



PRELIMINARY

**McNEARS BEACH FISHING PIER
REPAIR APPROACH SUMMARY FOR PERMIT APPLICATION
FOR COUNTY OF MARIN**

**Prepared by Liftech Consultants Inc.
April 6, 2023**

Project No. 2421

*Quality Assurance Review
for Liftech Consultants Inc.*

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BACKGROUND

On Tuesday, March 21, 2023, a severe storm with high winds occurred in the Bay Area. An unknown vessel was blown from the north into the McNears Beach Fishing Pier. The vessel collided into the north side of the pier causeway near the intersection with the pier head causing structural and non-structural damage to the pier. See Figure 1 for an overall site plan and vessel impact area. Photographs 1 through 10 show the extent of damage.

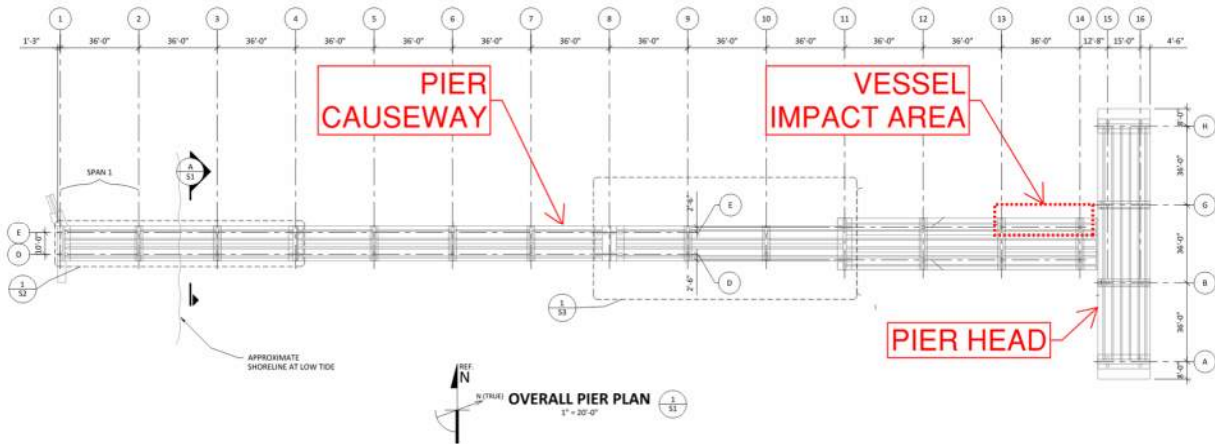
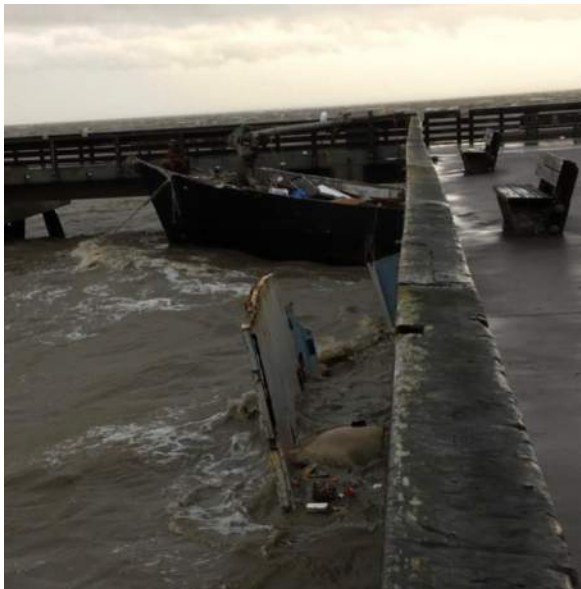


Figure 1: Overall pier plan with terms and impact area



Photograph 1: Unknown vessel collided into pier



Photograph 2: Reference photo of possible vessel

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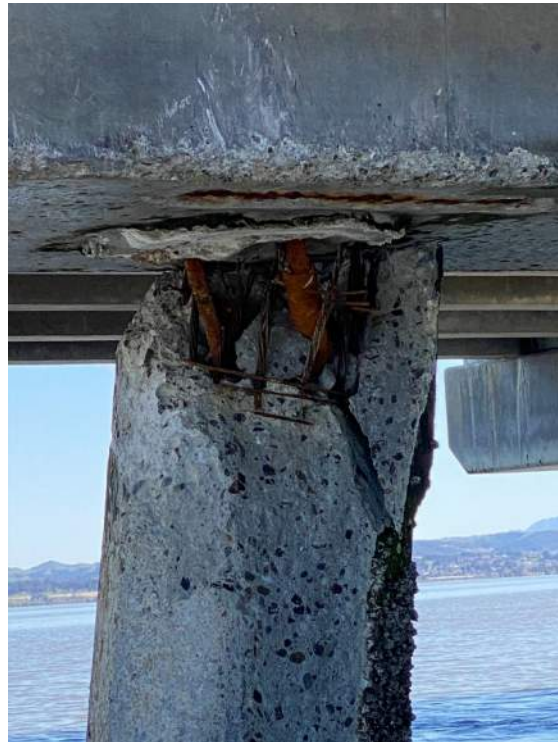
Photograph 3: Area of impact



Photograph 4: Pile shifted from support



Photograph 5: Severe damage at the top of Pile F14



Photograph 6: Pile-cap connection damage



Photograph 7: Lowered northwest end of causeway



Photograph 8: Damaged expansion joint cover plates



Photograph 9: Concrete cracking at bull rail



Photograph 10: Broken wood railing

Liftech's site visit report, dated March 28, 2023, indicated the pile-beam connection at Pile F14 is severely damaged. The top of the pile has been translated from its original position. The pile cap rests on a small portion of the pile top. It appears that the north end of Pile Cap 14 has lowered approximately 3".

Translation restraint of the pile top is compromised. If subjected to lateral loads, it is possible that the pile cap could lose support. If pile support is lost, the end of the causeway could collapse. This condition should be mitigated immediately with temporary shoring to reduce the possibility of partial causeway deck collapse. Public access has been limited to the area landside of Pile Bent 12.

Condition of the underwater portions of the pier structure have not been evaluated. Underwater inspection of the existing piles near the impact area is currently being pursued.

Design Status

Currently, Liftech has developed initial concepts for temporary shoring and permanent repairs. After underwater condition has been evaluated, the design of the temporary shoring and permanent repairs can be completed and implemented.

METHODOLOGY/PROCESS

The following approach is based on our current understanding of the damage.

For all work, Contractors will be required to keep materials, including debris from deck core drilling and pile chipping operations, from falling into the water.

Phase 1: Temporary Shoring Work Approach

Liftech has developed a temporary shoring concept. Refer to Page B1 of Attachment B.

The temporary shoring concept uses a pair of steel beams to support a saddle under the pile cap near the damaged pile. These supports can later be used to raise the lowered section of causeway. This concept assumes that piles at Bent 13, Bent G, and Pile C14 are not compromised. Underwater pile inspection will need to be performed as soon as practical to confirm the assumed condition of these piles.

This temporary shoring concept does not require driving temporary piles and most work can be performed above deck.

The temporary shoring work is envisioned as follows:

1. Mobilize crews, materials, and equipment.
2. Install a pair of Hanger Support Beams by a barge crane. Beams will be supported on timber or steel cribbing on top of deck.
3. Core drill 2 holes in deck to allow hanger rod installation.
4. Install Saddle Assembly to stabilize the north end of pile cap at Bent 14. Some work will be performed below deck and some parts of saddle may be below water at some tidal conditions.
5. Demobilize and cleanup project site.

Potential for Work Below Water Surface

None. All work is expected to be completed above water. Some parts of the steel saddle assembly may extend into water at some tide conditions.

Phase 2: Permanent Repair Approach

The temporary shoring can be used during construction of the permanent repairs.

Permanent repairs will consist of leveling the northwest end of the causeway near the head, restoring the structural integrity of Pile F14, expansion joint, wooden railing system, and bull rail damage. Repair of Pile F14 will utilize a pile sleeve type repair and a doweled connection to the existing pile cap. The pile sleeve may extend down into the water. Repairs are intended to restore the structure to its pre-damage condition, not strengthen it. Liftech has not evaluated the existing design regarding its adequacy for current design codes.

At this time, the permanent repair design has not been developed. However, the permanent repairs are expected to consist of the following steps:

1. Mobilize crews, materials, and equipment.
2. Install jacking system and preload system.
3. Cut the existing rebar connecting Pile F14 to the pile cap.
4. Raise the north end of Pile Cap 14 to its original position.
5. As practical, reposition Pile F14 to original location.
6. Remove damaged pile concrete by chipping.

7. Repair Pile F14 using a pile sleeve type repair and a doweled connection to the existing pile cap.
8. Repair railing system, bull rail, and expansion joint.
9. Remove shoring system and repair cored holes in concrete deck.
10. Demobilize and cleanup project site.

Potential for Work Below Water Surface

Step 6 may include chipping of damaged pile concrete below water.

EQUIPMENT, CONSTRUCTION ACCESS, AND STAGING AREA

Refer to Attachment A for the expected staging area, major equipment, and construction access.

DURATION

Phase 1 construction is expected to last for approximately three weeks onsite.

If the condition of the underwater piles is consistent with current assumptions, Phase 2 construction is expected to last for approximately eight weeks onsite.

These estimates are very approximate and not based on a detailed study of the activities.

POTENTIAL IMPACTS TO SAN PABLO BAY

By others.

ATTACHMENT A - METHODOLOGY/PROCESS

Staging Area

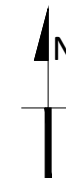
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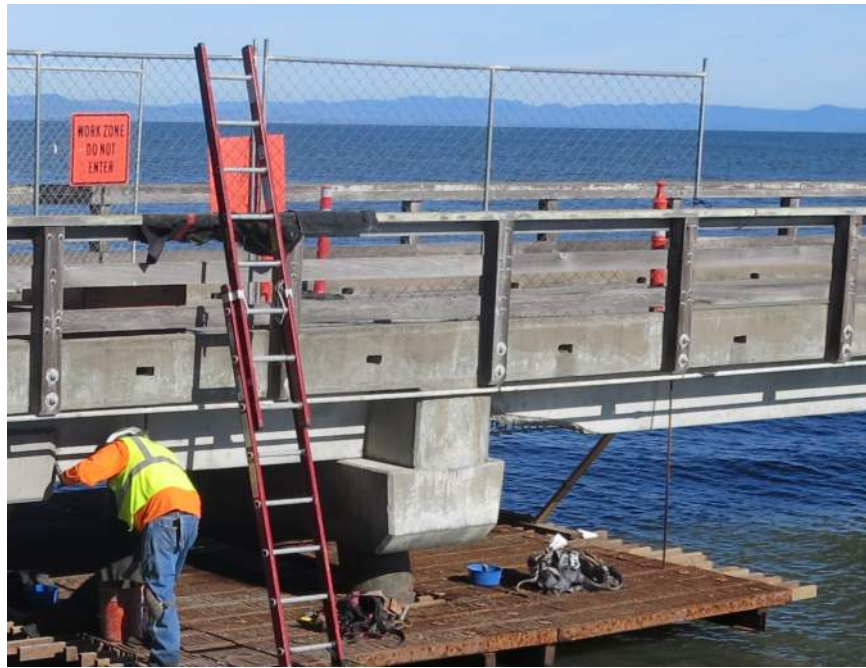
NOTES:

1. PRIOR TO BEGINNING WORK CONTRACTOR SHALL ARRANGE A MEETING WITH THE COUNTY TO DOCUMENT THE EXISTING CONDITION OF THE PARK AREAS THAT MAY BE IMPACTED BY THE CONSTRUCTION. THE SITE VISIT SHALL BE RECORDED WITH VIDEO AND PHOTOS OF CURRENT PARK CONDITIONS BY THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE A DUPLICATE COPY TO THE COUNTY.
2. TRAVEL PATH AND STAGING AREA ARE APPROXIMATE. CONTRACTOR SHALL COORDINATE CONSTRUCTION ROUTE FROM STAGING AREA TO PROJECT SITE WITH THE COUNTY.
3. CONSTRUCTION TRAFFIC SHALL BE ON UNPAVED ROAD OR ASPHALT PAVEMENT ON PARKING LOT. DO NOT USE CONCRETE SIDEWALK FOR CONSTRUCTION TRAFFIC.
4. CONTRACTOR SHALL PROTECT TURF, SIDEWALKS, AND OTHER PARK FEATURES. ANY DAMAGE SHALL BE REPAIRED BY THE CONTRACTOR AT CONTRACTOR'S COST.
5. STAGING AREA FOR STORAGE OR TRAILER SHALL BE FENCED OFF FROM PUBLIC.
6. SMALL CARTS ARE THE ONLY VEHICLES PERMITTED ON PIER. FOR TRUCK AND HEAVY EQUIPMENT, CONTRACTOR SHALL SUBMIT CALCULATIONS TO DEMONSTRATE THAT THE PIER CAN SUPPORT THE WHEEL LOADS TO THE ENGINEER FOR APPROVAL.

SITE PLAN 1
G3
1" = 100'-0"



ATTACHMENT A - METHODOLOGY/PROCESS
Equipment and Methods
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FIXED WORK PLATFORMS



FLOATING WORK PLATFORMS

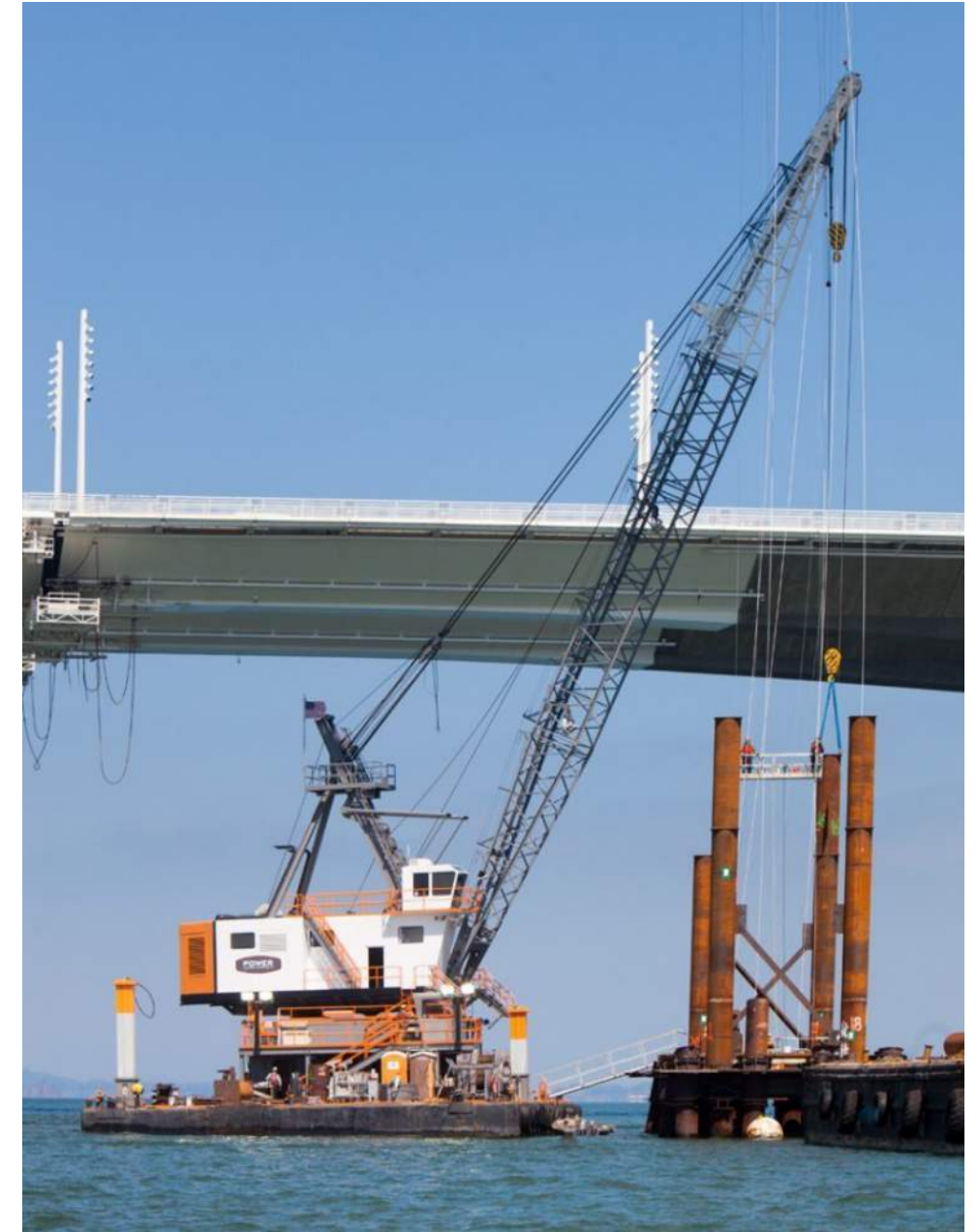


WORK TRUCKS MAY GO ONTO PIER
BUT NOT ON DAMAGED SECTION

WORK TRUCKS



SMALL BOATS FOR ACCESS

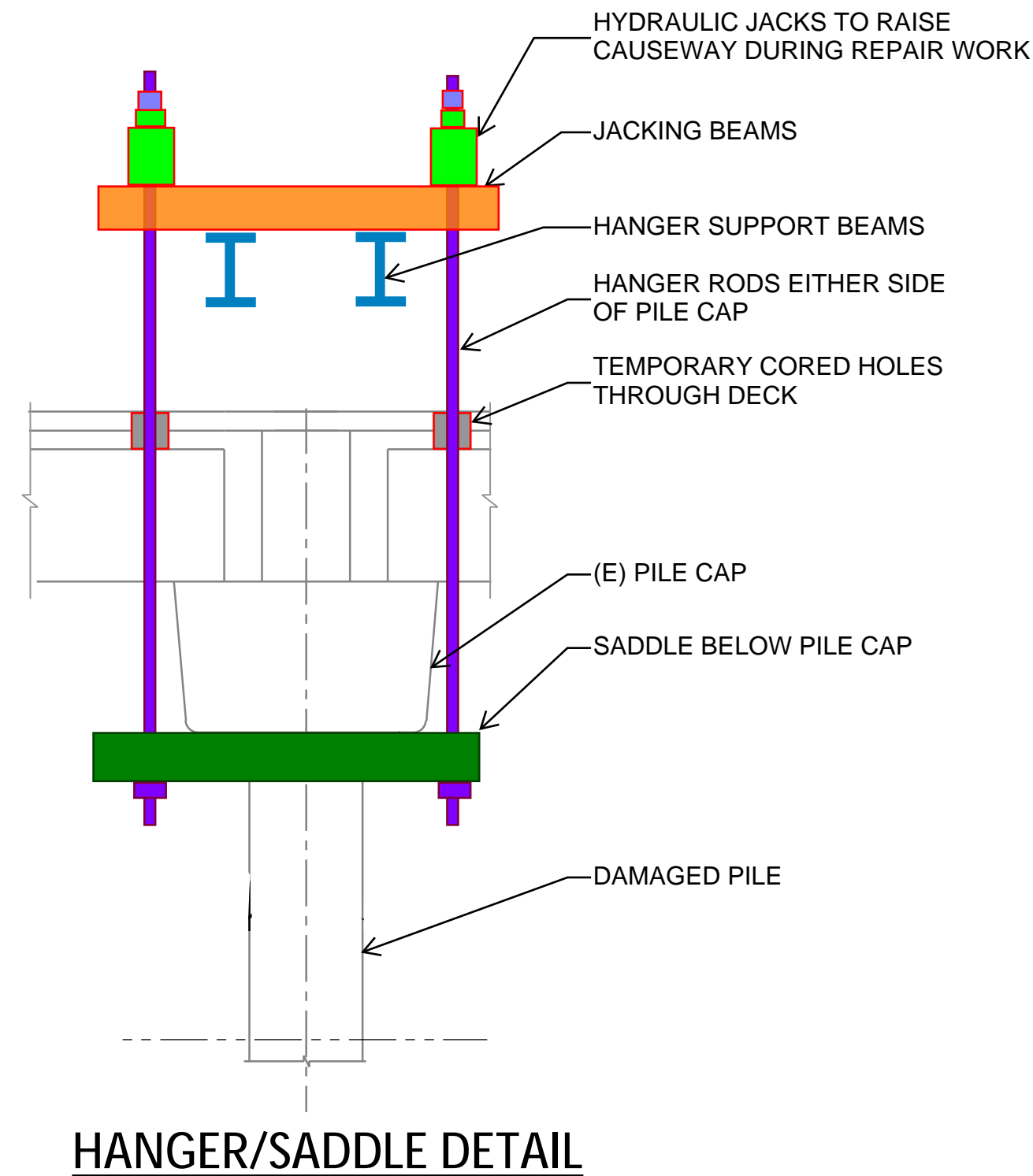
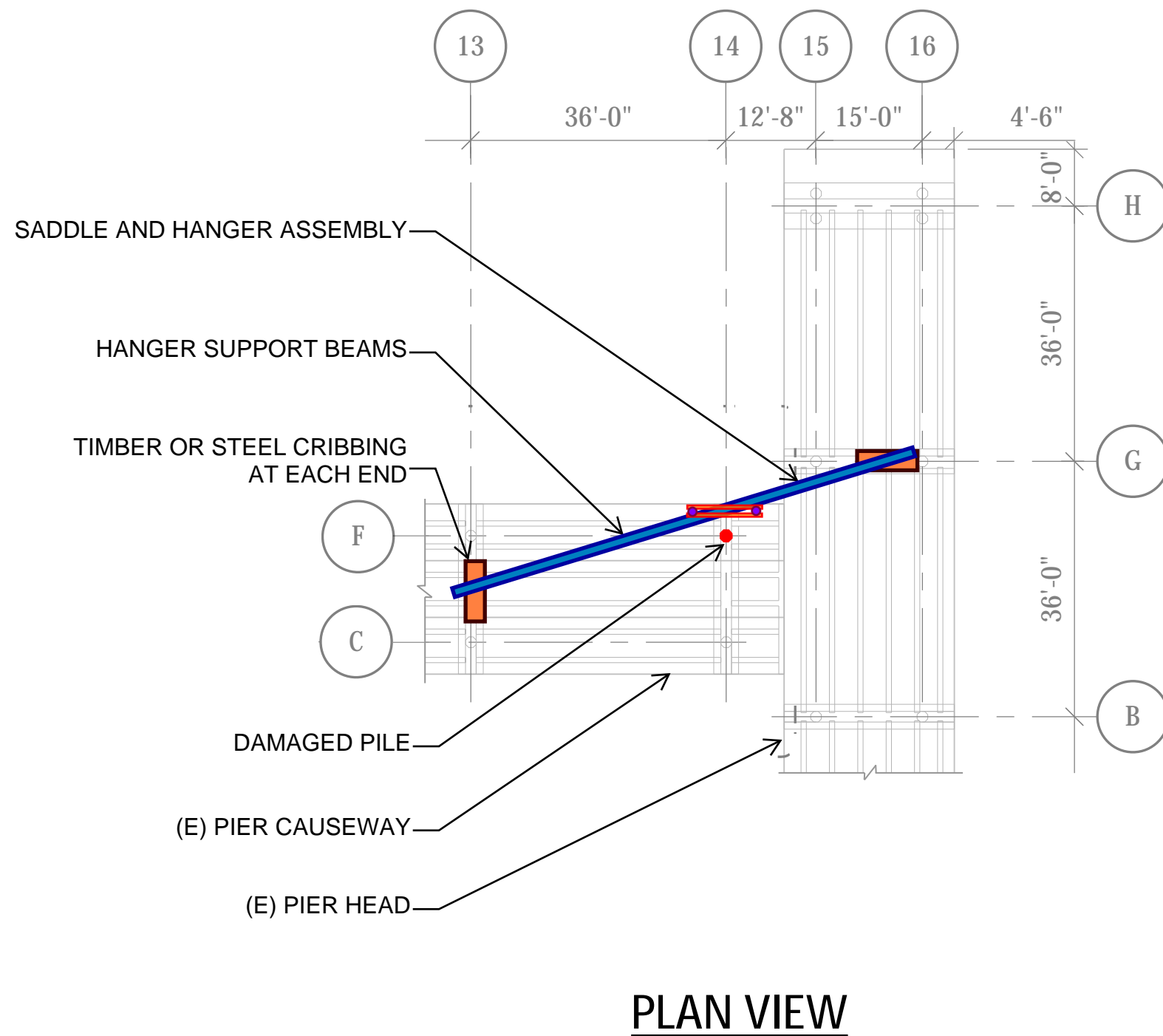


FLOATING CRANE USED TO
PLACE EQUIPMENT & MATERIALS

ATTACHMENT B - REPAIR DETAIL CONCEPTS

Phase 1: Temporary Shoring

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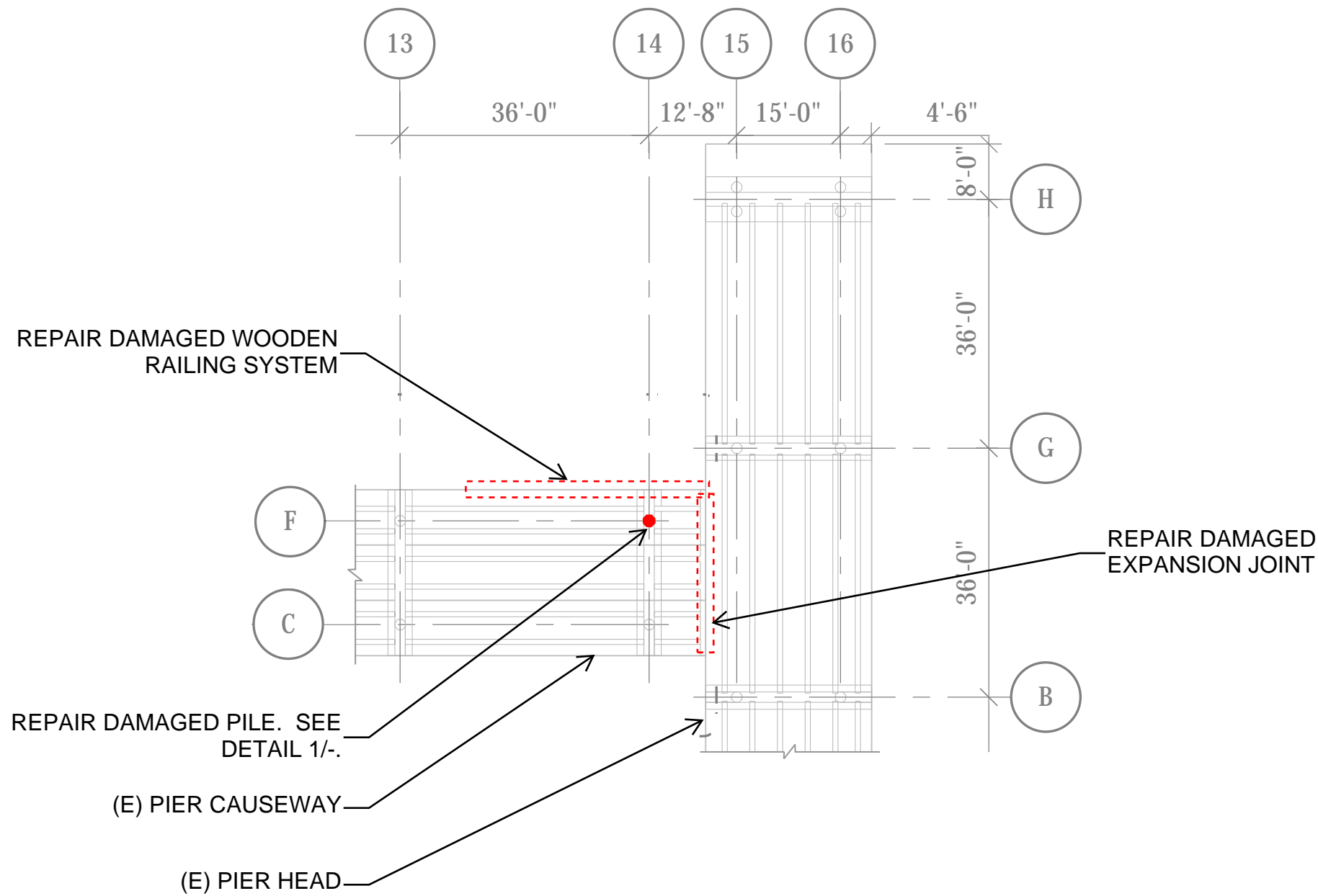
ATTACHMENT B - REPAIR DETAIL CONCEPTS

Phase 2: Permanent Repairs

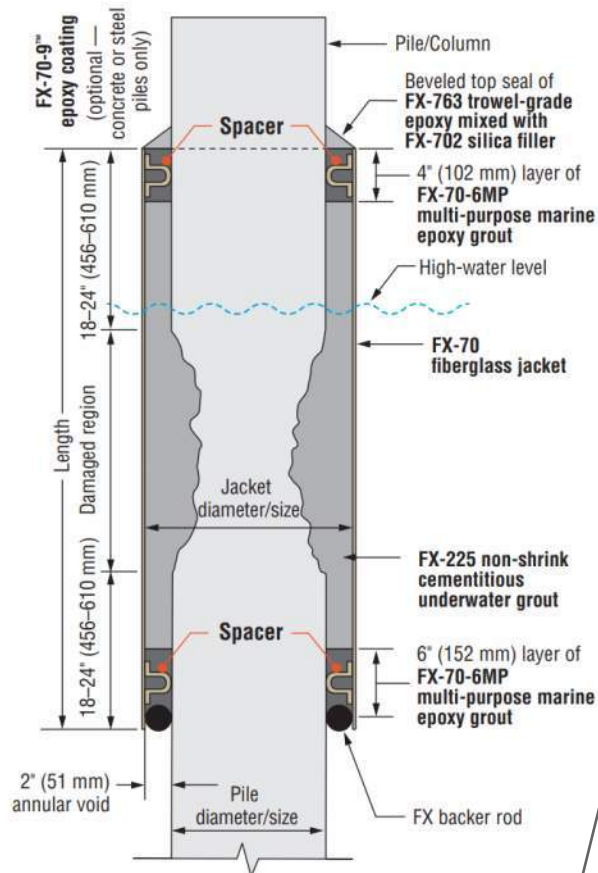
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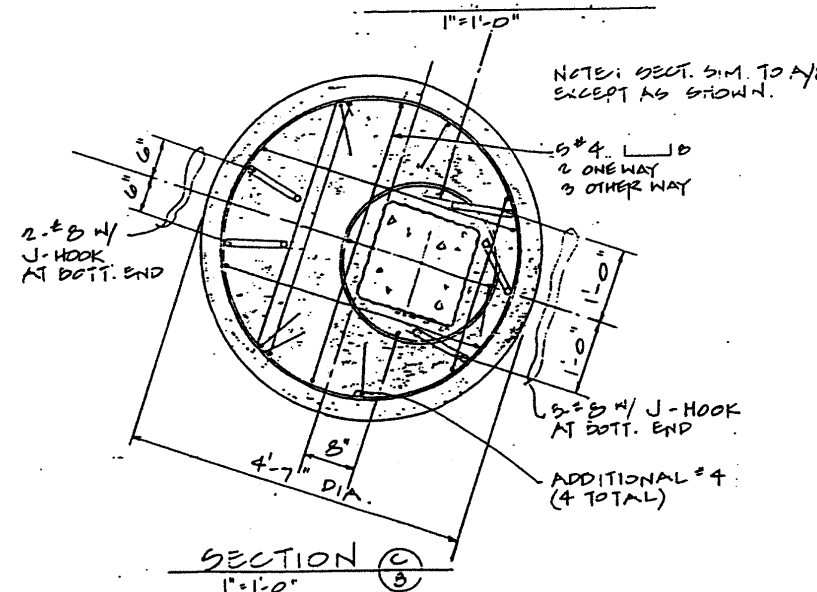
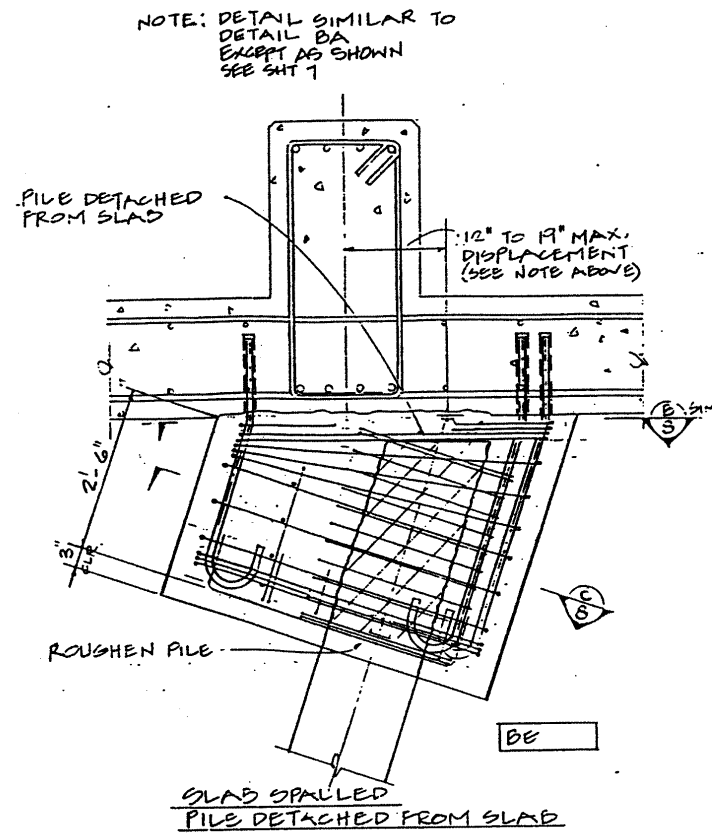
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PLAN VIEW



EXAMPLE PILE SLEEVE REPAIR CONCEPT



EXAMPLE PILE-CAP CONNECTION REPAIR CONCEPT

ATTACHMENT B - REPAIR DETAIL CONCEPTS

Phase 2: Permanent Repairs

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PERMANENT REPAIR NOTES

AT ONE DAMAGED (E) PILE, REPAIR DAMAGED PILE SEGMENT WITH A GROUTED PILE SLEEVE CONCEPT AND INSTALL DOWELS INTO (E) PILE CAP ABOVE TO RESTORE PILE-CAP CONNECTION.

EXTENT OF PILE DAMAGE IS NOT KNOWN AT THIS TIME, BUT PILE SLEEVE IS EXPECTED TO EXTEND BELOW WATER LINE.

FOR PILE SLEEVE REPAIR, WE PLAN TO LEAVE FIBER REINFORCED POLYMER (FRP) CONCRETE FORM IN PLACE AFTER POURING GROUT.

DETAIL 1 - PILE CONNECTION REPAIR CONCEPTS