



City of Berkeley
Berkeley Municipal Pier
DRAFT Structural Assessment Report

November 2017

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Appendix A

Engineer’s Opinion of Preliminary Probable Construction Costs

Appendix B

Pier Layout and Condition Rating

Appendix C

Rehabilitation, Retrofit and Replacement Sketches

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Underwater Inspection Report

Appendix E

Record Drawings

1. Executive Summary

1.1 Introduction

The City of Berkeley (City) has contracted GHD Inc. (GHD) to perform above- and below-water condition surveys of Municipal Pier at Berkeley, California associated with a structural evaluation of a concrete pier used primarily for recreational purposes. An above-water survey was performed on foot above deck and from a boat below deck by GHD engineers. A below-water condition survey was performed by divers from Sea Engineering Inc. (SEI), a sub-contractor to GHD.

This report presents condition survey results and recommended pier repairs and retrofit alternatives for concrete piles, pier bent cap beams and deck panels as well as survey results and recommended repair or replacement for above-deck items. The existing pier is approximately 3,000 feet long and 22 feet wide, see Photo 1-1.

The City closed the pier to the public in July 2015 due to safety concerns resulting from extensive deterioration of the concrete deck panels.



Photo 1-1: Berkeley Pier

1.2 Scope of Work

GHD was retained by the City of Berkeley to perform a condition evaluation and structural assessment for the Berkeley Municipal Pier located near the Berkeley Marina. The intent of the project is to perform a visual condition survey of the pier and prepare a report on the conditions along with conceptual repair alternatives and budgetary cost estimates. This review is limited to visual observations above deck and above water.

GHD's overall scope of work is to:

- 1) Perform a condition survey of the existing pier structure and identify structural components that require structural repair.
- 2) Provide a preliminary assessment of existing as-designed deck structure capacity to carry design basis loads.
- 3) Develop conceptual pier repair alternatives that will address structural deficiencies with respect to the load effects of dead, live, and seismic loads.

The structural condition survey was conducted in accordance with Chapter 31F of the 2016 California Building Code (MOTEMS) and ASCE Underwater Investigations Standard Practice Manual.

The structural condition assessment used information provided to GHD in the as-built drawings provided by the City. As-built drawings indicate existing pile locations, bent caps, panel sizes and reinforcement.

1.3 Results of Structural Condition Survey

The inspection and condition survey of Berkeley Municipal Pier was performed between August 7 and August 22, 2017.

The above-deck condition survey resulted in the following observations:

1. Concrete deck topsides are in fair condition. There are open and closed spalls at the longitudinal extremities of the concrete panels but generally are still serviceable. The exception is Section 2 which are the four-panel area that are in very poor condition with noticeable deflections and cracks.

The below-deck above-water condition survey resulted in the following observations:

1. Concrete piles above water are generally in poor condition. The majority of piles cracks or spalls, though no exposed timber piles. These piles should be repaired commensurate with good maintenance practice.
2. Most concrete deck panels are in serious condition. There are significant amount of spalling at the bottom concrete cover, exposing the bottom mat of rebar which permits corrosion at a rapid rate. It is likely that replacement concrete panels are required.
3. Concrete bent caps are generally in serviceable condition, with a few bent caps exhibiting localized concrete spalls or cracks. These bent caps should be repaired commensurate with good maintenance practice.
4. The timber battered piles are in critical condition, with the majority of the piles suffering severe section loss and almost all the piles no longer connected to the bent caps.

The below-deck below-water diver performed a Level 1 condition survey on all the piles, and a Level 2 condition survey at three underwater elevations (mudline, mid-water, and tidal zone). The underwater report is presented in Appendix D:

1. Piles were generally in poor condition similar to the above-water condition assessment.
2. Many piles have rock pockets and spalls, and a few piles have long cracks which should be repaired commensurate with good maintenance practice.

In general, the pier structure is currently inadequate for present-day design basis loadings.

1.4 Recommended Pier Repairs

Municipal Pier requires structural repair to reopen the pier for public use as a result of the deterioration of the concrete sustained due to exposure to the marine environment. In the absence of any repairs, the deterioration will continue to advance at an accelerated pace. Failure to address the concrete deterioration will result in additional sections of the pier structure that are no longer serviceable. Implementation of structural repairs reviewed in this study will provide a vertical live

load capacity of 100 pounds per square foot (psf) for Municipal Pier. This load capacity is in accordance with current building codes for public assembly areas.

Municipal Pier requires extensive repair to return the structure to serviceable condition and allow public use. The concrete panels require replacement in many locations due to extensive corrosion of the reinforcing steel. Concrete repairs are required in other areas to extend the service life of the structure and preclude significant structural damage in the future. Required repairs are fairly extensive which is expected considering the age and location of the structure, and primarily consist of concrete spall and crack repairs at the piles, bent caps and deck panels. Above deck, some timber guardrail railing and equipment such as light poles and benches require replacement. Typical repair details are provided in this report. Estimated construction cost for rehabilitation repairs required to return the pier structure to original design loads is \$27.36M. This cost does not include strengthening or retrofit of the pier for seismic loading.

2. General Description and Background

2.1 Pier Description

The Berkeley Municipal Pier was originally constructed in the late 1920s as access to an auto ferry terminal that crosses the bay. The original construction consists of concrete-jacked timber piles, precast concrete bent caps, and timber decking as shown in Photo 2-1. The pier started near the University Avenue off-ramp at Interstate 80, and extended approximately 3.5 miles into the bay, terminating near Treasure Island. After the San Francisco Oakland Bay



Photo 2-1: Original Pier Construction (Source: Bancroft Library, UC Berkeley)

Francisco Oakland Bay Bridge was constructed in 1936, the pier ceased operations as a ferry terminal and was turned over to the City of Berkeley as a recreational pier in 1938.

By the early 1960s, the pier was reduced to 2.5 miles after the first mile was filled in to form the Berkeley Marina. Despite the shortened pier, the City determined that the maintenance costs for the pier was excessive and reduced the length of to approximately 3,000 ft. At this time, the inboard 2,000 ft was the original construction, and the outboard 1,000 ft was converted from a timber deck to concrete deck. However, the piles and bent caps remained the same.

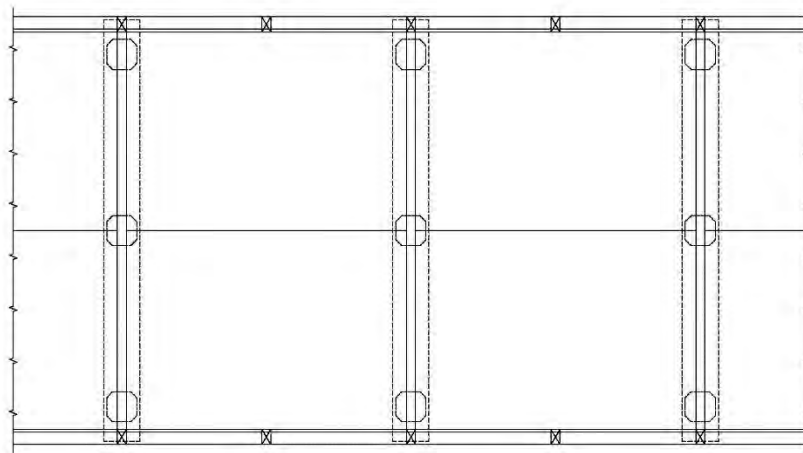
In the mid-1980s, the inboard 2,000 ft was converted from timber deck to concrete deck while keeping the original piles and bent caps. GHD speculates that at some time in the 1990s, the

outboard 250 ft was completely replaced with new construction: piles, bent caps, and concrete deck.

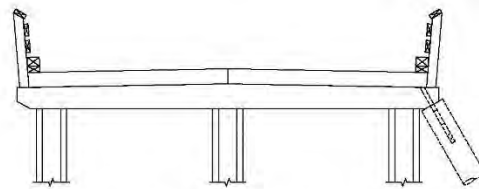
Today, the pier exists in three distinct sections, as outlined in Table 2-1. The substructure consists of piles and bent caps, and the superstructure is the deck surface. A typical plan and section view of Berkeley Pier is shown in Figure 2-1.

Table 2-1: Summary of Pier Sections

Section	Bent	Date of Substructure	Date of Superstructure	Deck Panels	Panel Dimensions	Total Length
1	280-402	1920s	1980s	2	11'x15.5'	1,936 ft
2	402-451	1920s	1960s	4	5.5'x15.5'	784 ft
3	452-467	1990s	1990s	2	11'x14.5'	247 ft



TYPICAL PARTIAL PLAN



TYPICAL SECTION

Figure 2-1: Typical Plan and Section

2.2 Background

Existing conditions for the pier were determined from GHD's condition survey and information provided by the City of Berkeley in the form of as-built pier drawings. GHD was retained by the City of Berkeley to perform a condition evaluation and structural assessment for the Berkeley Municipal Pier at the Berkeley Marina. The project scope of work includes a visual review of the pier structure and preparation of a report on the conditions along with conceptual repair and budgetary cost estimates.

Divers from Sea Engineering performed nondestructive evaluation of several concrete encased timber piles below water, and drilled four concrete cores to visually inspect the timber pile

conditions. GHD engineers performed nondestructive inspection of the pier, both above and below deck. This included both visual observations and performing soundings.

3. Existing Conditions

3.1 Evaluation Criteria

The evaluation criteria is based on the ASCE Standards of Practice for inspecting and assessing waterfront facilities. The condition rating is shown in Table 3-1.

Table 3-1: Condition Rating

Rating		Description
6	Good	No defects
5	Satisfactory	Minor defects
4	Fair	Hairline or small cracks smaller than 1/4 inches
3	Poor	Cracks larger than 1/4 inches, small spalls without exposed rebar
2	Serious	Large spalls with exposed rebar
1	Critical	Loss of reinforcing bars, severe deformities

3.2 Concrete Deck Panels

3.2.1 Above Deck Surface

In Section 1 (bents 280 to 402), the above deck surface is generally in fair condition. There are two precast concrete deck panels that span the precast concrete bent caps, which are at 16 feet spacing. At the bent caps, there is a 6-inch gap between the deck panels that are filled with concrete or grout. Dowels extend from the top mat of rebars in the deck panels and are tied into the 6-inch closure. At every third panel, one end of the panel is free and is not tied into the bent cap.

The majority of the damage is located at the bent cap joints, particularly where the dowels tie into the bent caps. Typically, these are open spalls due to the dowel bars corroding and expanding against the concrete. Using a non-destructive sounding test, the 2 feet from the ends of the panels exhibit signs of delamination, where a planar crack separates a layer of concrete. This is a precursor to open spalls and likely was caused by the corroding dowel bars. An example of an open spall at the closure pour dowels is shown in Photo 3-1 and Photo 3-2



Photo 3-1: Open spall at Section 1 deck panel



Photo 3-2: Open spall at pile bent with exposed longitudinal rebar

In Section 2 (bents 402 to 501), the above deck surface is generally in critical condition. There are four precast concrete deck panels that span the precast concrete bent caps, which are at 16 feet spacing. At the bent caps, there is a 6-inch gap between the deck panels that are filled with concrete or grout. Based on the as-built drawings, these concrete panels were installed in the 1960s and do not appear to have been maintained.

From the top surface, many of the panels exhibit noticeable deflection, with a transverse crack at the centerline. Photo 3-3 shows a panel with significant deflection.



Photo 3-3: Severe Deflection at Section 2 Panel

Section 3 (bents 452-467) of the pier was likely installed in the 1990s and is in good condition. It consists of two precast concrete panels that span concrete bent caps at 16.5-foot spacing. There are no observable deterioration of concrete. Photo 3-4 shows the typical condition.



Photo 3-4: Typical Above Deck Condition of Section 3 Panels

3.2.2 Below Deck Surface

Based on visual observations, the section 1 deck panels are generally in poor condition. The majority of the panels exhibit extensive open spalls that expose the bottom mat of rebar. Generally

the bottom mat of rebar appear to be heavily corroded but intact and bonded to the concrete core. However, without protection from concrete cover, the steel rebar is exposed to the elements and are subject to an advanced rate of deterioration. There are also numerous panels with closed spalls where the rebar is not visible, but are still exposed and is a precursor to open spalls. Photo 3-5 show the condition of Section 1 panels.



Photo 3-5: Typical Below Deck Condition of Section 1 Panels

The below deck surface for section 2 panels is generally in critical condition. There is extensive concrete spalling that expose the bottom mat of rebar, and in numerous panels, the bottom mat of rebar has corroded away or are no longer contributing to the structural load-bearing capacity of the panel and has deflected significantly in many locations. See Photo 3-6 for a typical Section 2 panel.



Photo 3-6: Typical Below Deck Condition of Section 2 Panels

Similar to the above deck surface, the panels in Section 3 are generally in good condition. There are no observable deterioration of the bottom concrete surface. Photo 3-7 shows the typical under deck condition of Section 3, and Photo 3-8 shows a comparison of the concrete condition between Sections 3 and 2 at bents 451 and 452.



Photo 3-7: Typical Below Deck Condition of Section 3 Panels



Photo 3-8: Comparison of Section 3 (left) and Section 2 (right)

3.2.3 Concrete Panel Summary

3.3 Bent Caps

The bent caps in Sections 1 and 2 are generally in fair condition with minimal rust bleeds and deterioration. A few bent caps are in poor condition with open spalls or cracks wider than 1/4-inch. See Photo 3-9. The bent caps in Section 3 are in good condition with no noticeable deterioration.



Photo 3-9: Example of Bent Cap with Open Spall in Section 1

3.4 Piles

3.4.1 Concrete Encased Timber Piles

There are a total of 172 precast concrete bent caps within sections 1 and 2 with three concrete encased plumb timber piles per bent cap that appear to be from the original construction. The concrete encased timber piles are in poor condition due to widespread corrosion cracks, localized closed and open spalls, and isolated structural cracks. Pile damage is typically located in the splash zone, between the Mean High Water (MHW) elevation and the bent cap. At four locations, divers core drilled the concrete encasement to inspect the timber piles which appeared to be in fair condition. See Photo 3-10 and Photo 3-11 for cored piles and Photo 3-12 for underwater spall.



Photo 3-10: Core of concrete pile jacket



Photo 3-11: Inside view of concrete core showing timber pile

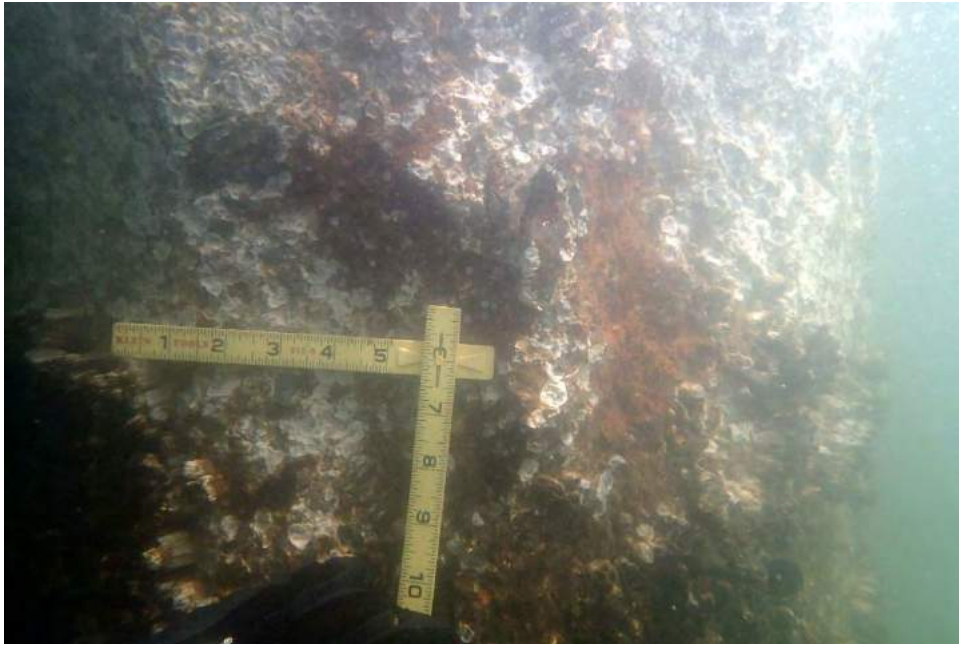


Photo 3-12: Underwater open spall on pile

The plumb piles within Sections 1 and 2 are summarized in Table 3-2 in increasing level of deterioration (some piles are double counted and therefore the table does not add up to 100%).

Table 3-2: Pier Sections 1 and 2 Plumb Pile Deterioration

Percentage	Deterioration
20%	No visible deterioration
7%	Corrosion staining without other visible damage
60%	Vertical cracks up to 1/4" wide (may be more than one)
15%	Closed spalls
2%	Vertical cracks wider than 1/4"
7%	Open spalls
3%	Horizontal structural cracks up to 1/4" wide

In section 3, there are a total of 16 bents with 48 plumb piles that are newer construction. The piles do not exhibit noteworthy deterioration.

3.4.2 Timber Battered Piles

At every two bents, the record drawings indicated a battered timber pile that alternated between the north and south sides. However, the timber battered piles are typically missing or in severely degraded condition due to section loss from the effects of marine borer infestation and steel

corrosion resulting in piles disconnected from bent caps. In general, the battered piles provide no lateral stability to the Municipal Pier, as shown in Photo 3-13.



Photo 3-13: Timber Pile Disconnected from Bent Cap

3.5 Summary of Structural Components

Table 3-3: Summary of Condition Ratings per Component

Rating		Piles	Bent Caps	Panels
6	Good	8%	10%	6%
5	Satisfactory	26%	0%	0%
4	Fair	42%	61%	10%
3	Poor	17%	24%	17%
2	Serious	7%	6%	12%
1	Critical	0%	0%	53%

3.6 Non-Structural

3.6.1 Guardrails

The timber guardrails are in fair condition throughout the pier. There was no noticeable deterioration or section loss with the exception of the guardrails at Section 2 where the guardrails are deformed due to the deflection of the concrete panels. See Photo 3-14.



Photo 3-14: Deformed Guardrail Due to Concrete Deflection

3.6.2 Luminaires

The luminaires generally appear to be in fair condition. There are no significant deterioration at the concrete pedestal or steel poles. Below deck, the anchor bolts extend beyond the concrete panels and the ends exhibit corrosion or may be a source of corrosion. See Photo 3-15.



Photo 3-15: Typical Luminaire

3.6.3 Benches

The benches are primarily constructed of reinforced concrete to act as a wind break with timber planks as bench seats. Most of the benches are in very poor condition with extensive spalling and rebar corrosion particularly at the base. Additionally, many benches are missing the seats. See Photo 3-16.



Photo 3-16: Typical condition of bench with concrete spalls

3.6.4 Fish Washing Stations

There are two fish cleaning stations and appear to be in serviceable condition. The stands and backsplash are composed of concrete masonry units, and the surface appears to be precast concrete. See Photo 3-17.



Photo 3-17: Fish Washing Station

3.6.5 Restroom

The restroom building near the start of the pier is constructed out of concrete masonry units but was boarded up and inaccessible. There was little structural deterioration noted at the visible outside face. See Photo 3-18.



Photo 3-18: Restroom

4. Design Criteria

4.1 Design Codes, References, and Standards

The design requirements of the following design codes and standards will be incorporated into structural evaluation and conceptual design of the Municipal Pier rehabilitation and replacement alternatives:

1. American Concrete Institute, Building Code Requirements for Structural Concrete, ACI 318-14 and Commentary (ACI 318R-14.)
2. American Institute of Steel Construction (AISC), 2010 LRFD Specification for Structural Steel Buildings.
3. American Society of Civil Engineers (ASCE), Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-10, 2010.
4. American Society of Civil Engineers (ASCE), Seismic Design of Piers and Wharves, ASCE/COPRI 61-14, 2014.
5. American Society of Civil Engineers (ASCE), Seismic Evaluation and Retrofit of Existing Buildings, ASCE/SEI 41-13, 2013.
6. American Society of Civil Engineers (ASCE), Manuals and Reports on Engineering Practice No. 130, Waterfront Facilities Inspection and Assessment.
7. California Building Standards Commission, 2016 California Building Code (CBC), Chapter 31F [SLC] Marine Oil Terminals.
8. American Society for Testing and Materials (ASTM), latest standards.
9. American Welding Society (AWS) – D1.1, latest version.
10. California Building Standards Commission, 2016 California Building Code (CBC), California Code of Regulations, Title 24, Parts 1 and 2, 2016.Design Codes, References, and Standards

4.2 Functional and Operational Criteria

Pier strengthening and retrofit modifications will be designed to meet 2016 California Building Code (CBC) requirements. Seismic analysis and design will be performed using displacement based design methods described in ASCE/COPRI 61-14 and the 2016 CBC, Chapter 31F, Marine Oil Terminals. Structural performance criteria for the Berkeley Pier are provided herein for use with these documents to meet the intent of the CBC for public access structures.

Berkeley Municipal Pier will be used for public pedestrian access for use as a recreational pier. The pier will be designed for maintenance vehicle use where repetition of loading is infrequent and cyclic loading and fatigue will not be considered.

Modifications and upgrades will be designed to bring the structure up to meet the intent of current code requirements for seismic design to ensure public safety when the facility is reopened for use.

4.3 Design Loads and Loading Combinations

Design loading combinations for Berkeley Municipal Pier are presented below. Design load combinations are summarized at the end of this section.

The pier will be designed for governing design load combinations per the requirements of the 2016 California Building Code. A summary of the recommended Design Criteria for the Berkeley Municipal Pier project follows:

1. Dead Loads – Self weight of all structures and fixed equipment, including permanent elements such as piles, bent caps, deck planks, guard rails, appurtenances, and utilities.

2. Live Loads – Public access

Pedestrian load..... 100 psf
Vehicle load (H5 loading with 14-foot wheel base)..... 10,000 lbs

3. Seismic Loading

ASCE 7-10

Seismic Design Category: D
Site Class: E
S_s: 1.733g
S₁: 0.687g
S_{DS}: 1.040g
S_{D1}: 1.100g

CBC, Chapter 31F, Level 1

Site Class: E
S_s: 0.558g
S₁: 0.198g
S_{DS}: 0.884g
S_{D1}: 0.634g

CBC, Chapter 31F, Level 2

Site Class: E
S_s: 1.486g
S₁: 0.547g
S_{DS}: 1.337g
S_{D1}: 1.312g

4. Load Combinations per the 2016 California Building Code

Loading	D	D+L	D+L+W	D+L+EQ	D-W	D+IM
D, Dead	1.4	1.2	1.2	1.2	0.9	1.2
L, Live		1.6	1.0	1.0		
W, Wind			1.0		1.0	
EQ, Earthquake				1.0		
IM, Impact						1.3

5. Environmental Loading

Loading	Value
Wind (ASCE 7 3-sec gust, mph)	110
Exposure Category (ASCE 7)	D
Current (knots)	1.0
Significant Wave Height (Hs, feet)	3.1
Significant Wave Peak Period (seconds)	3.8

4.4 Material Properties

The following structural material and properties are anticipated to be used for the project:

1. Concrete

All concrete shall be reinforced and utilize a mixture design suitable for the marine environment to meet the facility service life requirement.

2. Structural Steel

Plates and Bars	ASTM A131 or A36
Wide Flange Shapes	ASTM A992
Pipes	ASTM A53, Grade B
Tubes (Round or Rectangular HSS)	ASTM A500, Grade B
Angles and Channels	ASTM A36
All Other Plates	ASTM A992
Bolts	ASTM A3125, Grade A325
Welding Electrodes	ASTM E70XX
Nuts	ASTM A194 / ASTM A563, Grade A
Washers	ASTM F436 / F844

3. Stainless Steel

All Shapes and Plates	ASTM A276 Type 316
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4. Corrosion Protection

Passive cathodic protection system shall be used on any steel piles consisting of zinc anodes or by providing additional sacrificial material thickness. Piles will also be coated to a depth to be determined below the mud line.

4.5 Geotechnical Criteria

Geotechnical criteria and parameters for final design of the pier rehabilitation shall be based on site investigations and engineering studies conducted. Geotechnical information on the subsurface material at the pier location is unavailable. Based on knowledge of waterfront structures located in nearby areas, it is assumed that the timber piles were driven into a relatively stiff sand layer underlying the soft clay (Bay Mud) material.

Elevation of bay mudline at the pier location is approximately -8 to -10 feet Mean Lower Low Water (MLLW). Based on information from a geotechnical report for a project at nearby Berkeley Marina, it is assumed that the mudline is underlain by an approximately 10 feet to 15 feet layer of very soft silty to sandy clay (Bay Mud). This in turn is underlain by layers of loose dense sand, soft to medium stiff sandy clay and medium dense clayey sand. Stiff clays are found below these layers. Prior to final design of the pier rehabilitation, a geotechnical investigation will be conducted at the project site.

4.6 Accessibility Requirements

The pier approach and slopes will meet ADA Guidelines.

4.7 Tidal Data

Design tide elevations are based on the tidal information for Berkeley, CA NOAA Station ID 9414816 for the tidal epoch 1983-2001 as shown in Figure 4-1. Project datum is mean lower low water (MLLW).

Level	MLLW Elevation (feet)
Highest Astronomical Tide (HAT)	7.6
Mean Higher High Water (MHHW)	6.1
Mean Lower Low Water (MLLW)	0.0
Lowest Astronomical Tide (LAT)	-2.1

<https://tidesandcurrents.noaa.gov/datums.html?id=9414816>

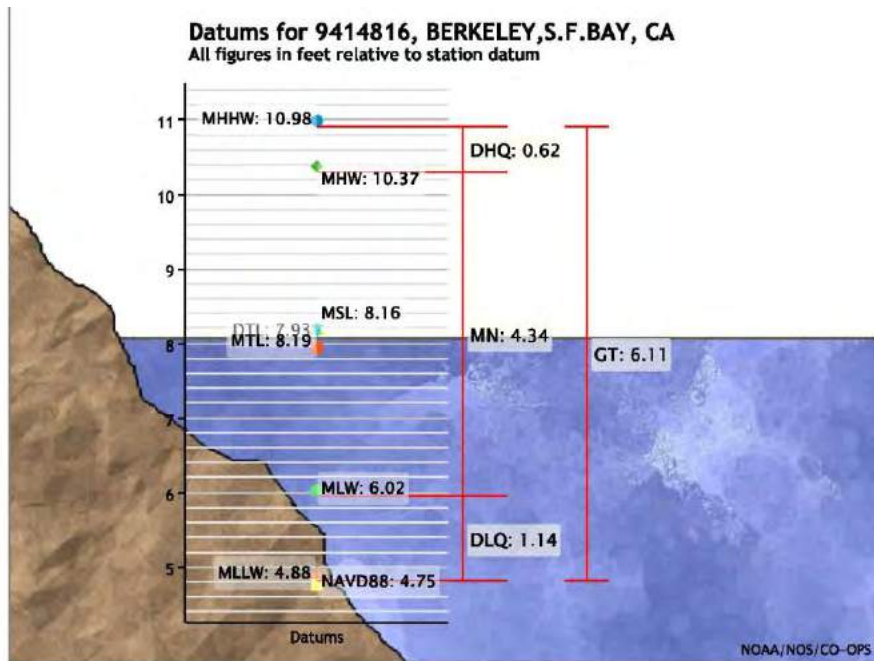


Figure 4-1: Tidal Reference (Source: National Oceanic and Atmospheric Administration)

4.8 Sea Level Rise

The pier structure can be designed to be adaptable to higher water elevations due to anticipated sea level rise. For example, the pier deck can avoid periodic flooding at higher water levels by using a fiberglass grating that allows seawater to pass through, also reducing uplift pressures on the pier. The pier can be designed with a higher deck surface elevation to prevent overtopping during most storm events. The approach to the pier can be raised to match the higher deck elevation by using lightweight fill material and adding a new walking surface with appropriate grades for ADA-accessibility. A new structure will be constructed of reinforced precast or cast-in-place concrete using a mix design suitable for the marine environment. Concrete structures in a marine environment utilize increased minimum concrete cover to reinforcing steel, epoxy coating of prestressing steel (if used), and use of a durable concrete with a low water to cementitious materials ratio with appropriate admixtures. Stainless steel, aluminum and fiberglass composite material can also be used to reduce corrosion and deterioration due to marine exposure and future immersion in seawater.

The year 2090 represents the 70 year service life of the pier structure (2020 estimated construction completion plus 70 years.) FEMA maps indicate 1% exceedance (100 year) Total Water Level Elevation of +10 feet at the pier site. The long-term sea-level rise predicted by the National Research Council between 2020 and 2090 is 2.65 feet per Figure 4-1 below. Adding 2.7 feet to represent the central estimate of sea level rise in year 2090 provides a design water elevation of +12.7 feet (NAVD88).

Estimated Relative Sea Level Change Projections From 2017 To 2100 - Gauge: 9414750, Alameda, CA

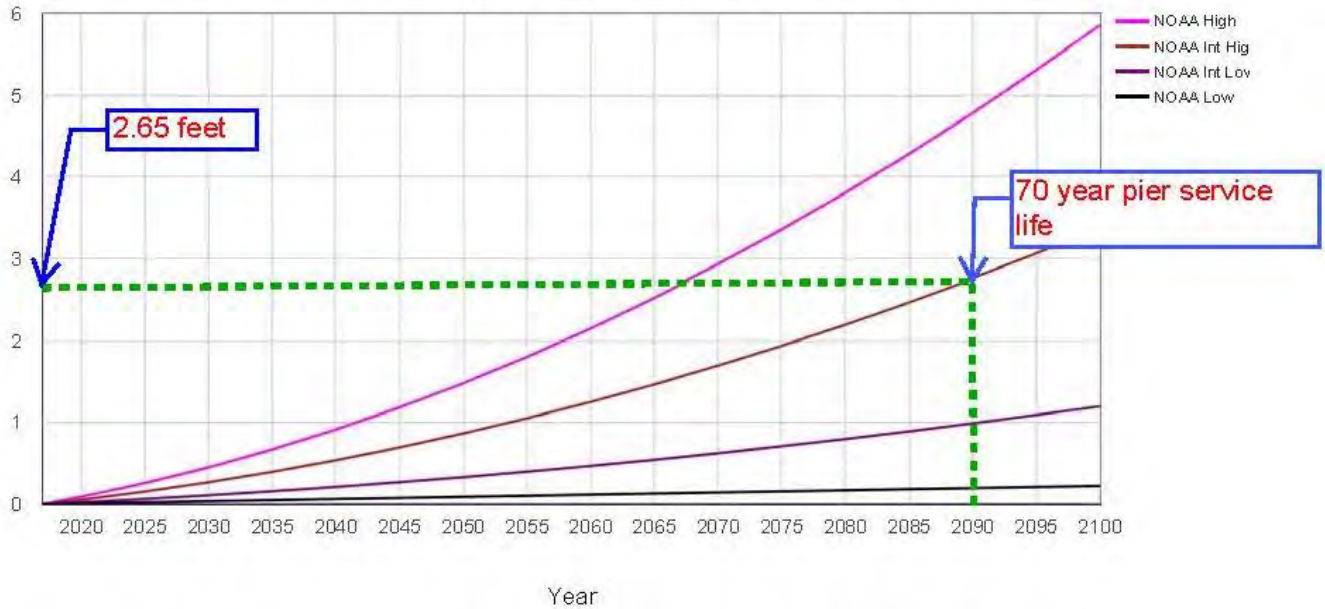


Figure 4-2: Relative Sea Level Change Projections

The Base Flood Elevation (BFE) is the maximum elevation the water (including waves) is anticipated to reach during the 1% chance storm event; it represents the envelope of water during an extreme event. The Design Base Flood Elevation is obtained from the superposition of the water elevation observed during the 1% annual chance storm (including the astronomical tide, El Niño, and surge due to wind effects), the wave action, and the projected sea level rise at a determined time horizon. The time horizon considered for Berkeley Municipal Pier consists of a minimum service life of 70 years (2090.)

The 1% annual chance storm is a storm having an annual chance of being equaled or exceeded of 1% of the time. Various sources documenting extreme water levels, including FEMA at or near the project site are compared to determine design water elevation. FEMA's 2015 1% surge elevation (also referred to as SWEL or Stillwater Elevation) is used to compute for the base flood elevation. From the most recent maps issued by FEMA, the SWEL at Municipal Pier is approximately +10 feet (NAVD88.)

The design wave height is 3.1 feet. The Base Flood Elevation is computed with the portion of the wave that stands above the Stillwater level. When the waves propagate nearshore, the waves tend to shoal, and the wave crest is located at a distance above the Stillwater level of approximately 70% of its total height. Therefore, the wave height component to be added to the Base Flood Elevation is 2.17 feet. Adding this to the 1% SWEL of 10 feet and the Sea Level Rise of 2.7 ft. leads to a Design Base Flood Elevation of 14.9 ft NAVD88 for 2090.

Recommended Design Base Flood Elevations:

- 70 year Service Life: 14.9 ft-NAVD88

5. Structural Condition Assessment

5.1 Vertical Load Analysis

5.1.1 Methodology

The basic methodology of the initial study was to determine the approximate existing structural capacity of the pier by conducting analyses using anticipated vertical loads, information derived from record information and taking into account deterioration noted during the site survey. Material properties will be determined either by physical tests or assumptions made considering the degree of deterioration and time of construction. Structural condition survey of the pier indicates significant deficiencies, and design repair concepts will be developed to provide sufficient structural capacity for gravity and live loads. This section includes determination of the approximate capacity of the pier to resist inertial loads to achieve a minimum performance level during a seismic event.

Based on the City of Berkeley Department of Public Works Plan No. 3549, File 102 B-63, dated December 1961, the planks for Section 2 are 5.5 feet wide, 15 feet long, and 9-5/8 inches thick. There are two different slab reinforcing configurations, varying between 10 or 11 #7 reinforcing bars in the bottom mat, and 5 #4 bars in the top mat. The concrete and steel rebar strength are not specified, but are assumed to be 2,500 psi and 60,000 psi respectively. The evaluation criterion for the structural materials is shown in Table 5-1 below.

Table 5-1: Material Properties

Element	Yield Point (psi)	Allowable Shear Stress (psi)	Allowable Bending Stress (psi)	Compressive Strength (psi)	Modulus of Elasticity (psi)
Concrete		95		3,000 ²	3,120,000
Reinforcing Steel	33,000 ¹				29,000,000
Timber Piles (Douglas Fir)			1,200 ²		1,500,000

Notes:

1. Value assumed for analysis given construction era.
2. Assumed value for analysis.
3. Value derived from prior studies.

5.1.1 Concrete Deck Panels

As-built drawings for the 11 feet wide concrete panels in Section 1 were not available, and is estimated based on the available drawings for Section 2. For the analysis, similar reinforcing spacing were used, with #7 at 6 inches in the bottom mat, and #4 at 12 inches in the top mat.

These panels were analyzed as simple spans under these load cases:

1. As-built, 100 psf live load
2. Loss of 50% bottom mat, 100 psf live load
3. Complete loss of bottom mat, 6 inch thick uncracked section, 20 psf live load

In load case 1, the bottom mat of reinforcing bars provides about two times as much capacity for vertical loads only. This means for vertical loads only, the bottom mat rebar can lose as much as half of the steel (load case 2) and still support the full 100 psf live load. However, in load case 3, without the bottom mat, the concrete panels are well over capacity and insufficient to carry a reduced live load.

The loss of the bottom mat of reinforcing was taken into account for the condition rating. Panels that appeared to have lost more than 50% of the bottom mat of rebar were considered critical.

5.1.2 Piles

The vertical piles supporting the pier structure are reinforced concrete jacketed timber piles which are assumed to extend to just below the mudline while the timber piles extend to the bearing depth. The vertical or plumb piles derive their lateral resistance from the passive pressure of the soil and from the flexural rigidity of the structural element.

The piles vary in length along the length of the pier and are assumed to extend 10 to 15 feet into the sand layer. Due to the stiffness of the sand layer the piles are believed to be driven to, the assumption has been made that a large portion of the vertical capacity of the piles is derived from end-bearing on the relatively stiff sand layer rather than skin friction from the soft clay layers penetrated. The piles were likely driven using a gravity hammer. Properties for the timber was used in the analyses.

The vertical piles, as constructed, have sufficient axial capacity for the vertical loading used in the evaluation. Lateral loading demand for the vertical piles has been reviewed against the capacity available and the results are discussed in Section 7. The pier was designed prior to current seismic design codes and consideration was not given for probable earthquake ground motions from earthquake faults in the region.

5.1.3 Pier Framing Elements

The pier substructure consists of 268 bents comprised of bent caps spanning 16 feet between the piles. The bent caps consist of reinforced concrete beams transverse to the centerline of the pier, with dimensions of 24-inches wide by 18-inches deep sections as shown on the record drawings.

As noted above, the concrete bent caps have open and closed spalls in numerous locations. The cause of the spalling is likely corrosion of the reinforcing steel. The porous nature of concrete combined with shrinkage cracks and cracks created by tensile loads in the beams have allowed salt from the moisture to reach the reinforcing bars. Chloride in the saltwater reduces the passivity of the cement, which allows the corrosion to accelerate. The resulting corrosion of the bars has expanded the volume of the steel causing the concrete to become delaminated.

5.2 Seismic Evaluation

5.2.1 Discussion of Structural Analysis for Load Capacity

Three-dimensional finite element computer models were developed for structural analysis of Berkeley Municipal Pier using the structural software SAP2000. The initial structural analyses conducted included a capacity evaluation using vertical loads consisting of an area live load suitable for the pier structure. The strength requirements for the repair design were determined from the results of the analyses. The lateral part of the study used the computer models to analyze the pier for inertial loading from an earthquake.

Inertial loading imposed on the pier due to a seismic event can be expected to cause potentially extensive damage to the substructure given the lack of ductile detailing in the structural elements provided in the original construction. A strengthening upgrade study of the pier structure was also performed.

As part of the initial structural assessment, calculations were performed to determine the existing capacity of the pier elements for resistance to vertical self-weight (dead) and transient (live) loads. A typical section of the pier structure was modeled using a finite element model developed for the purpose of the structural analysis. The computer models consist of nominally rectangular planar shell elements representing the deck slab. Frame elements have been used to model the beams and piles. An example of the finite element model is shown on Figure 5-1.

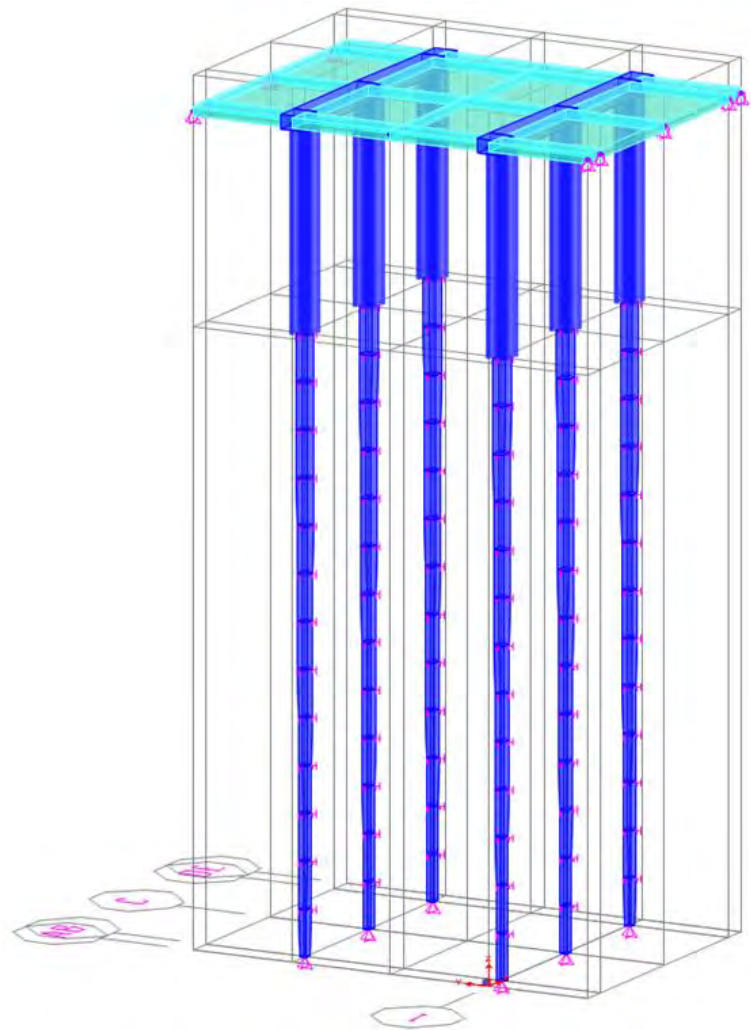


Figure 5-1: Existing Pier Configuration (Partial Section)

Non-linear springs were included in the finite element models along the embedded length of the piles to represent the lateral load-deflection (p-y) characteristics of the soil on the element. The pile tip was supported assuming a fixed boundary condition with no vertical or horizontal movement allowed. Because pile bending actions dominate the behavior for lateral analysis, skin friction and pile tip springs were not modeled.

For the structural analysis, piles were modeled considering the effects of the lightly reinforced concrete jacket from the pile cap down to the mudline. Modeling of the concrete jacket was cut off 2 feet below the assumed mud line elevation. The wood pile was modeled as a section tapering from a 14 inch diameter at the top to a 7 inch diameter at the bottom tip and was assumed to be 70 feet long with 52 feet of embedment below the mudline. The upper 18 feet below the pile cap was modeled as a composite section with a timber core and an exterior concrete jacket.

It was anticipated that lateral movements causing pile moments below the mudline at near the timber pile bending strength would be quite large and would be well past the displacement capacity of the pile to pile cap connection. The pile top connection to the pile cap was considered for the pushover analysis to have very limited strength and stiffness with a small spring value added

between the pile and pile cap for some continuity rather than a simply pinned connection. The maximum internal force and displacement results from these analyses were used to assess the load capacity of the existing structure and determine the critical elements for the vertical load distribution.

To determine the structural response of the pier structure due to earthquake loading, pushover analyses were utilized to determine the structural demand of the existing pier structure due to lateral loads resulting from inertial effects due to ground motion during a seismic event. The pushover analysis is a static, non-linear procedure in which the magnitude of a predetermined structural loading pattern is incrementally increased. The structure can be pushed to a target displacement level and the results assessed. The analysis is considered a process that accounts in an approximate manner for the redistribution of internal member forces that occurs when the structure is subjected to inertia loads that can no longer be resisted within the elastic range of structural response. The critical structural elements in the nonlinear lateral analyses were determined.

The two key elements of a performance-based assessment are capacity and demand. Demand will be the representation of the earthquake ground motion. For the purposes of the assessment the displacement demand is an estimate of the expected maximum response of the pier during the earthquake ground motion. Capacity is the representation of the structure's ability to resist the seismic demand. The capacity depends on the strength and deformation capacities of the individual components of the structure.

Traditionally, seismic evaluations and retrofit designs used a linear elastic, code-based approach. The adequacy of the structure was assessed to resist lateral forces with a specified base shear representing the inertia loads due to a seismic event. The design remains linear in the sense that the seismic load is applied and the structural components are designed to resist the resulting stresses without yielding. Recently the trend has shifted toward a "performance-based" approach to seismic retrofit design. This performance based approach is accomplished with the pushover demand-capacity analysis described above.

5.2.2 Seismic Assessment Methodology

Several design standards exist that describe performance based design methods usable for demand capacity analysis and pushover methods. Each method is a partial fit, as explained below, for the analysis and potential seismic strengthening of Berkeley Pier used for public access but not for ship berthing or mooring at all.

The approach chosen by GHD is the use of ASCE 61 as the primary reference for the displacement based design methodology for pile supported pier structures which for the intended purpose is essentially the same as CBC Chapter 31F. ASCE 61 provides appropriate information for connection modeling, soil spring modeling, and limitations of pile strains along with modeling parameters used for pile supported piers. However, earthquake loading from those two documents was determined to be inappropriate for publicly occupied existing facilities such as Municipal Pier. The higher earthquake loading prescribed by ASCE 41 is then used in this evaluation of existing conditions and for the modification schemes proposed along with Life Safety and Collapse Prevention performance objectives commonly used for publicly occupied structures.

ASCE 61-14 "Seismic Design of Piers and Wharves" is a design standard developed by the American Society of Civil Engineers (ASCE) for performance based design of new pier and wharf structures. This standard focuses primarily on the design of new port facilities such as container wharves and similar ship berthing facilities. This document is based heavily on the Port of Long

Beach standards for seismic design of new facilities at their port. This document provides focus on the performance of pier structures and their common components such as piles and pile caps which differs significantly from the construction of typical buildings. ASCE 61 assumes these piers are not typically publicly occupied facilities. The performance based design method used is very similar to CBC Chapter 31F and ASCE 41 described below.

The Marine Facilities Division of the California State Lands Commission has formalized the seismic design of marine structures through the "Marine Oil Terminal Engineering and Maintenance Standards" (MOTEMS). This standard has been codified as Chapter 31F "Marine Oil Terminals" in the 2016 California Building Code (CBC). This design standard represents a codified means to design or assess existing waterfront structures. Although the standard is intended for use on marine and waterfront structures, its use is primarily focused on marine oil terminals subject to heavy loading where environmental damage resulting from oil spills due to a seismic event is a main concern. CBC Chapter 31F utilizes a performance-based seismic assessment approach. This standard does provide some useful guidance on wood piling which is of use for this project. Chapter 31F assumes these piers are not typically publicly occupied facilities.

ASCE 41-13 "Seismic Evaluation and Retrofit of Existing Buildings" is another standard also developed by ASCE. This standard provides methods for performance based demand-capacity analysis and pushover analysis with particular emphasis on existing buildings and publicly occupied facilities. ASCE 41 provides little guidance for the capacity calculations and behavior of pile supported structures as compared to ASCE 61 and CBC Chapter 31F. ASCE 41 does however provide the best guidance on earthquake demands appropriate for use with existing publicly occupied facilities.

All standards discussed above are probability based and quantify risks associated with differing seismic events. The methodologies prescribed determine where and how inelastic actions may occur (i.e., by inelastic rotations in specified plastic hinge locations) and to protect other locations such as the pier deck and prevention of other failure modes such as shear by assuring that these locations remain elastic.

In the basic sense, force applied to any structure causes the structure to displace. Within the structural elements, the applied forces are associated with stresses, and the displacements with strain. The performance-based assessment method offers a clearer look at how a structure will respond during an earthquake, taking into consideration the post-yield (nonlinear) behavior of the materials. The structure is pushed beyond the elastic (yield) limit and hinges form in the elements into the plastic range of the materials.

CBC Chapter 31F defines the earthquake ground motion for use in the assessment as a Level 1 earthquake defined as 50%/50yr earthquake that has a 50 percent probability of being exceeded within 50 years (72-year return period). This level is defined as the structure sustaining no significant and only limited, repairable damage. The Level 2 earthquake is defined as 10%/50yr earthquake that has a 10 percent probability of being exceeded within 50 years (475-year return period). This is defined as the structure sustaining repairable damage and incurring controlled inelastic structural behavior without collapse during a major earthquake.

ASCE 61 uses the same defined earthquake ground motions as CBC Chapter 31F for an Operating Level Earthquake (OLE) corresponding to Chapter 31F Level 1, and for a Contingency Level Earthquake (CLE) corresponding to Chapter 31F Level 2. ASCE 61 adds a Design Earthquake Level (DE) which is taken from ASCE 7 "Minimum Design Loads for Buildings and Other Structures". This earthquake is taken as 2/3 of the ground motions caused by an earthquake with a

2% probability of being exceeded in 50 years. These earthquakes are intended for use with new structures and not necessarily for evaluation and upgrade of existing facilities.

ASCE 41 uses unique ground motions and performance standards that are appropriate for the evaluation existing structures that are publicly occupied and the strengthening or retrofit of those existing structures. Two earthquakes are typically used for evaluation of existing structures defined as Basic Safety Earthquake-1E (BSE-1E) and Basic Safety Earthquake-2E (BSE-2E) earthquakes. BSE-1E is defined as a 20%/50yr earthquake (225 year return period) and the BSE-2E is defined as a 5%/50yr earthquake (975 year return period). The performance objective in ASCE 41 are Life Safety for the BSE-1E earthquake and Collapse Prevention for the BSE-2E earthquake. As can be seen particularly with reference to the return period in years, the earthquake prescribed by ASCE 41 are larger than those typically used for other standards. The performance standards of Life Safety and Collapse Prevention are more lenient than those of ASCE 61 and CBC Chapter 31F where minimal damage or repairable damage are the performance goals.

5.2.3 Nonlinear Static Pushover Analysis Method

Nonlinear static analysis, commonly referred to as pushover or collapse analysis, is a method for determining the ultimate load and deflection capability of a structure using an inelastic procedure. Local nonlinear structure effects, such as flexural hinges at the member joints, are modeled and the structure is deformed or "pushed" until enough hinges form to develop a collapse mechanism or until the plastic deformation limit is reached at the hinges. The goal of the evaluation is determination of the ultimate displacement capacity of the structural components (Δ_c).

A linear elastic analysis provides a good indication of the elastic capacity of structures and indicates where first yielding will occur, however it is unable to predict failure mechanisms and account for the redistribution of forces during progressive yielding of the components of a structure. The nonlinear (inelastic) analysis procedures better demonstrate how structures perform by identifying modes of failure and the potential for collapse. Use of inelastic analysis attempts to better understand a structure's behavior when subjected to a major earthquake, where the assumption is made that the elastic capacity of the structure will be exceeded. The inelastic behavior of structural elements such as the deck beams, bent caps and piles is one of the nonlinear parameters used in the analyses.

The failure mechanism of the pier structural components must be identified and their nonlinear properties defined accordingly. Factors include material inelasticity, geometric effects, non-linear soil-foundation-structure interaction. The nonlinear pushover analyses utilized inelastic properties of the structural materials including the stress and strain characteristics of the concrete, reinforcing steel and timber in the case of the pier piles. Non-linear springs were used to represent the soil-structure (pile) interaction in the computer models. Lateral springs consist of load-deflection (p-y) response of the Bay Mud.

A nonlinear analysis such as a pushover procedure must be performed to determine an approximate force-displacement capacity diagram for the structure. The finite element computer model is modified during the analysis to account for the reduced resistance of yielding components. A lateral force distribution is again applied until additional components yield. Hinges representing

post-yield behavior begin to form as the structure is incrementally pushed in subsequent steps. The process is continued until the structure becomes unstable or a predetermined displacement target is reached.

5.2.4 Nonlinear Pushover Procedure

The nonlinear static pushover analysis used for the assessment of the pier utilized the method described above. The pushover procedure involves converting the typical acceleration versus period response spectra into a spectral acceleration versus displacement response plot.

The basic capacity and demand parameter for the analysis is the lateral displacement of the pier. For the nonlinear static procedure used to evaluate the capacity of the pier, the pushover analysis was performed using the SAP2000 finite element structural analysis program. An increasing monotonic lateral load pattern was used to displace the individual bent models and the results reviewed at each load step to evaluate formation of the hinges. The analyses included the effects of P- Δ , which is the additional moment imposed on a pile by the axial load acting on a moment arm created by lateral displacement at the top of the pile. This effect can be significant for a pier or bridge structure. A typical bent model for the pier is shown on Figure 5-2.

The pushover procedure creates a capacity curve or spectrum that represents the displacement capability of the structure being considered. This curve is plotted on top of demand curves or spectrums that represent the earthquake being considered. Earthquake demand curves are repeated for different levels of energy dampening which effectively scales the earthquake response that the structure must accommodate. Figure 3 shows a classic acceleration displacement response spectra with the pushover curve and demand curves plotted together.

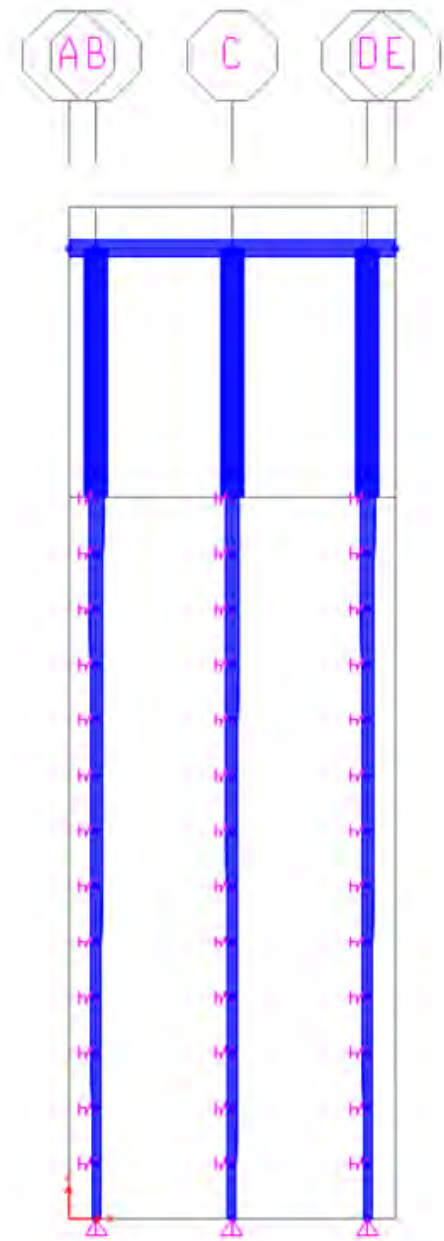


Figure 5-2: Typical Bent Model

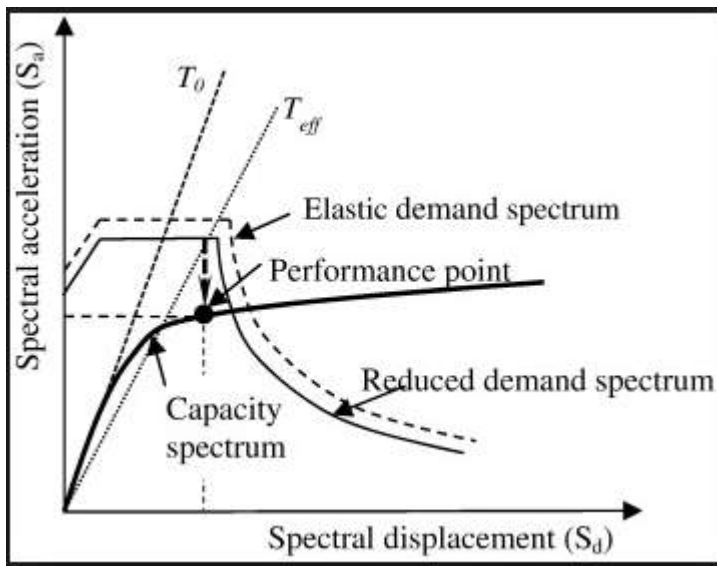


Figure 5-3: Typical Acceleration-Displacement Response Spectra (ADRS Spectra)

A unique performance point is calculated by iteration using the substitute structure method where successive trials for the effective period, T_{eff} , are calculated until a displacement matching a point on the capacity curve is found. For structures with insufficient strength or stiffness, no performance point may exist since the capacity curve may not reach one of the demand spectrum lines plotted.

Each model variation was subjected to the same procedure described here. A short summary of the results for each is described below.

5.2.5 Results of Seismic Assessment

Static non-linear pushover analyses were performed to evaluate the performance of the pier in its existing condition and then to evaluate several different options for strengthening the existing pier or for potentially replacing the pier with new structure. A total of seven variations of the model were run to that end. Table 5-2 lists the seven options studied by finite element pushover analysis.

Table 5-2: Model Variations for Seismic Pushover Analysis

Pier Alternative	Option Type	System Description
P1	Rehabilitate existing structure only. No seismic strengthening.	Maintain existing. No retrofit elements.
P4	Rehab and retrofit for seismic strengthening.	Add 24" steel pipe piles with steel moment frames at top of piles.
P5	Rehab and retrofit for seismic strengthening.	Add 48" cantilevered steel pipe piles
P6	Rehab and retrofit for seismic strengthening.	Add 18" diameter steel pipe piles with moment frames, replace deck with lightweight system.

P7	Rahab and retrofit for seismic strengthening.	Add 36" cantilevered steel pipe piles, replace deck with lightweight system.
P8	Pier replacement.	30" diameter steel pipe monopile with concrete pile cap and deck
P10	Pier replacement.	24" precast concrete piles with concrete pile cap and deck

Pushover analyses were performed for each of the models listed. Analysis results were saved at selected steps of each analysis as the structure lateral displacement increased. The structure displacement is plotted for the final step of each analysis.

Each model section was assessed for two levels of earthquake (BSE-1E and BSE-2E) using ASCE 61 procedures as described in the Seismic Assessment Methodology section above.

With the exception of the timber piles, calculations and analysis performed for the pier structure based on the design criteria above, indicate that the pier structure, with structural deficiencies repaired, is adequate for these design basis loadings. The most critical structural element in the pushover analysis for each model is the pile.

5.2.6 Structure Analysis Models

Model P1

Figure 5-2 above represents the basic model of existing conditions. For this condition, bending in the piles just below the mudline resists lateral movement of the deck structure due to earthquake. Timber piles are typically not modeled with non-linear hinges since they have very little rotational capacity beyond their ultimate moment strength. In this case the model was pushed at the top deck a distance of 2.5 feet and the resulting pile moments were monitored. Figure 5-4 shows a plot of the displaced shape at a deflection of 1.75 feet at the deck with the corresponding moment distribution in the piles for that deflection. The pile moment at this push step is indicated as 49 kip-feet.

The pile capacity of the timber pile section at approximately 11 inches in diameter was calculated to be about 45 kip-feet. This indicates that the maximum displacement of the structure is about 1.75 feet when the pile bending capacity was reached.

Further the pushover curve created was evaluated against the required BSE-1E and BSE-2E earthquakes. A plot of the structures ADRS spectra is shown in Figure 5-5. The green line is the structural capacity curve and the red lines are demand capacity curves for various damping levels. As can be seen by comparison to Figure 3, there is no intersecting performance point indicating a successful solution. This means in this case that the demand deflection far exceeds the capacity of 1.75 feet at the maximum pile moment. For the maximum earthquake case the structure can be expected to suffer extreme deflections and possible collapse.

This information informs us about the maximum displacement that can be tolerated in existing structure when combined with retrofit schemes. In this case, retrofit schemes must limit the displacement to 1.75 feet or less and must also have a capacity curve that intersects successfully with a performance point on the ADRS plot.

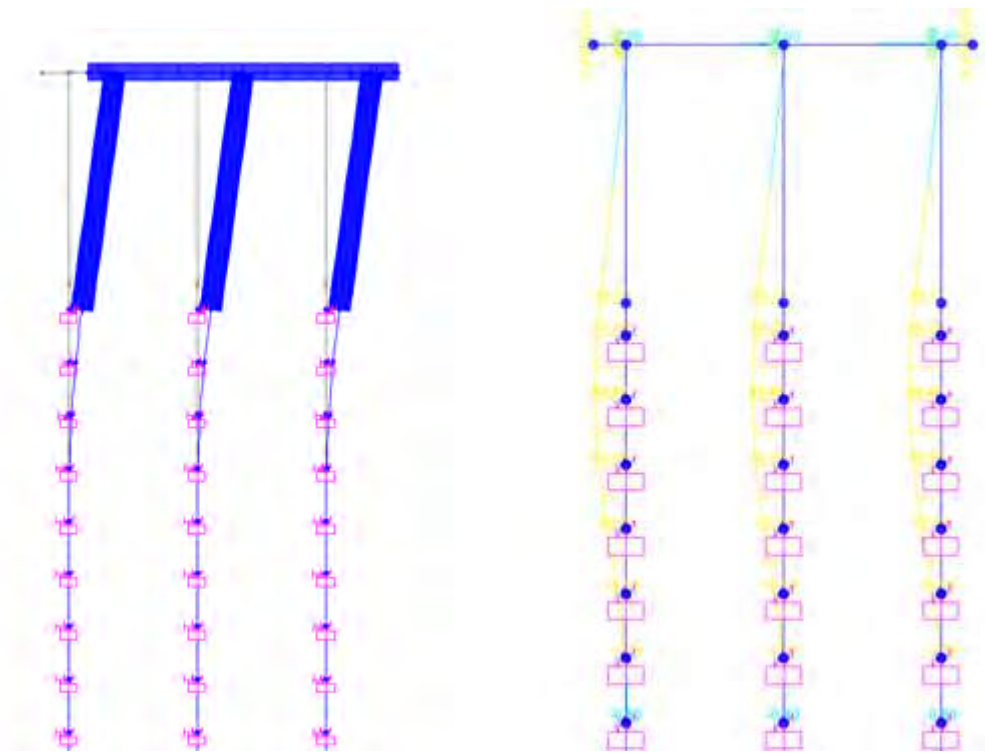


Figure 5-4: Displaced Shape and Pile Moment Diagram

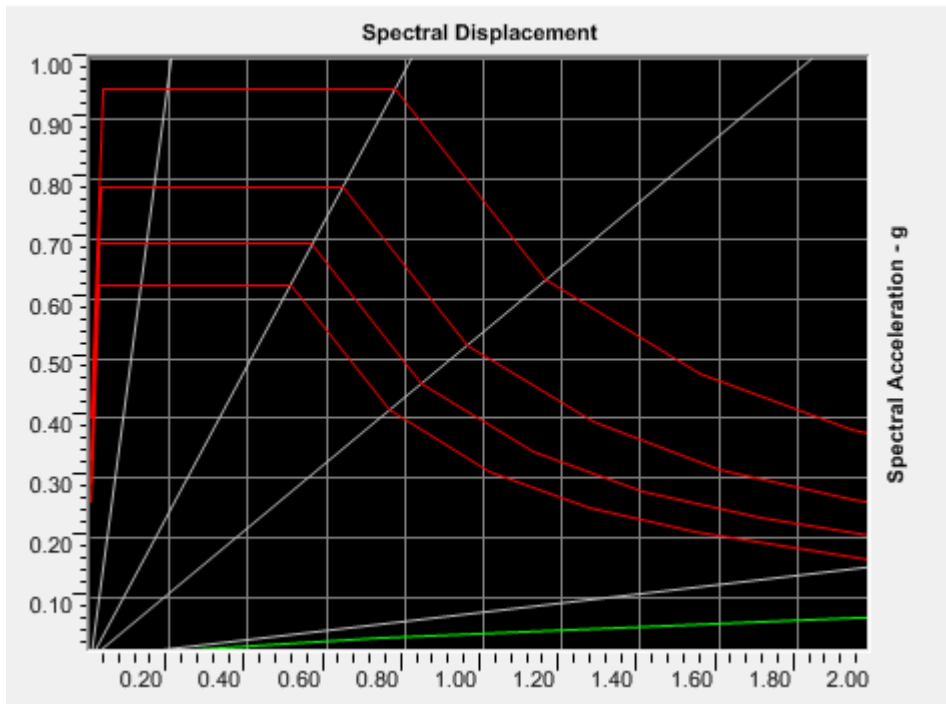


Figure 5-5: Acceleration Displacement Spectrum for Existing Timber Pile Condition

Model P4

Model P4 includes an option to add a pair new 24" diameter steel pipe piles at 32 feet on center. To help control deflections the pile tops are joined by beams capable of developing end moments which creates a fixed pile top condition.

Figure 5-6 shows a screen shot of this model where a 32 foot representative section of the pier is modeled and pushed across the narrow direction of the deck indicated in red. Green colored elements represent the new pipe piles joined by a moment frame beam shown in yellow. The right side of the figure shows the typical new bent added at 32 feet on center.

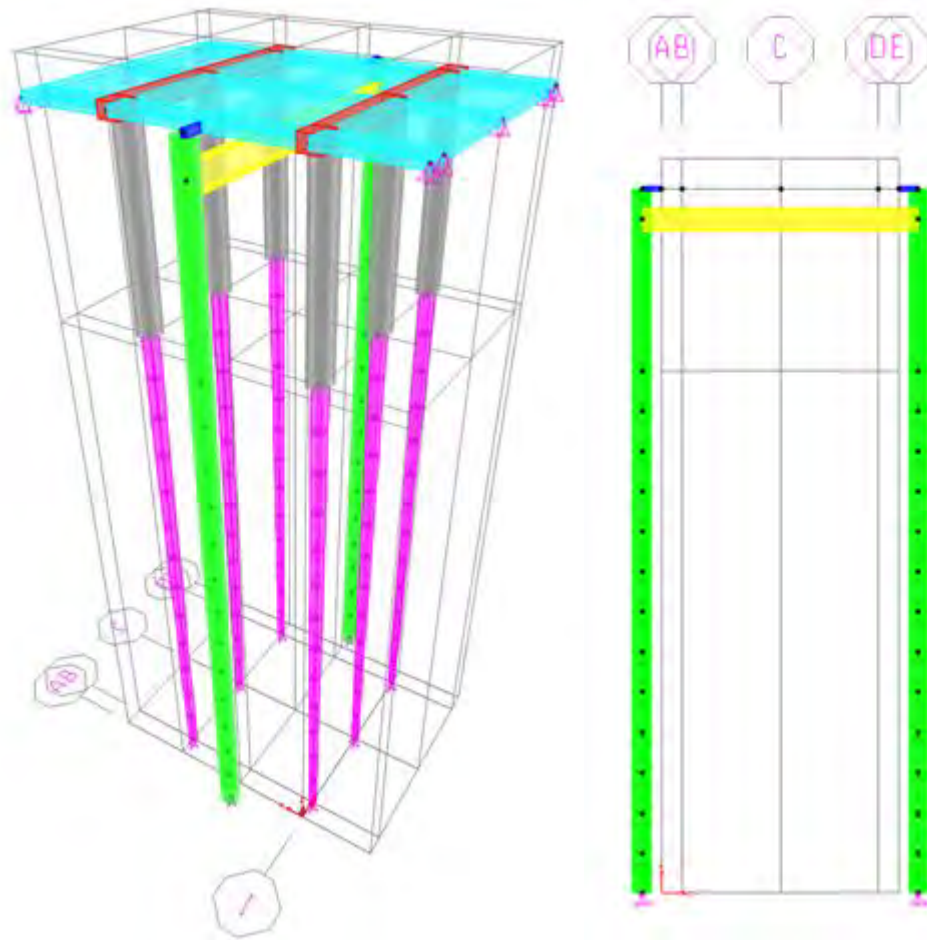


Figure 5-6: Typical Model View for Retrofit Model P4

Figure 5-7 shows a plot of the deflected shape at a horizontal pushover displacement of 1.5 feet corresponding to the performance point plotted for the structure in Figure 5-8.

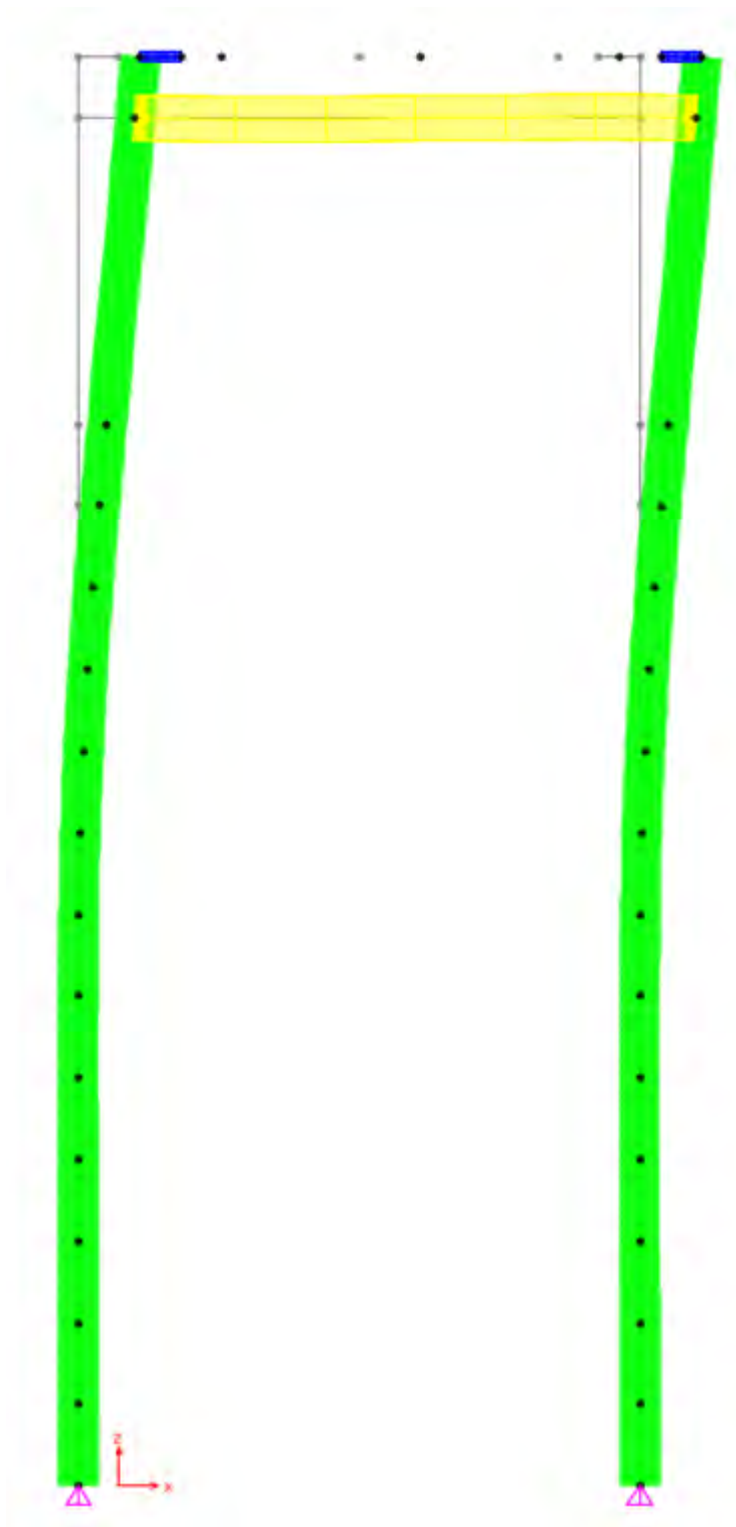


Figure 5-7: Deflected Displacement of 1.5 Feet at Deck Level

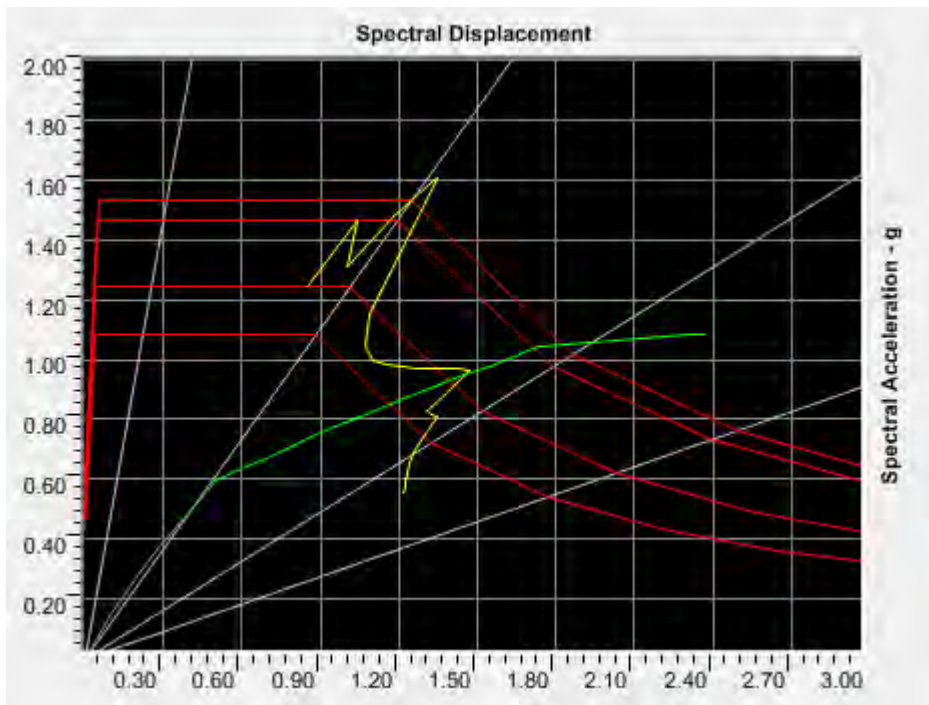


Figure 5-8: ADRS for P4 Retrofit Model

Figure 5-8 shows the green pushover curve for the retrofit pile moment frame model. The green curve is much taller indicating much more capacity compared to the original structure shown in Figure 5. The yellow line represents the the plot of each trial evaluation of effective structural period and it's corresponding displacement value. A solution, the performance point, is found where the yellow line intersects the green line. This occurs at 1.5 feet of deck displacement.

At a displacement of 1.5 feet non-linear actions in the new structure are seen in the moment frame beams. Non-linear compression of the soil springs occur but no hinging of piles occurs.

The maximum performance point displacement of 1.5 feet is also within the expected limits of displacement for the original structure therefore this will be a successful solution for retrofitting the existing pier.

Model P5

Model P5 is very similar to model P4 except that no moment frame beam is used to join the pile tops. Piles must cantilever from the base which ends up requiring larger diameter piles. Figure 5-9 shows a screen shot from this model.

Figure 5-10 shows the ADRS plot for this retrofit scheme. In this plot the performance point at the intersection of the green and yellow lines occurs at about 1.4 feet. This demand displacement is less than that which can be tolerated by existing timber piles so it is a successful retrofit scheme. In this case essentially all of the non-linear action occurs in the soil springs. The cantilevered piles remain elastic for this solution.

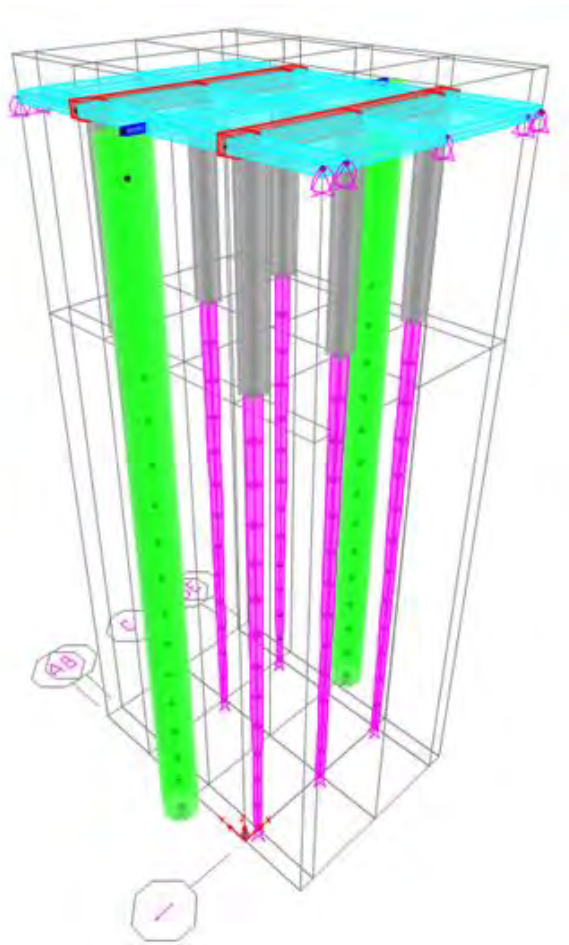


Figure 5-9: Typical Model View For Retrofit Model P5

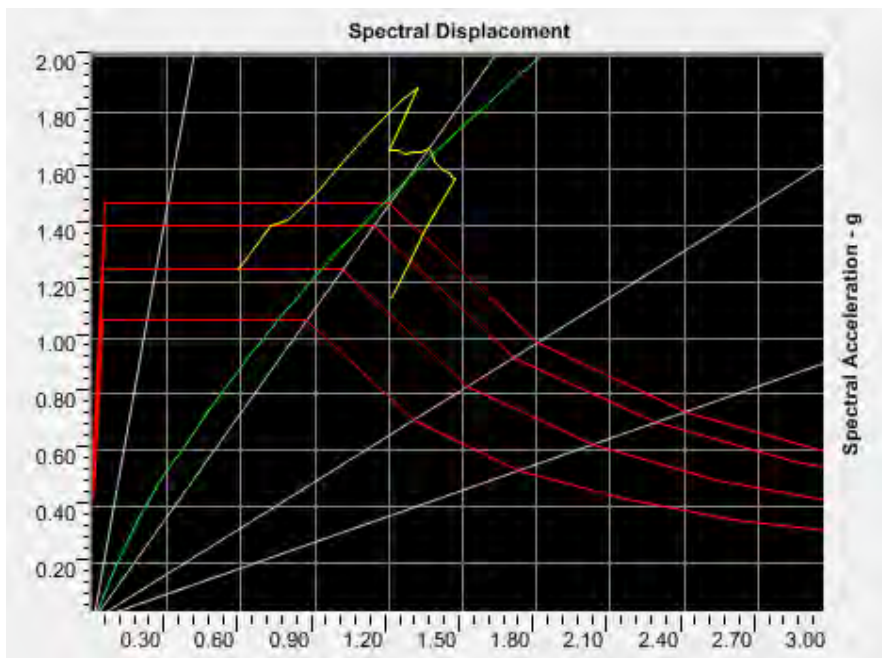


Figure 5-10: ADRS for P5 Retrofit Model

Models P6 and P7

These models options are essentially identical to Alternatives P4 and P5 respectively with the addition of replacing the existing pier deck with a new lightweight option that reduces the structural mass and therefore reduces the structural demands. As a result, correspondingly smaller pile sections are utilized.

Figure 5-11 shows the ADRS plot for model P5. The performance point occurs at a deflection of approximately 1.1 feet which is well within the expected deflection capacity of the original timber pile structure.

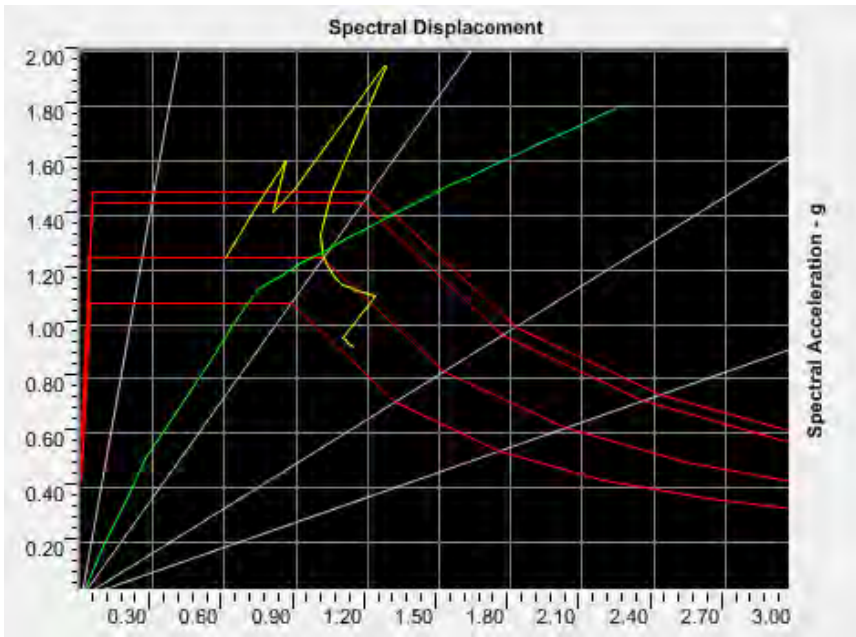


Figure 5-11: ADRS for P6 Retrofit Model

Performance point displacement for the P7 model is similar to the P5 model at about 1.5 feet.

Model P8

The P8 model is for a completely new pier structural system proposed as a replacement option for the entire pier. As such the selection of pier configuration and structural components is completely open. Option P8 considers the use of a monopile support system with single piles spaced at 32 feet on center. The pile is capped with a cast in place or pre-cast pile cap and the deck is a pre-cast pre-stressed 12 inch thick deck section.

Figure 5-12 shows the ADRS for the P8 model. For this solution the performance point occurs at about 1.5 feet. For this case essentially all inelastic non-linear action occurs in the soil springs. The cantilevered monopile section remains elastic up to the performance point demand displacement.

Figure 5-13 shows a screen shot of a two pile section (64 feet total length) of the proposed monopile pier.

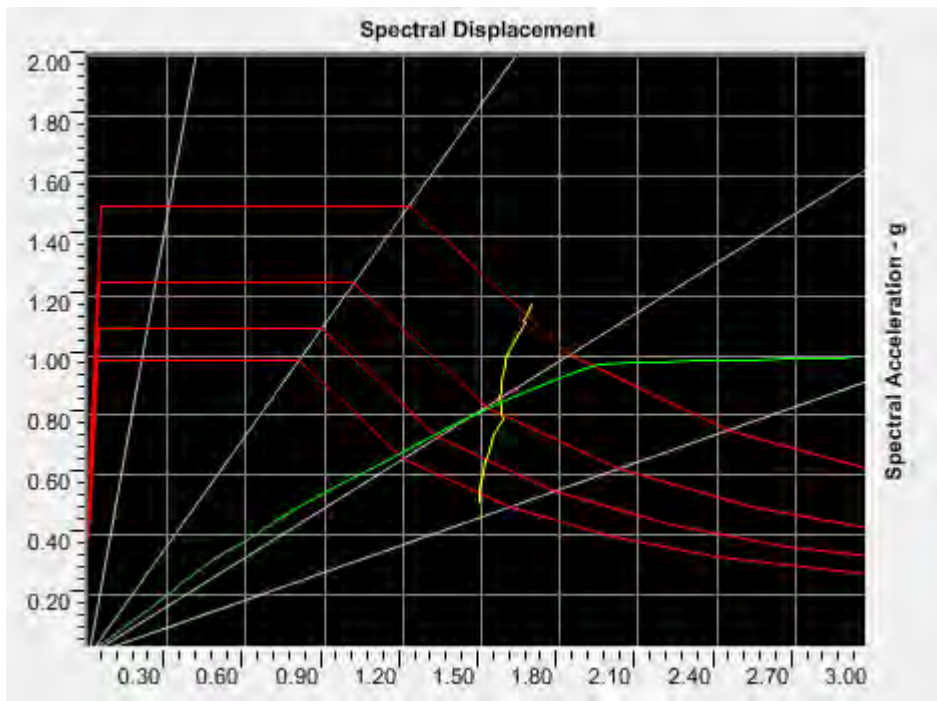


Figure 5-12: ADRS for P8 Retrofit Model

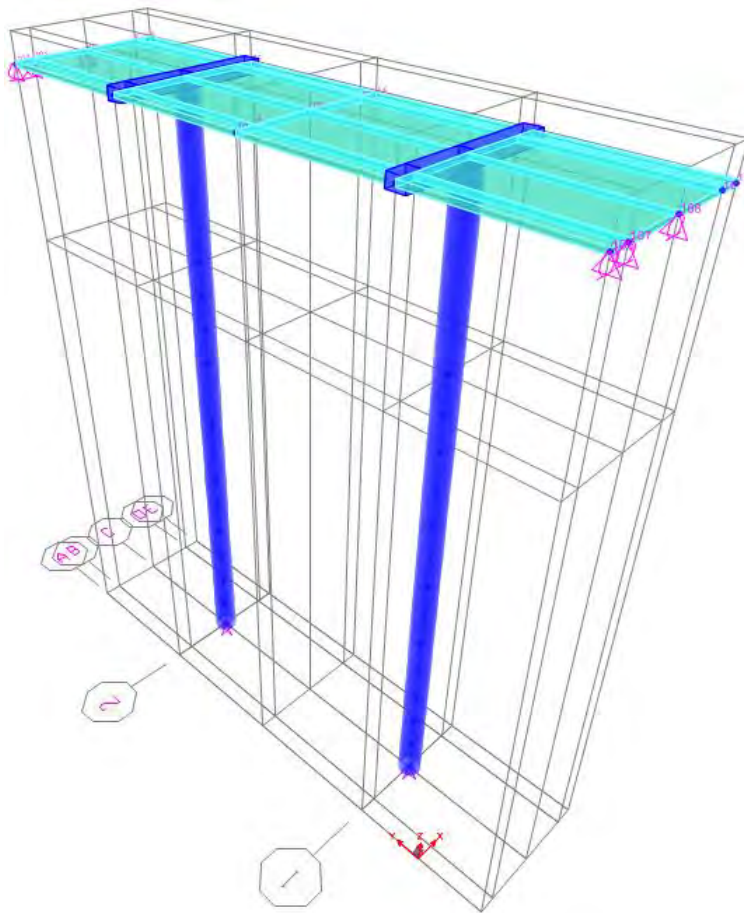


Figure 5-13: Typical Section of Model P8 Monopile Analysis Model

Model P10

The P10 model is for a completely new pier structural system proposed as a replacement option for the entire pier. As such the selection of pier configuration and structural components is completely open. Option P10 considers the use of a two pile bent support system with piles spaced at 32 feet on center. The pile is capped with a cast in place or pre-cast pile cap and the deck is a pre-cast pre-stressed 12 inch thick deck section.

Figure 5-14 shows the ADRS for the P10 model. For this solution the performance point occurs at about 1 foot. For this case a significant amount of non-linear deformation occurs within the precast pile at about 18 feet below the mudline. Some inelastic actions are also observed at the pile to pile cap connection. This deformation would be addressed by proper detailing of the pile to cap connection for the required ductility. For the design earthquake, some pile damage could be expected well below the mudline. This damage would be unreparable.

Figure 5-15 shows a screen shot of a two pile section (64 feet total length) of the proposed monopile pier

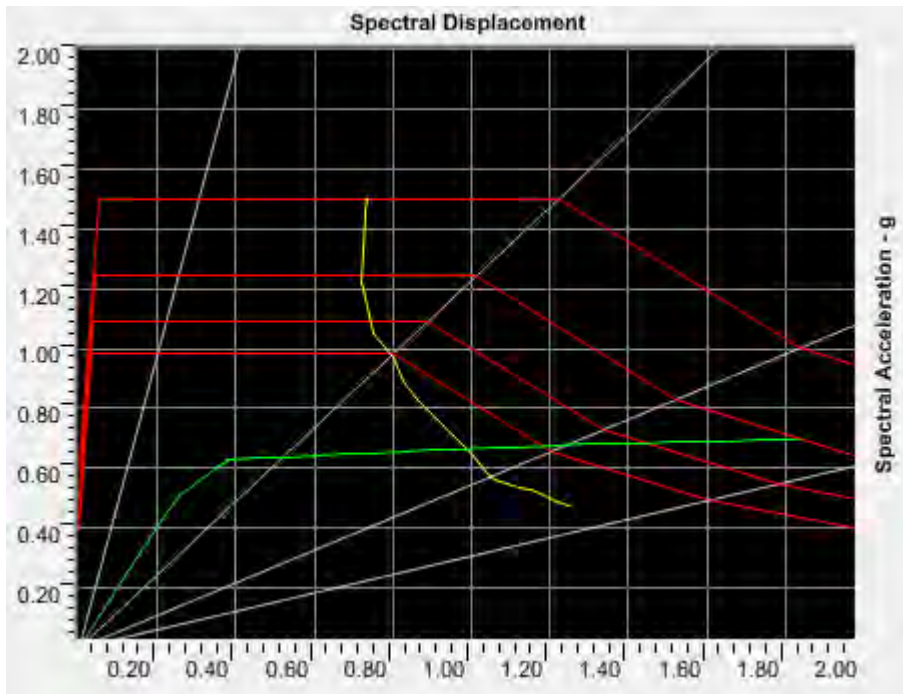


Figure 5-14: ADRS for P10 Model

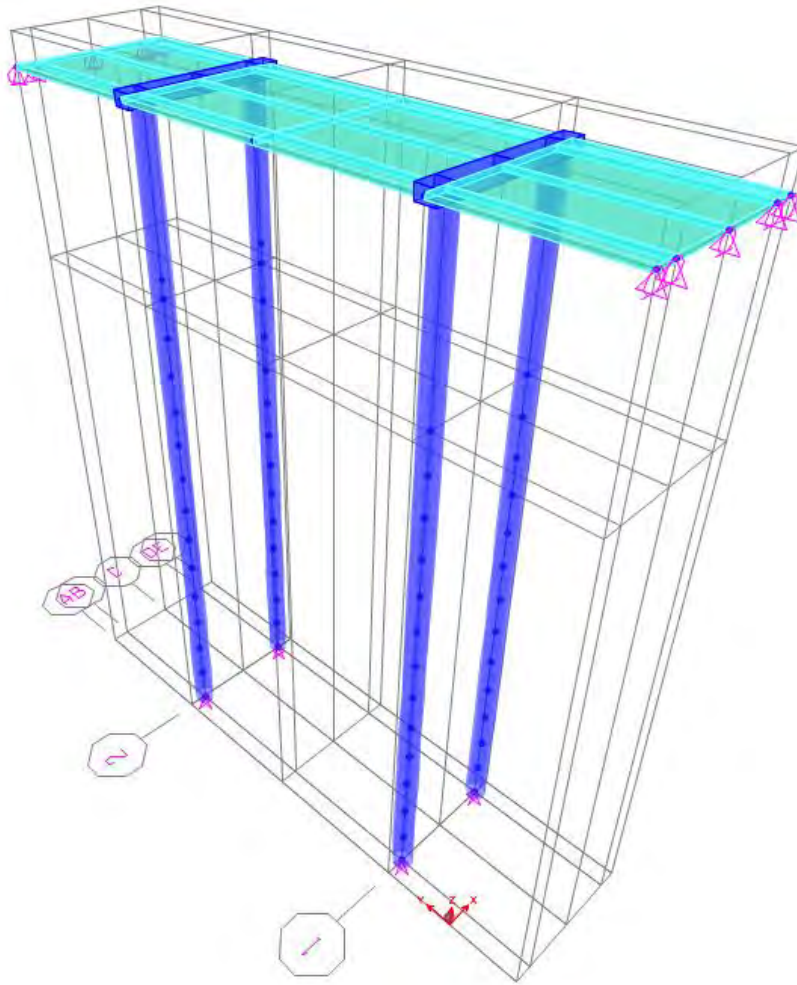


Figure 5-15: Typical Section of P10 Two Pile Bent Replacement Pier

Summary of Structural Deficiencies

Deficiencies noted for the existing pier during the seismic assessment include lack of flexural strength of the pile to pile cap connection due to an inadequate quantity of embedment of the longitudinal reinforcing at the pile-deck connection. Also, timber pile bending strength limits the deflection capacity of the pier deck. Seismic displacement demands far exceed the timber pile deflection capacity.

Conceptual Retrofit Strategy - Performance Goal

The basic approach to the seismic retrofit design strategy is to improve the probable seismic performance of the pier or otherwise reduce the existing risk to an acceptable level. The selected retrofit scheme should provide a survival (no-collapse) limit-state protection for the 975 year return period earthquake ground motion (BSE-2E) and life safety protection for the 225 year return period ground motion (BSE-1E). The concept would allow for damage to occur, but prevent a collapse mechanism from forming due to the largest earthquake considered. Retrofitting the pier to withstand the BSE-2E earthquake with only minor damage is unlikely to be economically feasible.

The basic methodology for retrofitting the existing structure is to add structural elements that resist part of the earthquake demands and therefore limit the displacement of the existing pier to within acceptable levels. Several different options have been evaluated that meet these requirements.

5.2.7 Seismic Assessment Summary

The seismic assessment of Municipal Pier consisted of a linear elastic response spectrum analysis of the complete structure followed by nonlinear pushover analyses of representative bent sections at locations along the pier. The results of the analyses showed that per the displacement capacity-demand assessment method used, the existing pier does not satisfy any criteria for the earthquakes evaluated. The existing structure will be unstable for the earthquake levels checked and should either be retrofitted or replaced.

Further structural analysis will be performed during the design phase of the rehabilitation and strengthening project. The subsequent design work will determine the most effective and feasible retrofit method for implementation at Berkeley Municipal Pier.

5.3 Corrosion Evaluation

The deterioration of concrete structures is primarily a function of the corrosion of the reinforcing steel. As the reinforcing steel corrodes, corrosion products generated occupy a volume of approximately four to seven times that of the parent steel. Tension is induced within the concrete as the corrosion products build which causes it to crack and delaminate at the reinforcing level.

Corrosion of steel reinforcement is the paramount failure mechanism for waterfront marine structures such as the Municipal Pier. Replacement can be the preferred alternative in cases where damage is extensive. Corrosion activity manifests itself through the appearance of cracks, spalling, and delamination and given sufficient time, can result in a reduction in structural capacity. Concrete is by its nature a porous material and is vulnerable to cracking due to thermal movements, shrinkage and moisture intrusion. Water, oxygen and chlorides can reach the steel reinforcing and cause damage by corrosion. Mitigation and repair methods are typically performed using low shrinkage cementitious repair materials, proper concrete cover and correct surface preparation and placement techniques that result in durable repairs.

Deterioration of concrete due to corrosion results in cracking because the products of corrosion (rust scale) occupy a greater volume than the original steel reinforcing and exert substantial stresses on the surrounding concrete. The observable manifestations of corrosion at the pier include staining, cracking and spalling of the concrete structural members.

Reinforcing steel corrosion is typically very active in the wave splash zone for marine structures and in curbs, railing and decks where concrete cover may be insufficient. In addition, the water-cement (w/c) ratio of the original concrete mix design has significant importance for the durability of the concrete. A higher w/c ratio would result in greater permeability of the concrete, allowing a pathway for moisture to enter the structural member and react with the reinforcing steel, causing the damage observed.

6. Conceptual Pier Rehabilitation Alternatives

6.1 Pile Repairs

6.1.1 Repair Methodology

The basic methodology for design of repairs to the pier structure consists of providing sufficient capacity for the existing structural elements to meet the current building code requirements for vertical area loading on a public access structure. The conceptual repairs will attempt to slow the rate of the ongoing deterioration of the reinforced concrete to the extent economically feasible. The conceptual structural repairs are considered maintenance and serve to restore the structural capacity for a public access structure and to extend the service life of the pier. The methods and type of repair designs reviewed were derived from damage observed during the course of the field surveys and review of the record documents.

A method to contain the debris during repair construction will be required as part of the project specifications for the repair work. Present environmental requirements maintain that loose concrete debris and other construction and demolition materials shall not fall in the water.

Conceptual seismic retrofit designs were evaluated in this study. This report provides an evaluation of strengthening schemes to provide an increase in the pier's capacity to resist lateral loads.

In the case of Municipal Pier, where the damage observed is due extensive deterioration, it may prove economical to replace all or part of the structure rather than performing extensive repairs. This option is discussed in greater detail below.

6.1.2 Pile Damage at Bent Cap

This repair utilizes fiber-reinforced shotcrete for the repair of the piles in locations with spalled concrete and exposed reinforcing steel in sections above the waterline. Shotcrete is defined as the application of mortar using a pneumatic method. The shotcrete can be applied using the wet or dry method where the material is blown into position using compressed air. This method has the disadvantage of only being able to be used on surfaces above low water. This limitation includes the impact of tides and obviously reduces the amount of time available for construction.

The concrete surface is prepared by chipping and hydroblasting the loose and unsound concrete and removing concrete from around the reinforcing steel. The steel is then cleaned of rust and scale and coated with a zinc-rich coating. The concrete surfaces are coated with an epoxy resin bonding agent and shotcrete is applied. Proper curing methods are then used to ensure that excessive shrinkage does not occur in the repair area. A sketch of the conceptual repair is shown on Figure 6-1 below.

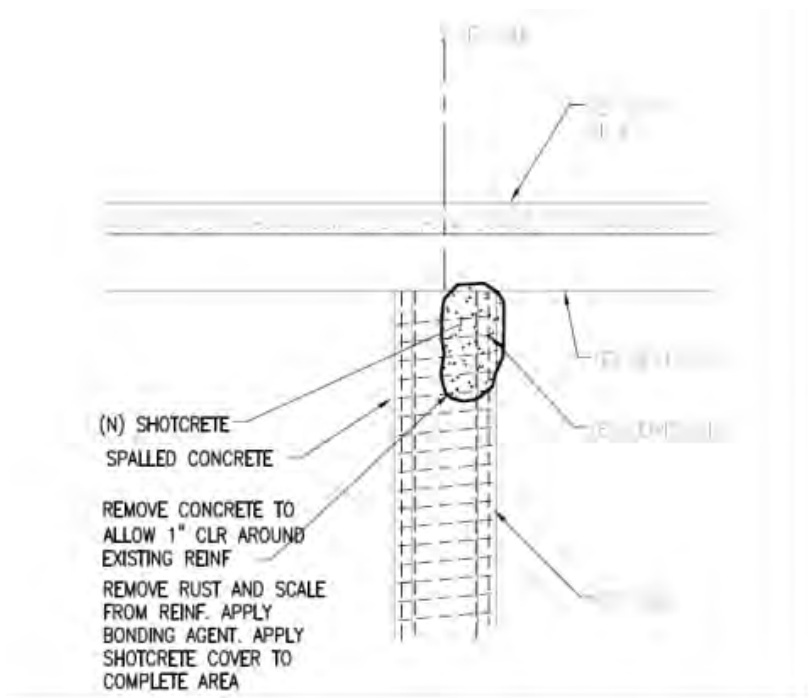


Figure 6-1: Pile Repair at Bent Cap

6.1.3 Pile Damage Repairs

An alternative for repair of the piles with extensive damage by exposure to the seawater and floating debris in the splash zone is the use of preformed, grout-filled fiberglass jackets. This repair has been used extensively for the repair of timber, steel and concrete piles that have suffered damage and deterioration and is well-suited for marine construction. The fiberglass jacket will extend above and below the high and low waterlines to cover the splash zone.

Work can be accomplished from floating or fixed platforms under the pier. The concrete pile surface is prepared using a hydropneumatic method for removing marine growth from the pile. The jackets are placed in position on the piles using spacers and reinforcing is placed if required. Cementitious grout is then pumped into place in the annulus through ports in the shell, bonding with the existing concrete and preventing further deterioration of the section. The fiberglass jackets remain in place on the piles and offer abrasion resistance and provide a longer service life than many of the options below. A sketch of this repair detail is shown below in Figure 6-2.

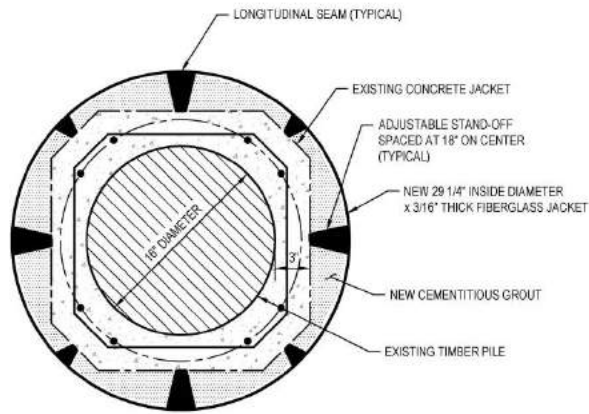


Figure 6-2: Fiberglass (FRP) Pile Jacket

6.2 Structural Concrete Repairs

6.2.1 Bent Cap Repairs

The reinforced concrete beams and bent caps have suffered extensive damage along the bottom and sides of the section due to delamination of the concrete cover and corrosion of the reinforcing steel.

The recommended repair consists of the use of fiber-reinforced shotcrete applied to form a built-up section and provide encasement for the reinforcing bars. The synthetic fibers are added to the shotcrete mix and have the benefit of reducing shrinkage of the repair material which is important in the marine environment. The spalled and loose concrete is first removed and the exposed steel is cleaned of rust and scale and an epoxy coating is applied to protect the reinforcing and increase bonding for the shotcrete.

Replacement of the existing reinforcing bars will be required if damage due to corrosion is extensive. The new sections of reinforcing bars may be lapped with the existing steel or mechanical couplers may be used. A bonding agent is spray-applied to the concrete surface and galvanized steel mesh or fabric is then attached to the concrete and the shotcrete applied. A sketch of the shotcrete beam repair detail can be seen below in Figure 6-3 below.

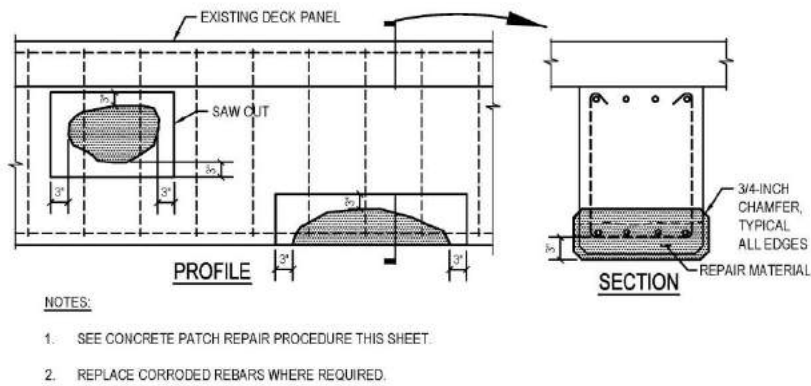


Figure 6-3: Typical Bent Cap Repair

6.2.2 Deck Slab Repairs

Deck Slab Repairs

The concrete is missing or spalled at many locations on the underside of the deck slab. This is damage commonly seen as the concrete forms tensile cracks over time due to shrinkage of the concrete or sustained loading. This provides a path for moisture from the marine environment allowing for a reaction with the reinforcing steel. As the steel rusts, the corrosion expands and occupies a volume greater than the original steel. This expansion creates the spalled condition observed.

The repair will consist of removing the spalled concrete and chipping away the concrete surrounding the existing reinforcing. The reinforcing will be cleaned to remove the rust and scale and then coated as described above. If the reinforcing is found to have deteriorated to the point where a significant percentage of the original section has been lost, additional reinforcing will be doweled into the concrete and spliced with the existing steel. Alternatively, the damaged reinforcing may be cut out and a new section attached using mechanical connectors. The new reinforcing may be of a smaller diameter with less spacing to reduce the lap lengths required. The prepared area will then be patched with an epoxy mortar or grout suitable for the overhead application or a shotcrete method will be utilized.

A sketch of the shotcrete deck slab repair detail can be seen on Figure 6-4.

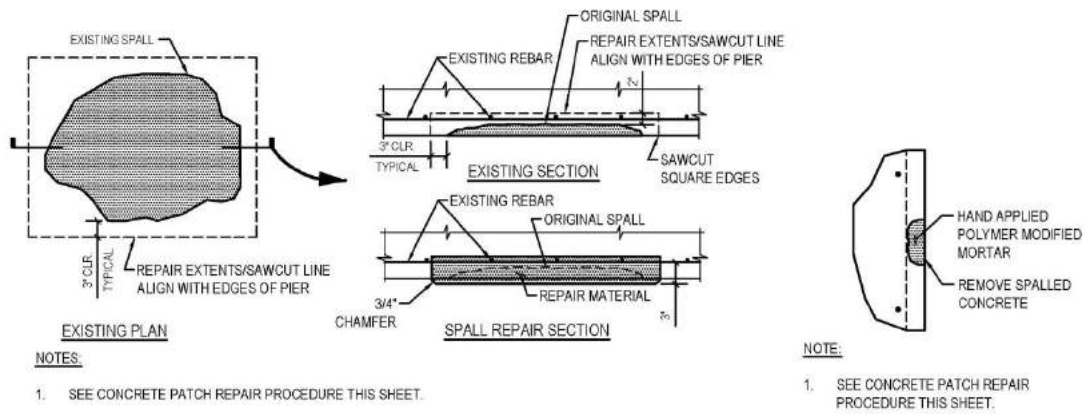


Figure 6-4: Deck Slab Repair

6.2.3 Deck Topping Repairs

The deck topping would receive a similar repair. The damaged area would be sawcut and then chipped out to expose the sound concrete. The reinforcing steel would be blasted clean and repaired if required. The area would then be filled with a self-leveling epoxy grout and a smooth finish applied using floats.

6.2.4 Concrete Crack Repairs

Concrete cracking not caused by corrosion of reinforcing steel can be repaired by an epoxy injection method. Treating corrosion-induced cracks with a pressure-injected epoxy will not stop the corrosion process and new cracks will continue to form. See Figure 6-5.

CONCRETE CRACK REPAIR NOTES:

1. SEE STRUCTURAL REPAIR PLANS FOR LOCATIONS AND ESTIMATED LENGTHS OF CRACKS TO BE REPAIRED. CRACKS EXCEEDING 1/16-INCH IN WIDTH SHALL BE REPAIRED.
2. LIGHTLY TAP THE EXISTING CONCRETE ADJACENT TO THE CRACK. IF THE CONCRETE SOUNDS "HOLLOW" OR IF CRACK WIDTH EXCEEDS 1/4-INCH AT ANY LOCATION, CHIP OFF THE SURFACE AND ANY DELAMINATED CONCRETE AND REPAIR AS A SPALL; OTHERWISE, PROCEED TO STEP 3 BELOW.
3. CLEAN THE EXISTING CONCRETE SURFACE ALONG THE CRACK OF ALL LOOSE BOND INHIBITING AND OTHER DELETERIOUS MATERIALS, INCLUDING ANY EXISTING CRACK SEALANT, BY MECHANICAL MEANS. SEAL THE CRACK WITH THE SURFACE CAP SEALANT (SEE SPECIFICATIONS) AND INSTALL THE PRESSURE INJECTION PORTS OVER THE CRACK AT A MAXIMUM INTERVAL OF 12-INCHES ON CENTERS. ENSURE CAP SEALANT COMPLETELY BRIDGES THE CRACK.
4. WITH STEADY PRESSURE, INJECT THE EPOXY (SEE SPECIFICATIONS) BEGINNING WITH THE INJECTION PORT AT ONE END OF THE CRACK (BOTTOM OF THE CRACK FOR VERTICAL CRACKS). WHEN EPOXY EMERGES FROM THE NEXT ADJACENT PORT, MOVE TO THE NEXT ADJACENT PORT AND CONTINUE WITH THE EPOXY INJECTION.
5. AFTER THE EPOXY HAS CURED, REMOVE THE INJECTION PORTS AND CAP SEALANT.
6. FINISH CONCRETE SURFACE TO MATCH EXISTING AND APPLY CONCRETE SEALER (SEE SPECIFICATIONS).

CONCRETE PATCH REPAIR PROCEDURE:

1. REMOVE ALL UNSOUND OR DELAMINATED CONCRETE, PROVIDING A MINIMUM OF 1/4-INCH SUBSTRATE PROFILE AND 3/4-INCH CLEARANCE BEHIND CORRODED REINFORCING STEEL.
2. REMOVE RUST AND SCALE FROM REINFORCING STEEL.
3. SAW CUT THE PERIMETER OF THE AREA IDENTIFIED FOR REPAIR TO A MINIMUM DEPTH OF 1/4-INCH TO PREVENT FEATHER EDGES. DO NOT CUT EXISTING STEEL REINFORCEMENT.
4. CHIP AND REMOVE ALL LOOSE AND DETERIORATED CONCRETE TO 3/4-INCH MINIMUM BEHIND EXPOSED REINFORCING STEEL. CARE SHALL BE TAKEN TO NOT DAMAGE THE EXISTING REBAR DURING THE DEMOLITION PROCESS.
5. WATER/SAND BLAST EXPOSED CONCRETE SURFACE AND EXPOSED REINFORCING STEEL TO REMOVE ALL CONTAMINANTS AND RUST.
6. APPLY ONE COAT OF SIKA ARMATEC 110 BONDING AGENT (OR APPROVED EQUAL) TO STEEL AND SURROUNDING CONCRETE TO INHIBIT CORROSION.
7. PRE-WET CONCRETE SURFACE TO A SATURATED SURFACE-DRY CONDITION (SSD).
8. PLACE POLYMER-MODIFIED, CEMENTITIOUS NON-SAG MORTAR WITH CORROSION INHIBITOR TO REPAIR AREAS.
9. UNLESS NOTED OTHERWISE ON REPAIR DETAILS, CHIP OUT AREAS SHALL EXTEND A MINIMUM 3-INCHES BEYOND SPALL SIZE AS INDICATED ON THE REPAIR SCHEDULE.

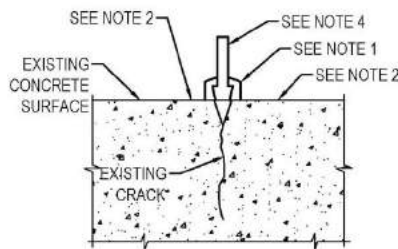


Figure 6-5: Typical Concrete Crack Repair

6.2.5 Construction Methods

The under deck construction repair will likely occur using work floats or fixed platforms secured to the piles under the deck. Equipment and materials can be supported using this method and the work may be performed from the floats. Barges could also be used to provide the contractor with a staging area to avoid impacting public access on the deck walkway. The work barges could be held in position adjacent to the pier using guide piles.

The repair design specifications developed will address the requirement for the contractor to provide a viable containment plan as a means of capturing all concrete and other materials during the demolition and construction process. This plan may consist of the use of a work platform with mesh curtains enclosing the work area. The specifications developed for the project would typically require a containment plan to be submitted by the contractor to contain the debris during demolition and preparation of the concrete surfaces and shotcrete during application.

6.2.6 Above Deck Repairs

Above the deck, these repair items are not structural and would not impact the stability of the pier structure. Based on our observations, the most time-sensitive repairs are related to the safety of the public.

Timber Guard Railing

While the timber guard railing is generally in good condition, many of the original timber railing components exhibit signs of rotting and cracking. From our observation, repairs are not an immediate concern but should be monitored for further deterioration that would compromise safety. Per the District’s general practice, the guard railing will be repaired using Alaskan Yellow Cedar.

Benches

Most of the benches are observed to be heavily deteriorated with missing bench planks. Replace benches with similar precast concrete benches or vandal-resistant wind shelters.

Fish Cleaning Station

The concrete surface of the sink is cracked and pitted and the piping is rusted and corroded. We recommend resurfacing the concrete and replacement of the pipes and faucet.

6.3 Pier Rehabilitation, Retrofit and Replacement Alternatives

GHD reviewed several alternatives for rehabilitation, retrofit and replacement of Municipal Pier. Complete replacement of the pier was also investigated as part of the study.

The replacement concept would be to provide a durable, functional recreational pier with a high seismic performance level. The pier would be designed to remain undamaged for an earthquake that is anticipated to occur one or more times during the life of the structure.

The conceptual pier structure would consist of precast concrete or prefabricated steel / aluminum construction. Advantages to the precast concrete include an elimination of expensive formwork required for the over water construction. Other benefits include a denser, higher strength concrete that has improved quality control as it is cast in a plant rather than at the project site. The curing process can be controlled in a better manner than cast-in-place concrete and the tolerances for the reinforcing steel placement are improved over those in the field. These factors add up to a longer service life than traditional cast-in-place concrete construction. Connections for the precast piles, bent caps and deck planks can be also be made easily, allowing for less construction time.

The tables below summarize the pros and cons of each alternative.

Table 6-1: Pier Rehabilitation Alternative P1 - Concrete Repairs Only

Pros	Cons
<ul style="list-style-type: none">Allows public use of recreational pier	<ul style="list-style-type: none">Construction work will require a long schedule due to staging required and type of concrete repairs.
<ul style="list-style-type: none">Repair work can be performed in stages allowing portions of the pier to be reopened while work continues	<ul style="list-style-type: none">Inelastic failure of the piles can be expected at relatively low lateral displacement of the structure during a seismic event. The timber piles do not have adequate displacement capacity. <u>Damage to pier should be expected following a moderate to large earthquake.</u>
<ul style="list-style-type: none">Environmental permitting is anticipated to be relatively straightforward. Work is	<ul style="list-style-type: none">Following repairs, concrete deterioration due to steel corrosion will continue and inspections will be required at two to three year intervals to evaluate deterioration. Repairs will be required

considered deferred maintenance and in-water work is minimal	at relatively small intervals to allow structure to remain open for use.
	<ul style="list-style-type: none"> • Longer term maintenance costs will be greater than pier replacement alternatives.
	<ul style="list-style-type: none"> • Initial construction cost is relatively expensive due to labor extensive repair work

Table 6-2: Pier Rehabilitation Alternative P2 – Concrete Repairs/Lateral Stiffening (add piles)

Pros	Cons
<ul style="list-style-type: none"> • Allows public use of recreational pier 	<ul style="list-style-type: none"> • Construction work will require a long schedule due to staging required and type of concrete repairs.
<ul style="list-style-type: none"> • Repair work can be performed in stages allowing portions of the pier to be reopened while work continues 	<ul style="list-style-type: none"> • Inelastic failure of the piles can be expected at relatively low lateral displacement of the structure during a seismic event. The timber piles do not have adequate displacement capacity. <u>Some damage to pier should be expected following a moderate to large earthquake.</u>
<ul style="list-style-type: none"> • Environmental permitting process and requirements will be more extensive due to addition of piles 	<ul style="list-style-type: none"> • Following repairs, concrete deterioration due to steel corrosion will continue and inspections will be required at two to three year intervals to evaluate deterioration. Repairs will be required at relatively small intervals to allow structure to remain open for use.
<ul style="list-style-type: none"> • Displacement capacity and resistance to earthquake damage is increased over Alternative P1 	<ul style="list-style-type: none"> • Longer term maintenance costs will be greater than pier replacement alternatives.
	<ul style="list-style-type: none"> • Initial construction cost is relatively expensive due to labor extensive repair work

Table 6-3: Pier Rehabilitation Alternative P3 – Concrete Repairs/Lightweight Deck

Pros	Cons
<ul style="list-style-type: none"> • Allows public use of recreational pier 	<ul style="list-style-type: none"> • Construction work will require a long schedule due to staging required and type of concrete repairs.
<ul style="list-style-type: none"> • Repair work can be performed in stages allowing portions of the pier to be reopened while work continues 	<ul style="list-style-type: none"> • Inelastic failure of the piles can be expected at relatively low lateral displacement of the structure during a seismic event. The timber piles do not have adequate displacement capacity. <u>Damage to pier should be expected following a moderate to large earthquake.</u>
<ul style="list-style-type: none"> • Environmental permitting process and requirements may be less extensive due to the reduced pier deck area 	<ul style="list-style-type: none"> • Following repairs, concrete deterioration due to steel corrosion will continue and inspections will be required at two to three year intervals to evaluate deterioration. Repairs will be required

	at relatively small intervals to allow structure to remain open for use.
<ul style="list-style-type: none"> Displacement capacity and resistance to earthquakes is increased slightly over Alternative P1. Seismic mass is decreased from previous alternatives due to lighter deck system. 	<ul style="list-style-type: none"> Longer term maintenance costs will be greater than pier replacement alternatives.
<ul style="list-style-type: none"> Concrete deterioration is reduced due to replacement using a lightweight deck system 	<ul style="list-style-type: none"> Pier width is reduced from 22 feet to 12 feet.

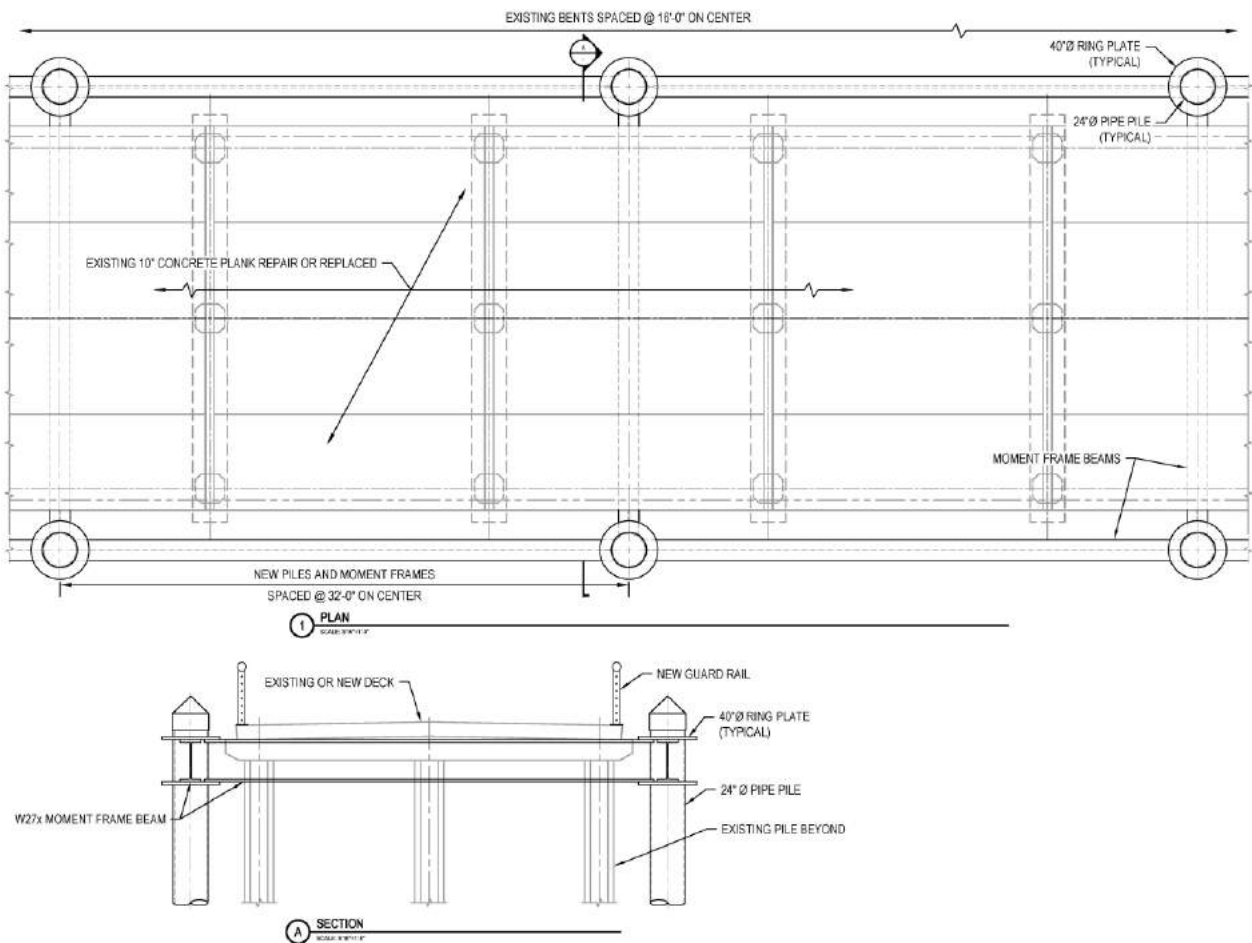


Figure 6-6: Pier Rehabilitation/Retrofit Alternative P4 – Concrete Repairs /Seismic Retrofit (add piles and moment frames)

Table 6-4: Pier Rehabilitation/Retrofit Alternative P4 – Concrete Repairs /Seismic Retrofit (add piles and moment frames)

Pros	Cons
<ul style="list-style-type: none"> Allows public use of recreational pier 	<ul style="list-style-type: none"> Construction work will require a long schedule due to staging required and type of concrete repairs.

<ul style="list-style-type: none"> • Repair work can be performed in stages allowing portions of the pier to be reopened while work continues 	<ul style="list-style-type: none"> • Very little damage to pier should be expected following a moderate to large earthquake.
<ul style="list-style-type: none"> • Environmental permitting process and requirements will be more extensive due to addition of piles 	<ul style="list-style-type: none"> • Following repairs, concrete deterioration due to steel corrosion will continue and inspections will be required at two to three year intervals to evaluate deterioration. Repairs will be required at relatively small intervals to allow structure to remain open for use.
<ul style="list-style-type: none"> • Complete seismic retrofit, pier meets current building code 	<ul style="list-style-type: none"> • Longer term maintenance costs will be greater than pier replacement alternatives.
	<ul style="list-style-type: none"> • High construction cost due to concrete repairs, steel piles and framing

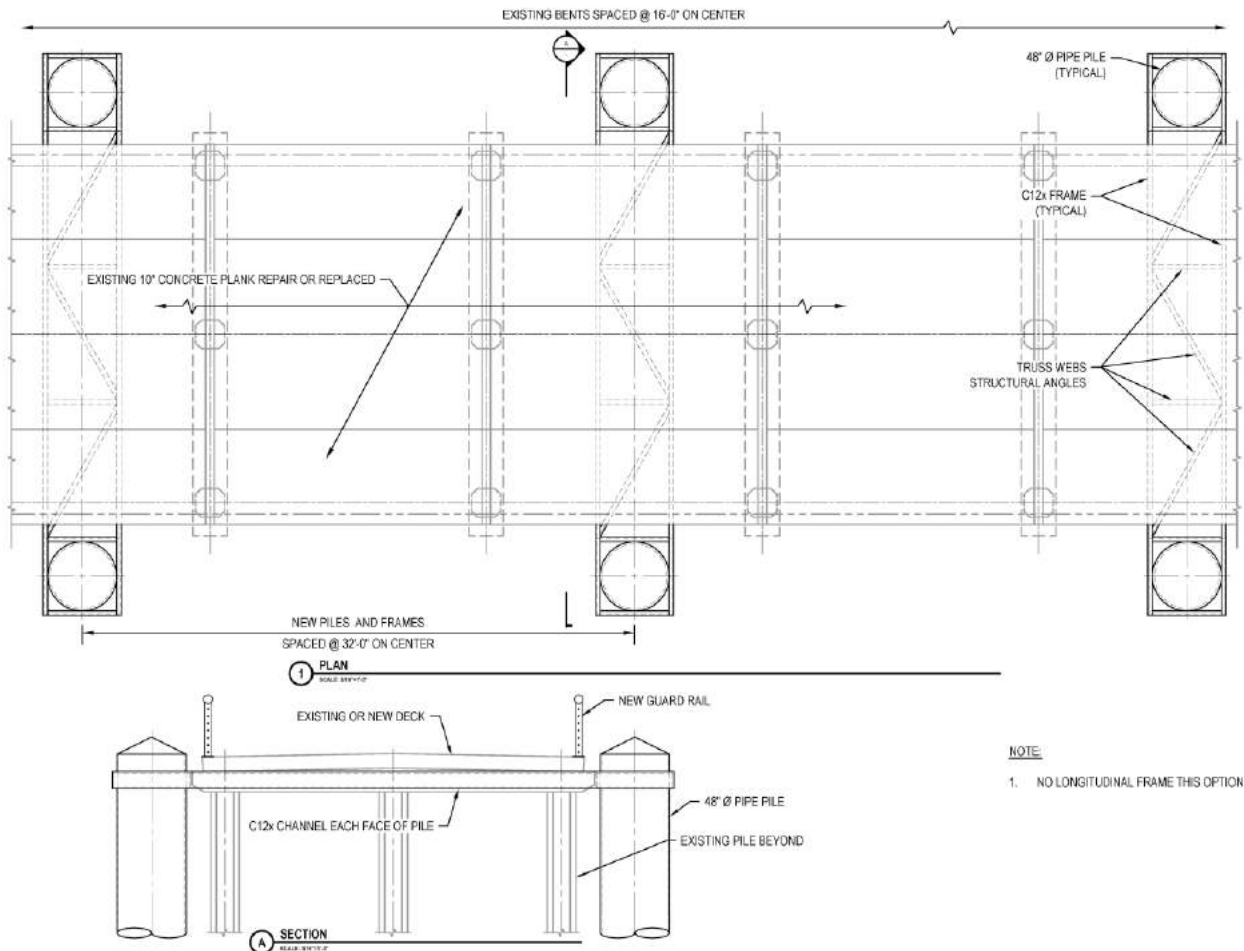


Figure 6-7: Pier Rehabilitation/Retrofit Alternative P5 – Concrete Repairs /Seismic Retrofit (add piles and pile bent frames)

Table 6-5: Pier Rehabilitation/Retrofit Alternative P5 – Concrete Repairs /Seismic Retrofit (add piles and pile bent frames)

Pros	Cons
<ul style="list-style-type: none"> Allows public use of recreational pier 	<ul style="list-style-type: none"> Construction work will require a long schedule due to staging required and type of concrete repairs.
<ul style="list-style-type: none"> Repair work can be performed in stages allowing portions of the pier to be reopened while work continues 	<ul style="list-style-type: none"> Very little damage to pier should be expected following a moderate to large earthquake.
<ul style="list-style-type: none"> Environmental permitting process and requirements will be more extensive due to addition of piles 	<ul style="list-style-type: none"> Following repairs, concrete deterioration due to steel corrosion will continue and inspections will be required at two to three year intervals to evaluate deterioration. Repairs will be required at relatively small intervals to allow structure to remain open for use.

- Complete seismic retrofit, pier meets current building code
- Longer term maintenance costs will be greater than pier replacement alternatives.

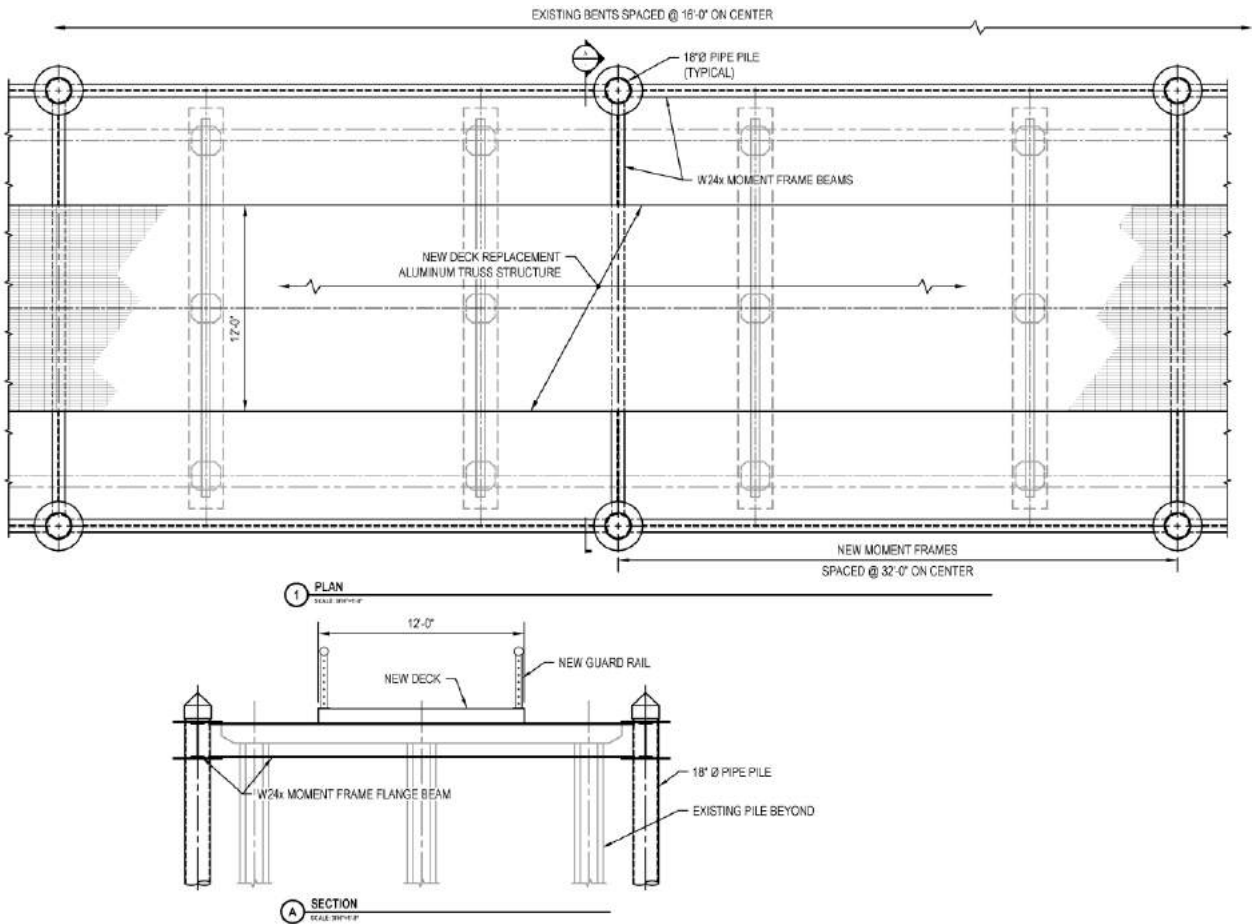


Figure 6-8: Pier Rehabilitation/Retrofit Alternative P6 – Concrete Repairs /Seismic Retrofit (add piles, moment frames and lightweight deck system)

Table 6-6: Pier Rehabilitation/Retrofit Alternative P6 – Concrete Repairs /Seismic Retrofit (add piles, moment frames and lightweight deck system)

Pros	Cons
<ul style="list-style-type: none"> • Allows public use of recreational pier 	<ul style="list-style-type: none"> • Construction work will require a long schedule due to staging required and type of concrete repairs.
<ul style="list-style-type: none"> • Repair work can be performed in stages allowing portions of the pier to be reopened while work continues 	<ul style="list-style-type: none"> • Inelastic failure of the piles can be expected at relatively low lateral displacement of the structure during a seismic event. The timber piles do not have adequate displacement capacity. Damage to pier should be expected following a moderate to large earthquake.

- Environmental permitting process and requirements will be more extensive due to addition of piles
- Concrete deterioration due to steel corrosion following repairs is reduced from Alternatives P4 and P5 due to lightweight deck. Deterioration will continue and inspections will be required at two to three year intervals to evaluate deterioration. Repairs will be required at relatively small intervals to allow structure to remain open for use.
- Complete seismic retrofit, pier meets current building code
- Longer term maintenance costs will be greater than other alternatives.

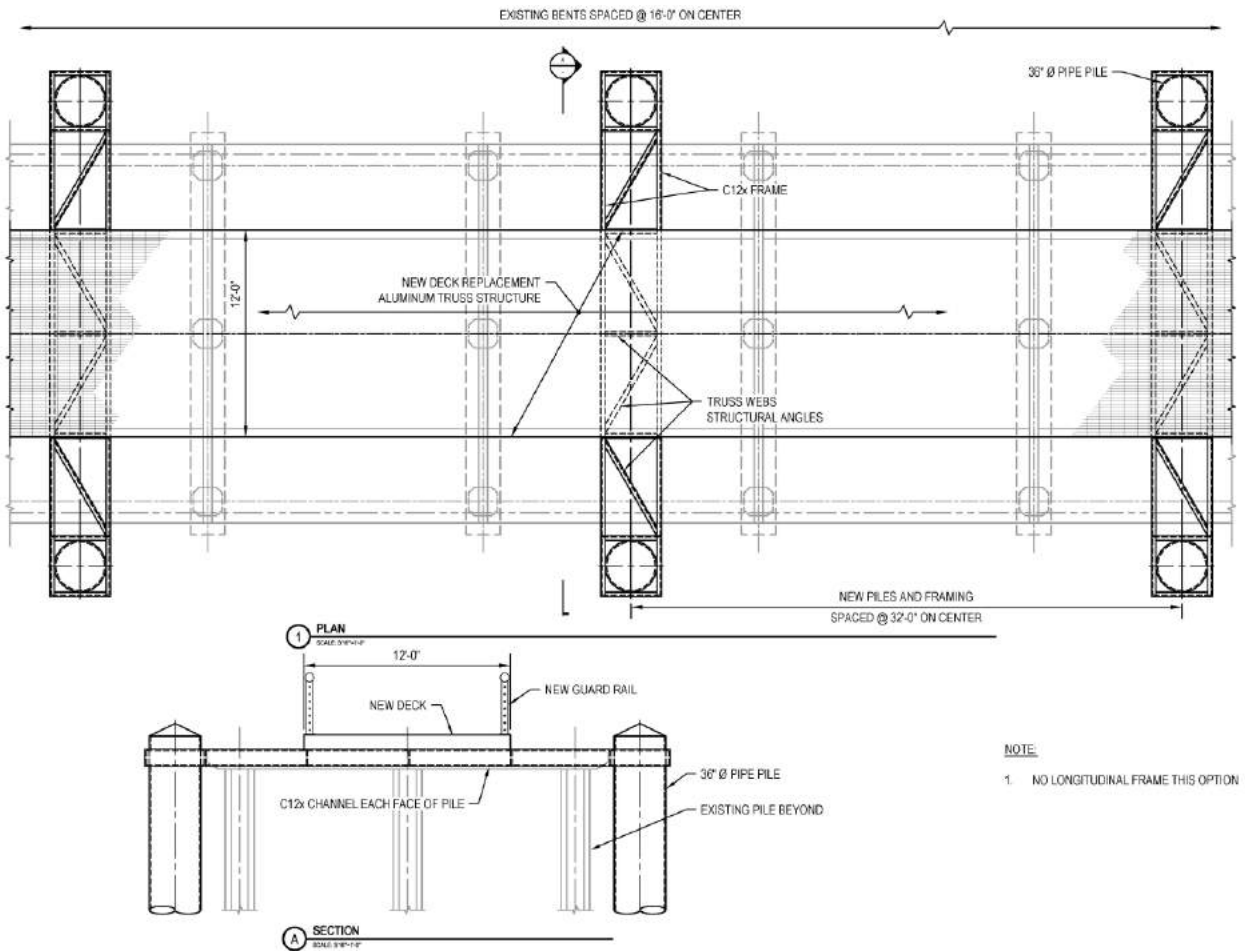
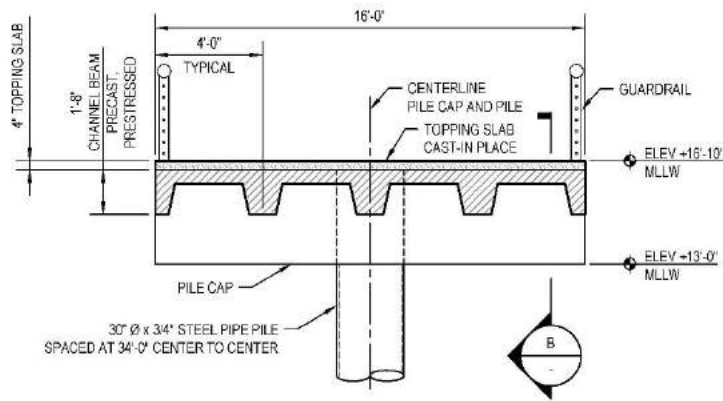


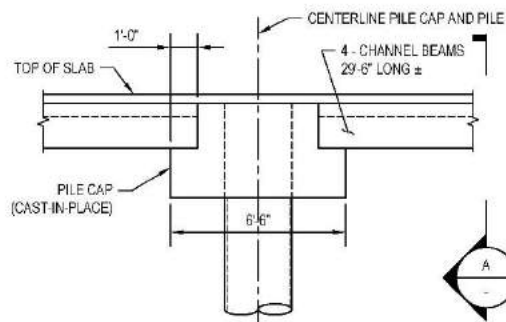
Figure 6-9: Pier Rehabilitation/Retrofit Alternative P7 – Concrete Repairs /Seismic Retrofit (add piles, pile bent trusses and lightweight deck system)

Table 6-7: Pier Rehabilitation/Retrofit Alternative P7 – Concrete Repairs /Seismic Retrofit (add piles, pile bent trusses and lightweight deck system)

Pros	Cons
<ul style="list-style-type: none"> Allows public use of recreational pier 	<ul style="list-style-type: none"> Construction work will require a long schedule due to staging required and type of concrete repairs.
<ul style="list-style-type: none"> Repair work can be performed in stages allowing portions of the pier to be reopened while work continues 	<ul style="list-style-type: none"> Inelastic failure of the piles can be expected at relatively low lateral displacement of the structure during a seismic event. The timber piles do not have adequate displacement capacity. Damage to pier should be expected following a moderate to large earthquake.
<ul style="list-style-type: none"> Environmental permitting process and requirements will be more extensive due to addition of piles 	<ul style="list-style-type: none"> Concrete deterioration due to steel corrosion following repairs is reduced from Alternatives P4 and P5 due to lightweight deck. Deterioration will continue and inspections will be required at two to three year intervals to evaluate deterioration. Repairs will be required at relatively small intervals to allow structure to remain open for use.
<ul style="list-style-type: none"> Complete seismic retrofit, pier meets current building code 	<ul style="list-style-type: none"> Longer term maintenance costs will be greater than other alternatives.



A SECTION - TRANSVERSE
SCALE: 1/4"=1'-0"



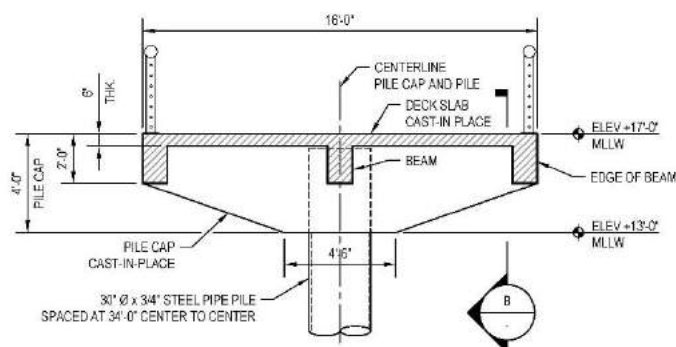
B SECTION - LONGITUDINAL
SCALE: 1/4"=1'-0"

Figure 6-10: Pier Replacement Alternative P8 – Monopile Pier with Precast Deck

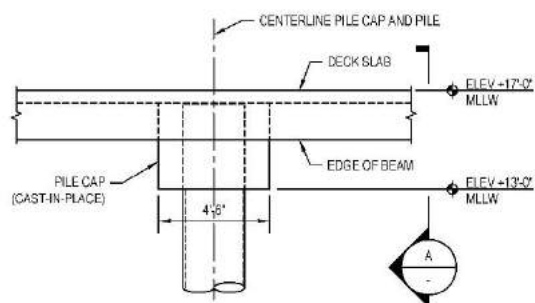
Table 6-8: Pier Replacement Alternative P8 – Monopile Pier with Precast Deck

Pros	Cons
<ul style="list-style-type: none"> Allows public use of recreational pier 	<ul style="list-style-type: none"> Requires demolition of existing pier structure
<ul style="list-style-type: none"> Pier meets current building code seismic requirements, very little damage should be expected during an earthquake 	<ul style="list-style-type: none"> Appearance will be different from existing pier
<ul style="list-style-type: none"> Lower cost compared to other alternatives 	
<ul style="list-style-type: none"> Environmental permitting may be easier than Alternatives P2 through P7 as area of pier is reduced from existing structure 	
<ul style="list-style-type: none"> Long service life can be expected, inspection intervals can be greater than Alternatives P1 through P7 	

<ul style="list-style-type: none"> • Pier deck can be raised from current elevation for higher water levels in the future 	
<ul style="list-style-type: none"> • Longer term maintenance costs will be less than other alternatives. 	
<ul style="list-style-type: none"> • Pier can be extended in future with additional funding 	
<ul style="list-style-type: none"> • Prefabricated elements will reduce construction schedule 	



A SECTION - TRANSVERSE
SCALE: 1/4"=1'-0"



B SECTION - LONGITUDINAL
SCALE: 1/4"=1'-0"

Figure 6-11: Pier Replacement Alternative P9 – Monopile Pier with CIP Deck

Table 6-9: Pier Replacement Alternative P9 – Monopile Pier with CIP Deck

Pros	Cons
<ul style="list-style-type: none"> • Allows public use of recreational pier 	<ul style="list-style-type: none"> • Requires demolition of existing pier structure
<ul style="list-style-type: none"> • Pier meets current building code seismic requirements, very little damage should be expected during an earthquake 	<ul style="list-style-type: none"> • Appearance will be different from existing pier
<ul style="list-style-type: none"> • Lower cost compared to other alternatives 	

<ul style="list-style-type: none"> • Environmental permitting may be easier than Alternatives P2 through P7 as area of pier is reduced from existing structure 	
<ul style="list-style-type: none"> • Long service life can be expected, inspection intervals can be greater than Alternatives P1 through P7 	
<ul style="list-style-type: none"> • Pier deck can be raised from current elevation for higher water levels in the future 	
<ul style="list-style-type: none"> • Longer term maintenance costs will be less than other alternatives. 	
<ul style="list-style-type: none"> • Pier can be extended in future with additional funding 	
<ul style="list-style-type: none"> • Prefabricated elements will reduce construction schedule 	

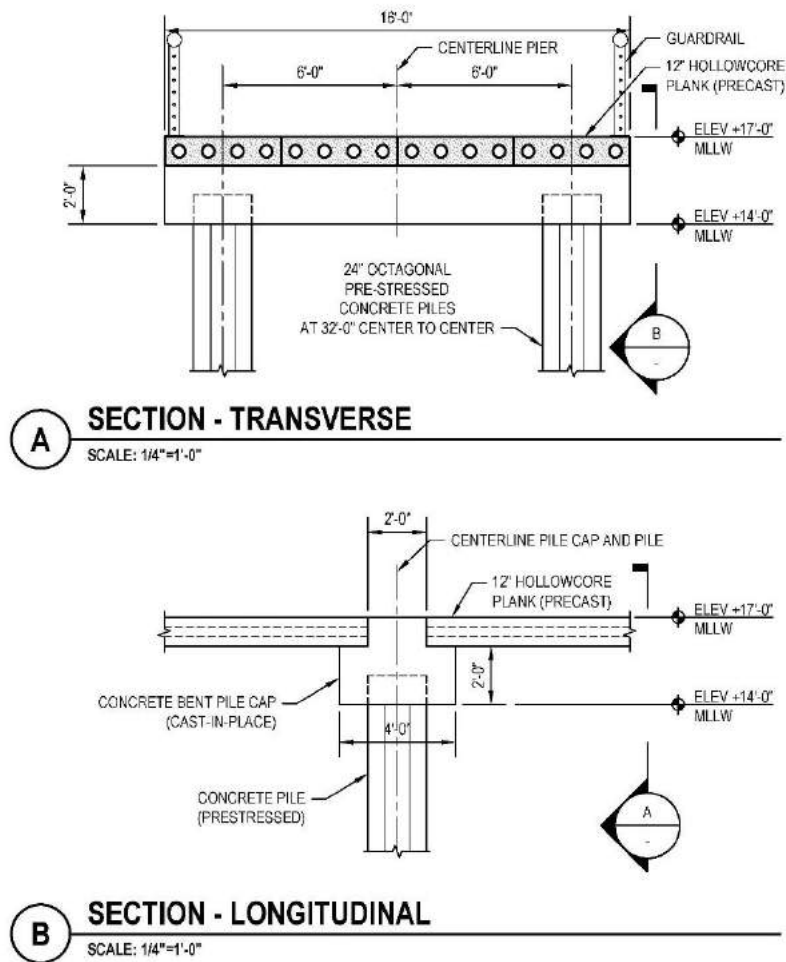


Figure 6-12: Pier Replacement Alternative P10 – Precast Concrete Construction

Table 6-10: Pier Replacement Alternative P10 – Precast Concrete Construction

Pros	Cons
<ul style="list-style-type: none"> Allows public use of recreational pier 	<ul style="list-style-type: none"> Requires demolition of existing pier structure
<ul style="list-style-type: none"> Pier meets current building code seismic requirements, very little damage should be expected during an earthquake 	<ul style="list-style-type: none"> Appearance will be somewhat different from existing pier, closer to original appearance than Alternatives P8, P9 and P11
<ul style="list-style-type: none"> Lower cost compared to other alternatives 	
<ul style="list-style-type: none"> Environmental permitting may be easier than Alternatives P2 through P7 as area of pier is reduced from existing structure 	
<ul style="list-style-type: none"> Long service life can be expected, inspection intervals can be greater than Alternatives P1 through P7 	
<ul style="list-style-type: none"> Pier deck can be raised from current elevation for higher water levels in the future 	
<ul style="list-style-type: none"> Longer term maintenance costs will be less than other alternatives. 	
<ul style="list-style-type: none"> Pier can be extended in future with additional funding 	
<ul style="list-style-type: none"> Prefabricated elements will reduce construction schedule 	

Table 6-11: Pier Replacement Alternative P11 – Monopile Pier with Prefabricated Steel Bents Caps and Aluminum Truss Deck System

Pros	Cons
<ul style="list-style-type: none"> Allows public use of recreational pier 	<ul style="list-style-type: none"> Requires demolition of existing pier structure
<ul style="list-style-type: none"> Pier meets current building code seismic requirements, very little damage should be expected during an earthquake 	<ul style="list-style-type: none"> Appearance will be different from existing pier
<ul style="list-style-type: none"> Lower cost compared to other alternatives 	
<ul style="list-style-type: none"> Environmental permitting may be easier than Alternatives P2 through P7 as area of pier is reduced from existing structure. Deck grating will allow sunlight to pass through 	
<ul style="list-style-type: none"> Long service life can be expected, inspection intervals can be greater than Alternatives P1 through P7 	

<ul style="list-style-type: none"> • Pier deck can be raised from current elevation for higher water levels in the future 	
<ul style="list-style-type: none"> • Longer term maintenance costs will be less than other alternatives. 	
<ul style="list-style-type: none"> • Pier can be extended in future with additional funding 	
<ul style="list-style-type: none"> • Prefabricated elements will reduce construction schedule 	

7. Project Permitting Considerations

In general, each of the three alternatives would require coordination with the same regulatory authorities. Table 7-1 provides a summary of the permit requirements. The level of effort and time necessary to obtain permits when comparing the three alternatives would be lowest for the pile repairs, moderate for the structural concrete repairs, and greatest for the pier rehabilitation, retrofit and replacement alternative. Effort and time considerations correlate directly with the potential cost to complete the permit process. The information provided in this section is intended as a preliminary assessment; final permit requirements would be obtained during coordination with each regulatory authority once an alternative is chosen and preliminary design is underway. Construction generally cannot begin until all regulatory authorizations have been obtained.

Table 7-1: Summary of Potential Permit Requirements

Authorization and/or Coordination Statute	Regulatory Authority with Jurisdiction	Trigger	Approach
General or Individual Permit: Section 404, Clean Water Act Section 10, Rivers and Harbor Act	U.S. Army Corps of Engineers (USACE), San Francisco District	Section 404 regulates discharge of fill material into waters of the U.S., including wetlands. Section 10 regulates placement of structures in navigable waters of the U.S.	Early coordination with USACE through a pre-application meeting would direct the most appropriate permit strategy. It is anticipated that the pile repairs and structural concrete repairs alternatives would qualify for approval under a general nationwide permit, while the pier rehabilitation, retrofit, and replacement alternative may require an individual permit.
State Historic Preservation Officer Concurrence: Section 106, National Historic Preservation Act	California Office of Historic Preservation	The USACE cannot permit an activity that may affect properties listed, or eligible for listing in the National Register of Historic Places without the appropriate review as well as avoidance	The California Historical Resources Information System (CHRIS) Northwest Information Center would be contacted early in the preliminary design process to determine the potential for nearby cultural resources.

Authorization and/or Coordination Statute	Regulatory Authority with Jurisdiction	Trigger	Approach
		and minimization measures.	
<p>Biological Opinion (BO):</p> <p>Section 7, Federal Endangered Species Act (FESA)</p> <p>Magnuson-Stevens Fishery Conservation and Management Act</p> <p>Marine Mammal Protection Act</p> <p>Migratory Bird Protection Act</p>	<p>U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries</p>	<p>If the USACE determines that a project may result in the take of a federally-listed species, approval would be required under Section 7 of the FESA. Fisheries, marine mammals, and migratory birds are further protected from project impacts under their respective statutes.</p>	<p>A Biological Resource Report would be prepared during the initial stages of the project to determine the potential for impact to specific species and recommend avoidance and minimization measures. A Biological Assessment for federally-listed species and essential fish habitat would then be prepared and submitted to USFWS and NOAA Fisheries for review. Alternatives with smaller scale construction would generally have less impact on sensitive species and may only require informal consultation resulting in agency concurrence that the project is not likely to adversely affect listed species. Total pier replacement is anticipated to require formal consultation with issuance of a BO.</p>
<p>Water Quality Certification:</p> <p>Section 401, Clean Water Act</p>	<p>San Francisco Bay Regional Water Quality Control Board (RWQCB)</p>	<p>An activity which may result in a discharge into a water body must request state certification that the proposed activity will not violate state and federal water quality standards.</p>	<p>Early coordination with the San Francisco Bay RWQCB during the preliminary design phase would allow for vetting of potential issues regardless of chosen alternative.</p>
<p>Incidental Take Permit:</p> <p>Section 2081 subdivision (b) of the California Fish and Game Code</p>	<p>California Department of Fish and Wildlife (CDFW)</p>	<p>CDFW may issue incidental take permits for any species listed under the California Endangered Species Act (CESA) when there is a potential for impact to those species from an activity requiring a discretionary permit or approval by a public agency.</p>	<p>A consistency determination is anticipated to be required for smaller scale alternatives. The total pier replacement alternative is anticipated to require a mitigation plan to address state-listed species and an incidental take permit for species that would be initially assessed in the Biological Resources Report.</p>

Authorization and/or Coordination Statute	Regulatory Authority with Jurisdiction	Trigger	Approach
Major or Administrative Permit	Bay Conservation Development Commission (BCDC)	Any activities that involves filing, dredging and dredged sediment disposal, and work on land within 100 feet of the San Francisco Bay shoreline.	It is anticipated that the pile repairs and structural concrete repairs may qualify for an administrative permit, but the pier replacement would be considered a major permit action. Early coordination with the BCDC would determine the level of effort required to complete their process.
Other	U.S. Coast Guard, County, or City Planning and Public Works	The U.S. Coast Guard may comment on the project, as the pier is located within a navigation channel. Also, local permit requirements for actions such as demolition and sampling would need to be satisfied.	Early coordination with stakeholders during preliminary design stages once an alternative is chosen would allow potential issues to be vetted and appropriate authorizations to be obtained.

It should be noted that the San Francisco Bay Area Joint Aquatic Resource Permit Application (JARPA) can be used for projects involving several regulatory agencies. However, each agency would still require submittal of appropriate information to satisfy their individual regulatory requirements. Therefore, the JARPA is not considered to be a more efficient permit method at this time and is not discussed further.

7.1 U.S. Army Corps of Engineers

Discharge of fill material into waters of the U.S., including wetlands, is regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA; 33 USC 1251-1376). The USACE regulations implementing Section 404 define waters of the U.S. to include intrastate waters (such as, lakes, rivers, streams, wetlands, and natural ponds) that the use, degradation, or destruction of could affect interstate or foreign commerce. Wetlands are defined for regulatory purposes as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3; 40 CFR 230.3). The placement of structures in navigable waters of the U.S. is also regulated by the USACE under Section 10 of the Federal Rivers and Harbors Act (33 USC 401 et seq.). Projects are approved by the USACE under general (i.e., nationwide, programmatic, or regional) or standard (i.e., individual) permits. The type of permit is determined by the USACE and based on project parameters.

Applicants can typically expect a Section 404 permit to be issued within six months to 1.5 years after the USACE acknowledges receipt of a complete permit package, including a compensation plan for mitigation of loss to wetlands and water resources as appropriate. This timeline depends greatly on consultation with other agencies (i.e., State Historic Preservation Officer and U.S. Fish

and Wildlife Service [USFWS] or National Oceanic and Atmospheric Administration [NOAA] Fisheries). Nationwide or regional general permits usually have a timeline on the shorter end of the spectrum, whereas individual permits are the longest to approve.

There is a nationwide permit for maintenance, which includes repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure, that may be acceptable for the pile or structural concrete repairs alternatives. The total pier replacement may require an individual permit. In addition to the nationwide or individual permit requirement, if dredging and disposal of dredged sediments is involved with any alternative, a consolidated dredging and dredged material reuse/disposal application with sediment sampling plan, and sediment quality sampling would be required and processed through the Dredged Material Management Office (DMMO).

7.1.1 Section 106 Consultation

USACE permittees must prove compliance with Section 106 of the National Historic Preservation Act, which stipulates that no permitted activity may affect properties listed, or eligible for listing in the National Register of Historic Places. Typically, the California Historical Resources Information System (CHRIS) Information Centers would be contacted regarding cultural resources within the project area. Then, further study may be required by a cultural resource specialist. The USACE may also receive approval of the project from the State Historic Preservation Officer.

The Northwest Information Center would be contacted shortly after project initiation to determine the potential for sensitive cultural resources under Section 106 to be a concern for any of the alternatives.

7.1.2 Section 7 Consultation

Pursuant to the requirements of the Federal Endangered Species Act (FESA), a federal agency, such as the USACE, reviewing a proposed project within its jurisdiction must determine whether any federally-listed or proposed species may be present in the project region, and whether the proposed project would result in a take of such species. The FESA prohibits take of a single threatened and endangered species except under certain circumstances and only with authorization from the USFWS or the NOAA Fisheries through a permit under Section 7 (for federal entities) of the Act. Take under the FESA includes activities such as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” The USFWS regulations define harm to include “significant habitat modification or degradation.” On June 29, 1995, a U.S. Supreme Court ruling further defined harm to include habitat modification “...where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”

The federal agency is also required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under the FESA, or result in the destruction or adverse modification of critical habitat for such species (16 USC 1536[3][4]). If it is determined that a project may result in the take of a federally-listed species, authorization would be required under Section 7 of the FESA.

During the Section 7 consultation, in-water construction activities for either alternative may be limited to a work window that NOAA Fisheries agrees would avoid impacts to FESA-listed fish spawning and migration seasons. An Incidental Harassment Authorization from NOAA Fisheries may also be required for pile driving and dredging activities to ensure appropriate minimization measures are enacted to reduce potential impacts to marine mammals.

Furthermore, the project may require consideration of essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act, which requires federal agencies to consult with NOAA Fisheries about any action that may adversely affect EFH or federally managed commercial fish species. Eelgrass (*Zostera marina*) is a native marine vascular plant indigenous to the soft-bottom shallow bays and estuaries of the San Francisco and San Pablo Bays. An eelgrass survey would be required for any of the alternatives per the Draft California Eelgrass Mitigation Policy and further coordination and conservation measures enacted based on the survey results.

The USFWS and NOAA Fisheries has a 135 day total timeline for Section 7 FESA consultations that begins once a complete Biological Assessment is received by the agency. More complex projects may require more time to review and receive agency approval.

7.2 Regional Water Quality Control Board

Section 401 of the CWA requires any applicant for a federal license or permit, which involves an activity that may result in a discharge of a pollutant into waters of the U.S., obtain a certification that the discharge will comply with applicable effluent limitations and water quality standards. CWA 401 water quality certifications are issued by Regional Water Quality Control Boards (RWQCBs) under the California Environmental Protection Agency.

The RWQCB has 30 days (from receipt) to determine whether an application is complete. Once an application is deemed complete, the board then generally has 60 days to issue or deny the 401 Water Quality Certification or to request additional review time. Time extensions can be granted for up to one year, however, this is not a typical occurrence.

Early coordination with the San Francisco Bay RWQCB regardless of the chosen alternative would allow for vetting of potential concerns and a more efficient receipt of the certification.

7.3 California Department of Fish & Wildlife

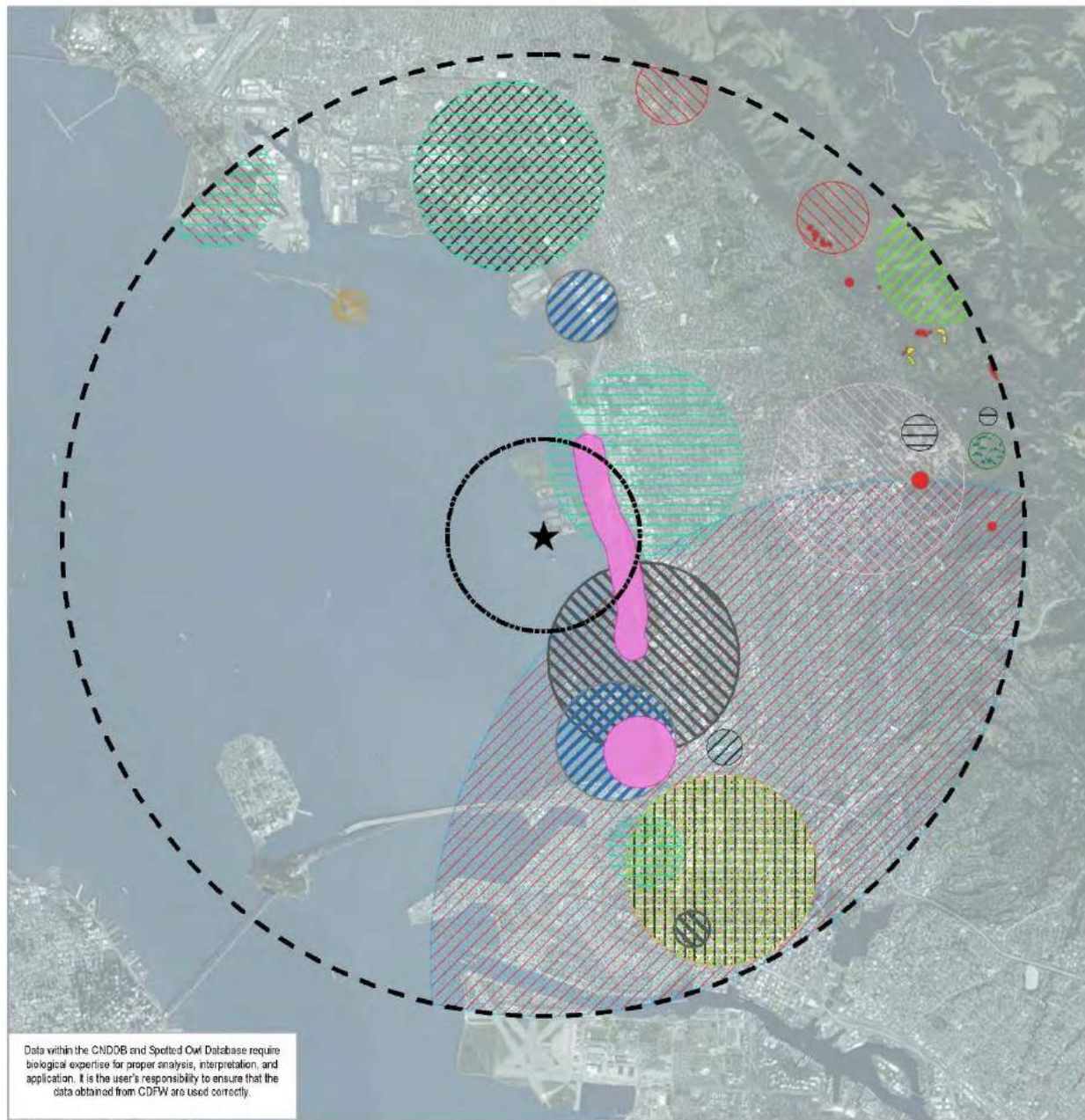
Section 2081 subdivision (b) of the California Fish and Game Code allows California Department of Fish and Wildlife (CDFW) to issue incidental take permits for any species listed under the California Endangered Species Act (CESA) as endangered, threatened, or candidate as long as the following applies:

- The authorized take is incidental to an otherwise lawful activity;
- The impacts of the authorized take are minimized and fully mitigated, typically by development and CDFW acceptance of a mitigation plan (or possibly a Habitat Conservation Plan for more complex projects);
- The mitigation plan includes measures to minimize and fully mitigate the impacts of authorized take that are (a) somewhat proportional to the proposed impact; (b) maintain the project objectives to the greatest extent possible; and (c) have a reasonable assurance of successful implementation;
- Adequate funding is available to fulfill measures outlined in the mitigation plan and incidental take permit; and
- Issuance of an incidental take permit will not jeopardize the continued existence of a species listed under the CESA. Also, the take of a fully protected species and birds specified in the Fish and Game Code cannot be authorized with a permit. Projects must be designed to avoid impacts to these species where they occur.

The CDFW has 30 days to inform an applicant of an incidental take permit that the application is complete or additional information is required. A draft of the permit is typically prepared and issued within 185 days after the application is deemed complete.

If a species to be impacted is both federally- and state-listed, the CDFW will provide a consistency determination with the USFWS findings from the Section 7 consultation. The determination is generally completed within 30 days of receipt of the request by CDFW.

A Biological Resources Report would be prepared following initiation of the project to determine the potential for impact to sensitive species from the chosen alternative as well as the necessity for an individual take permit and/or consistency determination. Plant and wildlife species in the vicinity of the pier that would be considered in the report are shown in Figure 7-1 and Figure 7-2.



Data within the CNDOB and Spotted Owl Database require biological expertise for proper analysis, interpretation, and application. It is the user's responsibility to ensure that the data obtained from CDFW are used correctly.

★ Project Location	California seablite	Diablo hellianthella	Most Beautiful Jewelflower	Round-Leaved Filaree	Santa Cruz tarplant
1 mile radius	Choris' popcornflower	Fragrant Fritillary	Oval-Leaved Viburnum	Saline Clover	Western Leatherwood
5 mile radius	Coastal Bluff Morning-Glory	Kellogg's horkelia	Pallid Manzanita	San Francisco Bay spineflower	
Alkali Milk-Vetch	Dark-Eyed Gilia	Marin knotweed	Point Reyes salty bird's-beak	San Joaquin spearscale	
Bent-Flowered Fiddleneck	Minute Pocket Moss				
Blue Coast Gilia					

Paper Size ANSI A
 0 0.4 0.8 1.2 1.6
 Miles
 Map Projection: Lambert Conformal Conic
 Horizontal Datum: North American 1983
 Grid: NAD 1983 StatePlane California III FIPS 0403 Feet



City of Berkeley
 Berkeley Municipal Pier Assessment

Project No. 11125268
 Revision No. A
 Date 14 Nov 2017

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 Data source: CNDOB, November, 2017. Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNR/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by jkand
 Print date: 14 Nov 2017 - 15:34

Figure 7-2: CNDOB 5-Mile Radius Wildlife Occurrences

7.4 Bay Conservation Development Commission

The San Francisco Bay Conservation and Development Commission (BCDC) has permit approval authority over activities that involve filling, dredging and dredged sediment disposal, and work on land within 100 feet of the San Francisco Bay shoreline. In addition, the BCDC has authority under the Coastal Zone Management Act to review federal projects (i.e. those requiring federal approval or are supported with federal funds).

The BCDC Design Review Board will generally review a project during preliminary design stages prior to the submittal of an application to ensure public access (both physical and visual) is well designed, useful, and attractive. The BCDC Engineering Criteria Review Board also reviews the engineering aspects of projects at their discretion. Typically, major projects involving fill in the Bay require ECRB review, while other smaller projects may warrant review if unusual engineering or geological factors are involved.

The BCDC has 30 days upon receipt of an application to determine whether the application is complete and notify the applicant about any deficiencies. The application, once complete, will then be processed as a Major, Administrative, or Regionwide permit depending on the type of work to be authorized. The BCDC generally has 90 days (unless the applicant agrees to a longer review period) to act on a project once an application is deemed complete.

Regionwide permits refer to routine maintenance that qualify for approval under an existing regionwide program. This type of permit is not anticipated to apply to any of the pier alternatives.

Administrative permits are applicable to minor repairs and improvements. Therefore, approval can be obtained without a public hearing. The average timeframe to obtain an administrative permit is between 45 to 60 days after a complete application has been accepted by BCDC. The pile and structural concrete repairs alternatives may qualify for an administrative permit.

Major permits are issued for projects that have a scope beyond a minor repair or improvement. A public hearing is mandatory for these projects and the application typically may also be reviewed by the Design Review Board and ECRB. If the time for multiple reviews and the public hearing is considered, major permits generally take longer than 90 days to receive once a complete application has been accepted by the BCDC. The pier rehabilitation, retrofit, and replacement alternative may require a major permit.

A final permit, regardless of type, is not considered complete until a signed version showing agreement with permit conditions has been provided to the BCDC.

8. Cost Estimates for Pier Repair and Rehabilitation Alternatives

Rough order of magnitude construction cost estimates have been prepared for the pier structural rehabilitation, retrofit and replacement concepts. Unit costs were developed based on relevant experience and knowledge, historical cost information, recent bid history of similar waterfront projects, vendor quotes from recent projects for similar items where applicable, recent Contractor quotes for similar items where applicable and discussion with marine construction contractors.

The cost estimates include topside repairs and improvements to the pier in addition to the structural repairs.

For Alternative P1, a large cost item are the concrete repairs required at the pier substructure, primarily to address the large amount of concrete deterioration at the deck panels. This is due to the extensive spalling and deterioration of the existing concrete sections. The estimates provided use a placed mortar method of repair for the deck panel and bent cap concrete damage. Alternative P2 includes the addition of a single pile at each pile bent to increase the lateral stiffness of the pier, reducing displacement demand on the timber piles. These alternatives do not represent a seismic retrofit per the Building Code.

Alternatives P4 through P7 represent a complete seismic retrofit of the existing pier structure in addition to the concrete repairs. The pier structure will be strengthened to prevent collapse during the 975-year return period seismic event as described in Section 5. In this retrofit scenario, the pier may suffer repairable damage, which may be acceptable from a life safety standpoint given that the pier is only rarely occupied by large crowds.

Alternatives P8 through P11 include demolition of the existing 3000 lineal foot pier structure and construction of a new pier structure.

A summary of the alternatives and estimated costs is provided in Table 8-1 below.

Table 8-1: Estimated Costs for Alternatives

Alternative	Description	Estimated Cost
P1	Rehabilitate Only (concrete repairs/replace deck panels)	\$27.73M
P2	Rehabilitate/Limited Lateral Strengthening (concrete repairs, add steel piles)	\$33.95M
P3	Rehabilitate/Replace Deck (repair existing piles and bent caps, add lightweight deck)	\$15.46M
P4	Rehabilitate/Retrofit (add piles with steel moment frames)	\$50.98M
P5	Rehabilitate/Retrofit (add cantilever piles with pile bent trusses)	\$43.12M
P6	Rehabilitate/Retrofit (add piles, steel moment frames and lightweight deck system)	\$33.93M
P7	Rehabilitate/Retrofit (add piles, pile bent	\$28.82M

Alternative	Description	Estimated Cost
	trusses and lightweight deck system)	
P8	Replacement (steel monopiles with precast bent cap and concrete deck)	\$19.82M
P9	Replacement (steel monopiles with CIP concrete deck)	\$20.65M
P10	Replacement (Precast concrete piles with precast deck)	\$20.92M
P11	Replacement (steel monopiles with steel bent caps and lightweight deck)	\$19.80M

An option to be considered is design and construction of a reduced length pier structure is funding becomes available. Figure 8-1 shows the estimated cost of Alternative P10 plotted against different pier lengths. The pier length can be increased in a later phase when additional funding is available.

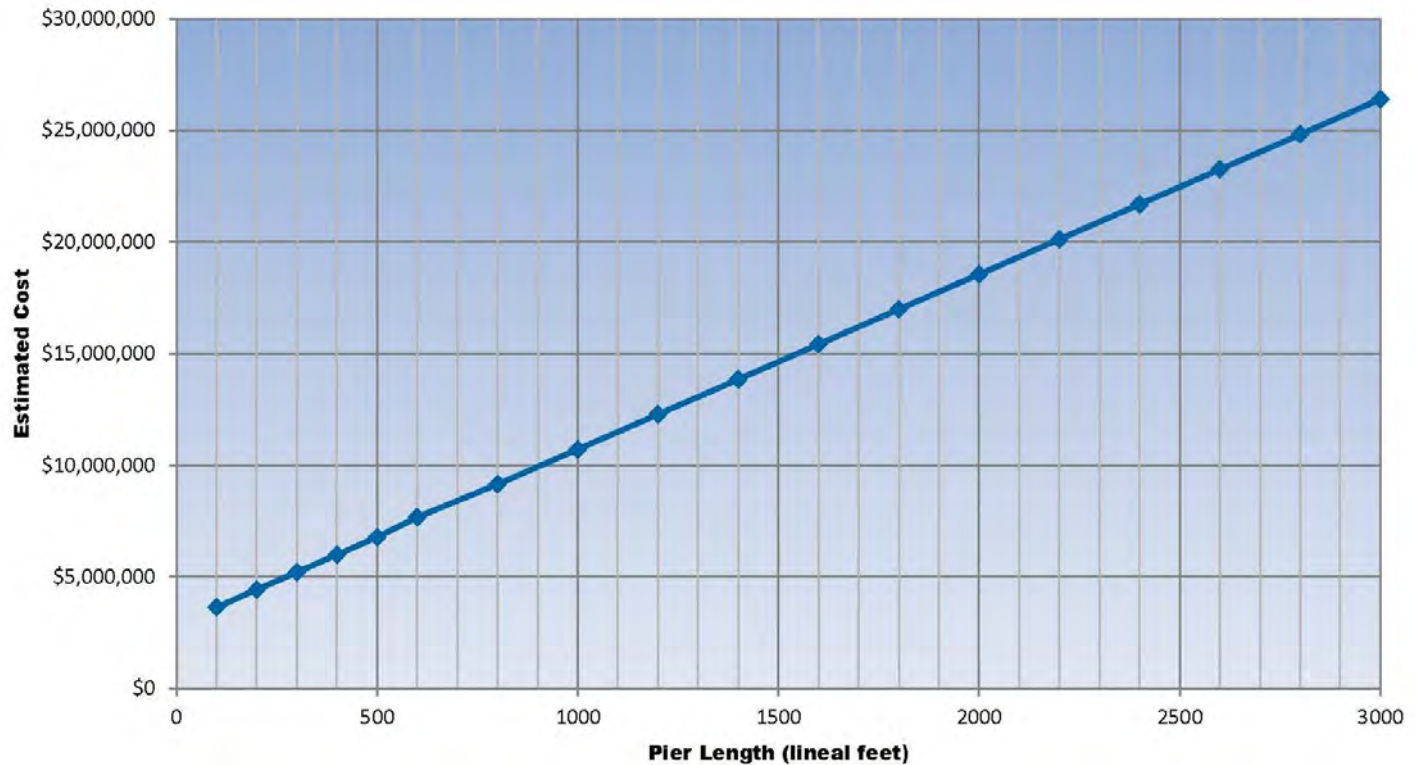


Figure 8-1: Replacement Pier Length versus Estimated Cost

9. Summary and Recommendations for Pier Rehabilitation

The reinforced concrete panels comprising the pier deck have suffered extensive deterioration as the result of lost concrete cover and corrosion of the reinforcing bars. In many locations, the deck section structural capacity has been greatly reduced as the result of the deteriorated concrete and steel reinforcement to the point where it is no longer safe for public use. Extensive repairs are required to the pier to allow public use and extend the service life of the pier for its intended use.

An alternatives ranking analysis was performed on the rehabilitation, retrofit and replacement concepts reviewed during the study. Parameters used in the analysis include estimated cost, construction schedule, environmental permitting, technical feasibility, maintenance/service life, seismic vulnerability, historic appearance and climate change adaptation. The parameters were each given a weighting based on an assumed importance. Results of the analysis show that demolition of the existing pier and construction of a new structure obtain the highest ranking. This is the result of having a lower estimated cost, reduced construction schedule, longer service life and achieving improved seismic performance. The pier deck can also be designed at a higher elevation, providing adaptability for higher sea levels in the future.

The weighted parameters and rankings are shown on Table 9-1 below. The rankings are shown plotted against estimated cost on Figure 9-1.

Table 9-1: Alternative Rankings Table

MUNICIPAL PIER ALTERNATIVES												
Parameter	Weighting Factor (%)	P1	P2	P3	P4	P5	P6	F7	P8	P9	P10	P11
		Rehabilitate Only (concrete repairs/replace deck panels)	Rehabilitate/ Lateral Strengthening (concrete repairs, add 2.4" dia. steel piles)	Rehabilitate/Replace Deck (repair existing piles and bent caps, add lightweight deck)	Rehabilitate/Retrofit (add 2.4" dia. piles with steel moment frames)	Rehabilitate/Retrofit (add 48" dia. cantilever piles with pile bent trusses)	Rehabilitate/Retrofit (add 18" dia. piles, steel moment frames and lightweight deck system)	Rehabilitate/Retrofit (add 36" piles, pile bent trusses and lightweight deck system)	Replacement (30" dia. monopiles with precast concrete deck)	Replacement (30" dia. monopiles with precast concrete deck)	Replacement (24" oct. Precast concrete piles with precast deck)	Replacement (30" dia. steel monopiles with steel bent caps, steel bent caps, lightweight deck)
Estimated Cost	35.00%	\$27,730,000 65.46%	\$38,945,000 47.96%	\$15,460,000 100.00%	\$50,980,000 0.00%	\$43,120,000 22.13%	\$39,935,000 48.02%	\$38,824,000 62.38%	\$19,815,000 87.74%	\$20,680,000 85.39%	\$20,920,000 84.63%	\$19,801,000 87.78%
Construction Schedule	15.00%	60.00%	50.00%	65.00%	55.00%	60.00%	55.00%	55.00%	90.00%	75.00%	80.00%	90.00%
Environmental/Permitting	15.00%	100.00%	90.00%	90.00%	85.00%	85.00%	85.00%	85.00%	50.00%	50.00%	45.00%	55.00%
Technical Feasibility[1]	5.00%	80.00%	75.00%	75.00%	80.00%	80.00%	80.00%	80.00%	95.00%	95.00%	95.00%	95.00%
Maintenance / Service Life	10.00%	50.00%	50.00%	65.00%	55.00%	55.00%	65.00%	65.00%	95.00%	95.00%	95.00%	95.00%
Historic Appearance	5.00%	100.00%	90.00%	65.00%	70.00%	70.00%	65.00%	65.00%	40.00%	40.00%	45.00%	40.00%
Seismic Vulnerability	10.00%	10.00%	30.00%	20.00%	90.00%	90.00%	90.00%	90.00%	100.00%	100.00%	100.00%	100.00%
Climate Change Adaptation	5.00%	40.00%	40.00%	85.00%	40.00%	40.00%	95.00%	95.00%	100.00%	100.00%	100.00%	100.00%
Total Rating	100.00%	51	42	59	36	43	52	56	79	76	76	80



Figure 9-1: Alternative Rankings Graphic

From the results of the analysis, we recommend that the City consider the replacement pier alternatives which meets all of the required parameters while providing a safe, recreational and viewing opportunity for the public.

10. Grant Funding Opportunities

10.1 Grant Programs

Transportation Investment Generating Economic Recovery (TIGER) grant program:

This unique program rewards innovative thinking and collaborative solutions to difficult and sometimes dangerous transportation problems. A great TIGER program doesn't just improve transportation; it expands economic opportunity and transforms a community. The TIGER grant program supports innovative projects, including multi-modal and multi-jurisdictional projects, which are difficult to fund through traditional federal programs. In FY 2016 \$500 million in TIGER Grants were awarded to 40 entities by the Federal Department of Transportation, including multiple port projects. This program has an annual solicitation, typically announced in February and typically requiring a 20% match in urban areas with a maximum grant amount of \$100 million.

10.2 California Department of Parks and Recreation (CDPR)

CDPR has several recreational funding opportunities that may align with recreational components of the City's pier project. These funding sources include:

- Land and Water Conservation Fund Program, supported by funds from the National Park Service
- Habitat Conservation Fund grant program which allocates approximately \$2 million each year to cities, counties, and districts through the Office of Grants and Local Services (OGALS). This

program requires a 50% match from grantees. Eligible projects include nature interpretation programs to bring urban residents into park and wildlife areas, protection of various plant and animal species, and acquisition and development of wildlife corridors and trails.

- Recreational Trails Program, funded through the Federal Highways Administration, which supports non-motorized trails projects. Project are required to have a 12% match and be listed on the State Transportation Improvement Plan.

10.3 Coastal Conservancy

The Coastal Conservancy has a variety of grant programs, some of which may align with the City's pier project to improve public access to the waterfront area and to revitalize working waterfronts. Project proposal should be coordinated with the appropriate regional conservancy staff. Project proposal are accepted on a continuous basis, with periodic grant rounds advertised and applications accepted for projects of a particular type or for specific locations.

10.4 Federal Highways Administration (FHWA)

The FHWA provides project funding through various program. The FHWA funding programs vary annually, and may be a source of funds for the City's pier project depending on the final configuration and project benefits. Potential programs that may be relevant include the Ferry Boat Discretionary Program and the Innovative Finance Program.

10.5 Federal Transit Administration (FTA)

Similar to other agencies, the FTA facilitates multiple grant programs that may provide funds for some of the improvements the City is looking at for the pier. Potential programs include the Metropolitan & Statewide Planning and Non-Metropolitan Transportation Planning Grant Program, Passenger Ferry Grant Discretionary Program, and the Public Transportation Innovation Program.

Appendix A

Engineer's Opinion of Preliminary Probable Construction Costs

**TABLE 4
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement/Retrofit Alternative P4**

Client: City of Berkeley
Project: Berkeley Municipal Pier

Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Rehabilitation/Retrofit Alternative P4 - Concrete repairs with new steel pipe piles and steel moment frame								
Mobilization / Demobilization								
	1	LS		\$5,069,696		\$5,069,696	\$5,069,696	\$5,069,696
Piles								
24"x3/4" Steel Pipe Piles (95 LF, furnish and install)	186	EA	\$8,000.00	\$13,500	\$1,488,000	\$2,511,000	\$21,500	\$3,999,000
Pier Moment Frames								
Steel Wide Flange Beams (W27)	1,040,000	LBS	\$3.75	\$4	\$3,900,000	\$3,640,000	\$7	\$7,540,000
Pile Repairs								
Concrete Spall Repairs	1,750	SF	\$36.00	\$214.00	\$63,000.00	\$374,500.00	\$250.00	\$437,500
Concrete Crack Repairs	5,120	LF	\$28.00	\$100.00	\$143,360.00	\$512,000.00	\$128.00	\$655,360
FRP Jacket Repair	25	EA	\$3,500.00	\$4,400.00	\$87,500.00	\$110,000.00	\$7,900.00	\$197,500
Remove Battered Piles	120	EA		\$2,000.00		\$240,000.00	\$2,000.00	\$240,000
Pier Deck Slab Soffit								
Concrete Deck Soffitt Spall Repairs	21,700	SF	\$38.00	\$334.00	\$824,600.00	\$7,247,800	\$372.00	\$8,072,400
Reinforcement Allowance	600	LB	\$0.95	\$1.75	\$570.00	\$1,050.00	\$2.70	\$1,620
Pier Deck Slab - Above Deck								
Concrete Deck Spall Repairs	12,500	SF	\$18.00	\$38.00	\$225,000.00	\$475,000.00	\$56.00	\$700,000
Reinforcement Allowance	400	LB	\$0.95	\$1.75	\$380.00	\$700.00	\$2.70	\$1,080
Bent Caps								
Concrete Spall Repairs	1,600	SF	\$45.00	\$600.00	\$72,000.00	\$960,000.00	\$645.00	\$1,032,000
Concrete Crack Repairs	625	LF	\$32.00	\$295.00	\$20,000.00	\$184,375.00	\$327.00	\$204,375
Reinforcement Allowance	100	LB	\$0.95	\$1.75	\$95.00	\$175.00	\$2.70	\$270
Replace Deck Panels								
Replace Precast Concrete Deck Panels	30,976	SF	\$14.00	\$12.00	\$433,664	\$371,712	\$26.00	\$805,376
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal					\$8,265,669.00			
Subtotal Labor + Materials								\$30,418,177
Hard Costs Estimating Contingency 10%								\$3,041,818
Subtotal Hard Costs								\$33,459,995
General Conditions 12%								\$991,880
General Contractor's Fee (OH & P) 8%								\$2,676,800
Special Inspection 3%								\$1,003,800
Subtotal								\$4,672,480
Bond & Insurance 3%								\$1,143,974.24
Escalation 3%								\$1,143,974.24
Design, Geotechnical, Permitting, Owner Administration and Construction Management 7%								\$2,478,610.85
Additional Estimating Contingency 20%								\$8,084,084.62
TOTAL ESTIMATED CONSTRUCTION COSTS								\$50,983,119

Notes: 1. The cost estimate presented above is considered rough order of magnitude (ROM).
2. Repair quantities shown are approximate and based on field observations.

**TABLE 5
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement/Retrofit Alternative P5**

Client: City of Berkeley
Project: Berkeley Municipal Pier

Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Rehabilitation/Retrofit Alternative P5 - Concrete repairs with new steel pipe piles and steel bent truss frames								
Mobilization / Demobilization	1	LS		\$5,165,620		\$5,165,620	\$5,165,620	\$5,165,620
Piles								
48"x1" Steel Pipe Piles (95 LF, furnish and install)	186	EA	\$12,000.00	\$16,000	\$2,232,000	\$2,976,000	\$28,000	\$5,208,000
Pier Bent Truss Frames								
Steel Truss Frame Members (C12, L's, etc.)	235,000	LBS	\$3.50	\$4	\$822,500	\$822,500	\$7	\$1,645,000
Pile Repairs								
Concrete Spall Repairs	1,750	SF	\$36.00	\$214.00	\$63,000.00	\$374,500.00	\$250.00	\$437,500
Concrete Crack Repairs	5,120	LF	\$28.00	\$100.00	\$143,360.00	\$512,000.00	\$128.00	\$655,360
FRP Jacket Repair	25	EA	\$3,500.00	\$4,400.00	\$87,500.00	\$110,000.00	\$7,900.00	\$197,500
Remove Battered Piles	120	EA		\$2,000.00		\$240,000.00	\$2,000.00	\$240,000
Pier Deck Slab Soffit								
Concrete Deck Soffitt Spall Repairs	21,700	SF	\$38.00	\$334.00	\$824,600.00	\$7,247,800	\$372.00	\$8,072,400
Reinforcement Allowance	600	LB	\$0.95	\$1.75	\$570.00	\$1,050.00	\$2.70	\$1,620
Pier Deck Slab - Above Deck								
Concrete Deck Spall Repairs	12,500	SF	\$18.00	\$38.00	\$225,000.00	\$475,000.00	\$56.00	\$700,000
Reinforcement Allowance	400	LB	\$0.95	\$1.75	\$380.00	\$700.00	\$2.70	\$1,080
Bent Caps								
Concrete Spall Repairs	1,600	SF	\$45.00	\$600.00	\$72,000.00	\$960,000.00	\$645.00	\$1,032,000
Concrete Crack Repairs	625	LF	\$32.00	\$295.00	\$20,000.00	\$184,375.00	\$327.00	\$204,375
Reinforcement Allowance	100	LB	\$0.95	\$1.75	\$95.00	\$175.00	\$2.70	\$270
Replace Deck Panels								
Replace Precast Concrete Deck Panels	30,976	SF	\$14.00	\$12.00	\$433,664	\$371,712	\$26.00	\$805,376
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal					\$5,932,169.00			
Subtotal Labor + Materials								\$25,828,101
Hard Costs Estimating Contingency							10%	\$2,582,810
Subtotal Hard Costs								\$28,410,911
General Conditions							12%	\$711,860
General Contractor's Fee (OH & P)							8%	\$2,272,873
Special Inspection							3%	\$852,327
Subtotal								\$3,837,061
Bond & Insurance							3%	\$967,439.16
Escalation							3%	\$967,439.16
Design, Geotechnical, Permitting, Owner Administration and Construction Management							7%	\$2,096,118.17
Additional Estimating Contingency							20%	\$6,836,570.04
TOTAL ESTIMATED CONSTRUCTION COSTS								\$43,115,538

Notes: 1. The cost estimate presented above is considered rough order of magnitude (ROM).
2. Repair quantities shown are approximate and based on field observations.

**TABLE 6
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement/Retrofit Alternative P6**

Client: City of Berkeley
Project: Berkeley Municipal Pier

Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Rehabilitation/Retrofit Alternative P6 - Concrete repairs with new steel pipe piles, steel moment frames and aluminum deck system								
Mobilization / Demobilization	1	LS		\$3,346,416		\$3,346,416	\$3,346,416	\$3,346,416
Piles								
18"x0.5" Steel Pipe Piles (95 LF, furnish and install)	186	EA	\$7,200.00	\$10,750	\$1,339,200	\$1,999,500	\$17,950	\$3,338,700
Pier Moment Frames								
Steel Wide Flange Beams (W24)	850,000	LBS	\$3.50	\$4	\$2,975,000	\$2,975,000	\$7	\$5,950,000
Remove Concrete Deck Panels								
Remove Existing Concrete Deck Panels	66,000	SF		\$12.50		\$825,000	\$13	\$825,000
Lightweight Deck System								
Install new Aluminum Deck System (12' wide, 32 foot span)	36,000	SF	\$28.00	\$16.00	\$1,008,000	\$576,000	\$44.00	\$1,584,000
Pile Repairs								
Concrete Spall Repairs	1,750	SF	\$36.00	\$214.00	\$63,000.00	\$374,500.00	\$250.00	\$437,500
Concrete Crack Repairs	5,120	LF	\$28.00	\$100.00	\$143,360.00	\$512,000.00	\$128.00	\$655,360
FRP Jacket Repair	25	EA	\$3,500.00	\$4,400.00	\$87,500.00	\$110,000.00	\$7,900.00	\$197,500
Remove Battered Piles	120	EA		\$2,000.00		\$240,000.00	\$2,000.00	\$240,000
Bent Caps								
Concrete Spall Repairs	1,600	SF	\$45.00	\$600.00	\$72,000.00	\$960,000.00	\$645.00	\$1,032,000
Concrete Crack Repairs	625	LF	\$32.00	\$295.00	\$20,000.00	\$184,375.00	\$327.00	\$204,375
Reinforcement Allowance	100	LB	\$0.95	\$1.75	\$95.00	\$175.00	\$2.70	\$270
Replace Deck Panels								
Replace Precast Concrete Deck Panels	30,976	SF	\$14.00	\$12.00	\$433,664	\$371,712	\$26.00	\$805,376
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal					\$7,149,319.00			
Subtotal Labor + Materials								\$20,078,497
Hard Costs Estimating Contingency 10%								\$2,007,850
Subtotal Hard Costs								\$22,086,347
General Conditions 12%								\$857,918
General Contractor's Fee (OH & P) 8%								\$1,766,908
Special Inspection 3%								\$662,590
Subtotal								\$3,287,416
Bond & Insurance 3%								\$761,212.90
Escalation 3%								\$761,212.90
Design, Geotechnical, Permitting, Owner Administration and Construction Management 7%								\$1,649,294.62
Additional Estimating Contingency 20%								\$5,379,237.83
TOTAL ESTIMATED CONSTRUCTION COSTS								\$33,924,722

Notes: 1. The cost estimate presented above is considered rough order of magnitude (ROM).
2. Repair quantities shown are approximate and based on field observations.

TABLE 7
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement/Retrofit Alternative P7

Client: City of Berkeley
 Project: Berkeley Municipal Pier

Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Rehabilitation/Retrofit Alternative P7 - Concrete repairs with new steel pipe piles, pile bent trusses and aluminum deck system								
Mobilization / Demobilization	1	LS		\$2,847,316		\$2,847,316	\$2,847,316	\$2,847,316
Piles								
36"x0.75" Steel Pipe Piles (95 LF, furnish and install)	186	EA	\$10,800.00	\$14,200	\$2,008,800	\$2,641,200	\$25,000	\$4,650,000
Pile Bent Truss Frames								
Steel Truss Frame Members (C14, L's, etc.)	282,000	LBS	\$3.50	\$4.10	\$987,000	\$1,156,200	\$8	\$2,143,200
Remove Concrete Deck Panels								
Remove Existing Concrete Deck Panels	66,000	SF		\$12.50		\$825,000	\$13	\$825,000
Lightweight Deck System								
Install new Aluminum Deck System (12' wide, 32 foot span)	36,000	SF	\$28.00	\$16.00	\$1,008,000	\$576,000	\$44.00	\$1,584,000
Pile Repairs								
Concrete Spall Repairs	1,750	SF	\$36.00	\$214.00	\$63,000.00	\$374,500.00	\$250.00	\$437,500
Concrete Crack Repairs	5,120	LF	\$28.00	\$100.00	\$143,360.00	\$512,000.00	\$128.00	\$655,360
FRP Jacket Repair	25	EA	\$3,500.00	\$4,400.00	\$87,500.00	\$110,000.00	\$7,900.00	\$197,500
Remove Battered Piles	120	EA		\$2,000.00		\$240,000.00	\$2,000.00	\$240,000
Bent Caps								
Concrete Spall Repairs	1,600	SF	\$45.00	\$600.00	\$72,000.00	\$960,000.00	\$645.00	\$1,032,000
Concrete Crack Repairs	625	LF	\$32.00	\$295.00	\$20,000.00	\$184,375.00	\$327.00	\$204,375
Reinforcement Allowance	100	LB	\$0.95	\$1.75	\$95.00	\$175.00	\$2.70	\$270
Replace Deck Panels								
Replace Precast Concrete Deck Panels	30,976	SF	\$14.00	\$12.00	\$433,664	\$371,712	\$26.00	\$805,376
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal					\$5,830,919.00			
Subtotal Labor + Materials								\$17,083,897
Hard Costs Estimating Contingency 10%								\$1,708,390
Subtotal Hard Costs								\$18,792,287
General Conditions 12%								\$699,710
General Contractor's Fee (OH & P) 8%								\$1,503,383
Special Inspection 3%								\$563,769
Subtotal								\$2,766,862
Bond & Insurance 3%								\$646,774.46
Escalation 3%								\$646,774.46
Design, Geotechnical, Permitting, Owner Administration and Construction Management 7%								\$1,401,344.67
Additional Estimating Contingency 20%								\$4,570,539.54
TOTAL ESTIMATED CONSTRUCTION COSTS								\$28,824,582

Notes: 1. The cost estimate presented above is considered rough order of magnitude (ROM).
 2. Repair quantities shown are approximate and based on field observations.

**TABLE 8
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement Alternative P8**

Client: City of Berkeley
Project: Berkeley Municipal Pier

Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Replacement Alternative P8								
- Demo and replace pier with precast deck beams, cast-in-place topping and monopile concept								
- Pier Area: 3000' Lx 16' wide								
Mobilization / Demobilization	1	LS		\$2,363,550		\$2,363,550	\$2,363,550	\$2,363,550
Demolition								
Demolish Existing Pier Structure	66,000	SF		\$22		\$1,452,000	\$22	\$1,452,000
Piles								
30"x3/4" Steel Pipe Piles (95 LF, furnish and install)	90	EA	\$8,500.00	\$14,000	\$765,000	\$1,260,000	\$22,500	\$2,025,000
Pier Deck Beams								
20" deep Precast Concrete Channel Beams (32' length)	360	EA	\$2,500.00	\$1,800	\$900,000	\$648,000	\$4,300	\$1,548,000
Bent Caps								
CIP Concrete Bent Caps	1,400	CY	\$155.00	\$1,500.00	\$217,000	\$2,100,000	\$1,655.00	\$2,317,000
Cast-in-Place Deck Topping								
CIP Deck Topping	36,000	SF	\$10.00	\$8.00	\$360,000	\$288,000	\$18.00	\$648,000
Water Pipe Hangers								
	10	EA	\$85.00	\$135.00	\$850.00	\$1,350.00	\$220.00	\$2,200
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal					\$3,250,350.00			
Subtotal Labor + Materials								\$11,817,750
Hard Costs Estimating Contingency 10%								\$1,181,775
Subtotal Hard Costs								\$12,999,525
General Conditions 12%								\$390,042
General Contractor's Fee (OH & P) 8%								\$1,039,962
Special Inspection 3%								\$389,986
Subtotal								\$1,819,990
Bond & Insurance 3%								\$444,585.44
Escalation 3%								\$444,585.44
Design, Geotechnical, Permitting, Owner Administration and Construction Management 7%								\$963,268.46
Additional Estimating Contingency 20%								\$3,141,737.13
TOTAL ESTIMATED CONSTRUCTION COSTS								\$19,813,691

Notes: 1. The cost estimate presented above is considered rough order of magnitude (ROM).
2. Repair quantities shown are approximate and based on field observations.

**TABLE 9
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement Alternative P9**

Client: City of Berkeley
Project: Berkeley Municipal Pier

Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Replacement Alternative P9 - Demo and replace pier with cast-in-place beams and monopile concept - Pier Area: 3000' LFx 16' wide								
Mobilization / Demobilization	1	LS		\$2,069,940		\$2,069,940	\$2,069,940	\$2,069,940
Demolition								
Demolish Existing Pier Structure	66,000	SF		\$20		\$1,320,000	\$20	\$1,320,000
Piles								
30"x3/4" Steel Pipe Piles (95 LF, furnish and install)	90	EA	\$8,500.00	\$14,000	\$765,000	\$1,260,000	\$22,500	\$2,025,000
CIP Pier Deck Beams								
CIP Concrete Deck Beams	2,100	CY	\$160.00	\$1,375	\$336,000	\$2,887,500	\$1,535	\$3,223,500
Bent Caps								
CIP Concrete Bent Caps	1,400	CY	\$155.00	\$1,500.00	\$217,000	\$2,100,000	\$1,655	\$2,317,000
Water Pipe Hangers								
Replace Pipe Hangers	10	EA	\$85.00	\$135.00	\$850.00	\$1,350.00	\$220.00	\$2,200
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal					\$2,326,350.00			
Subtotal Labor + Materials								\$12,419,640
Hard Costs Estimating Contingency							10%	\$1,241,964
Subtotal Hard Costs								\$13,661,604
General Conditions							12%	\$279,162
General Contractor's Fee (OH & P)							8%	\$1,092,928
Special Inspection							3%	\$409,848
Subtotal								\$1,781,938
Bond & Insurance							3%	\$463,306.27
Escalation							3%	\$463,306.27
Design, Geotechnical, Permitting, Owner Administration and Construction Management							7%	\$1,003,830.26
Additional Estimating Contingency							20%	\$3,274,031.00
TOTAL ESTIMATED CONSTRUCTION COSTS								\$20,648,016

- Notes:
1. The cost estimate presented above is considered rough order of magnitude (ROM).
 2. Repair quantities shown are approximate and based on field observations.

**TABLE 10
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement Alternative P10**

Client: City of Berkeley
Project: Berkeley Municipal Pier

Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Replacement Alternative P10								
- Demo and replace pier with precast deck plans and precast concrete piles								
- 3,000 LF x 16' wide								
Mobilization / Demobilization	1	LS		\$2,095,980		\$2,095,980	\$2,095,980	\$2,095,980
Demolition								
Demolish Existing Pier Structure	66,000	SF		\$22		\$1,452,000	\$22	\$1,452,000
Piles								
24"octogonal precast concrete piles (85 LF, furnish and install)	184	EA	\$4,600.00	\$10,200	\$846,400	\$1,876,800	\$14,800	\$2,723,200
CIP Pier Deck Beams								
CIP Concrete Deck Beams	2,100	CY	\$160.00	\$1,275	\$336,000	\$2,677,500	\$1,435	\$3,013,500
Bent Caps								
CIP Concrete Bent Caps	1,400	CY	\$155.00	\$1,150.00	\$217,000	\$1,610,000	\$1,305	\$1,827,000
Water Pipe Hangers								
Replace Pipe Hangers	10	EA	\$85.00	\$135.00	\$850.00	\$1,350.00	\$220.00	\$2,200
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal					\$2,407,750.00			
Subtotal Labor + Materials								\$12,575,880
Hard Costs Estimating Contingency							10%	\$1,257,588
Subtotal Hard Costs								\$13,833,468
General Conditions							12%	\$288,930
General Contractor's Fee (OH & P)							8%	\$1,106,677
Special Inspection							3%	\$415,004
Subtotal								\$1,810,611
Bond & Insurance							3%	\$469,322.38
Escalation							3%	\$469,322.38
Design, Geotechnical, Permitting, Owner Administration and Construction Management							7%	\$1,016,865.17
Additional Estimating Contingency							20%	\$3,316,544.85
TOTAL ESTIMATED CONSTRUCTION COSTS								\$20,916,134

- Notes:
1. The cost estimate presented above is considered rough order of magnitude (ROM).
 2. Repair quantities shown are approximate and based on field observations.

**TABLE 11
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
City of Berkeley - Municipal Pier
Replacement Alternative P11**

Client: City of Berkeley
Project: Berkeley Municipal Pier

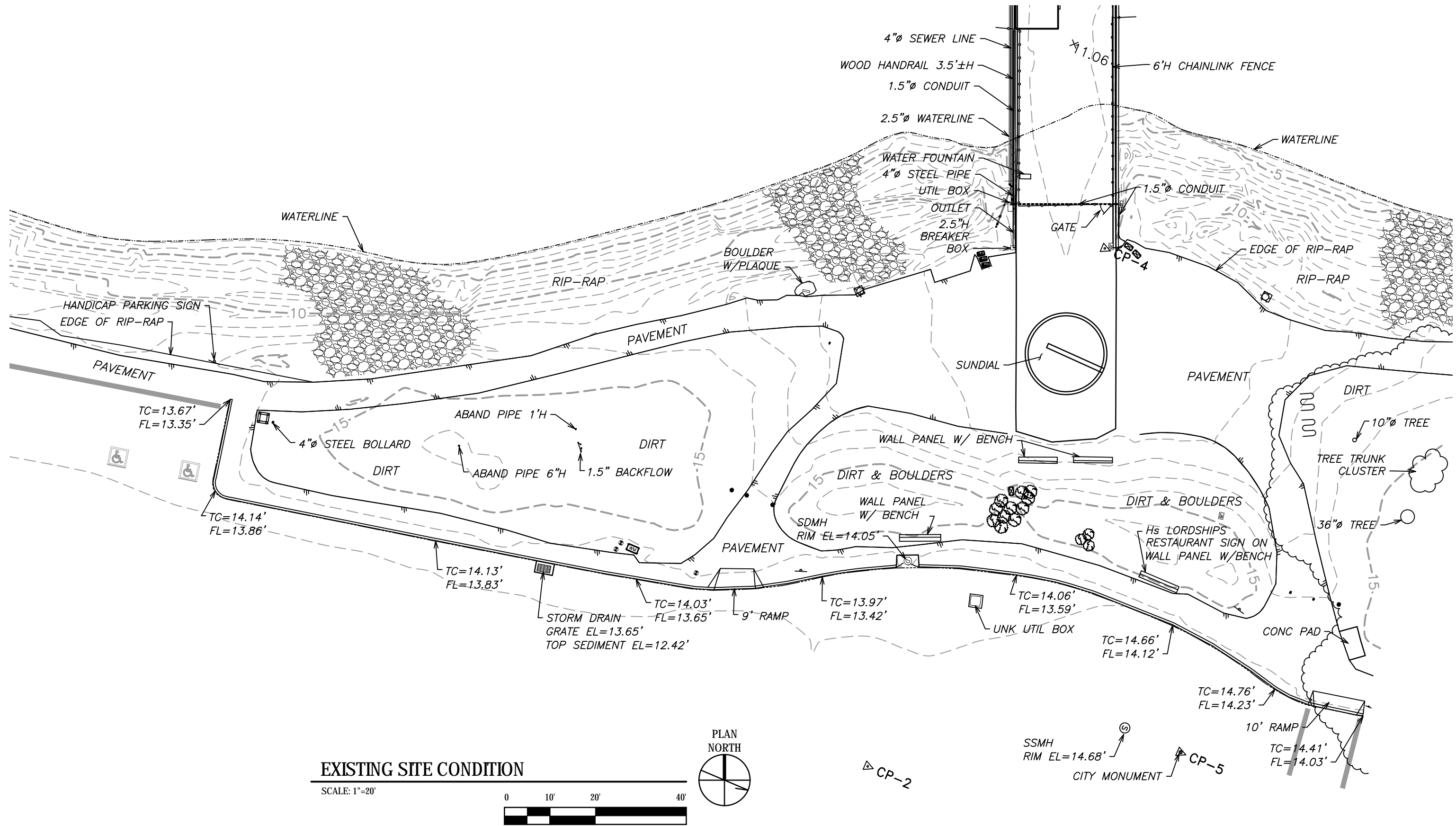
Date: 16-Nov-17

Description - Dock Extension	Quantity		Unit Cost		Total Material Cost	Total Labor Cost	Total Unit Cost	Total Cost
	No	Unit	Mat'l	Labor				
General Description of Work								
Berkeley Municipal Pier - Replacement Alternative P11								
- Demo and replace pier with steel monopiles, prefabricated steel bent caps and lightweight deck system								
- Pier Area: 3000' Lx 12' wide								
Mobilization / Demobilization	1	LS		\$1,958,040		\$1,958,040	\$1,958,040	\$1,958,040
Demolition								
Demolish Existing Pier Structure	66,000	SF		\$22		\$1,452,000	\$22	\$1,452,000
Piles								
30"x3/4" Steel Pipe Piles (95 LF, furnish and install)	90	EA	\$13,750.00	\$15,000	\$1,237,500	\$1,350,000	\$28,750	\$2,587,500
Steel Bent Caps								
Steel Prefabricated Bent Caps	235,000	LBS	\$2.75	\$8.75	\$646,250	\$2,056,250	\$11.50	\$2,702,500
Lightweight Deck System								
Install new Aluminum Deck System (12' wide, 34 foot span)	36,000	SF	\$28.00	\$16.00	\$1,008,000	\$576,000	\$44.00	\$1,584,000
Water Pipe Hangers								
	10	EA	\$85.00	\$135.00	\$850.00	\$1,350.00	\$220.00	\$2,200
Above Deck								
Guard Railing (galv steel)	6,100	LF	\$55.00	\$45.00	\$335,500.00	\$274,500.00	\$100.00	\$610,000
Light Poles and Fixtures	120	EA	\$5,600.00	\$1,500.00	\$672,000.00	\$180,000.00	\$7,100.00	\$852,000
Materials Subtotal								
					\$3,900,100.00			
Subtotal Labor + Materials								
								\$11,748,240
Hard Costs Estimating Contingency								
	10%							\$1,174,824
Subtotal Hard Costs								
								\$12,923,064
General Conditions								
	12%							\$468,012
General Contractor's Fee (OH & P)								
	8%							\$1,033,845
Special Inspection								
	3%							\$387,692
Subtotal								
								\$1,889,549
Bond & Insurance								
	3%							\$444,378.39
Escalation								
	3%							\$444,378.39
Design, Geotechnical, Permitting, Owner Administration and Construction Management								
	7%							\$962,819.85
Additional Estimating Contingency								
	20%							\$3,140,273.96
TOTAL ESTIMATED CONSTRUCTION COSTS								
								\$19,804,464

Notes: 1. The cost estimate presented above is considered rough order of magnitude (ROM).
2. Repair quantities shown are approximate and based on field observations.

Appendix B



Pier Layout and Condition Rating

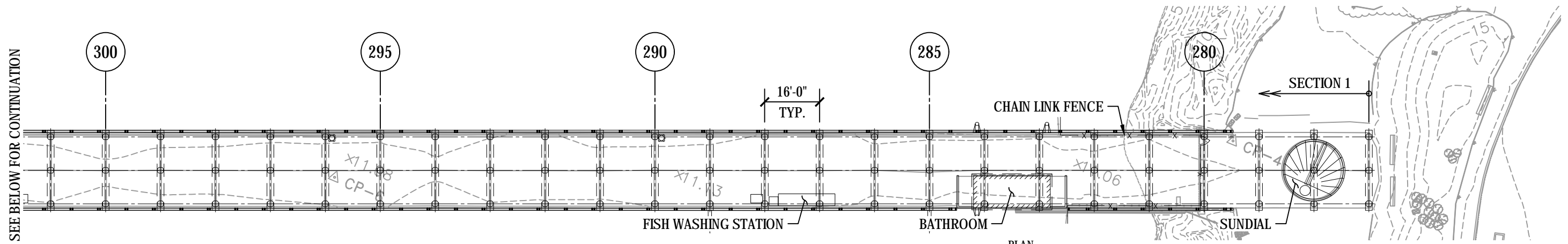


EXISTING SITE CONDITION

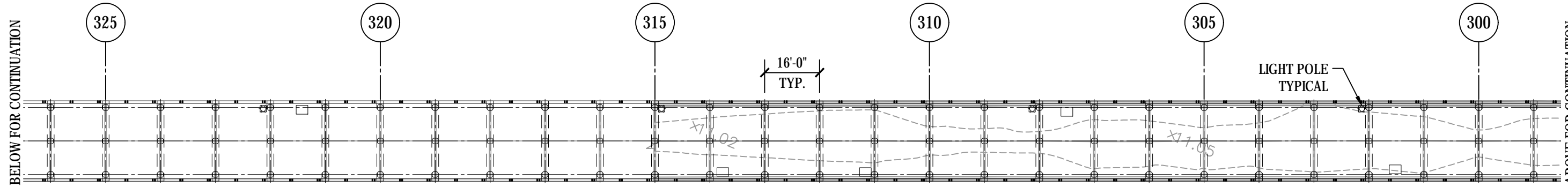
SCALE: 1"=20'



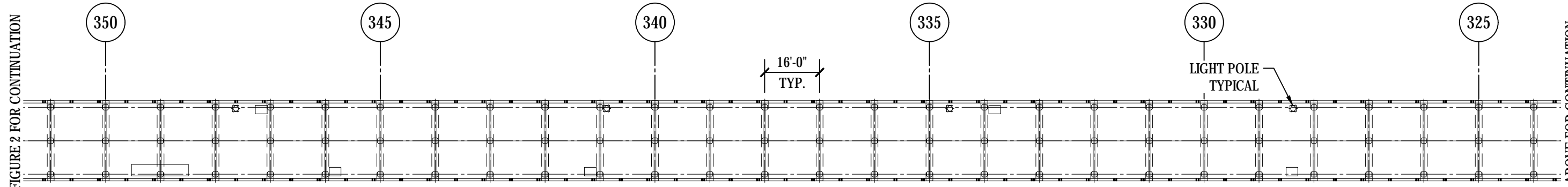
		CITY OF BERKELEY STRUCTURAL CONDITION ASSESSMENT OF BERKELEY MUNICIPAL PIER	Project No. 11125268 Report No. - Date NOV 2017
		EXISTING SITE CONDITIONS	
		FIGURE B-1	



1 PARTIAL DECK PLAN
SCALE: 1"=30'



2 PARTIAL DECK PLAN
SCALE: 1"=30'



3 PARTIAL DECK PLAN
SCALE: 1"=30'

SEE BELOW FOR CONTINUATION

SEE BELOW FOR CONTINUATION

SEE FIGURE 2 FOR CONTINUATION

SEE ABOVE FOR CONTINUATION

SEE ABOVE FOR CONTINUATION

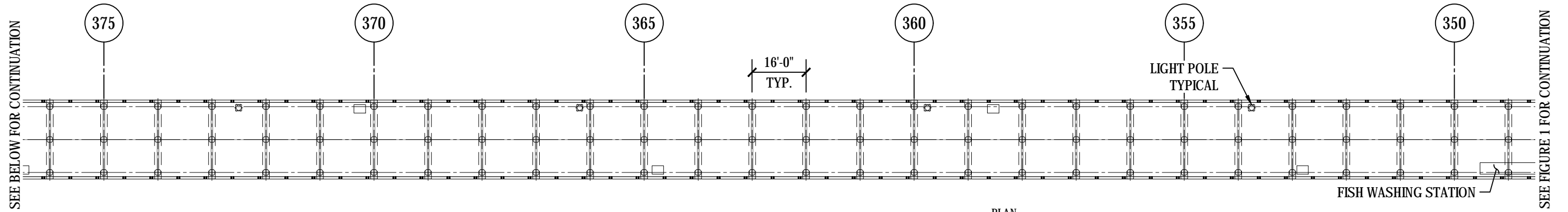


CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

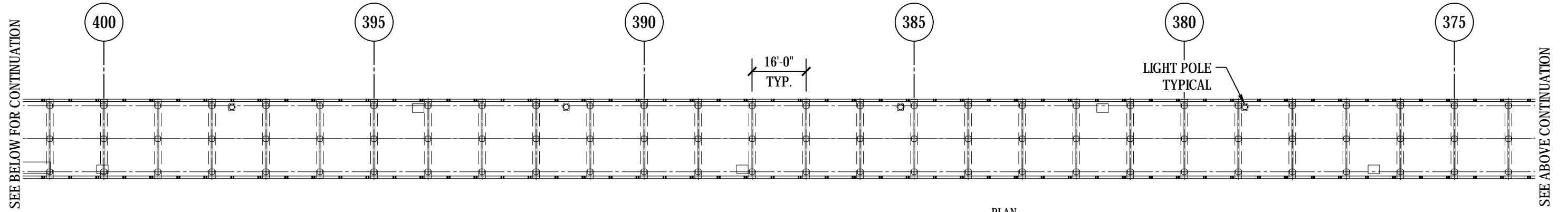
Project No. 11125268
Report No. -
Date NOV 2017

PARTIAL DECK PLAN

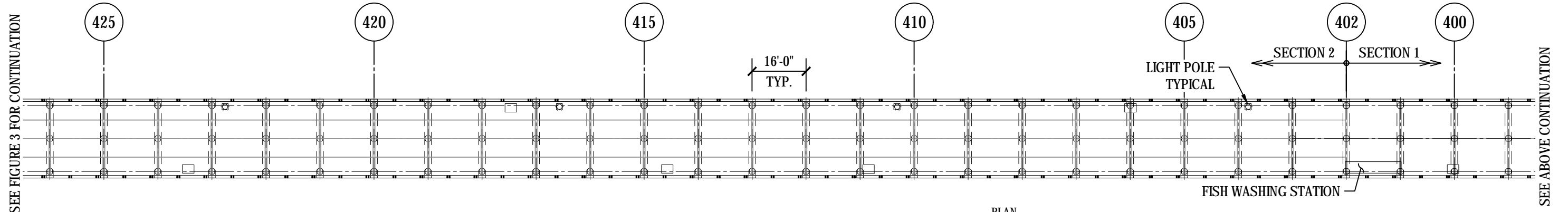
FIGURE B-2



4 PARTIAL DECK PLAN
SCALE: 1"=30'



5 PARTIAL DECK PLAN
SCALE: 1"=30'



6 PARTIAL DECK PLAN
SCALE: 1"=30'

SEE BELOW FOR CONTINUATION



SEE FIGURE 1 FOR CONTINUATION

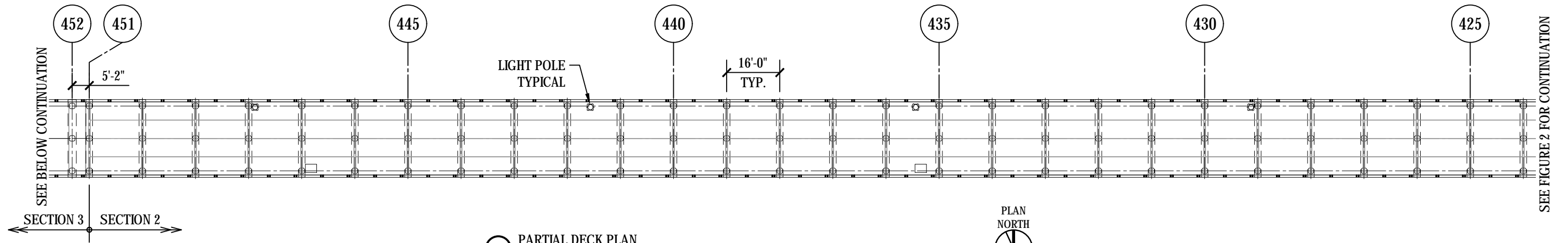
SEE BELOW FOR CONTINUATION

SEE ABOVE CONTINUATION

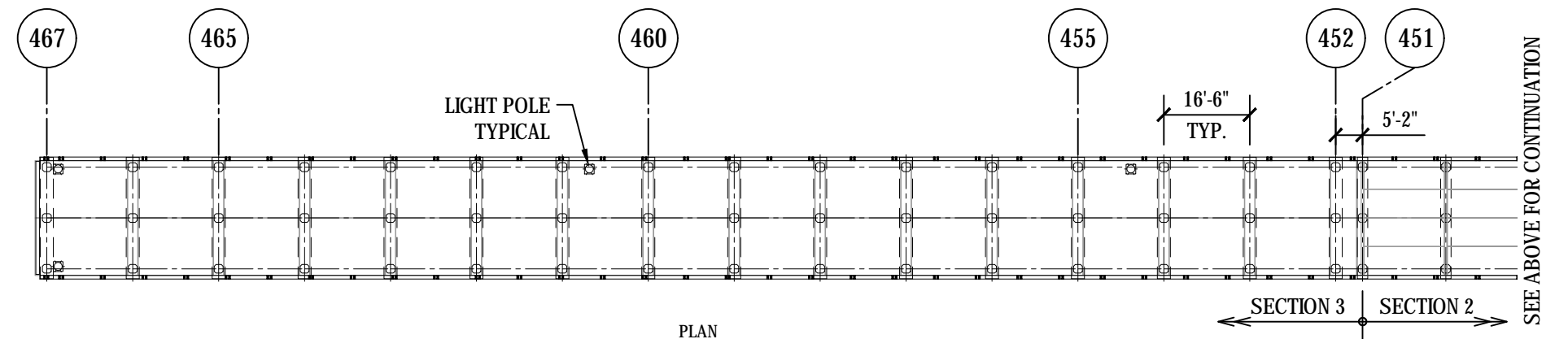
SEE FIGURE 3 FOR CONTINUATION

SEE ABOVE CONTINUATION

		CITY OF BERKELEY STRUCTURAL CONDITION ASSESSMENT OF BERKELEY MUNICIPAL PIER	Project No. 11125268 Report No. - Date NOV 2017	
		PARTIAL DECK PLAN		FIGURE B-3



6 PARTIAL DECK PLAN
SCALE: 1"=30'



7 PARTIAL DECK PLAN
SCALE: 1"=30'

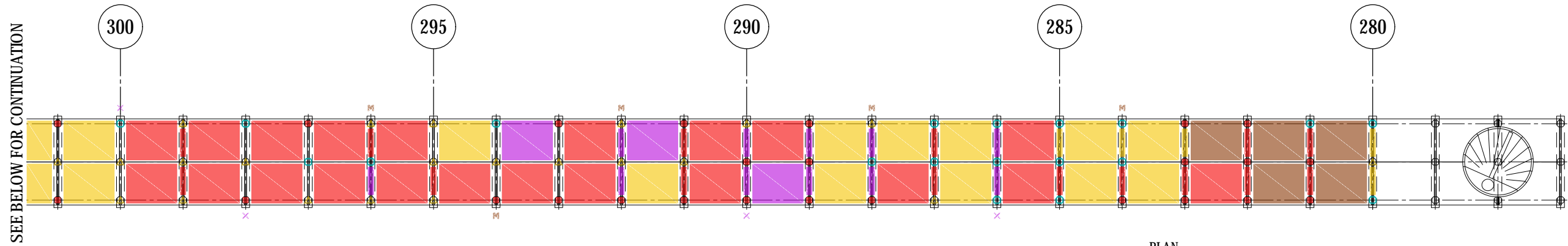


CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

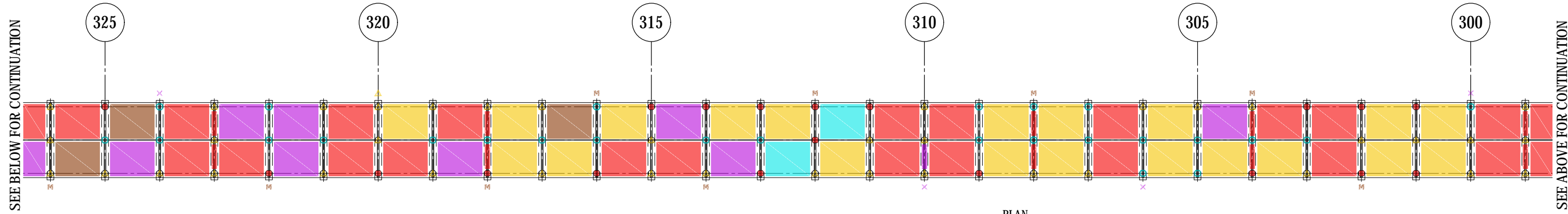
PARTIAL DECK PLAN

Project No. 11125268
Report No. -
Date NOV 2017

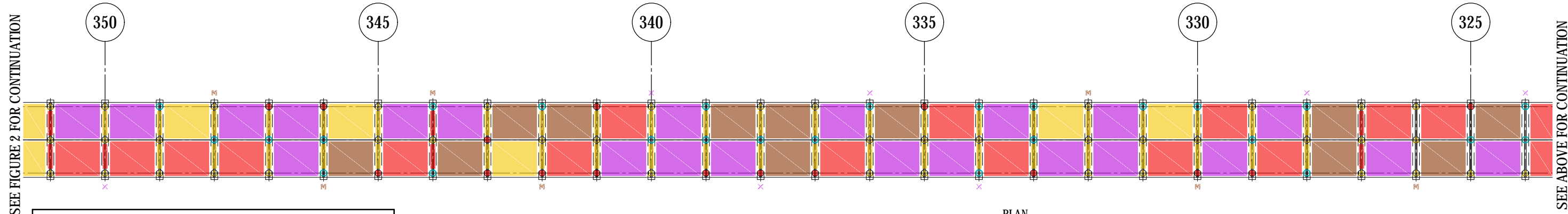
FIGURE B-4



1 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'



2 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'



3 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'

LEGEND		
RATING	DECK OR BENT CAP	PILE
6 GOOD		
5 SATISFACTORY		
4 FAIR		
3 POOR		
2 SERIOUS		
1 CRITICAL		

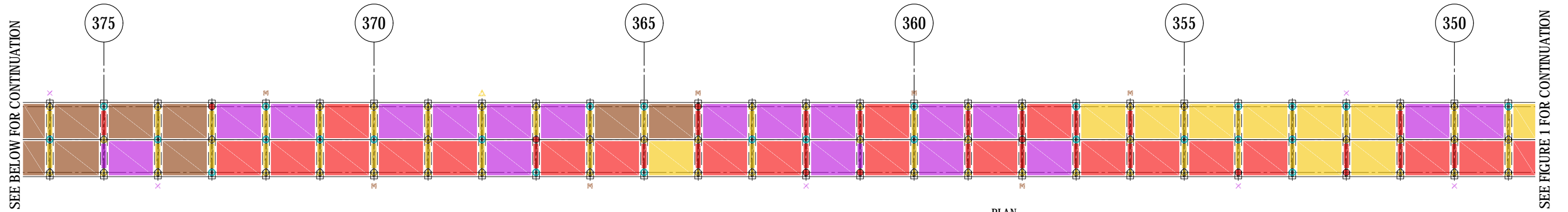
OR DISCONNECTED
PILE MISSING



CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER
PARTIAL DECK PLAN - PIER RATING

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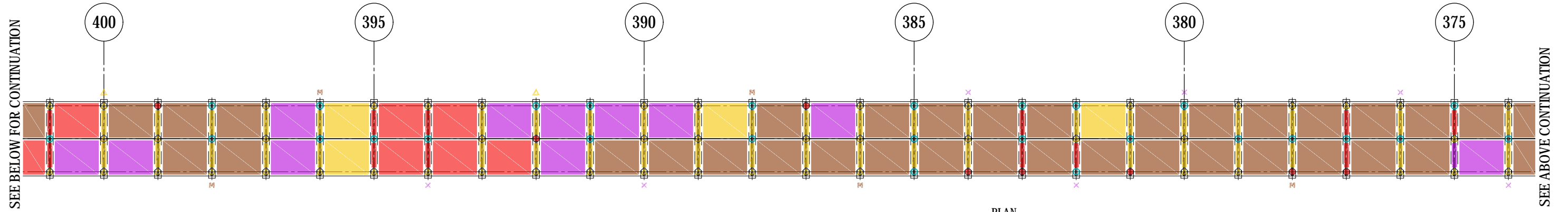
FIGURE B-5



SEE BELOW FOR CONTINUATION

SEE FIGURE 1 FOR CONTINUATION

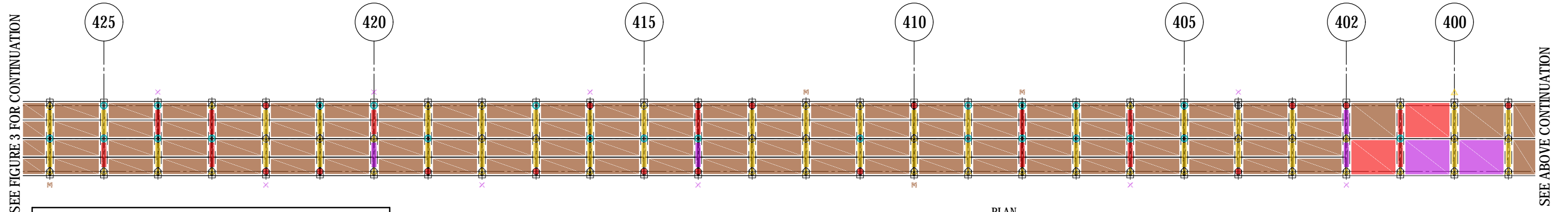
4 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'



SEE BELOW FOR CONTINUATION

SEE ABOVE CONTINUATION

5 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'



SEE FIGURE 3 FOR CONTINUATION



SEE ABOVE CONTINUATION

6 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'

LEGEND		
RATING	DECK OR BENT CAP	PILE
6 GOOD		
5 SATISFACTORY		
4 FAIR		
3 POOR		
2 SERIOUS		
1 CRITICAL		

OR DISCONNECTED
PILE MISSING



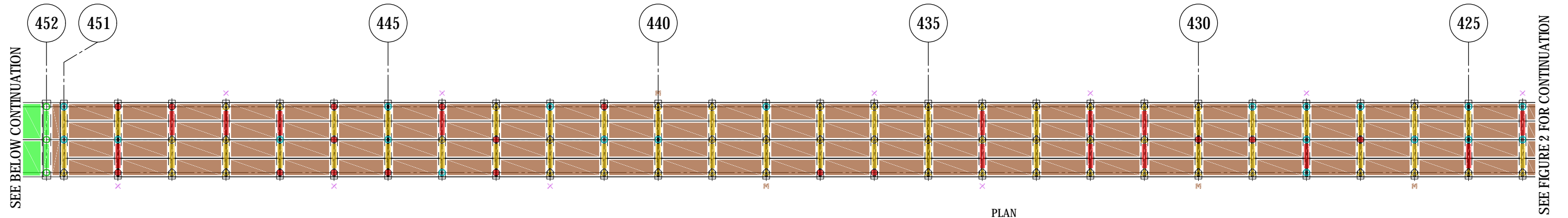



CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

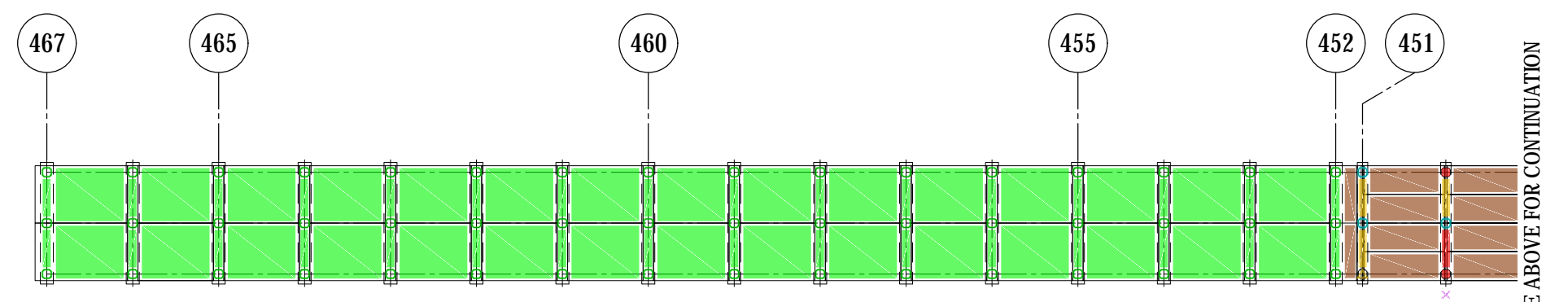
PARTIAL DECK PLAN - PIER RATING

Project No. 11125268
Report No. -
Date NOV 2017

FIGURE B-6



6 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'



7 PARTIAL DECK PLAN - PIER RATING
SCALE: 1"=30'

LEGEND		
RATING	DECK OR BENT CAP	PILE
6 GOOD		
5 SATISFACTORY		
4 FAIR		
3 POOR		
2 SERIOUS		
1 CRITICAL		

OR DISCONNECTED
PILE MISSING

CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

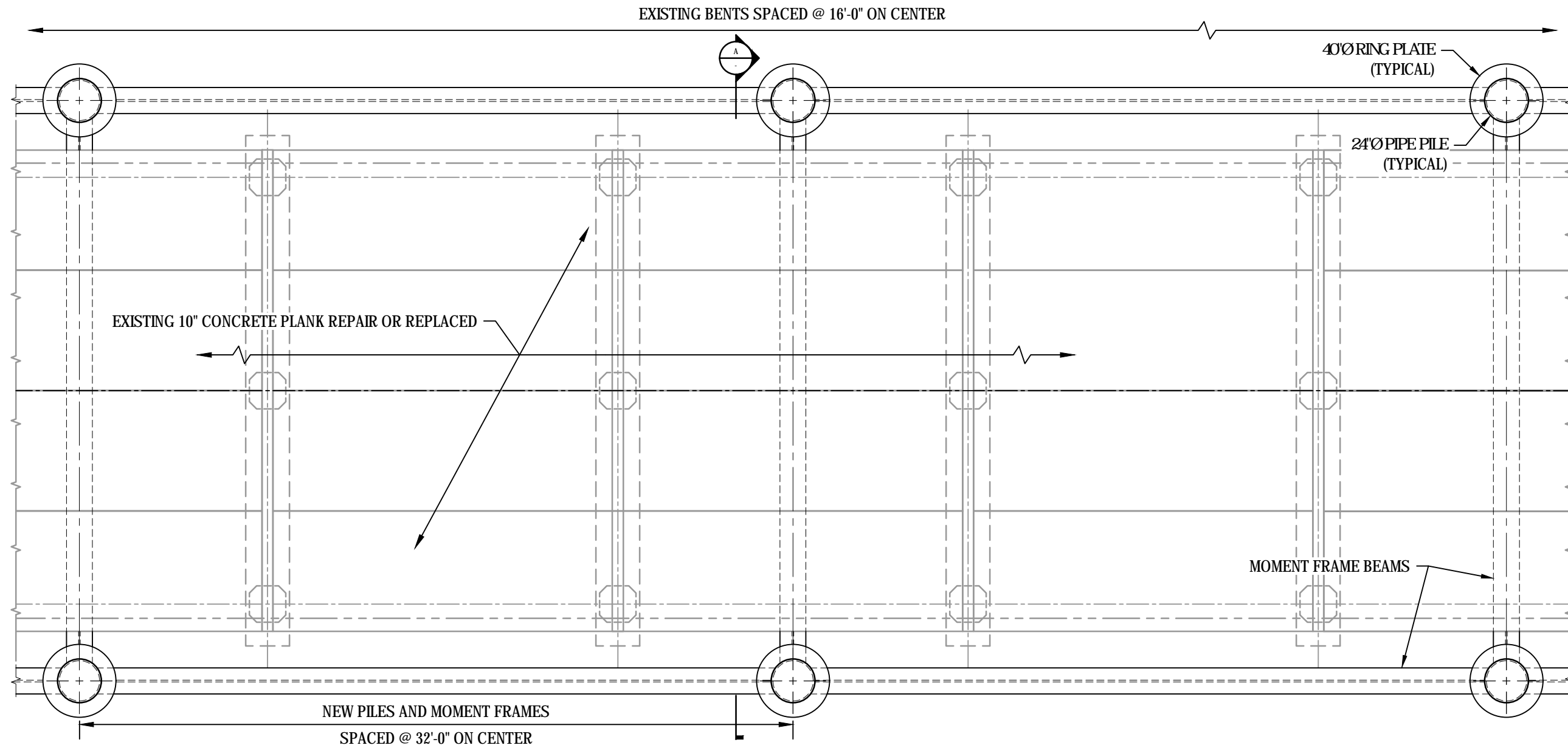
PARTIAL DECK PLAN - PIER RATING

Project No. 11125268
Report No. -
Date NOV 2017

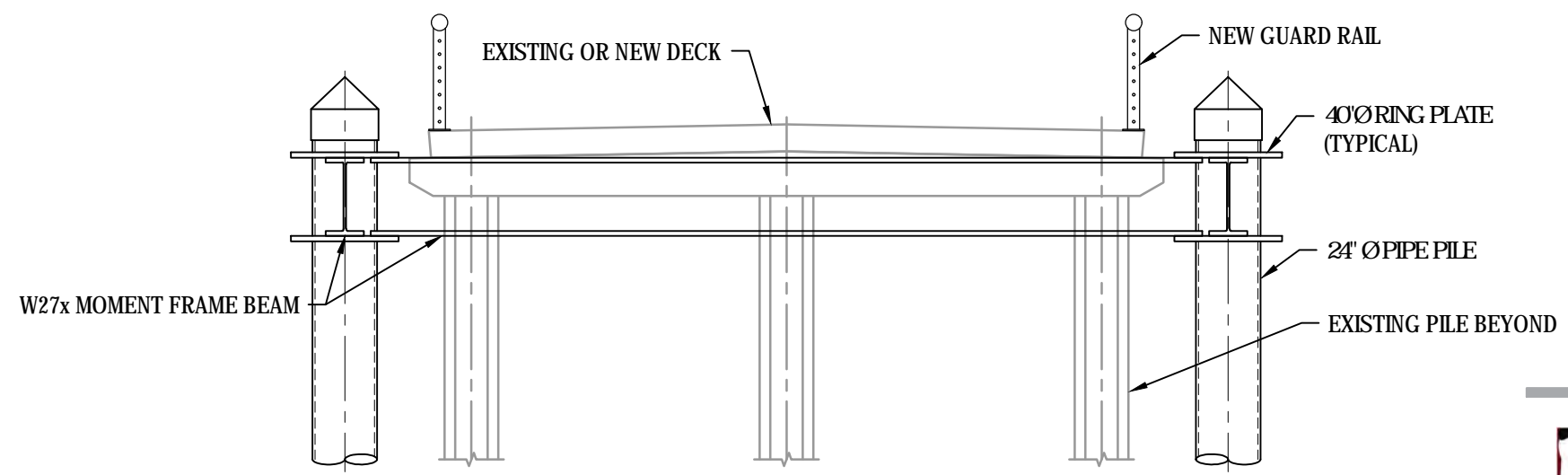
FIGURE B-7

Appendix C

Rehabilitation, Retrofit and Replacement Sketches





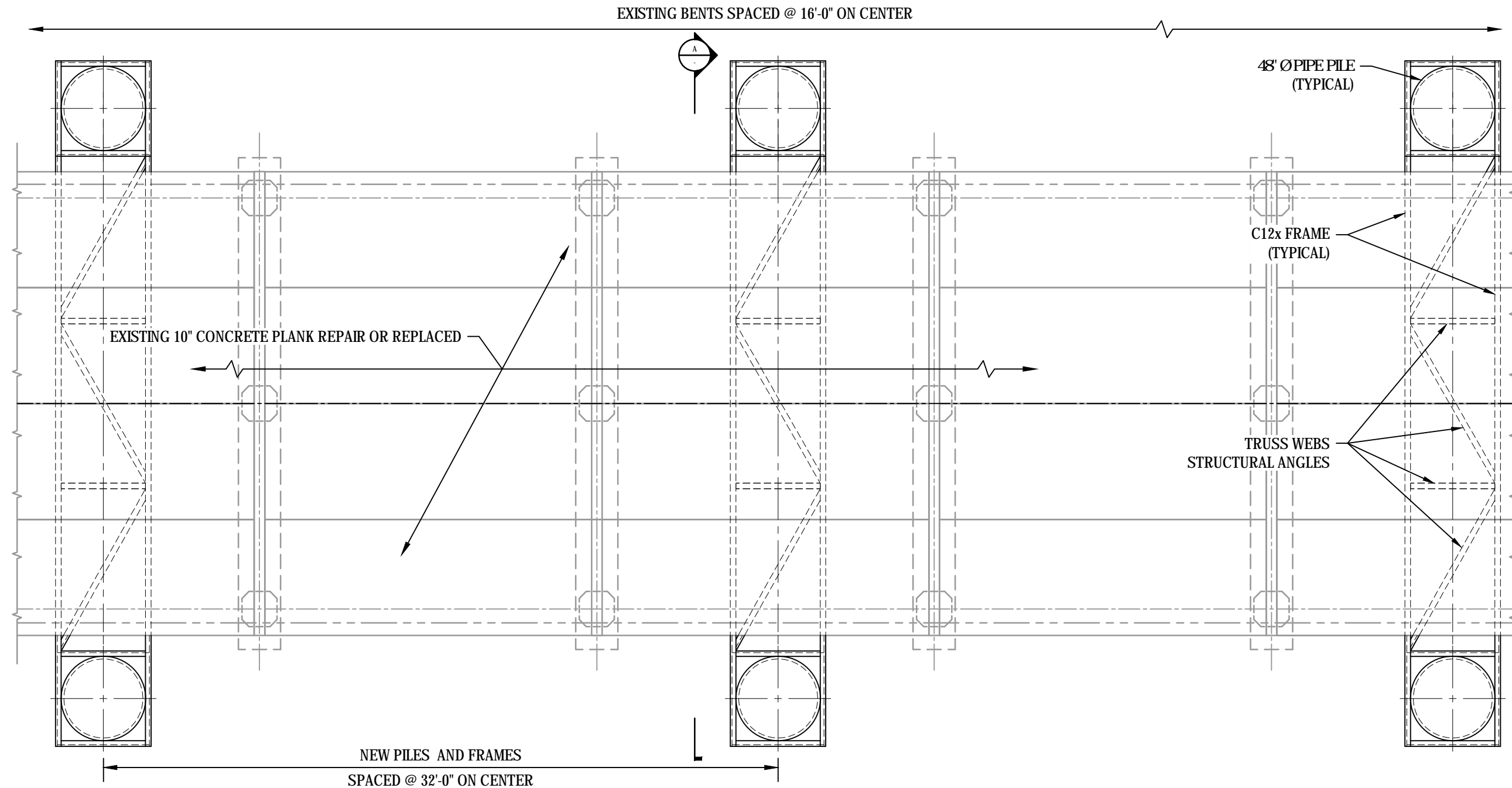
1 PLAN
SCALE: 3/16"=1'-0"



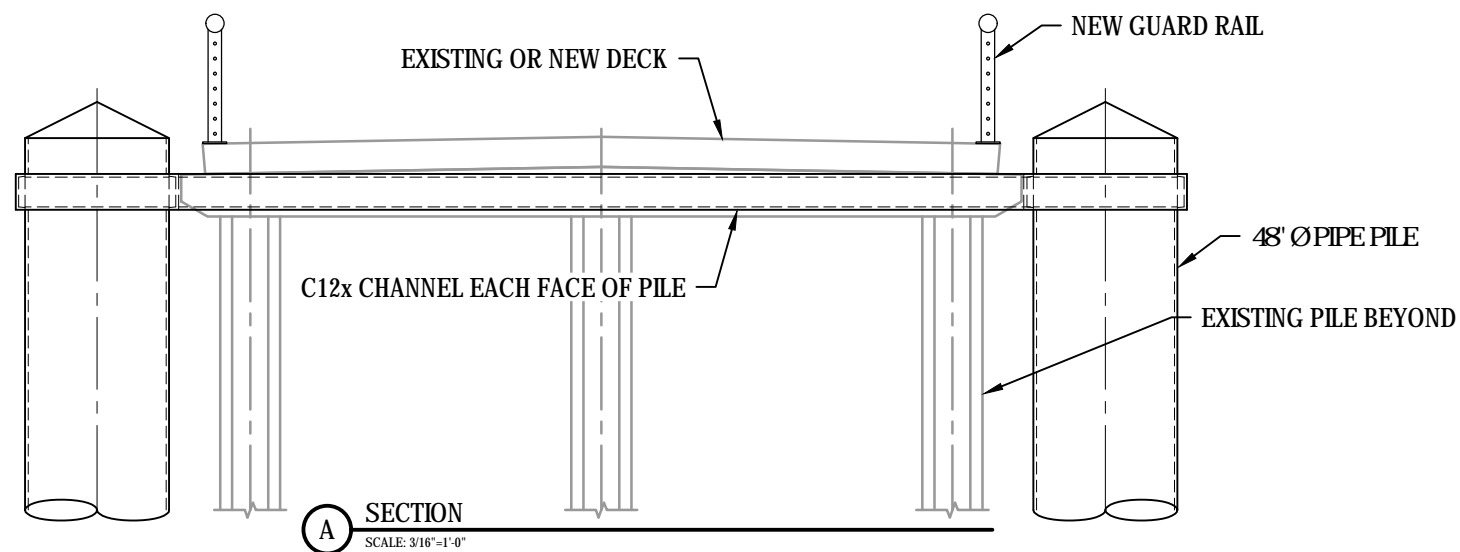
A SECTION
SCALE: 3/16"=1'-0"

ALTERNATIVE P4

		CITY OF BERKELEY STRUCTURAL CONDITION ASSESSMENT OF BERKELEY MUNICIPAL PIER	Project No. 11125268 Report No. - Date NOV 2017
		REHABILITATION / RETROFIT CONCEPT PILES WITH MOMENT FRAMES	



1 PLAN
SCALE: 3/16"=1'-0"



NOTE:

1. NO LONGITUDINAL FRAME THIS OPTION

ALTERNATIVE P5

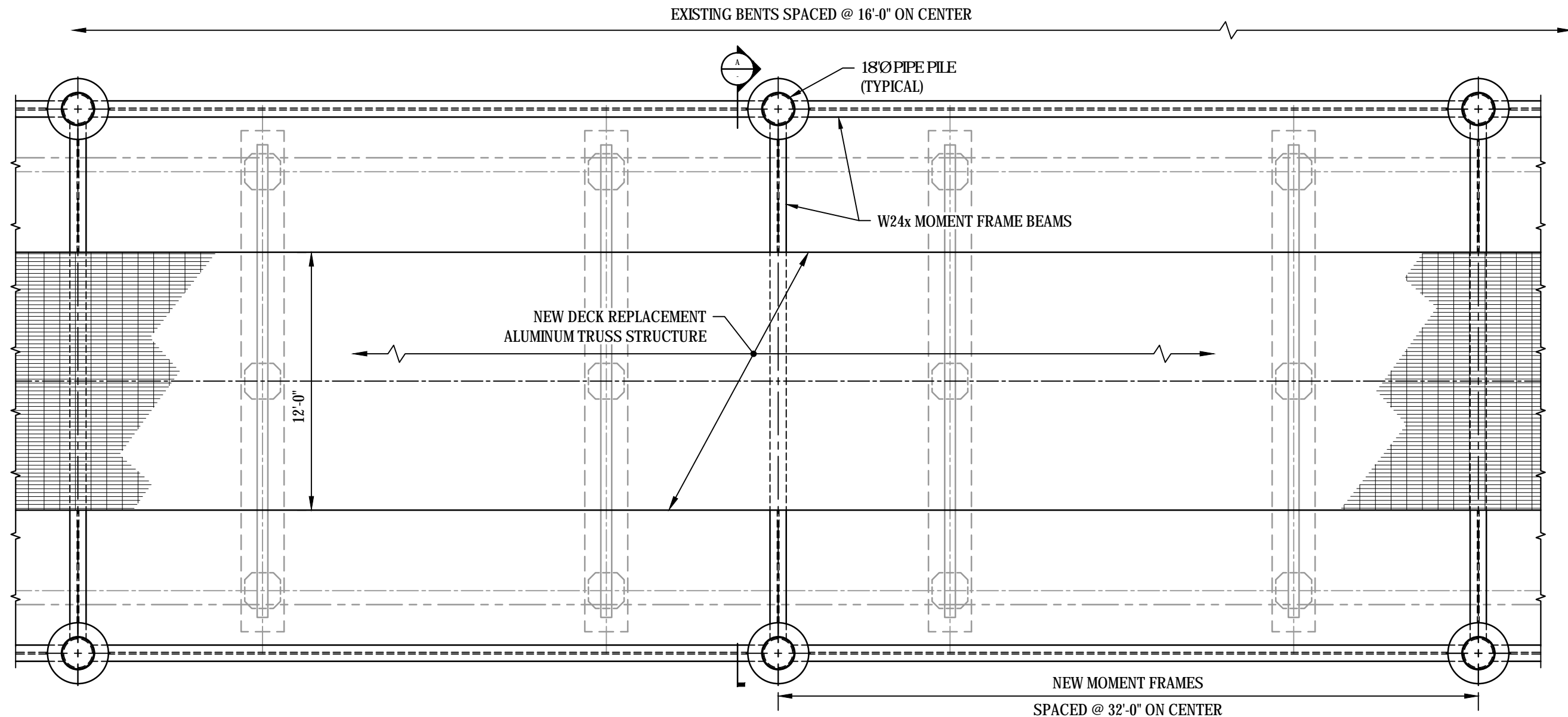


CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

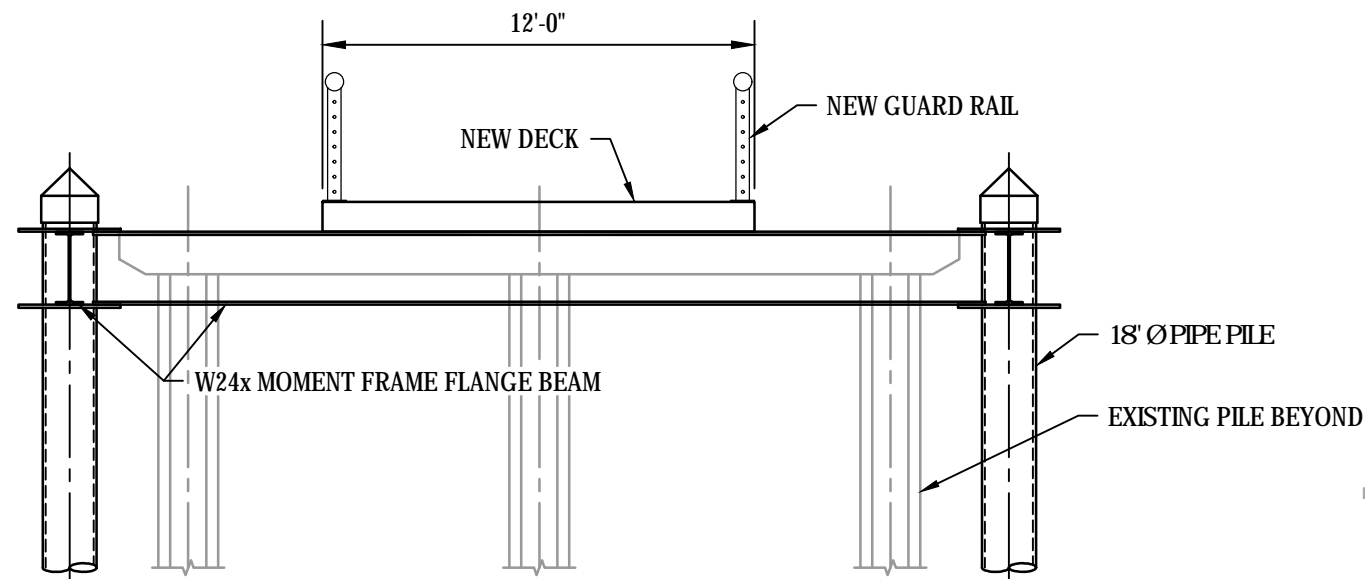
REHABILITATION / RETROFIT CONCEPT
CANTILEVERED PILES WITH PILE BENT FRAMES

Project No. 11125268
Report No. -
Date NOV 2017

FIGURE C-2



1 PLAN
SCALE: 3/16"=1'-0"



A SECTION
SCALE: 3/16"=1'-0"

ALTERNATIVE P6



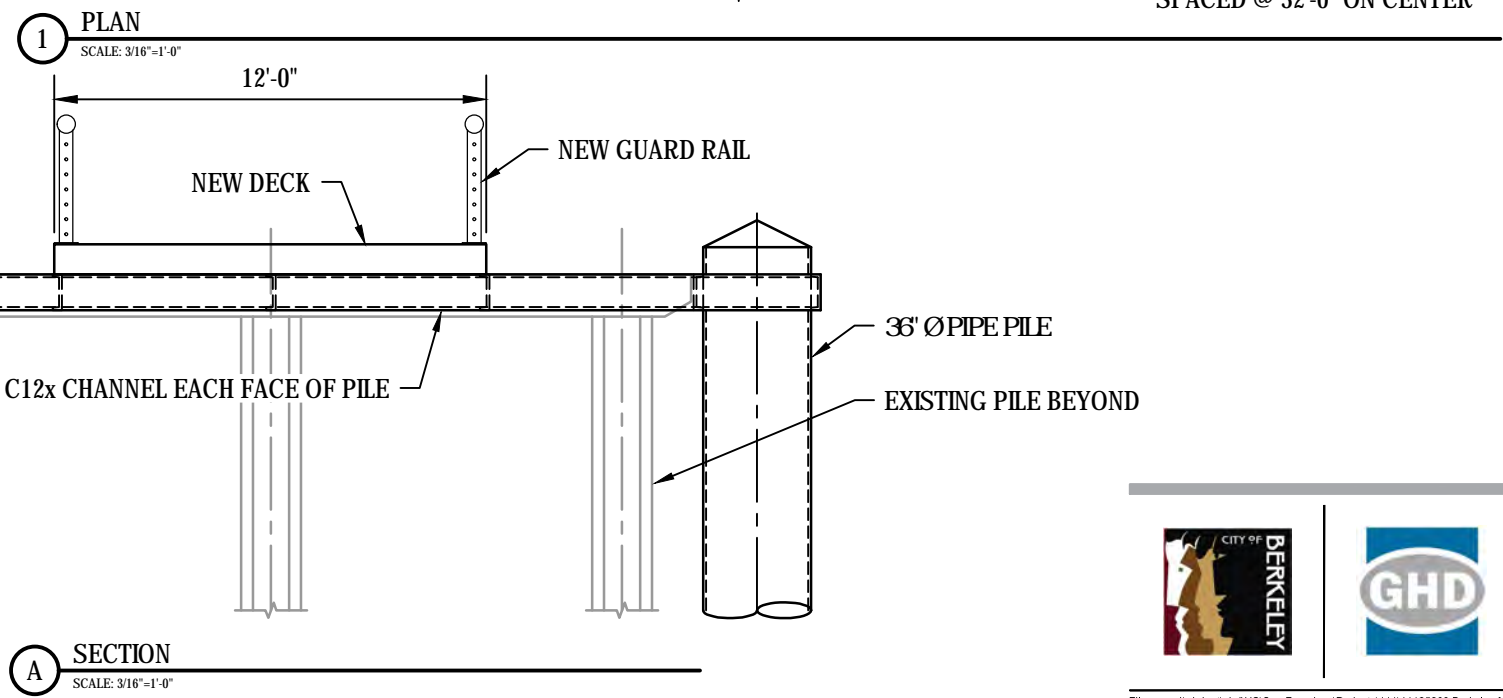
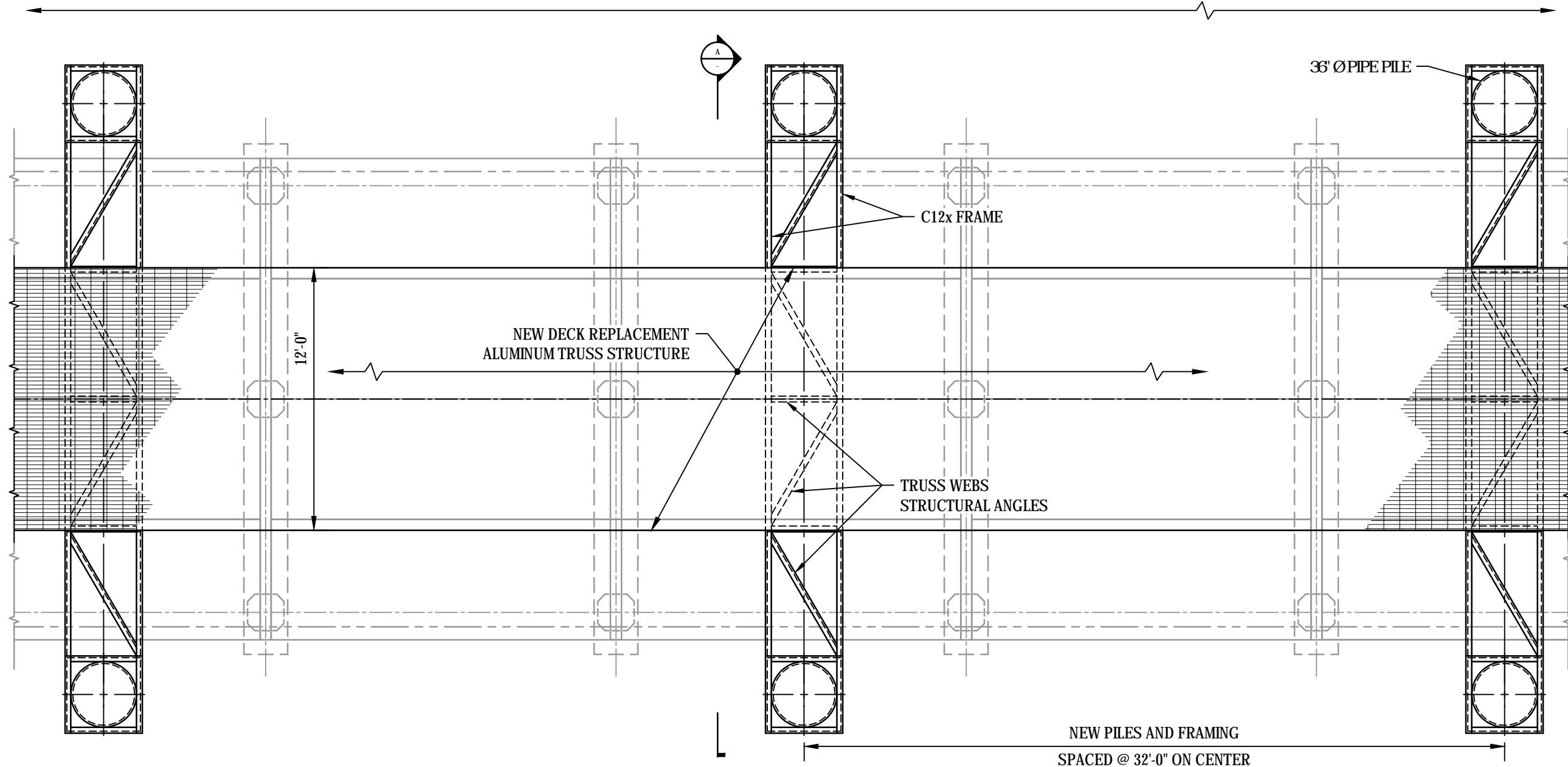
CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

REHABILITATION / RETROFIT CONCEPT
MOMENT FRAME WITH LIGHTWEIGHT DECK REPLACEMENT

Project No. 11125268
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Date NOV 2017

FIGURE C-3

EXISTING BENTS SPACED @ 16'-0" ON CENTER



NOTE:

- 1. NO LONGITUDINAL FRAME THIS OPTION

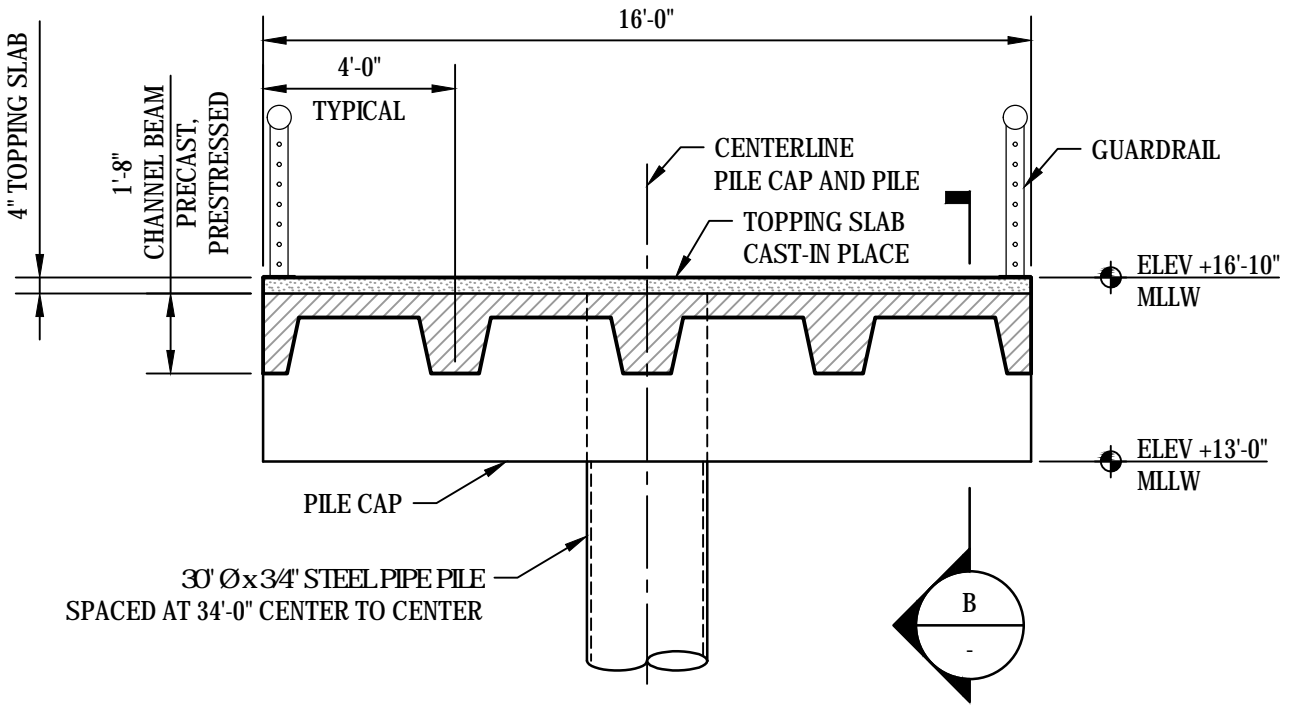
ALTERNATIVE P7



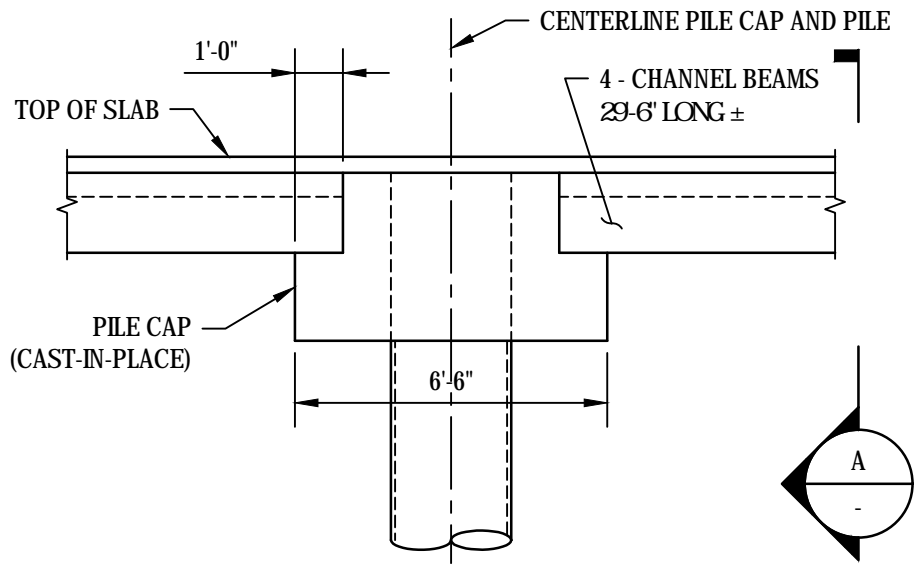
CITY OF BERKELEY
 STRUCTURAL CONDITION ASSESSMENT
 OF BERKELEY MUNICIPAL PIER
 REHABILITATION / RETROFIT CONCEPT
 CANTILEVER PILES WITH LIGHTWEIGHT DECK REPLACEMENT

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 Report No. -
 Date NOV 2017

FIGURE C-4



A SECTION - TRANSVERSE
SCALE: 1/4"=1'-0"



B SECTION - LONGITUDINAL
SCALE: 1/4"=1'-0"

ALTERNATIVE P8

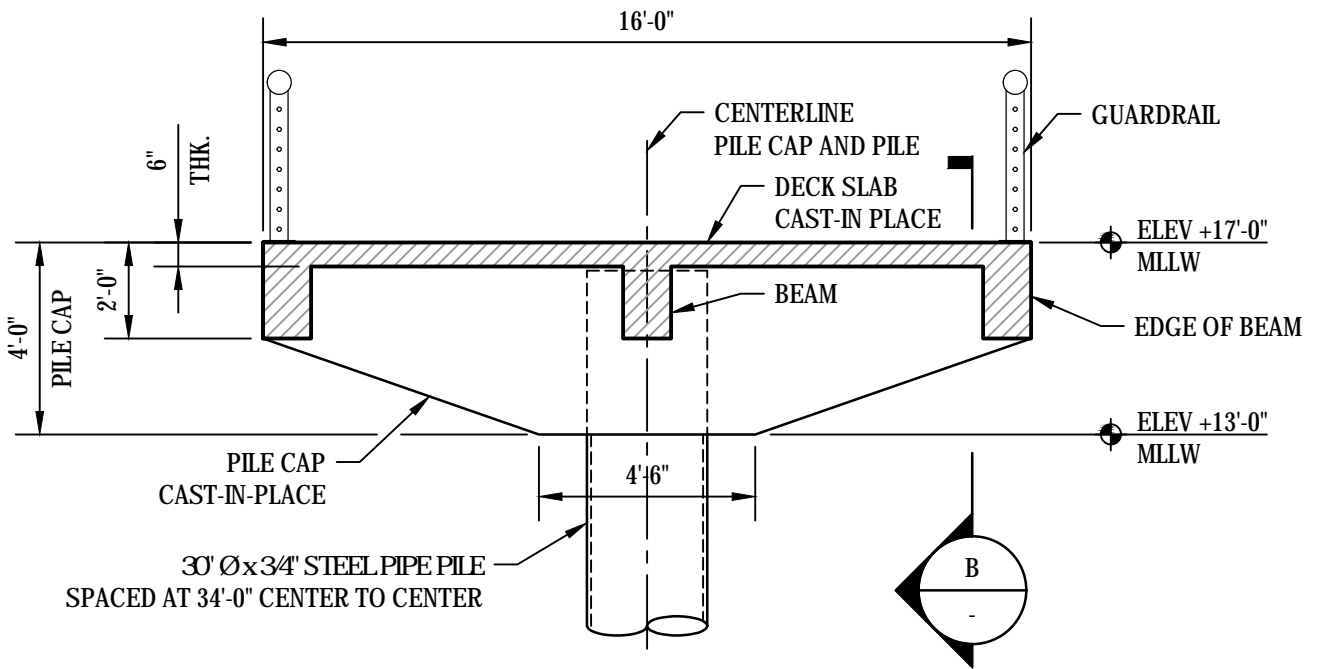


CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

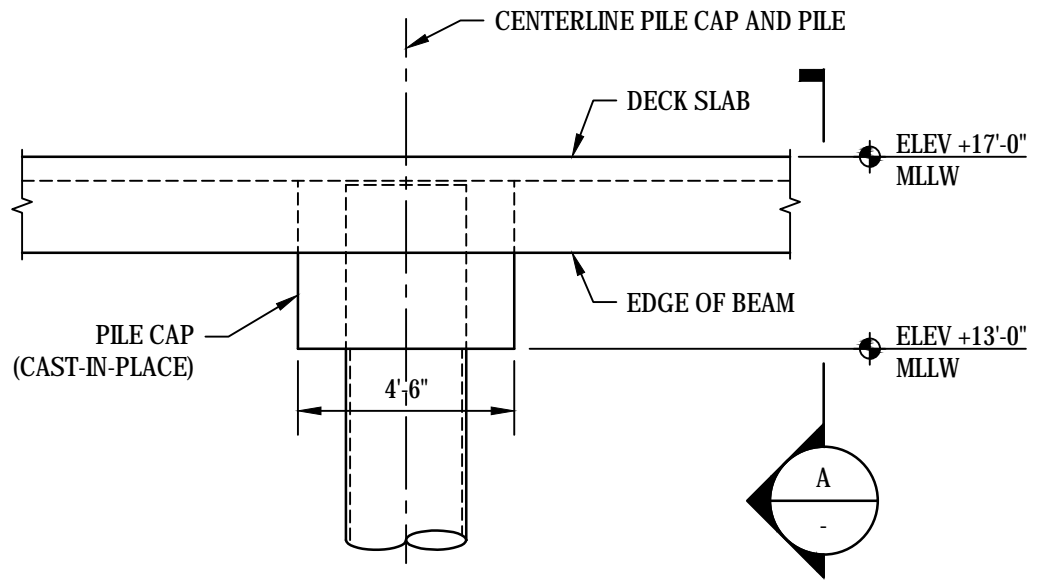
Project No. 11125268
Report No. -
Date NOV 2017

REPLACEMENT PIER
STEEL MONOPILES WITH PRECAST CONCRETE DECK

FIGURE C-5



A SECTION - TRANSVERSE
SCALE: 1/4"=1'-0"



B SECTION - LONGITUDINAL
SCALE: 1/4"=1'-0"

ALTERNATIVE P9

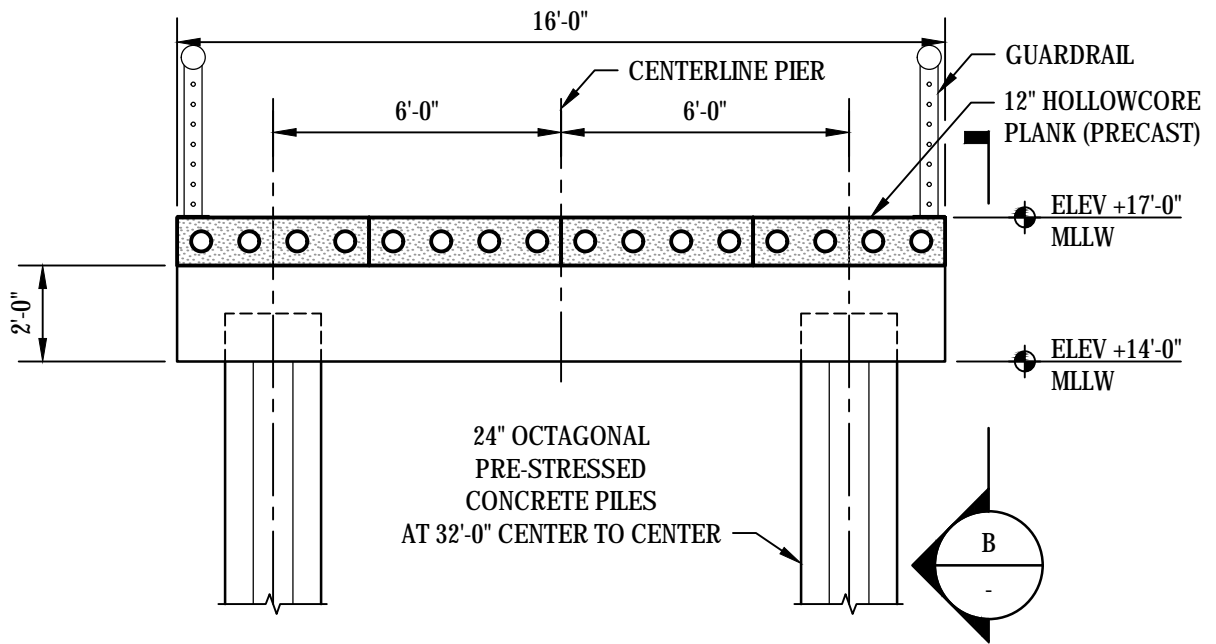


CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

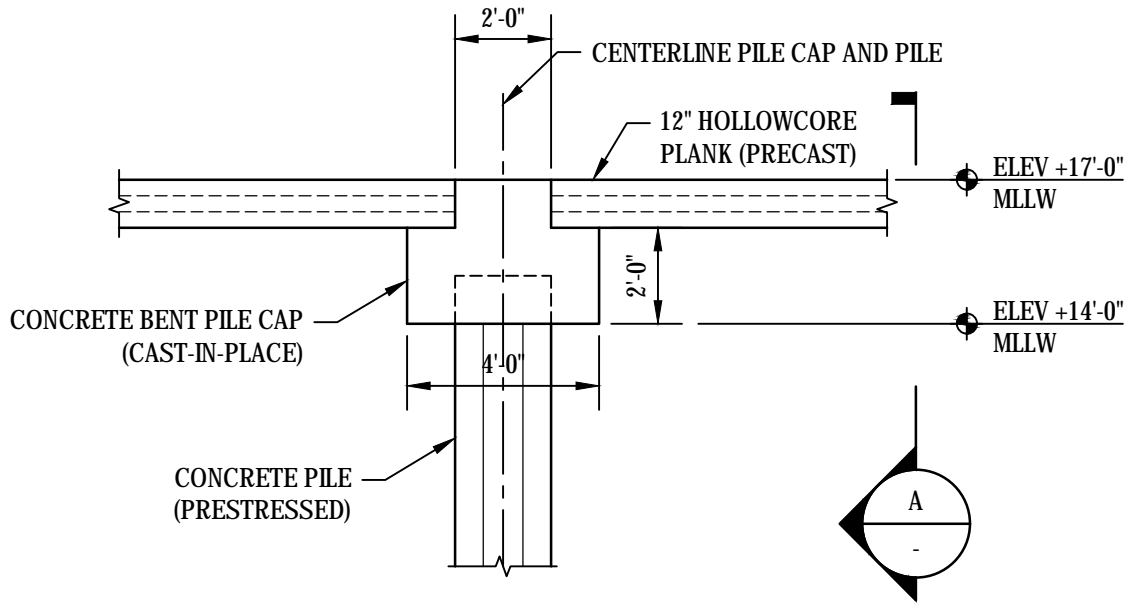
REPLACEMENT PIER
STEEL MONOPILES WITH CIP DECK

Project No. 11125268
Report No. -
Date NOV 2017

FIGURE C-6



A SECTION - TRANSVERSE
SCALE: 1/4"=1'-0"



B SECTION - LONGITUDINAL
SCALE: 1/4"=1'-0"

ALTERNATIVE P10

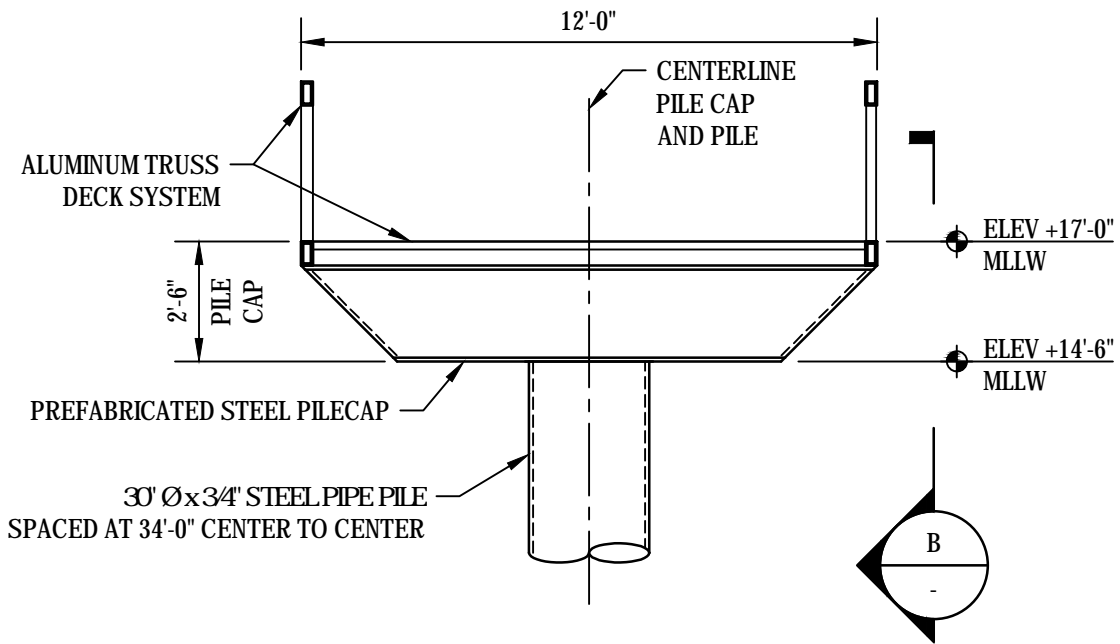


CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

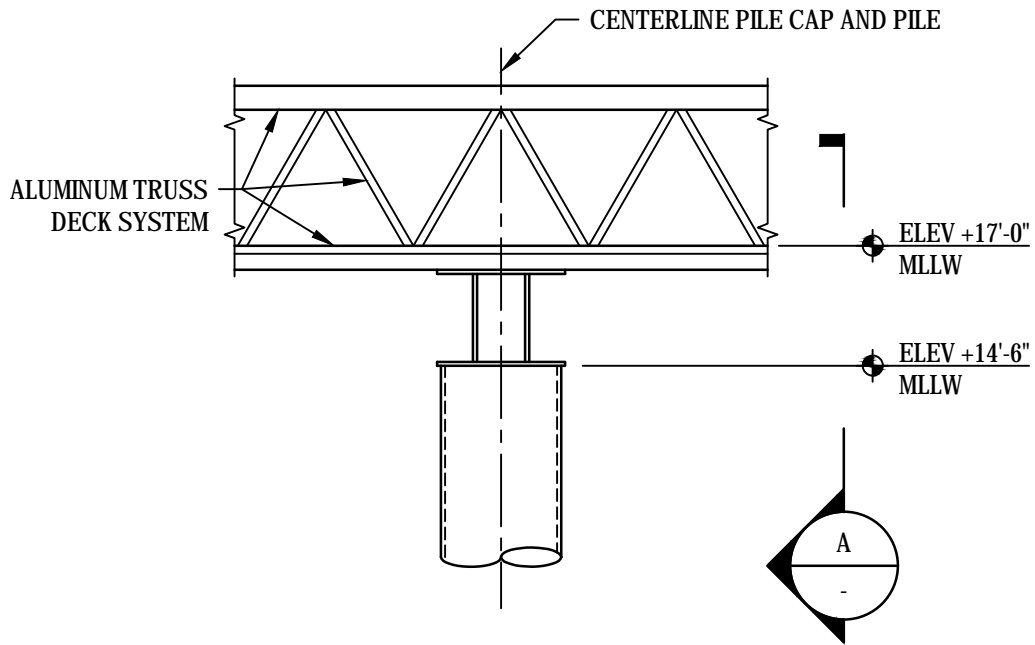
Project No. 11125268
Report No. -
Date NOV 2017

REPLACEMENT PIER
PRECAST CONCRETE PILES AND DECK

FIGURE C-7



A SECTION - TRANSVERSE
SCALE: 1/4"=1'-0"



B SECTION - LONGITUDINAL
SCALE: 1/4"=1'-0"

ALTERNATIVE P11



CITY OF BERKELEY
STRUCTURAL CONDITION ASSESSMENT
OF BERKELEY MUNICIPAL PIER

Project No. 11125268
Report No. -
Date NOV 2017

REPLACEMENT PIER
STEEL MONOPILE WITH LIGHTWEIGHT DECK SYSTEM

FIGURE C-8

Appendix D
Underwater Inspection Report

SEA ENGINEERING, INC.

City of Berkeley, California Berkeley Municipal Pier Underwater Inspection Report



10/17/2017

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2.	Introduction	2
2.1.	Site Description	2
2.2.	Inspection Scope and Methodology	2
3.	Description of Structures	2
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4.2.	Timber Batter Piles	4
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5.2.	Timber Batter Piles	5
6.	Recommendations	6
6.1.	Concrete Encased Timber Support Piles	6
6.2.	Timber Batter Piles	6

APPENDIX 1: FIGURES**APPENDIX 2: PHOTOGRAPHS****APPENDIX 3: INSPECTION NOTES****APPENDIX 4: REFERENCES**



Sea Engineering, Inc.
200 Washington Street, Suite 107
Santa Cruz, CA 95060
PH 831-421-0871 FX 831-421-0875
www.seaengineering.com

VIA ELECTRONIC MAIL

October 17, 2017

GHD
505 Montgomery Street
San Francisco, CA 94111
(415)283-4970

Attention: Craig Lewis, SE (craig.lewis@ghd.com)

Subject: City of Berkeley, CA – Municipal Pier – Underwater Inspection Report

Dear Mr. Lewis,

Sea Engineering, Inc. (SEI) is pleased to present the following Underwater Inspection report to GHD for City of Berkeley, CA (the city) Municipal Pier in Berkeley, CA. SEI prepared this report at the request of GHD and the city following completion of underwater inspection of Municipal Pier piles. The inspections were executed by an SEI team consisting of a PE diver and commercial divers. This report and its appendices were produced by SEI personnel that performed the inspection.

The following report includes an executive summary, descriptions of the piles inspected at Berkeley Pier, an account of the conditions observed during the inspection, evaluation and assessment of the inspected elements, as well as recommended follow up actions. Condition plans, inspection notes, photographs (above water and underwater) and reference material are included in appendices to the report.

1. Executive Summary

SEI performed the underwater inspection of the piles at Berkeley Municipal Pier over ten days between August 7 and August 18, 2017. The inspected portion of Berkeley Municipal Pier is comprised of the accessible portion of the pier from the inshore abutment to pile bent 188 (See Figure 1). Piles inspected by SEI include reinforced concrete encased timber plumb piles and timber batter piles.

Berkeley Municipal Pier concrete encased timber support piles are in **Poor** condition due to widespread corrosion cracks, localized closed and open spalls, and isolated structural cracks. Berkeley Municipal Pier timber batter piles are in **Critical** condition due to section loss from the effects of marine borer infestation and piles disconnected from pile caps. SEI recommends repair of support piles with new partial-height concrete encasements. No repairs are recommended for timber batter piles if lateral loading conditions are expected to remain unchanged.

2. Introduction

2.1. Site Description

Berkeley Municipal Pier is located just off the eastern shore of the San Francisco Bay on the southeast side of the Berkeley Marina in the City of Berkeley, CA 94720 (See Photograph 1). The project site consists of the plumb and batter piles supporting the pier between the abutment and pile bent 188. The Berkeley Municipal Pier has been closed off from public access since 2015 due to poor condition of the reinforced concrete deck planks. The pier was previously used for pedestrian access to the waterfront for fishing and public views of the San Francisco Bay.

2.2. Inspection Scope and Methodology

The scope of the underwater inspection consists of Level I above and below water visual & tactile inspection of 100% of the concrete encased timber support piles and timber batter piles (approximately 600 piles) from the mudline to the pile cap, as well as Level II cleaning and close visual & tactile inspection at three (3) underwater elevations (mudline, mid-water, & tidal zone) on 10% of the concrete encased timber support piles (approximately 56 piles). Level III concrete cores were removed from four (4) concrete encased timber support piles to view the localized condition of the original timber piles. SEI assigned ratings to inspected piles utilizing a condition rating system which follows requirements found in California State Lands Commission (CSLC) Marine Oil Terminal Engineering Standards (MOTEMS) and American Society of Civil Engineers (ASCE) Waterfront Facilities Inspection and Assessment Standard Practice Manual. SEI's inspection notes also provide descriptions of observed damage including; damage type, approximate elevation, location, and extent. Above water and underwater photographs were taken of typical pile damage and deterioration.

SEI completed the underwater inspection of Berkeley Municipal Pier utilizing Surface Supplied Diving (SSD) techniques and equipment which include hardwired communication between the diving inspector and note taker, a continuous low pressure (LP) air supply from a topside diving compressor, as well as back up and emergency high pressure (HP) air. Inspection notes were recorded by hand on pre-printed sheets by the topside note taker during diving operations. Due to water depths of less than 15 feet of seawater (fsw), SEI utilized No Decompression (No "D") dive tables and a three (3) man dive team for the underwater inspection. The dive team was led by Paul Roberts of SEI, a California Registered Professional Engineer (P.E.) and commercially trained and ADCI certified diver, who performed at approximately 50% of the inspection. Armando Gonzalez and Kenny Walton, both ADCI certified commercial divers with SEI, also performed portions of the inspection. Diving operations were staged from SEI's 25' dive boat, MV Response, for the duration of the project.

Following a thorough review of the inspection findings, SEI assigned overall condition ratings to the concrete encased timber plumb piles and timber batter piles using a rating system found in the ASCE Manual 130 (See Appendix 4). Pile damage ratings from the inspection, as well as condition ratings for the piles are provided in the Observed Conditions portion (Section 4) of this report.

3. Description of Structures

3.1. Concrete Encased Timber Support Piles

Berkeley Municipal Pier reinforced concrete pile caps and deck slabs are supported by approximately 564 concrete encased timber piles arranged in 188 bents (280-467), from

Project East to West or inshore to offshore) and three (3) rows (A-C from Project North to South). Typical concrete encasements are square in cross-section and measure 20 in. square (12 in. across the flat portion of each face with approximately 6 in. wide chamfered corners).

3.2. Timber Batter Piles

Timber batter piles are scattered along the north and south edge of Berkeley Municipal Pier, adjacent to A and C row plumb piles. Typical timber batter piles are round in cross section and measure approximately 12 in. in diameter. While reference drawings provided to SEI indicate that there should be two (2) timber batter piles every fourth pile bent, there are approximately only 43 remaining timber batter piles.

4. **Observed Conditions**

4.1. Concrete Encased Timber Support Piles

Berkeley Pier concrete encased timber support piles are in **Poor** condition due to widespread corrosion cracks, localized closed and open spalls, and isolated structural cracks. Pile damage is typically located in the splash zone, between the Mean High Water (MHW) elevation and the pile cap.

Table 4.1 below summarizes the quantity and percentage of Berkeley Pier concrete encased timber support piles observed with each damage type.

Table 4.1 Concrete Encased Timber Support Piles – Damage Summary

	Damage Type					
	Vertical Corrosion Cracks up to ¼ in. wide	Vertical Corrosion Cracks over ¼ in. wide	Closed Spalls	Open Spalls	Structural Cracks up to ¼ in. wide	No Damage
Percentage of Piles (%) *	55%	2%	14%	6%	3%	27%
Number of Piles (#) *	310	10	77	36	15	151

* Some piles exhibit more than one damage type (other than piles with No Damage)

See Photographs 2-7 for examples of vertical corrosion cracks up to ¼ in. wide; Photographs 8-9 for examples of vertical corrosion cracks over ¼ in. wide; Photographs 10-14 for examples of closed spalls; Photographs 15-17 for examples of open spalls; Photograph 18 for an example of a structural crack up to ¼ in. wide; and Photographs 19-20 for examples of undamaged piles.

Table 4.2 below summarizes the Damage Ratings for Berkeley Municipal Pier concrete encased timber support piles (MN = Minor/No Damage, MD = Moderate, MJ = Major, SV = Severe). Guidelines for Condition Assessment Ratings and Reinforced Concrete Damage

Ratings can each be found in Appendix 4. See Figures 1-6, Berkeley Municipal Pier Pile Condition plans, for a visual representation of the pile damage rating locations. Detailed records for each concrete encased timber support pile inspected can be found in Appendix 3.

Table 4.2 Concrete Encased Timber Support Piles – Damage Rating Summary

	Pile Damage Rating				
	No Damage (ND)	Minor (MN)	Moderate (MD)	Major (MJ)	Severe (SV)
# of Piles (564 Inspected)	152	51	256	105	0
% of Piles	27%	9%	45%	19%	0%

Piles rated Minor (MN) typically have occasional corrosion stains or small pop-out corrosion spalls. Piles rated Moderate (MD) typically exhibit corrosion cracks up to ¼ in. wide or structural cracks up to 1/16 in. wide. Piles rated Major (MJ) typically have open or closed spalls, corrosion cracks wider than ¼ in., or structural cracks 1/16 in. to ¼ in. wide.

Level III concrete cores were removed from four (4) piles: 301C, 358A, 386C, and 429A. No damage was noted on any of the four piles during visual inspection of the exposed concrete or timber (See Photographs 21-22).

4.2. Timber Batter Piles

Berkeley Municipal Pier timber batter piles are in **Critical** condition due to section loss from the effects of marine borer infestation (See Photograph 23) and piles disconnected from pile caps.

Table 4.3 below summarizes the quantity and percentage of Berkeley Pier timber batter piles observed with each damage type.

Table 4.3 Timber Batter Piles – Damage Summary

	Damage Type			
	Section Loss From Marine Borer [†]	Pile Disconnected from Cap*	Minor Checks & Splits	No Damage
Approximate Percentage of Piles (%)	79%	21%	7%	2%
Approximate Number of Piles	34	9	3	1

- * Piles disconnected from cap may also exhibit section loss from the effects of marine borer activity

Table 4.4 below summarizes the Damage Ratings for Berkeley Municipal Pier timber batter piles. Guidelines for Condition Assessment Ratings and Timber Structural Element Damage Ratings can each be found in Appendix 4. See Figures 1-6, Berkeley Municipal Pier condition plans, for a visual representation of the timber batter pile damage rating locations. Detailed records for each timber batter pile inspected can be found in Appendix 3.

Table 4.4 Timber Batter Piles – Damage Rating Summary

	Pile Damage Rating				
	No Damage (ND)	Minor (MN)	Moderate (MD)	Major (MJ)	Severe (SV)
# of Piles (43 Inspected)	1	3	5	5	29
% of Piles	2%	7%	12%	12%	67%

Piles rated Minor (MN) typically have checks or splits less than ½ in. wide. Piles rated Moderate (MD) typically exhibit evidence of marine borer activity and section loss up to 25%. Piles rated Major (MJ) typically have section loss 25 to 50% from the effects of marine borer infestation. Piles rated Major (SV) typically exhibit section loss more than 50% and/or loss of connection between the pile and pile cap.

5. Evaluation and Assessment

5.1. Concrete Encased Timber Support Piles

Damage to concrete encased timber support piles is typically the result of corrosion to the steel reinforcement. Over the approximately 91 years following installation of the encased piles, chlorides from the San Francisco Bay have intruded through the concrete to the embedded depth of steel rebar. In the splash zone and tidal zone, where the relative oxygen content is high and cycles of wetting and drying occur, steel rebar has corroded. Corrosion product (rust) expands in the concrete, resulting in vertical corrosion cracks, closed spalls and open spalls.

While there is widespread advanced deterioration of the concrete encasements, it does not significantly reduce the load-bearing capacity of the structure. No severe damage (structural cracks wider than ¼ in., section loss of more than 30%, broken encasements) was observed during the inspection.

5.2. Timber Batter Piles

While there is widespread advanced damage to the timber batter piles (failed connections, severe section loss), it does not significantly reduce the load-bearing capacity of the structure. Lateral loading of the pier is limited to environmental forces (wind, waves and currents) and it is likely that the concrete encased timber support piles provide sufficient resistance as no sign of

overstress was observed during the inspection, even though the majority of the original timber batter piles are missing.

6. Recommendations

6.1. Concrete Encased Timber Support Piles

SEI recommends repair of concrete piles with corrosion cracks, closed spalls, open spalls and structural cracks. Typical repairs recommended for these damage types include removal of loose concrete, replacement corroded rebar, and encasement of the damaged area in reinforced concrete.

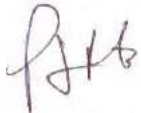
6.2. Timber Batter Piles

No repairs are recommended for timber batter piles if lateral loading conditions are expected to remain unchanged.

If you have any questions, please don't hesitate to contact me.

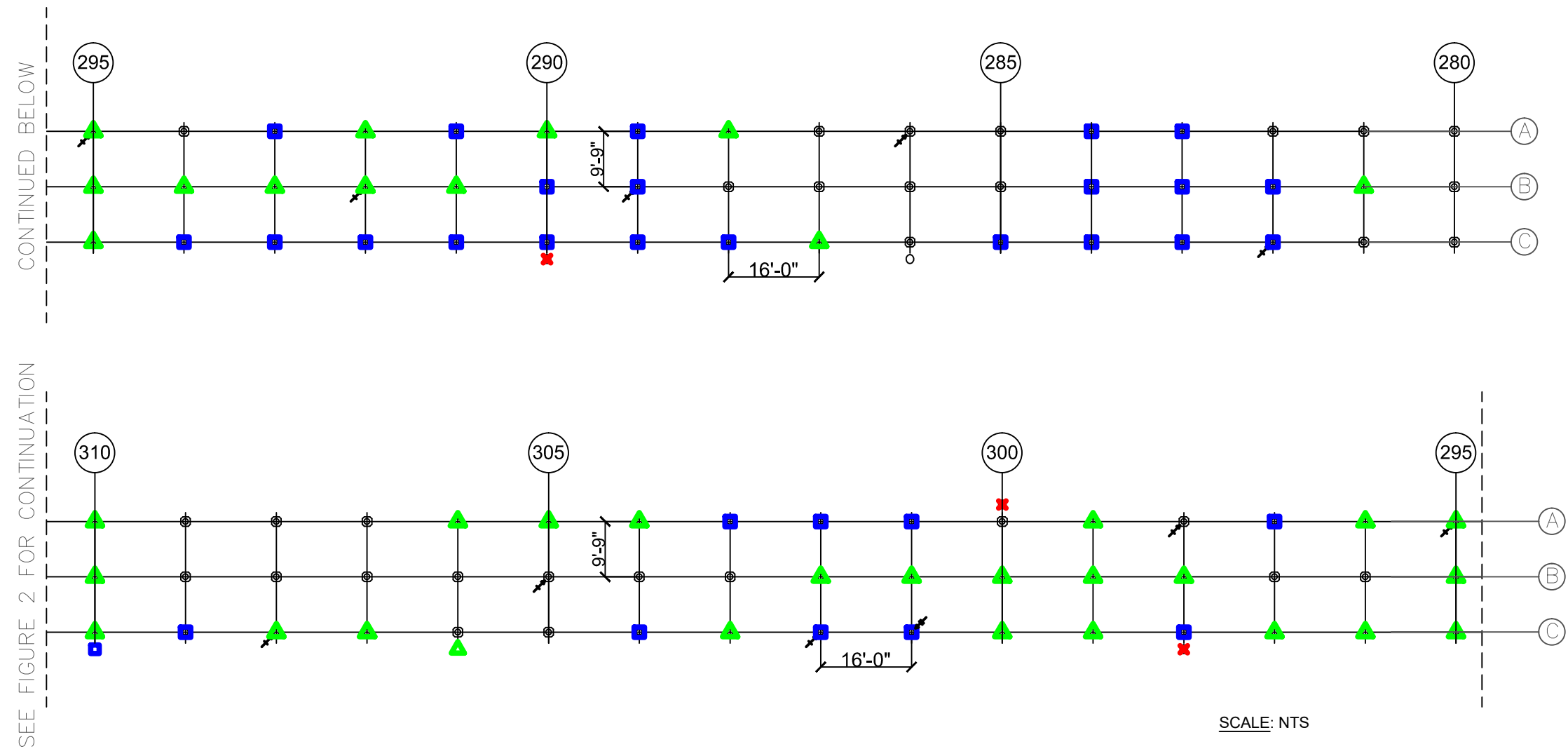
Very truly yours,

SEA ENGINEERING, INC.

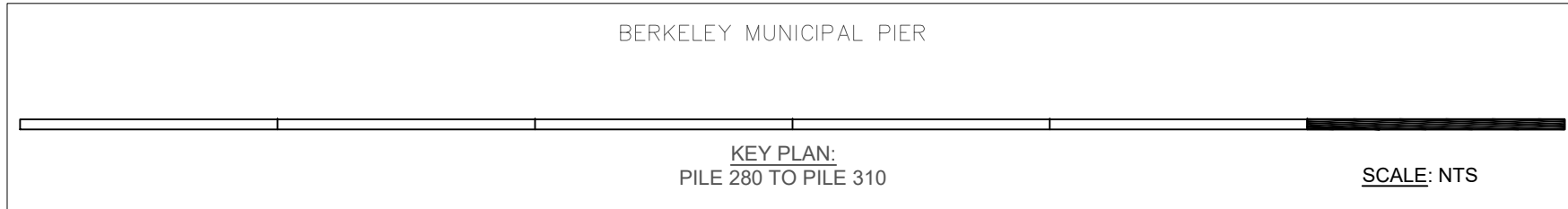


Paul L. Roberts, P.E.
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APPENDIX 1:
FIGURES



- LEGEND**
- PILE RATED MINOR OR NO DEFECT
 - △ PILE RATED MODERATE
 - PILE RATED MAJOR
 - ✗ PILE RATED SEVERE
 - ↗ LEVEL II INSPECTION LOCATION
 - ↘ LEVEL III INSPECTION LOCATION



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 FAX 831.421.0875

NOTES:



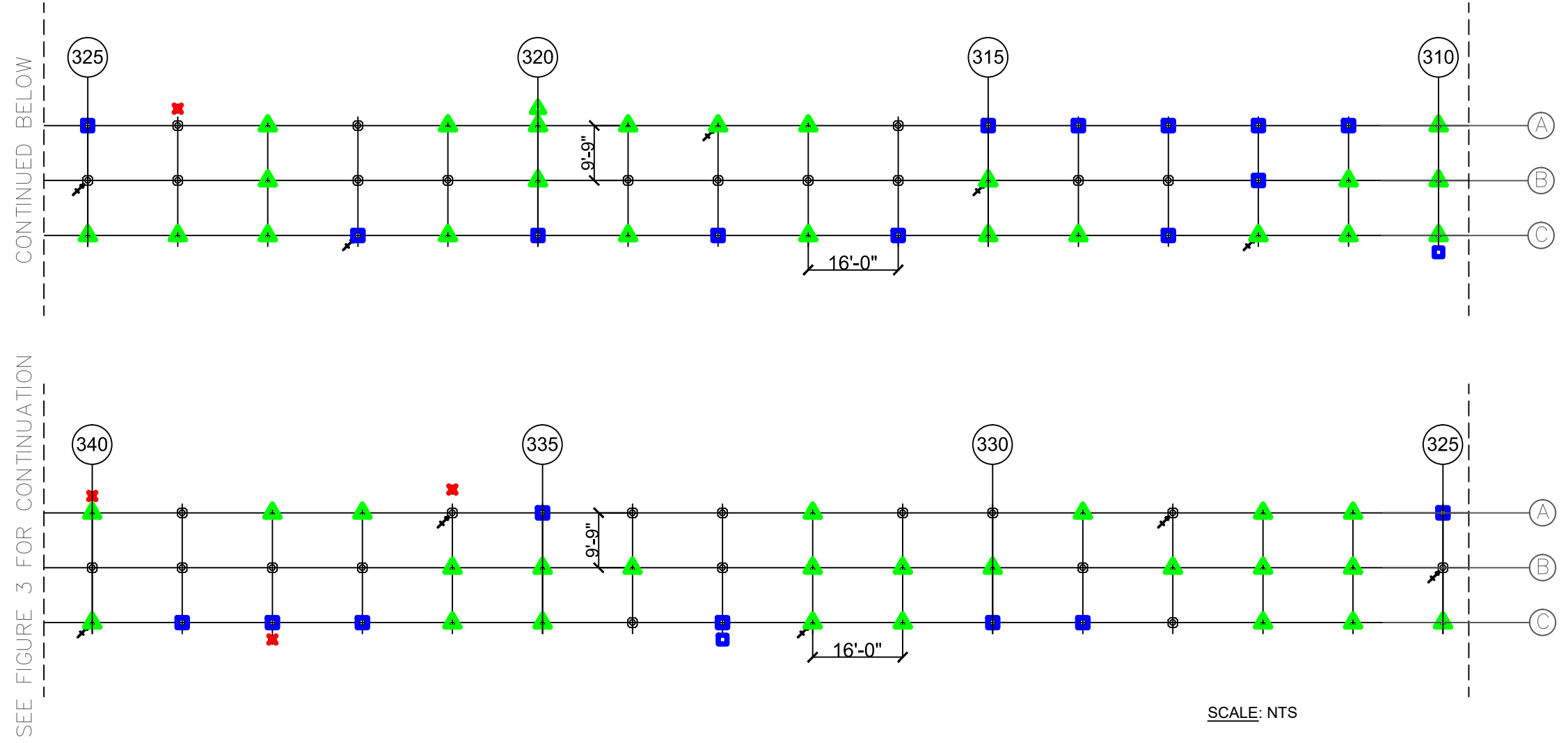
CITY OF BERKELEY
 DEPARTMENT OF PARKS,
 RECREATION AND WATERFRONT

PROJECT NUMBER: 35231
 PROJECT ENGINEER: PR
 DRAWN BY:
 CHECKED BY:
 SCALE: VARIES
 DATE: OCTOBER 3, 2017

BERKELEY MUNICIPAL PIER
 CONDITION PLAN (1/6)

UNDERWATER
 INSPECTION REPORT

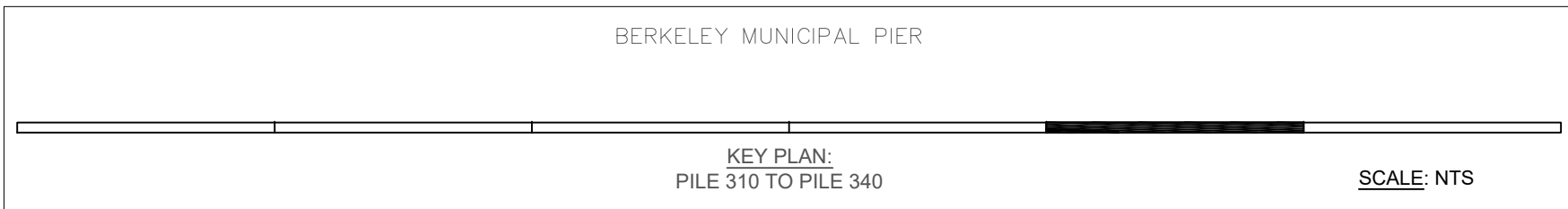
FIGURE NO. 1 RING 1/6



SCALE: NTS

LEGEND

- PILE RATED MINOR OR NO DEFECT
- △ PILE RATED MODERATE
- PILE RATED MAJOR
- ✗ PILE RATED SEVERE
- ↗ LEVEL II INSPECTION LOCATION
- ↘ LEVEL III INSPECTION LOCATION



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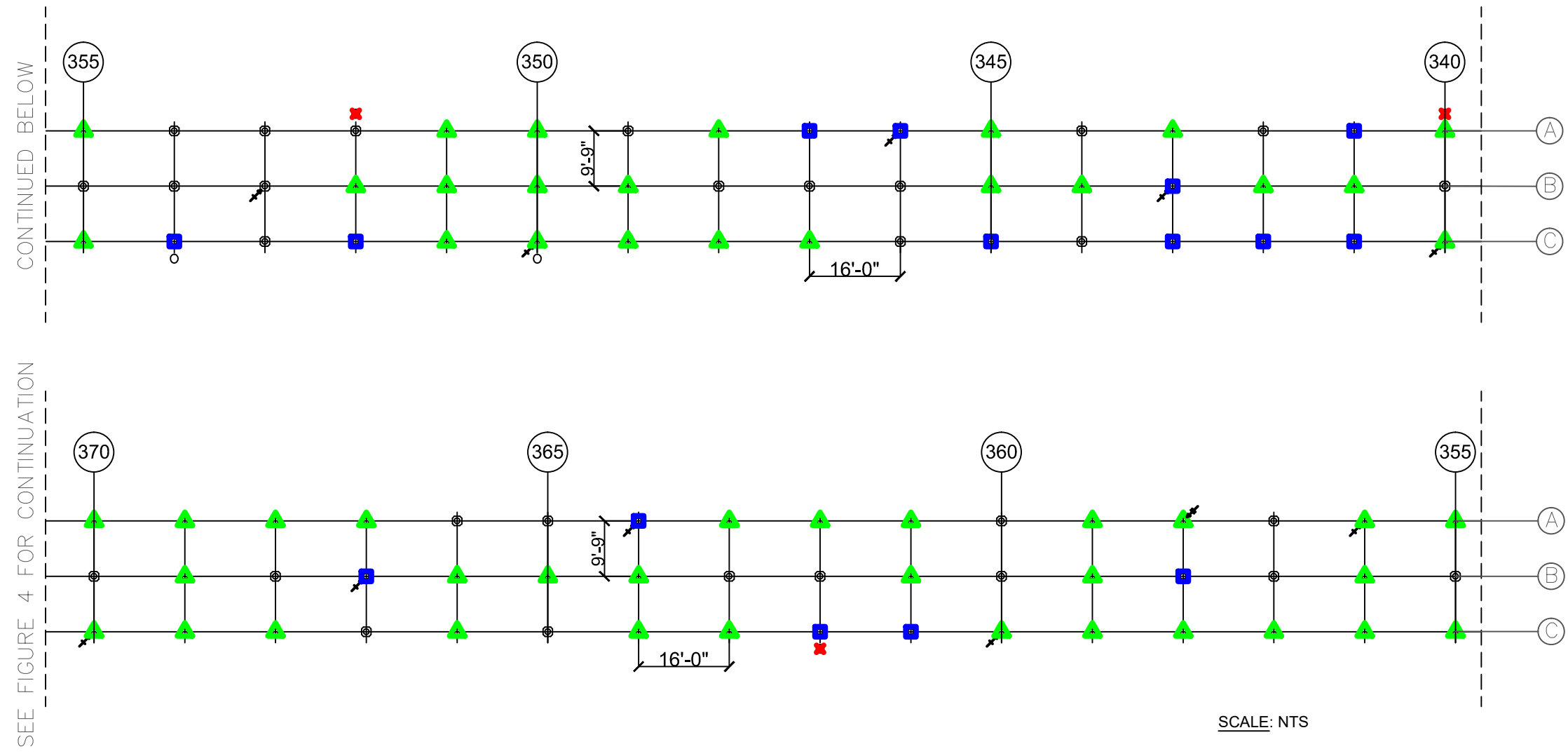
NOTES:



CITY OF BERKELEY
 DEPARTMENT OF PARKS,
 RECREATION AND WATERFRONT

PROJECT NUMBER: 35231
 PROJECT ENGINEER: PR
 DRAWN BY:
 CHECKED BY:
 SCALE: VARIES
 DATE: OCTOBER 3, 2017

BERKELEY MUNICIPAL CONDITION PLAN (2/6)	UNDERWATER INSPECTION REPORT



- LEGEND**
- PILE RATED MINOR OR NO DEFECT
 - ▲ PILE RATED MODERATE
 - PILE RATED MAJOR
 - ✗ PILE RATED SEVERE
 - ↗ LEVEL II INSPECTION LOCATION
 - ↘ LEVEL III INSPECTION LOCATION



KEY PLAN:
PILE 340 TO PILE 370

SCALE: NTS

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NOTES:

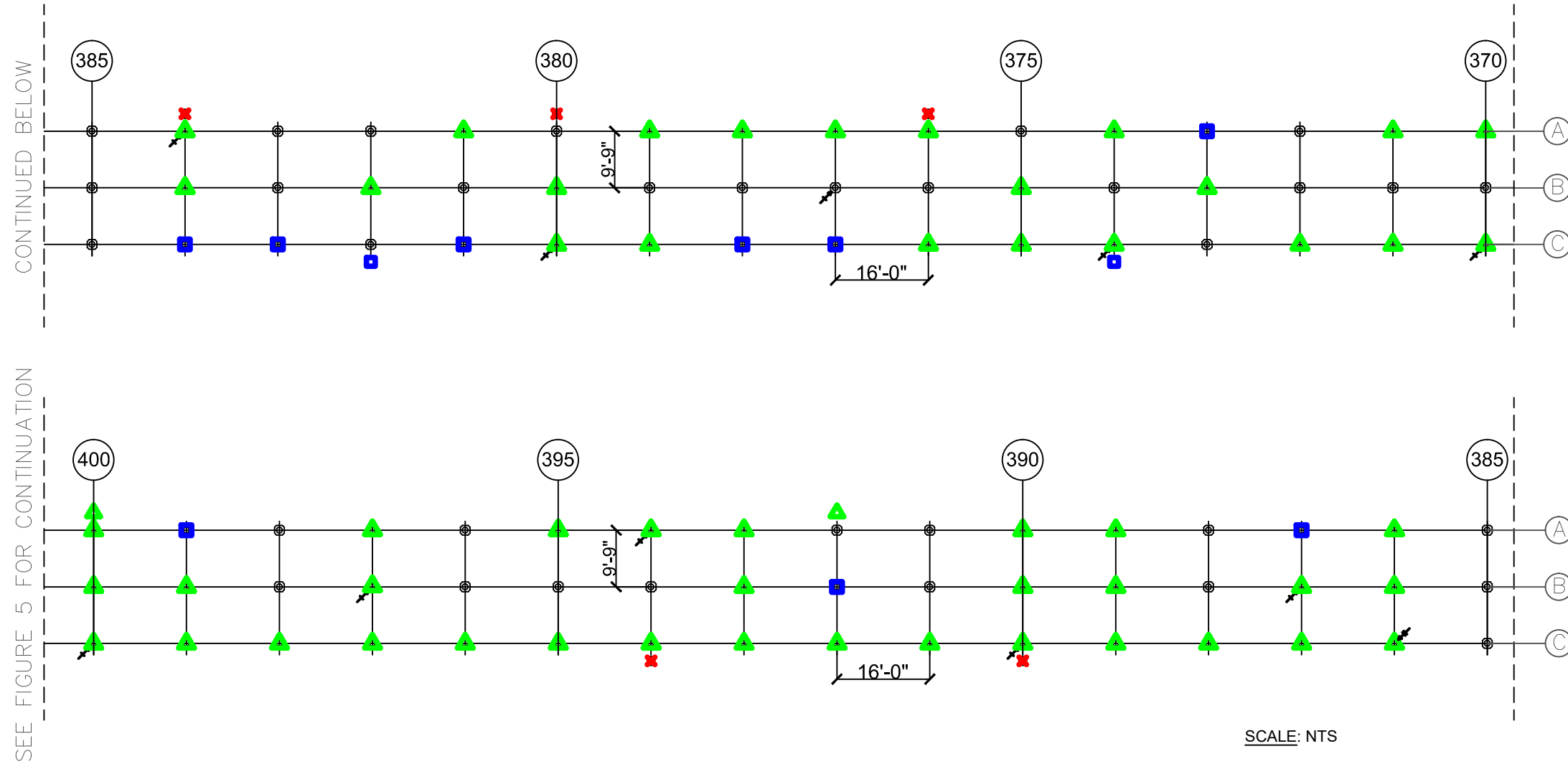


CITY OF BERKELEY
 DEPARTMENT OF PARKS,
 RECREATION AND WATERFRONT

PROJECT NUMBER: 35231
 PROJECT ENGINEER: PR
 DRAWN BY:
 CHECKED BY:
 SCALE: VARIES
 DATE: OCTOBER 3, 2017

BERKELEY PIER
 MUNICIPAL
 CONDITION PLAN (3/6)
 UNDERWATER
 INSPECTION REPORT

FIGURE NO. 3 RING 3/6



LEGEND

- PILE RATED MINOR OR NO DEFECT
- PILE RATED MODERATE
- PILE RATED MAJOR
- PILE RATED SEVERE
- LEVEL II INSPECTION LOCATION
- LEVEL III INSPECTION LOCATION



KEY PLAN:
PILE 370 TO PILE 400

SCALE: NTS



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NOTES:



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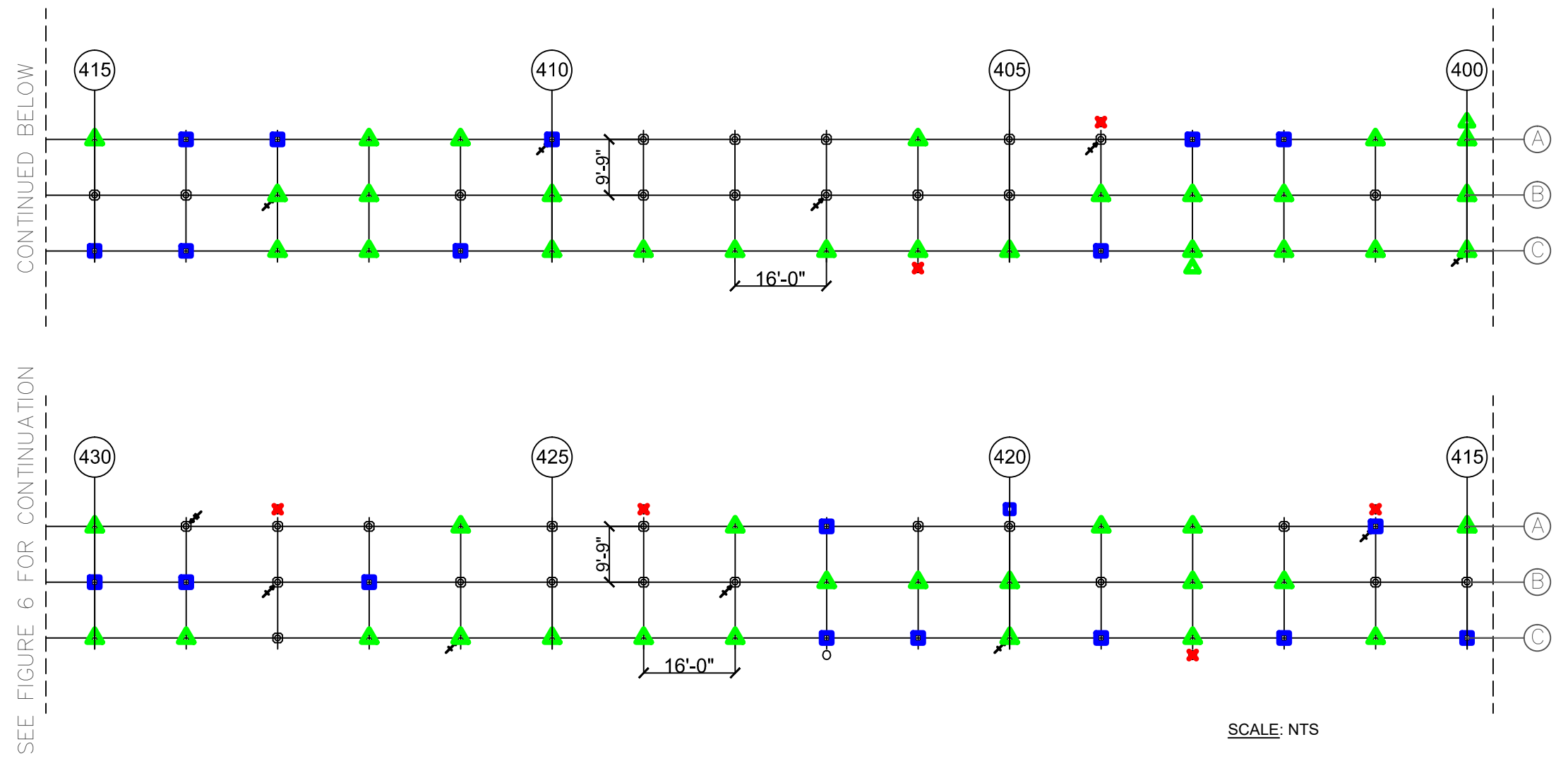
PROJECT NUMBER: 35231
 PROJECT ENGINEER: PR
 DRAWN BY:
 CHECKED BY:
 SCALE: VARIES
 DATE: OCTOBER 3, 2017

BERKELEY PIER
 MUNICIPAL
 CONDITION
 PLAN (4/6)

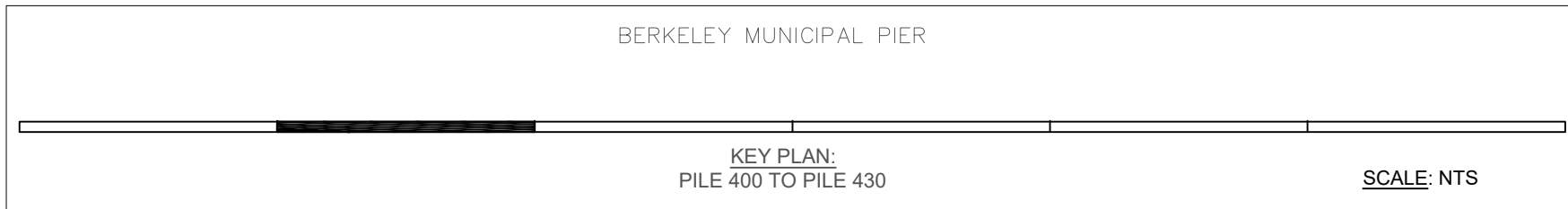
UNDERWATER
 INSPECTION REPORT

FIGURE NO.
4

RING:
4
6



- LEGEND**
- PILE RATED MINOR OR NO DEFECT
 - ▲ PILE RATED MODERATE
 - PILE RATED MAJOR
 - ✗ PILE RATED SEVERE
 - ↗ LEVEL II INSPECTION LOCATION
 - ↘ LEVEL III INSPECTION LOCATION



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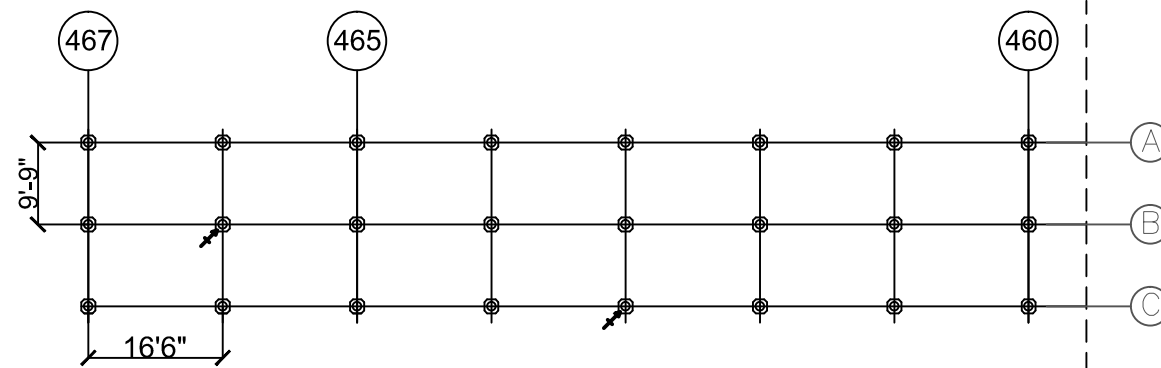
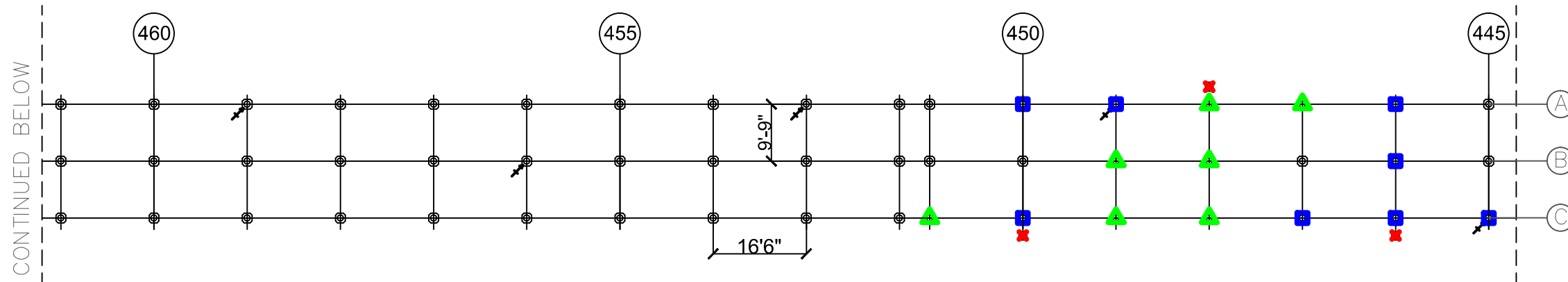
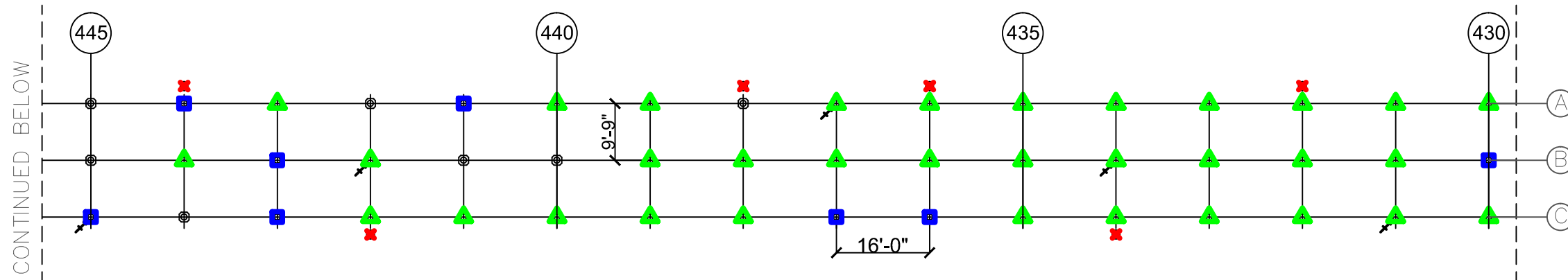
NOTES:



CITY OF BERKELEY
 DEPARTMENT OF PARKS,
 RECREATION AND WATERFRONT

PROJECT NUMBER: 35231
 PROJECT ENGINEER: PR
 DRAWN BY:
 CHECKED BY:
 SCALE: VARIES
 DATE: OCTOBER 3, 2017

BERKELEY MUNICIPAL PIER CONDITION PLAN (5/6)	UNDERWATER INSPECTION REPORT
FIGURE NO. 5	RING 5/6



LEGEND

- PILE RATED MINOR OR NO DEFECT
- PILE RATED MODERATE
- PILE RATED MAJOR
- PILE RATED SEVERE
- LEVEL II INSPECTION LOCATION
- LEVEL III INSPECTION LOCATION

SCALE: NTS

BERKELEY MUNICIPAL PIER



KEY PLAN:
PILE 430 TO PILE 467

SCALE: NTS



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NOTES:



CITY OF BERKELEY
 DEPARTMENT OF PARKS,
 RECREATION AND WATERFRONT

PROJECT NUMBER: 35231
 PROJECT ENGINEER: PR
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 CHECKED BY:
 SCALE: VARIES
 DATE: OCTOBER 3, 2017

BERKELEY MUNICIPAL PIER
 MUNICIPAL CONDITION PLAN (6/6)
 UNDERWATER INSPECTION REPORT

FIGURE NO. 6 RING 6

APPENDIX 2:
PHOTOGRAPHS



PHOTOGRAPH 1: Berkeley Municipal Pier



PHOTOGRAPH 2: Pile 287C, vertical crack ¼ in. wide



PHOTOGRAPH 3: Pile 306A, vertical crack less than $\frac{1}{4}$ in. wide



PHOTOGRAPH 4: Pile 379C, vertical crack less than $\frac{1}{4}$ in. wide with corrosion staining and efflorescence



PHOTOGRAPH 5: Pile 384B, vertical crack 1/4 in. wide



PHOTOGRAPH 6: Pile 423C, vertical crack 1/4 in. wide



PHOTOGRAPH 7: Pile 423B, vertical crack less than $\frac{1}{4}$ in. wide (Tidal Zone Level II)



PHOTOGRAPH 8: Pile 289C, vertical crack wider than $\frac{1}{4}$ in.



PHOTOGRAPH 9: Pile 304C, vertical crack wider than 1/4 in.



PHOTOGRAPH 10: Pile 303A, closed spall



PHOTOGRAPH 11: Pile 311A, closed spall



PHOTOGRAPH 12: Pile 408C, closed spall



PHOTOGRAPH 13: Pile 443C, closed spall



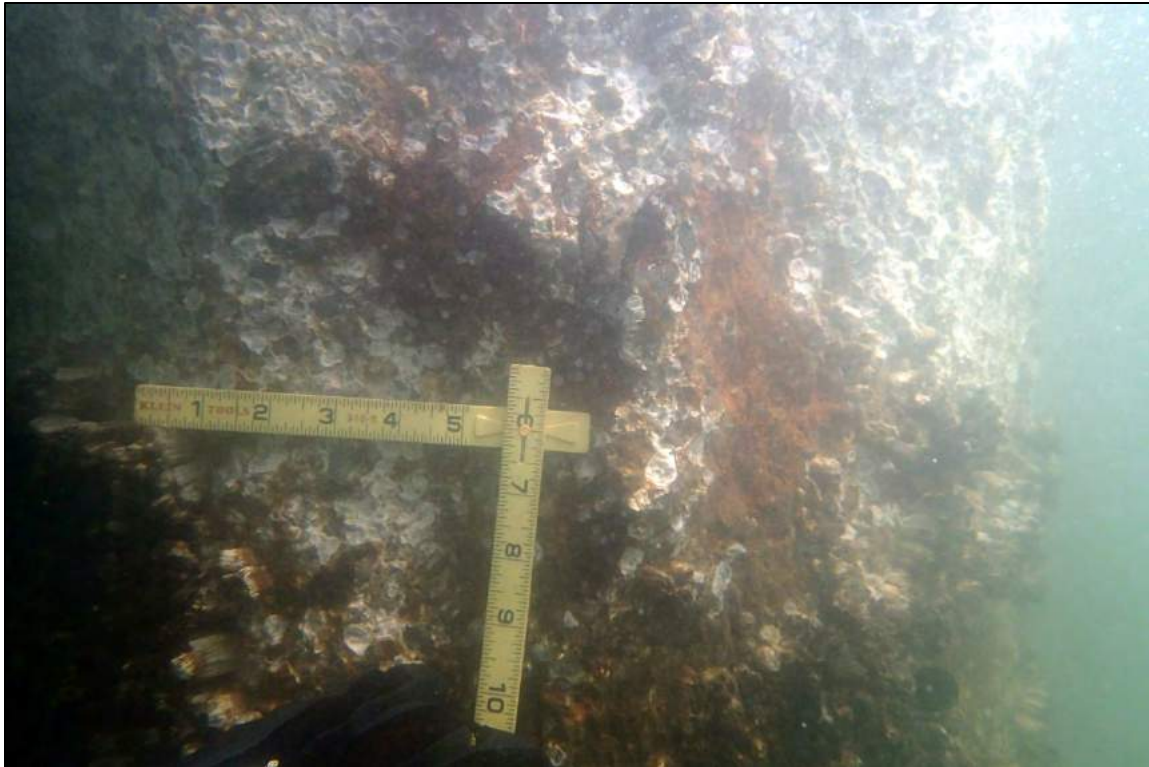
PHOTOGRAPH 14: Pile 445C, closed spall



PHOTOGRAPH 15: Pile 339C, open spall



PHOTOGRAPH 16: Pile 403C, open spall



PHOTOGRAPH 17: Pile 445C, open spall (underwater Level II)



PHOTOGRAPH 18: Pile 301C, horizontal crack



PHOTOGRAPH 19: Pile 309A, undamaged



PHOTOGRAPH 20: Pile 366A, undamaged



PHOTOGRAPH 21: Pile 429A, Level III concrete core hole



PHOTOGRAPH 22: Pile 429A, view of concrete and timber inside Level III core hole



PHOTOGRAPH 23: Pile 376A-BATT, Severe section loss from marine borer

APPENDIX 3:
INSPECTION NOTES

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 0915		Tide: +2.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
286	A	X		6'		X					CONCRETE ENCASED TIMBER BEARING PILE (TYP A, B, C)
286	B					X					
286	C					X					
286	C-BATT						X				TIMBER BATTER PILE (TYP C-BAT, A-BAT)
287	C							X			VERTICAL CRACK (VC) NORTHWEST (NW) CORNER (CRNR) 1/4" WIDE (W) X 8" LONG (L), VC SW CRNR 1/4" W X 3' L AT PILE TOP
287	B					X					
287	A					X					
288	A							X			VC WEST (W) FACE 1/16" W X 3' L WITH (W/) CORROSION CORROSION STAIN (CS) AT PILE TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 0944		Tide: +2.5'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
288	B					X					
288	C								X		1/2 SQUARE FOOT (SF) CLOSED SPALL SW CRNR AT TOP
289	C								X		3 SF OPEN/CLOSED SPALL W/EXPOSED REBAR AND MULTIPLE VC UP TO 1/2" WIDE SE CRNR AT TOP
289	B	X		6'					X		2 SF X 1" DEEP OPEN SPALL S FACE / SW CRNR W/CS APPROX. 6' BELOW (BLW) PILE CAP (PC). VC 1/8" W X 2' L EXTENDING UPWARD FROM SPALL
289	A								X		VC 1/8" W X 4' L W' CS SE CRNR 1' BLW PC. OPEN/CLOSED OPEN SPALL 1 SF X 1.5" DEEP W/CS NE CRNR 4' BLW PC. SPALL 1/2 SF X 1" DEEP W/CS NE CRNR 6' BLW PC. VC 1/16" W X 2.5' L AT TOP. CS 2" DIAMETER (DIA) S FACE 2' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 0944		Tide: +2.5'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
290	A							X			CS N FACE 2' BLW PC. VC 1/8" W X 2' L NE CRNR AT TOP. VC 1/4" W X 3' L NW CRNR AT TOP
290	B								X		OPEN SPALL 2 SF X 1" DEEP NW CRNR W/CS. CS 2" DIA W FACE 3' BLW PC
290	C								X		VC 1/16" W X 4' LONG W/ EFFLORESCENCE (EFF) SW CRNR AT TOP. OPEN/CLOSED SPALL 4 SF X 2.5" DEEP SW CRNR 5' BLW PC
290	C-BATT									X	90% SECTION LOSS (SL) FROM MARINE BORER (MB)
291	C								X		CLOSED SPALL 3 SF W/VC 1/8" W X 4' L W/CS S FACE AT TOP. VC 1/8" W X 3' L W/CS SW CRNR AT TOP. CLOSED SPALL 2 SF W/CS NW CRNR AT TOP. VC 1/16" X 2' W/CS...
ADDITIONAL COMMENTS:											
PILE 291-C NOTES CONTINUED: ...E FACE AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 0944		Tide: +2.5'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
291	B							X			VC 1/8" x 21" W/CS N FACE 2' BLW PC
291	A								X		OPEN SPALL 6"X2" DEEP N FACE 2' BLW PC (REMNANT BLACK EPOXY PAINT/COAT ON PARTS OF SPALLED AREA)
292	A							X			VC HL X 3' W/CS NW CRNR AT TOP VC HL X 3' W FACE AT TOP VC 1/8"X1' W/CS SW CRNR 3' BLW PC VC 1/16"X1' W/CS S FACE 3' BLW PC VC 1/16"X1.5' W/CS SE CRNR 3' BLW PC VC HLX X 1' W/CS E FACE 3 BLW. ...
ADDITIONAL COMMENTS:											
PILE 292-A NOTES CONTINUED... VC 1/16" X 1.5' W/CS NE CRNR 3' BLW											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1042		Tide: +3.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
292	B	X		8'				X			VC 1/16"X1.5' W/CS W FACE 2' BLW PC
											VC 1/16" X 3' W/CS N FACE 1' BLW PC
											HONEYCOMBING N FACE 3' AT TOP. CLEANED ML, MW & TZ
292	C								X		VC 1/16" X 3' W/CS S FACE AT TOP
											CLOSED SPALL 4 SF W/C SE CRNR AT TOP
											VC HL X 1' W/C E FACE 1' BLW PC
293	C								X		VC 1/8" X 5' W/CS S FACE AT TOP.
											VC 1/8" X 5' W/CS SE CRNR AT TOP.
											CLOSED SPALL 3 SF SW CRNR AT TOP W/ASSOCIATED
											CRACKING UP TO 1/4" WIDE AND CS
											VC HL X 2' W/CS W FACE AT TOP...
ADDITIONAL COMMENTS:											
PILE 293-C NOTES CONTINUED: ... VC 1/16" X 3' W FACE AT TOP ; VC 1/16"X 1.5' NW CRNR 3' BLW PC.											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1042		Tide: +3.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
293	B							X			VC 1/16" X 3' W/CS & EFF SW CRNR AT TOP
293	A								X		CLOSED SPALL 1 SF W/CS NW CRNR AT TOP VC 1/16"X4' W/CS N FACE AT TOP
294	A					X					
294	B							X			VC 1/16"X4.5' W/CS W FACE AT TOP.
294	C								X		VC 1/16" X 2' W FACE 2' BLW PC VC 1/16" X 4' W/CS SW CRNR AT TOP VC 1/16" X 3' W/CS & EFF NE CRNR AT TOP
ADDITIONAL COMMENTS:											
PILE 294-C NOTE CONTINUED: ... CLOSED (80%)/ OPEN (20%) SPALL 4 SF X 3" DEEP (NO EXPOSED REBAR) W/CS SE CRNR AT TOP.											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1125		Tide: +4.2'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
295	C							X			VC HL X 4' S FACE AT TOP
											VC HL X 2.5' W/CS SW CRNR 2.5 BLW PC
295	B							X			VC HL X 2' W FACE 2' BLW PC
295	A	X		8'				X			VC HL X 1' W/CS SW CRNR 4' BLW PC
											VC 1/16"X3' W/CS SE CRNR 2' BLW PC
											CLEANED ML, MW & TZ
296	A							X			VC 1/16"X4' W/CS N FACE AT TOP
											VC HL X 4' W FACE AT TOP
296	B					X					
296	C							X			VC 1/16"X5' W/CS W FACE AT TOP
											VC 1/16"X2' S FACE 1' BLW PC
ADDITIONAL COMMENTS:											
PILE 296-C NOTE CONTINUED: ... VC 1/16"X5' W FACE AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1125		Tide: +4.2'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
297	A								X		EXIST SHOTCRETE REPAIR SE CRNR AT TOP
297	B					X					
297	C							X			VC HL X 2' W/CS W FACE AT TOP
											VC HL X 4.5' W/CS S FACE AT TOP
											VC 1/8" X 4' W/CS E FACE AT TOP
298	C-BATT									X	TIMBER, 80% SL ML TO ML +4' FROM MARINE BORER (MB)
298	C								X		VC 1/16" X 4' SW CRNR AT TOP
											CLOSED SPALL 1 SF W/CS SW CRNR 1' BLW PC
											VC 1/8" X 4' NW CRNR 1' BLW PC
298	B							X			VC HL X 2' W/CS W FACE 2' BLW PC
											VC HL X 3' W/CS S FACE 3' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1201		Tide: +4.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
298	A	X		7'		X					CLEANED ML, MW & TZ
299	A							X			VC HL X 2' W/CS NE CRNR 1' BLW PC
299	B							X			VC HL X 2.5' W/CS W FACE 2' BLW PC
											VC 1/16" X2' W/CS 3 FACE 2.5 BLW PC
											VC HL X 1' W/CS N FACE 3' BLW PC
299	C							X			VC HL X 2' W/CS W FACE 2' BLW PC
											EXIST SHOTCRETE REPAIR S FACE
											VC 1/16" X 4' W/CS SE CRNR AT TOP
300	C							X			VC HL X 4.5' S FACE AT TOP
											VC HL X 2' W/ CS N FACE 3' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1315		Tide: +4.9'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
300	B							X			VC HL X 2' W/CS S FACE 4' BLW PC
300	A-BATT									X	TIMBER, 95% SECTION LOSS BTM 6'
300	A					X					
301	A								X		CLOSED SPALL 2 SF W/CS NW CRNR AT TOP EXIST SHOTCRETE REPAIR N FACE TOP 2'
301	B							X			VC 1/8" X 3' W FACE AT TOP
301	C		X						X		VC 1/4"X4.5' SE CRNR 1' BLW PC. EXIST SHOTCRETE REPAIR. HC 1/4" X FULL FACE E FACE 2.5' BLW PC
302	C	X		8'					X		VC 1/8" X 3' S FACE AT TOP VC 1/8" X 2.5' NE CRNR 2' BLW PC AND GOES INTO 1.5 SF OPEN SPALL X 1/2" DEEP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1315		Tide: +4.9'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
302	B							X			VC HL X 1.5' SE CRNR 2' BLW PC
302	A								X		CLOSED SPALL 2 SF W/C NW CRNR AT TOP
											VC 1/8"X3' W FACE AT TOP
											CLOSED SPALL 2.5 SF SE CRNR AT TOP
303	A								X		CLOSED SPALL 3 SF NW CRNR AT TOP
											EXIST SHOTCRETE REPAIR SE CRNR
303	B					X					BLACK EPOXY PAINT ON TOP 2' OF PILE
303	C							X			VC 1/8"X1.5' SW CRNR 1' BLW PC.EXIST SHOTCRETE REP.
304	C								X		CLOSED SPALL 2 SF W/C SE CRNR AT TOP
											BLACK EPOXY ON ALL FACE W FACE 2.5' BLW PC
											VC HL X 1' S FACE 2' BLW PC
ADDITIONAL COMMENTS:											
PILE 304-C NOTE CONTINUED: ... VC 1/2" X 2' SW CRNR AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 7, 2017							
Time of Day: 1347		Tide: +4.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
304	B					X					
304	A							X			VC 1/8" X 2' E FACE AT TOP
											VC 1/8" X 1.5' S FACE 3' BLW PC
305	A							X			VC HL X 4' W/C (IN SHOTCRETE) N FACE AT TOP...
305	B	X		9'		X					
305	C					X					
306	C-BATT							X			MARINE BORER ACTIVITY 25% SECTION LOSS
306	C						X				EXIST SHOTCRETE REPAIR E FACE TOP 2'
306	B					X					
306	A							X			VC HL X 3' W/C NE CRNR AT TOP
307	A					X					
ADDITIONAL COMMENTS:											
PILE 305-A NOTES CONTINUED: ... EXIST SHOTCRETE REPAIR N, S, AND W FACES.											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: 20170807							
Time of Day: 1415		Tide: +4.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
307	B					X					
307	C							X			VC HL X 3' W FACE AT TOP
											VC 1/16" X 3' S FACE AT TOP
308	C							X			VC HL X 2.5' S FACE 1' BLW PC
308	B					X					
308	A	X		7'		X					
309	A					X					
309	B					X					
309	C								X		CLOSED SPALL 3 SF SE FACE AT TOP
310	C-BATT								X		50% SECTION LOSS (SL) BOTTOM 4' MARINE BORER (MB)
310	C							X			VC HL X 1' W FACE 2' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: 20170807							
Time of Day: 1443		Tide: +4.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
310	B							X			VC 1/8" X 3' W/C W FACE 1' BLW PC
310	A							X			VC 1/8" X 1' SW CRNR 2.5 BLW PC
311	A								X		VC 1/8" X 2' W/C N FACE AT TOP
											VC 3/8" X 3' NW CRNR AT TOP
											VC HL X 1.5' W FACE AT TOP
											VC 1/8" X 1.5' SE CRNR AT TOP
311	B							X			VC 1/16" X 2' SE CRNR AT TOP
311	C							X			VC 1/16" X 2.5' W/C W FACE AT TOP
312	C	X		8'				X			VC HL X 2' W FACE 2' BLW PC
											VC HL X 16" W/C E FACE AT TOP
											VC 1/16" X 3' S FACE
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0825		Tide: +0.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
312	B								X		VC HL X 2" W/CS E FACE TO TOP
											VC HL X 2' S FACE TO TOP
											CORROSION STAIN W FACE BLW PC
											OPEN SPALL 1 SF X 1.5" DEEP NW CRNR 4' BLW PC
312	A								X		BLACK EPOXY PAINT ON TOP 2' OF PILE
											OPEN SPALL 2 1/4" X 1.5" DEEP W FACE AT TOP
											ASSOCIATED VC 1/4" X 1'
313	A								X		VC HL X 1' W/CS NE CRNR AT TOP
											CLOSED SPALL 1 SF W/CS NW CRNR AT TOP
313	B					X					
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0825		Tide: +0.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
313	C								X		OPEN SPALL 2 SF X UP TO 4" DEEP SW CRNR 4' BLW PC
314	C							X			VC 1/8"X2' W/CS SW CRNR TO TOP VC 1/16"X1.8' W FACE 1' BLW PC
314	B					X					
314	A								X		CLOSED SPALL 2 SF W/CS NW CRNR AT TOP
315	A								X		VC 1/8"X2' W/CS E FACE AT TOP CLOSED SPALL 1 SF W/CS NE CRNR AT TOP CLOSED SPALL 1 SF W/CS SE CRNR AT TOP
315	B	X		5'				X			VC 1/16"X2' W/CS W FACE AT TOP VC 1/4"X3' W/CS S FACE AT TOP
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0825		Tide: +0.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
315	C							X			VC 1/16"X3' W/CS SE CRNR AT TOP
316	C								X		VC 3/8"X3' W/CS S FACE AT TOP
											VC 1/8"X2' W/CS W FACE AT TOP
316	B					X					
316	A					X					
317	A							X			VC HL X 2' W/CS W FACE AT TOP
317	B					X					
317	C							X			VC 1/16"X3' W/CS E FACE AT TOP
											VC HL X2' NW CRNR AT TOP IN EXISTING SHOTCRETE
											REPAIR
											VC 1/16"X4' W/CS W FACE AT TOP
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0845		Tide: +1.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
318	C								X		VC 1/16"X2' W/CS S FACE AT TOP
											2X VC 1/16"X2' W/CS SW CRNR AT TOP
											VC 3/8"X2.5' 2/CS W FACE AT TOP
318	B					X					
318	A	X		5'				X			VC HL X 1' W/CS NW CRNR AT TOP
319	A							X			VC 1/16"X2' W/CS NW CRNR AT TOP
											VC 1/16"X2' W/CS W FACE AT TOP
											VC HL X 3' W/CS SE CRNR AT TOP
319	B					X					
ADDITIONAL COMMENTS:											

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 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0845		Tide: +1.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
319	C							X			EXIST SHOTCRETE REPAIR N & W FACE 2' BLW TOP
											VC 1/8"X2' W/CS W FACE AT TOP
											VC HL X 1' W/CS SW CRNR AT TOP
											VC 1/4"X2 W/CS SE CRNR AT TOP
320	C								X		VC 3/8"X4' W/CS S FACE AT TOP
											VC 1/4"X1.5' S FACE AT TOP
											VC HL X 2.5" W/CS W FACE AT TOP
											VC 1/8"X3' W/CS SW CRNR AT TOP
320	B							X			VC HL X 2' W/CS S FACE AT TOP
320	A							X			VC 1/8"X2 W/CS N FACE AT TOP
											VC 1/4"X3' W/CS NW CRNR AT TOP...
ADDITIONAL COMMENTS:											
PILE 320-A NOTE CONTINUED: ... VC 1/8"X3' W/CS SW CRNR AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0925		Tide: +1.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
320	A-BATT							X			20% SECTION LOSS FROM MARINE BORER AT MUDLINE
321	A							X			VC HL X 2' W FACE AT TOP
321	B					X					
321	C							X			VC HL X 2.5' W/CS & EFF S FACE AT TOP
											VC HL X 2.5' W/CS SE CRNR AT TOP
											VC 1/8"X3' W/CS W FACE AT TOP
											VC 1/16"X1.5' W/CS W FACE AT TOP
											VC 1/4"X3' W/CS SW CRNR AT TOP
322	C	X		6'					X		VC 3/8X4' W FACE AT TOP
											OPEN SPALL 3 SF X 2" DEEP SE CRNR 4' BLW PC
322	B					X					
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0925		Tide: +1.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
322	A					X					
323	A							X			VC HL X 2' W/CS NE CRNR AT TOP
											VC 1/16"X1.5' W/CS W FACE AT TOP
323	B							X			VC HL X 2' W/CS E FACE AT TOP
323	C							X			VC 1/4"X3' W/CS S FACE AT TOP
											VC 1/8"X1.5' W/CS SE CRNR AT TOP
											VC 1/8"X3' W/CS E FACE AT TOP
324	C							X			VC 1/8"X4' W/CS S FACE AT TOP
											EXIST SHOTCRETE REPAIR SW FACE TOP 2'
324	B					X					
324	A					X					
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0950		Tide: +2.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
324	A-BATT									X	90% SECTION LOSS BTM 6'
325	A								X		VC HL X 2' W/CS NE CRNR AT TOP CLOSED SPALL 1.5 SF W/CS NW CRNR AT TOP VC HL X 2' S FACE AT TOP
325	B	X		7'		X					
325	C							X			EXIST SHOTCRETE S FACE TOP 2' VC 1/4'X3' W/CS SW CRNR AT TOP VC 1/8"X3' W/CS SE CRNR AT TOP VC HL X 2' W/CS W FACE AT TOP VC HL X 2' W/CS W FACE AT TOP VC 1/8"X1.5' W FACE 2' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 0950		Tide: +2.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
326	C							X			VC HL X 2' W/CS SW CRNR AT TOP
											VC HL X 2.5' W/CS W FACE AT TOP
326	B							X			VC 1/8"X1.5' W FACE 2' BLW PC
											VC HL X 1' W/CS N FACE 3' BLW PC
326	A							X			VC 1/8"X2.5' W/CS N FACE AT TOP
											VC 1/8"X2.5' W/CS W FACE AT TOP
327	A							X			VC 1/16"X4' W/CS E FACE AT TOP
											VC HL X 4' W/CS E FACE AT TOP
327	B							X			VC HL X 2.5' W/EFF NW CRNR AT TOP
327	C							X			EXIST SHOTCRETE REPAIR SW CRNR TOP 2'
											VC 1/8"X2' W/CS W FACE AT TOP
ADDITIONAL COMMENTS:											
PILE 327-C NOTES CONTINUED: ...2 VC 1/8"X3' W/CS S FACE AT TOP. VC 1/4"X2.5' W/CS SE CRNR AT TOP. VC 1/8"X2' E FACE AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1018		Tide: +2.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
328	C					X					
328	B							X			VC 1/16"X1.5' W FACE 1' BLW PC
328	A	X		7'		X					
329	A							X			VC HL X 2' W/CS N FACE AT TOP VC 1/8"X3' W/CS NE CRNR AT TOP VC HL X 3' S FACE AT TOP
329	B					X					
329	C								X		CLOSED SPALL 3 SF W/CS SW CRNR AT TOP VC 1/8"X2' W/CS S FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1018		Tide: +2.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
330	C								X		VC HL X 3' W/CS & EFF S FACE AT TOP OPEN SPALL 1.5 SF X 1.5" DEEP S FACE 1' BLW PC CLOSED SPALL 2 SF W/CS SE CRNR AT TOP VC HL X 1' W/CS E FACE AT TOP VC HL X 2' W/CS & EFF W FACE AT TOP VC 1/16"X2' W/CS W FACE 1' BLW PC VC 1/6"X3' W/CS NW CRNR AT TOP
330	B							X			VC HL X 2' W/CS E FACE 1' BLW PC VC 1/16"X4' W/CS NW CRNR AT TOP VC HL X 1.5' W/CS SW CRNR 1.5' BLW PC
330	A						X				EXIST SHOTCRETE REPAIR W/CS N FACE 1' BLW PC
ADDITIONAL COMMENTS:											
PILE 330-A NOTE CONTINUED: ... EXIST SHOTCRETE REPAIR W/CS W FACE TOP 2'. VC HL X 1' W/CS W FACE 1' BLW PC											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1110		Tide: +3.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
331	A					X					
331	B							X			VC HL X 1.5' W/CS N FACE 2' BLW PC
											VC 1/8"X1.5' NW CRNR 2' BLW PC
331	C							X			VC 1/8"X4.5' W/CS S FACE AT TOP
											VC 1/8"X3' W/CS W FACE AT TOP
332	A							X			VC HL X 2' W/CS NE CRNR AT TOP
											2 VC HL X 3' W/CS E FACE AT TOP
332	B							X			VC HL X 1.5' W/CS N FACE 2' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1110		Tide: +3.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
332	C	X		7'				X			3 VC HL X 3' W/CS & EFF E FACE AT TOP
											VC 1/16"X3' W/CS N FACE AT TOP
											20" SQUARE PILE W/ 1" CHAMFEVED CRNRS ...
333	A					X					
333	B					X					BLACK EPOXY PAINT AT TOP
333	C								X		VC 1/8"/2' W FACE 2.5' BLW PC
											VC1/8"X2.5' W/CS 1' BLW PC
											VC 1/8"X3' SE FACE AT TOP
											CLOSED SPALL 1.5 SF W/CS N FACE AT TOP
											VC 1/8"X1.5' W/CS N FACE 2' BLW PC
333	C-BATT								X		50% SECTION LOSS BTM 6' DUE TO MARINE BORER
ADDITIONAL COMMENTS:											
PILE 332-C CONTINUED NOTE: ... 2 VC HL X 3' W/CS W FACE AT TOP. VC 1/16"X3' S FACE AT TOP. VC 1/8"X3' S FACE AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1110		Tide: +3.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
334	C						X				EXIST SHOTCRETE REPAIR W FACE TOP 2'
334	B							X			BLACK EPOXY PAINT AT TOP VC HL X 3' S FACE AT TOP
334	A					X					
335	A								X		CLOSED SPALL 3 SF W/CS NW FACE AT TOP VC 1/8"X1.5' E FACE 2.5' BLW PC
335	B							X			VC 1/16"X1.5' SW FACE 2' BLW PC VC 1/8"X4' SE FACE AT TOP
335	C							X			VC HL X 2.5' S FACE AT TOP
336	C							X			BLACK EPOXY PAINT AT TOP VC 1/8"X3' W/CS S FACE AT TOP...
ADDITIONAL COMMENTS:											
PILE 336-C NOTE CONTINUED: ... EXIST SHOTCRETE REPAIR S & W FACE AT TOP. VC 1/8" X 3.5' W/CS W FACE 1' BLW PC											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1213		Tide: +4.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
336	B							X			BLACK EPOXY PAINT AT TOP
											VC HL X 1.5' W FACE 1.5' BLW PC
336	A	X		7'		X					
336	A-BATT									X	100% SECTION LOSS (SL) BLW TOP
337	A							X			VC HL X 1' E FCAE 2.5 BLW TOP
337	B					X					
337	C								X		CLOSED SPALL 1 SF W/CS W FACE 0.5' BLW PC
338	C-BATT									X	BROKEN AND HOLLOW FROM TOP TO MUDLINE (ML)
338	C								X		OPEN SPALL 1 SF W/CS W FACE 1' BLW PC
											CLOSED SPALL 0.5' SF W/CS SW CRNR AT TOP
											VC 1/8"X1.5' W FACE AT TOP
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1254		Tide: +4.9'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
338	B					X					
338	A							X			VC 1/8"X0.5' N FACE AT TOP
339	A					X					PIECE OF REBAR HANGING FROM DECK UNDERSIDE
339	B					X					
339	C								X		OPEN (40%) / CLOSED (60%) SPALL 3 SF 1.5" DEEP W/CS SE FACE AT TOP
340	C	X		6'				X			VC 1/16"X2' W/CS S FACE AT TOP VC HL X 2' S FACE 1' BLW PC
340	B					X					
340	A							X			VC HL X 2.5' W FACE AT TOP
340	A-BATT									X	75% SECTION LOSS 3' ABOVE MUDLINE
ADDITIONAL COMMENTS:											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1254		Tide: +4.9'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
341	A								X		CLOSED SPALL 1.5 SF W/CS NW CRNR 1' BLW PC
											VC 1/16"X2.5' W FACE 2' BLW PC
341	B							X			VC 1/8"X1.5' W/CS W FACE 2' BLW PC
341	C								X		VC 1/16"X2' W/CS N FACE 2.5 BLW PC
											VC 1/16"X1' W FACE 2.5' BLW PC
											EXIST SHOTCRETE REPAIR E FACE TOP 3' W/
											CLOSED SPALL 3 SF W/CS E FACE AT TOP
342	C								X		CLOSED SPALL 1.5 SF W/CS SE CRNR AT TOP
											CLOSED SPALL 4 SF W/CS E FACE AT TOP
											VC 1/16"X1' W FACE AT TOP
											VC 1/16"X1' W/CS SW CRNR 3' BLW PC
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1322		Tide: +5.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
342	B							X			VC 1/16"X1' W/CS N FACE 2.5' BLW PC
342	A						X				3" DIA AREA OF CS N FACE 1' BLW PC
343	A							X			VC HL X 3.5' W/CS W FACE AT TOP
343	B	X		7'					X		OPEN SPALL 1.5 SF X 1.5" DEEP W/CR 4' BLW PC
343	C								X		CLOSED SPALL 2 SF W/CR SE CRNR AT TOP
											VC 1/16"X3' S FACE 1' BLW PC...
											CLOSED SPALL HL X 2.5" W/CR SE CRNR AT BTM. CRACK
344	C						X				EXIST SHOTCRETE REPAIR E FACE
344	B							X			VC HL X 1.5' E FACE AT TOP
											VC HL X 2' E FACE 2' BLW PC
344	A					X					
ADDITIONAL COMMENTS:											
PILE 343-C NOTE COTINUED: ... VC HL X 2.5' W/CS SE CRNR AT BTM OF CLOSED SPALL											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1322		Tide: +5.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
345	A							X			VC 1/16"X3' W/CR E FCAE AT TOP
											1/8"X3' W/CR E FACE 2.5' BLW PC
											CS 3"X6" E FACE 3' BLW PC
345	B							X			VC 1/8"X3' W/CR NW CRNR AT TOP
											VC HL X 1.5' E FACE AT TOP
345	C								X		VC HL X 1' W FACE 2.5' BLW PC
											VC HL X 1' W FACE 3' BLW PC
											VC 1/16"X2' SW CRNR 2' BLW PC
											VC HL X 2.5' S FACE 1' BLW PC
											OPEN SPALL 1.5 SF X 1.5" DEEP W/CR E FACE AT TOP
											VC 1/8"X2' W/CR E FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1404		Tide: +5.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
346	C					X					
346	B					X					
346	A	X		7'					X		CLOSED SPALL 1.5 SF S FACE 1' BLW PC
347	A								X		EXIST SHOTCRETE REPAIR N & W FACE TOP 3' CLOSED SPALL 2 SF AT REPAIR
347	B					X					
347	C							X			VC 1/8"X3.5' W/CR S FACE AT TOP
348	C							X			VC 1/16"X3' W FACE AT TOP
											VC HL X 2.5' W/CR S FACE AT TOP
											VC 1/4"X3' W/CR SE CRNR AT TOP
348	B					X					
ADDITIONAL COMMENTS:											

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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 8, 2017							
Time of Day: 1442		Tide: +4.7'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
348	A							X			VC 1/8"X3' W/CR N FACE AT TOP EXIST SHOTCRETE REPAIR N & W FACE W/CS & CRACK
349	A						X				EXIST SHOTCRETE REPAIR
349	B							X			VC 1/16"X2.5' W/CR E FACE 1.5' BLW PC
349	C							X			EXIST SHOTCRETE REPAIR NW & W FACE TOP 3' W/ VC 1/16"X1' W FACE. VC 1/16"X1.5' N FACE 2' BLW PC
											VC 1/16"X1' W FACE
											VC 1/16"X1.5' N FACE 2' BLW PC
349	C-BATT						X				CHECKS UP TO 1/2" W
349	C	X		8'				X			VC HL X 2' W/CR E FACE AT TOP
ADDITIONAL COMMENTS:											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0844		Tide: +0.5'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
350	B							X			EXIST SHOTCRETE REPAIR N & E FACE AT TOP
											VC HL X 2' W/CS E FACE AT TOP
350	A							X			VC HL X 2' W/CS S FACE AT TOP
											VC HL X 3' W/CS W FACE AT TOP
											VC 1/8"X1.5" W/CS NW CRNR AT TOP
351	A							X			VC HL X 2.5" W/CS N FACE AT TOP
											EXIST SHOTCRETE REPAIR NW CRNR AT TOP
											VC HL X 2.5' W/CS W FACE AT TOP
351	B							X			VC HL X 2' W/CS N FACE AT TOP
											VC 1/8"X2' W/CS NW CRNR 1' BLW PC
351	C							X			VC 1/8" X3' W/CS W FACE AT TOP...
ADDITIONAL COMMENTS:											
PILE 351-C NOTE CONTINUED: ... VC 1/8"X2' W FACE 1.5' BLW PC											

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 NI = Not inspected, inaccessible
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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0844		Tide: +0.5'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
352	C								X		CLOSED SPALL 1SF E FACE AT TOP
											VC 1/8"X2.5' W FACE AT TOP
352	B							X			VC 1/16"X1' SW CRNR 2' BLW PC
											VC 1/16"X2.5' W/CS W FACE AT TOP
352	A					X					
352	A-BATT									X	TIMBER BROKEN 5' BLW PC
352	A					X					
353	B	X		6'		X					
353	C						X				EXIST SHOTCRETE REPAIR SE, SW & S FACE W/CS TOP 2'
354	C-BATT						X				1/2" CHECKING ABOVE WATER
354	C								X		CLOSED SPALL 1 SF W/CS SE CRNR AT TOP...
ADDITIONAL COMMENTS:											
PILE 354-C NOTE CONTINUED: ... VC 1/4"X1.5' W/CS SE CRNR STARTING AT BTM OF SPALL											

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 NI = Not inspected, inaccessible
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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0904		Tide: +0.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
354	B					X					
354	A					X					
355	A							X			VC HL X 3' W/EFF SW CRNR AT TOP
355	B					X					
355	C							X			VC HL X 2' W/CS S FACE AT TOP
											2 VC HL X 2.5' W/CS S FACE AT TOP
											VC HL X 2' W/CS SW CRNR AT TOP
356	C							X			VC 1/4"X4' W/CS S FACE AT TOP
											VC HL X 1.5' W/CS SW CRNR 2' BLW PC
356	B							X			VC HL X 1' W/CS SW CRNR 2.5' BLW PC
356	A	X		5'				X			VC 1/16"X1.5' W/CS N FACE AT TOP
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0904		Tide: +0.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
357	A					X					
357	B					X					
357	C							X			VC 1/8"X4' W/CS N FACE AT TOP
											EXIST SHOTCRETE REPAIR NW CRNR
											VC HL X 1' W/CS NW CRNR
											VC HL X 2' W/CS W FACE AT TOP
											VC HL X 2' W/CS E FACE AT TOP
358	C							X			VC 1/16"/2' W/CS S FACE AT TOP
											EXIST SHOTCRETE REPAIR W/CS SE CRNR AT TOP
											VC HL X 1' W/CS E FACE AT TOP
											VC HL X 1.5' W FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 358-C NOTE CONTINUED: ...VC 1/8"X2' W/CS W FACE 6" BLW PC (SHOTCRETE). EXIST SHOTCRETE REPAIR SW CRNR 1' BLW PC											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0904		Tide: +0.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
358	B								X		CLOSED SPALL 1 SF W/CS SE CRNE AT TOP 2 VCS 1/16"X1' W/CS E FACE 1.5' BLW PC
358	A		X					X			EXIST SHOTCRETE REPAIR S & E FACE AT TOP
											VC 1/4"/3' W/CS E FACE AT TOP VC 1/8"X1.5' W FACE AT TOP
359	A							X			2 VC HL X 2' W/CS W FACE AT TOP VC HL X 2' S FACE AT TOP
359	B							X			EXIST SHOTCRETE W/CS S & SW FACE OPEN SPALL 4" DIA X 2" DEEP 4' BLW PC
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0904		Tide: +0.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
359	C							X			VC 1/8"X3' W/CS W FACE AT TOP
											VC HL X 1' W/CS W FACE AT TOP
360	A					X					
360	B					X					
360	C	X		5'				X			VC 1/8"X2' W/CS S FACE 1' BLW PC
											EXIST SHOTCRETE REPAIR SW & W FACE AT TOP
											VC HL X 1' W/CS W FACE AT TOP
361	C								X		VC HL X 2' W/CS E FACE AT TOP
											CLOSED SPALL 1/4 SF SE CRNR AT TOP
											VC 1/8"X2' W/CS SE CRNR BLW SPALL
											EXIST SHOTCRETE REPAIR SE & S FACE TOP 2'...
ADDITIONAL COMMENTS:											
PILE 361-C NOTE CONTINUED: ... VC 1/8" X 2' W/CS S FACE AT TOP. VC 1/4"X3' W/CS W FACE AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0904		Tide: +0.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
361	B							X			VC 1/8"X2' W/CS SW CRNR 2' BLW PC
											VC 1/16"X1.5' W/CS W FACE 2' BLW PC
361	A							X			VC 1/16"X3' W/CS E FACE AT TOP
362	A							X			VC HL X 1.5' W/CS N FACE AT TOP EXIST SHOTCRETE REPAIR W FACE TOP 2'
362	B					X					
362	C								X		CLOSED SPALL 2 SF W/CS SW CRNR 0.5' BLW PC
362	C-BATT									X	90% SECTION LOSS (SL) AT BTM. 95% SL TZ
363	C							X			EXIST SHOTCRETE W/CS S & SE FACE TOP 2'
											VC 1/6"X3' W/CS S FACE AT TOP
											VC HL X 1' W/CS SW FACE AT TOP...
ADDITIONAL COMMENTS:											
PILE 363-C NOTE CONTINUED: ... VC 1/8"X3' W/CS SE FACE AT TOP. VC HL X 2' W/CS E FACE AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0904		Tide: +0.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
363	B					X					
363	A							X			VC HL X 1' W/CS E FACE 3' BLW PC
364	A	X		5'					X		EXIST SHOTCRETE REPAIR W/CS N, NW & W TOP 2'
											VC 1/8"X1.5' W/CS N FACE AT TOP
											CLOSED SPALL 1 SF W/CS NW CRNR AT TOP
364	B							X			VC HL X 1.5' W/CS NE CRNR AT TOP
											VC HL X 1' W/CS W FACE AT TOP
364	C							X			VC 1/16"X4' W/CS W FACE AT TOP
											EXIST SHOTCRETE REPAIR E FACE TOP 1.5'
											VC 1/16"X1.5' E FACE AT TOP (IN SHOTCRETE)
											VC HL X 2.5' W/CS & EFF S FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 0904		Tide: +0.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
365	C						X				EXIST SHOTCRETE REPAIR E FACE TOP 2'
											EXIST SHOTCRETE REPAIR W/CS W FACE TOP 2' & HL VC
365	B							X			VC HL X 1' W/CS S FACE BLW PC
											VC HL X 0.5' W FACE 2' BLW PC
											SLIGHT BATTER DOWN TO SW
365	A						X				EXIST SHOTCRETE REPAIR NW & W FACE W/CS TOP 2'
366	A					X					
366	B							X			VC 1/8"X2' W/CS W FACE 2' BLW PC
366	C							X			VC 1/8"X1' W/CS N FACE 2' BLW PC
											VC 1/8"X3' W/CS W FACE AT TOP
											EXIST SHOTCRETE REPAIR W/CS SW CRNR TOP 2.5'...
ADDITIONAL COMMENTS:											
PILE 366-C NOTE CONTINUED: ... VC 1/5"X2' W/CS E FACE AT TOP. CLOSE SPALL 2 SF W/CS 1' BLW PC (IN SHOTCRETE)											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1038		Tide: +2.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
367	C						X				EXIST SHOTCRETE REPAIR W/CS S,SW,SE & E FACE TOP4'
367	B	X		6'					X		CLOSED SPALL 2 SF W/CS NW CRNR AT TOP
367	A							X			EXIST SHOTCRETE REPAIR NW & N FACE
											EXIST SHOTCRETE REPAIR W/CS W FACE
											VC HL X 1.5' W/CS NW CRNR BLW SHOTCRETE
368	A							X			VC 1/8"X4' W/CS N FACE AT TOP
											VC 1/4"X4' W/CS NW CRNRN AT TOP
											VC 1/8"X1.5' S FACE 2' BLW PC
368	B					X					
368	C							X			EXIST SHOTCRETE REPAIR W/VC S, SE & E FACE TOP 2'
											W/ HL VC. VC HL X 3' W/CS E FACE AT TOP
ADDITIONAL COMMENTS:											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1117		Tide: +3.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
369	C							X			EXIST SHOTCRETE REPAIR S, SF & E FACE
											VC HL X 3' W/CS S FACE AT TOP
											VC HL X 1' W FACE 2' BLW PC
											VC 1/8"X1' W/CS NW CRNR 2.5' BLE PC
369	B							X			VC HL X 1' W/CS 4' BLW PC
369	A							X			VC 1/4"X4.5' W/CS W FACE AT TOP
											VC 1/16"X2.5' W/CS NE CRNR AT TOP
370	A							X			VC 1/8"X2' W/CS W FACE 2' BLW PC
370	B						X				EXIST SHOTCRETE REPAIR W/CS W FACE
370	C	X		7'				X			VC HL X 3.5' W/CS NE CRNR AT TOP
											EXIST SHOTCRETE REPAIR SE CRNR AT TOP...
ADDITIONAL COMMENTS:											
PILE 370-C NOTE CONTINUED: ...VC 1/16"X2' W/CS S FACE AT TOP											

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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1117		Tide: +3.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
371	C							X			EXIST SHOTCRETE REPAIR NE, S, SE & SW FACES TOP 3' VC 1/8"X2.5' W/CR SW CRNR 1.5' BLW PC
371	B					X					
371	A							X			EXIST SHOTCRETE REPAIR S, SW & W FACES TOP 2.5' VC 1/2"X2.5' W FACE AT TOP
372	A					X					
372	B						X				EXIST SHOTCRETE REPAIR W FACE
372	C							X			EXIST SHOTCRETE REPAIR W/CS SE CRNR TOP 3' VC 1/8"X2.5' S FACE 0.5' BLW PC VC 3/16"X2' W FACE 1' BLW PC
373	C						X				EXIST SHOTCRETE REPAIR S, SW FACES AT TOP ...
ADDITIONAL COMMENTS: PILE 373-C NOTE CONTINUED: ... VC 1/8"X2' W/CR S FACE AT TOP											

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 NI = Not inspected, inaccessible
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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1258		Tide: +4.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
373	B							X			VC HL X 1.5' W/EFF W FACE 0.5' BLW PC
373	A								X		CLOSED SPALL 1 SF W/CS W FACE AT TOP
374	A							X			4 VC 1/16"X3"-6" E FACE 2' BLW PC
											VC 1/8"X3' W/CS W FACE AT TOP
374	B					X					
374	C	X		6'				X			EXIST SHOTCRETE REPAIR SE CRNR
											EXIST SHOTCRETE REPAIR S FACE 1' BLW PC
											VC 1/16"X2.5'
374	C-BATT								X		50% SECTION LOSS 3' OVER MUDLINE (ML)
375	C							X			EXIST SHOTCRETE REPAIR W/VC 1/4"X4' W FACE AT TOP
375	B							X			EXIST SHOTCRETE REPAIR S, SE, E FACES 2.5' BLW PC...
ADDITIONAL COMMENTS:											
PILE 375-B NOTE CONTINUED: ... VC HL X 3' E FACE AT TOP IN SHOTCRETE											

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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1258		Tide: +4.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
375	A						X				EXIST SHOTCRETE REPAIR W FACE 1.5' BLW PC
376	A-BATT									X	95% SECTION LOSS (SL) 3' BLW PC
376	A							X			VC 1/8"X3' W/CS W FACE AT TOP
376	B						X				EXIST SHOTCRETE REPAIR W/CS N, NW & W FACES
376	C							X			EXIST SHOTCRETE REPAIR SW TO N FACE
											AT TOP. VC 1/4"X3.5' SW FACE
											CRACK IN SHOTCRETE AT TOP
											PILE IS ROTATED 45 DEGREE
377	C								X		CLOSED SPALL 2 SF SW FACE AT TOP
											VC 1/16"X2.5' S FACE 1' BLW PC
											VC 1/8"X2.5' SW CRNR AT TOP ...
ADDITIONAL COMMENTS:											
PILE 377-C NOTE CONTINUED: ... VC 1/8"X2' W FACE 1.5' BLW PC											

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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1321			Tide: +5.0'			Pile Type (Bearing, Batter, Sheet): Bearing, Batter				Pile Material: Concrete, Timber	
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
377	B	X		6'			X				EXIST SHOTCRETE REPAIR W FACE 1.5' BLW PC
377	A							X			VC 1/4"X2.5 W/CS W FACE AT TOP
											VC 1/8"X0.5' W/CS NW CRNR 2' BLW PC
378	A							X			VC 1/4"X2' W FACE AT TOP
											EXIST SHOTCRETE REPAIR N FACE 1' BLW PC
											VC 1/16"X3' W/CS IN SHOTCRETE
											VC 1/8"X2' W/CS
378	B					X					
378	C								X		EXIST SHOTCRETE REPAIR E, SE & S FACES 4' BLW PC
											CLOSED SPALL 1 SF S FACE 1.5 BLW PC
379	C							X			VC HL X 3' W/CS & EFFLORESCENCE (EFF) S FACE AT TOP
ADDITIONAL COMMENTS:											

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 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1347		Tide: +5.2'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
379	B					X					
379	A							X			EXIST SHOTCRETE NW CRNR
											VC 1/16"X3' W/CS W FACE AT TOP
											VC 1/16"X2.5' W/CS & EFF E FACE AT TOP
380	A-BATT									X	60% SL MARINE BORER DAMAGE FROM ML TO ML +2'
380	A					X					
380	B							X			VC 1/16"X1' W/CS E FACE 1' BLW PC
											VC 1/16"X0.5' W FACE 2.5' BLW PC
380	C	X		6'				X			EXIST SHOTCRETE REPAIR SW FACE TOP 2' EXTENDS
											TO W FACE AND 1.5 S FACE
											VC 1/8"X3.5' W/CS W FACE AT TOP IN SHOTCRETE...
ADDITIONAL COMMENTS:											
PILE 380-C NOTE CONTINUED: ... VC 1/16"X1' W FACE 2.5' BLW PC											

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STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1347		Tide: +5.2'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
381	C								X		EXIST SHOTCRETE REPAIR SE, S & E FACES
											CLOSED SPALL 1.5 SF W/CS S FACE AT TOP
											VC 1/4"X3' W/CS E FACE AT TOP
											VC 1/8"X1.5' SW CRNR 2' BLW PC
											VC 1/16"X1' W FACE 1' BLW PC
											1/16"X1' W FACE 2.5 BLW PC
381	B					X					
381	A							X			EXIST SHOTCRETE REPAIR NW, W & N FACES
											VC 1/8"X3' W/CS N FACE AT TOP
											VC 1/8"X2' W FACE AT TOP
382	A					X					
ADDITIONAL COMMENTS:											

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 ND = No Deterioration/Damage
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1423		Tide: +5.2'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
382	B							X			VC 1/8"X2.5' W/CS E FACE 1' BLW PC
382	C						X				EXIST SHOTCRETE REPAIR W/CS E FACE TOP 2'
382	C-BATT								X		40% SL. MARINE BORER ACTIVITY BLW WATER LINE (WL)
383	C								X		EXIST SHOTCRETE REPAIR SW CRNR CLOSED SPALL 1' BLW PC
383	B					X					
383	A					X					
384	A-BATT									X	90% SECTION LOSS 4' BLW PC
384	A	X		7'				X			VC 1/16"X2' E FACE 1.5 BLW PC
											VC 1/8"X2' W/CS NE CRNR 1.5 BLW PC
											VC 1/16"X1' NE CRNR 2.5 BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
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 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 9, 2017							
Time of Day: 1423		Tide: +5.2'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
384	B							X			VC HL X 2' W/CS W FACE 2' BLW PC
											VC 1/4"X3' W/CS NE FACE AT TOP
384	C								X		EXIST SHOTCRETE REPAIR E, SE, S, SW FACES AT TOP
											CLOSED SPALL 1/8"X1' W/CS E FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0855		Tide: +0.7'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
385	A					X					
385	B					X					
385	C						X				EXIST SHOTCRETE REPAIR W FACE TOP 2'
											CS E FACE 2' BLW TOP
386	C		X					X			VC 1/16"X1' SW CRNR AT TOP
											EXIST SHOTCRETE REPAIR E FACE
											CS SE CRNR 1' BLW PC
											VC 1/8"X1' N FACE AT TOP
386	B							X			CS E FACE AT TOP
											VC 1/8"X1' W FACE AT TOP
											VC 1/8"X1.5' NW CRNR AT TOP
ADDITIONAL COMMENTS:											

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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0855		Tide: +0.7'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
386	A							X			VC 1/8"/1' NW CRNR 1' BLW PC
											VC 1/8"X0.5' W/CS N FACE 1' BLW PC
387	A								X		VC 1/8"X2' W/CS E FACE AT TOP
											VC 1/2"X1.5' NW CRNR AT TOP
387	B	X		6'				X			VC 1/16"X1' NE CRNR 0.5' BLW PC
387	C							X			EXIST SHOTCRETE REPAIR W/CS S FACE
											VC 1/8"X1' W/CS SW CRNR AT TOP
											VC 1/8"X1.5' W FACE 1.5 BLW PC
388	C							X			VC 1/16"X2' S FACE AT TOP
388	B						X				CS W FACE AT TOP
388	A						X				EXIST SHOTCRETE W/CS N FACE & NW CRNR
ADDITIONAL COMMENTS:											
PILE 388-A NOTE CONTINUED: ... VC 1/8"X1' N FACE 1' BLW PC											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0855		Tide: +0.7'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
389	C							X			EXIST SHOTCRETE REPAIR E & W FACES W/CS CS SE CRNR AT TOP VC 1/8"X0.5' W/CS N FACE 1.5' BLW PC
389	B							X			CS S FACE VC 1/8"X1' SW CRNR 0.5 BLW PC
389	A							X			VC 1/8"1' W FACE 1' BLW PC
390	A							X			VC 1/8"X1' W/CS NW CRNR AT TOP CS W FACE
390	B							X			VC 1/8"X1' W FACE 2' BLW PC
390	C	X		5'				X			EXIST SHOTCRETE REPAIR S & E FACES VC 1/8"X1.5' W/CS E FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0855		Tide: +0.7'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
390	C-BATT									X	90% SECTION LOSS (SL) 10' BLW PC
391	C							X			EXIST SHOTCRETE REPAIR S & W FACES
											VC 1/8"X1' W/CS S FACE 0.5 BLW PC
											VC 1/16"X8" W FACE 1' BLW PC
											VC 1/16"X05' W FACE 1.5' BLW PC
391	B						X				CS NW CRNR & N FACE
391	A						X				CS W FACE
392	A						X				CS E & W FACES
392	A-BATT							X			10% SECTION LOSS (SL) AT MARINE BORER
392	B								X		OPEN SPALL 3" DIA X 2" DEEP NW CRNR 1.5' BLW PC
											EXIST SHOTCRETE REPAIR W FACE...
ADDITIONAL COMMENTS:											
PILE 392-B NOTE CONTINUED: ... VC 1/16"X0.5' S FACE AT TOP. VC 1/8"X2' W/CS E FACE AT TOP.											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0920		Tide: +1.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
392	C							X			EXIST SHOTCRETE REPAIR S, SW & W FACES VC 1/8"X2' W/CS S FACE AT TOP
393	C							X			VC 1/8"X0.5' SE CRNR 1' BLW PC
393	B							X			VC 1/8"X2 W FACE 0.5' BLW PC CS N FACE
393	A							X			CS S & N FACES AT TOP VC 1/16"X8" W FACE 1' BLW PC
394	A	X		6'				X			CS N FACE AT TOP VC 1/4"X1' E FACE AT TOP
394	B						X				EXIST SHOTCRETE REPAIR W/CS SW CRNR CS E FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0920		Tide: +1.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
394	C							X			VC HL X 1.5' E FACE 1' BLW PC CS W/REMANENT SHOTCRETE W FACE CS S FACE
394	C-BATT									X	95% SECTION LOSS (SL) 10' BLW PC
395	C							X			VC HL X 1.5' W/CS & EFF SW CRNR AT TOP VC HL X 2' W/EFF S FACE 0.5' BLW PC CS SE CRNR VC 1/16"X1' W FACE 1' BLW PC
395	B						X				CS W & N FACES VC 1/8"X2' W/CS N FACE 0.5' BLW PC
395	A							X			CS W & E FACES IN SPLASH ZONE (SZ) ...
ADDITIONAL COMMENTS:											
PILE 395-A NOTE CONTINUED: ... VC 1/8"X1' W/CS N FACE AT TOP. EXIST SHOTCRETE REPAIR NE & N FACES											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0920		Tide: +1.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
396	A						X				CS N,W & NW FACES IN SZ
396	B					X					
396	C							X			VC 1/4"X1.5' W/CS S FACE AT TOP EXIST SHOTCRETE REPAIR W/CS SW CRNR VC 1/4"X2' W/CS W FACE 1' BLW PC
397	C							X			VC HL X1.5' W/CS S FACE AT TOP EXIST SHOTCRETE REPAIR NE CRNR VC 1/8"X2' W/EFF E FACE 0.5 BLW PC VC 1/8"X1' E FACE 0.5 BLW PC VC HL X 1' N FACE 0.5 BLW PC VC 1/4"X2' NW CRNR AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0948		Tide: +1.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
397	B	X		5'				X			CS S & W FACES EXIST SHOTCRETE REPAIR NE & E FACES VC 1/8"X0.5' E FACE 2' BLW PC VC 1/4"X2' W FACE 2' BLW PC (GOES INTO MB)
397	A							X			VC 1/4"X2' W FACE 1' BLW PC (GOES INTO MB) CS NW CRNR EXIST SHOTCRETE REPAIR NW & W FACES VC 1/8"X1.5' W/CS SE CRNR 1.5 BLW PC VC 1/8"X1' W/CS W FACE AT TOP
398	A						X				CS N & W FACES
398	B						X				EXIST SHOTCRETE REPAIR W/CS E & SE FACES ...
ADDITIONAL COMMENTS:											
PILE 398-B NOTE CONTINUED: ... CS N & W FACES											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0948		Tide: +1.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
398	C							X			VC 1/8"X2' W/CS E FACE 1' BLW PC (INTO MB)
											VC HL X 2' E FACE 1' BLW PC (INTO MB)
399	C							X			CS N FACE (SZ)
											EXIST SHOTCRETE REPAIR W/CS SE, E & S FACES
											VC 1/8"X2.5' W/CS S FACE 0.5' BLW PC
399	B							X			CS W FACE (SZ, TYPICAL)
											VC 1/8"X3' W/CS S FACE AT TOP
											VC 1/8"X4' W/CS SE CRNR AT TOP (INTO MB)
399	A								X		CLOSED SPALL 1 SF W/CS N FACE AT TOP
											CS E, N (SZ, TYP) & W FACES
400	A							X			VC 1/2"X2' W/CS NE CRNR 0.5' BLW PC (INTO MB) ...
ADDITIONAL COMMENTS:											
PILE 400-A NOTE CONTINUED: ... CS N & W FACES. VC HL X1.5' W/CS E FACE 1' BLW PC (INTO MG)											

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 NI = Not inspected, inaccessible
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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0948		Tide: +1.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
400	A-BATT							X			10% SL 15' BLW PC DUE TO MB
400	B							X			VC 1/8"X1' W/CS N FACE 1.5' BLW PC
											VC 1/8"X0.5' W/CS W FACE 2' BLW PC
400	C	X		6'				X			VC 1/4"X1.5' W/CS E FACE 0.5' BLW PC
											CS E & W FACES
											VC 1/8"X2' W/CS W FACE AT TOP (INTO MB)
											VC 1/8"X1.5' W/CS S FACE 1' BLW PC
											VC 1/16"X0.5' W/CS S FACE 2' BLW PC
401	C							X			VC 1/8"X2' W/CS W FACE AT TOP
											VC 1/4"X1' W/CS N FACE AT TOP
											VC 1/4"X2' W/CS E FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 401-C NOTE CONTINUED: ... CS E FACE											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0948		Tide: +1.6'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
401	B						X				CS W,S,E & N FACE (SZ, TYP)
401	A							X			CS N FACE
											VC HL X 1.5' E FACE AT TOP
402	A								X		OPEN SPALL 2" DIA X 3/4" DEEP W/CS N FACE 1' BLW PC
											VC 1/8"X1' W/CS W FACE 2' BLW PC (INTO MB)
402	B							X			VC 1/16"X1' W/CS N FACE 2' BLW PC
											VC 1/8"X1' W/CS W FACE 2' BLW PC
											CS W & S FACES
402	C							X			VC 1/8"X2' W/EFF SE CRNR AT TOP (INTO MB)
											CS W & N FACES
											VC 1/16"X1' W/CS W FACE 0.5 BLW PC ...
ADDITIONAL COMMENTS:											
PILE 402-C NOTE CONTINUED: ... EXIST SHOTCRETE REPAIR W/CS NW TO W FACE											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 0948			Tide: +1.6'			Pile Type (Bearing, Batter, Sheet): Bearing, Batter				Pile Material: Concrete, Timber	
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
403	C							X			CS N FACE EXIST SHOTCRETE REPAIR SW CRNR VC 1/8"X1' W FACE 0.5 BLW PC (AT SHOTCRETE)
403	C-BATT							X			10% SL MB
403	B							X			CS N FACE VC 1/8"X5' W/CS E FACE AT TOP VC 1/8"X2' W/CS W FACE AT TOP EXIST SHOTCRETE REPAIR W/CS NW CRNR
403	A								X		CS NW (SZ, TYP), E & S FACES OPEN SPALL 1 SF X 1" DEEP SW CRNR 3' BLW PC VC 1/8"X3' SE CRNR AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1050		Tide: +2.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
404	A	X		5'			X				CS S FACE
404	A-BATT									X	90% SL AT MB
404	B							X			VC 1/8"X2' S FACE AT TOP
											CS S FACE
											VC 1/16"0.5' W/CS E FACE 0.5 BLW PC
404	C								X		OPEN SPALL 3" DIA X 0.5" DEEP N FACE 2' BLW PC
											VC 1/16"X8" W/CS W FACE 1' BLW PC
											VC 1/4"X2' W/CS SW CRNR AT TOP (INTO MB)
											VC 1/8"X3.5' W/CS S FACE AT TOP (INTO MB)
											VC 1/4"X2' W/CS S FACE 0.5' BLW PC
											EXIST SHOTCRETE REPAIR W/CS SE & S FACES ...
ADDITIONAL COMMENTS:											
PILE 404-C NOTE CONTINUED: ... CS E FACE											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1050		Tide: +2.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
405	C							X			EXIST SHOTCRETE REPAIR W/CS E & SE FACES
											VC 1/8"X1' W/CS S FACE AT TOP
											VC 1/8"X1.5' W/CS S FACE 1' BLW PC
											CS S & E FACES
											VC 1/4"X2' W FACE AT TOP
405	B						X				CS N & W FACES (SZ, TYP)
405	A						X				CS S & W FACES
406	C-BATT									X	50-60% SECTION LOSS AT MUDLINE
406	C							X			EXIST SHOTCRETE REPAIR E, S & W FACES
											VC 1/8"X2' W/CS
											VC 1/4"X3' W FACE
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1050		Tide: +2.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
406	B					X					
406	A							X			VC 1/4"X2.5' W FACE 1' BLW PC
407	A					X					
407	B	X		6'		X					
407	C							X			EXIST SHOTCRETE REPAIR W/CS W FACE VC 1/8"X3.5' W/CS SW CRNR AT TOP
408	C							X			EXIST SHOTCRETE REPAIR SE, E & S FACES AT TOP VC 1/4"X3' W/CS S FACE 0.5' BLW PC VC 1/4"X3 W/CS SW CRNR 0.5' BLW PC VC 1/6"X2.5' W/CS E FACE 1' BLW PC
408	B					X					
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
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 ND = No Deterioration/Damage
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1050		Tide: +2.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
408	A					X					
409	A					X					
409	B					X					
409	C							X			VC 1/2"X2.5' W/CS W FACE 0.5' BLW PC
410	C							X			VC HL X 3' W/CS W FACE 3' BLW PC
											VC 1/16"X1' W/CS N FACE
410	B							X			VC HLX1' W/CS 2.5 BLW PC
											VC 1/16"X2' W/CS W FACE 2.5 BLW PC
											VC HL X 1' W/CS W FACE 2.5' BLW PC
											VC 1/16"X1' W/CS S FACE 2.5' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1050		Tide: +2.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
410	A	X		6'					X		VC 1/8"X2.5' W/CS E FACE 1.5' BLW PC
											VC 1/6"X2' W/CS N FACE 1.5 BLW PC
											VC 1/8"X1' W FACE 2.5' BLW PC
											EXIST SHOTCRETE REPAIR E & N FACES
											OPEN SPALL 3" X 1' X 0.15" NE CRNR 5' BLW PC
											OPEN SPALL 0.5' DIA X 1/2" DEEP NW CRNR 9' BLW PC
411	A							X			VC HL X 1' E FACE 3' BLW PC
411	B					X					
411	C								X		VC 1/16"X1' W/CS NW CRNR 3' BLW PC
											CLOSED SPALL 5' SF W/CS SW CRNR 3" BLW PC
											OPEN SPALL <1/4 SF x 1/2" DEEP W FACE 3' BLW PC ...
ADDITIONAL COMMENTS:											
PILE 411-C NOTE CONTINUED: ... CLOSED SPALL SE CRNR AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1050		Tide: +2.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
412	C							X			VC 1/8"X3' S FACE AT TOP
											VC 1/8"X1.5' S FACE 3' BLW PC
											VC 1/8"X2' W FACE 2.5 BLW PC
											VC 1/16"X1.5' W/CS W FACE 3' BLW PC
412	B							X			VC 1/16"X2' E FACE 2.5' BLE PC
											CS E FACE
											VC HL X 1.5' W/CS SW CRNR 2.5 BLW PC
											CS SE CRNR
412	A							X			VC 1/16"X3' W/CS E FACE AT TOP
											CS E FACE
413	A								X		OPEN SPALL 1 SF X 1.5" DEEP NE CRNR AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1318		Tide: +5.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
413	B	X		5'				X			VC 1/8"X2' W FACE 2' BLW PC
413	C							X			VC 1/8"X4' S FACE AT TOP
											VC 1/16"X1' NE CRNR 3' BLW PC
414	C								X		EXIST SHOTCRETE REPAIR SE CRNR AT TOP W/ CLOSED SPALL 4 SF W/CS SW CRNR
414	B					X					
414	A								X		CLOSED SPALL 1 SF W/CS SE CRNR AT TOP
											VC 1/16"X2' E FACE AT TOP
											EXIST SHOTCRETE REPAIR NW CRNR
											CLOSED SPALL 4 SF NW CRNR AT TOP
415	A							X			VC HL X 2.5' W/EFF W FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1336		Tide: +5.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
415	B					X					
415	C								X		VC 1/8"X3' W/EFF W FACE AT TOP EXIST SHOTCRETE REPAIR SE CRNR CLOSED SPALL 1.5' BLW PC VC 1/8"X4' E FACE AT TOP VC 1/8"X1.5 W/CS S FACE 1' BLW PC
416	C							X			VC 1/16"X1.5' S FACE 1.5 BLW PC
416	B					X					
416	A	X		5'					X		EXIST SHOTCRETE REPAIR W/CS NE & E FACE AT TOP VC HL X 1' W/CS NE CRNR 5' BLW PC OPEN SPALL 0.5' DIA X 3/4" DEEP NE CRNR 10' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1336		Tide: +5.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
416	A-BATT									X	30% SL. DISCONNECTED AT TOP. HOLLOW 4' BTM
417	A					X					
417	B							X			VC 1/16"X2' W FACE 2.5' BLW PC
417	C								X		VC HL X 2.5' W/EFF E FACE AT TOP CLOSED SPALL 3 SF W/CS SW CRNR IN SHOTCRETE
418	C-BATT									X	25% SL AT ML DUE TO MB. DISCONNECTED FROM TOP
418	C							X			VC 1/8"X3' W/CS W FACE 1' BLW PC
418	B							X			VC 1/8"X1' SW CRNR 2.5 BLW PC VC 1/4"X1' W FACE 2' BLW PC
418	A							X			EXIST SHOTCRETE REPAIR W/CS & CRACKS S FACE
419	A							X			VC 3/16"X2.5' W/CS N FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 419-A NOTE CONTINUED: ... EXIST SHOTCRETE REPAIR W FACE											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1336		Tide: +5.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
419	B					X					
419	C								X		EXIST SHOTCRETE REPAIR E,SE,S & SW FACES CLOSED SPALL 3 SF IN SHOTCRETE VC 1/8"X2.5' W FACE 1' BLW PC VC 1/4"X2.5' NW CRNR AT TOP
420	C	X		6'				X			EXIST SHOTCRETE REPAIR S, SW & W FACES VC 1/8"X3' W/C S W FACE AT TOP VC HL X 3' W/C S E FACE AT TOP
420	B							X			VC 1/16"X1' N FACE 2.5 BLW PC VC 1/16"X2' W/C S FACE 2.5 BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 10, 2017							
Time of Day: 1336		Tide: +5.1'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
420	A						X				EXIST SHOTCRETE REPAIR SW CRNR OVEROPEN SPALL
420	A-BATT								X		30% SL 1' ABOVE MUDLINE
421	A					X					
421	B							X			VC HL X 0.5' W FACE 1.5' BLW PC VC 1/16"X1.5' W/CS W FACE 2.5 BLW PC
421	C								X		EXIST SHOTCRETE REPAIR SW CRNR W/ CLOSED SPALL & 1" WIDE CRACKING ON BOTH SIDES OF SHOTCRETE. VC 1/8"X3' W/CS W FACE 0.5' BLW PC
ADDITIONAL COMMENTS:											

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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0820		Tide: +0.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
422	A								X		EXIST SHOTCRETE REPAIR N, E & S FACE
											CS N, SW & S FACE
											CLOSED SPALL NE CRNR W/ VC 1/8"X3'
422	B							X			CORROSION STAIN (CS) N FACE
											VERTICAL CRACK (VC) 1/4"X1' E FACE AT TOP
422	C								X		CS S & W FACE
											CLOSED SPALL W/SHOTCRETE 1.5 SF W/CS NE CRNR
422	C-BATT					X					
423	C							X			CS E FACE
											VC 1/4"X1' SW CRNR AT TOP
											VC 1/4"X3 W/CS S FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 423-C NOTE CONTINUED: ... VC 1/4"X2' W/CS W FACE AT TOP. VC 1/12"X1' W FACE 3' BLW PC.											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0820		Tide: +0.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
423	B	X		5'			X				CS W FACE
423	A							X			VC 1/8"X2' W/CS N FACE 0.5' BLW CAP
											VC 1/16"X0.5' W/CS N FACE AT TOP
											VC 1/2"X2' W/CS NW CRNR 1' BLW PC
											VC 1/8"X2' W/CS W FACE AT TOP
424	A						X				CS N FACE
424	A-BATT									X	90% SECTION LOSS (SL) 1.5' BLW PC.
											DISCONNECTED FROM TOP
424	B						X				CS W & E FACES
424	C							X			EXIST SHOTCRETE REPAIR W/CS SW CRNR
											VC 1/8"X3' W/CS W FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 424-C NOTE CONTINUED: ... VC 1/8"X3' W/CS S FACE AT TOP. VC 1/16"X1' S FACE 2' BLW PC. CS S FACE.											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0820		Tide: +0.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
425	C							X			VC 1/16" X 3' S FACE AT TOP (INTO MG)
425	B					X					
425	A						X				CS W & N FACES
426	A							X			CS N, NE & S FACES
											VC 1/4"X1.5' W/CS W FACE AT TOP
											VC 1/4"X1.5' W/CS SW CRNR AT TOP
426	B					X					
426	C	X		6'				X			EXIST SHOTCRETE REPAIR W/CS SW CRNR
											VC 1/8"X2' W/CS W FACE AT TOP
											VC 1/8"X2' W/CS S FACE AT TOP
											VC 1/8"X1.5' W/CS S FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 426-C NOTE CONTINUED: ... CS N FACE.											

CONDITION RATING LEGEND:
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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0820		Tide: +0.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
427	C							X			EXIST SHOTCRETE REPAIR S & W FACES
											VC 1/8"X2' W/CS S FACE AT TOP
											VC 1/4"X2' W/CS W FACE AT TOP
427	B								X		CLOSED SPALL 1 SF E FACE
427	A						X				1' TALL TIMBER PILE STUB HARD AGAINST NE CRNR
											CS N FACE
428	A-BATT									X	DISCONNECTED FROM PC
428	A						X				CS W & N FACE
428	B	X		6'			X				CS W FACE
428	C							X			EXIST SHOTCRETE REPAIR SW CRNR
											VC 1/8"X2' W/CS & EFF S FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 428-C NOTE CONTINUED: ... CS W FACE											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0820		Tide: +0.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
429	C							X			VC 1/8"X1' W/EFF S FACE AT TOP
											VC 1/8"X2' W/CS S FACE AT TOP
											EXIST SHOTCRETE REPAIR NE, SW CRNR
											VC 1/2"X1' W/CS W FACE 1' BLW PC
											VC 1/8"X2' W/CS E FACE AT TOP
											CS N FACE
429	B								X		FAILING SHOTCRETE SW CRNR
											CLOSED SPALL ON PILE
											VC 1/8"X2' W/CS S & W FACES AT TOP (EDGES OF SPALL)
											CS NW CRNR
429	A		X				X				CS S & E FACE
ADDITIONAL COMMENTS:											

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 NI = Not inspected, inaccessible
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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0820		Tide: +0.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
430	A							X			VC 1/16"X1' N FACE AT TOP CS N FACE EXIST SHOTCRETE REPAIR SW CRNR VC 1/8"X1' W/CS W FACE AT TOP VC 1/4"X2' W/CS SW CRNR IN SHOTCRETE VC 1/8"X0.5' W/CS SE 0.5 BLW PC
430	B								X		EXIST SHOTCRETE REPAIR NE CRNR VC 1/8"X1.5' W/CS E FACE 1' BLW PC CS E, NE & W FACES
430	C							X			VC 1/8"X1' W/EFF & CS W FACE AT TOP VC 1/4"X3' W/CS S FACE AT TOP (INTO MG) ...
ADDITIONAL COMMENTS: PILE 430-C: CS SW CRNR											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0950		Tide: +1.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
431	C	X		5'				X			EXIST SHOTCRETE REPAIR N, E, S & W FACES VC 1/16"X1' W/EFF S FACE AT TOP HORIZONTAL CRACK (HC) 1/8"X1' E FACE IN SHOTCRETE CS N & W FACES VC HL X 1' W/EFF W FACE 0.5' BLW PC
431	B							X			EXIST SHOTCRETE REPAIR VCs W/CS & EFF W FACE IN SHOTCRETE CS S FACE
431	A							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP VC 1/16"X1' W/EFF SW CRNR AT TOP IN SHOTCRETE VC 1/16"X1' W/EFF NW CRNR AT TOP IN SHOTCRETE
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0950		Tide: +1.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
432	A							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP HC W FACE IN INTERSECTION BTW SHOTCRETE & TOP CS N FACE
432	A-BATT									X	DISCONNECTED FROM TOP. ND IN WATER
432	B							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP VC 1/8"X0.5' W/EFF W FACE AT TOP
432	C							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP HC 1/8" W/EFF S & E FACES AT TOP
433	C							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP VC 1/8"X1.5' W/EFF S FACE AT TOP HC HL X 2' W/EFF E FACE IN SHOTCRETE
ADDITIONAL COMMENTS:											
PILE 433-C NOTE CONTINUED: ... VC 1/8"X0.5' W/EFF NW CRNR AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 0950		Tide: +1.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
433	B							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP CS W FACE BLW SHOTCRETE & INTO SHOTCRETE (SC) EFF W FACE AT BOTTOM (BTM) VC 1/8"X1' E/EFF SW CRNR AT TOP HC 1/8"X1.5' SE & E FACES IN SHOTCRETE
433	A							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP HC 1/8"X1' E FACE INTERSECTION BTW PILE & CAP CS W FACE BLW SHOTCRTE
434	A							X			EXIST SHOTCRETE REPAIR N, S, E & W FACES AT TOP CS W & N FACES BLW SHOTCRETE HC 1/8"X0.5' W/EFF E FACE INTERSECTION BTW PILE & CAP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1025		Tide: +1.4'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
434	B	X		5'				X			CS N & W FACES BLW SHOTCRETE EXIST SC REPAIR N,S,E & W FACES BTW PILE & CAP HC 1/8"X1.5' S FACE BTW PILE & CAP VC 1/16"0.5' W/EFF NE CRNR AT TOP
434	C							X			EXIST SC REPAIR N,S,E & W FACES BTW PILE & CAP CS W FACE BLW SHOTCRETE VC HL X 1' W FACE AT TOP HC 1/8"X1.5' W/EFF W FACE BTW PILE & CAP
434	C-BATT									X	DISCONNECTED FROM TOP. BROKEN 6'-7' ABOVE ML
435	C							X			EXIST SC REPAIR N,S,E & W FACES BTW PILE & CAP VC HL X 3' W/EFF & CS S FACE AT TOP
ADDITIONAL COMMENTS:											
PILE 435 C: ... VC1/8"X1.5' W/EFF E FACE AT TOP. CS N FACE IN SHOTCRETE. CS W FACE BLW SHOTCRETE.											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1025		Tide: +1.4'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
435	B							X			EXIST SC REPAIR N,S,E & W FACES BTW PILE & CAP CS W FACE BLW SHOTCRETE HC 1/8"X1.5' W/EFF E FACE BTW PILE & CAP
435	A							X			EXIST SC REPAIR N,S,E & W FACES BTW PILE & CAP CS S FACE BLW SHOTCRETE VC HL X 0.5' N FACE AT TOP HC 1/8"X4' W FACE INTERSECTION BTW PILE & CAP
436	A							X			VC HL X 1' W/CS E FACE AT TOP VC 1/16"X1' W/CS NW CRNR AT TOP VC 1/8"X1.5' W/CS S FACE AT TOP
436	A-BATT									X	10% SL FROM MB. DISCONNECTED FROM TOP
ADDITIONAL COMMENTS:											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1025		Tide: +1.4'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
436	B							X			CS E & W FACES AT TOP
											VC 1/8"X3' S FACE AT TOP (INTO MG)
436	C								X		CLOSED SPALL 3 SF SW CRNR BLW EXIST SC REPAIR
											VC 1/2"X3' W/CS S FACE AT TOP EDGE OF CLOSED SPALL
											VC 1/8"X3' W/CS W FACE AT TOP EDGE OF CLOSED SPALL
											CS W & S FACES BLW SPALL
437	C								X		EXIST SHOTCRETE REPAIR SE CRNR OVER CLOSED SPALL
											VC 1/8"X2' W/CS S FACE AT TOP EDGE OF CLOSED SPALL
											VC 1/8"X3' S FACE AT TOP (INTO MG)
											VC 1/16"X1.5' W/CS S FACE AT TOP
											VC 1/2"X3' W/CS E FACE AT TOP EDGE OF CLOSED SPALL...
ADDITIONAL COMMENTS:											
PILE 437 C NOTE CONTINUED: ... VC 1/2"X2' W/CS W FACE AT TOP											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1025		Tide: +1.5'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
437	B							X			CS W FACE VC 1/8"X1' W/CS N FACE AT TOP VC 1/4"X1' N FACE 2' BLW PC (INTO MG)
437	A	X		6'				X			EXIST SHOTCRETE REPAIR W/CS NE CRNR VC HL X 1' E FACE 1' BLW PC CS E & N FACES BLW SHOTCRETE
438	A						X				CS S & N FACES
438	B							X			CS W FACE VC 1/8"X2' S W/CS S FACE 1' BLW PC (INTO MG)
438	C							X			VC 1/4"X3' N FACE AT TOP (INTO MG) VC 1/8"X2' S FACE AT TOP ...
ADDITIONAL COMMENTS: PILE 438-C NOTE CONTINUED: ... CS E FACE											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1025		Tide: +1.5'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
438	A-BATT									X	BROKEN 7' BLW CAP
439	C							X			VC 1/8"X1.5' W/CS SE CRNR 0.25' BLW PC EXIST SHOTCRETE REPAIR W/CS W, SW & S FACES VC 1/16"X1' W/CS S FACE 0.25 BLW PC VC 1/8"X2' W/CS W FACE 1' BLW PC (INTO MG)
439	B							X			OPEN SPALL 3" DIA X 1/2" DEEP SW CRNR AT TOP
439	A							X			VC HL X 1.5' S FACE AT TOP EXIST SHOTCRETE REPAIR NW & W FACES CS W FACE IN SC & BLW SC ON PILE VC 1/8"X1.5' W/CS N FACE AT TOP
440	A							X			OPEN SPALL 2" DIA X 1/2" DEEP NE CRNR
ADDITIONAL COMMENTS:											
PILE 440-A NOTE CONTINUED: ... OPEN SPALL 7" DIA X 1/2" DEEP N FACE. CS N FACE.											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1025		Tide: +1.4'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
440	B						X				CS E & S FACES
440	C							X			VC 1/4"X1' W/CS & EFF N FACE AT TOP VC 1/8"X1' W/CS SW CRNR AT TOP EXIST SHOTCRETE REAPIR S & E FACES VC 1/8"X1' W/CS S FACE 1' BLW PC VC 1/8"X2' S FACE AT TOP (GOES INTO CAP) VC W/EFF E FACE IN & OUT OF SHOTCRETE
441	A								X		VC 1/2"X2.5 NW CRNR AT TOP CLOSED SPALL 1 SF NW CRNR AT TOP
441	B					X					
441	C							X			EXIST SC REPAIR W/VC 1/8"X2' S FACE AT TOP ...
ADDITIONAL COMMENTS:											
PILE 441-C NOTE CONTNUED: ...OPEN SPALL <1 SF X 1/2" DEEP 2.5' BLW PC. VC 1/16"X1' W/CS S FACE 3' BLW PC											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1234		Tide: +3.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
442	C-BATT									X	10% SL AT MUDLINE FROM MARINE BORER ACTIVITY
											CONNECTION HARDWARE AT TOP IS SEVERE
442	C							X			EXIST SHOTCRETE REPAIR W/ SPIDER CRACK W/CS
											SW TO S FACE
442	B	X		6'				X			VC 1/16"X1' SW CRNR 2.5' BLW PC
442	A					X					
443	A							X			VC 1/8"X1.5' W/CS W FACE 2.5' BLW PC
443	B								X		OPEN SPALL 6" DIA X 1" DEEP W/CS SW CRNR 3' BLW PC
											VC 1/8"X1.5' W/CS COMING FROM SPALL
											VC 1/16"X3' W/CS COMING FROM SPALL
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1234		Tide: +3.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
443	C								X		CLOSED SPALL 2 SF W/ X2 CRACK 1/2" SW TO S FACE
											OPEN SPALL 1 SFX1.5" DEEP E FACE
											VC 1/8"X2.5' SE CRNR AT TOP
											CLOSED SPALL 1.5 SF W/CS S FACE
											VC 1/2"X2' W/CS EXTENDING DOWN FROM SPALL
											VC 1/8"X2.5' SW CRNR 0.5' BLW PC
444	C						X				CS S FACE AT TOP
444	B							X			EXIST SHOTCRETE REPAIR NE & N FACE
											VC 1/16"X1' N FACE 1.5 BLW PC
444	A								X		VC 1/16"X3' W/EFF W FACE AT TOP
											CLOSED SPALL 1.5 SF NW CRNR AT TOP
ADDITIONAL COMMENTS:											

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 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1302		Tide: +4.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter			Pile Material: Concrete, Timber				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
444	A-BATT									X	50% SL DOWN TO ML. DISCONNECTED AT TOP
445	A					X					
445	B					X					
445	C	X		6'					X		VC 1/4"X2.5' W/CS W FACE AT TOP CLOSED SPALL 1.5 SF W/ASSOCIATED CRACKS UP TO 1" W S FACE OPEN SPALL 4 SF X 1.5" DEEP WITH HEAVY CS IN SPALL S FACE 5' BLW PC
446	C-BATT									X	40% SL 4' UP MUDLINE (ML). PILE DISCONNECTED AT TOP
446	C								X		EXIST SHOTCRETE REPAIR W/ CLOSED SPALL SW CRNR. VC 1/2"X2' W/CS SW CRNR 1.5' BLW PC ...
ADDITIONAL COMMENTS:											
PILE 446-C NOTE CONTINUED: ... VC 1/8"X3' W/CS SE CRNR AT TOP (INTO MG)											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1302		Tide: +4.3'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
446	B								X		VC 1/4"X2.5' NE CRNR AT TOP CLOSED SPALL 1 SF E FACE AT TOP VC 1/8"X2' W/CS N FACE AT TOP VC 1/8"X2.5 N FACE 2' BLW PC (INTO MG)
446	A								X		VC 1/8"X2' W/CS E FACE 2.5 BLW PC CLOSED SPALL 3 SF W/ASSOCIATED CRACK UP TO 1/2" W W/CS AT TOP
447	A							X			VC 1/16"X2' W/CS N FACE AT TOP
447	B					X					
447	C								X		CLOSED SPALL W/CRACK 1/16" 1.5 SF S FACE 0.5' BLW PC
448	C							X			EXIST SHOTCRETE REPAIR SW & S FACES ...
ADDITIONAL COMMENTS:											
PILE 448-C NOTE CONTINUED: ... VC 1/4"X3' W/CS S FACE AT TOP (EXTENDS INTO MG). VC 1/16"X0.5' W FACE 2' BLW PC											

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 NI = Not inspected, inaccessible
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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1354		Tide: +5.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
448	B							X			VC 1/16"X1' W/CS N FACE 2' BLW PC (INTO MG) CS S FACE VC 1/16"2' W FACE 2' BLW PC
448	A							X			VC 1/8"X4' W/CS E FACE 1' BLW PC VC HL X 0.5' W/CS NW CRNR VC HL X 2' W FACE 2' BLW PC
448	A-BATT									X	50% SL. DISCONNECTED AT TOP
449	A	X		6'					X		VC 1/4"X1.5' W/CS NW CRNR AT TOP VC 1/16"X2' W/CS W FACE 1' BLW PC OPEN SPALL 1 SF X 3/4" DEEP N FACE 5' BLW PC
449	B							X			VC HL X 1' N FACE 1' BLW PC (INTO MG)
ADDITIONAL COMMENTS:											

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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1354		Tide: +5.0'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
449	C							X			VC 1/8"X3' S FACE 1' BLW PC (INTO MG)
											VC 1/16"/0.5' N FACE 2.5' BLW PC (INTO MG)
450	C-BATT									X	40% SL AT BTM. DISCONNECTED AT TOP
450	C								X		CLOSED SPALL 3 SF NW CRNR AT TOP
450	B					X					
450	A								X		CLOSED SPALL 2 SF W/CS NW CRNR 1' BLW PC
											W/ CS & CRACKS UP TO 1/2" W
451	A					X					
451	B					X					
451	C							X			3X VC 1/8"X2' W/CS S FACE AT TOP (INTO MG)
											VC 1/4"X2' W FACE 0.5' BLW PC
ADDITIONAL COMMENTS:											

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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 11, 2017							
Time of Day: 1421		Tide: +5.2'		Pile Type (Bearing, Batter, Sheet): Bearing			Pile Material: Concrete				
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
452	C					X					
452	B					X					
452	A					X					
453	A	X		6'		X					
453	B					X					
453	C					X					
454	C					X					
454	B					X					
454	A					X					
455	A					X					
455	B					X					
ADDITIONAL COMMENTS:											
PILE 455-C ND.											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 14, 2017							
Time of Day: 0815		Tide: +2.8'		Pile Type (Bearing, Batter, Sheet): Bearing		Pile Material: Concrete					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
456	A					X					
456	B	X		8'		X					
456	C					X					
457	C					X					
457	B					X					
457	A					X					
458	A					X					
458	B					X					
458	C					X					
459	C					X					
459	B					X					
ADDITIONAL COMMENTS:											

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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 14, 2017							
Time of Day: 0830		Tide: +2.7'		Pile Type (Bearing, Batter, Sheet): Bearing		Pile Material: Concrete					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
459	A	X		9		X					
460	A					X					
460	B					X					
460	C					X					
461	C					X					
461	B					X					
461	A					X					
462	A					X					
462	B					X					
462	C						X				VOID 2" DIA X 1" DEEP N FACE 2' BLW PC
ADDITIONAL COMMENTS:											

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 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 14, 2017							
Time of Day: 0855		Tide: +2.4'		Pile Type (Bearing, Batter, Sheet): Bearing		Pile Material: Concrete					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating					Comments	
Bent	Pile				NI	ND	MN	MD	MJ	SV	
463	C	X		8.6'		X					
463	B						X				CS S FACE 1 BLW PC VOID/OPEN SPALL 2.5" DIA X 1/2" DEEP N FACE 1.5 BLW PC
463	A					X					
464	A					X					
464	B						X				CS 0.5 SF S FACE AT TOP
464	C						X				CS 2" DIA S FACE 1' BLW PC
465	C						X				OPEN SPALL 2.5" DIA X 0.5" DEEP N FACE 1' BLW PC
465	B						X				OPEN SPALL 2.5" DIA X 0.5" DEEP N FACE 3' BLW PC
465	A					X					
466	A					X					
ADDITIONAL COMMENTS:											

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 ND = No Deterioration/Damage
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 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 14, 2017							
Time of Day: 1020		Tide: +1.9'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
282	C	X		1'					X		CLOSED SPALL 1.5 SF W/CS S FACE AT TOP
											VC 1/8"X2' W/CS SW CRNR AT TOP
											VC 1/4"X4.5' W FACE AT TOP
											CLOSED SPALL 0.5 SF W FACE AT TOP
											CLOSED SPALL 0.5 SF E FACE AT TOP
											CLOSED SPALL 1 SF NE CRNR AT TOP
283	C								X		VC HL X 2' W/CS W FACE AT TOP
											OPEN SPALL 1 SF X 1.5" DEEP SW CRNR AT TOP
											VC 1/16"X2.5' SW CRNR AT TOP
283	B								X		CLOSED SPALL 3 SF W/CS SE CRNR AT TOP
											CLOSED SPALL 1.5 SF SW CRNR AT TOP ...
ADDITIONAL COMMENTS:											
PILE 283-B NOTE CONTINUED: ... VC 1/16"X3.5' S FACE AT TOP. VC 1/16"X3' W/CS W FACE AT TOP.											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 14, 2017							
Time of Day: 1020		Tide: +1.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
283	A								X		VC 1/8"X2' W/CS N FACE AT TOP
											VC 1/8"X2' W/CS NE CRNR AT TOP
											VC 1/8"X2' W/CS W FACE AT TOP
											VC HL X 2.5' W/CS & EFF S FACE AT TOP
											CLOSED SPALL 2.5 SF E FACE AT TOP
284	A								X		CLOSED SPALL 2 SF W/CS NW CRNR AT TOP
											CLOSED SPALL 4 SF W/CS NE CRNR AT TOP
284	B								X		CLOSED SPALL 0.5 SF W/CS SE CRNR AT TOP
											VC HL X 2.5' W/CS NW CRNR AT TOP
											OPEN SPALL 1.5 SF X 1.5" DEEP N FACE 5' BLW PC
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
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 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: August 14, 2017							
Time of Day: 1020		Tide: +1.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
284	C								X		CLOSED SPALL 3 SF W/CS SW CRNR AT TOP
											VC 1/16"X2.5' W/CS & EFF SE CRNR AT TOP
											VC 1/16"X2' W/CS NW CRNR AT TOP
285	C								X		VC 1/4"X3' SW CRNR AT TOP
											OPEN (15%) CLOSED (85%) SPALL 2 SF X 1" DEEP
											S FACE 2' BLW PC
285	B					X					
285	A						X				CS 1 SF W FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

STANDARD PILE INSPECTION RECORD

Structure: Berkeley Municipal Pier		Location: Berkeley, CA		Company: Sea Engineering, Inc.		Divers: P. Roberts A. Gonzalez K. Walton					
Inspection Team Leader: Paul Roberts, PE				Inspection Date: September 7, 2017							
Time of Day: 1042		Tide: +3.8'		Pile Type (Bearing, Batter, Sheet): Bearing, Batter		Pile Material: Concrete, Timber					
Location		Level II Insp	Level III Insp	Water Depth	Pile Condition Rating						Comments
Bent	Pile				NI	ND	MN	MD	MJ	SV	
280	A					X					2' EXPOSED ONLY S FACE
280	B					X					3' EXPOSED
280	C				X						NOT ACCESSIBLE. COVERED IN CONC. OVERPOUR
281	A					X					2.5' EXPOSED ONLY ACCESSIBLE S & W FACES
281	B							X			4' EXPOSED
											VC HL X 1' W FACE 2' BLW PC
281	C					X					
282	A					X					5' EXPOSES ONLY ACCESSIBLE E FACE
282	B								X		5'-6' EXPOSED. VC 1/4"X4.5' E FACE AT TOP (INTO MG)
											VC 1/4"X6.5' W FACE AT TOP
											CLOSED SPALL 2 SF N FACE AT TOP
ADDITIONAL COMMENTS:											

CONDITION RATING LEGEND:
 NI = Not inspected, inaccessible
 ND = No Deterioration/Damage
 MN = Minor Deterioration/Damage
 MD = Moderate Deterioration/Damage
 MJ = Major Deterioration/Damage
 SV = Severe Deterioration/Damage

APPENDIX 4:
REFERENCES

Table 2-14. Condition Assessment Ratings

Rating	Description
6 Good	No visible damage or only minor damage noted. Structural elements may show very minor deterioration, but no overstressing observed. No repairs are required.
5 Satisfactory	Limited minor to moderate defects or deterioration observed, but no overstressing observed. No repairs are required.
4 Fair	All primary structural elements are sound, but minor to moderate defects or deterioration observed. Localized areas of moderate to advanced deterioration may be present, but do not significantly reduce the load-bearing capacity of the structure. Repairs are recommended, but the priority of the recommended repairs is low.
3 Poor	Advanced deterioration or overstressing observed on widespread portions of the structure, but does not significantly reduce the load-bearing capacity of the structure. Repairs may need to be carried out with moderate urgency.
2 Serious	Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of primary structural components. Local failures are possible, and loading restrictions may be necessary. Repairs may need to be carried out on a high-priority basis with urgency.
1 Critical	Very advanced deterioration, overstressing, or breakage has resulted in localized failure(s) of primary structural components. More widespread failures are possible or likely to occur, and load restrictions should be implemented as necessary. Repairs may need to be carried out on a very high-priority basis with strong urgency.

2.6.2 Condition Assessment Ratings

The Condition Assessment Rating should be assigned upon completion of the routine inspection and remain associated with the structural unit (as defined in Section 3.1.1) until the structure is rerated following a quantitative engineering evaluation and repairs, or upon completion of the next

Table 2-6. Damage Ratings for Reinforced Concrete Elements

Damage Rating		Existing Damage ^a	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> • Not inspected, inaccessible, or passed by^b 	
ND	No Defects	<ul style="list-style-type: none"> • Good original hard surface, hard material, sound 	
MN	Minor	<ul style="list-style-type: none"> • Mechanical abrasion or impact spalls up to 1 in. in depth • Occasional corrosion stains or small pop-out corrosion spalls • General cracks up to 1/16 in. in width 	<p>Minor damage not appropriate if</p> <ul style="list-style-type: none"> • Structural damage • Corrosion cracks • Chemical deterioration^c
MD	Moderate	<ul style="list-style-type: none"> • Structural cracks up to 1/16 in. in width • Corrosion cracks up to 1/4 in. in width • Chemical deterioration: Random cracks up to 1/16 in. in width; "Soft" concrete and/or rounding of corners up to 1 in. deep • Mechanical abrasion or impact spalls greater than 1 in. in depth 	<p>Moderate damage not appropriate if</p> <ul style="list-style-type: none"> • Structural breakage and/or spalls • Exposed reinforcement • Loss of cross section due to chemical deterioration beyond rounding of corner edges

MJ	Major	<ul style="list-style-type: none"> • Structural cracks 1/16 in. to 1/4 in. in width and partial breakage (through section cracking with structural spalls) • Corrosion cracks wider than 1/4 in. and open or closed corrosion spalls (excluding pop-outs) • Multiple cracks and disintegration of surface layer due to chemical deterioration • Mechanical abrasion or impact spalls exposing the reinforcing 	<p>Major damage not appropriate if</p> <ul style="list-style-type: none"> • Loss of cross section exceeding 30% due to any cause
SV	Severe	<ul style="list-style-type: none"> • Structural cracks wider than 1/4 in. or complete breakage • Complete loss of concrete cover due to corrosion of reinforcing steel with more than 30% of diameter loss for any main reinforcing bar • Loss of bearing and displacement at connections • Loss of concrete cover (exposed steel) due to chemical deterioration • Loss of more 30% of cross section due to any cause 	

^a Any defect listed below is sufficient to identify relevant damage grade.

^b If not inspected due to inaccessibility or passed by, note as such.

^c Chemical deterioration: Sulfate attack, alkali-silica reaction, alkali-aggregate reaction, alkali-carbonate reaction ettringite distress, or other chemical/concrete deterioration.

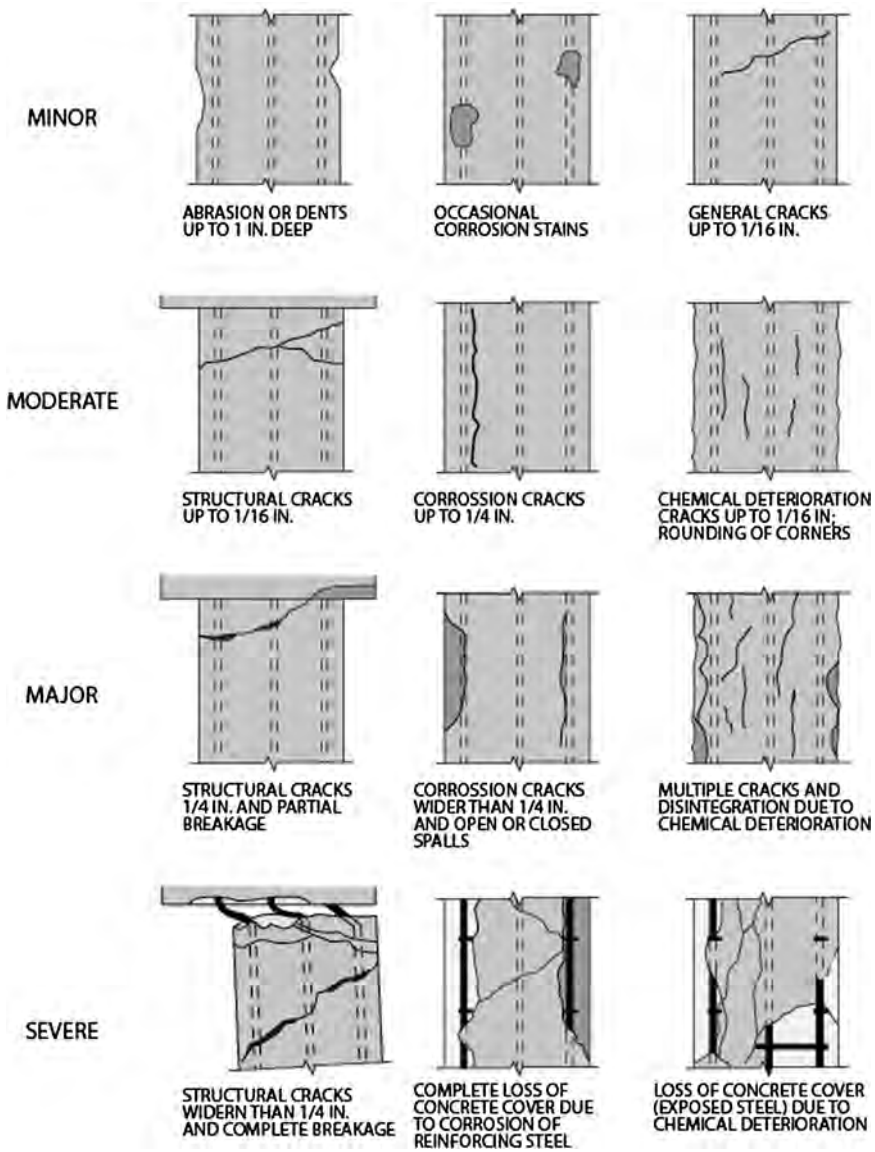


Fig. 2-4. Damage ratings for reinforced concrete elements

Source: Courtesy of CH2M HILL, Inc. and COWI, Inc., reproduced with permission.

Table 2-4. Damage Ratings for Timber Elements

Damage Rating		Existing Damage ^a	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> • Not inspected, inaccessible, or passed by^b 	
ND	No Defects	<ul style="list-style-type: none"> • Sound surface material 	
MN	Minor	<ul style="list-style-type: none"> • Checks, splits, and gouges less than 0.5 in. wide • Evidence of marine borers or fungal decay 	<p>Minor damage not appropriate if</p> <ul style="list-style-type: none"> • Loss of cross section • Marine borer infestation • Displacements, loss of bearing, or connections
MD	Moderate	<ul style="list-style-type: none"> • Remaining diameter loss up to 15% • Checks and splits wider than 0.5 in. • Cross section area loss up to 25% • Corroded hardware • Evidence of marine borers or fungal decay, with loss of section 	<p>Moderate damage not appropriate if</p> <ul style="list-style-type: none"> • Displacements, loss of bearing or connections

(Continued)

Table 2-4. Damage Ratings for Timber Elements (*Continued*)

Damage Rating		Existing Damage ^a	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
MJ	Major	<ul style="list-style-type: none"> • Remaining diameter loss 15 to 30% • Checks and splits through full depth of cross section • Cross-section area loss 25 to 50%; heavily corroded hardware • Displacement and misalignments at connections 	Major damage not appropriate if <ul style="list-style-type: none"> • Partial or complete breakage
SV	Severe	<ul style="list-style-type: none"> • Remaining diameter loss more than 30% • Cross section area loss more than 50% • Loss of connections and/or fully nonbearing condition • Partial or complete breakage 	

^a Any defect listed below is sufficient to identify relevant damage grade.

^b If not inspected due to inaccessibility or passed by, note as such.

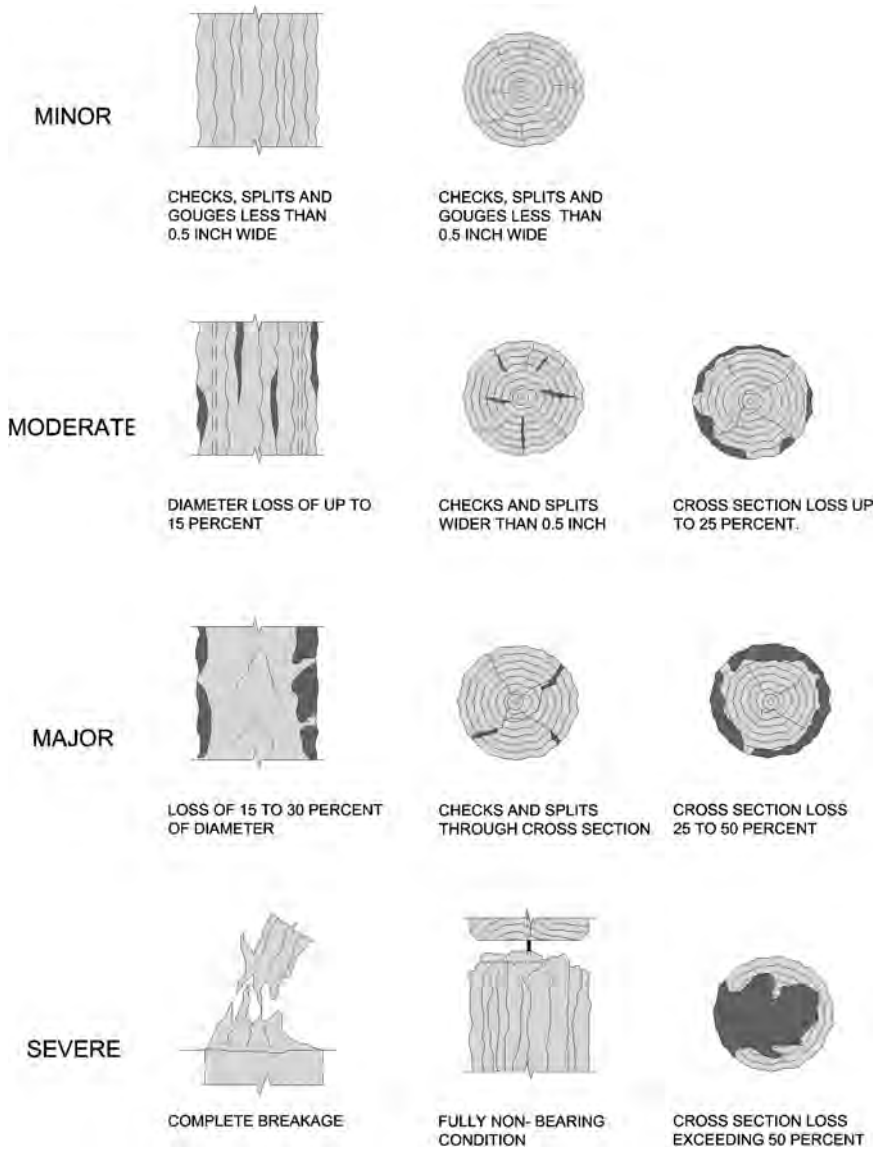


Fig. 2-2. Condition ratings for timber elements
 Source: Courtesy of CH2M HILL, Inc. and COWI, Inc., reproduced with permission.

ABBREVIATION KEY

ABBREVIATION	TERM	ABBREVIATION	TERM
'	FOOT	MJ	MAJOR
"	INCH	ML	MUDLINE
BAT, BATT	BATTER	MLW	MEAN LOW WATER
BLW	BELOW	MN	MINOR
BTM	BOTTOM	N	NORTH
BTW	BETWEEN	ND	NO DAMAGE
CONC	CONCRETE	NE	NORTHEAST
CR	CORROSION	NI	NOT INSPECTED
CRNR	CORNER	NW	NORTHWEST
CS	CORROSION STAIN	S	SOUTH
DIA	DIAMETER	SE	SOUTHEAST
E	EAST	SF	SQUARE FOOT
EFF	EFFLORESCENCE	SL	SECTION LOSS
ENC	ENCASEMENT	SV	SEVERE
GEN	GENERAL	SW	SOUTHWEST
H	HORIZONTAL	SX	SECTION (CROSS SECTION)
HC	HORIZONTAL CRACK	SZ	SPLASH ZONE
HDW	HARDWARE	TYP	TYPICAL
HT	HEIGHT	TZ	TIDAL ZONE
HVY	HEAVY	V	VERTICAL
LT	LIGHT	VC	VERTICAL CRACK
MB	MARINE BORER	W	WEST
MD	MODERATE	W/	WITH
MHW	MEAN HIGH WATER	WL	WATERLINE
MID, MW	MIDWATER		

Atmospheric
Zone

Splash Zone

MHHW

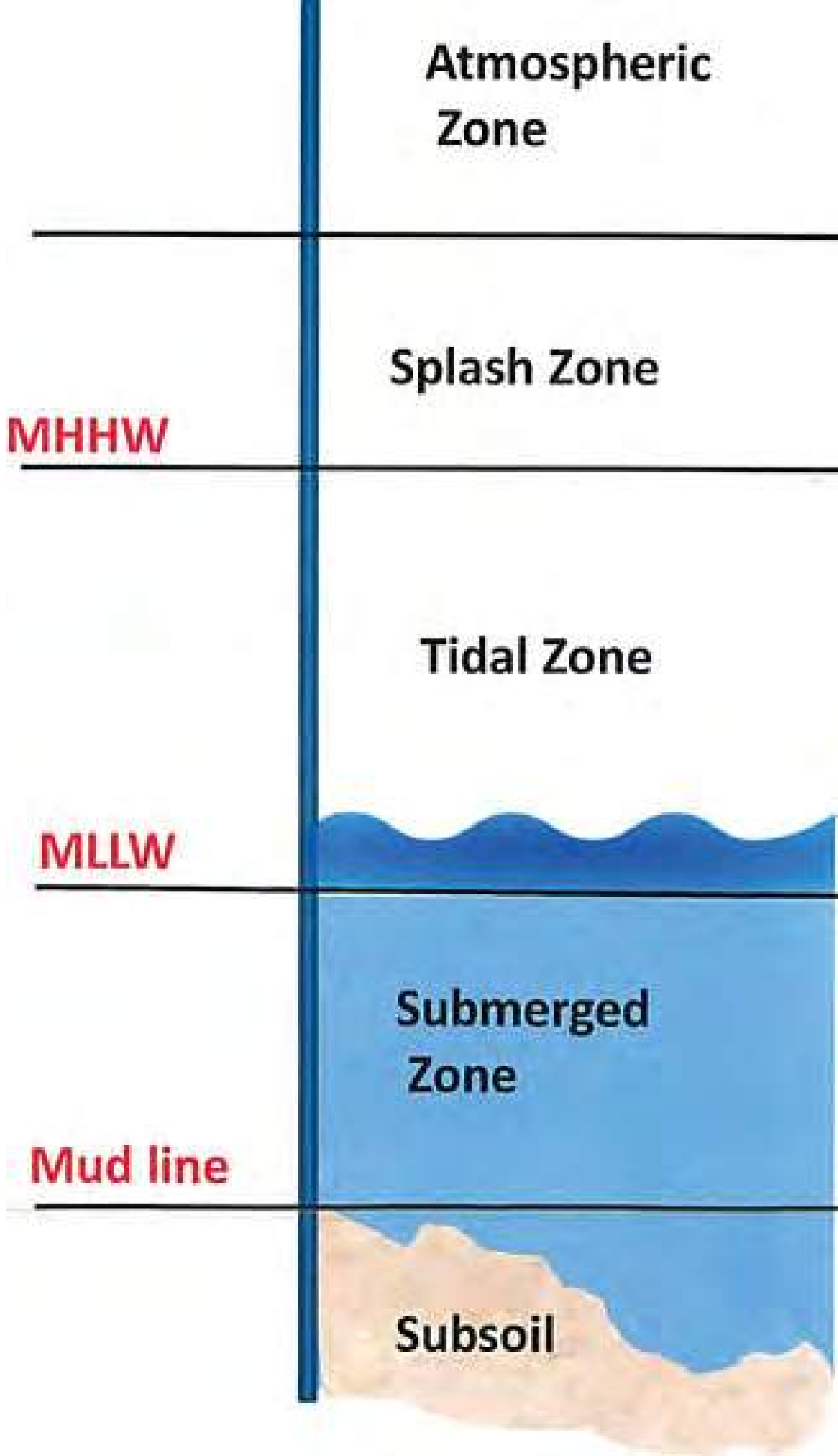
Tidal Zone

MLLW

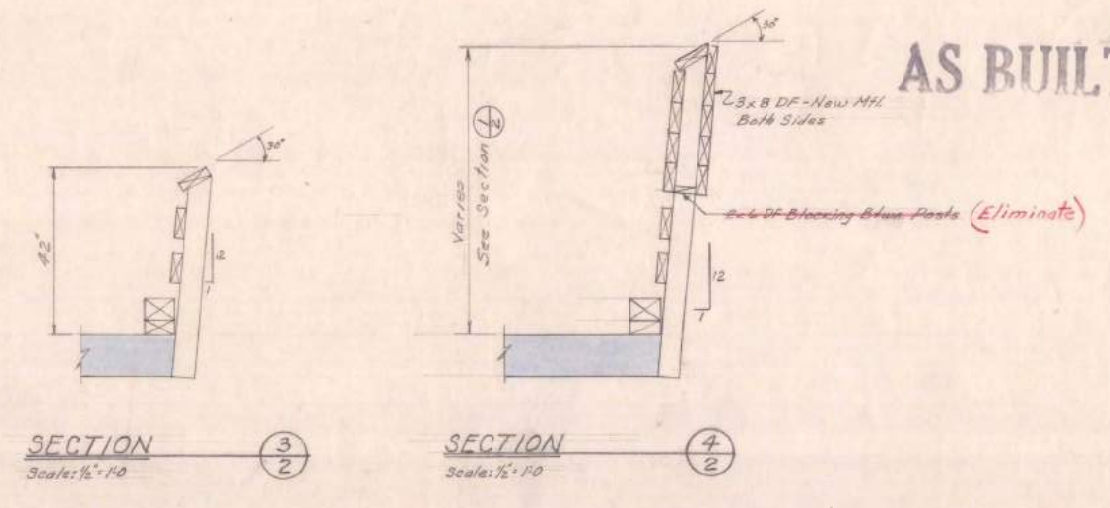
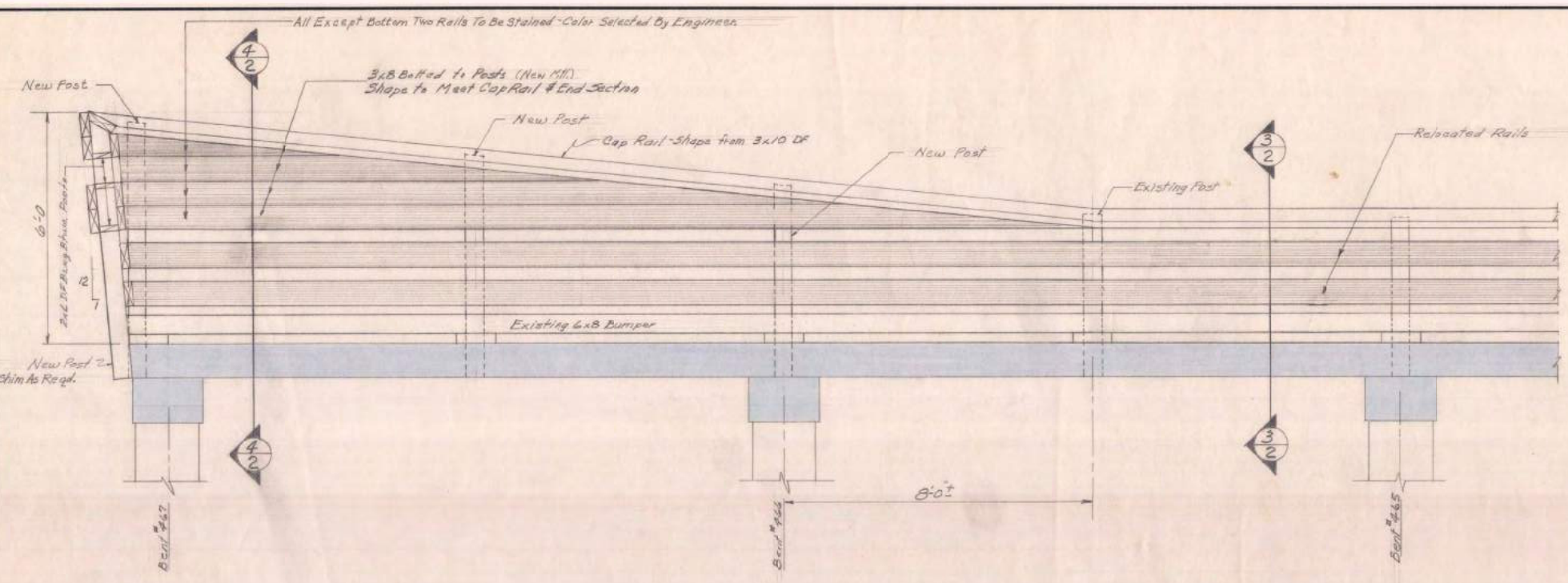
Submerged
Zone

Mud line

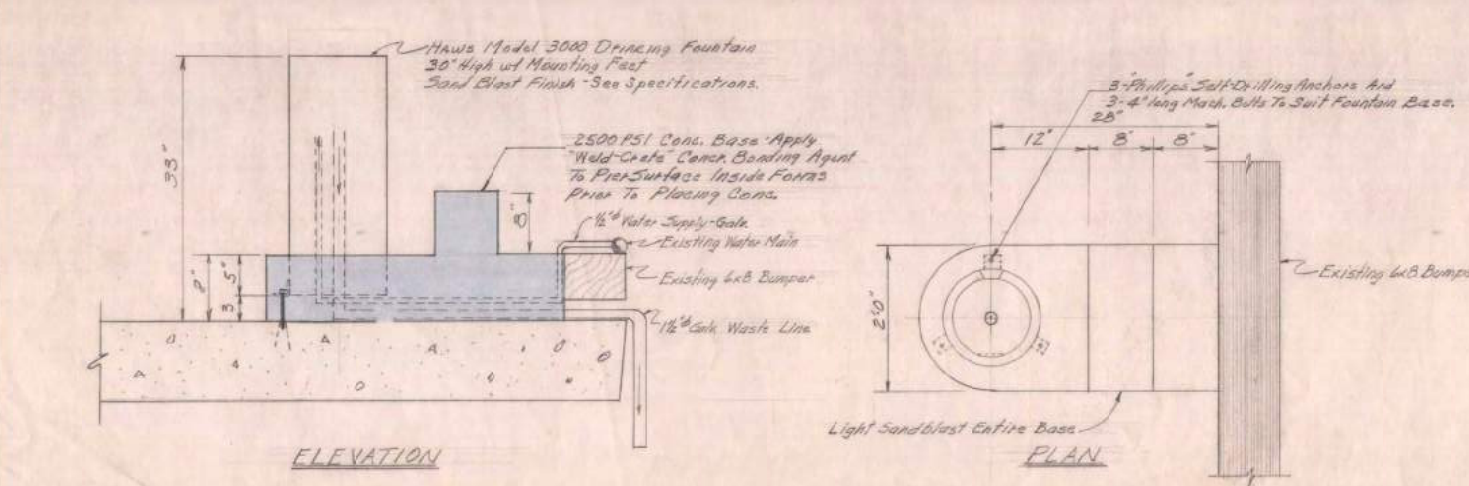
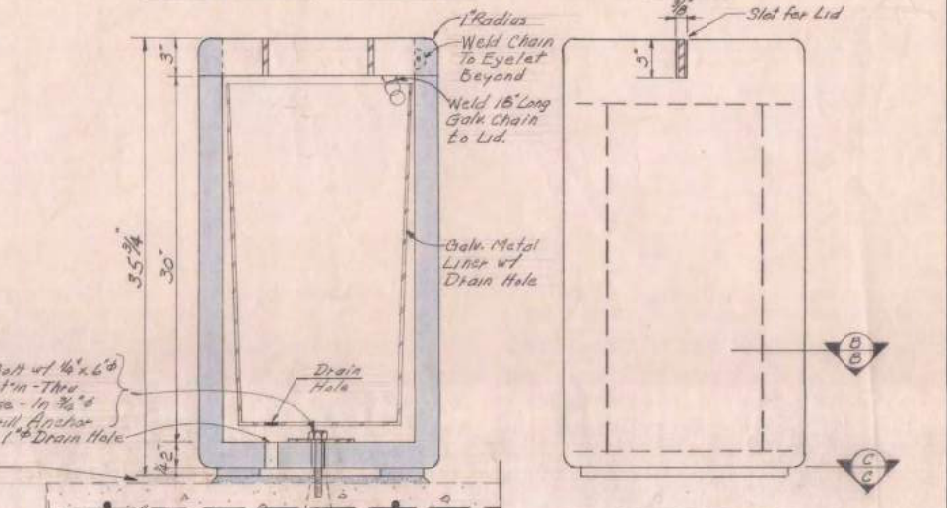
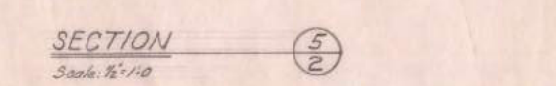
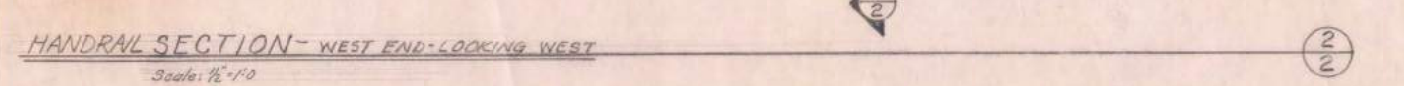
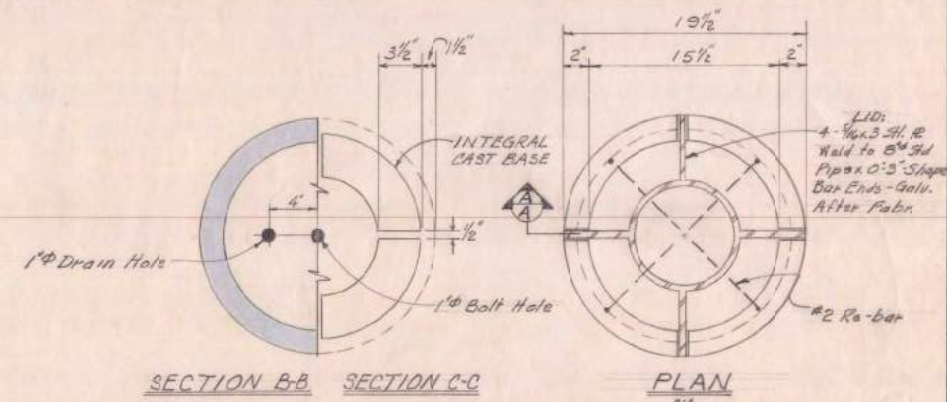
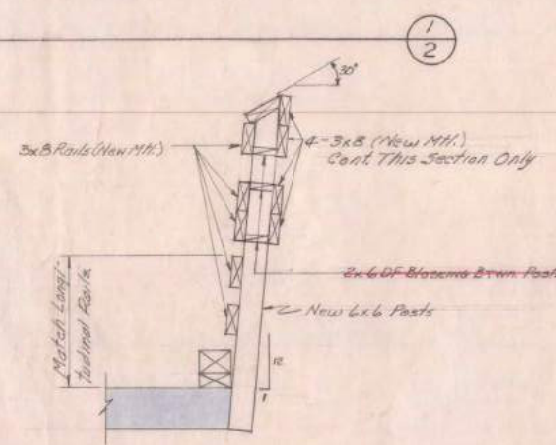
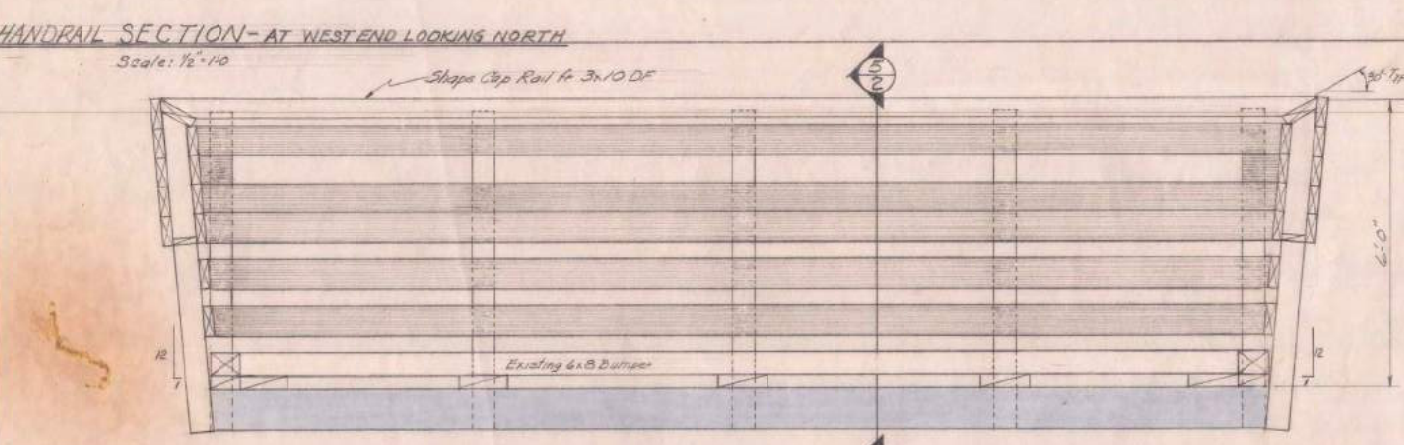
Subsoil



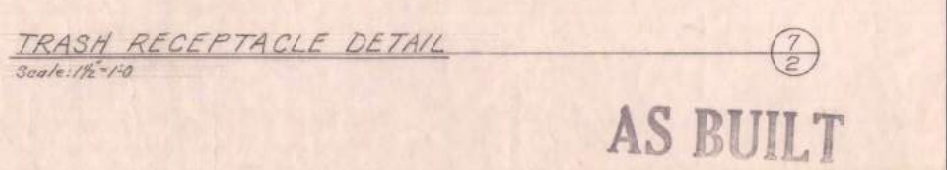
Appendix E
Record Drawings



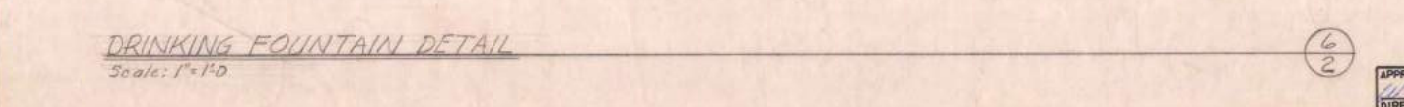
AS BUILT



NOTE:
Re-bar Locations In Existing Slabs Are As Shown On Record Drawings. Contractor Shall NOT Drill Thru Any Structural Reinforcement In Event Of Conflict By New Anchors, These Shall Be Relocated As Directed By The Engineer. Falsely Drilled Holes Shall Be Repaired By Filling With Epoxy Bonded Cement.
This Note Applicable To All "Phillips" Anchors



AS BUILT

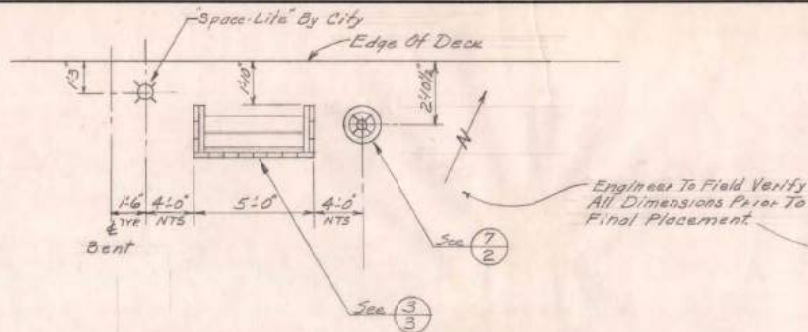


RECOMMEND APPROVAL: DATE 1/26/72	DATE 1/26/72	CITY OF BERKELEY DEPARTMENT OF PUBLIC WORKS	DESIGN TK DRAW EED CHECK WLD AS BUILT	HORIZ. As Noted VERT. BOOK DATE 15/Nov 72	PLAN 6043 FILE 405-87 SHEET 2 OF 6
APPROVED: [Signature] DATE 4/4/72	DATE 4/4/72				
DIRECTOR OF RECR. & PARKS	DIRECTOR OF PUBLIC WORKS	R.C.E. 18198	R.C.E. 8595		

LOCATION OF FISHING LIGHTS

4' West of Bent No. 287	4' West of Bent No. 382
" 306	" 401
" 325	" 420
" 344	" 439
" 363	" 458

All By City

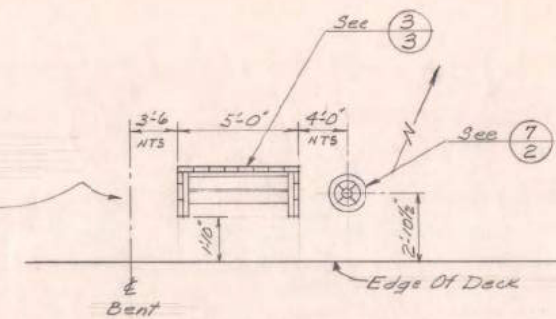


Benches & Trash Receptacles To Be Located In Above Relationship To Pier Bents Tabled Below

Bent Numbers		
465	405	345
453	393	333
441	381	321
429	369	309
417	357	297

DETAIL-BENCH & TRASH RECEPTACLE LOCATIONS

Scale: 1/4" = 1'-0"



Benches & Trash Receptacles To Be Located In Above Relationship To Pier Bents Tabled Below

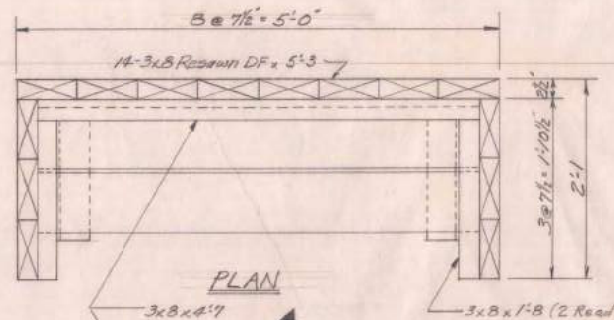
Bent Numbers		
459	399	339
447	387	327
435	375	315
423	363	303
411	351	291

DETAIL-BENCH & TRASH RECEPTACLE LOCATIONS

Scale: 1/4" = 1'-0"

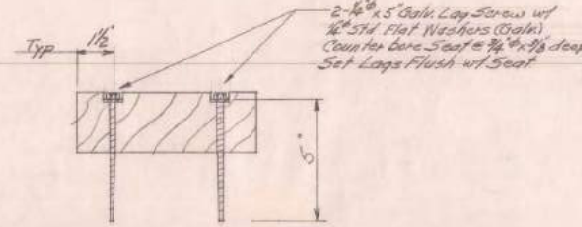
AS BUILT

EXISTING RAILS TO BE REPLACED			
North Side		South Side	
Between Bent 311 & Bent 312	Between Bent 296 & Bent 297		
316	317	301	302
321	322	302	303
328	329	303	304
330	331	310	311
331	332	315	316
332	333	321	322
342	343	323	324
346	347	333	334
349	350	359	360
372	373	361	362
378	379	390	391
380	381	400	401
392	393	402	403
393	394	409	410
398	399	415	416
402	403	424	425
405	406	430	431
410	411	432	433
415	416	440	441
423	424	444	442
427	428	445	444
434	435	456	457
440	441	458	459
448	449	460	461
453	454	463	464
458	459	464	465
465	466	465	466
466	467	466	467



PLAN

Scale: 1/4" = 1'-0"



DETAIL

Scale: 5" = 1'-0"

TYPICAL NAILING PATTERN:
4-20d Ring Shank Nails
Each Piece Each Support

BENCH NOTES:

- All Dimensions Based On: 3x8 - 2 1/2 x 7 1/2 & 3x14 - 2 1/2 x 13 1/2.
- All Material Shall Be DF No. 1 Appearance Grade - Reosun Except Seat Boards Shall Be S4S.
- Nailing & Hardware Shall Be As Shown On Plans.
- Grout Shall Be Per 'Rox' Cement (Or Equal When Approved By The Engineer) And Shall Be Used According To Mfgs. Recommendations.
- Finish Shall Be Two (2) Coats Transparent Stain, Color To Be Selected By Engineer. See Specifications.
- Seat Boards Shall Be Installed w/ Two (2) 1/2" x 5" Galv. Hex. Hd. Lag Screws Each End w/ Flat Washers & Bolt Heads Shall Be Flush w/ Seat Surface.

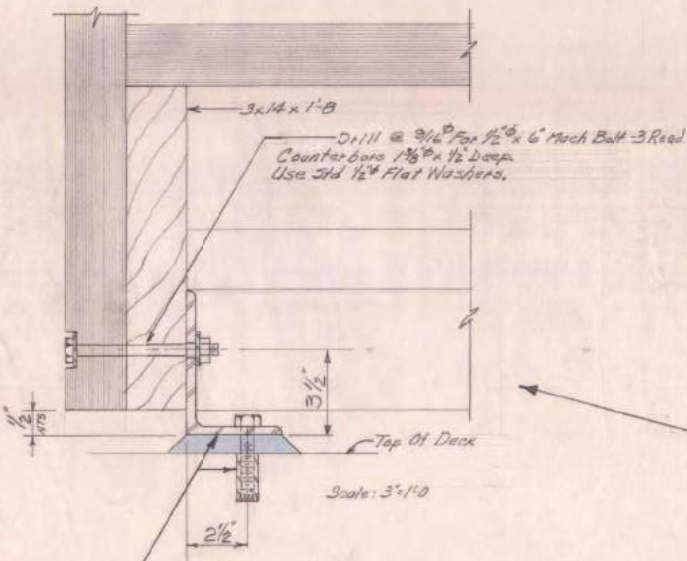
GENERAL NOTE:

NTS = Not To Scale

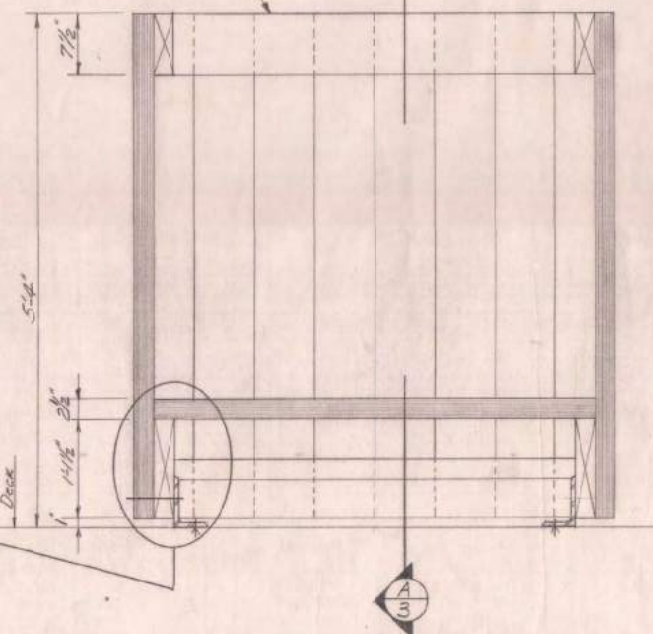
FINAL QUANTITIES

1. Handrail Removal, Replacem.	L.S.	\$ 32,000.00
2. Handrail Sandblasting	L.S.	2,400.00
3. Trash Receptacles	34 ea. @ \$175.00	5,950.00
4. Benches	30 ea. @ 300.00	9,000.00
5. Drinking Fountains	2 ea. @ 500.00	1,000.00
Att.A. Observation Platform	L.S.	21,000.00
c.c.d.#1. Furnish & Install 600 Carriage Bolts		250.00
c.c.d.#2. Furnish & Install Lumber & Bolts		151.00
TOTAL		\$ 71,751.00

CONTRACTOR : McGUIRE & HESTER
INSPECTOR : H. PETERSEN
Job Awarded : 8-1-72
Job Completed & Accepted : 3-21-73
Contract Compl. Date incl. Extensions : 3-29-73



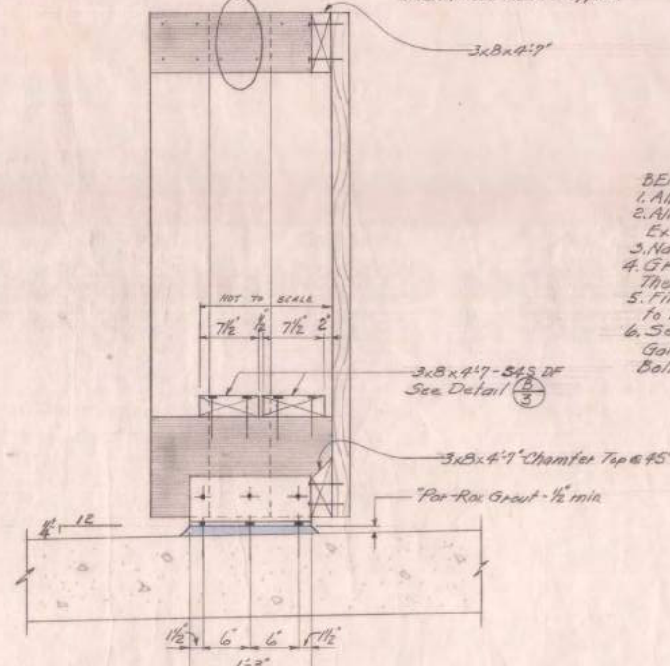
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ELEVATION

DETAIL-BENCH (See Notes At Right)

Scale: 1" = 1'-0"



SECTION

Scale: 1" = 1'-0"

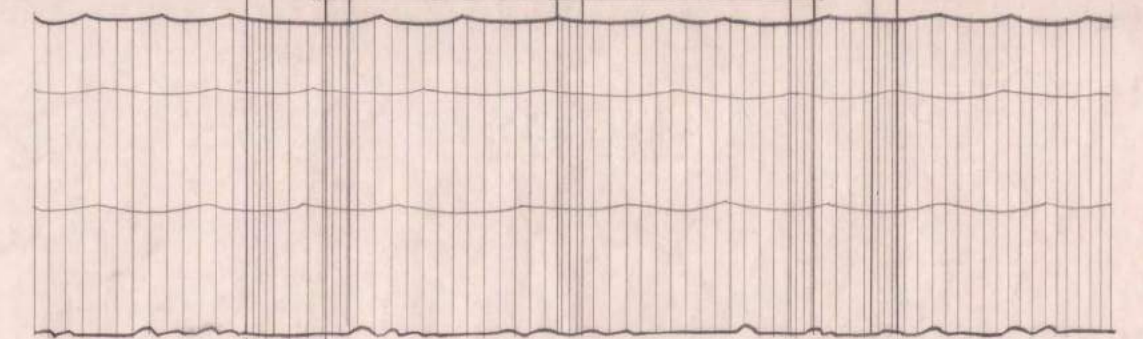
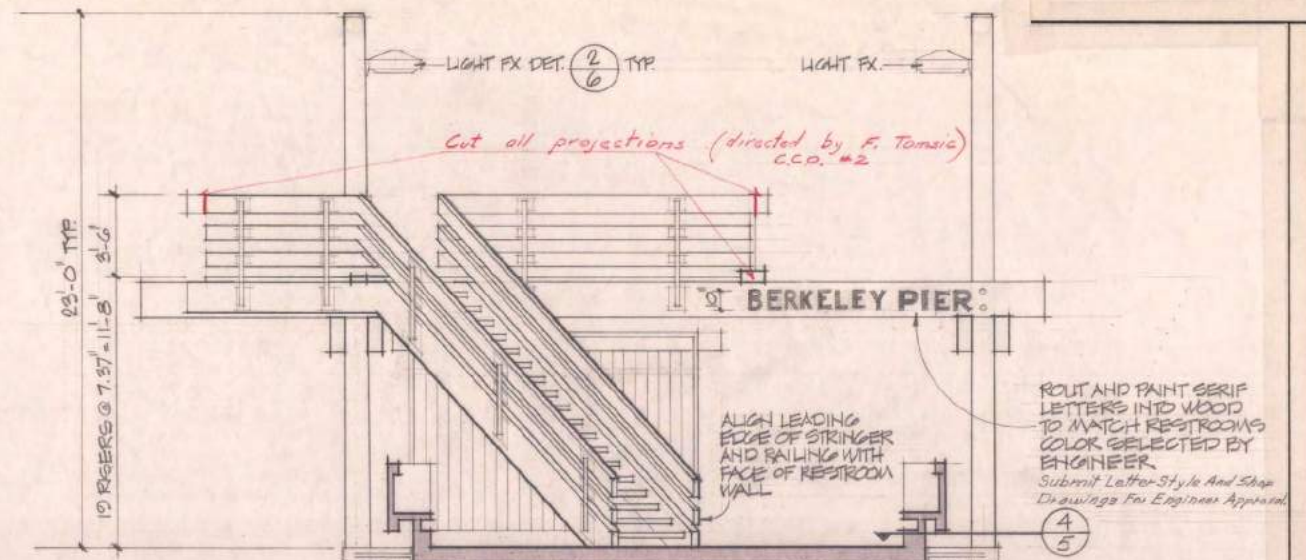
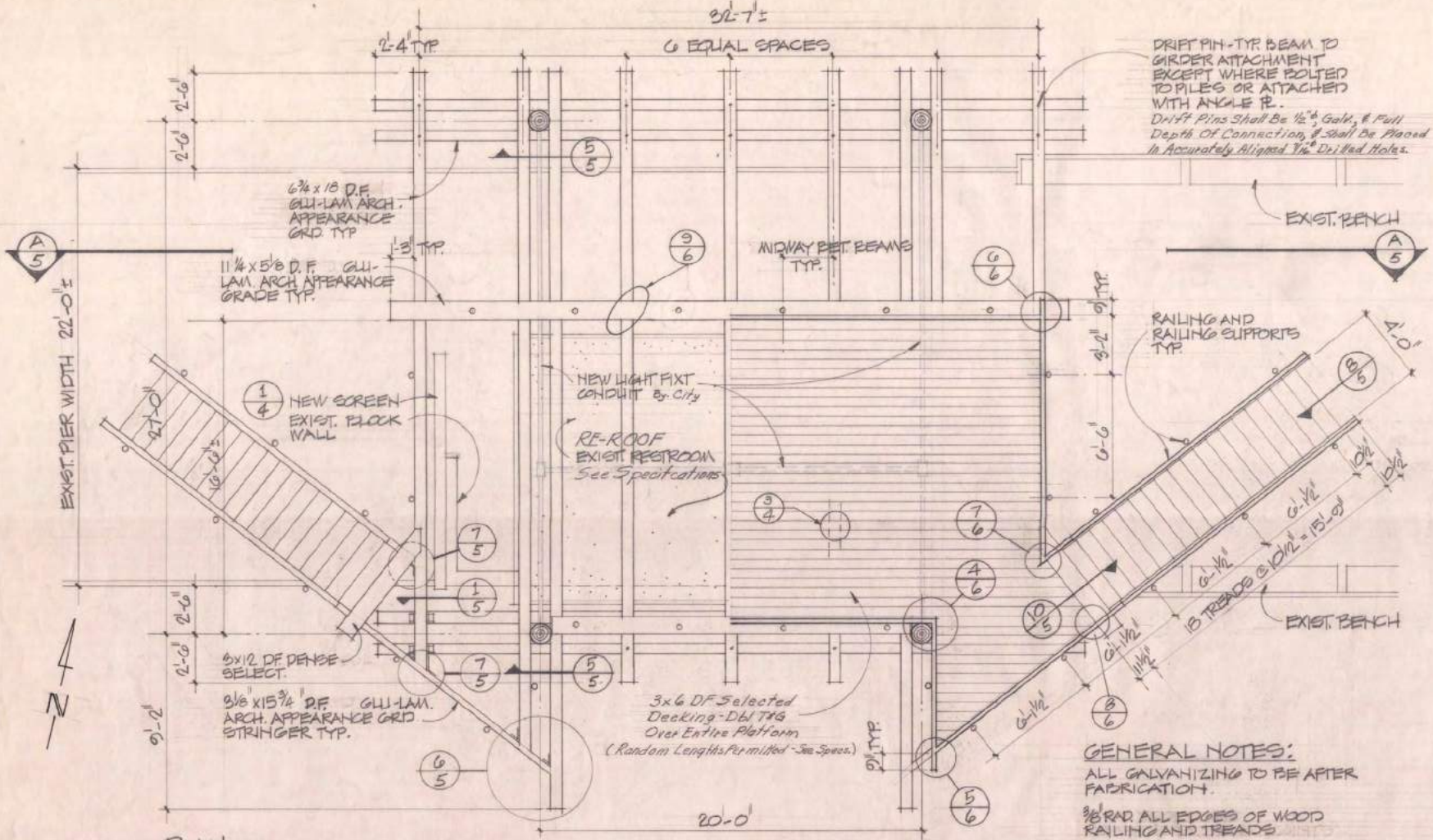
AS BUILT

APPROVED: <i>E. F. Johnson</i> ELECTRICAL SUPERINTENDENT DATE: 4/1/72	DATE: 4-16-72	RECOMMEND APPROVAL: <i>John D. Johnson</i> ASSOCIATE CIVIL ENGINEER DATE: 4/1/72	DATE: 3-29-72
APPROVED: <i>W. J. Long</i> DIRECTOR OF REGR. & PARKS		APPROVED: <i>R. J. [Signature]</i> DIRECTOR OF PUBLIC WORKS	R.C.E. 18198 R.C.E. 8592

CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

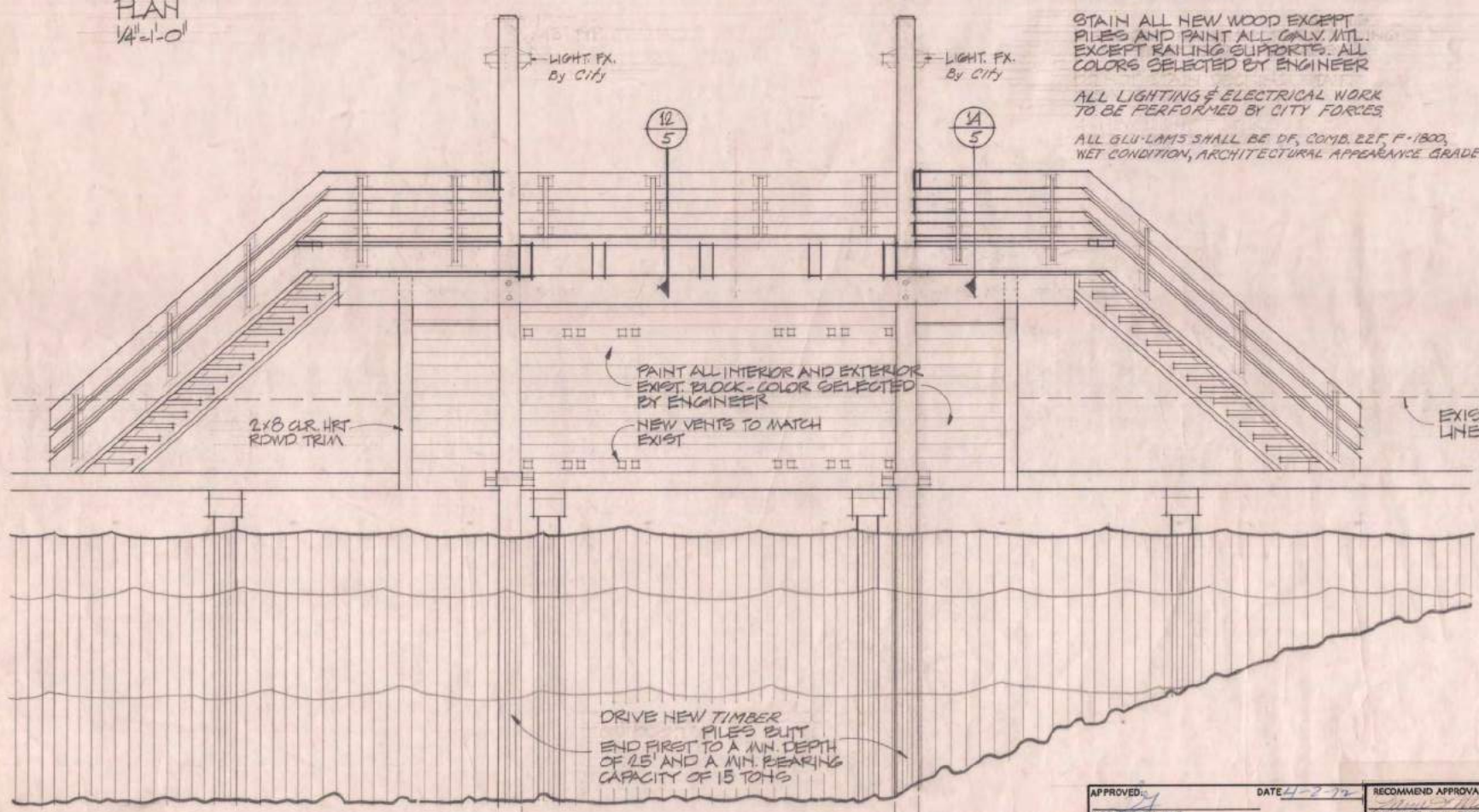
FISHING PIER IMPROVEMENTS
MISC. TABLES & DETAILS

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DRAWN: EED	VERT.:	FILE: 405-87
CHICK: W.P.	BOOK:	SHEET: 3 OF 6
AS BUILT:	DATE: 11 Mar 72	

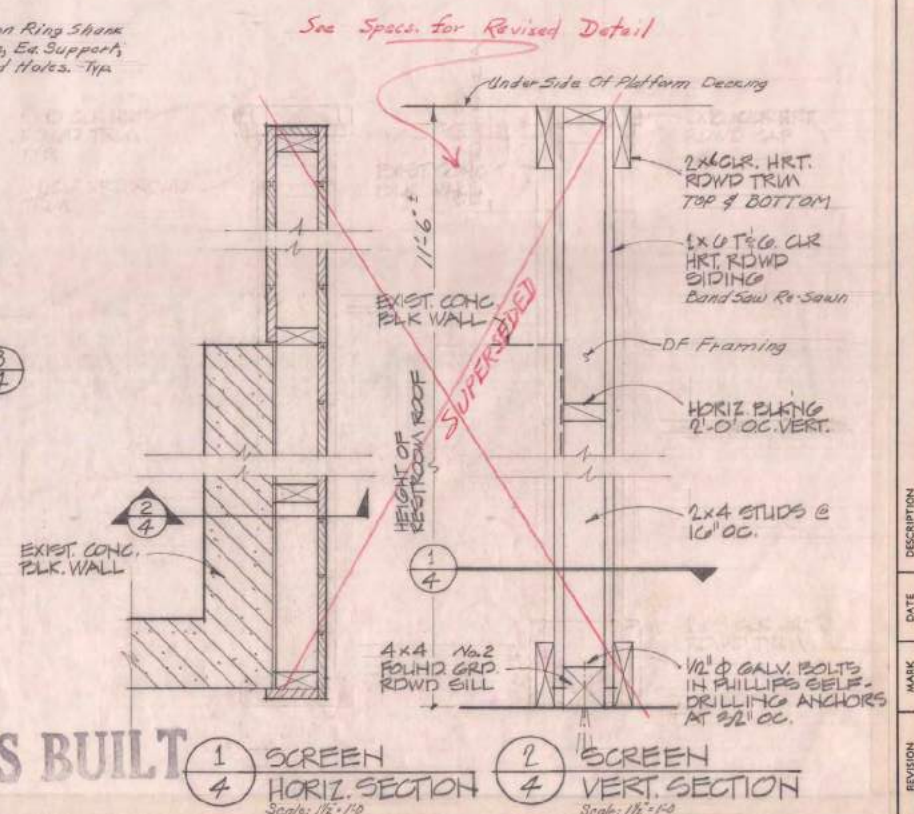


EAST ELEVATION
1/4" = 1'-0"

AS BUILT



SOUTH ELEVATION
1/4" = 1'-0"



McCUE BOONE TOMSICK ARCHITECTS
311 CLAY ST. SAN FRANCISCO 94111 TEL: (415) 434-0250

APPROVED: [Signature] DATE 7-26-72
ELECTRICAL SUPERINTENDENT

APPROVED: [Signature] DATE 4-27-72
FIRE DEPARTMENT

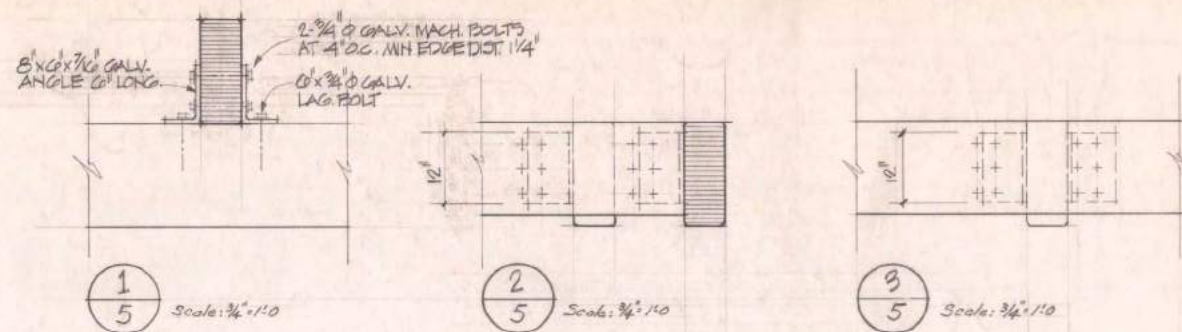
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ASSOCIATE CIVIL ENGINEER
APPROVED: [Signature] DATE 4/27/72
DIRECTOR OF PUBLIC WORKS

CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

FISHING PIER IMPROVEMENTS
OBSERVATION PLATFORM

DESIGN: JD
DRAWN: JD
CHECK: TKSND
AS BUILT: [Signature]
DATE: [Signature]

HORIZ. AS NOTED
VERT. [Signature]
BOOK [Signature]
FILE 405-27
SHEET 4 OF 6



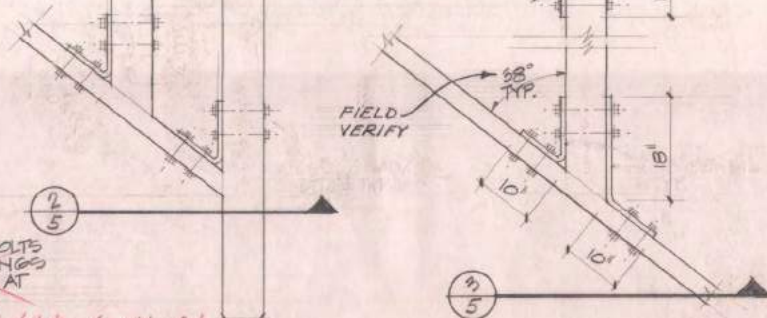
1
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2
5 Scale: 3/4" = 1'-0"

3
5 Scale: 3/4" = 1'-0"

TYPICAL NOTES: 1 2 3 4 5

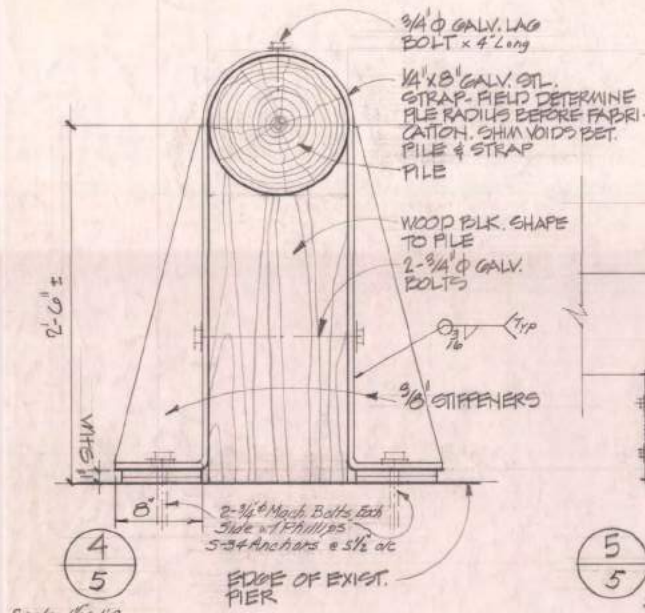
- 3/4" Ø GALV. MACH. BOLTS AT 4" O.C. EA. WAY
- 3/8" x 1/2" x LENGTH SHOWN GALV. BENT PL'S. LENGTH GALV. SHOWN ON DET. 1/2" TYP. FOR DET. 1/2" TYP. BOLT HOLE EDGE DIST. 1/4" EA. WAY TYP. ALL PL'S



4
5 Scale: 3/4" = 1'-0"

5
5 Scale: 3/4" = 1'-0"

Substitute 6-1" dia. Galv. Bolts - No Split Rings See Specs for Revised Detail



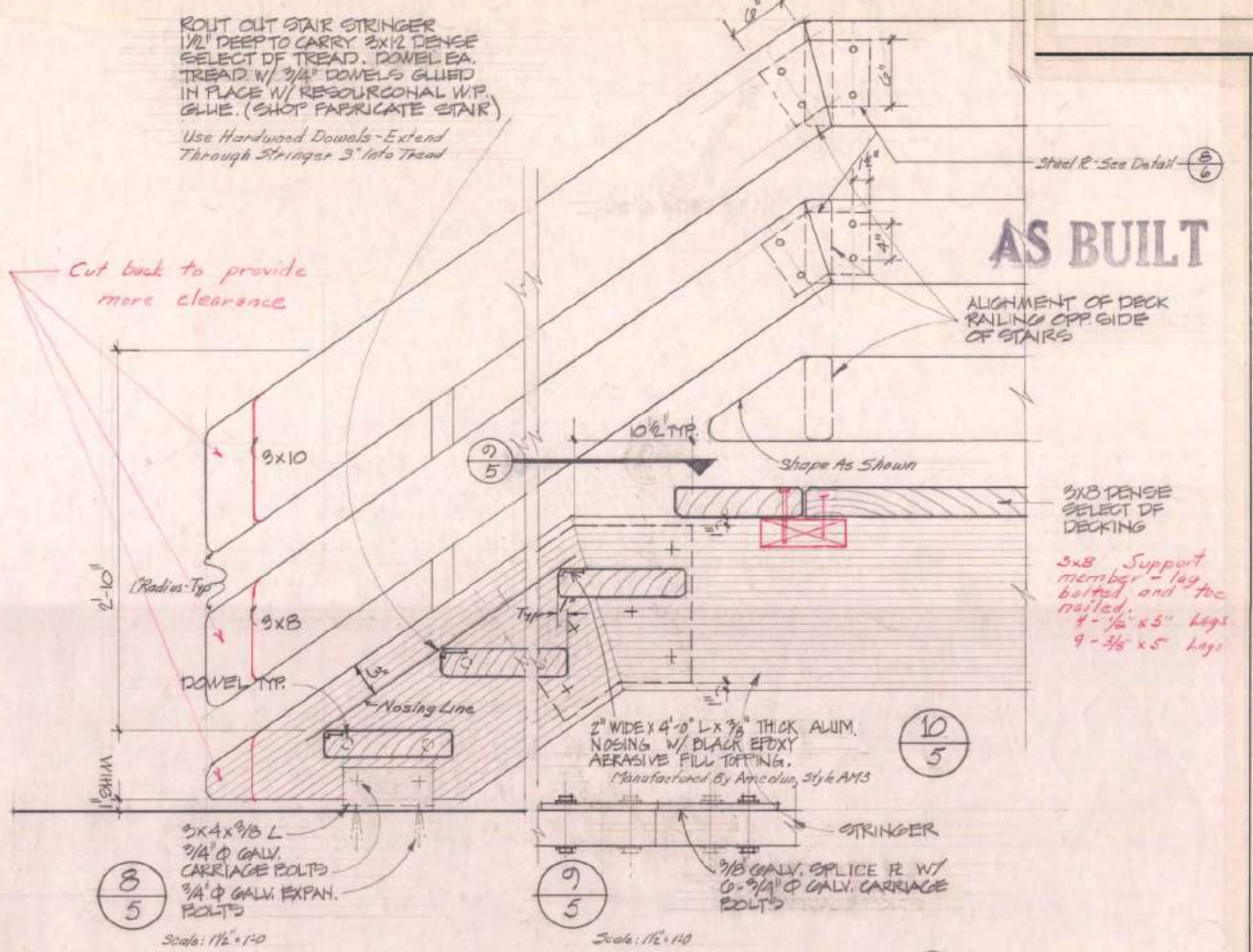
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5 Scale: 1 1/2" = 1'-0"

7
5 Scale: 3/4" = 1'-0"

8
5 Scale: 3/4" = 1'-0"

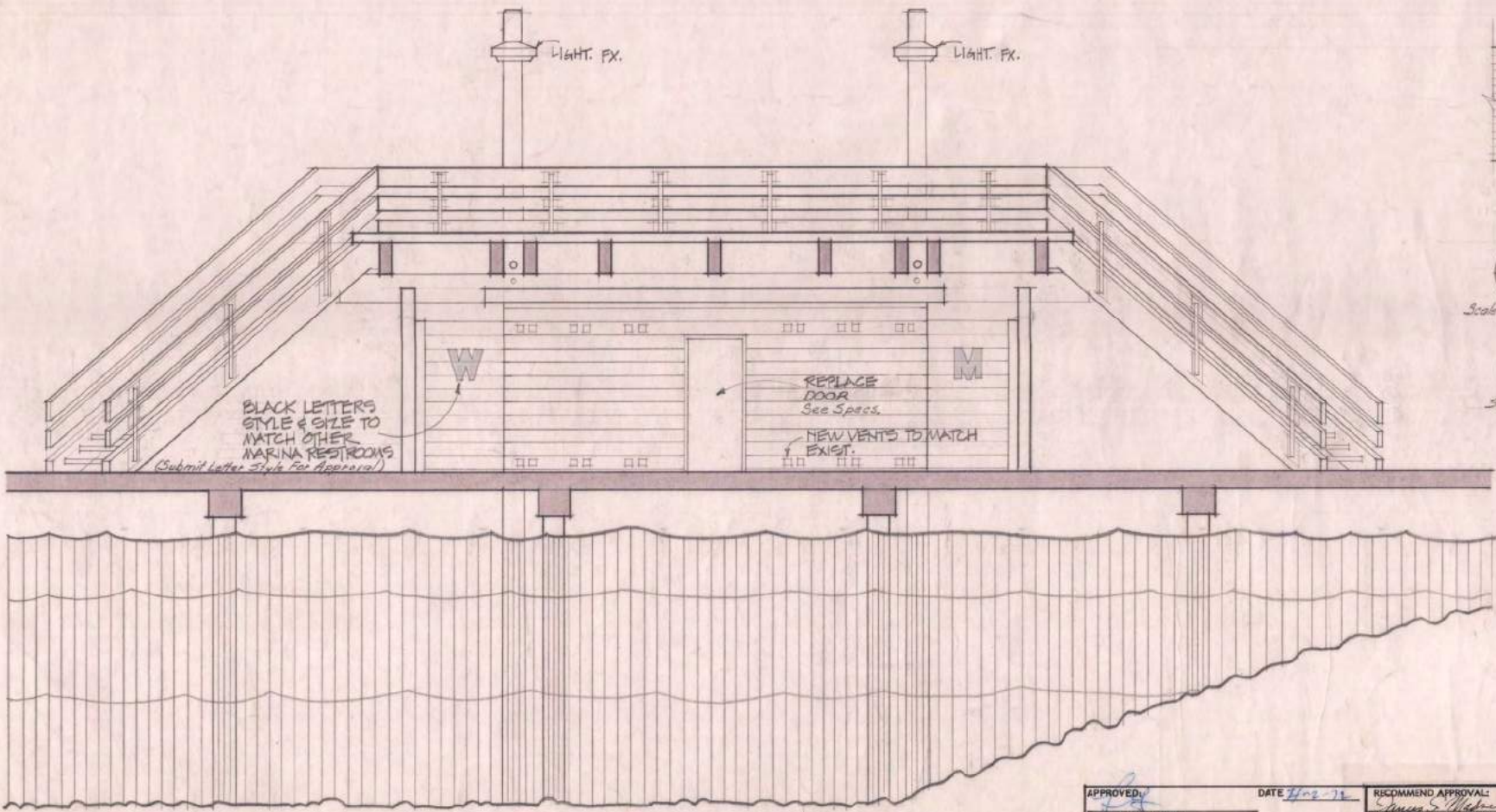
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10
5 Scale: 3/4" = 1'-0"

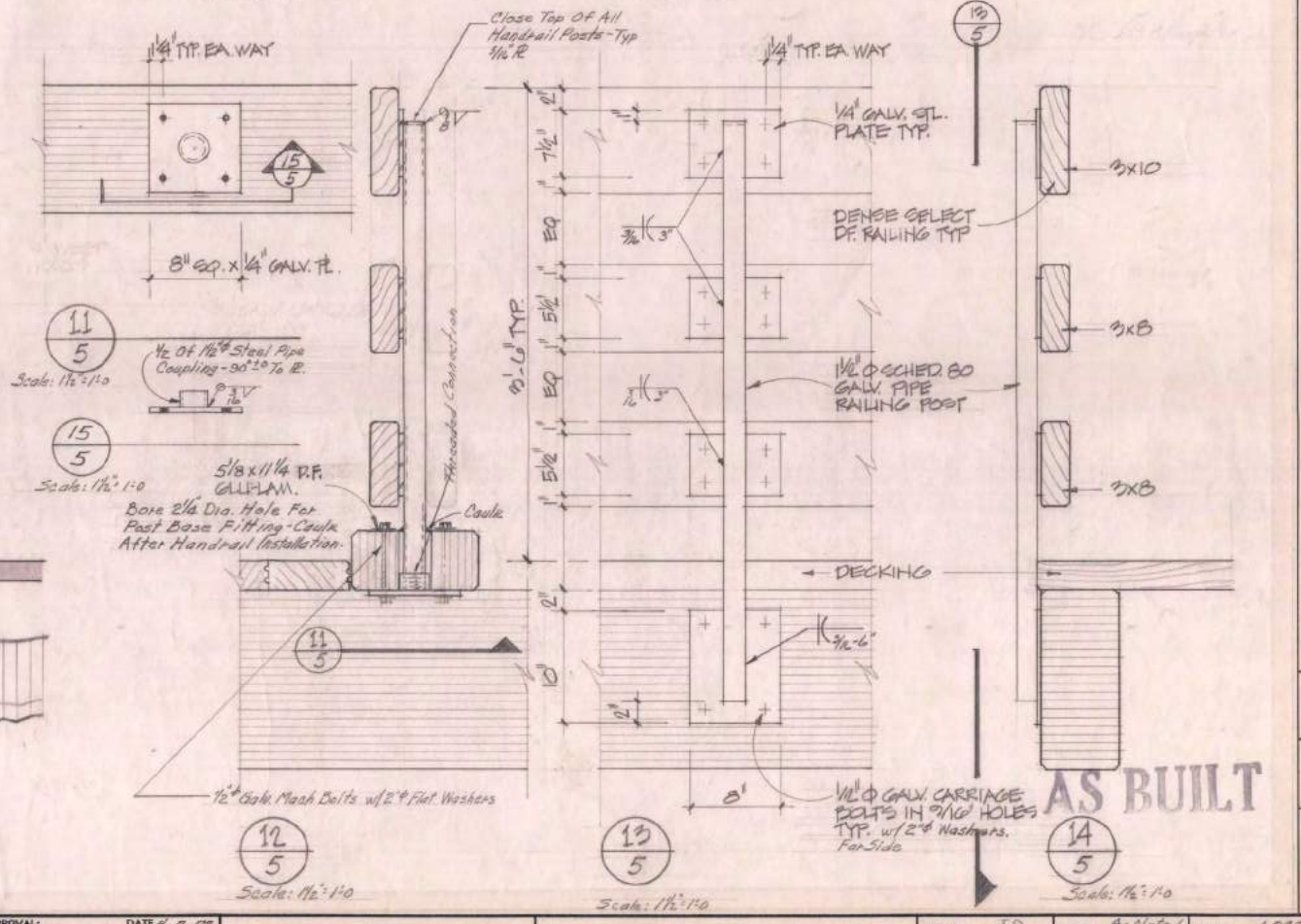


9
5 Scale: 1 1/2" = 1'-0"

10
5 Scale: 1 1/2" = 1'-0"



SECTION A
5 Scale: 1/4" = 1'-0"



11
5 Scale: 1 1/2" = 1'-0"

12
5 Scale: 1 1/2" = 1'-0"

13
5 Scale: 1 1/2" = 1'-0"

14
5 Scale: 1 1/2" = 1'-0"

McCUE BOONE TOMSICK ARCHITECTS
401 CLAY ST. SAN FRANCISCO 41113 TEL. (415) 454-0300

APPROVED: [Signature] DATE 7-26-78
ELECTRICAL SUPERINTENDENT

APPROVED: [Signature] DATE 7-26-78
DIRECTOR OF RECR. & PARKS

RECOMMEND APPROVAL: [Signature] DATE 7-5-78
ASSOCIATE CIVIL ENGINEER
APPROVED: [Signature] DATE 7-5-78
DIRECTOR OF PUBLIC WORKS

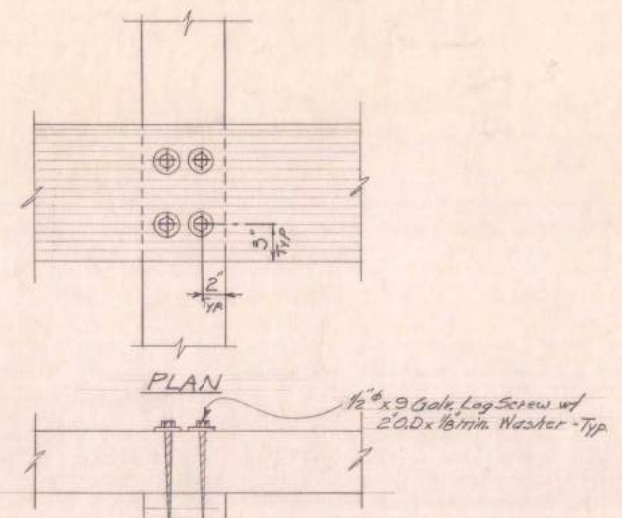
CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

FISHING PIER IMPROVEMENTS
OBSERVATION PLATFORM

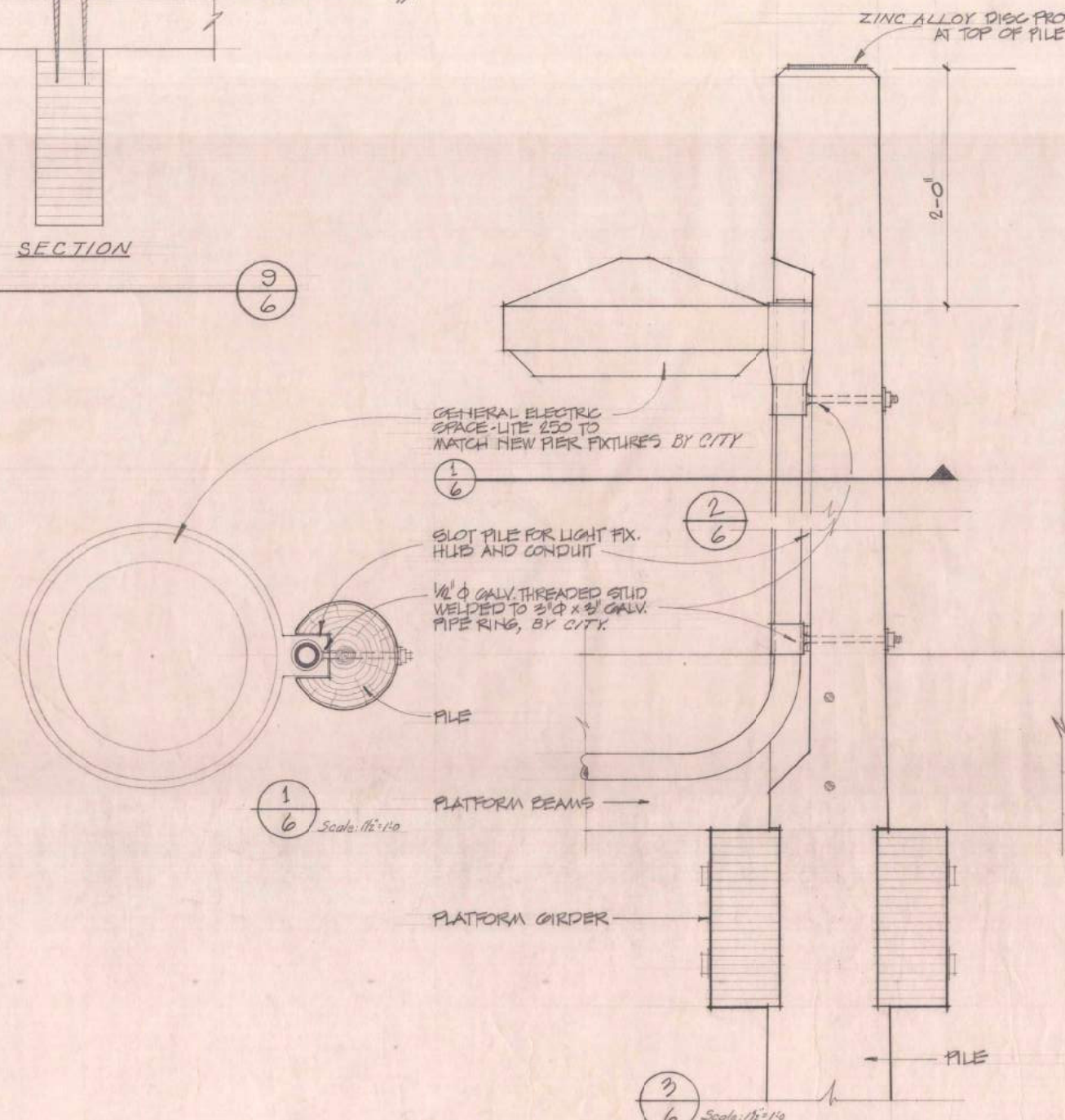
DESIGN: J.D.
DRAWN: J.D.
CHECK: T.K.M.
AS BUILT: [Signature]
DATE: 1/28/78
HORIZ. As Noted
VERT. [Signature]
PLAN: 609B
FILE: 405-87
SHEET: 5 OF 6

REVISION MARK DATE DESCRIPTION

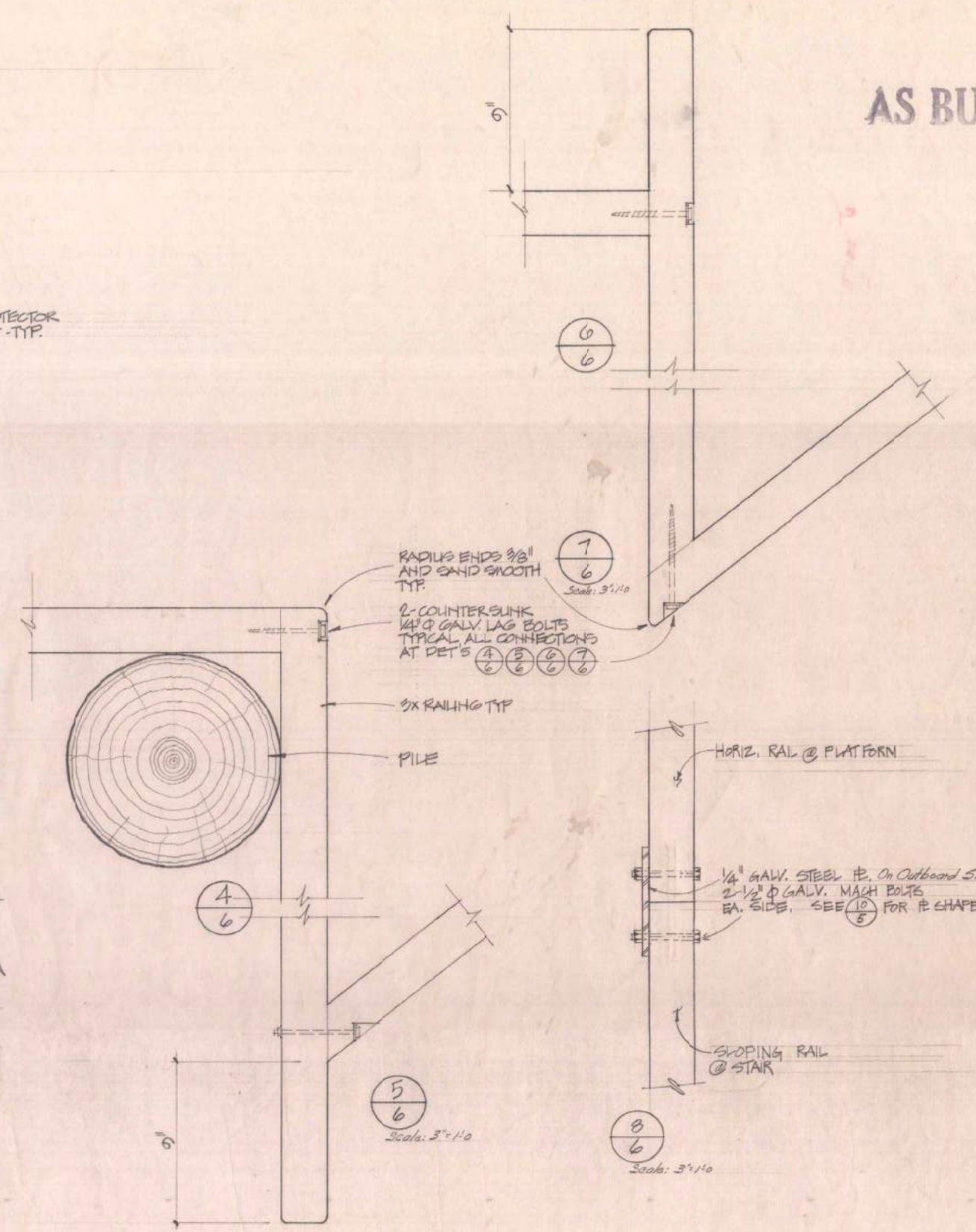
AS BUILT



DETAIL
Scale: 1 1/2" = 1'-0"



NOTE:
Contractor To Slot Pile As Shown
All Electrical Work To Be Done By City Forces.



AS BUILT

McCUE BOONE TOMSICK ARCHITECTS
31 CLAY ST SAN FRANCISCO 94111 TEL: (415) 434-0200

APPROVED: *E.S. Hulse*
ELECTRICAL SUPERINTENDENT
DATE: 4/10/72

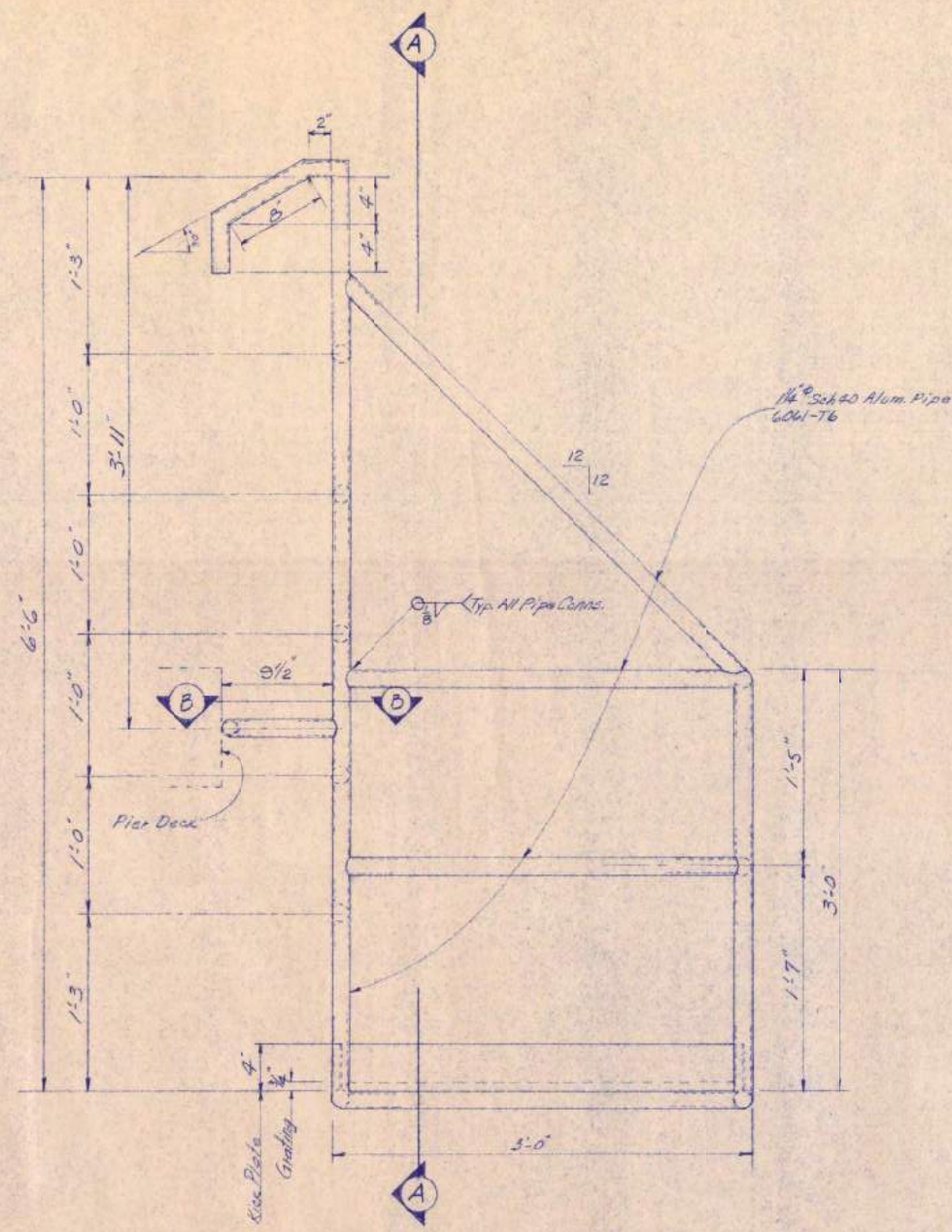
RECOMMEND APPROVAL: *James M. ...*
ASSOCIATE CIVIL ENGINEER
DATE: 4/10/72

CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

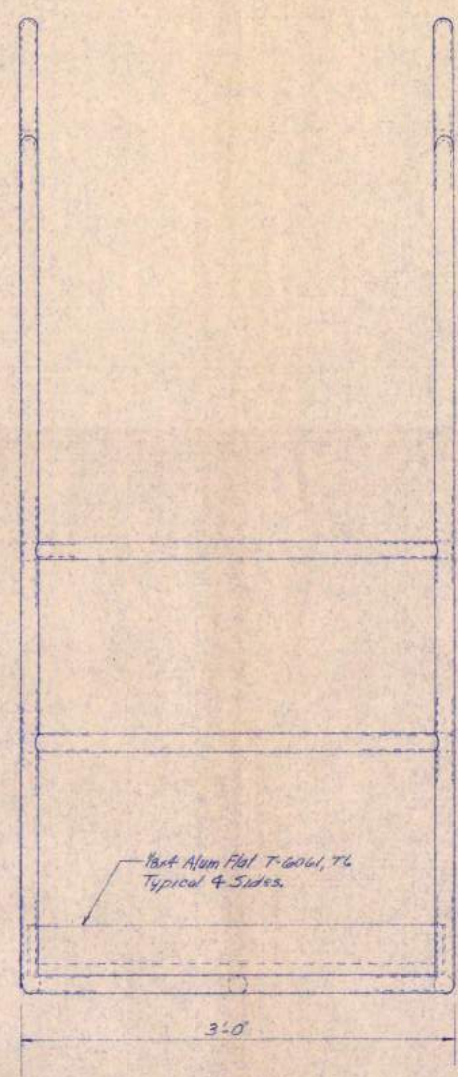
FISHING PIER IMPROVEMENTS
OBSERVATION PLATFORM

DESIGN	JD	HORIZ.	As Noted	PLAN	6049
DRAWN	JD	VERT.		FILE	405-87
CHECK	TRW	BOOK		SHEET	10 of 10
AS BUILT		DATE	1 Dec 72		

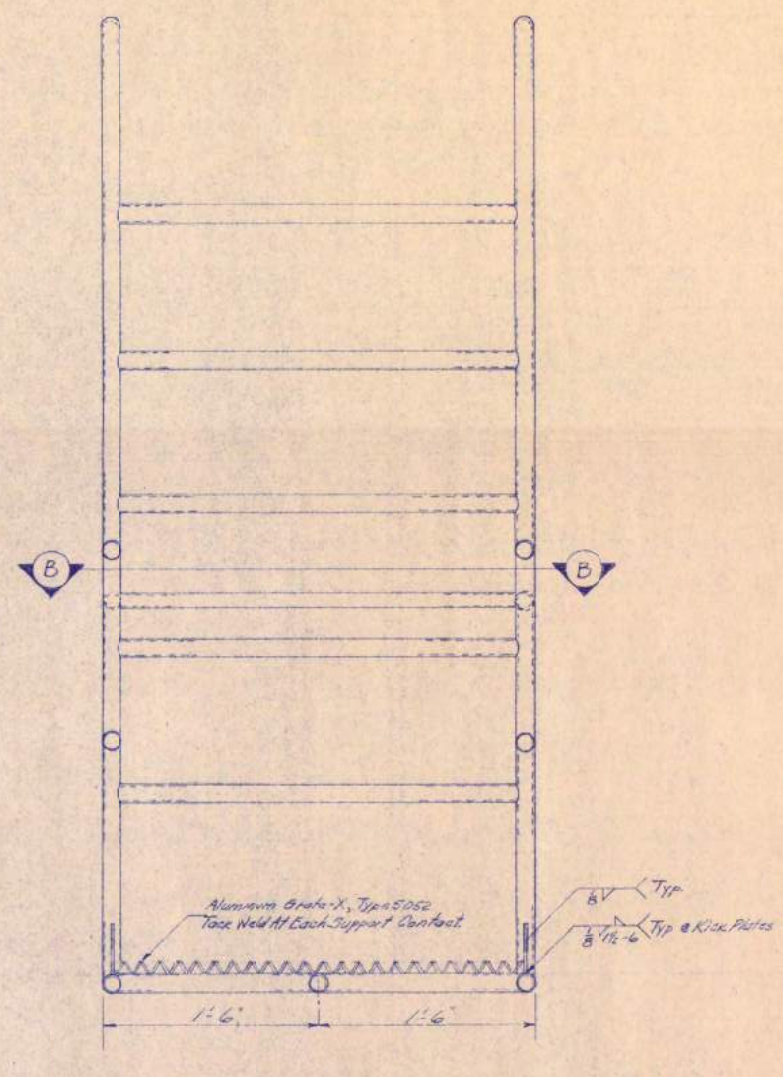
REVISION
MARK
DATE
DESCRIPTION



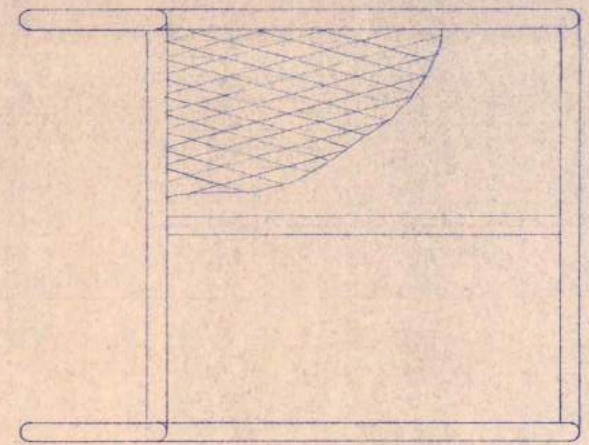
ELEVATION



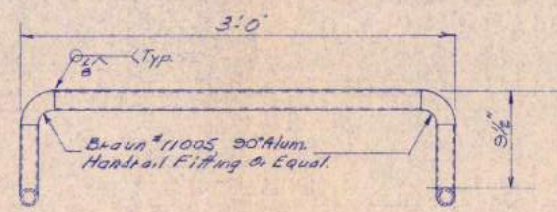
FRONT ELEVATION



SECTION A-A



PLAN



SECTION B-B

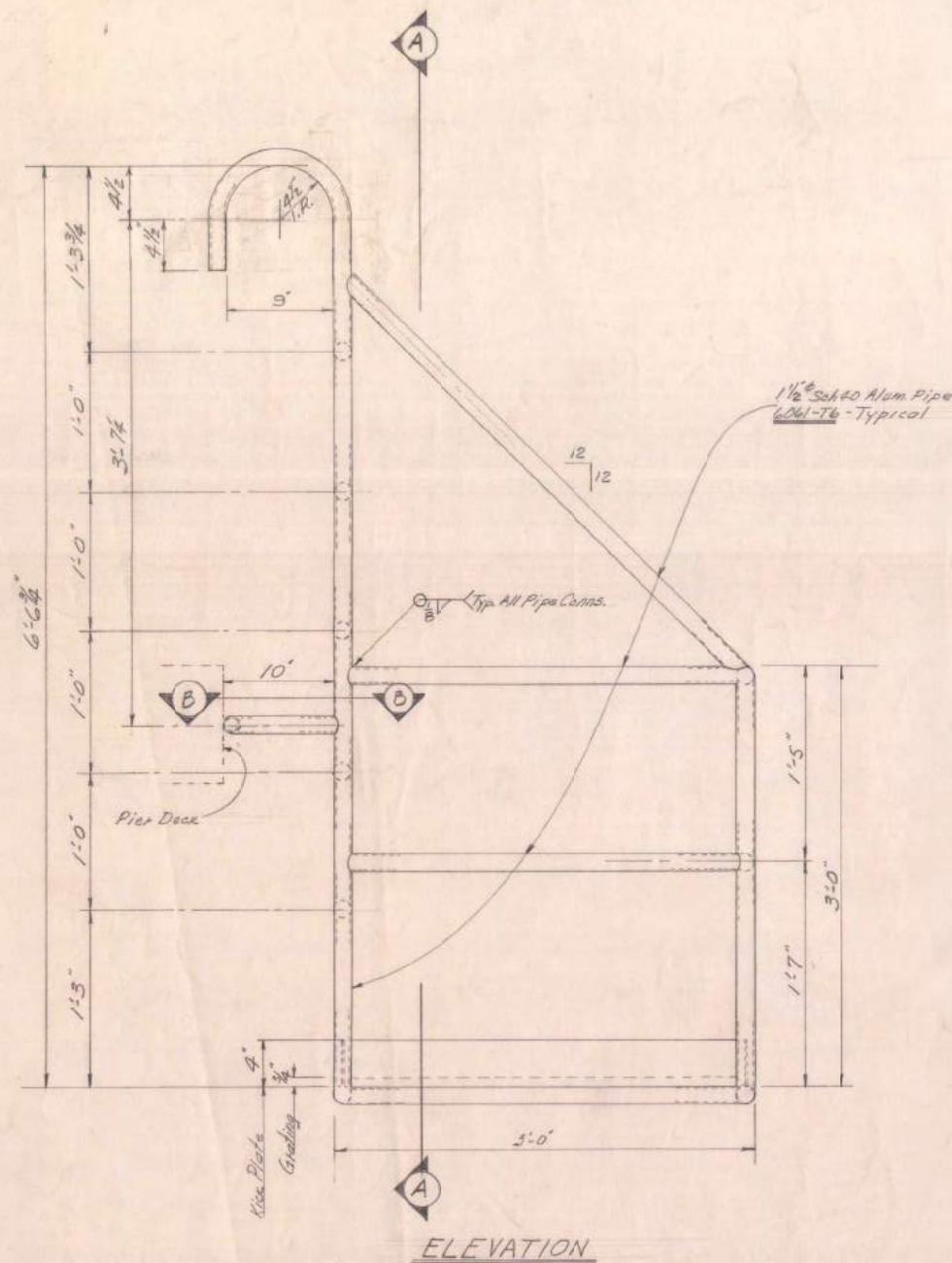
RECOMMEND APPROVAL:	DATE
ASSOCIATE CIVIL ENGINEER	R.C.E. 18198
APPROVED:	DATE
ELECTRICAL SUPERINTENDENT	R.C.E. 8598

CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

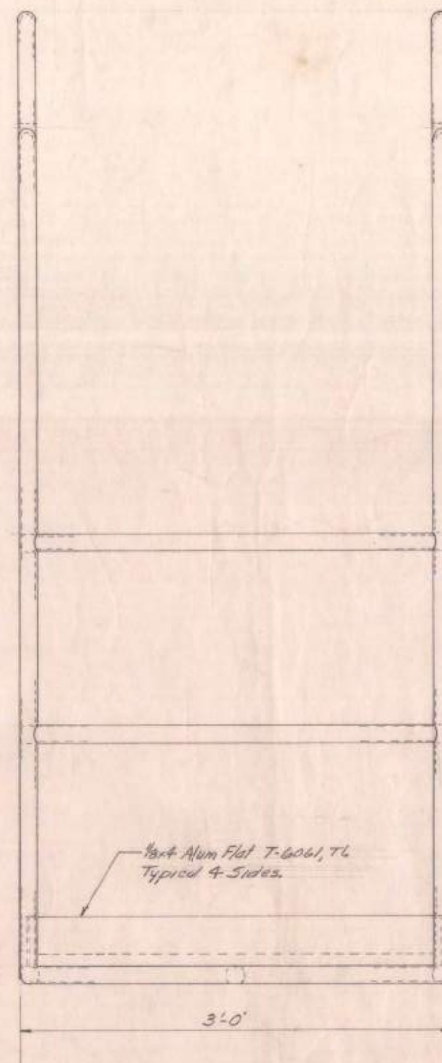
SERVICE PLATFORM
For FISHING LIGHTS
FISHING PIER IMPROVEMENTS

DESIGN	TK	HORIZ.	1/2"=1'-0"	PLAN	6049
DRAWN	EED	VERT.		FILE	6051
CHECK		BOOK		SHEET	7 of 7
AS BUILT		DATE	11 Apr 72		

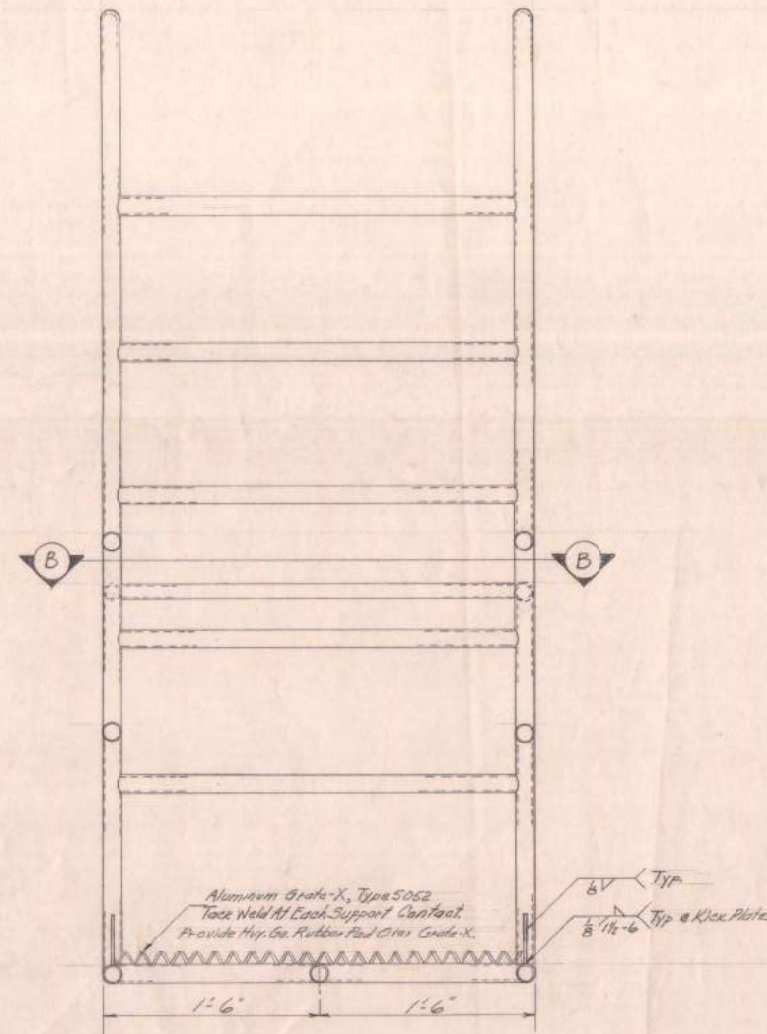
REVISION
MARK
DATE
DESCRIPTION



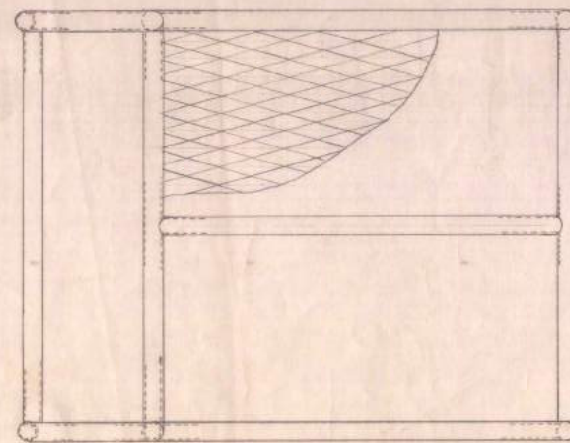
ELEVATION



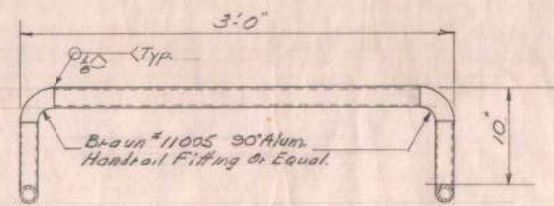
FRONT ELEVATION



SECTION A-A



PLAN



SECTION B-B

RECOMMEND APPROVAL: *[Signature]* DATE 6-7-72
 ASSOCIATE CIVIL ENGINEER R.C.E. 18198
 APPROVED: *[Signature]* DATE 6-7-72
 ELECTRICAL SUPERINTENDENT R.C.E. 8595

CITY OF BERKELEY
 DEPARTMENT OF PUBLIC WORKS

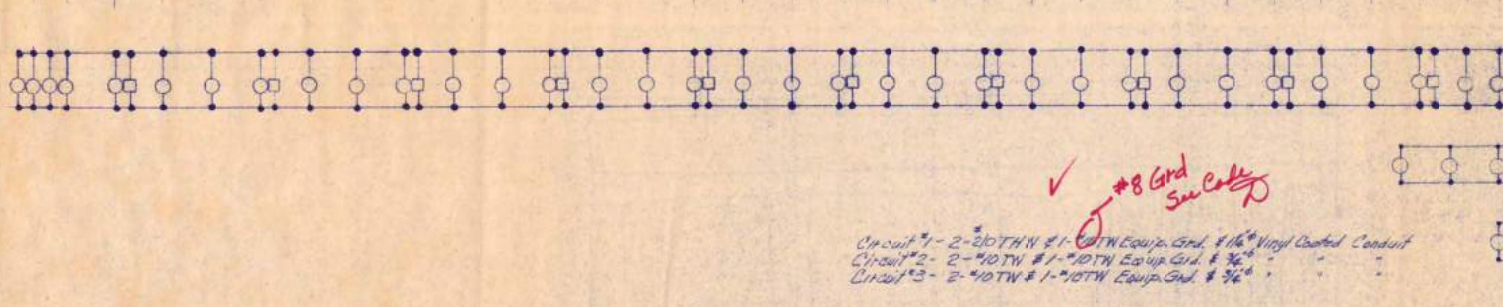
SERVICE PLATFORM
 For FISHING LIGHTS
 FISHING PIER IMPROVEMENTS

DESIGN TK
 DRAWN EED
 CHECK WJD
 AS BUILT
 HORIZ. 1/2"=1'-0"
 VERT. 1/4"=1'-0"
 BOOK
 DATE 11 Apr 72

PLAN 6043
 FILE 405-87
 SHEET 1E OF 2

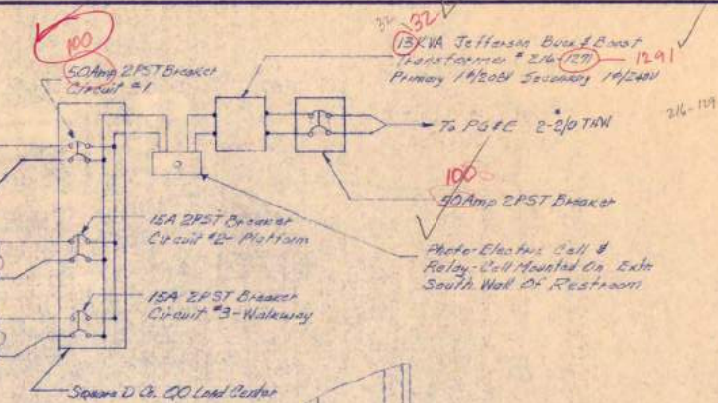
NO.	DATE	DESCRIPTION
1	5-20-72	Pipe changed from 1 1/2" to 1 1/4" - upper, lower revised
2		
3		
4		
5		

Reference Dist Nos.	
407	415
423	433
441	451
459	469
477	487
495	505
513	523
531	541
549	559
567	577
585	595
603	613
621	631
639	649
657	667
675	685
693	703
711	721
729	739
747	757
765	775
783	793
801	811
819	829
837	847
855	865
873	883
891	901
909	919
927	937
945	955
963	973
981	991
999	



✓ #8 Gnd See City

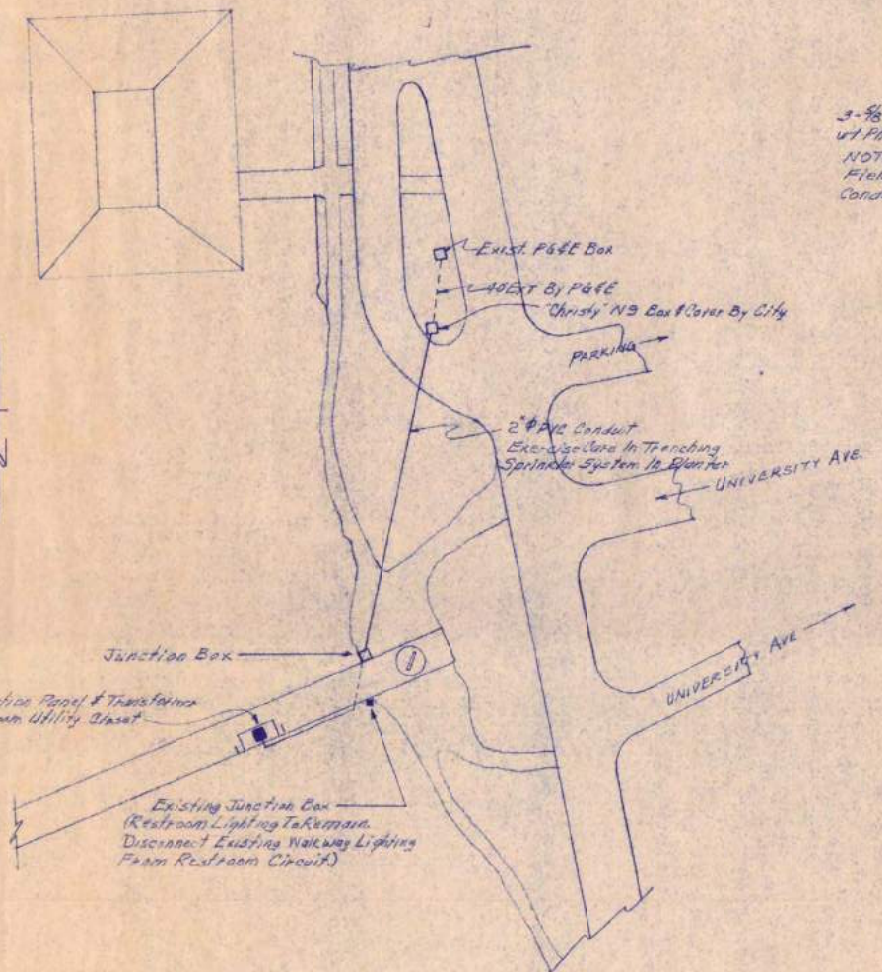
Circuit #1 - 2-20TW #1-20TW Equip. Gnd. #16" PVC Banded Conduit
 Circuit #2 - 2-10TW #1-10TW Equip. Gnd. # 3/4"
 Circuit #3 - 2-10TW #1-10TW Equip. Gnd. # 3/4"



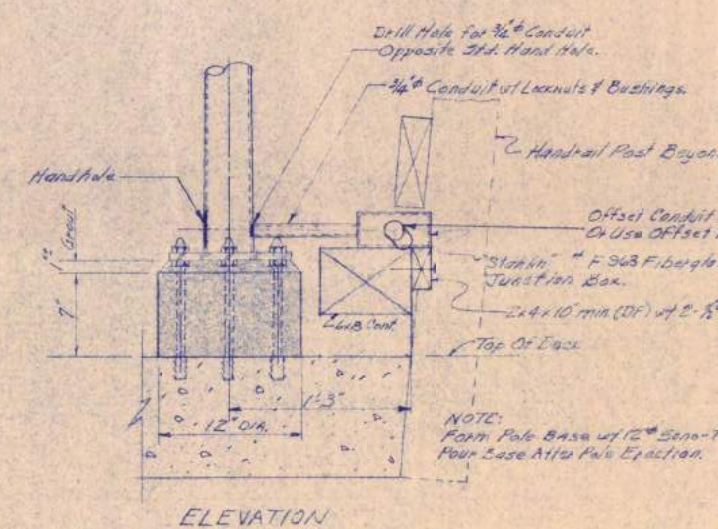
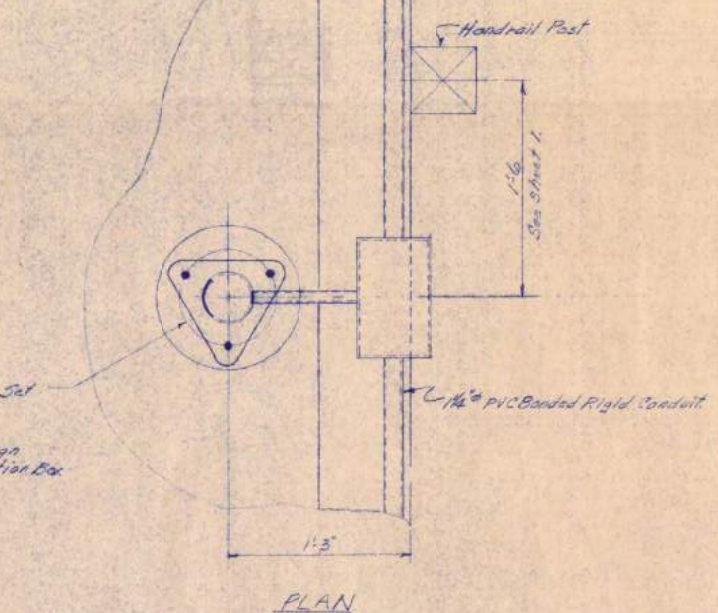
Volts amp watts
 21 amp
 34
 175 - 100 amp fuse look at

$$\begin{array}{r} 175 \\ 36.00 \\ \hline 52.00 \end{array}$$

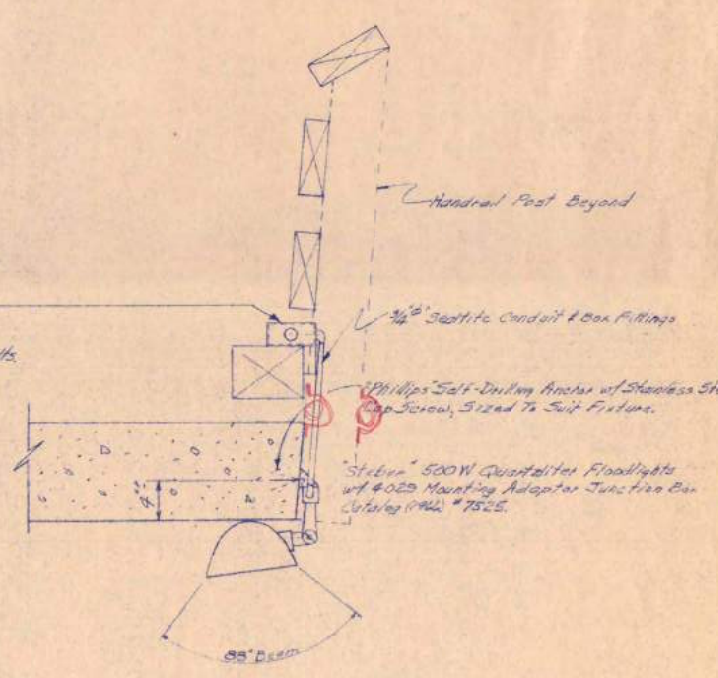
1/2" KUP use 50 amp fuse
 size - 13 1/2" wide 12" deep



3-3/8" ID Galv. Threaded Rod, Set w/ Phillips S-58 Anchors.
 NOTE:
 Field Orient Anchors To Align Conduit & Hand Holes w/ Junction Box



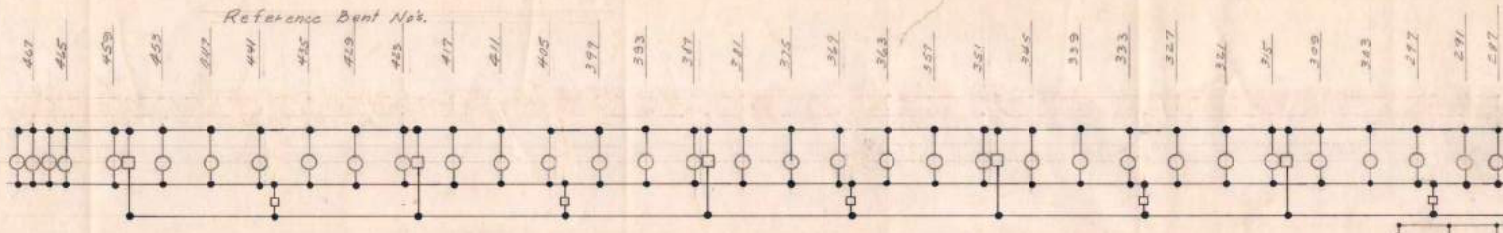
ELEVATION
 INSTALLATION DETAIL - LUMINAIRE SEE SHEET 1 FOR LOCATIONS
 Scale: 1/4" = 1'-0"



INSTALLATION DETAIL - FISHING LIGHT - SEE SHEET 3 FOR LOCATIONS
 Scale: 1/4" = 1'-0"

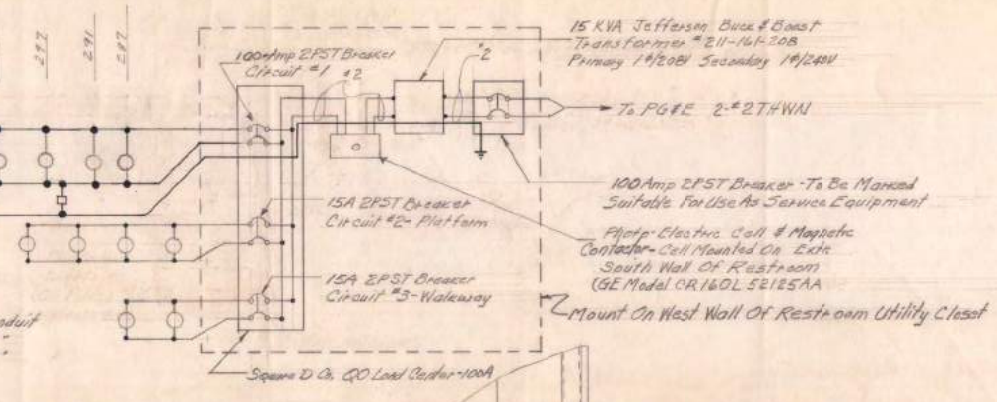
NOTES:
 1. All Electric Materials To Be Furnished & Installed By City of Berkeley.
 2. Installation Shall Conform To National Electrical Code, 1971 Edition.

APPROVED: _____	DATE: _____	RECOMMEND APPROVAL: _____	DATE: _____	CITY OF BERKELEY DEPARTMENT OF PUBLIC WORKS	FISHING PIER IMPROVEMENTS ELECTRICAL DETAILS	DESIGN: TK	HORIZ: NONE	PLAN: 6043
ELECTRICAL SUPERINTENDENT: _____	DATE: _____	ASSOCIATE CIVIL ENGINEER: _____	R.C.E. 18198			DRAWN: EED	VERT: _____	FILE: 425-87
APPROVED: _____	DATE: _____	APPROVED: _____	DATE: _____			CHECK: _____	BOOK: _____	SHEET: 6 OF _____
DIRECTOR OF RECR. & PARKS: _____	DATE: _____	DIRECTOR OF PUBLIC WORKS: _____	R.C.E. 8595			AS BUILT: _____	DATE: 8 May 76	

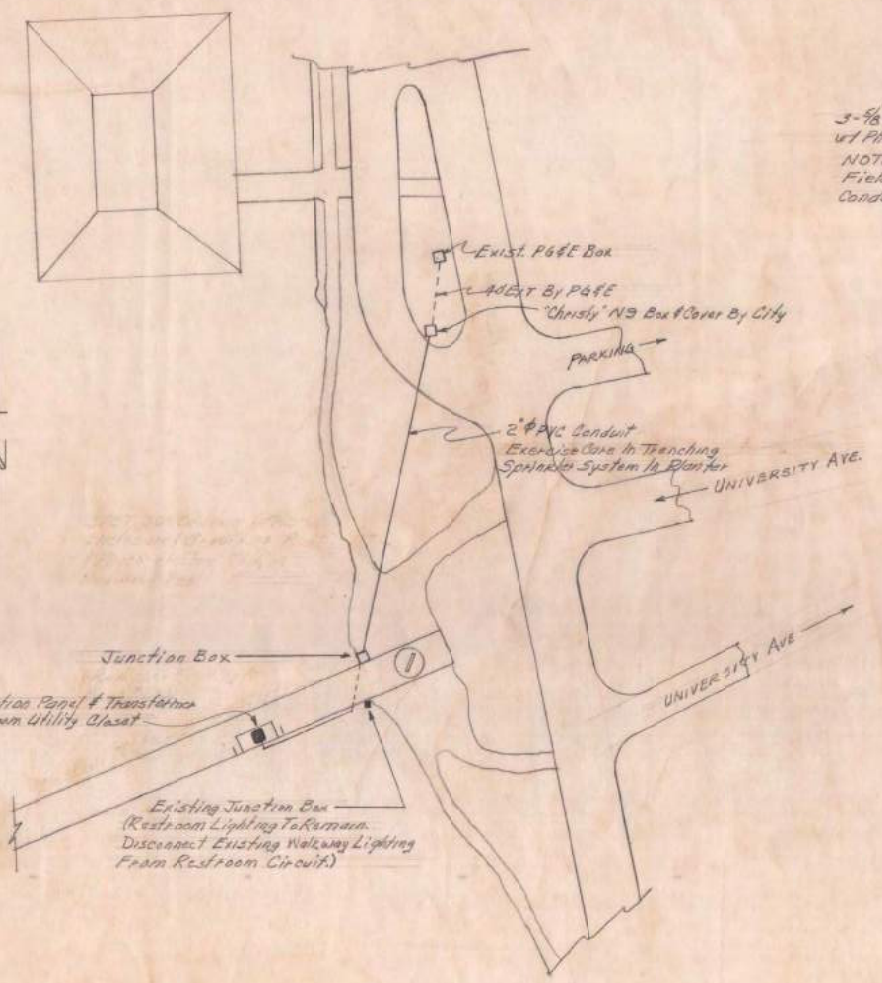


Circuit #1 - 3-#2THWN #1-#2THWN Equip. Gnd. #1/2" Vinyl Coated Conduit
 Circuit #2 - 2-#10TW #1-#10TW Equip. Gnd. #3/4"
 Circuit #3 - 2-#10TW #1-#10TW Equip. Gnd. #3/4"

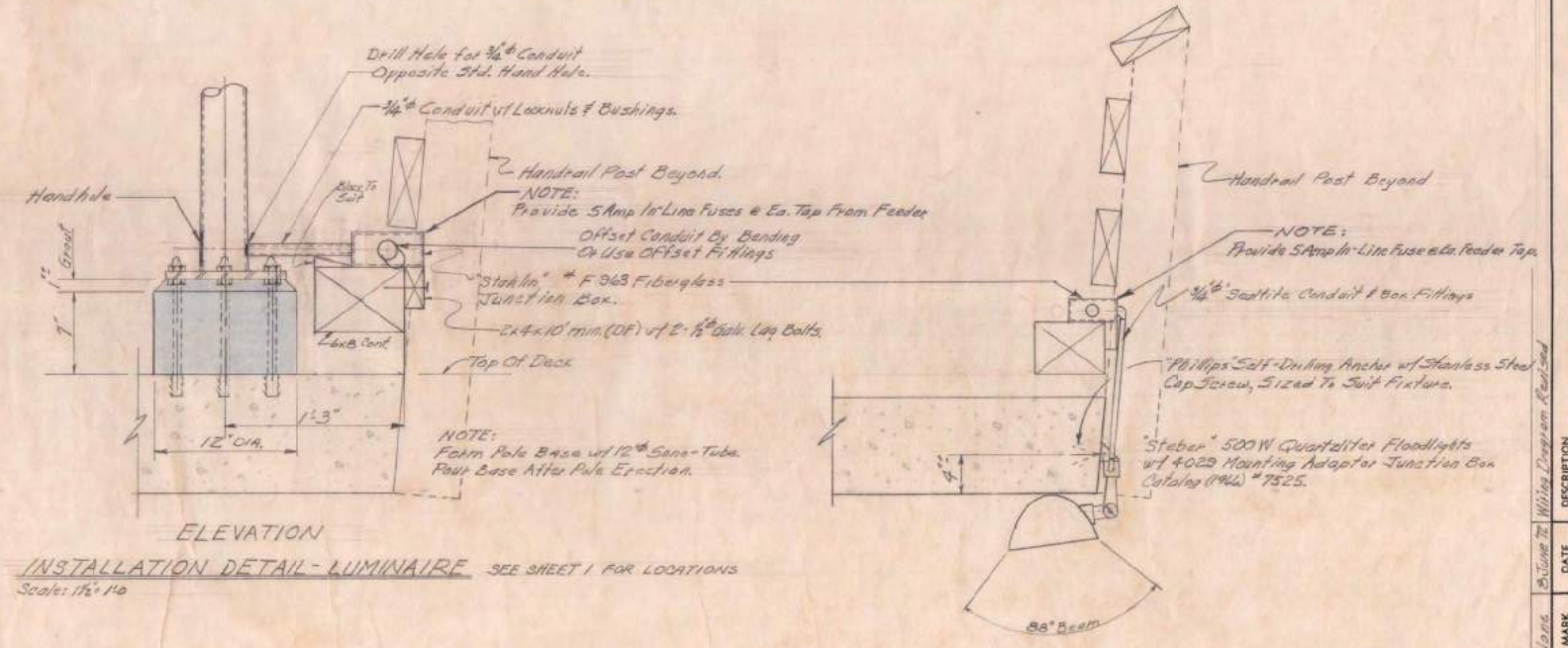
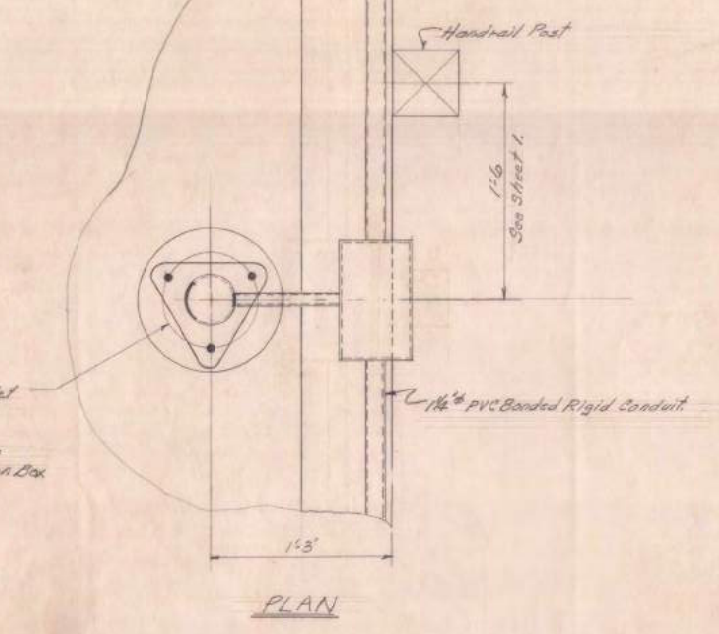
LEGEND
 ○ - GE-Spec 150-175 W.
 □ - Steber 500W Quartzlight



NOTE: T.C.L. = 7000 W/240V/1ϕ
 + 5000 W/120V/1ϕ
 @ 125% Loading 62.5A Service - Use 100A Service
 Cautions Above 192 Voltages Drop



3-#8 x 10 Galv. Threaded Rod, Set
 w/ Phillips S-58 Anchors.
 NOTE:
 Field Orient Anchors To Align
 Conduit & Hand Holes w/ Junction Box



NOTES:
 1. All Electric Materials To Be Furnished & Installed By City of Berkeley.
 2. Installation Shall Conform To National Electrical Code, 1971 Edition.

INSTALLATION DETAIL - FISHING LIGHT - SEE SHEET 3 FOR LOCATIONS
 Scale: 1" = 1'-0"

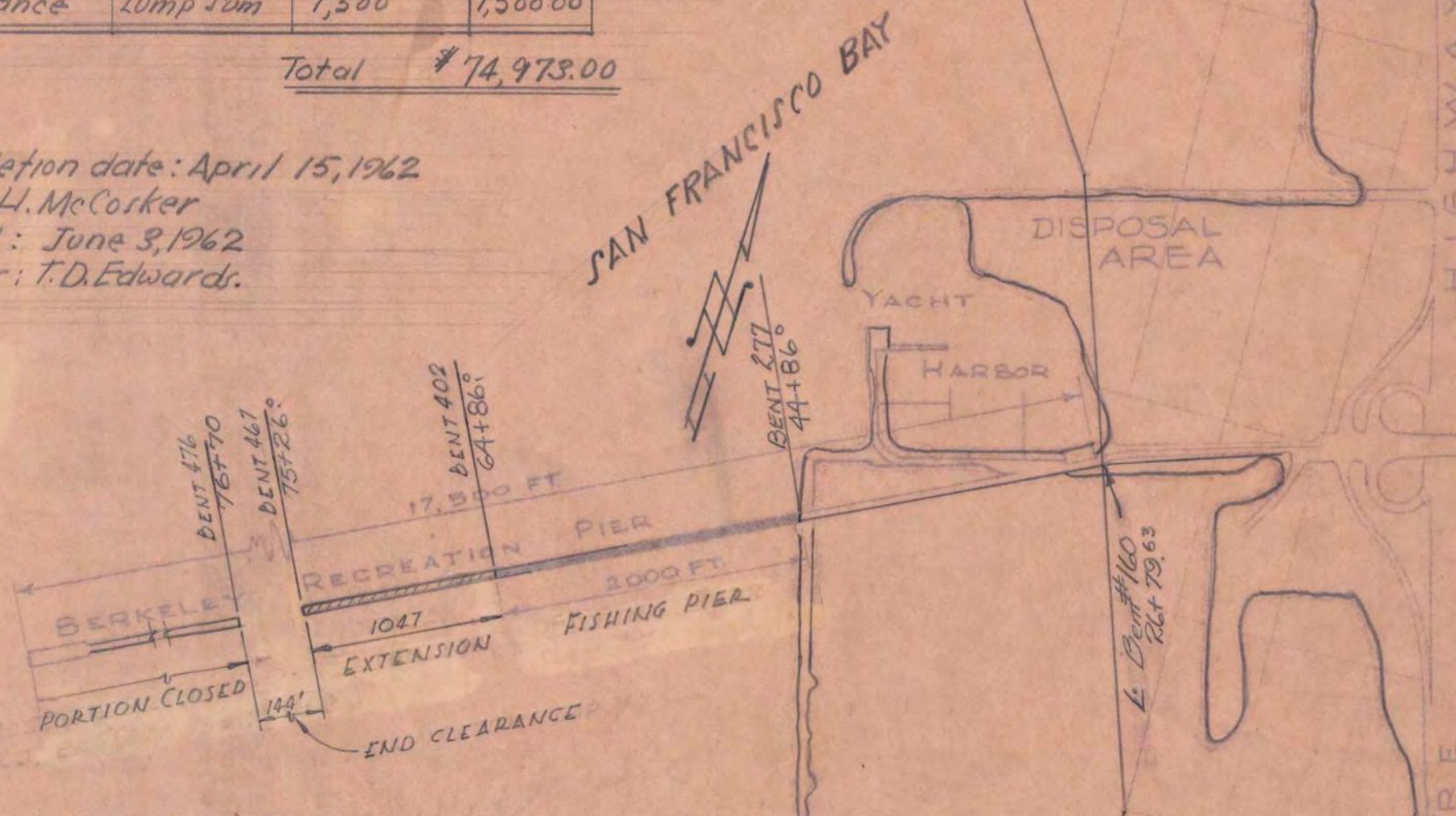
APPROVED: E. J. Nathan ELECTRICAL SUPERINTENDENT DATE 5-23-72	RECOMMEND APPROVAL: James J. Maloney ASSOCIATE CIVIL ENGINEER DATE 5-26-72	DATE 5-26-72 R.C.E. 18198	CITY OF BERKELEY DEPARTMENT OF PUBLIC WORKS	DESIGN LH DRAWN EED CHECK W.J.D. AS BUILT	HORIZ. NONE VERT. NONE BOOK DATE 8 May 72	PLAN 4023 FILE 402-87 SHEET 2E OF 2
APPROVED: Walter J. Jones DIRECTOR OF RECR. & PARKS	APPROVED: Walter J. Jones DIRECTOR OF PUBLIC WORKS	DATE 5-26-72 R.C.E. 8995				

FINAL QUANTITIES

Item	Description	Quantity	Unit Price	Value
1	Deck removal	Lump Sum	12,160	12,160.00
2	Rein. conc. deck	1047	43.00	45,021.00
3	Hand rail	2133	4.00	8,532.00
4	Brace piles	960	6.00	5,760.00
5	Fish clean table	Lump Sum	2,000	2,000.00
6	End Clearance	Lump Sum	1,500	1,500.00

Total \$74,973.00

Contract Completion date: April 15, 1962
 Contractor: J.H. McCosker
 Work completed: June 3, 1962
 Field Inspector: T.D. Edwards.



Bent No's are as Designated on Original 1927 Plans of Pier Built by S.F. Bridge Co for Golden Gate Ferry Co. Stations Noted are G.G.F. Co data.

AS BUILT

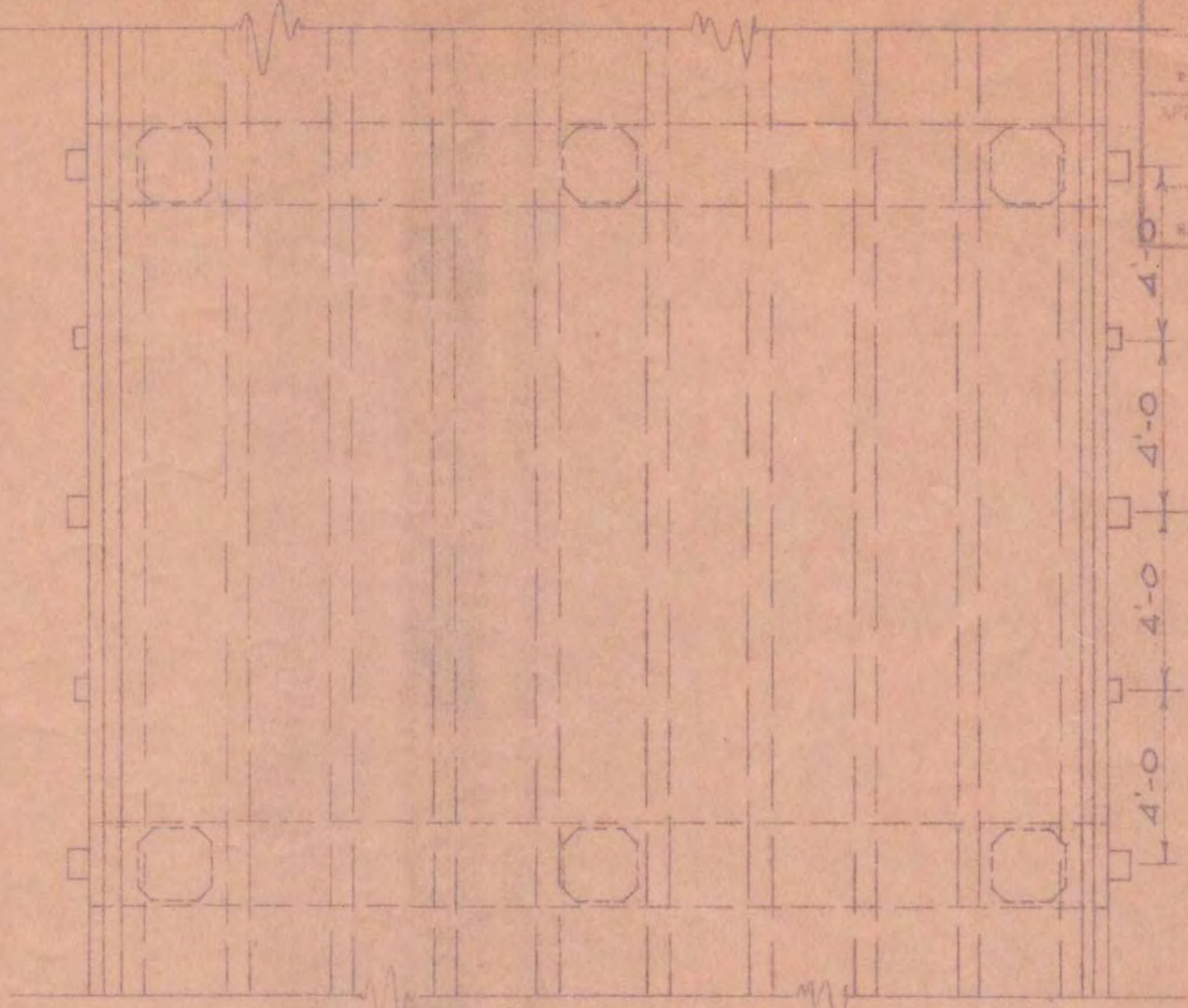
SLAB DETAILS ARE ON PLAN 3631
 FILE NO 503-105

FOR 1ST SECT. SEE:
 Plan - 3155
 102 B-57

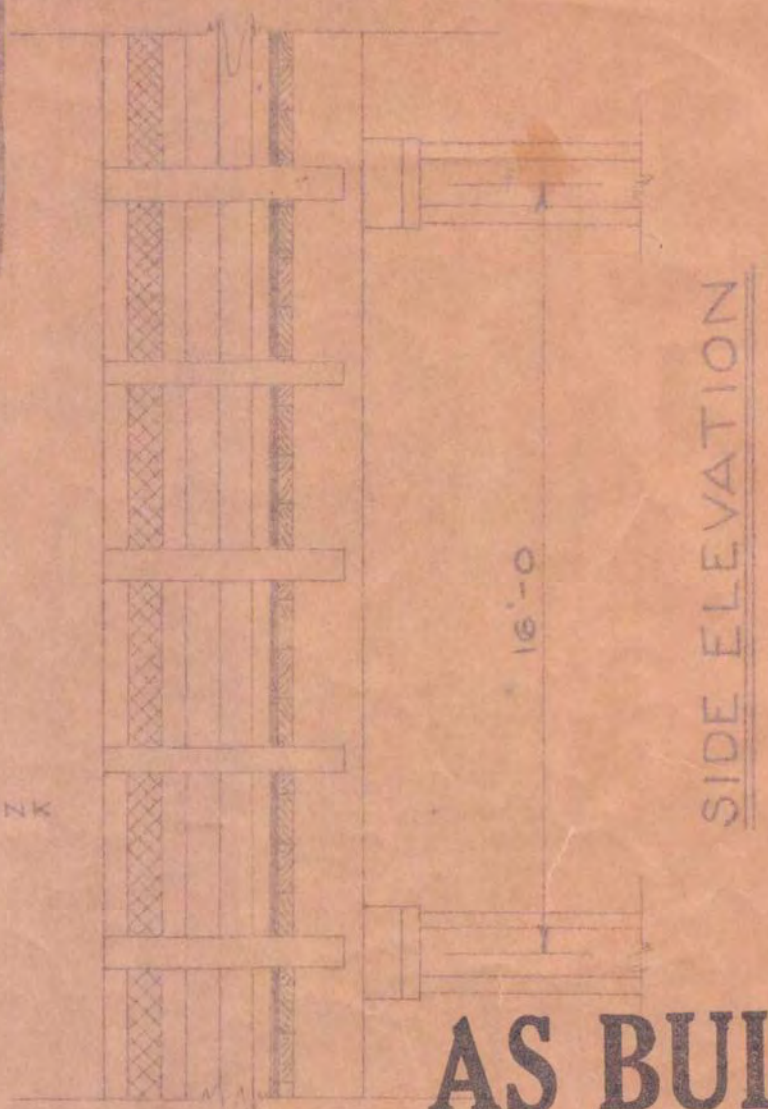
APPROVAL RECOMMENDED: DATE: 9-5-61
Clare J. Gagnon
 ASSISTANT CITY ENGINEER
 REGISTERED CIVIL ENGINEER, NO. 8561
 APPROVED: DATE: 9-5-61
S. C. Jucker
 DIRECTOR OF PUBLIC WORKS
 REGISTERED CIVIL ENGINEER, NO. 7409

CITY OF BERKELEY
 EXTENSION ON THE BERKELEY FISHING PIER LOCATION MAP
 DATE: 9-61 PLAN # 3549
 SCALE: 1" = 1000' FILE: 102B-63
 SHEET 1 OF 7

APPROVAL RECOMMENDED: DATE 9-61
Clare J. Pagnon
 ASSISTANT CIVIL ENGINEER
 REGISTERED CIVIL ENGINEER NO. 8561
 APPROVED: DATE 9-61
S. C. Jackson
 DIRECTOR OF PUBLIC WORKS
 REGISTERED CIVIL ENGINEER NO. 7409

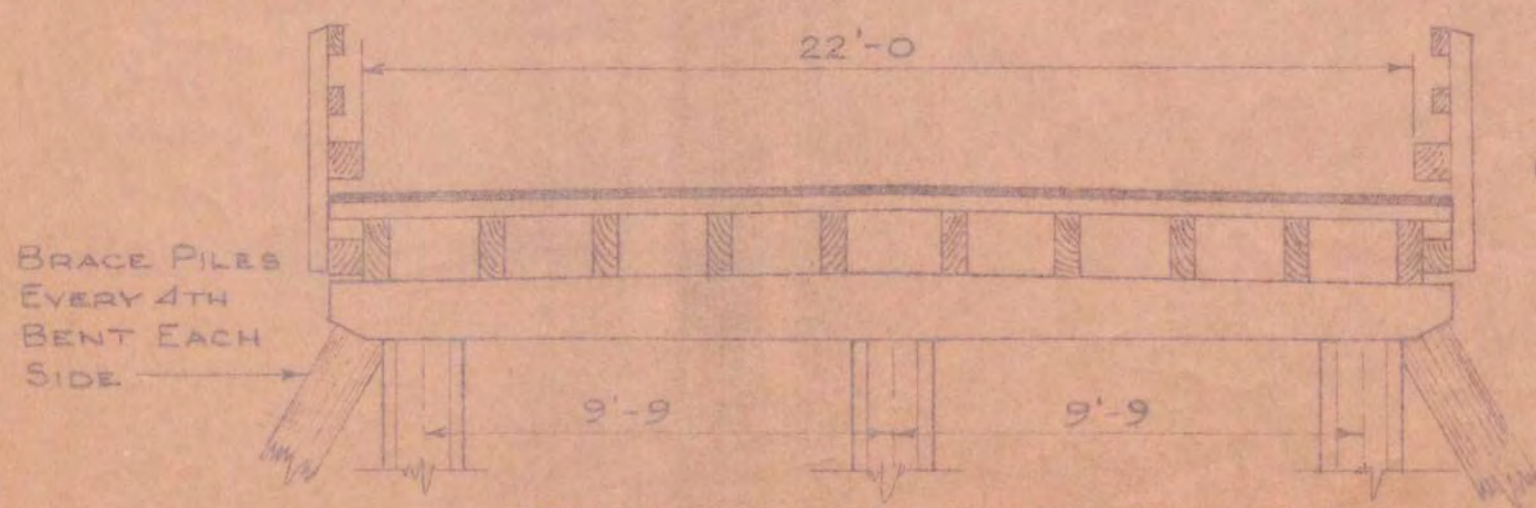


PLAN



SIDE ELEVATION

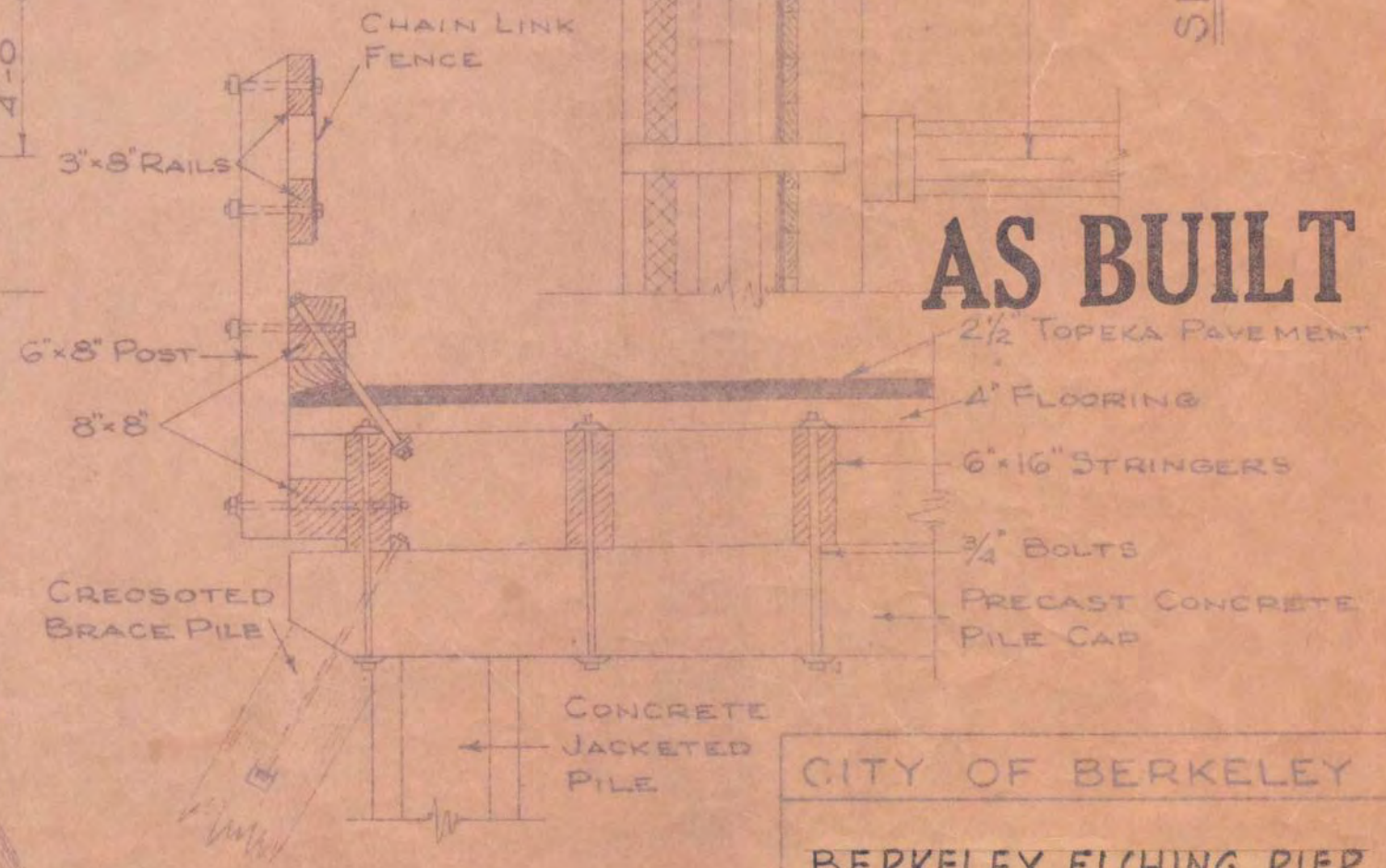
AS BUILT



TYPICAL CROSS SECTION

BENT # 277 TO BENT # 402

SCALE 1/4" = 1'-0"



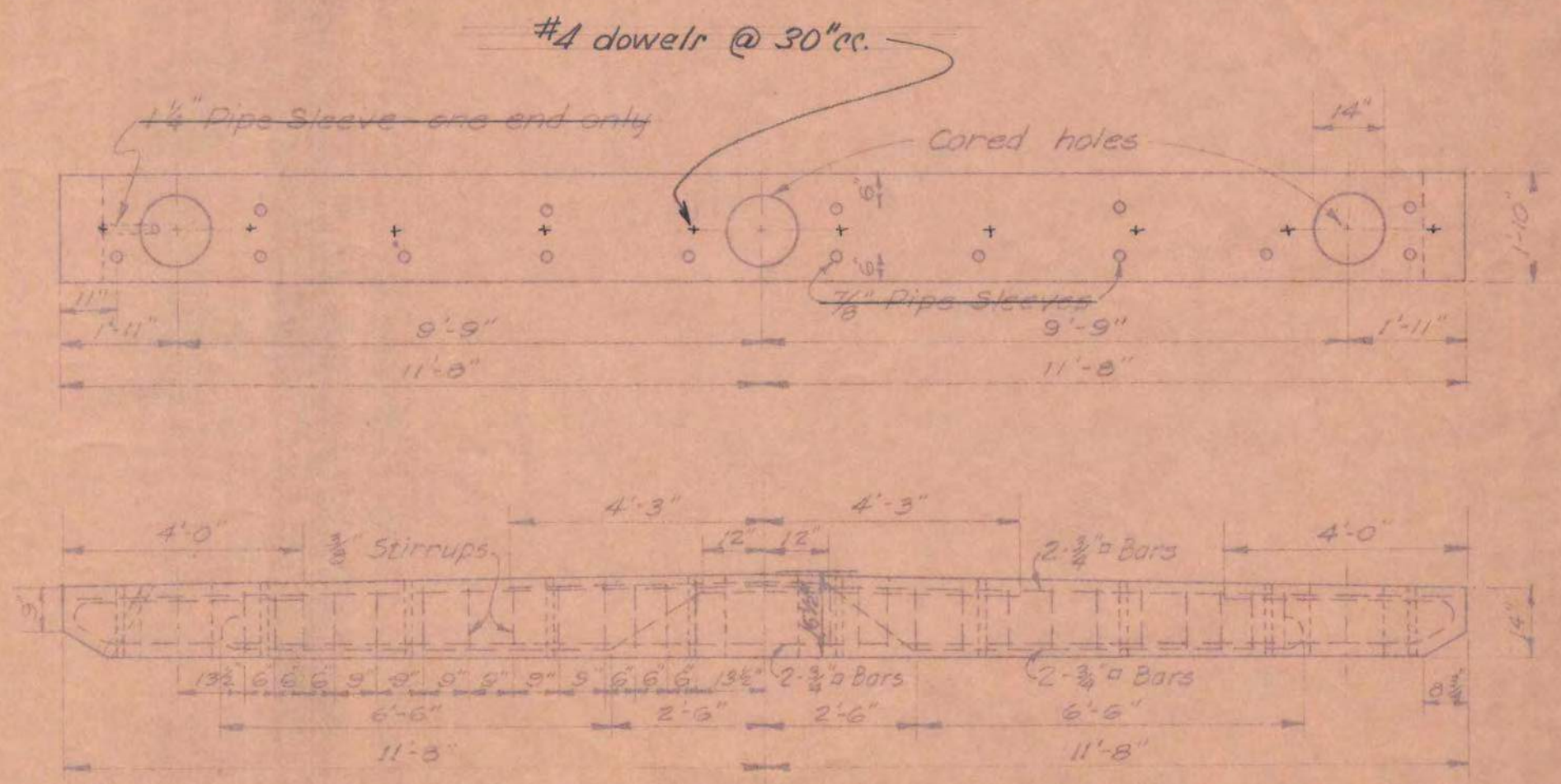
DETAIL SECTION

SCALE 1/2" = 1'-0"

CITY OF BERKELEY

BERKELEY FISHING PIER
 DETAILS OF EXISTING
 SUPERSTRUCTURE

DATE: 9-61 PLAN: # 3549
 SCALE: AS SHOWN FILE: J02-63

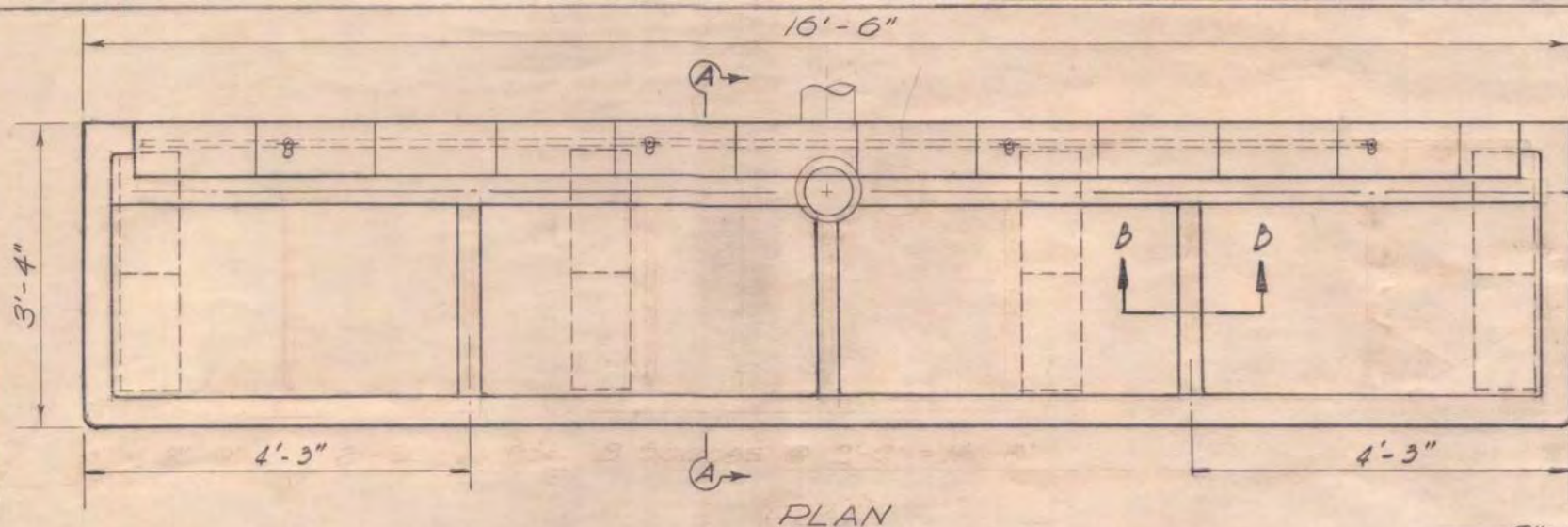


DETAIL OF CONCRETE CAP
 22 FT. ROADWAY
 Scale: 3/8" = 1'-0"

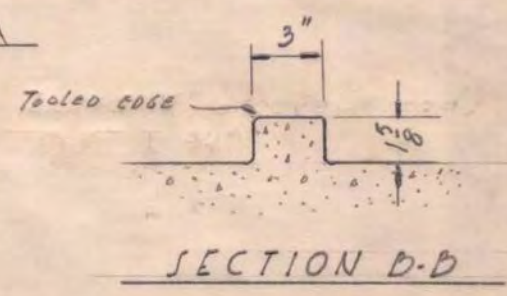
Caps on bents #431 to 435 constructed as shown.

AS BUILT

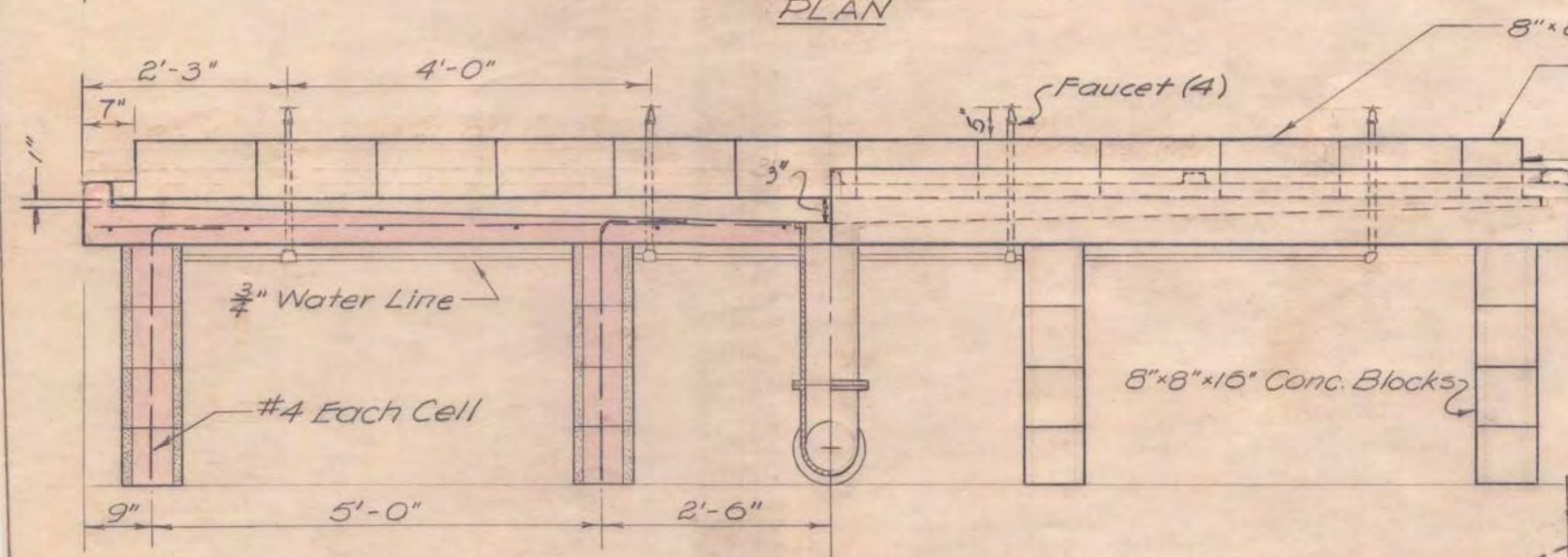
CITY OF BERKELEY	
BERKELEY FISHING PIER	
DETAIL OF	
CONCRETE CAP	
DATE: 9-61	PLAN # 3549
SCALE: AS SHOWN	FILE: 102-B-63
SHEET 4 OF 7	



4" Diam. Semi-Circular Drain Trough
See Notes For Details



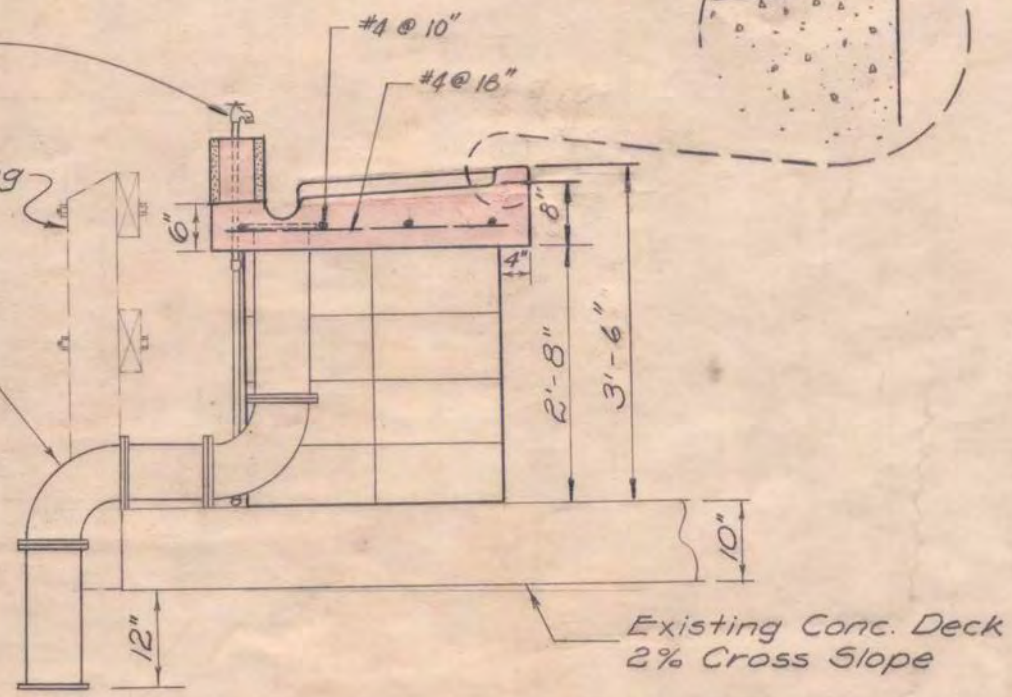
PLAN



FRONT ELEVATION

HALF SECTION THROUGH DRAIN TROUGH

Self closing faucet w/hose bibb.
6' of garden hose attached



SECTION A-A

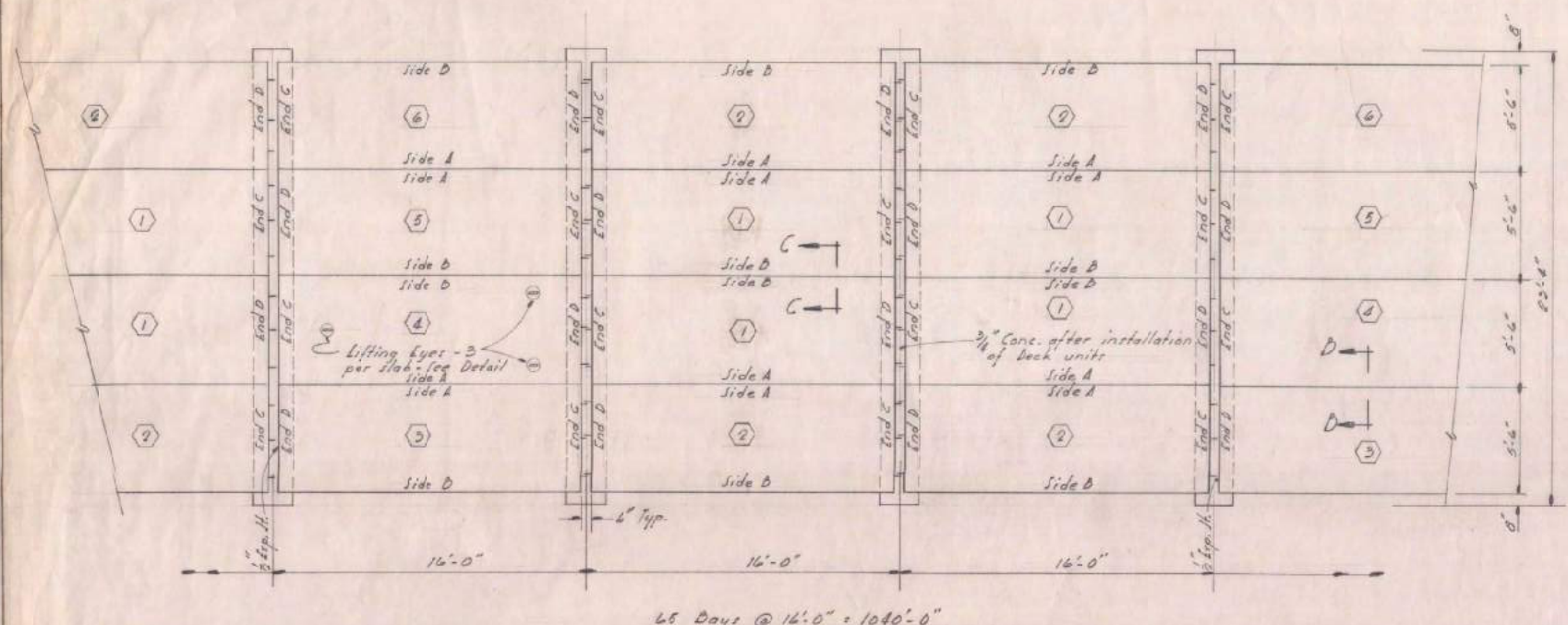
6" ID Cast Iron Pipe
Overboard Discharge
Cut lower rail for sewer
pipe opening

Existing
Timber Railing

AS BUILT

APPROVAL RECOMMENDED: DATE: 9-5-61
<i>Clare J. Gagnon</i> ASSISTANT CITY ENGINEER REGISTERED CIVIL ENGINEER, NO. 8561
APPROVED: DATE: 9-5-61
<i>S. C. Jacka</i> DIRECTOR OF PUBLIC WORKS REGISTERED CIVIL ENGINEER, NO. 7409

CITY OF BERKELEY DEPARTMENT OF PUBLIC WORKS	
FISHING PIER ADDITIONS	
FISH CLEANING TABLE	
DESIGN: B.H.	DATE: 1-23-59
DRAWN: B.H.	PLAN: 3549
FILE: 102-B-63	

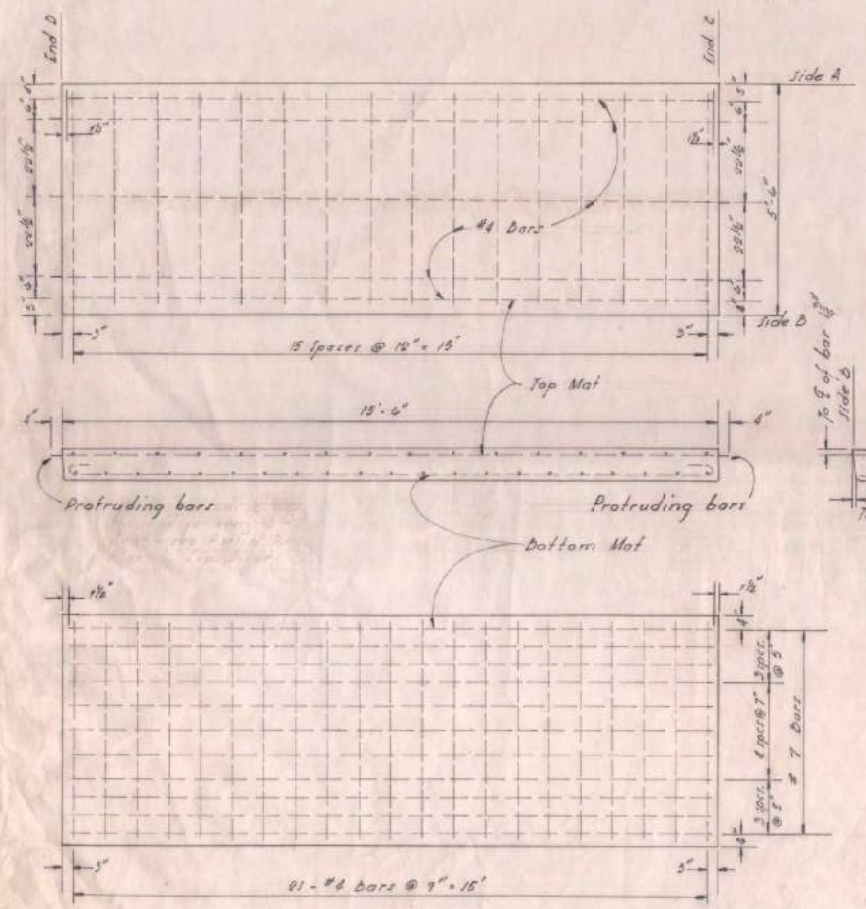


PARTIAL PLAN
SCALE: 1" = 8'

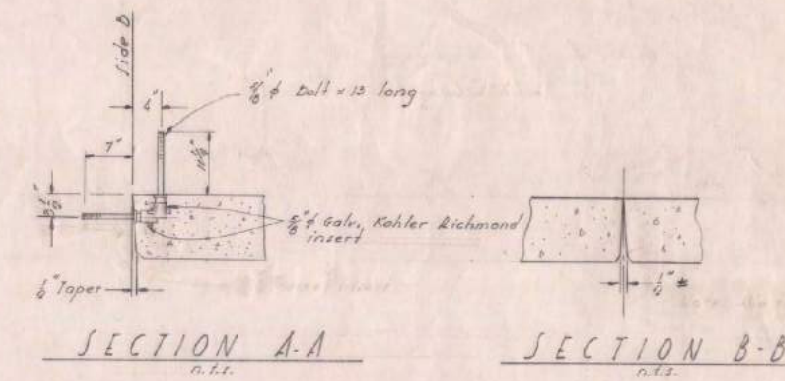
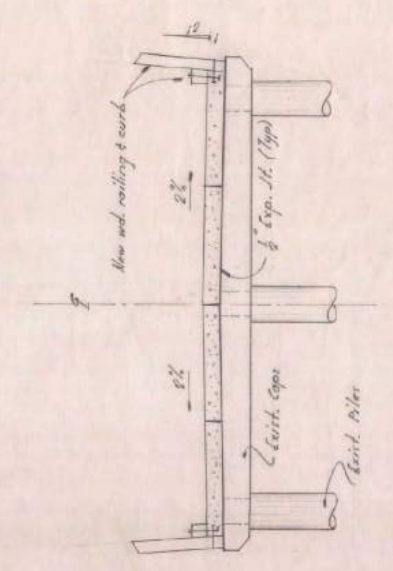
Note: Expansion joints starts on first span out (Bent No 002) and every 5th bent thereafter.

Mark	No. Req.	Remarks
①	06	NONE
②	06	"
③	22	END "D" *
④	22	END "C" *
⑤	22	END "D" *
⑥	22	END "C" *

* Omit protruding bars this end for every 3rd bent. Place 1/4" Exp. Jt. - see Partial Plan above.

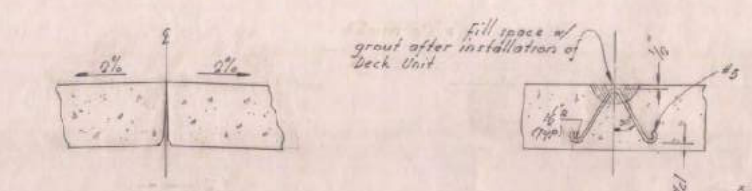


SLAB DETAIL
SCALE: 1" = 2'



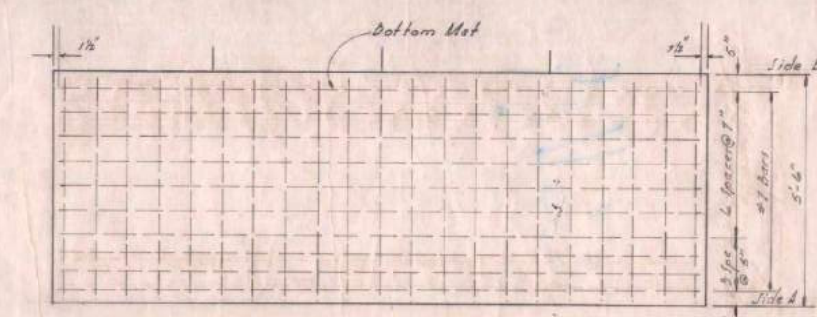
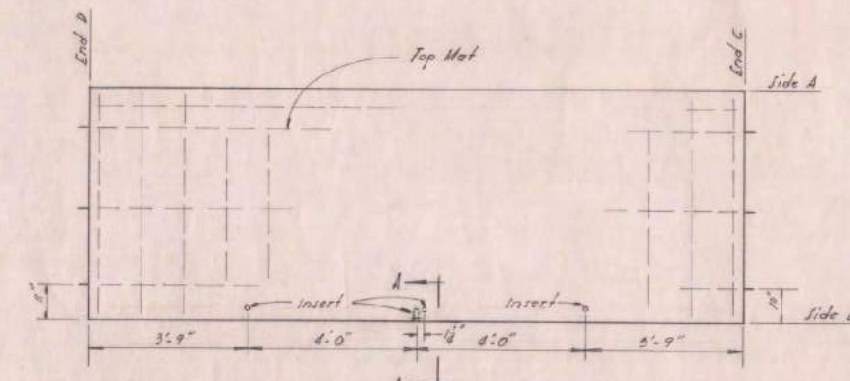
SECTION A-A
n.t.

SECTION B-B
n.t.



SECTION C-C
n.t.

LIFTING EYE DETAIL
n.t.



SLAB DETAIL
SCALE: 1" = 2'

- FINISH
1. Broom finish crosswise
 2. 1" high slab numbers to be stamped on top for identification purposes.

Note: Same as slab # 102B-63 except as noted. See Schedule

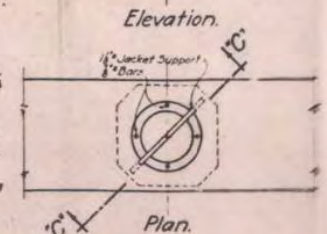
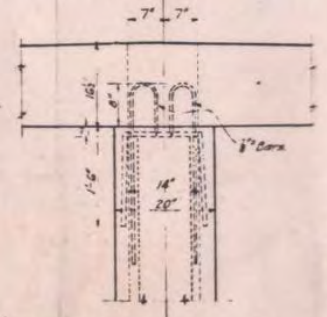
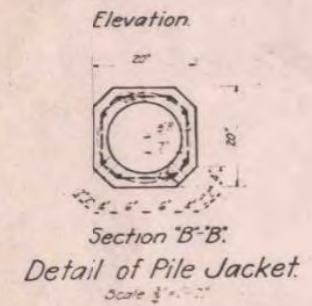
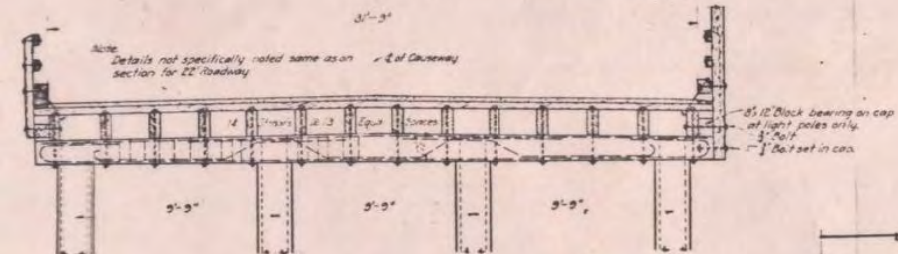
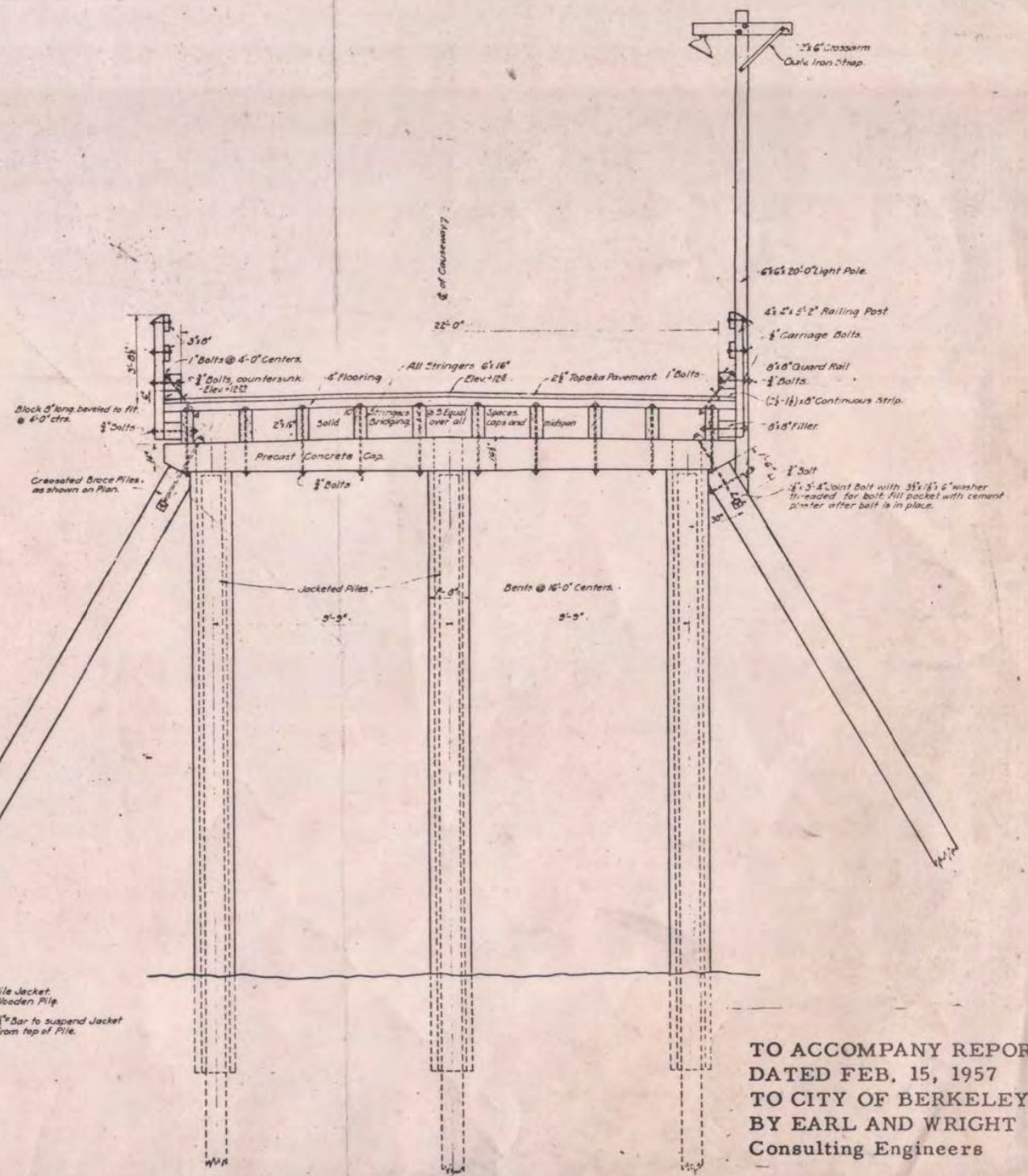
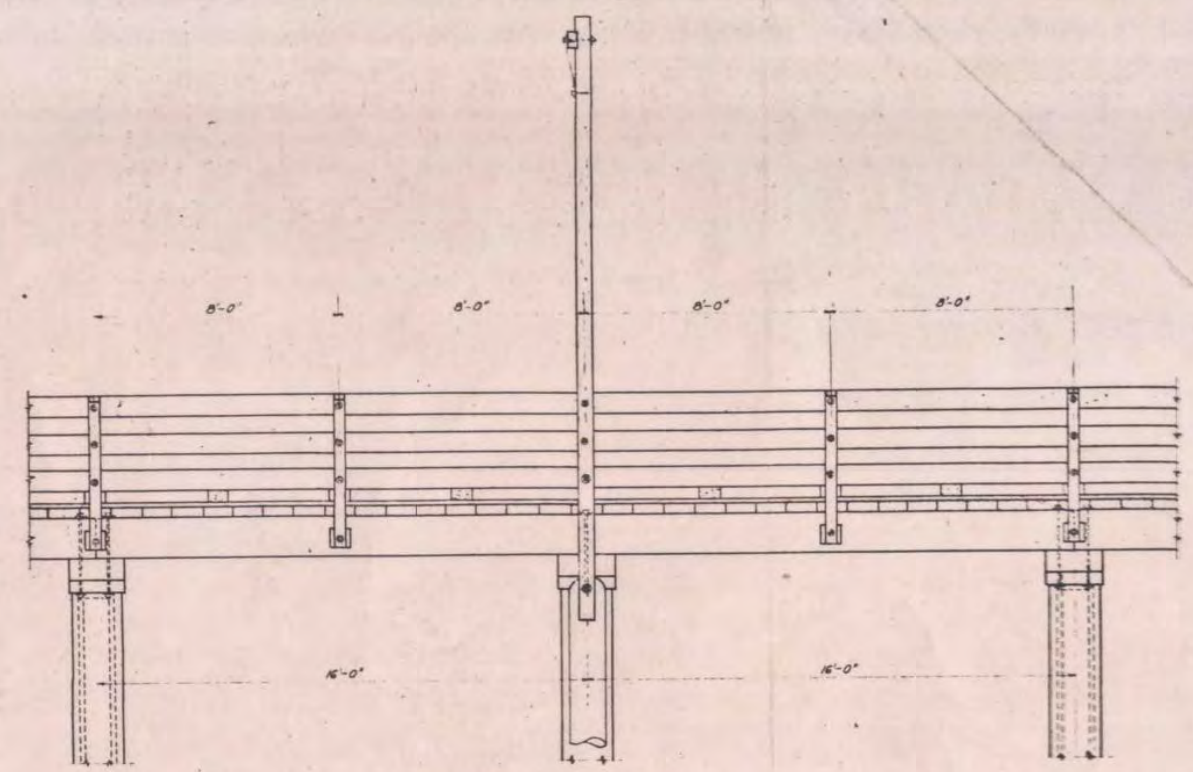
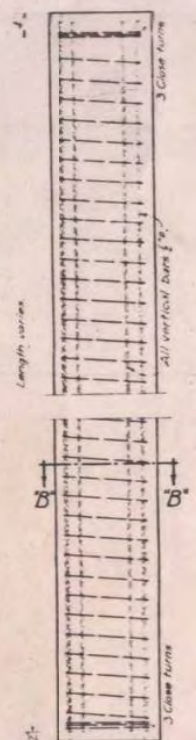
THIS PLAN IS A PART OF A SET OF PLAN NO 3549 FILE 102B-63

AS BUILT

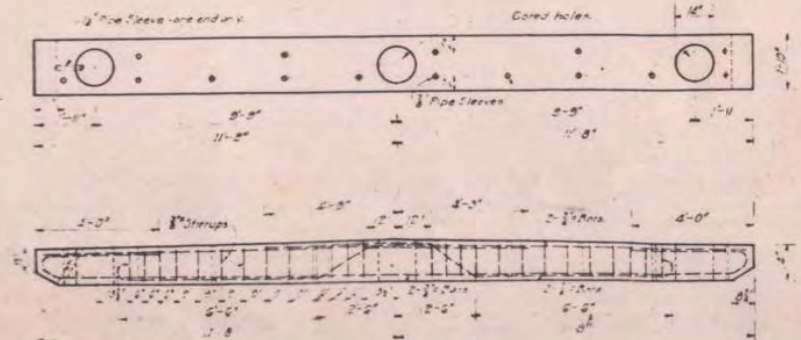
APPROVAL RECOMMENDED DATE 12-12-61
Clare J. Jopson
 SUPERVISOR OF PUBLIC WORKS
 APPROVED: _____ DATE: _____

PROPOSED SLAB
 for RECREATION PIER

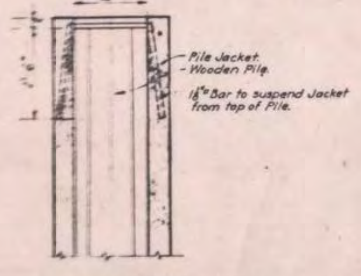
OWNER	CITY OF BERKELEY	DATE	DEC. 1961	PLAN	3451
TRACED	BY	SCALE	AS SHOWN	FILE	303-105
CHECKED	BY	BOOK	PAGE	SHEET	OF



Detail of Connection Between Pile and Cap
Scale 1/4" = 1'-0"



Detail of Concrete Cap
22 Ft. Roadway
Scale 1/4" = 1'-0"

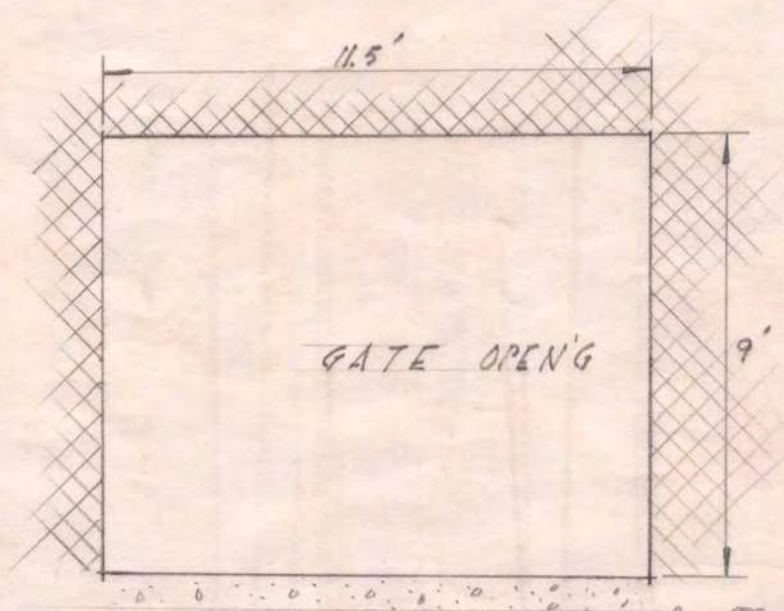
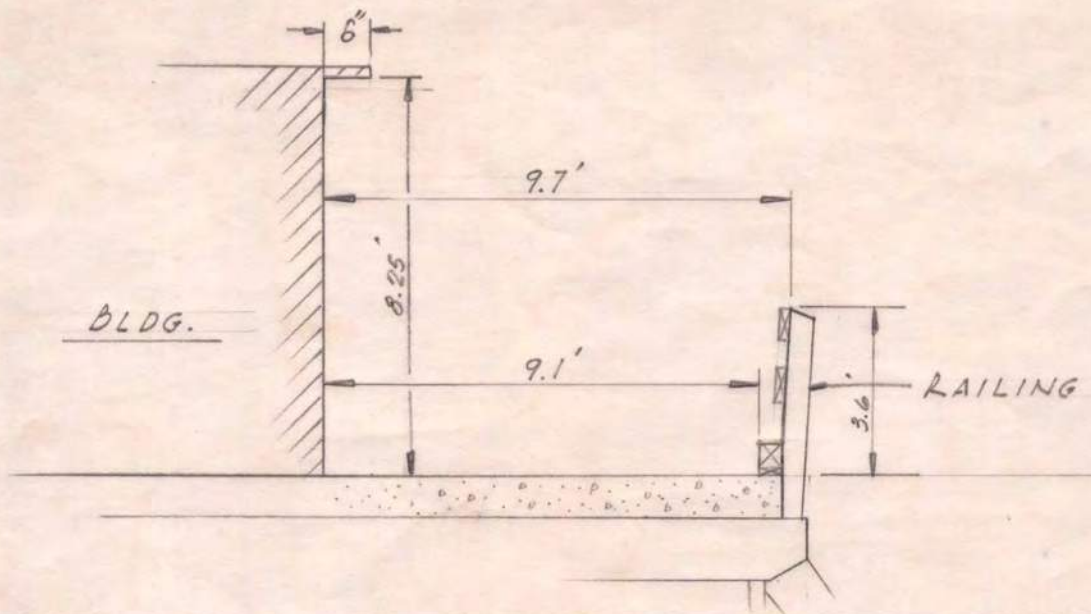


TO ACCOMPANY REPORT
DATED FEB. 15, 1957
TO CITY OF BERKELEY
BY EARL AND WRIGHT
Consulting Engineers

Fishing Pier Plan 6238
File 405A-13

THE GOLDEN GATE FERRY COMPANY
PLANS FOR
FERRY TERMINAL
AT BERKELEY, CALIFORNIA
CAUSEWAY AND WHARVES
FRANK C. WHITE AND HARRY E. SQUIRE
CONSULTING ENGINEERS
AUG. 24, 1938 SHEET 2 OF 4

APPROVED
THE GOLDEN GATE FERRY COMPANY
BY _____ PRESIDENT



AS BUILT

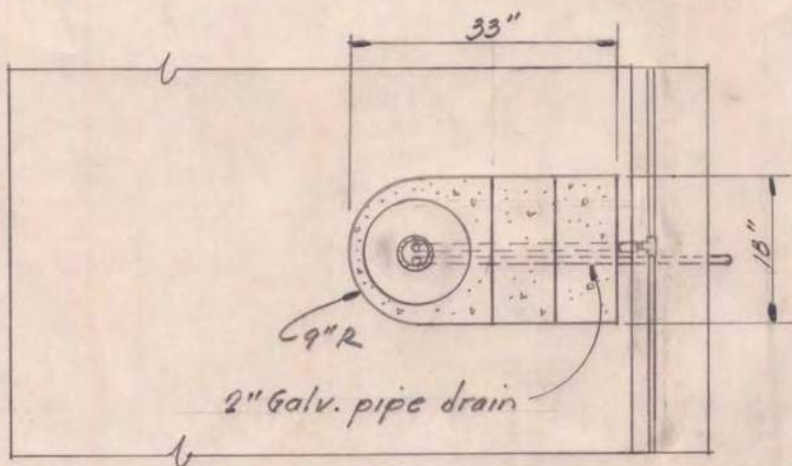
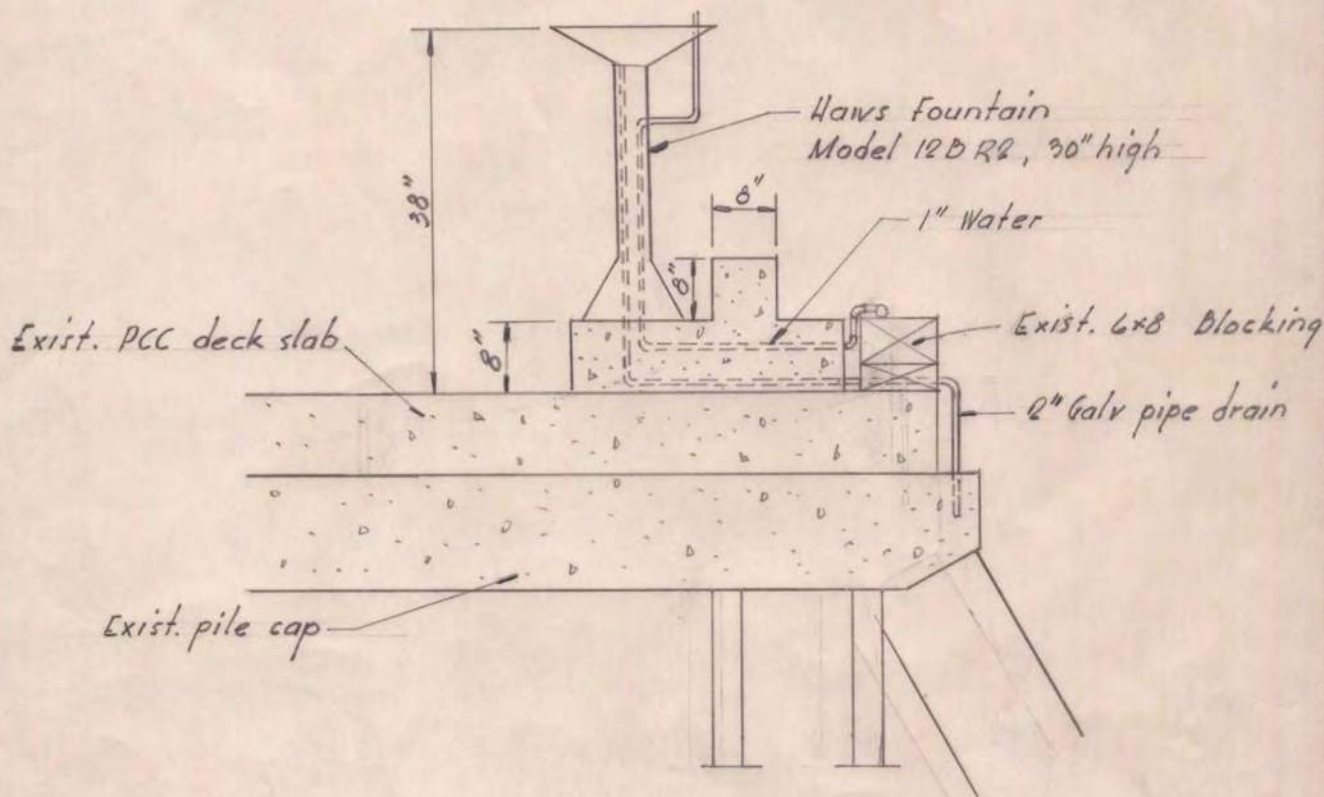
NOTE: CONTRACTOR MAY ALTER GATE OPENING UPON APPROVAL.

CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

APPROVAL RECOMMENDED: DATE: 9-5-61
Clare J. Jagnon
 ASSISTANT CITY ENGINEER
 REGISTERED CIVIL ENGINEER, NO. 8561
 APPROVED: DATE: 9-5-61
S. C. Jaska
 DIRECTOR OF PUBLIC WORKS
 REGISTERED CIVIL ENGINEER, NO. 7409

BERKELEY FISHING PIER
 OBSTRUCTION ON EXISTING PIER

DRAWN	DATE	6-8-61	PLAN	3549
TRACED	SCALE	HORIZ 1" = 40'	FILE	102B-63
CHECKED	BOOK	VERT 1" = 40'	SHEET	5 OF 7



AS BUILT

APPROVAL RECOMMENDED: DATE: 9-5-61

Clare J. Jagnon
ASSISTANT CITY ENGINEER
REGISTERED CIVIL ENGINEER NO. 8561

APPROVED: DATE: 9-5-61

J. C. Quacka
DIRECTOR OF PUBLIC WORKS
REGISTERED CIVIL ENGINEER NO. 7409

CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

BERKELEY FISHING PIER
DRINKING FOUNTAIN DETAIL

DESIGN BY: _____ DATE: 8-61
DRAWN BY: f.o. SCALE: No Scale
CHECKED BY: _____ BOOK: _____ PAGE: _____

PLAN: 3509
FILE: _____
102-B-63

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Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date

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