

SELECT STRUCTURAL

February 8, 2023

RE: Brick Wall Repair
324 N. Main St.
Davenport, IA

To Whom It May Concern:

An emergency site visit was performed at the property above on February 2nd. The building is a six-story, brick and steel structure. There is commercial space at street level and residential units above. There is a concern on the west exterior wall where a localized area of brick is cracked and crumbling. This engineer determined that this is not an imminent threat to the building or its residents, but structural repairs will be necessary.

As described in the previous letter (2/2/2023), there are two east-west beams in the vicinity of the west wall which need to be shored. With these secured, reconstruction of the wall can commence. The clay brick wall appears to be three or four wythes thick. The damaged area is roughly eight feet long by four feet high, mainly under the larger east-west beam. The full height of the wall in this area should be replaced. A suitable replacement would be a concrete masonry unit (CMU) wall.

The new CMU wall need not replace the entire west side of the building, but rather only the approximately twelve foot wide area from a window opening (currently boarded up) to an adjacent wall area of CMU. The joint between existing and new CMU could serve as a construction joint. It is also recommended to replace the brick wall in segments, and to shore/support the wall above in said segments. This will help minimize the amount of time which the west side of the building would be unsupported by a wall (even though the beam shoring will remain in place throughout the process). The twelve-foot length of wall may be demolished and shored in three four-foot-wide segments, then it can be replaced in similar increments so the new wall can alleviate the weight of the exterior walls above.

It is unknown if there is a north-south steel beam inside the wall at the second floor level, or if there is a steel post encased in the brick which supports the encased east-west beam. It will therefore be conservatively assumed that the east-west beams bear directly on the brick wall to be replaced. This is further reason to replace the wall in smaller segments to minimize the area and duration of unsupported walls above. If, however, steel members are encountered during demolition, they are to be preserved and undamaged. Notify the Engineer of their presence. These members are not to be removed or damaged so that they can be reused and incorporated into the repairs. The new CMU wall will be built around any such members, encasing them as before.

For each four-foot segment of wall, two holes shall be cut/drilled through the wall just below the beam line. Steel W8 needle beams shall be passed through these holes and shall be supported by 6x6 timber posts (or steel posts) to grade on the exterior side and the floor slab on the interior side. On top of the needle beams, parallel to the face of wall, there is to be shoring consisting of two 4"x4"x3/8" angles (one on each side). Horizontal cuts shall be made into the opposing faces of the brick wall to insert the horizontal legs of the angles. Their purpose is to support the brick wall above during demolition of their respective wall segment, and they shall remain in place until their respective segment is rebuilt.

The CMU shall be 16"x8" standard blocks, full-height grouted in vertical cells at 24 inch spacing (minimum). #5 rebar shall anchor the wall to the existing footing in the grouted cells. The rebar shall be drilled to a minimum embedment of nine inches and an epoxy adhesive such as Hilti HIT-RE 500 V3 (or

Safe & Efficient Designs | Practical Experience

SELECT STRUCTURAL

equivalent) used. These anchoring bars need only extend 24 inches above the surface because they shall lap with full-height #5 rebar. Reinforced cells shall be fully grouted, as shall the cells directly below the east-west beams. Horizontal #3 ladder bars shall be placed in the mortar beds every other course. These ladder bars may be permitted to hang free temporarily as each wall segment is constructed so they can be lapped into the next wall segment. The intent is to tie the three wall segments together with continuous horizontal reinforcement. A bond beam shall be placed in the top course continuous across the new wall. If the wall is installed segmentally, as recommended, the horizontal reinforcement in the bond beam may be lapped to the adjacent segments, similar to the ladder bars. Smaller, solid blocks may be needed to fill gap(s) at the top of the wall for the existing upper wall to bear. A new clay brick façade may be installed against the outer face of the CMU to match the rest of the building. The window opening, currently boarded shut, shall also be infilled with CMU.

It is further emphasized that the full 12'-0" length of wall to be replaced is not demolished all at once. There are many unknown factors in the construction and stability of a 100 year old masonry structure. As always, there is inherent risk to altering an existing masonry structure which is showing signs of deterioration. The purpose of the staged and incremental demolition and reconstruction of wall segments is to minimize the risk of local structural failures.

The opinions and recommendations in this report are based on field measurements and observable conditions. It is not an assessment of the non-structural elements of the local building code or an in-depth analysis of every member of the full structure. Should conditions change or new information become available, the Engineer reserves the right to amend his recommendations and this report. Select Structural Engineering assumes no liability on construction or demolition means and methods. Notify the Engineer immediately should field conditions vary from expectations, as a new course of action may be needed. If you have any questions about the findings or recommendations, please contact me.

Thank you,



David Valliere, PE



SELECT STRUCTURAL

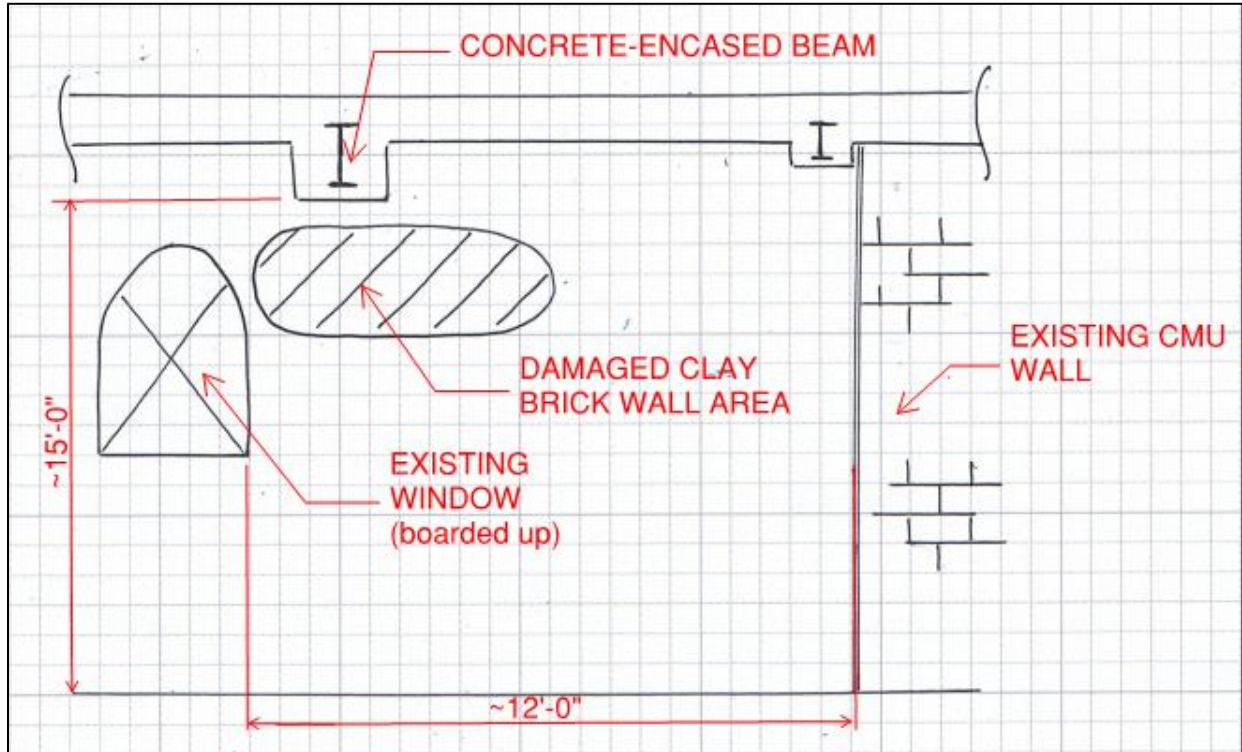


Figure 1 – Current Wall Condition

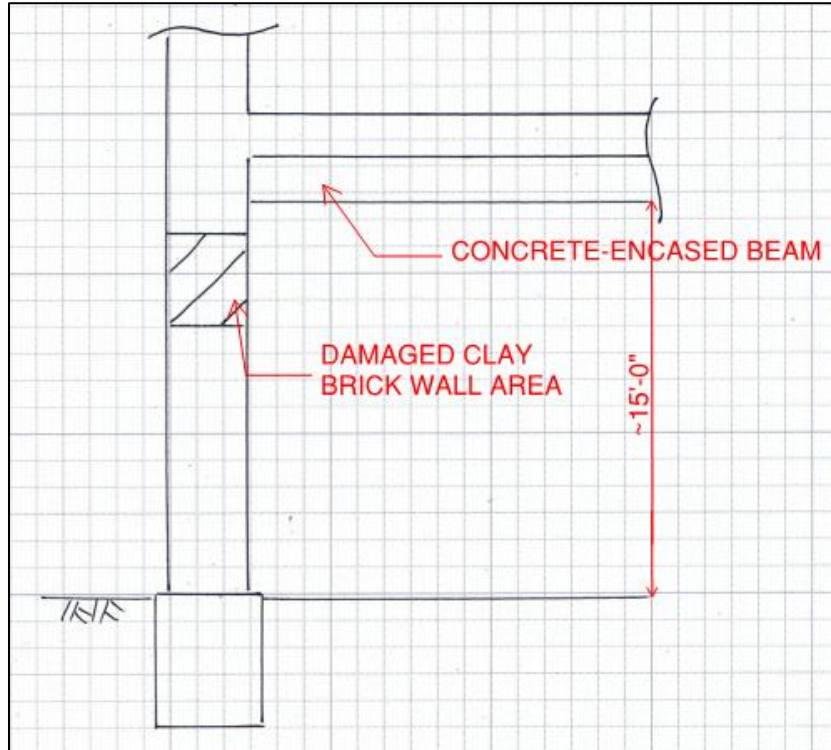


Figure 2 – Current Wall Condition (Section View)

SELECT STRUCTURAL

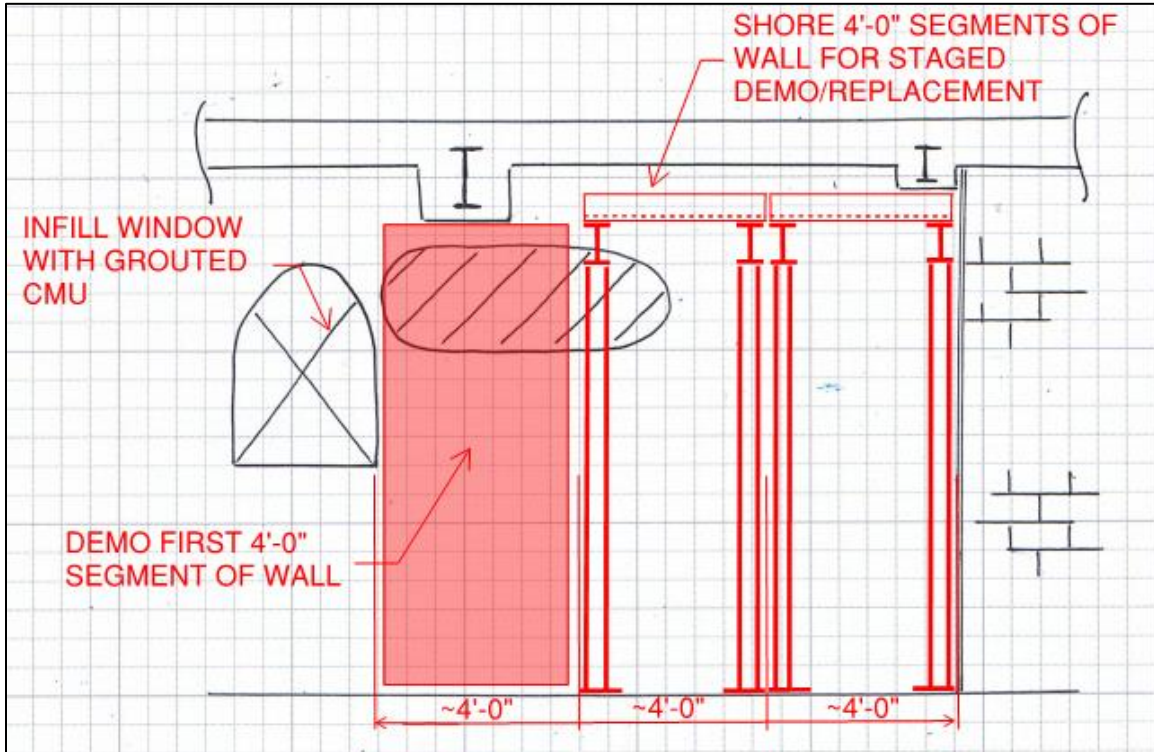


Figure 3 – Step 1 Repairs

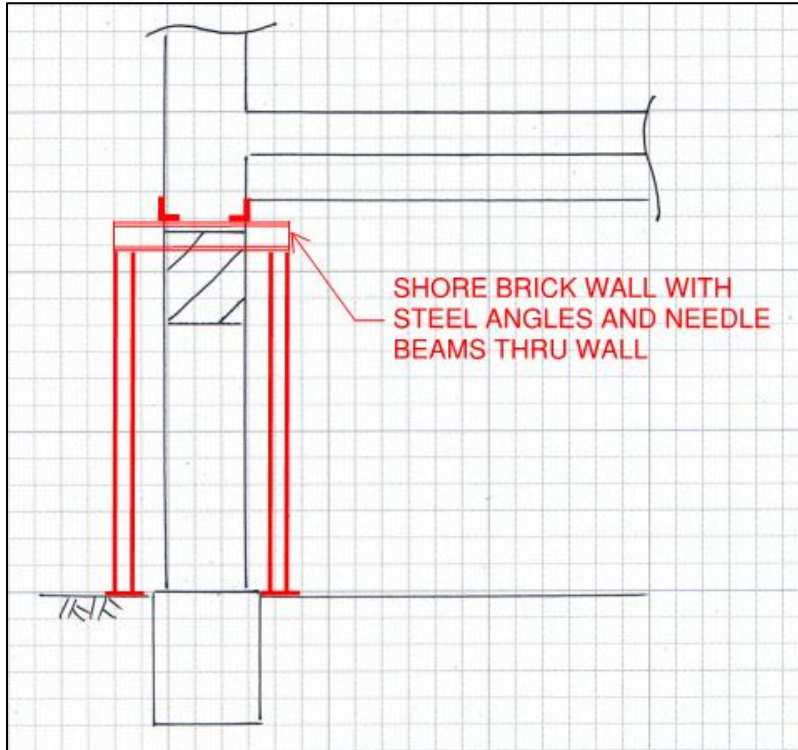


Figure 4 – Step 1 Repairs (Section View)

SELECT STRUCTURAL

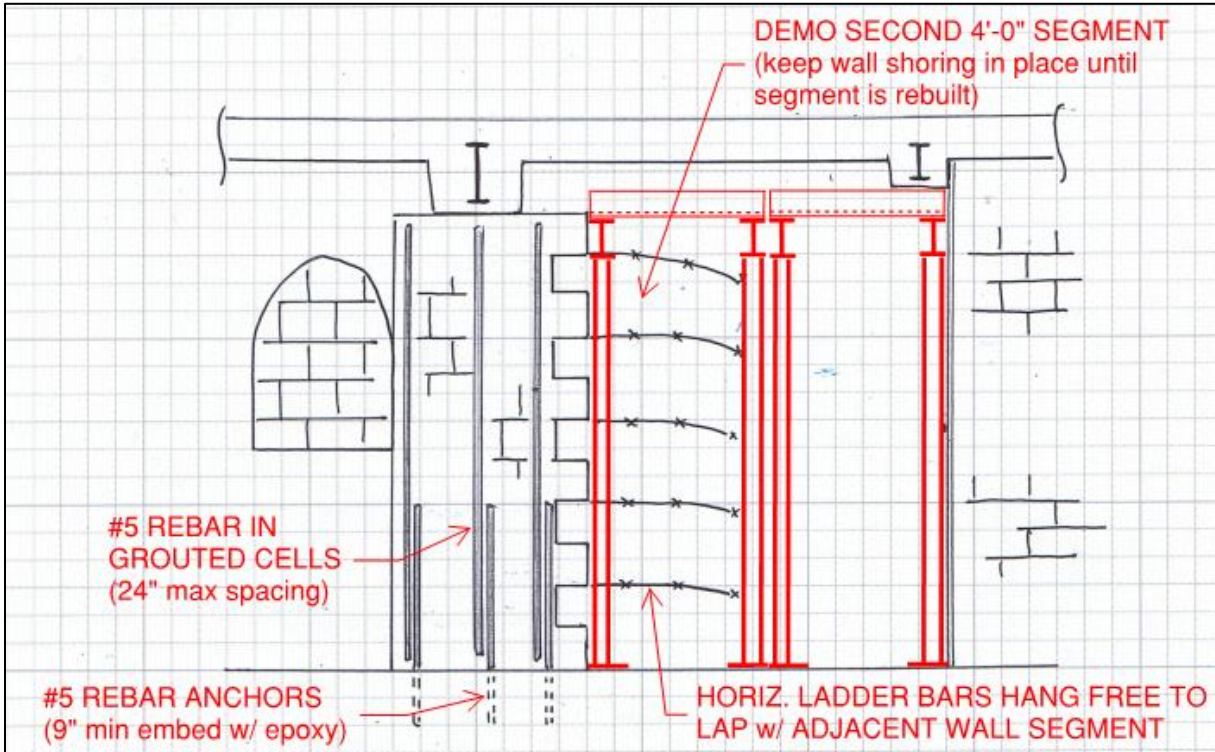


Figure 5 – Step 2 Repairs

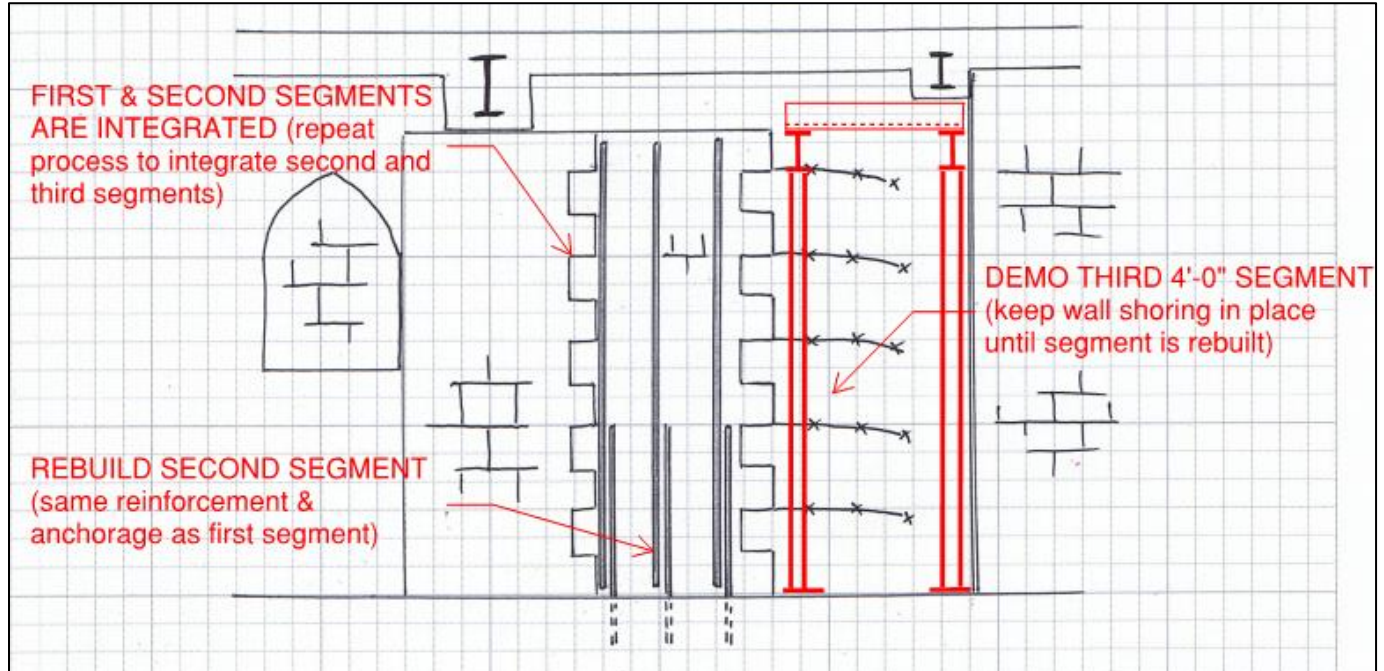


Figure 6 – Step 3 Repairs

SELECT STRUCTURAL

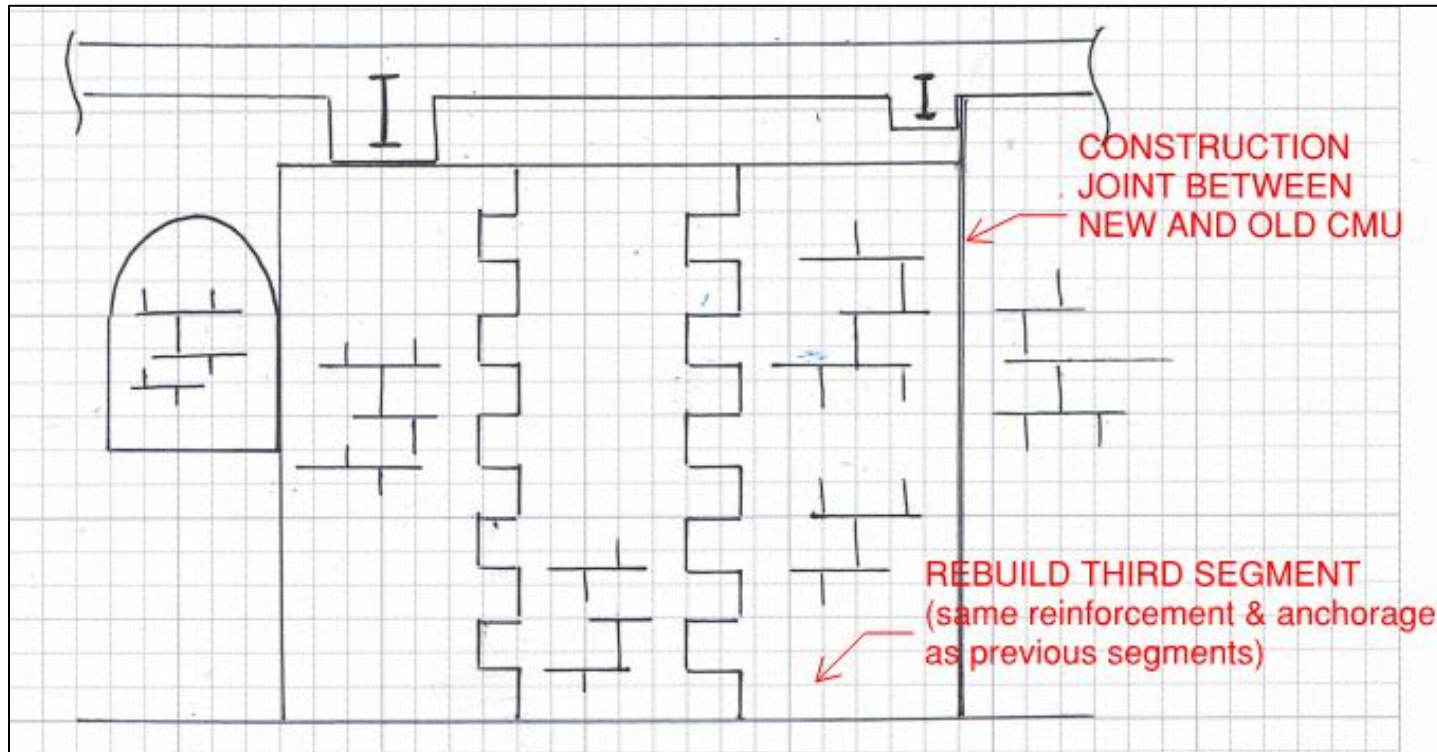


Figure 7 – Final Wall Condition

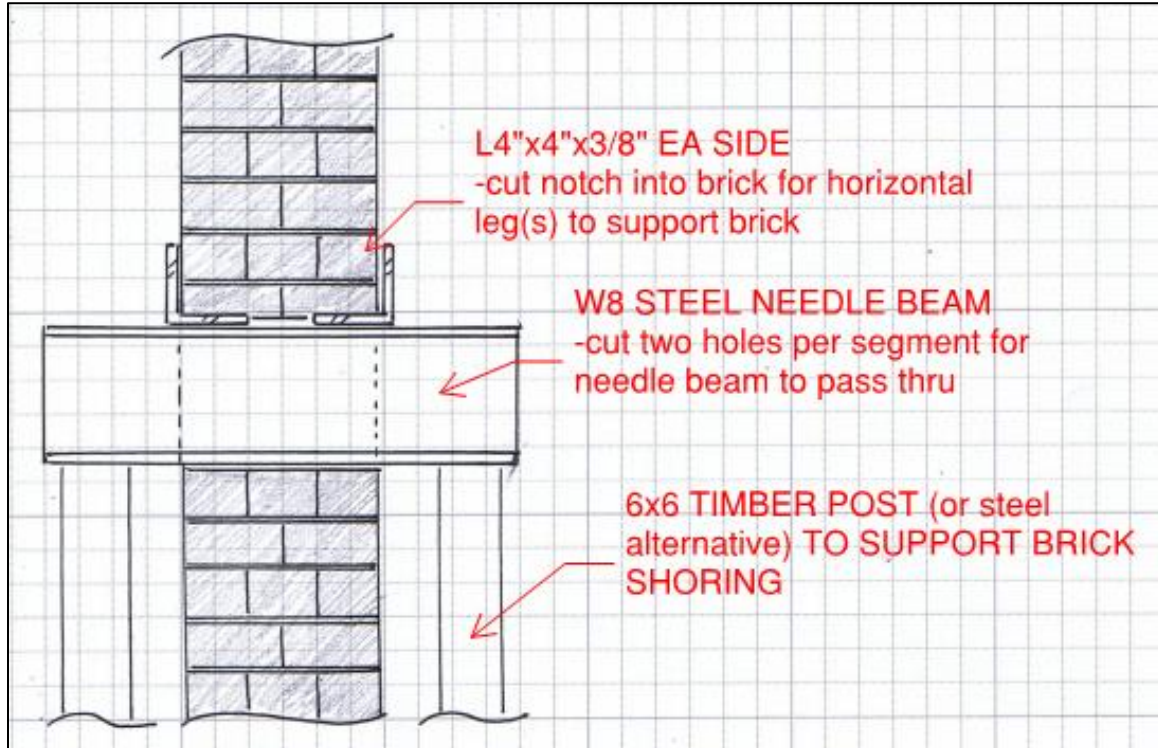


Figure 8 – Brick Wall Shoring Detail