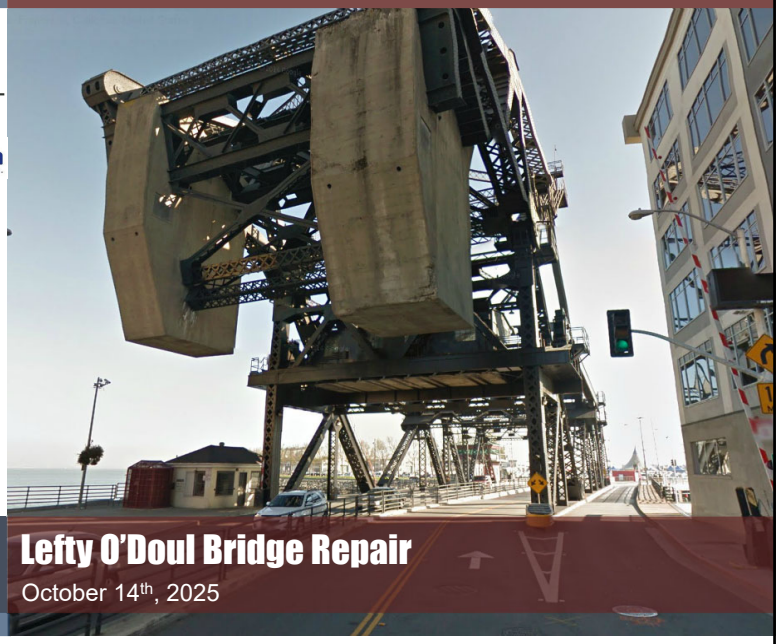
Presentation



Lefty O'Doul Bridge Repair

October 14th, 2025

1

History

Bridge type: Bascule

Opened: 1933

Designed by: Joseph Baerman Strauss

San Francisco Landmark: #149

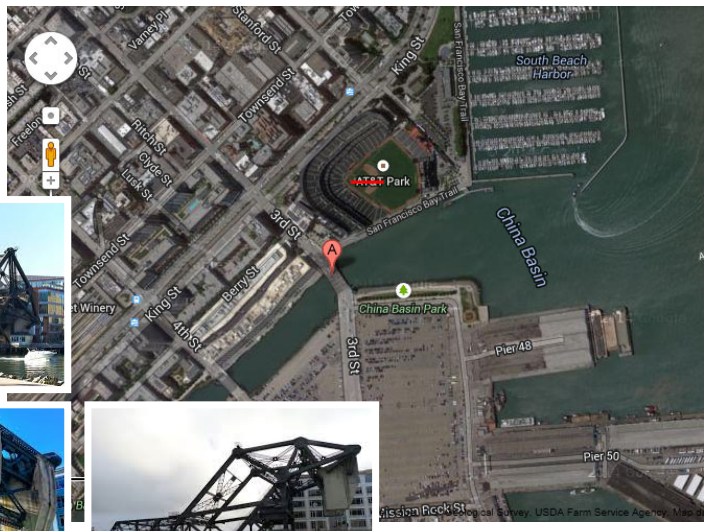
Total Length: 295-ft.

Main Span: 143-ft.

Vertical Clearance Above Deck: Approx 19-ft.

2

Location



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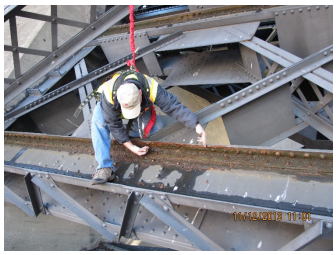
Bridge Elements of Interest

Bridge Substructure

Bridge Deck



Superstructure

Concrete Counterweights

4

Bridge inspection

Structural Bridge Inspection

Superstructure Repair

a. Buckled members
b. Stair and landing supports
c. One corroded built up member

Substructure Repair

a. Sill beam to stringer connection repair .
b. Replacement of existing bolts and rivets.
c. Repair of corroded welds
d. Repair of corroded steel members
e. Repair of buckled members
f. Repair for missing rivets
g. Coating repair

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Reinforced Concrete Piles – Corrosion Assessment an Mitigation Plan

Specs

SECTION 036101 - PILE PROTECTION SYSTEM FOR REINFORCED CONCRETE PILES UTILIZING MARINE EPOXY GROUT

PART 1 – GENERAL

1.1 SUMMARY

A. The work under this section shall include furnishing and installing a permanent outer jacket, made from durable, inert corrosion-free materials and filling the annular space between the pile and the permanent jacket with a hydro-ester multi-purpose marine epoxy grout and constructing a bevel at the top of the jacket with a trowel grade hydro-ester grout. All materials shall be compatible and shall be manufactured by a single source. For concrete and steel piles apply a hydro-ester protective coating to the pile between the top of the jacket and the underside of the bent.

B. Measurement: The items to be measured under this contract shall be the total linear feet, in place for the sizes of pile jackets specified and for the total amount of square feet of pile protected with two coats of the epoxy coating between the top of the jacket and the underside of the bent.

C. Payment: Payment will be made at the contract unit price bid per linear foot of the pile jacket, and per square foot of epoxy protective coating. Payments made will constitute full compensation for all tools, material, labor, and equipment necessary to complete the project.

D. There are a total of 8 vertical piles to be repaired with approximate dimensions of 12"X12" X 12'. There are also 8 horizontal beams connecting together the vertical piles with similar dimensions, also to be repaired. The contractor shall inspect the piles and determine the pile dimensions as well the length of all pile repair jackets and associated materials in consultation with the repair system manufacturer. Some of the piles, especially the horizontal beams are only accessible at very low tide.

E. Cleaning and removal of defective concrete may expose corroded steel reinforcement that may require repairs and additions of steel reinforcements.

F. Any vertical piles and horizontal beams that are inspected by the Contractor and designated to need rebar reinforcement will be deemed for additional work. Manufacturer of the repair system Simpson Strong-Tie or equal, will determine the size and spacing of the rebar and provide a drawing for the reinforcement cage. In the area where a reinforcement cage is needed, the overall dimension of the structure my change due to the additional rebar and the jacket.

1.2 SUBMITTALS

A. Certification and Material Tests: The Contractor shall furnish a certificate to the Engineer, attesting that the materials meet all the requirements contained herein and that the system submitted has been successfully used by city, state or federal agencies for a minimum of five years.

B. Shop Drawings: Shop drawings, showing locations of standoff spacers, method of fastening jacket form to piling, sealing the jacket after installation, and bracing during

NOTE:
PHOTOGRAPHS SHOWING GENERAL CONDITION OF THE 12" X 12" REINFORCED CONCRETE PILES.

Plans

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Substructure, Stringers, and Decking

7

Footings & Box Beams

8

Substructure & Superstructure Steel Inspection

Severe corrosion of plate steel

Corrosion of angle steel and return

Some corrosion of steel grate support elements

Some corrosion of steel stairs

Some corrosion of superstructure elements

9

Coating Evaluation

Typical Corrosion of steel plate and fasteners.

Bridge box beams, stringers, and girder.

10

Coating Evaluation

Coating adhesion testing.

Broad corrosion evident over local areas likely due to lack of adherence to manufacturer's recommendations for coating/surface preparation or application.

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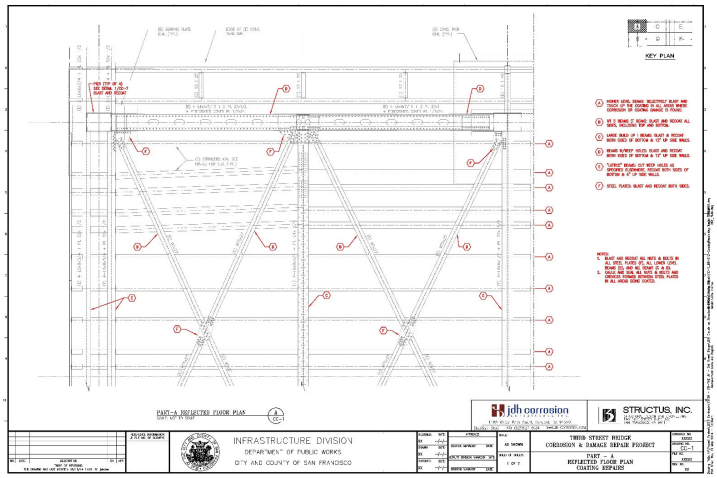
Steel Element Coating Repair Plan



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Counterweight – Inspection and Corrosion Assessment

Visual Inspection

- Concrete counterweight faces were found to be generally in fair condition.
- Majority of the deterioration on the concrete counter weight occurs along the edges and where the steel girders connect to the counter weights, and along some edges where reinforcing steel has spalled concrete.
- This damage ranges from exposed steel mesh to concrete spalling with large chunks of concrete missing exposing the reinforcing steel to the elements.

- Depth of carbonation was found to be less than ½" at all locations tested.

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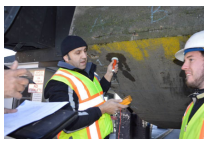
Counterweight – Inspection and Corrosion Assessment

Delamination Testing = a separation of concrete planes, generally parallel to the reinforcement, resulting from the expansive forces of corrosion products.

➔multiple locations on both concrete counter weights



Half-Cell Potential Mapping = measure the electrical potential, since it is qualitatively associated with the steel corrosion rate.

➔Low risk for steel that's still covered, while amount of corrosion on exposed steel varies

Carbonation Testing

➔Carbonation was generally observed between 1/8" – ½" at all tested locations

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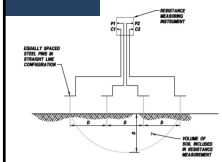
Counterweight – Inspection and Corrosion Assessment



Electrical Resistivity Testing = Resistivity is a measure of the ability of concrete to conduct an electric current and is, therefore, an important parameter in consideration of corrosion data.

➔the potential corrosion rate of rebar is very low.

Chemical Analysis of Concrete Samples = Powdered samples of concrete were obtained at several locations and from depths varying from 0.5" to 2". The samples were tested in the lab by CERCO Analytical.

➔The testing results show the pH ranges from 9.2 to 12.31, indicating sound concrete with no indication of carbonation.

Concrete Compressive Strength Testing = through Schmidt hammer

➔ Lowest average was found on the west counter weight on the north face (equaling a compressive strength of 4,500 psi)

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Counterweight – Plans & Specifications

Specs

SECTION 03932

THIRD STREET BRIDGE CORROSION & DAMAGE REPAIR PROJECT
COUNTER WEIGHTS

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to repair or rehabilitate all existing concrete members and surfaces identified in the Contract Documents.
2. The CONTRACTOR shall repair all damage to concrete counterweights as specified herein.
3. The CONTRACTOR shall repair all damage that is discovered after removal of the delaminated or spalled concrete to concrete counterweights as specified herein.

1.2 QUALITY ASSURANCE

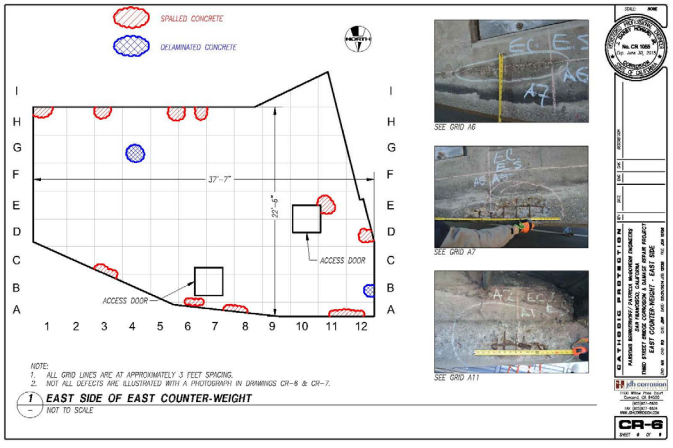
A. Reference Standards: Comply with the latest edition of the applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. ASTM C 109, Test Method for Compressive Strength of Hydraulic Cement Mortars.
2. ASTM C 157, Test Method for Length Change of Hardened Cement Mortar and Concrete.
3. ASTM C 882, Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete.
4. ASTM D 412, Test Methods for Vulcanized and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
5. ASTM D 624, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
6. ASTM D 903, Test Method for Peel or Stripping Strength of Adhesive Bonds.

B. Construction Tolerances: Construction tolerances shall be within ½" of the original design.

1.3 SUBMITTALS

A. Shop Drawings: Comply with Section 01300, Submittals, and the additional requirements below: Submit for approval the following:
1. The CONTRACTOR shall submit manufacturer's product information and recommended placement procedures for all repair materials.

4/23/2014 03932-1



Plans

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Counterweight – Inspection and Corrosion Assessment

Sikadur 31 – Hi-Mod Gel

➔Surface Sealant.

Sikadur 35 – Hi-Mod LV

➔For high-pressure injection deeper into concrete or masonry cracks/voids.

Sika Crack Weld

➔Surface Sealant.

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Work Constraints & Repair Considerations

Most work cannot be undertaken with public traffic on the bridge

➔Needs to be coordinated with Ballpark events

➔ Substructure work is tide sensitive

➔ Requires traffic study

➔Lead Paint Abatement

➔Historically significant structure requires that the bridge's existing aesthetic is maintained

➔High carbon welds

Options to consider

- Potential 90-Day Bridge Closure.
- Multiple 30-Day closures over a one-to-two-year period.
- Nights and Weekends Only.
- Intermittent multi-day closures working around ballpark events.

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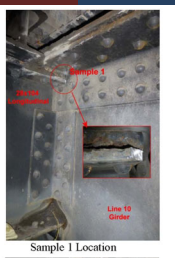
Welding Repair Considerations

Potential for high carbon content indicated by weld failures at several locations on the structure



Sample 1 Location

Sample 2 Location

- ➔Samples removed for spectrochemical and LECO indicated:
  - ➔Slightly elevated carbon levels which could cause hardening under applied heat.
  - ➔Also high levels of phosphorus which removes strength and ductility, but could also cause cracking during weld heat application.
  - ➔Copper impregnated in the alloy, in conjunction with phosphorus, potentially increases weathering capabilities.
  - ➔Elevated silicon indicates steel was likely killed (deoxidized) during manufacturing, removing most gas voids and creating a more homogeneous alloy matrix.

- ➔Heat and moisture controls were recommended for all standard weld repairs on the 3rd St Bridge.

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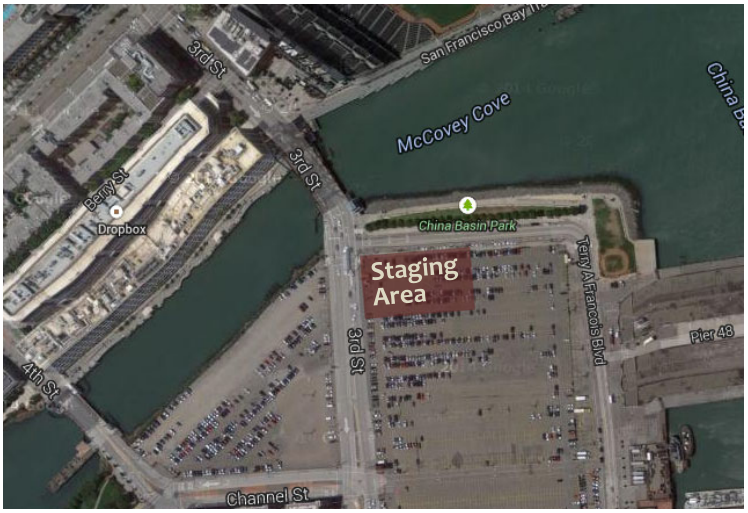
Staging Area and Waterway Access - Overview



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Coordination

Encouraged coordinate with possible stakeholders

- **Public**

SFMTA	SF Muni	California DFW
SFFD	SF Rec & Park	Caltrans
SFPD	USCG	BDCD
SF Port Authority	US COE	DOT

- **Private**

AT&T Park
Nearby building owners and businesses
Houseboat occupants

- **Utilities**

PG&E
SF Water/Sewer
Communication Companies

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Staging Area and Waterway Access

Staging Area

- dirt parking lot to the south east of the bridge as a construction staging / laydown area.

  → accommodate the construction offices,
  → tool and material storage,
  → field shops,
  → construction safety,
  → worker rest/lunch area, and
  → heavy equipment.

A partial list of hazardous materials that will be stored on-site includes fuel and oil, paints, epoxies, and solvents.

Waterway Access:

The contractor will need to board and load / unload boats for the construction.
Barges may need to access the construction site.

→ The extent of waterway access must be determined with contractor input; the amount of boat access will depend on the construction scheme. One potential scheme is a temporary dock near the construction site. Access via a nearby pier may also prove helpful.

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Other issues

Public Boundaries

➔ For safety and other reasons boundaries / limitations of pedestrian and vehicle traffic will need to be established.

Bridge openings / boat crossings

➔ Bridge needs to be available to raise on a one-hour notice!

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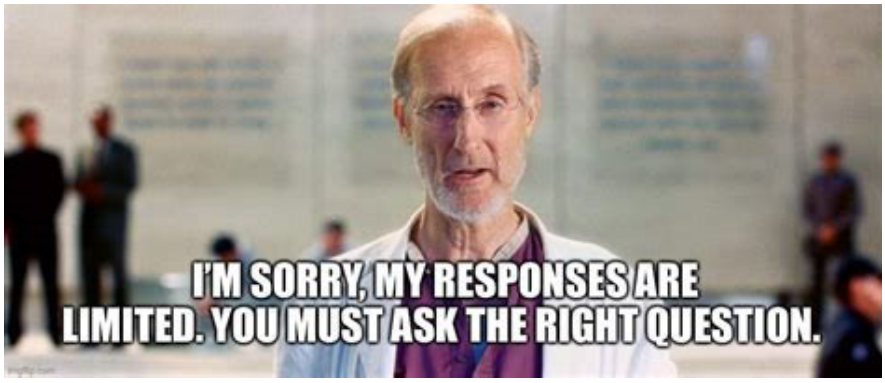
Questions?



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