

# MARINO STRUCTURAL SOLUTIONS

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NICHOLAS MARINO, P.E.

December 4, 2018

Mrs. Sandy Hearing - President  
Board of Trustees  
Vineland Historical Society  
108 S. 7<sup>th</sup> Street  
Vineland, NJ 08360

**Draft**

RE: **Building Evaluation**  
Vineland Historical Society  
108 S. 7<sup>th</sup> Street  
Vineland, Cumberland Co., NJ  
**MSS #18167**

Dear Mrs. Hearing;

An evaluation of 108 South Seventh Street, Vineland, NJ was performed on various dates in October 2018 (10/3, 10/6, 10/12, 10/19) and November 2018 (11/2) to review exposed and accessible components of the building system for evidence of deficiencies. Please review the report in its entirety; all left and right descriptions are based on facing the building from South Seventh Street.

## **Background**

The Vineland Historical Society consists of an original two (2) story structure that was built in 1910 plus three subsequent building additions. The original two-story building also contains a three (3) story Stack Room at the rear left corner (lower ceiling heights); the first floor Stack Room is now known as the Glass Room. Based on my observations and the architectural plans provided by your office, the original structure is comprised of 17" wide basement foundation walls, 13" x 13" interior brick piers, 6" x 12" wood girders, 3" x 8" and 3" x 12" wood floor joists. The framing of the second floor (which is hidden from view) is comprised of 9"-13" wide exterior brick walls, interior columns, interior steel beams and 3" x 12" wood floor joists. The roof level is comprised of 2" x 8" rafters with intermediate steel beams (hidden from view).

An addition was constructed in 1931 that abuts the front right corner of the original building. This addition consists of two-stories plus a basement foundation. Although an architectural plan of the foundation system indicates that the exterior foundation walls are constructed brick 12" – 15" wide, no further structural information is provided.

An addition for a “Vault” was constructed at the rear right corner of the building in 1933. The architectural plans indicated that this addition consists of a basement level and first floor only. The addition is comprised of 12” masonry block walls with a brick façade and 10” precast concrete floor and roof decks.

The final addition was constructed in 1964 along the rear of the original structure; a single architectural plan sheet on this addition exists. The plan indicates that this addition consists of three (3) stories plus a basement located at the rear left corner of the building. The plan also indicates that this addition included a new second floor addition above the previous one-story Vault addition. Although the plan does not indicate building components, field observations indicate that the construction is similar to that of the Vault addition, which is 12” masonry block walls with a brick façade and precast concrete floor and roof decks.

### **Observations**

**Foundation Walls** - The basement foundation walls beneath the original structure are constructed of stone with a layer of cement parging (stucco) or plaster on the interior surface. The exterior foundation walls were found to be reasonably plumb with no significant evidence of cracking, bowing or displacement.

The stucco surface was found to be cracked and loose at several locations exposing the underlying stone foundation wall. Where exposed, the mortar of the stone foundation wall was often deteriorated to a depth of approximately 2” – 3”. It appeared that a section of the stucco finish had been recently removed and replaced at the front left corner of the basement.



**Photo #1** – Basement conditions, front left building corner in background





**Photo #2** – Front left building corner, newly applied stucco finish on lower section of wall



**Photo #3-** Loose spalled stucco finish on left foundation wall





**Photo #4** – Loose deteriorated mortar



**Photo #5** – Typical foundation condition along left foundation wall



The rear half of the left foundation wall was found to be in poor condition. Although no evidence of bowing or displacement was observed, this section of the foundation walls has experienced excessive widespread deterioration of the mortar joints due to water infiltration. The interior plaster finish along this wall section has completely collapsed.



**Photo #5** – Rear left quadrant of original basement foundation



**Photo #6** – Deteriorated rear left foundation wall



**Photo #7** – Eroded mortar joint in photo #6 above





**Photo #8** – Decayed wood nailing joint in foundation wall of photo #6

The basement windows were found to have been removed and replaced with masonry infill along the front foundation wall. However, the thickness and height of the masonry infill did not match either the thickness of the exterior brick wall above or the full height of the framed opening. Subsequently, the brick wall above was left either poorly supported or unsupported by a header or lintel.



**Photo #9** – Right end of original front foundation wall



**Photo #10** – Poorly infilled window opening, note wood header with loose brick above





**Photo #11** – Unsupported brickwork at infilled window opening

A vertical crack and a diagonal crack were found in the interior foundation wall that is common to the front basement and rear workshop on the right side of the original structure. Random hairline cracks were also noted in the remaining workshop foundation walls. No evidence of bowing or displacement were observed.



**Photo #12** – Interior foundation wall common to workshop, location of cracking noted



**Photo #13** – Vertical and diagonal cracking noted in photo #12 above





**Photo #14** – Overview of workshop, rear addition in photo background



**Photo #15** – Minor random hairline cracks in exterior workshop foundation wall

The rear 1933 and 1964 additions were found to consist of concrete masonry block. The masonry block walls were found to be in good condition with minor hairline cracks. No evidence of bowing, separation or displacement were observed.



**Photo #16** – Rear 1933 addition, foundation wall of original structure on right side of photo



**Photo #17** – Rear wall of 1933 addition





**Photo #18** – Overview of 1964 addition



**Photo #19** – Minor cracking at left foundation wall of 1964 addition  
(background of photo #18 above)

The foundation walls of the 1931 addition located on the right side of the original structure were found to consist of both cast-in-place concrete and clay brick. The foundations walls were found to be in good condition with no significant evidence of cracking, bowing, separation or displacement.



**Photo #20** – Overview of 1931 addition at rear of the building





**Photo #21** – Overview of 1931 addition at front of building

Basement Piers & Columns – The basement below the original structure includes six (6) brick piers that support the floor framing above. The brick piers were generally found to be in good condition with minor evidence of mortar deterioration along their bases.

Adjustable Steel lally columns were added at a later date to provide supplemental support to cracked and decayed joists and girders. Supplemental lally columns were also added to support the large safe located in the first floor exhibition room. The steel lally columns were placed directly on the concrete basement floor without concrete footings and the threads of the adjustable ends are fully exposed. Two (2) steel lally columns adjacent to the front foundation wall were found to be severely corroded. The column cap plates beneath the first floor safe were found to be deformed. No evidence of cracking was noted in the concrete floor surrounding the column base plates.



**Photo #22** – Overview of brick piers



**Photo #23** – Deteriorated mortar at base of pier





**Photo #24** – Supplemental steel lally columns



**Photo #25** – Corroded steel column



**Photo #26** – Corroded base of column depicted in photo #25 above



**Photo #27** – Column beneath first floor safe





**Photo #28** – Deformed cap plate of column depicted in photo #27

Basement Level Floor Framing – The floor framing of the original structure consists of 6” x 12” girders with 3” x 8” floor joists along the left and right sidewalls and 3” x 12” floor joists beneath the center of the first floor exhibition room.

The girder adjacent to the front left building corner has experienced significant decay. The decay is hidden by new lumber that has been placed over the girder in an attempt to provide reinforcement. The girder at the front right building corner is currently experiencing similar decay. Where probed, the remaining girder sections appeared to be sound and in good condition.

The ends of the floor joists along the left and right sidewalls are embedded in the exterior walls. Moisture staining was observed at the joist ends, several joists were probed at the face of the foundation wall and found to be sound; the condition of the embedded sections is not known. Along the left sidewall, two (2) joists were found to be cracked at natural knots. Two (2) joists were also found to be cracked at the right side of the basement. Approximately 8-10 3” x 12” floor joists were found to be cracked beneath the center of the exhibition room. It appears that a steel beam and column system were installed to provide supplemental support to these cracked floor joists by reducing their span lengths.

Decay was commonly observed along the front wall impacting both the floor joists immediately alongside the front foundation wall and the hardwood flooring above. Decay was also found at the window header above the basement window on the left sidewall adjacent to the front left building corner.



**Photo #29** – Decayed girder reinforced by new lumber



**Photo #30** – Overview of girder and joist framing





**Photo #31** – Heavily notched girder



**Photo - #32** – Girder along right sidewall (front wall in background)





**Photo #33** – Decayed girder and joist at front wall adjacent to right corner



**Photo #34** – Floor joists embedded in left sidewall





**Photo #35** – Embedded joist end



**Photo #36** – Joist cracked at natural knot





**Photo #37** – Decayed joist and flooring along front wall



**Photo #38** – Beam and columns installed to support cracked floor joists





**Photo #39** – Cracked floor joist in photo #38



**Photo #40** – Decayed flooring along front wall



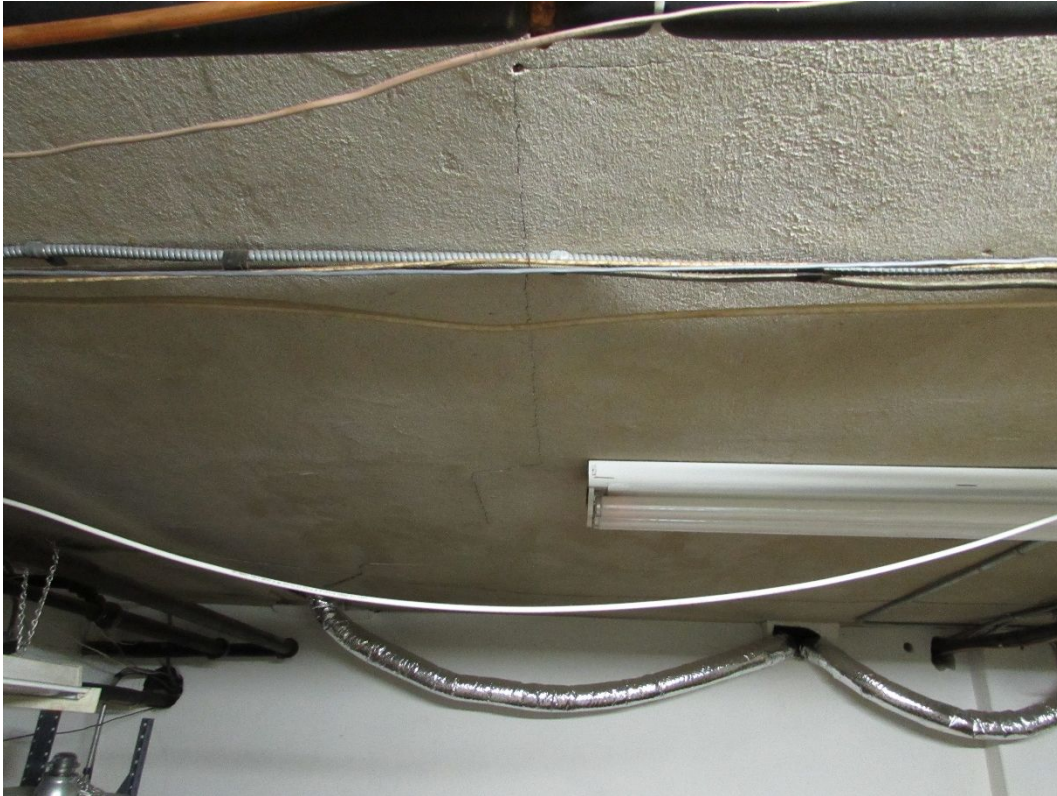
**Photo #41** – Cracked flor joist

The floor framing at the rear half of the original structure is hidden from view by plaster ceilings. Subsequently, no comments can be provided. Openings were frequently found in the plaster ceilings and the ceilings were found to be cracked and loose indicating separation from the underlying framing.

The rear 1933 and 1964 additions contain precast concrete floor plank, which were found to be in good condition.

The floor framing of the 1931 addition at the right side is also hidden from view by a plaster ceiling. Viewing through an opening in the plaster, it was determined that the floor framing consists of open web steel joists. No further comments can be provided regarding these joists.





**Photo #42** – Cracked plaster ceiling at workshop



**Photo #43** – Opening in workshop ceiling





**Photo #44** – Opening in plaster ceiling



**Photo #45** – Plaster ceiling overview





**Photo #46** – Cracked plaster ceiling in photo #45 above



**Photo #47** – Plaster ceiling of 1931 addition on right side of building

First & Second Floors – The walls, floors and ceilings of the first and second floors are finished, concealing building components. The finished surfaces were reviewed for evidence of cracking, separation, bowing, deflection, staining or decay.

The first floor of the original building and the subsequent additions were found to be in good condition with evidence of minor cracking on each of the walls. The floor surface was found to be uneven adjacent to the safe, beneath the piano at the front left building corner and above girder lines; the floor movement at the piano coincides with decay found at the basement level.



**Photo #48** – Minor cracking at front foyer





**Photo #49** – Cracking at front wall



**Photo #50** – Enlarged view of photo #49, cracking noted



**Photo #51** – Cracking at front wall



**Photo #52** – Close up view of photo #51





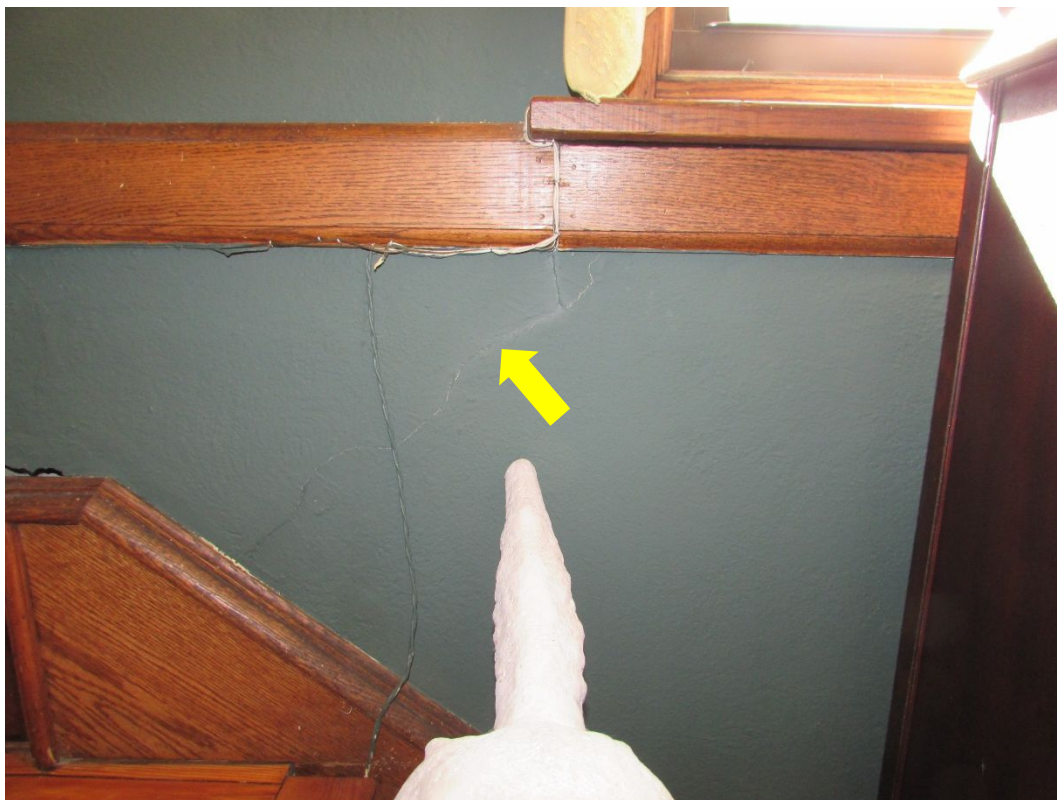
**Photo #53** – Floor movement beneath piano



**Photo #54** – Gap between wall trim and floor depicting floor movement



**Photo #55** – Cracking above and below window at left sidewall



**Photo #56** – Cracking below window in photo #55





**Photo #57** – Cracking at office wall



**Photo #58** – Enlarged view of photo #57



**Photo #59** – Cracking at office wall



**Photo #60** – Enlarged view of photo #59



A separation was found where the right sidewall of the 1933 (vault) addition abuts the rear wall of the original structure.



**Photo #61** – Wall separation



**Photo #62** – Close up view of photo #61

Light corrosion of the ceiling tile and trim was found at the front right corner of the 1931 addition.



**Photo #63** – Location of corrosion at first floor level of 1931 addition



**Photo #64** – Close up view of photo #63



At the second floor main exhibition room, evidence of water intrusion including corrosion of the tin ceiling was observed at several locations; most significantly at the front right corner of the original structure. The plaster wall surface at this location was heavily stained, cracked and loose. Evidence of loose plaster surfaces were also found along the main stairway and the Indian Artifacts Gallery (original structure).



**Photo #65** – Overview of 2<sup>nd</sup> floor main exhibition room, rear left building corner in background



**Photo #66** – Evidence of corrosion and water infiltration





**Photo #67** – Significant evidence of water infiltration and loose plaster at front wall



**Photo #68** – Evidence of water infiltration at right sidewall of original structure



**Photo #69** – Evidence of water infiltration at front right corner of 1933 addition





**Photo #70** – Water infiltration at 1933 addition



**Photo #71** – Close up view of photo #70



**Photo #72** – Cracked loose plaster at Indian Artifacts Gallery



**Photo #73** – Close up view of photo #72



Evidence of water infiltration was found at the rear right corner of the Civil War Gallery (1964 addition above the 1933 addition). Minor settlement cracking was noted at the rear left corner of the Civil War Gallery. The finished wood floor was found to be approximately ½” – 1” below the base of the wall trim.



**Photo #74** – Location of settlement cracking in Civil War Gallery



**Photo #75** – Water infiltration (paint blisters and staining) at Civil War Gallery



**Photo #76** – Gap between wood floor and wall trim at Civil War Gallery

Minor settlement cracks were found on the masonry blocks walls of the 1964 addition at the 2<sup>nd</sup> floor level.



**Photo #77** – Overview of 2<sup>nd</sup> floor level (1964 addition)

Location of settlement cracking noted





**Photo #78** – Close up view of settlement cracking in photo #77 above

The second floor Stack Room contained a plywood ceiling, indicating that the original plaster ceiling had been removed and replaced. An unprotected opening was noted in the HVAC chase.



**Photo #79** – Plywood ceiling at 2<sup>nd</sup> floor Stack Room



**Photo #80 – Opening in HVAC chase**

The 3<sup>rd</sup> floor Stack Room of the original structure exhibited a failing plaster ceiling. The ceiling was cracked, separated from the framing and several pieces had fallen. The 3<sup>rd</sup> floor Stack Room also contained an opening in the HVAC Chase.



**Photo #81 – 3<sup>rd</sup> Floor Stack Room**





**Photo #82** – Failing Plaster ceiling at Stack Room



**Photo #83** – Opening in HVAC Chase (3<sup>rd</sup> Floor Stack Room)



The 3<sup>rd</sup> floor of the 1964 addition was found to be in good condition with the exception of a bearing crack at each end of a window header. Water intrusion was also noted at the emergency exit door.



**Photo #84** – Overview of 3<sup>rd</sup> floor level, 1964 addition



**Photo #85** – Bearing crack at end of window header





**Photo #86** – Water intrusion at emergency exit

A limited section of the roof framing is visible through the roof hatch. Moisture staining was evident on the framing members. No visible evidence of cracking or decay was observed .



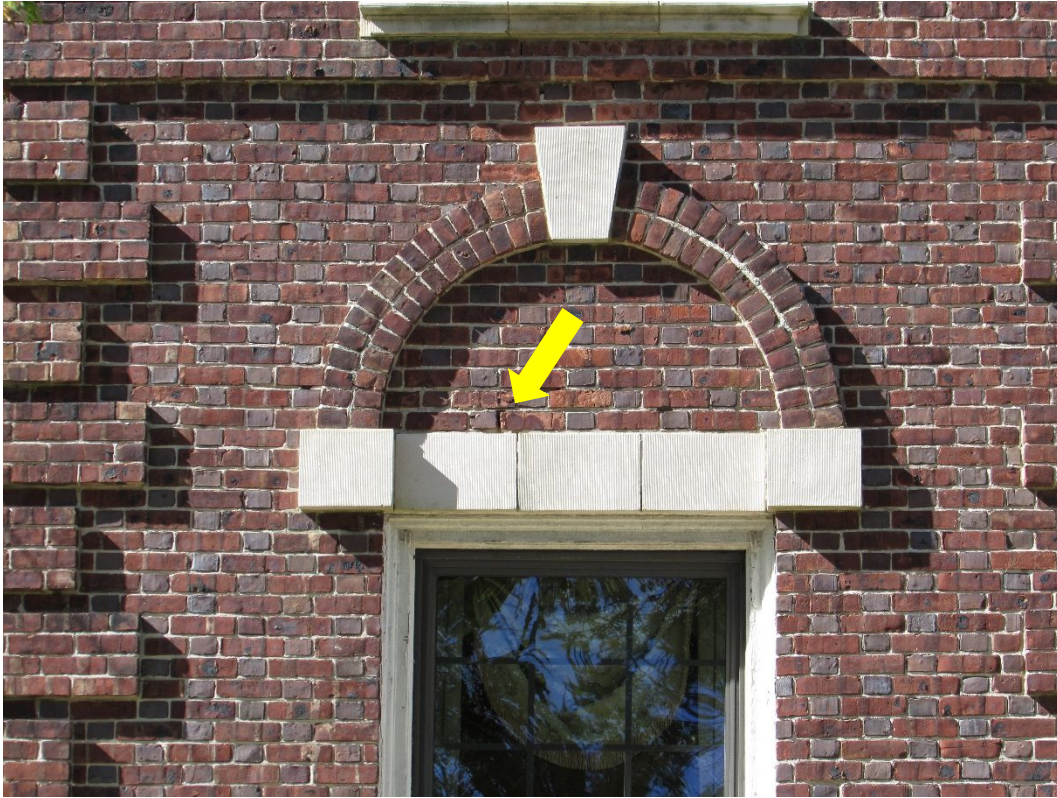
**Photo #87** – Roof framing visible at roof hatch

Exterior Façade - The exterior brick façade of the original structure and the right 1931 addition were both found to be in generally good condition. Open mortar joints were noted intermittently along with moderate weathering of the mortar joints. No significant evidence of cracking, bowing, separation or displacement were observed. A separation between the 1931 addition and the original structure was noted at both the front façade and left rear corner of the addition.



**Photo #88** – Front Façade



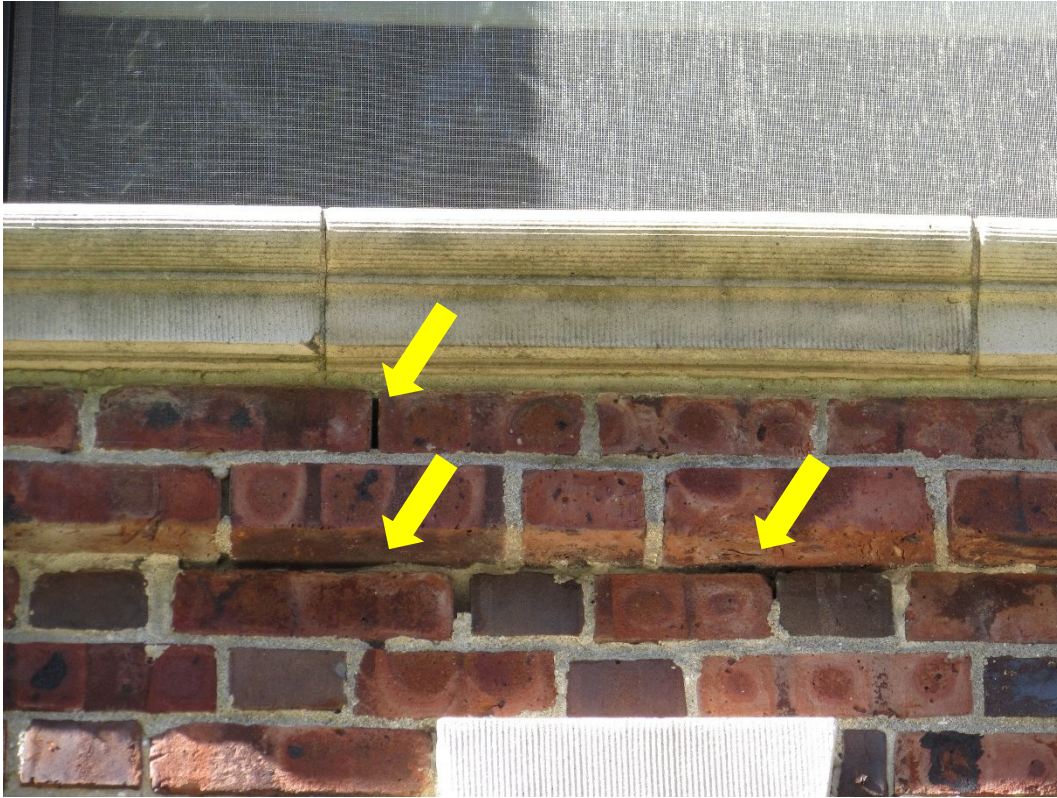


**Photo #89** – Open mortar joint



**Photo #90** – Close up view of photo #89





**Photo #91** – Open mortar joints



**Photo #92** – Open mortar joint





**Photo #93** – Close up view of photo #92



**Photo #94** – Open mortar joint



**Photo #95** – Close up view of photo #94





**Photo #96** – Open joint between 1931 addition and original structure





**Photo #97** – Close up view of photo #96





**Photo #98** – Open Joint at precast window sill

A precast concrete segment on the left façade was found to be dislodged; the location of this precast segment coincides with a decayed wood header above a basement window.



**Photo #99** – Location of dislodge precast concrete trim





**Photo #100** – Close up view of precast concrete segment in photo #99 above



**Photo #101** – Side view depicting movement of segment



The stone foundation was found to be exposed at grade level along the left sidewall; the exposed mortar joints were well eroded.



**Photo #102** – Eroded joints of stone foundation wall



**Photo #103** – Overview of right side wall





**Photo #104** – Open joint (separation) of rear left corner of 1931 addition



**Photo #105** – Close up view of photo #104 above



The rear wall of the 1933 and 1964 additions generally appeared to be in good condition. Open joints were noted at steel lintels above window openings. Minor lateral displacement was noted surrounding the roof scupper.



**Photo #106** – Overview of rear wall



**Photo #107** – Open joints at steel lintel





**Photo #108** – Appearance of minor lateral displacement at roof scupper

Roof Surface - The roof surface (membrane) generally appeared to be in good condition. No low areas or significant evidence of ponding were observed. No loose or open seams were readily observed with the exception of a potential open seam at the chimney base.



**Photo #109** – Roof overview looking towards front wall

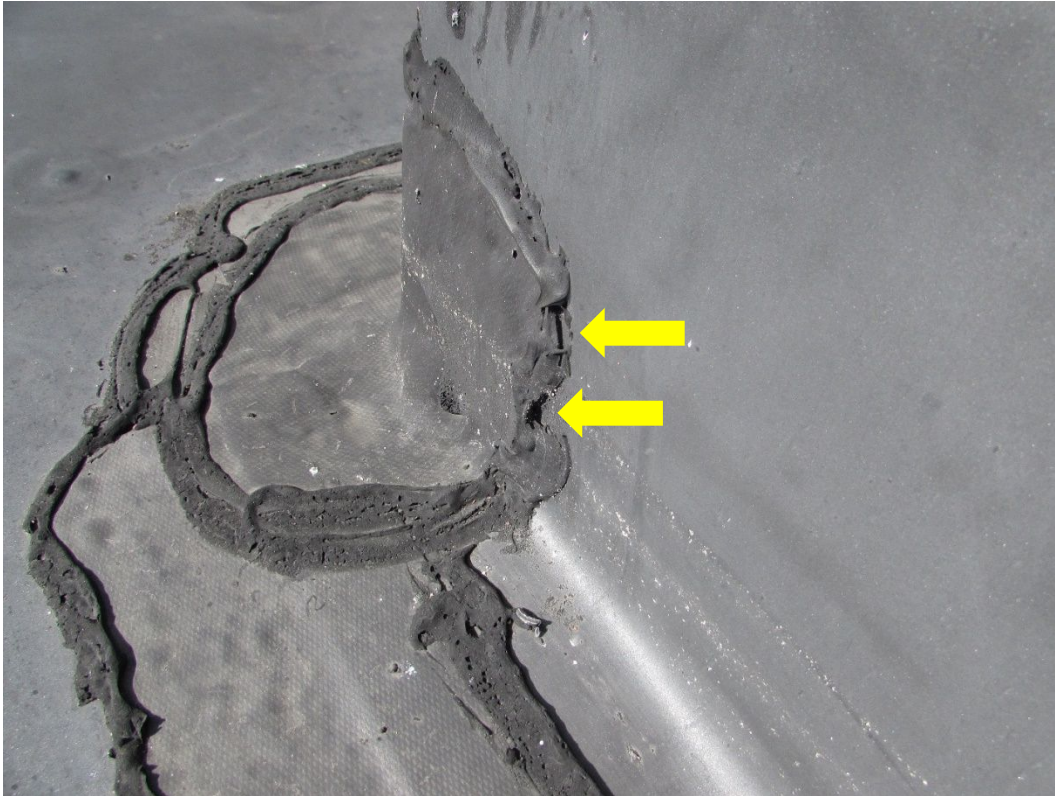




**Photo #110** – Front roof scupper



**Photo #111** – Chimney base



**Photo #112** – Potential open seam at chimney base in photo #111 above



**Photo #113** – Roof Conditions above rear 1964 addition





**Photo #114** – Roof conditions above 1931 addition

The parapet wall at the rear of the 1964 addition appeared to be rotated and leaning towards the front of the building; no horizontal cracking was readily apparent in the brick façade.



**Photo #115** – Rear parapet wall leaning inward

Open joints were noted in the dentil trim surrounding the building.



**Photo #116** – Looking down from roof at open seam in perimeter trim

### **Conclusions & Recommendations**

The following opinions and recommendations are based solely on visual review of exposed and accessible building components. No testing of any kind was performed. Marino Structural Solutions shall not be liable for conditions that are considered hidden, buried, or inaccessible.

This review is intended to be a preliminary assessment; further investigation, analysis or development of repair plans may be required, as outlined below.

#### **Original Structure (1910)**

1. The basement foundation walls did not display any evidence of movement. However, the mortar joints of the stone foundation walls are worn to varying degrees due to water infiltration over the life of the structure; the most advanced state of deterioration occurs along the left sidewall. Removal of loose debris and rebuilding of the mortar joints is required to ensure the long term stability of the foundation walls. Application of a wire lath in the pointing/parging process is recommended to reinforce and solidify (unify) the stone mass. In my opinion, parging and dampproofing of the exterior face of the foundation walls is not feasible; this work would require excavation along the building perimeter to expose the exterior face of the foundation walls.



2. Basement windows that were removed were poorly infilled. It is recommended that the remaining wood lintels be removed at these locations and that additional masonry infill be provided to fully infill the area and adequately support the brick above.
3. Where basement windows remain in place, the decayed wood lintels must be removed and replaced to prevent movement in the brick above.
4. Hairline cracking observed in the cement stucco surfaces of the foundation walls at the workshop are considered negligible and no repairs are required. Two (2) moderate cracks were noted in the interior basement wall common to the workshop. The exact cause of these cracks are not known at this time. The cracks do not extend completely through the wall, appear to have existed for an extended period of time and also appear stable. Cosmetic repairs may be made to these cracks; which can be used as a means of monitoring. If the cosmetic repairs crack in the future, then additional movement has occurred and further investigation may be required.
5. The brick piers were found to be in good condition. Minor deterioration of the mortar joints was noted at their bases. Cleaning and repointing should be performed.
6. Lally columns were installed later during the life of the building to provide supplemental support for various reasons. The columns were not installed in accordance with conventional methods. The threads of the adjustable ends are exposed, which may loosen over time. The column bases were placed directly on the floor slab without footings. No negative impacts have been experienced as a result of these improper techniques. However, improvements should be included in your building maintenance program as general good practice.

Corroded columns must be removed and replaced. Additionally, it is recommended that the column with a deformed cap beneath the first floor safe be removed and replaced with an adequate column and cap plate.
7. A decayed girder has been reinforced and supplemental support has been provided to cracked floor joists. It is recommended that an analysis of the reinforcement and supplemental support methods be performed to verify that the framing is adequate in its present state.

A decayed girder remains at the front right corner of the basement. Repair/reinforcement of this girder is required.
8. Evidence of long-term water intrusion is evident along the front wall of the building extending from the 2<sup>nd</sup> floor ceiling down to the basement framing. Decayed floor joists and wood framing were consistently found in the basement along the front wall. Loose stained plaster was found at the 2<sup>nd</sup> floor level along with corroded tin ceiling members. Removal and replacement of the decayed framing is required to prevent crushing or localized failure; crushing has occurred beneath the 1<sup>st</sup> floor piano. However, it is recommended that a section the hidden second floor members, roof rafters and brick wall surface be exposed to verify that the long-term water intrusion has not resulted in hidden decay/deterioration.
9. Cracked and loose plaster surfaces were found in the basement ceiling and along localized areas of the first and second floors. This condition is the result of both natural aging and water intrusion (exterior walls only). Removal and reconstruction of these

surfaces will be required. These surfaces also provide a degree of fire resistance. For example, the plaster basement ceiling may slow the spread of a fire originating in the basement. Subsequently, it is recommended that openings/penetrations in these surfaces be adequately sealed.

Openings in the HAVC chase noted in the Stack Room also provide a means for a fire below to quickly spread to upper levels. It is recommended that a means of draftstopping be investigated for these areas.

#### 1931 Building Addition

10. The various components of this addition were largely hidden from view, including the basement level floor framing. No evidence was found to suggest that an underlying structural deficiency currently exists. Where water infiltration was noted at the 2<sup>nd</sup> floor level, it is recommended that the underlying framing be exposed to verify that the hidden members are structural sound and adequate.

#### 1933 and 1964 Building Additions

11. These building additions consist of concrete masonry block and precast concrete plank. No evidence of deficiencies were found at the building interior that warrant remedial measures with the exception of the 3<sup>rd</sup> floor level. Cracking was noted beneath the bearing ends of a window header; it is recommended that either the bearings ends be filled solid with mortar, or that the cracks be sealed with an epoxy injection. Improvements should also be made as necessary to ensure that the emergency exit door is weathertight.

#### Façade

12. The exterior brick walls were generally found to be in good condition. No evidence of bowing, bulging, cracking or displacement was readily observed to suggest deterioration of the inner brick wythes due to moisture infiltration and freeze/thaw cycles. Repointing is required to fill various open joints and prevent water intrusion. Repointing of precast segments is also required. A precast segment at the left sidewall has displaced and will require re-setting.
13. The 1931 and 1933 building additions abut the main structure; however, open joints at these locations indicate that the buildings were not interconnected. At a minimum, these open joints should be caulked to prevent water intrusion and allow for differential movement between the buildings.
14. The plans indicate that the 1933 and 1964 building additions consist of 12" wide cmu walls with a brick façade and an air-space between the cmu and brick; wall ties are indicated on the plan connecting the brick façade to the cmu wall. If correct, thin steel ties often corrode and fail over time as moisture migrates through the wall. Bowing, bulging (waviness) and/or horizontal cracking may occur in the brick façade prior to failure, or a sudden failure of the façade may occur (the brick will lean and fall outward of the building). No significant evidence of movement was observed. It is recommended that a qualified mason examine the wall more closely for evidence of movement and verify that the wall was constructed as indicated on the plan (sometimes the air-space is omitted and the brick is bonded directly to the cmu). Installation of masonry repair anchors may be required to better secure the brick to the underlying cmu.



15. The rear parapet wall of the 1964 addition appeared to be leaning inward. This condition may be the result of thermal expansion of the precast concrete roof plank. No evidence of horizontal cracking was readily observed at the base of the parapet wall. However, it is recommended that a mason examine the area more closely for evidence of cracking. If cracking is discovered, repair or alterations may be required to ensure its long-term stability.
16. It is recommended that open joints at steel lintels be adequately caulked to prevent water intrusion. Corrosion of the steel lintels can result in the development of horizontal and stepped cracks in the brickwork as the steel expands due to corrosion.

#### Miscellaneous

17. No comments were provided under the Observation section of this report regarding windows. The exposed casings/trim at the exterior façade were found to be well weathered; however, where probed, the woodwork was found to be sound. Painting and caulking of the windows is required.
18. No comments were provided under the Observation section of this report regarding the steel fire escape. In general, the fire escape was found to be in good condition with evidence of only light rust. It is recommended that the fire escape be cleaned and painted. It is also recommended that, where attached to the building, the points of attachment be adequately caulked to inhibit water intrusion.
19. Open joints were noted in the dentil trim surrounding the building. All joints should be adequately sealed to limit water intrusion and inhibit decay.

Please note that although Marino Structural Solutions has reviewed the structure as outlined under our agreement, this review is not an exhaustive review of each individual building component and area; additional deficiencies may exist that were not discovered. No guarantees are expressed or implied. Marino Structural Solutions reserves the right to amend the opinions expressed above should new or additional information become available.

If you have any questions or wish to discuss the matter further, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink that reads "Nicholas Marino". The signature is fluid and cursive, with the first name "Nicholas" and last name "Marino" clearly distinguishable.

Nicholas Marino, P.E.  
Professional Engineer  
N.J.P.E. Lic. #39992