

## ENGINEERING REPORT

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March 31, 2023

Mayor Garrett Jones and the Caldwell Borough Council  
Borough of Caldwell  
24c Smull Avenue  
Caldwell, NJ 07006



Re: Structural Review of Existing Building  
Caldwell Public Library  
268 Bloomfield Avenue, Caldwell, NJ  
KSI Project Number 2300\_50

Dear Mayor Garrett Jones and the Caldwell Borough Council,

Pursuant to your request we performed a site visit to the above referenced building on March 10, 2023 to review the existing structural condition. It was our understanding the building was recently flooded and there were general structural concerns with the structure. The purpose of our review was to document the readily observable structural deficiencies and provide written recommendations for repair. It was also our understanding the building was being considered for municipal re-use or demolition and replaced with a new building. At the time of our site visit, the building was no longer in use. For directional purposes of this report, the building side facing Bloomfield Avenue is the North side.

### **BUILDING DESCRIPTION:**

The building was a one-story building with a basement. Per the datestone located on the front of the building, the library was constructed around in the early 20th century. There was also a later addition(s) located to the east and south of the original structure. The original building was located along Bloomfield Ave and featured the main building entry from street level. Directly to the south of this structure, it appeared there was another building section of similar age; however, there were differences in floor construction, which indicated it was an addition or was retrofitted at one point in time.

To the east, there was a newer addition, which appeared to have been constructed in the late 1970's or early 1908's. Existing addition drawings were provided to our office and were prepared by Calvin M. Colabella Architect dated November 17, 1978.

The original building's floor framing was constructed with true 2x12 floor joists spaced at 16" on center. The joists were supported by the basement's brick masonry walls located around the building's perimeter. The interior joist supports consisted of a combination of wood stud walls, CMU walls, and a dropped steel beam. It was our understanding the steel beam header and CMU walls were added after a previous flood.

The original building's roof framing was not observable due concealment by the ceiling finishes. The ceiling had dropped acoustical panels, but there was a drywall or a plaster ceiling located above it. However, it appeared there were two main dropped girders spanning in the north-south direction of the building. Over the girders, it appeared there were wood rafters spanning in the east-west direction, but this could not be verified.

The exterior walls of the original building were constructed of multiwythe brick masonry construction with an approximate thickness of 12" located at the first-floor level. The basement wall thickness was not verified but was of similar brick masonry construction.

To the south of the entry structure, the framing was completely concealed by the finishes. From the exterior, it had similar architectural features as the north end but window styles and headers were different, which suggested this section may have been built after the original section of the building. Furthermore, one large difference between the north and south structures was the first-floor construction type. The floor framing appeared to be concrete structural slab or was some type of structure with a concrete topping over the top. There did not appear to be any readily observable defects in the floor framing.

The east addition's roof construction consisted of 1-1/2" metal deck over 18 deep open-web steel bar joists spaced at 4-5ft on center. The joists spanned in the north-south direction and were supported on the load bearing perimeter CMU masonry walls. In general, the roof framing was in fair condition with the exception of water deterioration in one section as noted below.

The east addition first floor framing consisted of 8" deep precast concrete plank with a 2" concrete topping, which appeared to be in fair condition. The basement walls were constructed of 12" CMU masonry.

### **INTERIOR OBSERVATIONS & RECOMMENDATIONS:**

According the basement wall stain line, the flood water surged to roughly 5 feet above the basement slab. At the time of our site visit, the drywall finishes in the basement were removed. Since the existing basement walls were masonry construction, the water did not appear to do any observable damage to the masonry. However, there were some wood bearing walls in the basement, which is an area of concern (Photo #29). These walls were located in the original building's basement section. Some walls were swapped out with newer light gage wall but other wood walls, which appeared load bearing, remained. These walls are vulnerable to basement water damaged and is recommended to be removed and replaced with more robust, water-resistant construction.

In addition, the bearing wall layout will require further review. There were some sections of 2x12 floor joists spanning excessively far and may require new intermediate supports and/or wood sistering in order to comply with the code required library live loads.

Also noted in the basement, there was a horizontal crack between a window and wall mounted AC unit (Photo #31). It did not appear this was crack was the result of the flood; however, it will require repairs. The cracked wall may have to be braced by a new masonry/concrete pilaster or steel column brace. The pilaster or vertical steel brace would be located on the interior side of the basement wall.

The first-floor joist tongue and groove subfloor had multiple missing or damaged floor sections (Photos #15, #16, & #17). Due to the extensive damage and unlevel surface, it is recommended to remove and replace the existing subfloor and replace it with a new plywood subfloor.

The exterior walls had severe horizontal cracking located just below the roof line along the south and west walls of the southwest section of the building (Photos #21, #22, & #23). The walls were also severely water damaged in these sections. There were signs of efflorescence and/or mold. It appeared there is ongoing water infiltration issues from the roof and/or parapet flashing. KSI was not able to access the roof to comment on the condition of the roof above. Based on the wall damage, significant wall repairs will be required. It is our recommendation the top several feet of wall may need to be rebuilt with a combination of new CMU on the inside face and new or salvaged brick located on the outside face to match the existing construction. This would be disruptive to the existing roofing membrane, which may require replacement anyway.

The east addition roof was water damaged from an existing or ongoing roof leak (Photo #25). The metal roof deck had significant section loss and will require selective replacement with new metal deck similar in kind. There was a makeshift funnel and hose being used to catch the leak. We recommend an architect and licensed roof contractor to review the roof in its entirety to ensure there is positive drainage and to provide recommendations for roof replacement.

#### **EXTERIOR OBSERVATIONS & RECOMMENDATIONS:**

The front entry stairs and ramps were severely damaged and require removal and replacement (Photos #11 & 12). For the reconstruction, the foundations may be able to be re-used, provided the new stair and ramp layout would be the same footprint and if footing probes reveal the footings are of sufficient size and depth. Otherwise, the foundations may have to be completely removed and replaced. Per conversations on site, some of the damaged was caused by recent DPW work. The rear ramp had some damage to the connecting sidewalk slab, and may require selective reconstruction where the ramp meets the sidewalk (Photo #6).

The steel lintels above the windows had signs of surface deterioration and will require repair (Photo #9) located at southwest section of the building. Weep holes, which provide water drainage from behind the brick to escape, were not present. We recommend cleaning of the rust and painting the steel in order to prolong the life of the lintels. We also recommend the flashing to be further reviewed by a licensed architect. This would require some investigative demolition in select lintel locations. We recommend weep holes to be installed in conjunction with any waterproofing/flashing details recommended by the architect.

Lastly, the east addition façade had stepped cracking on the south face (Photo #10). The crack width ranged from hairline to 1/8" wide. The crack is indicative of settlement, but was only apparent in a 3-4 wide section of wall. We recommend periodic monitoring of the crack width to see if worsens. If it does, we recommend further review by KSI for foundation repair options.

**SUMMARY:**

The building will require miscellaneous structural repairs throughout the building (as noted above) in order restore the building to a safe working condition. The repair to the mechanical, electrical and plumbing systems will require a significant overall and should be reviewed by a NJ licensed MEP engineer. Also, we recommend the services of a NJ licensed architect to determine the best options for re-use, adaptive reuse, or reconstruction. The cost of the structural, MEP, and architectural repairs for this building can be significant. The economic feasibility of repair vs. replacement shall be further studied in conjunction with practical use of the current building layout. At this time, KSI can only comment on the extent of repairs required for the current use. However, KSI can further consult on the repair, renovation or reconstruction options once a more defined building use and layout is determined.

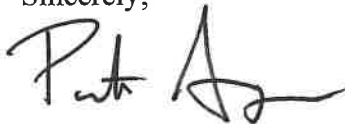
From our conversations on site, it is our understanding the most recent flooding was not the only flooding the building has experienced. Unless measures are taken to redirect exterior water away from the building, it will continue to flood. Floodproofing work could be investigated as an option; however, the basement walls and slab were not designed to resist the lateral and buoyancy flood forces. Given the height of the recent flood water, these forces would be significantly high. It may not be structurally and economically feasible to retrofit the building for this water management method.

One possible option for the building would be to restrict use of the basement and leave it strictly as a mechanical basement. However, any mechanical equipment or storage would have to be elevated given the risk of flooding, and this would severely limit the occupancy use of the building.

There were also discussions about adding another level to the existing building. However, based on our review, the existing masonry walls would not be suitable to support another story in order to simply "build up". An alternate and common approach to build up without relying on the existing walls is to build steel framed structure/platform to be built inboard of the existing exterior walls. This structure would require many new columns, footings and steel diagonal bracing throughout the building, which could limit floor plan use. It is an expensive option and shall be considered in the repair vs reconstruction study for the building.

Our observations and recommendations are based on our visual review of the exposed areas of the framing and our experience reviewing this type of construction. We performed limited calculations concerning the existing framing and offer no guarantee or warranty for any part of the existing building. If you have any questions or need clarification, please do not hesitate to contact us.

Sincerely,



Peter J. Aragon, P.E.

NJ Professional Engineer License Number 051243



Photo #1 – Front Entry of Building



Photo #2 – East Addition – Front.

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www.ksl-pe.com

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Verona, NJ 07044  
Phone: 973.577.7739

P.O. Box 628  
Farmingdale, NJ 07727  
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Photo #3 – West View of Building.



Photo #4 – West View of Building.

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Photo #5 – Southwest View of Building.



Photo #6 – South Entry Ramp.

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Photo #7 – Rear View of Building – Zoomed Out.



Photo #8 – Rear View of Building.

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Photo #9 – Deteriorated Steel Lintels over Windows.

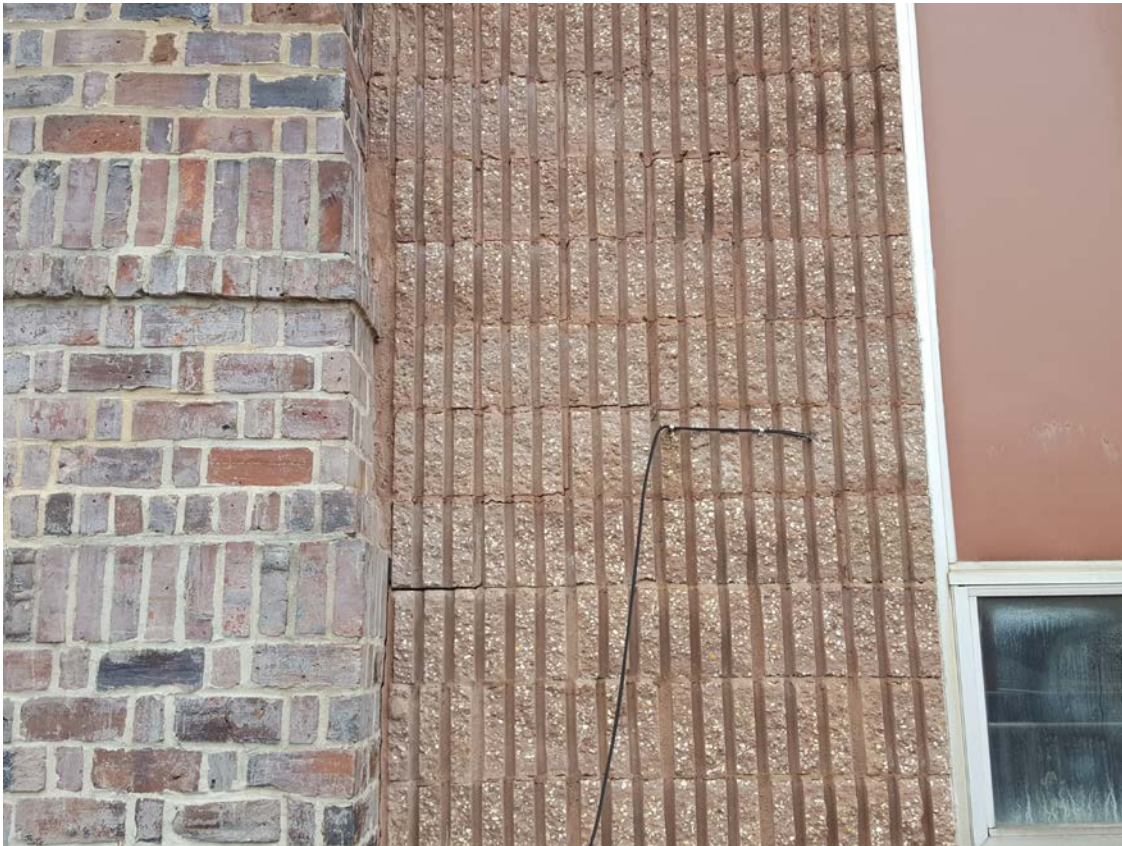


Photo #10 – Stepped Cracking in Façade.



Photo #11 – Damaged Front Entry Steps, Guardrail & Ramp.



Photo #12 – Damaged Front Entry Ramp.

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Photo #13 – Interior View of Main Entry – North Side.



Photo #14 – Interior View of Space, Looking towards South Addition.

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*Photo #15 – Floor Transition from Original Structure to Addition.*



*Photo #16 – Damaged Floor Sheathing Sporadic Throughout Wood First Floor.*

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*Photo #17 – Opening in Floor with Miscellaneous Blocking & Loose Plywood Covering.*



*Photo #18 – Rear Addition Space – First Floor.*

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Photo #19 – Ceiling Cavity over Original Building – Dropped Beam 1 of 2.



Photo #20 – Moisture Damage of Interior Finish/Paint Located at Southwest Section.

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Photo #21 – High Moisture Damage above Photo #20.



Photo #22 – Horizontal Masonry Cracking at Southwest Section – Located at South Wall.

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*Photo #23 – Horizontal Masonry Cracking at Southwest Section – Located at West Wall.*



*Photo #24 – Typical Roof Construction at East Addition.*



Photo #25 – Deteriorated Metal Roof Deck Plus Makeshift Drain & Hose.



Photo #26 – Basement Level – Looking Southwest.

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*Photo #27 – Precast Concrete Plank at East Addition.*



*Photo #28 – Newer CMU Wall Near Entry of Original Building.*

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Photo #29 – Wood Bearing Wall at Northeast Corner of Original Building.



Photo #30 – Newer Steel Beam Supporting Wood Joists Above – Basement Northeast Section.

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*Photo #31 – Horizontal Cracking Between Basement Openings – East Side.*

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