

# STRUCTURAL ENGINEERING ASSESSMENT REPORT



80-88 North Main Street, Memphis, Tennessee

Prepared for  
Downtown Memphis Commission  
Mr. Brett Roler

Prepared by



Davis Patrikios Criswell, Inc  
7975 Stage Hills Boulevard, Suite 1  
Memphis, TN 38133

Job No. 2021105

June 17, 2021

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**OBSERVATION DATA SUMMARY**

**Date of Visit:** *May 4, 2021*

**Weather:** *Cloudy, 70°*

**Time:** *10:00 AM*

**Site Conditions:** *Dry*

**Location:** *80-88 North Main Street  
Memphis, Tennessee*

**Notes:** *Observing general condition of  
structure*

**Client(s):** *Downtown Memphis Commission  
Mr. Brett Roler, Vice President  
114 North Main Street  
Memphis, Tennessee 38103*

**Owner of Building:** *Downtown Memphis Commission*

**Present at Observation:** *Mr. Eric Criswell, P.E.*

**FORENSIC ENGINEERING SCOPE**

*Davis Patrikios Criswell, Incorporated* was contacted to provide an expert engineering hypothesis on the following item:

- 1.) What is the overall structural condition of the building? Is the building safe to have prospective developer tours through when the time comes?

**INVESTIGATION**

The on-site field investigation was performed by Mr. Eric Criswell, P.E of Davis Patrikios Criswell, Incorporated (DPC). DPC performed the field investigation of the building located at 80-88 North Main Street in Memphis, Tennessee on May 4, 2021. DPC was given a set of keys for access to the buildings by Mr. Brett Roler (Downtown Memphis Commission).

**STRUCTURE BACKGROUND AND COMPONENTS**

The properties located at 80-88 North Main Street in Memphis, Tennessee have been a mixture of uses and were all unoccupied at the time of observation. The buildings were

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approximately a total of 50,204 square feet and were built between 1880 and 1910 making the buildings approximately 141 to 111 years old at the time of observation. The buildings have had various additions over their history; however, the majority of the historical structures are intact. The owner indicated that the buildings had been vacant since approximately March of 2021 when the properties were purchased.

The buildings were located in Memphis, Tennessee at the corner of Jefferson Avenue and North Main Street. The buildings were fully built out on their parcels and have an alley on the east side called November 6<sup>th</sup> Street. The buildings varied between two to four stories along North Main with basement access from the alley for some buildings. The buildings were generally wood framed on the interiors built over a basement level supported by unreinforced multi-wythe masonry basement walls. The exterior walls were constructed of unreinforced multi-wythe masonry. The buildings were relatively narrow in widths of the buildings being between 22' to 27' wide. The buildings were generally framed with wood joists varying in shapes and spacing. The joists were pocketed into the existing multiwythe unreinforced masonry walls allowing a mostly clear spanned interior condition. The typical joists were covered with 1x wood decking over the majority of the floor areas.

The 88 North Main building had an addition section located in the rear of the building that was framed with steel bar joists covered with metal decking and concrete. The area was located over the two-story portion of the building which was approximately located on the last 30' section of the building.

In general, the basement levels of the buildings were supported by wood columns and beams breaking the longer spans of the floor joists to increase the capacity of the ground floor joists for retail loading. The depths of the basements became greater as the buildings moved towards the south.



The roofs of the buildings were accessed and noted to have different roof coverings over the various buildings. We noted that in all conditions that the roof coverings were aged and were beyond their practical service life. We recommend the roof coverings be removed and replaced. Several large gaps and openings were observed on the roof coverings allowing water entry into the building damaging existing framing members. The roofs were framed with wood joists of varying sizes and spacing and were covered with wood 1x decking. Areas of ponding were noted at the time of observation over several of the roof structures. The perimeter unreinforced masonry walls were covered with wall flashing so the masonry could not be observed for cracking; however, no significant displacement was observed in the firewalls above the roof line where accessible.

We noted that some roof top HVAC units were placed on the roofs and others were located on the rear of the building. We noted that some of the roofs have areas where old RTU openings were abandoned and have been reframed and closed. The roofs were sloped back towards November 6<sup>th</sup> alley and were at different pitches but generally low sloped.

Portions of the roof were failing at the time of observations; however, roof access was not available at the pitched roof. Roof access was available at the south portion of the structure that consisted of a flat roof covered with a built-up roof system. The roof coverings were noted to be beyond their practical service life and had gaps and openings over the roof system especially where the roof met the walls. Vegetation was noted to be growing on the roof in several locations.

**INTERIOR AND EXTERIOR OBSERVATIONS:**

- The interior and exterior of the masonry wall was cracked on the north side of the 88 North Main building at the perimeter wall. The cracks were located on the addition portion of the building located in the rear. The cracks were

approximately an inch in magnitude and were located on the ground floor and the second story northern exterior wall. The cracks were generally vertical in orientation and traveled through both the brick and the mortar. The cracking had the appearance of aged cracking and did not appear active; however, we recommend that the cracks be repaired to prevent additional separation of the masonry materials. There does appear to be impact damage from the exterior of the building located adjacent to the parking lot on the north side of the building. We recommend tuck pointing the exterior cracks to prevent water infiltration into the building and to prevent additional movement of the bearing wall (Photos 41 through 48)

- The remaining unreinforced masonry bearing walls were observed to be in good condition without cracking or settling. The exterior mortar joints were generally in good condition; however, we recommend that some areas will require spot tuck pointing where loss of mortar has occurred. We estimate that tuck pointing will be required on approximately 20 percent of the building exterior. The lintels over the openings were generally in good condition with only minor repairs needed (Photos 49 through 54)
  
- Several of the building's windows have deteriorated or been broken over the many years of neglect and exposed the interior framing to natural elements. The majority of the open windows are located on the November 6<sup>th</sup> street side of the building. Several of the framing members on the rear of the buildings were observed to have moisture intrusion damages. The water was entering through both open windows and through the poor conditions of the roof coverings. We recommend these openings be sealed to prevent additional moisture entry into the building. Additionally, the deteriorated framing materials on the rear of the buildings should be sistered or replaced with new framing members. Damages were located in the 88 and 86 North Main buildings at the rear. Repairs to these

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locations shall be completed prior to access to the building to the public. (Photos 55 through 58)

- Roof coverings were observed to be beyond their practical service life which has caused damages to the floor and ceiling joists in several buildings. The areas of structural framing damages are localized and are generally small areas. We recommend that the large area of framing adjacent to the basement stairs in the 88 North Main building be sistered and any saturated floor decking be replaced to prevent possible injury of pedestrians.
- The basement stairs in the 88 North Main building shall be shored prior to any access due to poor framing conditions and deterioration of the wood framing members. Additionally, there is a lack of an adequate handrailing in this location. (Photos 59 through 62)
- The metal decking of the addition on 88 North Main was observed to have oxidation damages consistent with long-term water exposure. Damages were observed on the roof and floor levels of the addition. We recommend that repairs be made during improvements; however, the damages are not advanced enough to prevent public access to the building during walkthroughs. (Photos 63 through 66)
- On the fourth-floor portion of the 88 North Main building, we noted that the roof joists were sloped aggressively and several joists were torqued. We recommend that the joists be blocked and repaired to prevent movement at the roof. In general, the roof framing members were in good condition with only spot repairs necessary. (Photos 67 through 72)
- Several joists and decking members were observed as having past charring from a fire at the joint between the addition and the existing building of 88 North Main. We recommend that the charred joists, beam, decking and kickers be removed and replaced or sistered. (Photos 73 through 76)

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- Water entry has been occurring on 86 North Main at the rear entry. We noted water damages caused by roof covering openings that have damaged the wood framing at the rear of the building. The 1x wood decking had stains consistent with long term water exposure. We recommend removal and replacement of the damaged decking and sistering of the deteriorated wood joists at the rear of the building. (Photos 77 through 88)
  
- We observed four (4) roof joists on 86 North Main that were deflecting and had failed. There was temporary shoring in place; however, the shoring was poorly installed and should be strengthened to prevent additional deflection of the roof joists. We observed ponding over the roof coverings on the 86 North Main building that we contributing to the deflection of the roof members. We recommend the upper part of the roof not be accessed by the public until the deflecting joists be repaired. The current repairs do not adequately bear at the masonry walls. The new joists will need to bear at the masonry bearing walls on each side of the building. (Photos 89 through 100)
  
- Several locations were observed on the upper floor of the 84 North Main building that showed areas around the perimeter where staining had occurred consistent with long term water entry through the roof. The majority of the structure was covered up by finishes; however, the areas were generally small and did not appear to have been widespread. We recommend that additional exploration of the structure be performed in covered up areas to determine full extend of damages from water exposure. In our professional opinion, the damages were minor enough to allow full entry into 84 North Main. (Photos 101 through 108)
  
- The east side exterior of 84 North Main has an area of collapsed street and sidewalk. We recommend that the alley and sidewalk be repaired. Water is currently draining under the sidewalk and can effect the exterior wall of the structure if left unattended for too long. The building was not showing signs of

settling at the time of observation; however, we recommend regular observation of this area until repairs have been completed. (Photos 109 through 110)

- We noted some exterior façade cracking on the scratch coating of the west façade of 80 North Main at the second floor. The cracking was not observed in the masonry from the inside and did not appear to be in the masonry exterior wall but just surface cracking through the coating. (Photos 111 through 116)
  
- The roof structure appeared to be in fair condition during the time of observations at 80 North Main. There were some locations where long-term exposure to moisture has caused deterioration of the 1x roof decking that will require replacement. Due to safety concerns, roof access should be prevented until the roof decking and members have been properly remedied. We also recommend a new roof system be installed to prevent future moisture intrusion. (Photos 117 through 118)
  
- Wood joists were damaged below the roof ladder on 80 North Main. We recommend that the wood joists be replaced to prevent possibly injury from accessing the roof ladder. Until the joists have been repaired, we recommend no access to the roof of 80 North Main. (Photos 119 through 120)

**DISCUSSIONS:**

The building in question requires a variety of repairs that directly affect the structural integrity of the building. In particular, several of the structural framing members in both 88 and 86 North Main have been damaged by long term exposure to water from both roof leaking and openings on the rear of the building. These damages make walking through the building dangerous in some locations. The repairs are minor and relatively low cost repairs; however, without roof covering repairs or replacement, these areas will continue to get saturated. If repairs are not able to be made prior to the walkthroughs, we

recommend limiting access to the rear of both 88 and 86 North Main. This can be done by going no further east than the stair access locations for these buildings.

Overall in our engineering judgement, the existing condition of the structural system is good for a building of this age and comparable construction type. The building does require repairs but can be remediated to meet the accepted existing building code standards. The exterior masonry was observed to have some cracking on the northeast corner of 88 North Main. We recommend repair of the cracking from the interior and exterior; however, the cracking should not limit access to the buildings. Due to erosion of the mortar in the masonry joints, we do recommend the exterior of the building to be tuck pointed and sealed in order to prevent additional moisture intrusion and prevent loss of bearing in the load bearing masonry walls. We estimate that approximately 20 percent of the exterior will require tuck pointing. Without proper sealing of the exterior of the structure, the cracks will grow due to the freeze-thaw cycle and can lead to structural instability of the unreinforced load bearing walls.

The roof showed evidence of moisture intrusion in the roof 1x decking leaving portions of the roof decking damaged from long term exposure to moisture. The damaged areas are structurally unsound. All effected decking must be replaced to allow for proper diaphragm action and structural support for the roof. In order to transfer lateral loads and gravity loads into the framing members, undamaged decking is required to prevent gravity loads from puncturing the diaphragm or lateral loads racking the framing members. All damaged decking must be replaced for proper diaphragm use, as well as, to prevent future moisture intrusion into the structure. The moisture damage on the decking is also evident on the roof framing members. The full extent of damage on the roof joists was not visible during the time of inspection, but it is probable that several of the joists also sustained water damage due to the leaking roof coverings on the building. The roof repair is paramount due to the amount of associated damage from water intrusion through the roof system. The flat roof sections of the buildings showed evidence of neglect and



deferred maintenance. The moisture entering into the building from the roof penetrations are causing more damages to the floors below. The low spots on the roof are also causing water ponding which loads the roof framing below. Deflection of roof joists were observed in 86 North Main that should be fully repaired. The current repairs are not properly constructed.

Similar to the decking at the roof, the water damaged decking at the rear of 88 and 86 North Main posed a problem for both the accumulation of gravity loads and lateral loads. All decking and wood joists exposed to moisture damage are subject to wood rot and microbial growth that undermines the structural integrity of the structure. All microbial growth must be treated and all rotten wood must be replaced to ensure the safety of the public in a full live loading scenario or seismic event. In order to repair the floor decking and wood joists framing, localized shoring of the damaged floor systems will be required. Shoring shall remain in place until repairs are completed.

The east side of the building showed evidence of water damage due to the intrusion of water through the missing and open windows on the east elevation. We recommend the sealing of the open windows and openings to limit water intrusion into the building. These areas should be covered to allow for proper drainage away from the structure. The gutters were full of water on the day of observation on the east side of the building, we recommend that all gutters be cleaned to allow proper drainage. Proper drainage must be maintained to prevent continuing issues for the structure.

**LIMITATIONS:**

The services of Davis Patrikios Criswell, Inc. performed for this project have been provided at a level that is consistent with the general level of skill and care ordinarily provided by engineers practicing in structural engineering. Work is necessarily done under the constraints of time and budget. Conclusions and information presented in this report are dependent on information provided by others and available at the time of

reporting. Conditions that are currently unseen which are exposed during construction or further investigation may require changes to the conclusions presented here. While skill and care have been used to develop these findings, conclusions, and recommendations, no prediction, level of confidence, or guarantee of future performance of this structure is provided. No warranty is expressed or implied.

**CONCLUSIONS:**

After examination of the property, it is our professional engineering judgment that the damages to the historical buildings were consistent with damages from lack of maintenance to the roof coverings and exterior openings on the building which has accelerated the deterioration of the floor and roof framing members and decking. The structure is currently in fair condition, but structural remediations are possible without destroying the structures as a whole. The deterioration of the framing members has made portions of these structures unsafe to the general public, but can be restored with removal and replacement of the damaged framing materials. The damaged roof coverings should be removed and replaced as soon as possible to prevent additional interior damages to the structure. In our professional engineering judgment, the majority of the buildings may be accessed without concern for collapse of structural materials. We do recommend for the building tours to prevent access to the rear of both 86 and 88 North Main. The area should be cordoned off with caution tape and signs indicating the area is currently closed for repairs. We recommend the repairs be performed when possible, to prevent possible danger to pedestrians crossing the area.

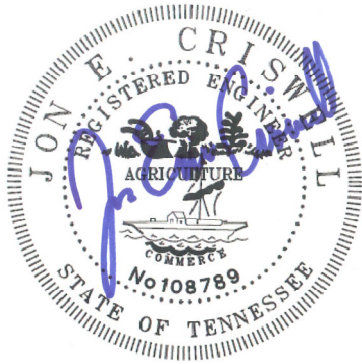
Thank you for your business and please feel free to call us if you have any questions or comments regarding our report or structural observation.

Sincerely,

Davis Patrikios Criswell, Inc.



Jon Eric Criswell, P.E.  
Senior Engineer



**PHOTOGRAPHIC DOCUMENTATION:**



**Photo 1** Front Elevation at North Front Street



**Photo 2** Front Elevation at North Front Street



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**Photo 3** Front of 88 North Main



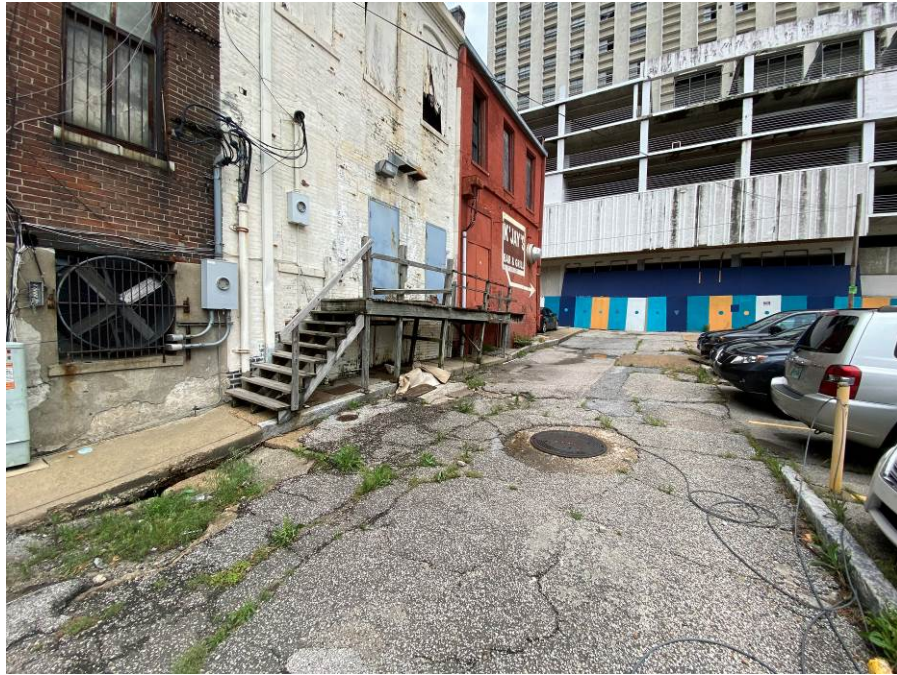
**Photo 4** Front Elevation of 86 North Main



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**Photo 5** Rear Elevation at November 6<sup>th</sup> Alley



**Photo 6** Condition of Masonry at Rear on 80 North Main





**Photo 7** Second Floor General Condition of 88 North Main



**Photo 8** General Condition of 88 North Main Second Floor



**Photo 9** Condition of 88 North Main Second Floor



**Photo 10** Condition of 88 North Main





**Photo 11** Front Elevation at 86 North Main



**Photo 12** Interior General Condition of First Floor at 86 North Main



**Photo 13** General Interior Kitchen at First Floor of 86 North Main



**Photo 14** General Condition of 86 North Main





**Photo 15** General Basement Condition of 86 North Main



**Photo 16** General Connections at Basement in 86 North Main Basement



**Photo 17** 86 North Main Basement Framing



**Photo 18** Second Floor Framing General Condition of 86 North Main





**Photo 19** 86 North Main General Conditions



**Photo 20** 86 North Main General Framing Condition



Photo 21 Front Elevation of 84 North Main



Photo 22 General Condition of 84 North Main Ground Floor



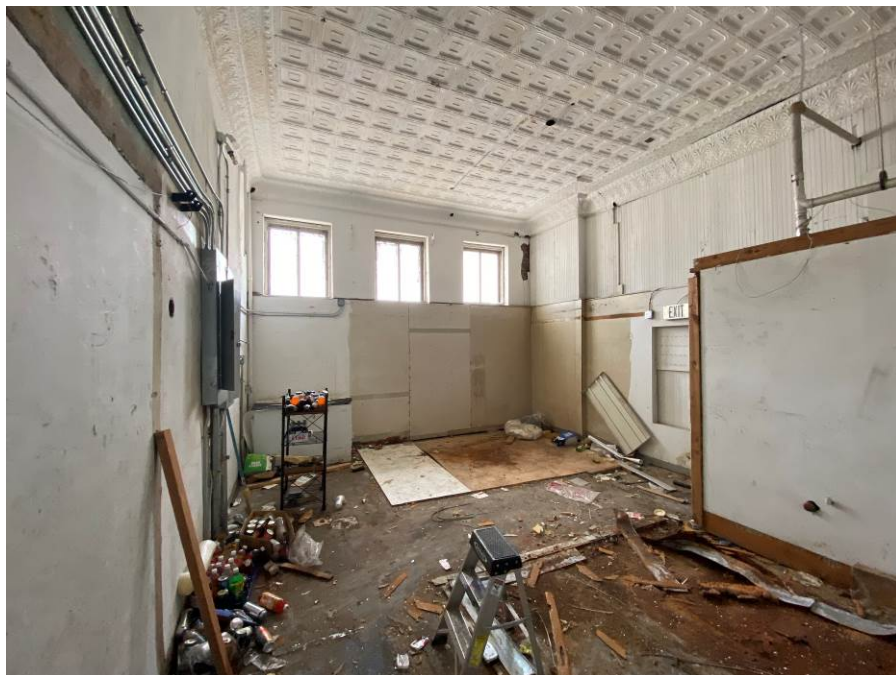
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**Photo 23** Interior General Condition of Ground Floor at 84 North Main



**Photo 24** Interior General Condition of Ground Floor at 84 North Main



**Photo 25** Stairwell at 84 North Main Rear



**Photo 26** Basement Framing of 84 North Main





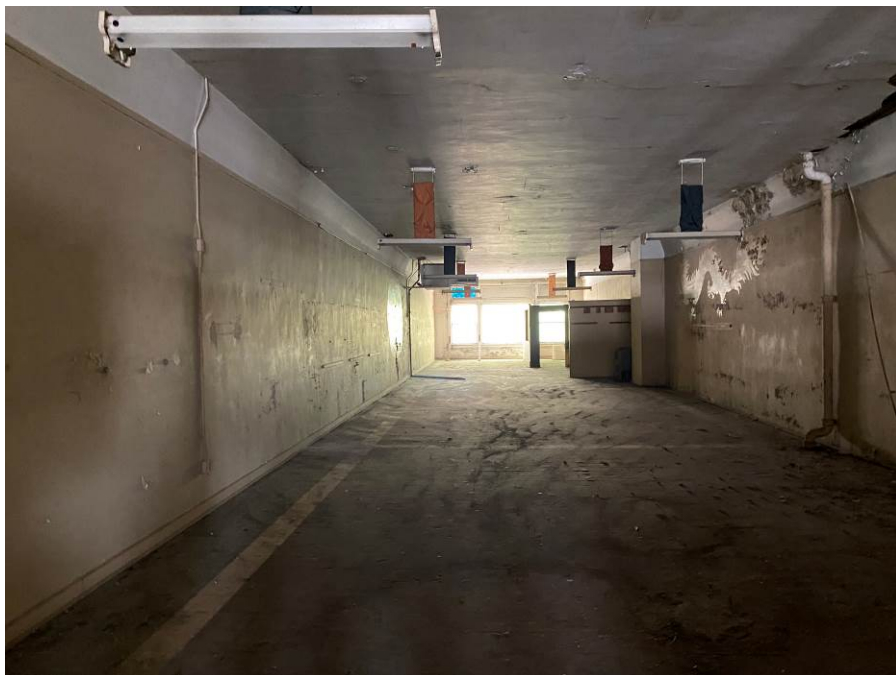
**Photo 27** Basement Condition of 84 North Main



**Photo 28** Basement Wall and Framing in 84 North Main



**Photo 29** Second Floor Framing at 84 North Main



**Photo 30** General Condition of Second Floor at 84 North Main



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**Photo 31** 80 North Main Exterior General Condition



**Photo 32** First Floor General Condition of 80 North Main



**Photo 33** General interior Condition of 80 North Main



**Photo 34** Stair to Basement in 80 North Main





**Photo 35** Basement Framing of 80 North Main



**Photo 36** Masonry Pilasters in Basement of 80 North Main



**Photo 37** General Condition of Framing in Basement of 80 North Main



**Photo 38** General Condition of 80 North Main Second Floor





**Photo 39** Second Floor of 80 North Main



**Photo 40** Hallway on Second Floor of 80 North Main



**Photo 41** Masonry Crack on 88 North Main



**Photo 42** Magnitude of Masonry Crack on 88 North Main





**Photo 43** Crack on North Exterior Wall of 88 North Main



**Photo 44** Exterior Wall Cracks on 88 North Main





**Photo 45** Magnitude of Crack on 88 North Main



**Photo 46** Second Floor Metal Deck and Steel Bar Joists Framing on 88 North Main



**Photo 47** General Condition of Exterior Masonry on Rear of 86 North Main



**Photo 48** General Condition of Masonry on 84 North Main





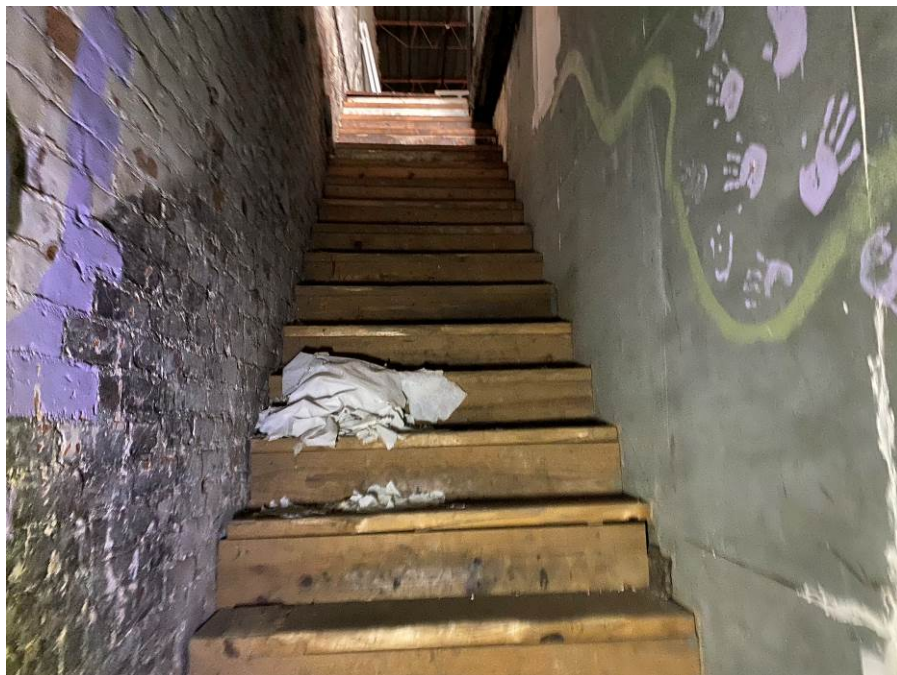
**Photo 49** Masonry Condition on 88 North Main Elevation



**Photo 50** Condition of Exterior Masonry on 88 North Main



**Photo 51** Condition of Masonry



**Photo 52** Stair Condition in 88 North Main (Shoring Recommend)





**Photo 53** Condition of Second Floor Addition Framing on 88 North Main



**Photo 54** Metal Deck and Steel Bar Joists on 88 North Main





**Photo 55** Open Windows at Second Floor 88 North Main



**Photo 56** Open Exterior Windows and Openings at 88 North Main



**Photo 57** Condition of Window Openings



**Photo 58** Openings at 86 North Main at Windows





**Photo 59** Aged Condition of Roof Coverings



**Photo 60** Poor Condition of Wall Flashing Between 88 North Main and 86 North Main





**Photo 61** Ponding over 88 North Main



**Photo 62** Ponding on Roof Coverings





**Photo 63** Oxidation Damages on Metal Decking



**Photo 64** Joint at Concrete and Floor Decking at 88 North Main





**Photo 65** Four Story Roof Area with Aged Roof Coverings on 88 North Main



**Photo 66** Parapet Wall with Aged Wall Flashing with Gaps and Openings





**Photo 67** Roof Joists Condition at 88 North Main (Water Staining Damages)



**Photo 68** Condition of Roof Joists at 88 North Main Four Story Area



**Photo 69** General Condition of the Roof Framing at the Fourth Story Area on 88 N Main

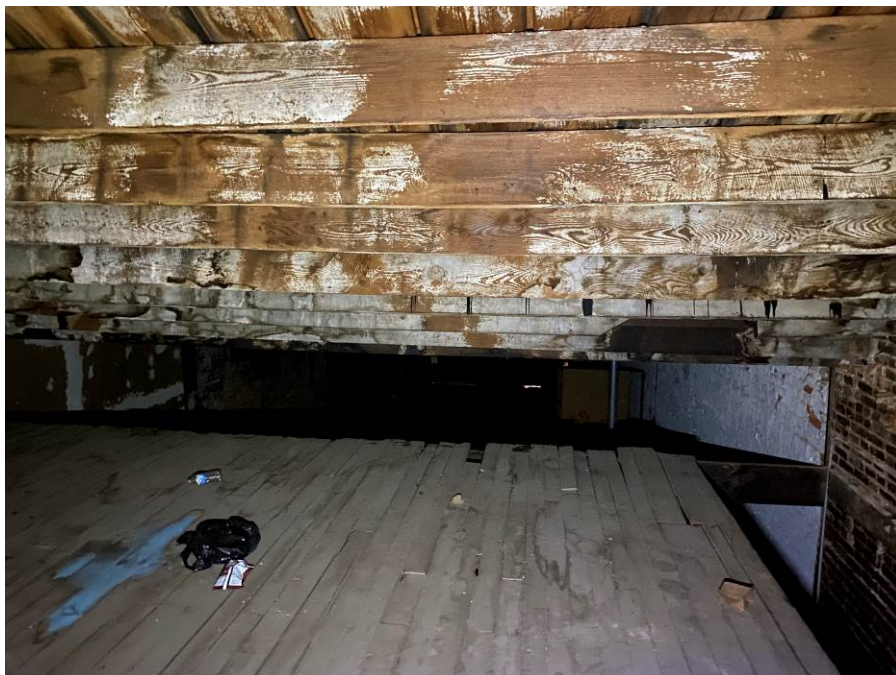


**Photo 70** Rotating Joists at Sloped Area on 88 North Main





**Photo 71** Water Stains on Roof Framing Members on 88 North Main



**Photo 72** General Condition of Roof Framing at 88 North Main



**Photo 73** Charred Framing at 88 North Main to be Repaired



**Photo 74** Charred Joists at 88 North Main to be Repaired





**Photo 75** Charred Kicker to be Replaced on 88 North Main



**Photo 76** Charred Kicker to be Replaced at 88 North Main



**Photo 77** Saturated Floor Framing on 86 North Main



**Photo 78** Microbial Growth on Interior Finishes on 86 North Main





**Photo 79** Water Entry into 86 North Main Basement



**Photo 80** Water Entry into the Basement of 86 North Main



**Photo 81** Moisture Stains on Framing in Basement of 86 North Main

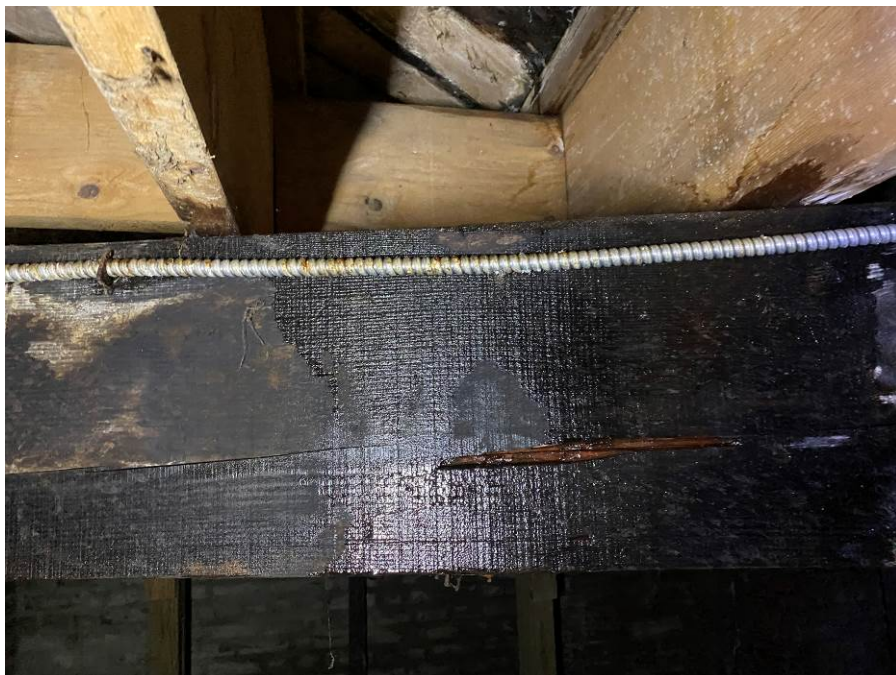


**Photo 82** Active Moisture Leak at Framing at 86 North Main





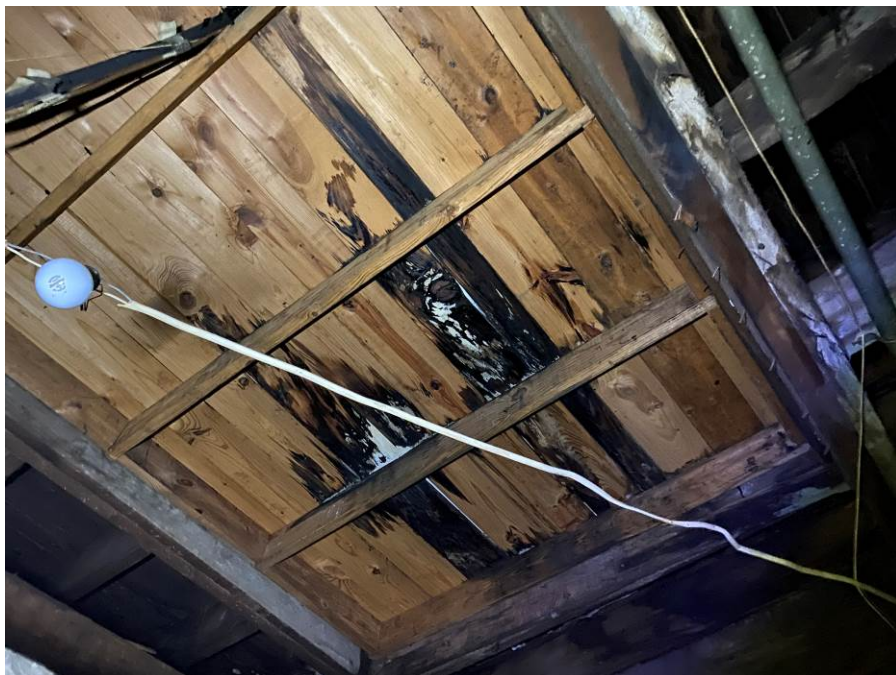
**Photo 83** Moisture Damage to Decking at 86 North Main Rear



**Photo 84** Active Moisture Damages to Rear Framing at 86 North Main



**Photo 85** Roof Decking Moisture Damages on 86 North Main



**Photo 86** Moisture Damages on 86 North Main Decking (To be Replaced)





**Photo 87** Moisture Exposure to Decking and Framing at Roof at 86 North Main



**Photo 88** Moisture Damages to Decking at 86 North Main



**Photo 89** Shoring at Roof of 86 North Main



**Photo 90** Lath Ceiling Moisture Damage at 86 North Main





**Photo 91** Moisture Damages at 86 North Main Roof to be Repaired



**Photo 92** Roof Ponding at 86 North Main





**Photo 93** Hole in Roof Coverings on 86 North Main Causing Damages Below

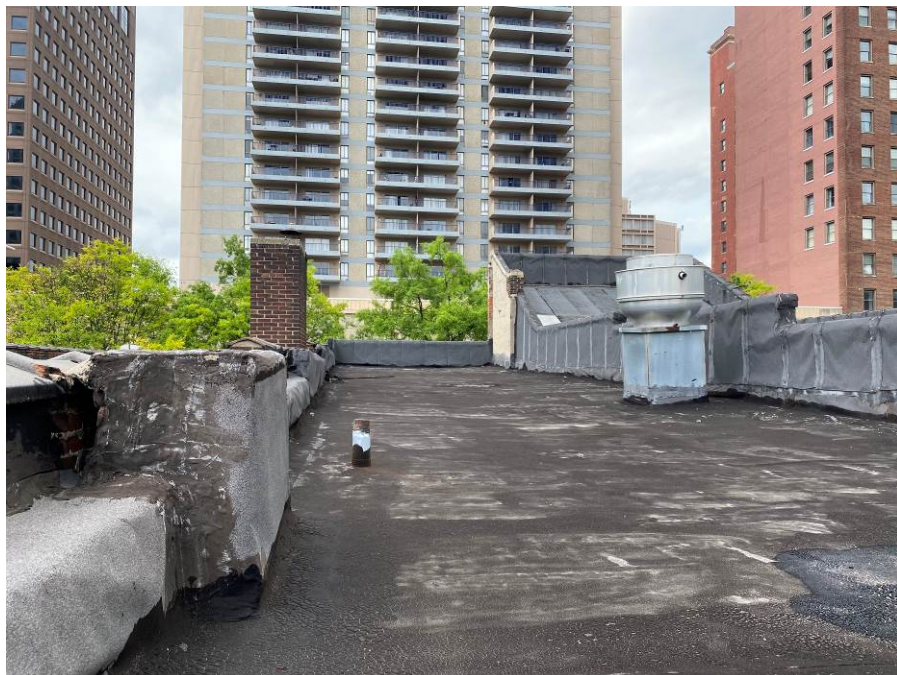


**Photo 94** Gutters Full and Hole in Roof Coverings at 86 North Main





**Photo 95** Aged Roof Flashing at Roof Coverings



**Photo 96** Aged Roof Coverings at 86 North Main with Gaps and Openings



**Photo 97** Condition of Existing Shoring at Roof of 86 North Main (Repairs Required)



**Photo 98** Condition of Temporary Shoring at 86 North Main





**Photo 99** Shoring Condition at 86 North Main Roof (Repairs Required)



**Photo 100** Shoring Bearing Condition at 86 North Main



**Photo 101** Interior Water Stains to Acoustical Ceiling Tiles at 84 North Main



**Photo 102** Acoustical Ceiling Tile Water Stains at 84 North Main





**Photo 103** Water Exposure Damage to Covered Ceiling of Second Floor at 84 North Main



**Photo 104** Water Damages in Ceiling of 84 North Main



**Photo 105** Water Damages in Ceiling at 84 North Main



**Photo 106** Water Exposure Damages to 84 North Main





**Photo 107** Water Damages to Ceiling and Lath of 84 North Main



**Photo 108** Water Damages to Ceiling on 84 North Main

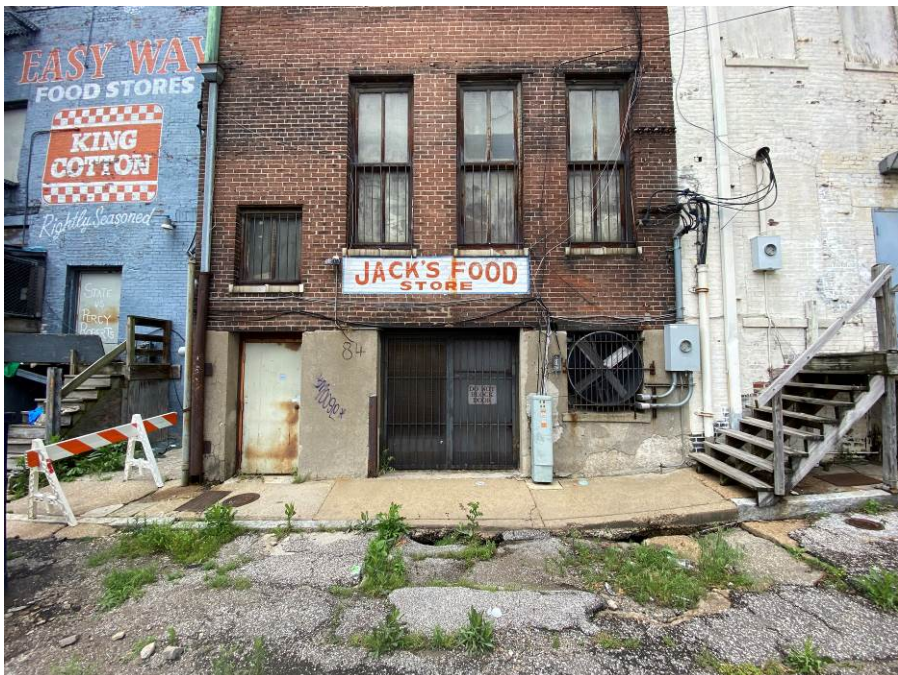
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**Photo 109** Collapsing Sidewalk and Pavement of November 6<sup>th</sup> Alley



**Photo 110** Collapsing Sidewalk and Pavement Outside 84 North Main



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**Photo 111** Exterior Condition of 80 North Main



**Photo 112** Masonry of 80 North Main



**Photo 113** Parging Coat of Masonry Coat on Condition o

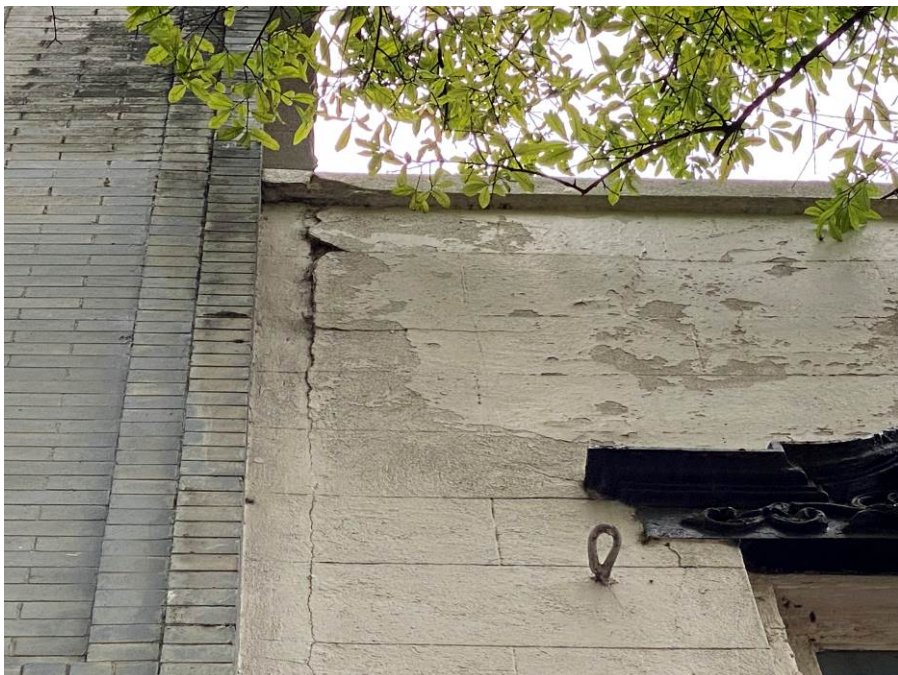


**Photo 114** Parge Coat Cracking on Facade





**Photo 115** Cracking Parge Coating



**Photo 116** Cracking Parge Coating

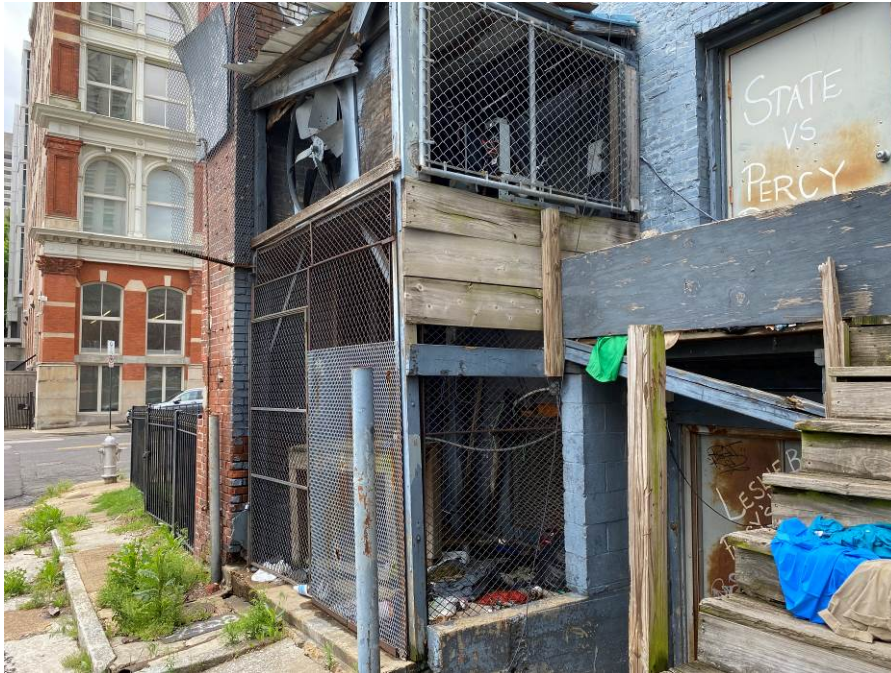


**Photo 117** Decking Water Stain Damages at Roof of 80 North Main

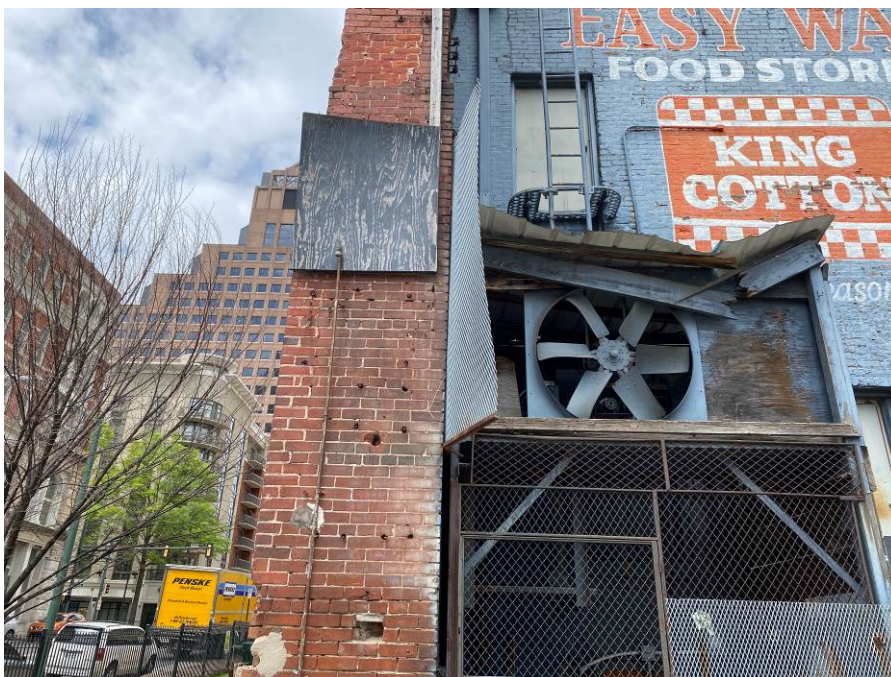


**Photo 118** Water Stain Damages at 80 North Main





**Photo 119** Sheared Framing Members at Mechanical Roof on 80 North Main



**Photo 120** Damaged Roof Structure at 80 North Main