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Report of Findings

Historical Property

Structural Condition Assessment

1005 West Third Street

Rimkus Matter No: 100145027

Julie C. Furr

Julie C. Furr
Senior Structural Engineer

STATE OF OHIO
STEVE A.
WEBER
E-75400
REGISTERED
PROFESSIONAL ENGINEER

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November 30, 2021

TABLE OF CONTENTS

Section I
INTRODUCTION

Rimkus Consulting Group, Inc. (Rimkus) was retained by interested parties to perform a structural condition assessment of the historic Gem City Ice Cream building. The building was located at 1005 West Third Street in Dayton, Ohio.

Rimkus. was retained to assess the current stability of the structure and to determine the feasibility of preserving part or all of the structure. The inspection and this report were prepared by Ms. Julie C. Furr under the direct supervision of Steve A. Weber, P.E., Principal Consultant.

Our report was based on the information available to us at this time, as described in the **Basis of Report**. Should additional information become available, we reserve the right to determine the impact, if any, the new information may have on our opinions and conclusions and to revise our opinions and conclusions if necessary and warranted.

Section II
DISCUSSION

Background Information

The building was a two-story commercial structure with a partial basement at the southwest corner. For the purposes of this report, the front of the building faced south (**Photograph 1**).

Per the Montgomery County Property Assessor's database, this structure was 27,558 square feet in total area and was initially constructed circa 1890. An addition was added to the north circa 1911, and a second addition was added to the west circa 1920. The current brick façade was constructed circa 1914. Construction dates are best estimates based on available data and have been used within the context of this report to determine prevailing construction practices. These dates should not be referenced to authenticate construction dates for historical preservation or other purposes.

The original structure was constructed of multi-wythe exterior brick walls on the east, north, and west sides. The floors and roof were framed with wood joists and wood decking bearing on the exterior walls and interior columns. Interior columns appeared to be constructed of brick, but that could not be confirmed. The wood framing had fallen in multiple locations, and access to this portion of the building, including the basement, was restricted due to safety concerns.

The first addition was constructed of cast-concrete columns, beams, and floor slabs. The concrete structure was braced against lateral movement by haunches poured at select beams and columns. The haunches were part of the original construction and had not been added at a later date. This addition connected to the north wall of the original structure (not structurally independent), without expansion joints between the original structure and the first addition.

The second addition was also constructed of cast-concrete columns, beams, and floor slabs of a similar size and configuration to the first addition. Unlike the first addition, haunches had not been constructed, and resistance against lateral movement was provided solely by the strength of the concrete columns and the inherent beam-to-column connection stiffness. The second addition was structurally independent of the first addition and original structure, with a construction joint visible down the center of the building. The construction joint was a minimal width at the base of the double columns but widened at the top.

The brick façade was a single-wythe veneer wrapped around the concrete structure at the west end. The east-end construction could not be confirmed but was presumed to also be a single-wythe veneer wrapped around the original structure. Stone windowsills and accent pieces had been inset in the brick on the vertical elevation and a segmented stone cap installed along the top of the parapet. The ground floor had four storefronts constructed of other materials and was set between five columns.

Document Review

The following publicly available documents were reviewed for information and context:

- "Structural Evaluation Report of 1005 W. Third Street, Dayton, Ohio" by Shell and Meyer Associates, Inc, dated February 6, 2007.
- "Demolition of existing concrete structures" by Shell and Meyer Associates, Inc, dated October 12, 2007.
- "Structural Analysis of Former Gem City Ice Cream Building, Dayton, Ohio" by John, L. Geiger, P.E., dated May 10. 2019.
- Schematic Architectural drawings by Historic Renovation Consulting, date unknown.

General Observations

The following observations were made during the inspection. See the attached Floor Plan Sketch (**Attachment B**) for column number locations:

General

- The construction joint between the first and second additions was oriented north-south, with each addition supported by columns to create a double-column line down the center of the structure (**Photograph 2**).
- The joint between the double columns was approximately 1/2 inch wide at the base and expanded to approximately 2 inches wide at the top (**Photograph 3**).
- The second-addition concrete elements along the north exterior wall were deteriorated to a greater extent than concrete elements in the first addition. On the second addition, the concrete slabs, columns, and beams were cracked and spalled, exposing extensively corroded reinforcement. The corrosion had progressed through the full steel cross-section, breaking the reinforcement in multiple locations. Concrete elements in the first addition, while also spalled and cracked, remained substantially intact with less extensively corroded reinforcement (**Photograph 4**).
- Where column reinforcement was exposed, the vertical reinforcement was severely corroded, and the remaining cross-sections were approximately 1 inch in diameter. In addition to the rust and surface delamination, longitudinal cracks had formed through the remaining cross-section (**Photograph 5**).

Original Structure

- All four exterior walls of the original structure were constructed with three brick wythes tied together by header bricks every eight courses (approximately 24 inches) and staggered between the inner and exterior wythes (**Photograph 6**).

- The roof and floors were framed with wood joists and wood plank decking laid perpendicular to the joists. The wood was darkened with moisture stains and had rotted in areas exposed to weather. The ground floor was supported by shoring poles and brick columns within the basement area (**Photograph 7**).

- The brick wall was exposed at the ground and second-floor openings through the north wall. At both levels, individual brick units were generally intact, but mortar pieces were missing along the joints (**Photograph 8**).

- On the second floor, the west wall of the original structure, multi-wythe brick, had separated from the second addition concrete columns (**Photograph 9**).

<u>First Addition</u>

- Aggregate used in the concrete mix was angular with slightly rounded edges and an estimated maximum size of 1 inch in diameter.

- Column ties were rectangular around four vertical corner bars and were spaced approximately 12 inches on-center (**Photograph 10**).

- The bottom edges of the concrete haunches were cracked and spalled with corroded reinforcement. The remaining concrete areas of the triangular haunches were intact with limited cracking or spalling (**Photograph 11**).

- Beam ties were visible at beam-to-column connections, spaced approximately 16 inches on-center, and sized approximately 3/8 inch in diameter (**Photograph 12**).

- The second-floor slab was a one-way slab reinforced with bars spaced approximately 8 to 10 inches on-center and primary reinforcement was estimated at 3/4 inch in diameter. Perpendicular temperature and shrinkage reinforcement was spaced approximately 6 to 8 inches on center and an estimated 3/8 inch in diameter (**Photograph 13**).

Second Addition

- Aggregate used in the concrete mix was rounded river rock with estimated sizes ranging from 1/8 inch in diameter up to 1 1/2 inches in diameter (**Photograph 14**).

- The northwest corner concrete elements were extensively spalled with corroded reinforcement (**Photograph 15**).

    - Concrete beams were constructed with four longitudinal bottom bars across the clear span. The outer two bars were bent-up bars at the beam-to-column connections. There were no ties or stirrups visible along any beams with exposed reinforcement.

    - Column ties were an estimated 1/4 inch in diameter and spaced approximately 9 inches apart.

    - The second-floor slab was a two-way slab reinforced with bars spaced approximately 6 to 8 inches on center each way, and reinforcement was estimated at 1/2 inch in diameter.

    - Concrete at the base of column 9 was severely spalled, reducing the column cross-section by an estimated 25 percent (%) and the vertical reinforcement broken (**Photograph 16**).

- Concrete had cracked at beam-to-column connections around the column perimeter. This was a common condition, although not present at every column (**Photograph 17**).

- Brick on the west wall had been inset between concrete columns without mechanical connections between the materials (**Photograph 18**).

Exterior

- The east wall of the original structure, multi-wythe brick, was intact with minimal deterioration toward the south end (front). At the north end, the brick was darkened with water stains with vertical cracks extending from the top down to the finished grade. Additional deterioration at the north end included loose and displaced brick units and soft or missing brick mortar (**Photograph 19**).

- At the front façade:

  - The façade had separated from the east exterior wall at the top, leaving an estimated 2-inch-wide crack, narrowing toward the bottom of the wall (**Photograph 20**). The crack extended the full height of the joint and had been previously infilled with a repair mortar (**Photograph 21**).

  - The top of the parapet had visibly bowed out-of-plane above the last panel between columns (**Photograph 22**).

  - The remaining brick and stonework were generally intact and in-plane without visible displacement and minimal cracked, broken, or missing brick units (**Photograph 23**).

- At the east exterior wall of the first addition (**Photograph 24**).:

  - Concrete beams, columns, and slab edges were moderately deteriorated with concrete cracks visible from the ground.

  - Cracks occurred primarily at joints between concrete and masonry infill and along the top of the second-floor windows where darkened water stains occurred.

- At the north exterior wall (**Photograph 25**).:
    - Concrete beams, columns, and slab edges visible on the north exterior wall were moderately deteriorated with concrete cracks visible from the ground.
    - On the north wall, stairstep cracks were present in the concrete masonry unit (CMU) infill at the ground level. The cracks stopped at the concrete to CMU joints.
- At the east exterior wall (**Photograph 26**).:
    - Concrete had spalled from the exposed beam and slab edges and cracks extended through columns. Infill walls between concrete columns were constructed from a combination of CMU, concrete brick, and clay brick, and individual masonry units were broken, cracked, or missing.
    - The north penthouse was cast concrete with vertical cracks along the full height of the walls. The cracks extended through the supporting roof concrete beam and progressed through the roof slab toward the building interior (**Photograph 27**).
    - The middle penthouse was constructed using clay CMU with an exterior cementitious finish. Clay unit corners were broken, and mortar was missing along the joints (**Photograph 28**).

Analysis

The Gem City Ice Cream building was constructed in three phases: Original Structure (circa 1890), First Addition (circa 1911), and Second Addition (circa 1920). The original structure was constructed with multi-wythe brick bearing walls and wood-framed roof and floor systems. The additions were both constructed with cast-concrete beams, columns, and floors and relied on the stiffness of beam-to-column connections and infill walls to support the structure against lateral movement. All three structures were originally constructed to be structurally independent from each other.

The stability of each structure has been assessed and categorized based on the following definitions:

- **Performing:** The structural systems are relatively undamaged and appear adequate to support vertical and horizontal loads that may be applied during normal operations. No repair is warranted.

- **Marginal:** Some structural systems are damaged sufficiently to compromise their ability to support vertical and horizontal loads that may be applied during normal operations. Significant repair on multiple systems is warranted.

- **Deficient:** Multiple structural systems are damaged sufficiently to compromise their ability to support vertical and horizontal loads that may be applied during normal operations. Significant repair on multiple systems is warranted.

- **Unsafe:** Multiple structural systems are failed or damaged and no longer provide adequate support. Immediate shoring or demolition is warranted to stabilize the structure and preserve life safety.

Structural Assessment – Original Structure

The original structure has been categorized as **Unsafe**. At the time of Rimkus' inspection, the wood floor framing was rotted and had fallen in multiple locations. The deteriorated condition of the wood framing made the floors unsafe to walk on, and openings had been barricaded to restrict access to the interior.

Multi-wythe brick walls are independently strong in-plane due to the compressive capacity of brick material and the interlocking construction between brick wythes. Deterioration of wood roof or floor framing has minimal impact on the vertical stability of the wall. However, out-of-plane brick walls rely on the roof and floor diaphragms to provide lateral support and prevent horizontal displacement or rotation of the wall. With the current deteriorated condition of the wood floor and roof framing, the east and south exterior walls within the original structure area are vulnerable to failure under extreme high wind events. As the wood continues to deteriorate and further weaken the out-of-plane supports, the vulnerability of the exterior brick walls will continue to increase, and localized failures could be precipitated by less than extreme high wind events.

Structural Assessment – First Addition

The first addition structure has been categorized as borderline between **Marginal and Deficient**. Concrete is strong in compression but weak in tension. In contrast, steel reinforcement is strong in tension and flexible in compression. Used together, the interconnection of steel reinforcement and concrete provides flexural capacity to horizontal elements and concrete confinement to vertical elements. Lateral stiffness (resistance to horizontal movement) is provided either by walls between columns or by the strength of beam-column connections

The condition of the concrete elements (slabs, beams, columns) varied based on their exposure to water and weather. Extensively spalled concrete and corroded steel reinforcement were observed in the following locations: along the construction joint at the center row of double columns, around exterior bay openings without infill walls, and around vertical penetrations through the second-floor slab. At all other locations, the concrete elements were generally solid, with minimal cracked or spalled surfaces, and limited to non-existent steel corrosion.

The vertical capacity of each element was compromised by the spalled concrete and corroded reinforcement, with a greater loss of capacity occurring at the areas of the most extensive damage. Based on the lack of repeated and regularly spaced stress cracks along beam and column lengths, the reduced vertical capacity of the structure remained sufficient to support its own self-weight and was not vulnerable to a sudden failure.

The lateral capacity of the structure had been supplemented with the construction of triangular haunches at beam-to-column connections, which increased the inherent lateral stiffness of the structure. Although subject to the same spalled concrete and corroded reinforcement, the haunches remained substantially intact and continue to provide resistance against global structure movement.

The deterioration of the concrete and reinforcement in the first addition has not compromised the global stability of the structure under normal operating loads or typical high wind events. Although unusual weather events such as a direct hit by a tornado could precipitate a collapse, even new structures in compliance with current building codes are not designed to withstand that type of pressure.

Structural Assessment – Second Addition (North End)

The north end of the second addition structure has been categorized as **Unsafe**. Concrete slabs and beams were universally extensively spalled, and the exposed steel reinforcement corroded with an extensive loss of cross-section. The concrete/steel deterioration occurred in the north penthouse structure, and large cracks extended through the roof slab. Exterior perimeter columns were cracked and spalled and the cross-section of exterior columns in the northwest corner had been reduced up to 25% at the base. At the double columns, the construction joint widened at the top due to lateral movement of the second addition toward the west.

The vertical capacity of each element was significantly compromised by the spalled concrete and corroded reinforcement. Repeated and regularly spaced stress cracks along beam and column lengths indicated that while reduced vertical capacity of the structure remained sufficient to support its own self-weight, the structure was vulnerable to localized failure under excessive applied loads.

The lateral capacity of the structure relied on the inherent stiffness of beam-to-column connections. With the extensively spalled concrete and corroded reinforcement, these connections have flexed under normal loads, as evidenced by the frequently cracked concrete around the columns at the bottom edge of the beams.

The deterioration of the concrete and reinforcement in the north end of the second addition has compromised the global stability of the structure under excessive high-wind events. Although currently stable under normal loading conditions, the deterioration will progress and continue to increase the structure vulnerability to localized failures.

<u>Structural Assessment – Second Addition (Middle and South End)</u>

The center and south ends of the second addition were categorized as **Deficient**. The concrete elements were cracked but with less spalling and exposed reinforcement as compared to the north end of the addition. Similar to the first addition, corrosion and spalling occurred primarily along the west wall and at areas of repeated weather and water exposure.

The vertical capacity of individual elements was compromised by the spalled concrete and corroded reinforcement, with a greater loss of capacity occurring at the areas of the most extensive damage. The structural integrity remained sufficient to support its own self-weight and was not vulnerable to a sudden global failure. Individual elements were vulnerable to localized failures at the areas of the most extensive damage.

The lateral capacity of this portion of the structure relied on the inherent stiffness of beam-to-column connections and was tied to the north-end structure by the concrete floor and roof slabs. Horizontal movement in the north-end structure will translate into stresses and potential movement in the middle and south areas of the structure. As such, although the vertical structure capacity remains substantially stable, the global stability of the structure remains vulnerable under excessive high wind events.

The deterioration of the concrete and reinforcement in the second addition has not compromised the global vertical stability of the structure under normal operating loads.

However, the deterioration has compromised the global lateral stability of the structure under excessive high wind events.

Structural Assessment – South Façade

The south exterior façade has been categorized as **Marginal**. This was a typical brick construct with stone accent elements and inlaid brick patterns. This façade was constructed independently of all three buildings and was supported by the original structure and the second addition. At the west end (second addition), the brick wrapped around the concrete columns in a single veneer thickness. At the east end (original structure), it was presumed the brick wrapped around the original brick columns or cast-concrete columns, also in a single veneer thickness.

Brick units in the façade were intact without displacement and minimal cracks or missing units. The mortar remained solid without loss of the cementitious binding and few open joints. Where the top of the parapet at the east end had rotated out of plane between the columns and away from the building, there was no damage within the façade itself that would indicate failure of the façade structure, indicating the movement was caused by global instability.

As previously described, floors and roof diaphragms provide out-of-plane bracing to brick walls, which prevents global rotation. Because the façade was constructed separately from the three buildings, it was not integrally connected with the floors or roof. As a result, although they provided support to the façade against movement toward the building interior, they provided little restraint against movement away from the building interior. As the wood framing deteriorated, the parapet rotation at the east end of the façade occurred and will continue to progress unless out-of-plane support is provided to the façade.

Disregarding economic considerations, the south exterior brick and stone façade can be independently stabilized and preserved regardless of the presence or removal of the three buildings behind the façade.

General Preservation Approaches

Rimkus was requested to provide potential preservation approaches for each of the three buildings and the south façade. Preservation approaches are conceptual in nature and are not for permitting and/or construction purposes. The services of a licensed professional experienced in this type of work should be retained to design and oversee the work, providing more specific information. Shoring and bracing shall be constructed as needed and shall be maintained until the final permanent structural system is maintained or demolition has been completed.

There are three basic options for each building and the south façade: repair/rehabilitation, demolition and reconstruction, and full demolition. These options are presented based on the technical feasibility of achieving a stable and safe structure, without economic consideration.

<u>Repair/Rehabilitation</u>

- Restoration of the original structure is possible. However, due to the degree of damage, this will require extensive lateral bracing to maintain out-of-plane stability of the brick walls while the wood floors and roof are fully replaced with new connections anchoring the floors and roof to the brick structure. The multi-wythe brick walls can be repointed, broken brick units replaced, and displaced areas of brick reconstructed to restore the structural integrity of the walls.

- Although restoration of the first concrete addition is technically possible, all corroded-steel reinforcement cannot be completely removed without compromising the stability, even with temporary shoring. Corroded reinforcement encased in new concrete will continue to deteriorate and expand, resulting in future and additional damage to the concrete, even after repairs.

    - Although not recommended, repairing the first concrete addition will require removal of the cracked and spalled concrete and corroded reinforcement down to solid undamaged concrete at all locations, followed by replacement with new concrete to form the original element shape. The capacity lost by the removed reinforcement must be replaced by reinforced fiber products, steel jacketing, or a reinforced concrete shell based on the element being repaired.

- Full repair of the second addition is not technically feasible, leaving demolition as the most viable option.
  - In the second concrete addition, damage to the north end has progressed beyond the concrete surface and into the core of each structural element. This makes repair technically unfeasible since the removal of the damaged concrete would require the full removal of each element.
  - Although the concrete at the middle and south end was not as extensively damaged, the global lateral stability remained compromised by the deteriorated beam-to-columns connections. New structural steel frames or shear walls can be installed between columns to increase building stiffness, but the vulnerability or absence of the north end will continue to influence the stability of the remaining structure.
- The south façade was constructed independently, after each of the three buildings was already present. With minimal damage to the brick and stone and notable out-of-plane movement limited to the parapet top, restoration of the south façade is well within a typical design and construction scope.
  - Permanent supports consisting of the restored existing structures or a new structure such as a steel frame backing will be required to provide the necessary support against out-of-plane rotation.
  - The south façade must be anchored to the support structure with new connections that permanently tie the support to the façade.

Demolition and Reconstruction

- The two concrete additions are utilitarian in layout and design, without unique decorative features, frills, or detailing. The presence and impact of the building as a whole can be preserved by the demolition of the damaged structures followed by reconstruction using an identical layout and geometry. This would result in two new concrete structures designed and constructed to new and current code requirements, while preserving the presence and impact of the building.

- The multi-wythe brick walls of the original structure are generally utilitarian in construction with the exception of brick arches over the doors in the north wall. Characteristic of 20^{th}-century construction, these arches are functional structural elements that also provide architectural detailing but do not face the main street and are concealed by the first concrete addition. The original structure can be preserved by demolition and reconstruction of the wood floors and roof and the multi-wythe brick walls and columns. Temporary lateral would be required on each of the brick walls to maintain out-of-plane stability of the façade until the permanent wood framing had been installed with new connections anchoring the floors and roof to the brick structure.

- The south façade has unique features and detailing that represent main street architecture of the early 20th century. Similar to the concrete additions, the façade can also be demolished and reconstructed with a replica in accordance with requirements established by authoritative historical organizations.

Demolition of Backing Structures of the Façade

- All three structures can be safely demolished while preserving the south exterior façade. Preservation of the façade will require careful and selective demolition of the backing structures at the façade interface, along with temporary lateral bracing in the north/south direction to maintain out-of-plane stability of the façade until permanent supports can be constructed. Permanent supports consisting of a steel frame backing with diagonal braces would be the simplest to construct, install, and anchor the façade and can easily provide the necessary support against out-of-plane rotation.

Section III
CONCLUSIONS

*For reference, a floor plan identifying the location of each building area has been provided in **Appendix B**.*

1. The structural stability of each building and the south façade have been categorized as follows. A definition of each category has been provided in the analysis:

    a. **Marginal:** south exterior façade.

    b. **Marginal/Deficient:** first addition.

    c. **Deficient:** center and south end of the second addition.

    d. **Unsafe:** original structure and the north end of the second addition.

2. It is not technically feasible to repair the second addition.

3. It is technically feasible to repair the first addition but not recommended.

4. It is technically feasible to repair the original structure but will require extensive shoring, care, and consideration to maintain safety until permanent stability is achieved.

5. It is technically feasible to repair and stabilize the south exterior façade, with or without demolition of the three structures. Anchorage to the existing buildings once stabilized or installation of new support bracing if the buildings are demolished are both common practice and well within a typical design and construction scope.

Section IV
BASIS OF REPORT

1. An on-site inspection of the Gem Ice Cream building was performed by Ms. Julie C. Furr under the direct supervision of Steve A. Weber, P.E., on November 5, 2021.

2. Visual observations and photographs were obtained during the inspection.

3. Historic and current aerial views of the building obtained from Google Earth Maps (http://maps.google.com).

4. Montgomery County Property Assessor's database (https://www.mcrealestate.org/Main/Home.aspx).

5. "Historic Buildings: Structural Terra Cotta" article by Mr. Bill Kibble, posted on www.historicbldgs.com.

6. "Repairing Historic Flat Plaster Walls and Ceilings", Technical Preservation Brief 21. Published by the National Park Service United States Department of Interior, October 1989. (https://www.nps.gov/tps/how-to-preserve/briefs/21-flat-plaster.htm).

7. IS536 "Types and Causes of Concrete Deterioration" by Portland Cement Association, PCA R&D Serial No. 2617, 2002.

8. BIA Technical Notes on Brick Construction: TEK 36 "Brick Masonry Details, Sills, and Soffits", The Brick Industry Association, Reston, VA, January 1988.

Section V
ATTACHMENTS

A. Photographs

B. Floor Plan Sketch

C. Curricula Vitae

Section V

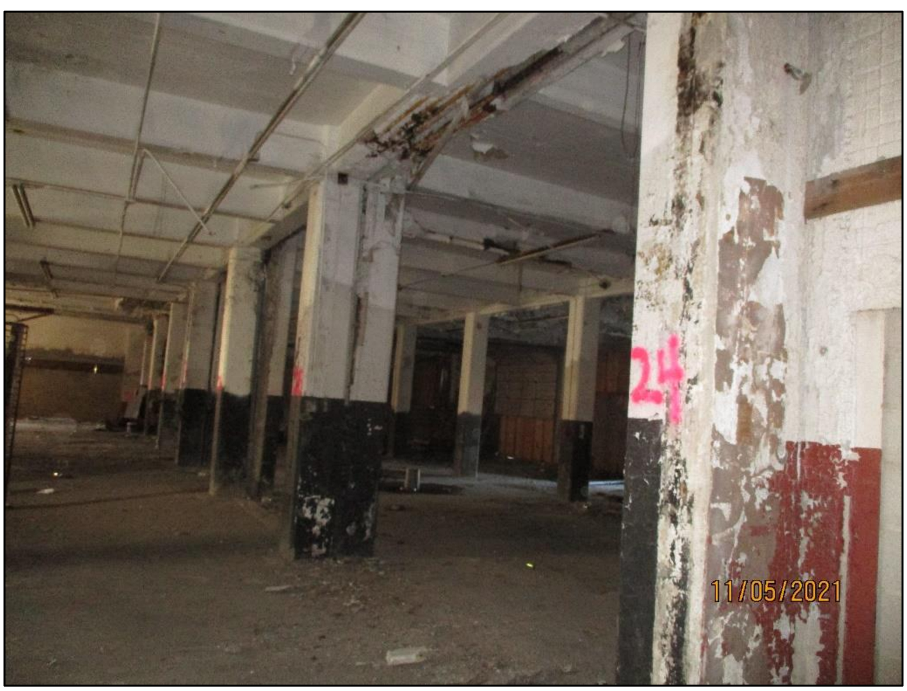
ATTACHMENT A

Photographs

Photographs taken during our inspection, including photographs that were not included in this report, were retained in our files and are available to you upon request.

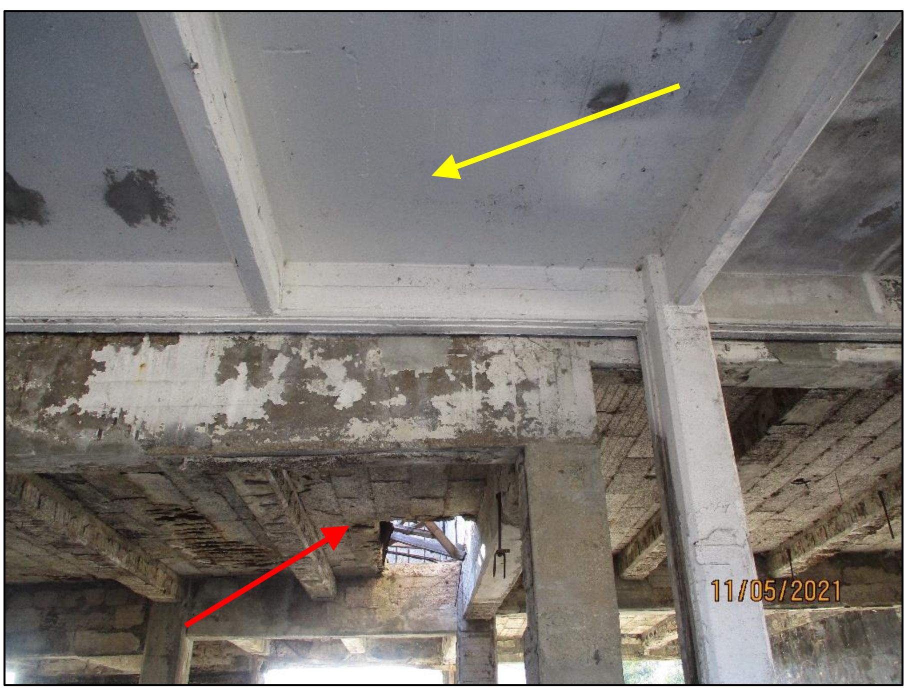
Photograph 1
South exterior façade at the front of the Gem Ice Cream building.

Photograph 2
Double columns along the center construction joint between the first addition (right) and the second addition (left).



Photograph 3
Construction joint separation between the first addition (right) and the second addition (left) at the second floor.

Photograph 4
Typical conditions of the first concrete addition (yellow arrow) and the second concrete addition (red arrow).



Photograph 5
Typical vertical column reinforcement, corroded and with longitudinal cracks.

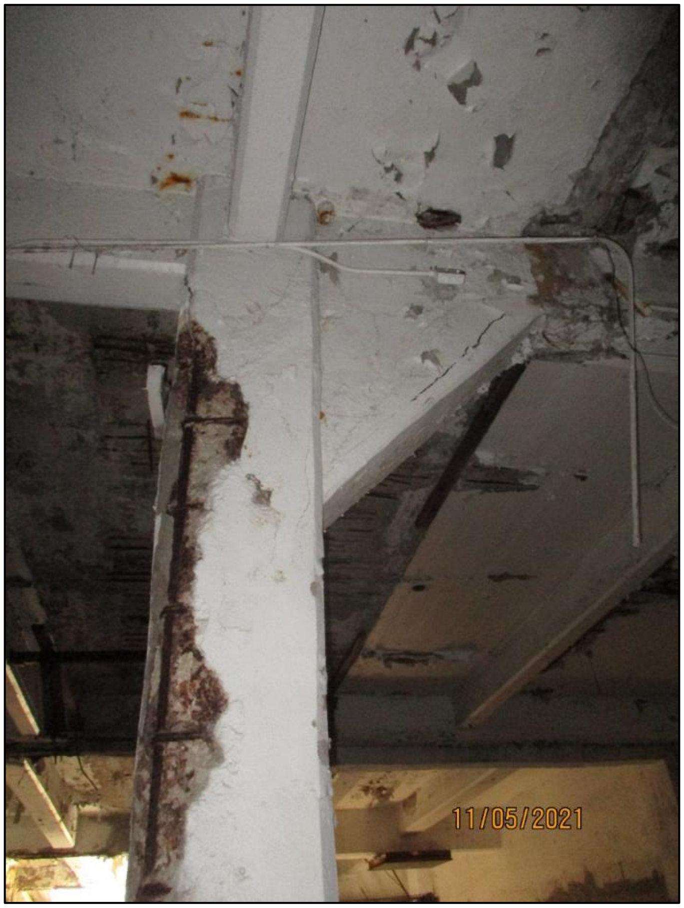
Photograph 6
Original structure: three-wythe exterior brick bearing wall with staggered header bricks (yellow arrows).

Photograph 7
Original structure: rotted and deteriorated wood floor framing leading into the basement.

Photograph 8
Original structure: typical condition of the north and west brick walls. Note the structural brick arch over the opening.

Photograph 9
Original structure: west brick wall separated from the second addition concrete columns.

Photograph 10
First addition: exposed column ties and vertical steel.



Photograph 11
First addition: concrete haunch at beam-to-column connections with spalled concrete along the bottom haunch edge.

Photograph 12
First addition: beam ties and longitudinal reinforcement exposed by spalled concrete.

Photograph 13
First addition: second-floor slab reinforcement exposed by spalled concrete.

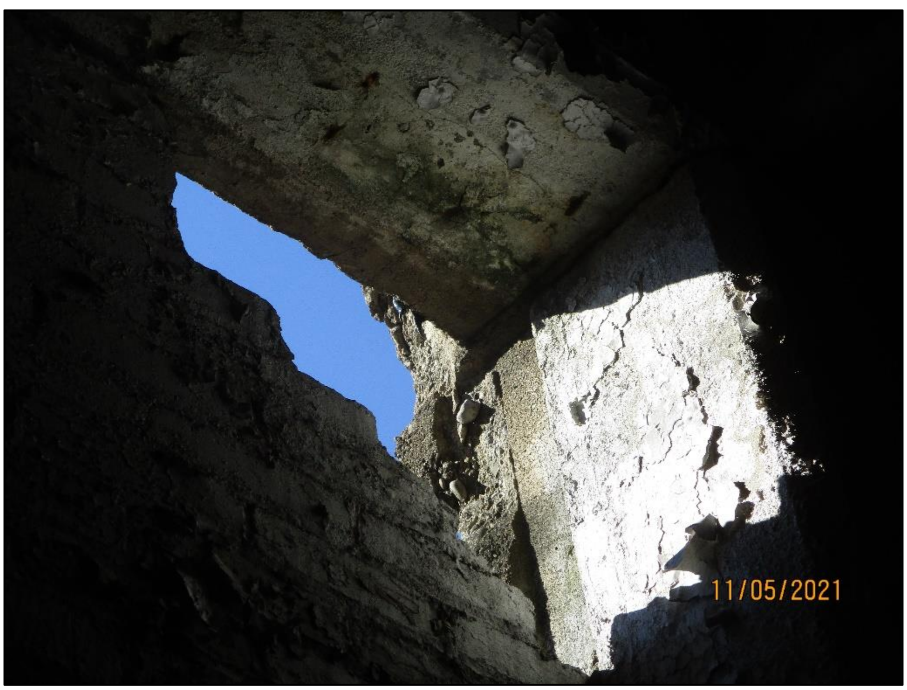
Photograph 14
Second addition: large, rounded river rock aggregate used in the concrete mix.

Photograph 15
Second addition: beam, column, and slab reinforcement exposed by spalled concrete.

Photograph 16
Second addition: vertical column reinforcement, corroded, and broken.

Photograph 17
Second addition: concrete crack around the column at the base of the connecting beam.

Photograph 18
Second addition: brick infill walls between columns but without a mechanical connection.

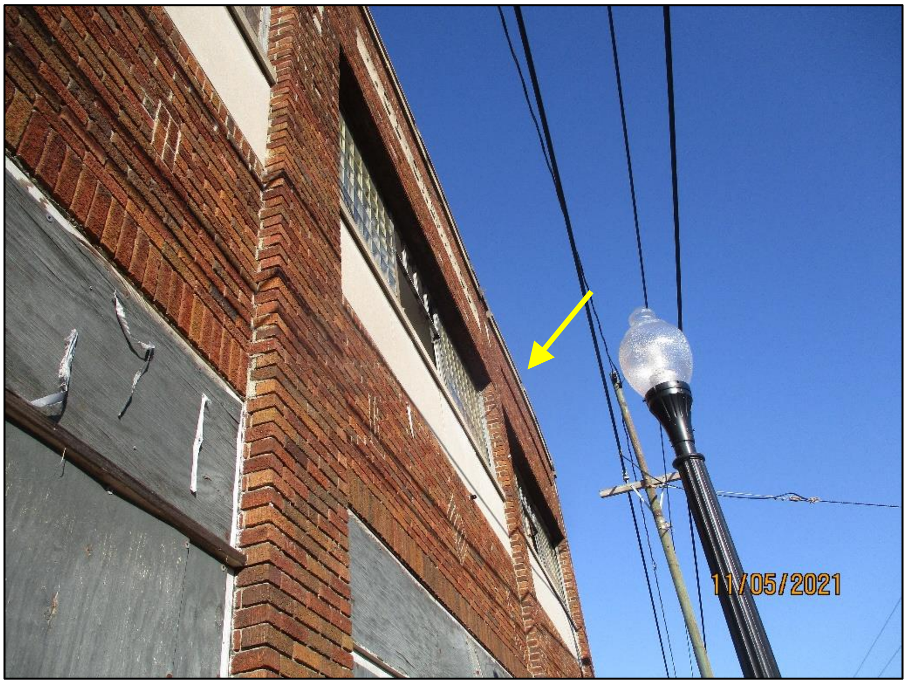


Photograph 19
Original structure: east exterior wall deteriorated at the joint with the first concrete addition.

Photograph 20
Original structure: separation between the south exterior façade and the original structure, wide at the top and narrowed at the base.

Photograph 21
Original structure: separation between the south exterior façade and the original structure, with new cracks through prior repairs.

Photograph 22
South exterior façade: top of parapet bowed out of plane.



Photograph 23
South exterior façade: typical brick and stone condition.

Photograph 24
First addition: overview of the east exterior wall.

Photograph 25
Overview of the north exterior wall, including the first addition (left) and second addition (right).

Photograph 26
Second addition: Overview of the west exterior wall.

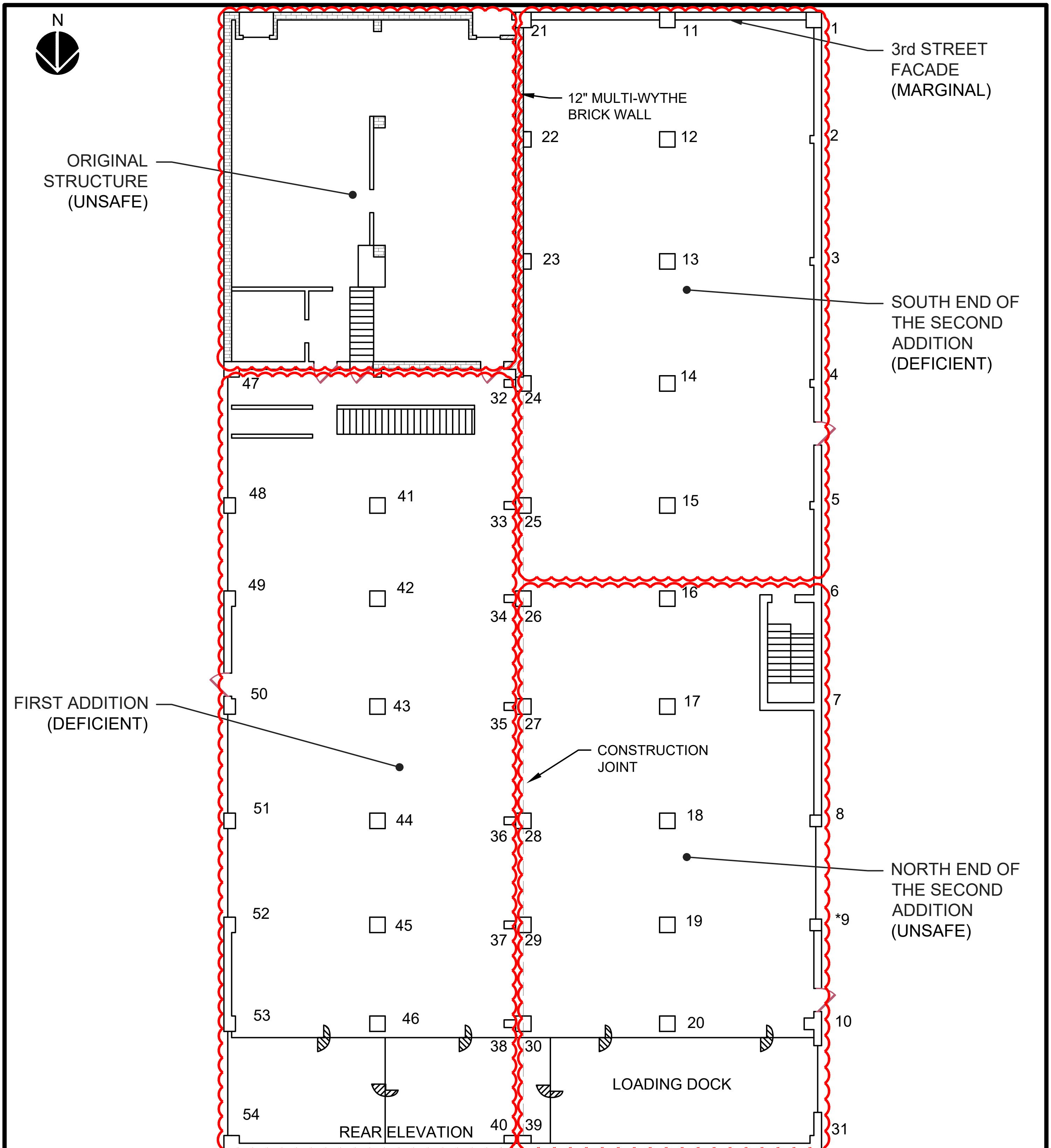
Photograph 27
Second addition: North penthouse with concrete cracks.

Photograph 28
Second addition: middle penthouse constructed with clay CMU.

Section V

ATTACHMENT B

Floor Plan Sketch



RIMKUS

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1005 WEST THIRD STREET
STRUCTURAL CONDITION ASSESMENT
SCHEMATIC FLOOR PLAN

DRAWN BY:	REP	REVIEWED BY:	
PA REVIEW:		PE REVIEW:	JCF
JOB #:		100145027	
DATE:	11/19/2021	SCALE:	NTS

PAGE:
1
Revision: 1

Section V

ATTACHMENT C

Curricula Vitae

RIMKUS CONSULTING GROUP, INC.
FORENSIC ENGINEERS AND CONSULTANTS

Julie C. Furr, P.E., S.E.C.B.

Senior Structural Engineer

Background

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Ms. Furr holds a B.S. degree in Civil Engineering with a Structural Concentration and a Mathematics Minor and an M.S. degree in Civil Engineering with a Structural Concentration. She has over 19 years of practice in the field of structural/civil engineering and construction and has been registered for 17 years as a licensed professional engineer. She is licensed in Tennessee, Arkansas, North Carolina, and Kentucky.

Ms. Furr's experience includes full structural design, consultation, and structural and seismic assessment services on both commercial and private structures up to 11 stories, and residential wood-framed structures of all sizes. Material experience encompasses knowledge of concrete, masonry, steel, wood, and light-gauge metal construction materials.

Project locations are predominately in the central and southeastern parts of the United States, with scattered projects along the East Coast and through the Midwest. Design criteria knowledge encompasses the following design codes and standards: IBC, IEBC, IRC, SBC, ASCE7, ASCE31, ASCE41, FEMA, AASHTO, SEAOC, DOD UFC, NAVFAC, and state building codes in the central and southeastern parts of the United States.

She has also been a member of several professional organizations and industry committees, including American Society of Civil Engineers, Tennessee Structural Engineers Association, Structural Engineering Certification Board, Scientific Earthquake Studies Advisory Committee to the United States Geological Survey (USGS), Building Seismic Safety Council Project 17 Executive Committee to the USGS, and Tennessee Society of Professional Engineers.

Professional Engagements

- **Commercial/Office/Retail**
  - Enterprise Rental Center on Union – Memphis, TN (2016), Structural engineer responsible for design and production of contract drawings and construction management for single-story concrete masonry with steel bar joists and metal deck construction.
  - Kimbrough Offices – Germantown, TN (2014), Structural engineer responsible for design and production of contract drawings and construction management for single-story structural steel construction.
  - Charlotte Douglas Airport – Charlotte, NC (2001-2005), Assisted with realignment of existing roadway and analyzed potential routes for cut and fill requirements and avoidance of environmentally sensitive areas.

- **Government**
  - NGA Billeting Facilities at Bagram Air Base – Afghanistan (2012), Structural engineer responsible for design and production of contract drawings utilizing light-gauge steel, structural steel, and miscellaneous materials locally available in country. Adapted design as required based on material supply and field construction expertise.
  - Air National Guard and Pope AFB – Fayetteville, NC (2001-2005), Structural engineer responsible for design and production of contract drawings and construction management for prefab metal office and storage systems.
  - Historic WWII Barracks Relocation – Charlotte, NC (2001-2005), Structural engineer responsible for design of wood support beams and foundation piers for use during and after barracks relocation.

- **K-12 Education**
  - Osceola Elementary School Renovation – Osceola, AR (2011), Structural engineer responsible for design and production of contract drawings and construction management for 47,000-square-foot renovation of school facility for 458 students.
  - Marion Junior High School Arena – Marion, AR (2009), Structural engineer responsible for design and production of contract drawings and construction management for 197,000-square-foot, 2,500-seat arena used by 850 students.
  - West Memphis High School Arena – West Memphis, AR (2008), Structural engineer responsible for design and production of contract drawings and construction management for $6 million, 44,000-square-foot arena with seating capacity for 2,800.
  - FEMA Safe Rooms – Multiple locations in western Arkansas and Tennessee, Designed FEMA safe rooms for various educational facilities Utilizing concrete masonry block and concrete cap, wood stud framing and structural steel panels, and full cast concrete construction.

- **Multi-Family Residential**
  - Gallatin Apartments – Gallatin, TN (2015), Structural engineer responsible for design and production of contract drawings and construction management for wood-frame construction of two- and three-story structures as well as a clubhouse, mailbox kiosks, and gazebos.

- The Avenue at Nicholasville – Nicholasville, TN (2014), Structural engineer responsible for design and production of contract drawings and construction management for wood-frame construction of two- and three-story structures as well as a clubhouse, mailbox kiosks, and gazebos.

- **Restaurant**
  - One & Only BBQ Restaurant – Cordova, TN (2016), Structural engineer responsible for design and production of contract drawings and construction management for single-story wood frame construction.
  - Great Cookout Restaurant Renovation – Memphis, TN (2016), Single-story wood frame construction. Renovation of prior restaurant facility that required approximately 75% reconstruction.
  - Crescent Center Garage Modification – Memphis, TN (2013), Removed north bays of existing parking garage to provide additional room for new restaurant construction. Analyzed remaining garage structure and designed and provided new lateral-resisting structure on garage end wall.

- **Religious/Institutional**
  - Islamic Association of Greater Memphis Mosque – Memphis, TN (2012), Pre-engineered metal building foundation with interior structural steel and concrete-filled metal deck mezzanine.

- **Shoring**
  - Dupont Pit Shoring – Memphis, TN (2015).
  - New Johnsonville Shoring – New Johnsonville, TN (2014).
  - Black & Veatch Shoring – Memphis, TN (2012).
  - Houston Cofferdam – Houston, TX (2006-2018), Temporary steel shoring 71-foot by 83-foot, 41-foot below-grade. PZ sheet piling used with heavy structural steel rings and braces to provide interior support against buckling.
  - Miscellaneous Temporary Shoring Designs – AR, TN, MS (2006-2018) Designed and detailed temporary shoring to facilitate construction of permanent structures, utilizing steel H-piles and timber lagging, steel sheet cast-concrete tangent piles, and soil nails.

- **Sports Venues**
  - Liberty Bowl Memorial Stadium ADA Renovations (2013), Concrete and structural foam modifications to existing pre-cast concrete risers to provide additional ADA seating in compliance with ADA rules and regulations.

- **Transportation**
  - State Route 304 Project – Desoto County, MS (1998-2001), Assisted in design of new highway bridges.
  - I-240 Highway Project – Memphis, TN (1998-2001), Assisted in design and detailing of bridge seismic retrofits.
  - I-55 Highway Project – Memphis, TN (1998-2001), Assisted in design of widening existing highway bridges.

  - Proposed Route 475 Project – west of Knoxville, TN (1998-2001), Developed vertical and horizontal alignments and produced preliminary cost estimates as part of draft Environmental Impact Statement.
  - State Routes 15 and 18 – central Tennessee (1998-2001), Produced cost estimates and authored the draft and final environmental assessment reports.
  - Bridge Repair/Replacements – various locations in Tennessee (1998-2001), Determined drainage basin areas, 10-year/100-year flood elevations, and expected velocities in the channel as part of the advanced planning reports.
  - Polaris Parkway – Columbus, OH (1998-2001), Prepared detailed roadway and bridge plans.
  - State Route 162 – Knox County, TN (1998-2001), Produced preliminary cost estimate for feasibility study.

- **Water/Wastewater**
  - MLGW Allen Pump Station Renovation – Memphis, TN (2015), Structural assessment of potential modifications to existing concrete structure and of cracks and damage observed during renovation.

- **Expert Witness Cases**
  - Deficient Performance at Lyon's Ridge Apartments – Memphis, TN (2006-2018), Multi-story wood-framed retirement complex. Engaged by general contractor to review original construction documents and provide testimony on design deficiencies in defense. Repairs to correct deficient performance were estimated in excess of $1 million.
  - Deficient Construction at 6401 River Tide – Memphis, TN (2006-2018), Wood-framed 5,000-square-foot addition to an existing 12,300-square-foot private residence. Engaged by property owner to review renovation documents, assess property condition, and identify potential life-safety concerns with the then-current state of construction. Repairs to correct renovation deficiencies were estimated at $2.1 million.
  - Collapsed Roof at 612 Broad Street – Crenshaw, MS (2006-2018), Multi-wythe unreinforced masonry brick with timber floor and roof framed two-story structure. Engaged by attorney to investigate the structure on-site and identify potential cause of roof collapse and life-safety concerns with the damaged structure. One fatality caused by falling structure. Structure has since been demolished.

- **Structural Design/Site Investigations**
  - Cordova Baptist Church – Memphis, TN (2006-2018), Two-story single cab elevator addition to an existing wood-framed structure with basement and concrete foundation walls. Engaged by architect to provide foundation design and assess existing concrete basement walls impacted by construction. Additional assessment was requested while on-site to determine cause of basement water intrusion and mold growth.
  - International Paper Parking Garage – Memphis, TN (2006-2018), Two-story existing concrete parking garage with lower level below grade. Engaged by owner to perform structural assessment and inspection of deteriorated/damaged elements, including subgrade concrete retaining walls, and to provide repair recommendations and details as required.

- Cossitt Library – Memphis, TN (2006-2018), ASCE 7 41-13 Tier 1 and Tier 2 Seismic assessment of a historical designated structure on the river bluff to determine structural integrity and identify structural deficiencies and life-safety concerns for continued occupancy.
- Elvis Presley YMCA – Memphis, TN (2006-2018), Structural investigation of World War II-style Quonset hut structure with deteriorated support girders to determine structural integrity and identify immediate life-safety issues with continued occupancy. Also performed structural investigation of precast concrete natatorium with deteriorated precast concrete roof framing to determine structural integrity, collapse potential, and life-safety impact to immediately adjacent occupied structure.
- VA Clinics Tier Seismic Assessments – Memphis and Jackson, TN (2011-2017), Performed Tier 1 and Tier 2 seismic assessments per ASCE 31-03 and 41-13.
- Peabody Place Seismic Assessment – Memphis, TN (2012-2016), Structural steel and concrete-filled metal deck structure. Gravity and lateral assessment of existing structure for compliance with newer building codes, including seismic lateral design.
- LaPetite Academy – Olive Branch, MS (2013), Assessed damage to storefront wall and structure following impact by a vehicle. Provide a repair scope and recommendations.
- Warehouse Concrete Tilt-Panel Assessment – Memphis, TN (2013), Assessed spalling concrete tilt-panels and deteriorated steel reinforcement. Designed and developed repair plans.
- KT Building Assessment – Union City, TN (2012), Circa 1900 historic building featuring multi-wythe unreinforced masonry clay brick construction. Assessed deterioration of brick and mortar. Designed and provided repair recommendations using methods compatible with historic brick and mortar construction.
- Memphis in May Headquarters – Memphis, TN (2011), Three-story existing building (circa 1900) renovation. Engaged by architect to assess extensive water damage to multi-wythe unreinforced masonry clay brick walls and timber floor and roof framing. Design details for damaged element repair and water remediation were required for safe occupancy.

- **Structural Analysis – Renovations**
  - Artspace 138 St. Paul – Memphis TN (2006-2018), Three-story existing building (circa 1901) renovation. Engaged by architect to perform structural analysis and design required to upgrade the former cotton warehouse into efficiency luxury apartments. Exterior wall construction consisted of multi-wythe brick URM with interior floor/roof framing of heavy timber framing with wood plank decking.
  - Liberty Bowl Jumbo Tron Skin – Memphis, TN (2006-2018), Existing steel Jumbo Tron structure was reviewed for capacity to support new solid skins on three sides to conceal framing. Miscellaneous steel modifications were required to meet original design intent and reinforce structure for increased wind loading.
  - Peabody Place Service Master Improvements – Memphis, TN (2006-2018), Structural steel and composite concrete floor infills required to renovate existing space into new office space. Miscellaneous steel connections, details, and small structures were also provided to support expanded floors and architectural elements.

- Memphis School of Excellence – Memphis, TN (2006-2018), Seismic retrofit of existing structure. CMU perimeter bearing walls with interior structural steel columns and moment frames, and metal roof deck.

- **Structural Analysis – New Construction**
  - Nicholasville Apartments – Lexington, KY (2006-2018), Multi-structure wood-framed apartment complex. Units ranged in size from single-story duplexes to multi-family three-story apartments. Conventional shallow foundations with slab-on-grade construction.
  - Legends Park Apartments/Mixed-Use Facility – Memphis, TN (2006-2018), Multi-structure wood-framed apartment complex. Units ranged in size from single-story, single-family residences to multi-family, three-story apartments. Conventional shallow foundations with slab-on-grade construction and CMU stemwalls.
  - Home 2 Suites – St. Simmons Island, GA (2006-2018), Four-story hotel constructed of CMU and concrete hollowcore planks, with structural steel framing over the open ground floor lobby and entrance canopy.
  - Satellite Healthcare – Memphis, TN (2006-2018), Outpatient medical facility with structural steel framing and metal roof deck, with large architectural entry canopy and fin.
  - Bunge River Tower – Helena, AR (2006-2018), Structural steel tower located in Mississippi River to support elevator conveyor used to offload material back to shore.
  - Arbor Glenn Housing – Charlotte, NC (2001-2005), Multi-structure wood-framed apartment complex. Units ranged in size from single-story, single-family residences to multi-family, three-story apartments. Conventional shallow foundations with slab-on-grade construction and CMU stemwalls.

Forensic Engagements

- **Foundation and slab settlement**
  - Memphis, TN (2019), Performed a structural assessment of a sagging sanctuary floor in a wood-framed church. The floor joists had been damaged from long-term moisture exposure. Two joists had broken completely and were on the ground with additional joists cracked and in imminent danger of falling.
  - Olive Branch, MS (2018), Investigated a 5,200-sq-ft residence constructed in 2017 to determine cause of brick veneer, interior finish, and concrete slab cracks. Cause of damage was identified as foundation settlement due to poorly compacted fill.

- **Construction Defects/Accidents**
  - Memphis, TN (2018), Structural consultation on an industrial accident involving one fatality and one injury. A demolition company was contracted to remove a steel tower supporting tanks when the tower came down early due to improper sequencing of the demolition procedures.

- **Storm Damage**
  - TN, AR, MS, MO, KY (2018-2019), Performed multiple roofing assessments of residential and commercial structures damaged by wind and hail.

- **Vehicular Impact Damage**
  - Memphis, TN (2018), Performed a structural assessment of a single-story, wood- and steel-framed funeral home structure that had been hit by car, damaging two exterior bearing walls.
  - Parsons, TN (2018), Performed a structural assessment of a two-story structure, circa 1910, constructed of multi-wythe unreinforced masonry clay brick and timber floor and roof framing. A car had run through the front of the structure and through a shared tenant wall.

- **Roofing System Integrity**
  - Alamo, TN (2019) Performed an assessment of a wind-damaged TPO roofing system on a two-story structure, circa 1920, constructed of multi-wythe unreinforced masonry clay brick and timber and roof framing.
  - Memphis, TN (2018) Performed an assessment of a hail-damaged natural slate tile roofing system on a 10,000-square-foot residence.

- **Fire/Natural Disaster Investigations**
  - Jackson, TN (2018) Performed a structural assessment of a residence damaged by a magnitude 3.6 earthquake on January 16, 2018. Damage was limited to cosmetic damages of interior and exterior finishes and occurred due to the unique framing layout.
  - Blytheville, AR (2018) Performed a structural assessment of a two-story, wood-framed hotel that had been damaged by a tornado. Two structures were located in the complex: one structure had suffered minor cosmetic damage; the second structure had lost the full second floor.
  - Caruthersville, MO (2018) Performed a structural assessment of a residential structure damaged by fire. Determined a prior fire had caused most of the damage that was revealed during cleanup efforts and which had been concealed during an interior renovation.

Professional Experience

- **Rimkus Consulting Group, Inc.** **2018 – Present**
  - Senior Structural Engineer
    Responsibilities encompass all commercial and residential occupancy types and square footages. Provides written reports, analysis, calculations, and drawings as required based on project scope.

  - Senior Consultant – Design Services, AEC Services Group
    Design services include structural design for new buildings and renovations/repairs of existing buildings. Perform structural assessments of existing buildings and provide report and/or construction documentation of the conditions and remediation options.

- **Chad Stewart & Associates, Inc.** **2006 – 2018**
  - Senior Structural Engineer/Project Manager

  Performed design and oversaw production of contract drawings for new projects and renovations of existing buildings for commercial, residential (single-family and multi-family), mixed-use developments, educational facilities, fire stations, assisted living facilities, worship facilities, metal building foundations, hotels, and county and state institutional occupancies.

  Also inspected existing structures to determine structural integrity and identify life-safety concerns. Produced reports documenting results, possible repair solutions, and repair details. A significant percentage of buildings inspected included older, unreinforced masonry buildings and wood frame structures. Performed existing building structural assessments for refinancing and insurance purposes. Assessment methods included Tier 1 and Tier 2 analyses per ASCE-31 and ASCE-41 and Probable Maximum Loss estimates utilizing FEMA HAZUS software and FEMA-310. Served as an expert witness for high-end residential and multifamily litigation and provided consultation services for legal and insurance purposes on both commercial and private structural failures.

- **Bulla Smith Design Engineering, Inc.** **2001 – 2005**
  - Structural Engineer

  Designed and produced contract drawings, reviewed shop drawings for approval, performed site visits, consulted with clients and contractors. Experience working on the following project types: wood frame multi-family housing; steel frame/concrete slab education and multi-use retail/office/residential; prefab metal office and storage for Air National Guard and Pope AFB; CMU/steel joist fire stations; renovation/addition to existing wood frame and CMU/steel joist structures; and manufactured wood/CMU state and federal park buildings.

- **Parsons Transportation Group** **1998 – 2001**
  - Structural Engineer Intern

  As structural engineer intern, participated in a variety of transportation infrastructure projects in Missouri, Tennessee, and Ohio.

Education and Certifications

- **Civil Engineering, M.S.:** University of Memphis (2018)
- **Civil Engineering, B.S.:** University of Memphis (1998)
- **Registered Professional Engineer:** North Carolina, Tennessee, Arkansas, and Kentucky

Committees

- **National Council of Structural Engineers:** Existing Buildings/Structural Retrofit Subcommittee - Member
- **Applied Technology Council 136:** Seismic Code Support Committee - Member
- **Collierville Board of Adjustment and Appeals -** Commissioner

- **Memphis and Shelby County Code Advisory Board -** Member
- **Tennessee Structural Engineers Association State Board –** Member
- **West Tennessee Structural Engineers Association Regional Board –** Past President
- **Tennessee Society of Professional Engineers Legislative Committee -** Member

RIMKUS CONSULTING GROUP, INC.
FORENSIC ENGINEERS AND CONSULTANTS

Steve A. Weber, P.E.

Principal Consultant

Background

Along with a B.S. degree in Civil Engineering, Mr. Weber is a registered professional engineer in Indiana, Kentucky, Illinois, Florida, Ohio, West Virginia, Pennsylvania, Michigan, Mississippi, Missouri, Louisiana, Maryland, New York, New Jersey, Alabama, and Virginia and over 40 years of experience in civil/structural consulting.

His structural design experience ranges from commercial steel buildings, concrete foundation designs, river transfer facilities, and support facilities for mining operations. He has a wide range of experience in soil stabilization and analysis, as well as geological investigations. He has been the lead designer in the development of a number of engineering and management software packages including the physics of traffic accident reconstruction. He has trained many police officers and engineers across the U.S. in data gathering and analysis using traffic accident reconstruction software.

Over 25 years of Mr. Weber's experience has involved failure analysis and damage repair. He has examined single-family homes, commercial buildings, and industrial complexes for deficiencies in construction, design, and materials. He has used his structural and geotechnical engineering experience as a recognized expert in building reactions from blasting induced and construction related vibrations. He also has extensive experience in foundation settlement, slope stability, water damage, roofing failure, materials failure, structural failure, subsidence, environmental damage, traffic accident damage to buildings, and construction defects.

Contact Information

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Professional Engagements

- **Software Development**
  - Physics of Traffic Accident Calculation Toolbox – Maysville, KY (2000-2009), Part of software development team as part of Carlson Software Investigations (formerly Nikon AIMS).
  - Productivity Tools – Maysville, KY (2000-2009), Developed real-time volumetric and time tracking of earth moving machinery equipped with GPS hardware for Carlson Software.
  - Blasting Module – Maysville, KY (2000-2009), Developed management and analysis of blasting operations tool.
  - Hole Manager – Maysville, KY (2000-2009), Developed database tracking tool of corehole projects.
  - Elog Manager – Maysville, KY (2000-2009), Developed corehole electric logs database tracking tool.
  - Carlson Software C4 (Carlson Command and Control Center) – Maysville, KY (2000-2009), Developed tool for monitoring and project management of heavy vehicles in a radio enabled GPS system.
  - TruckPro – Maysville, KY (2000-2009), Developed tool for haulage tracking of loads, employee logs, material tracking, and downtime logs.

- **Commercial**
  - Revco Pharmacy – Seymour, IN (2000), Project engineer for construction of new pharmacy.
  - True Value – Rockport, IN (2000) Project engineer for construction of new hardware store.
  - Toyota Truck Plant Roof Reinforcement– Fort Branch, IN (1996-2000) Project manager structural analysis and modifications for overhead conveyor construction.
  - General Electric Building Renovations – Madisonville, KY (1977-1990), Project manager for geotechnical foundation analysis and design.
  - Executive Inn Building Addition Pilings – Vincennes, IN (1977-1990), Project engineer for geotechnical analysis
  - State of Kentucky New Prison Foundation Investigation – Eddyville, KY (1977-1990)

- **Industrial**
  - Mining Equipment – Virginia and Kentucky (2013-2015), Conducted assessment of condition of trapped mining equipment in mine.
  - Styline Plant No. 11- Leitchfield, KY (2000), Project manager for analysis of structural tornado damage, and subsequent design and reconstruction.
  - Aristokraft Plant Roof Reinforcement – Littlestown, PA (1996-2000), Project manager in charge of design and construction of structural roof reinforcement to meet Factory Mutual requirements.
  - Aristokraft Plant Roof Reinforcement – Crossville, TN (1996-2000), Project manager in charge of design and construction of structural roof reinforcement project to meet Factory Mutual requirements.
  - Aristokraft Plant Wall Reinforcement Project – Jasper, IN (1996-2000), Project manager in charge of geotechnical and structural design of wall and piling engineering.

- P&M Coal Reclaim Tunnel – Madisonville, KY (1977-1990), Project engineer responsible for geotechnical analysis.
- Industrial Park – Morganfield, KY (1996-2000), Project manager for site development including analysis of existing soil conditions and methods of stabilization for construction.
- Borg-Warner York Plant New Crane Reinforcement – Madisonville, KY (1977-1990), Project manager structural analysis and modifications for overhead crane construction.
- Borg-Warner York Plant Degreaser Addition – Madisonville, KY (1977-1990), Project manager for geotechnical foundation and building structural design.
- Andalex Coal Dam Stability Analysis – Muhlenberg County, KY (1977-1990), Project engineer responsible for geotechnical stability analysis.

- **Marine**
  - BRT Barge Repair Area Project – Gilbertsville, KY (1977-1990), Project engineer for structural design of barge repair facility
  - BRT Rail-to-Barge Transfer Building – Gilbertsville, KY (1977-1990), Project engineer for structural design and construction of new building construction.
  - Retaining Wall and Piling System – Gilbertsville, KY (1977-1990), Project engineer for geotechnical and structural design, and construction of new retaining wall and piling system for BRT Truck-to-Barge Transfer project.
  - Island Creek Ohio #11 River Dock Transfer Facility – Morganfield, KY (1977-1990), Project manager responsible for geotechnical and structural design.

- **Higher Education**
  - Henderson Community College Building Addition Pilings – Henderson, KY (1977-1990), Project engineer responsible for geotechnical analysis of pilings.

- **Water/Wastewater/Sewer**
  - Sewer System Overflow Project – Newburgh, IN (2000), Project engineer for SWMM modeling of city sewer system flow
  - Sewer Renovation – Jasper, IN (1996-2000), Project manager municipal sewer renovation project including hydraulics analysis, drainage, and sedimentology.
  - Breckinridge Job Corp. – Morganfield, KY (1996-2000), Sewer system
  - Black Beauty Coal – Macomb, IL (1996-2000), Project manager in charge of sedimentation ponds system design

- **Infrastructure**
  - Aristokraft Plant Sewer Rerouting – Jasper, IN (1998), Project manager for sewer renovation project including hydraulics analysis, drainage, and sedimentology.
  - Nerco Patoka River Bridge – Jasper, IN (1986), Project manager for design and construction management of bridge

- Lake Pewee Dam – Madisonville, KY (1984), Project engineer responsible for geotechnical Stability Analysis.
- Hwy 670 Bypass – Providence, KY (1978), Project engineer responsible for drainage design on bypass project.
- U.S. Hwy 41 – Madisonville, KY (1978), Project engineer responsible for drainage design

Forensic Engagements

- **Natural Disaster Investigations**
  - New Orleans and Baton Rouge, LA (2016-2017), Structural assessment of commercial and residential structures after floods.
  - Washington, IL (2013), Tornado damage evaluation of commercial and residential structures
  - Ohio (2013), Derecho (straight line wind) structural evaluations of commercial and residential buildings.
  - New York and New Jersey (2013), Hurricane wind structural evaluations for Hurricane Sandy structural assessment of commercial and residential buildings.
  - St. Louis, MO (2011), Tornado damage evaluation of commercial and residential structures
  - Southern Illinois (2011), Tornado damage evaluation of commercial and residential structures
  - Florida (2009-2018), Hurricane roof covering evaluations for Hurricanes Wilma, Matthew, Irma, and Michael assessment of commercial membrane and built-up roofs, and residential tile and shingle roofs.
  - Florida (2009-2018), Hurricane wind structural evaluations for Hurricanes Wilma, Matthew, Irma, and Michael structural assessment of commercial and residential buildings.
  - Ohio, Kentucky, Indiana, Illinois, Florida (1977-2018), Fire related structural assessment of commercial and residential buildings.
  - Ohio, Kentucky, Indiana, Illinois, Florida, Virginia (1977-2018), Landslides, soil and foundation failure evaluations
  - Southern Indiana and Illinois (1977-2018), Mine subsidence evaluation of commercial and residential structures.
  - Ohio and Indiana, Grain bin failure analysis and structural assessments
  - Ohio, Kentucky, Indiana, Illinois, and Florida (1977-2018), Blasting and construction vibration structural assessments of commercial and residential structures
  - Ohio, Kentucky, Indiana, and Illinois, 500+ residential and commercial structure hail and wind damage roof evaluations.

- **Construction Defect Evaluations**
  - Pittsburgh, PA (2016), Roof truss collapse
  - West Virginia (2015-2018), Foundation construction claims on multiple residential structures.
  - Pittsburgh, PA (2013), Building wood frame Collapse,
  - Illinois (2013), Overland conveyor foundation failure and collapse

Professional Experience

- **Rimkus Consulting Group, Inc.** **2009 – Present**
  - Principal Consultant

    Investigates and analyzes failures in civil/structural engineering disciplines related to residential, commercial, municipal, and industrial buildings. Investigates premises liability issues, foundation failures, roofing failures, residential damages, structural deficiencies and failures, storm damage and verify construction compliance with applicable building codes and contract specifications.

  - District Manager – Columbus

    Responsible for management and oversight of operations and personnel in district office. Investigates and analyzes failures in civil/structural engineering disciplines related to residential, commercial, municipal, and industrial buildings. Investigates premises liability issues, foundation failures, roofing failures, residential damages, structural deficiencies and failures, storm damage and verify construction compliance with applicable building codes and contract specifications.

- **Carlson Software** **2000 – 2009**
  - Vice President R/D, Director – Engineering Machine Control Division

    Responsible for all facets of design, testing, verification, approval, releasing and maintenance of software results. Design of computer models to aid in development of engineering solutions to problems encountered in forensic, civil, mining and construction industries. Designer of geographic information systems that support graphical and spatial analyses with topological databases. Designed and implemented training programs for non-engineering personnel gathering and interpreting three-dimensional engineering data.

- **Commonwealth Engineers** **2000**
  - Structural Engineer

    Responsible for design of new wood and modification of steel and concrete factories, bridges, houses, office complexes, retail stores, industrial process plants, product transfer facilities, and river dock complexes. Designed municipal water distribution systems, hydraulics analysis, drainage, and sedimentology. Analyzed failures in residential and commercial buildings with respect to: design deficiencies/code compliance, building material failures, construction deficiencies, wind, hail, lightning, flood damage, vibration damage, roof system failures, settlement, subsidence, and blasting. Analyzed automobile traffic accidents including: speed determination, collision forces, time-distance relationships, and three-dimensional computer graphic models. Provided services for liability defense and litigation assistance, case evaluations, modeling and exhibit preparations, and expert witness testimony.

- **Donan Engineering Co., Inc.** **1996 - 2000**
  - Director – Engineering

    Managed an office of seven engineers in structural design of new structures, civil engineering projects, and failure analysis. Responsible for design of new and modification of wood, steel, and concrete factories, bridges, houses, office complexes, retail stores, industrial process plants, product transfer facilities, and river dock complexes. Analyzed failures in residential and commercial buildings with respect to: design deficiencies/code compliance, building material failures, construction deficiencies, wind, hail, lightning, flood damage, vibration damage, roof system failures, settlement, subsidence, and blasting. Provided services for liability defense and litigation assistance, case evaluations, modeling and exhibit preparations, and expert witness testimony.

- **Robert Ray and Associates** **1992 - 1996**
  - Director – Research and Development

  Manager on all facets of mining engineering including: computer aided mineral evaluation and reserve analysis (CAMERA), drill hole management, graphical presentations with two-dimensional and three-dimensional contouring, hydrology and sedimentology of surface mined lands, digital terrain modeling, volumetrics, engineering operations analysis, coal mine permitting, GIS systems design for mining applications. Manager of failure analysis in residential and commercial buildings with respect to: building material failures, vibration damage, roof system failures, settlement, subsidence, and blasting.

- **Professional Computing Consultants/Weber Engineering** **1990 - 1992**
  - President

  Design of new wood, and modification of steel and concrete factories, bridges, houses, office complexes, retail stores, industrial process plants, product transfer facilities, and river dock complexes. Design of municipal water distribution systems, hydraulics analysis, drainage, and sedimentology. Development and supervision of subsurface drilling investigations involving soils for new construction. Written reports on existing soil conditions and methods of stabilization for construction, Interpretation of laboratory soil analysis, Dam Stability. Analyzed failures in residential and commercial buildings with respect to: design deficiencies/code compliance, building material failures, construction deficiencies, wind, hail, lightning, flood damage, vibration damage, roof system failures, settlement, subsidence, and blasting. Provided services for liability defense and litigation assistance, case evaluations, modeling and exhibit preparations, and expert witness testimony.

- **Donan Engineering Co., Inc.** **1977 - 1990**
  - Vice President – Technical Support

  Responsible for design of new wood and modification of steel and concrete factories, bridges, houses, office complexes, retail stores, industrial process plants, product transfer facilities, and river dock complexes. Designed municipal water distribution systems, hydraulics analysis, drainage, and sedimentology. Developed and supervised subsurface drilling investigations involving soils for new construction. Prepared written reports on existing soil conditions and methods of stabilization for construction, interpreted laboratory soil analysis related to dam stability. Analyzed failures in residential and commercial buildings with respect to: design deficiencies/code compliance, building material failures, construction deficiencies, wind, hail, lightning, flood damage, vibration damage, roof system failures, settlement, subsidence, and blasting. Provided services for liability defense and litigation assistance, case evaluations, modeling and exhibit preparations, and expert witness testimony.

Education and Certifications

- **Civil Engineering, B.S.:** Rose-Hulman Institute Of Technology (1977)
- **Professional Engineer:** Indiana, Kentucky, Illinois, Florida, Ohio, West Virginia, Pennsylvania, Michigan, Mississippi, Missouri, Louisiana, Maryland, New York, New Jersey, Virginia, and Alabama
- **Memberships:** National Society of Professional Engineers; American Society of Civil Engineers; Kentucky Society of Professional Engineers; Society for Mining, Metallurgy & Exploration

Continuing Education

- **Indiana Structural Engineering Association**: Blast Design of Building Facades and Structural Systems (2018); Welding Myths the Structural Engineer Should Know About (2018); Introduction to Progressive Collapse Criteria and Analysis Methods (2018); In-Situ Evaluation of Structural Wood Members in Existing Buildings (2018)
- **Red Vector:** Hurricane Damage: Wind vs. Water Determination (2017); Making the Flood Zone Determination (2017); Guide to the FEMA Elevation Certificate V2 (2017); Post Disaster Recovery and Reconstruction (2017)
- **American Society of Safety Engineers**: Slips, Trips & Falls Virtual Symposium Certificate of Completion: Investigation and analysis of existing facilities with regards to pedestrian accidents (2009)
- **Other**: Failures and Problems Seen on structural Plans, Structural Engineering Association of Ohio (2014);Construction Law for Public Projects (2013)