FLOOR DECK
	= COLUMN CONDITION CATEGORY "X"

2011 Condition Review	
Category	Description
<b>A</b>	< 25% deteriorated
<b>B</b>	25% - 50% deteriorated
<b>C</b>	50% - 75% deteriorated
<b>D</b>	75 - 100% deteriorated
<b>X</b>	collapsed framing
<b>U</b>	Undetermined: inaccessible area

Figure A-6 - Fifth Floor Framing Plan - 2000 and 2011 (red)



LEGEND	
	= EXISTING FRAMING CONDITION, UNCHANGED OR UNKNOWN.
	= FRAMING CONDITION CATEGORY A
	= FRAMING CONDITION CATEGORY B
	= FRAMING CONDITION CATEGORY C
	= FRAMING CONDITION CATEGORY D
	= DECK CONDITION CATEGORY A
	= DECK CONDITION CATEGORY B
	= DECK CONDITION CATEGORY C
	= DECK CONDITION CATEGORY D
	= APPROX. AREA COVERED BY PLASTIC SHEETING, ACOUSTICAL TILE OR SUSPENDED CEILING @ UNDERSIDE OF FLOOR DECK
	= COLUMN CONDITION CATEGORY "X"

2011 Condition Review	
Category	Description
<b>A</b>	< 25% deteriorated
<b>B</b>	25% - 50% deteriorated
<b>C</b>	50% - 75% deteriorated
<b>D</b>	75 - 100% deteriorated
<b>X</b>	collapsed framing
<b>U</b>	Undetermined: inaccessible area

Figure A-7 - Sixth Floor Framing Plan - 2000 and 2011 (red)

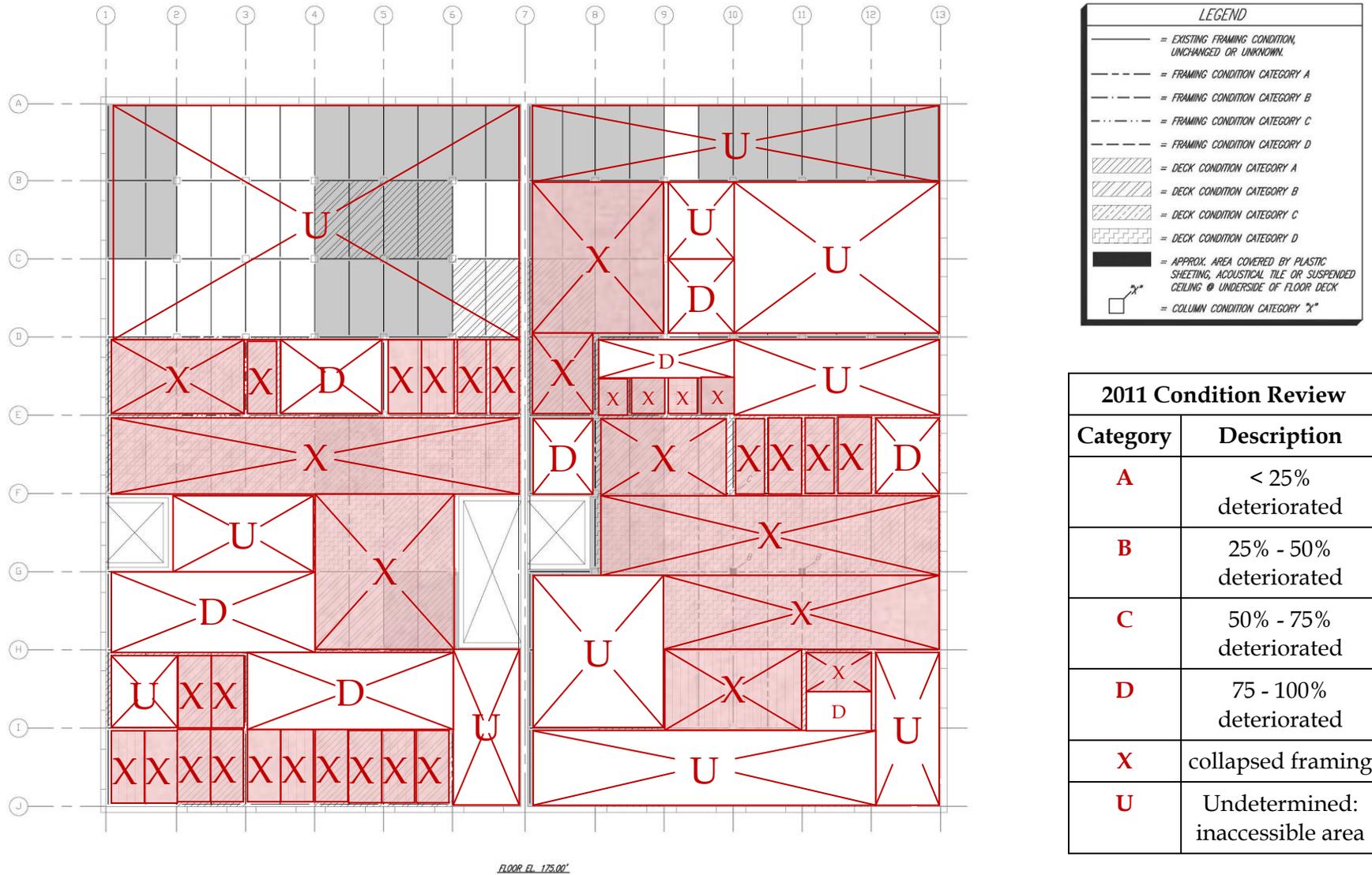
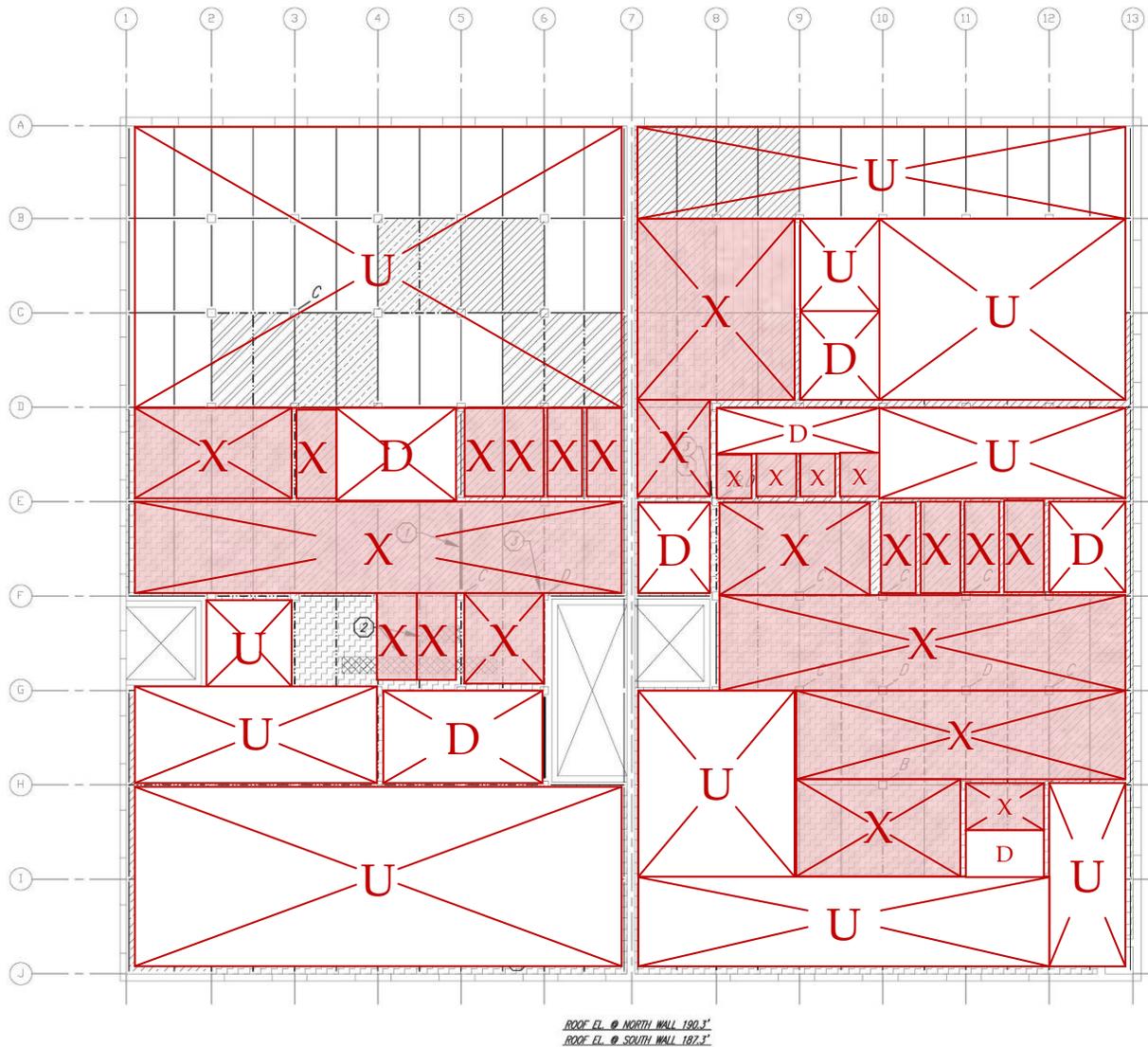


Figure A-8 - Seventh Floor Framing Plan - 2000 and 2011 (red)



LEGEND	
	= EXISTING FRAMING CONDITION, UNCHANGED OR UNKNOWN.
	= FRAMING CONDITION CATEGORY A
	= FRAMING CONDITION CATEGORY B
	= FRAMING CONDITION CATEGORY C
	= FRAMING CONDITION CATEGORY D
	= DECK CONDITION CATEGORY A
	= DECK CONDITION CATEGORY B
	= DECK CONDITION CATEGORY C
	= DECK CONDITION CATEGORY D
	= APPROX. AREA COVERED BY PLASTIC SHEETING, ACOUSTICAL TILE OR SUSPENDED CEILING @ UNDERSIDE OF FLOOR DECK
	= COLUMN CONDITION CATEGORY "X"

2011 Condition Review	
Category	Description
<b>A</b>	< 25% deteriorated
<b>B</b>	25% - 50% deteriorated
<b>C</b>	50% - 75% deteriorated
<b>D</b>	75 - 100% deteriorated
<b>X</b>	collapsed framing
<b>U</b>	Undetermined: inaccessible area

Figure A-9 - Roof Framing Plan - 2000 and 2011 (red)

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## **Appendix B - Representative Photos**



Figure B-1 : East Side Partial Collapse, Looking Northeast

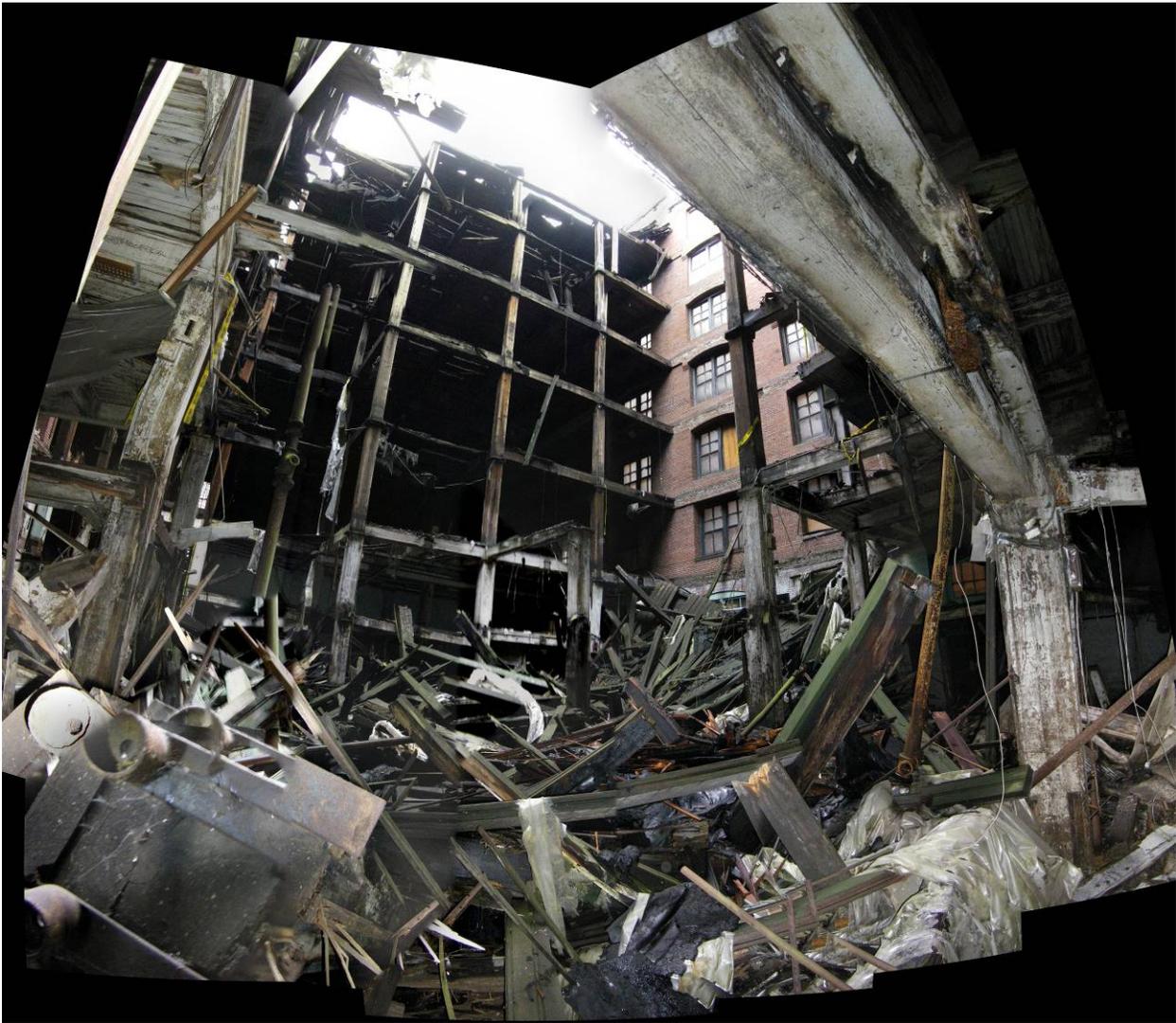


Figure B-2 : East Side Partial Collapse, Looking Northeast (composite image)



Figure B-3 : East Side Partial Collapse, Looking East (composite image)

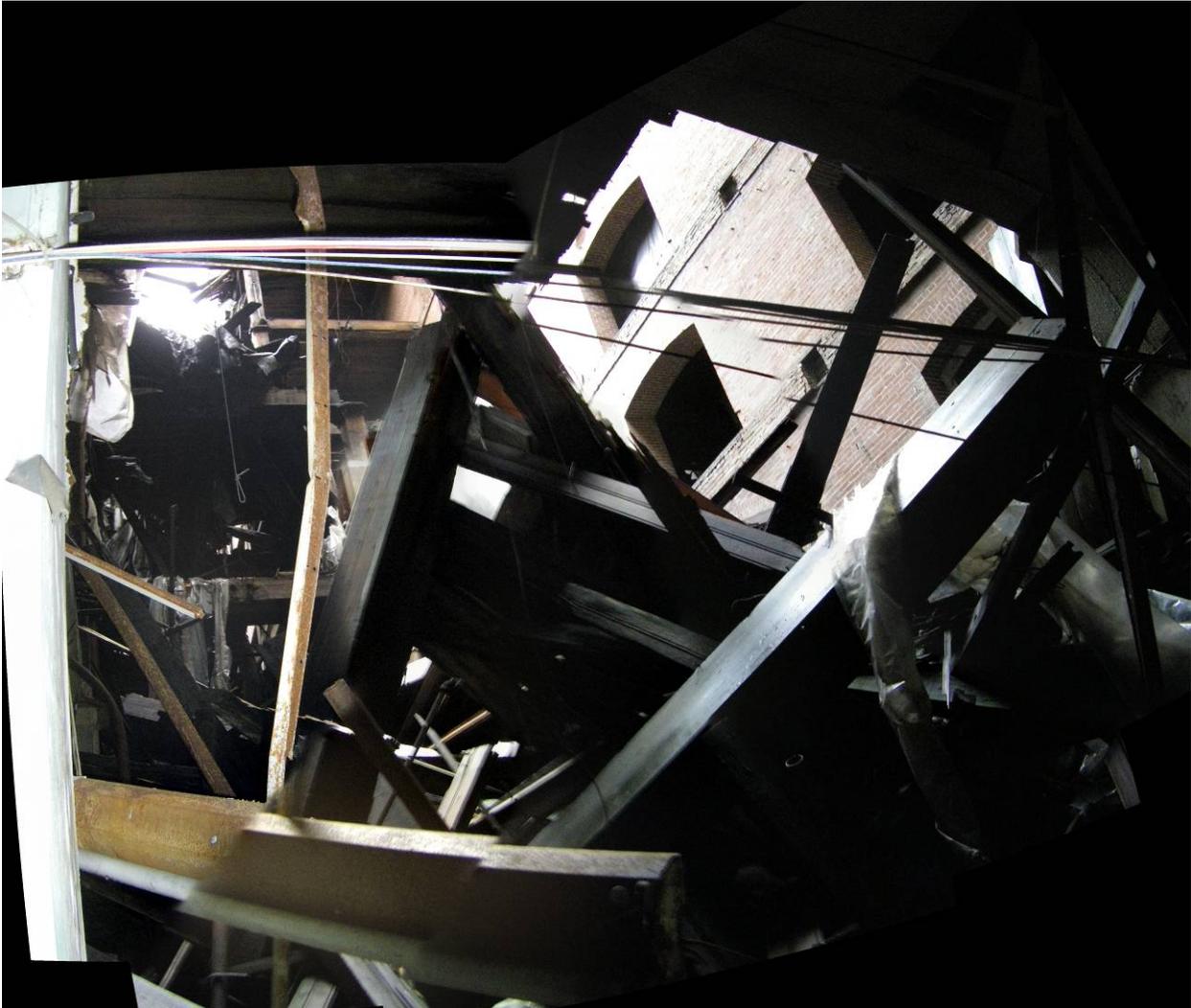


Figure B-4 : East Side Partial Collapse, Looking Southwest at Center Wall (composite image)



Figure B-5 : West Side Partial Collapse, Looking West from Seventh Floor Door in Stair Shaft  
(composite image)



Sixth Floor hanging column slipped off bearing plinth poses an imminent interior collapse hazard.

Figure B-6 : West Side Partial Collapse, Looking West from Sixth Floor Door in Stair Shaft.  
(Note partial collapse in background along west wall; composite image)



Figure B-7 : West Side Partial Collapse, Looking West from Fourth Floor Door in Stair Shaft (composite image)



Figure B-8: East and North Facades, Looking Southwest (composite image)



Vertical crack through window opening arch  
Dropped window frame  
Vertical crack through window opening arch

Figure B-9 : East Wall Parapet and Seventh Floor Windows, Looking West (composite photo)



Vertical crack through window opening arch  
Dropped window frame  
Vertical crack through window opening arch and brick above

Figure B-10 : East Wall Parapet and East Wall of Penthouse, Looking West (composite photo)

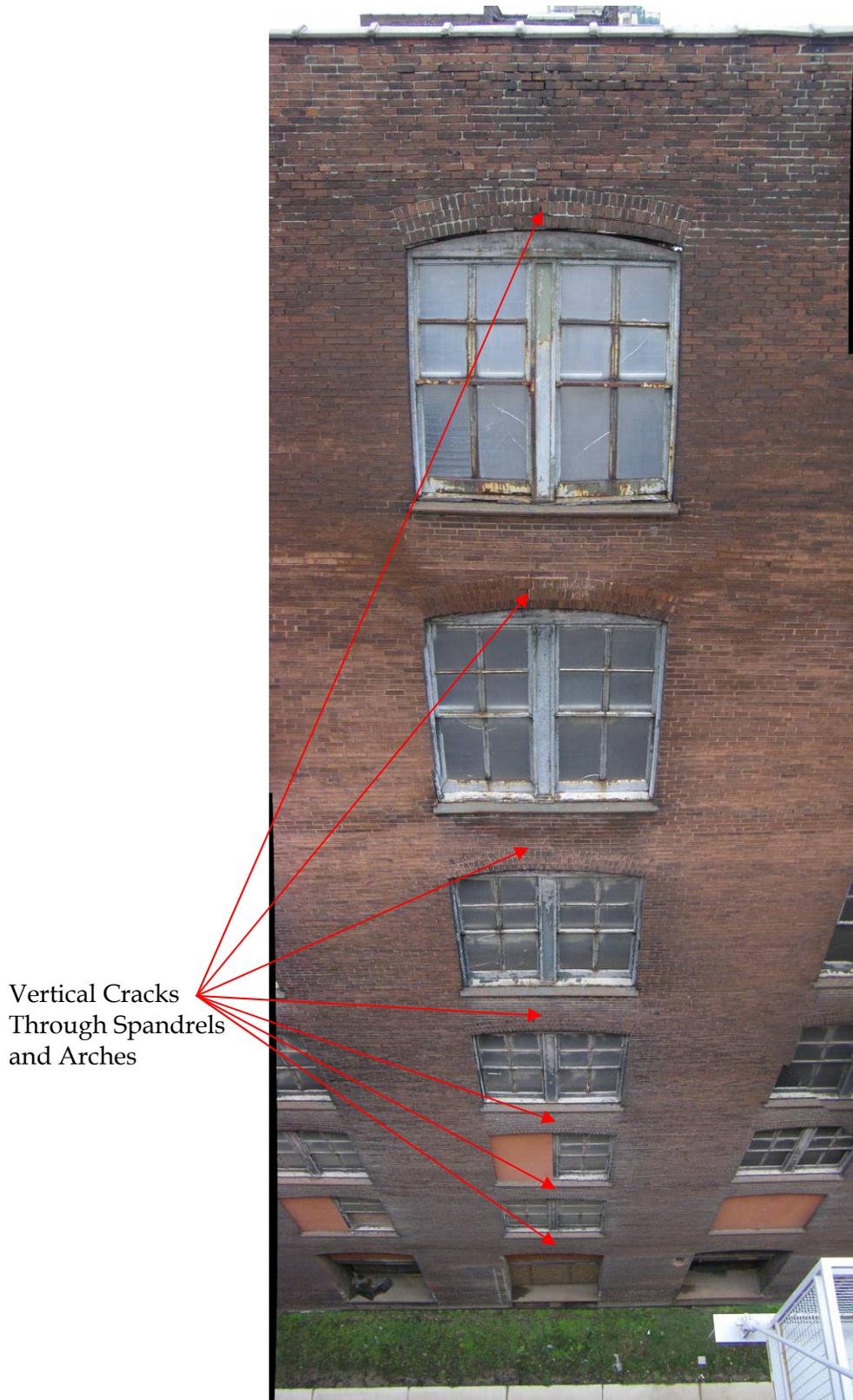


Figure B-11 : East Wall Vertical Crack Through Spandrels (composite imste)

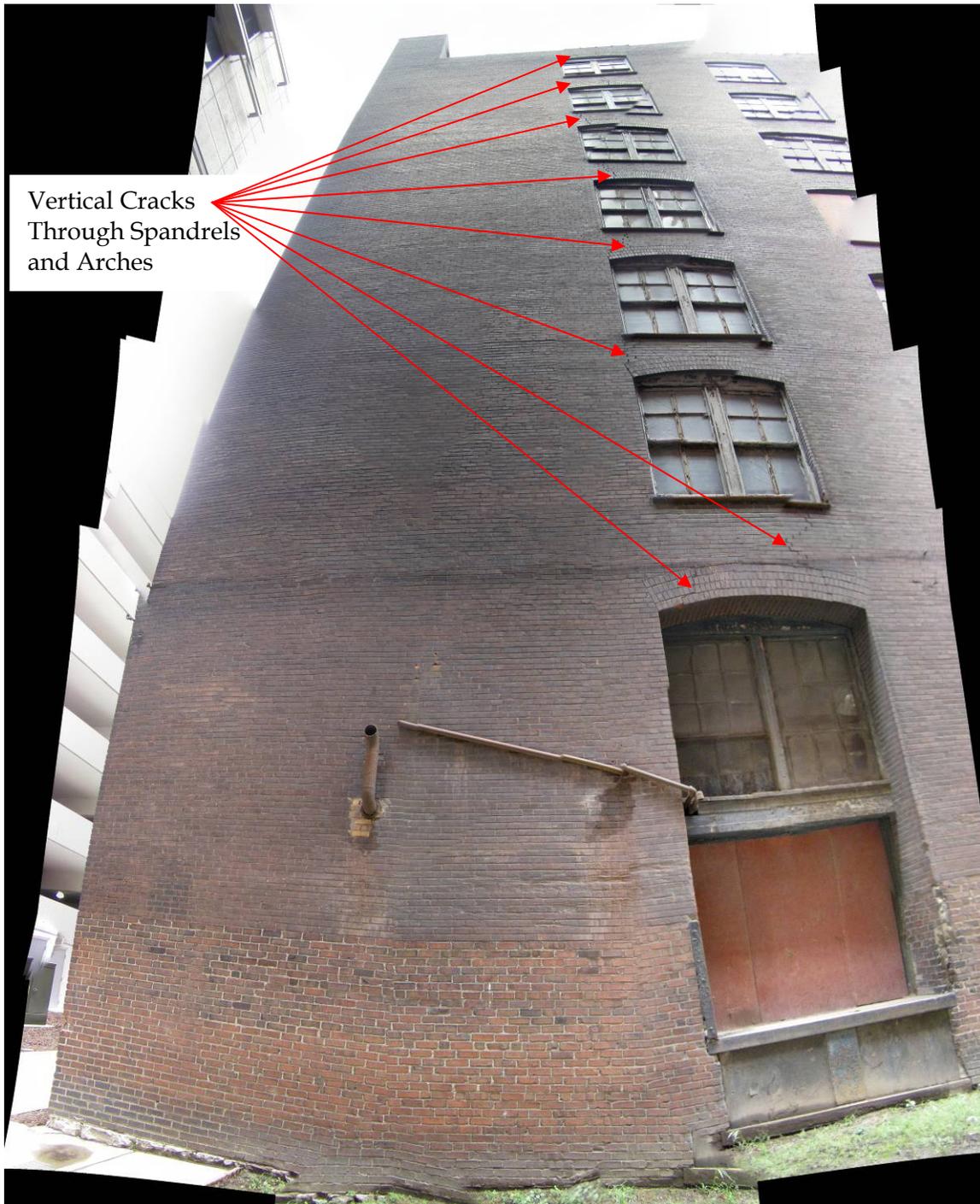
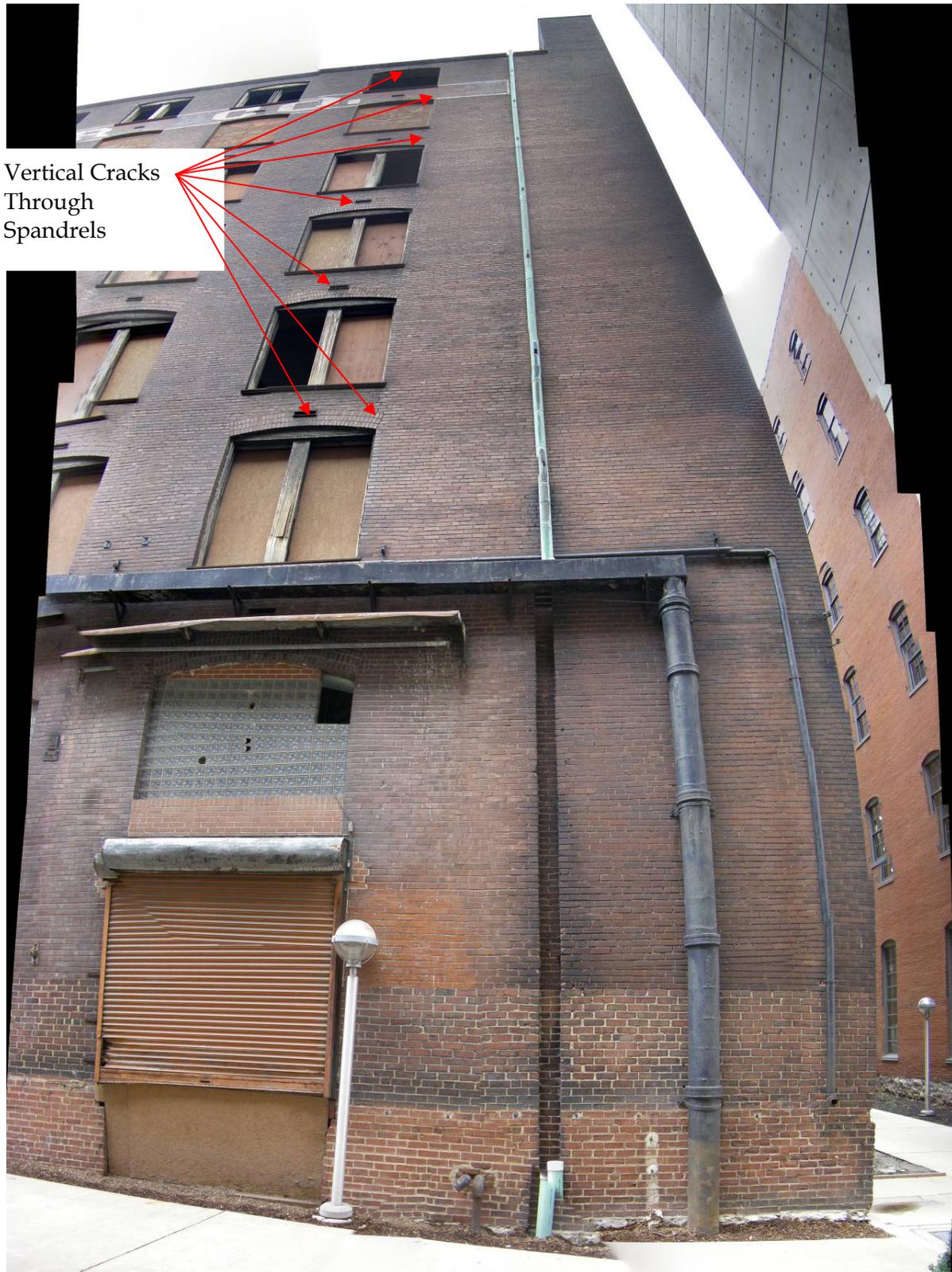


Figure B-12 : East Wall Crack Through Spandrels Near Southeast Corner (composite image)



Vertical Cracks  
Through  
Spandrels

Figure B-13: South Wall Crack Through Spandrels Near Southeast Corner (composite image)



Figure B-14 : West Wall Cracks Near Southwest Corner (composite image)



Figure B-15 : North Facade (composite image)