



Historic Structure Report The Cabaret at Taliesin West

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HSPV 7210 Capstone Studio: Materials + Materialities
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Image Credit: Author, March 2023





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Preface and Acknowledgements

This report was prepared as part of HSPV 7210 Historic Preservation Capstone Studio: Taliesin West: Materials + Materialities in the Graduate Program in Historic Preservation at the Weitzman School of Design at the University of Pennsylvania. We would like to thank the Frank Lloyd Wright Foundation and especially Fred Prozzillo, Jennifer Grey, Stuart Graff, Margo Stipe, Indira Berndtson, Oskar Munoz and Gunny Harboe for support and assistance in this work.



Figure 1.1 View looking North, taken from the entrance of the Cabaret
Image Credit: Author, March 2023

Section I. Introduction

I.1 Purpose of the Report

The Cabaret was constructed in 1948-1950 in the north-eastern sector of Taliesin West, located on the north-eastern edge of Scottsdale, Arizona. Originally designed as a theater for the Taliesin community, the Cabaret was modified over the years and is now open to the public and functions as a small-scale auditorium. Constructed almost completely of Wright's iconic desert masonry, the Cabaret exhibits significant conservation challenges related to its maintenance and interpretation.

A summary description and analysis of the Cabaret is included in the 2015 Conservation Master Plan prepared by Harboe Architects. This Historic Structure Report (HSR) expands that summary presenting a more in-depth study of the building's chronology and morphological evolution, an assessment of current conditions, especially related to the masonry ceiling/roof using non-destructive testing (NDT) to understand the original design and its modifications and pathologies of deterioration, and provides guidance for future conservation through treatment and maintenance recommendations.

The study of the Cabaret follows standard methods for the preparation of a Historic Structure Report as described in NPS-28 federal policy. According to NPS-28, Chapter 8:

The historic structure report (HSR) is the primary guide to treatment and use of a historic structure and may also be used in managing a prehistoric structure.

The HSR is composed of:

Management Summary: This section provides a brief overview of the research conducted to produce the HSR, highlights major research findings, major issues identified in the task directive, and provides recommendations for treatment and use.

Developmental History: It is a scholarly report documenting the evolution of a historic structure, its current condition, and the causes of its deterioration. It involves a combination of archival research and physical inspection. The scope of archival research can be extended beyond the physical evolution of the structure to clarify the significance of the resource or to refine contextual associations.

Treatment and Use: The following section examines various options and approaches for utilizing and treating a historical structure while prioritizing the preservation of the existing historic material and minimizing any potential conflicts that may arise from the structure's final treatment. Part 2 of the report ends by recommending a course of action and use that aligns with the Foundation's objectives.

All aspects of a historic structure and its immediate grounds should be addressed in an HSR.¹

I.2 Report Structure

The document is divided into two sections: the masonry building and the artwork and furnishings within. Unusual for its tectonics, the Cabaret represents an example of how Wright approached and solved structural issues related to his preference for a flat masonry roof at the Cabaret, one of two examples at Taliesin West. The building is also a fine example of Wright's integration of his art collection and purpose-built furnishings into the theater's design. The decorative precast concrete piers, the cast-in place benches, furniture, lighting, and the Buddha head entrance of the Cabaret all contribute to Wright's original design intent for the space and its use.

¹ National Park Service, "Chapter 8: Management of Historic and Prehistoric Structures," June 11, 1998, https://www.nps.gov/parkhistory/online_books/nps28/28chap8.htm.



Section 2. Building History

The construction chronology outlined below is based on a combination of primary sources including historical photographs, written accounts, and oral history, as well as on-site observations of the building's physical evidence. Given the Cabaret's interconnection with two other buildings, Wright's Office and the Pavilion, the full construction chronology of the Cabaret is complex extending over the past 75 years. To better understand the Cabaret's construction history, we divided the chronology into three phases:

- Phase 1: Construction of Wright's Office and the Cabaret (1938-1954)
- Phase 2: Construction of the Pavilion (1955-1959)
- Phase 3: Alterations after Wright's death in 1959 (1960-present)

2.1 Brief History of Cabaret: Construction Chronology

2.1.1 Phase I: Construction of Wright's Office and the Cabaret (1938-1954)

Structure

Wright's Office was constructed between 1938 and 1939 as a free-standing building (Figures 2.3 & 2.5). When the Cabaret was built 10 years later in 1948, it was placed adjacent to Wright's office on the southwest exterior end (Figures 2.4 & 2.6). This is clearly discernible at the junction of the original rusticated exterior Office wall with the Cabaret's non-rusticated interior entrance wall (Figure 2.2). According to the historic site plan, the Office's original bathroom was also converted into a coat room and a bathroom for the Cabaret at the same time. Construction of the Cabaret's masonry form work was completed by the summer of 1950 and left to cure. When the Fellowship returned the following winter and removed the form work, large cracks developed in the desert masonry roof. Wright's solution was to add desert masonry beams with reinforcement on top of the roof slab (Figure 2.6).¹

Art and Furnishings

The Cabaret's original furnishings included 12 rows of built-in desert masonry benches with narrow wooden tables in the center for dining. The last row of benches was just beside a planter along the west (Figure 2.7) and was constructed without built-in seats; instead, several square stools were placed behind. Two separate rows of benches were also attached on the rear north and east walls flanking the fireplace (Figure 2.8). All benches were upholstered with individual fabric cushions and pillows in red for each seat. Several freestanding hexagonal wooden



Figure 2.1 Historic Construction Photo
Source: Frank Lloyd Wright Foundation Archives



Figure 2.2 View looking South towards the exit, showing the masonry differences between Wright's office and the Cabaret addition.
Image credit: Author, March 2023

¹ Besinger, Curtis. Working with Mr. Wright: What It Was Like. Cambridge: Cambridge University Press, 1997.

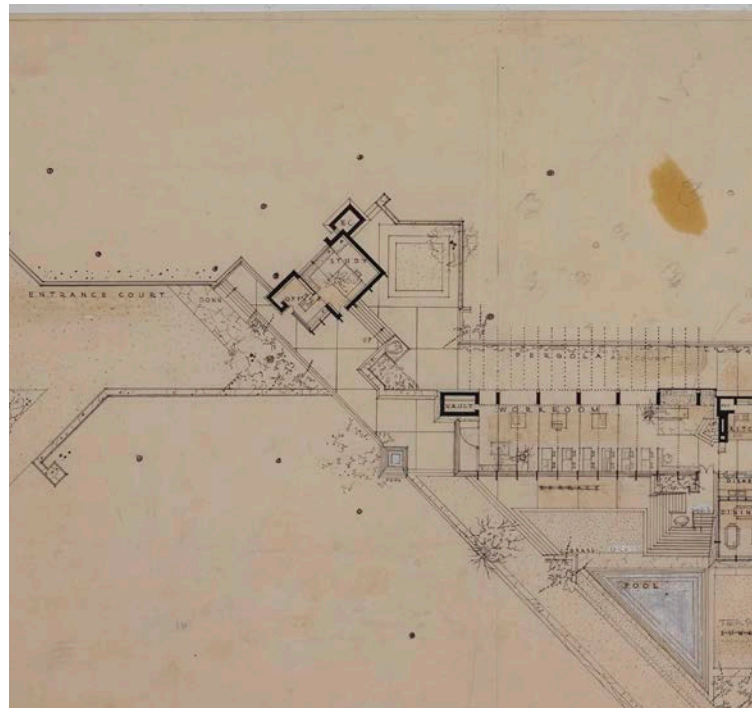


Figure 2.3 Historic site plan, before the construction of the Cabaret
 Source: Frank Lloyd Wright Foundation Archives

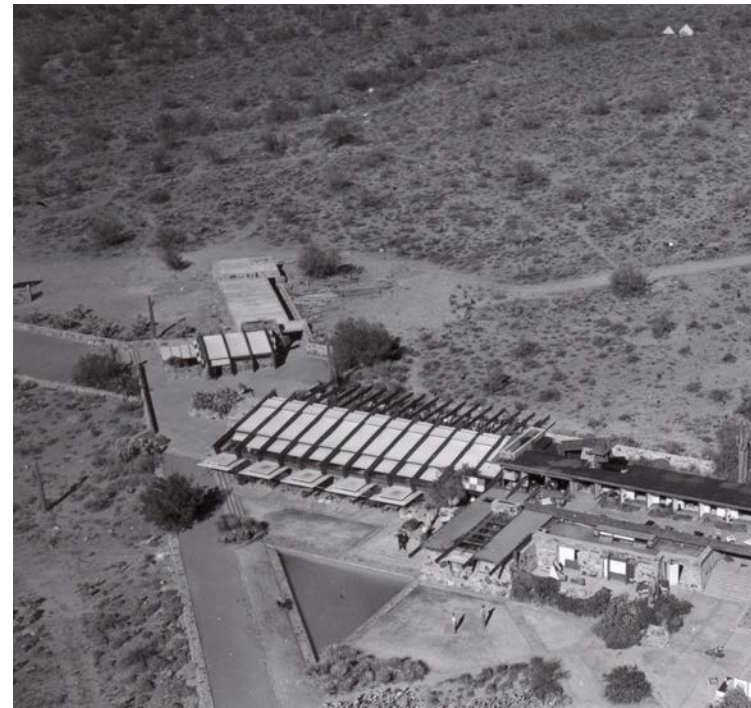


Figure 2.5 Close-up of historic aerial photo, before the addition of the beams
 Source: Frank Lloyd Wright Foundation Archives

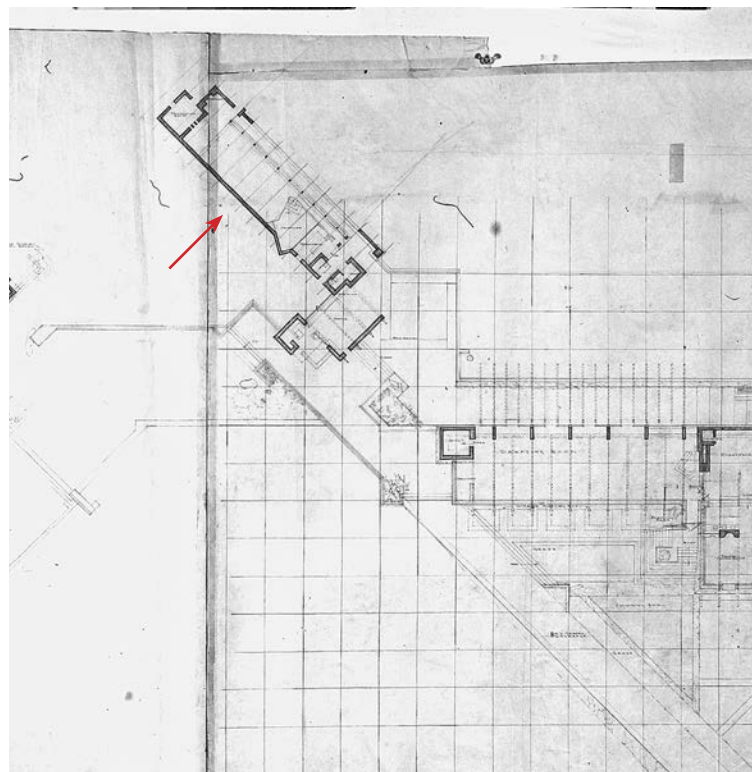


Figure 2.4 Close-up of historic site plan, after the construction of the Cabaret
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.6 Close-up of historic aerial photo, showing the roof of the Cabaret before the beams were added.
 Source: Frank Lloyd Wright Foundation Archives

tables and square stools were placed around the benches in the rear of the hall as informal seating. There were three sets of operable canvas panels in the Cabaret's gallery corridor: one set between the decorative cast piers that closed the gallery corridor off from the main hall; a second set on the roof of the gallery corridor; and a third set closing off the outside wall of the gallery (Figure 2.9). All were operated by a rope and pulley system that successfully created a flexible environment controlling daylight, ventilation, and weather. Original electrical lighting included custom made triangular wall sconces on the top of the west wall and triangular cove base lights along the gallery and the aisle on the east (Figure 2.8). In front of the stage a screen was installed for film projection. A quartet music stand and several hexagon stools designed by Wright were placed on the stage for the apprentices' orchestra rehearsal and performances (Figure 2.10).² A grand piano was placed in a triangular cove within the west wall beside the stage which was specially created during the construction.

² Interview with Margo Stipe, Frank Lloyd Wright Foundation Archive, March 10, 2023

The interior of the Cabaret was decorated with Asian artwork from Wright's personal collection. Inside the main entrance, a cast-iron Buddha head was placed on a stepped wood support in a round cast-in-place concrete niche (Figure 2.11). Above the Buddha head an exquisite Southeastern Asian carved wooden panel painted in red and gold was hung on the ceiling. On the interior side of the main entry doors, two carved relief wooden panels with floral-motifs were also installed (now removed to Collections). A series of Chinese painted scrolls depicting the ten levels of Hell were mounted on long narrow wooden planks and attached to the ceiling above the stage area. One end was butted against the west wall and the other end reached to the middle of the ceiling, terminated by a triangular stop and batten strip that connected to one of the gallery piers.³ The ceiling scroll was lit by a wooden triangular ceiling fixture to the north. According to oral history, Wright placed the ceiling scroll here to encourage the apprentices to lie down on the benches and gaze at the scenes to contemplate their future.⁴ Although the

³ Ling Po, interview by Indira Berndtson and Greg Williams, April 20, 1989, Oral History Collection, Frank Lloyd Wright Foundation, Scottsdale, AZ.

⁴ Bill Mims, interview by Indira Berndtson and Greg Williams, date unknown, Oral History Collection, Frank Lloyd Wright Foundation, Scottsdale, AZ.



Figure 2.7 Historic photos showing the original row of benches.
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.8 1950 Historic photo, showing the benches on the back wall and near the fireplace
 Source: Ezra Stoller Archives



panel was removed at an unknown date,⁵ the wooden battens can be seen in many historic photos and today evidence of the battens are visible on the masonry ceiling.

2.1.2 Phase 2: Construction of the Pavilion (1955-1959)

Structure

The construction of the Pavilion began in 1955 and was completed in 1957, its south end connected to the existing north end of the Cabaret. As seen in a 1950 historic photo (Figure 2.12), the east exit, which is close to the north end of the Cabaret, faced a semi-sunken narrow corridor. The construction of the Pavilion linked the Cabaret to the new building requiring the original exterior wall to be reconfigured from a semi-subterranean wall to one entirely above ground. The comparison of the historic and current photos (Figure 2.13) shows the alterations.

Another alteration to the Cabaret related to the Pavilion's construction was the addition of the last pier at the rear of the corridor. This desert masonry pier differs from the other precast piers (Figure 2.14) in the use of a massive vertical stone and the presence of a cold joint between the original knee wall and the pier base, indicating that it was not built at the same time (Figure 2.15). Given the partial rebuilding of the wall connecting to the Pavilion, this pier may have been added to accommodate an increasing load.

⁵ Ling Po, interview by Indira Berndtson and Greg Williams, April 20, 1989, Oral History Collection, Frank Lloyd Wright Foundation, Scottsdale, AZ.



Figure 2.9 Corridor with the operable canvas panels in the Cabaret
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.10 1955 historic photo showing the six quartet stands
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.11 Buddha head displayed in a circular niche
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.12 1950 historic photo looking west to the exit
 Source: Ezra Stoller Archives



Figure 2.13 Current photo looking west to the exit
 Image Credit: Author, March 2023

Art and Furnishings

According to historic photos dated to 1955, the last row of benches was removed. A small platform table was cast in the rear along the aisle for placing decorations (Figure 2.16). In the same year, the first row of benches and the one seat of the second row near the aisle was also removed, assumed to extend the stage area (Figure 2.17). The built-in benches screwed on the back wall were also removed as well as the hexagon tables and square stools and they were replaced by freestanding round tables and round-back chairs surrounding them with Taliesin red upholstery. A large concrete planter along the west wall



Figure 2.14 1950 historic photo looking west to the exit. Note absence of pier.
 Source: Frank Lloyd Wright Foundation Archives

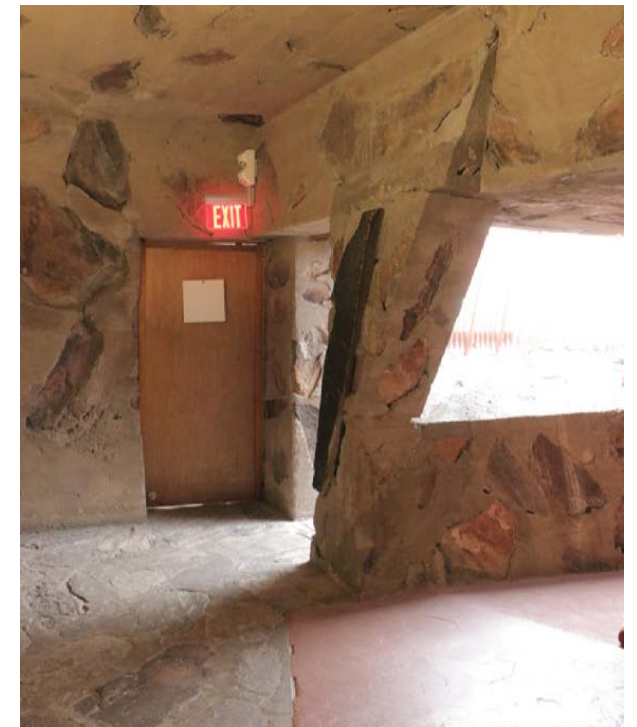


Figure 2.15 Current photo looking west to the exit
 Image Credit: Author, March 2023

behind the tenth bench might also be cast during this phase according to a similar historic photo but without a specific date (Figure 2.18).



Figure 2.16 1955 historic photo showing the last row of benches was absent
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.17 1959 historic photo showing the first row of benches and one set of the second row were removed
 Source: Ezra Stoller Archives, Esto Photographics Inc



Figure 2.18 Historic photo showing the large concrete planter in the rear.
 Source: Frank Lloyd Wright Foundation Archives

2.1.3 Phase 3: After Wright's death in 1959 (1960-present)

Structure

In 1963, a fire partially destroyed the Pavilion, possibly damaging the east side of the Cabaret as well. Only some interior areas were smoke damaged.⁶ Between 1960 and 1965, a backspace was added to the Pavilion, which enclosed the entrance to the Cabaret's projection room and created an interior space with a corridor leading to other storage areas (Figure 2.19). In 1984, this backspace was renovated into a library.⁷ There were no other major alterations after this 1984 rehabilitation.

Another change in the 1960s was the replacement of the operable canvas panels to plywood. This alteration was accompanied by a change in the roof drainage direction from east-west to west-east (Figures 2.20 & 2.21). The original drains in the parapet were later filled in due to this change of drainage direction (Figure 2.22).

Recent preservation of the Cabaret includes the 2012 structural roof repairs (Figure 2.23), the 2014 waterproofing along the east and west walls and entrance door replacement (Figure 2.24), the 2015 roof system replacement with new waterproof membrane (Figure 2.25), and the 2020 entry and corridor stone paver floor restoration that removed the cementitious topping added to the entry and corridor of the Cabaret Theater between 2001 and 2012 (Figure 26).⁸

⁶ Kamal Amin, interview by Indira Berndtson and Greg Williams, July 29, 1992, Oral History Collection, Frank Lloyd Wright Foundation, Scottsdale, AZ.

⁷ Gunny Harboe Architects. Taliesin West Preservation Master Plan, October 2015.

⁸ Preservation Records of the Cabaret, Frank Lloyd Wright Foundation, Scottsdale, AZ.



Figure 2.19 1955 historic aerial photo taken prior to construction of the Pavilion backspace
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.20 1950 historic photo looking west to the exit
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.21 Current photo looking west to the exit
 Image Credit: Author, March 2023



Figure 2.22 Historic photo showing the original drains in the parapet
 Source: Frank Lloyd Wright Foundation Archives



Figure 2.23 2012 structural roof repair
 Source: Frank Lloyd Wright Foundation Preservation Records



Figure 2.24 2014 waterproofing along the East wall
 Source: Frank Lloyd Wright Foundation Preservation Records



Figure 2.25 2015 roof system replacement
 Source: Frank Lloyd Wright Foundation Preservation Records



Figure 2.26 2020 stone paver restoration
 Source: Frank Lloyd Wright Foundation Preservation Records



Art and Furnishings

Around 1964, Olgivanna rehabilitated the interior of the Cabaret, removing all ten of the built-in concrete benches and installing fewer concrete benches of similar design resulting in more dining space between rows. According to the 2015 Master Plan and oral history, “every other row of benches was removed” in the 1964 alteration; however, a comparison of photographic and physical evidence suggests the current benches were all replaced at that time. This can be confirmed by the change from an open to solid base for the benches and the fact that the benches now rest on top of an added slab on the original ramp. Also, the individual affixed seat cushions were replaced with single panel upholstered seat backs.(Figure 2.27)

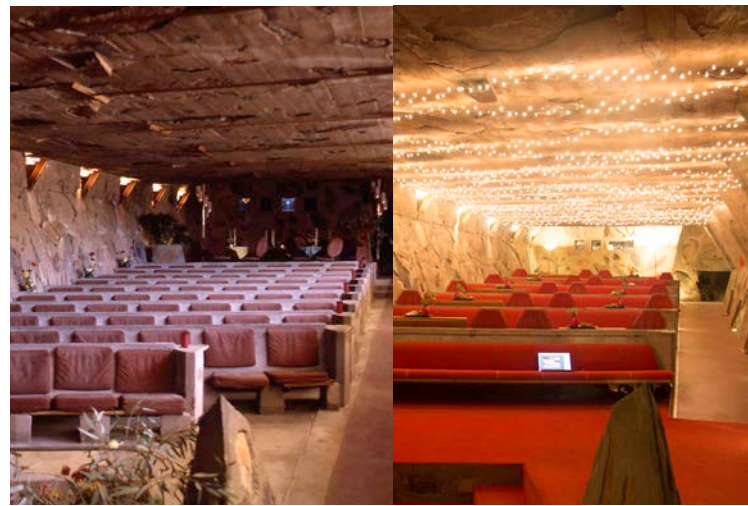


Figure 2.27 Comparison of the concrete benches-base and upholstery
Left figure source: Frank Lloyd Wright Foundation Archives
Right figure source: Author, March 2023

Up lighting was installed in the hollow triangular pillars at the end of the new benches with a fiberglass cover on the top and a triangular cove at the base. Hexagonal drop-leaf tables and hexagonal-back chairs with metal frames and flush red upholstery made by apprentices were placed between each row of benches (Figure 2.28). During the construction, the original ramp along the aisle was raised slightly which resulted in blockage of some of the original triangular base lights. New triangular openings covered by fiberglass shades were added on the edge of the ramp . During Christmas 1964, Olgivanna installed string lights on the ceiling of the Cabaret where they still remain today.



Figure 2.28 New freestanding drop-leaf tables and chairs between new benches.
Image: Author, March 2023

In 2014, the original main entry doors in the Cabaret were replaced by painted flush wooden double doors. The original Chinese decorative panels were removed in August 2014 due to damage and placed in Collections.

2.2 Statement of Significance

Located in Scottsdale, AZ, Taliesin West is one of eight properties comprising the Frank Lloyd Wright UNESCO World Heritage Site, inscribed in 2019. The property is renowned for being the winter studio and “camp” of American architect Frank Lloyd Wright. It stands as an exemplar of Wright’s pioneering work in his principles of Organic Architecture. Since 1938, over 500 apprentices resided and studied at Taliesin West under Wright’s tutelage, making it an influential hub of architectural education and experimentation in the twentieth century.

The Cabaret, one of three performance and theater spaces at Taliesin West, is a distinctive and intimate purpose-built design and its continued use makes it a valuable addition to the architectural legacy of both Frank Lloyd Wright and Taliesin West. The idea of constructing a new theater arose with the expansion of the Taliesin Fellowship. The Kiva, the first building used as a theater at Taliesin West, was later converted into a library after the Cabaret’s completion in the winter of 1949. The Cabaret served both as a theater and performance space which is reflective in its interior layout. However, due to limited natural light and a small stage area, the Pavilion was built in 1957 to accommodate larger performance events, especially dance. These changes in the auditorium spaces at Taliesin West reflect the Fellowship’s cultural evolution over time and all together they represent the changes in program and growth of the Fellowship.

Materials and Materiality : A Desert Masonry Cave

Wright’s use of desert masonry as Taliesin West’s primary building material highlights his philosophy of organic architecture, which emphasized the integration of structures with their local surroundings and materials. This approach also allowed the Taliesin Fellows to “learn by doing” which prioritized hands-on experimentation. However, applying desert masonry to larger span buildings posed a challenge,

especially for large flat masonry roofs, necessitating the use of reinforcement.

Structure: 3D solution to a 2D problem

The Cabaret’s design presents an inherently unstable solution by spanning a large space unobstructed by piers. To address this challenge, the roof slab acts as an in-plane diaphragm, spanning between the projection room on the north and the entrance area at the south end. Its X-pattern layout creates an action similar to that of an X-braced truss. This 3D solution to a 2D problem is a notable feature of Wright’s architectural design, as highlighted in a recent structural analysis.⁹ It represents an attempt to push the structural limits of the building to create the desired space. A similar approach is observed in the design of the canopy between the main house and the guest house at Fallingwater.

The use of an in-plane diaphragm and X-braced truss-like pattern in the Cabaret’s design exemplifies Wright’s creativity and problem-solving skills. It also showcases his willingness to experiment with unconventional structural systems to achieve his desired aesthetic and functional outcomes with limited material availability, skilled labor and funding.

Change over Time

The Cabaret is one of Taliesin West’s most well-known spaces, renowned not only for its use by the Fellowship for dining and film screenings but also as a venue for musical events during Wright’s lifetime to entertain and impress clients and guests. Over time, the furnishings, including benches, planters, and lighting, were altered to accommodate changing needs.

After Wright’s death in 1959, Olgivanna assumed control of Taliesin West and further transformed the space. In

9 Matteo, John. The Cabaret Field Report. 1200 Architectural Engineers, 2013.



In 1964, she reconfigured the seating, replaced the fabric seat panels with upholstered plywood, installed a new ramp and introduced string lights, exemplifying how the space adapted to her vision and the evolving needs of its occupants. Taliesin West served not only as a school but also as a living and office space, demonstrating the diverse and multi-functional nature of the complex. The various changes made to the Cabaret over time reflect these broader trends.

Conclusion

In summary, the Cabaret holds significance in three major aspects. Firstly, it is the second of three purpose-built event spaces designed by Wright and the Fellows, each different in their design and character but all dedicated to private and public entertainment. The weekly viewing of films by the Wrights was an important social component of life at Taliesin West and is still possible in the space, complete with the historic projection booth, equipment, films, and vinyl records. His creative combination of dine-in theater anticipated the current trend by half a century. Secondly, the Cabaret embodies the process by which Wright conceived and then modified his design in response to structure and structural issues but always holding to his original design intent. Lastly, the Cabaret continues to embody its use value and provides an intimate space for live recitals, film, and other public events.

Section 3. Physical Description of the Cabaret



Figure 3.1 Interior of the Cabaret
Image Credit: Author, 2023

3.1 Site and Context

The Cabaret is situated on the northern edge of the historic core of Taliesin West, adjacent to both Wright's Office and the later Pavilion. The primary entrance to the structure is located at the southern end of the building, facing the fountain, and features the iconic vermilion painted Chinese wooden doors, Chinese dragon roof tile and bronze gong (Figures 3.2 & 3.3)



Figure 3.2 Image showing the South entrance of the Cabaret fronted by the fountain.
Image Credit: Author, March 2023



Figure 3.3 Image showing the Dragon Roof Tile located above the Primary Entrance.
Image Credit: Author, March 2023

3.2 Structure

The Cabaret is an irregular hexagonal building¹ measuring approximately 111' by 27' in plan. It is a single-story structure partially constructed below grade with the building rising three feet above ground level on its west side.² Constructed using desert masonry, the Cabaret is one of two major buildings to employ a flat desert masonry ceiling/roof with exposed external beams on top. The irregular footprint of the building is on account of the access to Wright's office and the addition to the Pavilion. The eastern elevation features a row of openings with operable plywood panels, opening to the corridor.

Structural configuration

The roof of the structure is flat with a slight slope to the west end, concealed by a low parapet. The northern end is slightly lower. The roof provides stability to the structure, with the slab spanning from east to west like a beam or catenary, and from north to south like a box between the building masses of the projection booth and the south entrance areas (Figure 3.4)

The in-plane diaphragm behavior of the roof slab also contributes to the overall stability of the structure (Figure 3.5). The steel reinforcement layout of the roof slab further enhances this stability by creating a horizontally spanning X-braced truss stretching from north to south. Tapering concrete beams spaced 5'4" apart and running east to west were added immediately upon completion of the structure due to structural instability. The flat roof is currently covered with a Roof Mate liquid roofing system installed in 2015.³

¹ Taliesin West by Frank Lloyd Wright (659AR) — Atlas of Places. <https://www.atlasof-places.com/architecture/taliesin-west/>. Accessed 4 Apr. 2023.

² 1200 Architectural Engineers. 2013. Structural Field Report for Taliesin – West Cabaret Theatre

³ Frank Lloyd Foundation, Taliesin West. August 2015. Field Report – Cabaret Roof System Replacement

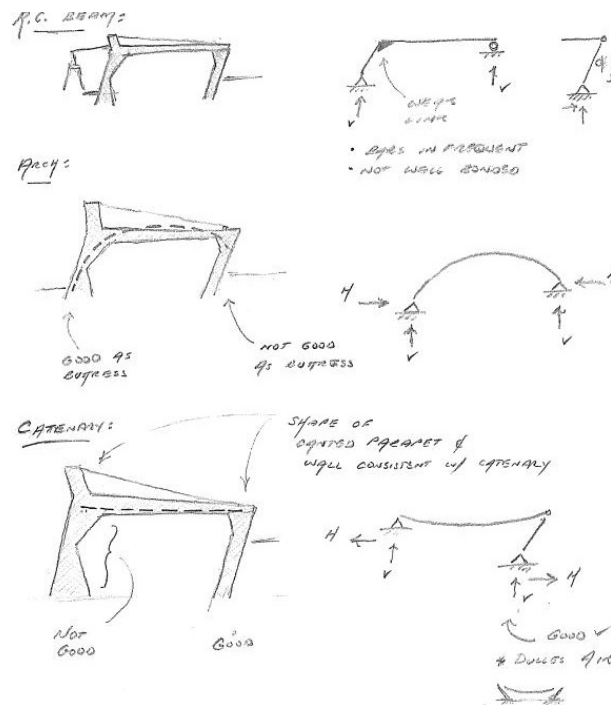


Figure 3.4 Sketches evaluating fundamental structural behavior
 Source: 1200 Architectural Engineers, 2013 Field report

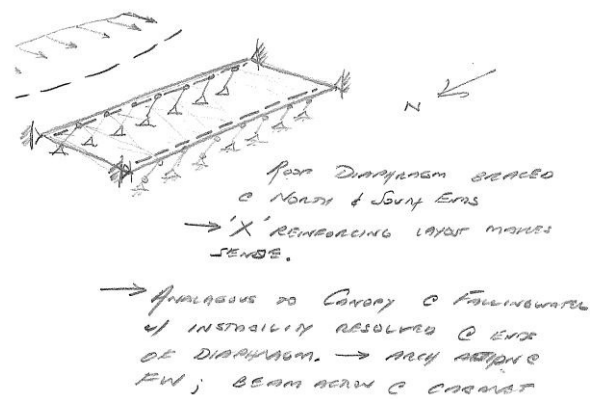


Figure 3.5 Diaphragm Behavior of roof slab
 Source: 1200 Architectural Engineers, 2013 Field report

3.2.1 Walls and Piers

The Cabaret's walls and piers are constructed with desert masonry, similar to Taliesin's other buildings employing local quartzite slabs set in a dry Portland cement and sand concrete mix. These walls were built in 1950 during the original construction phase and have remained unchanged over time.

The interior space is ten bays in length, with the final five bays towards the rear section of the space equipped with benches facing the front stage located on the south side of the room (Figure 3.6)

The room's unique slope and shape, made possible by the floor's slight gradient downward from the rear to front, enables an unobstructed view of the stage below and provides almost perfect acoustics. In fact the theater takes great pride in its "95% acoustic perfection" score.⁴



Figure 3.6 Interior view of the Cabaret
 Source: 1200 Architectural Engineers, 2013 Field report

⁴ Taliesin West by Frank Lloyd Wright (659AR) — Atlas of Places. <https://www.atlasofplaces.com/architecture/taliesin-west/>. Accessed 3 May 2023.

3.2.2 Roof

The Cabaret's ceiling/roof is constructed using reinforced concrete desert masonry. Similar to the walls, the roof deck itself dates to the original construction phase in 1950 and has successfully maintained its material integrity over the years. The slab varies in thickness from approximately 6" on the west end to around 11" on the east end. It is supported by a system of tapered upturned beams with the eastern ends of the beams extending above the roof slab and connecting to a north-south parapet, while the western ends of the beams taper down to the roof surface (Figure 3.7)

These reinforced concrete beams were immediately added to the roof when the initial concrete slab showed signs of failure after the removal of the form work and shoring in 1950.⁵



Figure 3.7 Image of the roof looking north showing the upturned beams.
 Image Credit: Author, March 2023

The major difficulty confronted during the construction of the Cabaret was with regards to the roof slab. The initial design was intended for standard sizing and spacing of steel reinforcing rebars.

Nevertheless, to adhere to Wright's vision of a continuous masonry surface and unobstructed space, the roof slab required the addition of sizable stones that matched the

⁵ 1200 Architectural Engineers. 2013. Structural Field Report for Taliesin – West Cabaret Theatre, pg. 2-3

walls' appearance. Consequently, conventional reinforcing was substituted with only two large rebars, measuring approximately one inch square each, to be placed in an X pattern in each bay. The rebars are bent to coincide with the slab's edge, thereby securely anchoring themselves into the end support sections (Figures 3.8 & 3.9)⁶



Figure 3.8 1948 construction photo of the roof showing the X-pattern rebar anchoring into the end slabs along the west end
 Source: Frank Lloyd Wright Foundation Archives



Figure 3.9 1948 construction photo of the roof showing the X-pattern rebar anchoring into the end slabs along the east end.
 Source: Frank Lloyd Wright Foundation Archives

⁶ *ibid*, pg. 5



3.2.3 Mechanical Systems

HVAC

Originally the Cabaret was heated by a large fireplace on the north end and ventilated by operable paneled openings on the east along the corridor. Today a modern HVAC system has been installed in the southwest corner behind the screen/stage and appears to be the second system.

Electrical

The space was originally furnished with embedded electrical conduit in the masonry walls. Today this has been partially updated with modern electrical wiring to facilitate lighting and other functions both in the Cabaret and the projector room.

Plumbing

The Cabaret currently features a preparatory kitchen and two bathrooms, which appear to be original to the plan but have been updated recently.

3.3 Artworks and Furnishing

Built as a theater, the Cabaret was also a place for Wright to display his Asian art collection strategically placed for visual effect. Here the Fellows and guests dined during performances and movie screenings as well as attended special events. The space was also enriched with accent lighting, furniture, and wooden partition screens.

3.3.1 Artworks

Studio Buddha

As a prolific Asian art collector and dealer, Wright's collection included a significant number of Buddhist artifacts.

A cast-iron Ming Dynasty Buddha head was prominently placed at the entrance of the Cabaret (Figure 3.10) The Buddha head is original to the Cabaret's construction in 1950 as is its circular concrete niche that might represent the holy halo, a tradition for Asian Buddhist artwork. It is known to have been in Wright's possession since the late 1920s. Before its placement in the Cabaret, it was displayed in the studio of Taliesin, Wright's summer house (Figure 3.11)



Figure 3.10 Buddha head displayed at the center behind the main entrance
Image Credit: Author, March 2023



Figure 3.11 The "Studio Buddha" and other Buddhist objects in Frank Lloyd Wright's Taliesin Studio, interior view, Taliesin III, Spring Green, Wisconsin, late 1920s.
Source: Frank Lloyd Wright Foundation Archives

Wright often reflected on the enigmatic expression of the Buddha which he said "pervades his thoughts" and "there seems evidence of the deep beneficent inner quiet our art so needs and that Taliesin covets." ¹ Wright imagined a dialogue between himself and the Great Buddha, further connecting his design tenets with traditional Asian philosophy.

Buddha: Why, Son of the West, has your great nation never realized that Creative Art is implicit in faith in one's own Ideal? . . . Its vast mechanical apparatus is too busy among you raising a vast crop of weeds. Regardless of true flowers the policy of the West seems to drive this weed crop ahead to a dead end . . .

Wright: You speak Truth, great Buddha, for my people do yet realize no other or better choice. Artificially powered they now are by their own Machines and are becoming themselves more and more like machines. But in this little green valley, as in others elsewhere, a message is being prepared: a message you have helped make clear to us. . . Someday East and West as one will waken to the honest practice of what we call a natural organic architecture . . .

Buddha: Then you may not die as all civilizations preceding yours have died! Sharing our ancient Wisdom, you may live. . . We will know eternal Life together. This meeting of East and West in thought will become a mighty feeling only when this vicarious Force you call the Machine becomes instead of your master, your expedient servant. Then only will you know Freedom.²

Carved wooden plaque

An exquisite Southeast Asian carved and painted wooden plaque was hung on the ceiling just above the Buddha sculpture. While not original to the space in 1950, it was installed before 1952 according to early photographs. (Figures 2.11 & 3.12) The decorative panel is in a ram's horn shape with leaves and flower motifs on two sides in symmetry. The surface of the panel is painted red and gold except for the small white Buddha in the center. According to Fred Prozzillo, the Director of Preservation at the Frank Lloyd Wright Foundation, it was Wright's intention to install the panel in this position as if the two Buddhas were in conversation. ³

Other Chinese wood carvings once installed on the interior side of the main entry doors were original but were removed in 2014. (Figure 3.13) These two identical panels depict dimensionally complicated flora and geometric motifs painted in brownish red. These panels were removed to the Archives for preservation due to their deterioration.



Figure 3.12 Carved wood plaque above the Buddha head
Image Credit: Author, March 2023

¹ Sprague, Paul E. "Frank Lloyd Wright Collected Writings: Volume I, 1894-1930." (1993): 29

² Ibid

³ Interview with Fred Prozzillo at Pavilion, March 10, 2023

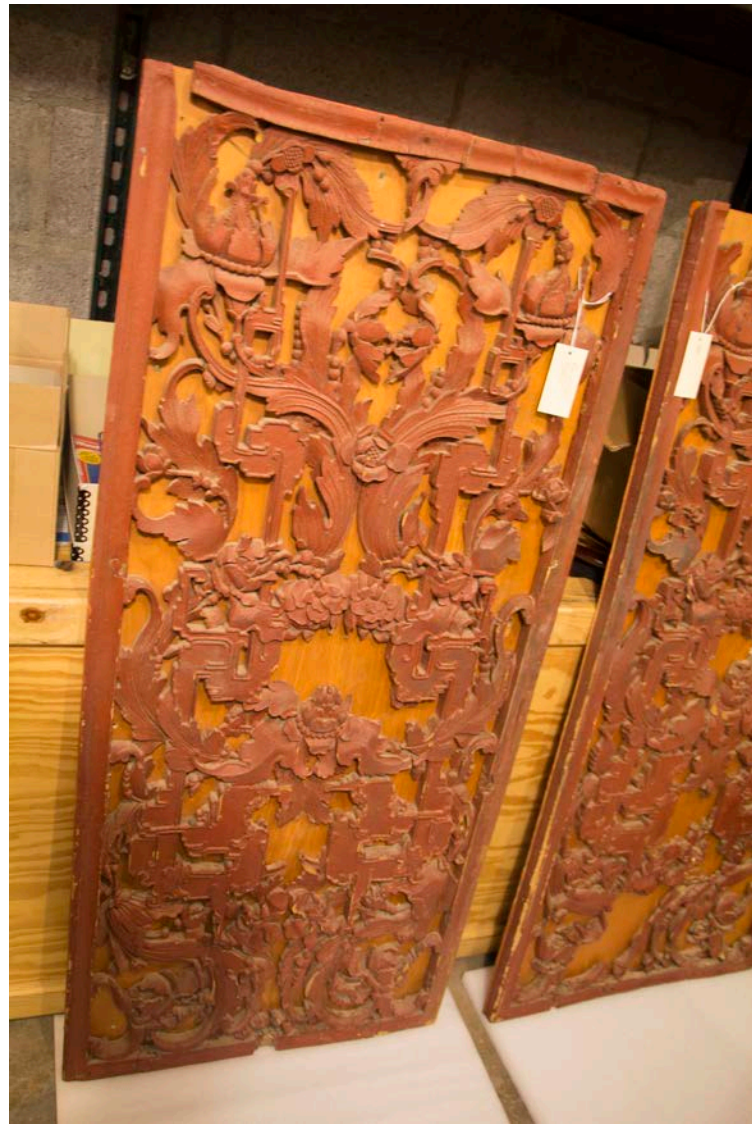


Figure 3.13 Original flora-motif wood carving installed on the interior side of the main entry door
 Image Credit: Author, March 2023

Polychrome glazed roof tiles

A separate polychrome glazed ceramic dragon-form roof tile is currently on the roof above the main entrance door. (Figure 3.14) It is not original to the Cabaret but was in place before Wright's death. Glazed in blue, green and white, the tile depicts a dragon with fish tail standing on a rectangular base and a seat decorated with a cloud pattern on its back. The base is decorated with flower motifs on both sides. On the back of the roof tile there are two

words in traditional Chinese which might indicate the original name of this kind of dragon-form. This fish-like hornless dragon is similar to Chiwen, which is one of the dragon's nine sons in Chinese traditional mythology.¹ The original motif of Chiwen is a huge fish with a bird tail living in the ocean that could control the power of water. It is traditionally believed that this motif can protect a building and its occupants from fire. However, for the traditional Chiwen motif its tail usually sticks up without a "seat" shape on the back like the one at the Cabaret. In addition, two traditional Chinese words near the joint side were discovered which might indicate the name of this motif. The upper word means "bird" and the other was not complete and difficult to decipher.

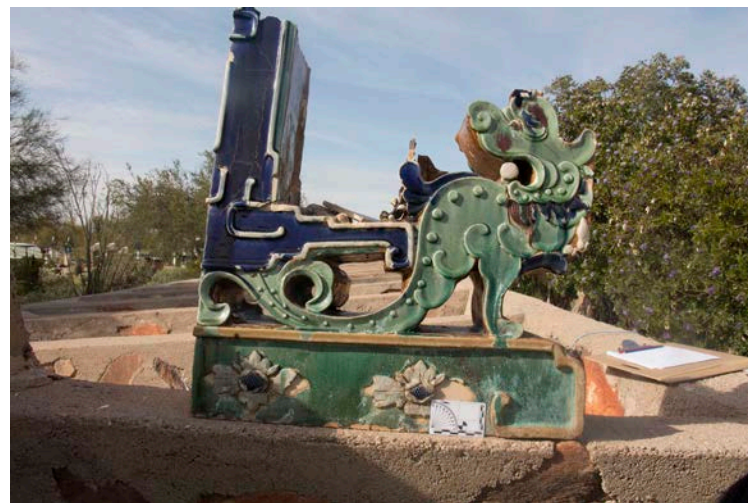


Figure 3.14 Chiwen-motif roof tile placed on the roof
 Image Credit: Author, March 2023

Hell Scroll

A series of traditional Chinese scroll paintings mounted on wooden planks were originally attached to the ceiling of the Cabaret with decorative wooden battens designed by Wright (Figures 3.15 & 3.16) The scrolls describe the ten levels of Hell in Taoism. Each level is governed by a King determining the fate of the departed souls. The lower the

¹ Li, Xianda. "The "shape" and "meaning" of the roof arts in Chinese classical architecture." In IOP Conference Series: Earth and Environmental Science, vol. 61, no. 1, p. 012110. IOP Publishing, 2017.

level, the more gruesome the scene becomes. According to an interview with Lin Po, Wright often assigned apprentices to lie on the bench and gaze at these scrolls "if they wanted to see what their future was going to be like". Due to a water leak, the scrolls were severely deteriorated and consequently removed and are now stored in the collection of the Foundation Archives.



Figure 3.15 Hell scroll mounted on narrow planks
 Source: Frank Lloyd Wright Foundation Archives



Figure 3.16 Running decorative wood battens
 Source: Frank Lloyd Wright Foundation Archives

3.3.2 Furnishings

The furniture in the Cabaret includes five rows of the fixed desert masonry benches and the freestanding tables and chairs replaced by Olgivanna in 1964. The benches are placed at a slight angle to the wall with a sloped floor that provides perfect sight lines to the stage. The benches consist of horizontal wood seating screwed to the concrete back upholstered with a red fabric cushion that extends along the entire length of the bench on the seat and back (Figure 3.17). The freestanding hexagonal back chairs have metal frames painted in red and are upholstered in the same color as the bench cushions (Figure 3.18). Freestanding wooden tables are of drop-leaf form in two different sizes behind each row. The larger one is placed in the inner space near the west wall and the smaller one is near the aisle. The tabletop is supported by three metal frame legs on a hexagonal base (Figure 3.19). It is believed that the furniture including chairs and tables were designed by Wright and made by the apprentices.

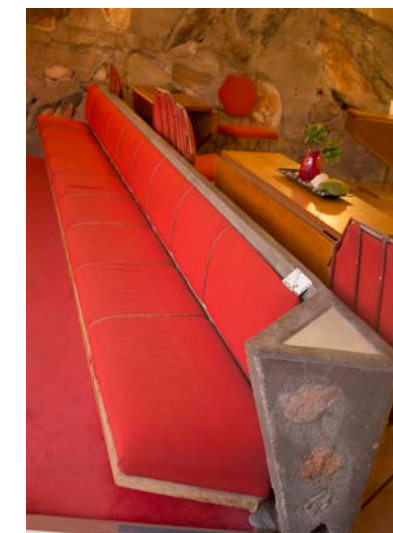


Figure 3.17 Desert masonry benches
 Image Credit: Author, March 2023



Figure 3.18 Hexagonal back chairs
 Image Credit: Author, March 2023



Figure 3.19 Drop-leaf hexagonal tables
 Image Credit: Authors, March 2023

3.3.3 Lighting

Lighting is an essential element of the Cabaret’s interior theater environment. There are six types of lights and lighting in the space: the wall sconces along the west wall, the base lights along the west wall along the corridor, the base lights along the aisle, the accent lights in the concrete piers at the end of the benches, the hanging light in front of the fireplace, and the string lights hanging on the ceiling. Other than the string lights, these lighting receptacles are all triangular in shape. (Figure 3.20)

The wall sconces have a triangular lampshade, originally Japanese paper (now modern fiberglass) with a wooden frame. Their design is very similar to the light fixtures in the Beth Sholom Synagogue and have been suggested to be the prototype for the synagogue project. Only the hanging fixture in front of the fireplace retains the original paper shade. The base lights along the corridor are small glass bulbs placed in a small triangular cove. The original base lights along the aisle are similar but have a triangular shade. Wright was one of the first to use low-level pathway lighting in a theater setting. In the alteration in 1964, the ramp of the aisle was raised and some lights were blocked (Figures 3.21 & 3.22).

As a result, the apprentices made triangular covers over the original lights. At the same time, up-lighting was in-

stalled in the new hollow concrete end pillars of the new bench seating. These lights are just bright enough to see the row but do not detract from the stage or the screen area. The shades function well to make the light softer and dispersed in the whole room. The string lights were added for a Christmas celebration organized by Olgivanna Lloyd Wright and were left in place as she said they “re-mind(ed) me of sleeping under the stars with Frank”.¹



Figure 3.20 Top left: Wall sconces; Top right: Base lights along the aisle; Middle left: Base light along the corridor; Middle right: Accent lights in the concrete piers; Bottom left: Hanging light; Bottom right: string lights
 Image Credit: Author, March 2023

¹ Tour script of the Cabaret



Figure 3.21 Left: Original base light Right: New triangular covers and original lights are blocked by the new ramp
 Image Credit: Author, March 2023

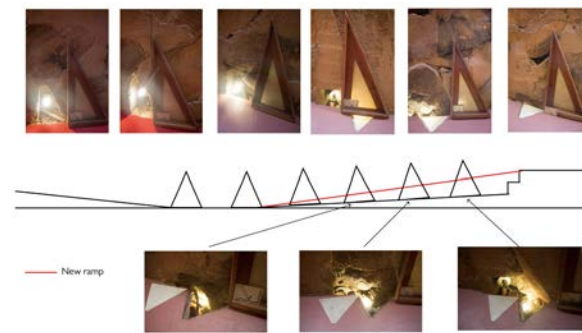


Figure 3.22 Diagram showing the original base light was blocked by the new ramp

3.3.4 Decorative architectural components

Nine decorative piers were prefabricated on site and then placed along the west side of the corridor between the knee wall and roof during the construction in 1949 (Figure 3.23). The shape of each pier was a combination of triangles of different sizes and painted in different colors: red, blue and gold at different times based on historic photos. (See Appendix 4)

Three decorative wood screens were installed in the Cabaret early on although they are not original to the construction. One was on the west side of the Buddha head and the circular niche (Figure 3.24), one was between the

first and second concrete piers just behind the entrance; and the third is behind the last outside operable panel and near the fireplace. All screens are vertical slats, varnished with selective highlighting in red. The screens have been over painted concealing the original varnish finish. The main double entrance doors were painted red with glass sidelights (Figure 3.25). Two square Chinese golden dragon-motif metal panels with handles are attached to the center edge of each door. The original doors were replaced in 2014 and their color was originally darker than the current one.



Figure 3.23 Decorative piers along the west side of the corridor
 Image Credit: Author, March 2023



Figure 3.24 Decorative wood screens on the west side of Buddha head
 Image Credit: Authors, March 2023



Figure 3.25 Main entry door
Image Credit: Authors, March 2023

3.3.5 Miscellaneous

The bronze gong currently to the east of the entrance appears as early as 1958 (Figure 3.26) ; it is not in place in a photo dated to 1956. According to the Foundation, the gong was as functional as it was decorative and used as a fire alarm. A silver pot decorated with a ring fixed in a monster head is currently placed near the fireplace with a wooden handled steel shovel inside (Figure 3.27). However, they cannot be found in any historic photographs.



Figure 3.26 The bronze gong hanging on the East side of the entrance
Figure 3.27 The silver pot and wooden handled steel shovel inside
Image Credit: Author, March 2023

Section 4. Condition Survey and Assessment



Figure 4.1 Grid laid out for GPR line scan of the West Wall
Image Credit: Author, 2023

4.1 Structure

4.1.1 Methodology

The documentation and assessment of the Cabaret's current conditions involved several steps in the following order:

- Documentation involved gathering all available information on the structure, including legacy data (historical drawings, photographs, written records, interviews) and oral history;
- Recording focused on the preparation of base drawings and other methods used to create a physical record of the site, building, and its contents including plans, sections, and elevations at the minimum. (See Appendix A - Architectural drawing set)
- Condition Survey and Assessment involved the recording and assessment of conditions to identify any signs of deterioration, such as cracks, water damage, or structural displacement. This assessment is crucial in determining the extent of damage and deterioration and informs subsequent steps in the analysis, diagnostic processes, and repair recommendations for future interventions. (See Appendix C - Conditions Assessment drawing set)
- Non-destructive testing (NDT) is another important step in the methodology, as it allows for a more detailed and comprehensive analysis of the structure without altering the historic fabric. NDT techniques used included ground-penetrating radar (GPR), thermal imaging (TI), and ultrasound testing (UT).
- To ensure accuracy and completeness, the results of this assessment were compared with the 2013 structural report by MCI 200 Architectural Engineers. Any discrepancies or changes in the condition of the structure were noted. (Figures 4.8 & 4.9)

- Finally, based on the results of this assessment and evaluation, recommendations were made for the preservation and maintenance of the Cabaret. These recommendations include repairs and other measures to ensure the continued viability and preservation of this structure. (Refer to Section 5.2)

4.1.2 Documentation

Before visiting the site, the team prepared preliminary drawings using the AutoCAD drawings provided by the Foundation. During the visit, the team updated our drawings by incorporating on-site measurements and photographs. The team used measuring tapes, distos, and hand-drawn sketches to capture the required data on the predesigned drawing sheets (Figure 4.2). The collected data was then transformed into digital form using AutoCAD software to create the architectural set. In addition, the team researched existing drawings, reports, and other documentation related to Cabaret's construction and history before the site visit. On-site, the team interviewed individuals with knowledge of the building, such as the staff members at the Archives, maintenance staff, and the preservation team. The information gathered helped to address knowledge gaps and make informed decisions about any issues identified during the assessment.



Figure 4.2 On-site documentation undertaken by students during their study trip
Image Credit: Authors, March 2023



4.1.3 Condition Assessment

The purpose of documenting the existing conditions of the Cabaret was to identify major current problems and make recommendations for future monitoring and/or repair. The entire building envelope was examined, although a detailed visual condition survey was focused on the interior walls and ceiling of the Cabaret. An informed understanding of the materials and structural system helped the team to develop a set of base drawings and an illustrated condition glossary that could be used for field condition notation. Building conditions were defined according to ACI (American Concrete Institute) “R-08 Guide for Conducting a Visual Inspection of Concrete in Service” (2008), and the NYC Building’s Façade Conditions- A Illustrated Glossary of Visual Symptoms and were codified using a two-letter code along with colored hatch patterns to enable appropriate recording/identification on drawing sheets which were supported by photographs. It is to be noted that the conditions shown on the drawing’s sheets are representative of the building as of March 2023, when we conducted the field work. The size and shape of condition hatches do not necessarily correspond with the exact borders of the damaged area. The interior walls were identified with an alphabetical naming system for ease of fieldwork. (See Appendix A – Architectural Drawing Set – A 103)

Conditions were identified and categorized by building components as follows:

Walls

- Efflorescence

Most of the interior walls exhibit large, localized areas of efflorescence, with this condition being most notable in the west, north and the east walls corresponding to A, B-C and D. Salts are mainly located in the mortar as opposed to the stone of the desert masonry walls (Figure

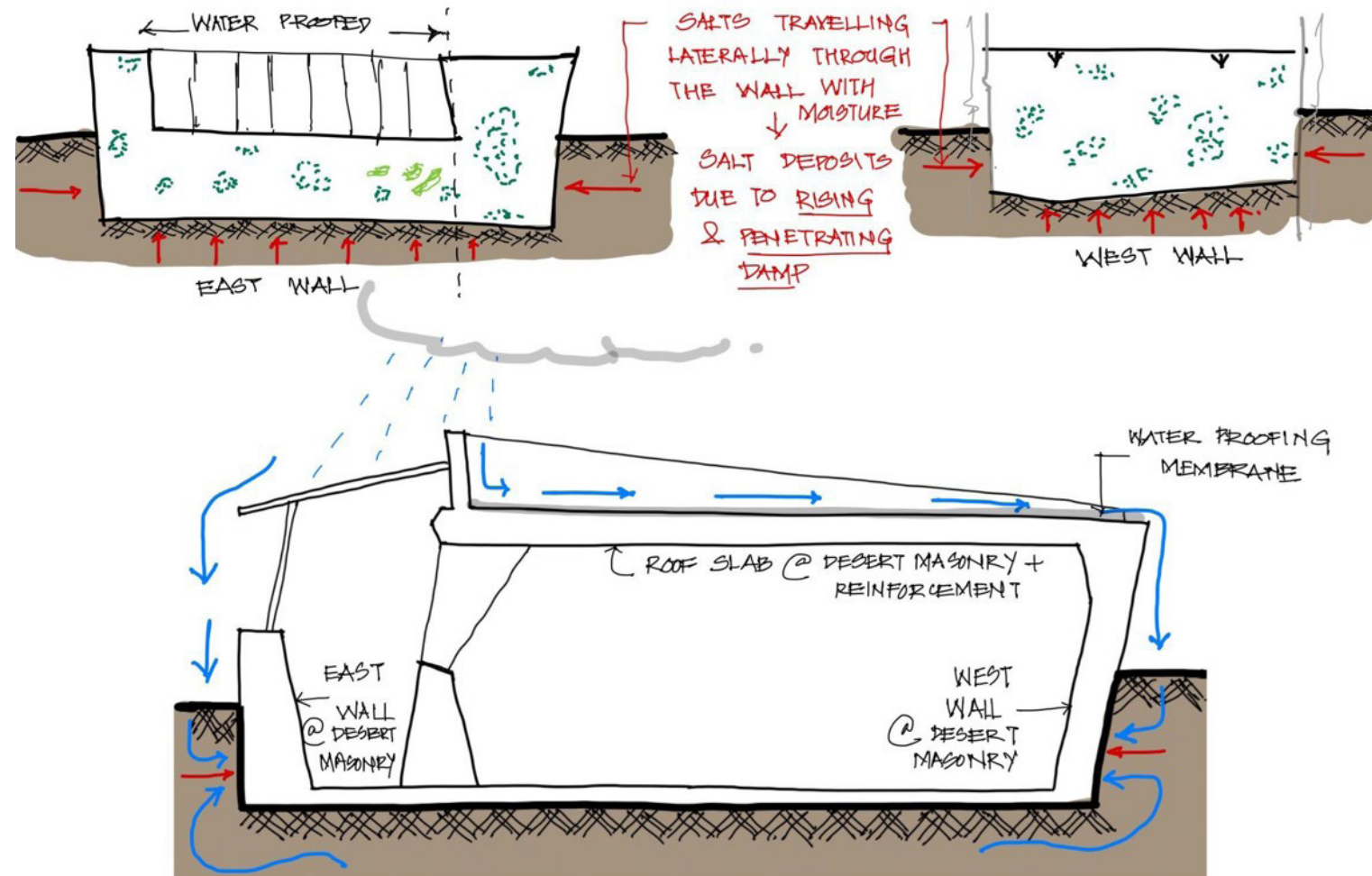


Figure 4.3 Condition Assessment Analysis of the Cabaret Walls
 Diagram: Priyanka Gorasia

4.4). As mentioned earlier, the structure is partially below grade. As such, the west and east face walls have direct contact with the soil below ground. The salts in this case can be attributed to rising and penetrating damp. While rising damp is caused by capillary action causing moisture to be drawn up through porous elements of a building’s fabric,¹ penetrating damp is the moisture that travels laterally through the fabric of the building from the outside.² Salts travel along with the moisture and crystallize on the surface upon evaporation (Figure 4.3)

¹ Rising Damp. https://www.designingbuildings.co.uk/wiki/Rising_damp. Accessed 28 Apr. 2023
² Penetrating Damp in Buildings. https://www.designingbuildings.co.uk/wiki/Penetrating_damp_in_buildings. Accessed 28 Apr. 2023.

The Frank Lloyd Wright Foundation initiated a waterproofing campaign in 2014 to tackle this recurrent problem. The waterproofing campaign involved two different approaches for the west and east exterior walls (Figure 4.5).

For the west wall, a catch basin and an underground flexible drainpipe were installed to prevent heavy saturation of the wall and water infiltration into the interior.³ For the east wall, the wall was excavated, patched, and treated with a cold-liquid-fluid applied waterproofing membrane. A French drainpipe was added to the trench and emptied into a newly created catch basin,

³ Frank Lloyd Foundation, Taliesin West. 2014. Project Report – 1400 Exterior Wall Waterproofing and Door Replacement



Figure 4.4 Salts found across the entire expanse of the West Wall in the Cabaret interior
 Image Credit: Authors, March 2023



Figure 4.5 Waterproofing campaign undertaken by the Frank Lloyd Foundation in 2014
 Image Credit: Frank Lloyd Wright Foundation

preventing water from soaking the wall and the corridor and leaving standing water on the corridor floor during heavy rains.⁴

However, it is worth noting that the wall closer to the entrance on the east side was not waterproofed beyond the corridor at that time. The continued presence of salts on the walls after the new waterproofing was added is a cause for concern as it indicates continued high moisture levels in the masonry.

⁴ ibid



- *Bio growth*

During inspection, it was discovered that bio growth (algae) was visible in the crevices of the rocks located on the east wall in proximity to the south entrance (Figure 4.6), probably due to the ideal combination of moisture and light. Given that the waterproofing campaign was executed up to the corridor, it is plausible that this issue may have resulted from the untreated portion of the wall.

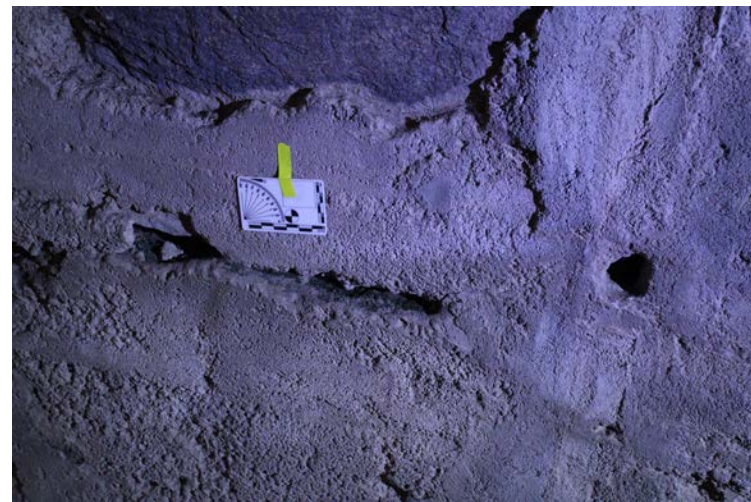


Figure 4.6 Bio growth (algae) found in the rock crevices in the West Wall interior
 Image Credit: Authors, March 2023

- *Cracks*

During fieldwork, the team recorded the presence of a few cracks with some traversing east-west across the ceiling slab on the interior which extend to the masonry wall (Figure 4.7). It is important to note that none of these cracks appear to be of a structural nature. It is our opinion that these cracks could be attributed to the experimental nature of the desert masonry construction, which may be prone to some level of settling and movement over time. Therefore, while the cracks may be a cause of concern, they do not appear to pose an immediate threat to the structural integrity of the building.



Figure 4.7 Cracks found across the desert masonry walls
 Image Credit: Authors, March 2023

Other conditions observed include previous repairs in multiple locations visibly not compatible with the original desert masonry.

Roof/Ceiling

Large areas of efflorescence, cracks, and exposed rebar were the major conditions visible on the ceiling.

- *Efflorescence*

In 2015, the existing stone and concrete roof waterproofing was determined to be at the end of its service life as a result of water infiltration observed in the ceiling. As a result, the foundation initiated a preservation campaign to replace the roof membrane with a new Roof Mate™ liquid roofing system.⁵ However, during our recent visual inspection, we observed extensive areas of efflorescence on the ceiling. If these areas of efflorescence are active, then the waterproofing membrane installed in 2015 may require repair or may have reached the end of its service life as salts are indicative of new moisture penetration.

⁵ Frank Lloyd Foundation, Taliesin West. August 2015. Field Report – Cabaret Roof System Replacement

- *Cracks*

The cracks on the ceiling were recorded after the first year of construction which led Wright to install the reinforced exterior roof beams. The team compared the cracks documented in our field analysis to those mapped out in the 2013 Structural Report (Issued by I200 Architectural Engineers) and found that the crack pattern has not changed significantly over time (Figures 4.8 & 4.9).

Although none of the cracks could be confirmed as through roof slab cracking, we recommend continued monitoring to ensure that they do not worsen over time. This will be further expanded upon in the Recommendations section of the report (See Section 5.2) Other conditions observed include exposed rebars which are mainly seen in the slab next to the interior decorative piers. According to the structural report by I200 Architectural Engineers, it is implied that the square reinforcing rebars were laid directly on the formwork as in some areas the reinforcement is exposed and visible on the ceiling.

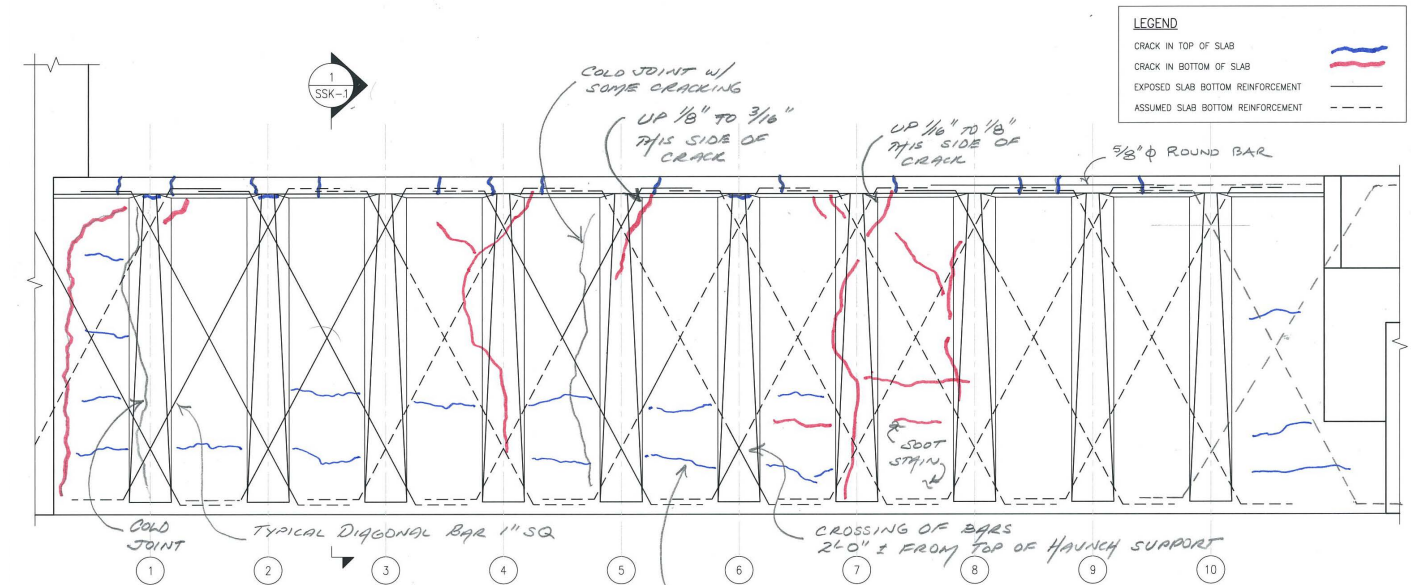


Figure 4.8 Cracks mapped on the Cabaret Roof Plan
 Source: I200 Architectural Engineers, 2013 Field report

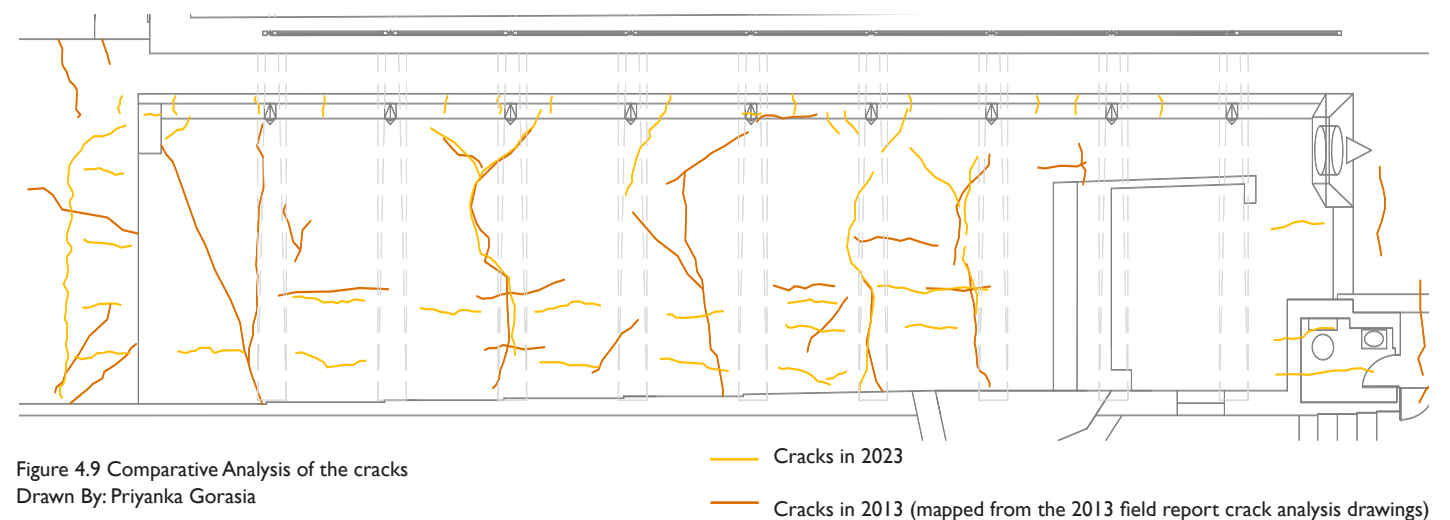


Figure 4.9 Comparative Analysis of the cracks
 Drawn By: Priyanka Gorasia



4.1.4 Non-destructive Testing

Question

Considering the limited historic drawings available, additional testing was undertaken. Below are the three main questions that our team tried to answer by using non-destructive testing in the Cabaret:

- What is the steel reinforcement layout? What is the average concrete cover?
- What is the thickness of the roof and walls?
- What is the overall condition of the walls and roof slab?

To reduce the damage to the historic structure of the Cabaret and to collect information to answer the questions suggested above, the team utilized Ground Penetrating Radar (GPR), Ultrasonic Pulse Velocity (UPV) scan and thermal imaging (TI). The equipment for each non-destructive testing used is listed below:

1. Ground Penetrating Radar
 - Proceq GP8000
 - Proceq GP8100
 - Proceq GP8800
2. Ultrasonic Pulse Velocity
 - Pundit Ultrasonic PD8050
3. Infrared Thermography
 - FLIR E60 Thermal Camera

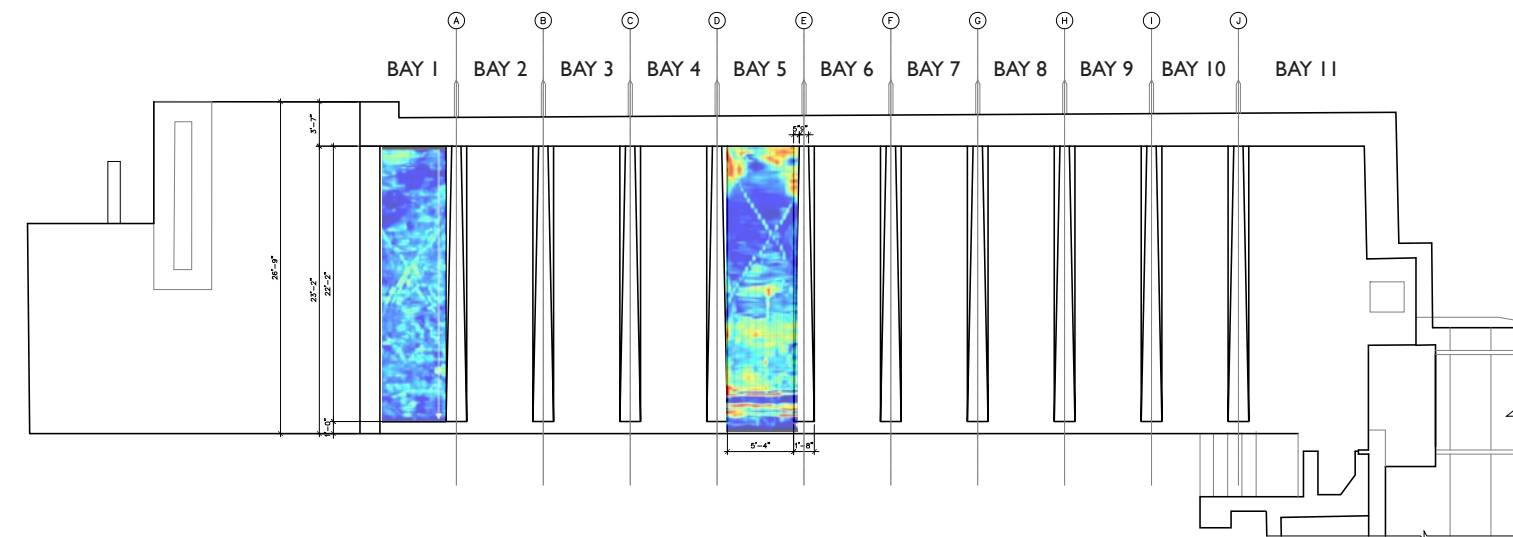


Figure 4.10 Overlapping GPR scans with roof plan

Roof Slab

The main purpose of the GPR Survey was to verify the steel reinforcement layout starting from the assumption in the 2013 structural report. Two area scans were completed in Bay 1 and Bay 5 on March 6th and 7th, 2023. Both of the area scans confirmed the “X-pattern” reinforcement clearly (Figure 4.10). This will be helpful in future forensic projects to decide the location of core sampling, to complete corrosion testing and carbonation testing.

According to the data, the slab thickness ranges between 4.4” to 8”. The thickness is not consistent; the slab is thicker at the east end and thinner towards the west end. The “noise” in the east end of the scan could be associated with the presence of the decorative piers located below, and the hyperbola in the west end could be the result of steel reinforcement located at end of the roof slab (Figure 4.11).

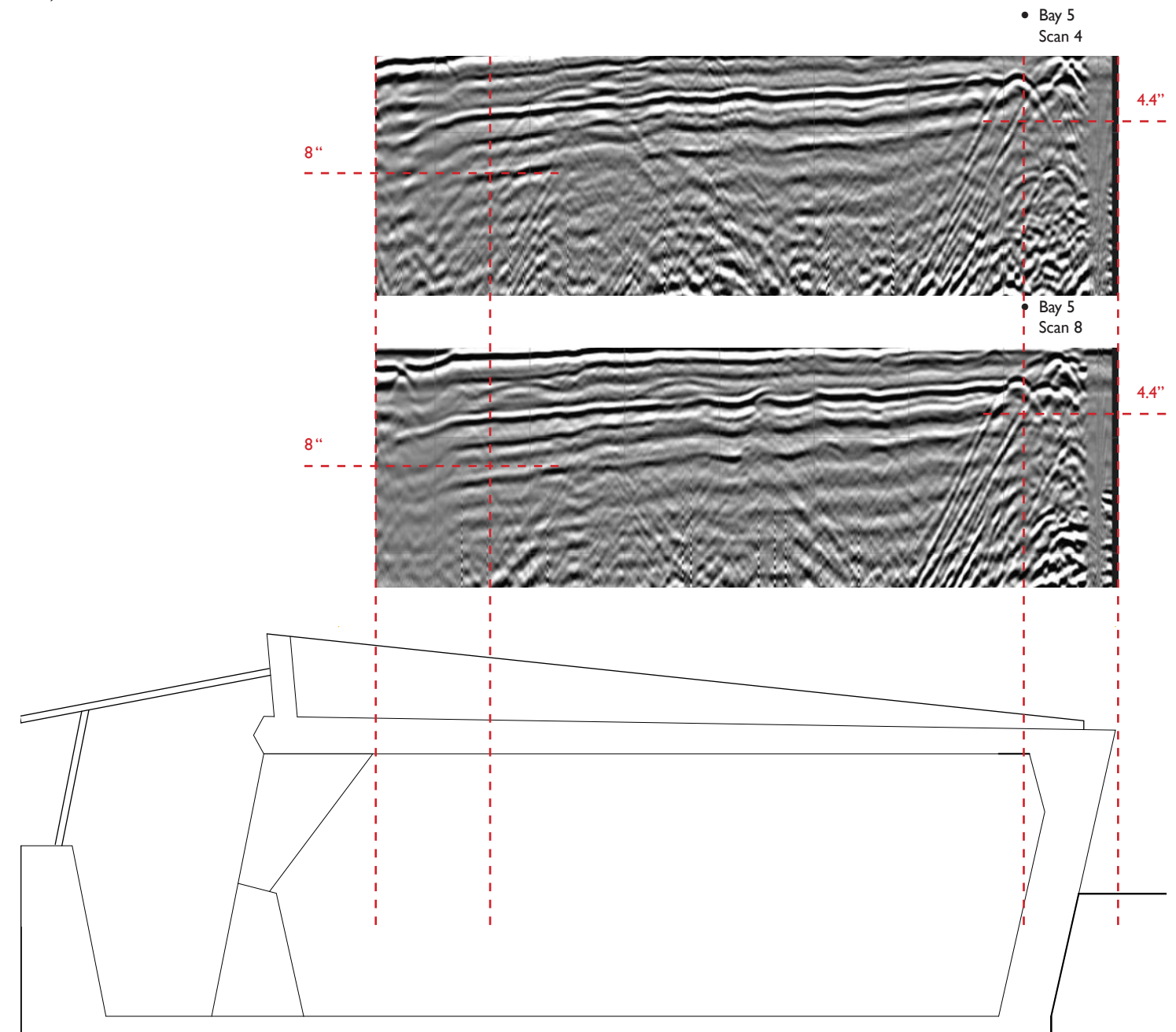


Figure 4.11 The Cabaret section overlapping with longitude scans in Bay 5



A 2” thick “layer” was observed in all of the scans of Bay 5 and Bay 1 (Figure 4.12). By comparing the historic photographs and the current photos, it is assumed that this layer could be a topping concrete slab added at a later time. It is noticeable that in a photograph dated back to 1959, the roof’s drainage holes were still present but later infilled in current photos. This could be attributed to when the topping slab was added.

The data collected by the GPR allowed us to determine the concrete cover. The majority of the steel reinforcement shows a cover of more than 3” from the topside (Figures 4.13, 4.14 & Table 4.1). From the inside, several of the squared original rebars are exposed (Figures 4.15 & 4.16). This condition could potentially lead to further deterioration of the steel reinforcement. This should be addressed and is included in our Recommendation section of the report.

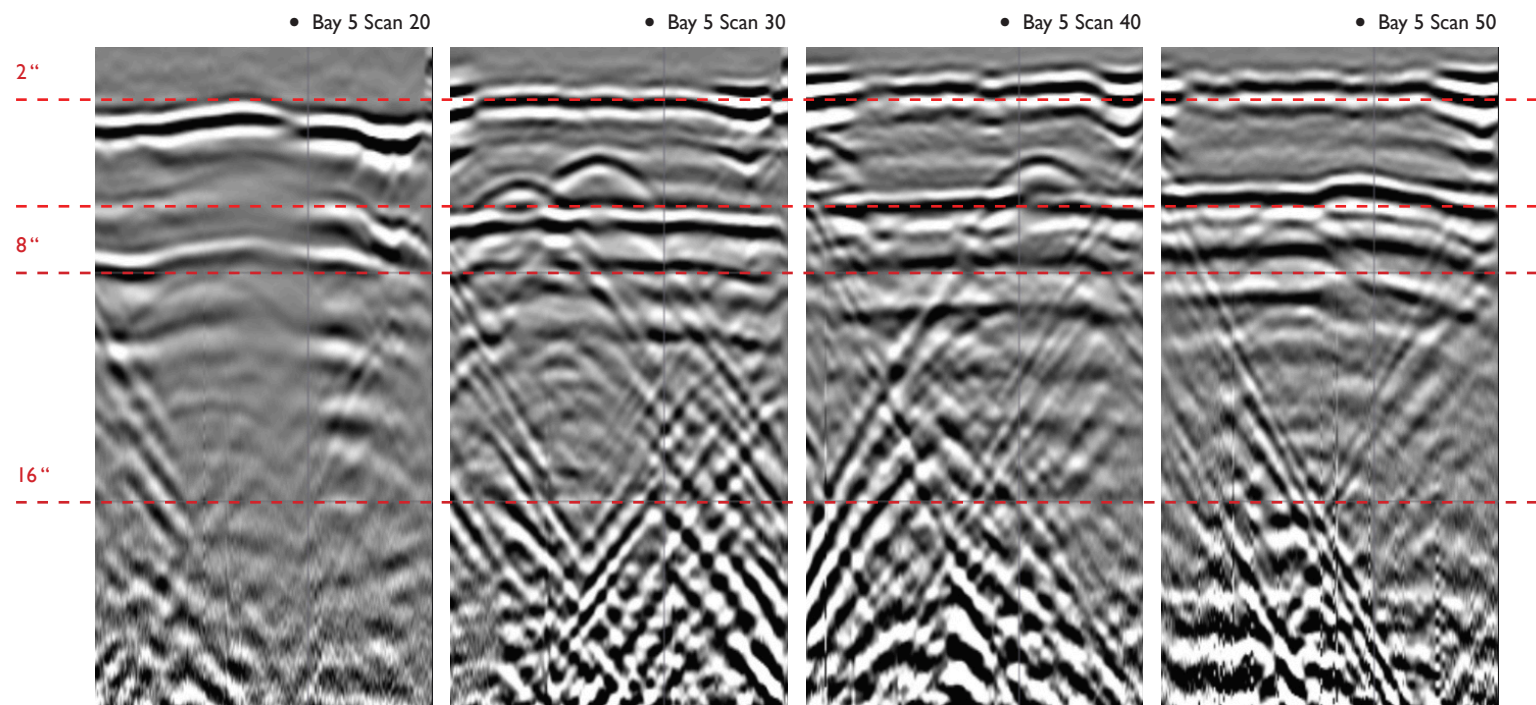


Figure 4.12 Latitude scans in Bay 5

Bay no.	Scan no.	Rebar Depth	Slab Thickness	Cover
Bay 1	Scan 10	5.1”, 4.3”	6.6”	0.9”, 2.3”
	Scan 12	4.6”, 5.3”	6.6”	2”, 1.3”
	Scan 13	4.7”, 5.1”	6.6”	1.9”, 1.5”
Bay 5	Scan 23	4.8”, 4.3”	6.3”	1.5”, 2”
	Scan 28	4.0”	5.5”	1.5”
	Scan 40	4.6”	6.6”	2”

Table 4.1 Concrete cover of Bay 1 & Bay 5

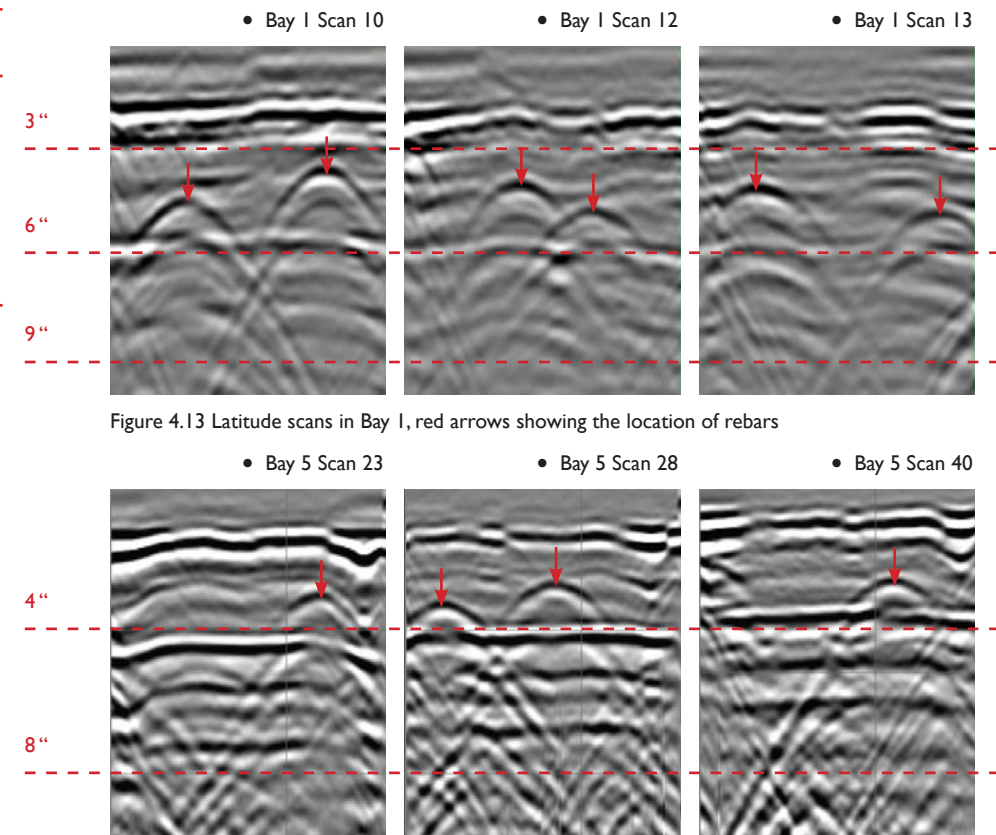


Figure 4.13 Latitude scans in Bay 1, red arrows showing the location of rebars

Figure 4.14 Latitude scans in Bay 5, red arrows showing the location of rebars

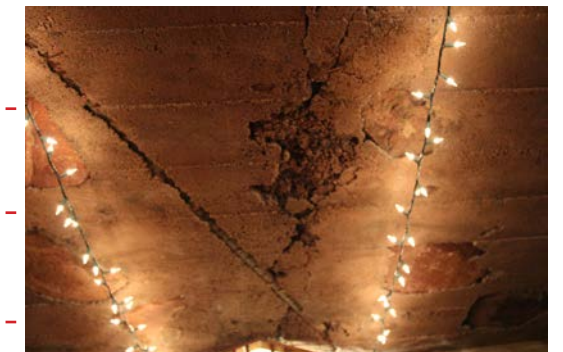


Figure 4.15 Photo taken from underside of the roof slab showing the exposed rebars
 Image credit: Author, March 2023



Figure 4.16 Photo taken from underside of the roof slab showing the exposed rebars
 Image credit: Author, March 2023



Beam

For the beams added onto the roof in 1950, the historic drawings in the archive are also insufficient in the reinforce and dimension information. These eleven line scans were conducted to determine the reinforcement layout. These beam scans were taken on Beam 4 on March 7th, 2023.

By aligning the scans and records of the scan location, and connecting the hyperbola found on each scan (Figure 4.17), we can determine that there are at least nine rebars as reinforcement in two directions in each beam (Figures

4.18 & 4.19). There are three longitude rebars: One is along the surface topside of the beam with a consistent depth of 2", and the other two are along the surface of the roof slab and slightly descending towards ground. The other six are transverse latitude rebars.

Compared to the historic section, the reinforcement is similar to its original design; however, the plate beneath the beam is not present in the downside of the roof slab.

The overall condition of the beam is sound without any efflorescence, bio-growth, cracking and exposed rebar.

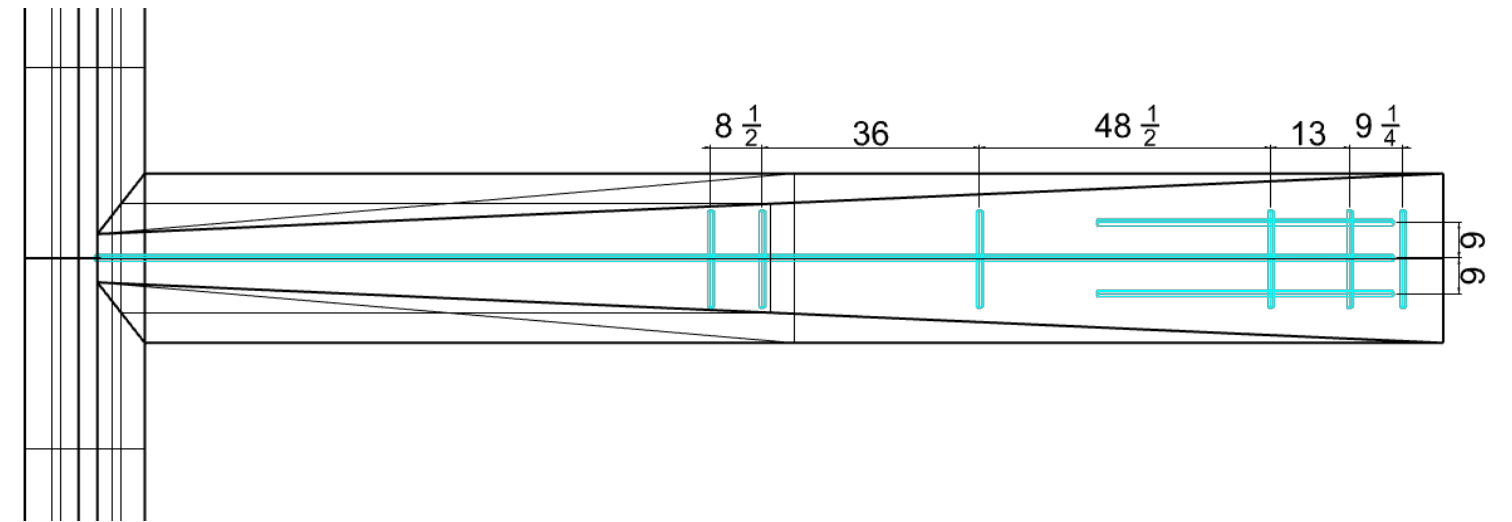


Figure 4.18 Beam Reinforcement Top View

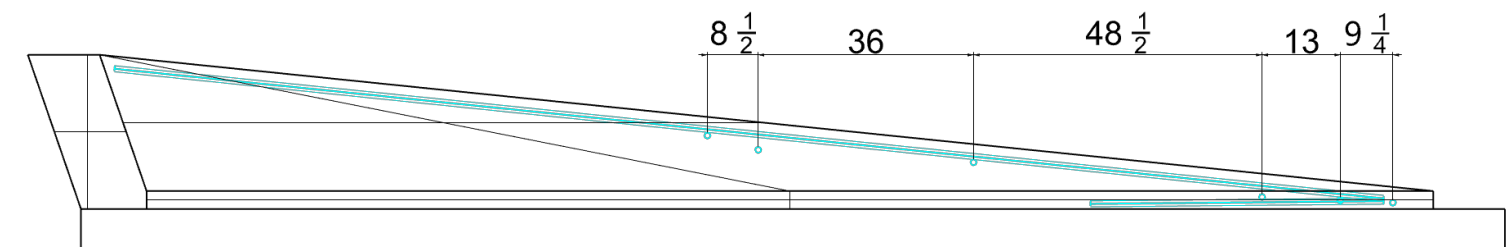
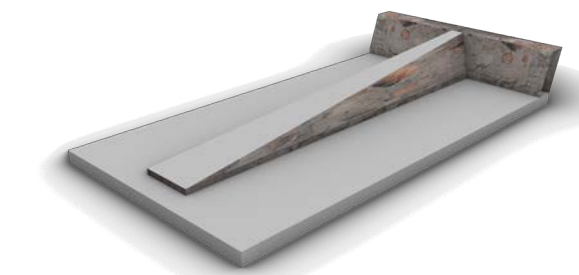
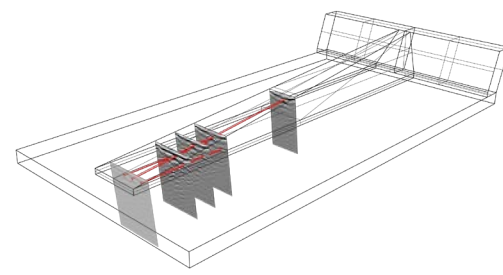


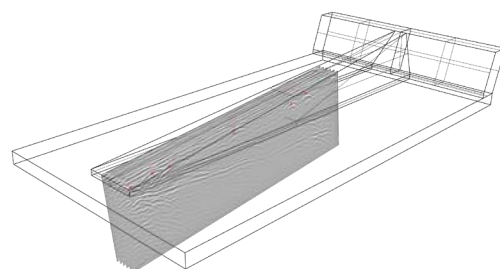
Figure 4.19 Beam Reinforcement Side View



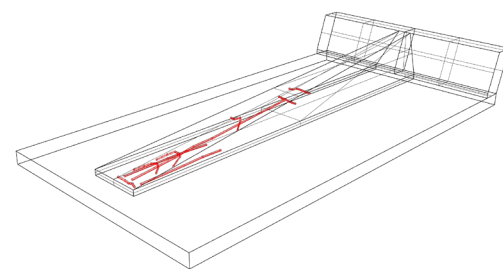
Step 0. Basic Modeling and Documentation



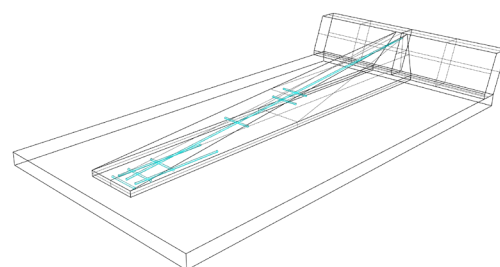
Step 1. Laying and mapping transverse scans (1-5)



Step 2. Laying and mapping longitude scans (A-F)

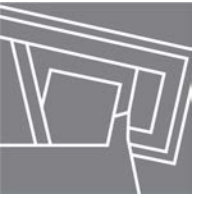


Step 3. Composing scan results



Step 4. Calibrating scan results

Figure 4.17 Beam Reinforcement Layout Modeling Diagram



Edge of Roof Slab

After analyzing the Ground Penetrating Radar (GPR) data collected during the scan of Bay 5, presence of steel reinforcements at the edge of the roof slab was detected (Figure 4.20). Based on archival photographs, the x-pattern rebars ran across the bays with the end that

extends parallel to the west wall, securely anchoring into the end support sections (Figure 4.21). A comparison of the data of Bay 5 indicates that the depth of the reinforcements is consistent, which confirms the previous assumption regarding the profile of the X-pattern reinforcement at the edge of the roof slab (Figure 4.22).



Figure 4.20 Location of the scan; arrows indicative of scanning direction
 Image Credit: Author, March 2023



Figure 4.21 1948 construction photo of the roof showing the X-pattern rebar anchoring into the end slabs along the West end.
 Source: Frank Lloyd Wright Foundation Archives

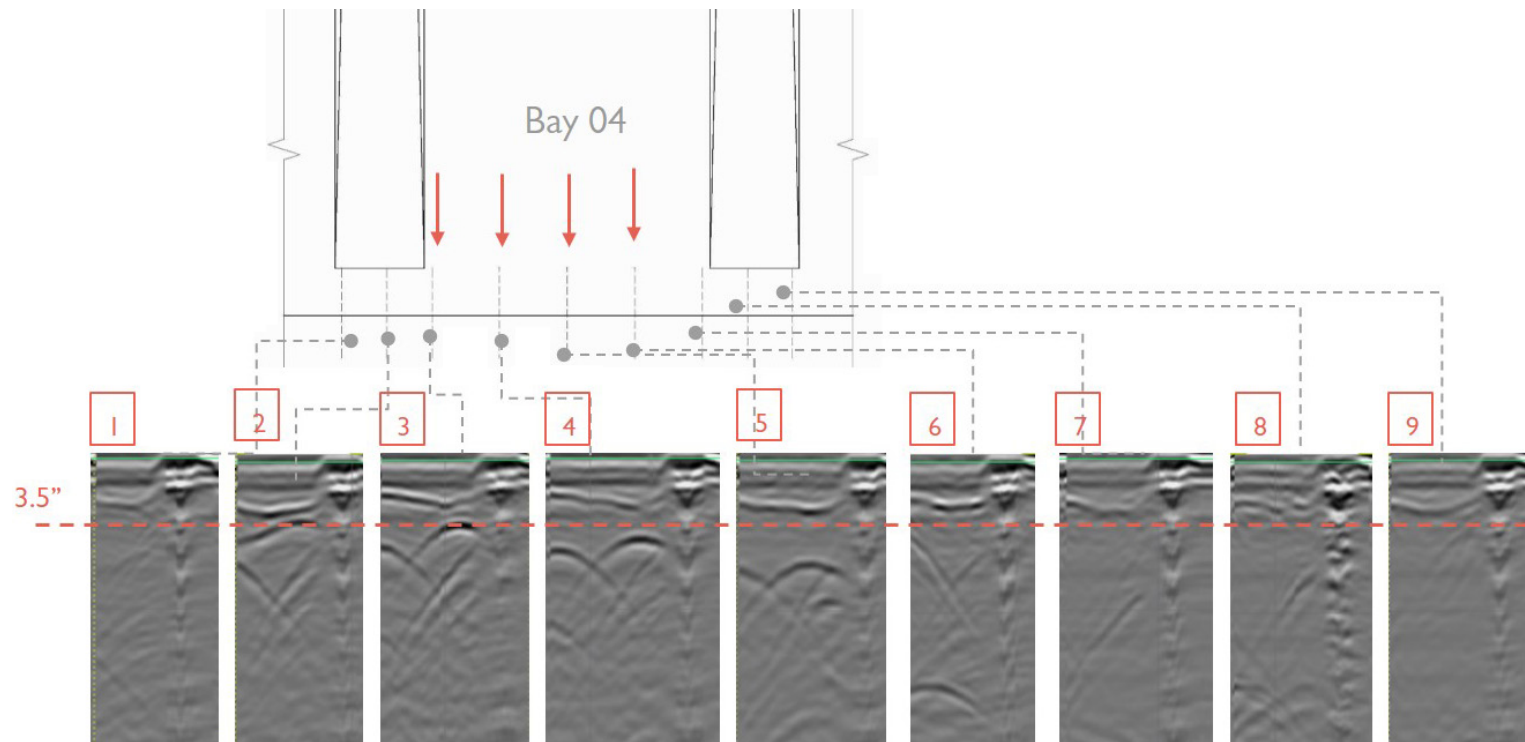


Figure 4.22 Line Scans from Bay 3 - Edge of the Roof Slab

West Wall

Based on archival data, it was discovered that the use of reinforcements was limited to the roof slab of the Cabaret. However, to further investigate the possibility of any reinforcements anchoring the walls to the roof slab, line scans were conducted along a segment of the wall,

with a spacing of 1 foot between each scan (Figure 4.23). These line scans were performed in both directions (Figure 4.24). However, no rebar was discovered in the west wall (Figure 4.25). This confirms that no steel reinforcement was used for the construction of the walls using desert masonry.

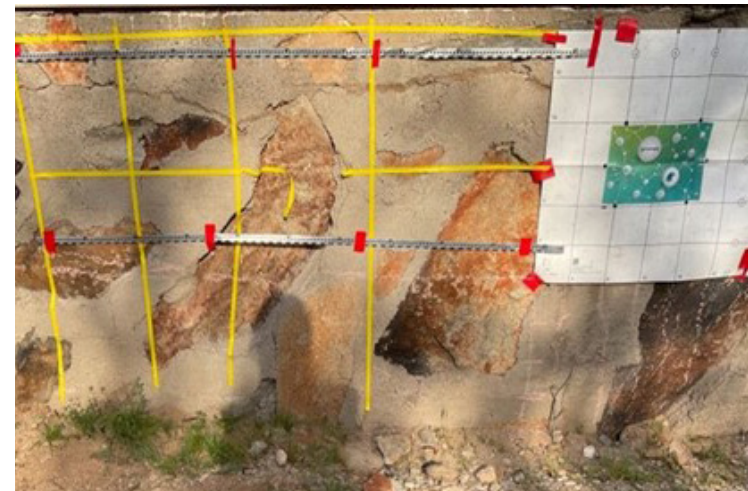


Figure 4.23 Grid laid out for taking line scans on the West Wall
 Image Credit: Author, March 2023



Figure 4.24 Student taking the GPR scan along the West wall
 Image Credit: Author, March 2023

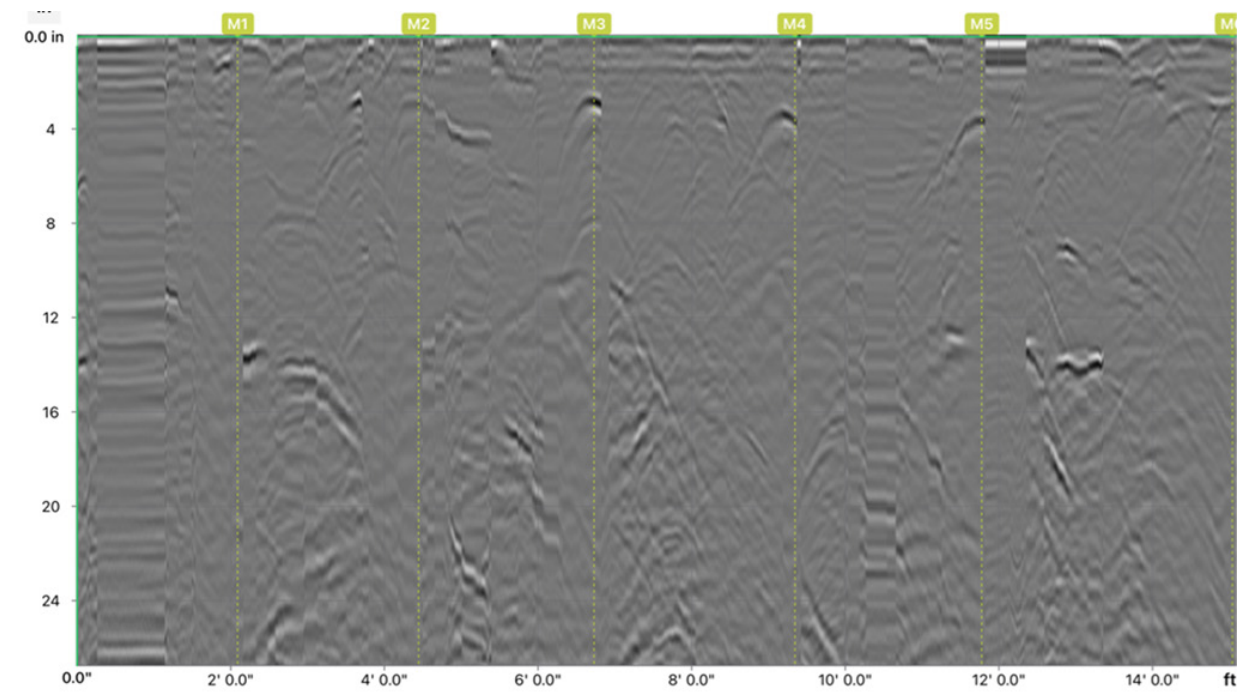


Figure 4.25 Line Scan reading of the West Wall



East Pier

Based on historical photographs and oral accounts, it is understood that the row of piers near the east wall were prefabricated on site and then installed in the space during

the 1950 construction period. To determine the presence of any reinforcements inside the piers, we carried out a GPR survey. Limited data could be acquired given the configuration of the pier, which did not allow us to collect enough scan (Figure 4.26).

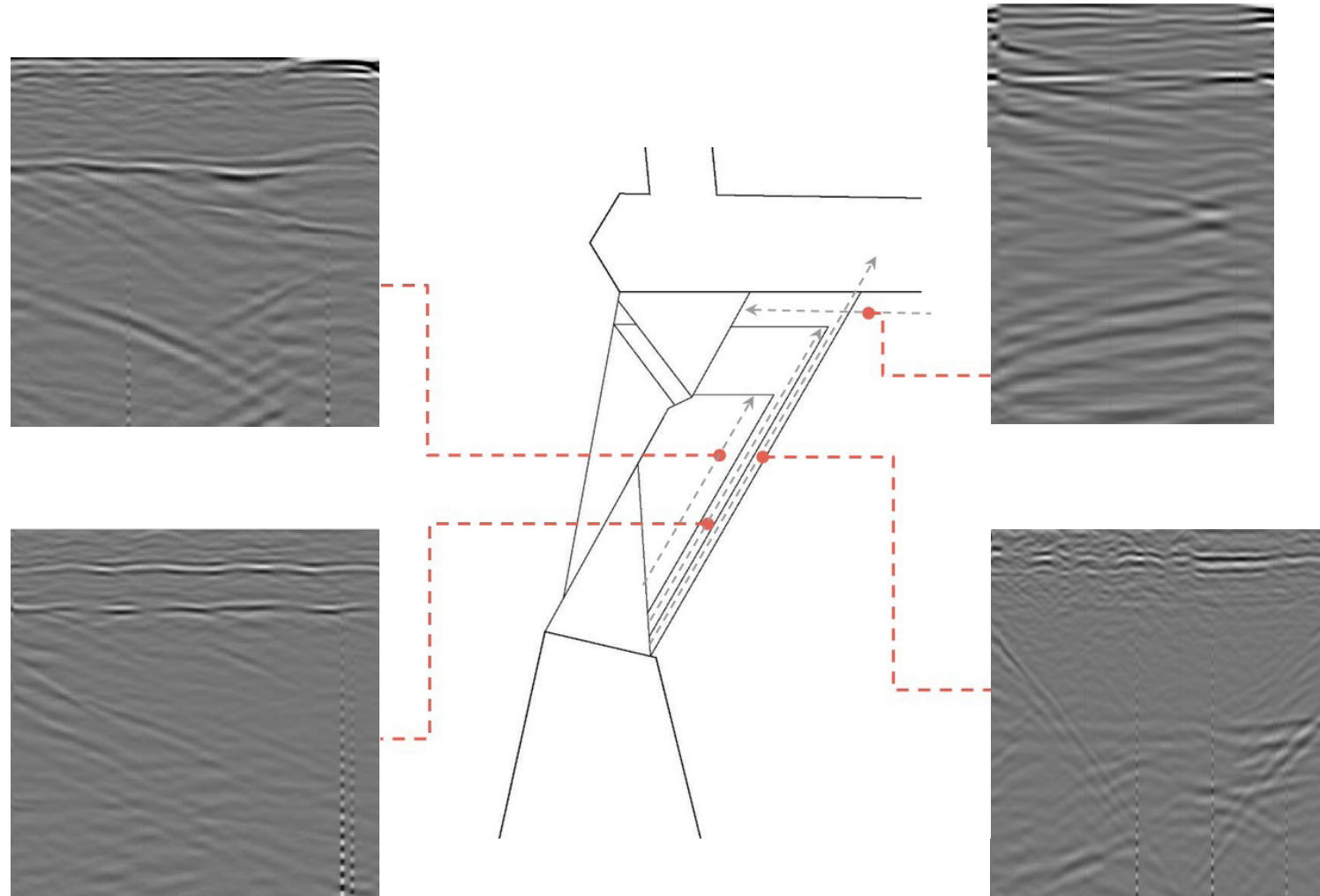


Figure 4.26 Line Scans of the East Pier

4.2 Art and Furnishings

4.2.1 Methodology

All artwork from Wright's collection and the furnishings designed for the Cabaret were inventoried and their general conditions recorded in an Excel spread sheet. For the same type of multiple elements such as operable panels and lights, the team created separate numbers for each which will help to locate each object more accurately (Table 4.2 & Figure 4.27).

4.2.2 Condition Summary and Locator Map

Object name	ID Number	Current Location	Condition
Studio Buddha	01	Center behind the entry door	Three cracks can be observed on the surface and restored by some kind of binder on the interior side
Chiwen-motif decorative roof tile	02	On the roof above the entrance.	The upper part is broken; several separate fragments are piled on the top; discoloring of the glaze;
Flora-motif carved wood plaque	03	Interior side of the entry door. Moved to the Archive in 2014	Severe distortion can be observed along the edge; some decoration parts in the center are missing.
Buddha-motif carved wood plaque	04	Above the Buddha sculpture	A deep vertical cracking in the center; discoloring of the paint
Entry Double Door	05	Entrance	Good
Painted concrete piers	06-14	West side of the corridor	Good
Decorative wood screen	15	Behind the Buddha head	Good
Decorative wood screen	16	West side of the Buddha head	Good
Decorative wood screen	17	End of the corridor	Good
Operable panels	18-26	East side of the corridor	Generally good. #22, #24: cracking near the hinge
Operable panels	27-35	West side of the corridor	Generally good. #28, #33: cracking near the hinge.
Base lights	36-43	Along the corridor	Generally good. #36 glass bulb is missing
Base lights	44-49	Along the aisle	Good.
Wall sconce	50-60	Along the west wall	Good
Hanging light	61	In front of the fireplace	Generally good. The Japanese paper lampshade is broken
Row of benches	62-66	Center of the theater, facing the screen at an angle	Generally good. #65 upholstery is worn off.
Freestanding hexagon-back chairs	67-90	Behind each row of benches	Generally good. Discoloring of the Cherokee Red paint on the metal frame is a common problem.
Freestanding drop-leaf tables	91-103	Behind each row of benches	Good
Gong	104	Beside the entry door	Good
Strip lights	105	On the ceiling	Good
Pot and shovel	106	In the fireplace	Good

Table 4.2 Table of the condition summary of the art and furnishings

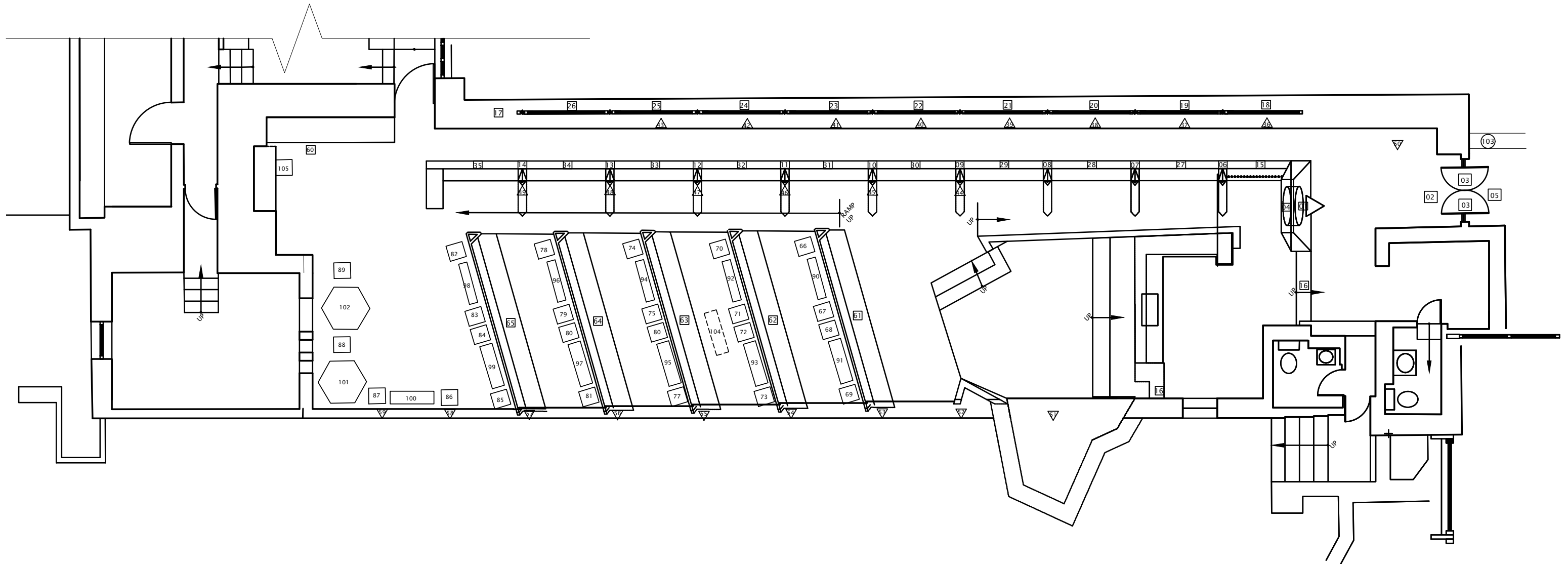


Figure 4.27 Furnishing locator map

Section 5. Recommendations



Figure 5.1 Historic photo of the Cabaret
 Image Credit: Frank Lloyd Wright Foundation Archives

5.1 Preservation Philosophy

Any preservation philosophy for the Cabaret should reflect the larger guiding principles already developed for the entire complex of Taliesin West. Although individual structures each have different significance and histories of change, all must be considered as part of a whole. This study of the Cabaret aims to establish a comprehensive framework that can guide all future decisions to ensure its significance and integrity including continued use as a theater and meeting space.

The 2015 Taliesin West Preservation Masterplan by Harboe Architects has identified the period of significance for Taliesin West as ranging from 1938 to 1959, and restoration efforts should endeavor to recapture the values and significance that were present at Taliesin West during Frank Lloyd Wright's lifetime. The recommendation however also maintains that individual structures that possess changes after Wright's death will require special consideration depending on the circumstances. The Cabaret is one such space, an essential building during the

first period of construction, its interior was sensitively renovated by Olgivanna soon after Wright's death to accommodate relaxed use. These modifications have now been in place for over 55 years, longer than Wright's 20-year period. As a result, designating a period of significance for the Cabaret should include the influence of Olgivanna Lloyd Wright, who made subtle but significant physical alterations after Wright's passing. Her changes should each be considered as well as those that occurred after her death.

By opting not to apply a period of significance, the preservation goal is to preserve the Cabaret in a manner that balances its essential design with modern needs and uses.

5.2 Structure

In general the condition of the Cabaret is good with the caveat that the roof/ceiling needs monitoring and possible intervention to ensure its stability. Three priority levels have been established based on the condition assessment:

	<u>Wall</u>	<u>Roof Slab</u>	<u>Reinforcement</u>
First Priority	Salt Test		
	Cleaning Salt		
Second Priority	Waterproof Layer Replacement		
		Carbonation Test	
Long-term Program	Moisture Content Test		Corrosion Test
		Crack Monitoring	

Figure 5.2 Recommendations matrix based on priority and building components



The first priority is to conduct salt analysis on the Cabaret's masonry. This will help to identify the type of salts and the source of the efflorescence, which could be from the concrete, stone, soil, or ground water. Identifying the salt type and source will assist in recommending the best long-term treatments and repair. If salts are residual in the mortar or stone from the original construction, efforts to poultice can only mitigate, not fully remove the salts. If the salts are extrinsic, coming from outside, then efforts to waterproof can eradicate the salt migration followed by a poultice removal treatment to remove as much salt as possible. To confirm whether the salts are active, qualitative monitoring should begin now by cleaning off all surface efflorescence using a dry brush and water poulticing and then monitoring with photography. RFID moisture tags or traditional moisture probe monitors can be installed for semi-quantitative measurement.

The second priority is the monitoring and if necessary, the replacement of the waterproof membrane at the roof slab previously installed in 2015. Waterproof membranes typically have a service life of 10 years depending on the exposure, and it is suggested to schedule the next replacement by 2025. To minimize the impact on the historic fabric and visitor experience, this replacement campaign can also be an opportunity to carry out additional testing including corrosion testing and concrete carbonation test. This test involves drilling and obtaining core samples from the roof slab to determine the extent of carbonation depth of the concrete overtime, responsible for the depassivation of the protective film on the reinforcing steel.¹ When the protective film is no longer present, corrosion of the steel reinforcement can occur if both oxygen and moisture are present to initiate the reaction. During the repair campaign in addition to carbonation tests, corrosion testing is recommended to be completed at the top side of the roof slab to assess the level of corrosion activity occurring at the steel reinforcement.

¹ Fuhaid, Abdulrahman Fahad Al, and Akbar Niaz. 2022. "Carbonation and Corrosion Problems in Reinforced Concrete Structures" Buildings 12, no. 5: 586. <https://doi.org/10.3390/buildings12050586>

Another important factor required for future structural preservation is determining the size of the rebar. Ground penetrating radar testing cannot provide this information, so it is recommended to use eddy current testing (ECT). ECT is a non-destructive inspection method used for flaw detection, material and coating thickness measurements, material identification, and determining the heat treatment condition of specific materials.² To apply Eddy current testing, attachment to the rebar is necessary. Similar to the concern for half-cell potential test, the replacement campaign scheduled in 2015 will be an ideal chance to conduct this test.

For the overall preservation of both concrete and steel reinforcement, it is essential to control the internal moisture condition to prevent corrosion and decreasing compressive strength of the concrete. To monitor moisture content, it is recommended to implement a long-term environmental monitoring program in the Cabaret. This program can also verify the effectiveness of the waterproofing installed along the west and east wall in 2014 and help determine the need for the next campaign.

Another long-term program that should be implemented is monitoring the movement of cracks located on the downside of the roof slab. Previous preservation records indicate a structural retrofitting campaign in 2012 that revealed structural displacement, which is a potential threat to the overall structure of the Cabaret. Crack motion monitoring is necessary to determine whether these cracks and displacement are still active and progressive. One way to conduct this monitoring program is to use crack monitor discs, which are small and not very visible to visitors. However, this device requires the use and reading of a caliper. Another way is to use scratch-a-track motion monitors, which cause more visible impacts but are easy to check for any motion.

² "Eddy Current Testing - A Definitive Guide," TWI, accessed April 22, 2023, <https://www.twi-global.com/technical-knowledge/job-knowledge/eddy-current-testing-123>.

5.3 Art and Furnishings

Based on our general preservation philosophy outlined for the Cabaret, the team believes that much of the artwork and furnishings placed within and designed for the building should be retained and, if necessary, replicated if the originals are too fragile for display in place. The art and furnishings within the Cabaret were essential to the enjoyment and use of the space by the Fellows and the public when invited. Below are specific recommendations for consideration:

1. Reinstall the canvas panels and rope-pulley control system while keeping current wood-operable panels. The kinetic experience of the operable canvas panels for light and ventilation was an essential component of the Cabaret visually and climatically. If the building is to be used year-round, air conditioning will still be required. This will mean installing modified canvas panels that could be operable but would allow year-round use of the building when closed. Retention of the wooden panels in a down position would be to show the system's evolution or for protection in the event of a storm. The current work at Wright's Office on designing modified canvas panels for climate control, natural lighting, and ventilation should be referenced for application at the Cabaret.

2. Reinstall a photographic facsimile of the ceiling scroll and carved panels in their original location. Since a stable environment may not be possible to showcase the original wooden artwork, we recommend installing replicas as needed and placing the originals in collections storage or on display. Digital scans replicated through digital fabrication could easily provide exact facsimiles for installation.

3. The circuits of all lamps and lighting should be checked, and the damaged and aging wires and bulbs should be replaced. For example, the bulb in the base of the Buddha's head is not working correctly, and the relevant

control device cannot be found.

4. Since the benches are heavily used, some obvious cracks should be addressed, such as those connections between the bench and the wall. The seat fabric, where damaged, should also be replaced.

5. Oral history, photographs, and traces of adhesive found on the wall next to the fireplace confirm the presence of wall benches here in the past. These original wall benches or replicas could be reinstalled to provide an additional intimate gathering space in the Cabaret. The exact date for their removal is unknown but believed to be sometime in the late 1950s or early 1960s.

6. The precast piers should be returned to one of the actual schemes following the painted finishes analysis in Appendix D of this report.

7. Priority should be given to conserving the exterior dragon ceramic roof tile at the entrance. The detached components were piled up nearby and could easily be lost. All fragments should be collected and reinstated by a conservator.

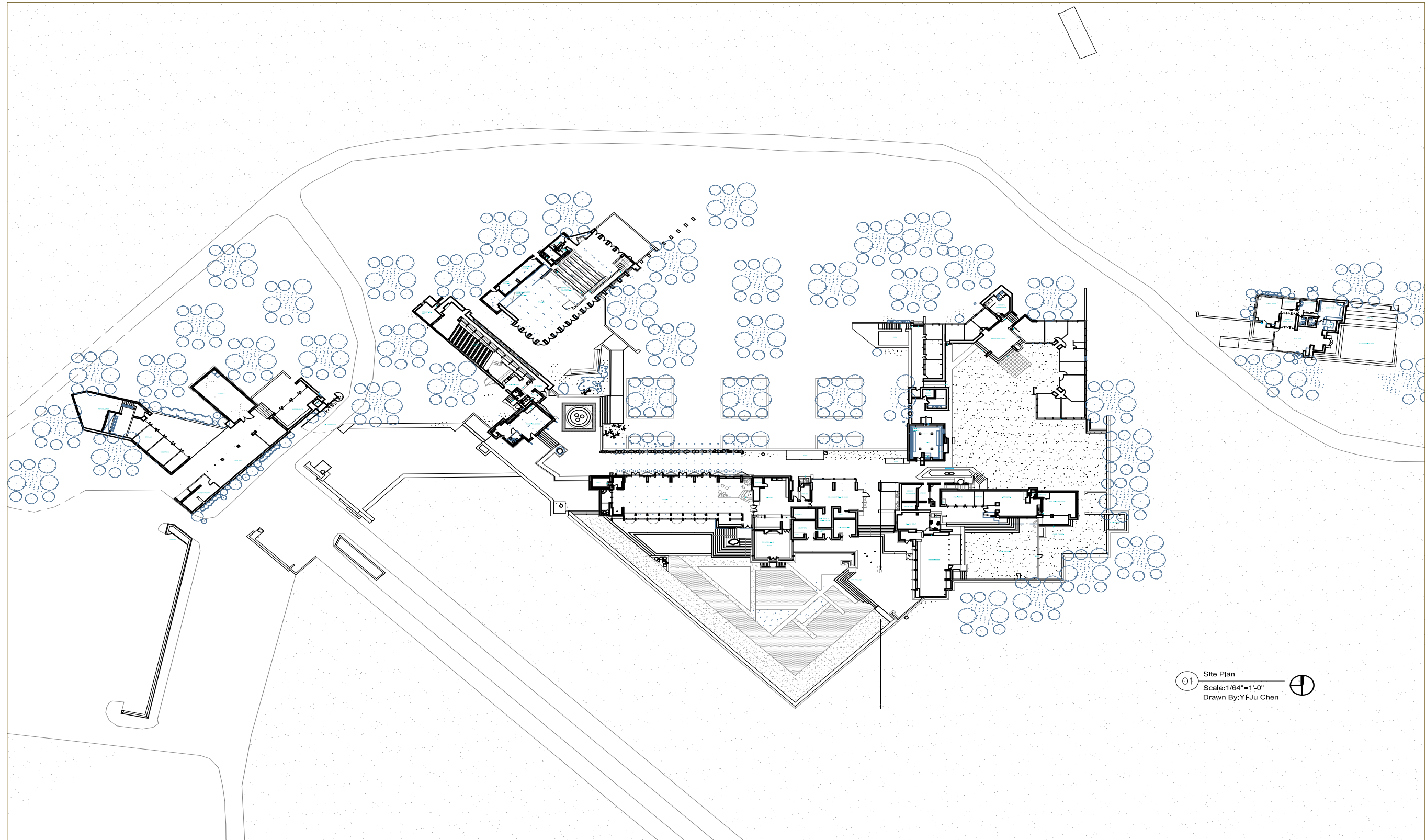
8. For the long term, we recommend monitoring all of the art and furnishings over time using a Rapid Assessment Survey and installing sensors to monitor the interior environment of the Cabaret and assess how it will affect the objects' conditions over time.

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Appendix A. Architectural Drawings



01 Site Plan
Scale: 1/64" = 1'-0"
Drawn By: Yi-Ju Chen

HSPV 721 TALIESIN WEST:
MATERIALS AND MATERIALITIES
CAPSTONE STUDIO IN
HERITAGE CONSERVATION

WEITZMAN SCHOOL OF DESIGN
UNIVERSITY OF PENNSYLVANIA



SPRING 2023

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Capstone Studio: Taliesin West
Historical Structure Report for the Cabaret

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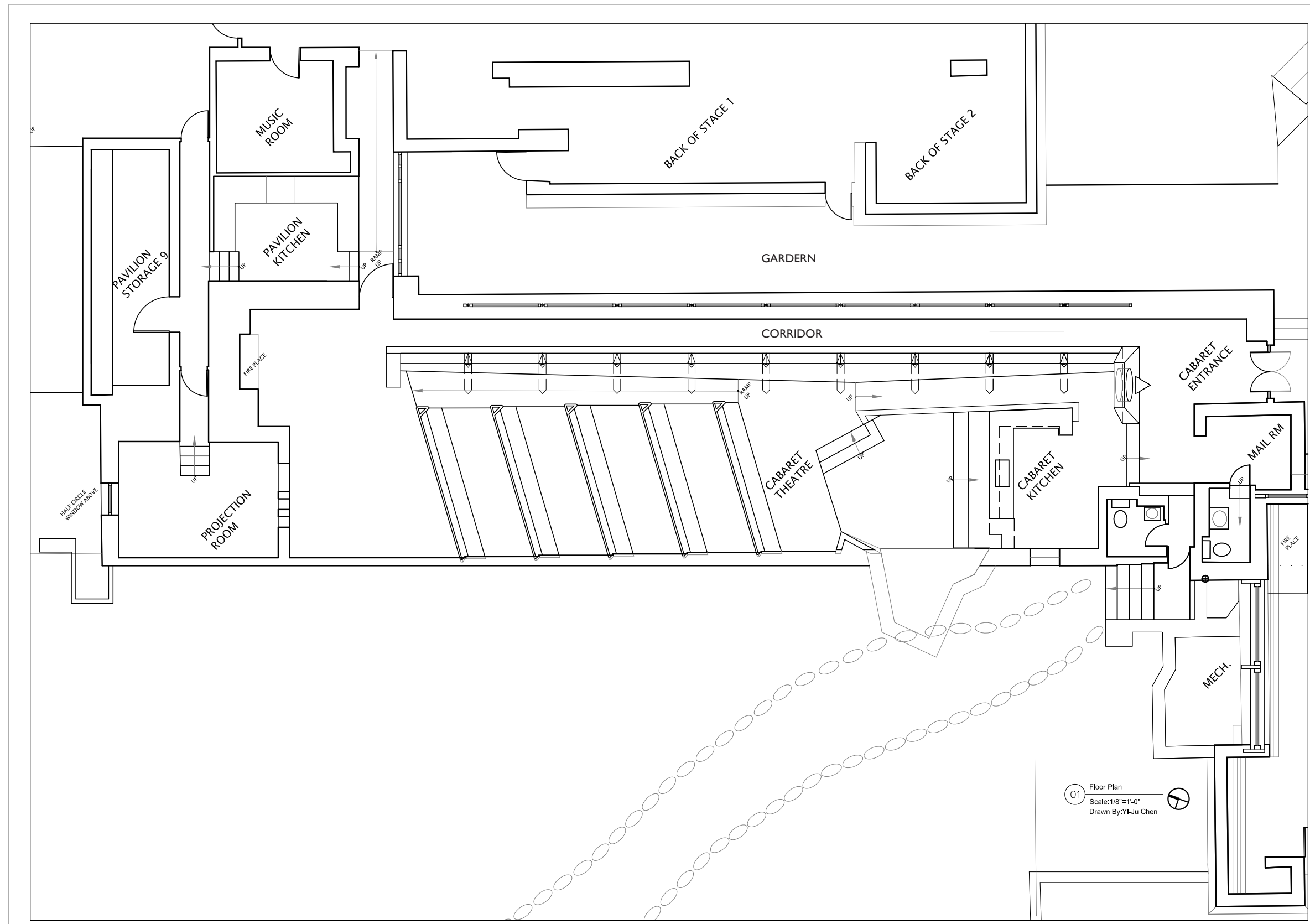
Group Members:
Yi-Ju Chen
Priyanka Gorasia
Anyuan Ji
Yuxuan Wu

SITE PLAN

DRAWN BY: YI-JU CHEN
DATE: 3/22/2023
SCALE: 1/64" = 1'-0"

BASE ON HABS DRAWINGS

A101



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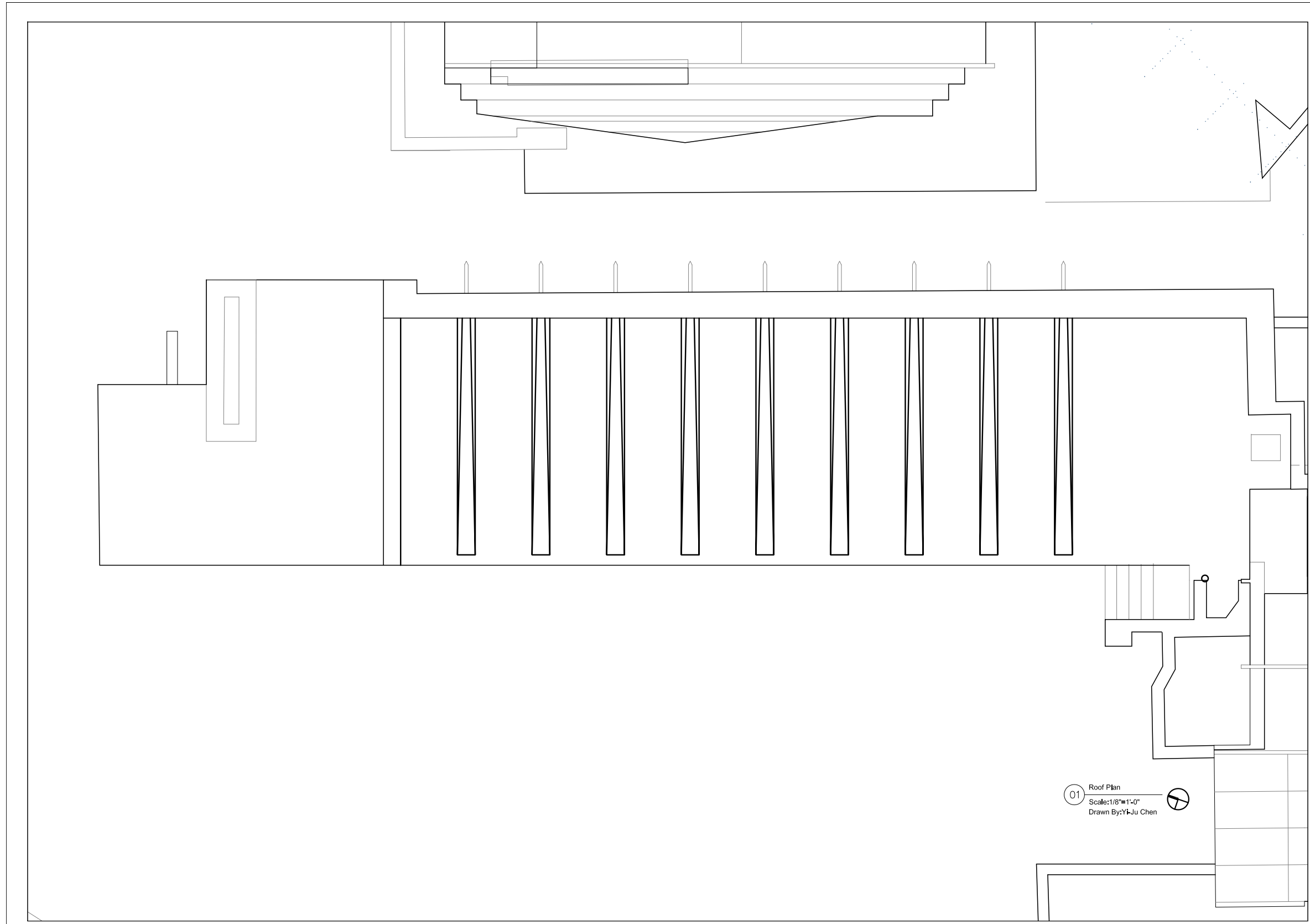
FLOOR PLAN

DRAWN BY: YI-JU CHEN
 DATE: 3/22/2023
 SCALE: 1/8"=1'-0"

BASE ON HABS DRAWINGS

A102

01 Floor Plan
 Scale: 1/8"=1'-0"
 Drawn By: Yi-Ju Chen



01 Roof Plan
Scale: 1/8"=1'-0"
Drawn By: Yi-Ju Chen

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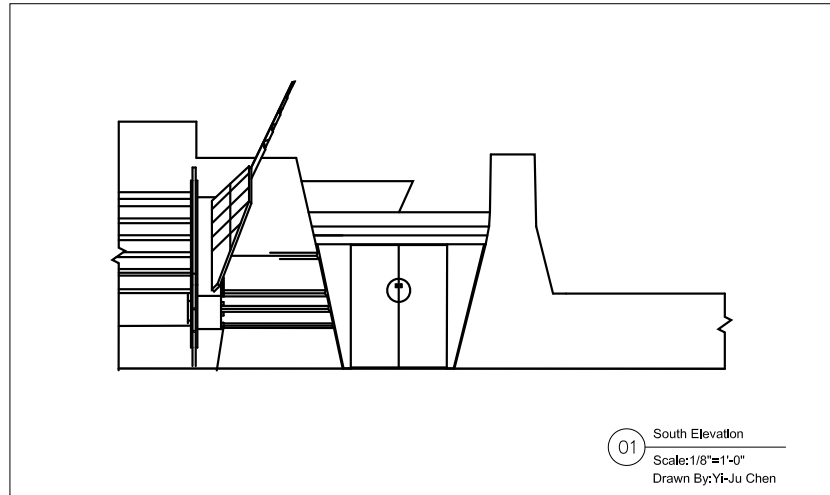
Group Members:
Yi-Ju Chen
Priyanka Gorasia
Anyuan Ji
Yuxuan Wu

ROOF PLAN

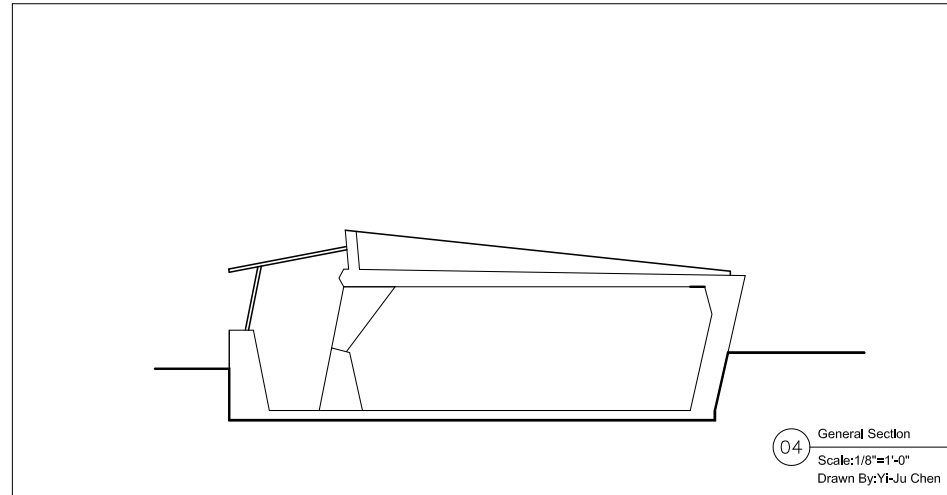
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DATE: 3/22/2023
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BASE ON HABS DRAWINGS

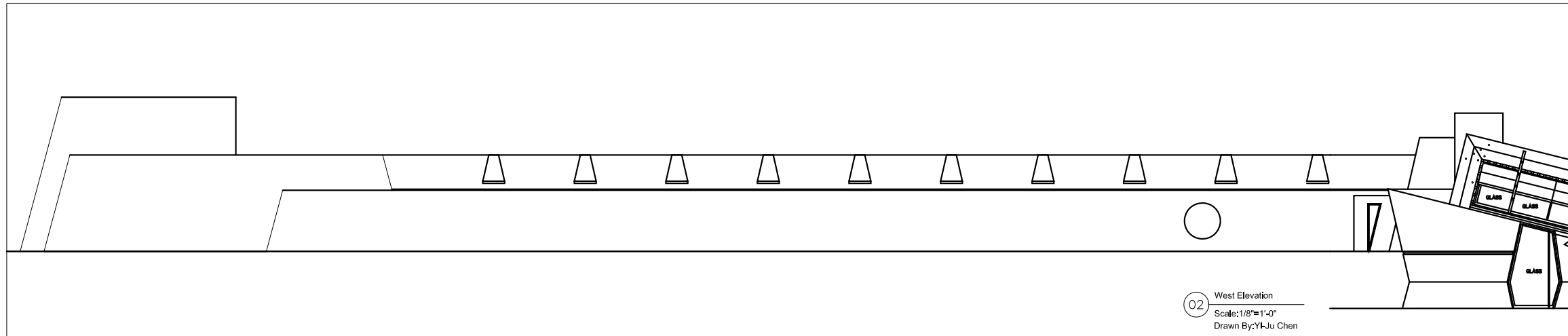
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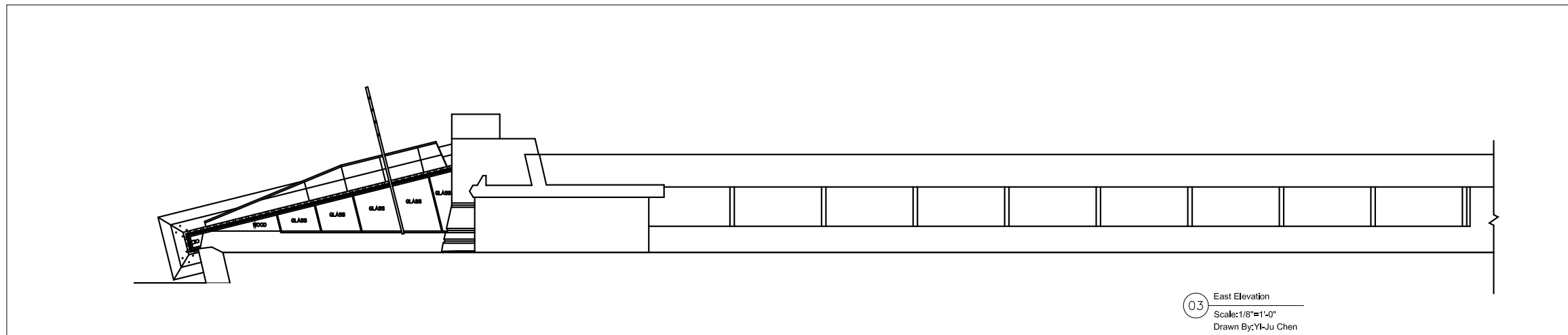
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 Drawn By: Yi-Ju Chen



04 General Section
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 Drawn By: Yi-Ju Chen



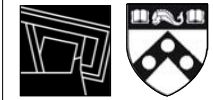
02 West Elevation
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 Drawn By: Yi-Ju Chen



03 East Elevation
 Scale: 1/8"=1'-0"
 Drawn By: Yi-Ju Chen

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ELEVATION & SECTION

DRAWN BY: YI-JU CHEN
 DATE: 3/22/2023
 SCALE: 1/8"=1'-0"

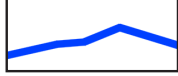







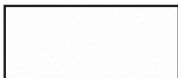

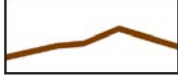

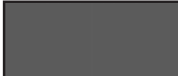

BASE ON HABS DRAWINGS

A201

Appendix B. Condition Glossary



Desert Masonry Condition Glossary

Condition	Symbology	Description	Reference Image
Cracks	 CR	Cracks larger than 3/16" in concrete surface.	
Delamination	 DE	Splitting/separation of concrete surface exposing reinforcing steel. Cracking of concrete surfaces in an isolated area with defined borders.	
Biogrowth	 BO	The presence of small plants, algae, fungi or lichens in areas exposed. It is an indication of the path of moisture	
Honeycombing	 HO	Small voids in concrete surface	
Efflorescence	 EF	Crystalline deposits resulting from the evaporation of water from a salt solution, which can form on the surface of a porous material exposed to air.	
Exposed Rebar	 ER	Reinforcing steel that's visible on the concrete surface that maybe indicative of underlying conditions	
Previous Repairs	 PR	Patch repairs that are inconsistent visually with the existing color and texture of the desert concrete	

Appendix C. Condition Assessment Drawings



01 Wall A - Condition Mapping
 Scale: 3/16" = 1'-0"
 Drawn By: Priyanka Gorasia

02 Wall A - Rectified Photo Elevation
 Scale: 3/16" = 1'-0"
 Drawn By: Priyanka Gorasia

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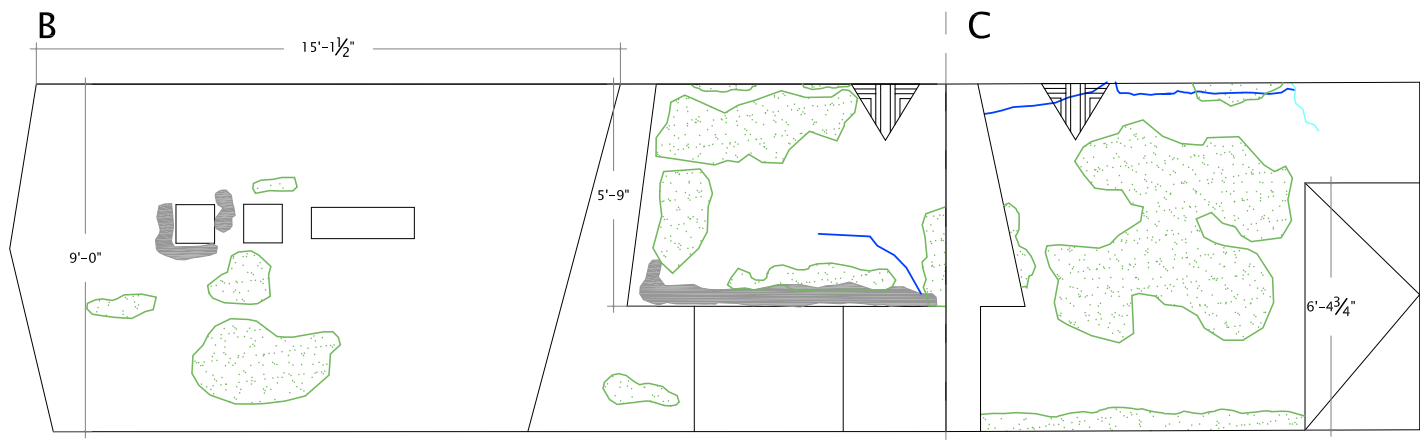
CONDITION ASSESSMENT
 INTERIOR WALL 'A'

DRAWN BY: PRIYANKA GORASIA
 DATE: 4/2/2023
 SCALE: 3/16" = 1'-0"

A301

KEY PLAN

CONDITIONS LEGEND	MATERIAL	ABB.	HATCH	CODE	CONDITION TYPE	NOTES
	DESERT MASONRY	DM		CR	CRACK	1. CONDITIONS SHOWN ARE REPRESENTATIVE OF THE BUILDING AS OF MARCH 2023. INACCESSIBLE AREAS ARE NOTED ON THE DRAWINGS. 2. THE SIZE AND SHAPE OF CONDITION HATCHES ARE DEPICTED FOR CLARITY AND ARE GENERALLY LARGER AND "SQUARED OFF." THEY DO NOT NECESSARILY CORRESPOND WITH THE BORDERS OF DAMAGE AREA. 3. DAMAGE TO LARGE SURFACE AREAS, SUCH AS OVERALL WALLS AND CEILINGS, ARE IDENTIFIED WITH EXTENT ARROWS KEYED TO NOTED CONDITION. ASSUME ENTIRE WALL OR CEILING PLANE UNLESS OTHERWISE NOTED.
	REINFORCED CONCRETE	RCC		DE	DELAMINATION	
	WOOD	WD		BO	BIOGROWTH	
	CONDITION TYPE	CODE		HO	HONEYCOMBING	
	EXISTING HARDWARE	EA		ER	EXPOSED REBAR	
	ELECTRICAL FIXTURE	EL		EF	EFFLORESCENCE	
	PLUMBING	PL		PR	PREVIOUS REPAIRS	



01 Wall B & C - Condition Mapping
 Scale: 1/4"=1'-0"
 Drawn By: Priyanka Gorasia



02 Wall B & C - Rectified Photo Elevation
 Scale: 1/4"=1'-0"
 Drawn By: Priyanka Gorasia

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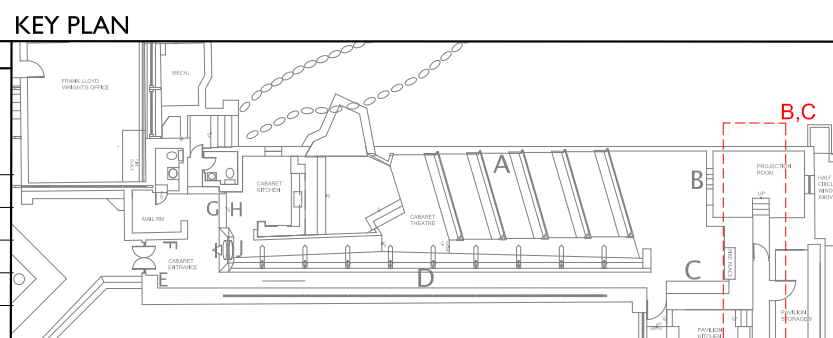
STUDIO INSTRUCTORS:
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Capstone Studio: Taliesin West
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 Scottsdale, AZ 85259

Group Members:
 Yi-Ju Chen
 Priyanka Gorasia
 Anyuan Ji
 Yuxuan Wu

CONDITIONS LEGEND	MATERIAL	ABB.	HATCH	CODE	CONDITION TYPE	NOTES
Material abbreviation: DM - CR_01 Condition Code: DM - CR_01 Dimensions: DM - CR_01 Dot: Surface Condition: DM - CR_01	DESERT MASONRY	DM		CR	CRACK	1. CONDITIONS SHOWN ARE REPRESENTATIVE OF THE BUILDING AS OF MARCH 2023. INACCESSIBLE AREAS ARE NOTED ON THE DRAWINGS. 2. THE SIZE AND SHAPE OF CONDITION HATCHES ARE DEPICTED FOR CLARITY AND ARE GENERALLY LARGER AND "SQUARED OFF." THEY DO NOT NECESSARILY CORRESPOND WITH THE BORDERS OF DAMAGE AREA. 3. DAMAGE TO LARGE SURFACE AREAS, SUCH AS OVERALL WALLS AND CEILINGS, ARE IDENTIFIED WITH EXTENT ARROWS KEYED TO NOTED CONDITION. ASSUME ENTIRE WALL OR CEILING PLANE UNLESS OTHERWISE NOTED.
	REINFORCED CONCRETE	RCC		DE	DELAMINATION	
	WOOD	WD		BO	BIOGROWTH	
	CONDITION TYPE	CODE		HO	HONEYCOMBING	
	EXISTING HARDWARE	EA		ER	EXPOSED REBAR	
	ELECTRICAL FIXTURE	EL		EF	EFFLORESCENCE	
	PLUMBING	PL		PR	PREVIOUS REPAIRS	



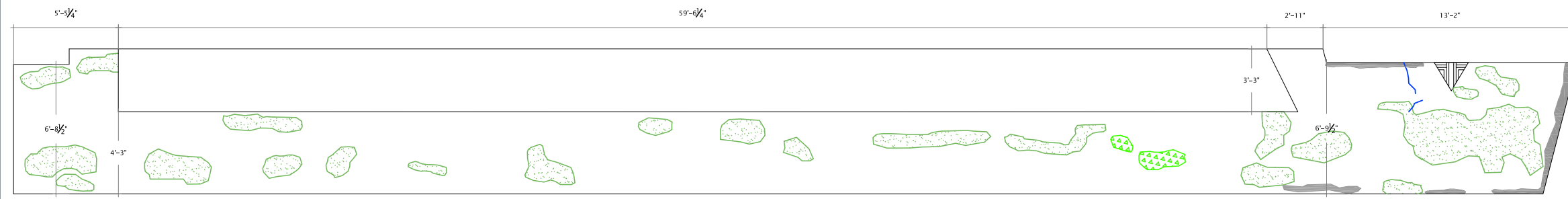
CONDITION ASSESSMENT
 INTERIOR WALL 'B' and 'C'

DRAWN BY: PRIYANKA GORASIA
 DATE: 4/2/2023
 SCALE: 1/4"=1'-0"

A302



D



01 Wall D - Condition Mapping
 Scale: 3/16"=1'-0"
 Drawn By: Priyanka Gorasia



02 Wall D - Rectified Photo Elevation
 Scale: 3/16"=1'-0"
 Drawn By: Priyanka Gorasia

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 STUDIO INSTRUCTORS:
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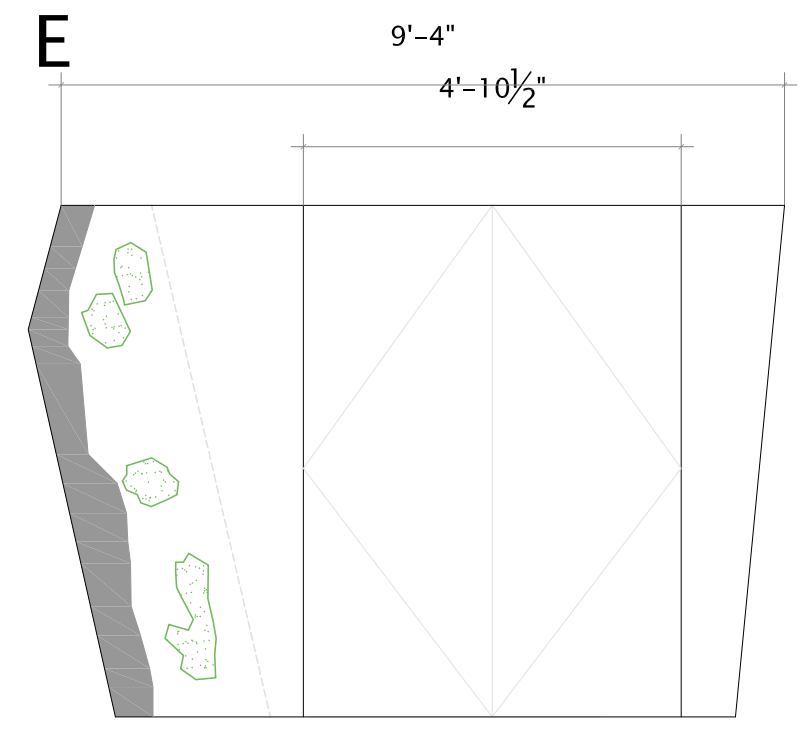
Capstone Studio: Taliesin West
 Cabaret Theater Historic Structure Report
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Group Members:
 Yi-Ju Chen
 Priyanka Gorasia
 Anyuan Ji
 Yuxuan Wu

KEY PLAN

CONDITIONS LEGEND	MATERIAL	ABB.	HATCH	CODE	CONDITION TYPE	NOTES
Material abbreviation: DM - CR_01 Condition Code: CR Dimensions: 6'-8 1/2", 4'-3" Dot: Surface Condition	DESERT MASONRY	DM		CR	CRACK	1. CONDITIONS SHOWN ARE REPRESENTATIVE OF THE BUILDING AS OF MARCH 2023. INACCESSIBLE AREAS ARE NOTED ON THE DRAWINGS. 2. THE SIZE AND SHAPE OF CONDITION HATCHES ARE DEPICTED FOR CLARITY AND ARE GENERALLY LARGER AND "SQUARED OFF." THEY DO NOT NECESSARILY CORRESPOND WITH THE BORDERS OF DAMAGE AREA. 3. DAMAGE TO LARGE SURFACE AREAS, SUCH AS OVERALL WALLS AND CEILINGS, ARE IDENTIFIED WITH EXTENT ARROWS KEYED TO NOTED CONDITION. ASSUME ENTIRE WALL OR CEILING PLANE UNLESS OTHERWISE NOTED.
	REINFORCED CONCRETE	RCC		DE	DELAMINATION	
	WOOD	WD		BO	BIOGROWTH	
	CONDITION TYPE	CODE		HO	HONEYCOMBING	
	EXISTING HARDWARE	EA		ER	EXPOSED REBAR	
	ELECTRICAL FIXTURE	EL		EF	EFFLORESCENCE	
	PLUMBING	PL		PR	PREVIOUS REPAIRS	

CONDITION ASSESSMENT
 INTERIOR WALL 'D'
 DRAWN BY: PRIYANKA GORASIA
 DATE: 4/2/2023
 SCALE: 3/16"=1'-0"
A303



01 Wall E - Condition Mapping
 Scale: 1/2"=1'-0"
 Drawn By: Priyanka Gorasia



02 Wall F - Condition Mapping
 Scale: 1/2"=1'-0"
 Drawn By: Priyanka Gorasia

HSPV 721 TALIESIN WEST:
 MATERIALS AND MATERIALITIES
 CAPSTONE STUDIO IN
 HERITAGE CONSERVATION

WEITZMAN SCHOOL OF DESIGN
 UNIVERSITY OF PENNSYLVANIA



SPRING 2023

STUDIO INSTRUCTORS:
 IRENE MATTEINI
 FRANK MATERO

Capstone Studio: Taliesin West
Cabaret Theater Historic Structure Report

12621 N Frank Lloyd Wright Blvd,
 Scottsdale, AZ 85259

Group Members:

Yi-Ju Chen
 Priyanka Gorasia
 Anyuan Ji
 Yuxuan Wu

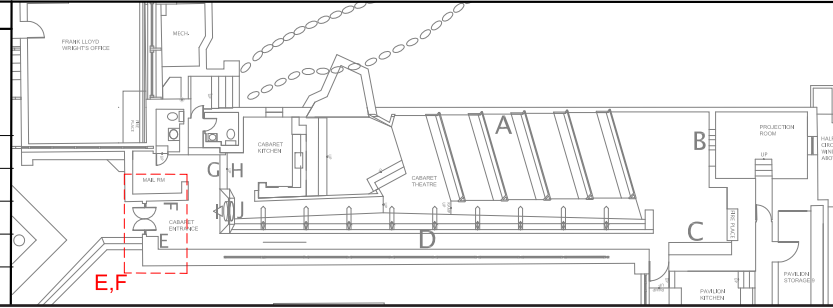
CONDITION ASSESSMENT
 INTERIOR WALL 'E' and 'F'

DRAWN BY: PRIYANKA GORASIA
 DATE: 4/2/2023
 SCALE: 1/2"=1'-0"

A304

CONDITIONS LEGEND	MATERIAL	ABB.	HATCH	CODE	CONDITION TYPE	NOTES
Material abbreviation: DM - CR_01 Condition Code: CR Dimensions: [Symbol] Dot: Surface Condition	DESERT MASONRY	DM	[Hatch]	CR	CRACK	1. CONDITIONS SHOWN ARE REPRESENTATIVE OF THE BUILDING AS OF MARCH 2023. INACCESSIBLE AREAS ARE NOTED ON THE DRAWINGS. 2. THE SIZE AND SHAPE OF CONDITION HATCHES ARE DEPICTED FOR CLARITY AND ARE GENERALLY LARGER AND "SQUARED OFF." THEY DO NOT NECESSARILY CORRESPOND WITH THE BORDERS OF DAMAGE AREA. 3. DAMAGE TO LARGE SURFACE AREAS, SUCH AS OVERALL WALLS AND CEILINGS, ARE IDENTIFIED WITH EXTENT ARROWS KEYED TO NOTED CONDITION. ASSUME ENTIRE WALL OR CEILING PLANE UNLESS OTHERWISE NOTED.
	REINFORCED CONCRETE	RCC	[Hatch]	DE	DELAMINATION	
	WOOD	WD	[Hatch]	BO	BIOGROWTH	
	CONDITION TYPE	CODE	[Hatch]	HO	HONEYCOMBING	
	EXISTING HARDWARE	EA	[Hatch]	ER	EXPOSED REBAR	
	ELECTRICAL FIXTURE	EL	[Hatch]	EF	EFFLORESCENCE	
	PLUMBING	PL	[Hatch]	PR	PREVIOUS REPAIRS	

KEY PLAN





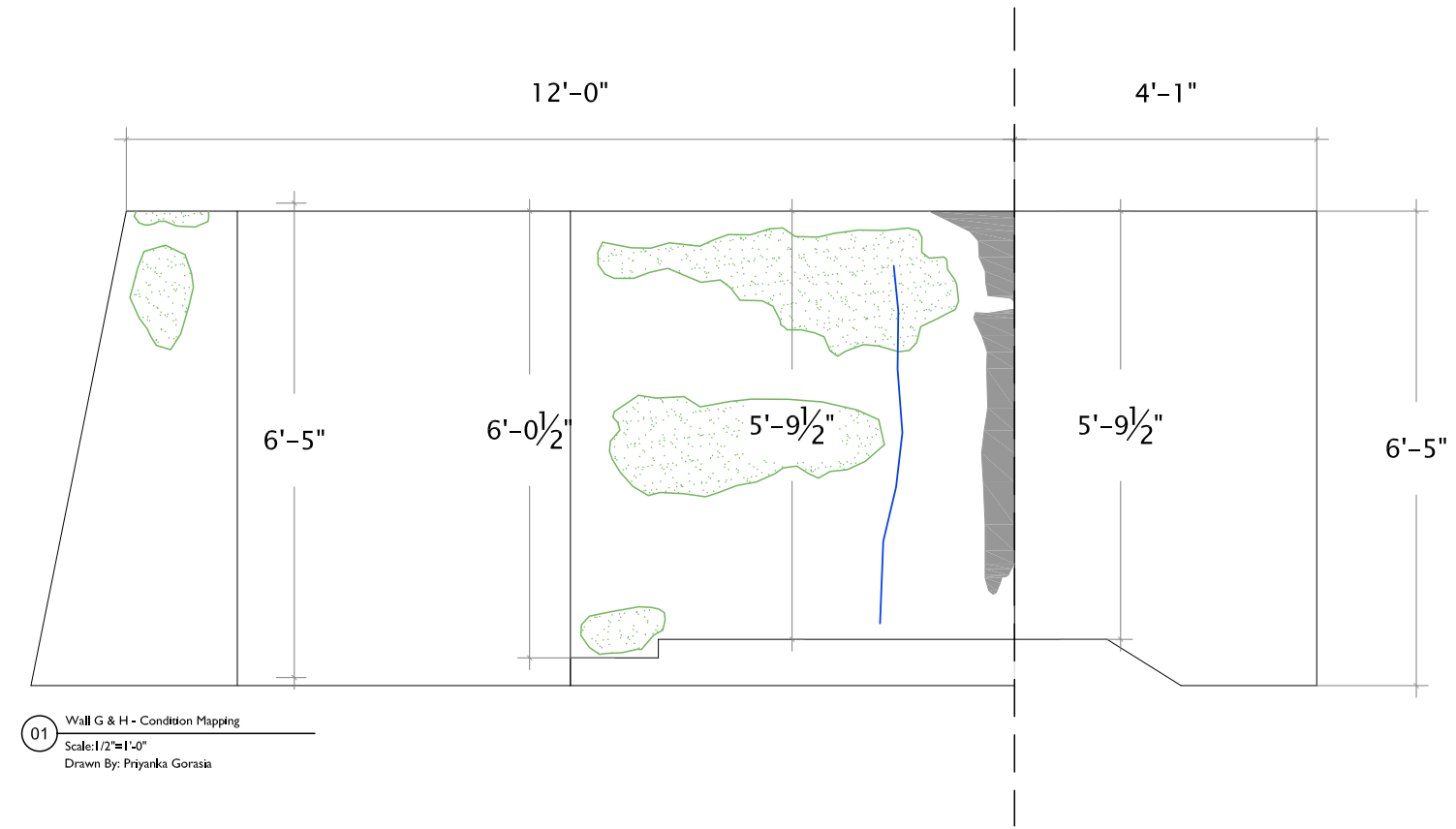
HSPV 721 TALIESIN WEST:
 MATERIALS AND MATERIALITIES
 CAPSTONE STUDIO IN
 HERITAGE CONSERVATION

WEITZMAN SCHOOL OF DESIGN
 UNIVERSITY OF PENNSYLVANIA



SPRING 2023

STUDIO INSTRUCTORS:
 IRENE MATTEINI
 FRANK MATERO



01 Wall G & H - Condition Mapping
 Scale: 1/2"=1'-0"
 Drawn By: Priyanka Gorasia

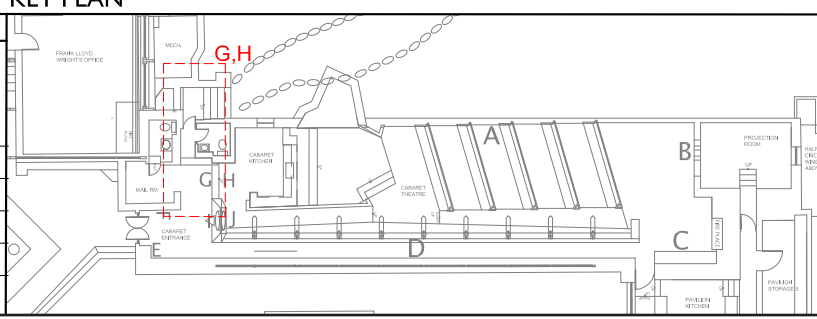
Capstone Studio: Taliesin West
 Cabaret Theater Historic Structure Report

12621 N Frank Lloyd Wright Blvd.
 Scottsdale, AZ 85259

Group Members:
 Yaju Chen
 Priyanka Gorasia
 Anyuan Ji
 Yuxuan Wu

KEY PLAN

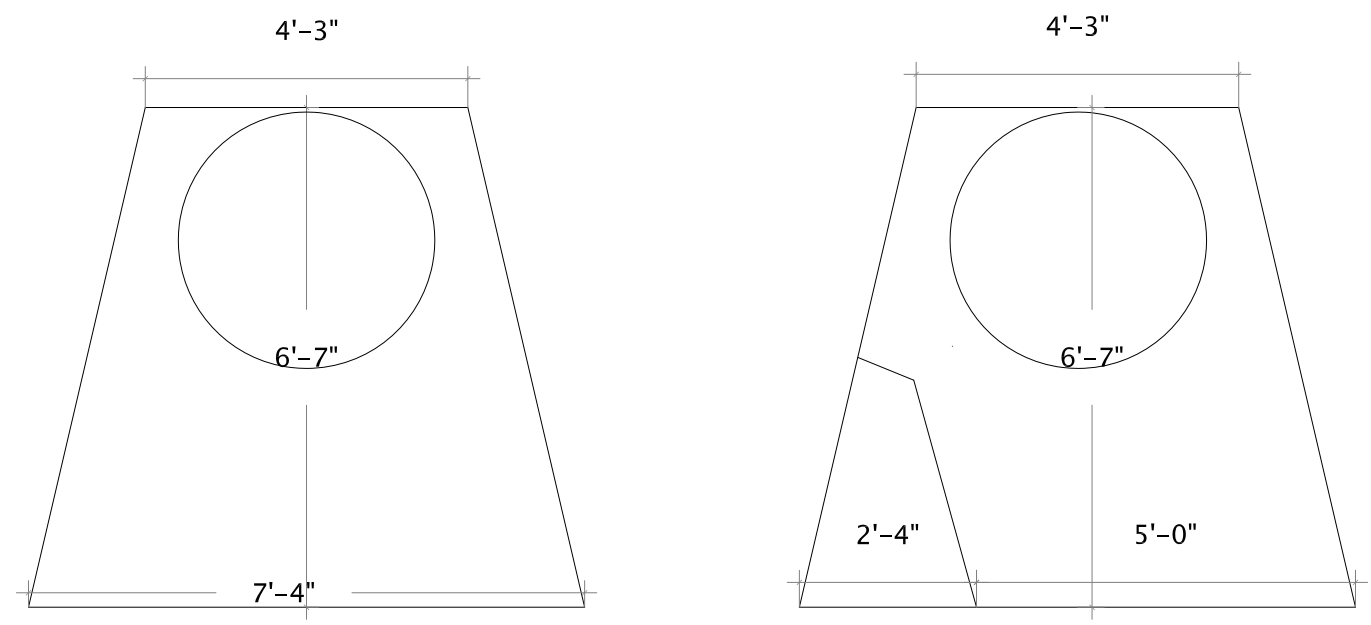
CONDITIONS LEGEND	MATERIAL	ABB.	HATCH	CODE	CONDITION TYPE	NOTES
Material abbreviation: DM - CR_01 Condition Code: CR Dimensions: [Symbol] Dot: Surface Condition	DESERT MASONRY	DM	[Hatch]	CR	CRACK	1. CONDITIONS SHOWN ARE REPRESENTATIVE OF THE BUILDING AS OF MARCH 2023. INACCESSIBLE AREAS ARE NOTED ON THE DRAWINGS. 2. THE SIZE AND SHAPE OF CONDITION HATCHES ARE DEPICTED FOR CLARITY AND ARE GENERALLY LARGER AND "SQUARED OFF." THEY DO NOT NECESSARILY CORRESPOND WITH THE BORDERS OF DAMAGE AREA. 3. DAMAGE TO LARGE SURFACE AREAS, SUCH AS OVERALL WALLS AND CEILINGS, ARE IDENTIFIED WITH EXTENT ARROWS KEYED TO NOTED CONDITION. ASSUME ENTIRE WALL OR CEILING PLANE UNLESS OTHERWISE NOTED.
	REINFORCED CONCRETE	RCC	[Hatch]	DE	DELAMINATION	
	WOOD	WD	[Hatch]	BO	BIOGROWTH	
	CONDITION TYPE	CODE	[Hatch]	HO	HONEYCOMBING	
	EXISTING HARDWARE	EA	[Hatch]	ER	EXPOSED REBAR	
	ELECTRICAL FIXTURE	EL	[Hatch]	EF	EFFLORESCENCE	
	PLUMBING	PL	[Hatch]	PR	PREVIOUS REPAIRS	



CONDITION ASSESSMENT
 INTERIOR WALL 'G' and 'H'

DRAWN BY: PRIYANKA GORASIA
 DATE: 4/2/2023
 SCALE: 1/2"=1'-0"

A305



01 Wall I & J - Condition Mapping
 Scale: 1/2"=1'-0"
 Drawn By: Priyanka Gorasia

HSPV 721 TALIESIN WEST:
 MATERIALS AND MATERIALITIES
 CAPSTONE STUDIO IN
 HERITAGE CONSERVATION



WELTZMAN SCHOOL OF DESIGN
 UNIVERSITY OF PENNSYLVANIA
 SPRING 2023
 STUDIO INSTRUCTORS:
 IRENE MATTEINI
 FRANK MATERO

Capstone Studio: Taliesin West
 Cabaret Theater Historic Structure Report
 12621 N Frank Lloyd Wright Blvd,
 Scottsdale, AZ 85259

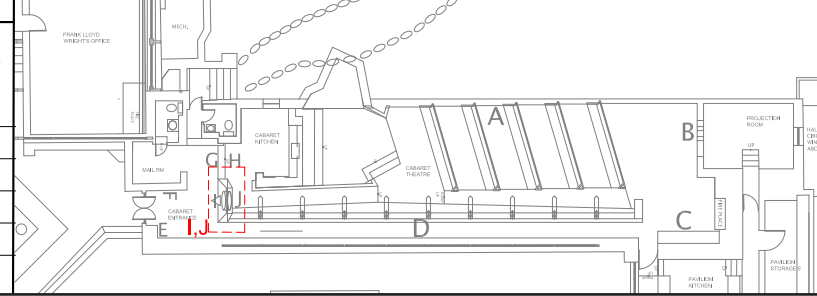
Group Members:
 Yi-Ju Chen
 Priyanka Gorasia
 Anyuan Ji
 Yuxuan Wu

CONDITION ASSESSMENT
 INTERIOR WALL T and J
 DRAWN BY: PRIYANKA GORASIA
 DATE: 4/2/2023
 SCALE: 1/2"=1'-0"

A306

CONDITIONS LEGEND	MATERIAL	ABB.	HATCH	CODE	CONDITION TYPE	NOTES
Material abbreviation: DM - CR_01 Condition Code: CR Dimensions: [Symbol] Doc: Surface Condition	DESERT MASONRY	DM	[Hatch]	CR	CRACK	1. CONDITIONS SHOWN ARE REPRESENTATIVE OF THE BUILDING AS OF MARCH 2023. INACCESSIBLE AREAS ARE NOTED ON THE DRAWINGS. 2. THE SIZE AND SHAPE OF CONDITION HATCHES ARE DEPICTED FOR CLARITY AND ARE GENERALLY LARGER AND "SQUARED OFF." THEY DO NOT NECESSARILY CORRESPOND WITH THE BORDERS OF DAMAGE AREA. 3. DAMAGE TO LARGE SURFACE AREAS, SUCH AS OVERALL WALLS AND CEILINGS, ARE IDENTIFIED WITH EXTENT ARROWS KEYED TO NOTED CONDITION. ASSUME ENTIRE WALL OR CEILING PLANE UNLESS OTHERWISE NOTED.
	REINFORCED CONCRETE	RCC	[Hatch]	DE	DELAMINATION	
	WOOD	WD	[Hatch]	BO	BIOGROWTH	
	CONDITION TYPE	CODE	[Hatch]	HO	HONEYCOMBING	
	EXISTING HARDWARE	EA	[Hatch]	ER	EXPOSED REBAR	
	ELECTRICAL FIXTURE	EL	[Hatch]	EF	EFFLORESCENCE	
	PLUMBING	PL	[Hatch]	PR	PREVIOUS REPAIRS	

KEY PLAN





HSPV 721 TALIESIN WEST:
 MATERIALS AND MATERIALITIES
 CAPSTONE STUDIO IN
 HERITAGE CONSERVATION

WEITZMAN SCHOOL OF DESIGN
 UNIVERSITY OF PENNSYLVANIA




SPRING 2023
 STUDIO INSTRUCTORS:
 IRENE MATTEINI
 FRANK MATERO

Capstone Studio: Taliesin West
 Cabaret Theater Historic Structure Report

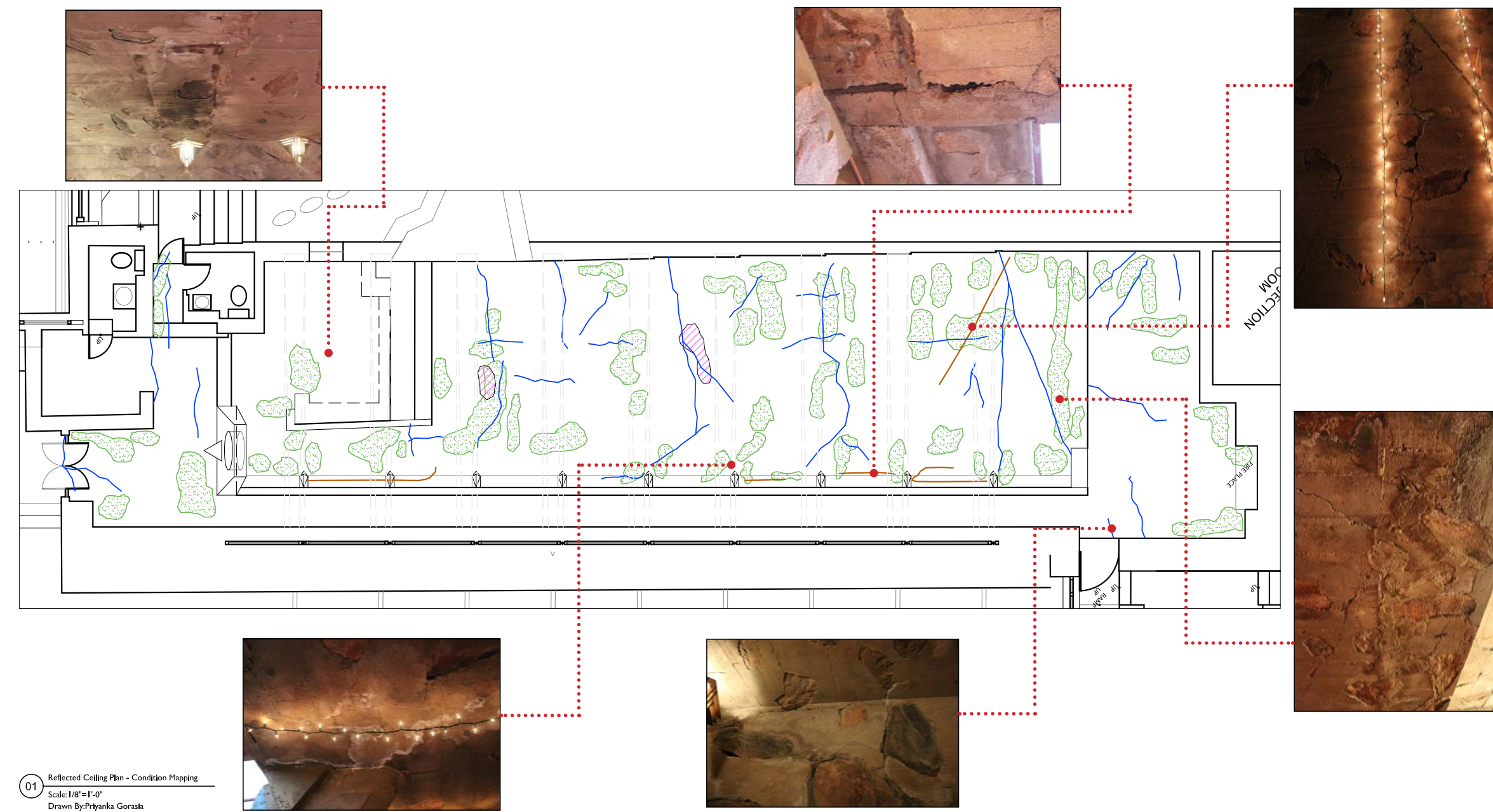
12621 N Frank Lloyd Wright Blvd,
 Scottsdale, AZ 85259

Group Members:
 Y-Ju Chen
 Priyanka Gorasia
 Anyuan Ji
 Yuxuan Wu

CONDITION ASSESSMENT
 REFLECTED CEILING PLAN

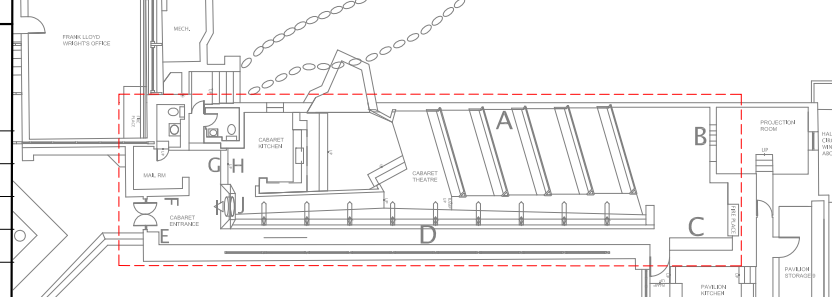
DRAWN BY: PRIYANKA GORASIA
 DATE: 4/2/2023
 SCALE: 1/8"=1'-0"

A307



01 Reflected Ceiling Plan - Condition Mapping
 Scale: 1/8"=1'-0"
 Drawn By: Priyanka Gorasia

KEY PLAN



CONDITIONS LEGEND	MATERIAL	ABB.	HATCH	CODE	CONDITION TYPE	NOTES
	DESERT MASONRY	DM		CR	CRACK	1. CONDITIONS SHOWN ARE REPRESENTATIVE OF THE BUILDING AS OF MARCH 2023. INACCESSIBLE AREAS ARE NOTED ON THE DRAWINGS. 2. THE SIZE AND SHAPE OF CONDITION HATCHES ARE DEPICTED FOR CLARITY AND ARE GENERALLY LARGER AND "SQUARED OFF." THEY DO NOT NECESSARILY CORRESPOND WITH THE BORDERS OF DAMAGE AREA. 3. DAMAGE TO LARGE SURFACE AREAS, SUCH AS OVERALL WALLS AND CEILINGS, ARE IDENTIFIED WITH EXTENT ARROWS KEYED TO NOTED CONDITION. ASSUME ENTIRE WALL OR CEILING PLANE UNLESS OTHERWISE NOTED.
	REINFORCED CONCRETE	RCC		DE	DELAMINATION	
	WOOD	WD		BO	BIOGROWTH	
	CONDITION TYPE	CODE		HO	HONEYCOMBING	
	EXISTING HARDWARE	EA		ER	EXPOSED REBAR	
	ELECTRICAL FIXTURE	EL		EF	EFFLORESCENCE	
	PLUMBING	PL		PR	PREVIOUS REPAIRS	

Appendix D. Painted Finishes Analysis



Date: 2021/04/04
Analyzers: Anyuan Ji
Samples Analyzed: 12

Microscope: LEICA MZI 6

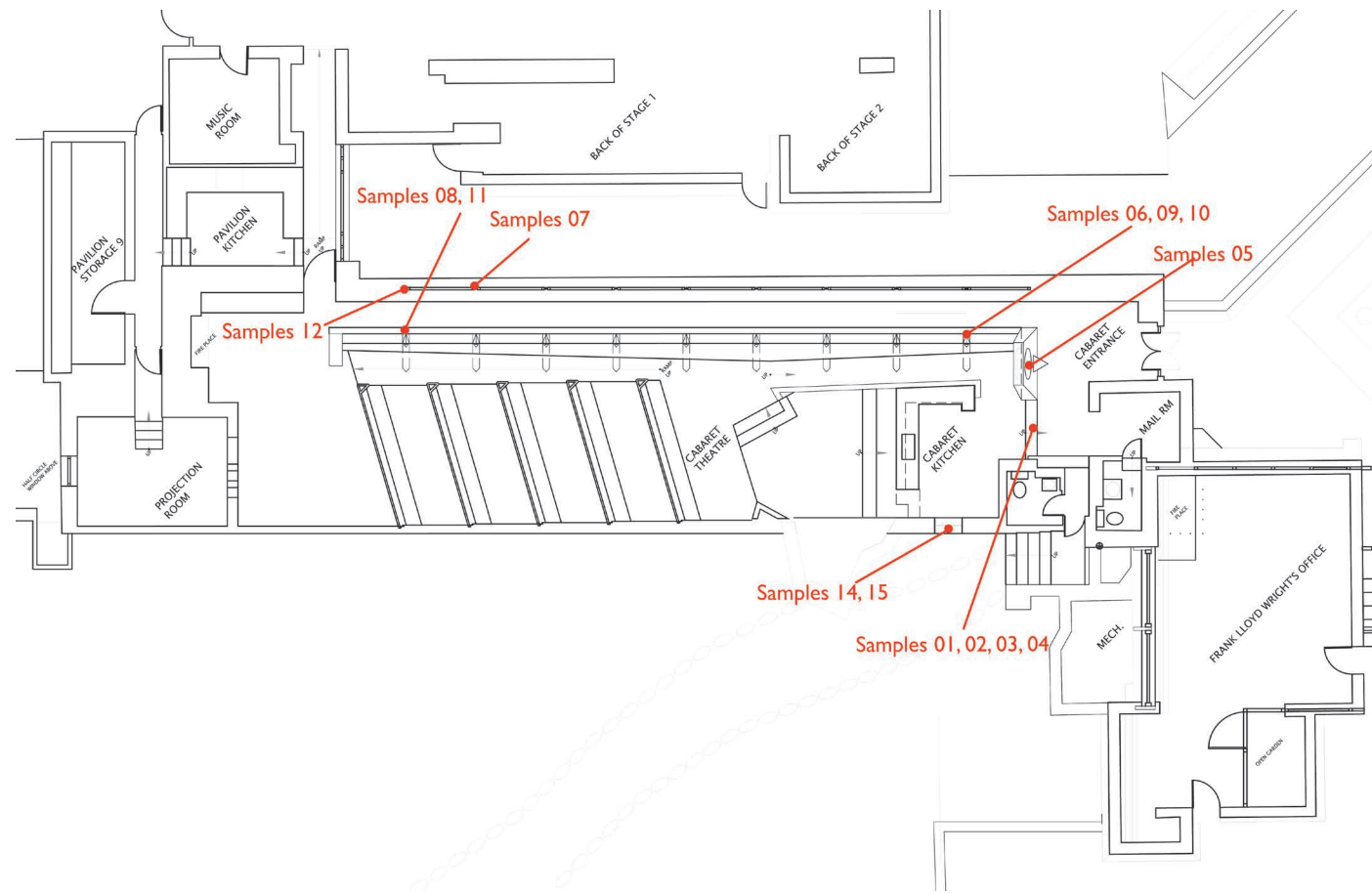


Figure 1. Sample Location map



Figure 2. Sample Location 01-04: : Front wood trim near the Buddha's head.

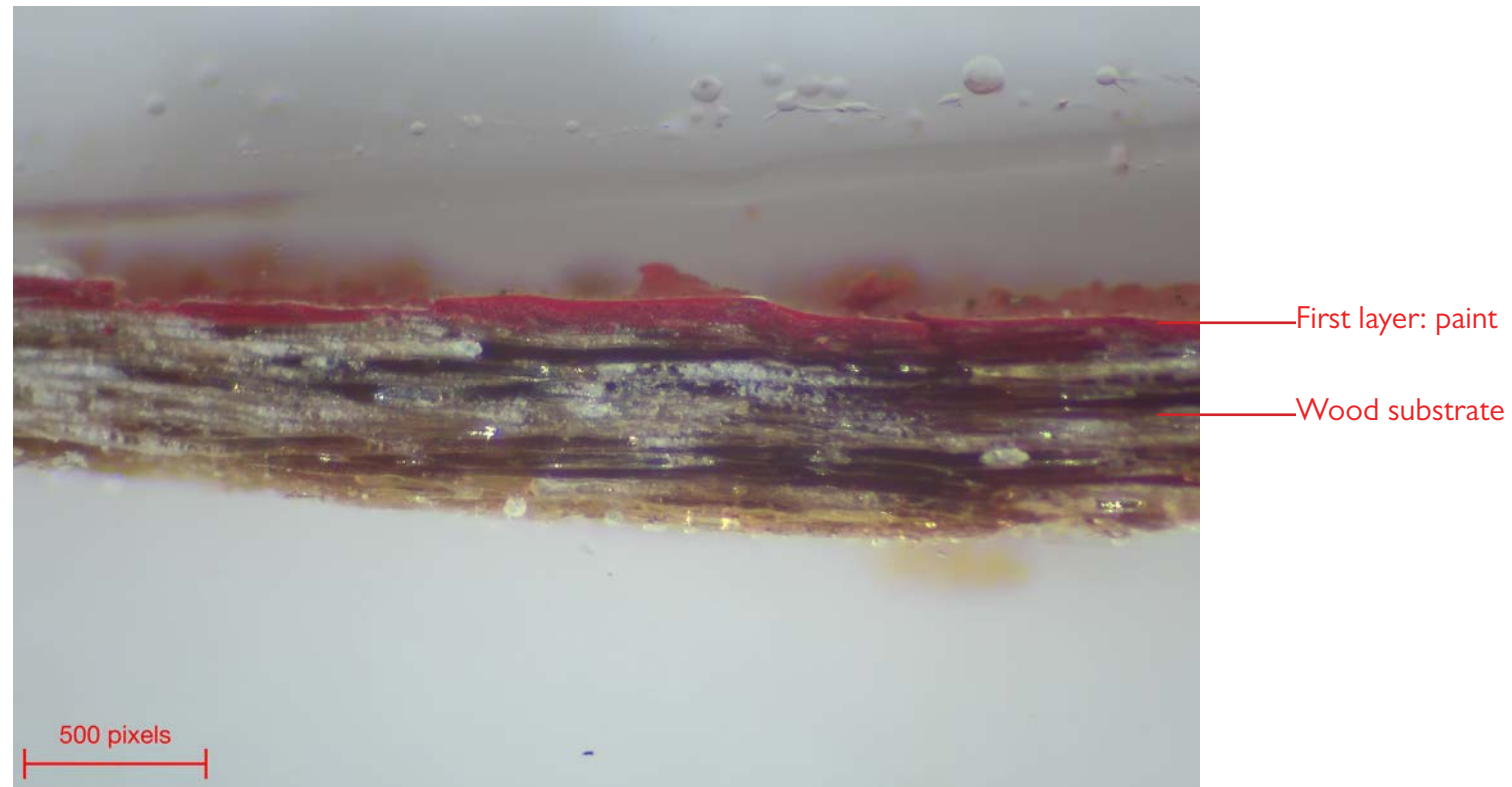


Figure 3. Sample 01

Sample Information

Sample Number: 01

Sample Location: Front wood trim near the Buddha's head.

Layers: 1

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

Layer 1: Red

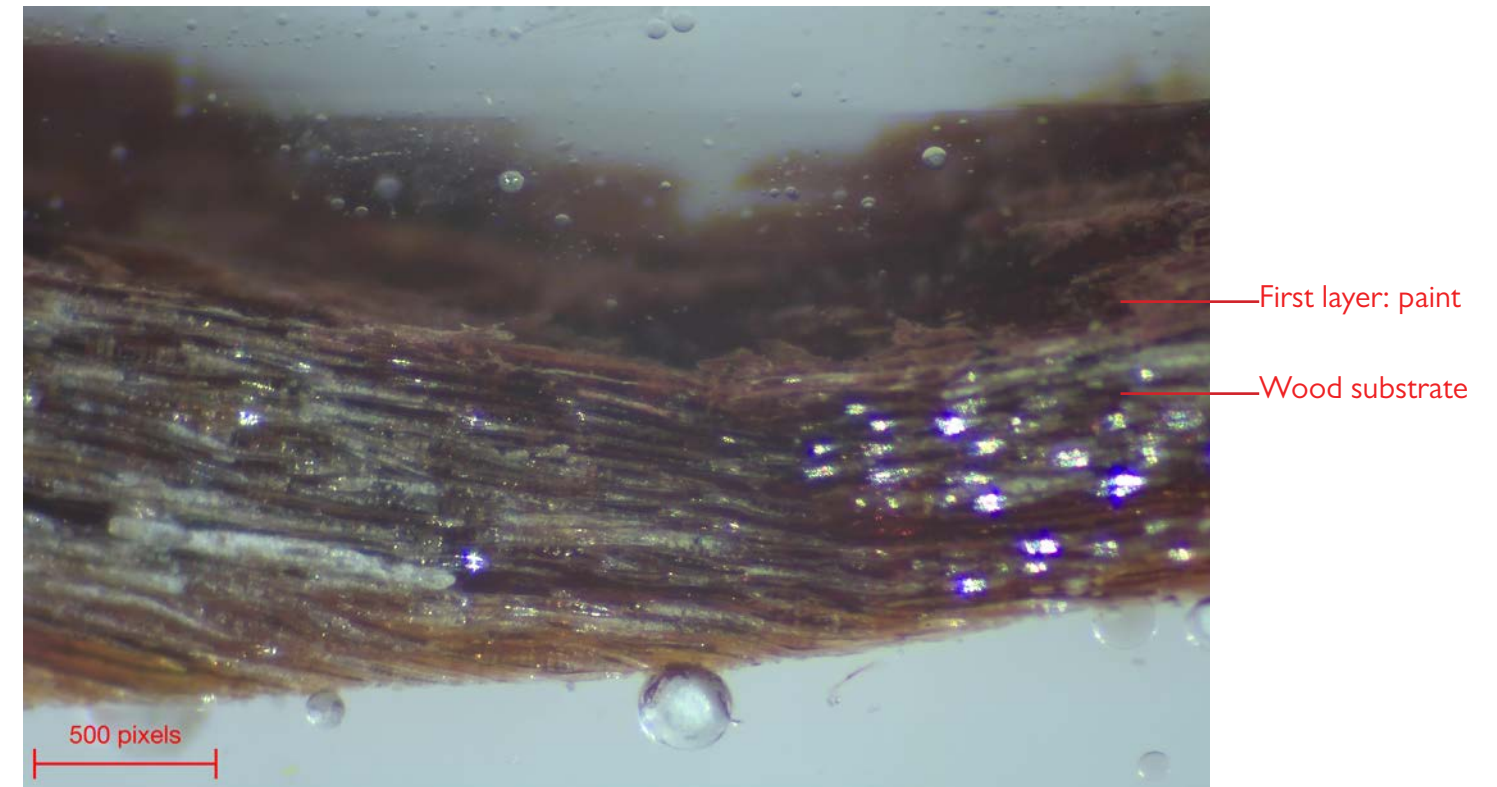


Figure 4. Sample 02

Sample Information

Sample Number: 02

Sample Location: Front wood trim near the Buddha's head.

Layers: 1

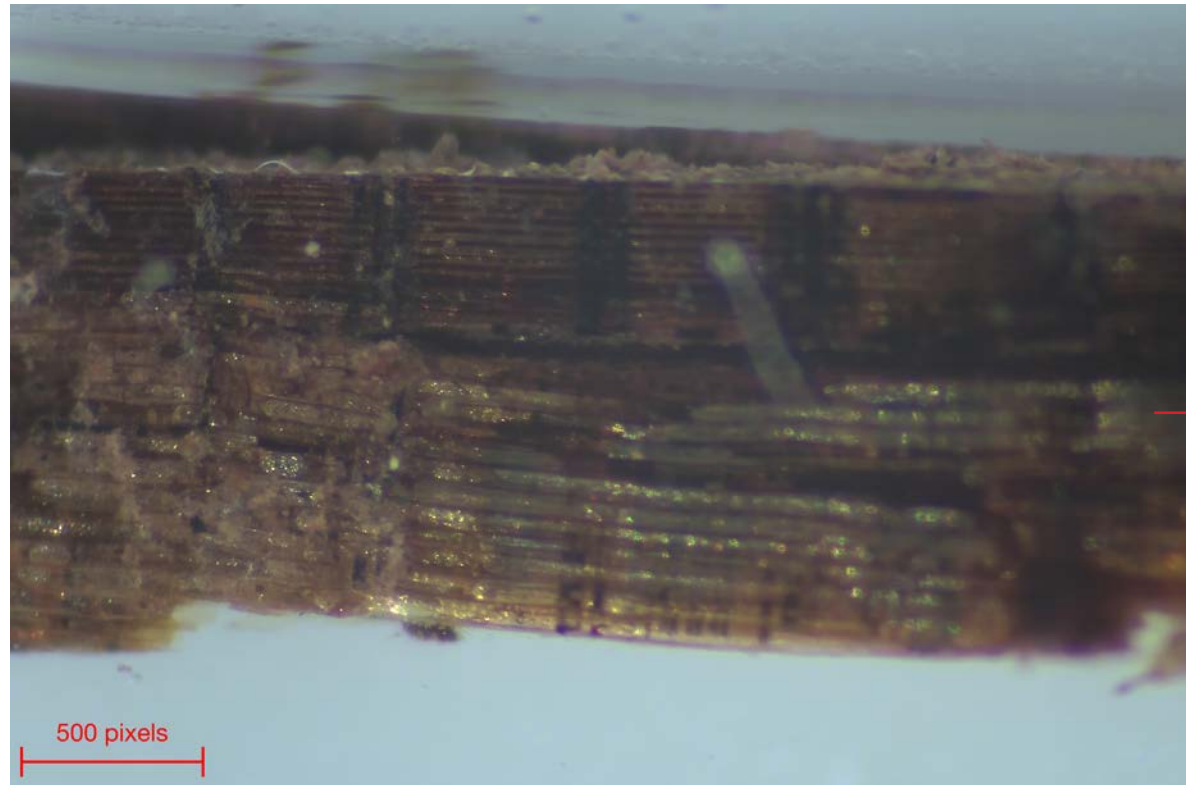
Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

Layer 1: Brown



Wood substrate

Figure 5. Sample 03

Sample Information

Sample Number: 03

Sample Location: Front wood trim near the Buddha's head.

Layers: 0

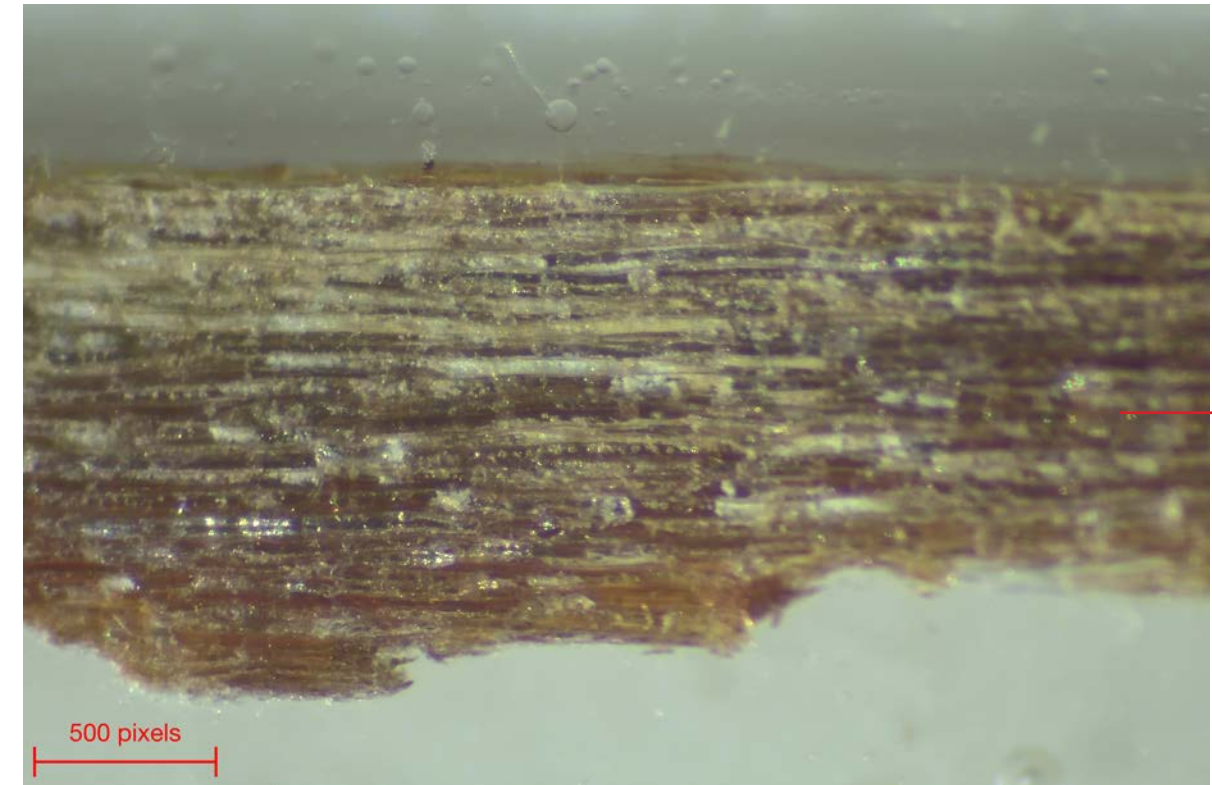
Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

No painted layer



Wood substrate

Figure 6. Sample 04

Sample Information

Sample Number: 04

Sample Location: Front wood trim near the Buddha's head.

Layers: 0

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

No painted layer



Figure 7. Sample Location 05: Buddha's head base.

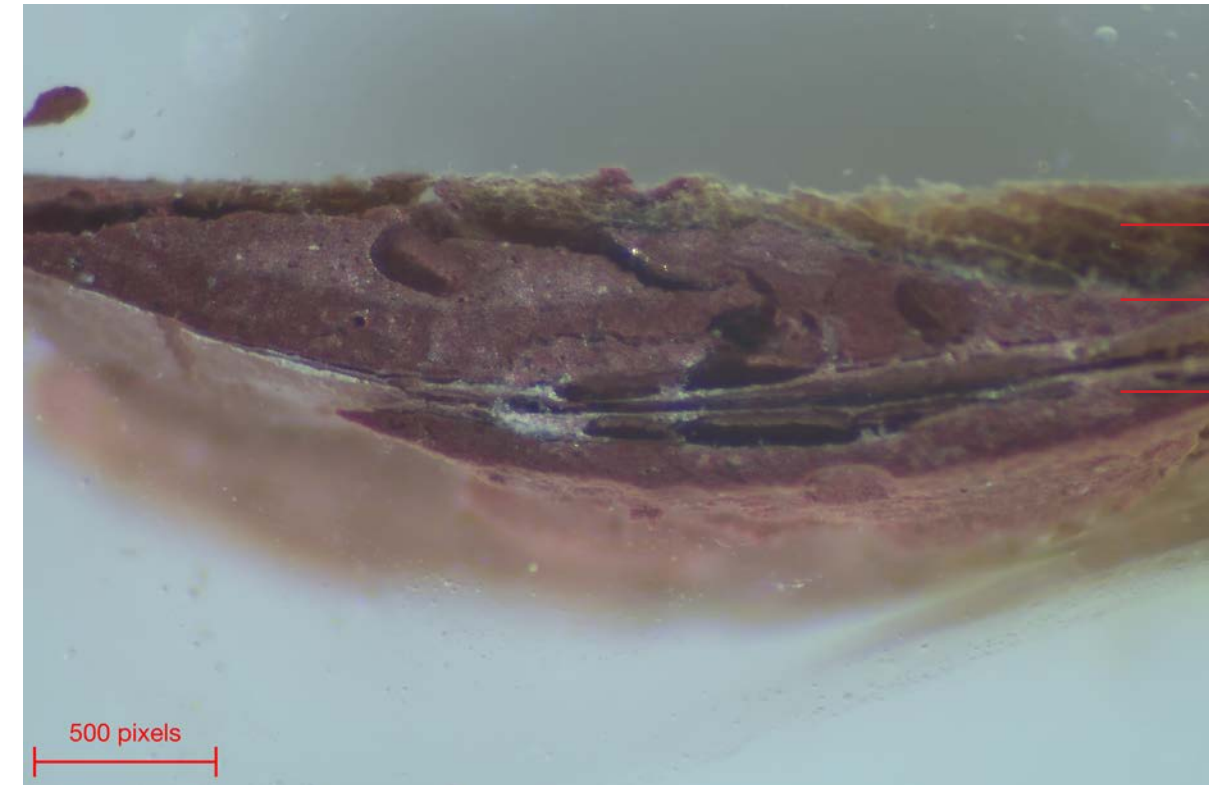


Figure 8. Sample 05

Sample Information

Sample Number: 05

Sample Location: Buddha's head base.

Layers: 2

Magnification: 4x

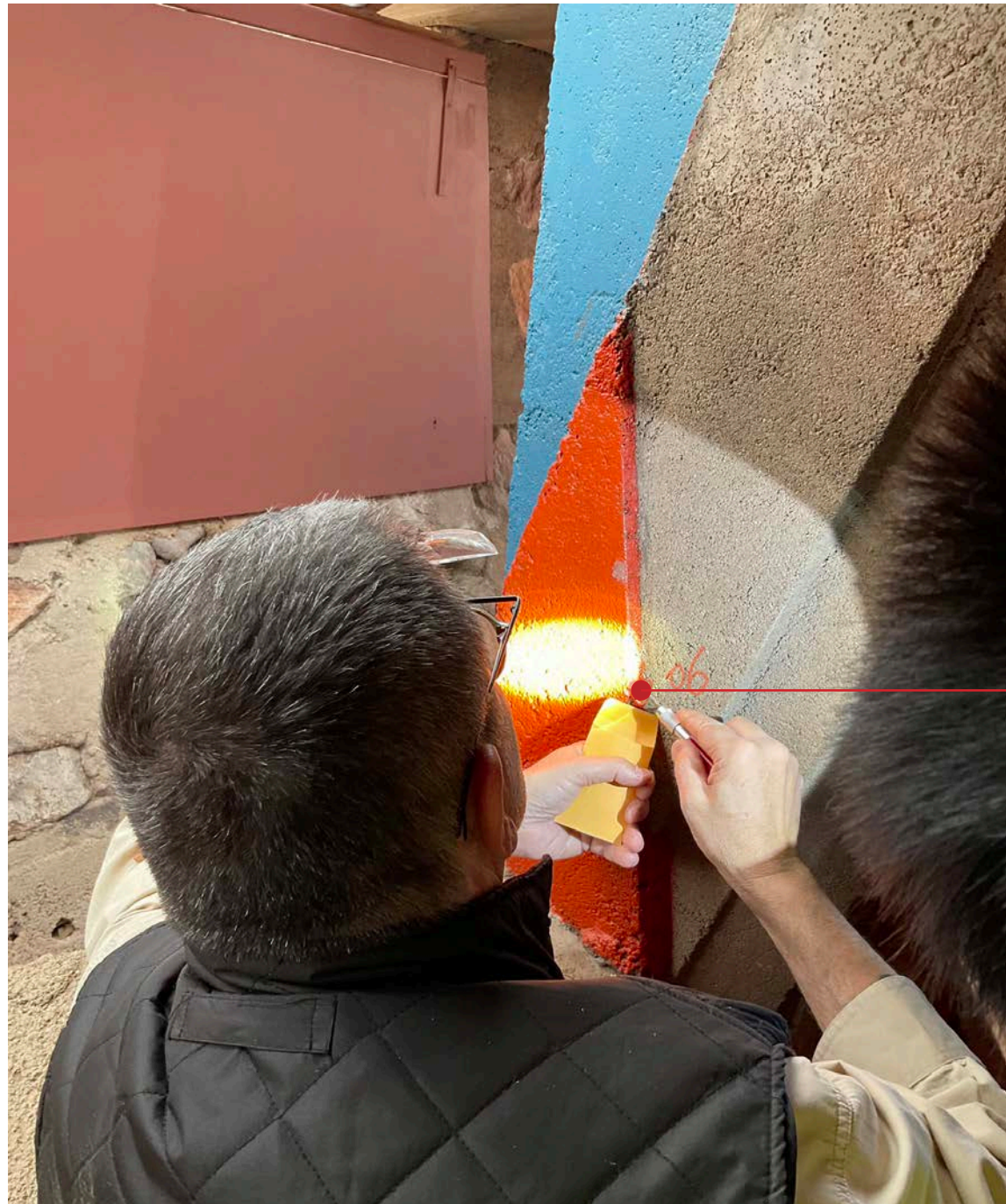
Illumination: reflected light illumination

Light Source: visible light

Observations

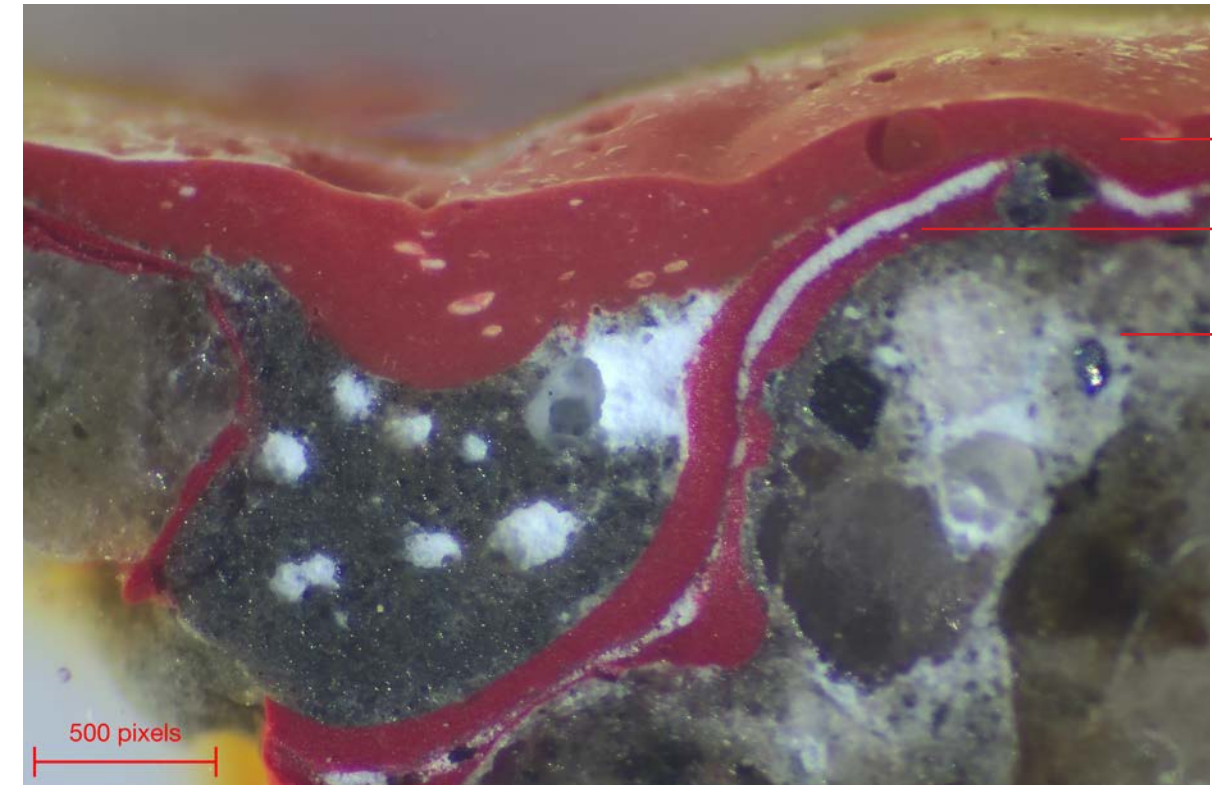
Layer 1: Red brown

Layer 2: Red brown



Sample 06

Figure 9. Sample Location 06: First concrete pier near the Buddha's head.



First layer: paint

Second layer: paint

Concrete

Figure 10. Sample 06

Sample Information

Sample Number: 06

Sample Location: First concrete pier near the Buddha's head.

Layers: 2

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

Layer 1: Bright red

Layer 2: Red



Figure 11. Sample Location 07: Exterior panel at the end of the corridor.

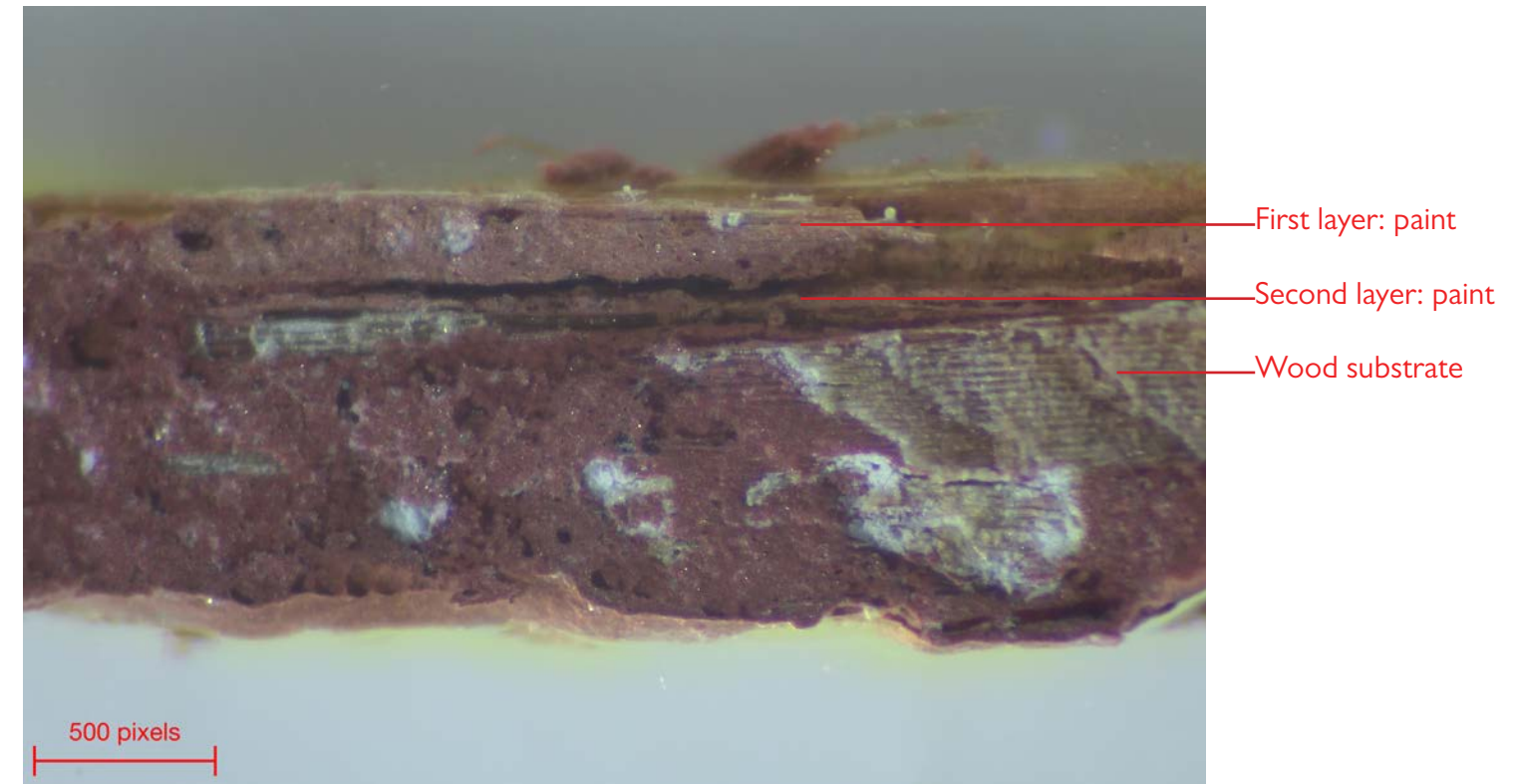


Figure 12. Sample 07

Sample Information

Sample Number: 07

Sample Location: Buddha's head base.

Layers: 2

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

Layer 1: Red brown

Layer 2: Red brown



Figure 13. Sample Location 09: First concrete pier near the Buddha's head.

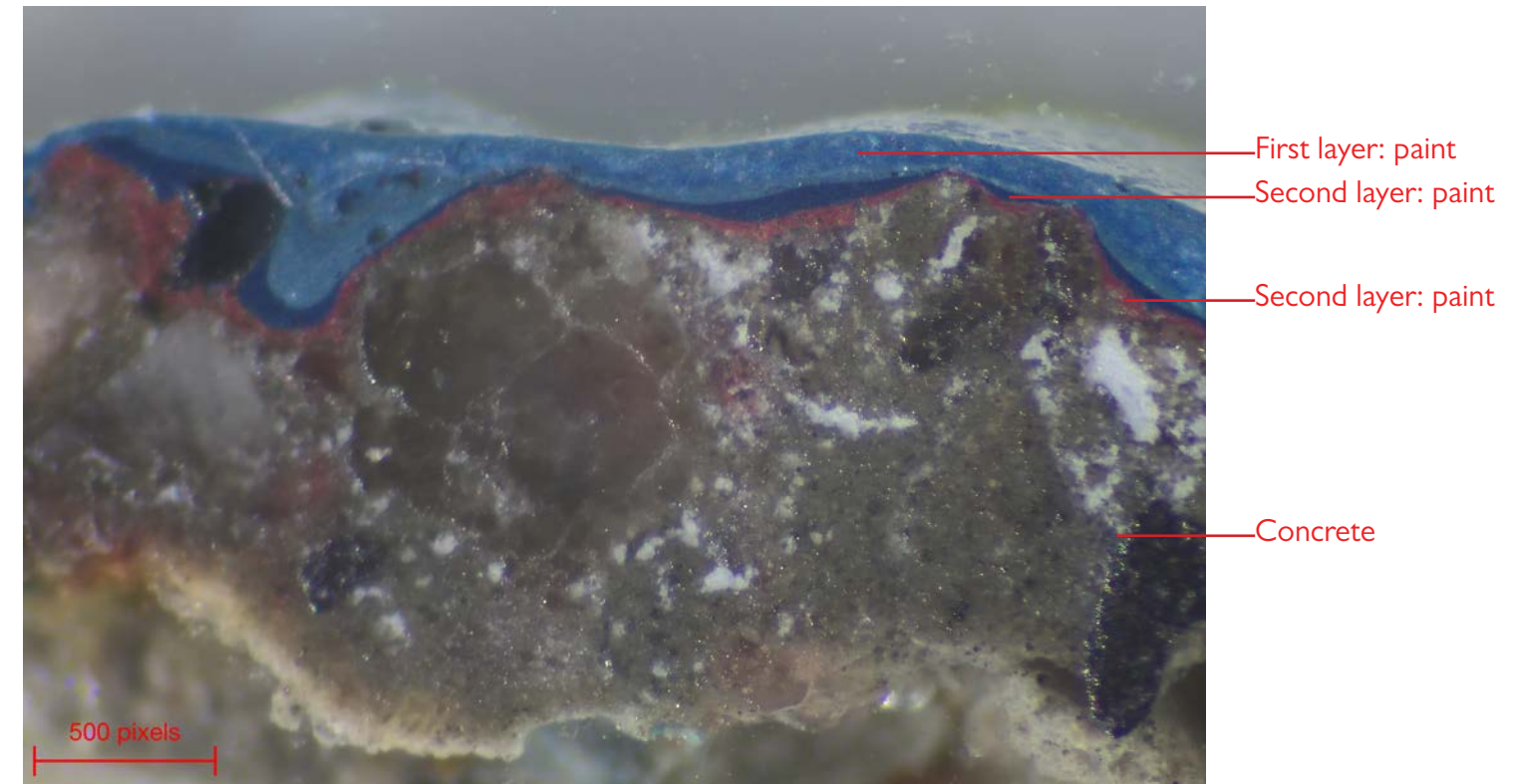


Figure 14. Sample 09

Sample Information

Sample Number: 09

Sample Location: First concrete pier near the Buddha's head.

Layers: 3

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

Layer 1: Light blue

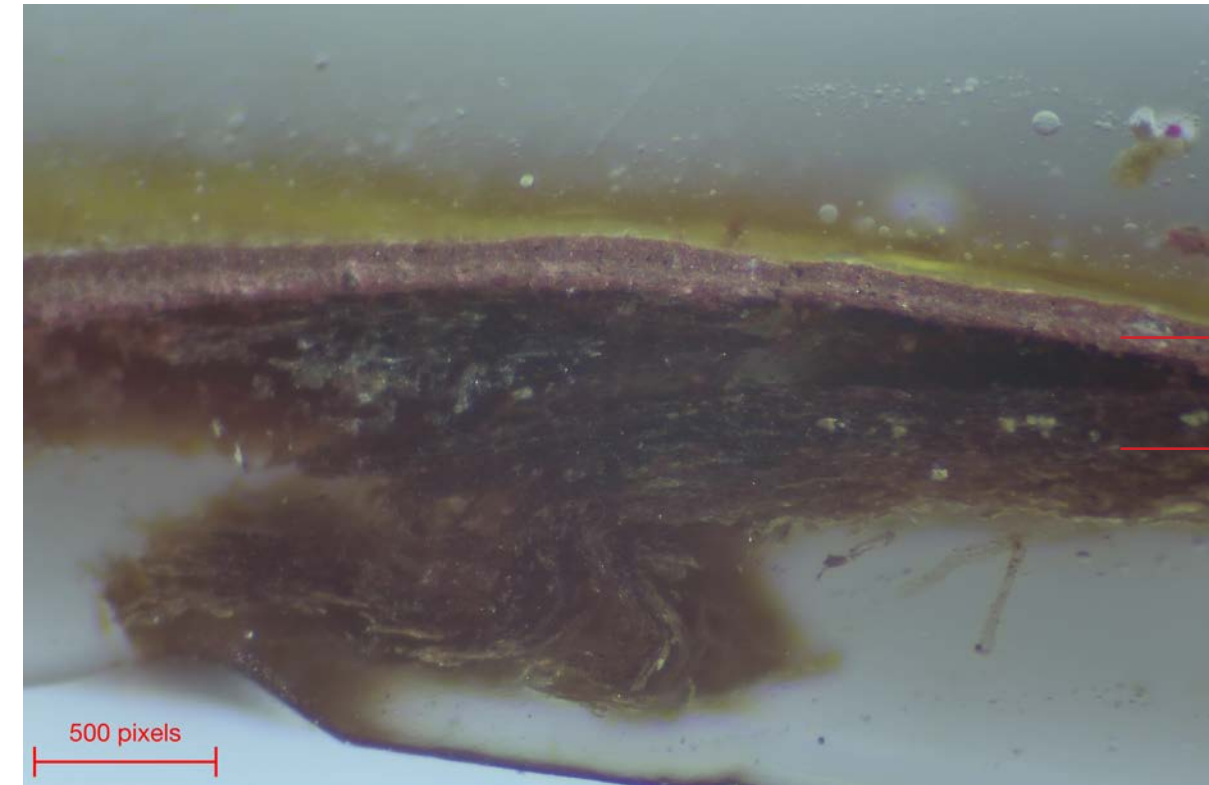
Layer 2: Dark blue

Layer 2: Red



Sample 11

Figure 15. Sample Location 11: Interior panel at the end of the piers.



First layer: paint

Wood substrate

Figure 16. Sample 11

Sample Information

Sample Number: 11

Sample Location: Interior panel at the end of the corridor.

Layers: 1

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

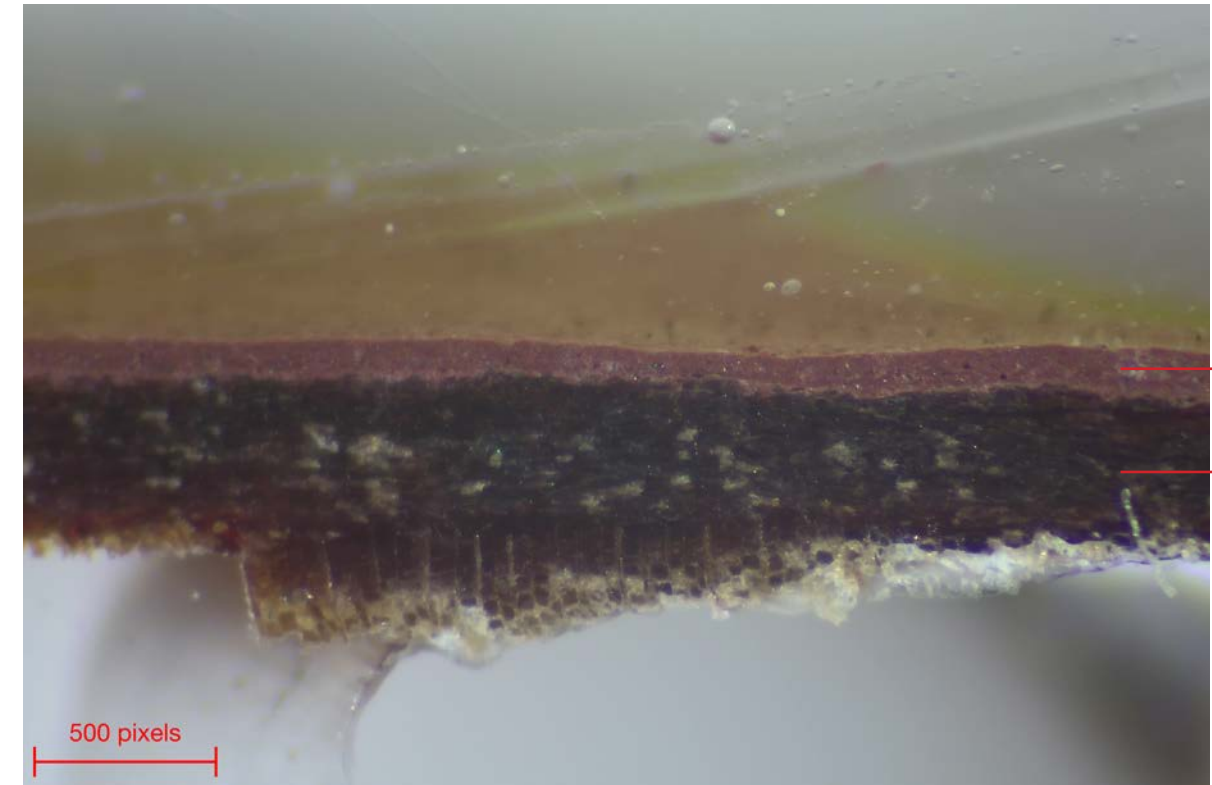
Observations

Layer 1: Red brown



Sample 12

Figure 17. Sample Location 12: Exterior panel at the end of the corridor.



First layer: paint

Wood substrate

Figure 18. Sample 12

Sample Information

Sample Number: 12

Sample Location: Exterior panel at the end of the corridor.

Layers: 1

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

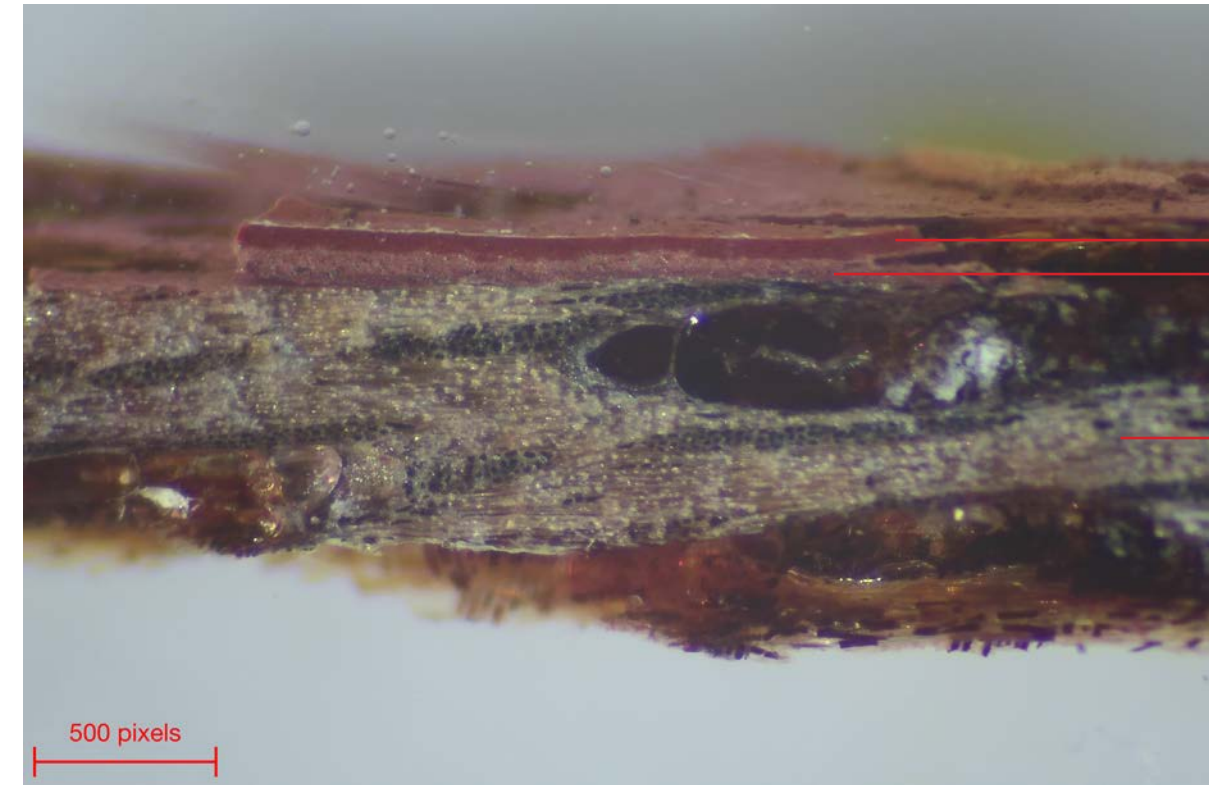
Observations

Layer 1: Red brown



Sample 14

Figure 19. Sample Location 14: Front side door near the Buddha's head.



First layer: paint

Second layer: paint

Wood substrate

Figure 20. Sample 14

Sample Information

Sample Number: 14

Sample Location: Front side door near the Buddha's head.

Layers: 2

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

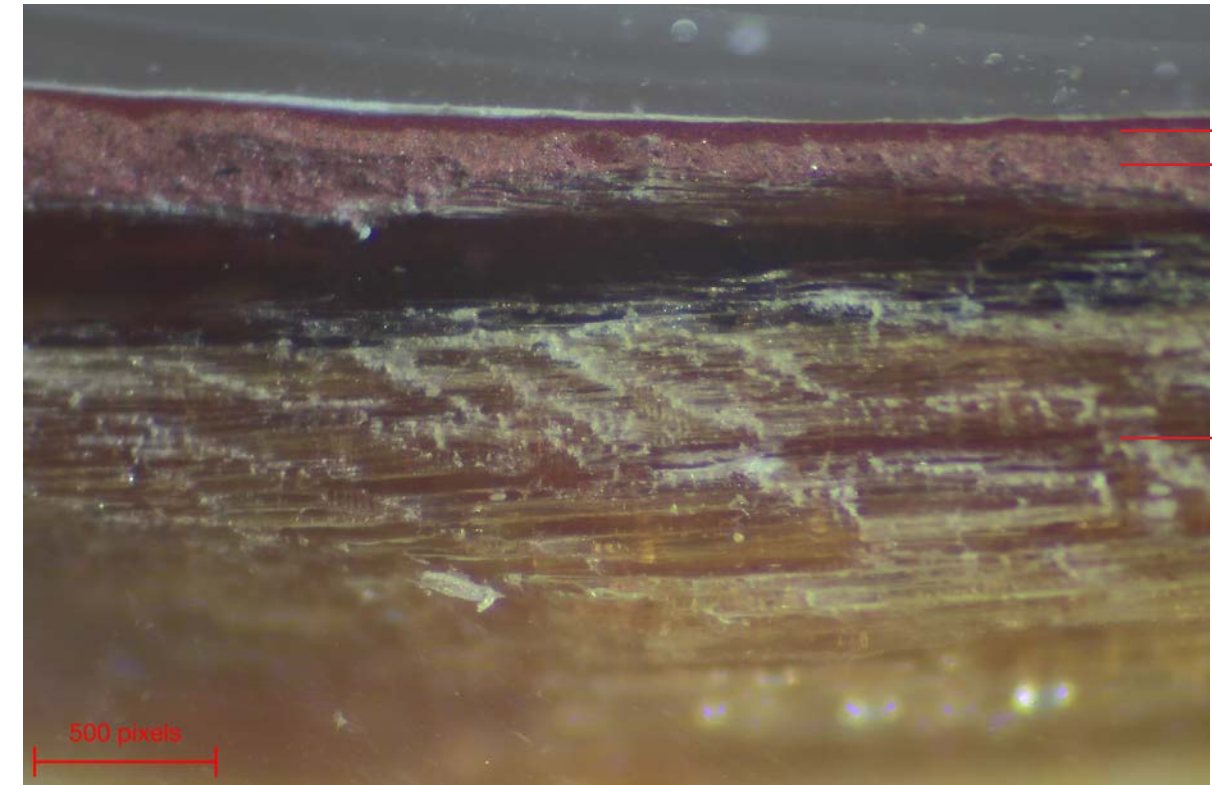
Observations

Layer 1: Dark red brown

Layer 2: Red brown



Figure 21. Sample Location 15: Front side door near the Buddha's head.



First layer: paint
Second layer: paint

Wood substrate

Figure 22. Sample 15

Sample Information

Sample Number: 15

Sample Location: Front side door near the Buddha's head.

Layers: 2

Magnification: 4x

Illumination: reflected light illumination

Light Source: visible light

Observations

Layer 1: Dark red brown

Layer 2: Red brown

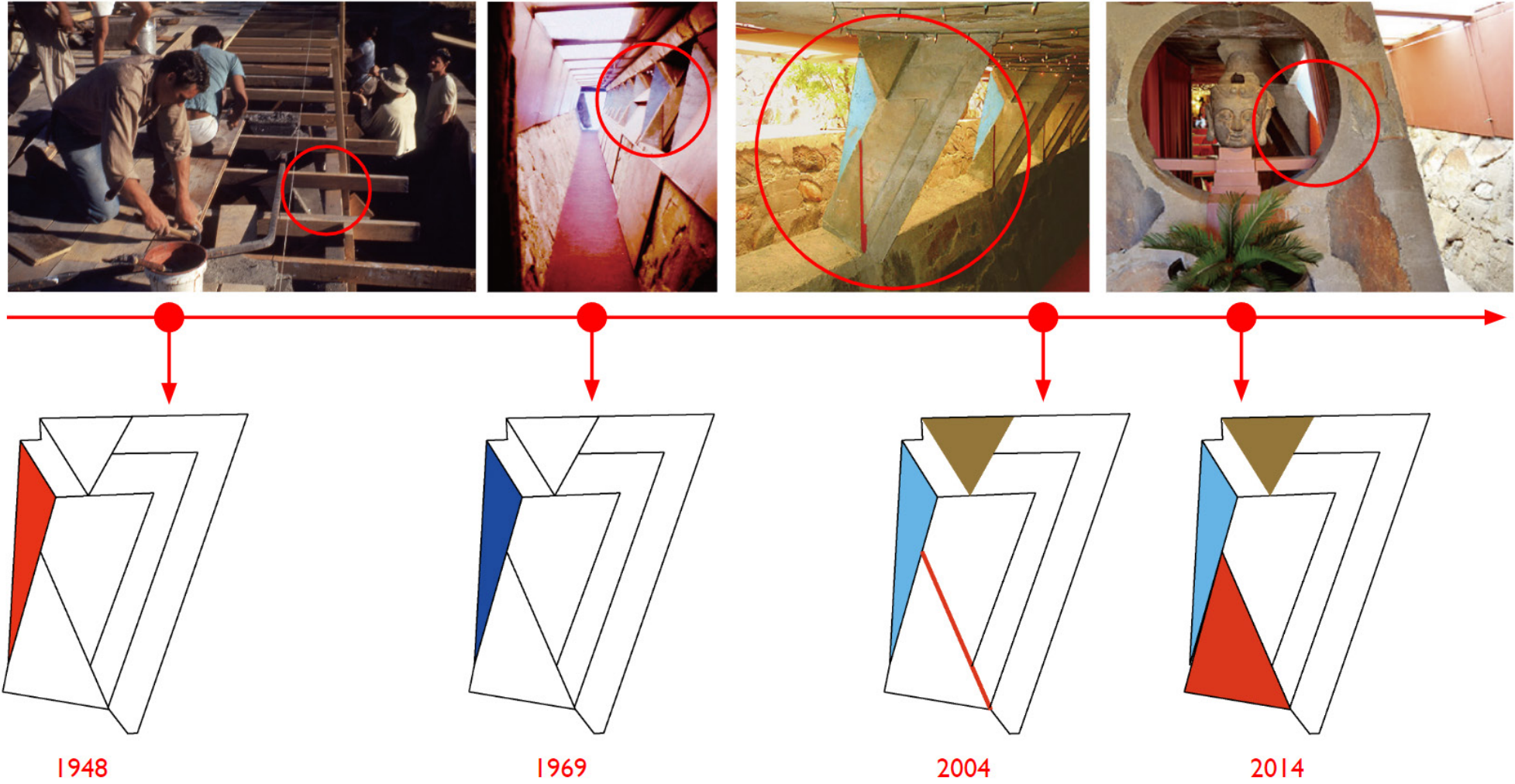


Figure 23. Timeline of the change of color on the concrete piers.

Conclusions

There is generally one finish layer on the wood trim; two layers on the wood panel and the front side door. Thus, the wood panel and the front side door may have been repainting.

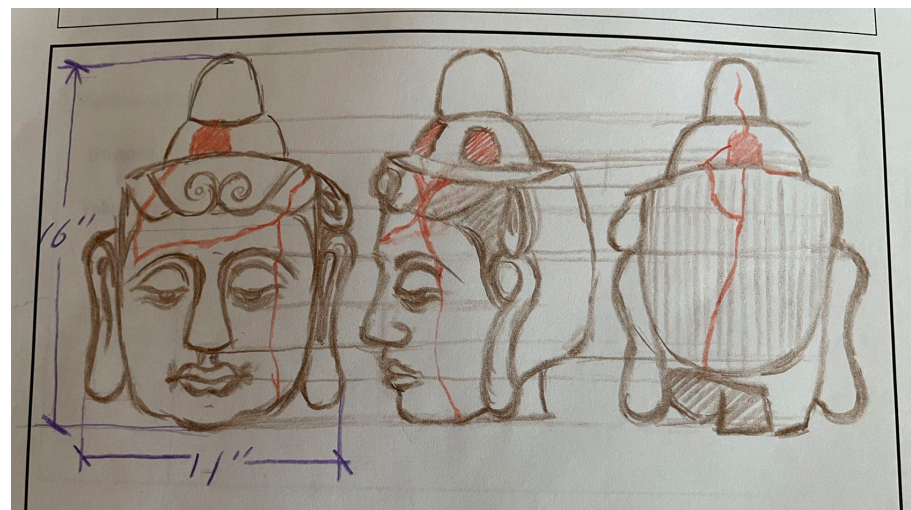
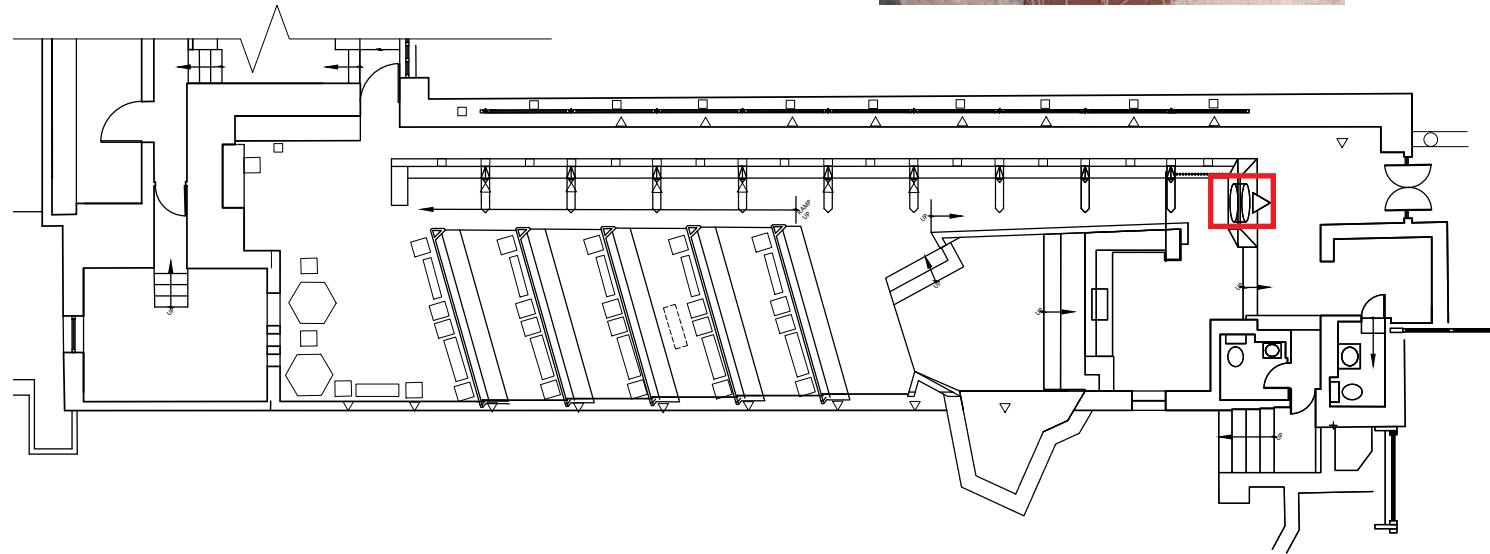
The precast concrete piers are the most interesting findings. The color of the piers has been changed many times in history. The red triangular part comprises two different red coatings; The blue triangular part has three layers of coatings, red, dark blue, and blue.

The triangular part in the middle of the pier was painted red when it was first installed in 1948. And the middle triangular part was changed to dark blue in 1969. In 2004 the triangle at the top was painted gold, the edges of the side triangles were painted red, And the middle triangular part was painted light blue. The 2014 photos show the side triangular parts completely painted red. These historic photos validate our analysis results.

Appendix E. Object Sheet

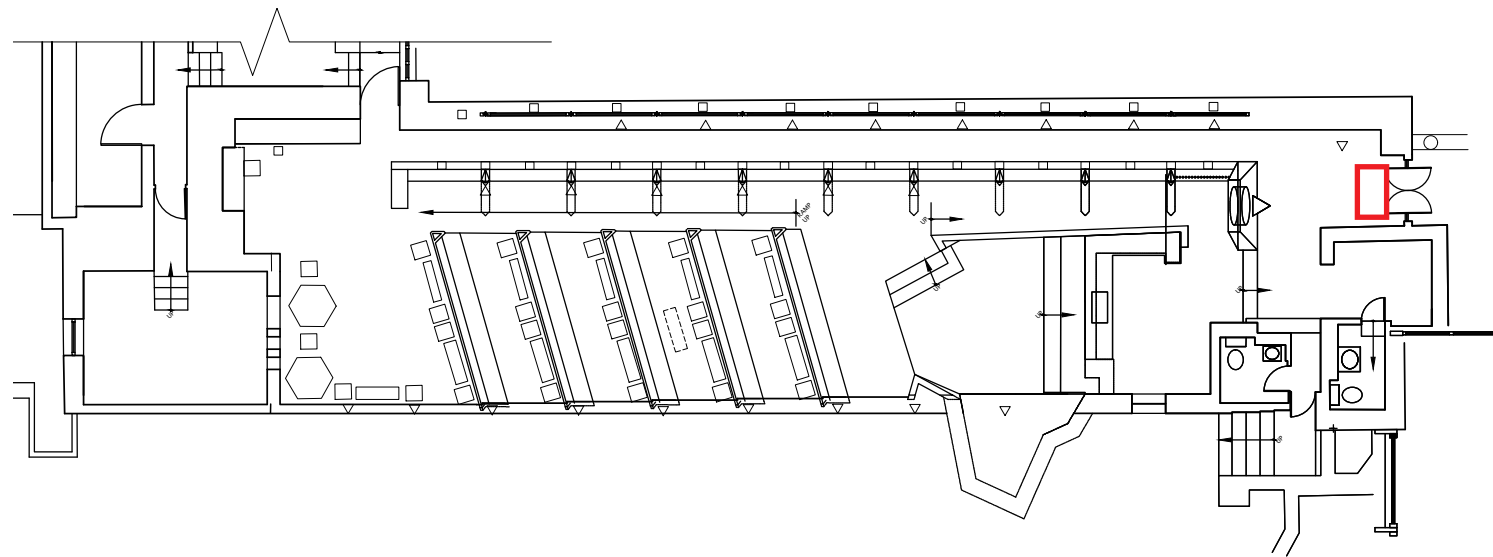


Object Name: Studio Buddha
Quantity: 1
Date of original installation: 1951
Current Location: Center behind the entry door
Material : Cast Iron
Condition: Three cracks can be observed on the surface and have been restored with some kind of glue on the interior side

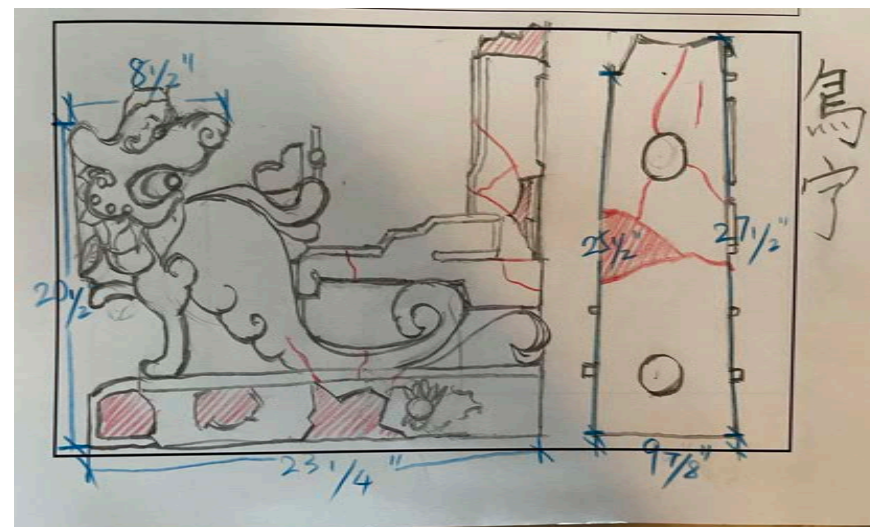




Object Name: Chiwen-motif decorative roof tile
Quantity: 1
Date of original installation: Between 1969 and 2004
Current Location: On the roof above the entrance
Material : Color glazed ceramic
Condition: The upper part is broken. Several separate fragments are piled on the top. Discoloration of the glaze can be observed at several spots.

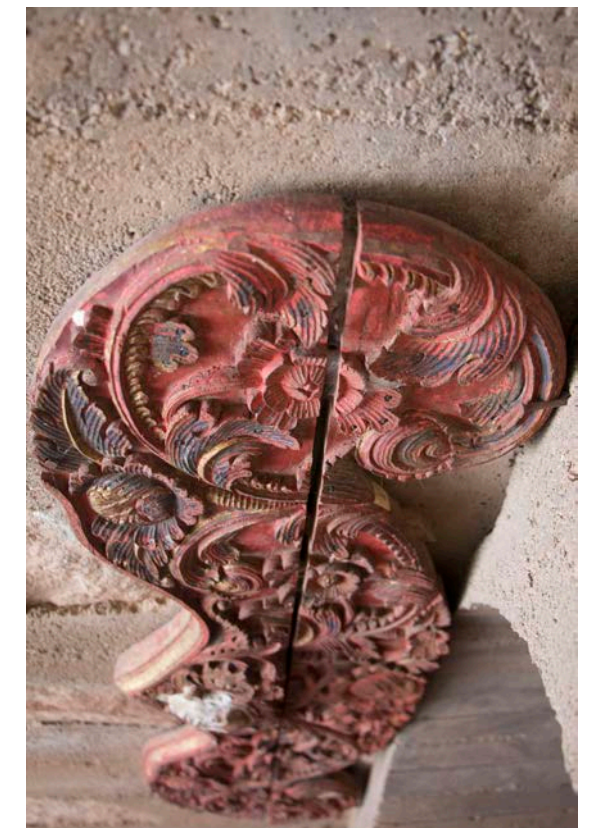
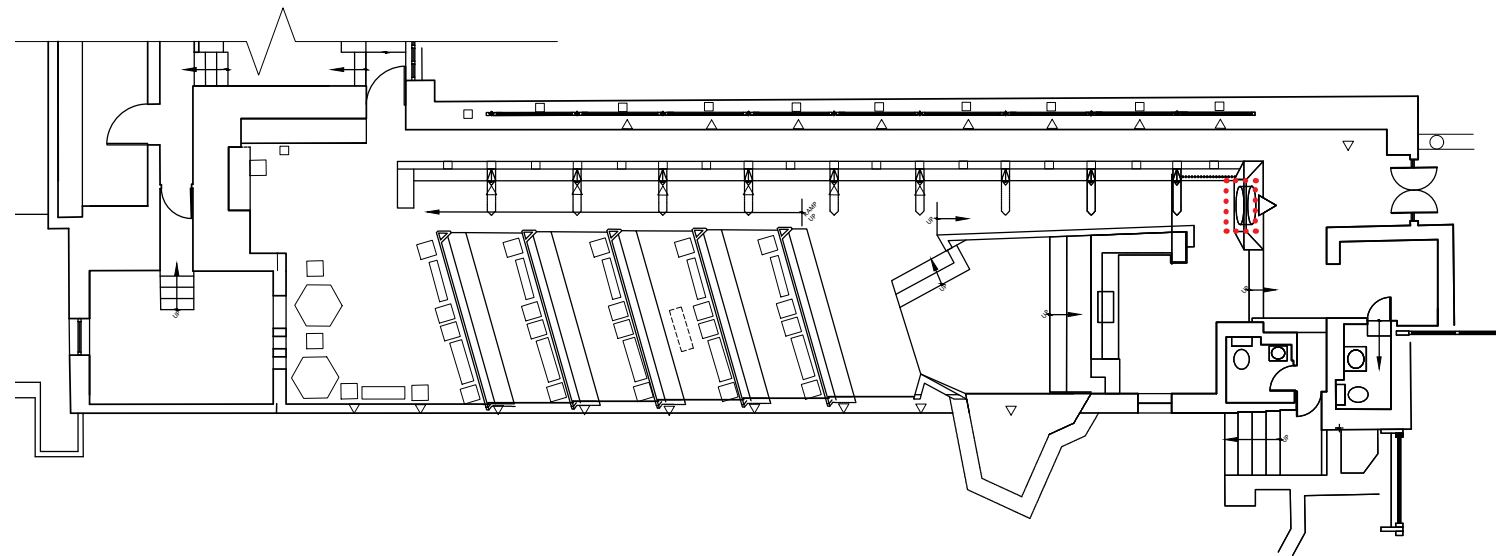


Sketch of the object

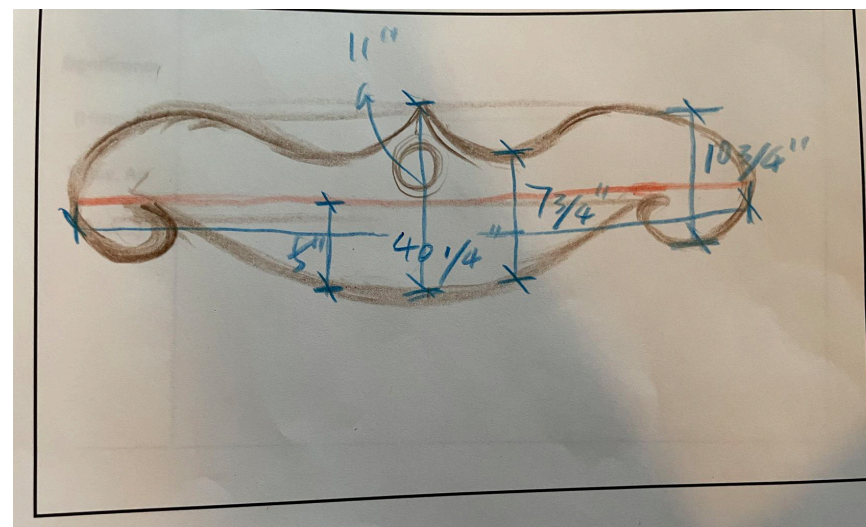




Object Name: Buddha-motif carved wood plaque
Quantity: 1
Date of original installation: 1951-1952
Current Location: Above the buddha head
Material : Wood with finishes
Condition: A deep vertical crack in the center. Discoloring of the paint.



Sketch of the object





Object Name: Entry Double Door (original carved wood plaque)

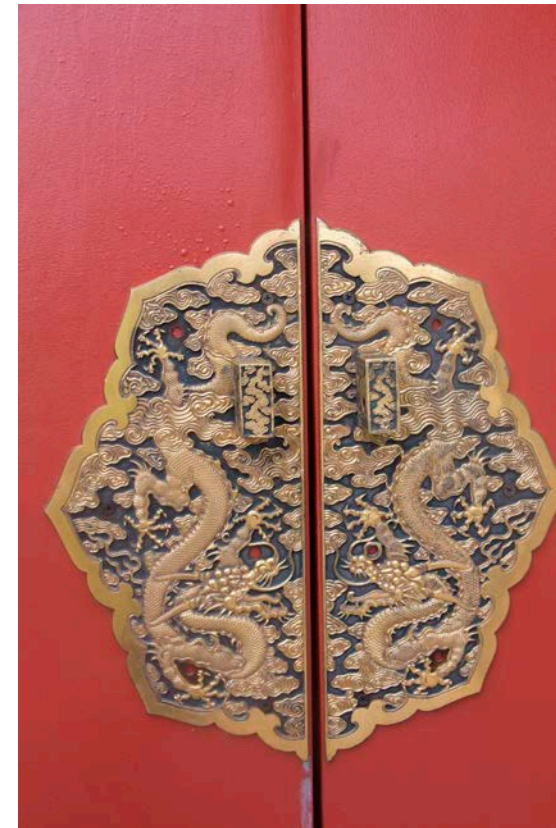
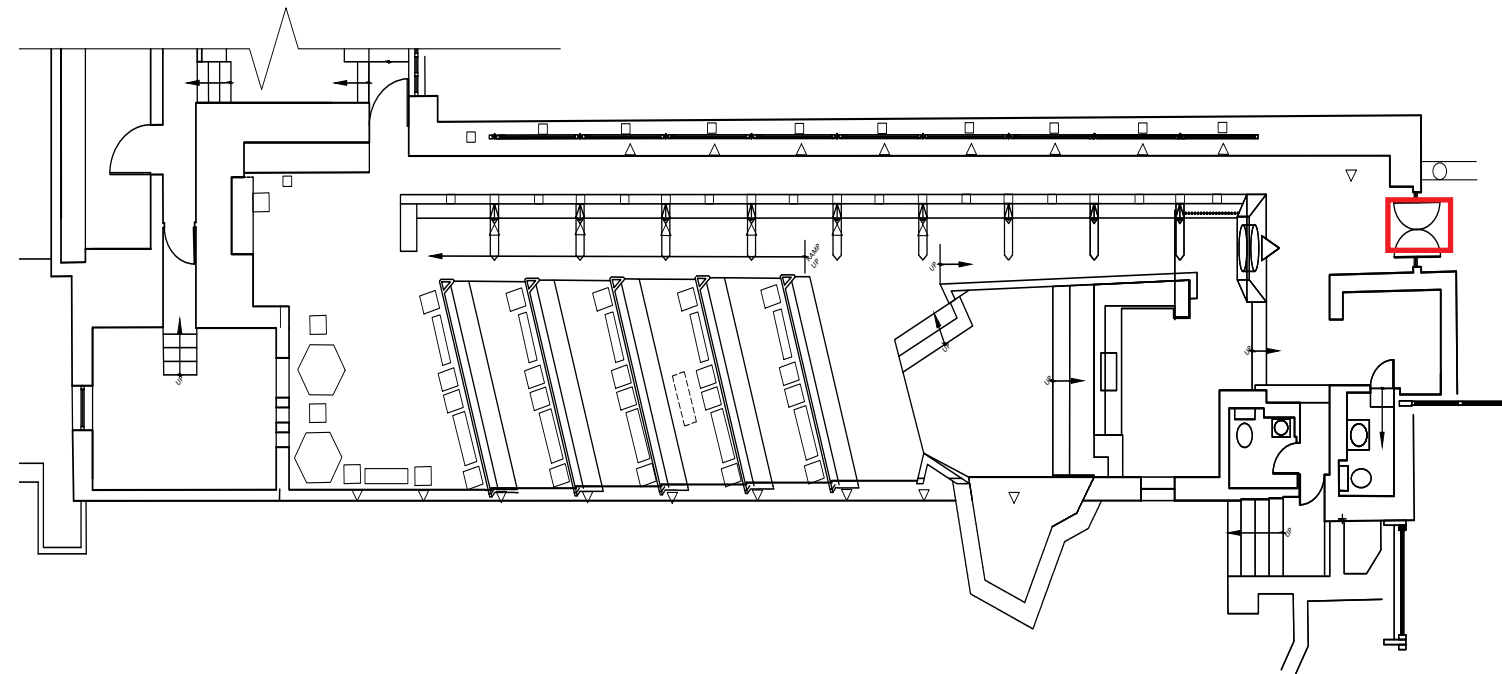
Quantity: 1

Date of original installation: Doors (2014), Carved wood plaque (1950)

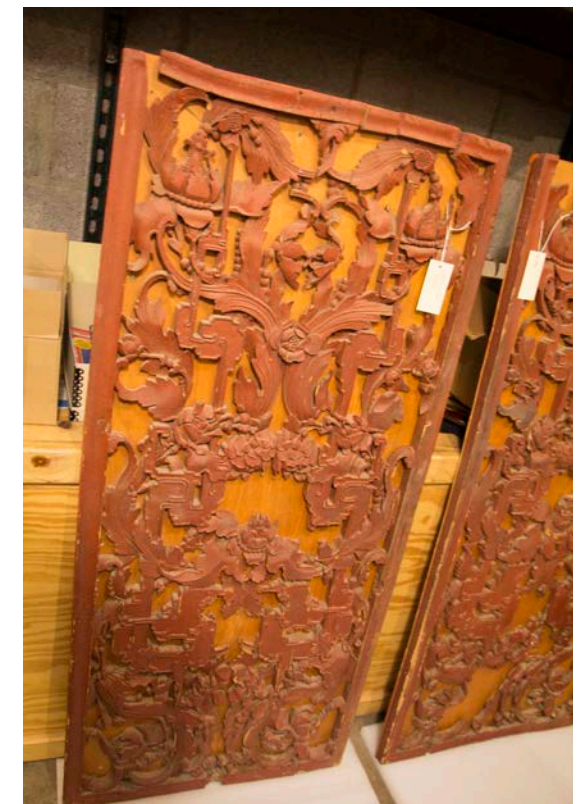
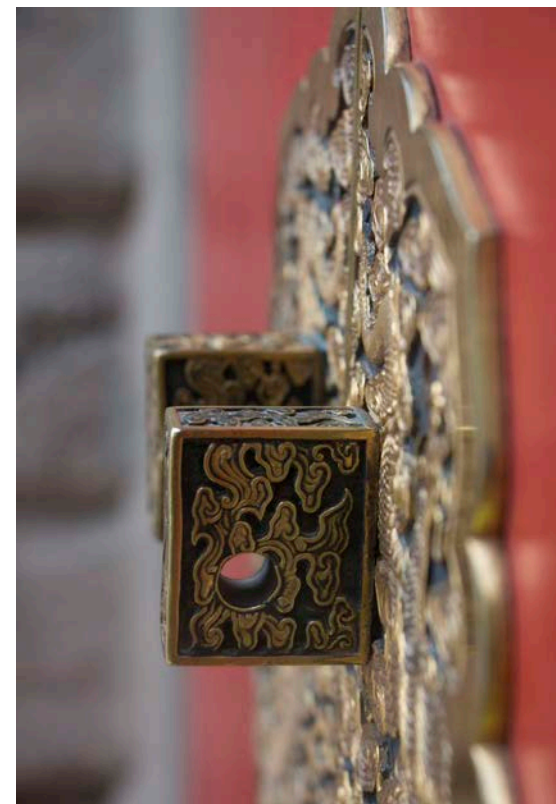
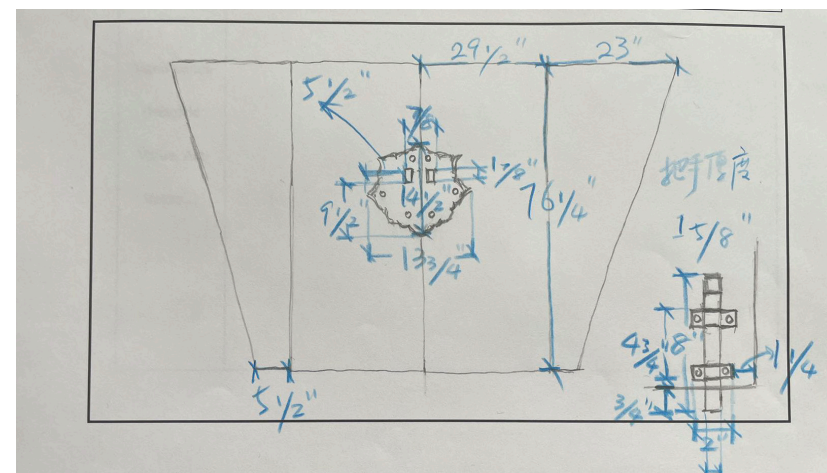
Current Location: Entrance of the Cabaret. The original carved plaques were moved to the Collection in 2014.

Material : Wood painted flush, metal pull

Condition: Good

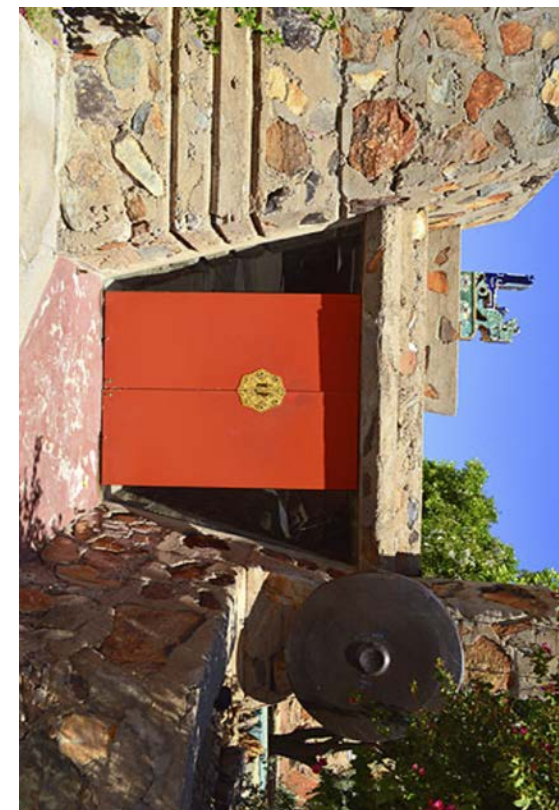
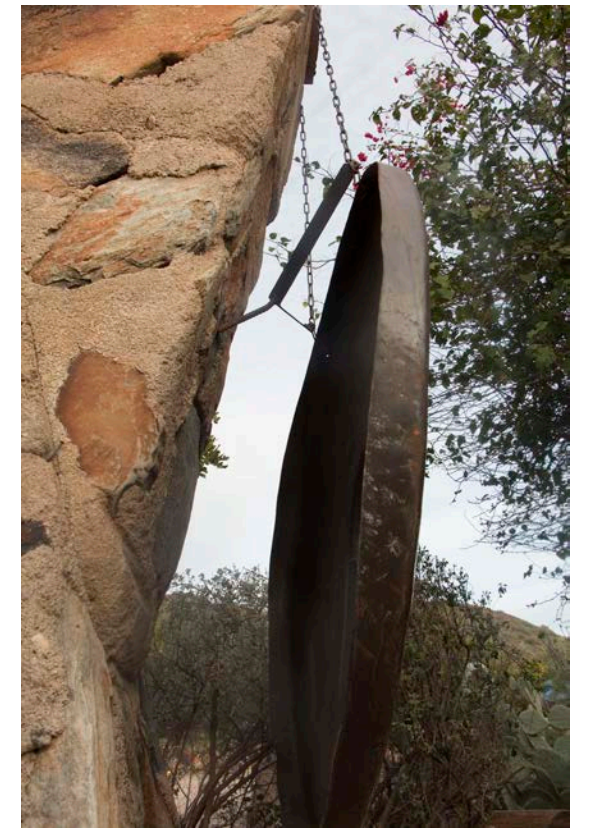
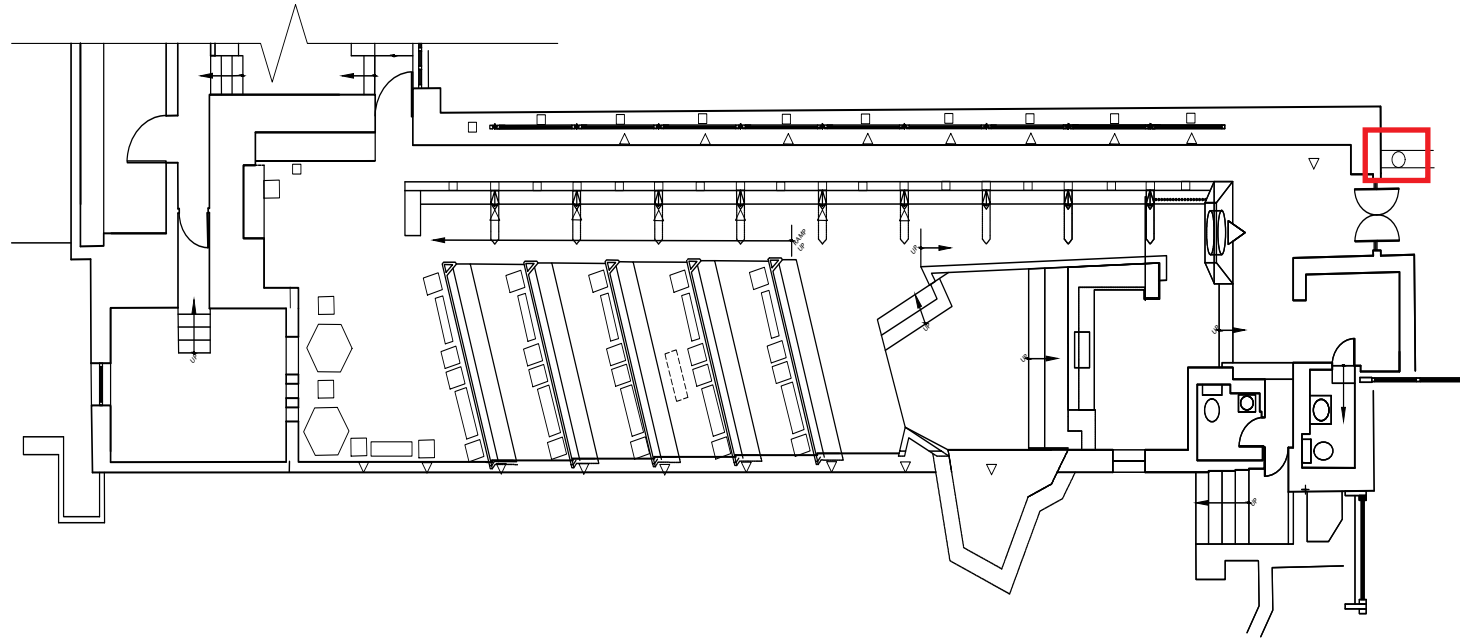


Sketch of the object

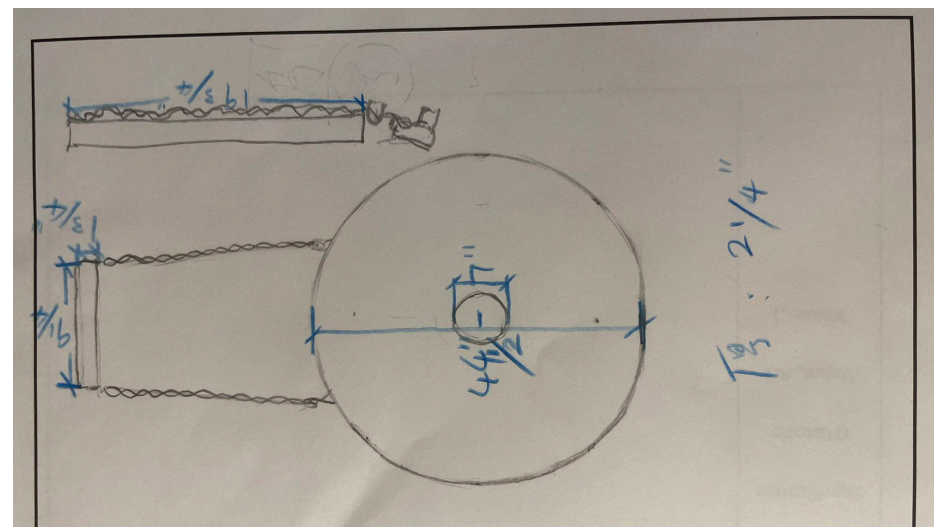




Object Name: Gong
Quantity: 1
Date of original installation: 1956-1958
Current Location: East side of the entry door
Material : Bronze
Condition: Good

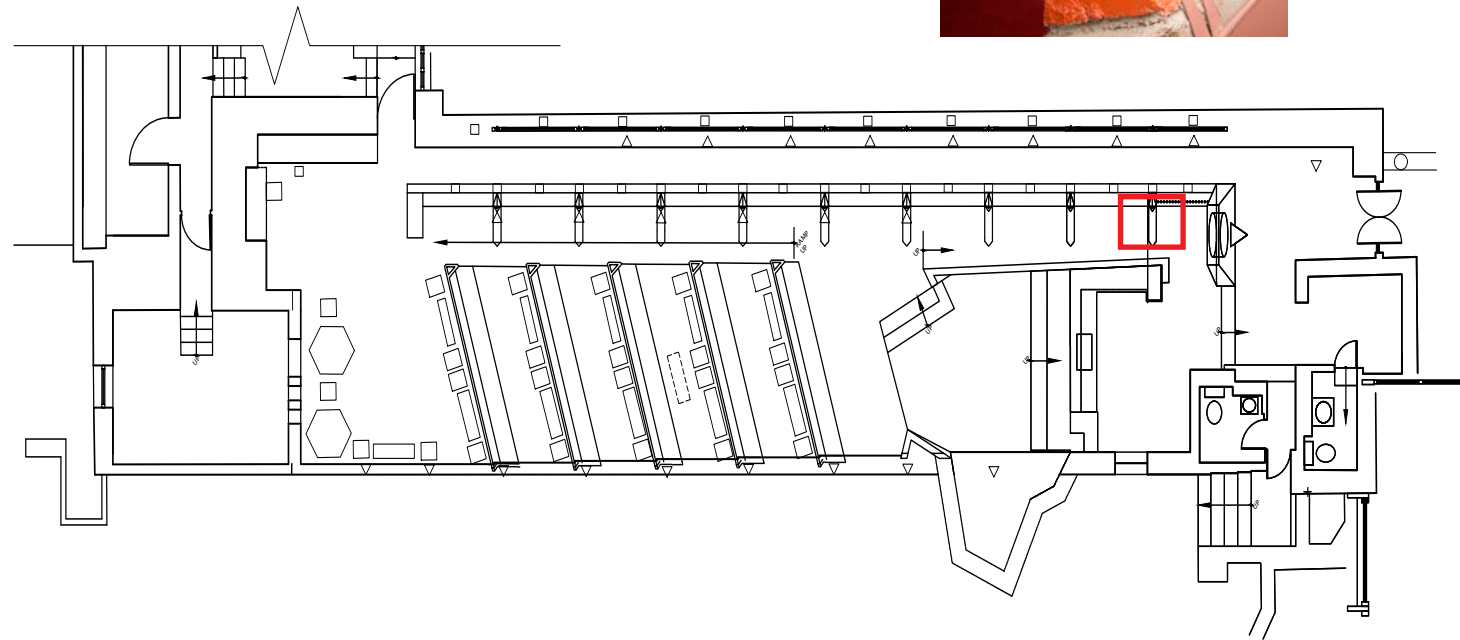


Sketch of the object

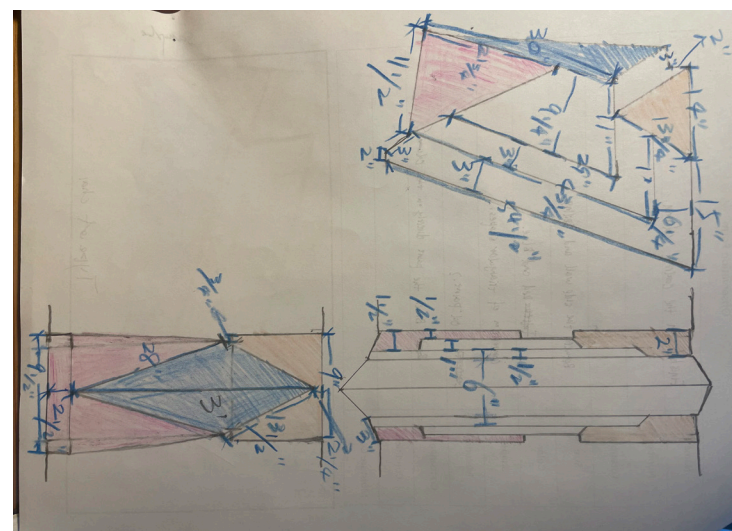




Object Name: Painted concrete piers
Quantity: 9
Date of original installation: 1951 (repainted for several times after that)
Current Location: West side of the corridor
Material : Concrete
Condition: Good

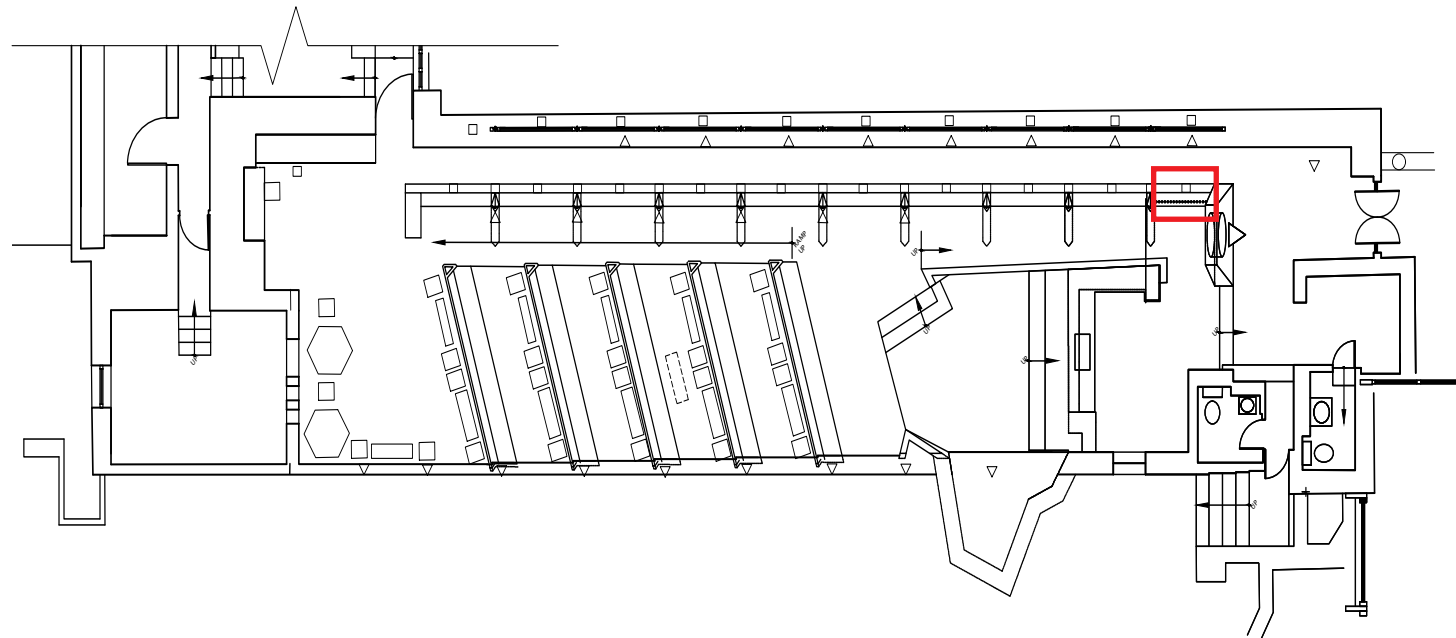


Sketch of the object

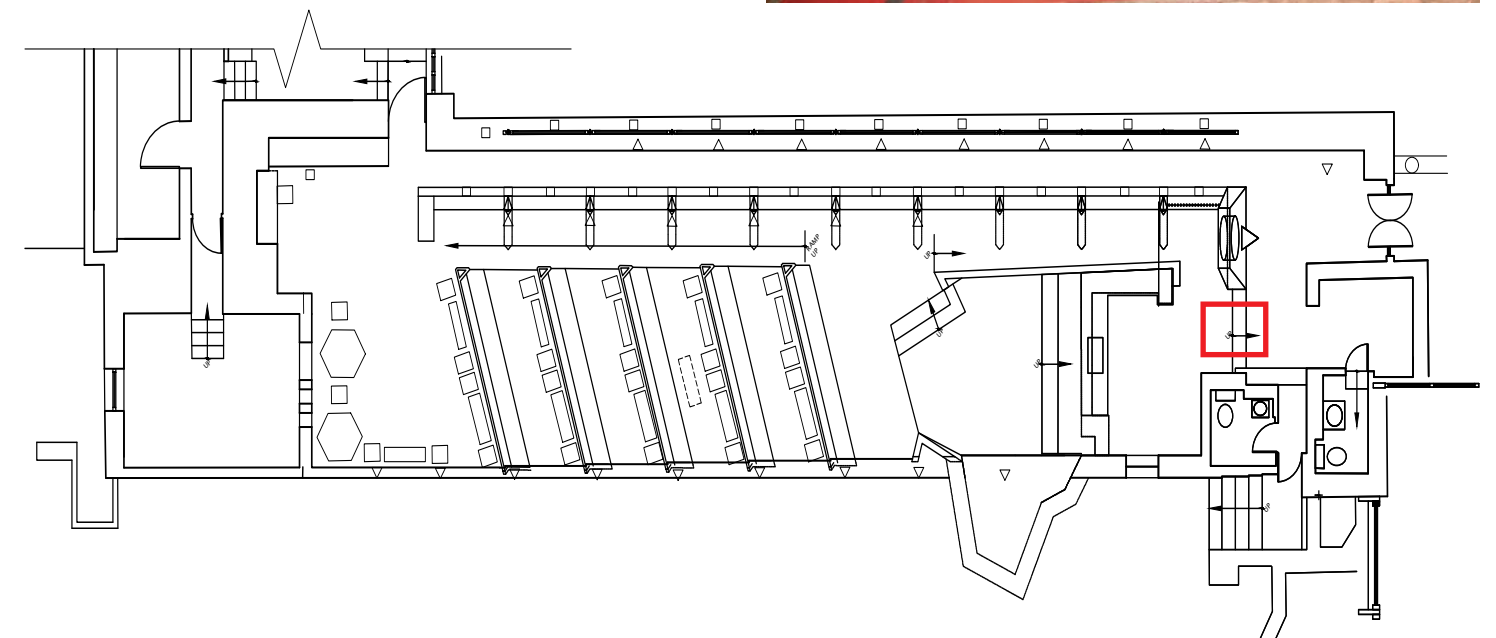




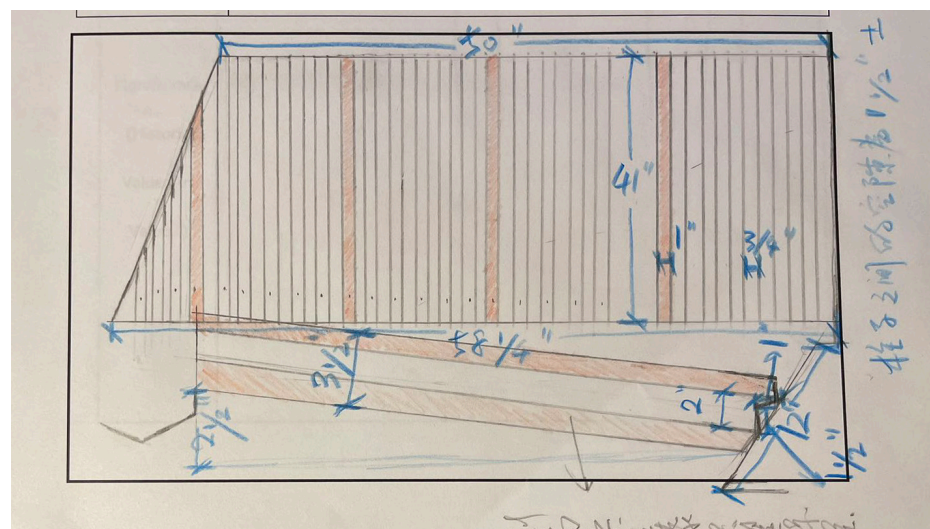
Object Name: Wood Screen
 Quantity: 1
 Date of original installation: After 1952
 Current Location: Between the first and second pier
 Material : Wood with finishes
 Condition: Good



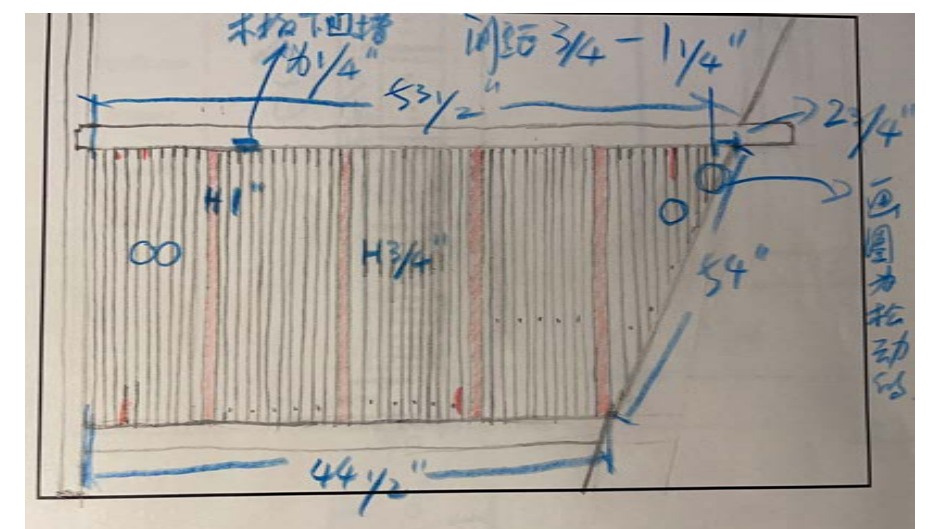
Object Name: Wood Trim Screen
 Quantity: 1
 Date of original installation: After 1956
 Current Location: Between the first and second pier
 Material : Wood with finishes
 Condition: Generally good, small cracks can be seen on the joint near the base and top part.



Sketch of the object

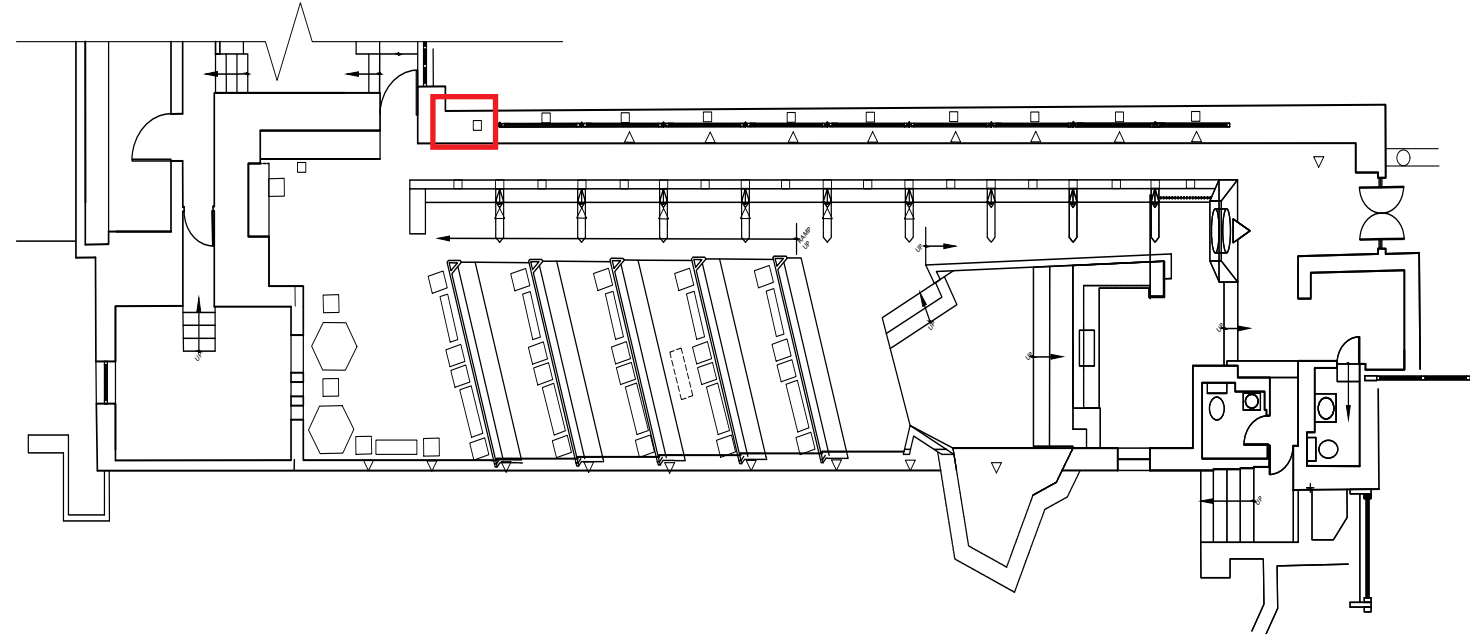


Sketch of the object

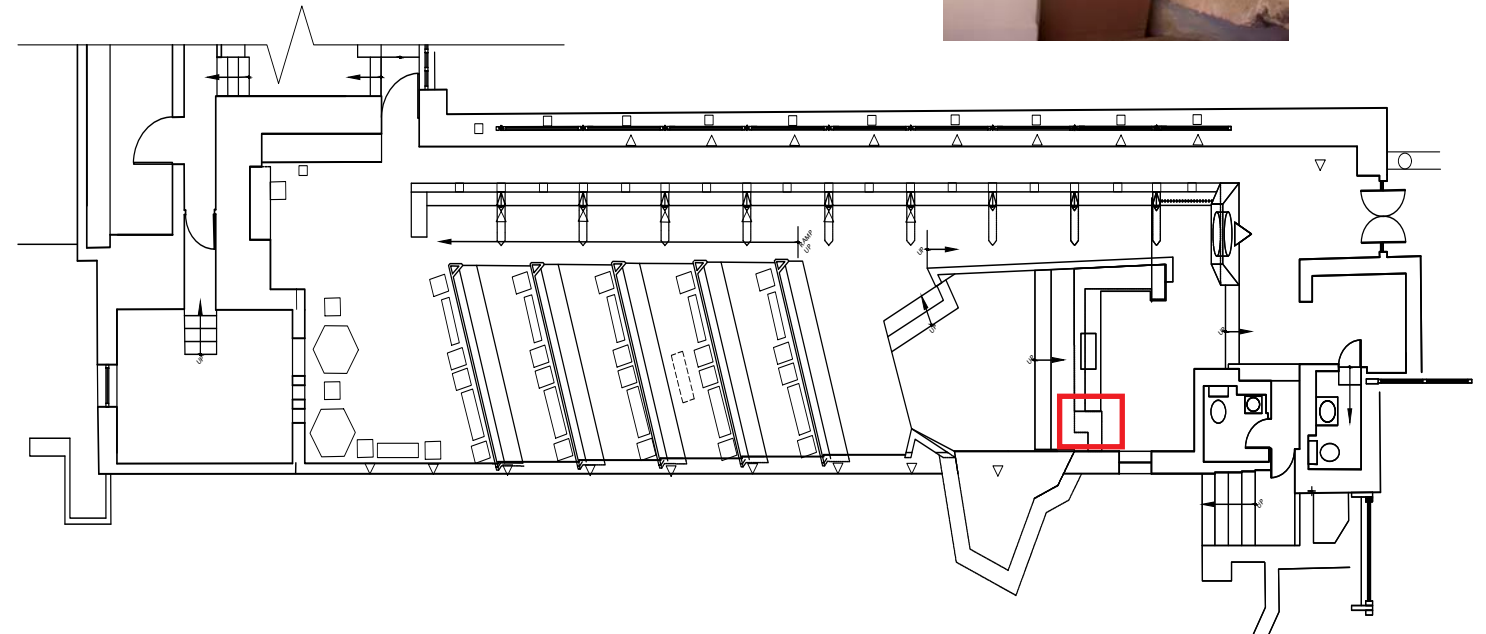




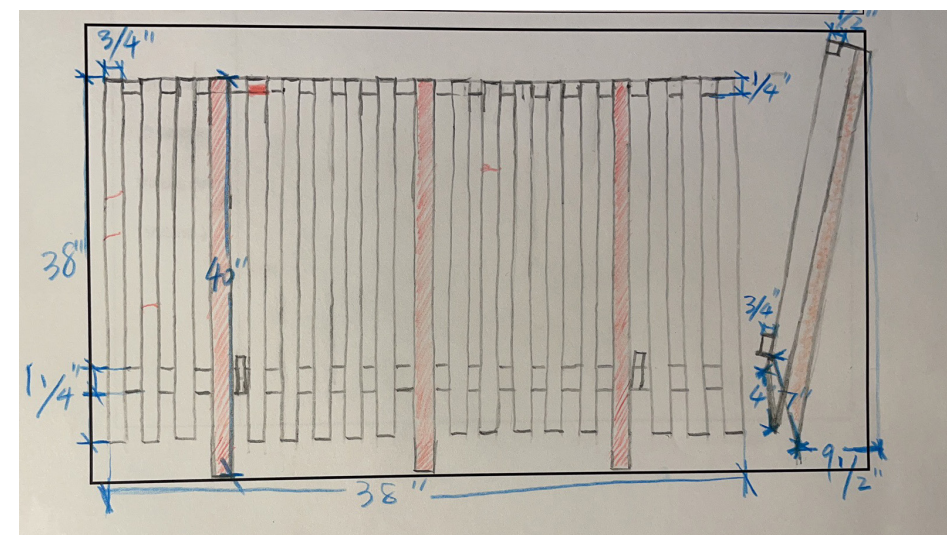
Object Name: Wood Screen
 Quantity: 1
 Date of original installation: Unknown
 Current Location: End of the corridor, behind the last panel
 Material : Wood with finishes
 Condition: Good



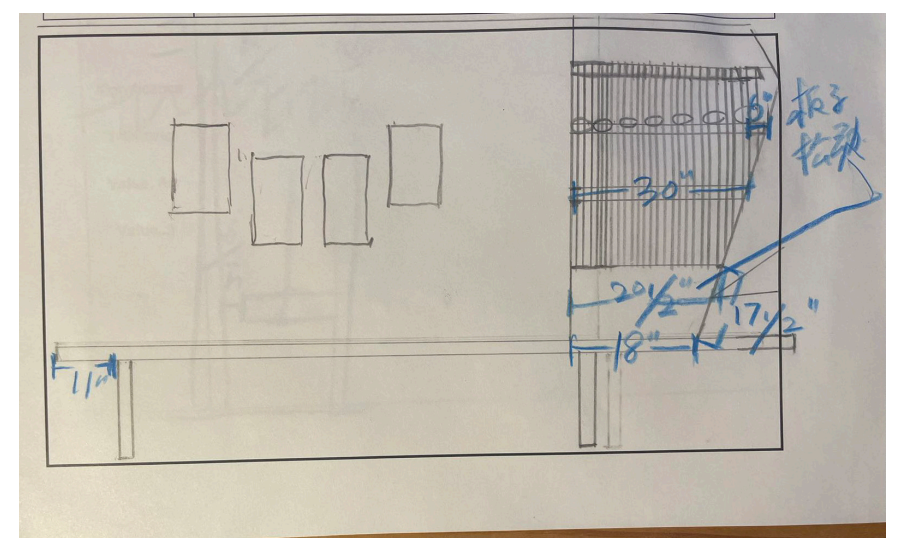
Object Name: Wood Trim Screen
 Quantity: 1
 Date of original installation: 1951
 Current Location: Between the stage screen and the west wall
 Material : Wood with finishes
 Condition: Good



Sketch of the object

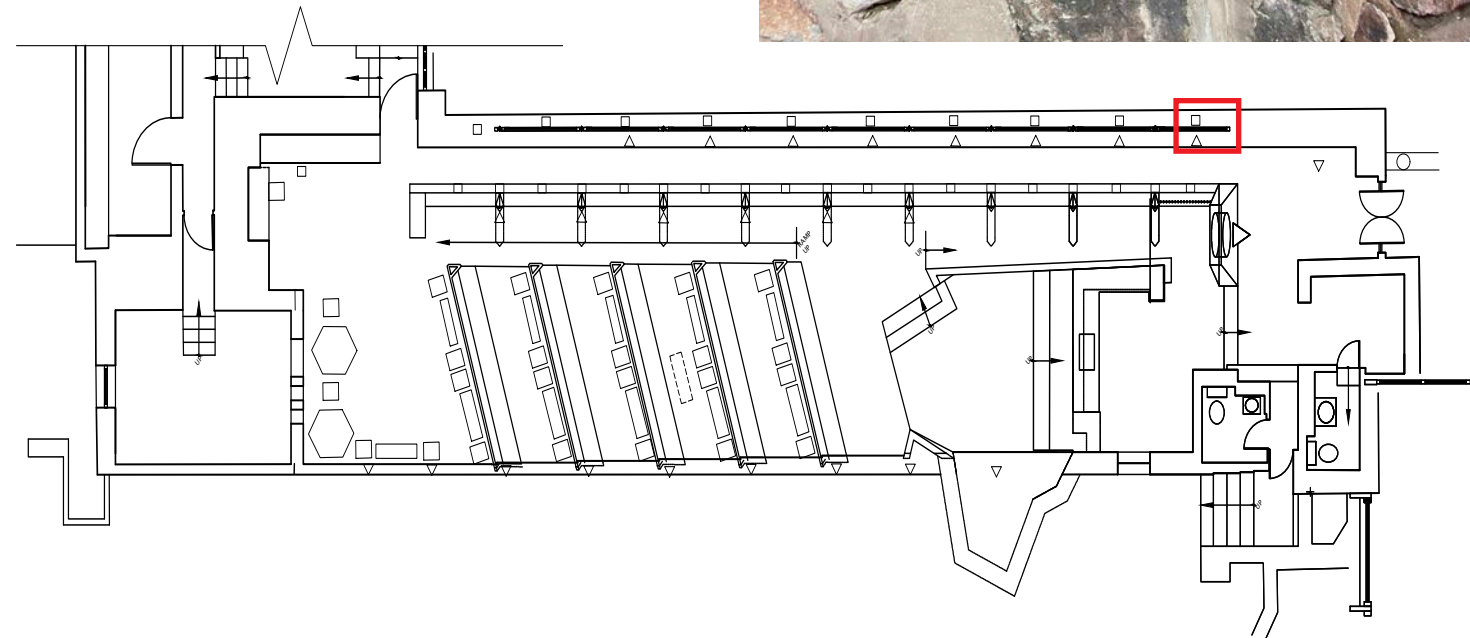


Sketch of the object

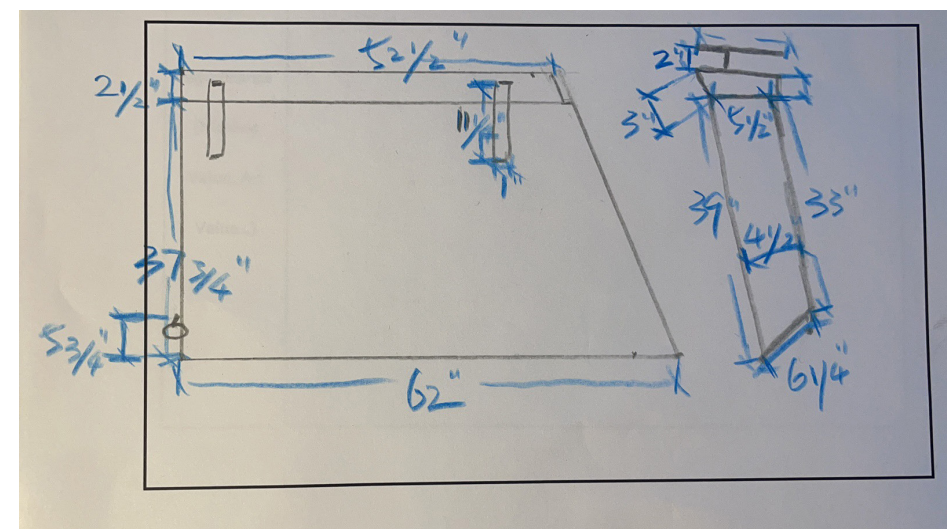




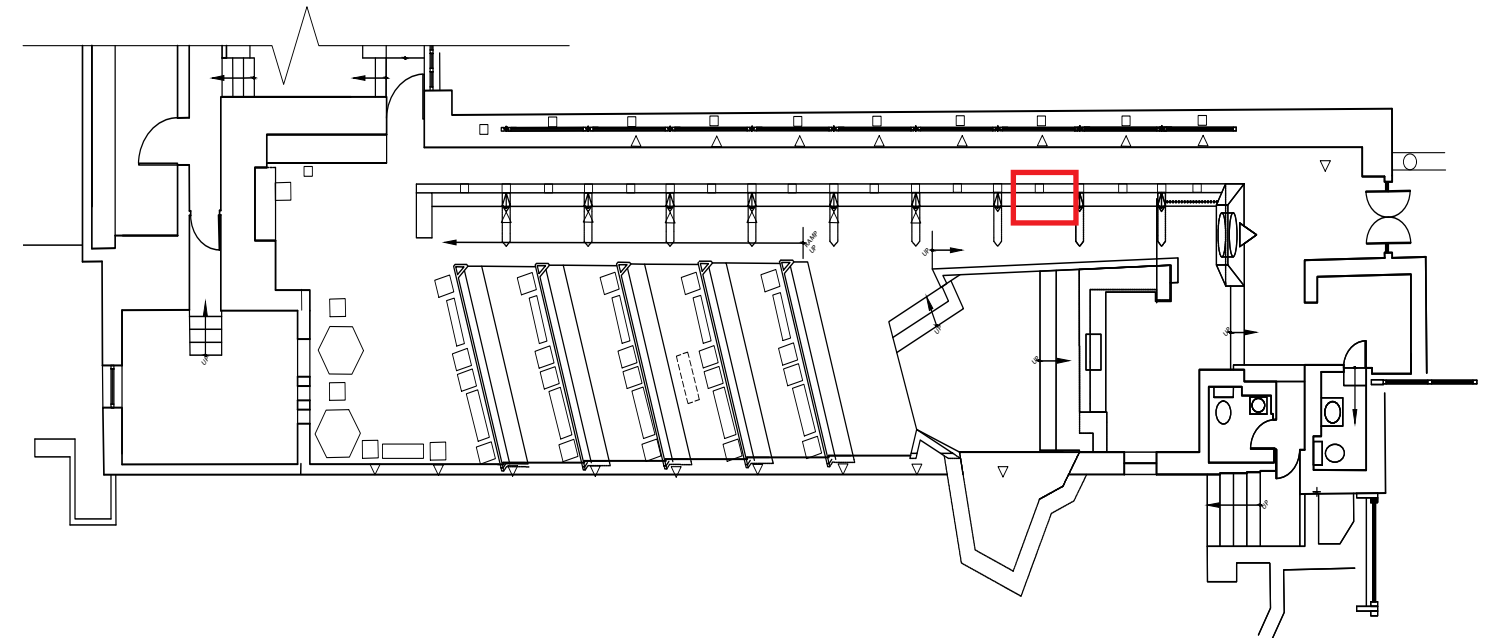
Object Name: Operable Panel
 Quantity: 9
 Date of original installation: 1960s
 Current Location: Along the west wall
 Material : Plywood with finishes
 Condition: Generally good. Peeling paint can be observed at some spots.



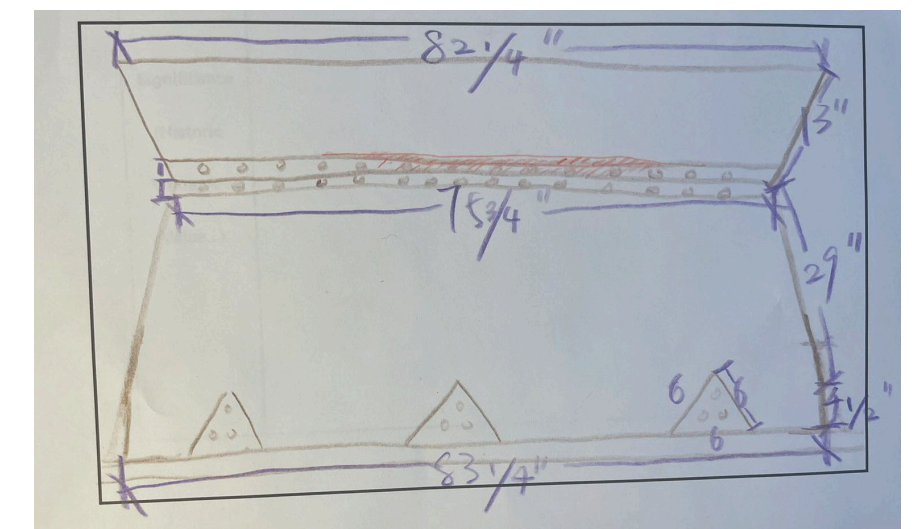
Sketch of the object



Object Name: Operable Panel
 Object Number: 12
 Quantity: 9
 Date of original installation: 1960s
 Current Location: Between decorative piers
 Material : Plywood with finishes
 Condition: Generally good. Some have a cracking near the hinge

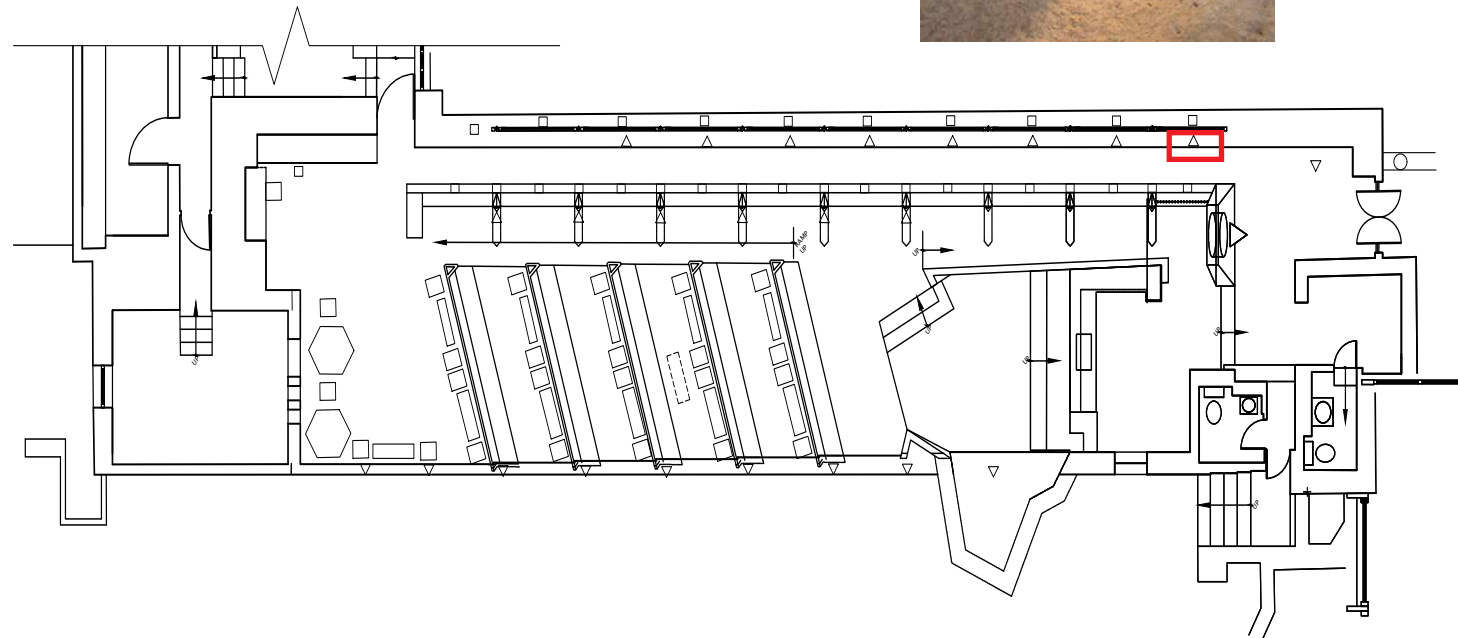


Sketch of the object

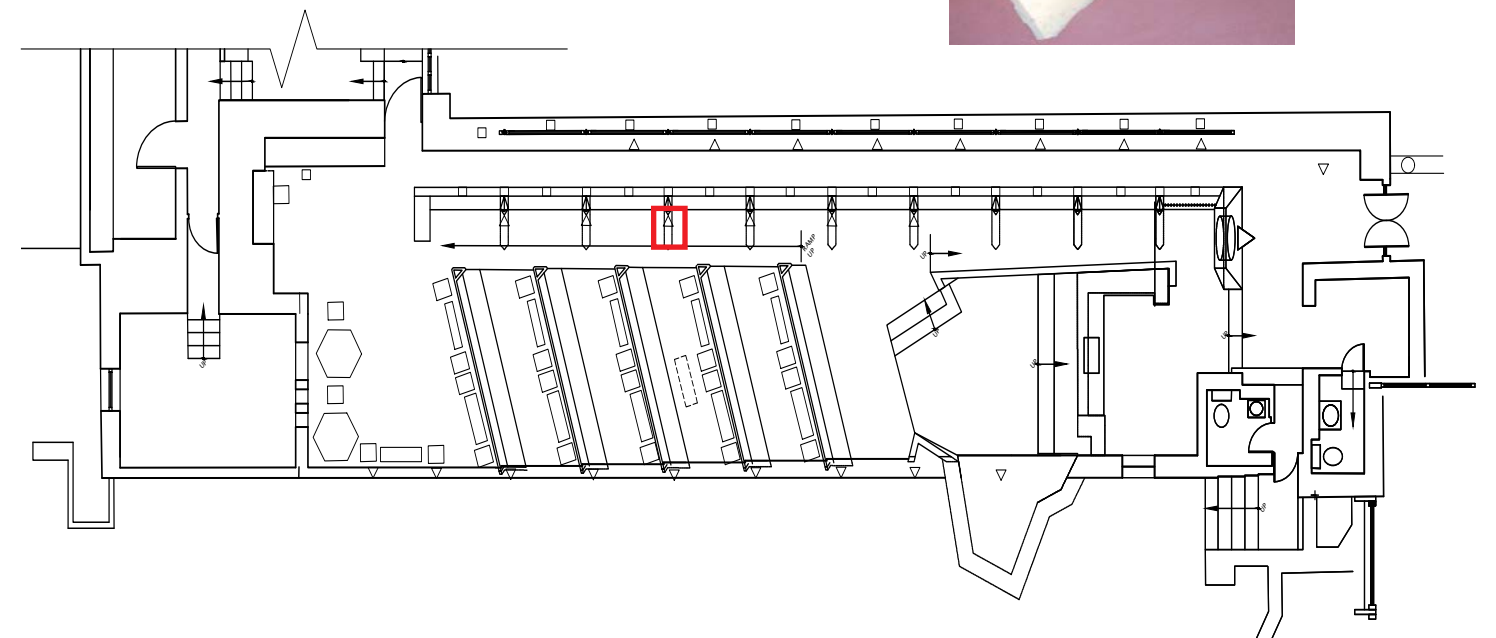
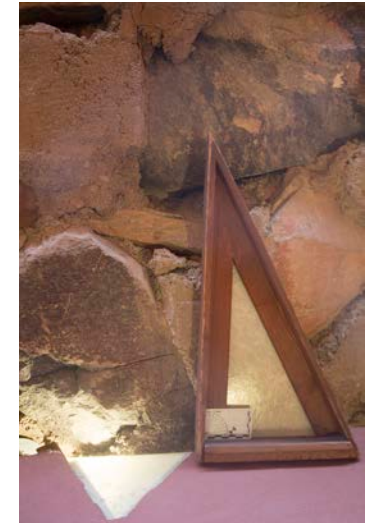




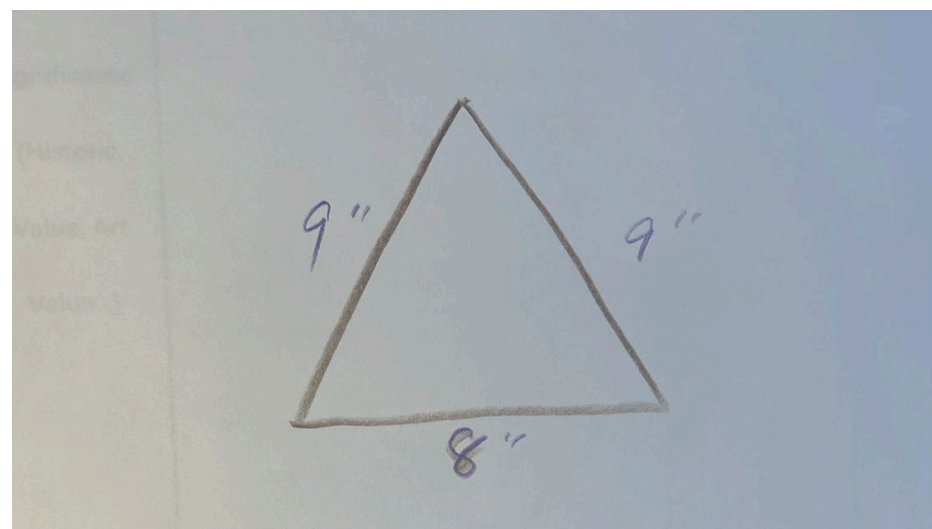
Object Name: Base light
Object Number: 13
Quantity: 8
Date of original installation: 1951
Current Location: Base of the east wall
Material : Masonry
Condition: Good



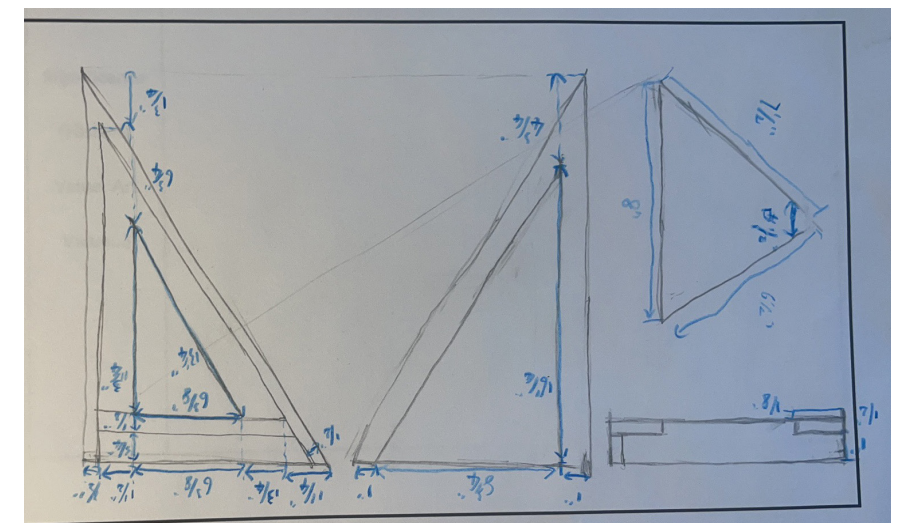
Object Name: Base light with lampshade
Object Number: 14
Quantity: 6
Date of original installation: Original base light (1951),
triangular opening cover along the edge of the new
ramp (1964)
Current Location: East side of the aisle
Material : Lampshades are made with wood frame and
fiberglass. Triangular cover are made with fiberglass.
Condition: Good



Sketch of the object

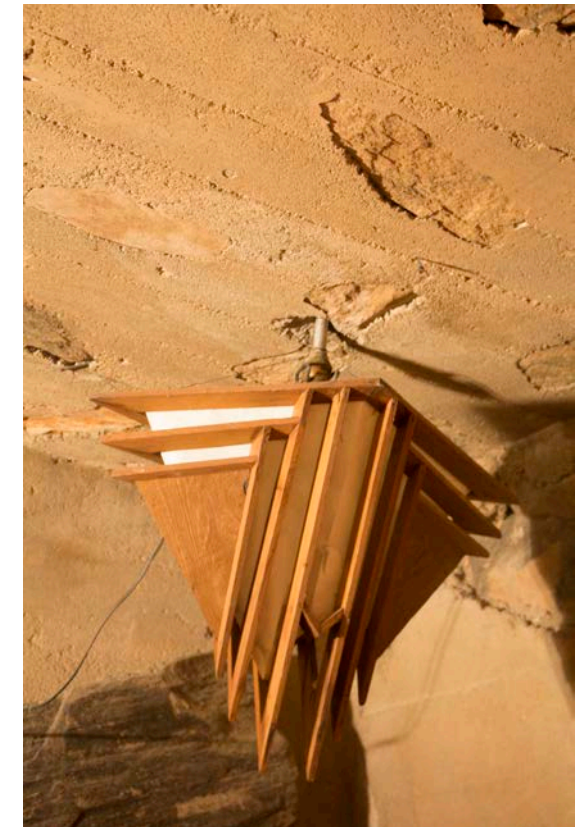
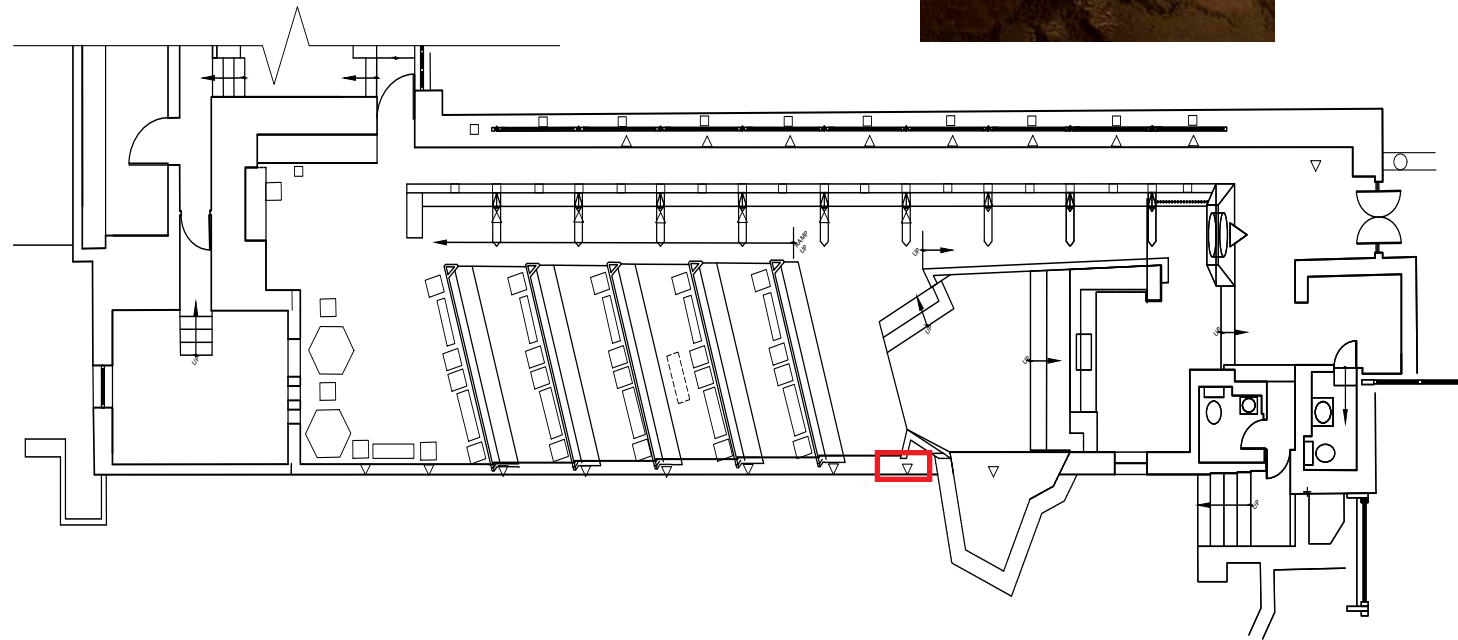


Sketch of the object

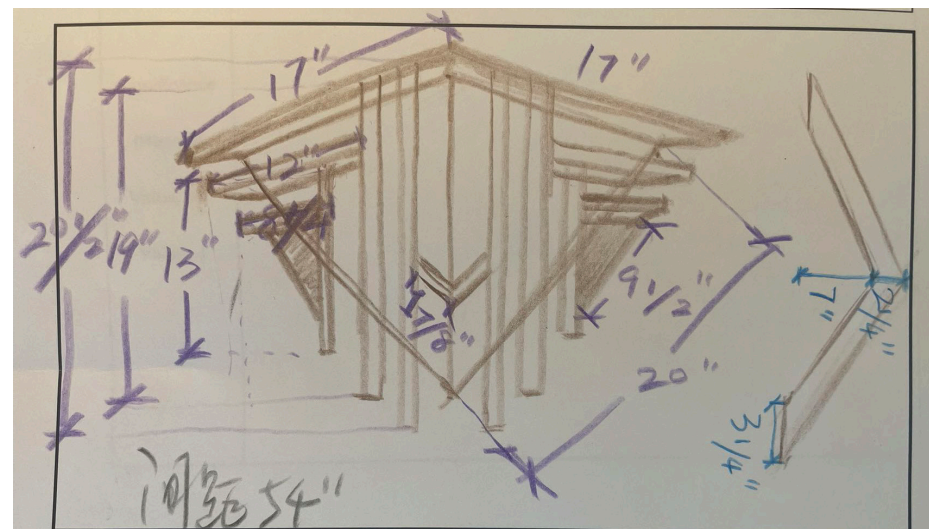




Object Name: Wall Sconce (Hanging light)
 Object Number: 15
 Quantity: 11
 Date of original installation: 1951
 Current Location: Hanging on the west wall, one behind the entrance and one beside the fireplace
 Material : Fiberglass lampshade in wooden frame. Original shade were made of Japanese paper.
 Condition: Good

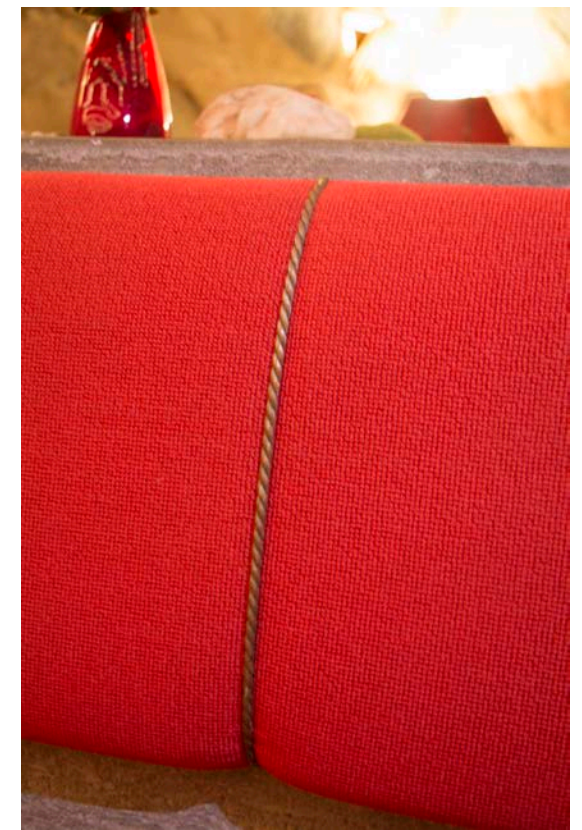
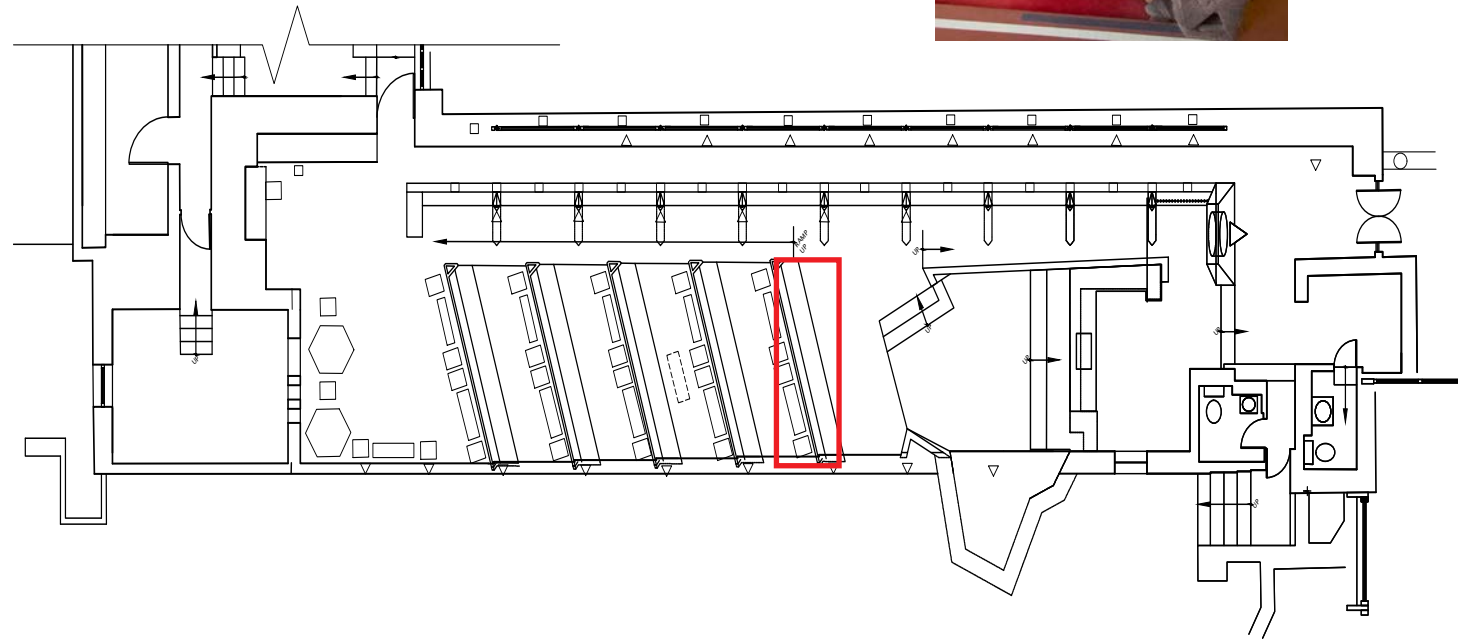


Sketch of the object

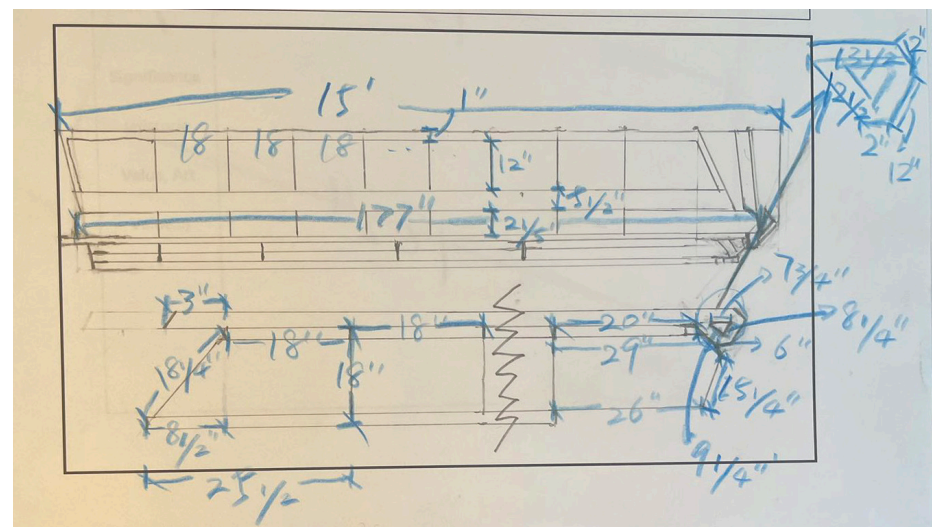




Object Name: Benches
Quantity: 5
Date of original installation: 1964
Current Location: Center of the theater, facing the screen at an angle
Material : Concrete back and pillar, wood seat, fabric upholstery
Condition: Generally good. Upholstery is worn.

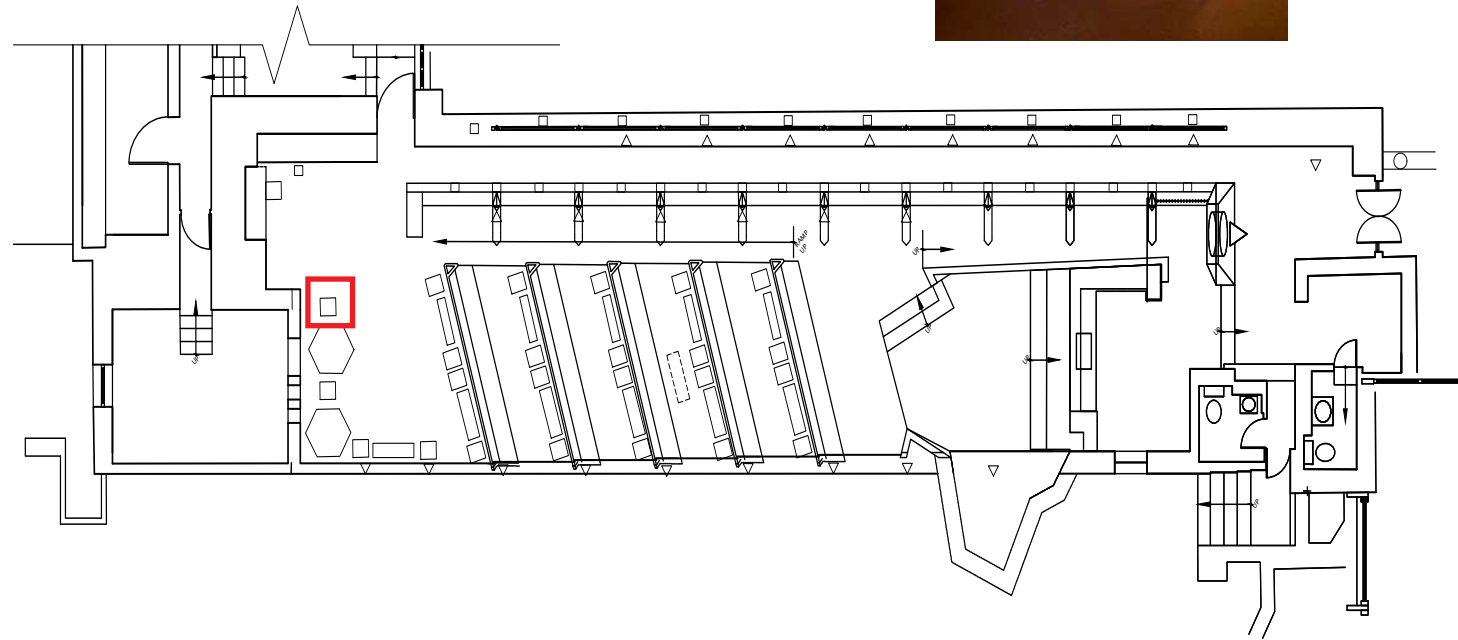


Sketch of the object

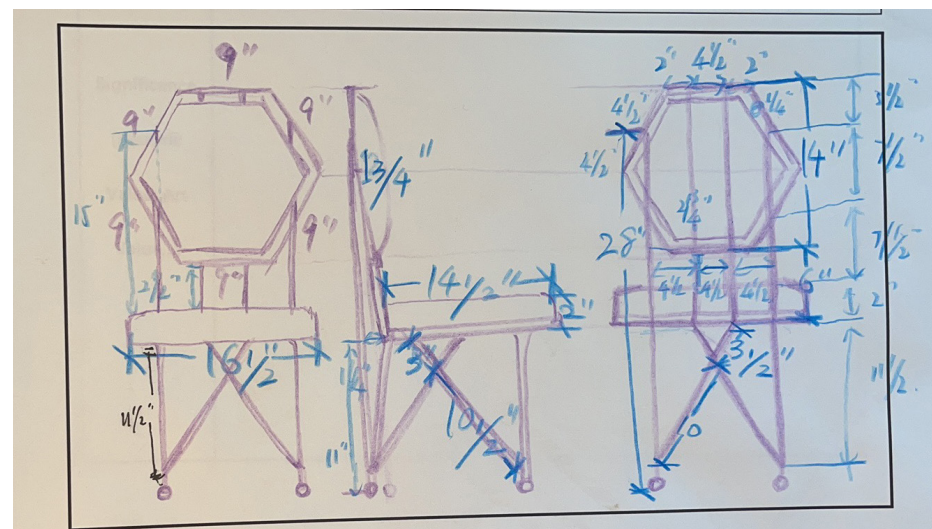




Object Name: Freestanding chairs
 Quantity: 24
 Date of original installation: 1964
 Current Location: Behind each row of benches
 Material : Metal frame and fabric upholstery
 Condition: Generally good. Discoloring of the Red paint on the metal frame is a common problem.

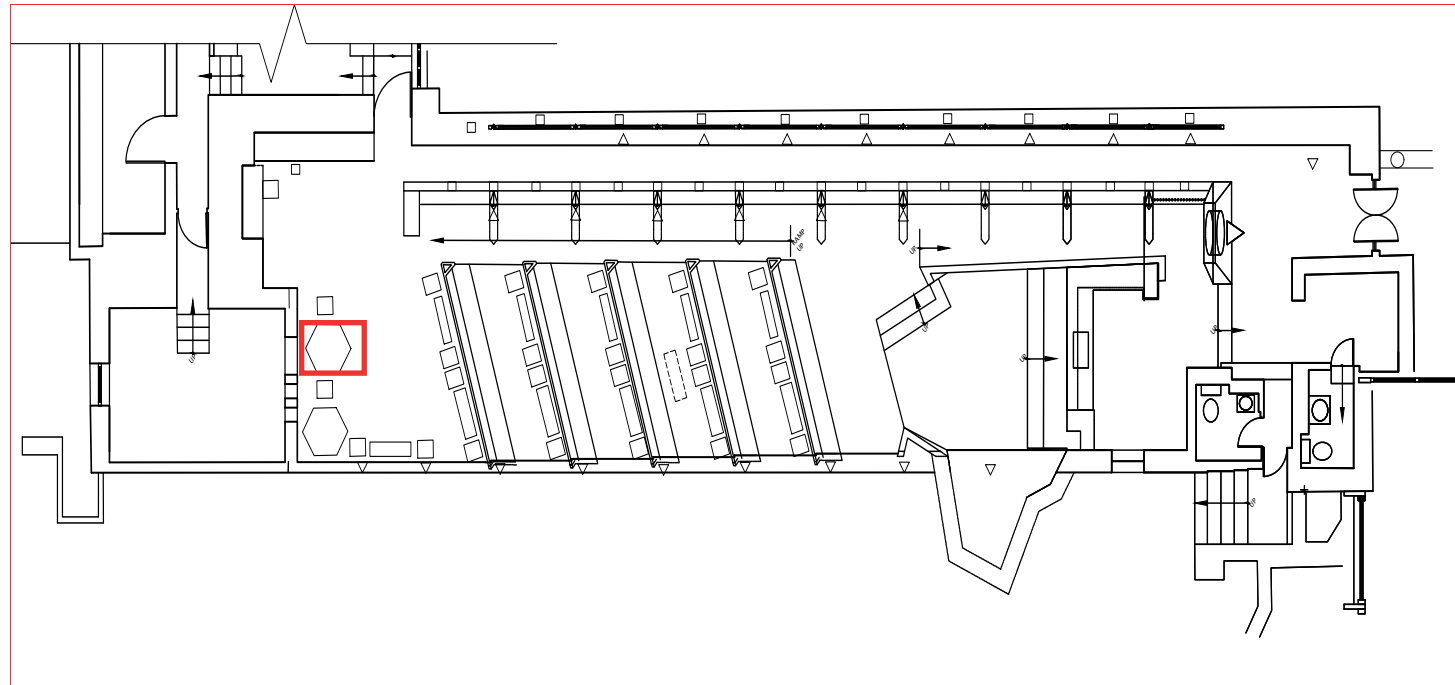


Sketch of the object

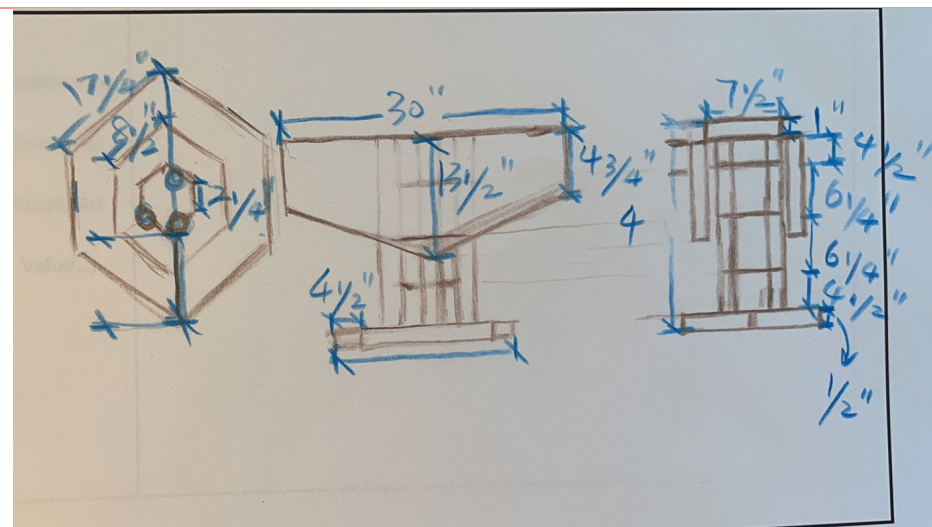




Object Name: Freestanding tables
Quantity: 13
Date of original installation: 1964
Current Location: Behind each row of benches
Material : Plywood table top, metal supporting and base
Condition: Good.

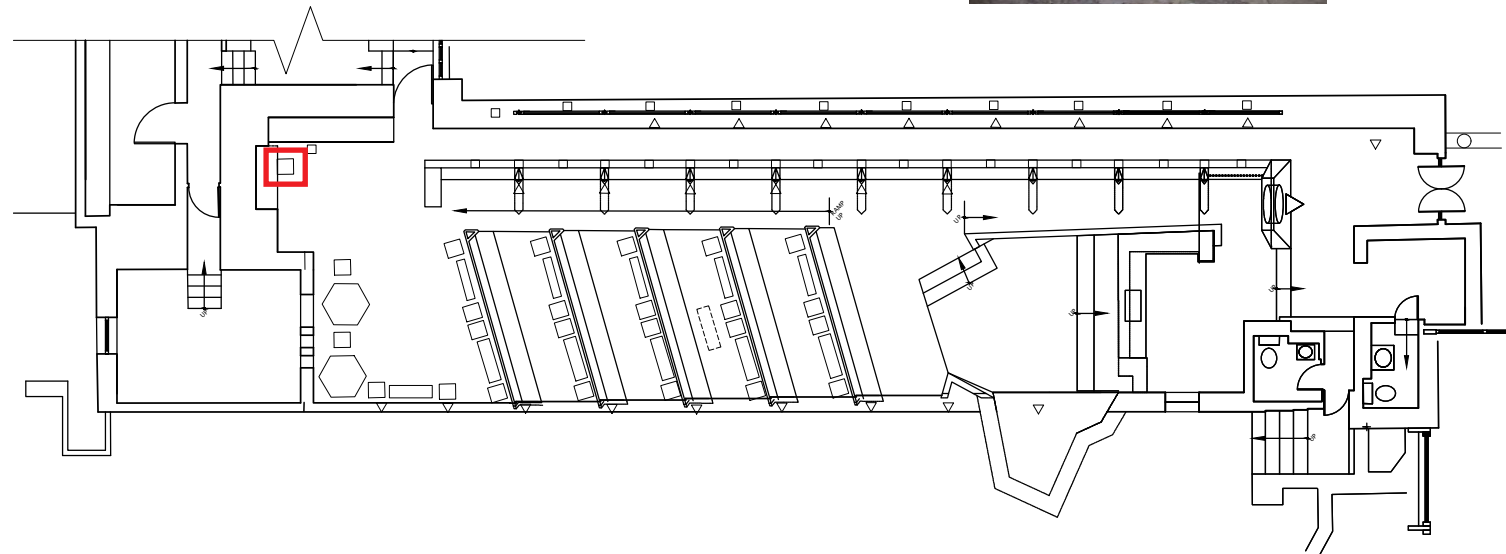


Sketch of the object





Object Name: Pot and shovel
Quantity: 1
Date of original installation: unknown
Current Location: In the fireplace
Material : Metal pot and wood-handle iron shovel
Condition: Good.



Sketch of the object

