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Date: February 24, 2015

To: Members of the Historic Preservation Committee

From: Stacy Bradley, Deputy Director of the Planning Unit, Capital and Planning Division

Subject: Mothers Building Conditions Assessment

The Mothers Building, currently located in the San Francisco Zoo, created a space for mothers and their small children to relax while enjoying the Fleishacker Pool. It was built in 1925 with notable murals painted in the 1930s. The building was used for its original purpose until 1960 and was eventually decommissioned in 2002. Since that time the building has mostly been vacant with maintenance work performed as needed.

The San Francisco Recreation and Parks Department received a grant for $102,484 on October 27, 2014 from the Historical Preservation Fund Committee (HPFC) to conduct a building conditions assessment and seismic evaluation for the Mothers Building. The HPFC was created to help disburse funds for historical preservation purposes. Recreation and Park Staff will provide a brief presentation which will highlight the conditions assessment results.

Architectural Resources Group (ARG) was retained by RPD to conduct the conditions assessment, which comprehensively examined the building's interior and exterior condition, including the condition of the murals, to identify and prioritize improvements for building renovation and mural protection.

ARG conducted site visits in May and June 2015 to identify the range of materials on site and assess their general condition. ARG outlined their findings and recommendations under the categories of immediate, short-term, or long term repairs. While short-term repairs include maintenance issues to protect from further water damage, the long-term repairs require seismic, mechanical electrical and plumbing system upgrades.

ARG determined that the building is at a "critical point in time" with significant problems that if left untreated, the deterioration of the historical building will accelerate causing in financial and historical damage.

Mothers Building

Conditions Assessment

prepared for

San Francisco Recreation and Parks Department

San Francisco, California

prepared by

Architectural Resources Group, Inc.

Architects, Planners & Conservators

San Francisco, California

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ARG # 13044

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Figure 1.1: "The Ark's Passengers Disembark" mural on the east wall of the main lounge (100).

1. EXECUTIVE SUMMARY

Architectural Resources Group (ARG) was retained by the San Francisco Recreation and Parks Department to conduct a condition assessment of the Mothers Building located at San Francisco Zoo and Gardens. The objective of the study was to comprehensively assess interior and exterior materials, the murals, and the building's structural, mechanical, and electrical systems for the purpose of identifying and prioritizing improvements to renovate the building.

The Mothers Building was constructed in 1925 by notable architect George W. Kelham, although the murals and mosaics were not added to the building until 1933-1938. The building is one of the few remaining structures from the original Fleishhacker Playfield and Pool and was in continuous use until 2002, when the building was decommissioned.

Today, the building is owned by the San Francisco Recreation and Parks Department, but management and operations of the zoo, including building maintenance, is handled by the San Francisco Zoological Society. There has been little alteration to the Mothers Building over time, and as a result, it maintains a high level of historic integrity. The building retains a number of character-defining features including original wood paneling, furniture, windows, doors, and the WPA murals. The building was listed on the National Register of Historic Places in 1979.

Since 2002, however, the Mothers Building has sat vacant and building materials and systems have quickly degraded. The building's proximity to the ocean has exacerbated deterioration, which will only continue at an accelerated rate. Exterior plaster and decorative precast concrete elements are cracked and spalling, causing further deterioration of the steel structure and creating falling hazards. There are a number of water infiltration issues at the west exterior wall causing severe moisture damage to interior finishes. The murals at this location are in an advanced stage of deterioration and may soon be lost. The building HVAC systems are also no longer operable, leaving the interior damp and cold.

Although the Mothers Building is noteworthy for its architectural design and its association with the Fleishhacker Pool and Playfield, it is the murals that distinguish it as a cultural resource equivalent to Coit Tower or the Beach Chalet. The biggest challenge of restoration will be performing seismic upgrades without damaging the murals. Painted on plaster, the murals are integral to the wall construction. Concealing seismic structural elements within the

existing walls and avoiding damage to the murals may be mutually exclusive goals. Given these circumstances, some latitude in the design of the structural scheme, in which structural elements are visible on the exterior, may be justified. Although visible, exterior structural elements could be playfully designed and even take on whimsical forms, like zoo animals.

The success of repurposing the Mothers Building hinges on developing a seismic scheme that a) provides adequate bracing to protect occupants during an earthquake and b) that can be installed without damage to the murals. Further, improving waterproofing of the west facing wall will be an important component of the upgrade given the damage that has occurred to the murals caused by water infiltration. While phasing the renovation is possible, it would be far more efficient to execute the work at one time due to the interrelationship between needed upgrades. It is imperative however that repairs are sequenced so the exterior envelope is repaired and waterproofed before beginning full restoration efforts on the murals.

The following report outlines our findings and recommendations for repair, each prioritized as *Immediate*, *Short-Term*, or *Long-Term*. Immediate repairs are typically maintenance issues intended to slow the rate of building deterioration. These repairs include replacing broken glazing, cleaning gutters, repairing downspouts, and installing temporary dehumidifiers. These repairs are recommended to be carried out as soon as possible, preferable in advance of the rainy season.

Long-term treatments for preservation of the building should be carried out as soon as funding becomes available, but preferably within 5 to 10 years. These repairs include:

- Document and stabilize murals. Provide operable HVAC system to regulate temperature and humidity.
- Waterproof west wall.
- Perform seismic upgrades.
- Repair or replace damaged/missing decorative precast concrete elements.
- Upgrade mechanical, electrical, and plumbing systems.

The Mothers Building is a historically significant building and an asset to both visitors and residents of San Francisco. Located adjacent to the playground and an open lawn, the Mothers Building is prominently sited and has the potential to be an important focal point and social gathering space. Reuse of the building would add much needed square footage to the zoo for educational programs or events. Site enhancements to the rear and sides of the building also have the potential to re-activate adjacent exhibits or future development in the area.

The building, however, is at a critical point in time. While it has retained much original fabric, significant problems such as water intrusion threaten its integrity. If conditions are left untreated, they will continue to deteriorate at an accelerated rate, resulting in costly damage – both financial and historic. If properly addressed now, repairs and upgrades can prolong the future of Mothers Building and ensure its continued use and enjoyment for generations to come.

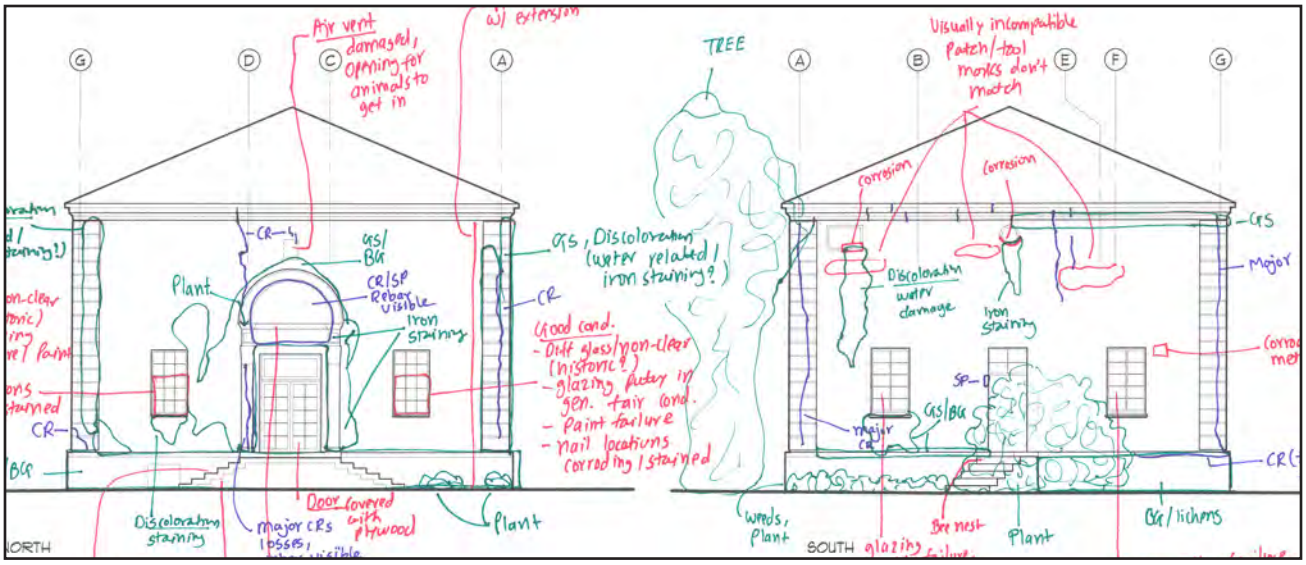


Figure 2.1: Example survey sheet, included in Appendix B.

2. METHODOLOGY

This document is a summary of Architectural Resources Group's assessment of existing conditions at the Mothers Building. The report summarizes the findings and proposed recommendations, and may be used to guide the implementation of conservation, maintenance, and upgrades. The assessment is primarily based on site investigations carried out by Architectural Resources Group (ARG) and its consultants. ARG assembled a multidisciplinary team of architects, conservators, and engineers, which was critical in developing a thorough and comprehensive report.

In conjunction with physical documentation, limited historical research was conducted to better understand the construction and development of the site. Research assists the architect in identifying original or historically significant features and materials which plays a critical role in developing recommendations. Further research, investigation, or testing may be necessary as the project progresses.

The team reviewed the following background documents provided by the San Francisco Recreation and Parks Department, the San Francisco Zoo, and Friends of the Mothers Building at the San Francisco Zoo:

- Original 1924 construction drawings (partial set)
- 1979 National Register of Historic Places Inventory - Nomination Form
- 1986 Structural Investigation Report by Faye Bernstein and Associates
- 1988 Grant Application for the History and Archeological Grant Program of the California Wildlife, Coastal, and Park Land Conservation Act to restore the Mothers Building
- Other historic resources pertaining to the building and murals

ARG conducted site visits at the Mothers Building several times during the months of May and June 2015 to identify the range of materials on site and assess their general condition. The ground survey was non-destructive and limited to visible and tactile inspection. Building features and materials were inspected for defects such as loss, erosion, cracks, rot, detachment, efflorescence, staining, and incompatible or failing repairs. The survey included examination of exterior walls, roof, windows and doors, interior finishes, and site features. Conditions were recorded on drawings, included in Appendix B.

A range of repair and treatment actions were developed and categorized as *Immediate*, *Short-Term* or *Long-Term*. Immediate repairs are typically

maintenance issues and should be carried out within six months, preferably in advance of the rainy season. Short-Term repairs should be carried in 1-3 years and Long-Term repairs should be carried out as soon as funding becomes available, preferably within 6 years. Building upgrades should be coordinated with seismic work and phased to maximize efficiency. A summary sheet of upgrades is included as Appendix G.

Consultants
ARG engaged the services of Anne Rosenthal Fine Art Conservation to conduct a close range visual examination of the historic murals. SOHA Engineers performed a structural analysis and Interface Engineering assessed mechanical, electrical, and plumbing systems. Site visits were conducted on June 9 and 10, 2015. Consultant findings are summarized in this report, however, more detailed reports are attached as Appendix D, E, and F. A budgetary cost estimate prepared by Karen Jensen is included as Appendix H.

Guidelines
The recommendations contained in this report are based on *The Secretary of the Interior's Standards for the Treatment of Historic Properties (The Standards)* with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings and on the Code of Ethics of the American Institute for the Conservation of Historic and Artistic Works (AIC).

The Standards provide general information for stewards of historic resources to determine appropriate treatments. They are intentionally broad in scope to apply to a wide range of circumstances, and are designed to enhance the understanding of basic preservation principles. *The Standards* are neither technical nor prescriptive, but are intended to promote responsible preservation practices that ensure continued protection of historic resources. Further, the Code of the Ethics of AIC calls for treatments to be "suitable to the preservation of the aesthetic, conceptual, and physical characteristics of the cultural property." The Code of Ethics also requires an "informed respect for the cultural property, its unique character and significance, and the people or person who created it."

Figure 2.2: Mural assessment being conducted by fine arts conservator Anne Rosenthal.

Treatments listed in this report respond to goals related to the preservation of materials and elements original to the Mothers Building's construction. Original or historic building materials, also known as historic fabric, contribute to the significance of a building because they inform the degree of architectural integrity a building retains. Retaining historic fabric increases the authenticity of the character-defining elements and serves broader preservation goals of advancing knowledge about the history of building design and technology. Repairs need to be both visually appropriate to retain character-defining features, and physically compatible to minimize loss of and damage to historic building materials.

Throughout the years, the Mothers Building has been referred to by different names and name variations such as Mother's Building (with the apostrophe), Mother House (without the "s"), Mother's House, Mothers House, Fleishhacker Mother House, Zoo Mother's Building and Delia Fleishhacker Memorial Building. For the purpose of this report, the building will be called Mothers Building.

Figure 3.1: c.1970s photo of the east entrance. (Source: San Francisco's Sunset District by Lorri Ungaretti)

3. CHRONOLOGY OF DEVELOPMENT AND USE

1925
Mothers Building opened to the public on Labor Day weekend.

1933-38
Murals painted by Helen K. Forbes and Dorothy W. Pucinelli.

1934
Mosaics completed by Helen, Margaret, and Ester Bruton.

1940s
Wading pool removed and the playfield replaced by a children's zoo. The Mothers Building continued to remain in use.

1947
Lunch Room on the north side converted to men's and women's restrooms.

1962
Murals restored by Puccinelli.

Late 1960s
Main lounge closed when the matrons who assisted mothers and young children retired. Access to restrooms kept via side doors.

Early 1970s
Nearby Fleishhacker Pool closed by order of the Board of Health after falling into disrepair.

1973
Mothers Building reopened as a visitor's center and served that function until 1978. It housed exhibits and provided space for educational programs and receptions related to Zoo activities.

1975
Murals restored by Emmy Lou Packard.

1978
Building used as a shop for the sale of zoo-related merchandise.

1979
Building added to the National Register of Historic Places.

Mid-1980s
Heating system upgraded and minor roof repairs made.

Late 1980s
Plywood barrier and scaffolding erected on the west side to shield the wall and roof seam from prevailing storms and fog.

1989
Trellis structure erected at east entrance to shield pedestrians from falling concrete or plaster.

Early 1990s
Wood walls and floor refurbished and electrical system upgraded.

2002
The gift shop moved to the current entrance and the Mothers Building decommissioned as a public space.

2007-8
Furnace repaired and turned on daily for short periods.

2010
Building cleared and cleaned by volunteers.

2011
Roof and gutter evaluated and repaired. New downspouts and drain pipes installed.

Figure 4.1: 1938 aerial view of San Francisco showing the Fleishhacker Pool, and the Mothers Building (circled). (Source: Harison Ryker, via David Rumsey Historical Map Collection)

4. DESCRIPTION AND SIGNIFICANCE

4.1 History

The Mothers Building was constructed in 1925 on a tract of land located at the junction of Sloat Boulevard and the Great Highway – now the San Francisco Zoo and Gardens. It was donated by the Fleishhacker brothers, Herbert[1] and Mortimer, to honor their deceased mother Delia's memory. The building was intended to serve as a lounge for mothers with small children – a place to change, nurse and relax. Distilled water, milk and refreshments were provided, including medical advice to mothers. It is noted to be the only structure in the west that was "designed to enhance comfort of mothers and young children spending the entire day in recreation".[2] Originally, boys over the age of six were excluded and this restriction was removed in the early 1970s when the general public was welcomed.

The Mothers Building was originally part of the adjoining Fleishhacker Pool and Playfield complex.[3] The wading pool and the Playfield were removed in the 1940s and replaced by a children's zoo; however, the Mothers Building continued to remain in use. In the late 1960s, the main portion of the building was closed when the matrons who had assisted mothers and young children retired. Access to the restrooms via side doors remained. The Pool was closed in the early 1970s, and the Mothers Building was reopened as a visitor center for the zoo housing exhibits and providing a space for educational programs. The use was changed to a gift shop in 1978.

The Mothers Building is one of the few remaining buildings from the original Fleishhacker Playfield and Pool, part of a grand scheme of expansion and improvement of the City park system during the 1920s and 1930s, which provided a continuous recreation zone along the western edge of the city. By 1940, Aquatic Park, Marina Green, Stern Grove, Phelan Beach, Legion of Honor, Kezar Stadium, Harding Golf Course, Mt. Olympus, and Mt. Davidson were all acquired by the City. These greatly extended free or low cost recreational opportunities

[1] Herbert Fleishhacker was a San Francisco philanthropist and also a Park Commission President.

[2] National Register of Historic Places Nomination Form.

[3] It was named after Herbert Fleishhacker.

to residents and visitors. This development reflected new patterns of recreational activity and changing perceptions of the obligations of City government.

4.2 Architectural Description

The Mothers Building was designed by noted Bay Area architect George W. Kelham in the Italian Renaissance style. It is a steel frame building with concrete foundation and a mission style red clay tile roof. The walls are hollow clay tile with a textured stucco finish. The interior wall partitions, floor framing, and roof are constructed of wood.

The building features a three-bay composition. The wider central bay on the east (main entrance) features broad steps leading to a recessed loggia. The loggia has a vaulted ceiling and five arches supported by Corinthian capitals and columns. The side bays include recessed apses containing urns. The exterior is embellished with decorative, pre-cast concrete elements which include frieze panels at the cornice level depicting cherubs and mythological figures, doors with circular pediments, Corinthian columns and capitals, and windows with triangular pediments and surrounds.

The north and south elevations each have two windows and an exterior door. The west (rear elevation) has a large central window, embellished by an ornate carved arch supported by two Corinthian columns. At the base of the window is a two-tiered, semicircular planter of concrete and stucco. The window is secured by a decorative wrought iron grill.

At the interior, the Mothers Building has a large central space flanked by smaller rooms on the north and south.[4] The main lounge (100) originally contained walnut tables, benches, and reed furniture for lounging and was decorated with potted ferns. The south bay contained a storage room (108), a restroom (109) and a janitor's closet (110). Currently, plumbing fixtures have been removed from the restroom, but the other rooms remain intact. The north bay was originally a "Lunch Room" (102) with a long wood counter and small pantry. In 1947, the room was converted to a men's and women's restroom and service closet. The original wood wainscot was reinstalled in the vestibule area.

[4] See "First Floor Plan" in *Appendix B* for the interior layout and room numbers.

The main lounge (100) has hardwood floors and wood paneling with murals above. The ceiling is painted plaster with decorative wood beams.

4.3 Character-Defining Features

Exterior

- Form of a three-bay composition in the Italianate Renaissance style
- Mission style red clay tile hipped roof
- Recessed loggia with arches and vaulted ceiling
- Stucco finish with a wavy texture
- WPA mosaics by Helen, Margaret, and Ester Bruton
- Recessed apses and urns at east elevation
- Frieze panels at east and west elevations
- Wood windows
  - One 16-lite paired casement sash window at west elevation with a semi-circular pediment supported by Corinthian columns
  - Six 5-lite paired casement sash windows, four at the east loggia and two at south elevation
  - Two double-hung 6 over 9 sash windows with precast concrete surrounds, and triangular pediments at east elevation
  - Eight double-hung 6 over 9 sash windows, two at north elevation and six at west elevation
- Wood doors
  - Panel main entrance doors with precast concrete semi-circular pediment
  - French doors with transom and semi-circular precast concrete pediment supported by Corinthian columns at north elevation
- Concrete balustrade and decorative pavement at east entrance plaza

Interior

- Symmetrical arrangement of a large central room flanked by two smaller rooms
- WPA egg tempera murals by Helen Forbes and Dorothy Pucinelli with wood wainscoting below

Figure 4.2: 1939 historic photo showing interior of Mothers Building. (Source: Works Progress Administration California, via livingnewdeal.org)

- Decorative wood beam ceiling
- Hardwood flooring at main lounge (100)
- Wood panel doors with painted surrounds at main lounge (100)
- Two walnut benches and octagonal tables

Site

- Location of the Mothers Building along the Pacific coast
- Relationship of the Mothers Building to the east entrance plaza

4.4 Building Significance

The Mothers Building is one of the few buildings remaining from the original Fleishhacker Playfield and Pool complex and the expansive recreational improvements made along the City's coastline during the 1920s and 1930s. The Building exemplified new patterns of recreational activity, designed to enhance the comfort of mother and young children spending the entire day in recreation. It is probably the only structure of this type in the West.

The Mothers Building was donated by Herbert and Mortimer Fleishhacker brothers to honor their deceased mother. Herbert served as president of the Anglo & London Paris National Bank

and represented millions of dollars operating in all parts of the world. He was a philanthropist, president of the San Francisco Park Commission, and was recognized as "one of the most influential, progressive and valuable citizens of the Golden State".[5] Herbert was the motivating force behind the idea of the City's recreational coastline.

The Mothers Building was designed by a notable Bay Area architect George W. Kelham, who designed other well-known San Francisco landmarks such as the San Francisco Public Library, Federal Reserve Bank, Standard Oil Building, and Shell Building. Kelham was also the Chief of Department of Architecture during the Panama-Pacific Exposition. The Mothers Building is an excellent example of Kelham's use of the Italian Renaissance architectural traditions on a smaller scale than much of his other work.

The Mothers Building houses notable Works Progress Administration (WPA) murals and mosaics. It appeared to be a deliberate act that solely women artists were commissioned to execute art in the building. The egg tempera murals by Helen K. Forbes and Dorothy W. Pucinelli depict the biblical story of the Noah and his ark and are the largest egg tempera murals in the West. The mosaics on the loggia walls were done by Helen, Margaret, and Ester Bruton. The Alameda-born Bruton sisters were known for adapting the ancient medium of frescos and mosaics to modern motifs.

There has been little alteration to the building over time and a significant amount of historic fabric remains. The main lounge (100) possesses a high level of integrity with a number of character-defining features including wood paneling, original furniture, and the murals. The north and south ends of the building have had greater levels of modification but are intact.

The historic period of significance for the Mothers Building is 1925-1938 – the date of building construction to the time the murals were completed. The Mothers Building was added to the National Register of Historic Places in 1979, but has not been designated a City Landmark.

[5] National Register Nomination.

Figure 5.1: Roof of the Mothers Building.

5. EXISTING CONDITIONS AND TREATMENT RECOMMENDATIONS

5.1 Exterior

Roof System

The Mothers Building has a wood framed hipped roof with a single ridge in the longitudinal direction. Roofing material is half-barrel mission clay tile over an unconfirmed waterproof membrane. Slope is approximately 6:12. Roof sheathing is 1x4 tongue and groove boards.

Viewed from a distance, most roof tiles appear to be intact and in good condition. Some damaged tiles were noted on the west elevation and several broken tiles were found on the ground adjacent to the building.

The building has built-in gutters set within the cornice and appear to be lined with copper sheet metal (Figure 5.2). Rainwater enters the built-in gutters through a screened void in the bottom clay tile pan at the gutter. Debris in the screened void could prevent the capture of rainwater into the gutter, resulting in rainwater overflowing the gutter and washing down the wall. This condition would subject the exterior wall components to concentrations of rainwater and may be contributing to water intrusion

Figure 5.2: Built-in gutter at the roof edge .

Figure 5.3: Damaged cornice exhibiting wood deterioration and cracked concrete, east elevation.

Figure 5.4: Damaged cornice showing corroded flashing, south elevation.

Figure 5.5: Copper downspout on east elevation without an extension.

on the west elevation. The built-in gutter appears to be constructed level, or with a very low slope to the downspouts.

Round copper downspouts are located at all elevations and have plastic extensions intended to direct water away from the building. In many instances, however, the extensions are sloped upward or directed toward other building elements. In some locations, water pools near exterior walls because of uneven site gradation. There is also evidence that the northern downspout on the east elevation is leaking. The surrounding stucco, which exhibits cracks and biological growth, was found to be wet. The downspouts were recently replaced and are in good overall condition.

Treatment Recommendations:

Immediate Repairs

- Clean gutters and roof debris.
- Replace broken or missing roof tiles.
- Inspect gutters. If leaks are found, replace/repair sheet metal liner and provide waterproof membrane at built-in gutter.
- Repair downspout on east elevation.
- Provide downspout extension where missing.
- Clear and redirect extensions so rainwater flows away from building.

Long-Term Upgrades and Repairs

- Coordinate roofing upgrades with structural upgrades. Salvage clay tile roofing for reinstallation. Provide waterproof membrane at roof deck and reinstall existing clay tile. Replace roof jacks/flashing at roof penetrations.

Figure 5.6: Soil around the foundation piers was found to be wet.

Foundation and Floor Framing

The building has a perimeter concrete stem wall foundation with spread footings, and isolated concrete piers at principal girders/lines of support. The sandy soils in the crawlspace were uniformly moist suggesting a rising damp condition and/or water leaks from the domestic water system. There is evidence to suggest a water leak beneath the building as suggested by the concentrated erosion of sand at footings.

The flooring system is typically wood frame construction with diagonal 1x floor sheathing. The floors are generally sound, however at the north wall of the main lounge (100) (gridline 5), the floor system has settled approximately 3/4 inch as evidenced by a void between the baseboard and floor.

The crawlspace has screened vents at the north and south elevations, however, they do not meet size requirements for passive ventilation under the current code. Alternate means and exceptions may be allowable by code and should be explored.

Treatment Recommendations:

Immediate Repairs

› Repair source of water leak in crawlspace, likely from domestic water lines.

Short-Term Upgrades and Repairs

› Shore first floor framing at north lounge wall to prevent further settlement.

Long-Term Upgrades and Repairs

› Recommend using code exceptions to achieve compliant ventilation of the crawlspace. This would include mechanical ventilation and/or placement of a vapor retarder on the soil surface in crawlspace.

Exterior Walls

The exterior walls of the Mothers Building are composed of steel columns with a rim beam at the roof line, infilled with hollow clay tile bearing on a concrete foundation. Building exterior is finished in a decorative stucco finish. The concrete and stucco are tan in color, with stucco finished in a wavy, river-like texture. At the base of the exterior walls, a smooth stucco finish is applied to the concrete foundation.

At the east loggia, a wood frame trellis with horizontal metal mesh was constructed in 1989 to protect occupants from spalling concrete and plaster above (Figure 5.7). The unpainted wood is weathered but members and connectors appear secure. The trellis is in fair overall condition but is stylistically incompatible with the building and is highly visible to zoo visitors.

Figure 5.7: Wood trellis at east entrance.

At the west elevation, a wood framed scaffold with plywood finish was constructed in the late 1980s to shield the west wall of the main lounge (100) from rain and fog (Figures 5.8 and 5.9). As evidenced by deterioration of the mural, the wall has long battled with problems related to water infiltration and moisture. In a secondary attempt to block water, a supplemental frame was added to the southern half and covered with plastic sheeting. The entire wood frame structure is in poor condition. Wood members are deteriorated and sit in direct contact with earth. While screening water, the plywood also prevents visual inspection of the west wall to check for maintenance issues. While not visually compatible with the building, the structure is mostly hidden from view on the rear of the building.

Figure 5.8: Wood framed scaffold at west elevation.

Figure 5.9: Wood framed scaffold at west elevation .

<u>Cracking and Spalling</u>
Damage to the exterior walls includes cracks and spalls, many which are result of corrosion of the steel frame. In presence of water, steel corrodes and expands causing concrete to crack and eventually spall. Structural steel columns are located at all four corners of the building and corrosion has caused major, almost full-height cracks to form (Figure 5.10). Some of the larger stucco cracks also extend through to the masonry infill wall below.

The major cracks and spalls are also visible at two recessed apses and the loggia (Figure 5.11). The decorative, pre-cast concrete panels making up the

Figure 5.10: Full-height crack at corner, south elevation.

apse ceilings are held in place using steel wires, some of which are corroded and broken (Figure 5.12). The panels exhibits cracks, spalls, and mortar loss, and allow water to get inside the building through open joints and holes.

At the loggia, pre-cast concrete column surrounds are cracked at multiple locations and exhibit efflorescence around cracks (Figure 5.14). Cracks in concrete are likely caused by expansion of corroded steel from water penetration. The pre-cast column covers have deteriorated beyond repair and must be recast. The Corinthian capitals are also spalled and exhibit material loss.

Decorative pre-cast concrete elements such as frieze panels, pediments and columns around doors and windows, and urns are also cracked, spalled and displaced, with corroded rebar exposed at several locations. The long frieze panel depicting a group of cherubs above the main entrance is significantly damaged exhibiting cracks, material loss, and spalls loosely attached to corroded rebar (Figure 5.13). Additional damage will continue to occur as freshly exposed concrete remains in contact with rainwater and moisture in air.

Figure 5.11: Deterioration of a recessed apse ceiling, east elevation.

Figure 5.12: Backside of a recessed apse showing pre-cast elements held in place using steel wires.

The door pediments and columns at the north and west elevations are also in poor condition. One door column at the north elevation is beyond repair and must be recast (Figure 5.15). Additionally, there are cracks and loose spalls in the lintel. Chicken-wire netting is attached to the pedimentbut does not cover all loose spalls. There is still risk of loose concrete falling to the ground.

At the west elevation, the pediment frieze is no longer extant and the area is covered with a piece of plywood. The 1986 structural report shows exposed masonry infill wall indicating the pediment was probably cracked and spalled, and therefore, removed for safety reasons and area covered to prevent water infiltration. The door lintel is also cracked and spalled, and corroded rebar exposed.

Figure 5.13: Concrete deterioration, frieze above the main entrance.

Figure 5.15: North elevation entrance column deterioration.

Figure 5.14: Column deterioration at the east loggia.

The four, hollow-core urns on the east elevation are cracked and spalled with an urn on the northern side exhibiting major material loss. Where there is a major cavity in the urn, corroded and chipped rebar is noted.

Aesthetic Defects

While aesthetic defects such as general soiling and biological growth do not impact structural integrity of a building, they have a significant impact on appearance and performance as some defects can permit water intrusion or prevent moisture evaporation from walls. The aesthetic defects found at the Mothers Building include small chips and loss of material in the concrete, crazing cracks in the stucco finish, discoloration, biological growth and efflorescence. There are a series of holes on the loggia wall, likely caused by anchors from building signage.

The flat stucco at the building base is hollow and exfoliating at several locations, with majority of the locations being heavily soiled and covered in biological growth.

The most common type of surface discoloration is general soiling, which ranges from moderate to heavy in severity and is found on all exterior surfaces and decorative elements. There is yellowish-green biological staining on the walls. The chicken-wire net attached to the door pediment on the north elevation has an orange-color algae growing that appears to be Trentopholia aurea. Lichens and mosses are also found growing on the building, mostly in areas close to the ground.

Some of the wall areas have overpaint, what appears to be an attempt to cover graffiti or poorly matched stucco repairs (Figure 5.18). The overpaint does not match the color of concrete and most importantly, a non-breathable coating can trap moisture within walls, causing damage. Some of the wall areas also have orange discoloration, more prominent on a door column at the north elevation. The corroded air vents have also stained adjacent stucco.

There are also visually incompatible patches on the south wall, with color and tool marks of the patches not matching the original stucco and finish.

Figure 5.16: Example of stucco exfoliation, east elevation of the loggia.

Vegetation

Trees and overgrown shrubs grow adjacent to the building and stairs on the south and west elevations. Tree roots can damage foundations and foliage can clog gutters and downspouts. Furthermore, vegetation can block wind and sun from drying out the walls, holding moisture against the building.

Figure 5.17: Urn covered in general soiling, east elevation.

Treatment Recommendations:

Immediate Repairs

- Repair wood frame structure at west elevation to ensure it is safe and secure. Inspect wall behind plywood.
- Repair exterior openings in building envelope (such as air vent on north elevation) that allow vermin into the building.
- Secure damaged or loose elements using non-corroding wire net. Replace wire net on north elevation, which is contributing to staining on adjacent surfaces.
- Remove or cut back vegetation adjacent to building, including dried plants in the urns.

Figure 5.18: Overpaint on the stucco, east elevation.

Short-Term Upgrades and Repairs

- Document decorative concrete elements (bas-relief and apse panels, column capitals, urns) using 3D scanning or rectified photography for future repair/replication.
- Patch major cracks and spalls.

Long-Term Upgrades and Repairs

- Remove wood framed trellis at loggia for discard.
- Remove wood frame and plywood scaffold at west elevation for discard.

- Clean exterior surfaces to remove general soiling, biological growth, efflorescence and discoloration.
- Replaster surface disturbed by structural work. Stucco mix, color, and texture to match historic. Conduct stucco analysis to determine historic binder to aggregate ratio.
- Where existing stucco remains, remove visually incompatible stucco patches and re-patch areas.
- Apply waterproof membrane or coating at west elevation. Coordinate with structural upgrade.
- Consider topical waterproofing at all building skin.
- Repair minor cracks, spalls and other deficiencies in stucco to remain.
- Replace precast column at north entrance and frieze at west elevation.
- Repair damaged decorative concrete frieze components, resecure in place, and repoint joints.
- Remove outdated or damaged building appurtenances including speakers, alarm boxes, and conduit.

Windows

Windows are single pane wood sash in wood frames set into the masonry wall opening. Glass throughout the building has varying texture, however plain transparent glass is typical. The windows are generally in fair condition, requiring functional repairs including wood repair, glazing and glass repair, paint preparation and coating, hardware replacement, and sash cord replacement. Sealant at the junction between the wood windows and masonry openings is failing and needs replacement throughout.

Windows at the east loggia are 5-lite paired casement sash (Figure 5.19). Windows are pad-locked shut, and concealed window hinges are rusting (Figure 5.20). The east windows flanking the loggia have cast concrete window surrounds with triangle pediments and cast iron security grilles (Figure 5.21). The concrete surrounds are cracked, spalled, and exhibit general soiling, efflorescence and plant and biological growth.

South elevation windows are paired 5-lite casement windows. The eastern-most window has a broken window pane that may be the point of entry for raccoons inhabiting the building. At the north elevation, the restrooms each have a single double-hung 6 over 9 sash, with obscured glazing in the bottom sash. The north elevation windows need replacement of sash cords and some hardware.

At west elevation, there is a large 16-lite paired casement sash at the center of the west elevation, which is missing a wood mullion (Figure 5.23). A cast iron security grill at the exterior exhibits corrosion and rust (Figure 5.24). Three windows flank either side of the large window – a fixed 15-lite window and two double-hung 6 over 9 windows. The windows require replacement of sash cords and some hardware.

Treatment Recommendations:

Immediate Repairs

› Replace broken window lites.

Short-Term Upgrades and Repairs

› Prepare and paint windows and metal grilles.

Figure 5.19: 5-lite paired casement sash window at the east loggia.

Figure 5.20: Typical paint failure and corrosion of fasteners at north, west and south elevation windows.

Figure 5.21: 6 over 9 double-hung window at east elevation.

Figure 5.22: East elevation window exhibiting paint and glazing putty failure.

Figure 5.23: Missing mullion at the 16-lite paired casement sash window, east elevation.

Figure 5.24: Corrosion of the metal grill at the large, 16-lite paired casement sash window, east elevation.

Long-Term Upgrades and Repairs

- Repair deteriorated wood sash and frame.
- Replace mismatched or damaged window glazing. Reputty all window panes.
- Replace all exterior perimeter sealant.
- Replace sash cords at double hung windows.
- Replace damaged or missing hardware.
- Prepare and paint all windows. Conduct paint analysis to determine historic finish colors.
- Lubricate hardware. Ensure smooth operability of all windows.
- Remove corrosion from metal grilles and refinish.

Exterior Doors

Exterior doors are a mixture of paneled, glazed, and flush wood doors. The doors are generally in fair condition, with functional repairs needed that include hardware replacement, operational repairs, glazing and glass repair, and paint preparation and coating.

The main entrance doors at the east loggia are original paired 10-panel oak doors (Figure 5.25). At the exterior, finish is weathered and wood grains are raised. The existing mortised lockset functions poorly and the oak threshold is weathered and split. The threshold is infested with beetles or drywood termites (Figure 5.26). Additionally, the astragal has detached from the door. There is a circular pediment above the door with a frieze depicting two female figures and a lintel listing dedication to Delia Fleishhacker in bronze letters.

The north elevation doors are a pair of glazed 10-lite french doors with a fixed leaf and deadbolt on active leaf set in the original opening with fixed 2-lite transom (Figure 5.27). There are surface mounted mending plates at stile-rail joints. At one door leaf, a wood mullion is missing. Currently, the doors are covered with plywood at the exterior.

The south elevation has a flush wood door set in an original opening with fixed 4-lite transom above (Figure 5.28). Historic drawings suggest the opening was originally a window and may have matched the tall window on the west elevation.

Exterior doors serve as egress from the building and an assembly occupancy over 50 occupants would require two egress doors with panic hardware, door swing in the direction of egress, and level landings to match interior floor heights.

Treatment Recommendations:
Long-Term Upgrades and Repairs

- Restore east loggia double doors. Stain and reseal.
- Repair north elevation glazed french doors. Remove surface-mounted mending plates and replace missing door mullion.
- Replace south elevation flush door with historically appropriate door.

Figure 5.25: East entrance doors, view from exterior.

Figure 5.26: Main entrance door threshold infested with beetles or drywood termites.

Figure 5.27: North elevation door, view from inside.

Figure 5.28: South elevation door, view from inside.

- Prepare and paint doors. Conduct paint analysis to determine historic finish colors.
- Provide accessible door hardware and panic hardware as required by code.
- As required by proposed use and occupancy, re-swing doors in the direction of egress travel. Consider exemption or alternate means as permitted by California Historic Building Code.

Figure 5.29: Exterior stairs and pavement, east elevation.

Stairs, Pavement and Balustrade

Stairs
There are exterior stairs at the north, south, and east entrances. The east entrance stairs are comprised of a concrete structure with a decorative parge finish. The steps are in fair condition and have a discernible sway/deflection in the center portion of the stairs, suggesting a loss of support due to soil subsidence at grade in this area. The soil subsidence extends into the eastern entrance plaza in the same location. General soiling and hairline cracks are typical conditions found. The steps are significantly damaged, cracked and fragmented, most notably at the ends (Figure 5.30). Additionally, weeds are growing in cracks and at the ground. The original handrails at the center of the eastern stairs have been removed, with evidence of a base plate 'ghost' and visible paired fasteners extant.

At the north and south are less decorative stairs, comprised of board-formed concrete steps and cast iron guardrails/handrails. The north and south stair landings at entrances doors have a single step up to the entrance doors. The north and south stairs are in good condition, with few cast iron elements bent and balusters missing at the north stair railing.

Pavement
The east entrance plaza has exterior concrete pavers comprised of three colors: red, tan and blue-green (Figure 5.31). The pavers are laid out in pinwheel pattern with four rectangular pavers around a square paver. The pavers are in fair overall condition, with isolated areas of deterioration. Typical deterioration conditions include cracks, spalls, soiling, staining from spilled liquids, tripping hazards, ponding, and weed growth. There are multiple long cracks extending the depth of a paver and cutting through multiple pavers. The pavement is uneven due to subgrade soil subsidence that extends beneath the east entrance steps.

Balustrade
The concrete balustrade at east entrance plaza is severely damaged and missing balusters, railing and posts in large numbers (Figure 5.32). It exhibits general soiling, biological growth, efflorescence,

Figure 5.30: Damaged stairs, east elevation.

Figure 5.31: Cracks in the pavement, east elevation.

Figure 5.32: Damaged balustrade, east elevation.

plant overgrowth, and cracking. The corroded rebar is also exposed at several locations. The existing elements are mostly beyond repair and the majority of them will need to be recast.

Treatment Recommendations:

Immediate Repairs

- Remove weeds, trash, and debris.
- Remove bee nest at south stair.

Short-Term Upgrades and Repairs

- Document balustrade with measured drawings to aid replication in the future.

Long-Term Upgrades and Repairs

- Correct soil subsidence beneath east entrance stairs and plaza. Regrade site. Level steps and restore.
- Replace pavers, matching historic color and finish. Re-lay pavers in the original pattern and color configuration.
- At north and south elevations, add top riser/ landing to align with finish floor. Modify existing handrails/guardrails as required for code compliant condition.
- Repair and repaint the north entrance handrail.
- Provide cast iron handrail at east entrance steps in keeping with extant handrails at north and south elevations.
- Repair existing concrete balustrade; re-cast missing components.
- Provide new plantings around building based on historic photos and evidence of original landscape design. If drought tolerant species are desired, specific plants should be chosen that match the size, form, color and shape of original plantings.

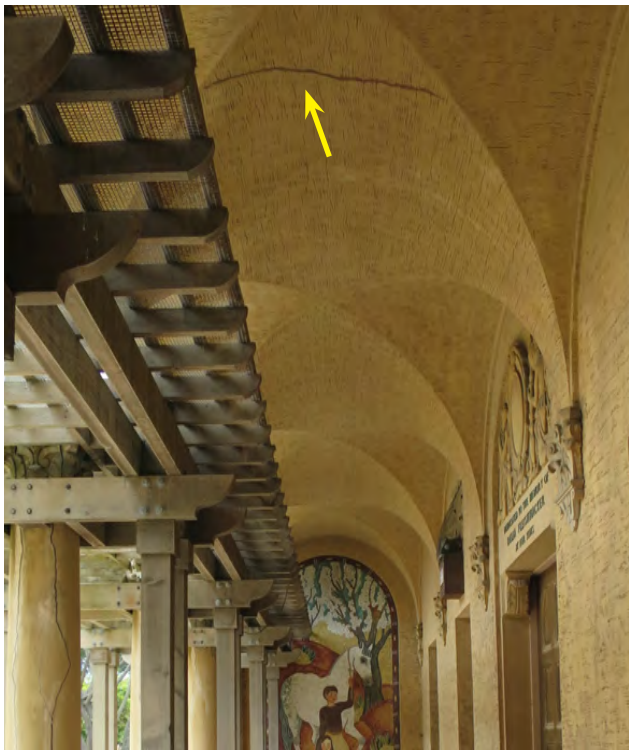


Figure 5.33: Crack in the ceiling highlighted by dark discoloration.

Figure 5.34: Loggia floor.

Loggia Ceiling and Floor

The loggia on the east elevation has a vaulted ceiling with a decorative stucco finish in a wavy pattern, similar to the exterior walls. The ceiling is generally in good condition with few visible cracks in the stucco (Figure 5.35). One major crack is highlighted by dark discoloration caused by water leak (Figure 5.33).

At the east loggia, the floor system is formed above-grade concrete slab construction, with a basket-weave pattern brick masonry finish. The floor is in fair condition, exhibiting general (Figure 5.34) wear and tear from use.

Figure 5.35: Cracks over a door capital.

Treatment Recommendations:
Long-Term Upgrades and Repairs

- Remove hollow, cracked areas in the plaster and repatch matching historic color and texture. Conduct stucco analysis to determine historic binder to aggregate ratio.
- Retain the brick flooring. Clean to remove general soiling and repoint mortar joints as required.

Figure 5.36: Northern mosaic depicting St. Francis with the animals.

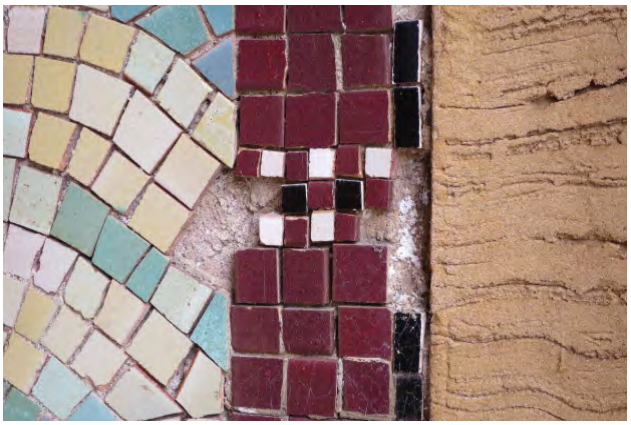


Figure 5.37: Missing tiles, north wall.

Figure 5.38: Grout loss and spalling of glazed surface, north wall.

Wall Mosaics

Two side walls of the east loggia include mosaics by Helen, Margaret, and Ester Bruton done for the Works Progress Administration. The northern mosaic depicts St. Francis with the animals and the southern mosaic depicts a scene of children and animals. Both mosaics are signed "Bruton 1934".

Both mosaics are generally in good condition; however, the northern mosaic shows deterioration that includes grout loss, spalling of tile glazes, missing tiles and a horizontal wall crack cutting through the mosaic wall (Figures 5.37 and 5.38).

Treatment Recommendations:
Long-Term Upgrades and Repairs

- Restore the northern mosaic; regrout and refill losses. Replace tiles with spalled surfaces matching new tiles in color and texture.

Figure 5.39: Painted plaster ceiling with decorative wood beams, main lounge (100).

5.2 Interior

Ceilings

The main lounge (100) ceiling is gypsum plaster over wood lath, with decorative wood beams below. The ceiling is marked with dust, mold and cobwebs. Vermin living in the attic leave behind waste which is staining the ceiling surface. There are few areas of plaster damage or loss that need repair.

The remaining rooms at the north and south bays have simple flat gypsum plaster ceilings, with areas of damaged or missing gypsum plaster that need repair. Rooms 105 and 106 have large areas of plaster loss.

Treatment Recommendations:
Immediate Repairs

- Vacuum up loose dirt, debris and vermin waste from above the finished ceiling.

Long-Term Upgrades and Repairs

- Repair missing gypsum plaster ceilings.
- Prepare and paint ceiling. Conduct paint analysis to determine historic color of ceiling.

Wall Finishes

The main lounge (100) has oak veneer paneled wainscoting, 10'-6" high, installed over plastered walls with egg tempera murals above depicting scenes from Noah and His Ark. The wainscoting is stained a dark walnut color and is embellished with a row of repeating metal motifs at the top (Figure 5.40). Minor damages include splits, bubbles and loss in the veneer panels and localized loss of surface finish (Figure 5.41). The wood finish shows more signs of wear at the east wall and at baseboards adjacent to doors. The walls have abandoned window hardware and fasteners, and some of the metal motifs are missing.

Figure 5.40: Repeating metal motifs, north wall, main lounge (100).

Interior wall finish at the end bays is typically gypsum plaster over wood lath, or gypsum board at areas of recent upgrade. There are several areas of wall loss/damage throughout the building. In general, the building feels extremely damp and has a musty odor. Mold was noted growing at the base of walls in the north and south ends (Figure 5.42).


Figure 5.41: Typical weathered wood finish, east wall, main lounge (100).

Restrooms (101 and 103) at the north bay have a ceramic tile wainscoting while Rooms 102 and 104 retain the original paneled wood wainscoting, currently painted. Structural recommendations will require the removal of interior wall finishes in the north and south bays.

See the Murals section (5.3) for additional wall conditions.

Treatment Recommendations:

Immediate Repairs

- Remove mold from wall surfaces following industry standard safety procedures.

Long-Term Upgrades and Repairs

- Repair damaged wood veneer panels. Replace metal motifs where missing or broken. Restain and reseal all oak wainscoting.
- Remove abandoned hardware and fasteners.
- Restore paneled wood wainscot in Rooms 102 and 104.
- Remove wall finishes in north and south bays for structural work. Replace wall finishes.


Figure 5.42: Mold on wall surfaces, Room 108.

Figure 5.43: Main lounge (100) floor.

Floors

The main lounge (100) has an oak floor finish. At the north wall the floor has settled approximately 3/4-inch. The oak floor finish is worn with soiling at traffic areas; damages includes scratches and borings in the floor.

The flooring in the north and south bays is a mix of composition flooring, some of which is original. The flooring is in poor condition. There are a number of cardboard boxes being stored in Room 108 that are moist and contributing to mold issues.

Structural upgrade recommendations at the north and south bays will require modification of the floor framing at the perimeter/exterior walls and subsequent replacement of all floor finishes in these rooms.

Treatment Recommendations:

Immediate Repairs

- Vacuum up loose dirt, debris, and vermin waste.
- Remove items being stored in Room 108. Follow industry standard safety procedures.

Long-Term Upgrades and Repairs

- Repair and refinish wood flooring in the main lounge (100).
- Replace floor finishes in north and south bays after completion of structural modifications.

Figure 5.44: Weathered finish from water damage near the large, central window on the west wall, main lounge (100).

Figure 5.45: Composition flooring in the south bay.

Interior Doors

The main lounge (100) has two sets of 5-panel paired wood doors at the south and north walls. The color of wood stain at doors is slightly different than the wainscoting (Figure 5.46). The wood frames are embellished with painted designs at two sides, which are fading. Wood finish has worn out from use and requires restaining and refinishing. The southern door is also covered in guano. At the east elevation, a door leading to the attic is missing a wood panel (Figure 5.47)

There are a mix of single-panel original doors and replacement flush wood doors at the north and south bays.

Treatment Recommendations:
Immediate Repairs

- Remove guano from south door.

Long-Term Upgrades and Repairs

- Restore doors in the main lounge (100). Fill losses in painted door surrounds.
- Repair interior single panel wood doors to operable condition and reuse where possible.
- Replace interior flush wood doors with single panel doors to match historic.
- Provide accessible door hardware.

Figure 5.46: Southern interior door, main lounge (100).

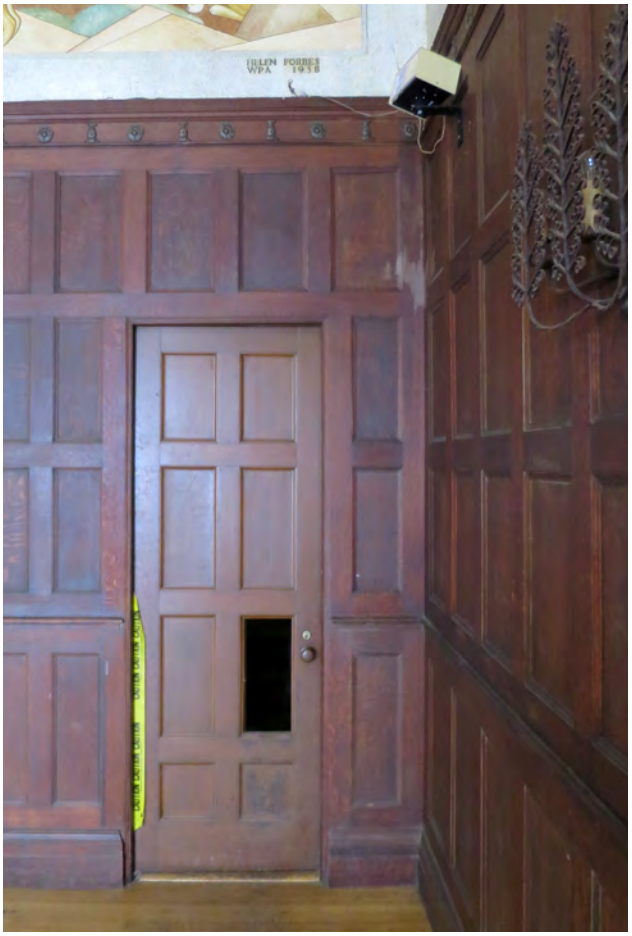


Figure 5.47: East elevation door in the main lounge (100) missing a panel.

Furniture

The main lounge (100) has two heavy, walnut benches and two octagonal tables which are original to the building. The 1979 National Register Nomination Form also identifies four additional wood benches and four tables with tile inlays, whose current whereabouts are unknown. If possible, it would be desireable to locate and return the original furnishings to the building.

Similar to other wood elements in the space, the existing furniture pieces are weathered with localized loss of finish, water damage, stains, splits, chipping, and accumulation of dirt.

Treatment Recommendations:
Short-Term Upgrades and Repairs
› Locate missing benches and inlayed tables.

Long-Term Upgrades and Repairs
› Repair and refinish furniture restoring original aesthetic.

Figure 5.48: Walnut bench, main lounge (100).

Figure 5.49: Walnut octagonal table, main lounge (100).

Figure 5.50: Split in the base assembly, main lounge (100).

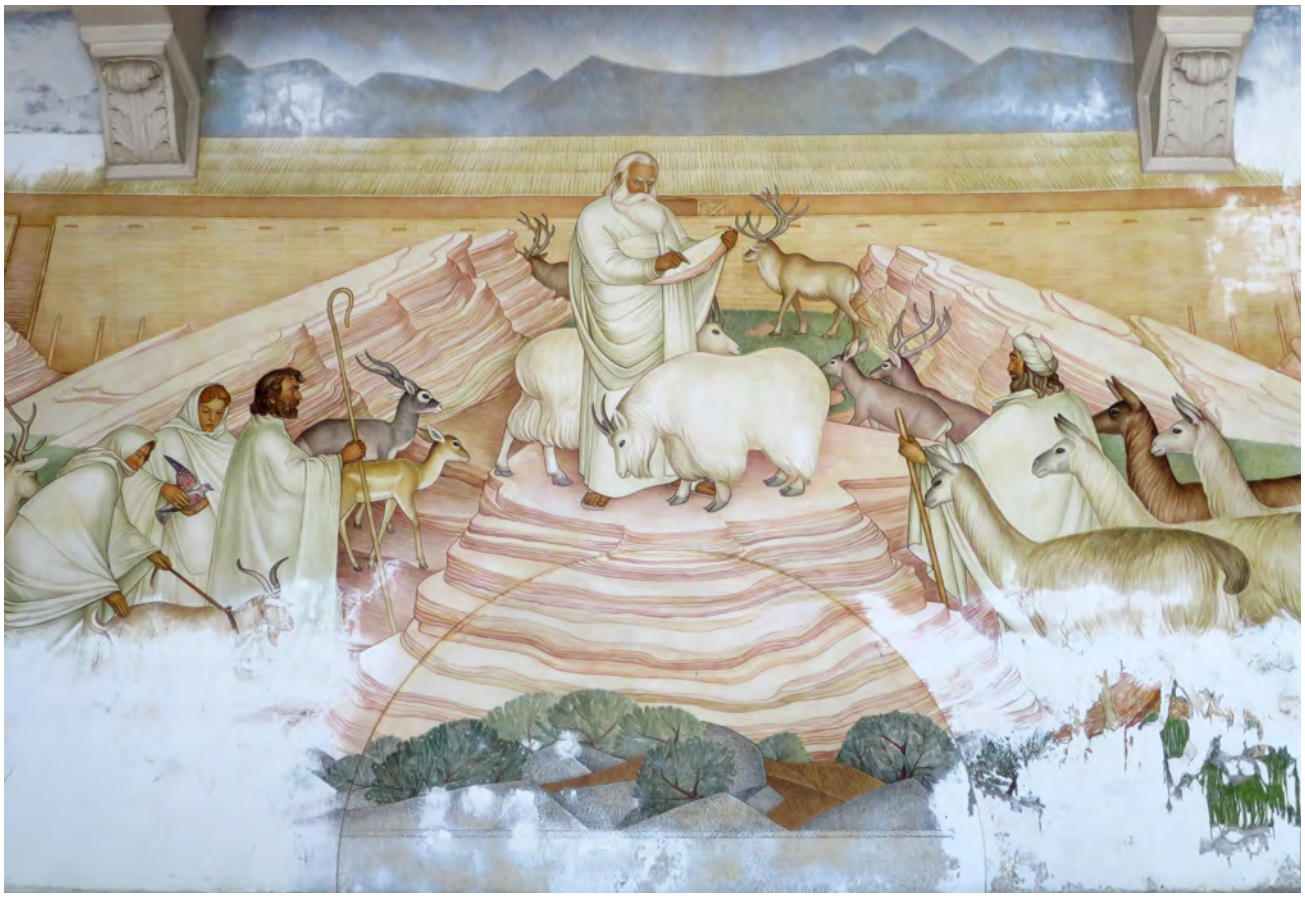


Figure 5.51: West wall mural area above the large central window showing damage and loss, main lounge (100).

5.3 MURALS

The Mothers Building murals, located above the wood paneling in the main lounge (100) were painted by Helen Forbes and Dorothy Pucinelli between 1933 and 1938. The mural medium is egg tempera on plaster and the murals are considered outstanding examples of public art created for the WPA Federal Art Project. The 1200 square feet of murals depict four scenes of Noah, the ark and the animals:

- "Building the Ark" on the north wall;
- "The Ark's Passengers Disembark" on the east wall;
- "Landing of the Ark" on the south wall; and
- "Loading of the Animals" on the west wall.

The murals were restored at least twice over the years. Dorothy Puccinelli is credited with one restoration in 1962. Following her death, Emmy Lou Packard worked on the murals in 1975.

Today, the mural walls are marked with dust, mold spots, insect dropping and webbing. While all the walls look and sound generally stable, they are filled with numerous cracks with major cracks occurring at the northwest corner of the main lounge (100).

Out of the four walls, the west wall mural exhibits most severe deterioration predominantly from water infiltration. There is significant damage to the finish layer through efflorescence. Soluble salts within the plaster, tile, and exterior stucco are deposited upon evaporation into the warmer interior of the building. Salts may form above or below the plaster, and above or below the paint film. In most damaged areas on the west wall, salts have pushed off the paint layer

entirely, leaving the surface devoid of design. The condition of the paint film on the west wall ranges from excellent to completely deteriorated, to non-existent. In most of the areas seen to be white on the west wall, the pressure of crystallization of salts has obliterated the design. Damage to the west wall is estimated to be approximately 40-50% of the design, as the paint has fallen away, or is compromised to such an extent that it probably cannot be saved. Additionally, the surface of the mural has a milky aspect, possibly due to mold or other biological attack.

The mural surfaces are coated with a varnish although it is not known whether this was applied originally or afterwards during a restoration. Varnish was applied either to deepen the color of the murals, or to protect the paint surface from airborne dirt. Or, it may have been applied as a preservative/adhesive to arrest flaking paint. The varnish, which would have been colorless when first applied, is discolored to a yellow-brown color, and can be readily recognized over the signatures found in the lower right of each mural. The varnish coating may be more harmful than helpful on the west wall. It may inhibit transfer of moisture, thus creating a barrier film. It may help explain the sharp delineations between where paint exists, or does not exist, on the west wall. On the north, south, and east walls, apart from the warm tonality of the walls due to the varnish, the walls seem to be reasonably well preserved.

On the west wall, there are strings of plastic-like paint hanging from the wall or laying shredded on the ledges below the west mural. Emmy Lou Packard who restored the murals in the 1970s is known to have frequently used Liquitex acrylic emulsion paints which can prevent plaster from breathing and may have contributed to this condition. These paints are darker, more opaque, and heavier than the original tempera paint. The film forming paint can cause salts and water to remain trapped below the paint until the plaster falls apart.

The full examination and condition report of the murals is included in Appendix D.

Figure 5.52: Major cracks at north-west corner, main lounge (100).

Figure 5.53: West wall detail showing the extent of deterioration of the plaster and paint, main lounge (100). (Source: Anne Rosenthal)

Figure 5.54: Detail of signature at the south wall; darkened halo around the letters, indicating several layers of discolored varnish, main lounge (100).

Figure 5.55: West wall detail of previously restored areas, consisting of acrylic emulsion paints, seen here in raking lights, main lounge (100). (Source: Anne Rosenthal)

Treatment Recommendations:

Immediate Repairs

- Stabilize the temperature and relative humidity within the building to protect murals against further damage.
- Do not touch the west wall or remove design fragments. Do not dust the murals surface.

Short-Term Upgrades and Repairs

- Photograph murals in detail to document existing conditions and to aid in reconstructing lost elements in the future.
- Search archives, personal papers or WPA records to locate original mural photographs or sketches.
- After documentation, attempt to conserve the remaining loose paint and indicate on the walls where forms begin and end. A pilot study may be necessary to determine if salvage of loose paint is possible and to test consolidation options.

Long-Term Upgrades and Repairs

- Conserve murals by strengthening and stabilizing the walls and paint film.
- Clean the mural surfaces of surface dirt, and/or varnish.
- Provide a protective counter-form against the mural surfaces when performing structural work.
- Establish periodic inspection times and maintenance and attend any needed repairs as soon as possible.

Figure 5.56: Framing above loggia. Note the backside of the precast frieze panel on the back wall.

5.4 STRUCTURAL UPGRADES

The building is constructed of steel columns and beams at exterior walls, infilled with hollow clay tile (HCT), and covered with stucco at the exterior face. The lateral load resisting system is the HCT infill walls. Most of the steel columns and beams are concealed in the HCT walls.

The eastern part of the loggia is comprised of steel columns with precast concrete column surroundings spaced 9 feet on center that extend to the roof. These columns are connected to steel columns in the western wall of the loggia by horizontal steel channels running in the east-west direction. As seen from the attic, there are more columns in the western wall of the loggia than original drawings indicate.

The interior of the building is wood framed and consists of stud walls and joists with straight sheathing at the floor and roof diaphragms. The roof consists of trusses with 2x8 top and bottom chords spaced at 24 inches on center. At the main lounge (100), a lath and plaster ceiling with decorative beams are attached to the bottom chord of the roof trusses. At the north and south ends, the first floor lath and plaster ceiling is supported by the attic floors.

At the attic areas, there is no ceiling and the roof framing is visible. Attic framing is comprised of 2x8 joists spaced at 16 inches on enter and supported by stud walls at the interior and HCT walls at the exterior. The south attic is used for mechanical and storage and floor joists are completely concealed. Since the sheathing is placed in the north-south direction, it is assumed joists run in the east-west direction. The north attic is accessible by a ceiling hatch and has no sheathing over the existing joists.

A three foot high crawl space exists under the first floor. The first floor framing is comprised of 2x10 joists spaced at 16 inches on center running in the north/south direction and supported by 6”x8” wood beams and 6”x6” wood posts. Wood posts are bearing on approximately 13”x13” square footings.

In the 1930s, murals were added on the interior face of walls at the main lounge (100). Preservation of the murals is the most challenging seismic strengthening constraint in the project.

The current scope of work is to perform an ASCE 31-03 Tier 1 seismic evaluation for the Mothers Building and provide seismic rehabilitation concepts for mitigating the structural deficiencies identified. With

Figure 5.57: Corrosion at steel connections (Source: SOHA)

some structural rehabilitation modifications this building can be seismically rehabilitated to conform to the Life Safety Performance Level objectives of ASCE 31-03 defined as:

> *After a design earthquake, Building performance includes damage to both structural and nonstructural components such that: (a) partial or total structural collapse does not occur, and (b) damage to nonstructural components is non-life threatening.*

We recommend the building be strengthened to a Life-Safety performance level in accordance with ASCE 41, "Seismic Rehabilitation of Existing Buildings". ASCE 41 was developed as a design standard specifically to be used for the rehabilitation of existing buildings subsequent to completing a seismic evaluation such as ASCE 31-03.

Using the procedures of ASCE 31-03, number of deficiencies in the lateral force-resisting system and the structural members and connections have been identified.

Structural Deficiencies

- HCT masonry walls do not meet shear stress check requirements.
- HCT masonry walls do not meet requirement of out-of-plane strength and there are large existing cracks. Failure of these walls out-of-plane will result in falling hazards and degradation of the strength and stiffness of the lateral force resisting system.
- Out-of-plane connections of the HCT masonry walls are not adequate. Failure of the connections will result falling hazards and degradation of the strength and stiffness of the lateral force resisting systems.
- Straight roof sheathing does not meet the aspect ratio and shear strength requirements.
- Connections between the roof and the HCT masonry walls are not adequate to transfer the seismic forces.
- Attic floors are not adequately connected to the lateral load resisting elements.
- Below the roof sheathing, on the east side, the steel beams and columns are exposed and corrosion is noted in columns, beams and connections. Most of the existing steel is concealed in the HCT masonry walls and stucco and corrosion is unknown. The quoins at the corners of the building have large cracks and the loggia precast columns have very large cracks. This is an indication the steel is corroded.
- Liquefaction and surface fault rupture and surface displacement at the building site should be investigated by a licensed geotechnical engineer.

Non-structural Deficiencies

- Existing precast concrete friezes, steel column and window and door surroundings, column capitals, balustrades, urns, and quoins are extensively damaged in many locations and pose falling hazards.
- The frieze panels at the east elevation do not have enough support.
- The reinforcing of the vaulting at the ceiling of the loggia is corroded.
- Lath and plaster in some areas of the two-story portions are damaged and spalled.
- The building mechanical and electrical equipment are not sufficiently anchored and braced.
- Duct bracing is not sufficient and lacks flexible couplings at the joints.

The full examination and condition report of the structural system is included in Appendix E.

Figure 5.58: Crack at a loggia column. (Source: SOHA)

Treatment Recommendations:

Short-Term Upgrades and Repairs

- Develop structural design to a design development (DD) level for a detailed evaluation of the impact on the building and murals.

Long-Term Upgrades and Repairs

Structural Options 1 and 2

- Remove existing roof straight sheathing and replace with plywood sheathing,
- Strengthen roof sheathing to existing steel beam connections around the perimeter of the building.
- Remove corrosion and galvanize all exposed steel columns, beams, and connections including the members above the loggia.
- Remove concrete surrounds from loggia columns. Remove corrosion, galvanize steel, and replace pre-cast surrounds.
- Remove plaster and masonry infill surrounding steel columns at the four corners of the building. Remove corrosion and galvanize existing steel columns, beams, and the connections. Replaster quoins to match historic.
- Add supplement supports at decorative precast concrete elements such as frieze panels and pediments.
- Seismically anchor and brace mechanical and electrical equipment.
- Conduct geotechnical investigation into liquefaction and surface fault rupture and surface displacement.

Structural Option 1 - This option includes structural work on the outside face of all four mural walls. Extreme care is need to ensure the murals remain stable and protected during work. There is high risk associated with this option including wall failure and moisture damage to the murals. However, Option 1 is the least visually obtrusive as structural components would not be visible upon completion.

- Shotcrete interior face of HCT at exterior walls of north and south ends. Connect shotcrete to roof diaphragm and dowel to existing footings.
- Add new concrete walls on outside face of wood framed walls on north and south ends of main lounge (100). Dowel concrete wall to existing footings. Protect existing murals in place.
- Channel HCT horizontally and vertically on the exterior face to install hollow structural steel (HSS) in east and west walls of main lounge (100). Provide anchor bolts in epoxy grout at 24 inches on center. Protect existing murals in place.

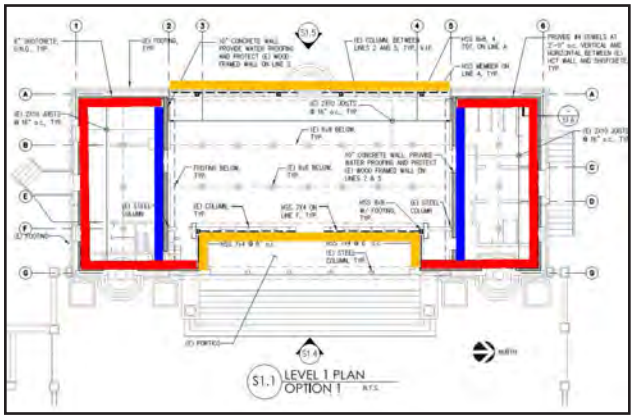


Diagram of Structural Option 1.

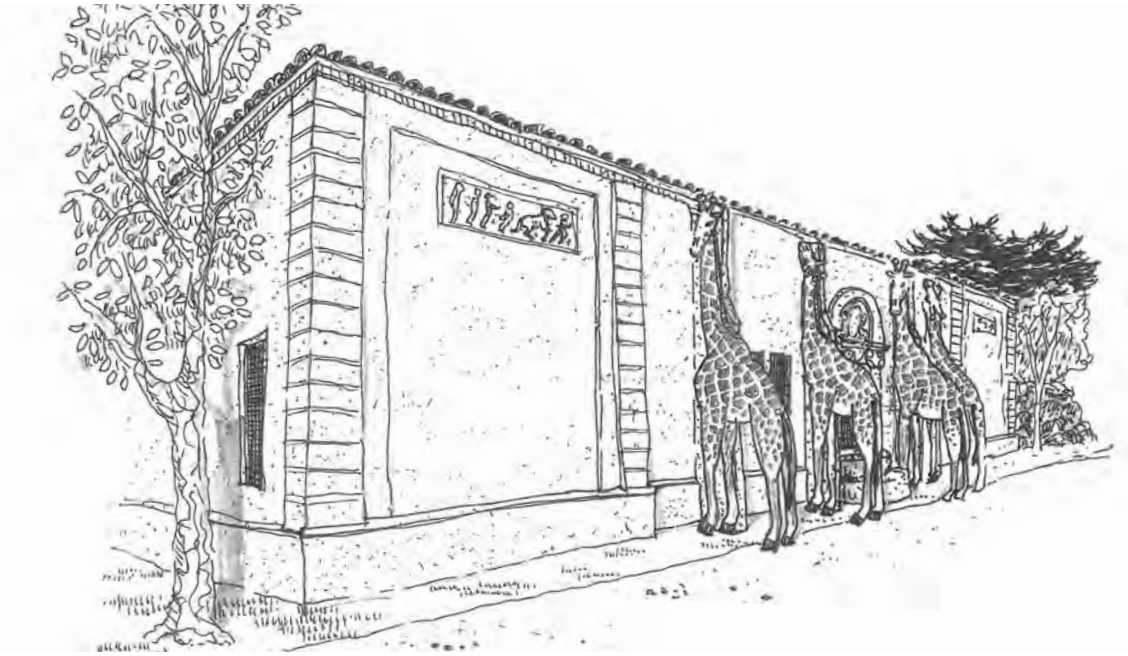


Figure 5.59: Conceptual sketch of buttresses at the west elevation in the form of giraffes.

Structural Option 2 - This option includes structural work on the east and west wall of the murals. Due to construction assembly and better stability of the murals on the east wall, there is less risk involved in embedding steel. Therefore, steel is proposed at the east wall (like Option 1) but exterior bracing is proposed at the west wall. Bracing would include buttresses which could be installed over the existing exterior plaster, eliminating the need to open up the wall. Option 2 provides less risk of damage to the murals, but the buttresses are permanently visible.

Although the exterior bracing occurs on the "rear" of the building, consideration should be given to how the site and zoo may be developed in the future. A number of design options could be explored for the buttresses including different materials, shapes, or even whimsical forms (see sketch above).

- Shotcrete interior face of HCT at exterior walls of north and south ends. Connect shotcrete to roof diaphragm and dowel to existing footings.
- Channel HCT horizontally and vertically on the exterior face to install HSS in east lounge wall only. Provide anchor bolts in epoxy grout at 24 inches on center. Protect existing murals in place.

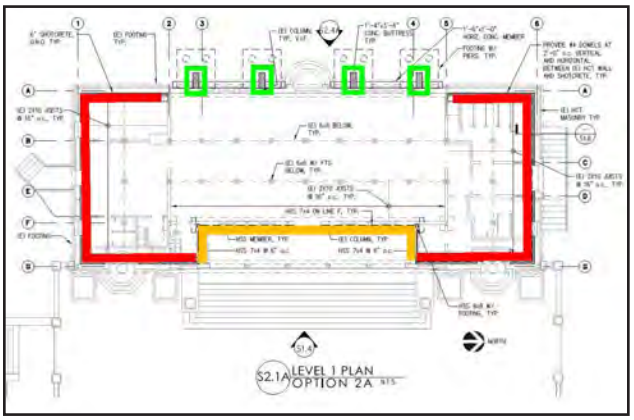


Figure 5.60: Diagram of Structural Option 2.

- At west lounge wall, provide four exterior buttresses with connection to roof diaphragm and foundation. Provide two foundation piers at each buttress. Buttresses can be installed on top of the existing plaster wall.
- At west lounge wall, provide horizontal concrete members between buttresses with anchor bolts in epoxy grout at 24 inches on center. In lieu of horizontal concrete members, shotcrete may be installed on the west wall surface between column lines 2 and 5.

Figure 5.61: Ceiling-hung furnace in the south attic.

5.5 MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS

Mechanical

The existing HVAC system consists of a 15-year-old 225,000 Btuh gas fired furnace and fan unit provides heated air to the space via underfloor ductwork and floor diffusers; and return via high ducted ceiling diffusers. The unit is ceiling hung on the second floor mechanical room. Ventilation is ducted to the furnace from the south side of the building via side wall louver. The gas pipe to the HVAC furnace appears to be in good condition. Two utility exhaust fans serve the existing bathrooms and exhaust to the sides of the building. These fans are floor mounted on the second floor, above the bathrooms. Neither is in operation.

Supply and return ductwork is in average condition although some ductwork is not connected to the diffusers. Exhaust ductwork is rusted and supply, return, and exhaust diffusers are rusted throughout. None of the ductwork is insulated.

Electrical

Based on the manufacturing date of the existing electrical equipment, the electrical system was upgraded in 1992. The main switchboard and associated branch circuit panelboard are just over 20 years old; but based on surface investigation appear to be in good working condition.

Located at the rear of the building are three transformers. There is an existing transformer that is rusted connected to a 400A 240V disconnect. This appears to be feeding the Mothers Building's main switchboard. All transformers were working at the time of inspection.

PG&E main service was located adjacent to the Ark Building behind the Mothers Building. An existing telephone block located inside the south wing has been abandoned. A new telephone service is located at the northwest of the building; the existing routing into the building is surface mounted bare cables.

Lighting for the first and second floors consists mostly of fluorescent luminaires. Lighting appears antiquated and does not provide good lighting quality to highlight the murals. The exterior light consists of two wall mounted decorative lights on the

front façade. There is no automatic lighting control system for the interior of the building.

Receptacle quantity and locations is adequate, but a majority of outlets were corroded and rusted or supports had failed. The outlets in the main lounge (100) had been installed at various installations and as a result had three different colored surface conduit installed. There is no emergency generator for the site. Emergency egress lighting consists of ceiling suspended emergency fixtures with integral battery back-up. Emergency lighting appears antiquated. No exit signs exist.

Plumbing

There are two storage tank electric water heaters, neither of which are in working condition. Toilet fixture, urinal and lavatories at the public restrooms are not working. The rain water leaders outside the building are generally in good condition.

Where visible, the sanitary sewer pipe system appears to be in good condition above ground floor. However, investigation in the crawl space shows pipe deterioration; some sections of pipes have completely broken off. During survey, it appeared excavation work to selectively repair the domestic water piping was occurring outside the building. Pipes are rusted and need to be replaced.

The full examination and condition report of the mechanical, electrical, and plumbing systems is included in Appendix F.

Treatment Recommendations:
Immediate Repairs

- Until HVAC system is restored, install temporary portable dehumidifiers to reduce humidity levels in building.

Short-Term Upgrades and Repairs

- Repair or replace HVAC system for proper space temperature and humidity controls to slow further deterioration of the murals.

Long-Term Upgrades and Repairs
Mechanical

- Install a new 20-ton VRF heat recovery system (Mitsubishi or equal) to provide space heating

Figure 5.62: Water heater.

Figure 5.63: Corroded piping in crawlspace.

Figure 5.64: Restroom sink.

and cooling with the indoor units located on the second floor mechanical room and the outdoor unit located in back of building. Indoor units to be provided to serve each zone for control.

- Remove and install new insulated supply ducts from air handling unit to the space via underfloor supply and return above ceiling.
- Remove existing exhaust fans and install new exhaust fans at 750 CFM each (Greenheck model SWD or equal) to serve the restrooms including associated ductwork and sidewall louvers.

Electrical

- Replace existing transformer and disconnect switch located outside the building.
- Remove redundant electrical transformers and equipment no longer used.
- Provide exit signs.
- Replace existing emergency luminaires with new luminaires. Provide integral battery packs to luminaires where appropriate. Egress lighting to be 1 footcandle minimum throughout.
- Replace or augment light fixtures to increase overall light levels. Restore existing iron wall luminaires with new LED bulbs.
- Provide new exterior lighting to light entrances and highlight architectural elements. Consider spotlights to accentuate recesses, urns, and arches on the east elevation.
- Provide new low voltage lighting control panel to control lighting in public areas such as restrooms and hallways. Provide daylight sensors to turn off lighting when there is sufficient daylight.
- Provide occupancy sensors to control lighting in electrical and storage rooms.
- Remove all wiring devices, conduit and conductors back to switchboard.

Plumbing

- Remove and replace entire plumbing piping system including sanitary sewer, vent, domestic cold water and domestic hot water.
- Remove existing hot water heaters and install new high efficiency gas fired water heaters.
- Remove existing toilet fixtures, urinal and lavatories. Install new water efficient fixtures.

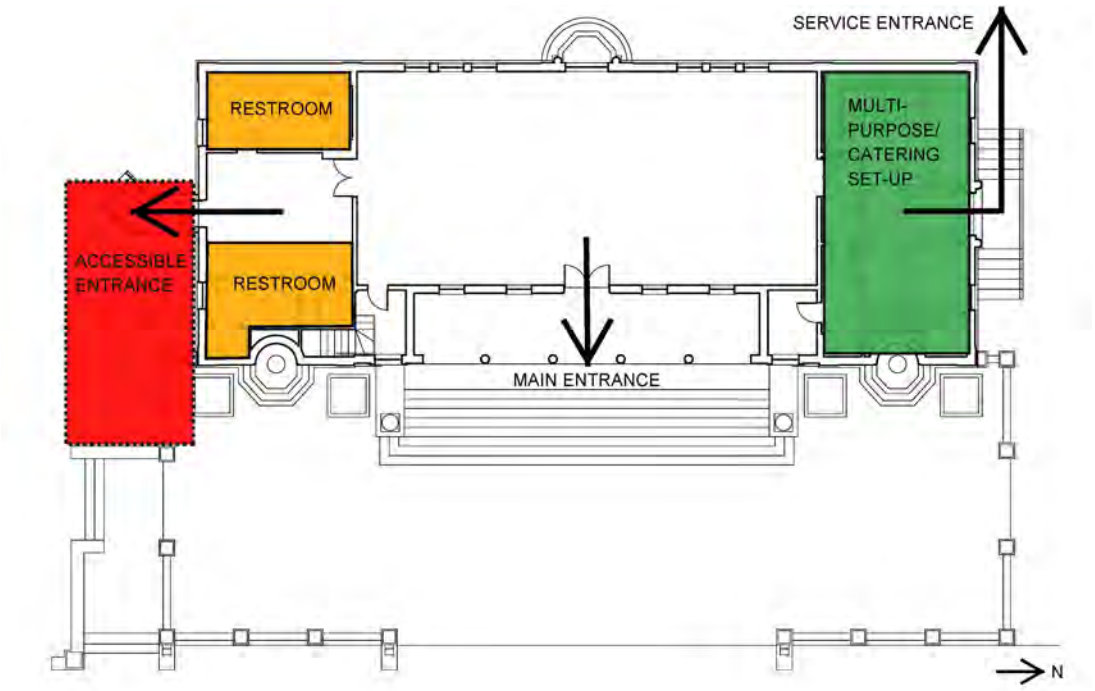


Figure 5.65: Proposed building use.

5.6 ACCESSIBILITY AND FUTURE USE

The Mothers Building does not meet current accessibility or egress requirements. All three entrance doors are located above grade and off stairs. The existing accessible restrooms do not meet current clearance requirements.

With minimal upgrade, the building can accommodate a business or assembly use with an occupancy load around 300. Potential uses include a rental facility for weddings, receptions, or meetings, zoo exhibit space, offices, or an educational facility. The proposed building use should fit with the San Francisco Zoo Master Plan and have minimal impact on the historic building.

The main lounge (100) should be maintained as one large space. Modification of the east entrance to accommodate an accessible ramp or lift would be difficult and may negatively impact the character of the primary facade. The south entrance may be better suited for an accessible entrance. Although secondary, the south facade is highly visible to guests approaching the building. Access can be provided by a ramp (recommended) or a lift.

Due to structural upgrades, most wall and floor finishes at the north and south bays will need to be removed. When reconstructed, the best use of the south bay may be an accessible vestibule and restrooms - similar to its original use. Although space limits the number of restroom fixtures that can be provided, the nearby zoo restroom building might also serve the needs of the Mothers Building.

The north bay of the building was originally designed as one open room used for snacks and tea. Proposed new uses include a singular multipurpose room, space for catering set-up, or offices. The north stair provides easy access to the service drive behind the building.

See Applicable Building Code and Accessibility Analysis (Appendix C) for additional detail and recommendations.

Treatment Recommendations:
Long-Term Upgrades and Repairs

- Provide accessible entrance to building. Consider location on south end for easy access and increased visibility.
- Provide accessible restrooms.

APPENDIX A

HISTORIC PHOTOGRAPHS AND DRAWINGS

APPENDIX A. HISTORIC PHOTOGRAPHS AND DRAWINGS

1925 aerial view of San Francisco showing the Fleishhacker Pool and the Mothers Building, December 5, 1925.
(Source: San Francisco Public Library)

1927 photo showing exterior of the Mothers Building with the Fleishhacker Playground in the foreground.
(Source: SF Department of Public works, via Friends of the Mothers Building at the San Francisco Zoo Facebook group)

1934 photo of Helen Forbes (left) and Dorothy Puccinelli (right) painting the murals at the Mothers Building.
(Source: San Francisco Public Library)

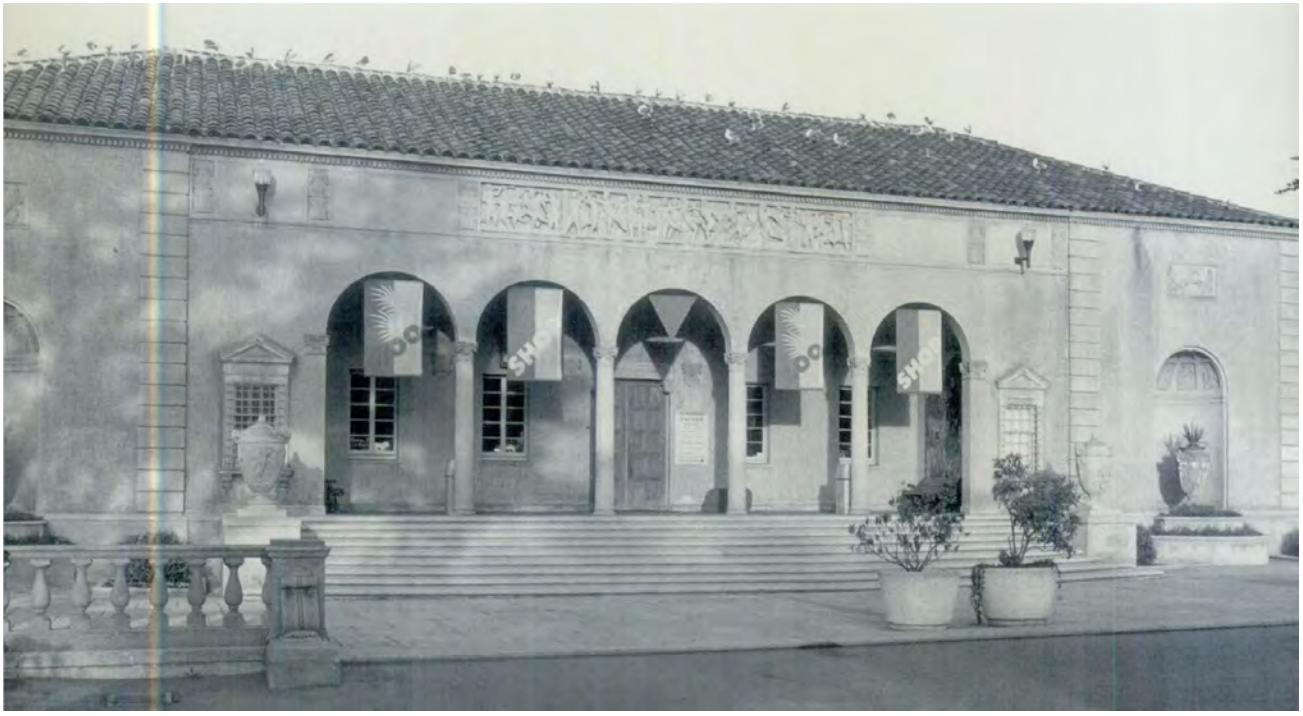
1934 photo of Helen K. Forbes painting the murals at the Mothers Building.
(Source: San Francisco Public Library)

1938 Photo of Helen K. Forbes (left) and Dorothy Puccinelli (right) painting the murals at the Mothers Building.
(Source: San Francisco Public Library)

1938 aerial view of San Francisco showing the Fleishhacker Pool, and the Mothers Building.
(Source: Harison Ryker, via David Rumsey Historical Map Collection)

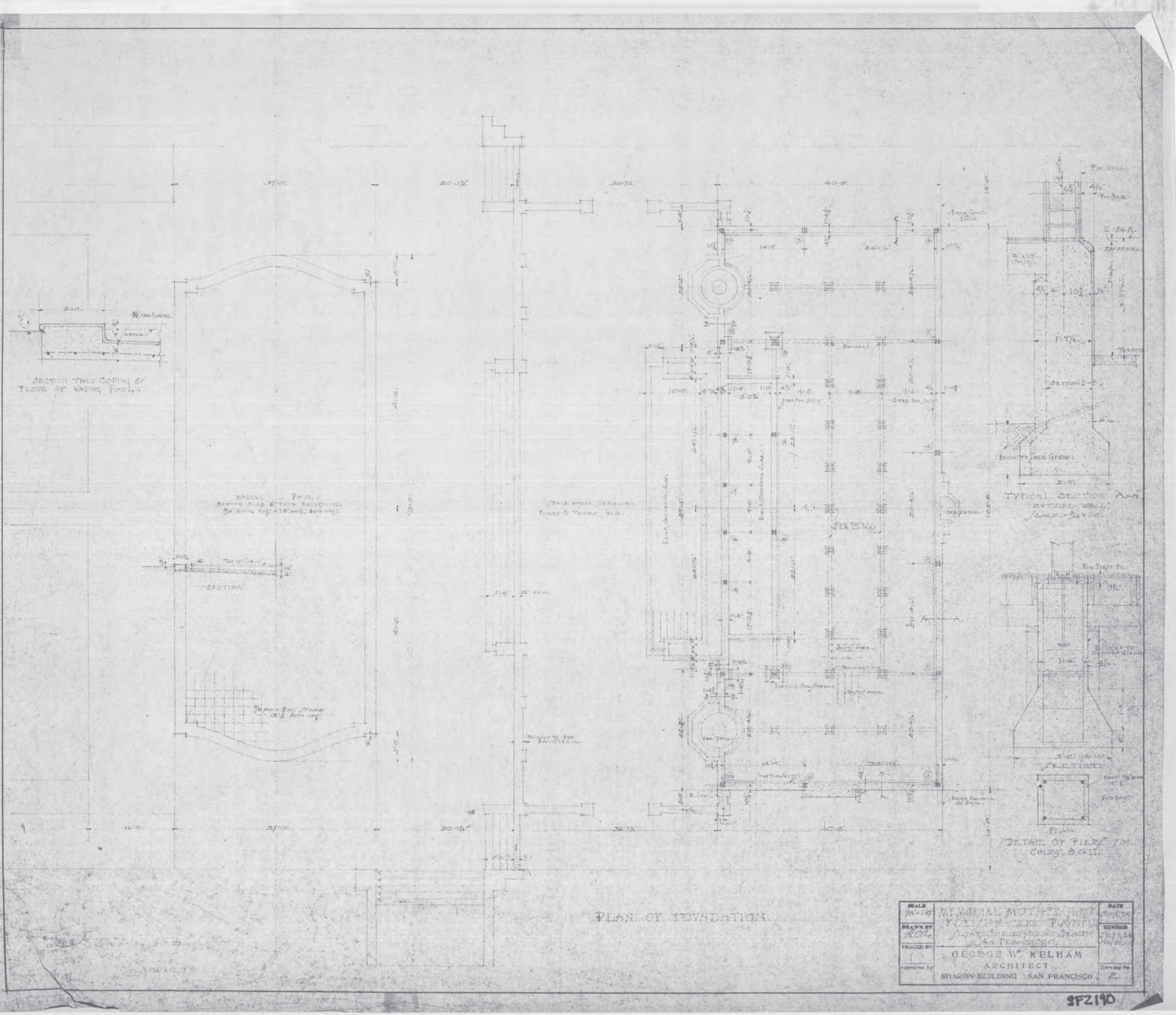
1939 photo showing interior of Mothers Building.
(Source: Works Progress Administration California, via livingnewdeal.org)

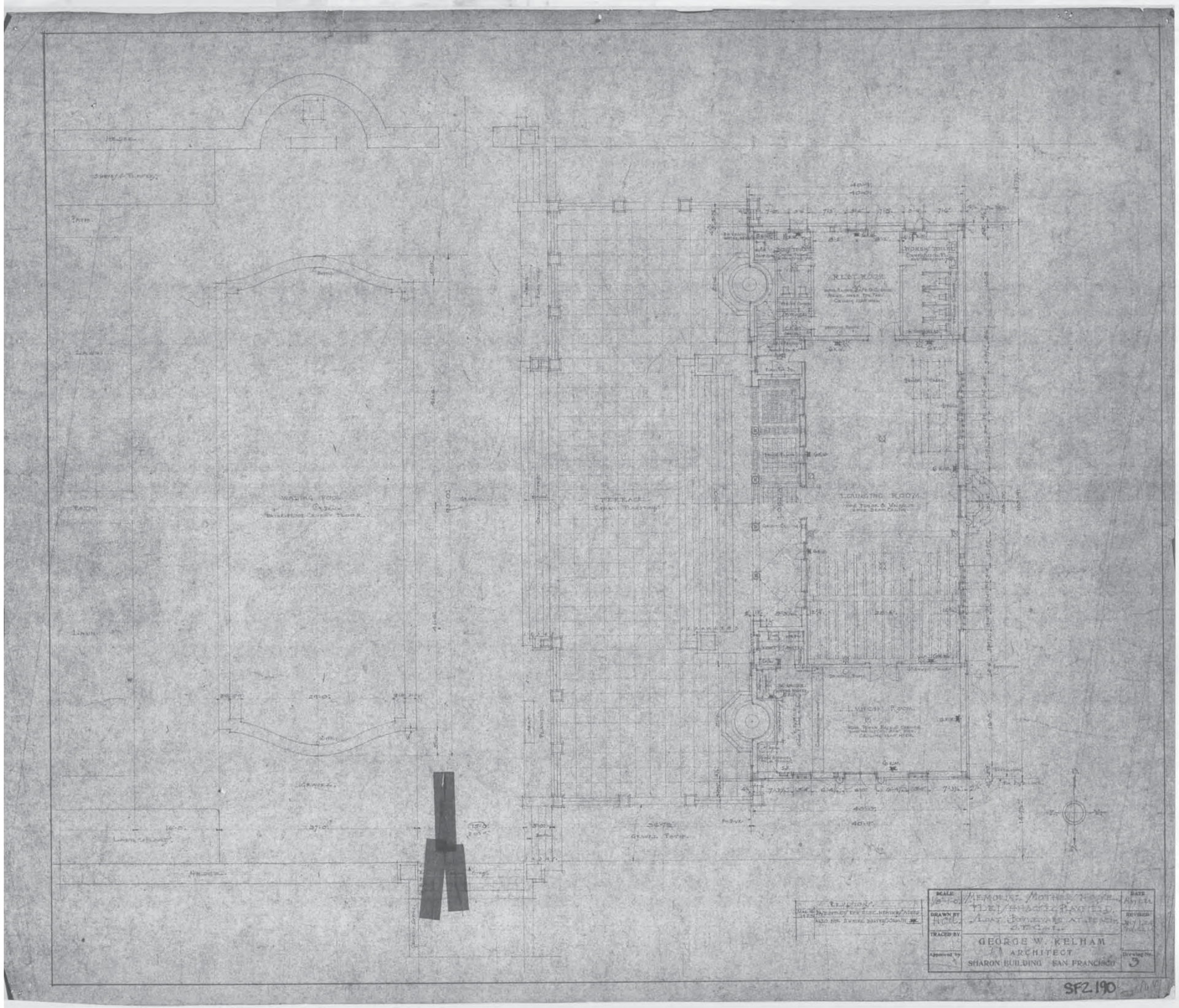
1939 photo showing interior of Mothers Building.
(Source: Works Progress Administration)

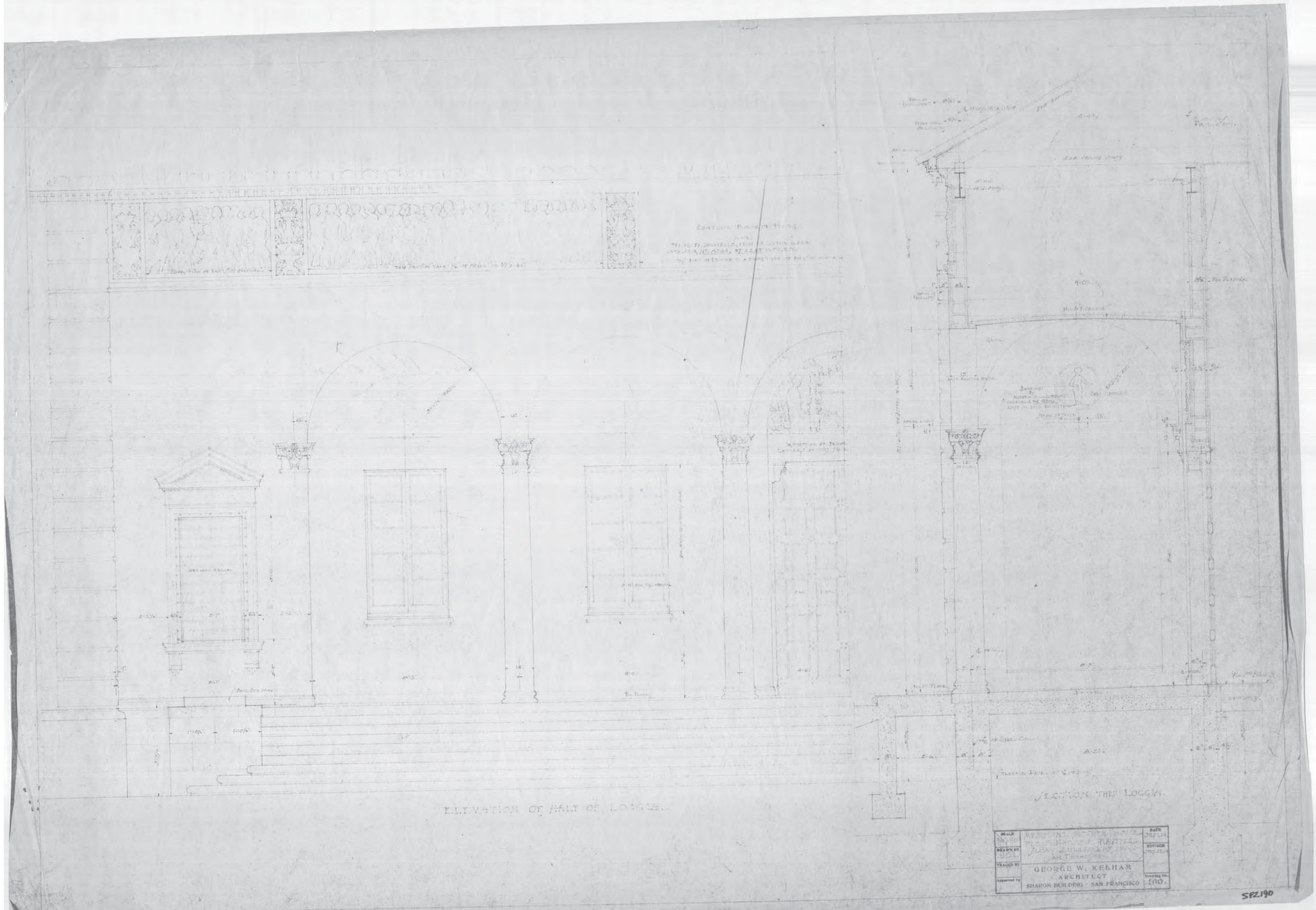


c1970s photo showing the main, east elevation of Mothers Building.
(Source: San Francisco's Sunset District by Lorri Ungaretti)

c1990s photo showing the main, east elevation of Mothers Building.
(Source: San Francisco's Sunset District by Lorri Ungaretti)


SECTION THRU COPING OF FLOOR OF WADING POOL.
WADING POOL
SECTION
PLAN OF FOUNDATION.
TYPICAL SECTION A-A OUTSIDE WALL
PLAN
DETAIL OF PIER FOR CORNER BLOCK
MEMORIAL MOTHER'S HOUSE
FLEISHHACKER PLAYGROUND
GEORGE W. KELHAM
ARCHITECT
SHARON BUILDING SAN FRANCISCO
SF2190


WAITING ROOM
RELIEF ROOM
LOUNGING ROOM
TERRACE
GEORGE W. KELHAM
ARCHITECT
SHARON BUILDING SAN FRANCISCO
SF2.190

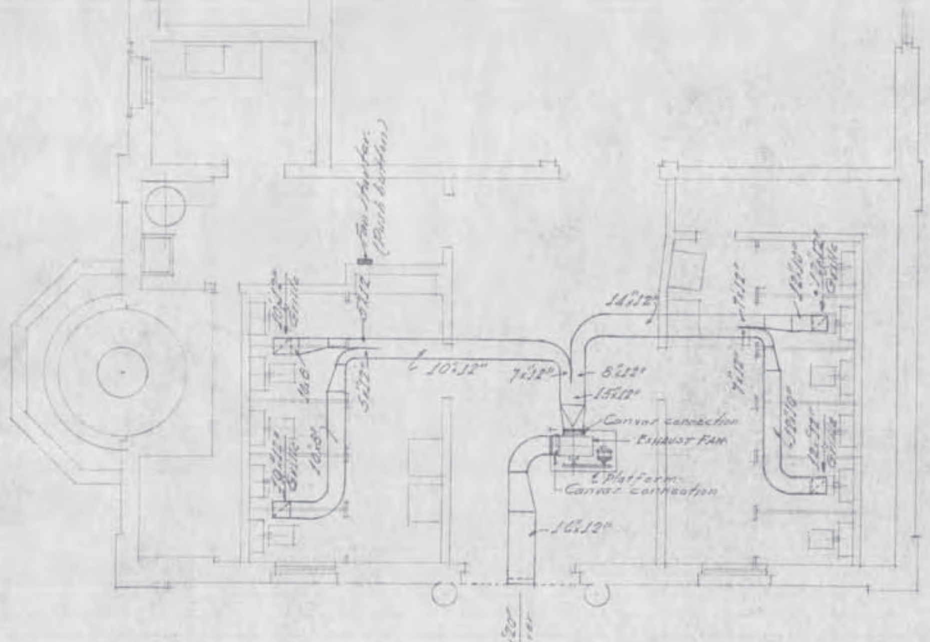


ELEVATION OF HALF OF LOGGIA.

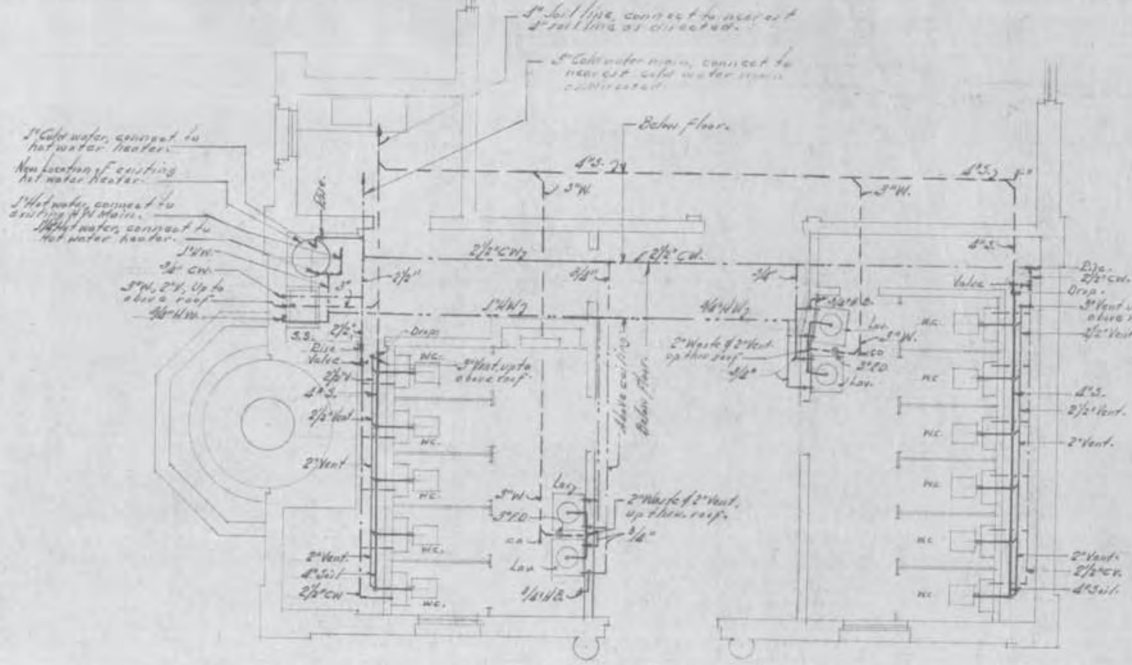
SECTION THRU LOGGIA.

SCALE	MEMORIAL MUSEUM	DATE
DRAWN BY	PLANS ELEVATIONS	REVISED
TRACED BY	SECTIONS	
APPROVED BY	GEORGE W. KELHAM ARCHITECT SHARON BUILDING SAN FRANCISCO	Drawing No. 100.

SFZ.190



PLAN (VENTILATING)
Scale 1/4" = 1'-0"



PLAN (PLUMBING)
Scale 1/4" = 1'-0"

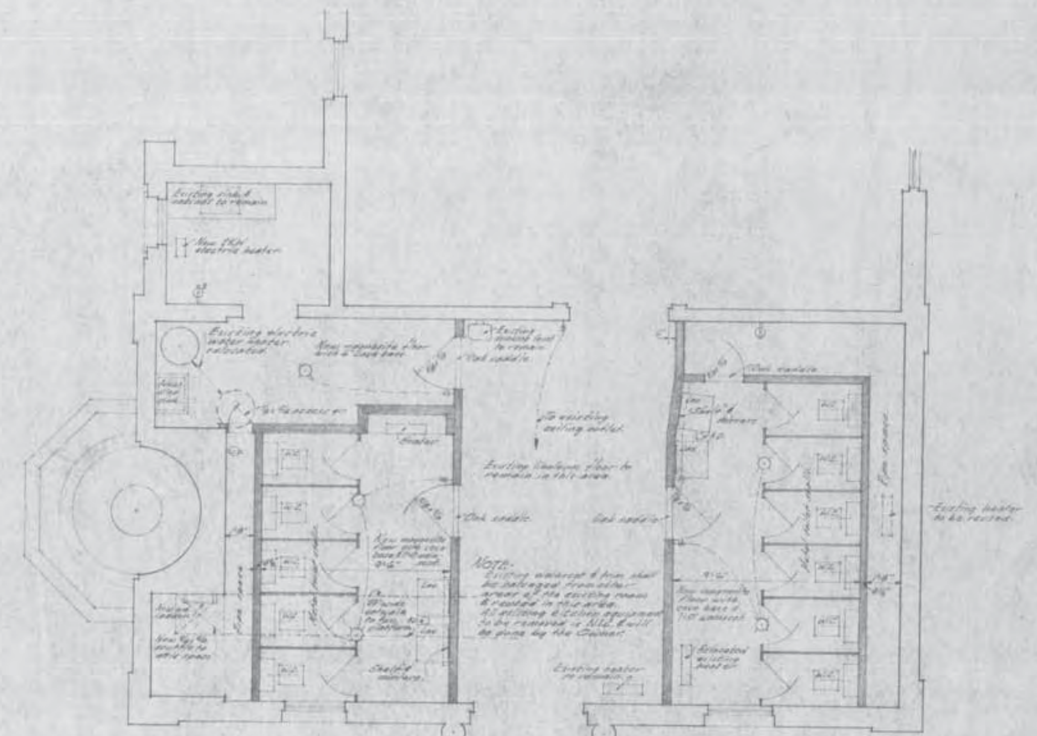
SPECIFICATION AND NOTES:

(VENTILATING)

1- Exhaust fan and duct work shall be located in space above Toilet Rooms.
2- Exhaust fan and motor shall be set on wood platform which shall be supported from construction above by four (4) 1/2" dia. bolts.
3- Fan shall be B.F. Sturtevant, Multivane Design G, bottom horizontal discharge, and shall have a capacity of not less than 1020 C.F.M. at 1/2" S.P. with 1/4 H.P. Motor, 1200 R.P.M., 120 volts, single phase, A.C. Motor, starter and cutout switch. Push button starter shall be located where shown on the Plan.
4- Grilles in ceiling shall be Tuttle and Bailey's plain lattice steel grille or equal.

(PLUMBING)

1- Water Closets shall be "American Standard" F-2490-Wall hung closets, Church #9500W-White Meltex Seat, Sloan "Crown" 110YV flush valve.
2- Lavatories shall be "American Standard" F-361 M, 20"x18" Vitreous china complete.
3- Service Sink shall be "American Standard" F-7710-24"x20" acid-resisting cast iron enamel set on F-7702 Trap Standard and B-914 service sink Faucet.
4- Hose bibbs shall be "American Standard" B-1682 rough brass, nickel plated finish.
5- Floor drains shall be Greenberg's, Series #300 chromium plated brass strainer.
6- All hot and cold water, vent pipe and fittings shall be standard galvanized soft steel pipe and fittings.
7- All cast iron pipe and fittings shall be extra heavy cast iron pipe and fittings.
8- Fittings for water closets shall be Blake Universal carrier chairs with adjustable collars for Universal closet fittings.
9- All flashing for vents passing thru roof shall be done by this contractor as directed by the Architects.



PLAN
Scale 1/4" = 1'-0"

▬ indicates new partitions to existing ceiling (11'-0" high)

ALTERATIONS TO
MOTHERS' HOUSE
FLEISHHACKER PLAYFIELD
SAN FRANCISCO, CALIFORNIA

HARRY A. THOMSEN, JR.
ALECK L. WILSON
ARCHITECTS ASSOCIATED

PLANS

DATE 3/5/47
DRAWN BY
CHECKED
REVISION

SHEET NO.
1/1

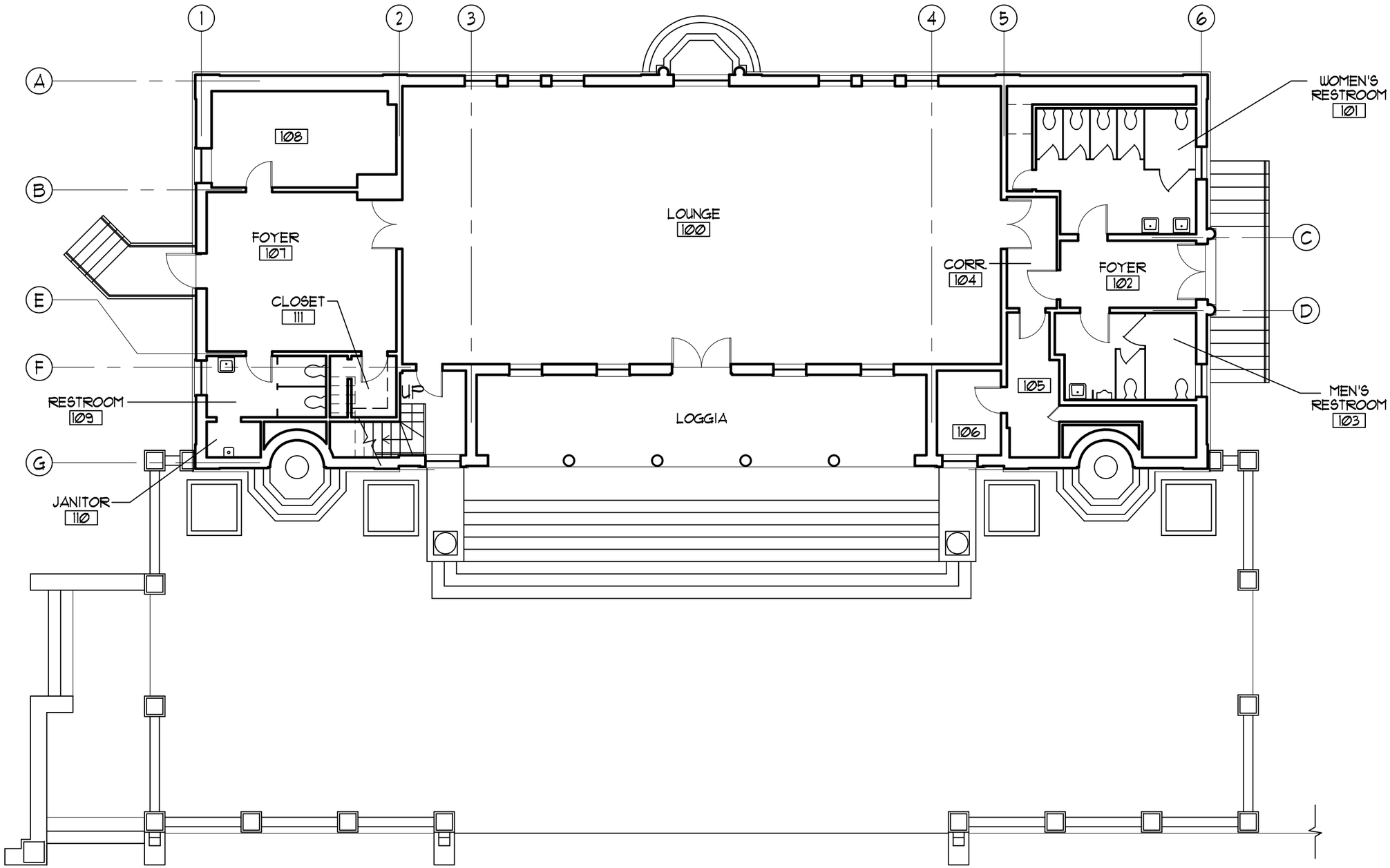
SCALE

B-MH47-28

SF2190

APPENDIX B

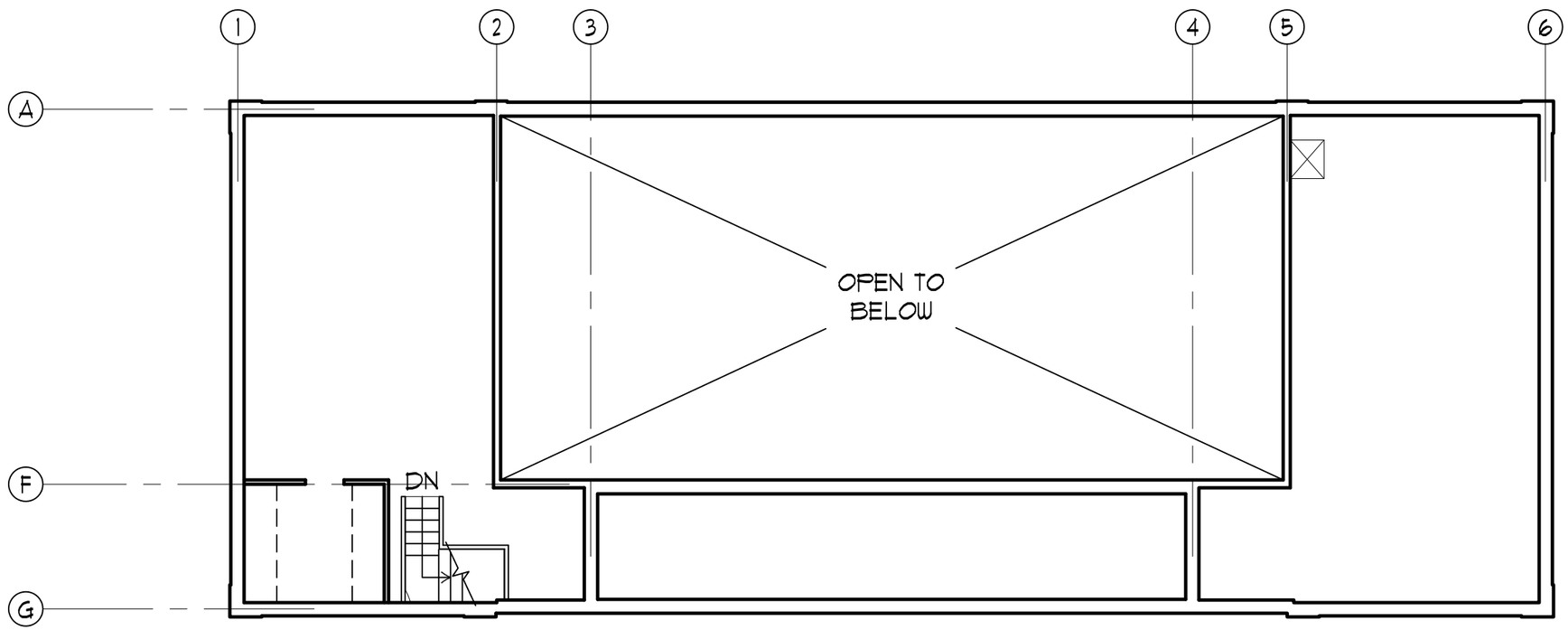
EXISTING CONDITION AND SURVEY DRAWINGS



FIRST FLOOR PLAN

SCALE: 3/32" = 1' - 0"

N



UPPER FLOOR PLAN

SCALE: 3/32" = 1' - 0"

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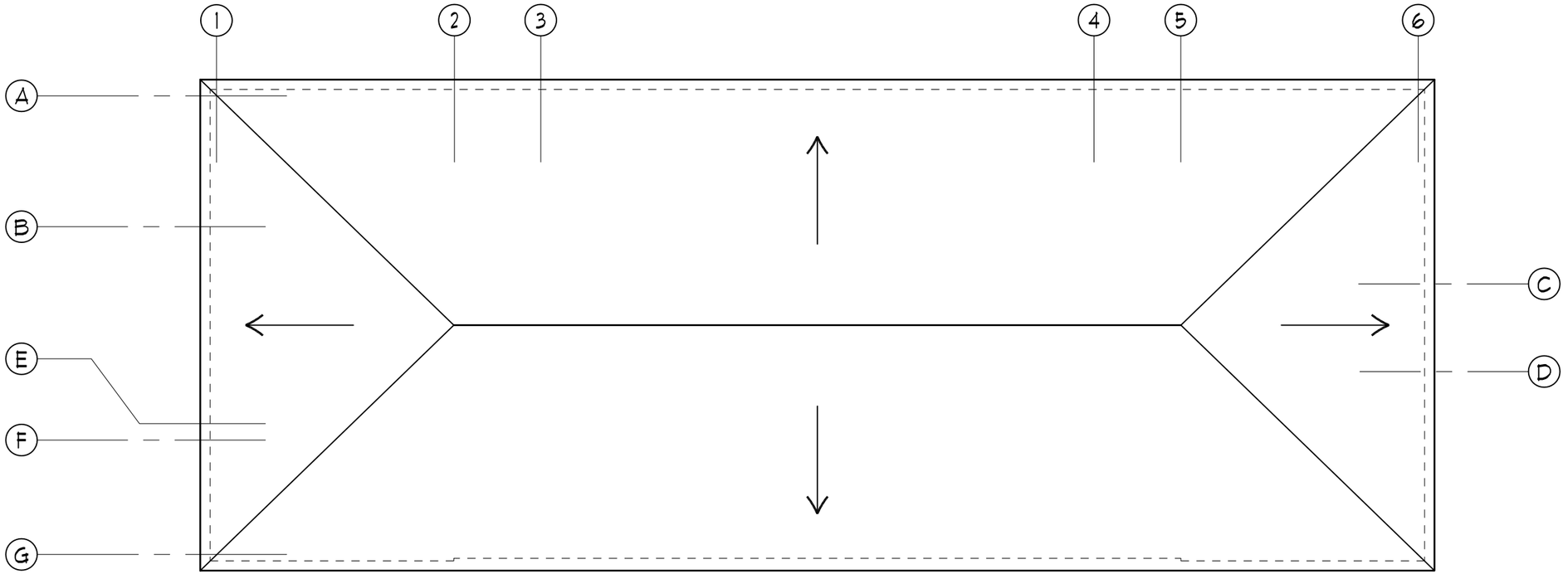
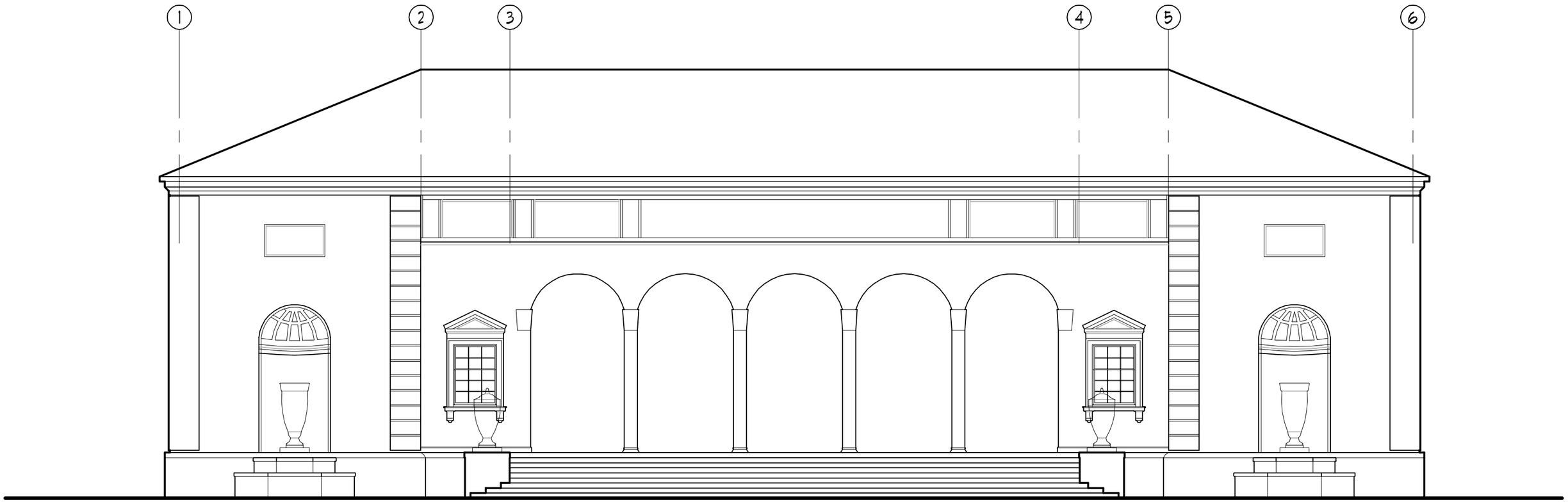


ROOF PLAN

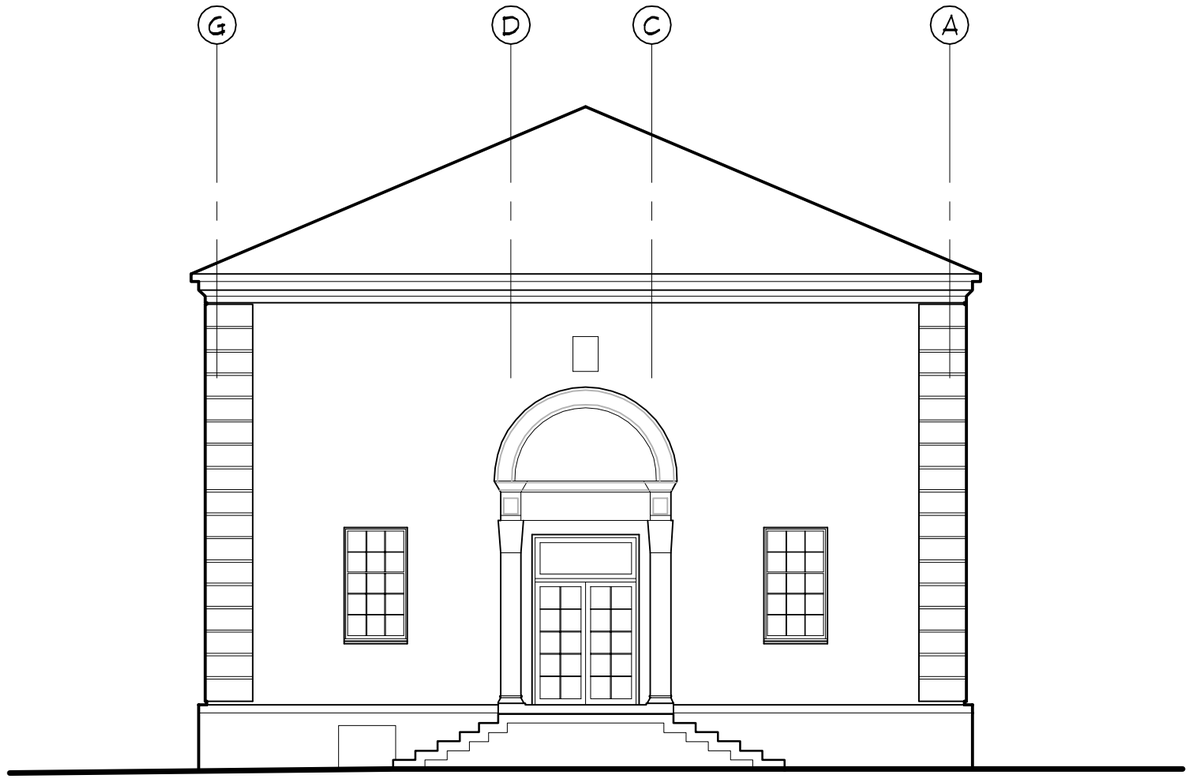
SCALE: 3/32" = 1' - 0"

N

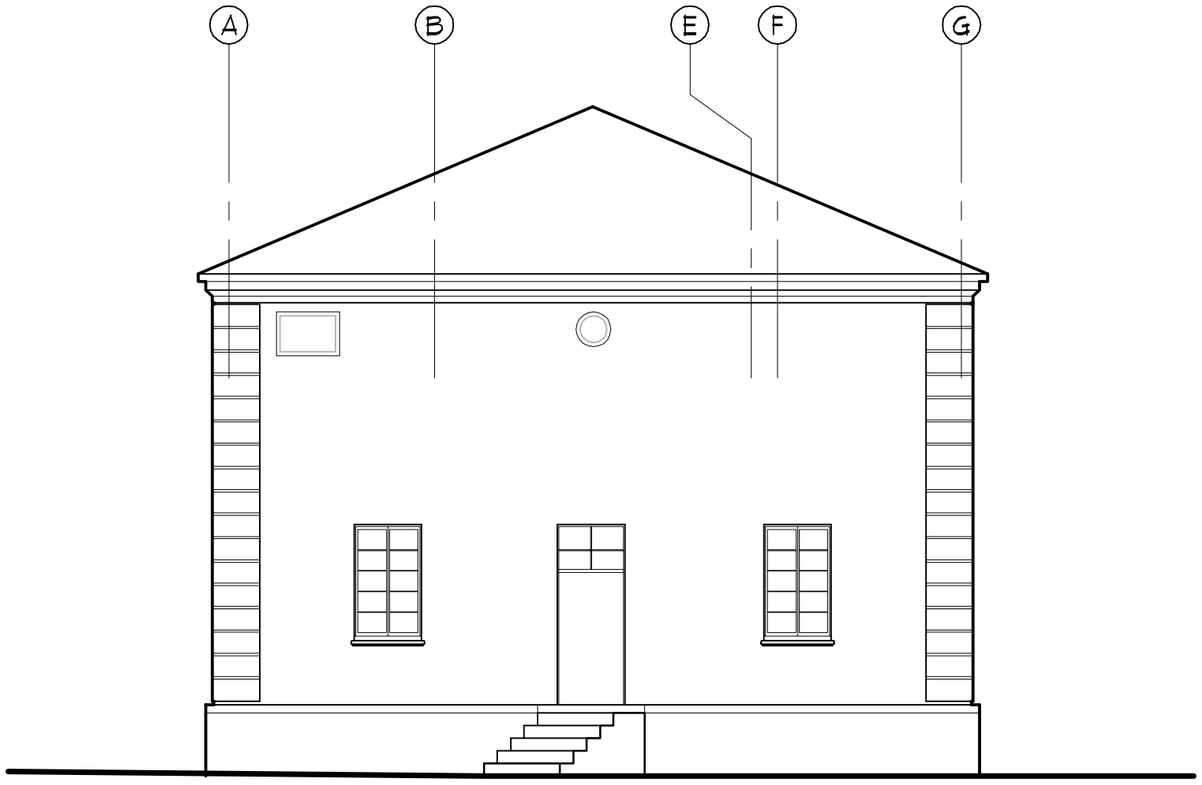


EAST

SCALE: 1/8" = 1' - 0"

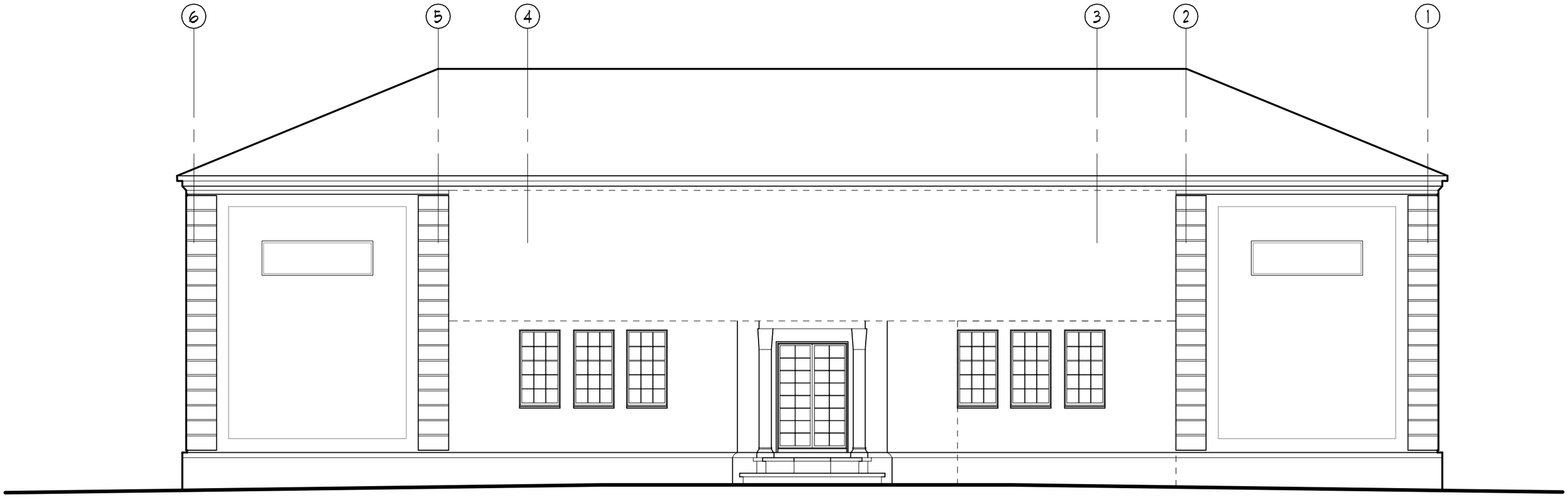


NORTH



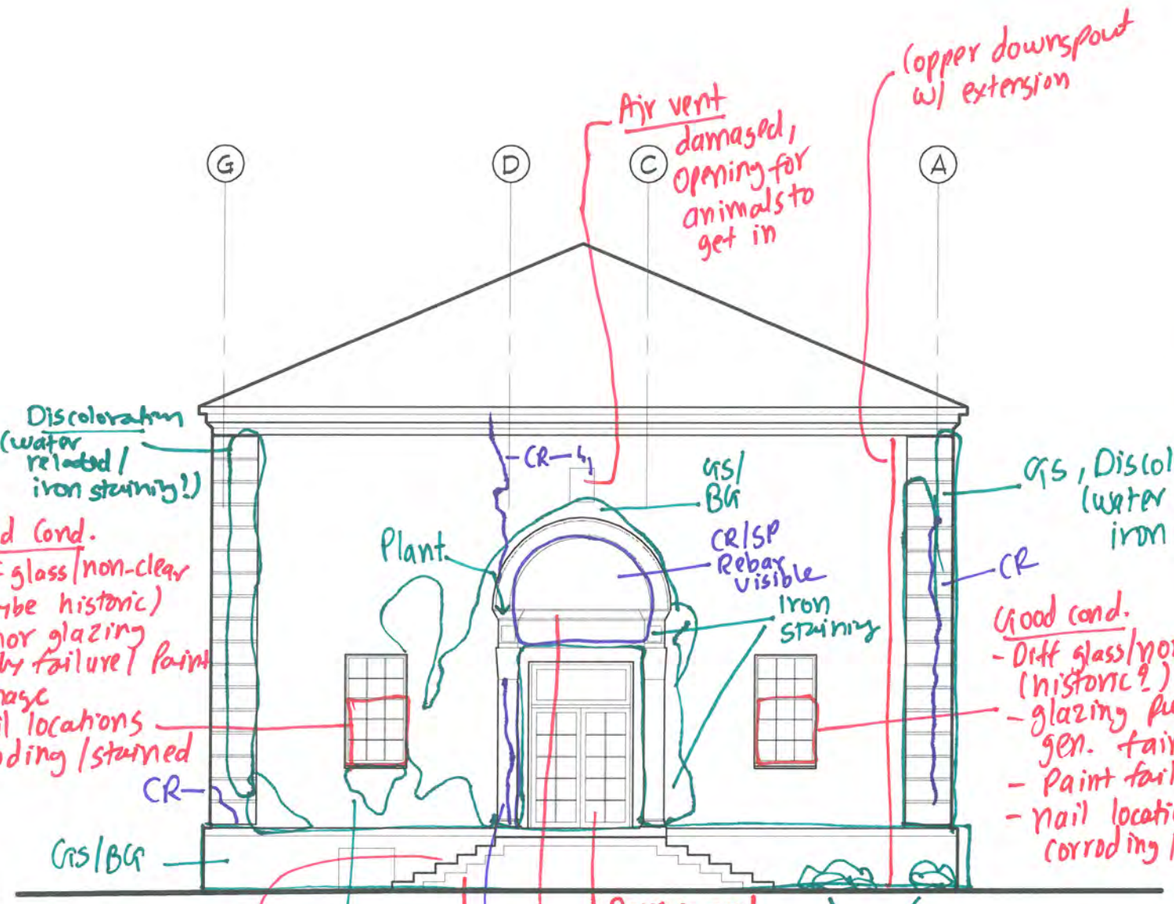
SOUTH

SCALE: 1/8" = 1' - 0"



WEST

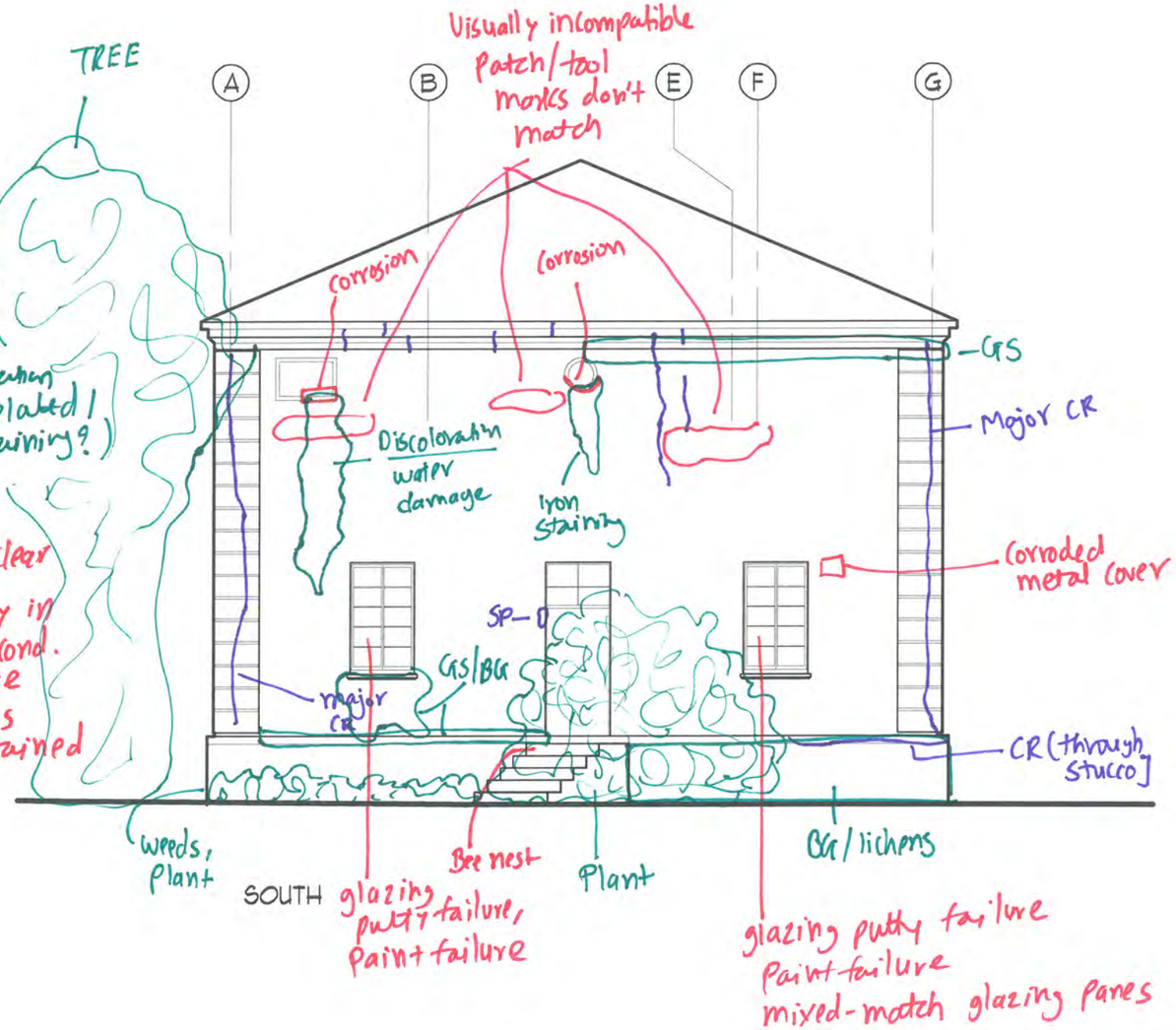
SCALE: 1/8" = 1' - 0"

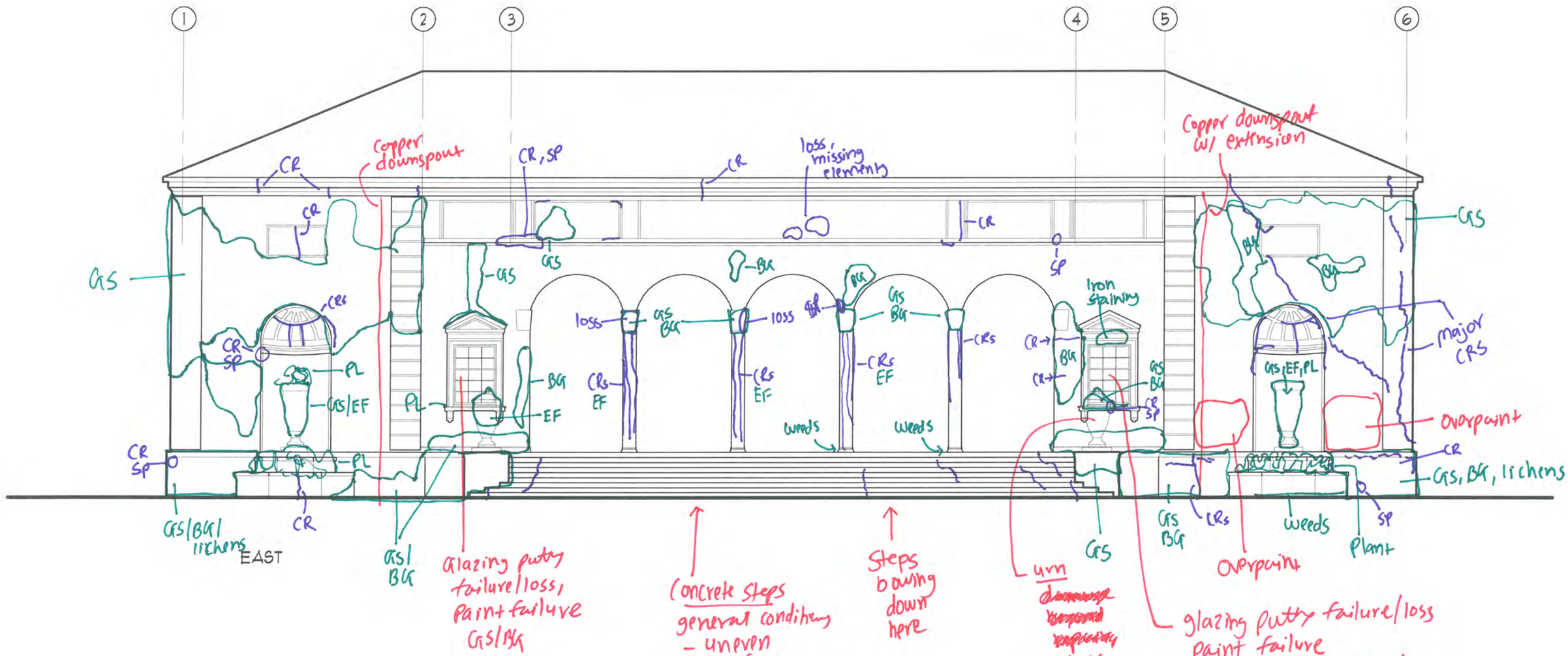


SCALE: 1/8" = 1' - 0"

GS- general soiling
EF- efflorescence
PL- plant
BG- biological growth

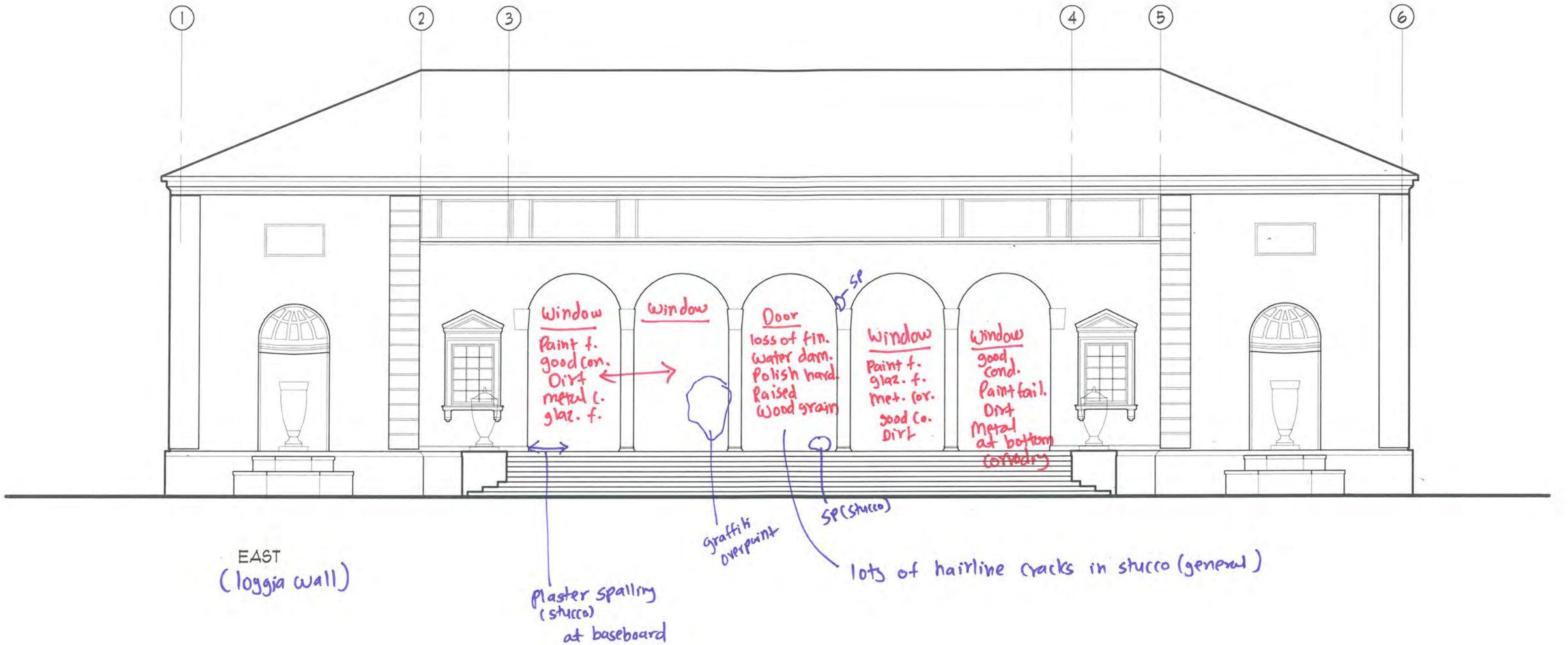
CR- Crack
Sp- Spall





SCALE: 1/8" = 1' - 0"

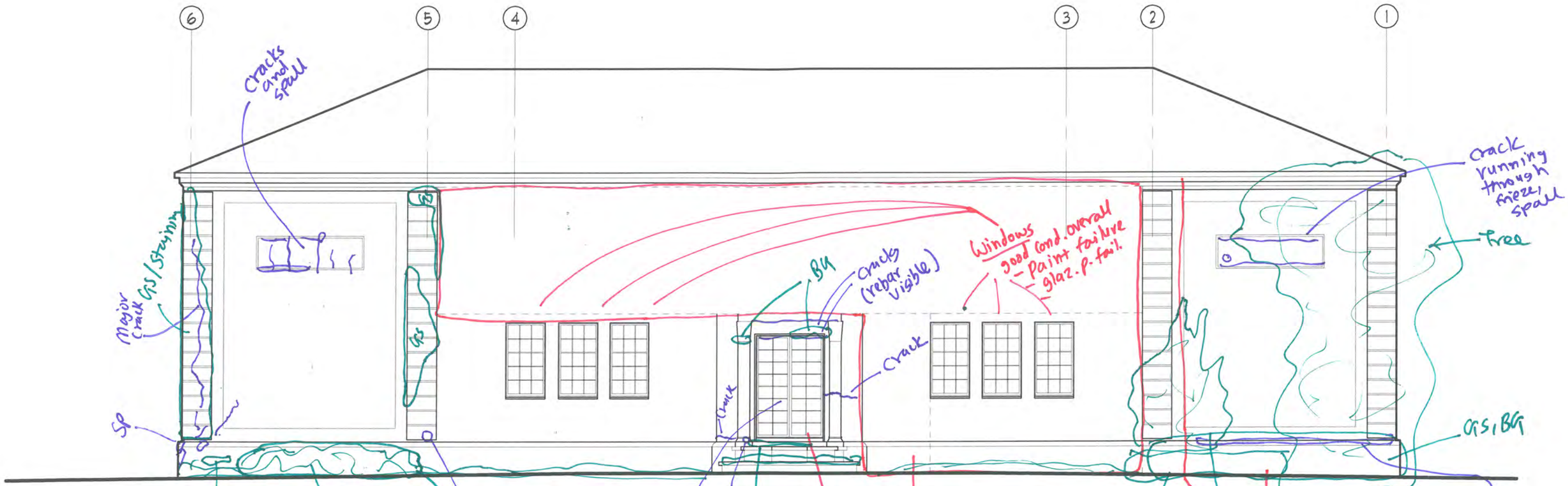
GS- general soiling
EF- efflorescence
PL- Plant
BG- biological growth
CR- Crack
SP- spalls



EAST
(loggia wall)

Sp - spall

SCALE: 1/8" = 1' - 0"



SCALE: 1/8" = 1' - 0"

GS- general soiling
EF- efflorescence
PL - plant
BG - Biological growth
CR- Crack
SP- spall

NORTH

SOUTH

INTERIOR MURAL ELEVATIONS

SCALE: 3/16" = 1' - 0"

EAST

INTERIOR MURAL ELEVATIONS

SCALE: 3/16" = 1' - 0"

WEST

INTERIOR MURAL ELEVATIONS

SCALE: 3/16" = 1' - 0"

APPENDIX C

APPLICABLE BUILDING CODE AND ACCESSIBILITY ANALYSIS

APPENDIX C. APPLICABLE BUILDING CODE AND ACCESSIBILITY ANALYSIS

The governing building codes for the project are the 2013 California Building Code (CBC) Parts 1 through 12, and the San Francisco Building Code (SFBC) current edition. Part 8 of the CBC includes the California Historical Building Code (CHBC). The Mothers Building was listed on the National Register of Historical Places Inventory as a local landmark in 1979. As a listed structure, the CHBC may be used for the rehabilitation. The CHBC provides the opportunity to utilize alternative methods for meeting the regular code, subject to review and acceptance by the Authorities Having Jurisdiction or the State Historic Preservation Officer (SHPO).

Building Code Summary

Name:		Mothers Building, Delia Fleishhacker Memorial Building
Location:		Zoo Road and Sloat Boulevard, San Francisco
County:		San Francisco
Designations:		National Register of Historic Places
Owner:		City and County of San Francisco, Recreation and Park Department
Building Occupancy:		Group A-3 (Assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A).
Construction Type:		III-B (unprotected)
Building Area:	First Floor:	2,931 square feet
	Second Floor:	1,205 square feet
	Total:	4,136 square feet
Allowable Building Area (CBC Table 503):		9,500 square feet
Building Height:		36 feet, 2 story
Allowable Building Height (CBC Table 503):		55 feet, 2 Story
Occupant Load (CBC Chapter 10):	First Floor:	289 Occupants
	Second Floor:	5 Occupants

The historical building use is planned to continue as an Assembly occupancy with accessory spaces in support of the principal function.

Building Egress
The Main exit doors from Lounge 100 (pair of 36" stairs) must be a minimum of one half of the required egress width from the building. 64"/2= 32", ***compliant condition***.

Exit doors shall swing in the direction of egress travel when occupant load exceeds 50 (CBC 1008.1.2). ***The pair of exit doors at east elevation of Lounge 100 shall be modified to swing to the exterior. The south elevation door at Foyer 107 shall continue to open to the exterior (recommend to replace modern flush wood door with compatible door).***

Doors serving an occupant load of 50 or more in Group A occupancy shall not be provided with a lock or latch unless it is panic hardware or fire exit

hardware (CBC 1008.1.10). ***Provide panic devices and fire exit hardware at egress doors at east and south elevations.***

A floor landing at the same elevation at either side of the door is required egress doors (CBC 1008.1.5). ***Existing landings at south and north elevations shall be modified to have align with interior floors.***

The means of egress, including the exit discharge, shall be illuminated at all times the building is occupied to a minimum of 1 footcandle at walking surface. Emergency power supply shall be provided of emergency egress lighting (CBC 1006). ***Provide compliant egress lighting.***

Exit signs shall be provided at exits and exit access doors, both above door and at floor level (CBC 1011). ***Provide exit signs at all exit and exit access doors.***

Handrails shall be provided at all stairways and ramps at a compliant height and graspability with extensions at top and bottom (CBC 1012). ***Provide compliant handrails at east stairs, and accessible path of travel to accessible entrance.***

Two means of egress are required from any space where the occupant load exceeds 49 for Assembly occupancy. Exit doors or exit access doors shall be placed a distance apart equal to or not less than one half the maximum overall distance of the building or area served (CBC 1015). The maximum diagonal distance of Lounge 100 is 67', 67/2= 33.5'. The separation of exit access doors in Lounge 100 is 33.75', compliant condition. ***The maximum diagonal distance of the Mothers Building is 106.5', 106.5/2= 53.25'. The separation of existing exit doors is 54', compliant condition.***

Accessibility to Public Buildings
Accessible spaces shall be provided with a minimum of one accessible means of egress (1007.1). ***Provide accessible entrance to building.***

Assistive listening system shall be provided in assembly areas, including conference and meeting rooms (CBC 11B-219.2). ***Should the building be used for conference and meeting rooms, an assistive listening system shall be provided.***

Directional and informational signs shall be compliant (CBC 11B-730.5). ***Provide compliant/ accessible signage at restrooms, and other spaces in conformance with code.***

APPENDIX D

MURALS REPORT

ANNE ROSENTHAL
FINE ART CONSERVATION
P.O. Box 150384, San Rafael, CA 94901, RosenDarte@aol.com
Voice 415.883.8050 Fax 415.883.8049

EXAMINATION AND CONDITION REPORT
THE MOTHERS' HOUSE, SAN FRANCISCO ZOO, Great Highway and Sloat Boulevard
MURAL of NOAH's ARK by Dorothy Puccinelli and Helen Forbes, 1933-38
For Architectural Resources Group, July 8, 2015

Mural Sequence:

- **North Mural** by Dorothy Puccinelli. Signed lower right, P.W.Puccinelli 1934
  Building the Ark
- **East Mural** by Helen Forbes. Signed lower right, Helen Forbes WPA 1938
  The Ark's Passengers Disembark
- **South Mural** by Helen Forbes. Signed lower right, Helen Forbes
  The Landing of the Ark
- **West Mural** by Dorothy Puccinelli. Signed lower right, P.W.Puccinelli, WPA 1938
  Loading of the Animals

Approximate Mural Size: above 10' 5 1/2" wainscot
North and South: 11' x 28' 1"
East and West: 11' x 60' 6"

Medium: egg tempera on plaster

Background:

The Mothers' House is an Italian Renaissance Revival structure designed and built in 1925 by Herbert and Mortimer Fleishacker, and dedicated to their mother as a place of respite for mothers and children while visiting the San Francisco Zoo. It is located a short distance from Sloat Boulevard, near the former main entry to the zoo grounds. By 1933 it was chosen as a venue for the first phase of federal relief projects for artists during the Great Depression. The mural cycle Noah's Ark was painted in egg tempera directly onto the four plaster interior walls of the Mothers' House between the years 1934-1938, by Dorothy Puccinelli and Helen Forbes, women who were recognized as gifted members of San Francisco's art community.

Architectural Resources Group compiled a number of historic documents that include specific reference to these murals. Among them are several key interviews of artists located in the Archives of American Art and in the oral history archives of the University of California, Berkeley.

As lead artists on the project, Puccinelli and Forbes were required to submit preliminary drawings and pass juried review. They were friends, and had spent several years together studying and drawing the animals at the San Francisco zoo prior to their offer to paint murals for the Mothers' House. The design and execution of the Noah's Ark murals bears out their competency, as they are arguably among the most meticulous and largest murals in San Francisco, and certainly represent the skillful work of women as important contributors to the artistic legacy of the WPA period.

Not surprisingly, Puccinelli and Forbes were not alone in this massive undertaking. Between them they added a crew of 8 or more skillful assistants at various times. Originally, the project might have only included the small lunette areas over the center doors on each wall, but under their influence the project was expanded to include the full length and height of the walls, and to provide more work for their fellow artists. While begun during the initial period of public works known as the Public Works of Art Project (the PWAP), this funding source soon ended. It was succeeded by the Works Progress Administration (WPA), under which the project ultimately concluded.

Prior Restoration:

Dorothy Puccinelli (Cravath) is credited with two former restorations of the Noah's Ark murals, one which took place in 1962. The details of the work are unknown. Her death is recorded in 1974. Emmy Lou Packard subsequently worked at the Mothers' House in 1975, as noted in her papers at the Archives of American Art (http://www.aaa.si.edu/collections/emmy-lou-packard-papers-5519/more), and are a source for continued research. The evidence of her work will be discussed in the ***Surface Films*** section below.

EXAMINATION/CONDITION REPORT, June 2015:

On site conditions: The conservator examined only a few feet of the bottom edge of the murals, as this was the reach of the temporary scaffold platform. Ambient light was enhanced with an LED hand-held work light (equivalent to 500w), a flash light, and a small hand-held ultraviolet light. Maximum head loupe magnification was 3.5x.

While the temperature and relative humidity readings were not available, upon entering the room the interior was distinctly moist and carried a powerful odor of mold. The walls were marked with overall dust, mold spots, insect dropping and webbing, and the results of water infiltration were clearly visible where the plaster is exposed on the west wall. Considerable time was spent looking at the center portion of the west mural, and the bottom left and right corners of the north wall. Distance photographs were taken at approximately 15 feet from the walls, as well as detail photographs at close range of the west, north and east murals.

Support:
The plaster support appears to exist in two layers, a scratch coat and finish coat, although there may be three. In one interview Dorothy Puccinelli states that the original wall surface was rough yellow plaster overall. This plaster may have been retained as a scratch coat, with a second scratch and finish coat over it. It is presumed from the time period that the plaster is mostly lime based. The plaster has a smooth texture, with very small-sized aggregate buried in the lime; the surface appears to be uniform with slight polishing by the trowel. The plaster is similar to that of Coit Tower, and the artist/plasterer Matthew Barnes is thought to have applied the plaster in both buildings. The Mothers' House walls exhibit more cracks than Coit Tower does, however. The large span of the walls in this room, as well as possible original yellow plaster left in place, or the substrate of hollow clay tile instead of poured concrete, may have resulted in these fairly numerous faults (cracks and settling) found in the Mothers' House.

While the walls look and sound generally stable, the frequency of cracks is noteworthy, especially in the center of the west wall, and scattered beyond. Larger settlement cracks are found elsewhere on all the walls, particularly radiating diagonally into the corners, due to shifting of the building. The widest cracks noticed were those on the north-northwest wall, and are approximately 10mm wide, and appear to be quite old. Cracks near the centers of the west wall are probably due to earthquakes or subsidence, as they are not the type formed due to poor craftsmanship, such as those resulting from shrinkage in drying. More likely, the long linear cracks follow the movement of the wall structure, composed of a hollow clay tile substructure with mortar between the courses of the tiles. The tiles and mortar are the first materials to deteriorate from exterior water penetration. Roof drainage may also be inadequate, causing rainwater to seep from the top of the wall downward, deteriorating the mortar and passing water to the interior plaster. Further, the floor of the room is not level,

and, depending upon the adequacy of the foundation, sandy soil near the beach may not provide a compacted footing for the building in general.

While the plaster support is generally sound in north, east and south, the west wall has significant damage to the finish layer through efflorescence. Soluble salts within the plaster, tile and exterior stucco are deposited upon evaporation into the warmer interior of the building. Salts may form above or below the plaster, and above or below the paint film. In most damaged areas on the west wall, salts have pushed off the paint layer entirely, leaving the surface devoid of design. In other large areas the salts are still attached to the wall surface; in these areas the mural looks three dimensional, as the salts and pigments of the design are dislodged and powdered, but have not yet fallen away from the wall.

Note: Cracks, and the remains of the original design, are noted in this area of water penetration near the bottom edge of the west wall.

Note: Detail of salts, residual pigments, and dust clinging to the west mural wall. Where touched, the smooth plaster finish has fallen away creating a shallow divot, indicating that deterioration goes below the surface in some areas.

Note: Details of other areas showing the extent of deterioration of the plaster and paint.

Left: Detail, the head of a goat in raking light.

Right: Detail, of a cow in raking light, showing the three dimensional appearance of the wall where paint and plaster is deteriorated.

Paint Film:

The paint medium used by Puccinelli and Forbes was documented as egg tempera. In this medium, the yolk of a raw egg is combined with water to form an emulsion, and is added to powdered pigments ground in water. The working diluent is water, and the artist must maintain a sufficient proportion of egg to pigment for the paint to be cohesive, and adhesive to the wall. Egg as a binding medium is centuries old. An interview with the artist does not stipulate the proportions of the mixture, nor say whether any other material (such as varnish) was added, as is sometimes done. According to Puccinelli, each egg lasted several days among several artists. As the brush strokes are relatively thin, the vibrant white of the plaster was allowed to show through. This method of applying the paint in a translucent way adds to the luminous final effect of the painting.

Puccinelli and Forbes knew that the use of egg tempera should be long lasting under moderate environmental conditions, and that this binding medium was readily available and could be applied to a dry (as opposed to a wet [as in fresco]) plaster wall. They may not have considered that water penetration to the west-facing wall would be a problem, but wall paintings are subject to the deterioration of the primary support, as well as the building in general. Their concern was mostly to preclude the constant timing required of working with a plasterer, as is necessary with fresco painting. In practical terms, with the zoo being a relatively long distance to travel, working on a dry wall would allow them the time they needed to start and stop their work whenever circumstances demanded. Puccinelli thought it was a mistake to paint directly onto walls (in general) since the art could not be transported, but was obviously willing to cooperate for the sake of steady work provided by the federal art project. The two women chose egg tempera because it was a classical medium, used by the Italians, and suitable for the stylistically Italian revival building.

According to Daniel V. Thompson, Jr., whose book on egg tempera painting (published in 1936) is now a standard text, says that egg tempera is not well suited to large size, beyond 20 square feet. It is suited best to graphic features, rather than blended and naturalistic forms (like oil paint would be.) It is suited to working in a high key, and leaves no room for mistakes, as the final product will show any errors. This was a bold choice for Puccinelli and Forbes, but their exacting work is amazingly effective in tempera, and attests to their confidence and skill.

Examination of the paint film shows the typical application method of working with egg tempera, which, like fresco, can be very thin (like watercolors) or more robust like gouache. Building forms requires a great many cross-hatched lines, and the length of the artist's lines is remarkable, and unshaken. Shadows and dark colors require multiple applications, and light colors require few, as most highlights are composed of the bare wall revealing the brightest white.

The condition of the paint film on the main subject on the west wall ranges from excellent to completely deteriorated, to non-existent. In most of the areas seen to be white on the west wall, the pressure of crystallization of salts has obliterated the design. This is not the "salty veil" of fresco painting where the salts exist over the paint film and can sometimes be removed from the design; the white areas are actual paint *losses*, where the pressure of evaporation and salt formation was greater than the cohesive strength of the paint binder. The design has simply cracked apart and been shed from the wall. Damage to the west wall is estimated to be approximately 40-50% of the design, as the paint has fallen away, or is compromised to such an extent that it probably cannot be saved. Additionally, the surface of the mural has a milky aspect, possibly due to mold or other biological attack.

There is yet another contributing agent of deterioration at work that will be discussed in the next section.

Surface Films:

The mural surfaces reflect light, as they are somewhat shiny. This sheen appears not to be due solely to the contributions of the paint binder and polished wall surface, but is also due to a somewhat glossy varnish coating that exists over all the surfaces. The varnish is discolored to a yellow-brown color, and can be readily recognized over the signatures found in the lower right of each mural, where the coating doubtless exists in multiple layers. The varnish is likely a natural resin, like dammar or copal, as it fluoresces under ultraviolet light, and is soluble in organic solvent. This coating would have been colorless when applied many years ago. It is not known if this varnish was applied originally, or afterwards during a restoration. Varnish was applied either to deepen the color of the murals, or to protect the paint surface from airborne dirt. Or, it may have been applied as a preservative/adhesive to arrest flaking paint.

While egg tempera is generally thought of as having cool undertones, the Noah's Ark panels are distinctly warm in tone due to the "colored filter" of aged varnish over the original paint. In specular lighting, the unevenness of the brush coating is visible. The solvent of the varnish or the friction of the brush may also be responsible for abrasion to the original paint that can be seen haphazardly across the surfaces.

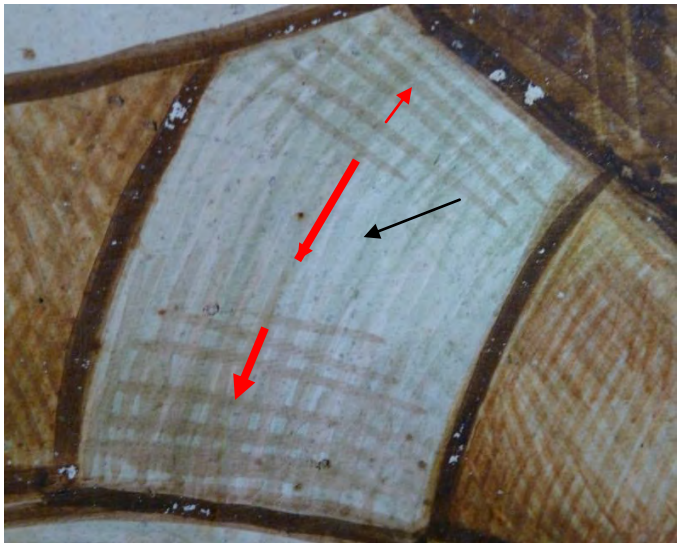
The varnish coating may be more harmful than helpful on the west wall. It may inhibit transfer of moisture, thus creating a barrier film. It may help explain the sharp dilineations between where paint exists, or does not exist, on the west wall. However, apart from the warm tonality of the walls due to the color of the varnish, the north, east and south walls seem to be reasonably well preserved, but they have not been exposed to direct water infiltration like the west wall has been.

Other surface films consist of airborne soot, cobwebs and assorted foreign matter. Much of this debris is collected on the ledge under the west mural.

Detail of signature, lower right of north wall.
Note: darkened halo around the letters, indicating several layers of discolored varnish

Note:
Varnish above the "D" was removed with solvent.

Note: streaks in the varnish film

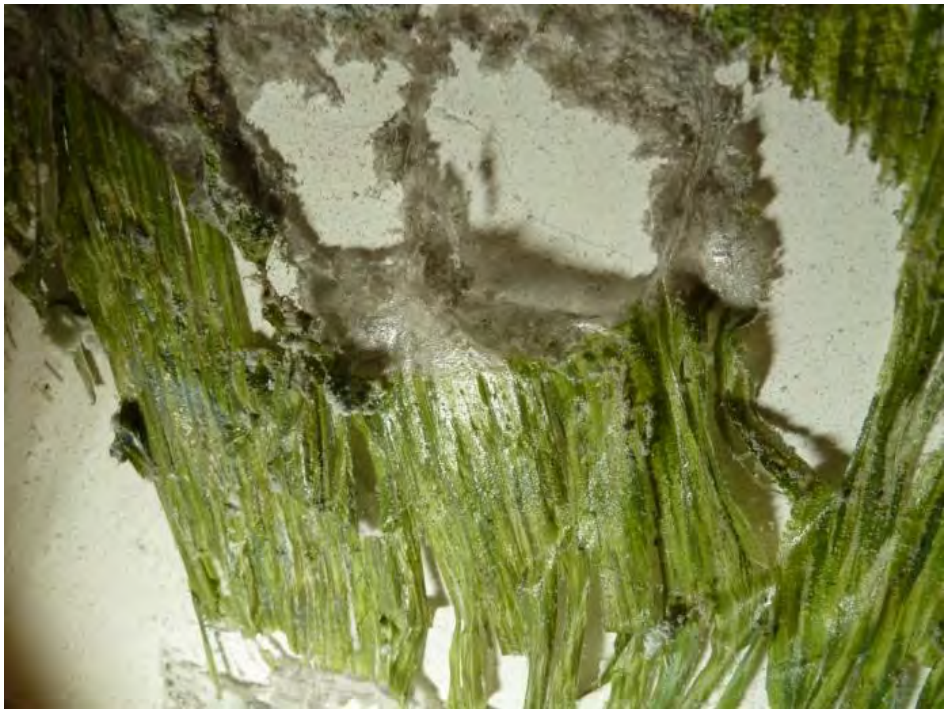


Note: Detail of a sandaled foot, north wall;
varnish was removed from the right side of the white strap

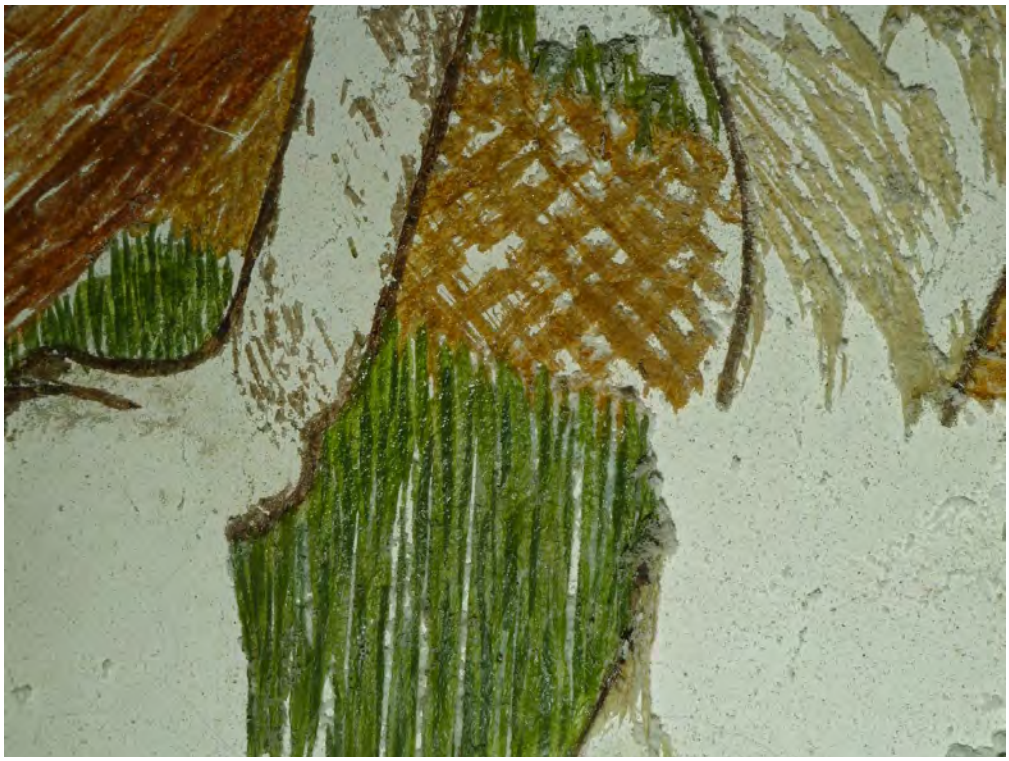
Note: discolored patches on mountains due to presence of the varnish film.

Previous Restoration:

As stated in the **Background** section, the Noah's Ark murals were restored at least twice, involving the work of Dorothy Puccinelli, and of Emmy Lou Packard (separately?). Both artists were employed in restoration work at Coit Tower, also. Although Puccinelli may have used her original materials (egg tempera) for Noah's Ark, Emmy Lou Packard is known to have used Liquitex® acrylic emulsion paints as a retouching medium for most of her restorations. While Liquitex® has not been confirmed by analysis, there are strings of plastic-like paint hanging from the wall or laying shredded on the ledges below the west mural. These paints are darker, more opaque, and heavier than the original tempera paint. By looking at the debris piles one can determine that the film-forming materials cause salts and water to remain trapped below the paint until the plaster falls apart.



Note: Details on the west wall of previously restored areas, consisting of acrylic emulsion paints, seen here in raking light. These paints are film-forming and do not allow the plaster to breathe. The paint is pushed from the wall by moisture and/or salts, and has fallen onto the ledges below the west wall.



Note: Another detail of a restored area on the west wall, consisting of acrylic emulsion paints. These paints are film-forming and do not allow the plaster to breathe. The paint is pushed from the wall by moisture and/or salts. Acrylic emulsion paints fall away in sheets, unlike the crumbling of the original (thinner) egg tempera.

Note: A large expanse of paint loss exists in the lower section of the west wall. Former repairs have failed, indicating that the water damage to this wall is a consistent problem, requiring extensive repair. Preservation of the mural cannot succeed without halting the water penetration and ambient environmental fluctuations.

RECOMMENDATIONS:

Short Term:

Undoubtedly, the main concern is the continued loss of design on the west wall due to moisture penetration. Repair of the building may impart vibration or impact to the wall. If losses of design continue, the restoration effort becomes more difficult and expensive, and diminishes the most valuable asset, which is the artist's original work. On the west wall, the original paint is so deteriorated that some parts may be beyond repair. In the short term, salvaging the original is the most important task.

1. **Detailed color photography should be taken immediately.** This record will become the baseline for recording the progress of deterioration, and the primary document for reconstructing lost elements of the design, as there may be no other images for the conservators to follow. Photography should be done prior to any substantive structural repair, as stress upon the west wall may cause additional spalling of the plaster/paint. Photographs should include very close details on the west wall. One to one (1:1) photographs (at least in badly damaged areas) would help conservators enormously to reconstruct the design later, following as faithfully as possible the artist's original work.

2. The mural must be protected against further damage caused by water penetration and high humidity. Current conditions are not favorable, and there should be some effort made to stabilize the temperature and relative humidity within the building. A project to monitor the environment digitally should be started. Whatever issues are related to direct water penetration from the exterior must be at least temporarily halted.

3. Imminent loss of additional paint and surface plaster is expected. Some parts of design that can still be seen are not actually attached to the wall, and are expected to fall away; any dusting or manipulation of the surface may destroy the outlines and color of the forms. It is **critical to the conservators that outlines of remaining forms be saved.** The original work is so fine and precise, that a successful restorative treatment will depend upon knowing exactly where the forms exist and how they are painted. If any original cartoons of the murals exist, these should be referenced, but it is doubtful they have survived. Someone (probably within the City Departments?) should research/locate any pertinent photographs or documents that might exist. Obtaining images of the intact murals will require searches of archives, personal papers, or WPA records, even a public plea to visitors who may have taken photographs, etc. Of course, any color photographs would be highly prized.

4. Sometime after the photography and the protection of the exterior from water penetration, conservators should attempt to conserve the remaining paint, and to

indicate on the walls where forms begin and end, to the extent possible. No one should be allowed to touch the west wall in its current state. Conservators may require a pilot study (approximately several weeks to a month in duration?) to determine if it is possible to salvage any loose paint on the west wall. It is unknown at this time if any consolidation method will be successful, as the surface is pulverized to powder, and pigments are entwined with salts and plaster debris. Design fragments should not be intentionally removed (dusted away) without knowing if they can be preserved by some method, and without knowing how to register where the forms belong (probably by marking the wall.)

Long Term:

1. The long term recommendation is to conserve the murals by strengthening and stabilizing the walls and paint film, and by providing environmental stability. A pilot study of the north, east, and south walls should including solvent testing and sounding of the walls to help predict the scope of work needed and the outcome of conservation treatment. Any subsequent stabilization of the walls for seismic upgrade will probably require a protective counter-form, put in place against the mural surfaces. This cannot be done until attending first to any stability issues.

2. The decision to clean the mural surfaces of surface dirt, and/or varnish will be part of a major conservation effort (this is secondary to saving the painting on the west wall). Removing the varnish film will require application of organic solvents with friction. At this point it is not known if the thin, original paint is stable against this action. Afterwards, a substitute coating may or may not be desirable. These treatment details are not known at this time.

3. A means to establish consistent temperature and relative humidity of the interior should be considered. Only by long-term environmental control can the murals truly be conserved for future generations. This should be part of the overall building plan. It is a concern that, if the building is closed for long periods of time between use, the environmental fluctuations will adversely affect the murals, even after restorative treatment; obviously, a damp environment will continue to support mold growth, condensation, and saline efflorescence, and would work to destabilize materials used to conserve the murals.

4. Continued preservation of the murals will require that the City establish periodic inspection times and maintenance. Any needed repairs must be attended to as soon as possible. Deferred maintenance is expensive, and invites irreversible loss. Art work must be periodically monitored just like any other resource to remain in stable condition.

APPENDIX E

STRUCTURAL REPORT

Historical Mothers Building
San Francisco Zoo, San Francisco, CA

Building Elevation

ASCE 31-03 Structural Evaluation Report

Prepared by

SOHA Engineers

July 28, 2015

1.0 Executive Summary

The Historical Mothers Building is located within San Francisco Zoo on Sloat Blvd. in San Francisco, CA. The building is a single story hip roofed with attic floors at the north and south ends and was designed and constructed in the mid 1920's. The building has remained essentially structurally unaltered since the time of original construction. In 1930's exterior mosaic panels and the interior murals in the Lounge were added. In its current state, Mothers Building has exhibits cracking, spalling, rusting, and general wear and tear. In 1986, City of San Francisco engaged "Faye Bernstein & Associates to conduct a structural investigation. The investigation was performed using 1979 San Francisco Building Code.

The current scope of work is to perform an ASCE 31-03 Tier 1 seismic evaluation for the Historical Mothers Building and provide seismic rehabilitation concepts for mitigating the structural deficiencies identified. The building was evaluated for a Life Safety Performance Level. Based on the ASCE 31-03 evaluation, there are several structural deficiencies including: Inadequate shear strength of the existing hollow clay tile (HCT) masonry walls, roof diaphragm sheathing, out-of-plane of the HCT masonry walls and their connections, roof diaphragm to perimeter existing steel beam connection. The seismic mitigation concepts to address these deficiencies are presented in Structural Appendix A.

Nonstructural deficiencies were also identified and include: damaged precast concrete friezes, steel column surroundings, column capitals, balustrades, urns, exterior stairs and concrete deck in plaza, and quoins. These nonstructural deficiencies should also be addressed as part of any future seismic rehabilitation work.

The building is located in an area with a long history of earthquake activities. Building codes and design practices have evolved since the mid-1920's design and construction, and reflect significantly better understanding of seismic design and building performance. With some structural rehabilitation modifications, this building can be seismically rehabilitated to conform to the Life Safety Performance Level objectives of ASCE 31-03. We recommend that the building be strengthened to a Life-Safety performance level in accordance with ASCE 41, "Seismic Rehabilitation of Existing Buildings". ASCE 41 was developed as a design standard to be used for the rehabilitation of existing buildings subsequent to completing a seismic evaluation such as ASCE 31-03.

1.1 Introduction

At the request of the Architectural Resources Group, we have evaluated the Historical Mothers Building, located within San Francisco Zoo on Sloat Blvd. in San Francisco, CA, to assess its expected structural and nonstructural performances in the event of a major earthquake. This report summarizes our findings and includes conceptual structural rehabilitation schemes to improve the building up to a Life-Safety performance level.

As part of this evaluation, we have reviewed available original architectural and structural drawings prepared by George W. Kelham dated May 1st, 1924 with revision date July 24, 1924 and structural investigation by "Faye Bernstein & Associates prepared in 1986. We performed a site visit on June 9, 2015 to verify original construction and the condition of the visible portions of the existing structure. Based on this information, we performed an ASCE 31-03 evaluation, identified structural deficiencies, and developed conceptual sketches to mitigate these deficiencies. The structural rehabilitation concepts are presented in Appendix A.

The scope of this report does not include addressing damages to the precast concrete friezes, steel column surroundings, column capitals, balustrades, urns, exterior stairs and concrete deck in plaza, and quoins. The items are listed only to indicate that they do not comply with nonstructural checklist. See Architect's report for of these and other items that are not listed here for restoration or replacement.

The opinions and recommendations presented in this report were developed with the care commonly used as the state of practice of the profession. No other warranties are included, either expressed or implied, as to the professional advice included in this report. This report has been prepared for the Architectural Resources Group to be used solely in its evaluation of the seismic safety of the building included herein.

1.2 Project Overview

The purpose of this evaluation is to assess the expected structural performance of the Historical Mothers Building using ASCE 31-03 with the goal of identifying and mitigating structural deficiencies and enhancing the performance to the Life-Safety Performance Level. This seismic evaluation report contains the following:

- A summary of identified seismic deficiencies for both the structural elements (i.e. roof diaphragms, shear walls, etc.
- Appendix A -Conceptual Structural Rehabilitation Sketches
- Appendix B- ASCE 31-03 Checklists

1.3 Evaluation Criteria and Methodology

This building evaluation is based on ASCE 31-03, "Seismic Evaluation of Existing Buildings" published by the American Society of Civil Engineers. ASCE 31-03 is a nationally recognized Standard that utilizes a three-tiered procedure for seismic assessment and evaluation of existing buildings. The goal of ASCE 31-03 is to identify the structural deficiencies in a building's lateral force resisting system that could lead to significant failure and/or collapse.

The evaluation process consists of three tiers: Tier 1 the Screening Phase, Tier 2 the Evaluation Phase and Tier 3 the Detailed Evaluation Phase. Tier 1 utilizes checklists to rapidly identify key structural and nonstructural elements as well as geologic and site hazards and assess their compliance with established standards of design and construction. These checklists are completed based on information contained in the original structural and architectural drawings, field observations and engineering judgment to determine whether specific elements are compliant or non-compliant. Compliant elements are considered acceptable. Non-compliant elements require further detailed evaluation that is included in the Tier 2 Evaluation Phase. The Tier 1 checklists are presented in Appendix B and structural calculations in Appendix C.

The Tier 2 procedures provide a methodology for performing more detailed analyses of the deficiencies identified in the Tier 1 assessment. The purpose is to better understand the severity, impact and complexity of the deficiencies so that the most efficient means to rectify the noncompliant elements can be determined. In some cases, the more detailed Tier 2 analysis may conclude that the previously non-compliant elements are indeed acceptable. In others, it will better define the extent of the rehabilitation or strengthening work required.

This evaluation of the Historical Mothers Building included a Tier 1 evaluation and recommendations for addressing specific non-compliant elements.

1.4 Performance Objective

Our evaluation of the Historical Mothers Building is based on a Life-Safety (LS) Performance Level as defined in ASCE 31-03. The definition of LS given in ASCE 31-03 is as follows:

> *After a design earthquake, Building performance includes damage to both structural and nonstructural components such that: (a) partial or total structural collapse does not occur, and (b) damage to nonstructural components is non-life threatening.*

In other words, this performance objective is meant to ensure that the risk to life safety is significantly reduced although the building may sustain significant damage in the event of a major earthquake and that exit paths from the building will not be blocked. As a result of earthquake related damage, the building may not be repairable after a major earthquake.

2.0 Building Description

The Historical Mothers Building is located within San Francisco Zoo on Sloat Blvd. in San Francisco, CA. The structure was designed and constructed in the mid 1920's and it has remained essentially unaltered since the time of original construction. The building is single story, hip-roofed, with attic floors at the north and south ends. The total gross area of the building at the first floor is about 4,150 square feet and there are total of 1680 square feet of attic areas at the north and the south ends. The building currently is not occupied and in use.

The building is rectangular in plan configuration with dimensions of approximately 103 feet in the north-south direction and 40 feet in the east west direction, see Figure 1. On the north and the south sides, the attic floors have plan dimensions of about 21 feet by 40 feet. The Lounge is approximately 61 feet by 40 feet. On the east side, there is a Loggia which has plan dimensions of about 46 feet by 9.5 feet. The first floor is about 3.5 feet higher than grade. The eaves are about 21.5 feet and the top of the hip roof is about 31.5 feet above the first floor.

In 1930's, exterior mosaic panels at the main entrance and murals on the inside face of the HCT masonry walls were added, see Photo 2.1. Preservation of the murals is the most challenging seismic strengthening constraint in the project. At the exterior of the building, there are many historical precast concrete friezes, steel column surroundings, column capitals, balustrades, urns, exterior stairs and concrete deck in plaza, and quoins.

The building is constructed of steel columns and perimeter beams at the exterior walls. The steel frames are infilled with HCT walls and stucco is applied at the exterior face all around the building. By default, the lateral load resisting system is the HCT infill walls. Most of the steel columns are concealed in the HCT walls.

Eastern part of the Loggia is comprised of steel columns with precast column surroundings (see Photo 2.2) spaced 9 feet on centers and extended to the roof. These columns are connected to steel columns in the western wall of the Loggia by horizontal steel channels running in the east-west direction. We noted that there are more columns in the western wall of the Loggia than the original drawings indicate.

The building is wood framed inside and consists of stud walls, joists with straight sheathing at the floor and roof diaphragms. The roof consists of wood trusses with 2x8 top and bottom chords spaced at 2 feet on centers. At the Lounge area, lath and plaster ceiling with decorative wood work are attached to the bottom chord of the roof trusses. There are decorative wood wainscot at the lower part and historical murals at upper part of the Lounge walls at all sides, see Photo 2.1.

At the attic areas, there is no ceiling and the roof framing is visible. Attic framing is comprised of 2x8 joists spaced at 16 inches on center and supported by the interior stud walls and HCT walls at the exterior, see Photo 2.3. The south attic houses the heating system, and floors joists are completely concealed. Since the sheathing is placed in the

north-south direction, the joists must run in the east-west direction. The north attic is a not functional space and access is provided by a small hatch at the first floor ceiling. There is no sheathing over the existing joists.

First floor lath and plaster ceiling is supported by the attic floor joists both at the north and south attic floors. A 3 feet high crawl space exists under the first floor. The first floor framing consists of 2x10 joists spaced at 16” on center running in the north south direction and supported by 6x8 wood beams and 6x6 wood posts. Wood posts are bearing on approximately 13”x13” square footings, see Photo 2.4

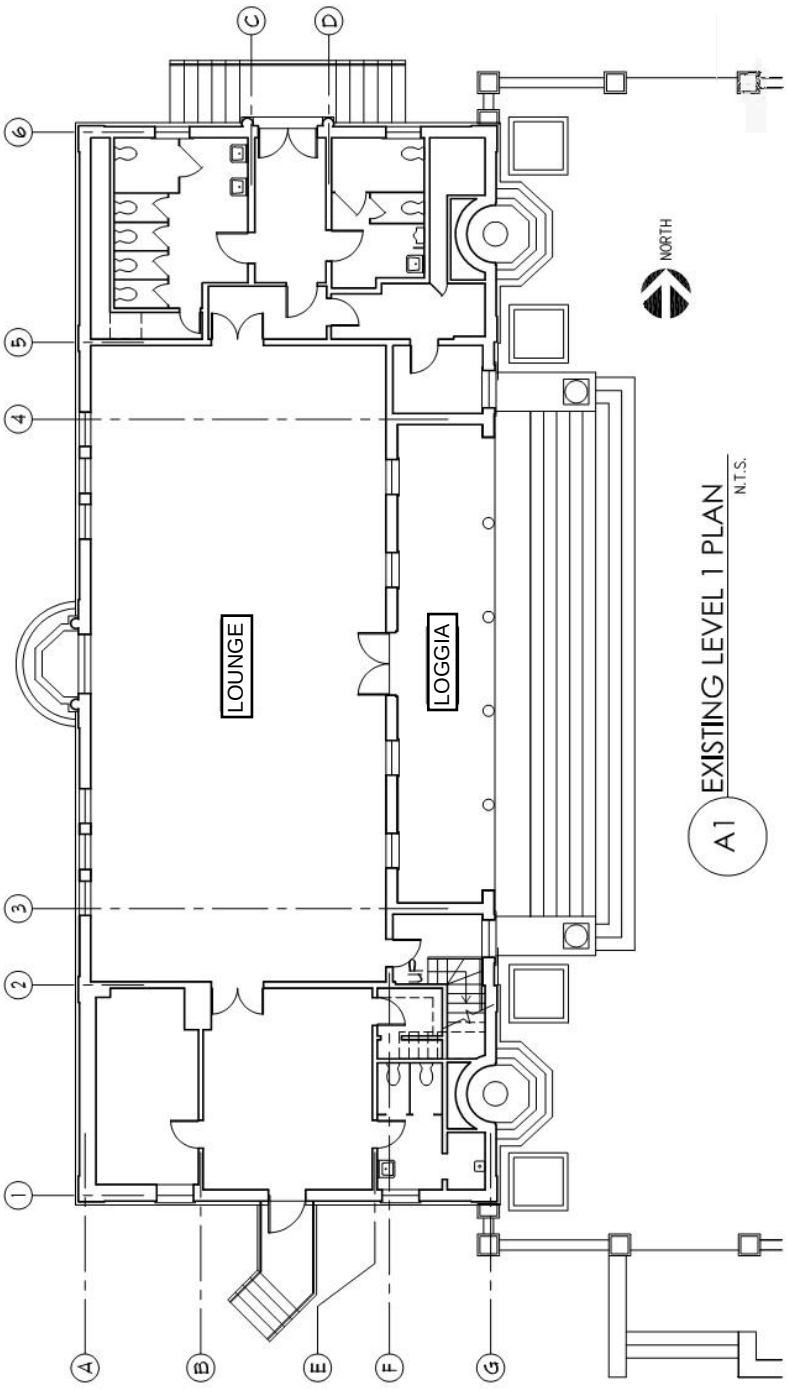

C
D
6
5
4
3
2
1
A
B
E
F
G
NORTH
LOUNGE
LOGGIA
EXISTING LEVEL 1 PLAN
N.T.S.
A1

Figure 1

Photo 2.1 Mural and Wood Finishes at Lounge

Photo 2.2 Loggia East Steel Columns with Precast Concrete Surroundings

Photo 2.3 North Attic Framing

Photo 2.4 Crawl Space below First Floor

3.0 Site Description and Seismicity

The Historical Mothers Building is located on a flat site in a San Francisco Zoo.
The seismic soil coefficients used for the evaluation of the building are based on the classification from the 2003 National Earthquake Hazards Reduction Program (NEHRP) provisions. The seismic evaluation parameters for this site are presented in Table 1:

Table 1

Site Class D	Site Soil Classification
$F_a = 1.0$	Site Coefficient
$F_v = 1.5$	Site Coefficient
$S_s = 2.125g$	Short Period Spectral Acceleration
$S_1 = 1.177g$	Long Period Spectral Acceleration
$S_{DS} = 1.417g$	Design Short-Period Spectral Response Acceleration Parameter
$S_{D1} = 1.177g$	Design Spectral Response Acceleration Parameter at a one-second Period

Based on United State Geologic Survey (USGS) data, there is approximately 35 percent probability of a Richter Magnitude 6.9 earthquake occurring during the next 30 years. Within a 100-kilometer radius of the building site, there are many earthquake faults including the Hayward, Calaveras, San Andreas, Rodgers Creek and other faults. The magnitude and probabilities of possible seismic events on faults occurring within a 100-kilometer radius of the building during the next 30 and 50 years site are presented in Table 2. Note that that intensity of ground shaking at the site is dependent on the distance from the site to the epicenter of the seismic event.

Table 2

Summary of Seismic Event Probability	
Magnitude of Seismic Event within 100 km	Probability of Occurrence for Specified Time Period
8.05	2.3 within 30 years
7.55	13.9 within 30 years
7.05	37.4 within 30 years
6.55	73.0 within 30 years
6.05	89.8 within 30 years
5.55	96.7 within 30 years
8.05	3.8 within 50 years
7.55	22.0 within 50 years
7.05	54.1 within 50 years
6.55	88.7 within 50 years
6.05	97.7 within 50 years
5.55	99.6 within 50 years

4.0 Discussion of the Historical Mothers Building Deficiencies

Using the procedures of ASCE 31-03, we have identified a number of deficiencies in the lateral force-resisting system and the structural members and connections of the building. The ASCE 31-03 checklists used to identify the structural and nonstructural deficiencies are attached in Appendix B.

4.1 Structural Deficiencies

- HCT masonry walls do not meet the shear stress check requirements.
- HCT masonry walls do not meet requirement of the out-of-plane strength and there are large existing cracks. Failure of these walls out-of-plane may result in falling hazards and degradation of the strength and stiffness of the lateral force resisting system, see Photos 4.1 and 4.2
- Out-of-plane connections of the HCT masonry walls are not adequate. Failure of the connections may result falling hazards and degradation of the strength and stiffness of the lateral force resisting systems.
- Straight roof sheathing does not meet the aspect ratio and shear strength requirements.

- The connections between the roof and the HCT masonry walls are not adequate to transfer the seismic forces.

- Attic floors are not connected to the lateral load resisting elements, see Photo 4.3.

- Below the roof sheathing, on the east side, the steel beams and columns are exposed and visible, corrosion is noted in columns, beams and connections, See Photo 4.4. Most of the steel is concealed in the HCT masonry walls and stucco and extend of corrosion is unknown. The quoins at the corners of the building have large cracks, see Photo 4.5. Also, there are very large cracks at the Loggia steel columns precast concrete surroundings. This is usually an indication that the steel is corroded and has caused cracks in the quoins. The exterior west wall steel is completely concealed in the HCT masonry and stucco, and verification of the steel and the wall construction was not possible.

- Additionally, we recommend liquefaction and surface fault rupture and surface displacement at the building site be investigated by a geotechnical engineer licensed in California.

Photo 4.1 Crack at the Existing Wall

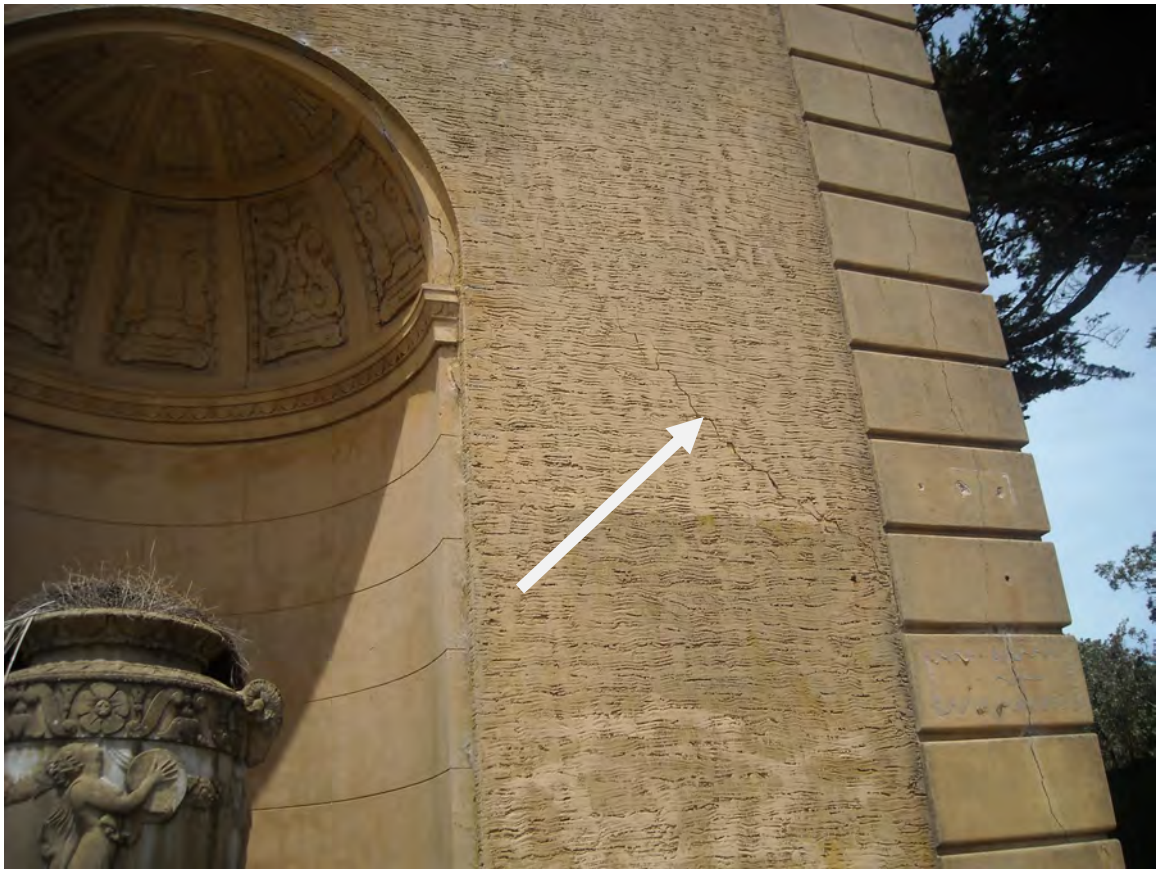


Photo 4.2 Crack at the Existing Wall

Photo 4.3 No Attic Floor to Wall Connection

Photo 4.4 Corrosion at Steel Connection

Photo 4.5 Crack at the South-East Quoin

4.2 Nonstructural Deficiencies

- Existing precast concrete friezes, steel column and window and door surroundings, column capitals, balustrades, urns, and quoins are extensively damaged in many locations and pose falling hazards, see Photos 4.6, 4.7, and 4.8.

- The frieze panels at the East façade do not have adequate support, see Photo 4.9.

- The reinforcing of the vaulting at the ceiling of the Loggia is corroded, see Photo 4.9.

- Lath and plaster in some areas the two-story portions damaged and spalled, see Photo 4.10.

- The building mechanical and electrical equipment are not sufficiently anchored and seismically braced, see Photo 4.11.

- Duct bracing are not sufficient and lacks flexible couplings at the joints, see Photo 4.11.

Photo 4.6 Large Cracks at Precast Steel Column Surrounding

Photo 4.7 Damaged Precast Door Surrounding

Photo 4.8 Damaged Precast Concrete Urn

Photo 4.9 Frieze Panels with Inadequate Support

Photo 4.10 Damaged Lath and Plaster

Photo 4.11 Mechanical Equipment with No Seismic Bracing

5.0 Expected Building Performance

Based on the deficiencies described above, The Historical Mothers Building does not meet the Life-Safety performance objective of ASCE 31-03. The Life-Safety performance level is building performance that includes damage to both structural and nonstructural components during a design earthquake, such that: (a) partial or total structural collapse does not occur, and (b) damage to nonstructural components is non-life-threatening.

We recommend that the building be strengthened to a Life-Safety performance level in accordance with ASCE 41, "Seismic Rehabilitation of Existing Buildings". ASCE 41 was developed as a design standard to be used for the rehabilitation of existing buildings subsequent to completing a seismic evaluation such as ASCE 31-03.

5.1 Proposed Structural Strengthening Schemes

We have developed conceptual structural rehabilitation schemes to address the identified structural deficiencies and bring to building to Life-Safety Performance level. Preservation of the murals is the most challenging seismic strengthening constraint in the project and the schemes are selected to provide the strengthening to achieve this preservation goal as the Life-Safety performance objectives are also met.

Three rehabilitation strategies are presented here. Rehabilitation schemes Option 1, Option 2A, and Options 2B are developed for strengthening the lateral resistance of the building and out-of-plane connections of the HCT masonry walls. These are discussed in details below and the seismic rehabilitation concepts are demonstrated in Appendix A.

During the structural investigation completed in 1986, a few tests were performed. These included three pull out strength tests on HCT masonry walls. The test values are 1700, 1660, and 2480 pounds. In our investigation, we used the lowest value, 1660 pounds with a safety factor of 1.3. Before the preparation of the construction documents, new tests are recommended to obtain additional new design values.

Option 1 (See Sheets S1.1 thru S1.8):

Two-story areas:

Shotcrete walls are used on the inside face of the HCT masonry walls at the two-story areas on lines A, G, 1, and 6 to for seismic strengthening. In addition, concrete walls on lines 2 and 5 next to the wood framed walls are added to reduce shear demands and the span length of the roof diaphragm for east west seismic loads. Existing walls on lines 2 and 5 are wood framed and the murals are on the opposite side (lounge area) of the added concrete walls. The murals will need to be carefully protected during the installation and curing of the concrete walls from any impact and moisture. Shotcrete and concrete wall footings need to be doweled into the existing footings.

Out-of-plane support of the HCC masonry walls are provided by the application of shotcrete thru the horizontally and vertically spaced dowels between the shotcrete and the HCT masonry walls. In order to transfer the out-of-plane forces, the shotcrete walls need to be connected to the roof diaphragm. See Figures A1 thru A8 for more details.

Lounge Area:

At the Lounge area of the building, out-of-plane support of the east and the west HCT masonry walls are provided by the steel HSS members that are horizontally inserted into the outer cell or the wythe of the masonry wall depending on the wall construction. The horizontal HSS members span between the steel columns. Steel columns in turn span between the foundation and the roof diaphragm. Steel column to roof diaphragm connections are required to transfer the out-of-plane forces.

On the east wall, there are more steel columns than the original drawings indicate. The existing columns are approximately spaced at 9 feet on centers. The east HCT masonry wall comprised of a 4" outer and an 8" inner wythe below the Loggia vaulting. Below the vaulting, the horizontal HSS members are inserted only to the 4" wythe so that the risk of damage to the murals is minimized. Anchor bolts at 2'-0" on centers in epoxy grout are required thru the horizontal HSS members; see Figures A4, A7, and A8.

The west wall existing column locations are not known since that the steel is completely concealed in the HCT masonry walls and the stucco. ARG performed an investigation and used a steel sensor to locate the existing columns on the west wall on July 2nd, 2015. The existing columns are spaced at approximately 20'-6" on centers. This spacing is very large and would require deep horizontal members. Using deep horizontal members will increase the risk for damage to the murals. Therefore, HSS vertical members are added to reduce the spans. The HCT masonry wall is completely concealed and the construction is unknown. The sketches assume that the wall is comprised of an 8" and a 4" wythes similar to the east wall and provide conceptual details for both conditions whether the 4" wythe is outside or inside. Similar to the east wall, the horizontal members are inserted only at the outer wythe or cell to minimize the risk of damage to the murals. Anchor bolts at 2'-0" on center in epoxy grout are required thru the horizontal HSS members; see Figures A4, A7, and A8.

It is our understanding that the entire stucco is planned to be replaced between lines 2 and 5 to install the vertical and the horizontal steel members. The stucco assembly should be detailed so that possible future cracking at the steel members is prevented.

Option 2A (See Sheets S2.1A thru S2.5A):

Two-story areas:

Shotcrete walls are used on the inside face of the HCT masonry walls at the two-story areas on lines A, G, 1, and 6 for seismic strengthening. Shotcrete wall footings need to be doweled into the existing footings. Unlike Option 1, there are no walls required on lines 2 and 5. See Figures A6, A9, A10, and A11.

Out-of-plane support of the HCT masonry walls are provided by the application shotcrete thru the horizontally and vertically spaced dowels between the shotcrete and the HCT masonry walls. In order to transfer the out-of-plane forces, the shotcrete walls need to be connected to the roof diaphragm.

Lounge Area:

East wall strengthening is same as described in Option 1; see Figure A4, A7, and A8.

Along the west wall, four buttresses are provided at the ends of the existing window groups. The buttresses can be placed at the face of the existing stucco and there is no need for stucco removal or replacement. The buttresses reduce the shear demands and the span of the roof diaphragm as well as provide support for the out-of-plane of the HCT masonry walls. They need to be connected to the roof diaphragm at the top and to the foundation at the bottom. Two foundation piers at each buttress are required to resist gravity and seismic loads.

In addition to the buttresses, horizontal concrete members between the buttresses approximately at 6’-0” o.c. and dowels at 2’-0” oc are required for out-of-plane connection of the HCT walls. Similarly to the buttresses, the horizontal members can be placed at the face of the existing stucco. See Figures A12 and A14.

Option 2B (See Sheets S2.4B and S2.5B):

Two-story areas:

The seismic strengthening is the same as the Option 2A described above: See Figures A6, A9, A10, and A11.

Lounge Area:

East wall strengthening is the same as the Option 2A described above; see Figures A4, A7, and A8.

For the west wall, buttresses are required as described for Option 2A. The horizontal members that span between the buttresses can be replaced by

4"shotcrete wall applied directly over the existing stucco, See Figures A13 and A15.

Additional Strengthening for All the Rehabilitation Strategies:

The existing roof straight sheathing needs to be replaced by new plywood sheathing,

Roof sheathing to existing steel beam connections around the perimeter of the building need to be strengthened.

All the exposed steel columns, beams, and connections including the members above the Loggia vaulting need to be cleaned from rust and be galvanized.

Existing plaster quoins and HCT around the steel columns need to be removed to clean the rust and galvanize the existing steel columns, beams, and the connections.

Concrete around the freestanding loggia columns needs to be removed to clean the rust and galvanize the existing steel columns. Replace concrete surrounds.

We recommend liquefaction and surface fault rupture and surface displacement at the building site be investigated by a geotechnical engineer licensed in California.

5.2 Nonstructural Strengthening

The scope of this structural evaluation does not include addressing damages to the precast concrete friezes, steel column surroundings, column capitals, balustrades, urns, exterior stairs and concrete in plaza, and quoins. The items are listed only to indicate that they do not comply with nonstructural checklist. See Architectural report for these and other items that are not listed here for restoration or replacement.

- Existing precast concrete friezes, steel column and window and door surroundings, column capitals, balustrades, urns, and quoins need to be repaired / replaced see ARG report.
- Additional support to be provided to secure the panels.
- The reinforcing of the vaulting at the ceiling of the Loggia needs to be cleaned from rust and be galvanized.
- Damaged lath and plasters needs to be replaced.
- It is our understanding that all the existing MEP equipment are planned to be replaced. The new equipment shall be anchored and braced to comply with San Francisco Building Code requirements.

- It is our understanding that the existing ducts will be replaced. The new ducts shall be braced to comply with San Francisco Building Code requirements.

6.0 Recommendations

Based on this ASCE 31-03 evaluation using the Tier 1 check lists and associated structural calculations several seismic deficiencies were identified for this building.

These are localized structural deficiencies that can be rectified to prolong the useful life of this building. Concepts for structural rehabilitation are provided to mitigate these deficiencies and are presented in Appendix A. We recommend that these concepts be further developed into a set of working construction documents.

7.0 Conclusion

The Historical Mothers Building is approximately 90 years old. Since the original design and construction, the building codes and design practices have evolved to reflect significantly better understanding of seismic design and building performance. With selection one of the rehabilitation schemes in this report, Mothers Building can be seismically rehabilitated to conform to the Life-Safety performance objectives of ASCE 31-03.

Structural Appendix A
Seismic Rehabilitation Concepts

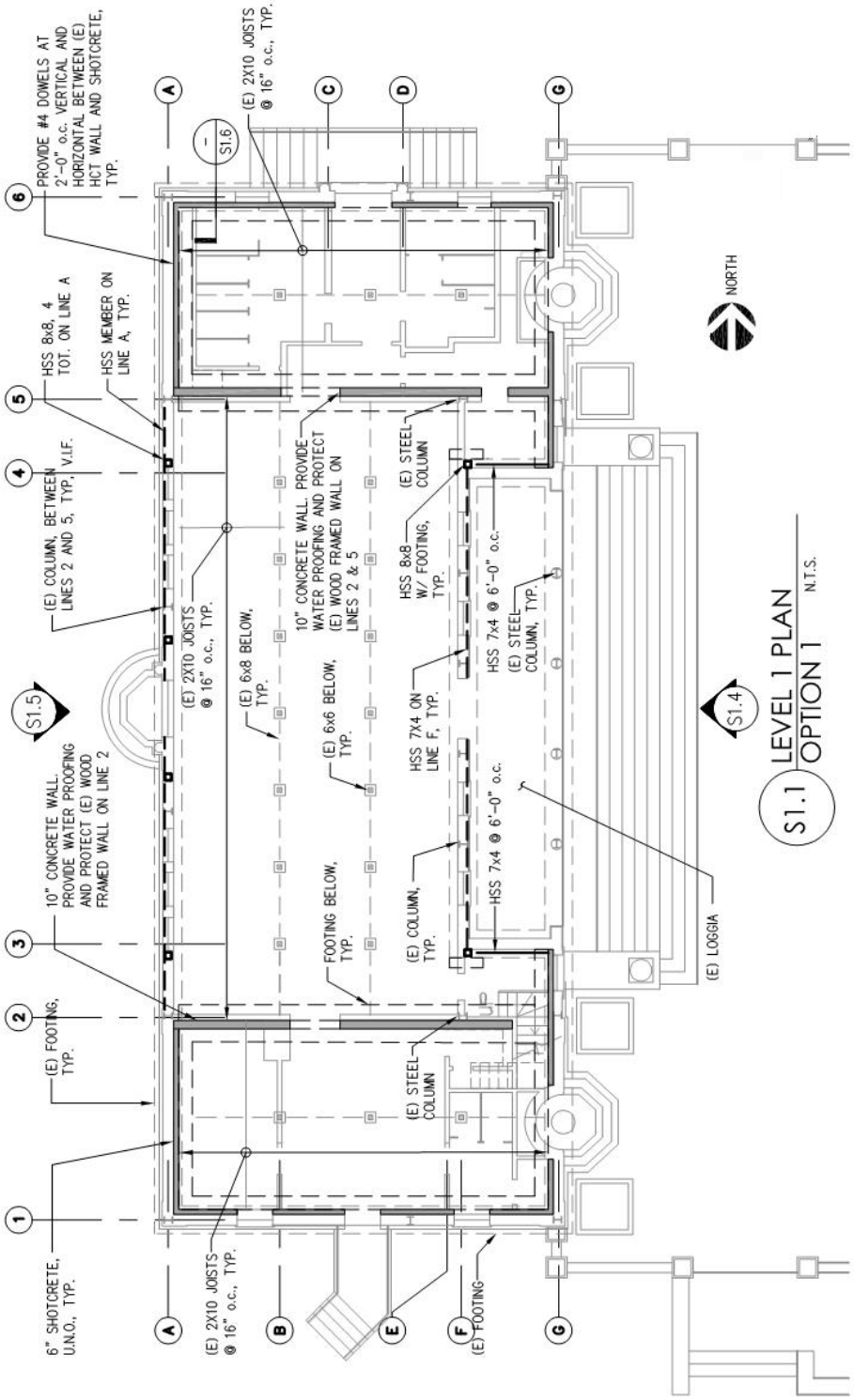


Figure A1 – Option 1 - Level 1 Plan

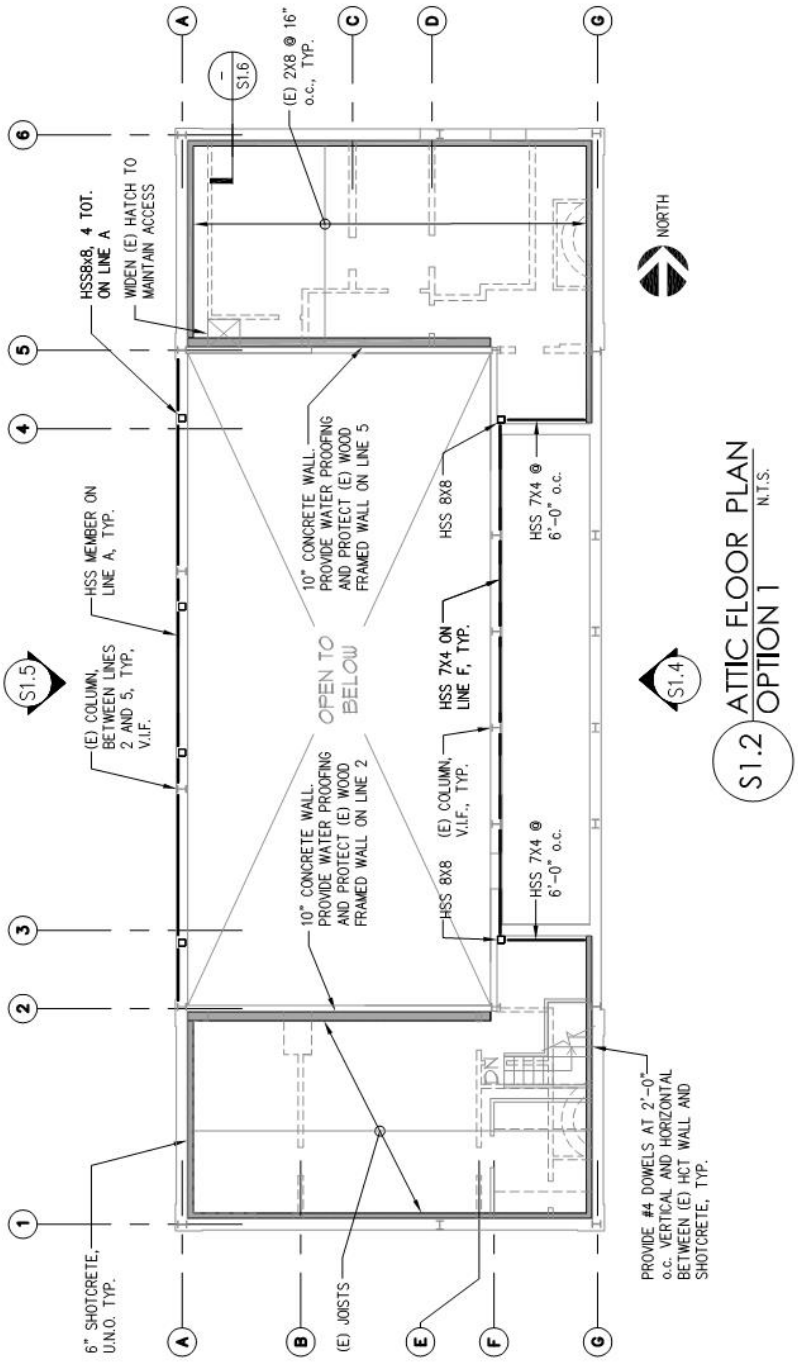


Figure A2 – Option 1 – Attic Floor Plan

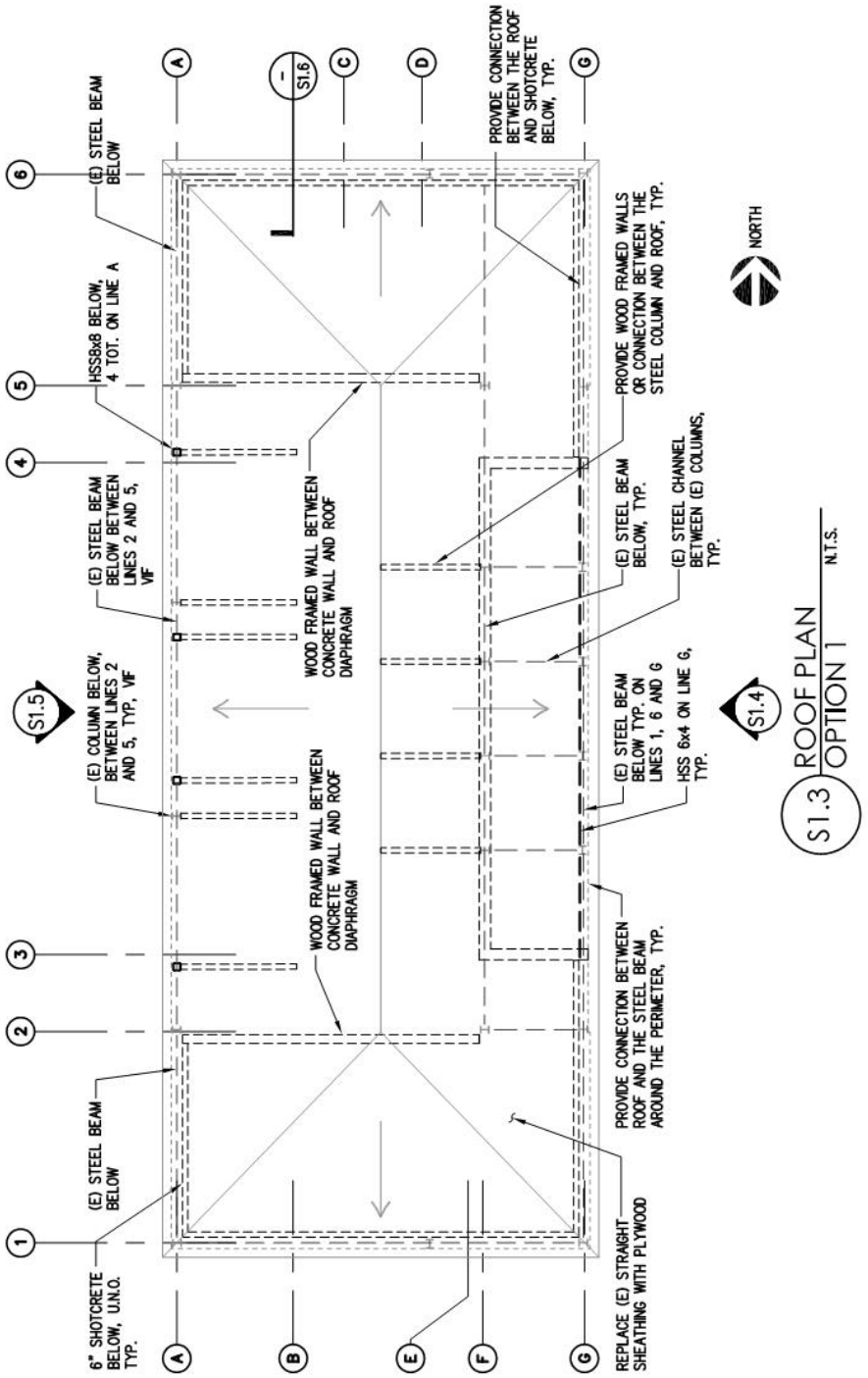


Figure A3 – Option 1 – Roof Plan

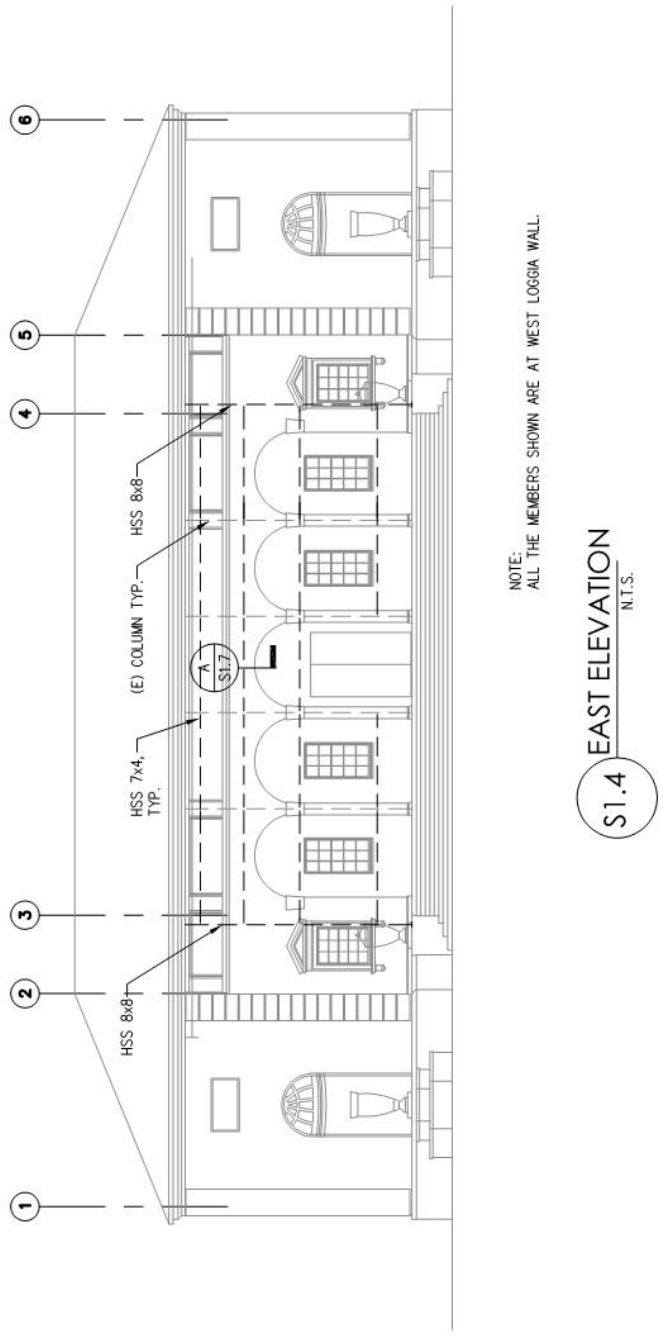


Figure A4 – Options 1, 2A, and 2B - East Wall Elevation

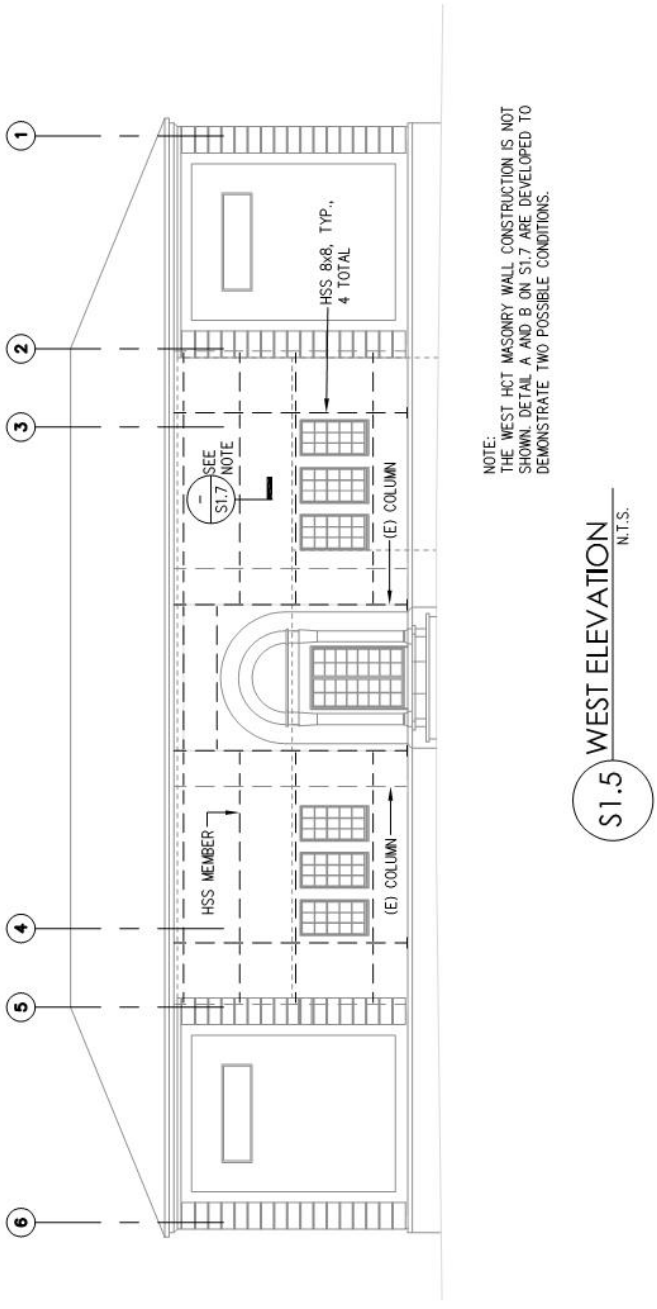


Figure A5 – Option 1 – West Wall Elevation

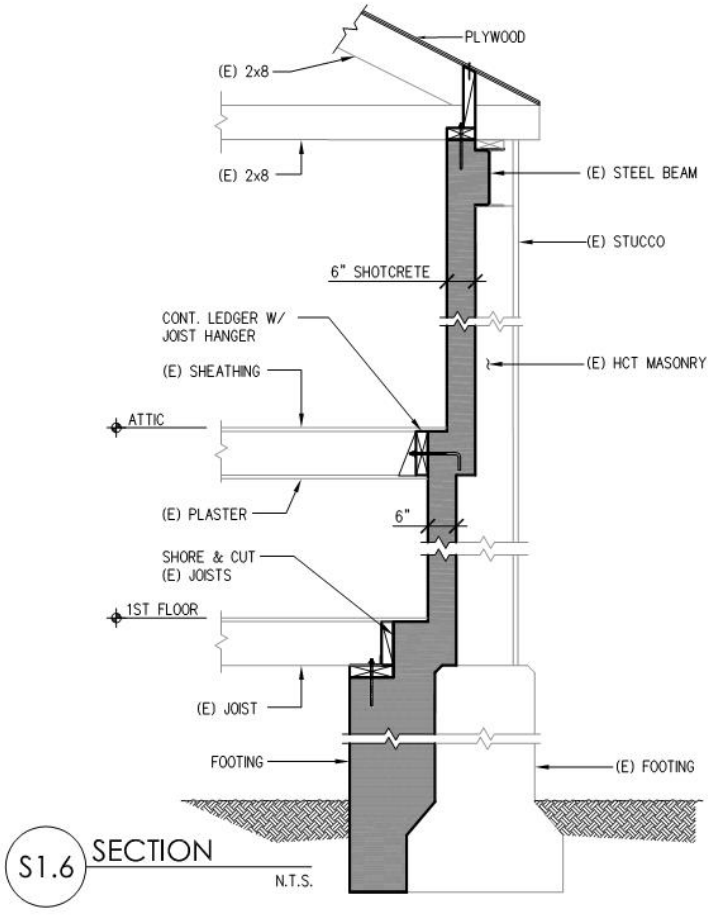


Figure A6 – Options 1, 2A, and 2B - Section at Attic Area

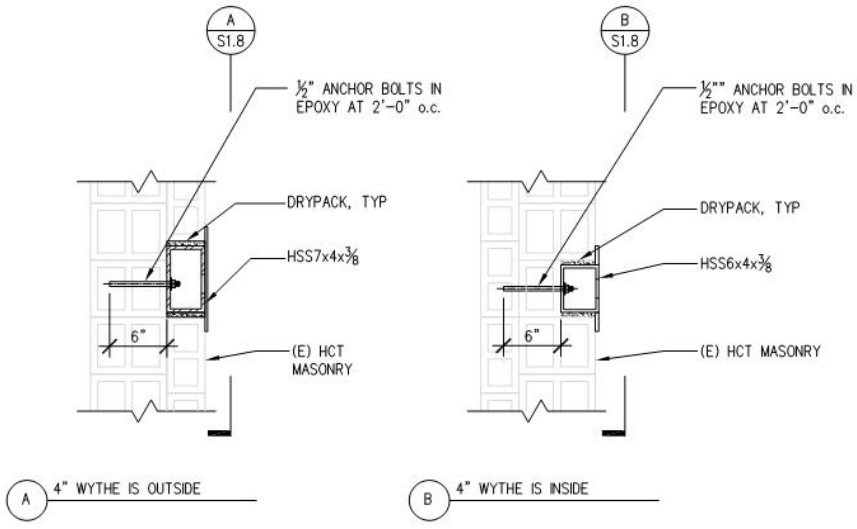


Figure A7 - HSS to HCT Masonry Wall connection

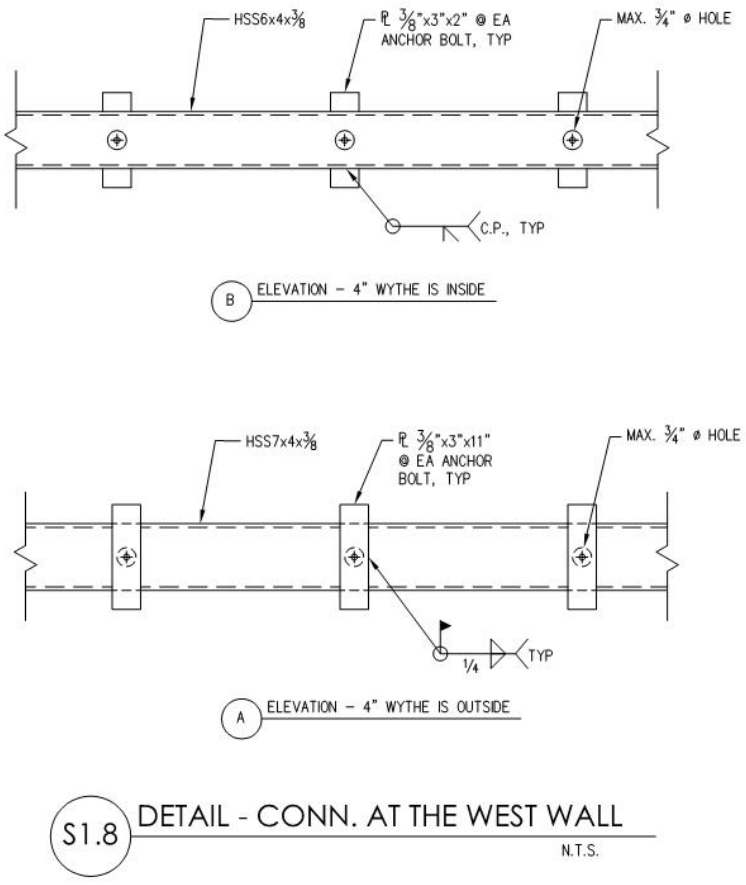


Figure A8 – HSS to HCT Masonry Wall connection

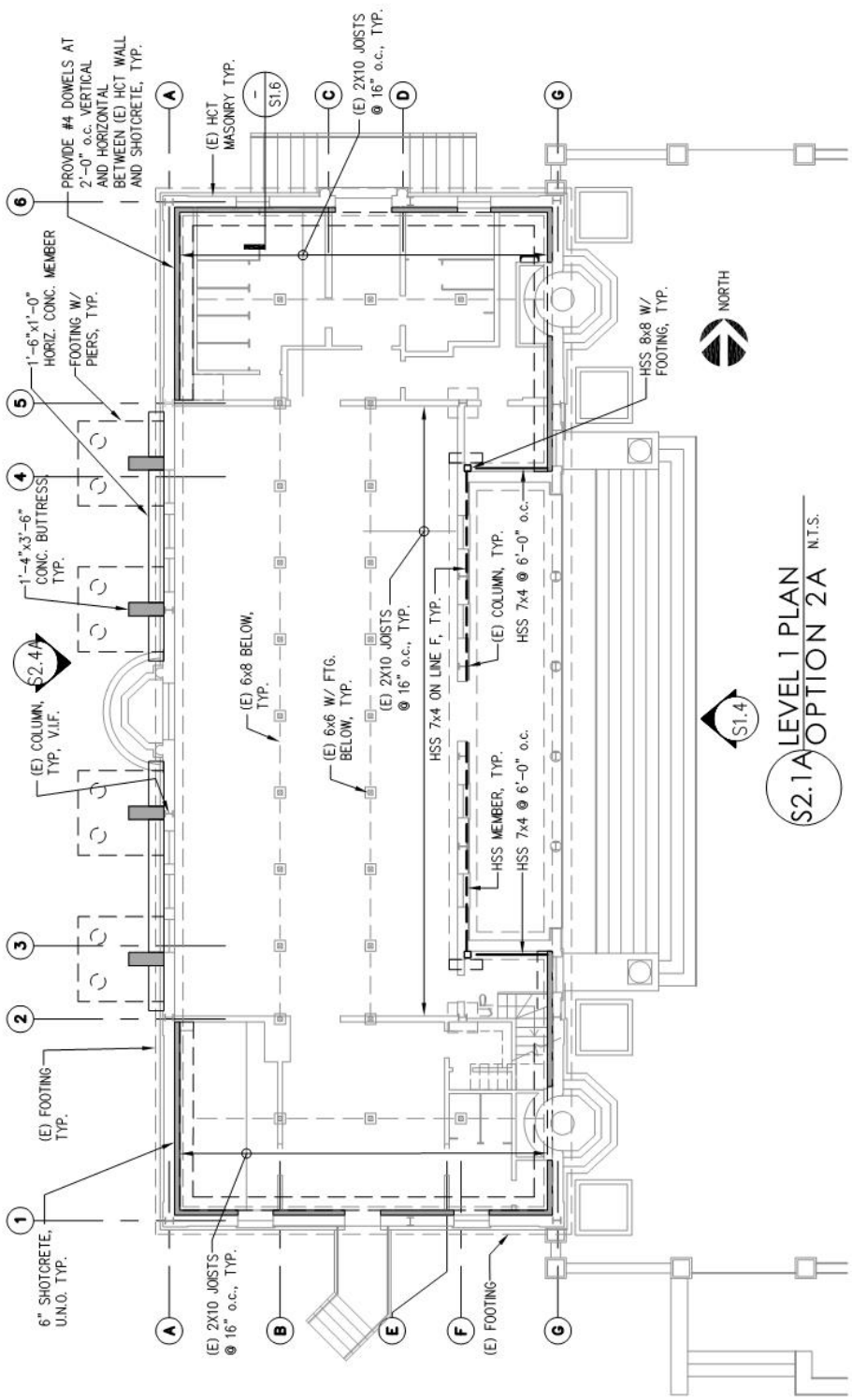


Figure A9 – Option 2A – Level 1 Plan

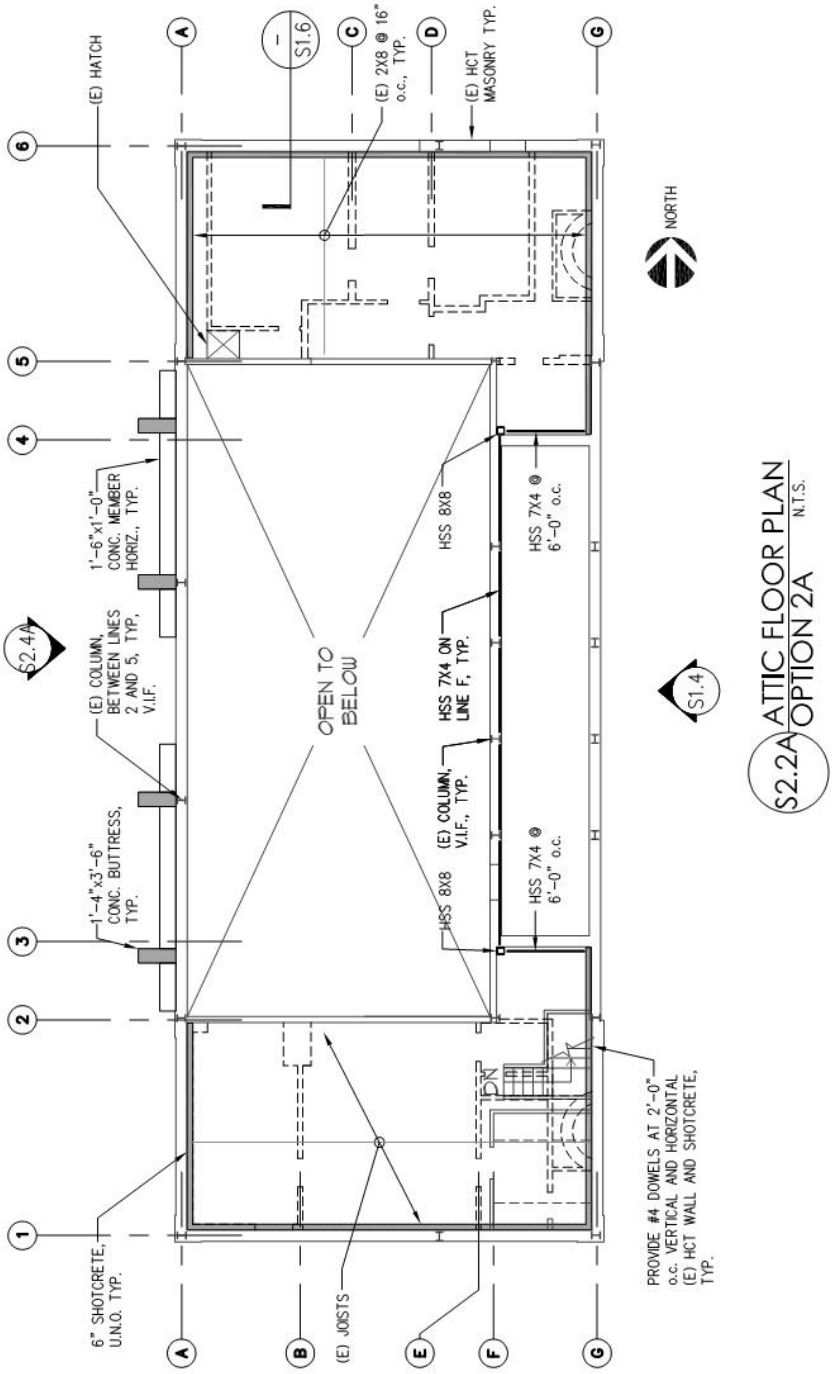


Figure A10 – Option 2A – Attic Plan

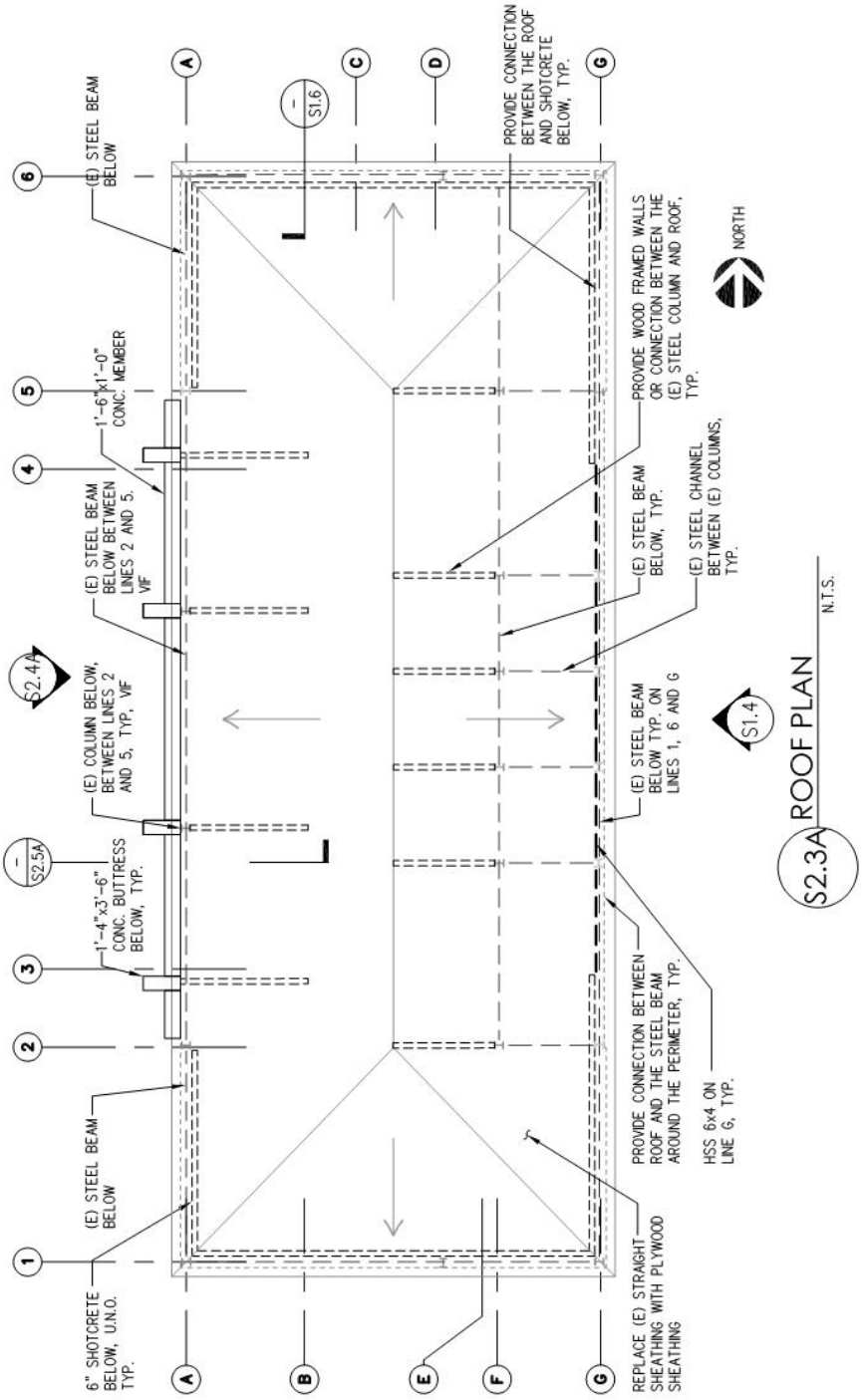


Figure A11 – Option 2A – Roof Plan

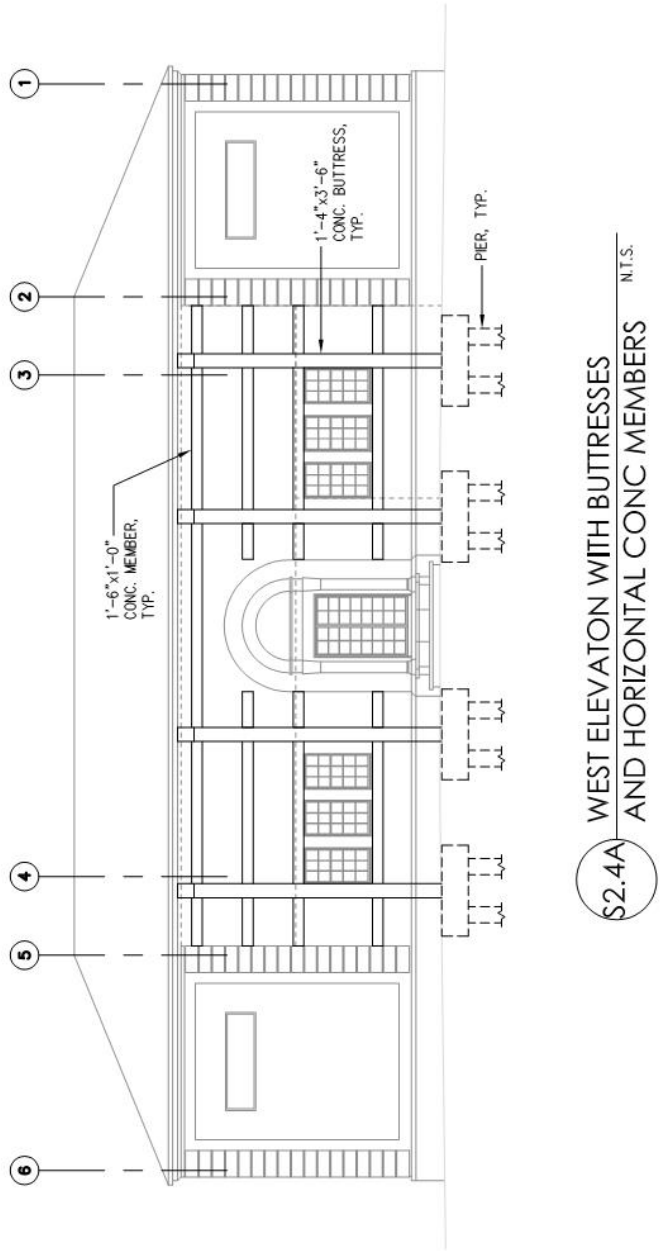


Figure A12 – Option 2A –West Elevation

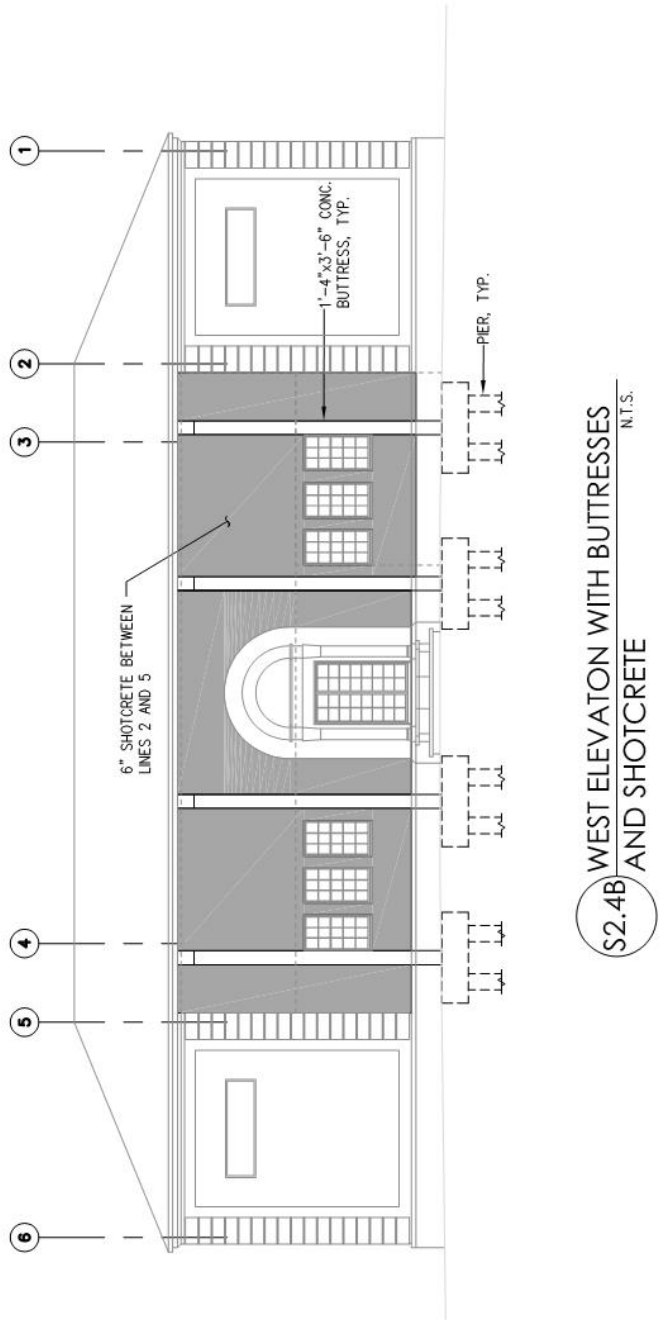


Figure A13 – Option 2B –West Elevation

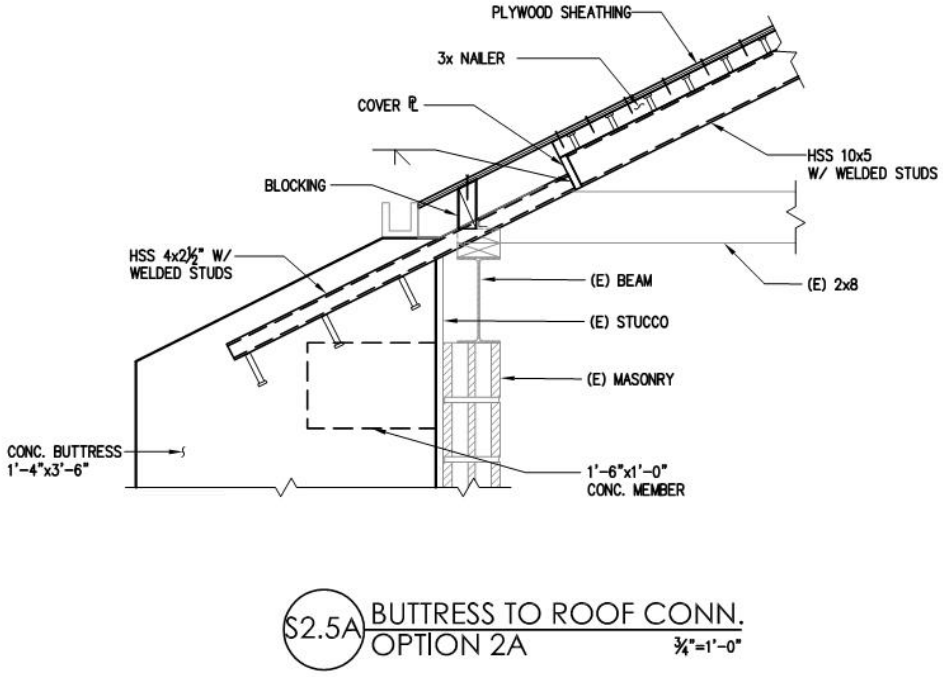


Figure A14 – Option 2A –Buttress to Roof Connection

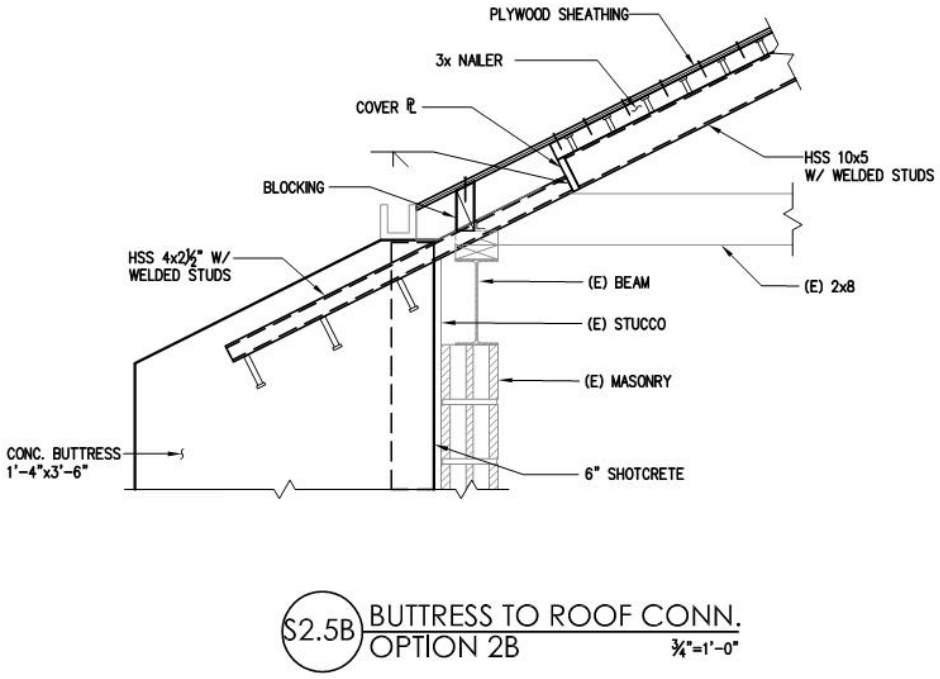


Figure A15 – Option 2B –Buttress to Roof Connection

Structural Appendix B
ASCE 31-03 Tier 1 Checklists

3.7.7A Basic Structural Checklist for Building Type S5A: Steel Frames with Infill Masonry Shear Walls and Flexible Diaphragm

This Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

C3.7.7A Basic Structural Checklist for Building Type S5A

This is an older type of building construction that consists of a frame assembly of steel beams and steel columns. The floors and roof consist of untopped metal deck or wood framing between the steel beams and are flexible relative to the walls. Framing consists of steel beams, open web joists or steel trusses. Walls consist of infill panels constructed of solid clay brick, concrete block, or hollow clay tile masonry. Infill walls may completely encase the frame members, and present a smooth masonry exterior with no indication of the frame. The seismic performance of this type of construction depends on the interaction between the frame and infill panels. The combined behavior is more like a shear wall structure than a frame structure. Solidly infilled masonry panels form diagonal compression struts between the intersections of the frame members. If the walls are offset from the frame and do not fully engage the frame members, the diagonal compression struts will not develop. The strength of the infill panel is limited by the shear capacity of the masonry bed joint or the compression capacity of the strut. The post-cracking strength is determined by an analysis of a moment frame that is partially restrained by the cracked infill.

Building System

(C)	NC	N/A	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1)
C	(NC)	N/A	MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)
C	NC	(N/A)	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4 percent of the height of the shorter building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.1.2)
C	NC	(N/A)	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1)
C	NC	(N/A)	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2)

C NC (N/A) GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 4.3.2.3)

(C) NC N/A VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)

C NC (N/A) MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)

(C) NC N/A DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken, or loose. (Tier 2: Sec. 4.3.3.1)

C NC N/A DETERIORATION OF STEEL: There shall be no visible rusting, corrosion, cracking, or other deterioration in any of the steel elements or connections in the vertical- or lateral-force-resisting systems. (Tier 2: Sec. 4.3.3.3)
NOT ABLE TO VERIFY THE COLUMNS AT THE BUILDING CORNERS.

(C) NC N/A MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7)

C (NC) N/A MASONRY JOINTS: The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8)

C (NC) N/A CRACKS IN INFILL WALLS: There shall be no existing diagonal cracks in the infilled walls that extend throughout a panel greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, or out-of-plane offsets in the bed joint greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy. (Tier 2: Sec. 4.3.3.12)

Lateral-Force-Resisting System

(C) NC N/A REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

C NC (N/A) SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.4.1)

C (NC) N/A SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units and 70 psi for concrete units for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.5.1)

C (NC) N/A WALL CONNECTIONS: Masonry shall be in full contact with frame for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.6.1)

Connections

C (NC) N/A TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2 Sec. 4.6.2.1)
NO ANCHORS NOTED BTW THE DIAPHRAGMS AND THE SHEAR WALLS

(C) NC N/A STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation for Life Safety, and the anchorage shall be able to develop the lesser of the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation, for Immediate Occupancy. (Tier 2: Sec. 4.6.3.1)

3.7.7AS Supplemental Structural Checklist for Building Type S5A: Steel Frames with Infill Masonry Shear Walls and Flexible Diaphragms

This Supplemental Structural Checklist shall be completed where required by Table 3-2. The Basic Structural Checklist shall be completed prior to completing this Supplemental Structural Checklist.

Lateral-Force-Resisting System

C NC (N/A) REINFORCING AT OPENINGS: All wall openings that interrupt rebar shall have trim reinforcing on all sides. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.3)

C (NC) N/A PROPORTIONS: The height-to-thickness ratio of the infill walls at each story shall be less than 9 for Life Safety in levels of high seismicity, 13 for Immediate Occupancy in levels of moderate seismicity, and 8 for Immediate Occupancy in levels of high seismicity. (Tier 2: Sec. 4.4.2.6.2)

C (NC) N/A SOLID WALLS: The infill walls shall not be of cavity construction. (Tier 2: Sec. 4.4.2.6.3)
BOTH INNER AND OUTHER WYTE'S NEED TO BE SUPPORTED FOR OUT OF PLANE

Diaphragms

(C) NC N/A CROSS TIES: There shall be continuous cross ties between diaphragm chords. (Tier 2: Sec. 4.5.1.2)

C NC (N/A) PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.7)

C NC (N/A) DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.8)

C (NC) N/A STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered. (Tier 2: Sec. 4.5.2.1)

C (NC) N/A SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing. (Tier 2: Sec. 4.5.2.2)

C NC (N/A) UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy. (Tier 2: Sec. 4.5.2.3)

C NC (N/A) NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans of less than 40 feet and shall have span/depth ratios less than 4-to-1. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.3.1)

X (C) NC N/A OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Tier 2: Sec. 4.5.7.1)
ATTIC IS NOT ASSUMED TO BE A DIAPHRAGM. THE MASONRY WALLS ASSUMED TO SPAN BETWEEN THE BASE AND ROOF

Connections

C (NC) N/A STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements shall be installed taut and shall be stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 inch prior to engagement of the anchors. (Tier 2: Sec. 4.6.1.4)

C NC (N/A) UPLIFT AT PILE CAPS: Pile caps shall have top reinforcement and piles shall be anchored to the pile caps for Life Safety, and the pile cap reinforcement and pile anchorage shall be able to develop the tensile capacity of the piles for Immediate Occupancy. (Tier 2: Sec. 4.6.3.10)

3.8 Geologic Site Hazards and Foundations Checklist

This Geologic Site Hazards and Foundations Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Geologic Site Hazards

The following statements shall be completed for buildings in levels of high or moderate seismicity.

C NC N/A LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 feet under the building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.1.1)

PER USGS MAPS, NO HIGH LIQUEFACTION. RECOMMEND GEOTECT TO VERIFY

C NC (N/A) SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure. (Tier 2: Sec. 4.7.1.2)

C NC N/A SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated. (Tier 2: Sec. 4.7.1.3)

GEOTECT TO VERIFY

Condition of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

(C) NC N/A FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.1)

The following statement shall be completed for buildings in levels of high or moderate seismicity being evaluated to the Immediate Occupancy Performance Level.

C NC (N/A) DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.2)

Capacity of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C NC (N/A) POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.3.1)

The following statements shall be completed for buildings in levels of moderate seismicity being evaluated to the Immediate Occupancy Performance Level and for buildings in levels of high seismicity.

(C) NC N/A OVERTURNING: The ratio of the horizontal dimension of the lateral-force-resisting system at the foundation level to the building height (base/height) shall be greater than $0.6S_a$. (Tier 2: Sec. 4.7.3.2)

(C) NC N/A TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Class A, B, or C. (Section 3.5.2.3.1, Tier 2: Sec. 4.7.3.3)

C NC (N/A) DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.4)

C NC (N/A) SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.5)

C NC (N/A) INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage. (Tier 2: Sec. 4.8.4.6)

C NC (N/A) PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-plane with a minimum of 4 connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.7)

Masonry Veneer

C NC (N/A) SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy. (Tier 2: Sec. 4.8.5.1)

C NC (N/A) TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.5.2)

C NC (N/A) WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 4.8.5.3)

C NC (N/A) DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.5.4)

Parapets, Cornices, Ornamentation, and Appendages

C NC (N/A) URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.1)

C NC (N/A) CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.2)

Masonry Chimneys

C NC (N/A) URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.9.1)

Stairs

C (NC) N/A URM WALLS: Walls around stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.10.1)

C NC (N/A) STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors. (Tier 2: Sec. 4.8.10.2)

Building Contents and Furnishing

C NC (N/A) TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.11.1)

Mechanical and Electrical Equipment

C NC (N/A) EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake. (Tier 2: Sec. 4.8.12.1)

C NC (N/A) HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports. (Tier 2: Sec. 4.8.12.2) ALL THE EQUIPMENT PLANNED TO BE REPLACED. THE NEW EQUIPMENT SHALL COMPLY WITH CODE REQUIREMENTS.

C NC (N/A) DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the anchorage or supports of mechanical or electrical equipment. (Tier 2: Sec. 4.8.12.3)
ALL THE EQUIPMENT PLANNED TO BE REPLACED.

C NC (N/A) ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced. (Tier 2: Sec. 4.8.12.4)
ALL THE EQUIPMENT PLANNED TO BE REPLACED. THE NEW EQUIPMENT SHALL COMPLY WITH CODE REQUIREMENTS.

Piping

C NC (N/A) FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996). (Tier 2: Sec. 4.8.13.1)

C NC (N/A) FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings. (Tier 2: Sec. 4.8.13.2)

Hazardous Materials Storage and Distribution

C NC (N/A) TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 4.8.15.1)

3.9.2 Intermediate Nonstructural Component Checklist

This Intermediate Nonstructural Component Checklist shall be completed where required by Table 3-2. The Basic Nonstructural Component Checklist shall be completed prior to completing this Intermediate Nonstructural Component Checklist.

Ceiling Systems

C NC (N/A) LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips. (Tier 2: Sec. 4.8.2.2)

C NC (N/A) INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wires or rigid members attached to the structure above at a spacing equal to or less than 12 feet. (Tier 2: Sec. 4.8.2.3)

(C) NC N/A SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 square feet of area. (Tier 2: Sec. 4.8.2.4)

Light Fixtures

C NC (N/A) INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures. (Tier 2: Sec. 4.8.3.2)

Cladding and Glazing

C NC (N/A) GLAZING: Glazing in curtain walls and indiyidual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 feet above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked. (Tier 2: Sec. 4.8.4.8)

Parapets, Cornices, Ornamentation, and Appendages

C NC (N/A) CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement. (Tier 2: Sec. 4.8.8.3)

C (NC) N/A APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3. (Tier 2: Sec. 4.8.8.4)

PRECAST CONC FRIEZES, STEEL COLUMN SURROUNDINGS, COLUMN CAPITALS, URNS, AND GOOINS WERE DAMAGED AND HAVE FALLING HAZARDS.

Masonry Chimneys

C NC (N/A) ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof. (Tier 2: Sec. 4.8.9.2)

Mechanical and Electrical Equipment

C NC (N/A) VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers. (Tier 2: Sec. 4.8.12.5)

Ducts

C NC (N/A) STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints. (Tier 2: Sec. 4.8.14.1)

APPENDIX F

MEP REPORT

Existing Conditions Report

Mother's House MEP System Survey

2015-0141

prepared for:

Architectural Resources Group, Inc.

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July 17, 2015

INTERFACE ENGINEERING

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Interface Engineering conducted a surface based site investigation on June 9, 2015 of Mother's House in San Francisco, California. The intent of the site investigation was to assess the existing condition of the Fire Protection, Plumbing, Mechanical, Electrical, and Fire Alarm systems.

Fire Protection

A. EXISTING CONDITIONS:

1. There is no existing sprinkler system serving the Building.

B. RECOMMENDATIONS:

1. Provide a new fire sprinkler system if required by local codes. Requirements will be based on building use and occupancy.
2. Provide new fire hose and nozzle. Provide maintenance and testing as required by NFPA 25and CSFM.

Plumbing

A. EXISTING CONDITIONS:

1. There are two storage tank electric water heaters, a larger one serving the north wing restrooms, with 1" pipe, and a smaller one serving the south wing restroom, with ¾" pipe; neither of which are in working condition.
2. Where visible, the sanitary sewer pipe system appears to be in good condition above ground floor. However, investigation in the crawl space shows pipe deterioration; some sections of pipes have completely broken off.
3. Gas pipe to the HVAC furnace in the south wing appears to be in good condition.
4. Excavation work to repair the domestic water piping is currently happening outside the building. Pipes are rusted and need to be replaced.
5. The rain water leaders outside the building are in good condition.
6. Toilet fixture, urinal and lavatories at the public restrooms are not working.
7. A janitor's sink has been removed from the closet in the southeast corner but the waste connection remains.

B. RECOMMENDATIONS:

1. Remove existing hot water heaters and install new high efficiency gas fired water heaters to provide domestic hot water for the space.
2. Remove existing toilet fixtures, urinal and lavatories. Install new water efficient fixtures.
3. Due to the condition of the existing piping system, the entire plumbing piping system should be removed and replaced with new. Including sanitary sewer, vent, domestic cold water and domestic hot water.
4. Retain existing rain water leaders.

Heating, Ventilating, and Air Conditioning (HVAC)

A. EXISTING CONDITIONS:

1. The existing HVAC system consists of a 15-year-old 225,000 Btuh gas fired furnace and fan unit provides heated air to the space via underfloor ductwork and floor diffusers; and return via high ducted ceiling diffusers. Unit is ceiling hung on the second floor mechanical room, west wing.
2. Ventilation is ducted to the furnace from the west side of the building via side wall louver.
3. Two utility exhaust fans serve the existing bathrooms and exhaust to the sides of the building. These fans are floor mounted on the second floor, above the bathrooms. Neither is in operation.
4. Supply and return ductwork is in average condition. None of the ductwork is insulated.
5. Exhaust ductwork is rusted. Some ductwork is not connected to the diffusers.
6. Supply, return and exhaust diffusers are rusted throughout.

B. SHORT TERM RECOMMENDATIONS:

1. Band aid solutions to get the heating system up and running are not recommended. A fully functioning HVAC system should be installed to provide proper space temperature and humidity control for preserving the murals.
2. Install temporary portable dehumidifiers as remedy for the deterioration of the murals.

C. RECOMMENDATIONS:

1. Install a new 20-ton VRF heat recovery system (Mitsubishi or equal) to provide space heating and cooling with the indoor units located on the second floor mechanical room and the outdoor unit located in back of building. Indoor units to be provided to serve each zone for control.
2. Remove and install new insulated supply ducts from air handling unit to the space via underfloor supply and return above ceiling.
3. Remove existing exhaust fans and install two (2) new exhaust fans at 750 CFM each (Greenheck model SWD or equal) to serve the restrooms. Install one in the second floor mechanical room and one above the east wing restrooms.
4. Install associated exhaust ductwork from restrooms to exhaust fans and exhaust to exterior via sidewall louvers.

Electrical

A. EXISTING CONDITIONS:

1. Normal Power and Distribution System

   a. Based on the manufacturing date of the existing electrical equipment, the electrical system was upgraded in 1992.
   b. The Building is served by a Main Switchboard 'M-HSE' rated for 400A, 120/240V, 3-phase, 4-wire. The switchboard is located in the stairway to the mezzanine.
      i. The following electrical panelboards are existing and fed by the Main Switchboard 'M-HSE'.
         a. Panel 'MH.PP' – 225A, 240V, 3-phase, via 200A breaker.
      ii. Additional loads fed by the Main Switchboard include:
         a. Breaker 1 for 'Storyland'– 100A, 240V, 1-phase, via 100A/2P breaker.
         b. Breaker 2 'bathroom Fans' – 20A, 240V, 3-phase, via 20A/3P breaker.
         c. Breaker 3 'Heater– 30A, 240V, 3-phase, via 30A/3P breaker.
         d. Breaker 4&5 'Cristy Box' – turned off

   c. The Main Switchboard and associated branch circuit panelboard are just over 20 years old; but based on surface investigation appear to be in good working condition.
   d. Located at the rear of the building are 3 transformers. There is an existing transformer that is rusted connected to a 400A 240V disconnect. This appears to be feeding the Mothers Building main switchboard. The second transformer is rated at 112.5kVA 120/208V, located next to it is a exterior power box with exterior outlets. The third transformer is a 75kVA 120/208V transformer labelled with 'Ticket Booths power Xmer Fed from Swbd "B". All transformers were working at the time of inspection.
   e. PG&E main service was located adjacent to the Ark Building located behind the Mothers Building.
   f. An existing telephone block located inside the south wing has been abandoned. A new telephone service is located at the North West of the building; the existing routing into the building is surface mounted bare cables.

2. Emergency Power System

   a. There is no emergency generator for the site. Emergency egress lighting consists of ceiling suspended emergency fixtures with integral battery back-up. Emergency lighting appears antiquated. No exit signs were observed.

3. Lighting System

   a. Lighting for the first and mezzanine floors consists mostly of fluorescent luminaires. A mixture of luminaire types are installed ranging from decorative iron wall sconces, decorative ceiling mounted luminaires, and surface mounted strip fluorescents. Lighting appears antiquated and does not provide good lighting quality to highlight the murals.
   b. Lighting on the mezzanine is surface mounted fluorescent.
   c. The exterior lighting consists of two wall mounted decorative lights on the front façade, there is no lighting on the entry canopy.
   d. There is no automatic lighting control system for the interior of the building.

4. Wiring Devices

    a. Receptacle quantity and locations is adequate, but a majority of outlets were corroded and rusted or supports had failed. The outlets in the main hall had been installed at various installations and as a result had 3 different colored surface conduit installed.

B. RECOMMENDATIONS:

1. Normal Power and Distribution System

    a. Replace existing transformer and disconnect switch located outside the building.
    b. Investigate other transformers located outside the building; remove any redundant equipment that is no longer used.

2. Emergency Power System

    a. Replace existing emergency luminaires with new luminaires that go along with aesthetic feel of the space. Provide integral battery packs to luminaires where appropriate. Egress lighting to be 1 footcandle minimum throughout. Provide Exit signs.

3. Lighting System

    a. Provide adequate lighting levels on the first floor to properly illuminate murals.
    b. Provide new luminaires on the first and mezzanine floors to go along with the aesthetic feel of the space. Or restore existing iron wall luminaires with new LED bulbs if part of historical preservation of the building.
    c. Provide new lighting within bathrooms and corridors and staff areas.
    d. Provide new exterior lighting at the building entry.
    e. Provide new low voltage lighting control panel to control lighting in public areas such as restrooms, hallways, and staff areas. Provide daylight sensors to turn off lighting when there is sufficient daylight.
    f. Provide occupancy sensors to control lighting in electrical room and storage rooms.

4. Wiring Devices

    a. Remove all wiring devices, conduit and conductors back to switchboard.

Fire Alarm

A. EXISTING CONDITIONS:

1. There is no existing fire alarm system in the building.

B. RECOMMENDATIONS:

1. A fire alarm system is not required by the applicable codes and standards. Provide new fire alarm system only if required by Owner's insurance company or other authority.

Existing Condition Photos

Existing diffuser condition.

Existing furnace and associated ductwork in second floor mechanical room.


Existing exhaust fan and exhaust ductwork condition.


Sidewall with outside air intake and exhaust louver locations.

Existing plumbing piping condition.

Existing domestic water heaters and restroom condition.

APPENDIX G

SUMMARY OF UPGRADES AND REPAIRS

MOTHERS BUILDING

Summary of Immediate, Short, and Long-Term Upgrades and Repairs

	Immediate Within 6 Months	Short-Term 1-3 Years	Long-Term 5+ Years
ARCHITECTURAL AND MURAL ASSESSMENT			
Exterior			
Roofing and Drainage	- Clean gutters and roof debris. - Replace broken or missing roof tiles. - Repair downspout on east elevation. - Provide downspout extensions where missing. Clear and re-direct existing downspout extensions so rainwater flows away from building. - Roofing contractor to inspect gutters. If leaking is found, remove sheet metal gutter liners and provide waterproof membrane at gutter pocket. Replace damaged/rotted wood in-kind. Reinstall metal gutter liners.	-	- Coordinate roofing upgrades with structural upgrades. Salvage clay tile roofing for reinstallation. Provide waterproof membrane at roof deck and reinstall existing clay tile. Replace roof jacks/flashing at roof penetrations.
Walls and Foundation	- Repair and secure loose plywood and wood frame structure at west elevation to ensure it is safe and secure. Inspect wall behind plywood. - Repair exterior openings in building envelope (such as air vent on north elevation) that allow vermin into the building. - Remove or cut back vegetation in contact with building or hardscape, including dried plants in the urns. - Repair source of water leak in crawlspace, likely from domestic water lines.	- Patch major cracks and spalls in exterior envelope.	- Remove wood framed trellis at loggia and wood frame scaffold at west elevation. - Clean exterior surfaces to remove general soiling and biological growth. - Remove visually incompatible stucco patches and re-patch matching historic color and texture. Repair stucco cracks and spalls. - Apply waterproof membrane or coating at west elevation. Coordinate with structural upgrade. - Consider topical waterproofing at all building skin. - Restore two mosaics at loggia. Regrout and refill losses.
Exterior Doors and Windows	- Replace broken window lites. - Ensure windows fully shut and are secure.	- Prepare and paint exterior doors, windows, and metal grilles.	- Restore wood doors, window sash, and frames. - Replace mismatched or damaged window glazing. Re-putty all windows.

	Immediate Within 6 Months	Short-Term 1-3 Years	Long-Term 5+ Years
			- Replace sash cords at double hung windows and damaged or missing hardware. - Remove corrosion and refinish metal grills. - Prepare and paint windows and doors. Conduct paint analysis to determine historic finish colors. - Replace south flush door with historically appropriate door. - Provide accessible door hardware and panic hardware as required by code.
Steps, Pavement and Balustrade	- Remove weeds, trash, and debris. - Remove bees nest at south stair.	- Document balustrade with measured drawings.	- Correct soil subsidence beneath east entrance stairs and plaza. Regrade site. - Replace pavers, matching historic color and finish. - At north and south entrances, add top riser/ landing to align with finish floor. Modify handrails and guardrails as required. - Provide handrail at east entrance stairs. - Repair existing concrete balustrade; re-cast missing components. - Provide new plantings around building. Remove, prune, or replace vegetation in planters.
Concrete Decorative Elements (bas-relief and apse panels, columns, urns)	- Secure damaged or loose elements using non-corroding wire net. - Replace wire net on north elevation, which is contributing to staining on adjacent surfaces.	- Document decorative elements using 3D scanning or rectified photography for future repair/replication. - Patch major cracks and spalls	- Repair or replace concrete decorative features (bas-relief panels, recessed apse, door surrounds, quoins, column capitols and urns). - Treat with a concrete penetrating sealer, which will bridge hairline crack networks.
Interior			
Ceiling	- Vacuum up loose dirt, debris, and vermin waste from above finished ceilings.	-	- Repair damaged plaster. - Prepare and paint ceiling.
Walls	- Remove mold from wall surfaces following industry standard safety procedures.	-	- Repair and refinish wood paneling. - Remove wall finishes in north and south bays for structural work. Replace wall finishes.

	Immediate Within 6 Months	Short-Term 1-3 Years	Long-Term 5+ Years
Murals	- Do not touch the west wall or remove design fragments. Do not dust the murals surface.	- Photograph murals in detail to document existing conditions and to aid in reconstructing lost elements in the future. - Search archives, personal papers or WPA records to locate original mural photographs or sketches. - After documentation, attempt to conserve the remaining loose paint and indicate on the walls where forms begin and end. A pilot study may be necessary to determine if salvage of loose paint is possible and to test consolidation options.	- Conserve murals by strengthening and stabilizing the walls and paint film. - Clean the mural surfaces of surface dirt, and/or varnish. - Provide a protective counter-form against the mural surfaces when performing structural work. - Establish periodic inspection times and maintenance and attend any needed repairs as soon as possible.
Floor	- Vacuum up loose dirt, debris, and vermin waste. - Remove items being stored in Room 108 (boxes, cardboard). Follow industry standard safety procedures.	- Shore first floor framing at north lounge wall to prevent further settlement.	- Repair and refinish wood flooring in lounge. - Level sagging floor at north lounge wall.
Interior Doors	- Remove guano from south lounge door.	-	- Refinish lounge doors. Fill losses in painted door surrounds. - Repair existing single panel wood doors and reuse where possible. - Replace interior flush wood doors with single panel doors to match historic. - Provide accessible door hardware.
Furniture	-	- Locate missing benches and inlayed tables.	- Repair and refinish furniture.
Accessibility		-	- Provide accessible path of travel to building. Consider ramp/stair at south elevation. - Provide assistive listening systems in lounge if used for assembly.
STRUCTURAL ASSESSMENT			
	-	- Develop structural design to a design development (DD) level for a detailed evaluation of the impact on the building and murals.	<u>Structural Options 1 and 2</u> - Replace roof sheathing with plywood sheathing. - Strengthen roof-to-steel-beam connections.

	Immediate Within 6 Months	Short-Term 1-3 Years	Long-Term 5+ Years
			- Remove concrete surrounds from loggia columns. Remove corrosion, galvanize steel, and replace pre-cast surrounds. - Remove plaster and masonry infill surrounding corner steel columns. Remove corrosion and galvanize steel. - Remove corrosion and galvanize all exposed steel, including above the loggia. - Add supplement supports to decorative precast concrete elements. <u>Structural Option 1</u> - Shotcrete interior face of hollow clay tile (HCT) at exterior walls of north & south bays. - Add new concrete walls on outside face of wood framed lounge walls. - Channel HCT horizontally and vertically on exterior face of east and west lounge to install hollow structural steel (HSS). <u>Structural Option 2</u> - Shotcrete interior face of HCT at exterior walls of north and south bays. - Channel HCT horizontally and vertically on exterior face of east lounge only to install HSS. - At west lounge wall, provide exterior vertical buttresses. Provide horizontal concrete members or shotcrete between buttresses.
MECHANICAL/ELECTRICAL/PLUMBING ASSESSMENT			
	- Until HVAC system is restored, install temporary portable dehumidifiers to reduce humidity levels. Check electrical system to ensure units can safely operate.	- Repair or replace HVAC system for proper space temperature and humidity controls	- Install new HVAC system, ducts, registers, and exhaust fans. - Replace existing transformer and disconnect switch and remove redundant equipment. - Provide exit signs. - Replace existing emergency luminaires.

	Immediate Within 6 Months	Short-Term 1-3 Years	Long-Term 5+ Years
			- Replace or augment light fixtures to increase overall light levels. Retrofit historic luminaires with LED bulbs. - Provide new exterior lighting to light entrances and highlight architectural elements. - Provide new low voltage lighting control panel, daylight sensors, and occupancy sensors. - Remove all wiring devices, conduit and conductors back to switchboard. - Remove and replace entire plumbing piping system including sanitary sewer, vent, and domestic water. - Replace hot water heaters with high efficiency gas fired water heaters. - Remove existing restroom fixtures and install water efficient fixtures.

APPENDIX H

BUDGET ESTIMATE

BUDGET ESTIMATE

Mothers Building

Immediate Repairs

	$180,000

Short-Term Upgrades and Repairs

	$260,000

Long-Term Upgrades and Repairs

Superstructure - Structural Option 1		$636,730
Exterior Enclosure		$426,525
Roofing		$61,790
Stairs/ Ramp		$28,500
Murals		$600,000
Interior Finishes		$260,940
Plumbing		$72,800
HVAC		$94,300
Fire Protection		-
Electrical		$96,775
Furnishings		$15,000
Site Improvements		$183,750
	Subtotal	**$2,477,110**
	General Requirements 20%	$495,422
	Subtotal	**$2,972,532**
	Contractor's Fee 18%	$535,056
	Subtotal	**$3,507,588**
	Project Contingency 15%	$526,138
	Subtotal	**$4,033,726**
	Design Fee 15%	$605,059
	Subtotal	**$4,638,785**
	Contracting Method Adjustment 15%	$695,818
	Subtotal	**$5,334,603**
	Escalation 0%*	$0
	TOTAL	**$5,334,603**

Structural Option 2

	+ $43,006

*Costs are in 2015 dollars. Escalation can be expected approximately 4% per year.