EXTERIOR CONDITIONS MEMO

Cable Car Barn

San Francisco, California

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Architecture
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Architectural Resources Group, Inc. (ARG) was retained by the San Francisco Department of Public Works to conduct an exterior conditions assessment of the Cable Car Barn in San Francisco, California, and provide treatment recommendations for its repair. The survey included general assessment of the exterior envelope including brick masonry, windows, doors, and skylights.

BRIEF DESCRIPTION OF THE BUILDING

Cable Car Barn is a two-story-tall brick-masonry building located at the southwest corner of Washington and Mason Streets in San Francisco, California. It was erected in 1907-08 to replace a three-story brick powerhouse and car barn destroyed in the 1906 earthquake and fire. The current structure was built on the footings and foundations of the original building. San Francisco's surviving cable car routes all operate out of this building. There is also a small museum inside the building housing exhibits on the history of San Francisco's cable cars.

The building is a typical brick commercial structure with a large chimney located on the south side. A pair of string courses visually separate the first and second floors. The fenestration includes multi-lite steel windows with awning or fixed sashes. The second-floor windows have an arched or rounded transom. There are also large entrance door assemblies with side lites and transoms.

The building has undergone a few changes over the years, including two major repair and renovation projects in 1967 and the 1980s. The 1967 work included brick masonry sandblasting, waterproofing, and painting. The 1980s rehabilitation project included masonry cleaning and repair, new roof and skylights, window and door replacement, and waterproofing. The Cable Car Barn has been recognized as a historic resource at the national, state, and local level, primarily as a contributor to the broader San Francisco Cable Car system.

METHODOLOGY

ARG conducted a visual survey of the building from the ground in April 2021. The conditions were observed using binoculars and a digital camera. A range of deterioration conditions such as crack, spall, mortar deterioration, general soiling, biological growth, stain, sealant failure, and corrosion was noted. The survey was non-destructive.

ARG also reviewed various background drawings, documents, and historic photographs of the building to prepare this report. They included 1967 and 1980s repair and renovation drawings and documents, National Register of Historic Places Inventory - Nomination Form, San Francisco Landmarks Preservation Advisory Board Case Report, and 2016 Facility Condition Assessment report.

Based on the existing condition survey, ARG identified appropriate treatment recommendations for the repair of the exterior fabric. The recommendations are based on *The Secretary of the Interior's Standards for the Treatment of Historic Properties (The Standards)* with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, and on the Code of Ethics of the American Institute for Conservation (AIC).

SUMMARY OF EXISTING CONDITIONS AND TREATMENT RECOMMENDATIONS

Overall, the exterior envelope is in fair condition and requires general maintenance work. The brick masonry is in fair condition and exhibits cracks, spalls, open or deteriorated mortar joints, general soiling, biological growth, and sealant failure at the sheet copper flashing. The windows, skylights, and doors are in fair condition and exhibit corrosion, paint deterioration, and perimeter sealant failure. The roof requires replacement including all flashing and sealants.

Various deficiencies in the brick masonry, windows, doors, and skylights outlined in this report should be addressed within the next 3 to 5 years to prevent more serious conditions from forming. Deteriorated sealant joints should be replaced sooner, preferably in the next 1 to 2 years.

ROOFING

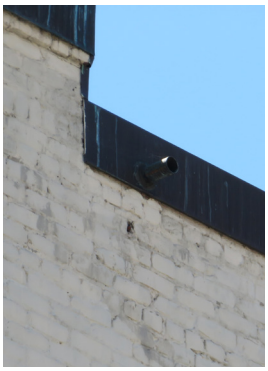
The low-slope roofs consist of a built-up membrane with red aggregate. The roof is drained by a series of in-field roof drains and overflow drains along with supplemental overflow scuppers. Various roof projections, including the clerestory, have standing seam sheet copper roof. Existing roofing may date to the 1984 renovation as no evidence of roof replacement was identified.

The following conditions were observed:

- Condition of the built-up membrane roof is obscured by aggregate, but assumed to be in overall fair to poor condition. Membrane has likely reached the end of its useful life. Evidence of past roof patching or selective replacement was noted.
- Membrane is covered in heavy biological growth at one location on the south side.
- Standing seam metal roofs were observed from the perimeter and appear to be in overall fair condition.
- Sealant joints at sheet metal flashing are deteriorated and in poor condition.
- SFMTA representatives reported a water leak in 2020 near/at the pit on the second floor (area marked in blue on the next page) and suggested the leak may be due to a pipe failure or the condition of the concrete. One pit has since been resealed, however it is not known if the leak has been resolved. ARG was not informed of the leak until after the site visit, however ARG did not observe any signs of major damage on the roof area immediately above the location besides deteriorated sealant and detached flashing. If the leak is still active, further investigation or testing may be needed to identify the source.

Built-up roof with red aggregate

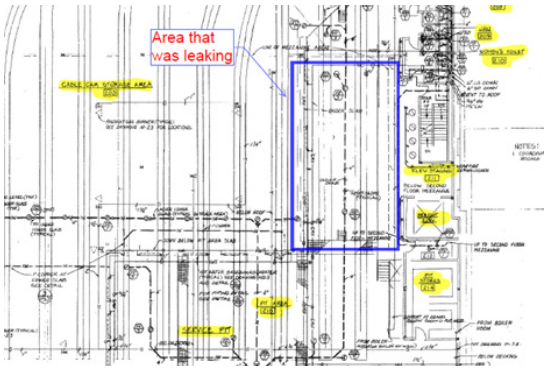
Roof covered in heavy biological growth on the south side



Overflow roof scuppers

Treatment Recommendations

- Replace membrane roof and all related flashing. Remove and replace all sealant joints.
- Remove all tree litter and debris from roof and ensure drains are kept clear.



Water leak near/at the pit on the 2nd floor in 2020 (Image credit: MTA)

Sheet copper roof at the clerestory

Area immediately above the reported water leak

Deteriorated sealant and corroded metal above the flashing at the roof parapet

Area immediately above the reported water leak

SKYLIGHTS

There are multiple aluminum pyramidal skylights on the roof, either square or rectangular. There is also a narrow pyramidal skylight on the ground floor on the south elevation. The glass is laminated.

The following conditions were observed:

- Skylights are in fair condition and exhibit mild corrosion, weathered finish, general soiling, and sealant failure.
- At the ground-floor skylight, the sheet metal flashing on the adjacent wall is detached and has deteriorated sealant.

Treatment Recommendations

- Clean and refinish the skylight frames. Remove and replace all sealant joints. Inspect and touch-up all sealant joints every 3 to 5 years.
- Repair the detached flashing at the ground-floor skylight. Replace the deteriorated sealant.

Roof skylights

Roof skylight

Roof skylight

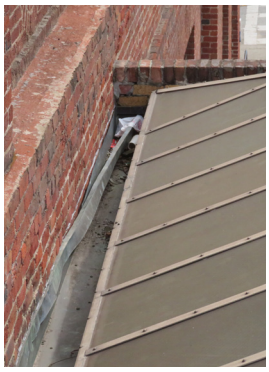
Roof skylight, view from below

Roof skylight, view from below

Mild corrosion and weathered finish

Mild corrosion, weathered finish, and deteriorated sealant

Ground-floor skylight, views from above and below



Detached flashing at the ground-floor skylight

BRICK MASONRY

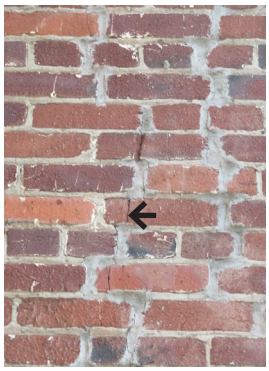
The exterior walls are red brick masonry capped with sheet copper coping. The brick masonry has an abraded finish from the 1967 sandblasting work. The coping was installed in the 1980s.

The following conditions were observed:

- Brick masonry is in fair condition and exhibits multiple cracks, spalls, and open or deteriorated mortar joints.
- A full-height hairline-size crack on the south elevation runs through brick units and mortar joints.
- Several stepped cracks were also noted.
- Brick chimney has numerous spalls and open joints.
- Building has several non-matching mortar joints and brick replacements from prior work.
- Masonry has an accumulation of general soiling, biological growth, and efflorescence - most significant at the projecting belt courses and trims, which are more likely to retain water. There are also mortar slurry residue, copper stains, and plant/weed growth.
- Plant beds are overgrown on the south elevation.
- Brick masonry is painted on the north elevation. The paint is in fair to poor condition. It is flaking and peeling at several locations and also covered in general soiling and biological growth at the parapets.
- Building-to-sidewalk joint is open at the base of the building.
- Sealant joints at the metal coping are missing or deteriorated.

East elevation

Ornate brickwork



Full-height crack, south elevation

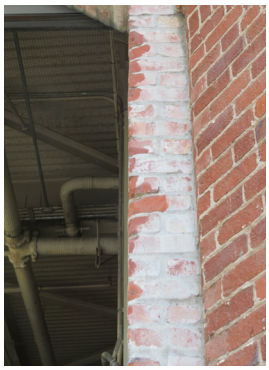
Treatment Recommendations

- Clean masonry to remove general soiling, biological growth, efflorescence, and stains. Consider installation of coating or sloped parge coat on skyfacing masonry surfaces like belt courses to shed water.
- Repair cracks and spalls in the brick masonry. Visually monitor large and long cracks after the repair. If any of the cracks open up again, it may indicate an area of active movement.
- Repoint open or deteriorated joints in the brick masonry.
- Consider replacing poorly matching masonry repairs and mortar joints for aesthetic reasons. Matching new or replacement brick to the existing abraded brick will require extra care.
- Repair leaking pipes on the east elevation.
- Trim overgrown plant beds and remove unwanted plant growth/weeds.
- Prepare, prime, and paint the brick masonry at the north elevation.
- Install sealant joint at the base of the building.
- Replace or repair metal parapet coping.Repair may include installation of an extruded silicone seal at joints.

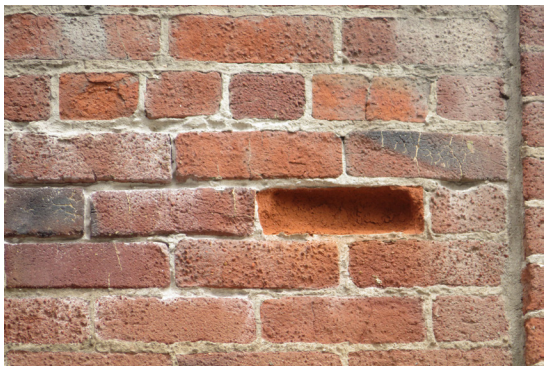
Stepped crack through mortar joints, east elevation

Stepped crack, south elevation

Spalled bricks around the windows, south elevation (left) and east elevation (right)

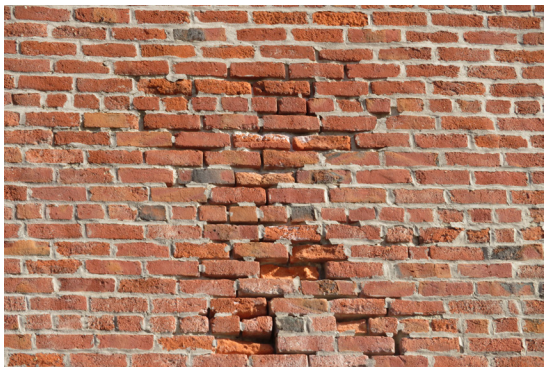



Spalled bricks around the building entrances, north elevation (left) and south elevation (right)



Spalled brick, south elevation

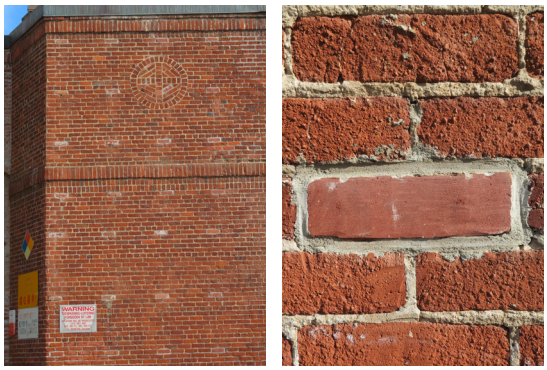
Damaged bricks, south elevation



Spalls and open joints in the brick chimney, south elevation

Spalls and open joints in the brick chimney, south elevation

Open joints



Non-matching mortar joints around brick replacements, south elevation

Non-matching brick replacements, south elevation

Non-matching repairs, east elevation

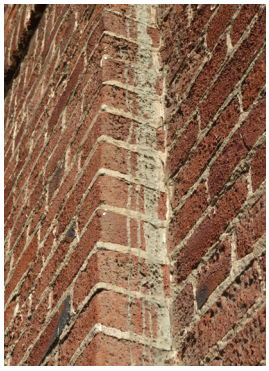
General soiling, biological growth, and paint deterioration, north elevation

General soiling, biological growth, efflorescence, and plant growth, east elevation

Biological growth, efflorescence, and open/deteriorated mortar joints, east elevation

Heavy general soiling and biological growth near overflow scupper, east elevation

Leaking pipes resulting in biological growth, east elevation



Copper stain (left) and mortar slurry residue (right), south elevation

Overgrown plant beds and weed growth, south elevation

Open joint at the base of the building, east elevation

Deteriorated sealant at metal coping

WINDOWS

Most windows are multi-lite steel windows with awning sashes and arched or rounded transom. There are also multi-lite fixed windows on the ground floor. The existing windows are not original and were installed during the 1980s rehabilitation project.

The following conditions were observed:

- Windows are in fair condition and exhibit corrosion, paint deterioration, and perimeter sealant failure.
- Cracked glass and missing hardware was noted at several windows.
- Select sashes were opened with relative ease during the site visit.

Treatment Recommendations

- Replace cracked glass panes to match existing in color, texture, size, and thickness.
- Replace missing or damaged hardware.
- Clean, adjust, or lubricate all sashes to make them easier to operate.
- Install new perimeter sealant at all windows.
- Prepare, prime, and paint all windows.

Second-floor multi-lite steel windows

Second-floor multi-lite steel windows, interior view

Ground-floor multi-lite steel windows

Multi-lite fixed window at the ground floor

Multi-lite fixed window at the ground floor

Corrosion on the windows

Corrosion on the windows

Deteriorated perimeter sealant

Cracked glass (left) and missing lever (right)

CLERESTORY WINDOWS

There are steel awning windows and a copper louver at the clerestory on the roof.

The following conditions were observed:

- Windows are in overall fair condition and exhibit corrosion, paint deterioration, and sealant failure.
- Plaster finish has minor cracks.
- Sealant is deteriorated at the sheet copper flashing at the base of the walls.

Treatment Recommendations

- Clean, adjust, or lubricate all sashes to make them easier to operate.
- Install new sealant at all windows and flashing.
- Prepare, prime, and paint all windows.
- Prepare, prime, and paint the plaster. Before painting, sound and replace all cracked and loose plaster. New plaster to match the texture of the existing plaster.

Steel awning windows at the clerestory

Steel awning windows

Sheet copper louver

Corrosion

Cracks in the plaster

Deteriorated sealant at the flashing

Deteriorated sealant at the flashing

DOORS

The building has a variety of both metal and wood doors. The main entrance has wood double doors set in a steel frame with a multi-lite transom. There is also a steel canopy above the entrance.

The east elevation has steel single doors with multi-lite side lites and transom. The south elevation has wood double doors with a louver in the transom and double steel doors with multi-lite side lites and transom.

The following conditions were observed:

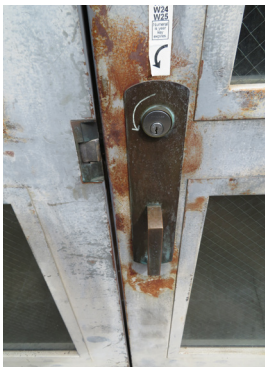
- All metal door and entrance canopy components exhibit corrosion and paint deterioration.
- Wood double doors exhibit a weathered finish.
- Perimeter sealant is deteriorated.

Treatment Recommendations

- Clean, adjust, or lubricate all doors to make them easier to operate.
- Install new perimeter sealant at all door surrounds.
- Prepare, prime, and paint all metal door and entrance canopy components.
- Clean and refinish all wood doors.

Museum entrance (left); east elevation doors (right)

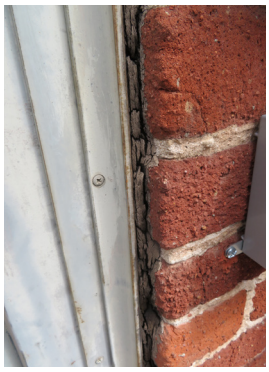

South elevation wood double doors

South elevation metal double doors

Flush metal door

Corrosion at the museum entrance canopy



Deteriorated perimeter sealant

Deteriorated perimeter sealant

Mild corrosion and weathered finish

Mild corrosion and weathered finish

RAILINGS

There are steel and bronze railings on the south elevation. The railings were installed in the 1980s and are not original.

The following conditions were observed:

- Steel railing is in overall good condition, but exhibits paint deterioration.
- Bronze pipe railing is in overall good condition, but exhibits a weathered finish and mild corrosion.

Treatment Recommendations

- Prepare, prime, and paint the steel railing.
- Clean and refinish the bronze railing.

Steel railing, south elevation

Steel and bronze railings, south elevation

Bronze pipe railing, south elevation

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