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DRAFT MEMORANDUM

To: Michael Anderson
Environmental Program Manager
Department of Fish and Wildlife

From: Sean Hart, P.E.
Carolyn Donohoe, E.I.T.
Brad Porter, P.E.

Date: December 13, 2019

Subject: Berkeley Pier Bird Habitat Field Evaluation

Job Number: 10658

1. Summary

The purpose of this memo is to describe the observations of the structural condition of The Berkeley Municipal Pier (the Pier) and to propose potential locations for the installation of bird habitat. The pier extends southwest from the edge of the Berkeley Marina shoreline (Figure 1). The above water inspection was conducted to observe the condition of the structure. The bay-ward 2-mile portion of the Pier was considered for potential bird habitat.

Large sections of the Pier have collapsed. Overall, a significant amount of deterioration in the remaining piles and bent caps has occurred. From this existing structure assessment, the proposed bird habitat is located to the east end of section C and to the west end of section D. These areas will likely require some structural rehabilitation and strengthening to provide the desired 30-year design life.

2. Background

The Pier was constructed in 1926 by the Golden Gate Ferry Company and was approximately 3.5 miles long. After completion of the Bay Bridge in 1936 and closure of the ferry service, the Pier was converted to recreational use. The Berkeley Marina was built out over the pier, reducing the length of the pier to approximately 2.5 miles. In the 1970s the City of Berkeley repaired a portion of the pier closest to land. This 0.5-mile piece of the pier was open to the public until July 2015. The remaining length of the pier was left in its existing condition.

At the time of inspection, no record drawings were available. Based on soundings, taken from current navigational maps, the mudline is expected to be around -9 ft (MLLW) (Figure 2).

On September 30th, Sean Hart and Carolyn Donohoe inspected the above water portions of the Pier from a small, motorized craft.

3. Above Water Inspection

We arrived at the site around 6:30 AM. Tide was 0.8 ft (MLLW) at 7:00 AM, increasing to 5.8 ft (MLLW) by 12:00PM. Atmospheric conditions were clear with little wind early in the morning building to low wind by noon.

The inspection started at the west end of the Pier progressing eastward (towards land). Given the length of the Berkeley Pier structure, areas previously considered to provide the best habitat were more closely inspected than the rest of the Pier.

The remains of the Pier structure are composed of two main elements:

- Plumb timber piles encased in 20 in square concrete jackets with 4 in chamfered edges. The Pier piles are similar to other Piers and Wharves constructed in the area during the period. See Figure 3 for the pile cross section of the 1924 design at Encinal Terminals, Alameda. Concrete casings are generally driven several feet below the mud line to protect the timber pile section from borers. The extent of scour around the remaining Berkeley Pier piles is unknown.

- Concrete bent caps are 15 in tall by 22 in wide. They span perpendicular to the longitudinal axis of the Pier, are spaced at approximately 16 ft O.C. and frame 3 or more piles together.

Overall, a significant amount of deterioration of many of the remaining piles and bent caps has occurred, which is to be expected from a 90-year-old structure exposed to salt spray. Large sections of the Pier structure have collapsed. Some bents can be seen having hinged below the water line and are now being supported by the piles of the nearest bent cap (See Photo 1 for an example of this behavior).

The Pier was divided into 4 distinct sections for inspection (Figure 1).

Section A

- 24 ft long bent caps supported by 3 piles.
- No cormorants observed during the inspection.
- This section had previously been deemed too close to shore and the likelihood of human disturbance to the birds and other risks associated with human presence is deemed high (rope ladders can be seen hanging on several bents of this section, Photo 2).

Section B

- 24 ft long bent caps supported by 3 piles.
- No cormorants observed during the inspection.
- Sufficient consecutive bents needed to provide the needed surface area without large structural deteriorations are few to none.

Section C

- 24 ft long bent caps supported by 3 piles.
- Cormorants present (~24) at the time of inspection on the easternmost portion of Section C.
- Structural conditions vary throughout section C. Overall, the east end of this section is in better condition than the rest of section C (Photo 3).

Section D

- This section is primarily composed of 62 ft long bent caps supported by 7 piles.
- The largest congregation of cormorants seen during this inspection was perched within this section of the Pier (estimated at around 100 individuals). Particularly on the westernmost portion of Section D (Photo 4).
- Being at the tip of the Pier, this Section is subject to the most exposure as it is directly facing into the west winds and at the edge of deeper water. The 3 most westerly bents have large structural deteriorations consisting of large spalls to both the piles and bent caps (Photo 5 and Photo 6).

4. Conclusions & Recommendations

The proposed bird habitat is located to the east end of section C and to the west end of section D (Figure 4 and Figure 5). These locations were selected to avoid areas of the Pier with the greatest observable structural deterioration and located where birds currently perch. The areas selected may require some rehabilitation to the existing structure prior to the installation of bird habitat, such a grout patching large spalls in pile caps, to slow structural deterioration.

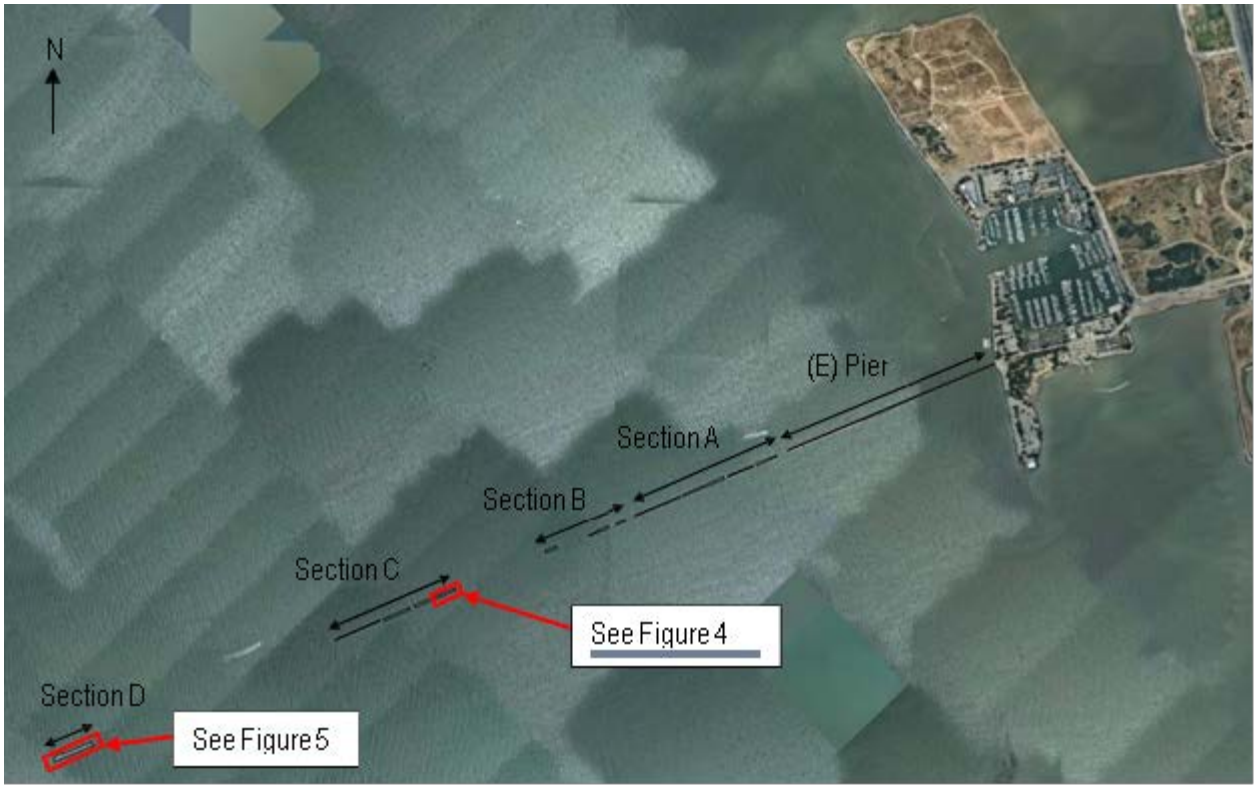

Figure 1: Layout of Berkeley Pier and Inspection Sections

Figure 2: Taken from NOAA Chart 18650 Showing Water Depths in feet Below MLLW

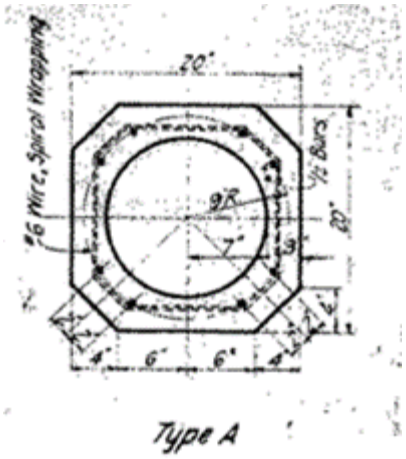

Figure 3: Design of Pile Casing at Encinal Terminals (circa 1920s)

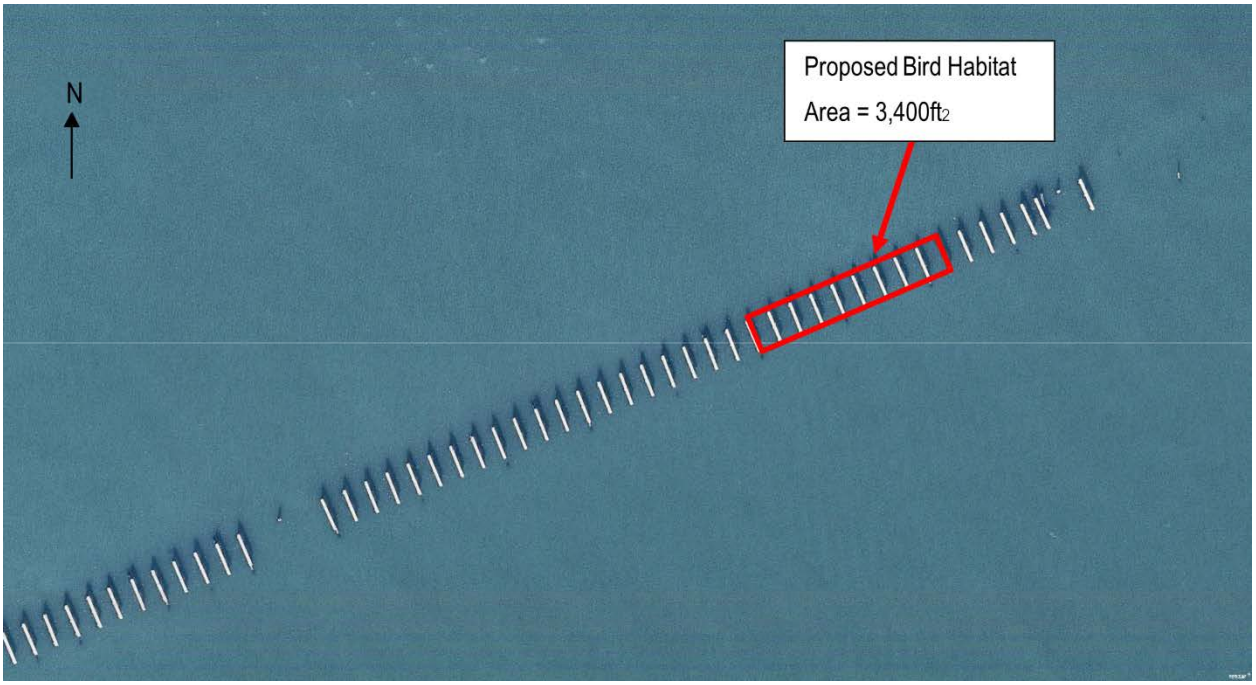

Figure 4: Eastern side of Section C - Proposed Bird Habitat

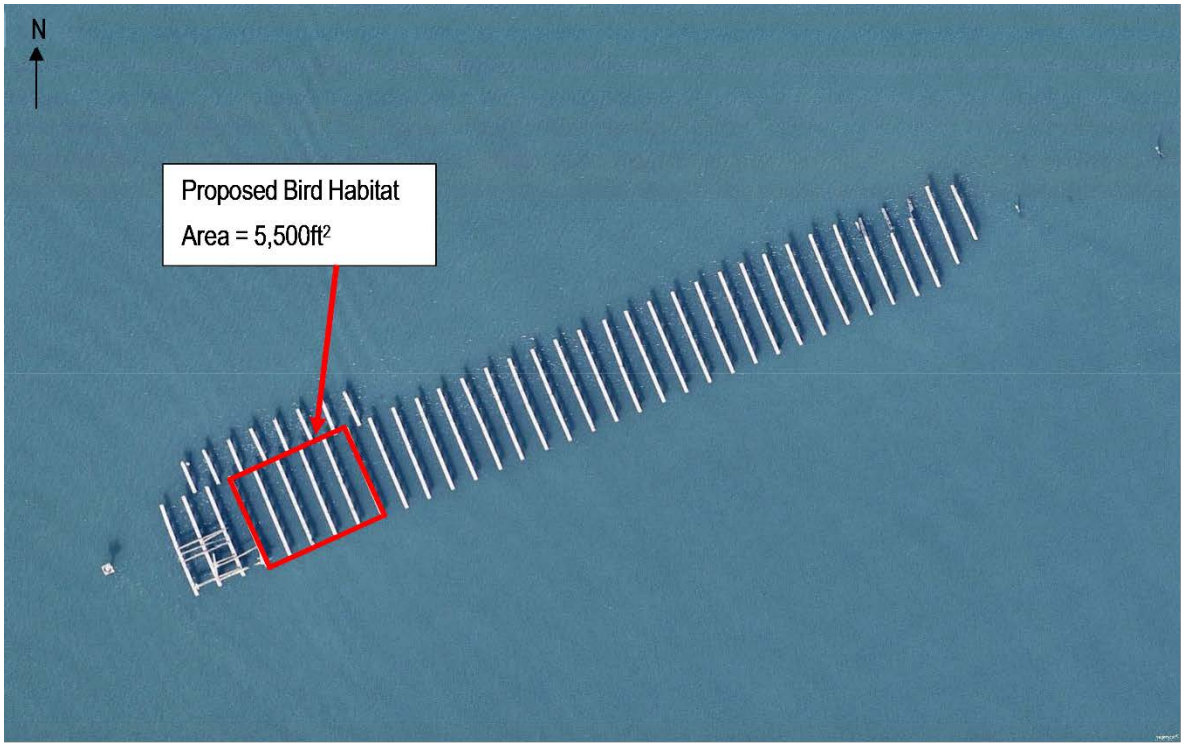

Figure 5: Section D - Proposed Bird Habitat

Photo 1: Example of Leaning Bent

Photo 2: Multiple Rope Ladders Present at Section A

Photo 3: East Face of Section C Bent Cap in Good Condition

Photo 4: West End of Section D Featuring the Greatest Number of Cormorants

Photo 5: Large Pile Spall at End of Bent in Section D

Photo 6: Typical Bent Cap Spalls