

INFORMATION HANDOUT

WATER QUALITY

WQ1 California Regional Water Quality Control Board Order 01-120
(Issued October 17, 2001)

WQ2 California Regional Water Quality Control Board Order R2-2002-0011
(Issued January 23, 2002)

PERMITS, LICENSE, AGREEMENT & CERTIFICATION

P1 California Department of Fish and Game (CDFG) Incidental Take
Permit No. 2081-2001-021-03
(Issued November 19, 2001)

P2 CDFG Incidental Take Permit No. 2081-2001-021-03 Minor Amendment #1
(Issued October 14, 2009)

P3 CDFG Incidental Take Permit No. 2081-2001-021-03 Major Amendment #2
(Issued February 23, 2012)

P4 CDFG Incidental Take Permit No. 2081-2001-021-03 Minor Amendment #3
(Issued September 6, 2012)

P5 U.S. Army Corps of Engineers (ACOE) Permit No. 023013S
(Issued December 04, 2001)

P6 U.S Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification
(Issued April 2, 2002)

P7 U.S Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification
(Issued November 12, 2002)

P8 U.S Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification
(Issued April 11, 2005)

P9 U.S Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification
(Issued August 15, 2005)

P10 U.S Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification
(Issued September 23, 2005)

P11 U.S. Army Corp of Engineers (ACOE) Permit No. 023013S Letter of Modification
(Issued May 20, 2008)

P12 U.S. Army Corp of Engineers (ACOE) Permit No. 023013S Time Extension
(Issued November 16, 2011)

P13 U.S. Army Corp of Engineers (ACOE) Permit No. 023013S Letter of Modification
(Issued July 6, 2012)

P14 San Francisco Bay Conservation and Development Commission (BCDC)
Permit No. 2001.008.34, Issued November 20, 2001
Last Amended January 23, 2014, Reflects Amendments 1-34

P15 National Marine Fisheries Service (NMFS) Biological Opinion and Incidental Take Statement
(Issued October 30, 2001)

P16 NMFS Supplemental Biological Opinion and Conference Opinion
(Issued April 10, 2009)

P17 NMFS Supplemental Biological Opinion and Conference Opinion
(Issued August 21, 2009)

P18 NMFS Supplemental Biological Opinion and Conference Opinion
(Issued February 6, 2012)

P19 NMFS Incidental Harassment Authorization
(Issued December 18, 2013)

P20 U.S. Fish and Wildlife Service (USFWS) Biological Opinion
(Issued October 29, 2001)

P21 U.S. Coast Guard (USCG) New Bridge Permit 3-01-11
(Issued December 11, 2001)

P22 U.S. Coast Guard (USCG) New Bridge Permit Amendment 3a-01-11
(Issued November 18, 2011)

MATERIALS INFORMATION

M1 SFOBB 504' & 288' Spans Inspection Reports

M2 SFOBB 504' & 288' Spans Original Construction Sequence

M3 SFOBB East Span Design Specifications – Superstructure Circa 1933

M4 Existing Bridge Modification Contract 4011 Resident Engineers Report on Deck Paving –East Bay
July 19 1963 (Testing Reports and Contract Specifications)

M5 Existing Bridge Modification Contract 4030 Resident Engineers Report on Steel Work – East Bay
Sept 18 1963 (Testing Reports and Contract Specifications)

M6 Original Bridge Contract 7 Superstructure East Bay Crossing Final Report March 24 1937 (Material
Specifications and Testing Reports)

M7 Original Bridge Contract 7 Superstructure East Bay Crossing Specifications March 8 1933 (Contract
Specifications and Cantilever Erection Procedure)

M8 Original Bridge Tests of Heavy Riveted Joints – Second Progress Report (1936)

M9 Original Bridge Tests of Heavy Riveted Joints – Special Report on Manganese Steel Specimens
(1936)

M10 Original Bridge Tests on Riveted Tension Members and Their Connections (1934)

- M11** SFOBB East Span Floor System Original Design Calculations (1933)
- M12** SFOBB East Span Original Construction Photographs from Bancroft Library
- M13** Pile Installation Demonstration Project (PIDP) Geotechnical Report: Main Text and Appendices
 - M14** Ground Motion Report: Main Text and Appendices
 - M15** Final Marine Geophysical Survey Report:
Volume-1, Main Text and Appendices
Volume-2, Maps
 - M16** Final Marine Geotechnical Site Characterization Report:
Volume-1, Main Text and Illustrations
Volume-2A through Volume-2H
- M17** Phase I Subcontractor Reports - Preliminary Geotechnical Site Characterization
Volume-1 through Volume-4
- M18** Phase-II Subcontractor Reports - Final Geotechnical Site Characterization
Volume-1 through Volume-3
- M19** Analysis and Design Procedures for Pile Foundations Supporting Temporary Towers Skyway
Structures: Main Text and Appendices dated March 2001
- M20** Revised Final Oakland Shore Approach Geotechnical Site Characterization Report, dated March
2001: Volumes 1, 2A, 2B, 3, and 4
 - M21** 1920 Geology Reports
 - M22** 1930 Boring Logs for Original Bay Bridge
- M23** Final Geotechnical Foundation Report for Oakland Shore Approach Structures
 - M24** Caltrans Bathymetric Survey Report No. 23.00007024 R1 (2103)
- M25** San Francisco-Oakland Bay Bridge East Span Underwater Debris Diagram, dated May 2001
- M26** SFOBB East Span Survey Information, Control Diagram dated December 30, 2002
 - M27** USCG Private Aid to Navigation Sample Application Form
 - M28** Geotechnical & Material Report for YBI
- M29** Ground Penetration Report No. 6488-01, GEO Vision, November 2006
 - M30** Historical Maps (1917, 1932, 1933)
- M31** Construction Vibration Monitoring Field Data Form
- M32** Water Quality Information Handout (Contract No. 04-01352) dated December 2012
- M33** Correspondence with United States Custom Service regarding Jones Act and use of crane/barge,
2002 and 2005

M34 Phase 1 Archaeological Survey Report- Maritime Archaeology, September 1999

M35 Addendum to Archaeological Survey Report-Maritime Archeology, December 6, 1999

M36 Addendum to Archaeological Survey Report-Maritime Archeology, March 2000

M37 Addendum to Archaeological Survey Report-Maritime Archeology, August 17, 2000

M38 SFOBB 504' & 288' Spans Construction Photographs

M39 Addendum Original Bridge Contract 7 Superstructure East Bay Crossing Shop Drawings

M40 Partial BrIM model for the 504' & 288' Spans

M41 Lead concentration data for the roadway asphalt by Advanced Technology Laboratories dated April 30, 2014

M42 Air Dispersion Modeling and Risk Assessment Summary Report for SFOBB 504/288 Spans Demolition

M43 Air Dispersion Modeling and Risk Assessment Summary Report for SFOBB Cantilever Truss Demolition

M44 Air Quality Monitoring Program Summary Report SFOBB Cantilever Truss Demolition (November 2013 through April 2014)

M45 Steel Beam Test-Cut Simulations Air Monitoring Results for SFOBB Oakland Touchdown Demolition

M46 Bare Steel Risk Assessment – SFOBB Cantilever Truss Demolition Project

M47 Structure Type Selection and Seismic Retrofit Strategy Report (Wharf Condition Report), January 2014

M48 Technical Memorandum - PCB Risk Evaluation, Old East Span Deconstruction by AMEC dated October 17, 2014

M49 Technical Report - 504/288 Contract, Nesting Bird Deterrence Measures dated September 2014

M50 Bird Management Plan for Bridge Dismantling - 504/288 Contract dated September 2014

1

3

3

ADDED PER ADDENDUM NO.3 DATED DECEMBER 29, 2014

1

ADDED PER ADDENDUM NO.1 DATED OCTOBER 28, 2014

INFORMATION HANDOUT

File Name	Information Handout Index	Index on SSP section 2-1.06B	Description
04-013524-IH-Vol01.pdf	M1	1.1	SFOBB 504' & 288' Spans Inspection Reports
	M2	1.2	504' & 288' Spans Original Construction Sequence
	M3	1.3	SFOBB East Span Design Specifications - Superstructure Circa 1933
	M4	1.4	Existing Bridge Modification Contract 4011 Resident Engineers Report on Deck Paving - East Bay July 19, 1963 (Testing Reports and Contract Specifications)
04-013524-IH-Vol02.pdf	M5	1.5	Existing Bridge Modification Contract 4030 Resident Engineers Report on Steel Work - East Bay Sept 18, 1963 (Testing Reports and Contract Specifications)
	M6	1.6	Original Bridge Contract 7 Superstructure East Bay Crossing Final Report March 24, 1937 (Material Specifications and Testing Reports)
	M7	1.7	Original Bridge Contract 7 Superstructure East Bay Crossing Specifications March 8, 1933 (Contract Specifications and Cantilever Erection Procedure)
	M8	1.8	Original Bridge Tests of Heavy Riveted Joints - Second Progress Report (1936)
04-013524-IH-Vol03.pdf	M9	1.9	Original Bridge Tests of Heavy Riveted Joints - Special Report on Manganese Steel Specimens (1936)
	M10	1.10	Original Bridge Tests on Riveted Tension Members and Their Connections (1934)
	M11	1.11	SFOBB East Span Floor System Original Design Calculations (1933)
04-013524-IH-Vol04.pdf	M12	1.12	SFOBB East Span Original Construction Photographs from Bancroft Library
	M13	2.1	Pile Installation Demonstration Project (PIDP) Geotechnical Report: Main Text and Appendices
	M14	2.2	Ground Motion Report: Main Text and Appendices
	M15	2.3	Final Marine Geophysical Survey Report: Volume-1, Main Text and Appendices
		2.3	Volume-2, Maps
	M16	2.4	Final Marine Geotechnical Site Characterization Report: Volume-1, Main Text and Illustrations
		2.4	Volume-2A through Volume-2H
		2.4	
		2.4	
		2.4	
2.4			
2.4			
04-013524-IH-Vol05.pdf	M17	2.5	Phase I Subcontractor Reports - Preliminary Geotechnical Site Characterization
		2.5	Volume-1 through Volume-4
		2.5	
		2.5	
04-013524-IH-Vol06.pdf		2.5	
04-013524-IH-Vol07.pdf		2.5	
04-013524-IH-Vol08.pdf	M18	2.6	Phase II Subcontractor Reports - Final Geotechnical Site Characterization
		2.6	Volume-1 through Volume-3
		2.6	
	M19	2.7	Analysis and Design Procedures for Pile Foundations Supporting Temporary Towers Skyway Structures: Main Text and Appendices dated March 2001
	M20	2.8	Revised Final Oakland Shore Approach Geotechnical Site Characterization Report, dated March 2001: Volumes 1, 2A, 2B, 3, and 4
		2.8	
		2.8	
		2.8	
	M21	2.9	1920 Geology Reports
	M22	2.10	1930 Boring Logs for Original Bay Bridge
M23	2.11	Final Geotechnical Foundation Report for Oakland Shore Approach Structures	
M24	2.12	Caltrans Bathymetric Survey Report No. 23.00007024 R1 (2013)	

File Name	Information Handout Index	Index on SSP section 2-1.06B	Description
04-013524-IH-Vol09.pdf	P1	3.1.1	California Department of Fish and Game (CDFG) Incidental Take Permit No. 2081-2001-021-03. Issued November 19, 2001
	P2	3.1.2	CDFG Incidental Take Permit No. 2081-2001-021-03 Minor Amendment #1. Issued October 14, 2009
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	P4	3.1.4	CDFG Incidental Take Permit No. 2081-2001-021-03 Minor Amendment #3. Issued September 6, 2012
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	P6	3.1.6	U.S. Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification. Issued April 2, 2002
	P7	3.1.7	U.S. Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification. Issued November 12, 2002
	P8	3.1.8	U.S. Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification. Issued April 11, 2005
	P9	3.1.9	U.S. Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification. Issued August 15, 2005
	P10	3.1.10	U.S. Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification. Issued September 23, 2005
	P11	3.1.11	U.S. Army Corps of Engineers (ACOE) Permit No. 023013S Letter of Modification. Issued May 20, 2008
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	P17	3.1.17	NMFS Supplemental Biological Opinion and Conference Opinion. Issued August 21, 2009
	P18	3.1.18	NMFS Supplemental Biological Opinion and Conference Opinion. Issued February 6, 2012
	P19	3.1.19	NMFS Incidental Harassment Authorization. Issued December 18, 2013
	P20	3.1.20	U.S. Fish and Wildlife Service (USFWS) Biological Opinion. Issued October 29, 2001
	P21	3.1.21	U.S. Coast Guard (USCG) New Bridge Permit 3-01-11. Issued December 11, 2001
	P22	3.1.22	U.S. Coast Guard (USCG) New Bridge Permit Amendment 3a-01-11. Issued November 18, 2011
	WQ1	3.1.23	California Regional Water Quality Control Board Order 01-120. Issued October 17, 2001
	WQ2	3.1.24	California Regional Water Quality Control Board Order R2-2002-0011. Issued January 23, 2002
	M25	3.2	San Francisco-Oakland Bay Bridge East Span Underwater Debris Diagram, dated May 2001
	M26	3.3	SFOBB East Span Survey Information, Control Diagram Dated December 30, 2002
	M27	3.4	USCG Private Aid to Navigation Sample Application Form
	M28	3.5	Geotechnical & Material Report for YBI
		3.5	
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	M30	3.7	Historical Maps (1917, 1932, 1933)
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04-013524ad3-IH.pdf	M49	3.21	Technical Report - 504/288 Contract, Nesting Bird Deterrence Measures dated September 2014
	M50	3.22	Bird Management Plan for Bridge Dismantling - 504/288 Contract dated September 2014

3

3

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San Francisco – Oakland Bay Bridge

East Span Seismic Safety Project



TECHNICAL REPORT

504/288 Contract

NESTING BIRD DETERRENCE MEASURES: MATERIALS AND APPLICATIONS



September 2014

EA 04-013521

04-SF-80 KP 12.2/KP 14.3

04-ALA-80 KP 0.0/KP 2.1

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San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

504/288 Nesting Bird Deterrence

Materials and Applications

EA 04-013521

September 2014

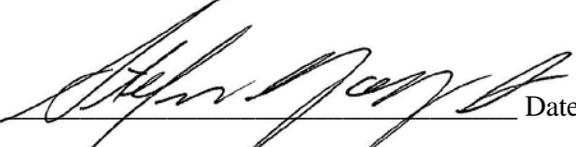
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Table of Contents

CHAPTER 1 – INTRODUCTION	1
1.1 Project Description	1
1.2 SFOBB and the Dismantling of the 504-ft and 288-ft Spans of the Original East Span	2
CHAPTER 2 – STRUCTURAL MEMBER GROUPS AND CHARACTERISTICS	3
2.1 Overview	3
2.2 Structural Member Groups	3
Marine Foundations	3
Steel Support Towers	6
Below Lower Deck Structural Members	8
Upper Superstructure	11
Existing Access Platforms	12
Concrete Oakland Shore Structure	14
Temporary Supports	14
Chapter 3 – BIRD MANAGEMENT	15
3.1 Phase 1: Non-Nesting Season (September 1-January 31)	15
Seasonal Avoidance	15
Historic Nest Removal	15
Deterrence Measures	15
3.2 Phase 2: Nesting Season (February 1-August 31)	16
Nest-Start Removal	16
Paint Ball Gun and Water Cannon (for nest-start removal only)	17
Supplemental Exclusionary Deterrence Measures	17
Hazing	17
Buffers (for occupied nests)	17
Occupied Nest Removal	18

CHAPTER 4 – CONTRACTOR DETERRENCE PLAN	19
4.1 Seasonal Avoidance	19
4.2 Deterrents	19
4.3 Occupied Nest Removal	21
4.4 Buffers for Occupied Nests	21
4.5 Deterrent Location, Means, and Methods for Installation	21
CHAPTER 5 - DETERRENT MATERIALS SPECIFICATIONS	22
5.1 Deterrent Materials	22
Bird Spikes	22
Slope Panels:	24
Netting:	25
Suspended Scaffolding System:	26
Welded Hardware Cloth:	27
Bird-Wire System:	28

List of Figures

Figure 1.1 SFOBB project and vicinity	1
Figure 1.2 SFOBB new and original east spans.....	1
Figure 2.1 Marine foundation at Pier E7 with raised pedestals, ledge areas around pedestals, and large open area between pedestals.	4
Figure 2.2 Wooden fender at Pier E5.....	4
Figure 2.3 Pier E9 pedestal top and weep holes.	5
Figure 2.4 Typical pedestal top for Piers E17-E22.....	6
Figure 2.5 Pedestal top and tower typical for Piers E4-E8 and E10-E16	6
Figure 2.6 Pier E9	7

Figure 2.7 West-facing recess (with peregrine falcon nestlings) in Pier E8 tower leg.....	7
Figure 2.8 Western gull nest at base of steel support tower	7
Figure 2.9 288-ft span, lower members	8
Figure 2.10 Double-crested cormorant nest on eye-bars	11
Figure 2.11 Typical superstructure for 504-ft span.....	11
Figure 2.12 Pier E16 existing access platforms on tower leg	13
Figure 2.13 Pier E22 existing access platforms typical on 288-ft spans.....	13

Appendices

Appendix A - SFOBB Original East Span Piers

Appendix B – 504-ft Span Superstructure Cross Section

Appendix C – Existing Access Platforms, General Locations

ACRONYMS AND ABBREVIATED TERMS

2014 BMP	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Bird Management Plan for Bridge Dismantling - 504/288 Contract (Supplement to the 2003 Final (Revised) Bird Monitoring and Management Plan)
504/288	The 504-foot Truss Spans and 288-foot Truss Spans of the original east span of the SFOBB
BCDC	San Francisco Bay Conservation and Development Commission
BDP	Bird Deterrence Plan
CDFW	California Department of Fish and Wildlife (formally: California Department of Fish and Game)
CFGC	California Fish and Game Code
CESA	California Endangered Species Act
Department	California Department of Transportation
FEIS	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Final Environmental Impact Statement
FESA	Federal Endangered Species Act
MBTA	Migratory Bird Treaty Act
OTD	Oakland Touchdown
PLAC	Permits Licenses Agreements and Certifications
RWQCB	Regional Water Quality Control Board
SFOBB	San Francisco-Oakland Bay Bridge
SFOBB Project	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project
USFWS	United States Fish and Wildlife Service

CHAPTER 1 – INTRODUCTION

1.1 Project Description

The California Department of Transportation (Department) has replaced the east span of the San Francisco-Oakland Bay Bridge (SFOBB) with a new bridge immediately to the north of the original span. The SFOBB East Span Seismic Safety Project (SFOBB Project) site is located in the central San Francisco Bay, between Yerba Buena Island in the City and County of San Francisco, and the City of Oakland, in Alameda County, in California (Figure 1.1). The SFOBB Project includes both the construction of the new east span and the dismantling of the original east span (Figure 1.2 and Appendix A). The SFOBB Project is a multi-year effort that involves a number of construction activities on land as well as in San Francisco Bay. Some of these activities could potentially affect protected bird species.



Figure 1.1 SFOBB project and vicinity



Figure 1.2 SFOBB new and original east spans

To address potential impacts to environmental resources, the Department and Federal Highway Administration prepared the SFOBB Project Final Environmental Impact Statement (FEIS), dated May 2001, pursuant to the National Environmental Policy Act. The Department also obtained approvals from regulatory agencies for all activities associated with both the construction of the new east span and the dismantling of the original east span. Regulatory agency approvals obtained from the United States Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), formerly the California Department of Fish and Game (CDFG), and the San Francisco Bay Conservation and Development Commission (BCDC) specifically addressed potential impacts to birds. When the FEIS was prepared and agency approvals were obtained in 2001, three federally and/or state listed bird species were identified as being present in or near the project area. These species are the California least tern, California brown pelican, and American peregrine falcon. The California least tern is also listed as endangered under both the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA). The formerly state and federally endangered California brown pelican was delisted from both FESA and CESA in 2009. The formerly state and federally endangered American peregrine falcon was delisted from FESA in 1999 and delisted from CESA in 2008. The California least tern, California brown pelican, and American peregrine falcon, remain fully protected by the California Fish and Game Code (CFGC).

In addition to birds identified in SFOBB Project approvals, the Department also observes other applicable state and federal regulations, such as the federal Migratory Bird Treaty Act (MBTA) and the CFGC, to protect birds and their nests within the SFOBB Project area.

1.2 SFOBB and the Dismantling of the 504-ft and 288-ft Spans of the Original East Span

The purpose of this report is to identify bird deterrence requirements for the SFOBB Project Construction Contract to remove the 504-foot and 288-foot spans (504/288) and steel support towers of the Original East Span beginning during the 2015 nesting season. The Department expects the 504/288 contractor to submit a work sequence for dismantling the SFOBB Original East Span from commencement of work and continuing through the duration of the contract. Based on this work sequence, the risk of impacts to nesting birds over multiple nesting seasons can be assessed. Impacts may result from the numerous construction activities, including construction of temporary marine falsework, dismantling of the original east span superstructure east of Pier E4 (see Appendix A for all pier locations), and dismantling of the pier towers.

In this report, we identify structural member groups, their characteristics with regards to nesting birds, and bird deterrence measures to potentially mitigate risk to schedule that may occur if bird nesting results in work stoppages during dismantling activities. This report provides a detailed summary of recommended deterrence measures, deterrence measure installation methods, maintenance, access, staging and scheduling requirements, as well as recommendations for the contractor-supplied Bird Deterrence Plan (BDP).

CHAPTER 2 – STRUCTURAL MEMBER GROUPS AND CHARACTERISTICS

2.1 Overview

The 504/288 spans are composed of multiple structural member groups all of which provide some historic or potential nesting bird habitat. Each member group is best suited to specific deterrence measure applications. These structural member groups are: marine foundations, support towers, below lower deck structure, lower deck, upper deck, superstructure, concrete Oakland shore structure, access platforms and temporary supports. In many areas unique location-specific deterrence measures are required. Deterrents discussed in this report are described by material specifications presented in Chapter 5 and shall be installed as shown in 504/288 Contract Specifications. Unique, and general, member-defined requirements are presented in this chapter. In many cases, deterrence measures implemented for one member group must overlap with those of adjacent member groups to create a seamless deterrence system covering both groups. Deterrence measures are to be monitored and maintained daily for effectiveness by the contractor supplied biologist(s).

2.2 Structural Member Groups

Marine Foundations

The 504/288 spans are constructed on 20 marine foundations (Piers E4-E22) of concrete construction and consisting of multiple horizontal and vertical planes. The marine foundations provide access points to bridge support towers as well as suitable nesting habitat for birds. These habitat areas include: horizontal concrete surfaces (Piers E4-E22), wooden fenders (Piers E4-E5), corner areas defined by vertical and horizontal surfaces at the bases of concrete pedestals (Piers E4-E22), weep holes (Piers E9, E17-E22), and concrete pedestal tops (Piers E9, E17-E22).

Horizontal Concrete Surfaces

Location: Piers E4-E22

Description: Flat, open areas between concrete pedestals defined by tops of concrete foundations (Figure 2.1).

Nesting habitat: Anywhere on surface

Deterrence measure(s): Large, flat surfaces are not feasibly covered by exclusionary deterrence measures and may need to be left open for access to construction area. These areas shall be managed by contractor biologist(s) to prevent or remove nest starts. Management strategies for these areas may include, but are not limited to monitoring, bird-hazing, and removal of nest starts



Figure 2.1 Marine foundation at Pier E7 with raised pedestals, ledge areas around pedestals, and large open area between pedestals.

Wooden Fenders

Location: Piers E4-E5

Description: Complex lattice of vertical and horizontal wooden beams, constructed around marine foundations as protection against potential collision from vessels and debris (Figure 2.2)

Nesting habitat: Multiple protected recesses within interstices of fender constructions as well as tops of fenders

Deterrence measure(s): Remove, or cover entire fender with netting to block access. To avoid creating flat horizontal surfaces with netting, extend netting at a diagonal from top of bumper to wall of concrete foundation and secure tightly. Slope panels may be used in areas where it is not feasible to attach netting to avoid creating a flat surface. Any remaining flat surfaces must be filled with bird spikes, or blocked to prevent access by nesting birds

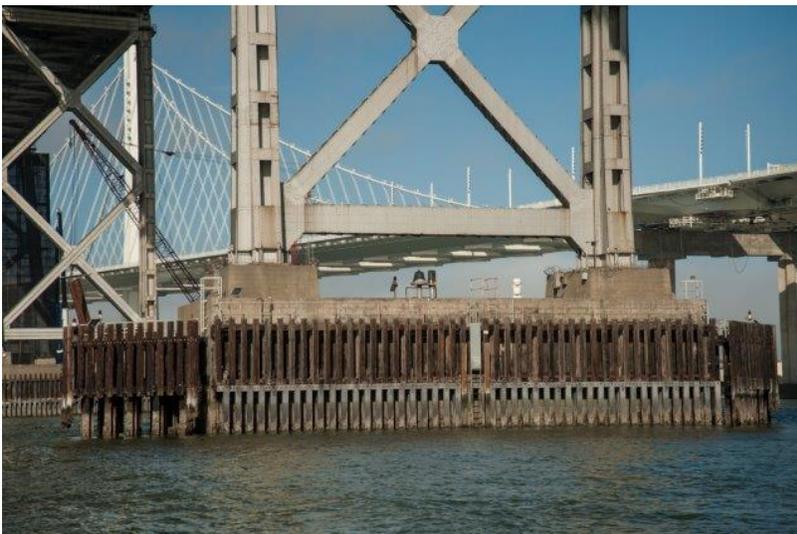


Figure 2.2 Wooden fender at Pier E5

Concrete Pedestal Bases

Location: Piers E4-E22

Description: Intersections between the base of semi-vertical concrete pedestal sides with the horizontal concrete surface on marine foundations (Figures 2.1-2.5)

Nesting habitat: Semi-protected, corner areas defined by vertical and horizontal slab surfaces

Deterrence measure(s): Fill corner areas with slope panels, and welded hardware cloth

Weep Holes

Location: Concrete pedestals at Piers E9, E17-E22

Description: Narrow openings through concrete pedestals to allow water to pass from depressed pedestal tops (Figure 2.3)

Nesting habitat: Cavity created by weep hole

Deterrence measure(s): Survey weep holes for presence of birds and/or active nests prior to blocking. If weep hole is uninhabited, cover with welded hardware cloth.

Concrete Pedestal Tops

Location: Tops of concrete pedestals at Piers E9 and E17-E22

Description: Recessed areas on concrete pedestals tops and associated connection points with support towers (Pier E9, Figure 2.3) or superstructure support beams (Piers E17-E22, Figure 2.4), as well as flat pedestal tops ((Piers E4-8 and E10-E16, Figure 2.5)

Nesting habitat: Horizontal surfaces and corners within recessed areas

Deterrence measure(s): Cover entire area with netting to block access. Fill difficult-to-cover areas with supplemental bird spikes, or slope panels to prevent bird access. The contractor-supplied biologist is required to flush out potential nesting birds as part of monitoring duties



Figure 2.3 Pier E9 pedestal top and weep holes.



Figure 2.4 Typical pedestal top for Piers E17-E22



Figure 2.5 Pedestal top and tower typical for Piers E4-E8 and E10-E16

Steel Support Towers

The 504/288 spans are supported by 13 steel towers (Piers E4-E16) anchored to concrete marine foundations. Towers E4-E8 and E10-E16 (Figure 2.5) each have 2 legs, connected by horizontal and diagonal truss-beams. Pier E9 (Figure 2.6) is composed of four tower legs, also connected by horizontal and diagonal truss-beams. For the purposes of bird management, the support towers are addressed by member type. Support tower member types include: legs, diagonal braces, and lateral top beams. Within each steel support tower member type are nesting bird habitat areas, for which specific deterrence measures are required. Deterrence measure requirements are presented below.

Tower Legs

Location: Piers E4-E16

Description: Vertical, steel, truss-members with tower legs have a number of vertically elongated, rectangular, recessed alcoves along the vertical length of their east and west faces (Figure 2.7) Piers 5-8 also have additional alcoves along the vertical length of the north and south faces of each leg

Nesting habitat: Horizontal areas within each recess (Figure 2.7) and at base of steel support tower legs (Figure 2.8)

Deterrence measure(s): Wrap legs with netting to block all access to recessed alcoves. Netting must be securely attached to bridge members via bolts, clamps, or other effectively equivalent method



Figure 2.6 Pier E9



Figure 2.7 West-facing recess (with peregrine falcon nestlings) in Pier E8 tower leg



Figure 2.8 Western gull nest at base of steel support tower

Tower Diagonal Braces

Location: Between north and south tower legs, Piers E4-E16

Description: All tower braces are four-sided members constructed of latticed steel beams connected to each other and the tower legs via gusseted plates (member joints) (Figures 2.1, 2.2, 2.5, and 2.6)

Nesting habitat: Horizontal surfaces wider than three inches occur at some member joints.

Deterrence measure(s): Bird spikes must be attached to all horizontal surfaces at member joints indicated in Contract plan sheets for bird deterrents

Tower Tops

Location: Tops of tower legs, Piers E4-E16

Description: Areas associated with connection points between tower supports and 504-ft or 288-ft span superstructure

Nesting habitat: Horizontal surfaces wider and longer than three inches

Deterrence measure(s): Bird spikes must be attached to all horizontal surfaces that are accessible to nesting birds

Below Lower Deck Structural Members

The structural members below the lower deck of the 504-ft and 288-ft spans of the SFOBB Original East Span include a network of stringers, transverse beams, lower diagonal, eye bars, and lower chords. Between Pier E4 and Pier E9 there are five 504-ft bridge sections. Between Pier E9 and Pier E23 there are fourteen 288-ft sections (Figure 2.9).

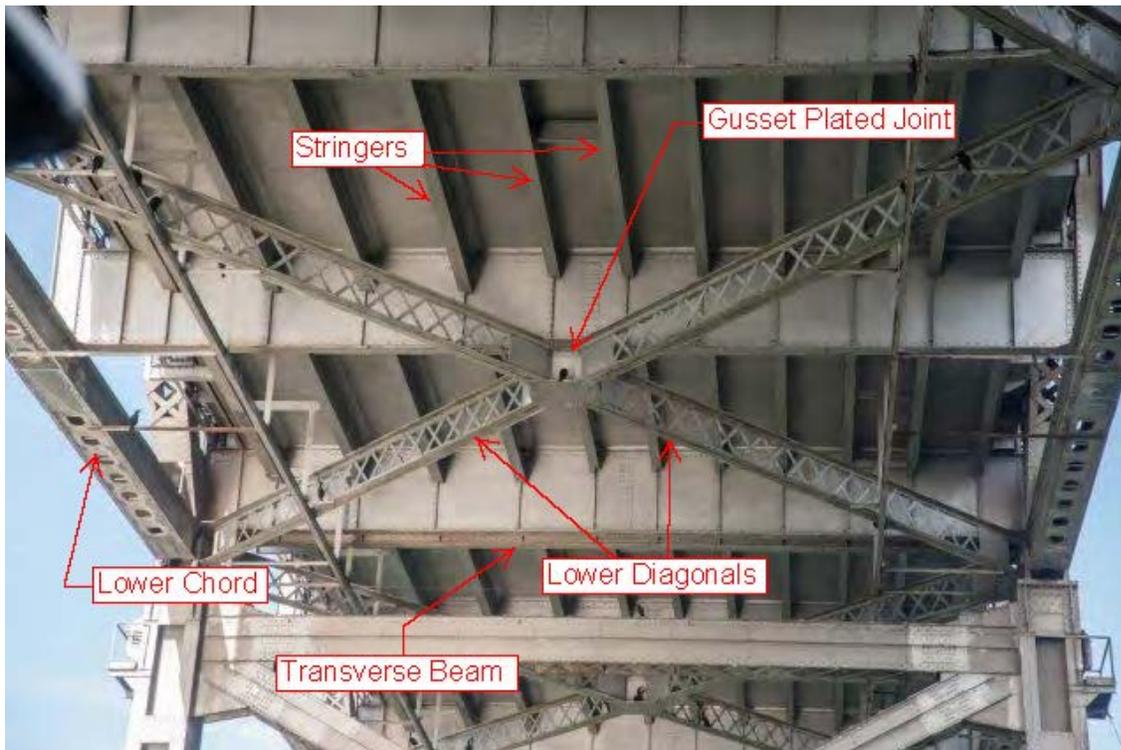


Figure 2.9 288-ft span, lower members

The joints among transverse beams and lower diagonals provide the most extensive nesting bird habitat on the bridge as well as the least accessible areas for deterrence measure installation. The transverse beams of both sections are composed of solid web I-beams with narrow ledges that are not suitable for nesting. The lower diagonals are laterally mounted, lattice web I-beams wide enough to provide suitable nesting habitat both along the top lengths and lower ledge surfaces of each member.

Historic nesting activity has left guano built up along the bottom superstructure members including the transverse beams, lower diagonals, and at joints connecting members.

A double-crested cormorant colony is located primarily within the lower members of the bridge, therefore nesting bird deterrence measures for the bottom of the bridge will require complete exclusion. Use of a suspended scaffolding system netted at all open ends and scaffolding deck openings will provide bird exclusion from these areas. If a scaffolding system fails to provide exclusion, wrap all diagonals with netting, clean and spike all flat surfaces at joints and install bird-wire system on top surfaces of all lateral members that are accessible to birds. The suspended scaffolding system will also provide nesting bird monitoring and deterrence monitoring access to the below-deck structural members.

Transverse Beams (Floor Beams)

Location: 504 and 288-ft spans; Large I-beams beneath road deck stringers mounted perpendicular to roadway

Description: Steel plated beams (Figure 2.9)

Nesting habitat: No significant nesting habitat, except at joints with lower diagonals

Deterrence measure(s): Block access to underside of bridge with a suspended scaffolding system enclosed with netting, or equivalent deterrence measures

Lower Diagonals

Location: 504-ft spans: integrated within level of below lower deck transverse beams; 288-ft spans: beneath below lower deck transverse beams

Description: Steel I-beams with lattice web mounted below the lower deck laterally and diagonal to roadway (Figure 2.9)

Nesting habitat: Tops of members, lower ledges and within lattice; these members present the largest area of historic nesting by the double-crested cormorant colony

Deterrence measure(s): Block access to underside of bridge with a suspended scaffolding system and netting, except at working ends for immediate removal. Any spans with the bridge bottom exposed, wrap horizontal members individually with netting. Install bird spikes on tops of wrapped members, fill member joints with bird spikes, or block with welded wire hardware cloth

Joints/Gusseted plates

Location: 504-ft and 288-ft spans; connection points among lateral and/or vertical members

Description: Steel plates connecting bridge members and associated areas (Figure 2.9)

Nesting habitat: Horizontal surfaces with a length and width of three inches or more

Deterrence measure(s): Block access to underside of bridge with a suspended scaffolding system and netting. In areas not excluded by the suspended scaffolding system install spikes within lateral surfaces of all plated member joints as directed by the Contract plan sheets for bird deterrents

Eye-bars

Location: Installed on the north and south facing sides of the 504ft spans; level with the diagonal bracing. Eye-bars are installed parallel to each other on the outer sides of the 504ft spans

Description: Heat-treated carbon steel eye-bars in varying configurations of four at the outer ends of 504-ft spans and six at mid-plate sections of the 504-ft spans

Nesting habitat: Eye-bars in groups of six spaced less than 5 inches apart from each other present potential nesting surfaces (Figure 2.10)

Deterrence measure(s): Install a suspended scaffolding system below the lower deck. Such a system shall extend beyond the north and south side of the bridge. The side-space between the suspended scaffolding system platform and the bridge shall be sealed with netting to exclude birds from nesting areas. Securely attach netting to the side of the lower deck. Seal all openings between the suspended scaffolding system and the lower deck with netting



Figure 2.10 Double-crested cormorant nest on eye-bars

Lower Chords

Location: North and south sides of the 288-ft spans

Description: Four-sided members constructed of steel plates and lattice, running parallel with the roadway and level with the lower diagonals (Figure 2.9)

Nesting habitat: Horizontal steel plates wider and longer than three inches at ends of lower chords provide suitable habitat. Lower chord lattice areas do not provide suitable nesting habitat

Deterrence measure(s): Install a suspended scaffolding system below the lower deck. Such a system shall extend beyond the north and south side of the bridge. The side-space between the suspended scaffolding system platform and the bridge shall be sealed with netting to exclude birds from nesting areas. Securely attach netting to the side of the lower deck. Seal all openings between the suspended scaffolding system and the lower deck with netting

Upper Superstructure

For this technical report, the upper superstructure refers to the bridge members extending above the bottom lateral structures, including the lower deck, the upper deck, and upper laterals (Figure 2.11, Appendix B). Most locations in these structures will be highly accessible during the dismantling process. Based on this accessibility as well as low incidence of historical nesting locations in upper superstructure locations, deterrence measure requirements for these areas emphasize daily monitoring, hazing, nest-start removal, supplemental deterrents and installation of deterrents as shown in Contract plans.



Figure 2.11 Typical superstructure for 504-ft span

Lower Deck

Location: 504-ft and 288-ft spans; lower roadway and associated bridge members

Description: Stringers, road surface, shoulder walkways, railings and truss members

Nesting habitat: Horizontal surfaces greater than 3 inches by 3 inches provide potential nesting area. Probability of nesting in these locations is low, as this area will be at the center of an active construction zone

Deterrence measure(s): Implement daily monitoring, hazing, nest-start removal, and installation of supplemental deterrents

Upper Deck

Location: 504/288 spans; above lower deck

Description: Floor beams, crossbeams, stringers, road surface, shoulder walkways, railings

Nesting habitat: Horizontal surfaces greater than 3 inches by 3 inches

Horizontal surfaces greater than 3in by 3in provide potential nesting area. Probability of nesting in these locations is low, as this area will be at the center of an active construction zone

Deterrence measure(s): The upper deck road surface, walkways and railings may be removed early in the dismantling Contract, thereby eliminating most of the upper deck nesting surfaces. If they are not removed prior to the onset of the bird nesting season, proceed with installation of deterrence measures as shown in plan sheets. Probability of nesting in this area is low. In areas where potential nest sites remain, implement daily monitoring, hazing, nest-start removal, and installation of supplemental deterrents

Upper Laterals

Location: 504-ft spans; steel superstructure surrounding upper deck

Description: Steel truss members, beams and connecting joints

Nesting habitat: Horizontal surfaces greater than 3 inches by 3 inches provide potential nesting area. Areas include, but not limited to, horizontal surfaces in joints, recesses within hollow members, and along the tops of truss members

Deterrence measure(s): Install bird spikes in joint locations shown on bird deterrent plan sheets. Cover access holes to members with suitable recesses. Access holes to recesses may be covered by wrapping the entire member with netting secured by clamp or equivalent means. Implement daily monitoring, hazing, nest-start removal, and installation of supplemental exclusions

Existing Access Platforms

Within the attached support tower legs and parts of the superstructure there are a total of 78 existing maintenance platforms on both the north and south side of the bridge. These existing maintenance platforms are associated with electrical boxes, access ladders, or other structures on the bridge requiring regular access (Figure 2.12, 2.13). Platforms occur at general locations shown in Appendix C.

Location: North and south side of the superstructure; tower legs.

Description: Horizontal platforms, with approximately 4-foot railing.

Nesting habitat: Platform surface

Deterrence measure(s): Platforms that are not critical in accessing other parts of the bridge structure should be removed prior to the nesting season. If removal of platforms prior to the bird nesting season is not feasible, platforms must be made inaccessible to birds by installing bird spikes, slope paneling, or netting. On remaining access platforms, during the nesting season, implement daily monitoring, hazing, nest-start removal, and installation of supplemental deterrents.

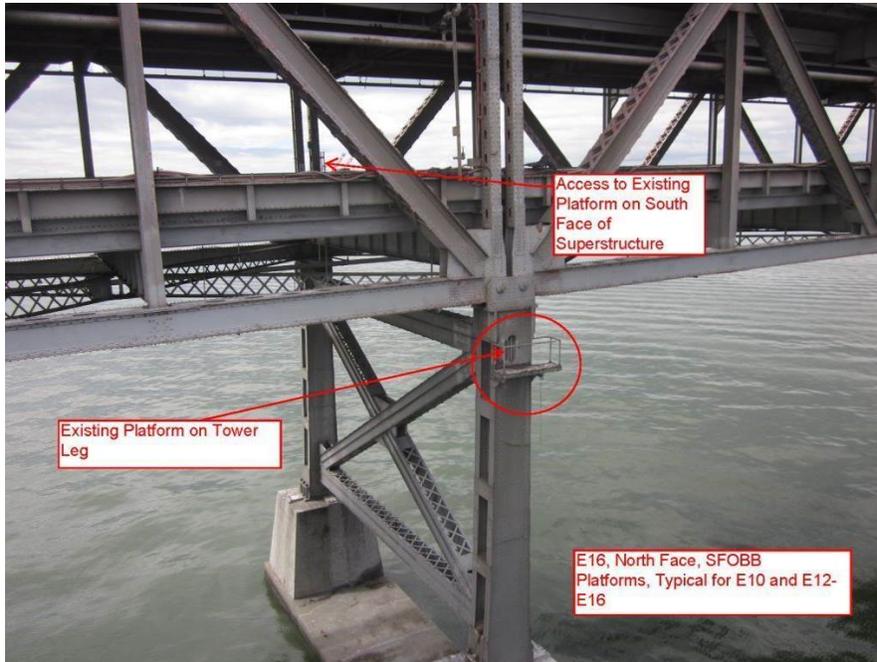


Figure 2.12 Pier E16 existing access platforms on tower leg



Figure 2.13 Pier E22 existing access platforms typical on 288-ft spans

Concrete Oakland Shore Structure

Additional SFOBB Original East Span land-based foundations occur east of Pier E22, on which the Oakland Touchdown (OTD) is built. Within this structure are multiple protected overhangs located on several concrete bents (Pier E23, Bents E24-E28). Protected overhangs provide nesting habitat for some bird species (Figure 2.14). Deterrence measures are given below.

Protected Overhangs

Location: Pier E23, Bents E24-E28 (OTD)

Description: Concrete foundations and road structure

Nesting habitat: Junction of vertical and horizontal surfaces, which create protected overhangs

Deterrence measure(s): During the nesting season, implement daily monitoring, hazing, nest-start removal, and installation of supplemental deterrents.



Figure 2.14 Black phoebe nest on OTD concrete bent

Temporary Supports

Temporary support structures may be required during the dismantling of the 504/288 spans. These temporary supports will be built and maintained by the contractor. It is the contractor's responsibility to demonstrate that temporary supports within the Project are in compliance with all environmental and safety laws and Project permits. Any nesting habitat created by temporary supports will be the responsibility of the contractor. Deterrence measure implementation and maintenance will also be the responsibility of the contractor, and must be in accordance with the Department's 2014 Bird Management Plan (2014 BMP) and reflected in the contractor biologists' Bird Protection Plan and Bird Deterrence Plan. All deterrence measures for temporary supports shall comply with all environmental laws and Permits Licenses Agreements and Certifications (PLACs) issued to the SFOBB Project. The Department will not be responsible for work stoppage as a result of failed deterrence measures on temporary supports.

CHAPTER 3 – BIRD MANAGEMENT

Bird management within the SFOBB Project area will rely on two phases of management. Phase 1 management focuses on activities during the non-nesting season (September 1 through January 31). This includes performing construction activities during the non-nesting season to avoid nesting birds and proactive prevention of nesting birds for the next nesting season, through the removal of nesting habitat and installation of deterrence measures. By preventing birds from nesting within the SFOBB Project area, the Department and contractor will avoid, and minimize, impacts to nesting birds. Bird-associated delays to the construction progress within the SFOBB Project area will be minimized as well. Phase 2 management will take place during the nesting season (February 1-August 31). Phase 2 strategies include ongoing monitoring of nesting bird activity, removal of nest starts before eggs may be laid, installation of supplemental deterrence measures, hazing, implementation of buffers around occupied nests, and -in specific cases to be determined by the 504/288 Contract RE and Department biologist(s) occupied nest removal.

3.1 Phase 1: Non-Nesting Season (September 1-January 31)

Seasonal Avoidance

Active demolition may be performed outside of the nesting season without the constraints of nesting bird deterrence measures. Impacts to nesting birds may be avoided by maximizing scheduled construction activities during the non-nesting season. Note: some birds may establish a nest during the non-nesting season (September 1-January 31). Occupied bird nests occurring during the non-nesting season are protected under the MBTA and CFGC. The contractor is responsible for protecting nesting birds within the 504/288 Project area, regardless of the season.

Historic Nest Removal

Many bird species re-use or build on top of old nests remaining from the previous years. Removal of unoccupied old nests from within the SFOBB Project area may act as a deterrence measure to nesting birds. Nests will be physically removed by hand or with small handheld tools. All nests will need to be placed in containment. Nesting material is not permitted to fall into the bay. Access must be provided to nest removal personnel. California Occupational Safety and Health Administration approved respirators and other applicable personal protective equipment must be worn by the nest removal personnel.

Deterrence Measures

The following section presents the deterrence measures to be installed on the SFOBB Original East Span. These deterrence measures include bird spikes, bird-slope panels, netting, bird-wire, welded hardware cloth and suspended scaffolding system. The areas of application for deterrence measures correspond with, but are not limited to, the structural member groups presented above and the engineering plans in Appendix I (Appendix I).

The majority of deterrence measure installation is to be performed during the non-nesting season. Prior to installation of deterrence measures directly onto bridge members, those members must be cleaned. As with removal of historic nesting materials, guano and other materials cleaned from members is not permitted to fall into the bay. The contractor is responsible for removal and containment of waste materials from the construction site. If water is used in the cleaning of members, the contractor is responsible for containment and removal of effluent and debris resulting from this process. Any discharge of water into the Bay must be done in accordance with and permitted by the Regional Water Quality Control Board (RWQCB). The contractor is responsible for seeking approval before pursuing use of any device or methods that will discharge water into the Bay.

The contractor is responsible for all deterrence measure installation, maintenance, replacement, as well as access to nesting sites, staging and scheduling requirements. Project areas scheduled for removal during a nesting season must have a minimum of 1,560ft of contiguous suspended scaffolding system and all other deterrence measures installed prior to the start of upcoming nesting seasons. For example, if the contractor plans to remove trusses between February 1 and August 31, deterrence measures must be implemented along at minimum 1,560ft of expected removal work area, and must be applied to the entire scheduled work area that is to be active during the upcoming nesting season by January 31. Deterrence measures that do not disturb active nest sites may be implemented after January 31. The contractor is responsible for any delays to construction caused by the occurrence of nesting birds or failures of bird deterrence measures. The contractor is responsible for providing the Department schedule information prior to construction activities in a timely manner to ensure accurate planning of bird deterrence implementation. The contractor is responsible for maintaining a work schedule appropriate to bird nesting season limitations and informing the Department in a timely manner of changes to the work schedule. The contractor will provide the Department with plan sheets clearly showing specific locations and types of deterrence measures to be installed, as well as photos documenting bird deterrence measures.

3.2 Phase 2: Nesting Season (February 1-August 31)

Nest-Start Removal

Nest start removal can be an effective measure to deter nesting. Occupied nests are nests that contain birds or eggs and are protected by the MBTA. Removal of occupied nests by the contractor is not permitted.

Birds may initiate nesting at any time during the nesting season. Nest-building may take between one day and several weeks to complete. During this period, nest removal is an effective nesting deterrent. Nest starts without contents must be removed as soon as they are discovered, throughout the nesting season. A nest becomes occupied the moment an egg is laid in it. A nest remains occupied until the young have fledged. The contractor, monitored by a Department biologist, may remove unoccupied nests and nest starts. As with Phase 1 nest removal, no

nesting materials must be allowed to enter the San Francisco Bay. The contractor is responsible for disposal of removed nesting materials. Once a nest start is removed, the contractor must install supplementary deterrence measures (described below) to prevent further nesting in that location.

Paint Ball Gun and Water Cannon (for nest-start removal only)

In calm conditions high-pressure water hoses may be able to remove nest starts at heights up to 30 meters (100 feet). Windy conditions may greatly reduce this range. Paint ball guns would be effective for use when a nest start is encountered that is difficult to remove using other means. Paint balls used for nest removal must be filled with bio-degradable oils or equivalent. If water or paint balls are used to remove nest starts, the contractor is responsible for containment and removal of effluent and debris resulting from this process. Use of either of these methods must be in used in accordance with all PLACs including those issued by the RWQCB. The contractor is responsible for acquiring approval from the Department and all applicable agencies for the use of any means or methods that create discharge into the Bay before they are implemented.

Supplemental Exclusionary Deterrence Measures

Additional nesting habitat may be discovered throughout the nesting season. The contractor is responsible for identifying suitable habitat and implementing bird nesting deterrence measures as needed.

Hazing

During daily monitoring, the contractor may use hazing as a deterrence measure. Hazing covers all activities designed to flush birds from Project areas. For the purposes of this Project, hazing will be limited to flushing birds from areas by means of approaching, waving, calling, shouting, and the use of laser pointers directed exclusively at the bird's feet. Under no circumstances shall the contractor attempt to attack, throw objects at, shoot, or otherwise attempt to cause physical harm to any bird(s) they are hazing. If any individual bird is physically harmed, or displays behavioral harm during hazing, the Department must be notified of the incident immediately and an incident report must be submitted by a contractor supplied biologist.

Buffers (for occupied nests)

An initial no-work buffer must be established around any newly discovered occupied nest to avoid impacts to that nest. Upon discovery of an occupied nest, the contractor will immediately establish a no-work buffer around the nest with an initial radius of 76 meters (250 feet) for raptors (including peregrine falcon) and 15 meters (50 feet) for non-raptors. After establishing the initial no-work buffer, the Department's biologists and contractor's biologists will monitor the nest-site. The Department, in consultation with USFWS, CDFW (for peregrine falcons only), and the contractor will make a determination to maintain, decrease, enlarge, or remove the buffer. Buffer size will be dependent on the species, nest location, and type of construction activities. All no-work buffers will be determined on a case-by-case basis.

Occupied Nest Removal

The Department and Agencies recognize that in spite of all efforts, some birds may succeed in establishing a nest within the Project area. In certain circumstances if an active nest is established, the CDFW and USFWS may allow removal of an individual nest and its contents. In 2013, the USFWS issued the Department Special Purpose-Miscellaneous permit (permit no. MB22730B-0) authorizing specific Department biologists to remove active nests on a case-by-case basis. If the presence of an occupied nest occurs within the Project critical path, and is determined to either delay construction, or if the outcome of that nest is doomed by construction activities, the Department biologist may remove the nest contents (i.e., eggs and/or nestlings), and transfer them to an approved wildlife care facility, where the young birds would be raised for future release. Due to the lack of wildlife rehabilitation centers capable of hatching songbird eggs and successfully raising hatchlings for release, limited quantities of songbird nests containing eggs may be destroyed by the Department biologist.

Under the Special Purpose-Miscellaneous Permit, occupied nest removal shall only be employed after all deterrence, protection and management measures have been exhausted and the occupied nest is under imminent threat. Removal of nest contents will be addressed on a case-by-case basis and in certain circumstances will require close communication with agencies. Removal of nest contents is the sole responsibility of the Department and is to be carried out by Department biologists exclusively. contractor supplied biologists are not authorized, under any circumstance, to handle active-nest contents.

CHAPTER 4 - CONTRACTOR DETERRENCE PLAN

A final Bird Deterrence Plan (BDP) written by the contractor's approved biologist(s) shall be submitted by the contractor 60 days before the initiation of construction activities on the original east span of the SFOBB and must be approved by the Department 15 days prior to the initiation of installation of deterrence measures. The BDP must include detailed accounts of the means, methods, locations, maintenance, expected results and access to all bird deterrents employed by the contractor. The BDP must also include a schedule clearly displaying all expected construction activities, bird deterrent installations, seasonal nesting times of nesting bird species expected in the Project area, as well as a schedule of monitoring and maintenance activities through the duration of the contract.

The BDP will demonstrate how the contractor intends to avoid and minimize impact on nesting birds during construction activities on the 504/288 spans using the following means and methods:

- Seasonal avoidance
- Deterrents
- Buffers (for occupied nests)
- Occupied Nest Removal

The contractor will be responsible for all strategies to minimize impacts to nesting birds.

4.1 Seasonal Avoidance

By restricting some construction activities to the non-nesting period between September 1 and January 31, the contractor can minimize the potential take of most nesting birds. Major installation of deterrents for areas to be experiencing final demolition activities in the following nesting period is expected to occur during the previous non-nesting period. The contractor shall develop their schedule and BDP in accordance with the nesting period.

4.2 Deterrents

Bird deterrents and exclusion devices to be used on the SFOBB Project include, but are not limited to:

- A Suspended Scaffolding System
 - Prior to the nesting season a suspended scaffolding system is to be installed below the lower deck of the original 504/288 spans scheduled for dismantling during the following nesting season, and shall be used as an exclusion device. This system must be netted at the sides and cover any openings to completely exclude nesting birds from their historical nesting areas. The contractor's BDP shall describe the system they choose to use and the netting strategies employed to ensure that it excludes birds from bottom bridge members
- Removal of Historic Nests

- All removal of historic nest material is to be monitored by a Department biologist in collaboration with the contractor supplied biologist to ensure that proper nest material disposal procedure is followed. The contractor's BDP is to offer explicit protocol for the handling and disposal of historic nest material during removal
- Exclusionary Deterrents
 - Bird Spikes: The contractor's BDP shall specify the dimensions and materials of their chosen bird spike deterrents. It shall also specify all locations that bird spike is to be used on the Project area
 - Netting: The contractor's BDP shall specify the material specifications for the netting they choose to use, and use their chosen netting material consistently. It shall also specify all locations that netting is to be used on the Project area. Damaged netting must be maintained and prevented from entering the Bay by the contractor.
 - Bird Slope Panels: The contractor's BDP shall specify the material specifications for the bird slope panels they choose to use. It shall also specify all locations that bird slope panels are to be used on the Project area
 - Bird Wire System: The contractor's BDP shall specify the material specifications for the bird wire system they choose to use. It shall also specify all locations where a bird wire system is to be used on the Project area
 - Welded Hardware Cloth: The contractor's BDP shall specify the material specifications for the welded hardware cloth they choose to use. It shall also specify all locations where welded hardware cloth is to be used in the Project area
 - One Way Flaps: The contractor's BDP shall specify the material specifications for one way flaps they choose to use. It shall also specify all locations where one way flaps are to be used on the Project area.
- Nest and nest start removal
 - Manual Removal: The contractor's BDP shall put forth protocol for nest start material removal that includes oversight by a contractor supplied biologist and proper handling of nest start material that is equivalent to historic nest material removal procedure
 - Water cannon and paint-ball gun (nest start only): Use of water cannon and paint ball guns for nest start removal must be approved by Department biologists and Project permitting Agencies. The contractor will be responsible for any discharge associated with the use of either device. The contractor's BDP shall put forth a containment plan for any potential discharge into the bay from the use of a water cannon or paint ball gun. It shall also illustrate all compliance measures required by the PLACs on the SFOBB Project for use of such devices
- Flushing Birds:
 - The contractor's BDP shall describe protocol to be used by individuals flushing birds from perches and potential nest areas. It shall describe a process where one disturbs an animal's sense of security to an extent that it moves on. Flushing by

individuals shall cause no physical harm to birds and shall be carried out without the use of any tools or devices that may cause harm. Flushing techniques are not to be used during the nesting season on nesting birds

4.3 Occupied Nest Removal

Status of USFWS Miscellaneous Take Permit:

- Under the authority of statute 16 USC 703-712, the SFOBB Project has been issued a miscellaneous take permit by the USFWS (permit no. MB22730B-0) allowing for the relocation of a limited number of active bird nests for specific bird species. This permit does not cover species that are fully protected under sections 3511, 4700, 5050 and 5515 of the CFGC. Fully protected species include, the California least tern, the California brown pelican and the American peregrine falcon. It does not allow for intentional take of any bird species protected by the MBTA, USFWS, or CDFW. The contractor's BDP shall illustrate a complete understanding of the miscellaneous permit, the species it covers, the amount of take permitted, the specifically named biologists allowed to use this permit and all other laws that protect bird species present, or expected, in the SFOBB Project area. It shall also show understanding that occupied nest removal is authorized only by a Department biologist with approval from the Department.

4.4 Buffers for Occupied Nests

The contractor's BDP shall display a complete understanding of buffers that are to be employed for nesting incidents in active construction zones. It shall also illustrate protocol for encounters with nesting birds that reflect those put forward in the Department's 2014 BMP.

4.5 Deterrent Location, Means, and Methods for Installation

The contractor's BDP shall also include the following information:

- Means and methods used to apply, install and secure each type of deterrent to bridge members
- Means, methods and containment plans for cleaning members in preparation of deterrence measure application
- Deterrent maintenance monitoring schedules
- Deterrent maintenance monitoring data sheets
- Proposal of means and methods to be used to safely access all Project areas during installation and maintenance of deterrents
- A schedule that includes staging, installation, removal and completion of bird deterrence measures used through the duration of the contract

CHAPTER 5 - DETERRENT MATERIALS SPECIFICATIONS

Throughout this Report specific bird deterrent devices have been prescribed. The following section outlines for each deterrent its name, materials, specifications, installation, application, and other requirements and gives at least two proprietary examples. For many of these deterrents there will be other product providers available than what is listed here and it is the contractor's responsibility to procure or manufacture deterrents that are equivalent to the examples given and meet minimum specifications shown for each.

5.1 Deterrent Materials

Bird Spikes

Material: Stainless steel wire spikes; polycarbonate or stainless steel base

Specifications: Spike Diameter = 0.04" to 0.055"(1.0mm-1.4mm)
Spike Length = 4"to 8"(10.16cm to 20.32cm)
Spike Number per cluster = 2 to 10
Cluster Width = 4" to 8.5"(10.16cm to 21.59cm)

Installation: Adhesive, bolt, or clamp

Application: Install bird spikes on any flat surface. Bird spike strips must be installed no more than two inches apart and at a density such that no flat surface greater than two inches is exposed. Bird spikes are appropriate for narrow ledges greater than 3-inches deep. Application areas include, but are not limited to historic or suitable nest locations on the tops of marine foundations, protected depressions at the base of support towers, horizontal ledges created by flanges, gusseted plates/joints, and protected alcoves

Other requirements: Adhesives cannot be used to attach bird spikes on guano-encrusted surfaces. Guano-encrusted surfaces must be cleaned prior to attachment of bird spikes when using adhesive. The contractor is responsible for removal of waste materials from the construction site. If water is used in the cleaning of members, the contractor is responsible for maintaining compliance and approval with all Project PLACs and permitting agencies before any discharge. The contractor is responsible for containment and removal of all effluent and debris resulting from leaning operations

Examples:

Brand	spike_material	spike_length	cluster_width	spike_diameter	spikes_per_cluster	Installation
Spec requirements	stainless steel	4-8"	4-8.5"	~0.04" 0.055"(1.0mm-1.4mm)	2 to 10	Clamp-On, or adhesive
bird-b-gone mega spike	stainless steel/polycarbonate base	7"	5"			3 glue, screw, tie-down (clamp?)
bird-b-gone girder bird spikes	stainless steel/polycarbonate base		3"; 5"; or 8"			clamp
Nixalite premium model-S	stainless steel/stainless steel base	4"	4"	1mm (0.041")	10	Clamp, glue, screw
Bird-X Extra Tall Spikes	stainless steel/polycarbonate base	5.75"	8.5"		5	
Bird X regular	stainless steel/polycarbonate base	4.3125"	4.5"		5	glue, screw, tie-down (clamp?)
Bird X Extra Wide	stainless steel/polycarbonate base	4.3125"	7.5"		5	glue, screw, tie-down (clamp?)
Bird Barrier 5 in. wide	stainless steel/polycarbonate base	?	5"		3	screw or glue
Bird barrier extra wide	stainless steel/polycarbonate base	?	8"		5	screw or glue

Vendors:

Bird-B-Gone

(800) 392-6915

<http://www.birdbgone.com>

Nixalite of America Inc.

PO Box 727

East Moline, IL

(888) 624-1189

<http://www.nixalite.com/>

Bird-X

300 N Oakley Blvd.

Chicago, IL 60612

Phone: 800.662.5021

<http://www.bird-x.com>

Bird Barrier

20925 Chico Street, Carson, CA

(800) 503-5444

<http://www.birdbarrier.com>

Slope Panels:

Material: Metal, wood, polycarbonate

Specifications: Depth = 6” (15.24cm)
Height = 6” (15.24cm)
Width/Length (typically produced in 4’ (1.22m) lengths)
Horizontal landing surface at 45⁰ angles

Installation: Typically glued, bolted, or clamped. Slope panels may be purchased or fabricated on site

Application: Surfaces with 90⁰ angle. May be constructed along tops of beams to create a non-horizontal surface. Slope panels are appropriate for protected corner areas or exposed horizontal surfaces. Application areas include, but are not limited to historic or suitable nest locations on marine-foundations, horizontal ledges created by flanges, gusseted plates/joints, maintenance platforms and protected alcoves

Other requirements: Ends must be capped to prevent creation of protected alcove under slope panel

Examples:

brand	width	height	length	material	installation
Spec Requirements	6"	6"	any	metal, wood, polycarbonat or any combination of	Any
Bird-b-gone bird slope	6"	6"	4'	UV protected PVC	adhesive, screw, clips
Bird barrier bird slide	6"	6"	4'	UV stabilized polycarbonate	adhesive, screw, clips

*Extenders are available for wider ledges.

Vendors:

Bird-B-Gone
(800) 392-6915
<http://www.birdbgone.com>

Bird Barrier
20925 Chico Street
Carson, CA 90746
800-503-5444
<http://www.birdbarrier.com>

Netting:

Material: High density knitted polyethylene mesh

Specifications: Density = 50-70% netting
Flame retardant and UV treated

Installation: Tied, bolted, or clamped. Netting may be wrapped around members with ends attached by cable ties, bungee ties, or tie wire. Ends may also be stretched across openings and clamped to bridge members with boards, bars, or equivalent materials

Application: To exclude large birds (i.e., gulls, cormorants, and peregrine falcons) from historic or suitable nesting areas

Other requirements: Must be monitored and maintained to prevent occurrence of tears or other openings that may provide access to nesting birds

Examples:

Brand	Width	Length	Weave (% Light block)	Material	Installation
Spec Requirements	Variable	Variable	70%	High density polyethylene mesh, flame retardant and UV treated	Any
Eagle Enclosures	8'	150'	70%	Knitted polyethylene mesh	Any
Debris Netting Inc.	2m-10m	50m-100m	50%, 70%, 90%	Knitted, knotless virgin HDPE	Any
InCord	Variable	Variable	70%	Knitted polyethylene mesh	Any

Vendors:

Eagle Enclosures

Western Sales: Rodney Normand
Office: (888) 692-2490
Cell: (504) 982-7553
email: Rnormand@eagleencl.com
<http://eagleenclosures.com>

InCord

226 Upton Rd.
Colchester, CT 06415
(800) 596-1066
Email: netting@incord.com
http://www.incord.com/netting_hardware/index.htm

Kenjoy Debris Netting Inc.
Industrial Development Zone
Anping County, Hebei Province, China.
Tel: +86 318 5821607
Fax: +86 318 5821607
e-mail: sales@debris-netting.com
<http://www.debris-netting.com>

Suspended Scaffolding System:

Material: Horizontal scaffolding platform of plywood and/or steel. Components include: joists, nodes, connecting pins, deck supports, beam clamps, chain or cable, plywood decking, guardrails, toe boards

Specifications: Platform = 4' X 8' plywood or steel sheets connected by steel joint sections. Size may be modified to fit purpose

Installation: Clamp or bolt to bridge members

Application: To exclude large birds (i.e., gulls, cormorants, and peregrine falcons) from historic or suitable nesting areas. Also gives access to difficult-to-reach areas on the underside of the bridge for deterrence measure monitoring

Other requirements: Openings between hanging scaffolding and bridge members must be covered with netting

Examples:

Brand	Specification	Material	Installation	Strength
QuikDeck	4'X8' sections	Steel and wood	Clamp, chain, cable	25-75 psf
Safspan	variable	steel	Clamp or bolt, Cable	25-50 psf

Vendors:

QuikDeck
Safway Services, LLC
Corporate Headquarters
N19 W24200 Riverwood Drive
Waukesha, WI 53188
Toll free: (800) 558-4772
Telephone: (262) 523-6500
<https://www.safway.com>

SafeSpan
252 Fillmore Avenue
Tonawanda, NY 14150
phone: 877-997-SPAN
fax: 716-694-1188
<http://www.safespan.com>

Welded Hardware Cloth:

Material: Galvanized Steel

Specifications: Maximum 0.25" (6.35mm) mesh and minimum 19 gauge wire

Installation: Adhesive, clamp, or screw

Application: To exclude birds from suitable nesting areas in open recesses or alcoves

Other Requirements: None

Examples:

Brand	Material	Mesh	Wire Gauge	Installation
Spec Requirement	Galvanized Steel	0.5" (6.35 mm)	19	Adhesive, clamp, screw
Wireclothman	Galvanized Steel	0.5" (6.35 mm)	19	Adhesive, clamp, screw
Home Depot	Galvanized Steel	0.5" (6.35 mm)	19	Adhesive, clamp, screw

Vendors:

Wire Cloth Manufacturers Inc.
110 Iron Mountain Rd.
Mine Hill, NJ 07803
Tel: (973) 328-1000 • 1-800-WIRE
MAN (947-3626)
Fax: (973) 328-0919
<http://www.wireclothman.com>

Home Depot
1-800-430-3376
<http://www.homedepot.com>

Bird-Wire System:

Material: Monofilament or stainless steel wire

Specifications: Wire = 0.55 mm to 0.75mm stainless steel wire cable coated with nylon, or manufactured from non-corrosive metal cable or equivalent

Installation: Clamp, Bolt

Application: To exclude birds from suitable nesting and perching areas along the tops of beams and railings. Wire may be installed in a parallel, grid, or spoke configuration to deter birds from nesting, roosting, or loafing in a treated area

Other Requirements: None

Examples:

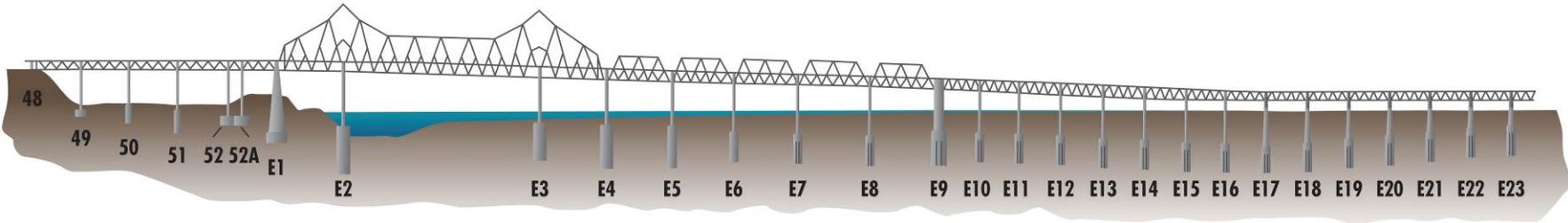
Brand	Material	Thickness	Break-Strength	Installation
Spec Requirement	Stainless steel wire coated with nylon, or other non-corrosive metal cable	0.5mm-0.75mm	> or = 100 lbs	Crimped and connected to spring
bird-b-gone Bird Wire	Stainless steel wire coated with UV stabilized nylon	0.55mm	110 lbs	Crimped and connected to spring
Bird barrier: birdwire stainless	Stainless steel wire coated with UV stabilized nylon	0.7mm	100 lbs	Crimped and connected to spring

Vendors:

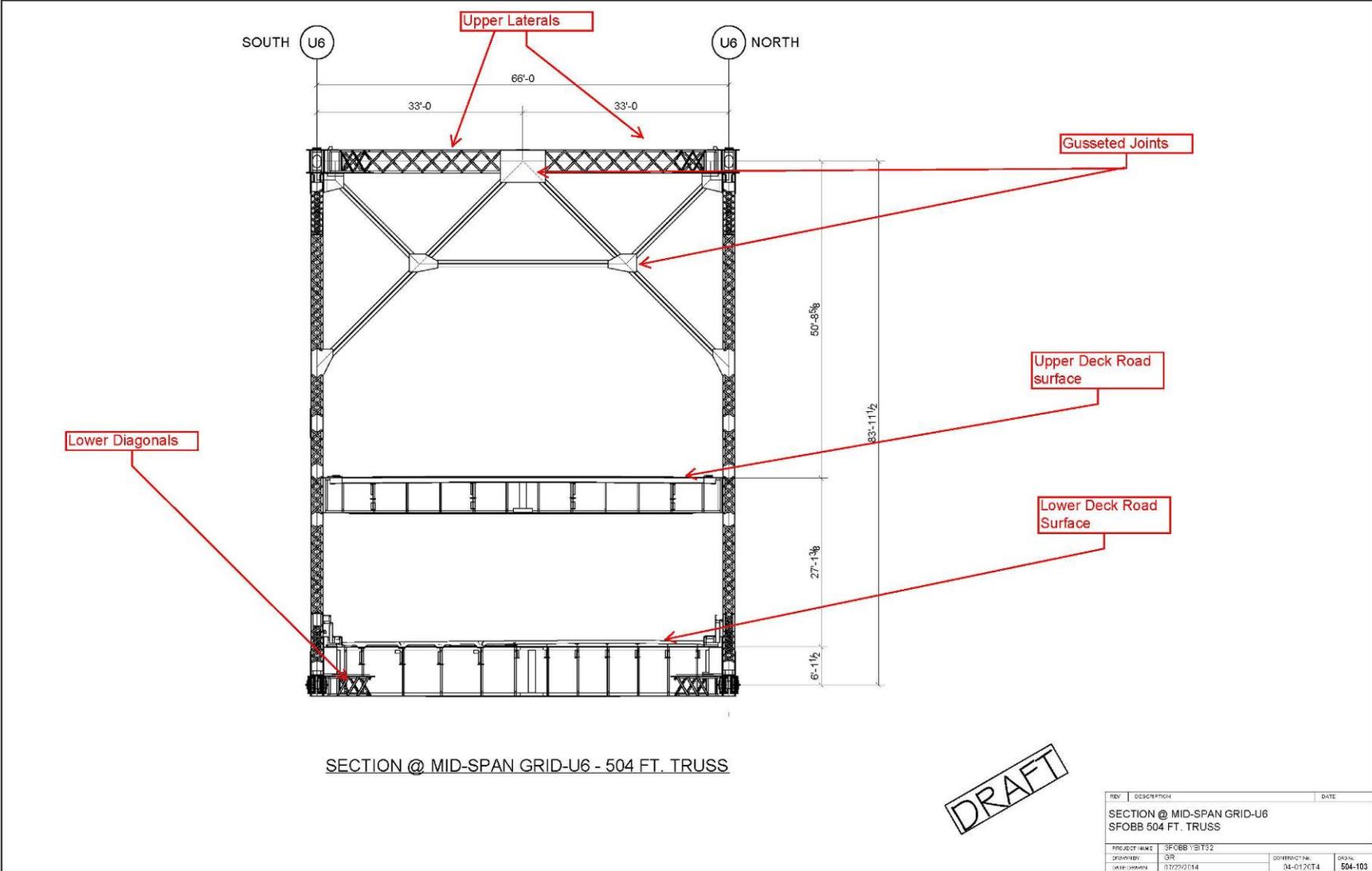
Bird-B-Gone
(800) 392-6915
<http://www.birdbgone.com>

Bird Barrier
20925 Chico Street
Carson, CA 90746
800-503-5444
<http://www.birdbarrier.com>

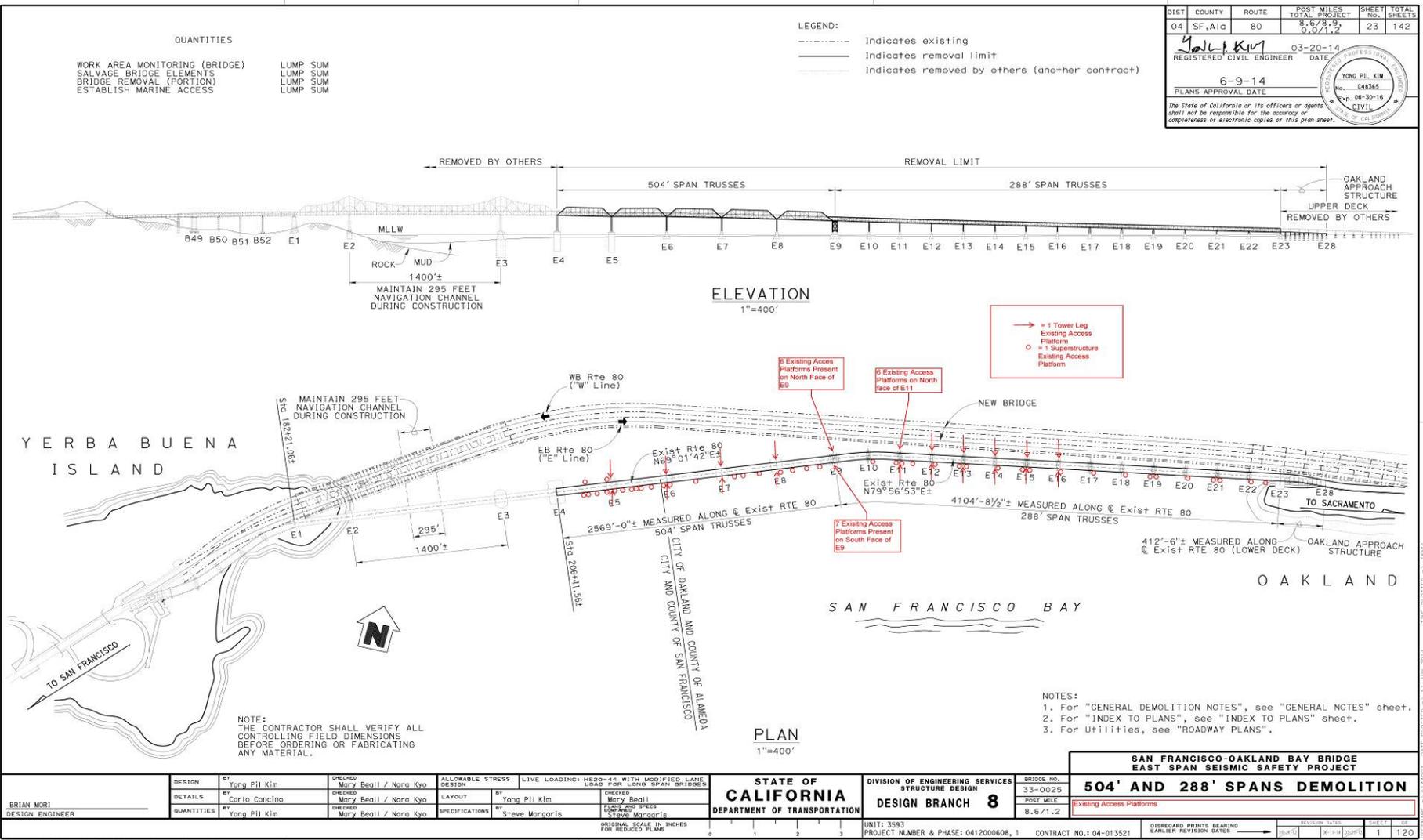
Appendix A - SFOBB Original East Span Piers



Appendix B – 504-ft Span Superstructure Cross Section



Appendix C – Existing Access Platforms, General Locations



QUANTITIES

WORK AREA MONITORING (BRIDGE)	LUMP SUM
SALVAGE BRIDGE ELEMENTS	LUMP SUM
BRIDGE REMOVAL (PORTION)	LUMP SUM
ESTABLISH MARINE ACCESS	LUMP SUM

LEGEND:

- Indicates existing
- - - - - Indicates removal limit
- Indicates removed by others (another contract)

DIST	COUNTY	ROUTE	POST MILES TO TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SF, Alq	80	8.6/8.9, 9.0/1.2	23	142
Yung Pil Kim			03-20-14		
REGISTERED CIVIL ENGINEER			DATE		
6-9-14					
PLANS APPROVAL DATE					
YOUNG PIL KIM					
No. C48345					
Exp. 08-30-16					
CIVIL					

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NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

- NOTES:**
1. For "GENERAL DEMOLITION NOTES", see "GENERAL NOTES" sheet.
 2. For "INDEX TO PLANS", see "INDEX TO PLANS" sheet.
 3. For Utilities, see "ROADWAY PLANS".

BRIAN MORI DESIGN ENGINEER		DESIGN BY: Yung Pil Kim DETAILS BY: Carlo Cancino QUANTITIES BY: Yung Pil Kim		CHECKED BY: Mary Beall / Nora Kyo CHECKED BY: Mary Beall / Nora Kyo CHECKED BY: Mary Beall / Nora Kyo		ALLOWABLE STRESS DESIGN BY: Yung Pil Kim LAYOUT BY: Yung Pil Kim SPECIFICATIONS BY: Steve Margaritis		LIVE LOADING: HS20-44 WITH MODIFIED LANE LOAD FOR LONG SPAN BRIDGES CHECKED BY: Mary Beall DESIGNED BY: STEVE MARGARITIS		STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 8		BRIDGE NO. 33-0025 POST MILE 8.6/1.2		PROJECT NUMBER & PHASE: 041200608, 1 CONTRACT NO.: 04-013521		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES SHEET 1 OF 120	
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STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REV.09-01-10)

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San Francisco – Oakland Bay Bridge

East Span Seismic Safety Project



**BIRD MANAGEMENT PLAN FOR BRIDGE DISMANTLING -
504/288 CONTRACT**

**Supplement to the 2003 Final (Revised) Bird Monitoring and
Management Plan**



September 2014

EA 04-013521

04-SF-80 KP 12.2/KP 14.3

04-ALA-80 KP 0.0/KP 2.1

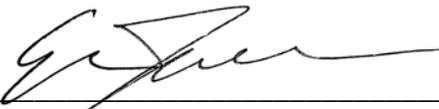
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San Francisco-Oakland Bay Bridge East Span Seismic Safety Project
Bird Management Plan for Bridge Dismantling- 504/288 Contract
Supplement to the 2003 Final (Revised) Bird Monitoring and Management Plan

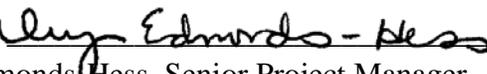
EA 04-013521

September 2014

STATE OF CALIFORNIA
Department of Transportation

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TABLE OF CONTENTS

CHAPTER 1 – INTRODUCTION..... 1

1.1 Project Description.....1

1.2 Implementation of the 2003 Final (Revised) Bird Monitoring and Management Plan2

1.3 Purpose of the 2014 Bird Management Plan for Bridge Dismantling – 504/288 Contract4

CHAPTER 2 – AGENCY APPROVALS, APPLICABLE REGULATIONS, AND ENVIRONMENTAL DOCUMENTATION 5

2.1 Overview5

2.2 SFOBB Project Final Environmental Impact Statement/Statutory Exemption and Final Section 4(f) Evaluation6

2.3 California Department of Fish and Wildlife Incidental Take Permit.....6

2.4 United States Fish and Wildlife Service Biological Opinion.....7

2.5 San Francisco Bay Conservation and Development Commission Permit7

2.6 The Migratory Bird Treaty Act7

2.7 California State Fish and Game Code8

2.8 California Endangered Species Act.....8

2.9 Federal Endangered Species Act.....8

CHAPTER 3 – BIRD SPECIES OF THE 504/288 CONTRACT AREA 9

3.1 American Peregrine Falcon.....11

3.2 California Brown Pelican16

3.3 California Least Tern17

3.4 Double-crested Cormorant18

3.5 Western Gull21

3.6 Other Protected Nesting Birds.....22

CHAPTER 4 – SUBMITTALS, SURVEYS, MONITORING, AND REPORTING 28

4.1 Contractor-supplied Biologist Qualifications.....28

4.2	Submittals.....	28
4.3	Bird Protection Plan	28
4.4	Bird Deterrence Plan	29
4.5	Contractor Monitoring Duties	30
4.6	Contractor Pre-construction Survey Report	31
4.7	Contractor Reporting.....	31
4.8	Incident Reports	33
4.9	Contractor Monitoring and Reporting Schedule	33
CHAPTER 5 – IMPACT AVOIDANCE MANAGEMENT TECHNIQUES.....		35
5.1	Seasonal Avoidance	35
5.2	Buffers	36
5.3	Deterrence Measures	36
5.4	Nest Removal and Nest-start Removal	37
5.4.1	High-pressure Water Hose	37
5.4.2	Paint Ball Gun	38
5.5	Exclusionary Deterrents	39
5.5.1	Filling/Blocking Potential Nest Sites	39
5.5.2	Suspended Scaffolding System	40
5.5.3	Netting.....	40
5.5.4	Slope Panels	40
5.5.5	Bird Spikes	41
5.5.6	Bird Wire and Overhead Wire Systems	42
5.6	Hazing	43
5.7	Access for Deterrence Measure Installation.....	43
5.8	Monitoring.....	44

CHAPTER 6 – BRIDGE DISMANTLING AND NESTING BIRDS 45

6.1 Original East Span Dismantling Plan Details45

6.2 Temporary Pile-Supported Access Trestles, Falsework, and Lay-down Yards.....46

6.3 Nesting Bird Activity in 504/288 Contract Area47

6.3.1 Peregrine Falcon.....48

6.3.2 Double-Crested Cormorant50

6.3.3 Western Gull52

6.3.4 Pigeon Guillemot.....56

6.3.5 Black Phoebe.....57

6.3.6 House Finch.....59

CHAPTER 7 – PROCEDURES IN THE EVENT OF NEST ESTABLISHMENT 61

CHAPTER 8 – REFERENCES 63

CHAPTER 9 – PERSONAL COMMUNICATIONS 66

List of Figures

Figure 1.1. SFOBB Project and vicinity 1

Figure 1.2. SFOBB new and original east spans 1

Figure 3.1. Peregrine falcon pair at 2009-2013 nest site, located in a trapezoidal alcove on the north side of Pier E2. 12

Figure 3.2. Peregrine falcon 2014 nest site located in a west-facing alcove at the base of the south tower of Pier E8..... 12

Figure 3.3. Peregrine falcon perched in 2009 on walkway structure tolerant of construction worker. 13

Figure 3.4. Adult brown pelican flying near the SFOBB Project area. 16

Figure 3.5. Least tern. 17

Figure 3.6. Double-crested cormorant nests on the steel crossbeams under the original SFOBB east span. 19

Figure 3.7. Typical locations of double-crested cormorant nests on the SFOBB east span. 19

Figure 3.8. Western gull 2014 nest location at the base of the Pier E8 south tower leg..... 21

Figure 3.9. Western gull nest on the T1 foundation, within active construction area. 22

Figure 3.10. Pigeon guillemot adult..... 23

Figure 3.11. Pigeon guillemot nest locations in weep holes at base of Pier E9..... 23

Figure 3.12. House finch female (left) and male (right). 24

Figure 3.13. Black phoebe 24

Figure 3.14. Brandt’s cormorant nest adjacent to cable crossing structure, south of the SFOBB original east span..... 25

Figure 3.15. Mourning dove 26

Figure 3.16. Killdeer. 26

Figure 3.17. Barn owl. 27

Figure 5.1. 504/288 deterrence measure installation areas. 36

Figure 5.2. Telescoping pole with detachable Z-hook..... 37

Figure 5.3. Black phoebe nest..... 38

Figure 5.4. Blocked weep hole in concrete footing for the seismic retrofit of the Antioch Bridge..... 39

Figure 5.5. Slope panel 40

Figure 5.6. A slope panel installed on a concrete ledge under a bridge. 41

Figure 5.7. Bird spikes installed in a preferred nesting area on the Antioch Bridge. 41

Figure 5.8. Bird wire installed on a ledge to prevent roosting..... 42

Figure 5.9. Bird wire installed on a pipe at an oil refinery in Alaska..... 42

Figure 6.1. The original east span of the San Francisco-Oakland Bay Bridge, including spans to be removed under the 504/288 contract..... 45

Figure 6.2. 504-foot sections (Piers E4-E9)..... 46

Figure 6.3. 288-foot sections (Piers E9 – E23)..... 46

Figure 6.4. Suitable nest locations within the superstructure of the original SFOBB east span. 48

Figure 6.5. Suitable nesting locations at Pier E9. 48

Figure 6.6. Peregrine falcon 2014 nest location in a west-facing alcove at the base of the south tower of Pier E8. 49

Figure 6.7. Peregrine falcon 2014 nest site located in a west-facing alcove at the base of the south tower of Pier E8..... 49

Figure 6.8. SFOBB double-crested cormorant colony..... 50

Figure 6.9. Typical double-crested cormorant nests on diagonal bracing below the lower deck of the SFOBB original east span. 50

Figure 6.10. Double-crested cormorant nest on a protected ledge at the top of Pier E9 support tower. 51

Figure 6.11. Double-crested cormorant nesting area west of Pier E9. 51

Figure 6.12. Western gull nesting habitat occurs throughout the 504/288 contract area, including the OTD (not shown). 52

Figure 6.13. Western gull 2014 nest location at the base of the Pier E8 south tower leg..... 52

Figure 6.14. Western gull 2014 nest location in the top-most, west-facing alcove on the Pier E14 north support tower leg (note attending adults close by). 53

Figure 6.15. Adult western gull in incubation posture on 2014 nest in west-facing alcove at base of south leg of Pier E7 support tower. 53

Figure 6.16. Adult western gull in incubation posture on 2013 nest on top of wooden pile, west of Pier E2. 54

Figure 6.17. Typical western gull nest location, at top of concrete pedestal (note attending adult). 54

Figure 6.18. Adult western gull roosting on access platform adjacent to a historic nest site within the open porthole on north side of the Pier E16 support tower. 55

Figure 6.19. Western gull 2013 nest located on temporary falsework east of T1, under the SFOBB new east span..... 55

Figure 6.20. Pigeon guillemot nesting habitat occurs in weep holes within the concrete pedestals supporting Pier E9 and Piers E17 through E22. 56

Figure 6.21. Pigeon guillemot nest locations in weep holes in concrete pedestals at the base of Pier E9..... 56

Figure 6.22. Pigeon guillemot nesting habitat occurs in weep holes in the concrete pedestals at Pier E20..... 57

Figure 6.23. Black phoebe nesting habitat at the OTD (Pier E23-Bent E28)..... 58

Figure 6.24. Black phoebe nest under a protected overhang on the southeast side of Bent E27..... 58

Figure 6.25. House finch nesting habitat in the eastern portion of the 504/288 contract area, east of Pier E20 and at the OTD..... 60

Figure 6.26. House finch nest built under a water tank, within an active construction site in the East Bay Area. 60

List of Tables

Table 3.1. Resident Bird Species within the 504/288 Project Area.....10

Table 3.2. SFOBB Peregrine Falcon Nest Monitoring Summary from 2003-2014.14

Table 3.2 (continued). SFOBB Peregrine Falcon Nest Monitoring Summary from 2003-2014. .15

Table 3.3. Annual SFOBB Double-crested Cormorant Nest Count Data.....20

Table 4.1. Monitoring Schedule.....34

Table 5.1. Bird Nesting Season.....35

Appendices

APPENDIX A. An Illustration of the Original East Span and the New East Span San Francisco-Oakland Bay Bridge

APPENDIX B. San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Final (Revised) Bird Monitoring and Management Plan (2003)

ACRONYMS AND ABBREVIATED TERMS

2003 BMMP	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project 2003 Final (Revised) Bird Monitoring and Management Plan
2014 BMP	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Bird Management Plan for Bridge Dismantling - 504/288 Contract (Supplement to the 2003 Final (Revised) Bird Monitoring and Management Plan)
504/288	504-foot Truss Spans and 288-foot Truss Spans
504/288 Contract	504/288 Bridge Dismantling Contract
BDP	Bird Deterrence Plan
BPP	Bird Protection Plan
BCDC	San Francisco Bay Conservation and Development Commission
CDFW (CDFG)	California Department of Fish and Wildlife (formally: California Department of Fish and Game)
CFGC	California Fish and Game Code
CESA	California Endangered Species Act
Department	California Department of Transportation
FHWA	Federal Highway Administration
FEIS	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Final Environmental Impact Statement
FESA	Federal Endangered Species Act
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
OTD	Oakland Touchdown
RWQCB	Regional Water Quality Control Board
SAS	Self-Anchored Suspension
SFOBB	San Francisco-Oakland Bay Bridge
SFOBB Project	San Francisco-Oakland Bay Bridge East Span Seismic Safety Project
SWPPP	Storm Water Pollution Prevention Plan
USFWS	United States Fish and Wildlife Service
YBI	Yerba Buena Island
YBITS 2	Yerba Buena Island Transition Structure 2

CHAPTER 1 – INTRODUCTION

1.1 Project Description

The California Department of Transportation (Department) is in the process of replacing and dismantling the original east span of the San Francisco-Oakland Bay Bridge (SFOBB). The new bridge opened in September 2013 and dismantling the original structure is currently underway. The SFOBB East Span Seismic Safety Project (SFOBB Project) site is located in the central San Francisco Bay, between Yerba Buena Island (YBI) in the City and County of San Francisco, and the City of Oakland, in Alameda County, California (Figure 1.1). The SFOBB Project includes both the construction of the new east span and the dismantling of the original east span (Figure 1.2 and Appendix A). The SFOBB Project is a multi-year effort that involves a number of construction activities on land as well as in San Francisco Bay. Some of these activities could potentially affect protected bird species.



Figure 1.1. SFOBB Project and vicinity



Figure 1.2. SFOBB new and original east spans

To address potential impacts to environmental resources, the Department and Federal Highway Administration (FHWA) prepared the SFOBB Project Final Environmental Impact Statement (FEIS), dated May 2001, pursuant to the National Environmental Policy Act (NEPA). The Department also obtained approvals from regulatory agencies for all activities associated with both the construction of the new east span and the dismantling of the original east span. Regulatory agency approvals obtained from the United States Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), formerly the California Department of Fish and Game (CDFG), and the San Francisco Bay Conservation and Development Commission (BCDC) specifically addressed potential impacts to birds. When the FEIS was prepared and agency approvals obtained in 2001, three federally and/or state listed bird species were identified as being present in or near the project area. These species are the California least tern, California brown pelican, and American peregrine falcon, all of which are fully protected under CDFG code (CFGC). The California least tern is currently listed as endangered under both the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA). The formerly state and federally endangered California brown pelican was delisted from both FESA and CESA in 2009. The formerly state and federally endangered American peregrine falcon was delisted from FESA in 1999 and delisted from CESA in 2008.

CDFW Incidental Take Permit (No. 2081-2001-021-03) required a bird management plan to address bird management and monitoring during the construction of the new east span and dismantling of the original east span. In compliance with the CDFW permit requirement, the Department prepared the Final (Revised) Bird Monitoring and Management Plan (2003 BMMP) (Appendix B), which outlined the bird monitoring and management associated with construction of the new SFOBB east span. The 2003 BMMP provided a general discussion of measures to avoid impacts to birds during the dismantling. In addition, the 2003 BMMP stated that a separate plan will be prepared to address impact avoidance measures during the dismantling of the original east span.

The new SFOBB east span opened to traffic on Labor Day, 2013. Although the bridge is open to traffic, several bridge construction contracts remain active, and it is anticipated they will be completed in late 2014 or early 2015. The first bridge dismantling contract began in late 2013 for the dismantling of the Cantilever; this contract is called Yerba Buena Island Transition Structure 2 (YBITS 2). A bird management plan, titled Bird Management Plan for Bridge Dismantling (2013 BMP), was written specifically for the YBITS 2 contract. The next bridge segments scheduled for removal in 2015 are the 504-foot truss spans and 288-foot truss spans (504/288) spans of the SFOBB original east span. This Bird Management Plan for Bridge Dismantling – 504/288 contract (2014 BMP) is necessary to address bird monitoring and management during the dismantling of the 504/288 spans.

1.2 Implementation of the 2003 BMMP

The 2003 BMMP was prepared in September 2002 and revised in September 2003 to address endangered or threatened bird species and other protected bird species. The 2003 BMMP was prepared pursuant to the following environmental documents, agency requirements, and applicable regulations:

- San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Final Environmental Impact Statement/Statutory Exemption and Final Section 4(f) Evaluation (FEIS).
- United States Fish and Wildlife Service's Biological Opinion (Letter 1-1-02-F-0002).
- California Department of Fish and Wildlife's Incidental Take Permit (No. 2081-2001-021-03).
- San Francisco Bay Conservation and Development Commission Permit No. 2001.008.32 (formerly Permit No. 8-01).

Based on analysis of potential impacts and regulatory agency approvals, the Department identified the following five target bird species for monitoring:

- American peregrine falcon (*Falco peregrinus anatum*)
- California brown pelican (*Pelecanus occidentalis californicus*)
- California least tern (*Sternula antillarum browni*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- Western gull (*Larus occidentalis*)

In addition to birds identified in SFOBB Project approvals, the Department also observes other applicable state and federal regulations, such as the federal Migratory Bird Treaty Act (MBTA) and CFGC, to protect birds and their nests within the SFOBB Project area. The Department has conducted bird monitoring and management activities since construction activities were initiated in 2002 to the present, under the guidance of the 2003 BMMP, which specifically addresses the following:

- Monitoring of active construction areas during pile driving, dredging, and general construction activities to assess potential effects on the five target bird species.
- Monitoring of peregrine falcon nests to assess the potential effects on the species from construction activities.
- Nest surveys on YBI by a Department biologist prior to vegetation removal.
- A bird management strategy that briefly outlines avoidance and minimization measures and scheduling guidelines to help avoid the take of (and minimize adverse effects on) birds that nest on the SFOBB. These birds include peregrine falcon, double-crested cormorant, and western gull.

1.3 Purpose of the 2014 Bird Management Plan for Bridge Dismantling – 504/288 Contract

The 2003 BMMP requires the development of, “a plan designed to minimize adverse impacts to... [peregrine falcons, double-crested cormorants, and western gulls] ...within known nesting areas on the existing bridge ... prior to the beginning of dismantling activities. This plan will address impact avoidance measures such as appropriate scheduling of work activities, the timing of measures to prevent nesting on the original east span, and buffer zones around the breeding colony” (Department 2003). This 2014 BMP fulfills both the requirements of the 2003 BMMP and regulatory agency approvals for the 504/288 bridge dismantling contract (504/288 contract).

The 2014 BMP contains the following:

- Review of the protected bird species in the SFOBB Project area and all applicable regulatory approvals and requirements guiding the monitoring and management of these birds.
- Outline of the bird management strategy during the removal of the 504-foot and 288-foot truss spans.
- Requirements for the use of seasonal avoidance, buffers, and deterrence measures to prevent birds from nesting on the original east span prior to, and during, dismantling activities.
- Required deterrence measures and the phased approach to implementation of these measures.
- Guidelines for installing bird deterrence measures on bridge surfaces
- An overview of all staging areas and structures that will be removed during the dismantling of the 504-foot and 288-foot truss spans, bird species expected to be found in staging areas and on these structures, and bird management techniques recommended to minimize impacts to birds during dismantling activities.
- Procedures to follow if an occupied nest is established within the SFOBB Project area during active construction.

CHAPTER 2 – AGENCY APPROVALS, APPLICABLE REGULATIONS, AND ENVIRONMENTAL DOCUMENTATION

2.1 Overview

In addition to following state and federal statutes applicable to the management of bird species, the Department has written an environmental document to ensure the Project’s overall NEPA compliance and has obtained permits from the CDFW, BCDC, and a biological opinion from USFWS. The environmental document, regulatory approvals, and statutes provide direction and requirements for managing all aspects related to the environmental impacts of the SFOBB Project. Environmental laws and permitting agencies require the protection and management of protected species within the Project area. This includes the protection of bird species and their occupied nests during the construction of the new SFOBB east span and the dismantling of the original SFOBB east span.

For the purposes of this BMP and compliance with regulatory agency approvals, an “occupied nest” is a partial or completed nest that contains any viable eggs or chicks and has not been abandoned. An “unoccupied nest” is a nest that is either empty or that contains nonviable eggs, dead young, or an egg that has been “dumped” (i.e., cold and unattended). A “nest start” is defined as an incomplete nest that is currently under construction by birds, but that does not yet contain eggs. The bird nesting season is from February 1 to August 31, however, nesting may occur at any time of the year for some species in the SFOBB Project area.

Environmental clearances, agency approvals, and applicable regulations include:

- SFOBB Project Final Environmental Impact Statement/Statutory Exemption and Final Section 4(f) Evaluation (FEIS)
- CDFW Incidental Take Permit No. 2081-2001-021-03
- USFWS Biological Opinion No. 1-1-02-F-0002
- BCDC Permit No. 2001.008.32 (formerly Permit No. 8-01)
- Migratory Bird Treaty Act (MBTA)
- California Fish and Game Code (CFGC) 3503, 3503.5, 3511, 3513
- California Endangered Species Act (CESA)
- Federal Endangered Species Act (FESA)

Brief summaries of these applicable agency approvals and regulations are given below.

2.2 SFOBB Project Final Environmental Impact Statement/Statutory Exemption and Final Section 4(f) Evaluation

The FHWA and the Department evaluated potential impacts to and proposed mitigation measures for special status species in the FEIS, including bird species. The FEIS identified special status bird species as those protected under FESA, CESA and MBTA. Special status bird species evaluated include the California least tern, California brown pelican, American peregrine falcon, double-crested cormorant, western gull, shorebird species, and bird species known to nest on YBI and at the Oakland Touchdown; all species evaluated are protected under MBTA. Per the FEIS, no permanent impacts to any of these species are anticipated.

The FEIS identified that removal of the original bridge could result in temporary impacts to western gull, double-crested cormorants, and American peregrine falcon. Direct impacts to the western gull would occur if nests were present on column footings of the original bridge prior to the dismantling of the structure. The FEIS identified that the removal of the original bridge would result in the loss of nesting habitat for both the American peregrine falcon and double-crested cormorant. No mitigation for American peregrine falcon was required. It was anticipated the peregrine pair would nest on the replacement bridge, and would not result in long-term impacts to the species. The FHWA and the Department committed to monitoring the peregrine falcon pair during dismantling of the bridge. If the dismantling work disturbed nesting activities, the eggs and/or chicks would be collected, raised and released off-site. To mitigate for the loss of cormorant nesting habitat the Department and FHWA committed to constructing nesting habitat for the double-crested cormorant on the new bridge.

2.3 California Department of Fish and Wildlife Incidental Take Permit

This permit (No. 2081-2001-021-03; issued November 19, 2001, as amended), states that if, through monitoring, it is determined that SFOBB Project construction activities resulted in the take (see MBTA, Section 2.5) of one or more least terns or brown pelicans, the Department shall identify measures to avoid additional take. In addition, the permit states the Department will work with CDFW and USFWS to develop a plan to protect least terns or brown pelicans, should impacts and take occur. Furthermore, under this permit, the Department, in consultation with the CDFW “shall develop a management plan that addresses potential impacts to peregrine falcons and cormorants [which are not fully protected or listed under FESA or CESA]. The management plan shall discuss all bridge construction, removal, and maintenance activities and develop schedules for activities to avoid the take of peregrine falcons and cormorants, especially during their critical nesting seasons.” Finally, the permit stipulates that the Department “conduct compliance inspections at least once every week to...avoid the take of the covered species...” (CDFG 2001).

2.4 United States Fish and Wildlife Service Biological Opinion

The Biological Opinion (Number No. 1-1-02-F-0002; issued October 29, 2001) outlines mitigation measures developed by the Department and FHWA to avoid impacts to birds. This includes monitoring and release efforts of the peregrine falcon. If construction or dismantling activities disturb nesting peregrines, Department biologists will collect eggs and/or capture and release any chicks present to a natural off-site location. If, through monitoring, it is determined project construction activities result in take of least tern or brown pelican the Department will work with the USFWS to mitigate for and avoid further impacts (USFWS 2001).

2.5 San Francisco Bay Conservation and Development Commission Permit

Under BCDC Permit No 2001.008.32 (formerly Permit No. 8-01), issued November 20, 2001, as amended, the Department shall submit “evidence, such as a contract and/or agreement with the U.S. Fish and Wildlife Service, the UC Santa Cruz Predatory Bird Research Group, and/or the Point Reyes Bird Observatory, that will ensure compliance with the terms of the Biological Opinion ... with respect to the California least tern and the brown pelican.” Furthermore, this permit requires the Department to provide “evidence that a plan designed to minimize adverse impacts, such as monitoring procedures approved by the California Department of Fish and Game, in consultation with the Point Reyes Bird Observatory, to the double-crested cormorant colony ... and other migratory bird nesting and breeding on the structure is in place.” (BCDC 2001).

2.6 The Migratory Bird Treaty Act

The USFWS is responsible for the application and enforcement of the MBTA of 1918. The MBTA §16 USC 703 states, “unless and except as permitted by regulations made as hereinafter provided in this subchapter, it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or egg of any such bird ...”

On April 15, 2003 USFWS issued a memorandum to “clarify the application of the MBTA to migratory bird nest destruction, and to provide guidance for advising the public regarding this issue.” The memorandum states, “the MBTA does not contain any prohibition that applies to the destruction of a migratory bird nest alone (without birds or eggs), provided that no possession [interpreted in the memorandum as holding the nest with the intent of retaining it] occurs during the destruction... The MBTA specifically protects migratory bird nests from possession, sale, purchase, barter, transport, import, and export and take. The other prohibitions of the MBTA – capture, pursue, hunt, and kill – are inapplicable to nests. The regulatory definition of take, as defined by 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound kill, trap, capture, or collect. Only collect applies to nests” (USFWS 2003). Abandoned eggs, such as those “dumped” by birds would be considered an “abandoned nest” under MBTA policy; no possession of such eggs is allowed without a permit.

Under the MBTA, the SFOBB Project may remove all nests that are not occupied and deter birds from attempting to nest within the SFOBB Project area. Occupied nests of all birds covered by MBTA are to be protected. Nests of bird species not covered under the MBTA may be removed at any time in the breeding cycle.

2.7 California State Fish and Game Code

CDFW is responsible for the application and enforcement of CFGC. CFGC §3503 states, “it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.” CFGC §3513 states, “it is unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Bird Treaty Act.” Nesting raptors are specifically protected under CFGC §3503.5, which states that it is “unlawful to take, possess, or destroy any birds in the order Falconiformes [falcons] or Strigiformes [owls] or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.” CFGC §3511 also defines certain bird species as “fully protected.” Birds occurring in the SFOBB Project area that are considered “fully protected” include peregrine falcon, brown pelican, and least tern. The “fully protected” status affords legal protection against take irrespective of any other special status designation, or lack thereof.

2.8 California Endangered Species Act

The CESA, as defined in CFGC §§ 2050-2115.5, prohibits the take of any plant or animal listed, or proposed for listing, as rare, threatened, or endangered. In accordance with the CESA, the CDFW has jurisdiction over state-listed species (CFGC §2070). The CDFW regulates all activities that may result in take of listed individuals, where “take” is defined as to “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” The California least tern (*Sternula antillarum browni*) is the only bird species occurring in the SFOBB project area that is protected by the CESA.

2.9 Federal Endangered Species Act

The FESA protects federally listed wildlife species from harm or “take,” which is broadly defined as to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct” (USFWS 1973). Take can also include habitat modification or degradation that directly results in death or injury to a listed wildlife species. The USFWS has jurisdiction over federally listed, threatened and endangered species under the FESA. The California least tern (*Sternula antillarum browni*) is the only bird species occurring in the SFOBB project area that is protected by the FESA.

CHAPTER 3 – BIRD SPECIES OF THE 504/288 CONTRACT AREA

The species that were identified in regulatory agency approvals as occurring and/or nesting within the SFOBB Project area, and were subsequently addressed in the 2003 BMMP, are:

- American peregrine falcon (MBTA, CFGC fully protected)
- California brown pelican (MBTA, CFGC fully protected)
- California least tern (federally and state endangered, MBTA, CFGC fully protected)
- Double-crested cormorant (MBTA, CFGC)
- Western gull (MBTA, CFGC)

In addition to those species identified in the 2003 BMMP, this 2014 BMP takes into account bird species regularly observed within the 504/288 contract area during ongoing monitoring of the original east span. To address species protections under the MBTA and the CFGC this plan also considers common local species for which suitable nesting habitat occurs within the 504/288 contract. Table 3.1 provides a summary of species that are known to nest within the 504/288 spans or for which suitable nesting habitat occurs on, or adjacent to, these spans.

Table 3.1. Resident Bird Species within the 504/288 Project Area

Species	Federal/ State Status ¹	Nesting Season ²	Presence	Nest Status	Known or Potential Nesting Locations
Species Identified for Monitoring					
American peregrine falcon (<i>Falco peregrinus anatum</i>)	CFGC, MBTA, fully protected (CFGC §3511)	Feb 1 – Jul 30	Observed	Observed	Nests observed between Piers E2 and E8 (Table 3.2)
California brown pelican (<i>Pelecanus occidentalis californicus</i>)	CFGC, MBTA, fully protected (CFGC §3511)	Jan 1 – Jul 31	Observed	None	None; foraging individuals regularly observed in 504/288 contract vicinity.
California least tern (<i>Sterna antillarum browni</i>)	FE, SE, CFGC, MBTA, fully protected (CFGC §3511)	Apr 15 – Aug 31	Observed	None	Rarely observed foraging in 504/288 contract vicinity; no nesting habitat in 504/288 contract area
Double-crested cormorant (<i>Phalacrocorax auritus</i>)	CFGC, MBTA	Mar 1 – Aug 31	Observed	Observed	Nests on bridge substructure between Piers E3 and E16
Western gull (<i>Larus occidentalis</i>)	CFGC, MBTA	Mar 1 – Aug 31	Observed	Observed	Nests on tower legs, marine foundations and other flat surfaces throughout the 504/288 contract vicinity; occasionally pairs with glaucous-winged gull (<i>Larus glaucescens</i>)
Other Species Protected Under MBTA and CFGC in the Project Area					
Barn owl (<i>Tyto alba</i>)	CFGC, MBTA	Jan 1 – Oct 31 ³	Observed	Unknown	May nest on protected, flat areas under the bridge
Black phoebe (<i>Sayornis nigricans</i>)	CFGC, MBTA	Feb 1 – Jul 31	Observed	Unknown	May nest on any vertical or horizontal surfaces on the bridge
Brandt's cormorant (<i>Phalacrocorax penicillatus</i>)	CFGC, MBTA	Mar 1 – Jul 15	Observed	Observed	Known to nest on the cable-crossing structure immediately south of the bridge; may nest on bridge substructure within the double-crested cormorant colony between Piers E5 and E18
House finch (<i>Carpodacus mexicanus</i>)	CFGC, MBTA	Feb 15 – Aug 31	Observed	Observed	May nest on any horizontal surface on bridge especially near the Oakland Touchdown
Killdeer (<i>Charadrius vociferus</i>)	CFGC, MBTA	Mar 1 – Aug 31	Potential	Unknown	May nest on gravel roads and ruderal staging areas
Mourning dove (<i>Zenaida macroura</i>)	CFGC, MBTA	Feb 1 – Aug 31 ³	Potential	Unknown	May nest on any horizontal surface on the bridge
Pigeon guillemot (<i>Cephus columba</i>)	CFGC, MBTA	Apr 15 – Jul 31	Observed	Observed	Nests observed in concrete pedestal weep holes at Piers E9, E20, and E21

¹ Federal/State protective status designations for species in Table 3.1:

FE = Federally Endangered (protected under the Federal Endangered Species Act)

SE = State Endangered (protected under the California Endangered Species Act)

CFGC = Protected by Section 3503 of the California Fish and Game Code

MBTA = Protected by the Federal Migratory Bird Treaty Act

² Refers to the period when the species could have eggs or young in the nest.

³ Anecdotal evidence suggests that some individuals may initiate breeding at any time of the year.

3.1 American Peregrine Falcon

Prior to 1999 the peregrine falcon was identified as a state and federally listed species. The USFWS delisted the peregrine falcon from the FESA in 1999 and the CDFW delisted it from the CESA in 2008. The peregrine falcon is recognized as “fully protected” by the CFGC, is identified federally as a “Bird of Conservation Concern,” and is protected under the MBTA.

The nesting season for the peregrine falcon occurs from February through July. Breeding behavior is marked by territorial defense (chasing or attacking of other birds within the territory), increased vocalizations, “bowing” courtship displays, food transfers between male and female adults, and copulation. While the peregrine falcon does not build a nest of sticks, a “scrape” or “nesting depression” is made at the chosen location for egg-laying. Nest locations that occur on man-made structures like buildings or bridges are often enhanced by biologists, who add gravel to the nest area. Eggs are often laid in a scrape in this gravel (Cade et al. 1996). This species may re-initiate nesting after an initial failed nest attempt.

Peregrine falcons were known to nest on the original east span prior to SFOBB Project construction. Since the mid-1980s observations have been made of an established, historic peregrine falcon territory that is located on the east side of YBI in the vicinity of the Cantilever structure (i.e., Piers E2 to E4). The peregrines in this territory generally initiate nesting in March and lay eggs during mid to late March. Eggs are incubated by both adults for approximately 33 days. After hatching, the adults care for and feed the young for an additional 30 to 35 days until fledging (leaving the nest). For successful nesting years from 2003 to 2014, fledging at the SFOBB east span occurred between late May and late July.

During monitoring conducted for the SFOBB Project from 2003 to 2013, the nest site for this territory has been in multiple locations on the Cantilever portion of the original east span, below the lower deck of the bridge (Table 3.2). From 2009 to 2013, the nest site was located in a trapezoid-shaped alcove below the lower deck, on the north side of Pier E2 (Figure 3.1). In response to deterrence measures installed during dismantling of the Cantilever section of the original east span, the SFOBB peregrines initiated nesting in 2014 at a new unknown location beneath the lower deck, between Piers E5 and E6. This initial nesting attempt failed. The pair then re-nested in a west-facing alcove at the base of Pier E8 (Figure 3.2).

Peregrine falcons that nest within the Project area appear to be tolerant of high ambient levels of noise, vibration and activities associated with construction. From 2009 to 2013, construction of the Self-Anchored Suspension (SAS) span occurred directly north of the Pier E2 nest site within a range of 45 meters (98 feet) in 2009 to 29 meters (95 feet) in 2013. During this period of intense construction activity, the peregrine falcons successfully produced and fledged young. Both adult and juvenile peregrine falcons have been observed in close proximity to construction activity. On several occasions, construction workers have passed within a few meters of an adult peregrine without causing the birds to flush (Figure 3.3).

Though peregrine falcons within the Project area have displayed some tolerance to disturbances associated with bridge construction, they are sensitive to unpredictable disturbances in close proximity to roost locations. Loud noises or sudden movements may cause the birds to flush. Juvenile birds are most susceptible to such disturbances, which may be fatal given their poorly-

developed flying skills and the dangerous environment (e.g., vehicle traffic, open water and construction activities).



Figure 3.1. Peregrine falcon pair at 2009-2013 nest site, located in a trapezoidal alcove on the north side of Pier E2.

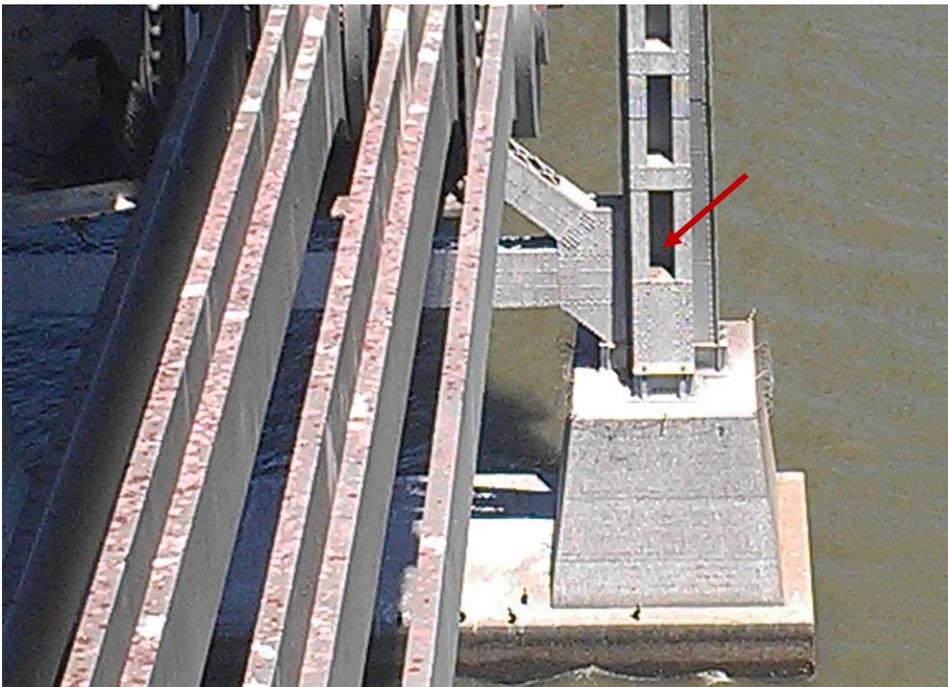


Figure 3.2. Peregrine falcon 2014 nest site located in a west-facing alcove at the base of the south tower of Pier E8.



Figure 3.3. Peregrine falcon perched in 2009 on walkway structure tolerant of construction worker.

Table 3.2. SFOBB Peregrine Falcon Nest Monitoring Summary from 2003-2014.

Year	Nest Location	Status	Approx. Lay Date*	Hatch Date	Fledge Date	Comments
2003	South side of Pier E3, gusseted plate facing YBI**	Failed, did not re-nest	March 26-April 4	n/a	n/a	Did not reach nestling stage
2004	South side of Pier E3, gusseted plate facing YBI**	Failed, did not re-nest	March 26	n/a	n/a	Did not reach nestling stage
2005	Trapezoid-shaped cavity below the lower deck on north side of Pier E2**	Failed, did not re-nest	March 16	n/a	n/a	Egg infertile, did not reach nestling stage
2006	North leg of Pier E3, below the lower deck**	Failed, re-nested, see below	March 17	n/a	n/a	Did not reach nestling stage
2006	Second gusseted plate west of Pier E2 on the south side of the bridge**	Young hacked off-site	June 3	July 7	n/a	Young hacked off-site
2007	Pier E3 below the lower deck**	Young hacked off-site	March 16	April 21	n/a	Young hacked off-site
2008	n/a	n/a	n/a	n/a	n/a	No nesting observed
2009	South side of Pier E4 in an oval-shaped recess below the lower deck**	Failed, re-nested, see below	mid-March	April 21	n/a	Did not reach nestling stage
2009	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck**	Successful	April 8	May 13	June 18-20	Three nestlings; two successfully fledged
2010	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck**	Successful	March 1-7	Mid-April	June 1-4	Three nestlings successfully fledged

Table 3.2 (continued). SFOBB Peregrine Falcon Nest Monitoring Summary from 2003-2014.

2011	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck**	Successful	March 16-21	April 19	May 30	Three nestlings successfully fledged
2012	Gussetted plate below the lower deck on the south side of Pier E3, **	Failed, re-nested, see below	March 9-11	n/a	n/a	Did not reach nestling stage
2012	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck**	Successful	May 19-20	June 27	July 30	One nestling driven into bay by gulls during fledging stage
2013	Trapezoid-shaped cavity on north side of Pier E2, below the lower deck**	Successful	March 21	April 25	June 6	Four nestlings; at least two fledglings observed up to several weeks post-fledging.
2014	Location unknown - likely in bridge substructure, between Piers E5 and E6	Failed, re-nested, see below	March 21	n/a	n/a	Did not reach nestling stage
2014	West-facing alcove at base of south tower of Pier E8	Failed	April 19	May 22	July 1	Nest adjacent to a western gull nest. Aggression by gulls observed. Both nestlings disappeared at time of fledging; assumed driven into bay by gulls

*The lay-date is defined as the date at which the 3rd egg is laid. With an egg laid every other day, it takes approximately 8 days to lay a typical 4-egg clutch. Full time incubation usually begins on day 6, after the 3rd egg is laid.

**Locations currently excluded by deterrence measures installed under the SFOBB Cantilever contract.

3.2 California Brown Pelican

The brown pelican was formerly listed as an endangered species under the CESA and the FESA due to population declines associated with pesticide residues in the environment. The brown pelican was delisted from both the CESA and the FESA in 2009; however, it is still protected under the MBTA and the CFGC. The CDFW includes brown pelican on their list of “fully protected” species.

The nesting season for brown pelican is from January through July. Nests take approximately four to ten days to complete. Clutch size is three eggs. Eggs hatch after 30 days of incubation and the young leave the nest when 11 to 12 weeks old (Shields 2002). Brown pelicans are commonly observed perched, foraging, and flying in and around the 504/288 contract area (Figure 3.4), but have not been documented as breeding within the 504/288 contract area, and the San Francisco Bay Area is not considered to be within the breeding range of the species. Individuals observed within the 504/288 contract area during the nesting season are likely non-breeders.



Figure 3.4. Adult brown pelican flying near the SFOBB Project area.

3.3 California Least Tern

The California least tern (Figure 3.5) is federally and state-listed under both the FESA and CESA and is also protected by the MBTA and fully protected by the CFGC. During bird monitoring conducted from 2002 to 2014, least terns have been observed foraging primarily south of the Oakland Touchdown (OTD) in the Port of Oakland Outer Harbor. Least tern observations have consistently occurred near the shore, towards the various marinas and harbors along the waterfront of the East Bay. Monitors have not observed least terns foraging in the eelgrass beds off the eastern side of YBI.

The nesting season for least tern is from April through August. Nests occur on barren to sparsely vegetated places near water, normally on sandy or gravelly substrates. Clutch size is generally two to three eggs. The time from egg-laying to fledging is approximately seven weeks (Thompson et al. 1997). There is no historic record of least tern nesting within the 504/288 contract area and none is anticipated. An existing colony of least tern is located on the decommissioned Alameda Naval Air Station, approximately 4.8 kilometers (3 miles) southeast of the SFOBB.



Figure 3.5. Least tern.

3.4 Double-crested Cormorant

Double-crested cormorants were first documented nesting on the original SFOBB east span in the early 1980s. This species nests colonially on the steel crossbeams below the lower deck (Figures 3.6, 3.7). The colony occupies an area that varies laterally each year, expanding and contracting around the colony's core between Piers E7 and E10. In the past decade, the number of nests has fluctuated from a high of 814 in 2007 to a low of 83 in 2009 (Table 3.3). Nest count data from 2003 to 2014 shows that the SFOBB colony can extend from Pier E3 to Pier E18 of the original east span.

The double-crested cormorant has no status under the FESA or CESA, but is protected under the MBTA and the CFGC. The most recent CDFW report, *California Bird Species of Special Concern*, includes double-crested cormorant nesting colonies in the list of, "Taxa to Watch" (Shuford and Gardali 2008).

The nesting season for cormorants is from March through August and nesting may be initiated at any time during this period. In 2013 late-season nesting in the vicinity of Pier E3 extended much later, with the last nests fledging young in early October. Nests are typically constructed on the remains of nests from previous years. Nest building takes two to four days to complete depending on the availability of nests from previous years. On average, four eggs are laid. Eggs hatch after 30 days of incubation and the young leave the nest when six to seven weeks old (Hatch and Weseloh 1999). This species may double-clutch. Newly-fledged juveniles utilize marine foundations of the original east span near the center of the colony as a feeding and roosting area (Rauzon 2001).

A breeding colony typically includes cormorants at many different stages from nest building to egg laying, incubation and fledging. Nest construction typically begins at the center of the colony and expands outward. Older and more experienced cormorants initiate nesting earliest in the season, while less experienced birds begin later and occupy the periphery of the colony (Meier 1981).

While the double-crested cormorant colony on the SFOBB east span is habituated to noise and vibration, dismantling activities will ultimately displace the colony. To mitigate for this loss of nesting habitat, the Department installed specially designed structures on the new east span to serve as nest platforms for the displaced colony. These structures were installed during construction of the skyway in 2006 and have been unobstructed and available to cormorants since 2009. To date, no cormorants have been observed utilizing these structures.



Figure 3.6. Double-crested cormorant nests on the steel crossbeams under the original SFOBB east span.

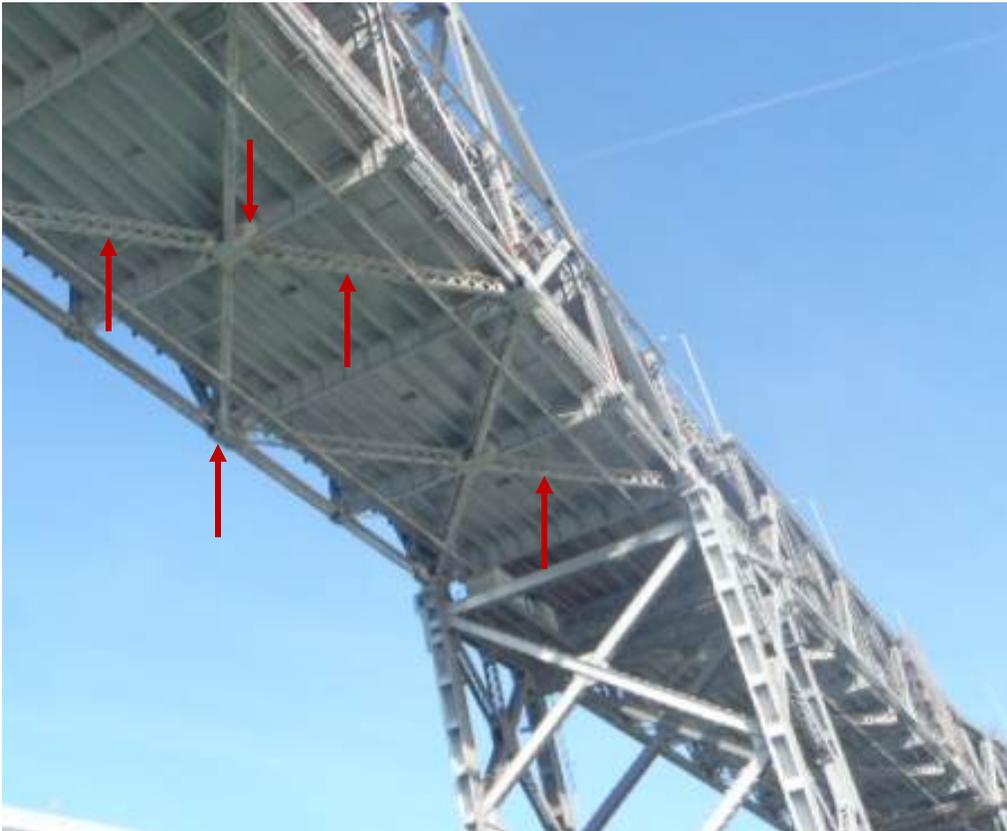


Figure 3.7. Typical locations of double-crested cormorant nests on the SFOBB east span.

Table 3.3. Annual SFOBB Double-crested Cormorant Nest Count Data

Pier	Number of Nests											Annual Average
	2003	2004	2005*	2007	2008	2009	2010	2011	2012	2013	2014	
E3 – E4	1	7	0	1	0	0	0	0	0	0	0	0.8
E4 – E5	27	33	0	40	11	0	0	0	20	13	10	14.0
E5 – E6	34	41	8	38	0	0	0	0	13	8	30	15.6
E6 – E7	42	41	7	49	11	0	5	3	19	8	40	20.5
E7 – E8**	135	143	23	102	36	7	41	36	43	22	57	58.6
E8 – E9**	329	270	89	276	137	54	116	105	171	150	154	168.3
E9 – E10**	121	141	174	160	79	18	68	83	86	136	159	111.4
E10 – E11	21	16	118	37	16	3	15	10	16	25	28	27.7
E11 – E12	19	15	16	27	11	1	3	6	11	11	19	12.6
E12 – E13	6	8	7	20	6	0	1	4	12	8	11	7.6
E13 – E14	10	4	3	19	3	0	1	4	10	7	14	6.8
E14 – E15	0	3	1	19	0	0	0	6	9	13	7	5.3
E15 – E16	0	1	0	16	0	0	0	2	12	6	4	3.7
E16 – E17	0	0	0	10	0	0	0	0	11	4	0	2.3
E17 – E18	0	0	0	0	0	0	0	0	6	2	0	0.7
Total	745	723	446	814	310	83	250	259	439	413	533	448.2

*No data collected in 2006

**Piers in double-crested cormorant colony core

 Location of greatest number of cormorant nests in a given year

3.5 Western Gull

The western gull has no status under the FESA or CESA. The western gull is protected as a migratory bird under the MBTA and the CFGC. The nesting season for western gulls is from March through August. Mated pairs may be observed perched together at a potential nest site for weeks, prior to initiating nesting. Both male and female adults are involved in nest building. It takes several days before the first egg is laid. As many as three nests may be initiated before the pair chooses one to finish and use. Nests are constructed with a variety of materials including dried grass, forbs, and woody debris. Egg-laying takes four to six days for a three-egg clutch. Incubation begins with the first egg and hatching occurs 30 to 32 days later. Chicks fledge when they are 40 to 50 days old (Pierotti and Annett 1995).

Western gulls are present within the 504/288 contract area year-round. Individuals may be extremely persistent in their attempts to nest on the bridge. In some cases eggs may be laid without the presence of any nest or nesting material. Nests are constructed on ledges or other flat surfaces including the marine foundations (Figure 3.8), on pilings, tower legs, and other locations where they are protected from terrestrial predators. Western gulls have been observed nesting throughout the 504/288 bridge structure, on falsework structures, on footings of the new east span, and at the base of the T1 foundation (Figure 3.9). Occasional pairings between western gull and glaucous-winged gull (*Larus glaucescens*) have also been observed within the 504/288 contract area. For management purposes, these species are treated equally. No other gull species has been documented nesting or is likely to nest within the 504/288 contract area.



Figure 3.8. Western gull 2014 nest location at the base of the Pier E8 south tower leg.



Figure 3.9. Western gull nest on the T1 foundation, within active construction area.

3.6 Other Protected Nesting Birds

Since implementation of the 2003 BMMP, additional bird species have been observed nesting and/or potentially nesting in the 504/288 contract area. These species are the pigeon guillemot (*Cephus columba*), house finch (*Carpodacus mexicanus*), black phoebe (*Sayornis nigricans*), and Brandt's cormorant (*Phalacrocorax penicillatus*). Future surveys may discover others as well. Other commonly occurring local species that may nest in the 504/288 contract area include, but are not limited to, mourning dove (*Zenaida macroura*), killdeer (*Charadrius vociferus*), and barn owl (*Tyto alba*). These species are included in this 2014 BMP due to their presence and potential to nest within the 504/288 contract area. All of these nesting birds are protected under the MBTA and the CFGC.

Pigeon Guillemot

The nesting season for pigeon guillemot in the San Francisco Bay Area is from mid-April through July. Nesting behavior is not well studied for this species, but nesting can be inferred by regular presence of one or both adults, copulation at the potential nest site, and food deliveries to the nest location later in the season. Adult pigeon guillemots are distinguished by large white wing-patches on a black body and bright orange feet (Figure 3.10).

Since 2010 pigeon guillemots have been observed during the nesting season and entering weep holes in the concrete pedestals at Piers E9, and E20 to E22 (Figure 3.11). This increase in nesting season observations, and observations of pigeon guillemots entering weep holes with fish in their bill, indicate that nesting numbers may be increasing within the 504/288 contract area.



Figure 3.10. Pigeon guillemot adult.



Figure 3.11. Pigeon guillemot nest locations in weep holes at base of Pier E9.

House Finch

The house finch is a common resident of the San Francisco Bay Area (Figure 3.12). This species has been observed exhibiting nesting behavior and entering the original bridge structure at YBI, and the OTD (E. Lichtwardt, pers. comm. 2011). In 2014 house finch nests were observed in the vicinity of Bent E24, on crossbeams below the temporary bicycle path and at Bent E24, on pipes below the lower deck. The nesting season is from late February through August. Nest building takes two to six days to complete. A typical clutch size is three to five eggs. Incubation lasts approximately 14 days. Nestlings fledge approximately 12 to 19 days after hatching. Re-nesting may occur multiple times in a season (Badyaev et al. 2012).



Figure 3.12. House finch female (left) and male (right).

Black Phoebe

Black phoebe (Figure 3.13) is a common nesting bird in the San Francisco Bay Area. Nests are constructed with grass and mud on vertical or horizontal surfaces. Nest construction takes five days to three weeks to complete. Clutch size is three to five eggs. Eggs hatch 15 to 18 days after laying and normally fledge 18 to 21 days after hatching (Wolf 1997). The nesting season for black phoebes is February through July. Re-nesting may occur multiple times in a season. Nesting black phoebes have been observed on the underside of the concrete bent structures at the OTD.



Figure 3.13. Black phoebe

Brandt's Cormorant

Brandt's cormorants are regularly observed in the 504/288 contract area, but nesting has not been documented on the original east span. A single Brandt's cormorant nest was observed on the cable-crossing structure directly south of the original east span in 2011 (E. Lichtwardt, pers. comm. 2011) (Figure 3.14). Two nests have been observed on the west side of YBI and there is a significant and increasing breeding colony on Alcatraz Island (San Francisco Field Ornithologists 2003). Nests may also occur within the double-crested cormorant colony between Piers E3 and E16. The nesting season is from March through August. Nests are constructed from grass, seaweed, and driftwood, and may take between two and ten days to complete. Clutch size averages between one and four eggs. Eggs hatch in 28 to 32 days. Fledging date is variable (33 to 42 days) and dependent on food availability. Fledging may also be gradual, with the young initially left alone by adults, then later forming "crèches" (groups of young birds) within the nesting area. Like the double-crested cormorant, Brandt's cormorant also nests colonially and is sensitive to human presence within the colony (Wallace and Wallace 1998).



Figure 3.14. Brandt's cormorant nest adjacent to cable crossing structure, south of the SFOBB original east span.

Mourning Dove

Mourning doves (Figure 3.15) are regularly observed in the 504/288 contract area but have not been documented nesting on the original SFOBB east span. Mourning doves could potentially nest on any flat, horizontal surface such as shelves, nooks, and cables on the bridge. They may also nest in trees, shrubs or other vegetation. The nesting season is from February through August; however some individuals may initiate nesting at any time of the year. Nests are typically constructed with small amounts of vegetation but may also be devoid of nest material. Nest construction typically takes two to four days. Squabs hatch approximately 14 days after laying and normally fledge 12 to 15 days after hatching (Otis et al. 2008). Although no nests have been documented to date, mourning doves may nest on the original east span, as well as in vegetation and structures on YBI and the OTD.



Figure 3.15. Mourning dove

Killdeer

Killdeer (Figure 3.16) are a common shorebird species in the San Francisco Bay Area. Killdeer nest in open, gravelly areas with sparse vegetation; bare ground is the preferred nesting substrate. Killdeer nests consist of a simple scrape on the ground and no nest materials are used. The average clutch size is four eggs. Eggs hatch approximately 25 days after laying and the precocial young leave the nest almost immediately after hatching (Jackson and Jackson 2000). The nesting season for killdeer is from March through August. In the 504/288 contract area, suitable nesting habitat is limited to bare ground at the OTD.



Figure 3.16. Killdeer.

Barn Owl

Barn owls (Figure 3.17) have been observed incidentally in the 504/288 contract vicinity and may nest on the original east span. No nesting barn owls have been observed. Nests may be on any flat horizontal surface on the bridge, especially in sheltered areas. The nesting season is mainly from January through October, but individuals may nest at any time of the year. No nest building occurs and eggs are laid directly on the substrate of the nest location. Clutch size varies between three and seven eggs. Eggs hatch approximately 31 days after being laid. Fledging is a slow process with first flights occurring approximately 55 days after hatching and independence of adults at day 76 to 86 (Marti et al. 2005).

Barn owls are nocturnal and are rarely observed during daytime. If barn owls occur or nest on the original east span structure, it is likely that they will only be observed through investigations of potential nest and roost sites. These sites may become evident by the accumulation of white guano spreading below them and/or pellets at their base. The presence of caches of dead prey may also be an indication of a nesting site.



Figure 3.17. Barn owl.

CHAPTER 4 – SUBMITTALS, SURVEYS, MONITORING, AND REPORTING

The Department is committed to avoiding impacts to nesting birds during 504/288 contract construction activities. In an effort to ensure minimal impact to bird species that occur within the SFOBB Project area, the Department requires specific duties and expectations of the 504/288 contractor-supplied biologists. These include specific qualifications, submittals, a pre-construction survey, weekly monitoring reports, incident reports, annual monitoring reports, updated monitoring schedules and consistently fulfilled monitoring duties.

Further monitoring of deterrence measures are addressed in the 504/288 contract Technical Report on Nesting Bird Deterrence Measures: Materials and Applications. While fulfilling these expectations, the contractor will also be responsible for meeting and maintaining compliance with all permits, licenses, authorizations and certifications for the SFOBB Project.

4.1 Contractor-supplied Biologist Qualifications

The contractor will be required to retain the services of at least 2 full-time qualified bird biologists that are approved by the Department. Contractor biologists must have a Bachelor's degree in biology, or related field, and a minimum of two years of relevant experience in bird monitoring, bird deterrent installation and reporting during construction activities. The contractor's biologists will monitor construction and all construction-related activities to protect regulated bird species. Construction activities shall not commence until the Department approves the contractor's biologists.

4.2 Submittals

Within 60 days after contract approval the contractor is to submit two copies of their Bird Protection Plan (BPP) and Bird Deterrence Plan (BDP). The BPP and BDP must be prepared by a Department-approved biologist and be consistent with methods outlined in this 2014 BMP, regulatory agency approvals, applicable regulations, and the FEIS. The BPP and BDP are subject to approval by the Department biologist and Resident Engineer. Upon submittal, the Department will have 15 days to review the BPP and BDP. If the Department finds the plans to be incomplete, the Department will provide the contractor with comments. The contractor will update and re-submit the plans to the Department within seven days of receipt of comments. Expectations for the BPP and BDP are listed in the following sections.

4.3 Bird Protection Plan

The BPP will detail the contractor's strategies for avoiding impacts to birds for the duration of the dismantling contract. The BPP will include the following:

- SFOBB Project agency approvals, applicable regulations, and environmental documentation for protection of birds

- List of bird species, types of nesting habitats expected at the job site, and locations of historic nesting sites at the job site
- Nesting bird impact avoidance strategies, including seasonal avoidance, monitoring, deterrence measures, and protective radii for regulated bird species encounters
- Nesting bird surveys, monitoring, and reporting schedule
- Nesting bird surveys, monitoring, and reporting duties
- Response plan for instances where occupied nests are encountered
- Information and protection measures consistent with the 2014 BMP

The BPP shall be updated and submitted annually, no later than January 15 during each year of construction. The purpose of the annual BPP is to update the Department's biologists and Resident Engineer on all items addressed in the contractor's original protection plan. The annual update of the BPP is subject to approval by the Department.

4.4 Bird Deterrence Plan

The BDP will detail the contractor's strategies for avoiding impacts to birds for the duration of the dismantling contract using specific means and methods. Further clarification and Specific expectations for the BDP are found in the 504/288 contract Technical Report on Nesting Bird Deterrence Measures: Materials and Applications.

The BDP will also include the following:

- Projected work sequence, dismantling schedule for duration of contract, and description of the job site
- Bird protection and deterrence measures for regulated bird species likely to occur within the job site. Measures must include the removal of historic nests, exclusionary deterrents, nest-start removal, and hazing methods and strategies
- Locations of bird protection and deterrence measures to be implemented throughout the duration of the Contract
- Schedule for the installation of bird protection and deterrence measures
- Justification for each instance where protection measures and an implementation plan are not necessary for a regulated bird species
- Means and methods to apply and secure deterrence measures to bridge members
- Means, methods, and containment plans for cleaning members in preparation of deterrence measure application
- Means and methods to establish safe access for the installation, monitoring, and maintenance of bird protection and deterrence measures

- Bird protection and deterrence measure monitoring and reporting schedule
- Bird protection and deterrence measure monitoring and reporting duties
- Schedule for maintaining bird protection and deterrence measures

4.5 Contractor Monitoring Duties

Contractor monitoring duties will include the following:

- Monitor for regulated bird species within the 504/288 contract area
- Assure that construction activities do not result in the take of regulated bird species
- Assure that construction activities comply with all applicable regulatory agency approvals, laws and the authorized BPP and BDP
- Coordinate and monitor hazing activities, including submitting an updated schedule of hazing activities, and safely hazing non-breeding birds
- Immediately notify the Resident Engineer of occupied nests found within the 504/288 contract area and any take of regulated bird species
- Prepare, submit, and sign notifications and reports
- Monitor effectiveness of bird protection and deterrence measures

During nesting bird monitoring, the contractor's biologists will pay special attention to signs of breeding and nesting activities including courtship, copulation, defending territories, gathering of nesting material, selecting nesting sites, nest building, foraging, caching food, and carrying food to young. The contractor's biologists will inspect all structures with the potential to support nesting birds, including, but not limited to: ledges, alcoves, crevices, crossbeams, weep holes, drain structures, foundations, and vegetation. In addition, the contractor's biologists will be responsible for removing nest starts, unoccupied nests, and food caches. The contractor's biologists will obtain approval from a Department prior to the removal of unoccupied nests and nest starts.

The contractor's biologists will also be responsible for inspecting and evaluating the effectiveness of deterrence measures that are installed and maintained by the contractor (see Chapter 5). This will include identifying required maintenance, and determining where and when new deterrence measures need to be installed or removed.

During each monitoring event, the biologists will inspect the bridge superstructure, the underside of the original bridge, steel towers, and the marine foundations. To accomplish this, the contractor's biologists may need to:

- Walk the upper and lower bridge decks
- Access steel structures below the lower deck, including crossbeams and tower legs (via catwalks, rappelling, hydraulic lifts, snoopers truck, quick deck scaffolding, etc.)

- Access steel elements above the decks
- Walk the bike path of the new east span to monitor the north side of the original bridge
- Access the marine foundations
- Access any areas not called out in the bullets above to properly inspect the original east span during nesting bird monitoring and deterrence evaluations

If an occupied nest is found during a nesting bird monitoring or deterrence evaluation, the Resident Engineer and contractor will be notified immediately, and the contractor will immediately establish a no-work buffer around the nest with an initial radius of 76 meters (250 feet) for raptors (including peregrine falcon) and 15 meters (50 feet) for non-raptors. The Department, in consultation with the contractor will make a determination to maintain, decrease, enlarge, or remove this no-work buffer. See Chapter 7 for procedures to follow in the event of nest establishment.

4.6 Contractor Pre-construction Survey Report

The contractor's biologists will perform a pre-construction survey within 7 days prior to beginning bridge dismantling activities. The pre-construction survey will be performed in the manner outlined in Section 4.5, Contractor Monitoring Duties. Their findings will be presented in a Pre-construction Survey Report, submitted as soon as possible, prior to beginning construction activities. The pre-construction survey report must include:

- Name(s) of the biologist(s) conducting survey
- Date(s) and time(s) of survey
- Locations of survey
- Description of activities surveyed
- Representative photographs
- Findings
- Recommendations for actions to protect the regulated bird species
- Locations showing types of installed bird protection and deterrence measures and recommendations for actions to supplement and maintain installed bird protection and deterrence measures
- Name(s) of the biologist(s) who prepared the report
- Signature(s) of biologist(s) certifying the accuracy of the report

4.7 Contractor Reporting

The contractor's biologists are required to submit weekly and annual monitoring reports written in a consistent format and delivered to the Resident Engineer. Weekly monitoring reports are to

be submitted every 7 days once construction begins. Annual monitoring reports are to be submitted no later than October 1st during each year of construction. These monitoring reports will include:

- Name(s) of the biologist(s) conducting survey
- Date(s) and time(s) of survey; Start and end dates for period covered by report
- An introduction that includes the project description
- Locations of survey
- Background that includes all PLACS that apply to bird species expected in the SFOBB Project area
- Project activities describing dismantling of the original east span of SFOBB
- Identification of project impacts on the regulated bird species
- Bird protection and deterrence measures implementation and maintenance details
- Description of activities surveyed
- Incidental take details, including bird species name, number taken, people contacted, contact information, and disposition of taken species
- Locations showing types of installed bird protection and deterrence measures
- Findings: An assessment of the effectiveness of bird protection and deterrence measures to mitigate project impacts for each expected and present bird species occurring within the project area, maintenance issues, and nesting activity throughout the SFOBB Project area
- Representative photographs
- Recommendations for actions to supplement and maintain installed bird protection and deterrence measures, to improve efficiency of protection and deterrence measures and to mitigate impacts to regulated bird species
- Support documents, including raw data sheets from period covered by report signed by biologist(s), and any supporting analysis
- Name(s) of the biologist(s) who prepared the report
- Signature(s) of biologist(s) certifying the accuracy of the report

4.8 Incident Reports

In addition to weekly and annual reports, the contractor will be required to submit a separate incident report to the Department within 24 hours of an incident involving take of a bird or nest contents. These incident reports will include:

- Name(s) of person(s) who observed the incident
- Date(s) and time(s) of report
- Date(s) and time(s) of incident
- Locations of incident
- Description of any take incident
- Bird species name and number taken
- Representative photographs
- Details of required notifications with contact information
- Corrective actions proposed or taken
- Disposition of taken bird species
- Name(s) of the biologist(s) who prepared the report
- Signature(s) of biologist(s) certifying the accuracy of the report

The Department will determine the significance of the incident and whether agency notification is necessary.

4.9 Contractor Monitoring and Reporting Schedule

Once construction begins, the contractor's biologists will perform regular nesting bird monitoring and deterrence evaluations. The bird nesting season is from February 1 to August 31, however, some birds may nest year-round. For this reason, the contractor's biologists will conduct nesting bird monitoring and deterrence evaluations year-round, with varying frequency. Monitoring frequency during the bird nesting season will be greater than during the non-nesting season with the exception of January. During January, the contractor's biologists prepare for bird nesting season by monitoring bird activities, identifying potential nesting locations, evaluating the condition of installed deterrents (i.e., determine if maintenance is required), and identifying areas where new deterrents are necessary.

For the reasons outlined above, the contractor's biologists will conduct nesting bird monitoring and deterrence evaluations daily from January 1 through August 31. From September 1 to December 31, nesting bird monitoring will be conducted at least one day per week (Table 4.1).

The contractor's biologists will submit monitoring reports in writing on a weekly basis for the preceding week to the Resident Engineer.

Table 4.1. Monitoring Schedule

<u>Monitoring Type</u>	<u>Schedule</u>
Nesting bird monitoring and deterrence measure monitoring January 1 to August 31	Monitor every day.
Nesting bird monitoring and deterrence measure monitoring September 1 to December 31	Monitor at least 1 in a 7-day period.

The contractor's biologists will continually work with the Resident Engineer for the 504/288 contract to determine the most effective frequency of nesting bird monitoring and deterrence evaluations required or needed. As the nesting season progresses, or as construction in a given area progresses, the results of nesting bird monitoring and deterrence evaluations will inform subsequent monitoring and management decisions. Adjustments to the monitoring program may include adding field staff and increasing the frequency of monitoring.

CHAPTER 5 – IMPACT AVOIDANCE MANAGEMENT TECHNIQUES

There are several required strategies to avoid impacts to nesting birds during the dismantling of the original east span. These strategies are generally categorized into the following:

- Seasonal Avoidance
- Buffers
- Deterrence Measures
- Monitoring

The contractor will be responsible for implementing all strategies to minimize impacts to nesting birds. Each of these strategies is discussed in detail below.

5.1 Seasonal Avoidance

Conducting work outside the bird nesting season is the most effective method to avoid impacts to nesting birds. Bridge portions scheduled for dismantling outside of the nesting season do not require installation of nesting bird deterrence measures. In general, the period from February 1 through August 31 encompasses the nesting season for most species in the 504/288 contract area. Work conducted during September to January would therefore avoid potential impacts to most nesting birds. Additionally, each species has its own discrete nesting season (i.e., period of time that viable eggs and/or chicks occupy a nest), which will be considered when attempting to avoid impacts to the species’ nests. For example, the east span peregrine falcon territory nesting period is from February to June. Work conducted in the vicinity of a peregrine falcon nest site between late July and February would likely avoid impacts to eggs or young.

The contractor, in coordination with the Department, will establish a schedule and sequence for dismantling work that takes into consideration anticipated bird nesting seasons (see Table 5.1).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
General Bird Nesting Season												
Peregrine Falcon												
Western Gull												
Double-crested Cormorant												
Red - occupied nest period Green - unoccupied nest period												

5.2 Buffers

An initial no-work buffer must be established around any newly discovered occupied nest to avoid impacts. Upon discovery of an occupied nest, the contractor will immediately establish a no-work buffer around the nest with an initial radius of 76 meters (250 feet) for raptors (including peregrine falcon) and 15 meters (50 feet) for non-raptors. After establishing the initial no-work buffer, the Department's biologists and contractor's biologists will monitor the nest-site. The Department, in consultation with the Department's biologist, and in the case of peregrine falcon nesting, in consultation with the CDFW, and the contractor will make a determination to maintain, decrease, enlarge, or remove the buffer. Buffer size will be dependent on the species, nest location, and type of construction activities. All no-work buffers will be determined on a case-by-case basis.

5.3 Deterrence Measures

Deterrence measures will be implemented to prevent birds from nesting within the Project area (Figure 5.1). Exclusionary deterrent methods will include filling/blocking potential nest sites (welded wire hardware cloth, netting, suspended scaffolding system) and surface modifications (bird wire, slope panels, bird spikes). The contractor will be responsible for implementing, monitoring, maintaining, and removing all deterrent measures. Deterrence measures approved for use on for the 504/288 contract are listed in the contract specifications.

Deterrents will be installed in phases. Phase 1 will occur outside the nesting season, from September 1 to January 31. Phase 1 involves the removal of historic nests and the installation of exclusionary deterrent methods in historic nesting sites and other potential nesting habitat within the nesting season work area (Figure 1). Phase 2 will occur during the nesting season, from February 1 to August 31. Phase 2 will focus on supplemental exclusionary deterrent methods, hazing, and nest-start removal. The Resident Engineer, in consultation with the contractor's biologists and the Department's biologists, may provide recommendations or direction to the contractor for installation, maintenance or removal of bird deterrent measure not covered in the Bird Deterrence specifications.

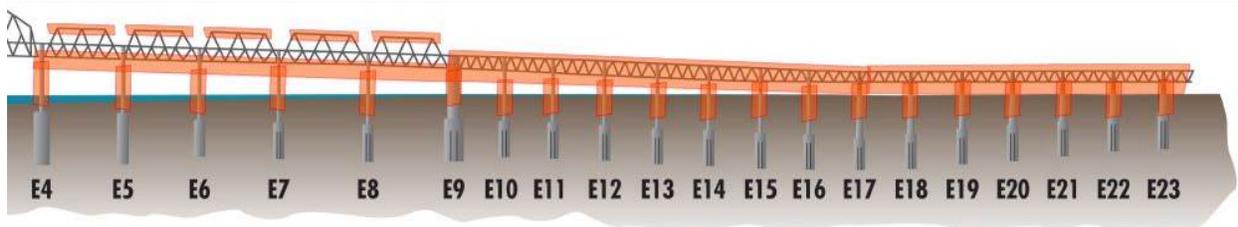


Figure 5.1. 504/288 deterrent measure installation areas.

Categories of approved Phase 1 deterrence measures include:

- Removal of Historic Nests
- Exclusionary Deterrents

Categories of approved Phase 2 deterrence measures include:

- Nest-start Removal
- Supplemental Exclusionary Deterrents
- Hazing

5.4 Nest Removal and Nest-start Removal

Old nests used in prior years may be re-used by birds in subsequent years, or may encourage birds to establish nests near them. Thus, nest removal may be an effective nesting deterrent. Nest starts without eggs should also be removed throughout the nesting season. The contractor, under supervision of a Department biologist, will remove unoccupied nests and nest starts. Unoccupied nests and nest start removal may be facilitated by the use of a telescoping fiberglass or aluminum pole (Figure 5.2). Any removed nest must be disposed of properly. No completed nests (or any other materials from the 504/288 contract area) are allowed to enter the bay (Regional Water Control Board [RWQCB] 2002) or to be possessed by individuals or organizations.



Figure 5.2. Telescoping pole with detachable Z-hook.

The RWQCB has accepted the use of high pressure hoses and paint ball guns by the Department to remove nest-starts in places that are difficult to access (see Sections 5.4.1 and 5.4.2). Use of water cannons or paint ball guns will require review and approval of the specification of work as well as the type of paintballs proposed for use by the contractor. These measures will only be used in conjunction with containment systems, such that no resulting debris and/or effluent may enter bay waters.

5.4.1 High-pressure Water Hose

High-pressure water hoses have been used successfully to remove bird nest starts from the Antioch Bridge (A. Arakozie, pers. comm. 2011). The effective range of a high-pressure water hose depends on the power of the pump and configuration of the hose, as well as wind conditions

that can affect the force of the water stream. High-pressure water hoses, in calm conditions, may be able to remove nest starts at heights up to 30 meters (100 feet). Windy conditions may greatly reduce this range.

Bay water, as opposed to any potable or non-potable source, will be used to wash away nest starts. The use of bay water prevents non-visible pollutants, such as chlorine, from entering the bay from overspray. Water would be pumped from the bay into water tanks or pumped directly from the bay and piped to the high pressure water hose. A pump speed would be chosen to prevent unnecessary suction and a mesh cage would be installed on the pump intake to avoid entrainment of fish. The cage walls would be comprised of 0.32 centimeter (0.12 inch) mesh; the distance from the cage wall to the pump intake would be a distance of 30 centimeters (12 inches) or greater.

The contractor must coordinate with the Resident Engineer and Department biologist to ensure proper permit compliance is addressed in advance of using a high-pressure water hose.

5.4.2 Paint Ball Gun

Paint ball guns were used successfully to remove cliff swallow nest starts on the Antioch Bridge during seismic retrofitting (A. Arakozie, pers. comm. 2011). They could be equally effective for species such as black phoebe, which can nest on vertical surfaces that are difficult to access (Figure 5.3). Clear training paint balls would be used. These paint balls are composed of biodegradable colorless gelatin liquids and shells made of vegetable oil that is designed to dissolve in water. Paint balls can knock down targets up to 30 meters (100 feet) distant, although they are likely to be more effective at closer range. Paint ball guns would be particularly effective for use when a nest start is encountered that is difficult to remove using other means. Paint balls containing vegetable oil may also be effective in preventing nesting in certain locations by leaving an oil-residue on the substrate, thereby reducing the adherence nesting materials. The use of a paint ball gun, both over land and over water, will require approval by the RWQCB and a Storm Water Pollution Prevention Plan (SWPPP) amendment may be required.



Figure 5.3. Black phoebe nest.

5.5 Exclusionary Deterrents

Exclusionary deterrents prevent bird nesting by making spaces with potential nest habitat unsuitable to birds that may attempt to nest there. Exclusion methods include filling or blocking potential nest sites, surface modification deterrents, hazing, and monitoring to ensure effectiveness. Deterrent devices for the 504/288 contract include, but are not limited to, a suspended scaffolding system, netting, bird slope panels, bird spikes, bird wire systems, and welded wire hardware cloth.

5.5.1 Filling/Blocking Potential Nest Sites

Surfaces that may provide nesting sites for birds can be effectively filled or blocked, with materials as described in the 504/288 contract specifications, so that there is not habitable space for nest establishment. Such areas include niches at connection points in the steel structures below the lower deck. This deterrence measure may be undertaken prior to and during the nesting season, in strict accordance with the MBTA and CFGC. Treated areas should be monitored throughout the year to ensure that the blocking materials are maintained, installed, or removed as needed.

There will be other structures on the piers that provide suitable nesting habitat for birds. Weep holes and other cavities could be blocked by screens (Figure 5.4), if it can be determined they are not being actively used by nesting birds through the use of a fiber-optic camera or careful observation. Unless cavities are known to be unoccupied, one-way doors should be installed to block the entrances; these doors allow birds to exit but not re-enter the cavity. One-way doors are not to be installed if there is an occupied nest within the cavity. Filling or blocking of potential nest cavities may be accomplished from a hydraulic lift (for lower holes or crevices), snooper truck, or by rappelling to the pertinent locations on the bridge.



Figure 5.4. Blocked weep hole in concrete footing for the seismic retrofit of the Antioch Bridge.

5.5.2 Suspended Scaffolding System

Prior to the nesting season a suspended scaffolding system is to be installed below the lower deck of the 504/288 spans scheduled for dismantling during the following nesting season, and shall be used as an exclusion device. This system must be netted at the sides and cover any openings to completely exclude nesting birds from their historical nesting areas. The contractor is required to describe the system they choose to use and the netting strategies they will employ to ensure that it excludes birds from bottom bridge members.

5.5.3 Netting

Portions of the bridge where nesting bird activity is concentrated may be covered with netting to preclude large birds (i.e., gulls, cormorants, and peregrine falcons) from accessing potential nesting areas. Netting material type and installation is addressed in contract specifications.

Installation of netting intends to substantially decrease the likelihood of birds nesting in treated areas and minimize the amount of regular (i.e., daily or every-other-day) disturbance of nests or removal of nest starts that may be needed in a given area. However, netting also has some major drawbacks: it is susceptible to being ripped by high wind and it may trap and kill birds. For this reason, daily monitoring and prompt repair and maintenance will be required to ensure the functionality of installed netting.

5.5.4 Slope Panels

Slope panels made of various materials (polycarbonate polymers (i.e., Lexan), PVC plastic, or clear acrylic surfaced slope panels (Figure 5.5) are to be used to exclude birds (Figure 5.6). These panels create a slippery and/or angled surface to which small to medium-sized birds cannot attach nest material. Panels may be attached to either vertical or horizontal surfaces. Large slope panels constructed of plywood or equivalent material may be fabricated on-site to block large bird access to large platform areas, such as the base of marine foundation pedestals. The panels are typically fastened to concrete using a power-actuated tool. They also may be attached to steel beams with outdoor polyurethane adhesives (BirdBGone 2011).

The panels would need to be installed without openings at their ends to prevent European starlings and other birds from nesting in these openings. A fairly high level of effort is initially required to install these devices, but other than periodic maintenance, they should not have to be re-installed.



Figure 5.5. Slope panel



Figure 5.6. A slope panel installed on a concrete ledge under a bridge.

5.5.5 Bird Spikes

Bird spikes may be placed on surfaces commonly used as nesting or roosting sites to prevent birds from using these areas. Bird spikes are used most commonly for pigeon exclusion in urban areas. During retrofitting of the Antioch Bridge and dismantling of the Cantilever segment of the SFOBB original east span, spikes were used effectively in preferred perching areas (Figure 5.7). Bird spikes are manufactured in a variety of configurations and sizes that can be used in a number of settings. Spikes may be useful in excluding birds from horizontal surface areas. Bird spikes may be installed with adhesives, clamps, bolts, or bailing wire.



Figure 5.7. Bird spikes installed in a preferred nesting area on the Antioch Bridge.

5.5.6 Bird Wire and Overhead Wire Systems

Lines of monofilament or stainless steel wire can be installed in a parallel, grid, or spoke configuration to deter certain bird species from nesting, roosting, or loafing in a treated area. Spacing between the wires varies with species (Figures 5.8 and 5.9). Lines can be made visible to birds by hanging streamers or other objects at intervals along the wires. The wire may be attached to springs to create an unstable landing surface.



Figure 5.8. Bird wire installed on a ledge to prevent roosting.



Figure 5.9. Bird wire installed on a pipe at an oil refinery in Alaska.

Overhead wire has been used extensively in aquaculture to deter piscivorous (i.e., fish eating) bird species. Trials conducted in a number of countries demonstrate that the use of overhead wires can reduce gull and cormorant impacts on aquaculture facilities, and is particularly effective on gulls. The recommended spacing of wire for gull deterrence is 9 meters (30 feet) for large gulls to 3 meters (10 feet) for small gulls. Results from studies of the overhead wire deterrence method on cormorants have been variable and in some trials there has been no apparent benefit. Studies thus far have used wires spaced from 9 meters (30 feet) to 20 meters (66 feet) to deter cormorants.

Overhead wire lines can be attached to ‘S’ hooks so they can be removed as needed. Birds may enter a wire system through the sides or at the ends, where wires attach to structures. These areas should be protected with netting to ensure birds do not enter.

5.6 Hazing

During daily monitoring, the contractor may use hazing as a deterrence measure. Hazing covers all activities designed to flush birds from Project areas. For the purposes of this Project, hazing will be limited to flushing birds from areas by means of approaching, waving, calling, shouting, and the use of laser pointers directed exclusively at the bird’s feet. Under no circumstances shall the contractor attempt to attack, throw objects at, shoot, or otherwise attempt to cause physical harm to any bird(s) they are hazing. If any individual bird is physically harmed, or displays harm due to behaviors resulting from hazing, the Department must be notified of the incident immediately and an incident report must be submitted by a contractor-supplied biologist.

Bird-hazing shall be carried out by the contractor-supplied biologists and contractor staff that are properly trained by the contractor-supplied biologists. All bird-hazing activity by trained staff shall be directed and overseen by the contractor-supplied biologists.

The contractor will supply a minimum of 3 full-time staff, trained and supervised by the contractor-supplied biologists, to haze birds during the nesting season. Training for bird-hazing shall be in compliance with all environmental laws, Project permits, licenses, authorizations, certifications, as well as the 2014 BMP and Nesting Bird Deterrence Measures Technical Report. Training shall clearly define hazing activities to be employed in the Project area. Bird-hazing staff shall be approved by a Department biologist and contract Resident Engineer after receiving training. The contractor-supplied biologists shall submit an updated weekly schedule for hazing activities showing locations where hazing is to occur. Hazing activities shall be during daylight hours and be scheduled to for a minimum of 6 days in a 7 day period and must include at least one weekend day.

5.7 Access for Deterrence Measure Installation

The contractor must provide access to facilitate the installation, monitoring and maintenance of deterrence measures. Deterrence measures will be installed throughout the dismantling work area on structures that include, but are not limited to, the original east span bridge superstructure, tower legs, marine foundations, concrete bents, as well as temporary structures like falsework and trestles (if necessary). Access to many of these structures is limited, and may necessitate the use of equipment like boats, trestles, barges, scaffolding, ladders, hydraulic lifts, and/or snooper trucks.

As many birds nest on steel beams and plates below to the lower deck of the bridge, access below the lower deck of the bridge will be critical throughout the dismantling. The contractor will be responsible for providing safe access to all areas of the bridge for all bird monitoring, bird deterrence measures, and deterrence measure maintenance activities.

5.8 Monitoring

Monitoring is an effective tool for the adaptive management of nesting birds. Monitors will be responsible for conducting nesting bird monitoring. During nesting bird monitoring, the Department's biologists and contractor's biologists will pay special attention to signs of breeding and nesting activities including courtship, copulation, defending territories, gathering of nesting material, selecting nesting sites, nest building, foraging, caching food, and carrying food to young. Bird monitors will inspect all structures with the potential to support nesting birds, including, but not limited to: ledges, alcoves, crevices, crossbeams, weep holes, drain structures, foundations, and vegetation. In addition, they will be responsible for removing nest starts, unoccupied nests, and food caches. The contractor's biologists will obtain approval from a Department biologist prior to the removal of unoccupied nests and nest starts.

The contractor's biologists will also be responsible for inspecting, evaluating and maintaining the effectiveness of deterrence measures that are installed by the contractor. This will include identifying required maintenance, and determining where and when new deterrence measures need to be installed or removed.

During each monitoring event, the biologists will inspect the bridge superstructure, the underside of the original bridge, steel towers, and the marine foundations. To accomplish this, Department bird monitors must be provided access by the contractor to all potential nesting locations within the 504/288 contract area including, but not limited to:

- The upper and lower bridge decks
- Steel structures below the lower deck to monitor work (via scaffolding, hydraulic lifts, snooper truck, etc.)
- Steel elements above the decks
- The marine foundations
- All falsework installed by the contractor or by sub-contractors
- All materials staged by the contractor or by sub-contractors

The contractor's biologists will monitor nesting birds, deterrent effectiveness, and deterrent maintenance needs throughout the construction and dismantling work area seven days per week. The results of this monitoring will be summarized in a weekly report. Weekly meetings between the contractor and the Department will be held to review the locations of known nests and potential nests, and to evaluate the nesting bird impact avoidance management techniques being utilized. Maintenance and/or removal of installed deterrents and installation of new deterrents will also be discussed at the weekly meeting.

CHAPTER 6 – BRIDGE DISMANTLING AND NESTING BIRDS

6.1 Original East Span Dismantling Plan Details

Construction of the SFOBB original east span connecting YBI and the Oakland shoreline was completed in 1936. The east span is a double-deck structure 3,696 meters (12,127 feet) in length and approximately 18 meters (58 feet) wide, carrying five traffic lanes in east- and westbound directions. The east span is supported by 22 marine foundations (Piers E2 through E22), as well as land-based bridge piers and bents on both YBI and the Oakland shoreline.

The SFOBB original east span is composed of three main sections (Figure 6.1): the Cantilever spans (Piers E1-E4), the 504-foot spans (Piers E4-E9), and the 288-foot spans (Piers E9-E23). The 504-foot segment of the bridge is comprised of five 154-meter (504-foot) long steel truss spans (Figure 6.1). The vertical clearance beneath the 504-foot spans (504's) is approximately 50 meters (165 feet) above the mean high water level. The 288-foot segment is comprised of fourteen 88-meter (288 feet) long steel truss spans (Figure 6.2). The vertical clearance beneath the 288-foot spans (288's) decreases as the structure extends towards the Oakland shoreline. The superstructure of both segments includes the trusses, road deck and steel and/or concrete support towers.



Figure 6.1. The original east span of the San Francisco-Oakland Bay Bridge, including spans to be removed under the 504/288 contract.



Figure 6.2. 504-foot sections (Piers E4-E9).



Figure 6.3. 288-foot sections (Piers E9 – E23).

The structures to be removed during the 504/288 contract are the 504-foot and 288-foot Truss Spans of the original east span. The marine foundations associated with the 504-foot and 288-foot truss spans will also need to be managed for nesting birds as they will likely be used for access and construction staging purposes. Falsework, access trestles, and lay-down yards associated with the 504/288 contract will also need to be managed for nesting birds.

Construction activities under separate contracts will continue on YBI and the marine foundations during the 504/288 contract. On YBI, these activities will include, but are not limited to, the construction of on and off ramps, public access facilities, buildings, realignment of roads, and restoration of areas affected by the 504/288 contract. For the marine foundations, activities will include removal of foundations following the dismantling of associated steel truss and tower legs.

6.2 Temporary Pile-Supported Access Trestles, Falsework, and Lay-down Yards

To remove the structures described in Sections 6.1, additional temporary structures and construction work areas may be required to support the original east span until it is completely removed. Temporary structures and/or work areas include but are not limited to: pile-supported access trestles, in-water falsework, and lay-down yards. Since the temporary structures will be

contractor-designed, their exact nature (size, type, number of piles, etc.) will not be known until the dismantling begins. All of these structures and areas may provide suitable habitat for nesting birds. The contractor is responsible for nesting bird monitoring and bird management for all temporary structures and work areas.

An access trestle may be built at the at the Oakland shoreline to facilitate access for dismantling during the 504/288 contract. The Oakland Access Trestle, running from the Oakland shoreline into the bay, is expected to be an approximately 8,920 square-meter (96,000 square-foot) pipe pile-supported trestle. The trestle will be constructed parallel to the south side of the original east span and extend west, potentially as far as Pier E9 of the original east span. The trestle will likely have structures that extend under the bridge, perpendicular to the main trestle, to allow for access during the dismantling of the superstructures and marine foundations. The trestle will likely be in place for four to five years.

In-water, temporary falsework may be constructed to support bridge members during dismantling. Typical falsework members are constructed of steel piles and steel truss members. Depending on the contractor's chosen method for dismantling, these structures may be extensive or limited within the 504/288 contract area. Temporary falsework will likely be in place for three to five years.

Lay-down yards, likely at the OTD, will be utilized by the 504/288 contract or for equipment and materials storage. Lay-down yards are used both for short or long-term storage, staging areas, or areas for fabrication of temporary structures. Lay-down yards will likely also include open gravel or paved areas, parked vehicles, and permanent structures.

6.3 Nesting Bird Activity in 504/288 Contract Area

Department biologists have monitored nesting bird activity in the 504/288 work area since 2002. In September of 2013 bridge traffic was moved to the new bridge and Department biologists gained increased bridge access for bird monitoring. As a result of this long-term monitoring the Department has extensive data on historic nesting within the Project area.

In general, nesting activity occurs within the 504/288 contract area in consistent and predictable areas. Similarly, individual species show consistent patterns of preferential nesting behavior within the bridge structure. The goal of this chapter is to link structural components with observed nesting bird activity and provide critical information for effective nesting bird management within the 504/288 contract area. The following sections outline the nesting history of birds within the 504/288 contract area. In addition, anticipated nesting habitat and management requirements created by the construction of temporary support structures, trestles, and lay-down yards associated with the dismantling will also be addressed.

Birds that are known to nest in over-water portion of the 504-foot and 288-foot segments and associated marine foundations include peregrine falcon, double-crested cormorant, western gull, and pigeon guillemot. Potential nest sites for these species are present in myriad recessed shelves, ledges, cavities, and crossbeams located within the superstructure of the original east span (Figure 6.4) and its steel support-towers and associated marine foundations (Figure 6.05). Other land-based birds that have nested at the eastern end of the 288-foot segments at the OTD include black phoebe, and house finch. Species for which suitable nesting habitat occurs within the 504/288 work area include Brandt's cormorants, barn owl, mourning dove, killdeer.



Figure 6.4. Suitable nest locations within the superstructure of the original SFOBB east span.



Figure 6.5. Suitable nesting locations at Pier E9.

6.3.1 Peregrine Falcon

Peregrine falcons have been the subject of monitoring since 2003 as part of the new east span construction. The pair has nested in various locations below the lower deck of the Cantilever during this time period. From 2009 to 2013, the preferred nest site in this territory was a north-facing trapezoid-shaped alcove on the north facing leg of Pier E2 below the lower deck. In response to deterrence measures installed during dismantling of the Cantilever section of the

original east span, the SFOBB peregrines initiated nesting in 2014 at a new location beneath the lower deck, between Piers E5 and E6. The exact location of this nest is unknown. After this initial nesting attempt failed, the pair re-nested in a west-facing alcove at the base of Pier E8 (Figures 6.6 and 6.7). As bridge dismantling continues under the 504/288 contract, the SFOBB east span peregrine falcon pair may choose new nesting locations in the eastern portion of the bridge, within the structure of the SAS, or outside of the 504/288 contract area.

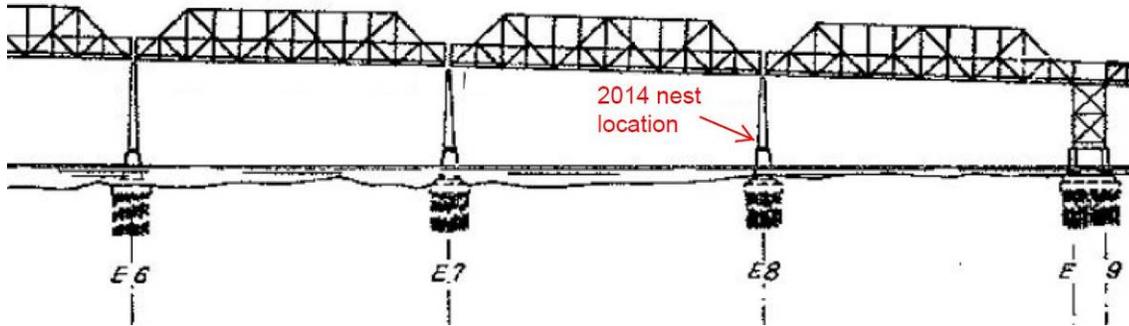


Figure 6.6. Peregrine falcon 2014 nest location in a west-facing alcove at the base of the south tower of Pier E8.

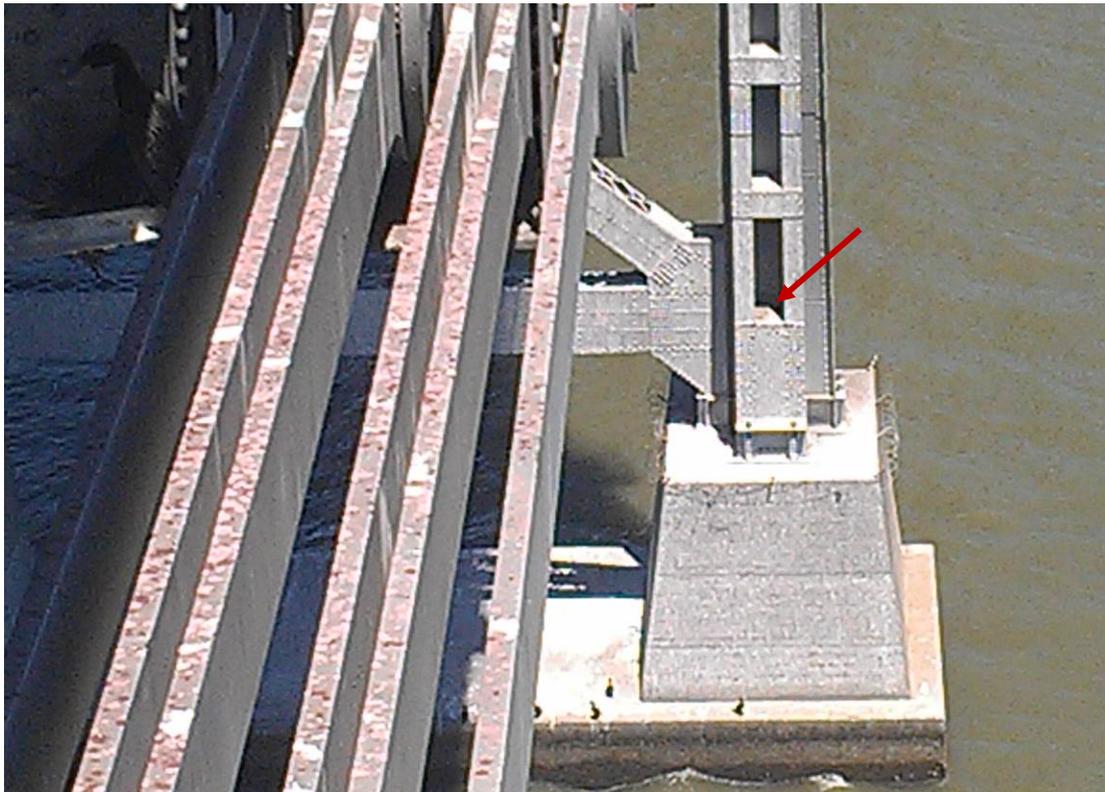


Figure 6.7. Peregrine falcon 2014 nest site located in a west-facing alcove at the base of the south tower of Pier E8.

6.3.2 Double-Crested Cormorant

The core of the SFOBB double-crested cormorant nesting colony is located on crossbeams below the lower deck of the original bridge, between Piers E7 and E10 (Figures 6.8- 6.11). Nest count data from 2003 to 2014 shows that the SFOBB colony can extend from Pier E3 to Pier E18 of the original east span (Table 3.3). The colony has the highest number of nests in the vicinity of Pier E9, which is at the junction of the 504-foot and the 288-foot segments. SFOBB dismantling work will ultimately displace this colony. As dismantling work progresses eastward, double-crested cormorants may establish new nesting areas east of Pier E18. Falsework construction and trestle installation may also impact breeding cormorants. Whether double-crested cormorants will attempt to nest on temporary supports is unknown, but could reasonably be expected to occur when the species is excluded from the historic colony by suspended decking that will be installed to deter nesting within areas to be dismantled during the breeding season.

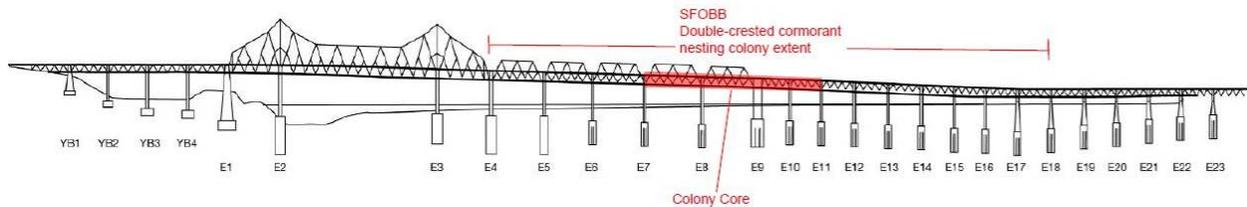


Figure 6.8. SFOBB double-crested cormorant colony.



Figure 6.9. Typical double-crested cormorant nests on diagonal bracing below the lower deck of the SFOBB original east span.



Figure 6.10. Double-crested cormorant nest on a protected ledge at the top of Pier E9 support tower.

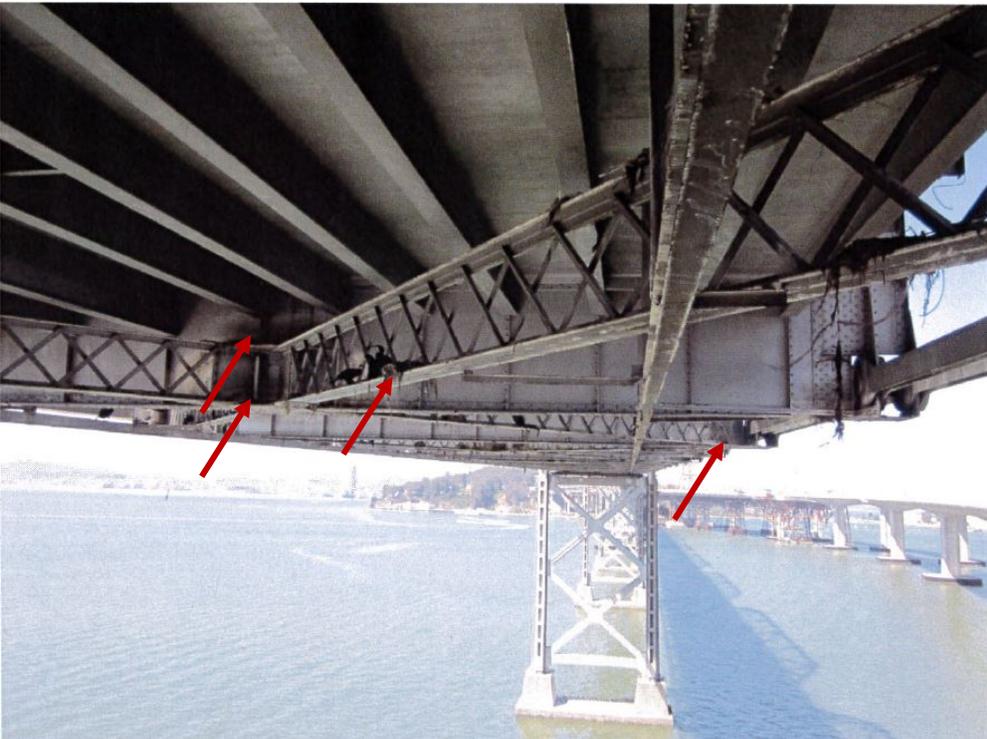


Figure 6.11. Double-crested cormorant nesting area west of Pier E9.

6.3.3 Western Gull

Western gulls nest throughout the steel superstructure of the 504/288 work area and on the associated marine foundations (Figure 6.12). Western gull nests have also been observed on the tops of marine piles, temporary bridge support structures, and recesses on buildings on land. Nesting density within the 504/288 contract area has historically remained low, with one to two nesting pair per bridge pier. Nests tend to occur at locations where one or more 90-degree angle in the bridge structure provides a protected horizontal surface on which to build. Typical historic nest locations include, but are not limited to: the base of marine foundation concrete pedestals, recesses at the base of support towers, alcoves within support towers, horizontal surfaces at the top of support towers, access platforms, and protected alcoves with horizontal surfaces within truss joints (Figures 6.13-6.18).

Western gull will also nest opportunistically on temporary structures throughout the 504/288 contract area. Historic nesting has occurred on protected horizontal surfaces on temporary access platforms, falsework, in-water piles, and lay-down yards (Figures 3.9 and 6.19). The adaptability of this species to new potential nest locations should not be underestimated.

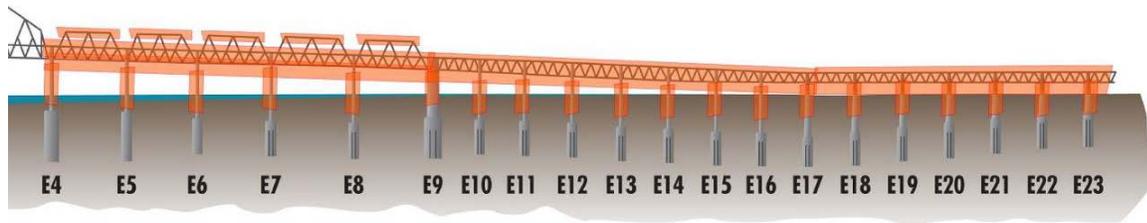


Figure 6.12. Western gull nesting habitat occurs throughout the 504/288 contract area, including the OTD (not shown).



Figure 6.13. Western gull 2014 nest location at the base of the Pier E8 south tower leg.

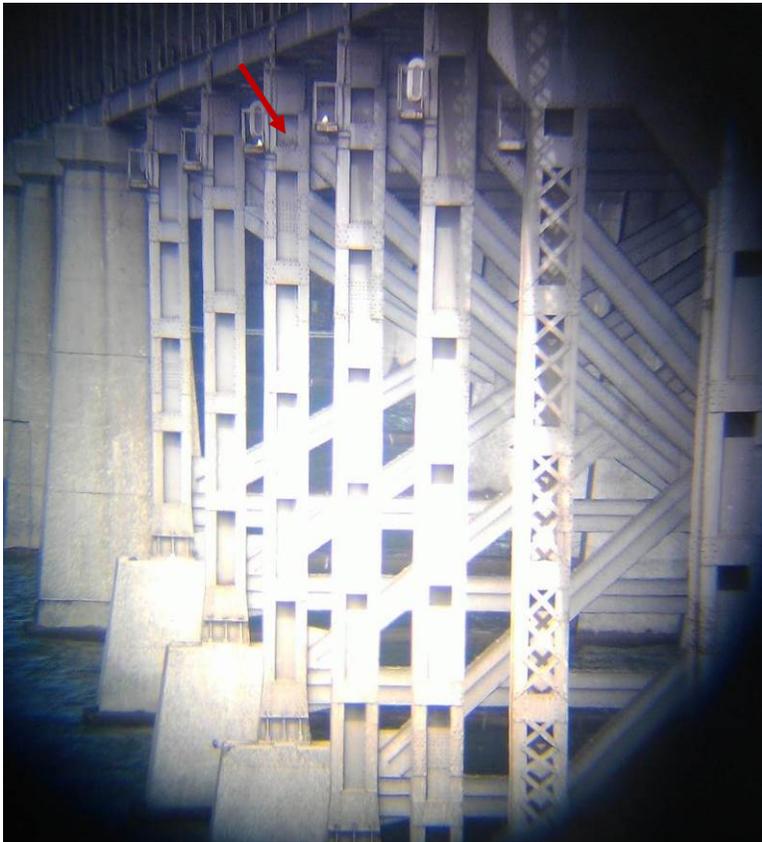


Figure 6.14. Western gull 2014 nest location in the top-most, west-facing alcove on the Pier E14 north support tower leg (note attending adults close by).



Figure 6.15. Adult western gull in incubation posture on 2014 nest in west-facing alcove at base of south leg of Pier E7 support tower.



Figure 6.16. Adult western gull in incubation posture on 2013 nest on top of wooden pile, west of Pier E2.



Figure 6.17. Typical western gull nest location, at top of concrete pedestal (note attending adult).



Figure 6.18. Adult western gull roosting on access platform adjacent to a historic nest site within the open porthole on north side of the Pier E16 support tower.

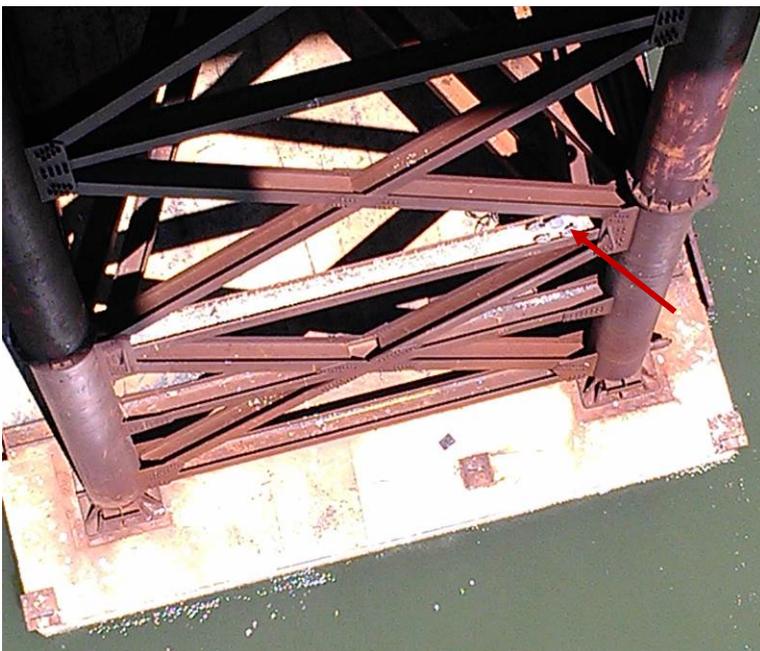


Figure 6.19. Western gull 2013 nest located on temporary falsework east of T1, under the SFOBB new east span.

6.3.4 Pigeon Guillemot

Small numbers of pigeon guillemots have been observed nesting within marine foundation weep holes at Piers E9 and E20. This species may also utilize weep holes in additional marine foundations at Piers 17 through 22 (Figure 6.20). Since 2011, flocks of up to 12 individuals have been observed flying and swimming in the vicinity of Piers E9 and E20 through 22 (Figure 6.21-6.22).

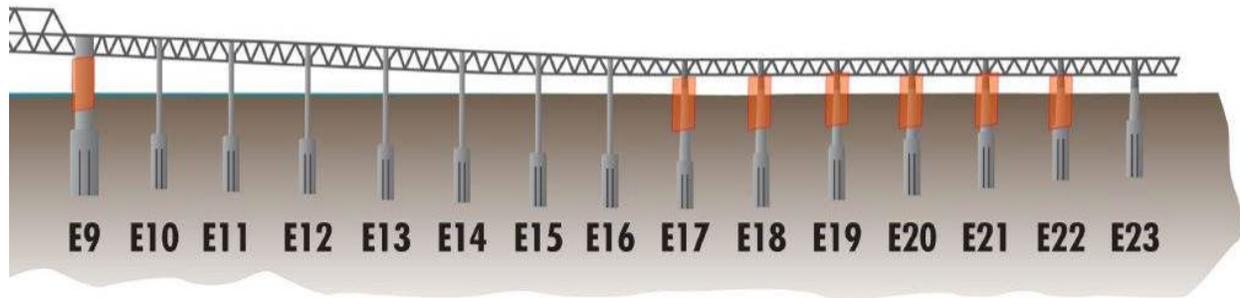


Figure 6.20. Pigeon guillemot nesting habitat occurs in weep holes within the concrete pedestals supporting Pier E9 and Piers E17 through E22.



Figure 6.21. Pigeon guillemot nest locations in weep holes in concrete pedestals at the base of Pier E9.



Figure 6.22. Pigeon guillemot nesting habitat occurs in weep holes in the concrete pedestals at Pier E20.

6.3.5 Black Phoebe

There are a few past observations of black phoebes nesting in the 504/288 contract area. From 2012 through 2014 black phoebes have been observed nesting or attempting to nest under the protected concrete overhangs east of Pier E23 (Figure 6.23). At these locations, the black phoebe has built its nest against the 90-degree angle formed by the concrete pier and the roadway (Figure 6.24). Black phoebes may also nest under overhangs on various permanent and temporary structures adjacent to and within the OTD.

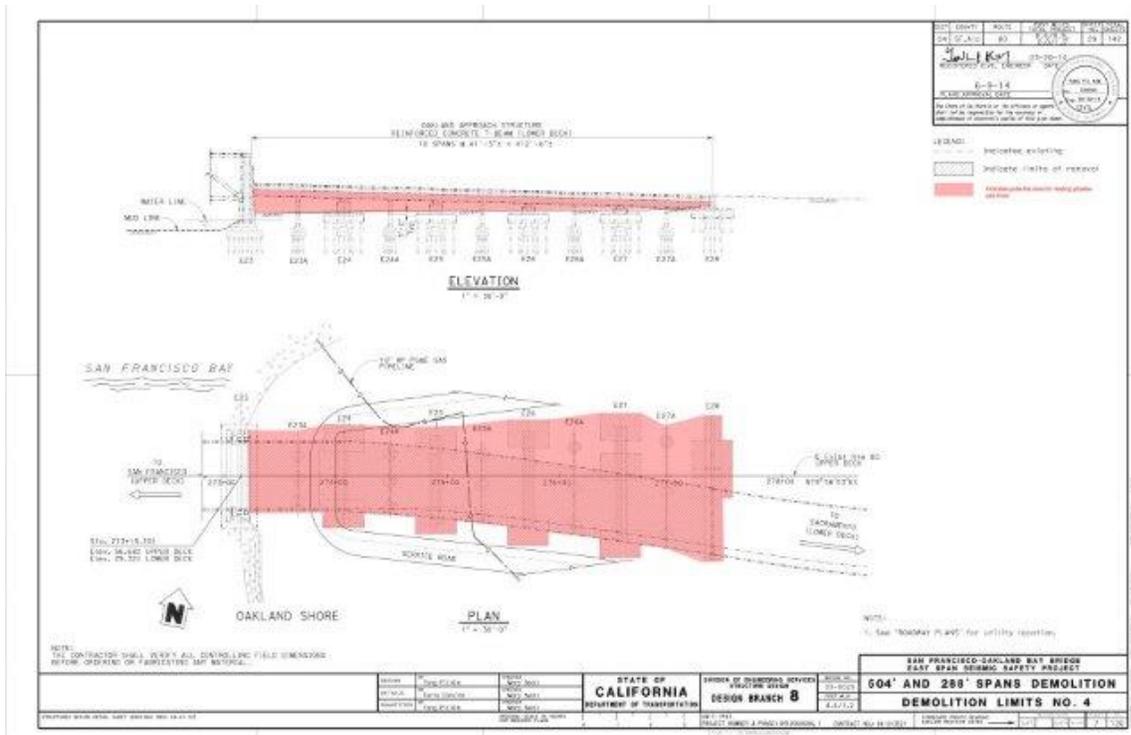


Figure 6.23. Black phoebe nesting habitat at the OTD (Pier E23-Bent E28).



Figure 6.24. Black phoebe nest under a protected overhang on the southeast side of Bent E27.

6.3.6 House Finch

House finches have nested on the bridge structures near the OTD within the 504/288 contract area. In 2014 house finch nests were observed in the vicinity of Bent E24, on crossbeams below the temporary bicycle path and at Bent E24, on pipes below the lower deck. Small flocks of house finches have also been observed flying from perch to perch along the bridge structure as far west as Pier E20. Nesting habitat for house finches occurs on the myriad protected ledges within the bridge structure (Figure 6.25). House finches may also nest within construction equipment and temporary structures within the 504/288 contract area (Figure 6.26).



Figure 6.25. House finch nesting habitat in the eastern portion of the 504/288 contract area, east of Pier E20 and at the OTD.

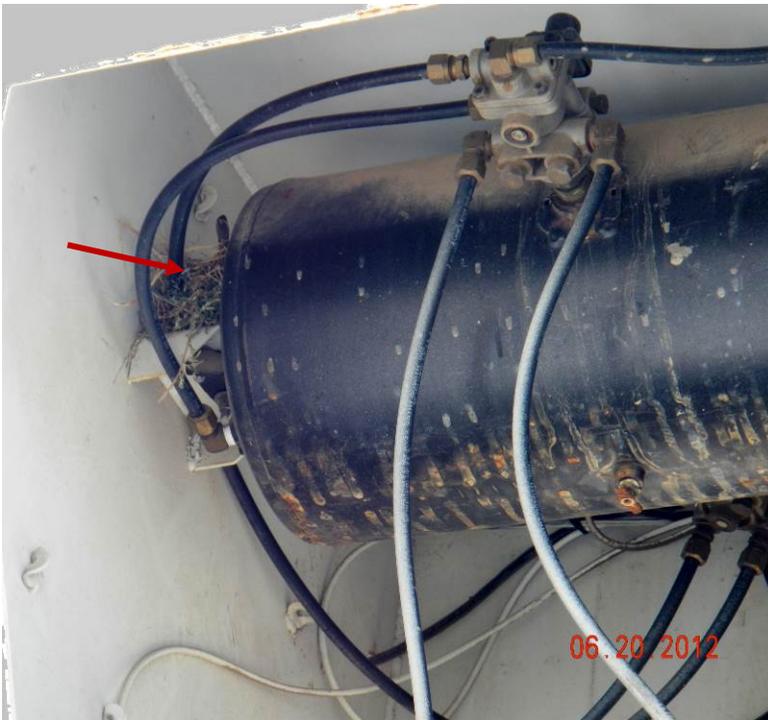


Figure 6.26. House finch nest built under a water tank, within an active construction site in the East Bay Area.

CHAPTER 7 – PROCEDURES IN THE EVENT OF NEST ESTABLISHMENT

This Plan identifies measures that will be taken to prevent the establishment of occupied bird nests within the 504/288 contract area and to avoid take of birds protected under the MBTA. Despite deterrent measures, it is possible that some nests may become established within the 504/288 work area. This can be attributed to the duration of the 504/288 contract, the number of nesting birds present in and adjacent to the 504/288 work area, and the anticipated persistence of some birds, particularly those already habituated to, or tolerant of, disturbance currently associated with the original bridge.

In the event that an occupied nest is detected in the 504/288 work area, the contractor will immediately establish a no-work buffer around the nest with an initial radius of 76 meters (250 feet) for raptors and 15 meters (50 feet) for non-raptors and contact the Resident Engineer. After establishing the initial no-work buffer, the Department, in consultation with the Department's biologists, and/or with CDFW (for peregrine falcons only), and the contractor will make a determination to maintain, decrease, enlarge, or remove the buffer. Options for addressing an occupied nest that becomes established in the 504/288 work area might include the following:

- Monitor the nest site during both ongoing and new construction activities. If no disturbance is observed, allow construction activities to continue without a designated buffer. The decision to exercise this option is dependent on the location of the nest, and nature and proximity of surrounding construction activities.
- Allow construction activities, which were ongoing when the nest was constructed, to continue based on site-specific monitoring. These construction activities will only be allowed to continue if it is determined through site-specific bird monitoring that they are not reasonably expected to result in take. New activities will be restricted from commencing within the buffer zone. New activities are those which vary in equipment and/or implementation methods from those occurring the time of nest establishment.
- Maintain the initial no-work buffer (76 meters [250 feet] for raptors and 15 meters [50 feet] for non-raptors) around the nest based on site-specific bird monitoring.
- Maintain a reduced no-work buffer around the nest based on site-specific bird monitoring.
- Enlarge the initial no-work buffer around the occupied nest based on site-specific bird monitoring.

- Remove nest contents. In certain circumstances, the Department may remove specific nests and their contents. Under the authority of statute 16 USC 703-712, the SFOBB Project has been issued a miscellaneous take permit by the USFWS (permit no. MB22730B-0) allowing for the relocation of a limited number of active bird nests for specific bird species. This permit does not cover species that are fully protected under sections 3511, 4700, 5050 and 5515 of the CFGC. Fully protected species include, the California least tern, the California brown pelican and the American peregrine falcon. It does not allow for intentional take of any bird species protected by the MBTA, USFWS, or CDFW.
- Occupied nest contents (i.e., eggs and/or nestlings), with exception of a limited number of songbird nests, must be transferred to a wildlife care facility, where the young birds would be raised and released.
- Removal of nest contents is expected to be dealt with on a case-by-case basis and in certain cases will require close communication with agencies. Removal of nest contents can only be authorized and performed by the Department's biologists.

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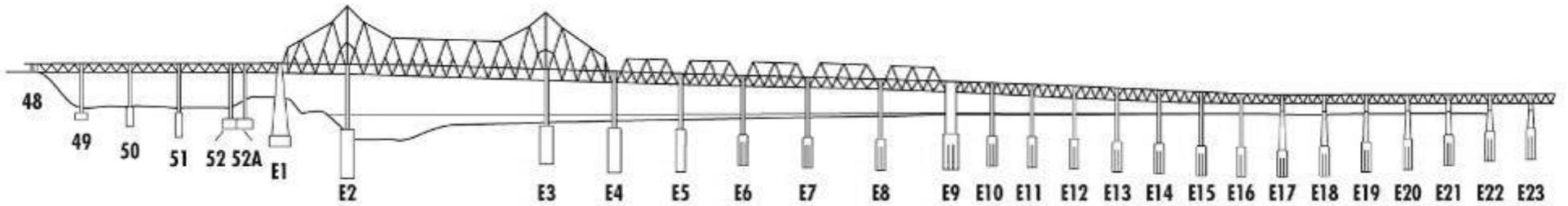
CHAPTER 9 – PERSONAL COMMUNICATIONS

Abdullah Arakozie, California Department of Transportation; meeting with Eric Jepsen, December 2, 2011.

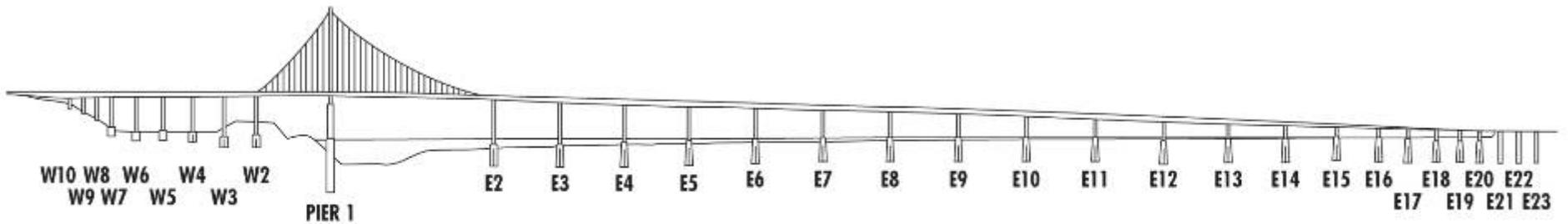
Eric Lichtwardt, LSA Associates, Inc; email communication with Ivy Edmonds-Hess, Parsons Brinckerhoff, November 14, 2011.

APPENDIX A. An Illustration of the Original east span and the New East Span San Francisco-Oakland Bay Bridge

Original east span



New East Span



**APPENDIX B. San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Final
(Revised) Bird Monitoring and Management Plan (2003)**