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Placerville Old City Hall Stabilization Structural Investigation

Placerville, California

June 30, 2023

General Description

We were requested by Architectural Nexus to provide a stabilization investigation for two historic buildings located at 487 and 489 Main Street in Placerville, California. The buildings are on the list of the National Record of Historic Places.

Scope of Work

The eventual project scope consists of a seismic upgrade to two attach two-story unreinforced masonry structures that was constructed in the 1860's and one concrete and wood frame addition constructed in the early 1900's. A previous rehabilitation feasibility study was performed by Burns Engineering to investigate possible retrofit options. A separate shoring contractor designed and installed a shoring and bracing system on the west wall to mitigate the wall cracking and provide support for gravity loads of the floor and roof.

This project will be completed in phases whereby information is gathered in each phase that will inform the engineering required for the next phase. Below is a list of the following phases anticipated for the project:

- Stabilization Investigation
- Stabilization Construction Documents (including Construction Administration)
- Retrofit Investigation
- Retrofit Construction Documents (including Construction Administration)

The current scope of work is a report for the Stabilization Investigation phase only.

Our scope of work will include the following tasks:

- Up to three site visits. We will need to complete our general condition observation on the balance of the structures and specifically verify the wall support condition of the existing floor joists and trusses. A contractor hired by the City will need to open up finishes in areas identified for observation.
- Collaboration with the project Architect to create as-built documentation.
- Up to three, one-hour meetings.
- A report of our observations and recommendations.

- Attendance of a meeting with the Owner to discuss the report (one hour).

Materials testing or Geotechnical services are not included in the scope of work however may be recommended in this report.

Applicable Codes

1. 2022 California Building Code (CBC)
2. 2022 California Existing Building Code (CEBC)
3. 2022 California Historical Building Code (CHBC)

Code Discussion

CEBC Section 405 are the applicable provisions concerning structural damage to an existing building. In Section 405.2.3, the code discusses “substantial structural damage” to the vertical elements of its lateral-force resisting system shall be evaluated according to Section 405.3.1 and either repaired or retrofitted depending on the structural evaluation. Substantial structural damage is defined in CEBC Section 202. In this case, the shored west wall of the Confidence Building has suffered damage such that the lateral-load carrying capacity of any story in any horizontal direction has been reduced by more than 33% from its pre-damaged condition.

The CHBC also has provisions to reduce the required lateral force design in consideration of the historic nature of the materials used. These provisions will be helpful in the future retrofit design.

General Field Observations

On April 24th, 25th, and 28th, 2023, we visited the site accompanied by Victor Burbank, Senior Principal at Arch Nexus, Cleve Morris, City Manager for the City of Placerville, and Terry LeMoncheck, Executive Director for the Arts and Culture of El Dorado. The individuals named were present on site for various days the site visit was performed. The objectives of the site visit were to determine if the roof was safe to access as a conclusion of this stabilization investigation, document details on the crack in the west wall and gather information on the existing framing to create as built documents. Currently there is a temporary shoring system in place at the west wall to stabilize lateral displacement of the unreinforced brick wall at the upper level, mitigate effects of the wall cracking and provide temporary shoring support for gravity loads of the floor and roof adjacent to the west wall. We toured the interior of the two buildings and used ladders to access the floor and roof levels to determine gravity framing. We also walked the building exterior to examine wall conditions and basement area to determine the floor framing. There are no as-built drawings for these buildings.

Building Description

The Old City Hall is comprised of two, two-story buildings: The Confidence Engine Company building was built in 1860, seen as the red building on the west and the Emigrant Jane Building was built in 1861, seen as the yellow building to

the east. These two buildings have a façade on Main Street and consist of unreinforced masonry structures. There is also a two-story concrete and wood frame rear addition on the north east end of Emigrant Jane Building that was reported to be constructed in the 1910's.

For the Confidence Engine Company Hall building, the roof structure is wood trusses over 1x straight sheathing at the supported on 2x3 stud walls. The second-floor framing consists of 2x12 joists @ 16"cc spanning east to west with 1x straight sheathing. The joist is supported by beam pockets at both ends in the rock wall. At the ground floor level, there is a crawl space below and the framing was 2x15 ½" net joists @ 18"cc supported on 6x6 beams and 6x6 posts located at each end of the floor span.

For the Emigrant Jane building, the roof structure consists of 2x4 trussed rafters over 1x8 straight wood sheathing. The trussed rafters are supported by bearing on the rock wall at both ends. The second-floor gravity framing main floor framing for the west building consists of 2x12 joists @ 16"cc spanning east to west over 1x straight sheathing. On the west wall end, the joists sit on top of a double top plate that is supported by a brick wall. At the east span end, the joist frame to the interior brick wall where the joist sits in a wall pocket. At the ground floor level, there are 2x9 ½" net joists at 24"cc that span east to west to 4x6 beams. The beams are supported on both 4x4 and rock posts that are located at each ends of the wall and one at midspan.

The floor framing for the rear addition consists of 2x12 joists @ 16"cc over 1x diagonal sheathing spanning to a 6x8 girder on 8x8 end posts. The girders span approximately half the building width. The ground floor level framing at the west building consists of 2x16 joists @ 18"cc spanning to 6x6 wood girders. The girders were supported on 6x6 posts that were approximately 5'-10" cc. The ground floor framing for the east building consisted of 2x10 joists @ 1'-11" cc. The joists span to 4x6 wood beams that are located at both wall ends and in the center of the building span. The girders are supported on a combination of rock and 4x4 wood posts. The spacing of the post supports is approximately 5'-0" cc.

Exterior bearing walls consist of brick wall at the west wall, brick and rock at the east wall, brick at the south wall, and concrete and wood at the addition portion. All walls appear to be load bearing at exterior and interior. The west wall observed about four to six inches of out of plane deflection and bowing at the center of the wall at the upper level.

Specific Observations

1. We observed damage to the brick wall in areas on the north side of the west building near the ground level. Some bricks were removed at the door jamb revealing the deteriorated condition of the mortar matrix. The mortar appeared to be dry and granular as was draining out of the space between brick from gravity. The lime in the mortar that provides the bonding capability had likely leached out over time. Typical mortar joint at exterior was soft and easily removed, see Photo 9. None of the brick

faces appeared to be deteriorated however there was no evidence of re-pointing.

2. The Confidence Engine Hall building had evidence of fire damage to the roof and floor structure. Some smoke discoloration was on the inside face of brick along with charred pieces of wood frame attached to the brick, see Photo 13. Anchor ties from the brick intended to engage floor and roof framing were left in place loose in the re-construction. We observed the roof trusses to be supported by the furred wood wall and not pocketed into the brick wall as was the likely the original construction. The west wall at roof level is currently not bearing and was not supported laterally to the structure.
3. We observed roof framing of the Confidence Hall building at the interior wall. The truss chords were pocketed into the brick. We did not note any lateral movement of the chord in the wall pockets that should have been evident in the ceiling finishes at that intersection.
4. The stone masonry walls on the Emigrant Jane Building appeared to terminate at a "parapet" distance above the second floor and continue with brick above. This leads us to question the order in which the buildings were constructed and if the first structure was originally a single-story building with a basement.
5. The rear addition to the east building has full height concrete walls just on two sides with no apparent wall ties to the wood frame structure. Curiously, the east side was an in-filled wood stud wall system that may suggest some other structure was there prior. The building addition is actually three-story with a full storage mezzanine above the 2nd floor spaces. An infilled stair opening was evident on the north east corner of the building.
6. Extensive dry-rot decay was noted at the exterior stair access balcony framing on the east side of the structure.

Discussion / Recommendations

Recommendations are related to item observations above.

1. Localized brick damage should be encapsulated by filling with a Type O mortar and forming face to prevent additional mortar from being displaced until permanent repairs can be made.
2. The reason for the wall cracks at the west wall of the Confidence Engine Company Hall building is likely due to an inadequate wall anchorage system to tie the wall to the floor and roof level. Fire damage occurred previously near the wall and not all of the wall anchors were replaced which caused the wall to displace from the floor levels. There were a few existing wall anchors towards the north and south wall ends but not near the center of the wall where the crack in the wall was the largest. The shoring system provides temporary out of plane wall bracing however, continuous anchor ties will need to be established around the building to tie the exterior walls at the floor and roof levels. Where there are existing wall ties installed per the shoring design drawings, additional Simpson HDU's are proposed to be installed at the opposite end of joist. The

HDU's will have a threaded rod that will span across the Emigrant Jane building and tie the West wall to the rest of the building, see SSK-1 and SSK-2 for details.

3. The roof framing at the Confidence Hall building is currently supporting on a 2x3 furring stud wall. The roof trusses initially were supported by a five-inch step in the brick wall but due to the out of plane distortion of the wall, the furring stud wall is now the main support. In order to tie the roof to the rest of the building, a similar mechanism to the second floor for stabilization of the wall is proposed. A new HDU will be installed at the opposite end of the truss bottom chord with a threaded rod that spans across the Emigrant Jane building to the East wall end, see SSK-3 for details. At the North and South wall ends, the existing wall ties do not appear to be connected to the roof framing. To reestablish the wall ties at these walls, where there is an existing wall tie, a new angle brace that is thru bolted to the exterior brick wall and bolted to the top truss chord with blocking is proposed. Blocking and straps will be added to tie the walls to the roof diaphragm see SSK-4 for details.
4. The rock mortar matrix of the walls appears to be intact. No repair is recommended for this stabilization phase. This will be addressed in future retrofit phase.
5. No additional stabilization measures are required at the north-east concrete and wood addition. Retrofit measures will be addressed in future retrofit phase.
6. We recommend immediate barricading of the stair access at ground level to prevent public access to the damaged landing area.

The next steps will be creating construction drawings to complete the stabilization effort. Further will be scoping for testing services and generating as-built documents to start the renovation design process.

We met with the City and Architect on June 28, 2023 to review the recommendations of this report. It was desired by the City to explore temporary roof patching repairs to address the water damage in the roof areas. The recommendations for the stabilization phase are intended to complete the out of plane wall bracing load path for the Confidence Engine Company Hall building west wall that was initiated by DH Glabe & Associates. The vertical shoring system with hold down ties to the roof trusses were installed to brace the damaged wall from further movement by establishing a connection to the building lateral system. This system provides a localized bracing system but does not provide a continuous lateral tie system across the entire building width to engage the entire structure. This stabilization report recommends additional hold downs and tie rods installed across the width of the building to complete the stabilization effort. Once the stabilization phase is constructed, the building will remain unoccupied until the retrofit design and construction is completed.

Experience and Qualifications of Buehler Engineering, Inc.

Buehler Engineering, Inc. was founded in 1946 under the original name of Walter A. Buehler, Structural Engineer. The firm has been engaged in structural design of a wide variety of projects over the life of the firm. The firm currently has a total staff of 92, including 41 registered Structural Engineers. The firm maintains computer facilities for the analysis and design of engineering structures. Engineering services are provided for the design and analysis of building and other structures and for structural investigations.

Limitations

The services of Buehler Engineering, Inc. performed for this project have been provided at a level that is consistent with the general level of skill and care ordinarily provided by engineers practicing in structural engineering. Sketches are schematic in nature for general cost budgeting purposes. Work is necessarily done under the constraints of time and budget. Conclusions and information presented in this report are dependent on information provided by others. No warranty is expressed or implied.

Submitted:



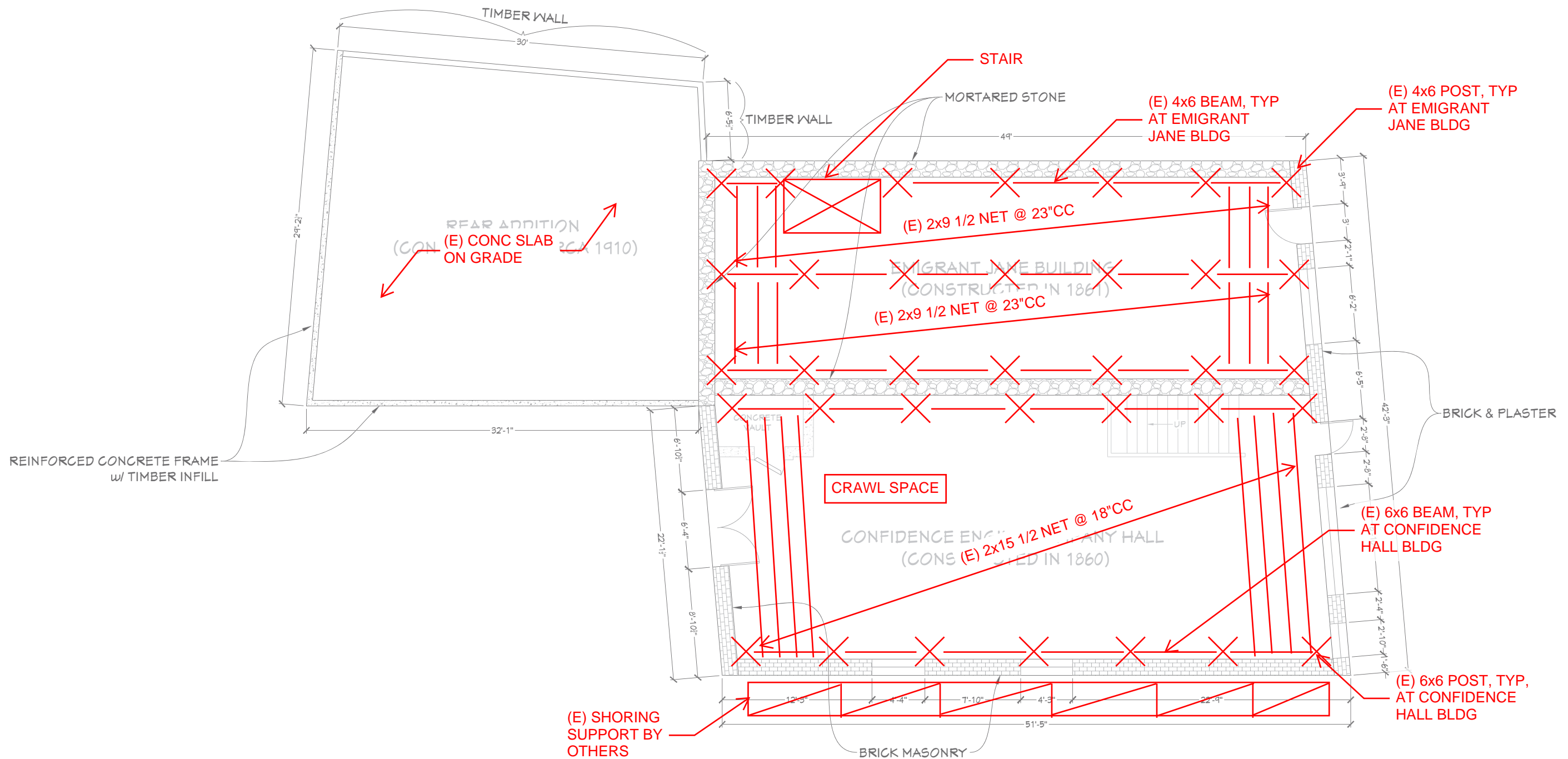
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Senior Principal
Buehler Engineering, Inc.



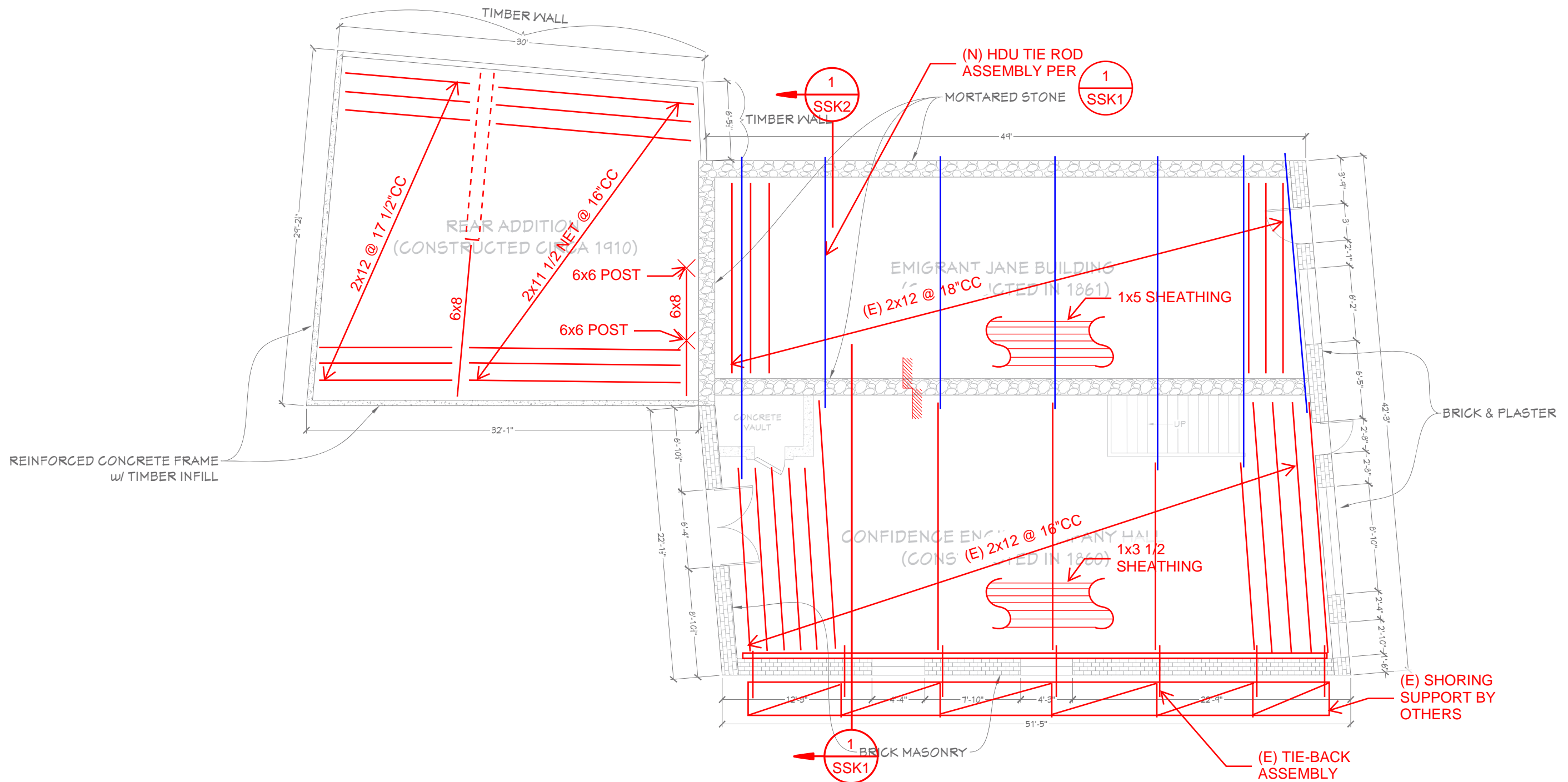
Structural Sketches



FOUNDATION AND FIRST LEVEL FRAMING PLAN
 NOT TO SCALE



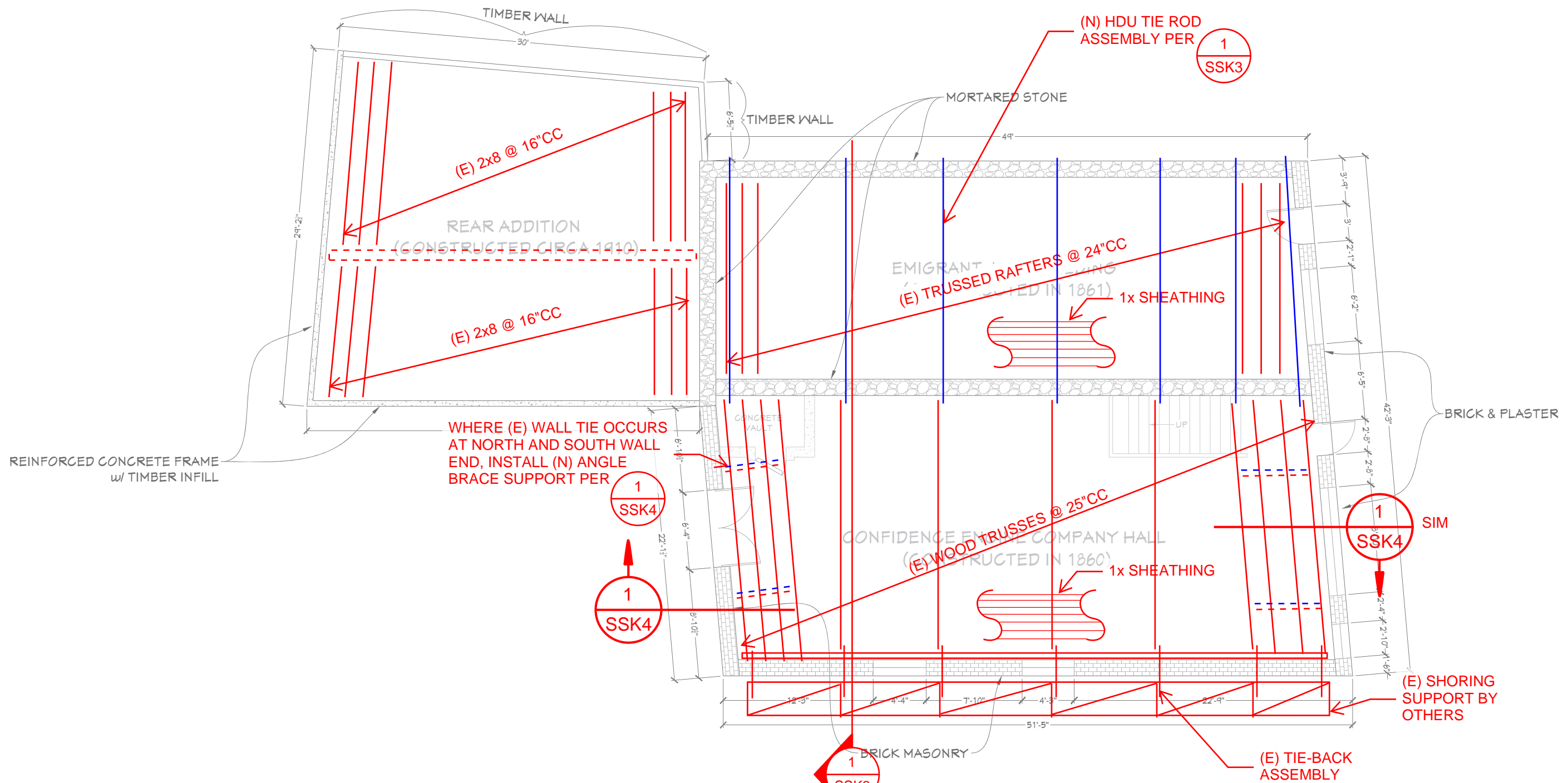
FIGURE 1



SECOND FLOOR FRAMING PLAN
NOT TO SCALE



FIGURE 2

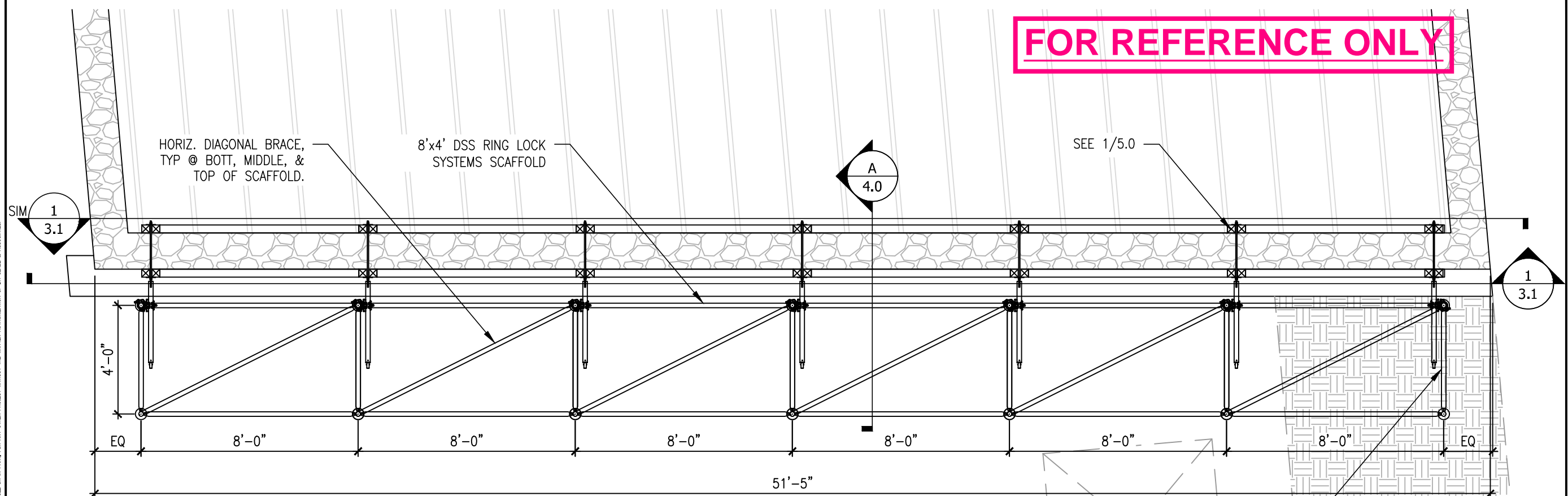


ROOF FRAMING PLAN
NOT TO SCALE



FIGURE 3

FOR REFERENCE ONLY



ADDITIONAL NOTES FOR SCAFFOLDS USED AS SHORING:

1. ALL SCAFFOLD USERS AND THE SCAFFOLD SHALL COMPLY WITH ALL APPLICABLE STANDARDS.
2. DH GLABE & ASSOCIATES IS NOT RESPONSIBLE FOR THE PROPER ERECTION, USE, AND/OR THE INSPECTION OF THE SCAFFOLD.
3. SCAFFOLDS SHALL BE ERECTED, MOVED, DISMANTLED, OR ALTERED ONLY UNDER THE SUPERVISION AND DIRECTION OF A COMPETENT PERSON QUALIFIED IN SCAFFOLD ERECTION, MOVING, DISMANTLING OR ALTERATION. SUCH ACTIVITIES SHALL BE PERFORMED ONLY BY EXPERIENCED AND TRAINED EMPLOYEES SELECTED FOR SUCH WORK BY THE COMPETENT PERSON.
4. ALL STATIONARY SCAFFOLD LEGS SHALL BE INSTALLED WITH BASE PLATES.
5. ALL SCAFFOLD TUBES FOR TUBE AND CLAMP BRACING SHALL BE MINIMUM 1.9"O.D.x0.09" THICK 50 KSI STEEL.
6. ALL TUBE AND CLAMP SHALL BE CLEAN AND FREE OF OILS AND DEFECTS.
7. ALL TUBE AND CLAMP CLAMPS SHALL HAVE A MINIMUM SAFE WORKING CAPACITY OF 1,500 LBS. AND BE TESTED IN ACCORDANCE WITH ANSI/SSFI SC-100.
8. ALL TUBE AND CLAMP CLAMPS SHALL BE TIGHTENED TO MANUFACTURER'S RECOMMENDED TORQUE AND USED ONLY ON TUBE SIZES APPROVED BY MANUFACTURER.
9. ALL TUBE AND CLAMP CLAMPS USED IN HANGING APPLICATIONS MUST HAVE AN ADDITIONAL CHECK CLAMP INSTALLED BELOW THE LOAD BEARING CLAMP IN PHYSICAL CONTACT WITH THE PRIMARY CLAMP.
10. ALL SCREW JACKS SHALL BE LIMITED TO THE MANUFACTURER'S MAXIMUM EXTENSION AND SHALL BE INSTALLED TIGHT.
11. ALL SCAFFOLD LEGS SHALL BE SECURED TOGETHER FOR UPLIFT. REQUIRED STRENGTH SHALL BE 1,500 POUNDS MINIMUM.
12. ALL SCAFFOLD COMPONENTS SHALL BE INSTALLED AND USED IN COMPLIANCE WITH ALL MANUFACTURER'S SPECIFICATIONS,

1 WALL BRACING LAYOUT - PLAN VIEW
1/4" = 1'-0"

TRANSFORMER
RAISED PLANTER AREA
CONTRACTOR SHALL PROVIDE SILL, SUCH AS STEEL OR ALUMINUM BEAM, BENEATH LEGS IN RAISED PLANTER AREA TO ENSURE SOLID BEARING



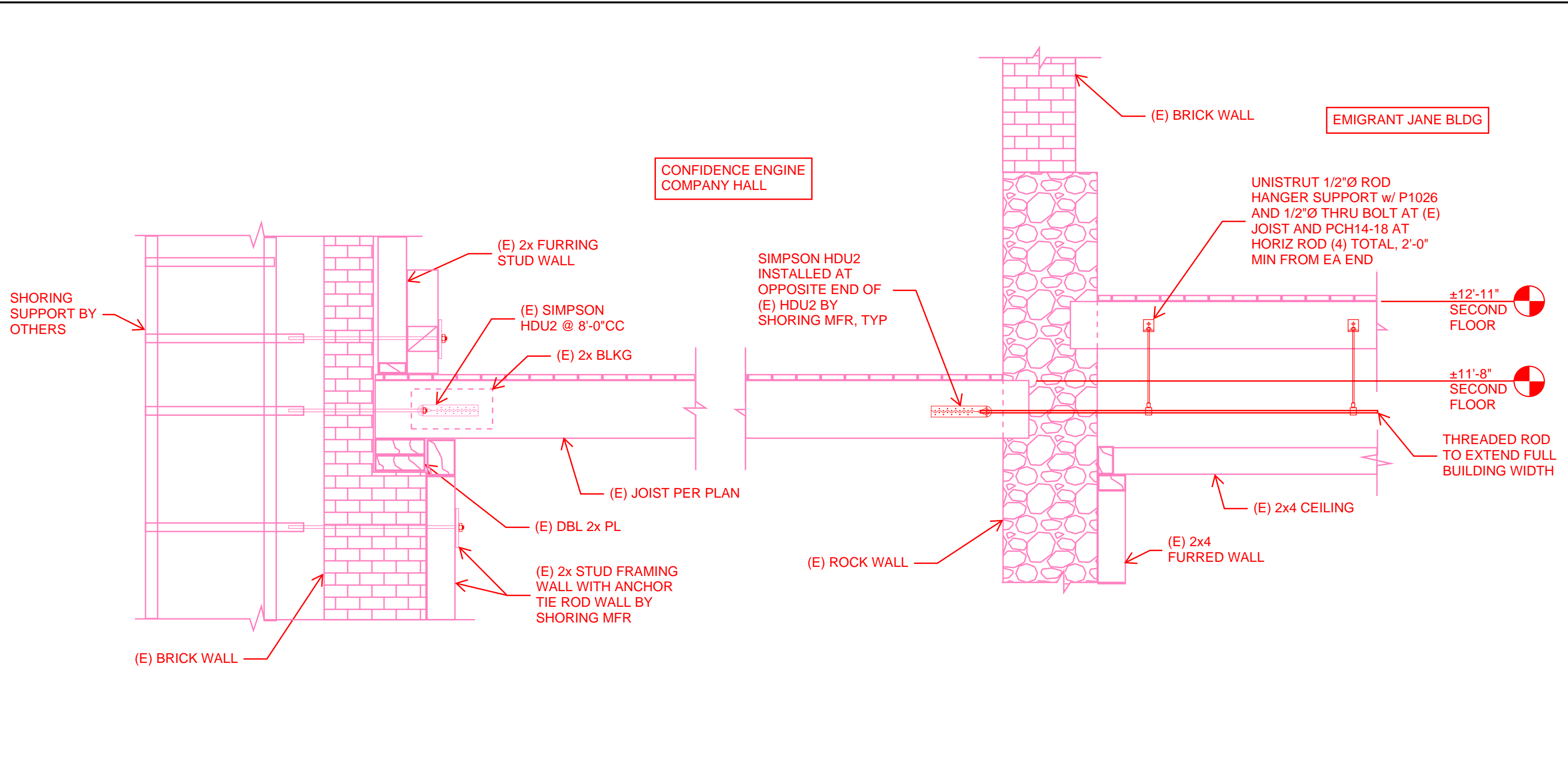
REVISIONS:	H	G	F	E	D	C	B	A	DATE	DESCRIPTION
									12/23/2020	REVISION A- ADDITIONAL WALL BRACING AT CRACKED AREAS AND ADDITIONAL DETAILS

DHG | **DH GLABE & ASSOCIATES**
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 3835 Newland Street
 Wheat Ridge, CO 80033

PROJECT:	OLD CITY HALL LATERAL WALL BRACING DESIGN	CUSTOMER:	CITY OF PLACERVILLE
SHEET TITLE:	WALL BRACING LAYOUT - PLAN VIEW	DATE:	03/11/2020
JOB NO.:	2019-0398	TASK NO.:	03
DRAWN BY:	BAR		

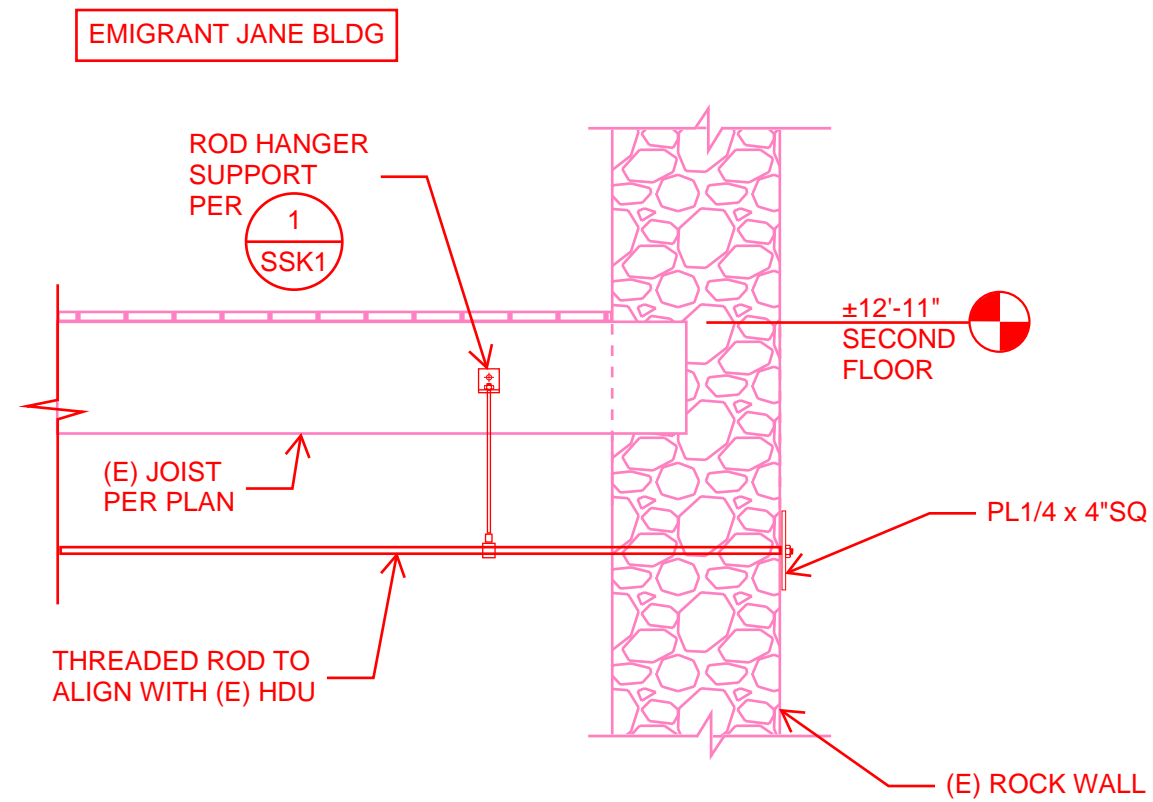
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REVISION:	A

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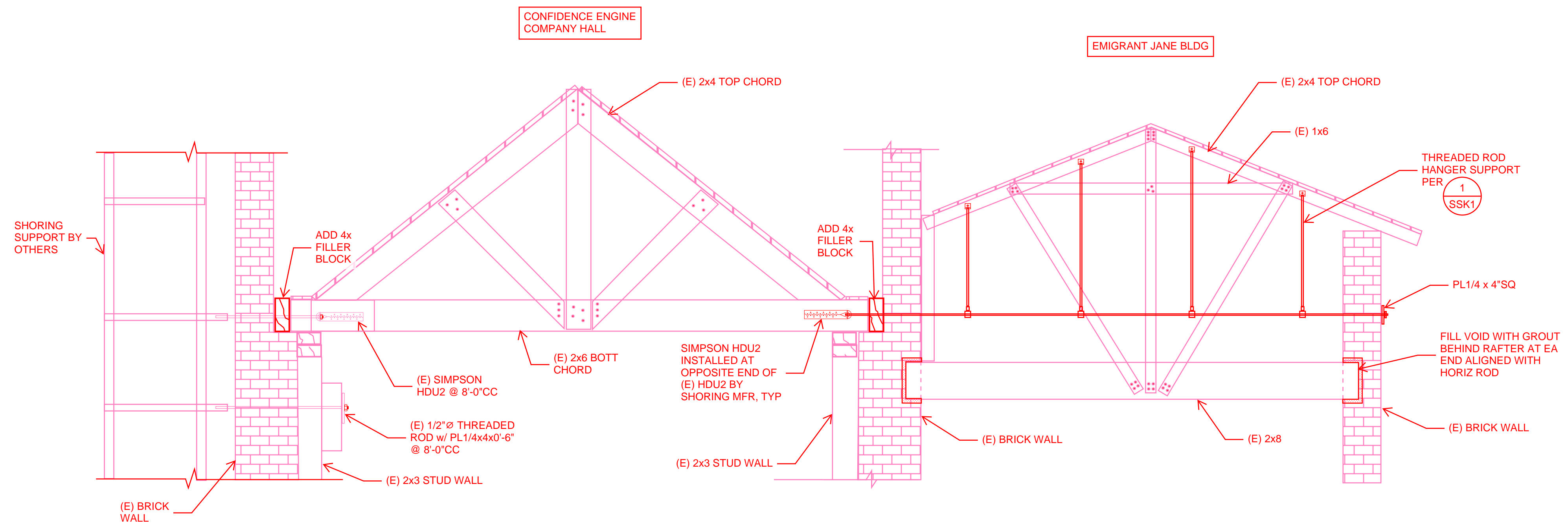
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SECTION $\frac{1}{SSK2}$ — NOT TO SCALE

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SECTION 1
SSK3 — NOT TO SCALE

SSK-3

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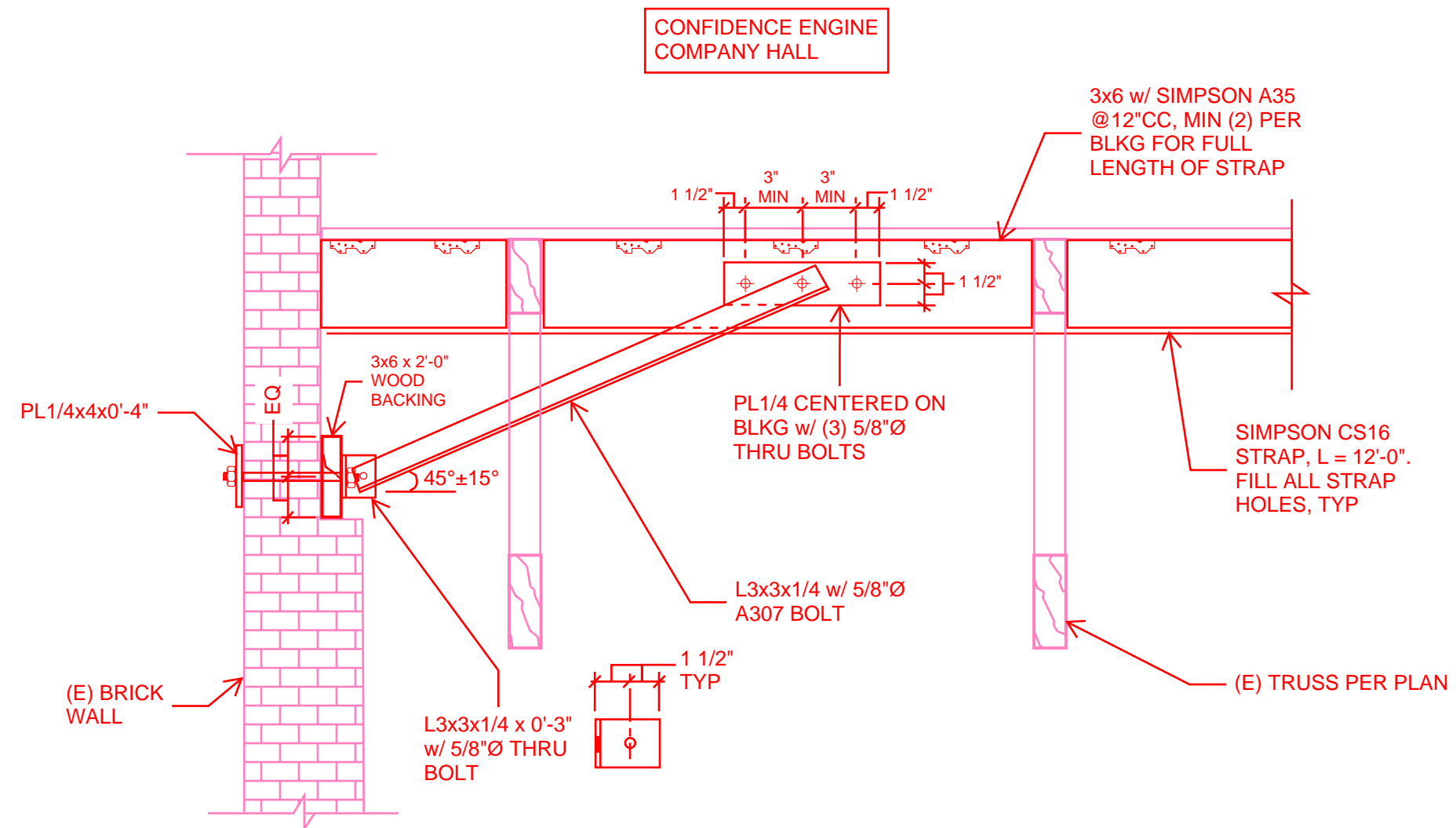
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SECTION $\frac{1}{SSK4}$ — NOT TO SCALE

Current Condition Photographs

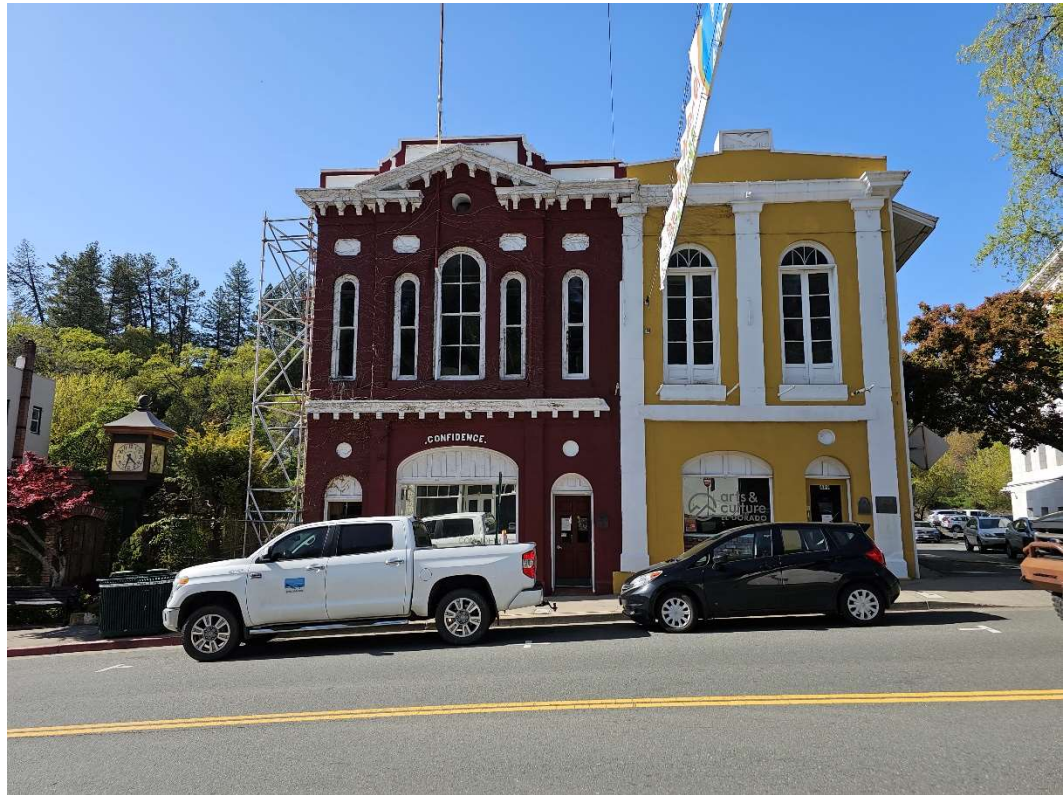


Photo #1: South Elevation

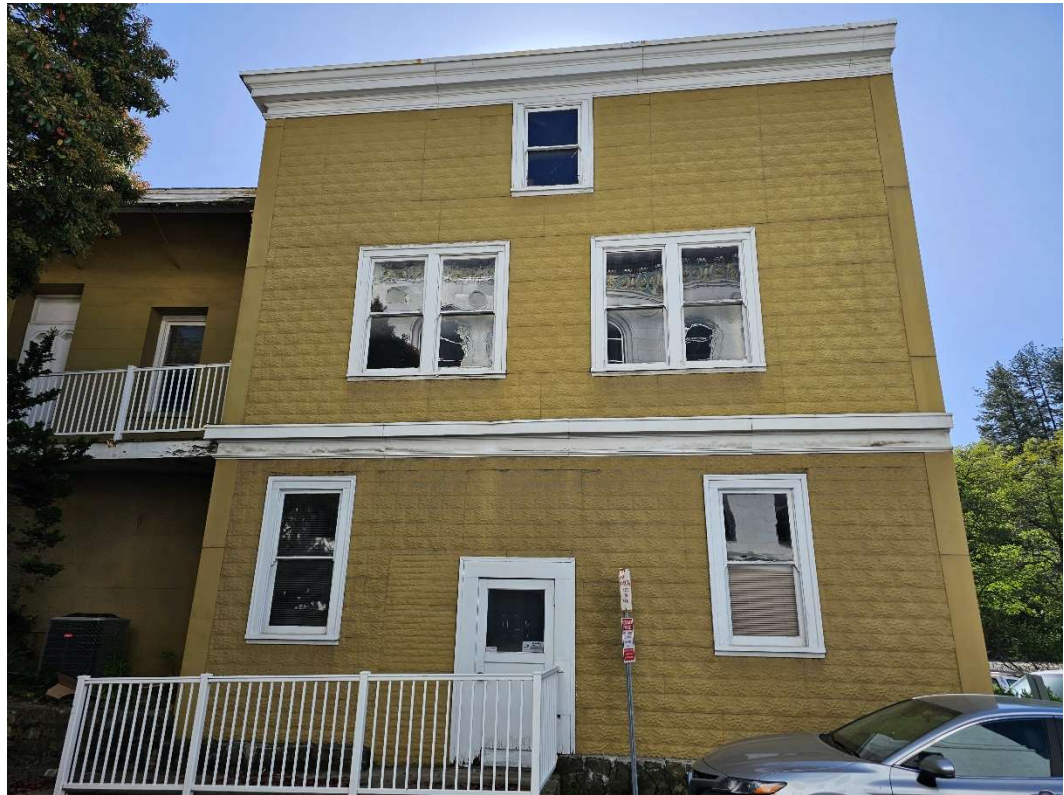


Photo #2: East Elevation

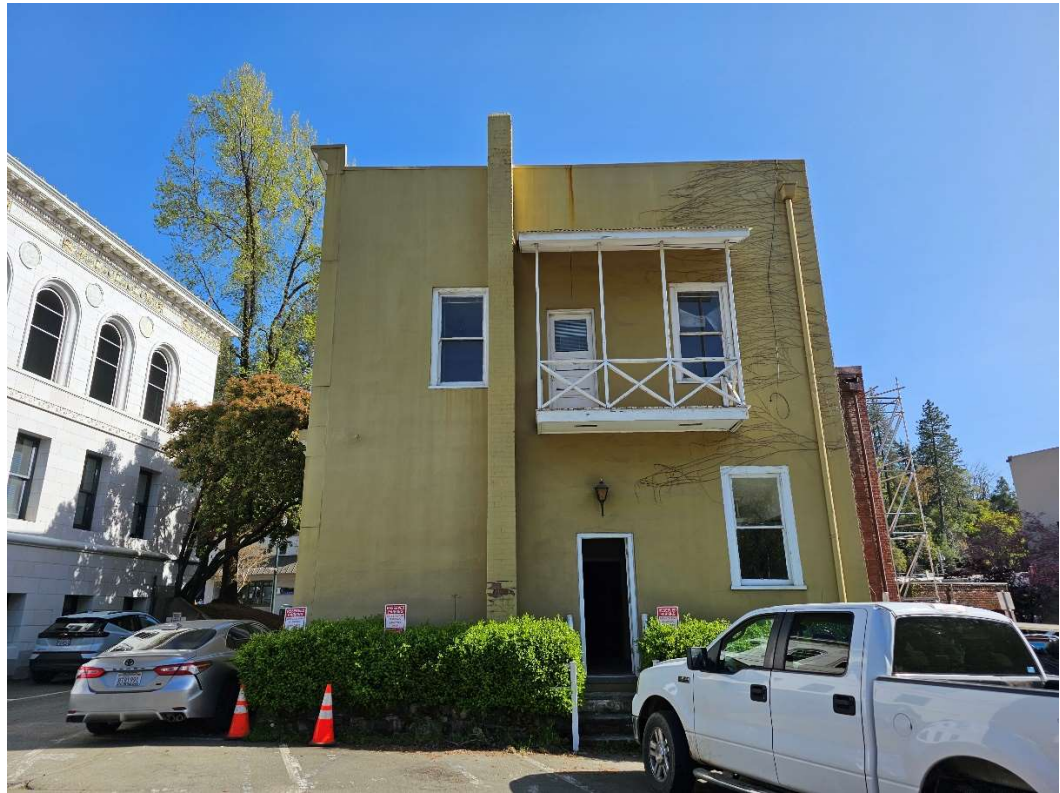


Photo #3: North Elevation (Rear Addition Building)



Photo #4: North Elevation (Confidence Engine Company Hall)



Photo #5: West Elevation



Photo #6: Rooftop View (Looking South)



Photo #7: Basement view Emigrant Jane



Photo #8: Crawl space view from Confidence Engine Company Hall



Photo #9: Brick damage near door jamb at Confidence Hall building



Photo #10: Crack in brick wall (West wall end)



Photo #11: Company Hall Building Roof Trusses



Photo #12: Company Hall Building Roof Trusses bearing on existing furring stud



Photo #13: Company Hall Building Roof Trusses West wall support displacement



Photo #14: Roof truss wall anchor (Confidence Engine Company Hall)



Photo #15: Company Hall Building 2nd Floor West wall support



Photo #16: 2nd Floor Interior Rock (below 2nd) to Brick (above 2nd) Transition



Photo #17: South Wall End Steel Beam



Photo #18: Emigrant Jane Building Roof Trussed Rafters



Photo #19: Emigrant Jane Building 2nd Floor Framing



Photo #20: Rear Addition Building view of 2nd floor framing



Photo #21: Rear Addition Building Roof Ceiling Framing