TORELLO ENGINEERS
DESIGN - INVESTIGATION - INSPECTION

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December 14, 2020

Josh Redacted
3 Avenue La
Anytown, CT 064

RE: 3 Avenue La, Anytown, CT.

Mr. Redacted,

On December 10, 2020 we visited the above referenced location to visually assess the existing residential structure for signs of any significant structural damage and/or distress. This inspection was limited to structural components accessible at the time of the inspection. The following were our findings:

OBSERVATIONS

GENERAL

The subject structure is a 1764 built, approximately 3,400 sq. ft. colonial style single family home with a stone / poured concrete foundation and peaked roofs. A full basement exists beneath the western portion of the structure, and a partial full height basement and crawlspace to the east.

EXTERIOR SITE DRAINAGE AND GRADING

The grading on the north and south side of the structure appeared appropriate, however the grade to the east and west sides should be improved. (Key Plan Observation Item #2) Currently, grading may water toward the foundation at low areas surrounding the structure.

At the west side of the structure there is a large un-mortared brick patio area which is flat or pitched slightly toward the structure. This may allow water to be directed toward the structure.

Many of the existing downspouts have been extended to deliver water away from the foundation, however two of these extensions were observed to be clogged. (Key Plan Observation Item #1)

Basement window wells are low; current surrounds may direct water into the basement.

Signs of water entry were noted at the exterior stair hatch leading to the basement. Water is being delivered to the wall sill at this location.

FOUNDATION

The foundation for the main structure is mortared stone, varying in width – wider at the base than at the top where it was measured at approximately 16”. Some portions of the stone foundation have been parged.

In general, the mortar for this foundation is in need of attention. Voids and cracks exist in the existing mortar along all walls. In areas the mortar has failed and can be seen on the basement floor. (Key Plan Observation Item #6) In one area, it appears mortar has been removed in a possible start to re-pointing.

At the rear addition, a small section of the foundation wall beneath the rear entry door has deteriorated. (Key Plan Observation Item #7) The perimeter beam is deflecting where it spans across the unsupported area.

Efflorescence and other signs of water entry were observed in many portions of the foundation, with the most severe being along the foundation west wall. (Key Plan Observation Item #5)

In the southwest corner mortar for the foundation is soft, wet, and disintegrating. Evidence of heavy water infiltration was observed in this area. Portions of the west foundation wall were visibly wet, and water infiltration has affected the base of this wall. A portion of the western wall is undermined, stones are missing from the base of this wall. (Key Plan Observation Item #9)

Cracks were observed in the foundation for the southern chimney. Prominent cracks exist in both the southeast and northwest corners of this chimney’s foundation, an indication that settlement or movement has occurred at some time in this chimney. This settlement has allowed some bricks for the hearth above to separate. (Key Plan Observation Item #7, #8)

A section of the northern foundation wall has been removed to facilitate the installation of an exterior access stairway. The perimeter beam now spans the opening at this location, however, over the opening a splice exists in the perimeter beam. An attempt was made to reinforce this splice with the addition of a material to this beam. The beam is deflecting around the spliced area, and not properly supported.

In the northeast corner, horizontal and diagonal cracks were observed in a small section of the north foundation wall. This section exists to the east of the opening which was cut through the north wall for the exterior stairs. This area of the foundation has had a heavy cementitious coating added to the interior.

FIRST FLOOR - FLOOR FRAMING

The first floor – floor framing was exposed for inspection from the basement area. The eastern portion of the main house is framed with original log beams and floor joists, typical for this era construction. Insect damage was observed in many of the original timbers framing this section of the structure. Portions of the western half of the first floor have been re-framed since original construction.

Eastern Section

Deflections of the original framing were observed, as well as a series of adjustable columns supporting various portions of the floor framing in this area. (Key Plan Observation Item #10) Partial beams have been installed reducing the effective spans of the floor joists in this area; however these beams do not support every joist in this area, and the un-reinforced section deflects noticeably underfoot on the first floor level. (Key Plan Observation Item #12) Partial beams have been constructed in a “T” configuration using only one column for support.

In this portion of the structure, many of the mortise and tenon style connections of the floor joists and intermediate beams to the perimeter beam, which sits atop the east foundation wall, have failed. Joists have pulled away from the perimeter beam due to deflection. Insect damage has affected many of these connections. Temporary supports have been added at some locations to prevent complete failure. (Key Plan Observation Item #3)

Some of the larger beams in the floor system have concerning deterioration from insect activity. An attempt to sister these beams has been made with what appears to be tongue-and-groove flooring sections. Limited probing of these beams revealed several locations where the structural integrity may be compromised. (Key Plan Observation Item #4)

The attachment at the top of the stairs is failing. The stair stringers have been nailed into original wood timbers which have been compromised by insect damage. The nails used have caused one stair stringer to split. These stairs have a noticeable slant from side to side, and the top individual stairs also slant downward, creating an uneven and dangerous condition. (Key Plan Observation Item #11)

Western Section

The western portion of the basement consists of one full height room to the south, and two crawl space areas.

In the full height room, two brick piers were added at some point to provide additional support for the hearth area above. These piers are not properly mortared together, and are out of plumb. Temporary supports have been incorrectly added in this area in an attempt to stiffen the floor above. (Key Plan Observation Item #10)

In the southern crawlspace, the first floor – floor framing has been more recently replaced. Framing in this area is comprised of double 2x members. In one area, these joists are improperly supported by a “T” configuration beam and column with no footing. (Key Plan Observation Item #10) Other framing connections in this area appeared adequate.

In the northern crawlspace, both original and newer framing exists. Support for one small beam at the hearth framing is improperly supported by a single adjustable column. (Key Plan Observation Item #10) A brick pier which supports one section of framing in this area is not properly mortared together, and out of plumb.

SECOND FLOOR FRAMING

Much of the second floor – floor framing itself was restricted from view due to installed finishes. Finished rooms on the first and second floor were inspected for signs of structural distress.

In the large room which comprises the south end of the first floor, a noticeable deflection was observed at the ceiling level of the east wall. The ceiling along the east wall deflects downward from the corners of the room to a central point where a beam intersects a post at the perimeter framing. Finish paint was cracked and displaced showing the beam has deflected downward at this intersection. (Key Plan Observation Item #13) The east wall is bowing outward at the first floor level.

Inspection of the sill area beneath this post showed signs of slight deterioration, however this did not reflect the much larger deflection at the first floor ceiling level. The beam connection to the post has likely failed in the wall at this location, and the beam is settling downward without the proper support. This was further evidenced by noticeable deflections in this area of the second floor - floor system when traversed, and cracks in the drywall above. (Key Plan Observation Item #14, #15)

ROOF FRAMING

A limited inspection of the roof framing was performed from the attic area. Flooring was not installed in the attic, restricting access to some areas.

The roof framing for the main roof consists of a series of both larger diameter and smaller diameter log rafters, spaced between approximately 36” and 44” apart. Mid-span beams are connected to the larger rafters, providing support for the other, intermediate smaller rafters in the system. Deflections were observed in the rafters of this system. (Key Plan Observation Item #16)

The mid-span beams have also deflected, and the connection to the larger rafters has pulled apart substantially. Connections of rafters at the ridge exhibit signs of separating. Collar ties have been installed at some roof rafters, however are not installed throughout.

An almost full length dormer has been added to the east section of the roof. The dormer headers appear improperly constructed and exhibit signs of excessive deflection. (Key Plan Observation Item #17)

RECOMMENDATIONS

SITE DRAINAGE AND GRADING

Grading should be modified to provide a minimum 5% slope away from the building. The brick patio at the western side of the structure is leading water toward the foundation as evidenced by the water infiltration in the basement through the foundation walls. This patio will should be removed and the grade reconfigured providing the minimum required slope. The patio can then be re-constructed in a way that leads water away from the structure.

All drainage systems, gutter systems and downspouts should be cleaned out and have their functionality verified.

Surrounds around window wells should be raised if possible.

The hatch to the basement stairs should be sealed to prevent water entry.

FOUNDATION

Efflorescence and water entry can be reduced by completing re-grading recommendations listed above.

All foundation walls for this structure will require re-pointing. A qualified mason should be consulted to determine the extent of failed mortar, remove as necessary, and re-point the entire foundation. **Of particular concern is the undermined portion of the west foundation wall.*** At the time of inspection, the upper section of this wall has not become affected, however, if this condition is not corrected, may lead to significant failure of this wall. Mitigation of the water conditions on the exterior of this wall by re-grading the front patio or otherwise re-directing runoff water will be key in preventing continuation of this deterioration.

The deteriorated section of foundation wall beneath the rear entry should be re-built and re-pointed as required.

The settlement in the foundation for the south chimney are likely related to movements in the loosely, or non-mortared stone. **Both chimneys should be re-mortared by a qualified mason, with experience in repairing stone foundations of this era.***

The splice above the opening for the exterior basement stairs should be reinforced with the addition of an appropriately designed steel member.

The cracking in the heavily parged section of the north foundation wall is an indication that some movement has occurred in this section of the foundation wall. Interrupting this wall for the exterior stair passageway has lessened this wall's ability to support the weight of soil pressure applied to exterior. These cracks should be monitored, and if they increase in width, this wall may require additional support at the opening for the basement exterior stairway.

FIRST FLOOR - FLOOR FRAMING

<u>Eastern Section</u>

Temporary supports have been added in this area in an attempt to reduce the spans of deflected floor framing members in this area. The line of support is not continuous, and some beams are not properly supported. We would recommend the addition of proper columns, beams and footings creating a continuous line of support reducing the span of these original floors joists. All "T" configuration supports should be reconfigured providing two columns for support.

The connections at the east wall, as noted, are failing. The addition of a support line of properly designed beams and columns along the east wall to support floor framing is recommended.

All framing connections in this area should be inspected, as some mortise and tenon failures and connection failures were noted. Reinforcement of individual connections will be required. Improperly sistered beams will require proper sistering members designed and added. Extent of insect damage to framing members should be evaluated and members with extensive damage replaced.*

The basement interior stairs should be completely reconstructed. This stair is dangerous and use should be limited until corrected.*

Western Section

In the full height room, framing supported by the masonry piers should be temporarily supported, the piers removed and replaced with properly designed columns and footings.

In the southern crawlspace, the improperly supported beam will require the addition of properly designed columns and footing.

In the northern crawlspace, framing supported by the masonry pier should be temporarily supported, the pier removed and replaced with a properly designed column and footing. The small beam will require an additional support column and footing.

SECOND FLOOR FRAMING

The connection between a beam and post over the large room which comprises the south end of the first floor has failed. **Repair of this area will require extensive temporary shoring and removal of interior finishes in order to re-align and re-attach the exterior perimeter beam and the sagging interior beam. ***

ROOF FRAMING

To prevent undue settlements of the roof rafters and failure of the current support system, we recommend the sistering of existing roof rafters, and the addition of rafter between the existing rafters reducing the current spacing. Properly designed and installed rafter can eliminate the need for the center supporting beams in this system entirely, reducing additional deflections and preventing failure of this system.

The dormer areas should have a header added to the framing at the dormer roof junction, properly supported by additional framing.

Collar ties should then be added to every roof rafter in this system.

**** Indicates priority structural repair***

CONCLUSION

This report outlines a number of structural issues observed during our inspection, however the most important issues are the noted as priority items concerning fiorst floor framing, foundation issues, second floor beam to post connection, and basement stairs. The stairs are currently unsafe and use should be restricted until these issues are resolved.

It is our opinion that repairs to restore the structural integrity to the structure may not be able to correct already observed out of plumb or out of level conditions. Our repair recommendations are designed to stabilize the structure in place. Attempting to repair and straighten the east wall will cause some disruption to and damage to interior finishes.

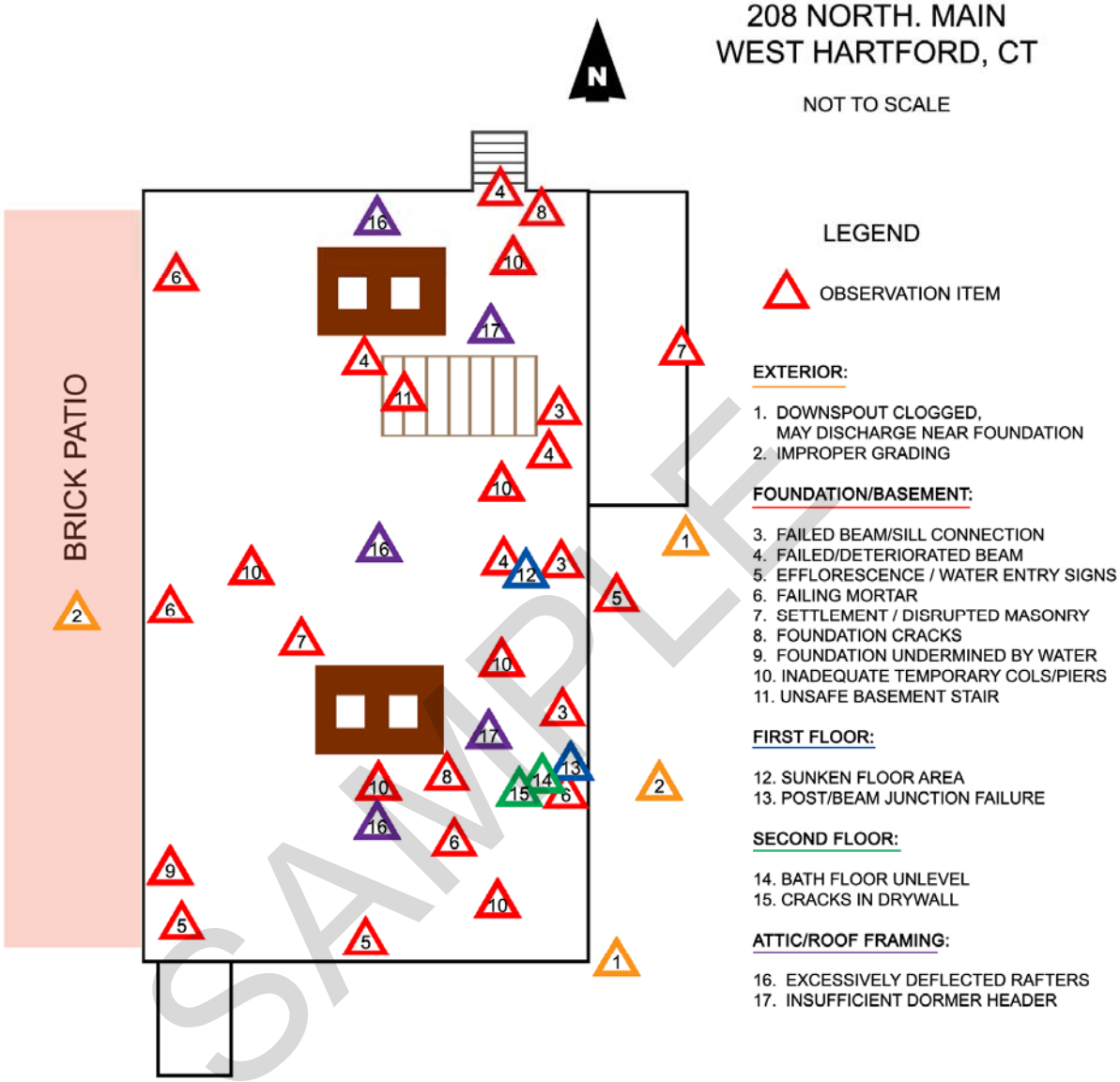
Our opinion of probable construction costs for the repairs recommended in this report is between $80,000 and $120,000. This is a preliminary estimation of probable costs and may vary greatly depending upon the contractor selected and other economic factors.

If you need any assistance in design of these repairs, do not hesitate to give us a call.

Respectfully Submitted,

Anthony Torello
Construction Inspector

Franklin Grussey. P.E.
Project Engineer



KEY PLAN

Overview of property.

Brick patio may direct water toward the structure.

Downspouts observed clogged in some locations.

Low windows wells may allow water entry into basement.

Re-pointing of the stone foundation is required.

Re-pointing of the stone foundation is required.
Some mortar is soft and deteriorated.

Water infiltration in the southwest corner has caused mortar failure.
A section of the wall has become undermined.

Cracks in the stone of the southern chimney foundation. (North face)

Separation of brick and un-mortared stone in southern chimney foundation. (North face)

Cracks in the stone of the southern chimney foundation. (South face)

Horizontal and diagonal cracks in foundation north wall, northeast corner.

Adjustable supports for non-continuous beams in basement.

“T” style supports – Beams supported by single columns.

Failed framing connection along foundation east wall, with added temporary support.

Failed framing connection along foundation east wall.

Improper / failing framing connection, first floor - floor framing.

Framing timber with insect damage, first floor - floor framing.

Failing connection at interior basement stair stringer.

Un-level basement stair connected to insect damaged framing.

Out-of-plumb, poorly mortared masonry piers.

Out-of-plumb, poorly mortared masonry piers.

Southern crawlspace – poorly supported beam.

Northern crawlspace – Poorly supported beam,
Out-of-plumb, poorly mortared masonry piers,
Masonry re-pointing required.

Deflection at failed beam to post connection at the first floor ceiling.

Deflection at failed beam to post connection at the first floor ceiling.

Roof framing visible from attic.

Attic - Failing connection between mid-span beam and roof rafter.

Dormer roof constructed without header.