Limited Structural Engineering Services Report
511 Minnehaha Avenue East, St. Paul, Minnesota 55130
SRC Project No. SRC24-302
January 2, 2025
for
Jerry Brashier

Report Certification Page

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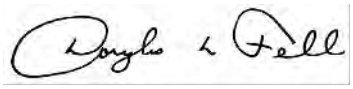
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.
Signature:



Typed or Printed Name: Douglas L. Fell

Date: 01-02-2025 License No. 16176

Certified attachments as part of this report: **Image #2 - Image #33 on page 20 – page 33.**

Mr. Jerry Brashier
511 Minnehaha Avenue East
St. Paul, Minnesota 55130
Mobile Phone: (612) 385-8707
Email: tghardyviv@gmail.com

RE: Limited Structural Engineering Services Report
Building location: 511 Minnehaha Avenue East, St. Paul, Minnesota 55130
Via: Emailed this date.

Dear Mr. Brashier:

Per our December 11, 2024, consulting agreement accepted by you on that date, and your authorization, Structural Resource Center LLC (**SRC**) has been retained by you, (**CLIENT**) to provide structural engineering services relating to the multi-family residential property identified above. See **Image #1** for the front of the structure. You are the owner of the property.

Image #1	~~SRC 6181~~	Front

The existing building is a multi-family residential structure that you own. You were concerned about responding to the City of St. Paul December 10, 2024, letter to you regarding a listing of items that need to be structurally evaluated, and you would like a structural engineer licensed in the state of Minnesota to evaluate the condition of the structure relating to those areas.

SRC provided limited structural engineering evaluation services of the structure at the address listed above that you wanted to know the general structural conditions of those areas listed in the City letter (items 1,3,4,5, and 7) on a pass/fail basis. The goal was to make a condition determination of the structure as-is and to determine if the conditions of those areas are sufficient to make a condition determination or determine if additional evaluation is required to make that determination or if there are concerns about the structure relating to that area. This is an evaluation only that provides generalization concepts of how to proceed and is not the design of any structure required to repair the areas or any other repair or remodeling.

SRC made a site observation visit and reviewed other information provided by you (general building information, other engineering reports, contractor work, etc. if provided prior to the release of the report draft, and if stated within this report) for information that may assist with this limited evaluation. This report is limited to the specific areas listed herein only. No other areas of the structure were evaluated and should not be assumed to have been evaluated unless specifically addressed within this report. Any deficiencies outside of the specific scope area not mentioned in this report does not mean that it is structurally acceptable, it should be taken that it was not evaluated.

SRC generated this limited structural "condition evaluation report" for this work. It documents the primary structural aspects and conditions of this area. This report represents the summary of my findings.

Site Observation:

I performed the site observations on Friday, December 20, 2024, starting at about 11:00 a.m. and ending at about 12:05 p.m. You were present for the site visit. No previous or subsequent site visits were performed by **SRC** relating to this work. Photos and rough measurements and field notes were taken, and general observations were made at this site visit. My findings were shared verbally with you at the site visit.

General Information, Conditions, Comments and Recommendations:

1. This structural evaluation was limited to the areas defined within this report only.
2. You said the items listed in the city letter (items 1,3,4,5, and 7) is why you wanted a structural engineer to perform the structural evaluation. This was the primary focus area of the site visit and evaluation.
3. You said that the city is intending to have you remove the occupants if you do not comply with some of the repairs of the structure, especially those relating to the condition of the back deck which is a means of egress for the tenants of the upper level.
4. You said that you bought the building in 2017.
5. You said that the deck existed when you bought the building. You also said that you are intending to replace the existing deck entirely with a new deck and deck foundations in the summer to fall of 2025.
6. You said that a new roof was installed before you purchased the property.
7. It appears the structure was built around 1900.
8. The house is a two story structure with a basement which you told me is a four-plex apartment building. You said that you currently reside in the building.
9. I am not sure if you had a general home inspection performed prior to purchasing the property. A general home inspection report was not presented to me prior to this report being compiled.
10. The structure appears to be relatively true to magnetic compass lines. For the purposes of this report, I will call the front side of the structure (the side with the front entry door), the side facing Minnehaha Avenue East, the south side. As you face the front of the building with your back to Minnehaha Avenue East, the right side of the structure is the east side of the structure, the left side of the structure is the west side of the structure, and the side opposite the front is the back or rear of the structure which faces north. See **Image #1** for a front view of the structure. **This orientation of front/back/left/right relative to the overall structure layout defined herein is used throughout this report.**
11. The current building code is the 2020 Minnesota State Building Code, (MSBC), effective March 31, 2020. See https://www.dli.mn.gov/business/codes-and-laws/2020-minnesota-state-building-codes for various Minnesota building code information and see

https://codes.iccsafe.org/content/MNRC2020P1 for the current residential building code information.

12. There were no other materials submitted to me regarding this project for review prior to writing this report unless noted otherwise in this report.
13. Any crawl space entrance, any attic entrance and rooftop access were excluded from the scope of this work unless noted otherwise in this report.
14. Lifts and/or ladders were not utilized for this observation other than as noted otherwise within this report.
15. This evaluation does not include a code compliance evaluation or structural capacity verifications/calculations or repairs of the existing structure or any noted damage.
16. This evaluation performed by SRC is limited to visible surfaces only.
17. There was no destructive testing equipment or procedures used or dismantling of finishes performed by SRC in performance of this evaluation.
18. We do not have any design and/or construction documents for this building, either for the original construction or for any additions or renovations.
19. The following observations were made at the site visit:
    A. I have examined the digital photos and video that I took at the site visit prior to writing this report.
    B. The general neighborhood adjacent to your site appeared to be relatively flat. The general site also was relatively flat. There were some areas adjacent to the structure that did appear relatively flat or low around the structure. Maintain good surface water management systems to keep the water away from the foundation systems.
    C. There were gutters and downspouts on the back of the structure. The downspout extension on the back right corner was not attached allowing the discharge to occur directly at the corner of the structure. This extension should be attached and allow the discharge to occur away from the foundation wall. I highly recommend gutters and downspouts with appropriate downspout extensions and gutter covers to control the roof moisture (snow melt and rain) and keep the soils adjacent to the foundation wall dry. Wet soils adjacent to the basement walls increases the potential for water infiltration and damage to the foundation wall.
    D. There does not appear to be any large trees that are very close to the foundation walls.
    E. Keep at least 6” of distance between the ground surface and the siding and wall framing to reduce the potential of moisture intrusion and insects getting into the framing.
    F. The observations were primarily limited to the exterior of the structure, the exterior of the foundations and the back deck area.
    G. The observations began at the front and sides of the main structure and moved to the back deck and stairway area.
    H. The building had a brick facade on the exterior of all sides of the building. You told me that there was wood framing, lath and plaster on the interior of the building behind the brick.
    I. The foundation walls were constructed of limestone. Typically, the mortars used in this type of construction were very soft and allowed for some minor movements of the wall without significant cracking. The patching appeared to be more of a modern cement

mixture that may be more brittle and may crack rather than move with the wall thermal and moisture expansion and contraction.

J. The overall appearance of the foundation walls appeared to be generally good with minimum wall cracking or signs of moisture, except as noted elsewhere in this report. There was a lot of patching of the exterior of the foundation wall with a concrete type patching material. The foundation walls do appear to require additional patching and/or sealing to reduce the potential of further degradation of the foundation walls. This should be performed as part of the general building maintenance as soon as reasonably possible to extend the life of the foundation wall. We discussed the option of installing an insulated covering over the exterior face of the foundation wall to reduce the potential of moisture intrusion. Example materials are shown at the end of the image section of this report.

K. Efflorescence was present on some of the exterior of the foundation walls. Efflorescence indicates the presence of moisture. Sealing the walls and reducing the potential of moisture against the outside of the foundation wall may help with reducing the potential infiltration of moisture through the walls. I recommend that use of a high quality basement waterproofing paint on the inside surface of the basement walls to assist in the reduction of potential moisture infiltration.

L. Some of the exterior bricks have some gaps in the mortar joints with missing mortar. General maintenance of the exterior brick should be performed (tuckpointing) to extend the life of the brick exterior.

M. The roof edge cap flashing on the left and right side appears to be loose and should be fastened to the wall to reduce the potential of moisture infiltration into the areas around the wall and to reduce the potential of wind damage to the roofing edge material. This should be done as soon as reasonably practicable.

N. The deck framing consisted of double 2x12 drop beams on the front and back edge of the upper deck spanning parallel to the back wall of the building with 2x8 joists spaced at approximately 16” on center spanning from the front to the back of the upper deck. The beam members were bearing over the top of the 6x6 nominal posts on a notched ledge of the top of the post, so the beam members were flush with the front and back face of the posts and the beam members were bolted to the remaining post material that was between the two beam framing members.

O. The decking was constructed of 6x6 nominal wood posts bearing on 12” diameter concrete piers. I do not know the depth of the piers (to provide adequate frost protection to reduce the potential of frost heave) or if they are flared/belled at the base of the concrete pier to provide additional soil bearing capacity. Based upon the 12” diameter of the concrete pier alone, the piers appear to be adequate (utilizing 1,500 PSF allowable soil bearing pressure) for the given building code required deck live loads (40 PSF live load for decks) and dead loads with some slightly higher soil bearing pressures at the posts located at the back edge of the deck near the stairway attachment.

P. Some of the posts were eccentric to the center of the concrete piers. The condition of the piers, the posts and the framing supported by the posts appear to be performing well. This condition should continue to be monitored by the structure owner as part of a routine

structure monitoring program for signs of changes (cracking, settlement, etc.), and take appropriate steps (contact a licensed professional engineer (structural), if changes are noticed.

Q. The dimensions of the deck were taken at the site visit, and the beams, posts and joists were reviewed for structural capacity and found to be acceptable for the given loads and conditions.

R. Some of the railings of the deck are loose and should be fastened according to the requirements of the building code.

S. You said you were going to get the building permit records to determine if there was any information on when the deck was built and any other information on the building drawings of the deck. While this is good information to have, it may not confirm exactly how the deck was constructed.

T. I was concerned about the ledger board attachment to the main structure. I could see some of the bolts from the ledger board to the main building, but I did not know what type of fasteners were used, what spacing, the diameter or length of the fasteners, and if the fasteners were just fastened to the brick façade or to the framing behind the brick façade. The main concern was if the fastener was only fastened to the brick, the brick may pull away from the backup framing depending on how the brick was fastened to the backup material and the condition of the connection. I was most concerned about the deck lateral bracing in the front to back direction of the upper deck. See elsewhere in this report for information relating to the lateral bracing of the upper deck.

U. The structure should continue to be monitored by the structure owner as part of a routine structure monitoring program for signs of changes (cracking, settlement, bowing, signs of moisture, etc.), and take appropriate steps (contact a licensed professional engineer (structural), if changes are noticed.

V. See individual images for additional comments.

20. "**SRC ####**" shown on the images is the SRC camera image number. This is provided for internal SRC purposes of referencing the camera image relative to the image number stated within the report.
21. See **Image #2** for a view of the exterior of the front left corner of the structure taken from the front looking towards the front left corner of the structure.
22. See **Image #3** for a view of the exterior of the front right corner of the structure taken from the front looking towards the front right corner of the structure.
23. See **Image #4** for a view of the top of the front left corner of the structure. It appears that some of the brick window openings had wood framing on the interior of the opening to allow for a smaller window. Some of that wood framing appeared to need some repair work and painting. There also appeared to be a horizontal band of wood framing just above the main level window openings where there may have been a previous roof or canopy. There does appear to be a flashing above the wood band which further supports that there was a previous roof or canopy. Some of that horizontal wood band needs some repair work, sealants and paint. Some of the brick work below the upper windows appears to need some sealants and/or patching.

24. See **Image #5** for a view of the top of the front right corner of the structure. See the previous image for comments that may apply to this image.
25. See **Image #6** for a view of the bottom of the front left corner of the structure. See the previous images of the front for comments that may apply to this image. There is also a horizontal wood band just above the foundation wall that may have been a previous deck or porch floor.
26. See **Image #7** for a view of the bottom of the front right corner of the structure. See the previous images of the front for comments that may apply to this image. There is also a horizontal wood band just above the foundation wall that may have been a previous deck or porch floor.
27. See **Image #8** for a closer view of the bottom of the front left corner of the structure. This image is adjacent to the next image. There appears to have been considerable patching of the limestone foundation wall.
28. See **Image #9** for a view of the bottom of the front left of center of the structure adjacent to the front door. This image is adjacent to the previous image. There appears to have been considerable patching of the limestone foundation wall.
29. See **Image #10** for a view of the front end of the right side wall. This image is adjacent to the next image. There appears to have been considerable patching of the limestone foundation wall. There is also areas of missing mortar in the mortar joints that should be repaired (tuckpointed).
30. See **Image #11** for a view of the right side wall. This image is adjacent to the previous image, just further towards the back of the structure and adjacent to the next image. There appears to have been considerable patching of the limestone foundation wall.
31. See **Image #12** for a view of the right side wall. This image is adjacent to the previous image, just further towards the back of the structure. There appears to have been considerable patching of the limestone foundation wall.
32. See **Image #13** for a view of the back end of the right side wall of the structure.
33. See **Image #14** for a closer view of the top of the right side wall. This image shows the cap flashing of the wall is not secured to the top of the wall. The membrane under the cap flashing appears to be loose. The cap flashing should be repaired as soon as possible to reduce the potential of moisture intrusion into and around the wall area and to reduce the potential of roofing damage due to moisture intrusion and wind.
34. See **Image #15** for a view of the bottom of the front left corner of the structure showing the front end of the left wall. This image is adjacent to the previous image. There appears to have been considerable patching of the limestone foundation wall.
35. See **Image #16** for a view of the bottom of the left side wall. This image is taken looking towards the back of the structure and is adjacent to the previous image and is adjacent to the next image. There appears to have been considerable patching of the limestone foundation wall.
36. See **Image #17** for a view of the bottom of the left side wall. This image is taken looking towards the front end of the left wall of the structure and is adjacent to the previous image. There appears to have been considerable patching of the limestone foundation wall.
37. See **Image #18** for an overall view of the right end of the back deck and stairway. This image is taken from the back right corner of the property looking towards the back left corner of the structure.

38. See **Image #19** for an overall view of the right end of the back deck and stairway. This image is taken from the back left corner of the property looking towards the back right corner of the structure.
39. See **Image #20** for an overall view of the left end of the back deck and stairway. This image is taken from the back left corner of the property looking towards the back left corner of the structure.
40. See **Image #21** for a view of the beams adjacent to the building on double posts. This image shows how the beams bear upon the top of the posts.
41. See **Image #22** for a view of the ledger board and the lag bolts from the ledger board into the main building structure. I do not know the exact spacing, size or length of the bolts or if the bolts go into only the brick or into the building framing behind the brick. See elsewhere in this report for recommendations on lateral bracing of the deck.
42. See **Image #23** for a view of the deck floor framing including the drop beams and the floor joists. This view is taken from the back left side of the structure looking towards the right side of the structure.
43. See **Image #24** for a view of the back edge beam of the deck floor framing showing the drop beam and the joists bearing over the top of the beam and the stair framing into the deck.
44. See **Image #25** for a view of the base of the posts at the stair landing and at the back deck edge beam.
45. See **Image #26** for a view of the base of the posts at the first interior posts from the right.
46. See **Image #27** for a view of the second interior posts from the right side next to the building structure. A closer view of these post bases is shown in the next image.
47. See **Image #28** for a closer view of the second interior posts from the right side next to the building structure.
48. See **Image #29** for a view of the deck back right corner post on the concrete pier.
49. See **Image #30, Image #31 and Image #32** for a view of an example of a foundation wall exterior covering material (Styro Industries FP Ultra Lite 2' x 4' x 1" Natural Tan Aggregate Foundation Insulation Panel – courtesy of Menards). This is shown as a possible above grade foundation wall exterior covering. Verify applicability of installation with the manufacturer prior to purchasing or installation of this or any product.
50. See **Image #33** for “Sketch A” of the deck layout and recommended deck bracing.

Existing Building Drawings:

There was no existing structure building information of this area available for review. I do recommend to building owners that they make all reasonable attempts to obtain the exiting building documents including the original building drawings and specifications and any documents pertaining to any building additions and/or remodeling of the building structure. Possible sources for this information are the previous owners of the property, the City building department, the contractors that performed the work (sometimes the neighbors know who the contractors were), or other sources. These records may assist to determine the existing construction systems and materials that may reduce exploratory work and costs in the future.

I suggest that you get the building permit records from the city building department so that you know what permitted work was done and when and who may have done the work.

General Conclusions and Further Recommendations:

In my opinion, the overall visual structural condition of this structure appears to be generally good in the area of my observations with possible concerns listed within the observations of this report. See the "**General Information, Conditions, Comments and Recommendations"** section for additional comments and recommendations.

The original structure appears to have been there for over one hundred years. It has likely reached an equilibrium of loads being balanced and the rate of settlement significantly diminished. In my opinion, the condition of the structure appears to be currently stable, but I would suggest that the recommendations stated in this report be followed to confirm the stability of the structure.

Structural engineering responses to the City of St. Paul December 10, 2024, letter to you regarding a listing of items that need to be structurally evaluated, "DEFICIENCY LIST":

1. **Item(s) from letter:**
   Exterior - Foundation - SPLC 34.09 (2)(a), 34.33 (1)(a) - Provide and maintain foundation elements to adequately support this building at all points. -
   1) Mortar is soft, flaking, and damaged in multiple locations
   2) Mortar comes out in powder form when touched
   3) This work shall be done under permit, the work inspected, and the permit closed

   Structural Response:
   In my opinion, the general exterior condition of the foundation wall appeared to be adequate but should be patched and sealed as required to extend the life of the structure. See elsewhere in this report for additional comments on the condition of the foundation walls. In my opinion, the structural condition of this item is not severe enough to discontinue the occupancy of the building but does require additional work as stated to extend the usable life of the area.

3. **Item(s) from letter:**
   Exterior - Rear - SPLC 34.09 (3), 34.33(2) - Repair or replace the unsafe stairways, porch, decks, or railings in an approved manner. Every outside stair, porch and deck shall be constructed safely and shall be capable of supporting imposed loads as determined in the building code and shall be kept in a professional state of maintenance and repair with proper anchorage. This work may require a permit(s). Call DSI at (651) 266-8989.-
   1) Deck support beams are walking off and not centered on footings.

2) Floorboards are soft, cracked, water damaged, and uneven.
3) Beams and joists not properly installed.

Structural Response:
In my opinion, the overall structural condition of the deck framing appears to be adequate, except for the lateral bracing of the deck in the front to back direction as defined elsewhere within this report. Any localized damaged members, loose connections, etc. should be repaired according to the building code. See elsewhere in this report for additional comments on the condition of these items.

In my opinion, the structural condition of the lateral bracing of the upper deck and the stability of the stairway railings are serious enough to be required to allow the continued occupancy of the building.

4. **Item(s) from letter:**
Exterior - Roof - SPLC 34.09 (2)(b), 34.33 (1)(d) - Provide and maintained the roof weather tight and free from defects. -
1) Panels not properly installed, loose and crooked sections, visible separation between panels.
2) Visible gaps between panels and structure.
3) This work shall be done under permit, the work inspected, and the permit closed.

Structural Response:
The loose cap flashing on the side walls should be repaired as soon as reasonably possible as stated elsewhere in this report. In my opinion, the structural condition of this item is not severe enough to discontinue the occupancy of the building but does require additional work as stated to extend the usable life of the area.

5. **Item(s) from letter:**
Exterior - Walls - SPLC 34.09 (1)(2)(a), 34.33 (1)(b) - Provide and maintain all exterior walls free from holes and deterioration. All wood exterior unprotected surfaces must be painted or protected from the elements and maintained in a professional manner free from chipped or peeling paint. -
1) Trim boards along roof and front facia chipped and peeling paint, boards are water damaged or missing.
2) Exposed boards where facia and trim have been removed.
3) Holes and gaps in brick where trim boards have been removed.
4) Mortar is soft, damaged, cracked, and comes out in dust form when touched.
5) Cracks and visible gaps between bricks.
6) This work shall be done under permit, the work inspected, and the permit closed.

Structural Response:
General maintenance shall be performed on these items to provide adequate protection of the building structure. In my opinion, the structural condition of this item is not severe enough to discontinue the occupancy of the building but does require additional work as stated to extend the usable life of the area.

7. **Item(s) from letter:**
Exterior - Windows - SPLC 34.09 (4), 34.33 (3)- Repair and maintain the window in good condition. All windows shall be maintained in accordance with the building code in effect at the time of construction or as altered/modified under an approved building permit. -
1) Multiple windows with weather damage boards and trim.
2) Boards and trim are soft, cracked, swelled, or missing.
3) Cracked, chipped, and peeling paint.
4) Gaps between windows and/or boards and structure.
5) Windows have been boarded over and have chipped, cracked, and peeling paint or no paint.

Structural Response:
General maintenance shall be performed on these items to provide adequate protection of the building structure. In my opinion, the structural condition of this item is not severe enough to discontinue the occupancy of the building but does require additional work as stated to extend the usable life of the area.

In my opinion, based upon the information I have and my observations at the site and my engineering experience, the structural condition of the building exterior and deck appears to be acceptable except as noted within this report.

My primary structural concern is the lateral bracing of the upper deck in the front to back direction of the deck, potentially moving away from the primary building. This concern is based upon the unknown fastening system of the ledger board to the back wall of the structure to provide lateral bracing. I do not know if the fastening of the deck is to the exterior brick façade only or to the wood. We decided that you would add lateral bracing at the end posts at each end of the main upper deck level down to the base of the posts and add lateral bracing to the stair landing to reduce the potential of the deck and landing from pulling off the brick façade while bracing the deck in the front to back direction. In my opinion, the lateral bracing in the left to right direction should be adequate based upon the current framing of the deck and landing and stairway.

Fasten all bracing members to the posts with 5/16” diameter by 6” long mechanical fasteners (GRK brand RSS™ Rugged Structural Screws in placed 1½” from the top and the bottom and the edge of the members, stagger screws horizontally so they do not line up vertically. GRK brand JTS™ Joist and Truss Screws of similar diameter and length to the specified GRK brand RSS™ Rugged Structural Screws may be substituted. Install all fasteners per manufacturer’s requirements, including proper

length, edge distance and center to center spacing. A minimum of five (5) fasteners for each 2x8 brace to each post shall be installed, two rows of two (top and bottom) and a center fastener.

See the provided sketch for the approximate layout of the existing deck and the proposed framing of the lateral bracing.

All work shall be done according to the state of Minnesota building code.

I recommend that you monitor the movement and conditions of the foundation walls and take appropriate action (consult with a licensed professional engineer – structural) if additional movement, cracking, bowing, etc. of the walls are noticed. Control of the moisture around the foundation wall should help reduce the potential of future movements. Keeping the surface water away from the foundation areas is important and will likely extend the usable life of the foundation system.

It is common for foundation walls to form cracks due to a variety of reasons either initially when the wall is built or over time. It is the degree of the cracking and the activity of the crack that may be of concern if the crack is large and widening and if there are signs of moisture around the crack. Bowing of the wall may occur as the crack increases in size.

Foundation wall evaluations are based upon visual observations of the area around the foundation wall only. The soils and conditions adjacent to the foundation walls below the surface were not observed and may contribute to future performance of the foundation wall. Conditions may vary/change/worsen beyond the time of the site observations. Future additions and/or modifications in adjacent areas may be limited or restricted by the conditions stated within this report.

The weather conditions we have had over the past several years have been historically severe. We have had excessively high and low snowfall amounts and widely varying temperatures. This is on top of drought periods with excessive rainfall periods that may have affected the soils around the house and may have also contributed to the conditions.

Any cracks/joints between concrete surfaces and the foundation walls should be sealed with a high-quality elastomeric sealant (caulking) and monitor for future changes. A foam backing rod may be required to be installed into the gap to allow a surface for the caulking to rest against until it sets. Patching with cementitious materials may crack in the future rather than move with the structure. Example material: Brand: DAP, Manufacturer Part Number:18814, Sealant Base: Polyurethane, Application: Multipurpose, For Use on Surface Material: Aluminum; Asphalt; Concrete; Fiber Cement; Glass; Metal; Mortar; Plastic; PVC; Stone; Stucco; Vinyl; Wood; Working Time: 3 hours, Full Cure Time: 5 days. Example material: Brand: Sika Self-Leveling Sealant: No tooling required, levels itself, able to bridge gaps up to 1.5 in. wide, flexible and

durable, paintable, stainable and sandable, water immersible & waterproof after cure. This one component polyurethane sealant meets Federal Specification TT-S-00230C, Type 1, Class A. Meets ASTM C-920, Type S, Grade P, Class 25. Available in 10.1 fl. oz. and 29 fl. oz. cartridge.

Always consider if an area should be sealed/caulked or not before doing so. Some things are designed to drain/weep and should not be sealed (such as the top of metal flashing that is under siding). Water should be able to drain over the metal flashing and if that joint is sealed it may cause a dam that may hold moisture and cause moisture related issues.

Cracking of interior finishes may occur with this type of construction and era of structure. The type of repairs of finish cracking can vary and you may have to try several of them before you find one that works for the conditions. Do not use a spackling compound material for repairs of cracks as this is more appropriate for small holes such as nail holes only. Drywall mud can be used but it is very brittle and if the crack is at all active and possibly moving by changing loads or changing temperature and moisture conditions, it may crack again. A paintable elastomeric sealant (caulking) can be used to fill the cracks but may be more difficult to smooth out to hide the crack. The caulking will likely be able to tolerate slight movements at the crack area without having the crack open. Painting with a latex paint may also allow for some slight movement in the crack area better than a more brittle oil-based paint. For extreme movement and larger cracks, you may consider the use of a fiberglass mesh over the crack with drywall mud over it to reinforce the crack. For severe cracks consider replacing a portion of the wall finish (gypsum board or plaster) with new gypsum board or even a denser gypsum board such as a water resistive gypsum board with closely spaced screw type fasteners. If this is done, you should observe the framing behind the removed wall finish for soundness (no notches or large holes in framing members and for separation of the finish from the framing) and consider providing solid wood blocking between existing framing members to increase the stiffness of the framing in that area. Other options are also available and can be researched online.

I generally do not recommend the use of expanding foam spray for filling any cracks.
I generally do not recommend that significant measures be taken to lift or plumb any areas of the structure to repair settlement areas or tilting areas back to level of plumb. Lifting or plumbing may cause significant additional stresses upon the structure that may result in other more serious conditions. I normally recommend that other measures be taken to reduce the perception of the sloped areas or out-of-plumb areas such as modifying the trim around openings, provide a new leveled floor overlay system or pour a self-leveling topping where appropriate. Any lifting or plumbing efforts shall be the responsibility of the owner/contractor and is excluded from this report.
I typically do not recommend that the surface of the foundation walls be power washed as this can be very destructive to the foundation wall surface and can force water into places that it may not normally be able to get to and may take a very long time to dissipate (dry). There are many variations of power washing equipment available and operator experience is very important to the outcome of the process.

Absolute terms such as “permanent” “no”, “none”, never”, “ever” relating to structures cracking, tilting, bowing, settling, deflecting (sagging), etc. should not be used. I rarely use absolute terms as there is rarely anything in building structures and home ownership that is absolute. All structures crack. All structures deflect (sag). They creek, slope, and do other things where the absolutes do not apply. It is not that they do this, it is a matter of to what degree it happens, how perceptible it is to the occupants and if it leads to additional problems. The building codes generally allow for “tolerances” and rarely give “absolutes” to building conditions.

All structural materials deflect (sag), crack and structural materials and systems can move with time (thermal and moisture changes in the materials, natural “creep” of the materials and other issues). It is not that they do this or not, but the degree to which they do this. Minor movements, cracking and sagging are generally tolerable and acceptable. Larger movements, cracks and sagging that is highly perceptible may not be within generally acceptable limits and may not be acceptable. Monitoring the structure for changes in the deflection and cracking of finishes is important to be able to respond to changes that may occur.

Existing structures tend to have some cracking, settlement, creeking and other things that typically are due to many different circumstances and those by themselves do not always indicate a failing structure. Often, there are steps that can be taken to reduce the potential and magnitude of these type of issues and others that are usually a matter of common sense and are not often expensive or difficult to implement. At the same time, the older homes present to the owner the history of how it has survived the many different circumstances that have been presented to the structure such as storms, soil settlement, expansion and shrinkage due to moisture and thermal extremes, and many other factors. Typically soil settlement occurs early in the life of a structure and the rate of settlement diminishes with time. Keeping the structure properly ventilated, heated and cooled and the moisture content appropriate will go a long way to extending the life of the structure.

Due to the recent pandemic, I have noticed more building owners are in their buildings for longer periods of time than they have been in the past. Before the pandemic, they may have been away from the structure for many hours at a time, at work or at school or out socializing. When they were away, the heating and air conditioning was normally set to keep the temperature and moisture in the structure at a stable level. Before the pandemic there was less chance for occupants to add to the moisture level within the structure, by cooking, etc. When people are home, they may be adding to the moisture within the structure more than if they are away, including opening the windows providing more ventilation during the day rather than setting the air conditioning to be on, potentially adding moisture from the outside air to the inside of the structure. This may change the way the finishes in the structure react to swings in temperature and moisture and can sometimes cause changes in the finishes of the structure, including expansion which may cause some cracking or dimensional changes of the finishes. Try to keep the temperature and humidity within the structure at a constant level, which can be hard to do in Minnesota. You should run the air conditioner and a dehumidifier in the warm seasons to remove moisture from the air and consider running a humidifier

in the winter months to add moisture to the dry heated air. This approach is better for the building to keep it within constant levels rather than large swings.

Consistent temperature and moisture levels in a structure are important for reducing the expansion and contraction of framing and finish materials. Moisture levels in a structure are important for keeping the structure moist enough to not dry out the wood within the structure and dry enough to not allow condensation of moisture on the windows. I do recommend the use of wireless temperature and humidity sensors that can be used to monitor fluctuations of conditions inside the house. I do recommend the ones that keep records that can be monitored over time. I also recommend the use of battery powered moisture monitors that emit a loud shrill sound if moisture is present to be placed on floors and near equipment in moisture susceptible areas. There are a wide variety of these available on the market.

A dehumidifier can help to control the moisture levels in the structure, especially in the basement area. A whole structure dehumidifier occurs when the central air conditioner (not applicable for hot water heat systems) is operating by flowing the warm moist air over a cooling coil where the temperature of the air is reduced and the moisture within the air condenses on the cooling coil and drains away. That works great when the central air conditioner is operating, but for those conditions that may still be warm and moist but not enough to run the central air conditioner or for a hot water heat system with some independent air conditioning systems in parts of the structure, a stand-alone dehumidifier may be the answer to keeping the moisture level lower in the structure. Mechanical humidification should also be considered to add moisture to the dry inside air when needed, but should not increase it to where condensation occurs on surfaces and windows.

I recommend that you maintain adequte ventilation of bathrooms with baths and showers by the use of mechanical ceiling vents that vent to the outside of the roof area to reduce the potential of moisture buildup within the room or upon the finishes. Confirm that any vent ductwork in the attic area is properly insulated and clear of obstructions and does not leak.

I have to mention the tendancy of “increasing awareness” of the structural conditions within a structure. The noticing of interior finish cracks and/or structure plumbness (vertical) or sloping structure (horizontal) typically increases as a person starts to look for those things. A crack or sagging part of the structure may not have been noticed before, but once you are “tuned” to looking for those items, you tend to see them everywhere. I tell people it is like listening to someone giving a speech that says “and-um” in the speech over and over again. While you may not have noticed it before, once you notice it that is all you hear throughout the rest of the speech. Once you start seeing the cracks you tend to see them everywhere. That is a natural thing. That does not mean that the crack has always been there or that it is a recently formed crack. It means that sometimes it may be more that we have just started noticing the cracking more than we had in the past.

In general, water can be an enemy of any structure. It works to erode the structure and the supporting area around the structure. If it gets into the structure, it can become trapped and under the right

circumstances cause a variety of structural concerns. Diligent efforts should be taken to eliminate or control the presence of moisture on, in or near the structure. Even minor adjustments reducing the potential of moisture on, in or near the structure can add up to be a significant reduction of moisture related problems. Sloping away from the foundations, impervious surfaces near the foundations, properly performing and free-flowing gutters, properly placed and acting downspout discharge, removal of moisture attracting materials from near the foundations, surface coatings and other measures all help in the battle against moisture.

Foundation walls are designed to resist the lateral pressures exerted upon them from the soils adjacent to the foundation walls and to transfer vertical loads bearing upon the top of the wall from the weight of the house down to the foundation or "footing" that is beneath the wall. When the floor and/or roof framing is bearing upon the foundation wall we call that a "bearing wall". The bearing wall loads are higher than the non-load bearing walls and may be subject to additional settlement of the foundations, especially noticeable at the corners of a house where they intersect, and differential loading may result in differential settlements of adjacent footings.

Do not add soil against an existing "basement" wall condition (an occupied interior space that has soil against the exterior wall pushing on the wall toward the inside of the structure) to create more slope away from the foundation wall. While it sounds like a good idea, it actually can significantly increase the loads upon a foundation wall. For example, if a 7' tall wall is only holding back about 6' of soil on the exterior of the wall and we add another foot of soil height against the wall, the total lateral soil pressure loads resisted by the foundation wall, the lateral load acting at the top of the foundation wall and the lateral load acting at the base of the wall increase over 30%! That is a substantial increase of loading for any structural member or system. The flexural stresses upon the wall will increase significantly also, increasing the potential of internal bowing of the wall, creating cracking of the wall or increasing the size of any cracks that already exist. This is why I always recommend to NOT add soils against an existing foundation wall and to utilize other alternative ways to increase the slope away from the foundation wall.

When people add more height of retained soil against the wall they are increasing the total lateral loads resisted by the wall. When the soil against the wall becomes saturated the lateral pressure exerted upon the wall can increase significantly. That is why a wall that has performed great for years starts to show signs of cracking and bowing when the rainwater gutter downspout extensions are dislodged from the downspout and heavy amounts of rainwater can saturate the soils in that area. Every reasonable action to reduce the moisture of the retained soils will reduce the potential for wall cracking, bowing and moisture intrusion.

Heavy loads on the surface of the soils adjacent to the foundation walls can also increase the lateral pressure against the foundation wall. These types of loads are called "surcharge" loads. Heavy loads can be such as parking cars or stacking heavy materials such as stone or gravel near the foundation walls. Heavy loads upon the soils adjacent to the foundation walls should be kept about as far away

from the foundation wall as the basement is deep. This will reduce the “influence” of the pressures under the surcharged loading area from getting to the foundation walls.

One of the best ways to reduce moisture in the soils against the wall is to use gutters and downspouts and to have the downspout discharge be far away from the basement walls. I typically say that the discharge should be “as far away from the house as the basement is deep”. If the basement is retaining 5’ of soil the discharge should be 5’ away from the house. This allows for the moisture to enter the soils and dissipate at approximately (depending upon the soil type and amount of moisture) a one-to-one slope and the moisture would not rest against the foundation wall.

All gutters and downspouts should be properly maintained and cleaned to provide proper unrestricted flow. Consider the use of a gutter end cap to protect the gutter from debris and animals entering the end of the downspout.

Downspouts that are connected to an underground discharge system may freeze solid and not allow the downspouts to drain into the underground system. I recommend that these systems be seasonally disconnected and a surface extension be added to allow for the discharge to surface drain away from the structure. The use of black flexable extension material may allow for the solar assistance in keeping the surface discarge system to not freeze solid. The system may be reconnected after the ground is no longer frozen.

The general approaches to repair and monitor the existing conditions is what I would call the minimum level of care that should be taken to address the given conditions. More elaborate and extensive measures could be taken that may add a higher degree of confidence that the conditions will not worsen. These may include significant foundation repair, reinforcement and/or replacement. These measures may be significantly higher in cost than general repairs and monitoring. Contractors and vendors may suggest that these measures be taken to reduce the potential for future problems relating to these conditions. You should evaluate all of the options and determine for yourself which options are the most appropriate for you considering your situation.

The structure should continue to be monitored by the structure owner as part of a routine structure monitoring program for signs of changes and take appropriate steps if changes are noticed. While not anticipated or expected, changes may be in the form of additonal movement, bowing, cracking, settlement, cracking of interior finishes, etc. As part of the routine structure monitoring program, it is important to document what is noticed and when it is noticed and to take photos of the damage with an appropriate date stamp. Photos of various dates can be compared to see if there are changes in the images.

Notify me in writing of any changes to the stated and/or assumed conditions and parameters listed within this report and you shall not proceed until a response from SRC is received in writing. Changes to the conditions of the existing structure not specifically stated within this report are excluded from the scope of services.

Any information provided within this report is not intended to contradict any design drawings and any comments by the any building department.

Always follow manufacturers recommendations/requirements for any products being used on the structure.

This report should be kept with the building documents for future reference for considerations of future modifications.

These findings are a result of the observations made upon the information submitted to me and obtained at the site visit only and based upon the current conditions. Conditions may vary/change/worsen beyond the time of the site observations. Future additions and/or modifications in adjacent areas may be limited or restricted by the conditions stated within this report.

Analysis of the overall building structural design, components, or systems and building code compliance was NOT included as part of this evaluation. The original structural engineer of record and/or building designer remains responsible for the structural design of this building. Review of any submitted items were limited to those items within the scope of this work only.

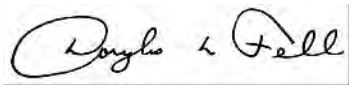
This report does NOT include any review of ADA conditions and/or site safety, review of fire ratings and/or fire separation issues, mold, asbestos, lead, radon, or any other environmental conditions. The CLIENT shall be responsible for obtaining the proper professionals for these items.

Photographs taken at the site were from a Canon EOS Rebel T3i digital SLR camera with a Canon EFS 18-55mm image stabilizer lens (regular shots) and a Canon EFS 55-250mm image stabilizer lens (longer distance shots) (longer shot lens was not used). The images were uploaded to our server directly from the camera memory disk. There has been no manipulation of any of the images other than some of the photos may have been cropped for inclusion into the report and some private information (license plate numbers, faces, etc.) may have been obscured to maintain privacy and some of the images may have been digitally lightened or darkened to highlight the subject of the image. Some of the photos are embedded within this report. The photos taken by me at the site visit will be retained for a period of approximately six months and then discarded. The photos may be forwarded to you under separate cover if a written request for the photos is received in writing no later than 30 days from the date of this report.

I have endeavored to perform the services for review and report with the level of care and skill ordinarily exercised by members of the profession currently practicing in the area under similar budget and time constraints. No warranty is made, expressed or implied. The opinions made within this report are informed by my training and career experience with building design, analysis, and construction and are based upon the information that has been made available to me as of the date of this report. I reserve the right to modify or supplement this report as additional information, or other expert reports and/or other information becomes available.

Thank you for allowing me to assist you with your structural engineering needs. Please contact me directly at (651) 352-1052 if you have any questions regarding this matter.

Sincerely,
Structural Resource Center LLC



Douglas L. Fell, PE
Managing Principal

cc: Project file
encl: Certified attachments as part of this report: **Image #2 - Image #33 on page 20 – page 33.**

Image #2

Image #3

Image #4

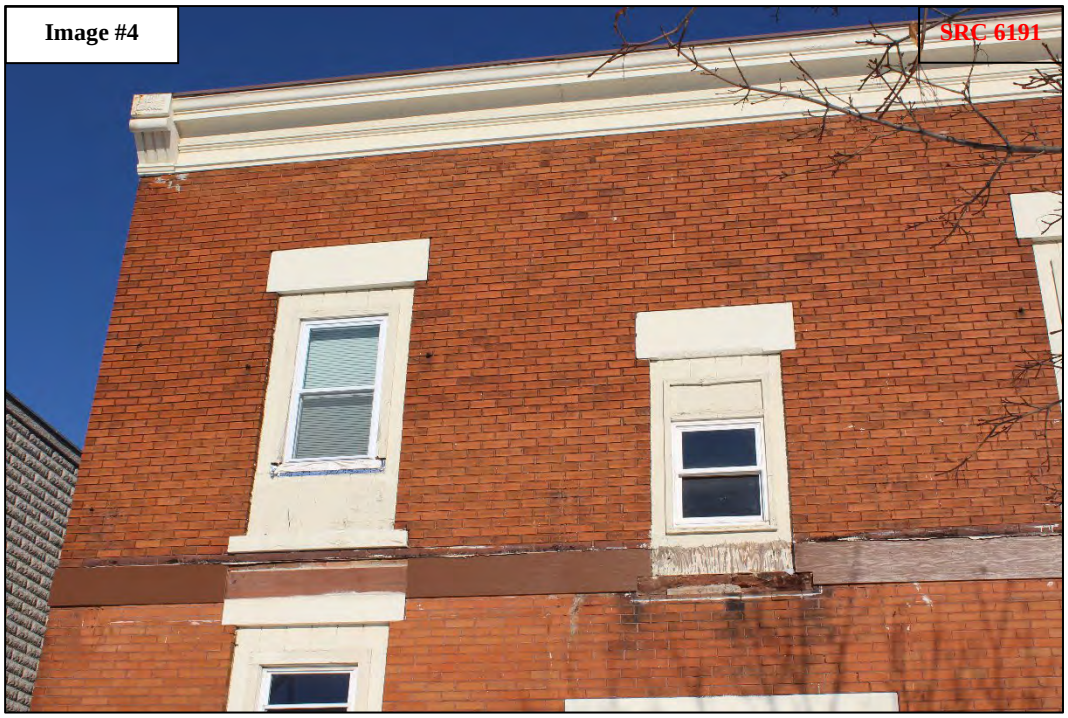


Image #5

Image #6

Image #7

Image #8

SRC 6196

Image #9

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Image #10

Image #11

Image #12

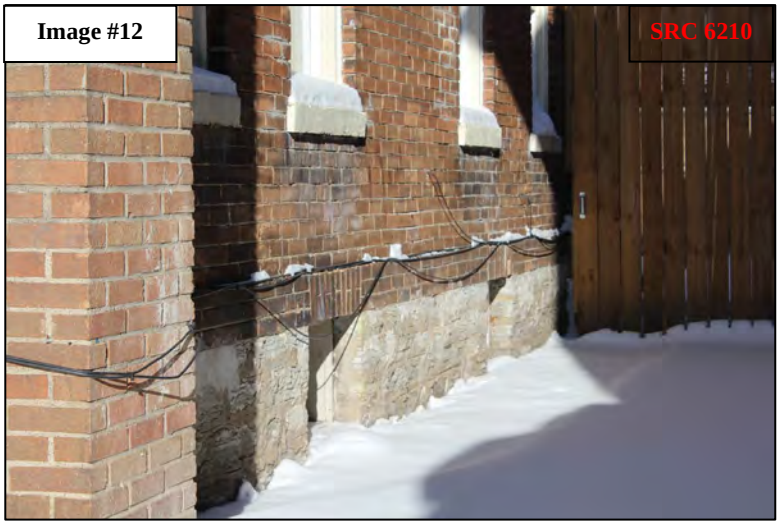


Image #13

Image #14

Image #15

Image #16

Image #17

Image #18 SRC 6254

Image #19 SRC 6257

Image #20 SRC 6258

Image #21

SRC 6233

Image #22

SRC 6236

Image #23

Image #24

Image #25

Image #26

Image #27

Image #28

Image #29

Image #30

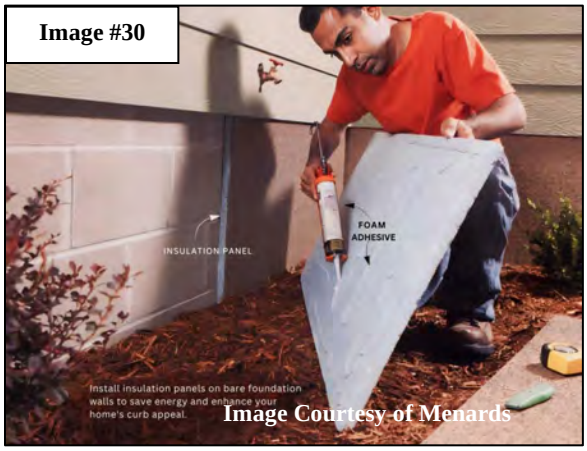


Image Courtesy of Menards

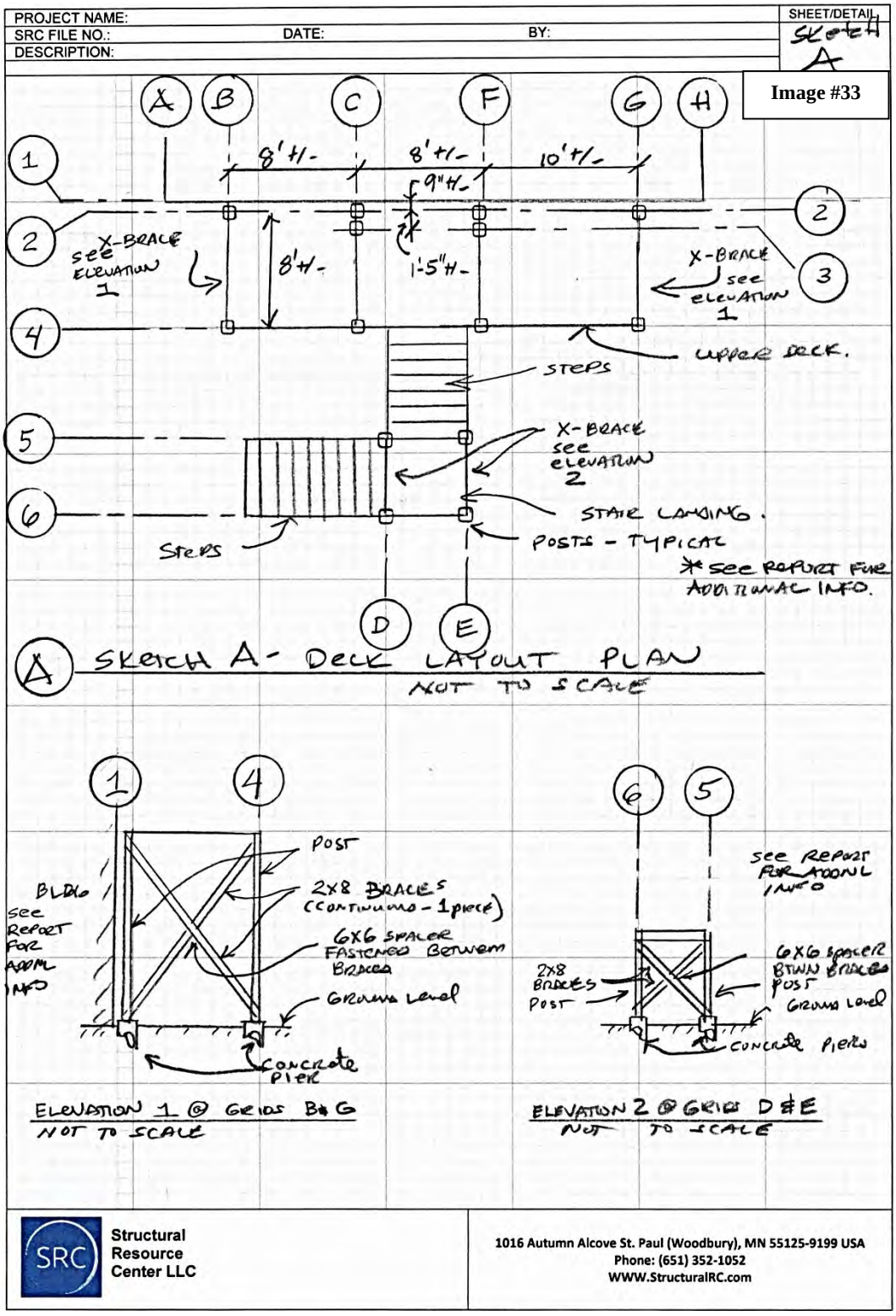
Image #31

Image Courtesy of Menards

Image #32

Image Courtesy of Menards

Image #33



END OF REPORT