WELCOME

Hugo A. Cisneros, P.E.

Long D. Nguyen

"The purpose of this code is to establish minimum engineering, inspection and maintenance criteria for marine oil terminals in order to prevent oil spills and to protect public health, safety and the environment."

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

THE PORT OF LOS ANGELES

California State Lands Commission – Prevention First 2012

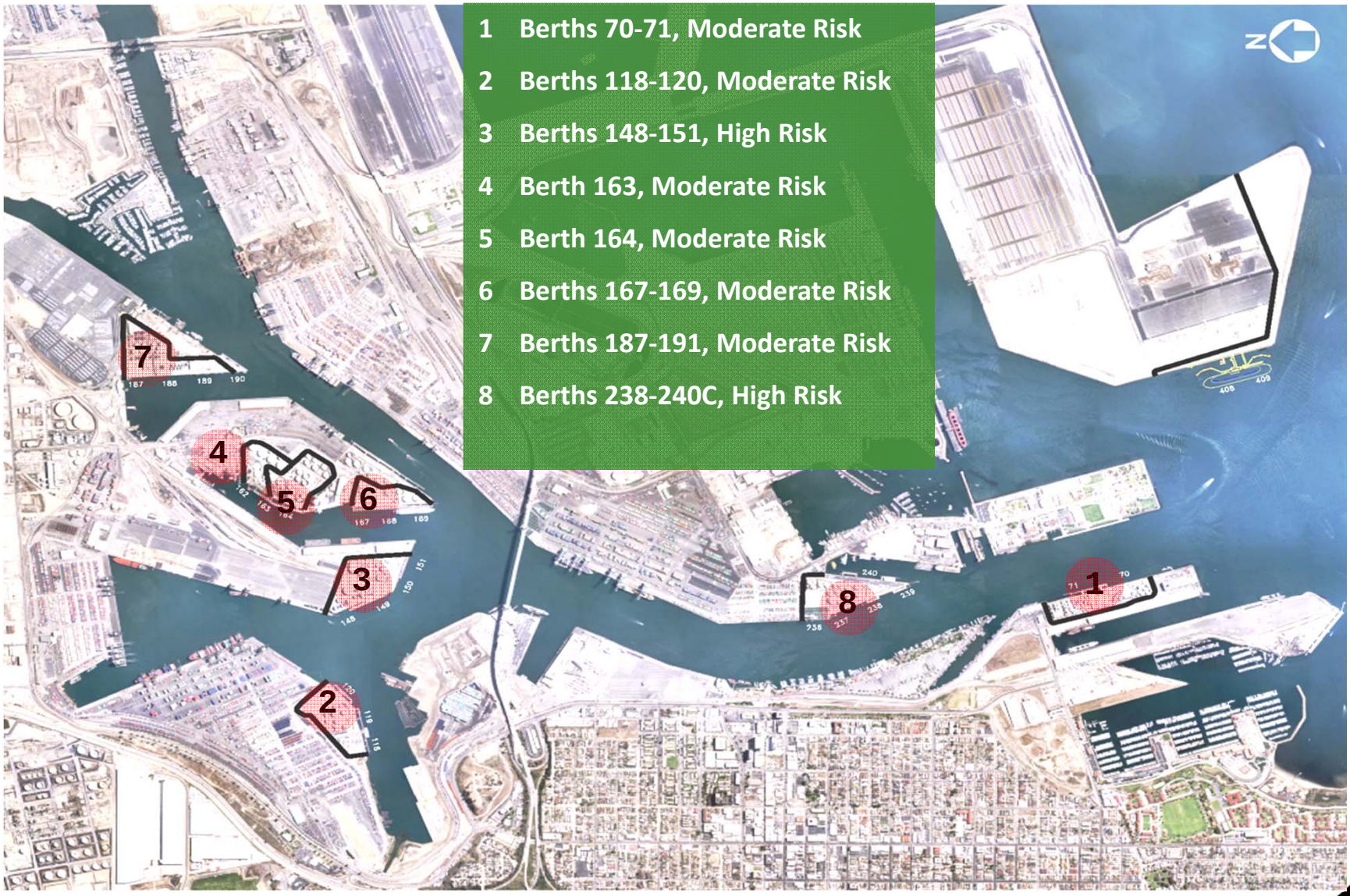
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES (POLA)

Part I: Existing Marine Oil Terminals

Part II: MOTEMS Compliance

Part I: Existing Marine Oil Terminals

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES



THE PORT OF LOS ANGELES

BERTHS 70-71 (DEMOLISHED)

- Built 1923
- 800 ft Berth
- Concrete Deck
- 18” Conc. Piles
- 14.8 ft Deck Elev.
- 35.0 ft Water Depth

Moderate Risk

Initial Audit Submitted 07/2009

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

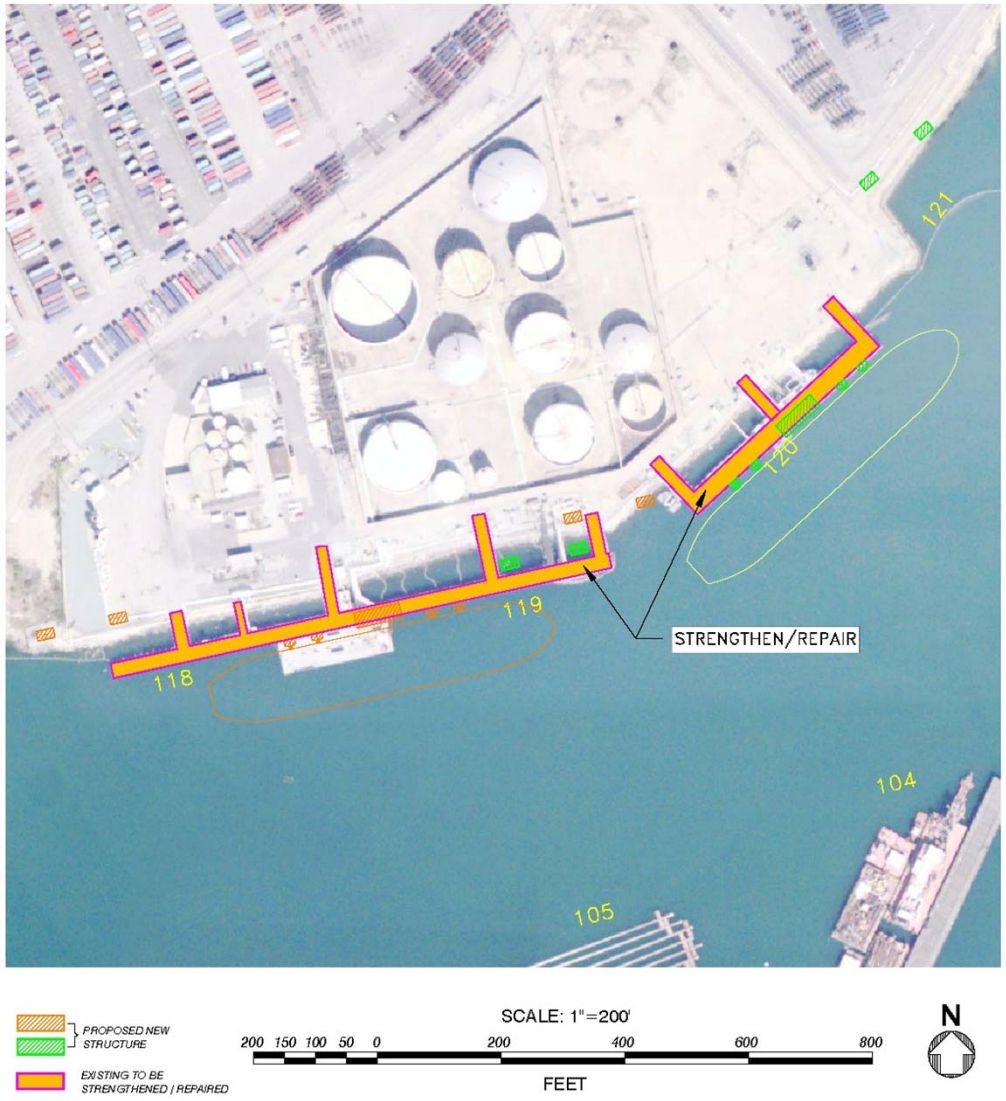
BERTHS 70-71 (DEMOLISHED)

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 118-120

- Built 1959
- 825 ft 2 Berths
- Timber Deck
- Timber Piles
- 13.0 ft Deck Elev.
- 35.0 ft Water Depth



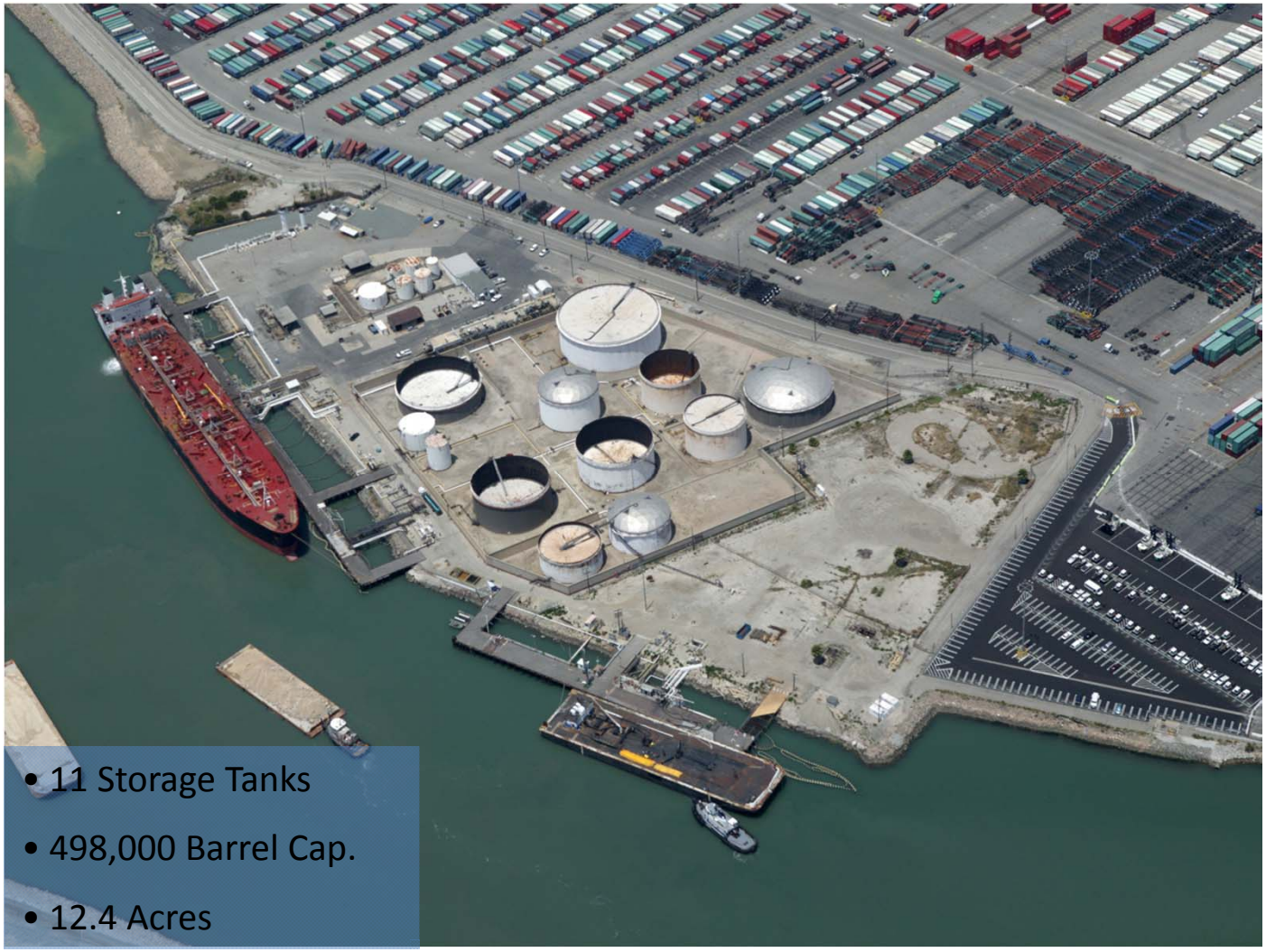
Moderate Risk

Initial Audit Submitted 01/2011

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 118-120

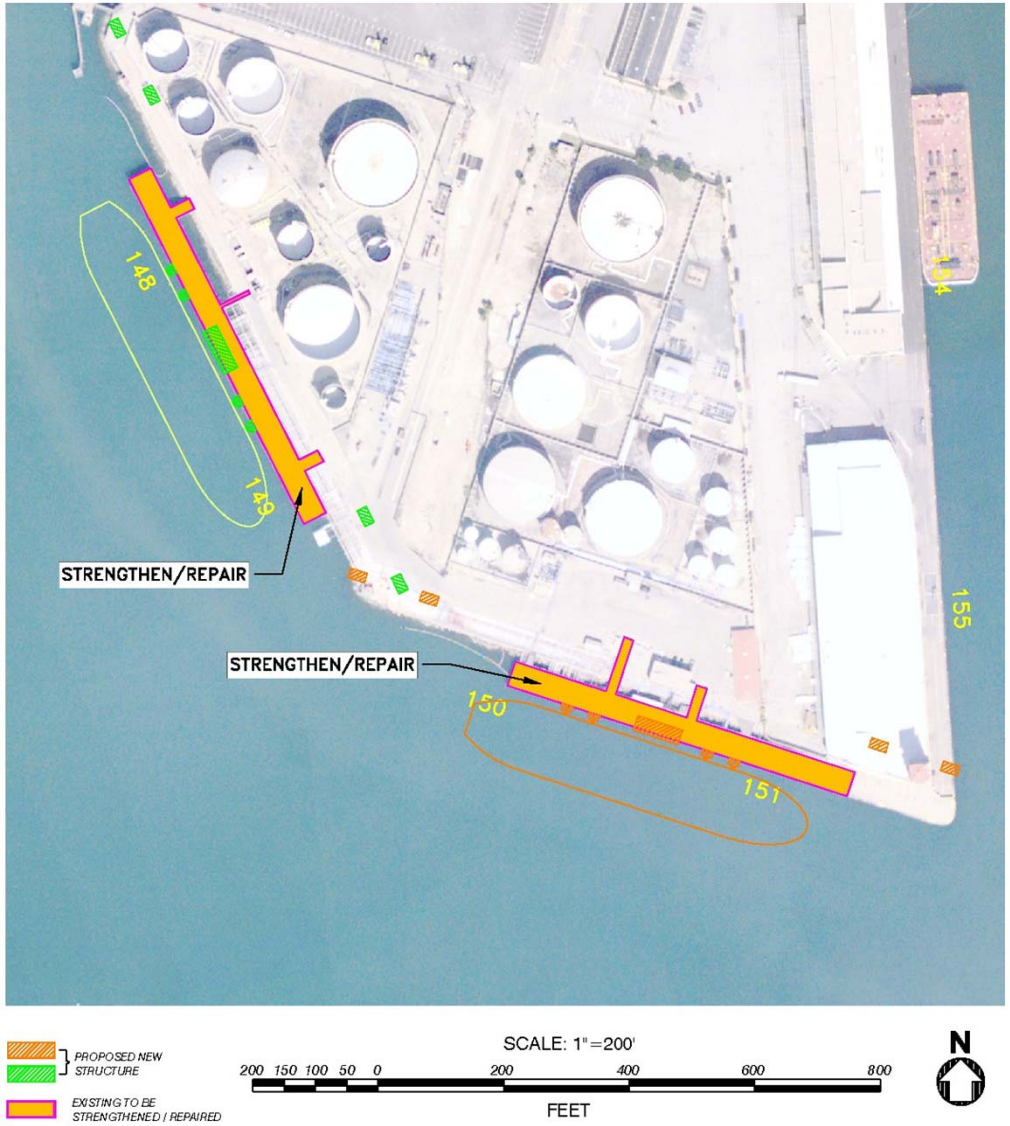


- 11 Storage Tanks
- 498,000 Barrel Cap.
- 12.4 Acres

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 148-151

- Built 1955
- 1328 ft Total Length
- Concrete Deck
- 18” Concrete Piles
- 15.2 ft Deck Elev.
- 35.0 ft Water Depth



High Risk

Initial Audit Submitted 04/2009

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 148-151

- 26 Storage Tanks
- 825,000 Barrel Cap.
- 13.5 Acres

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

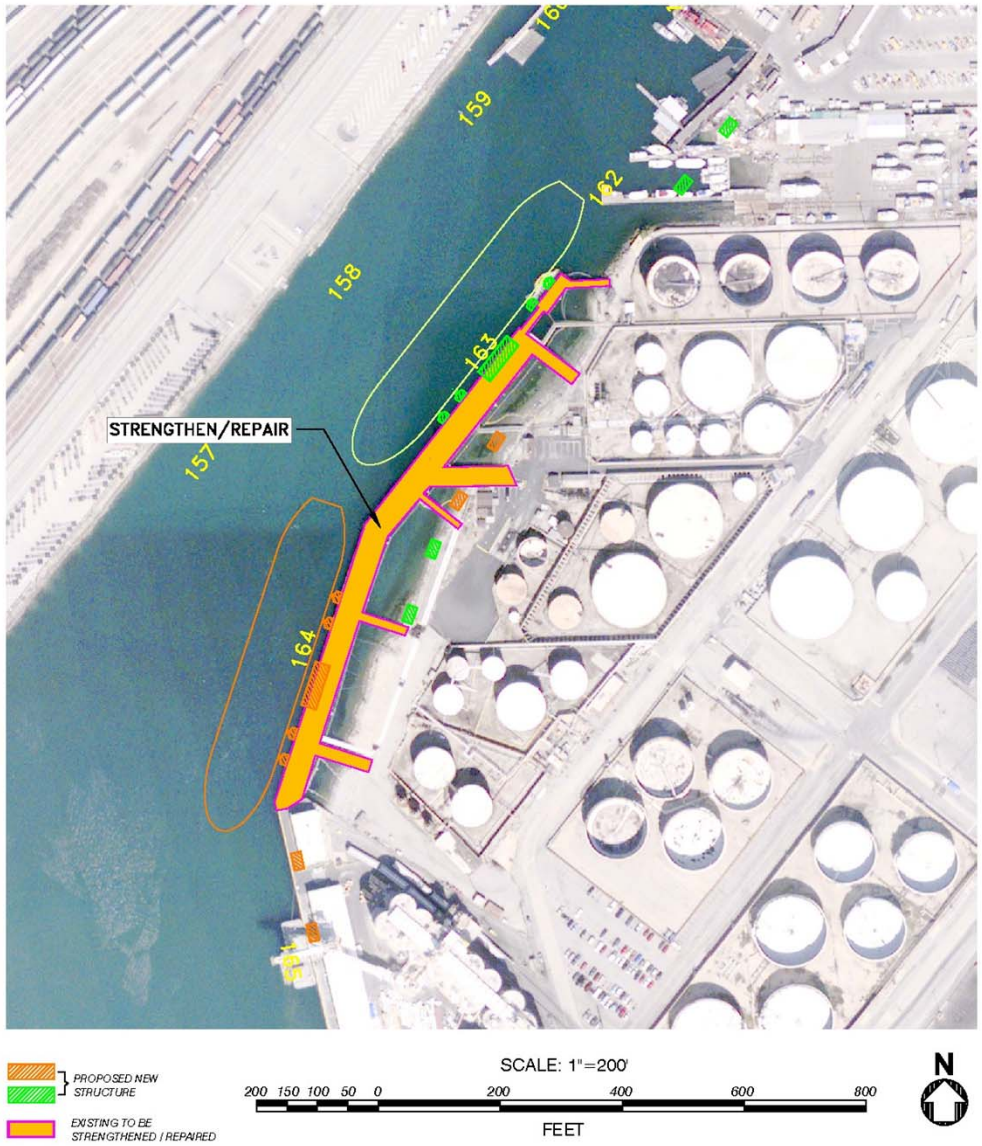
BERTHS 163-164

Berth 163

- Built 1959
- 888 ft Berth
- Timber Deck
- Timber Piles
- 13.0 ft Deck Elev.
- 40.0 ft Water Depth

Moderate Risk

Initial Audit Submitted 01/2010



Berth 164

- Built 1923
- 888 ft Berth
- Timber Deck
- Timber Piles
- 13.0 ft Deck Elev.
- 35.0 ft Water Depth

Moderate Risk

Initial Audit Submitted 01/2010

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 163-164

Berth 163

- 19 Storage Tanks
- 599,000 Barrel Cap.
- 5.8 Acres

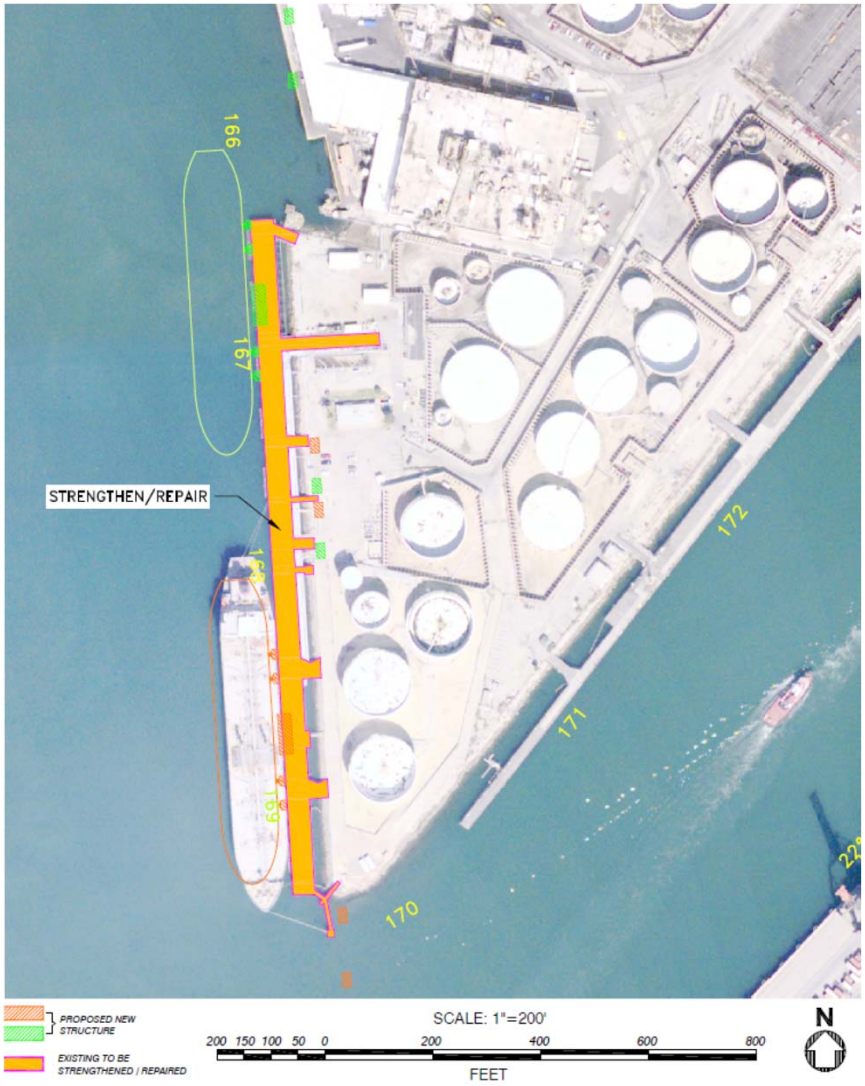
Berth 164

- 17 Storage Tanks
- 947,000 Barrel Cap.
- 10.5 Acres

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 167-169

- Built 1947
- 1238 ft Total Length
- Timber Deck
- Timber Piles
- 13.0 ft Deck Elev.
- 40.0 ft Water Depth



Moderate Risk

Initial Audit Submitted 01/2010

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 167-169

- 10 Storage Tanks
- 580,000 Barrel Cap.
- 9.1 Acres

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 187-191

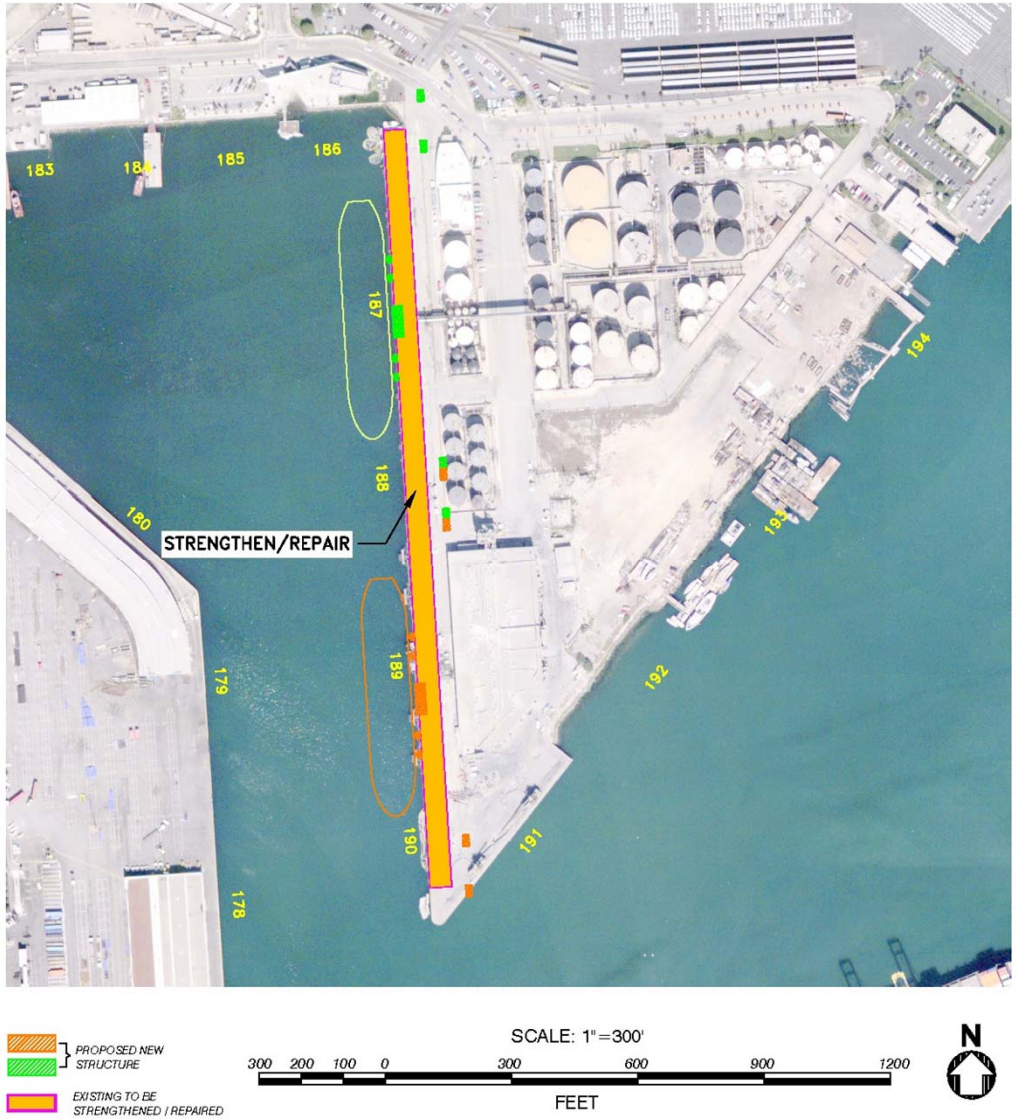
Berths 187-191

- 2,336 ft Total Length
- 15.0 ft Deck Elev.
- 38.0 ft Water Depth

- B187 Built 1920
- Concrete Deck & Piles

- B188 Built 1921
- Concrete Deck & Piles

- B189-191 Built 1922
- Timber Deck & Piles



Moderate Risk

Initial Audit Submitted 02/2010

THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 187-191

- 60 Storage Tanks at 700,000 Barrels Cap.
- 22 Storage Tanks 1,700,000 Barrels Cap. (inland)

THE PORT OF LOS ANGELES

BERTHS 238-240C

Berths 238-240C

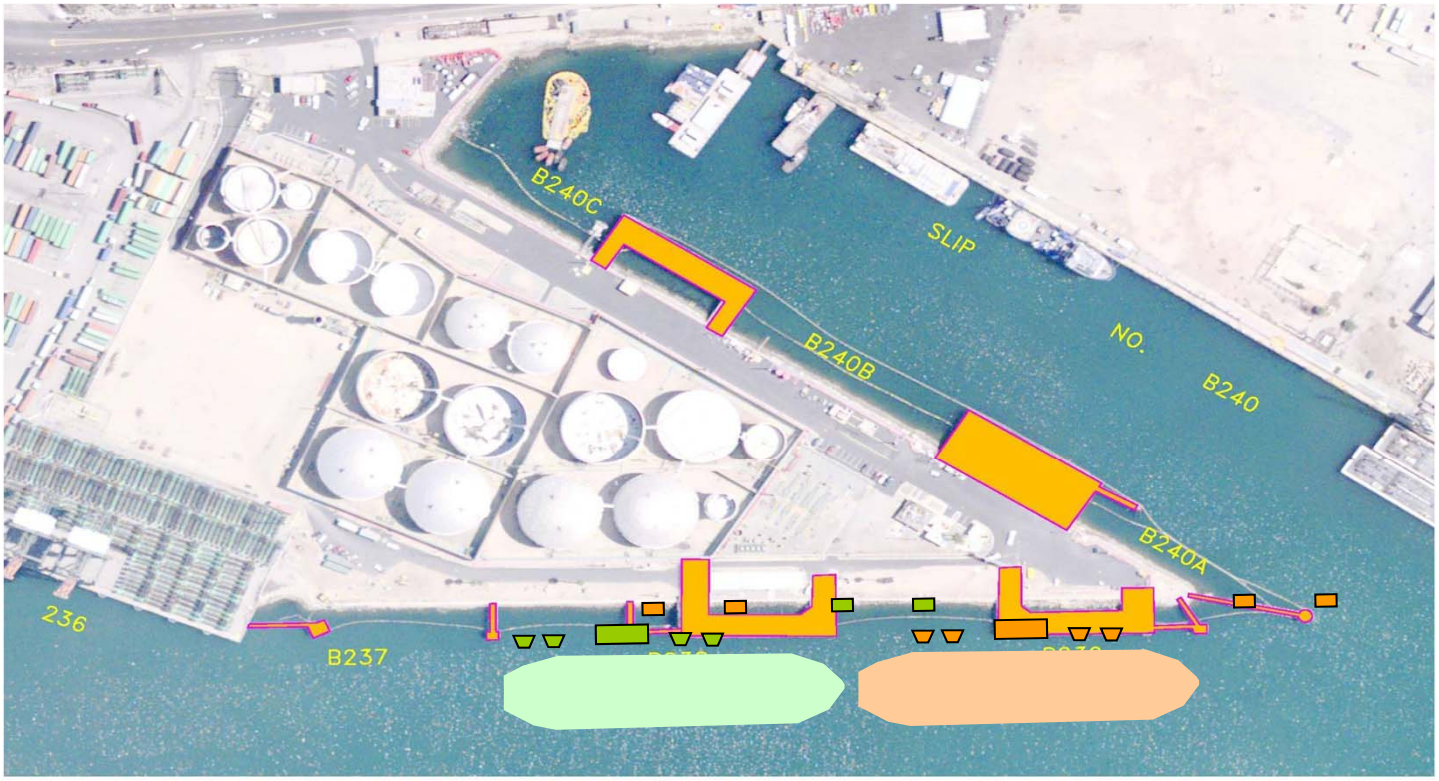
- 903 ft Total Length
- 14.0 ft Deck Elev.
- 37.0 ft Water Depth

- B238-239 Built 1925
- Concrete Decks & Piles

- B240 Built 1926
- Timber Deck & Piles

High Risk

Initial Audit Submitted 08/2008



THE PORT OF LOS ANGELES

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 238-240C

- 26 Storage Tanks
- 2,313,000 Barrel Cap.
- 31.4 Acres

THE PORT OF LOS ANGELES

Part II: MOTEMS Compliance

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

MOT	Risk Classification	Initial Audit Submitted	1st Subsequent Audit Schedule	2nd Subsequent Audit Schedule
Berths 70-71	Moderate	07/2009	N/A (Demolished)	---
Berths 118-120	Moderate	01/2011	N/A	N/A
Berths 148-151	High	04/2009	(B148-149) 04/2012 (B150-151) N/A	(B148-149) 04/2015 (B150-151) N/A
Berth 163	Moderate	01/2010	02/2013	02/2016
Berth 164	Moderate	01/2010	02/2013	02/2016
Berths 167-169	Moderate	01/2010	01/2013	01/2016
Berths 187-191	Moderate	02/2010	02/2013	02/2016
Berths 238-240C	High	08/2008	08/2011	08/2014

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

The Port's focus, with respects to Plans, Specifications, and Estimates (PS&E), for MOTEMS compliance for existing Marine Oil Terminals (MOTs) is as follows:

- Division 2 – Audit and Inspection(Structural Only)
- Division 3 – Structural Loading Criteria(Structures Only)
- Division 4 – Seismic Analysis and Structural Performance
- Division 5 – Mooring and Berthing Analysis and Design
- Division 6 – Geotechnical Hazards and Foundations
- Division 7 – Structural Analysis and Design of Components

PS&E Goals:

- Comply with MOTEMS
- Prepare PS&E:
  - New Mooring and Berthing Structures
  - Independent Structural Systems
  - Slope Stability
  - MEP components compatible with Structural System Displacements

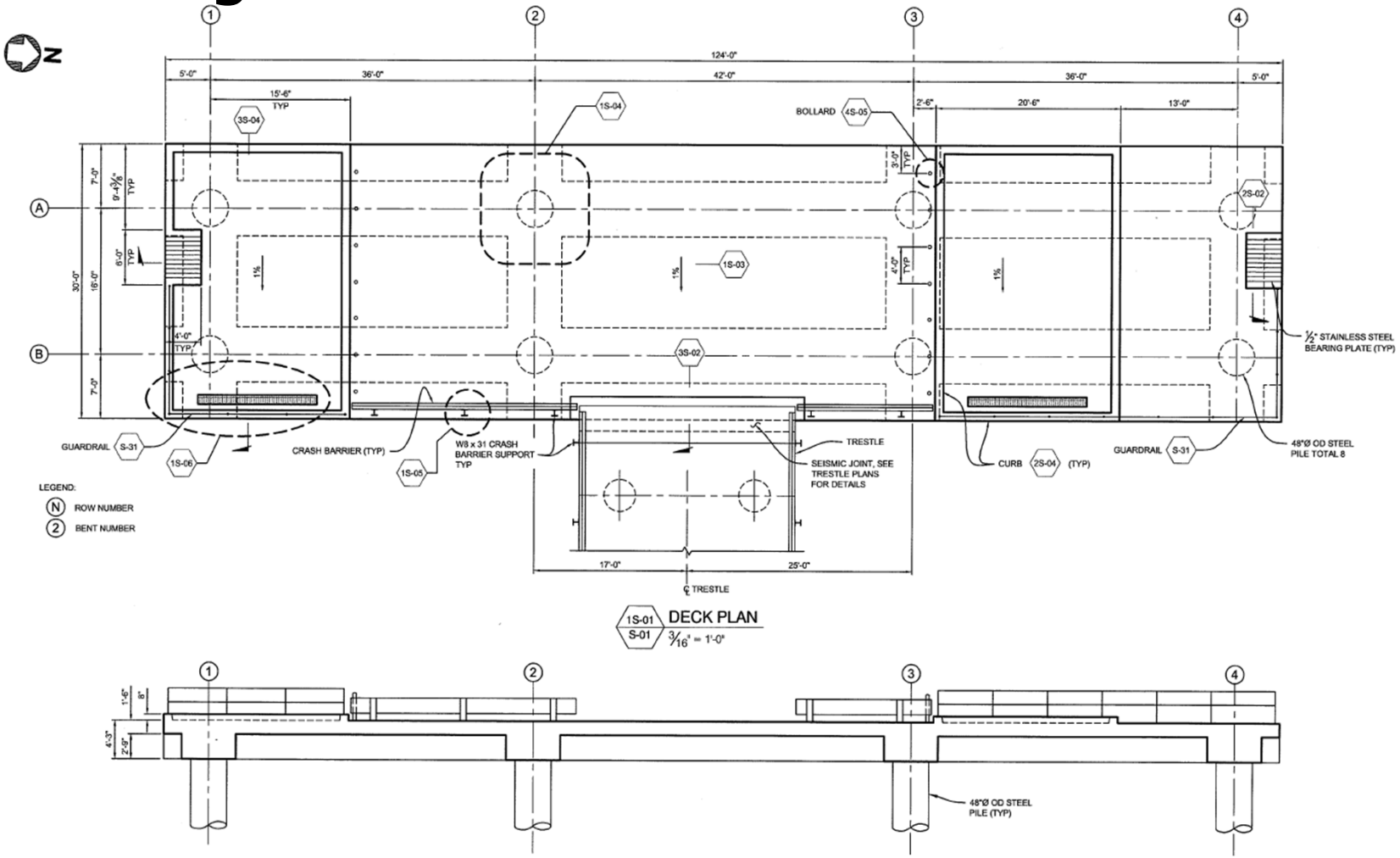
MOTEMS compliance options for:

- Loading Platform Structures
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring

MOTEMS compliance options for:

- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring

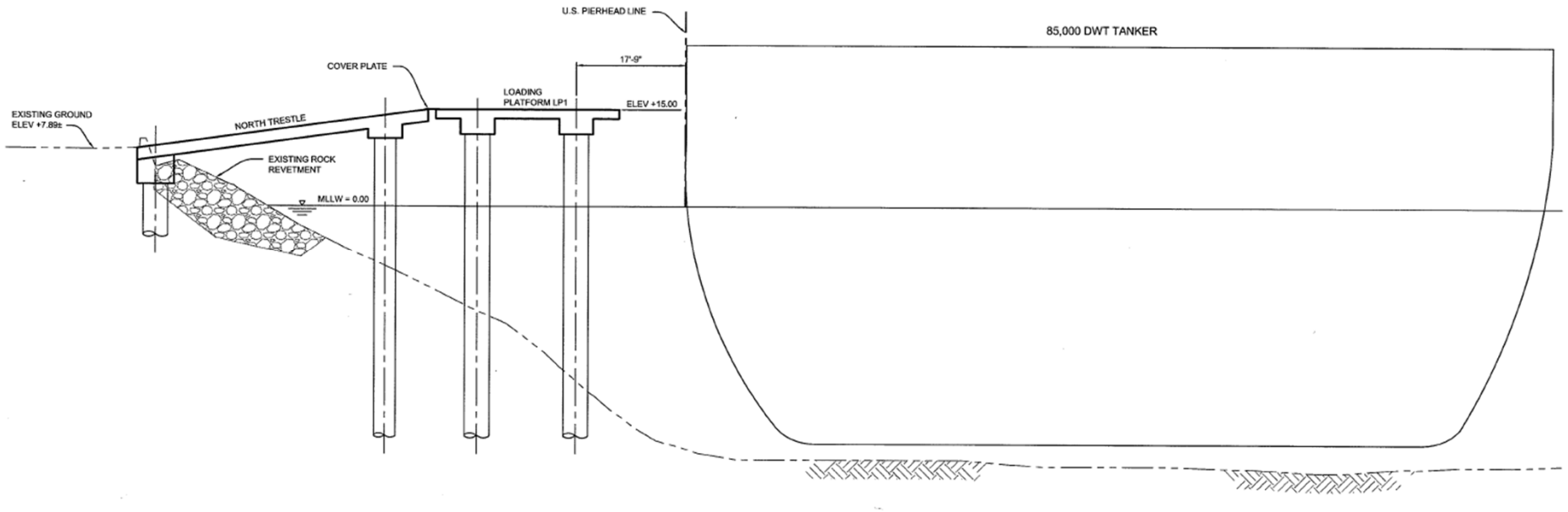
Loading Platform



Steel Piles, Concrete Deck and Pile Caps

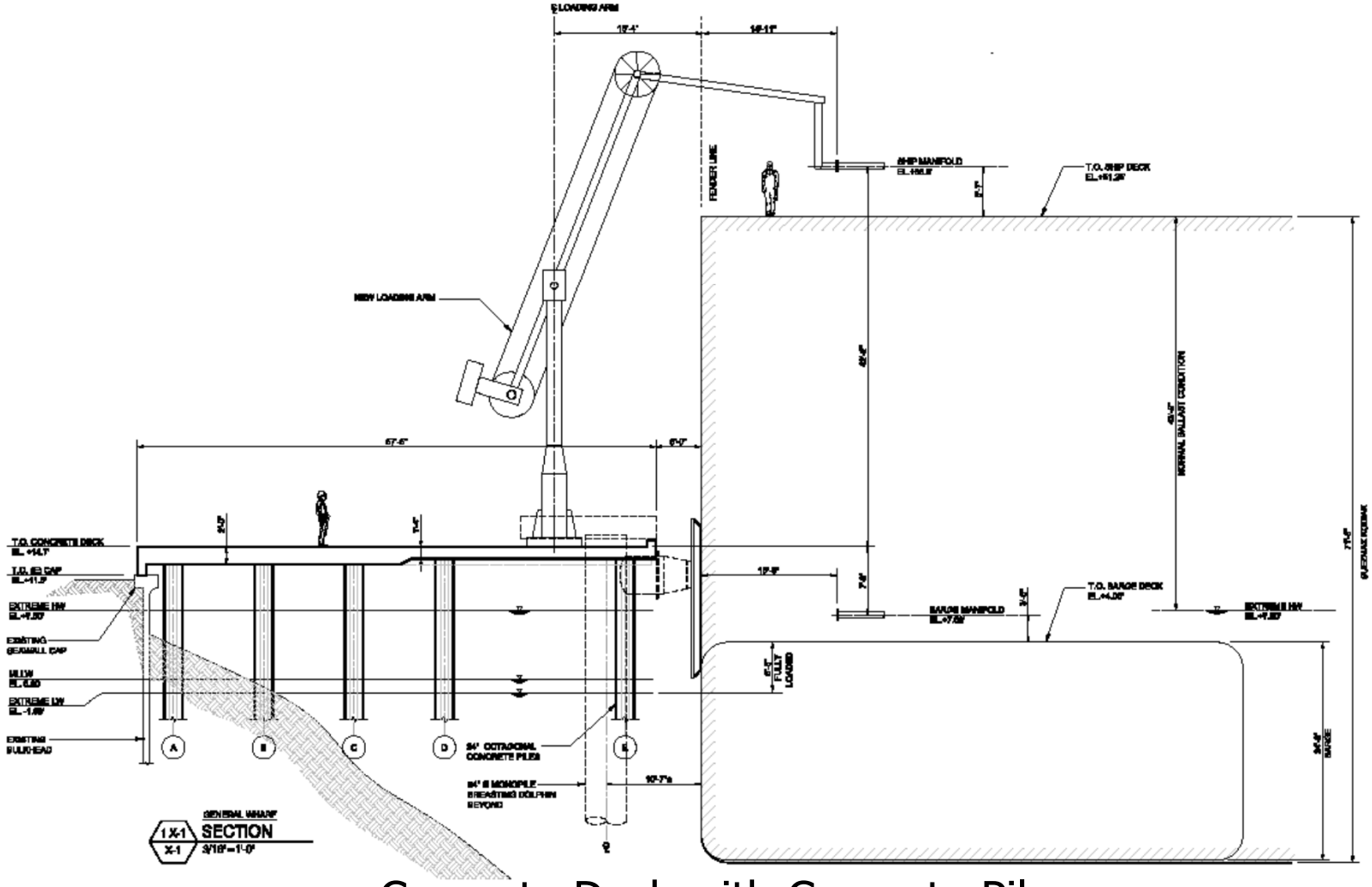
THE PORT OF LOS ANGELES

Loading Platform



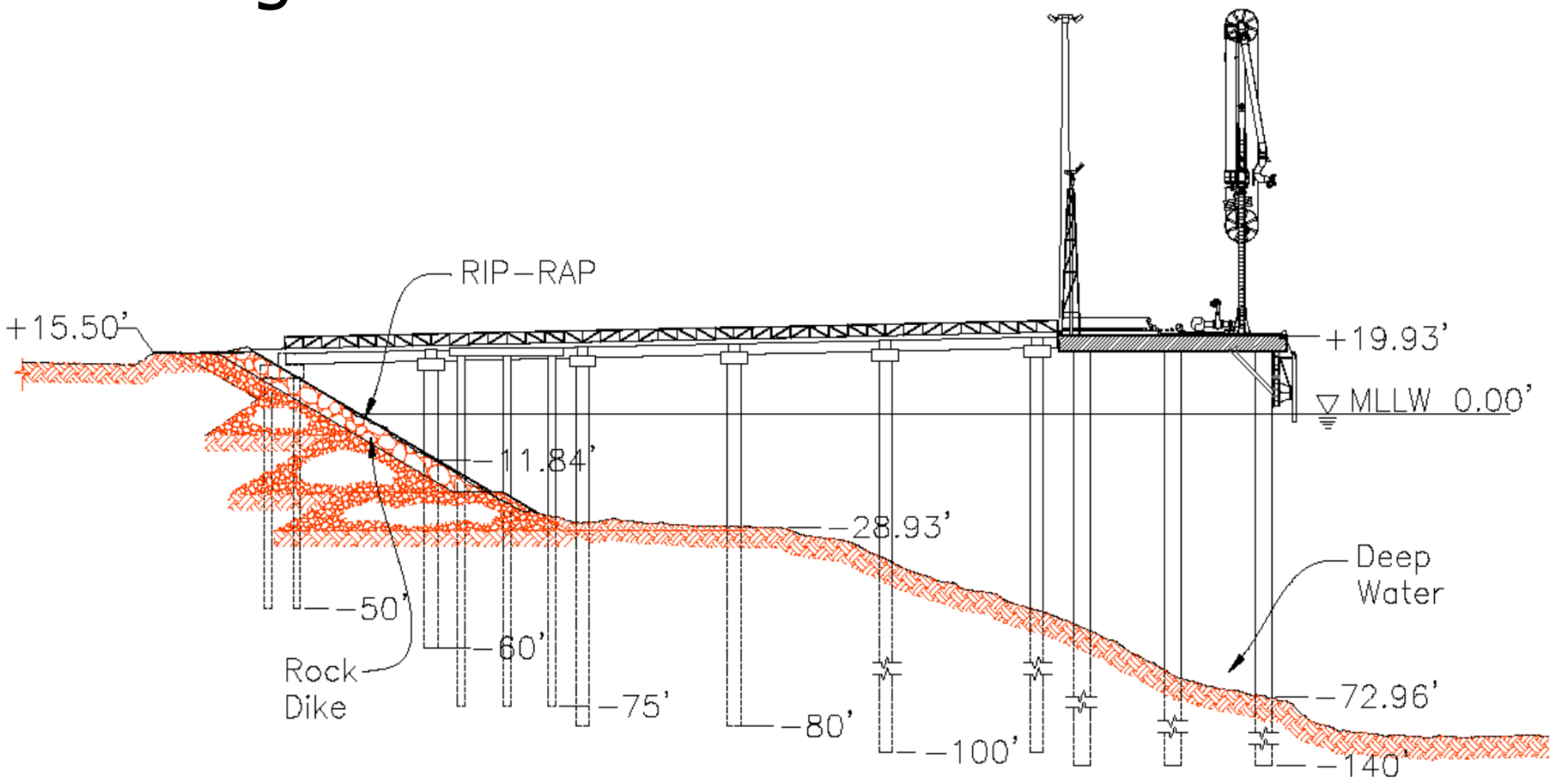
Cross Section of Steel Piles, Concrete Pile Caps and Conrete Deck with Matching Trestle

Loading Platform



Concrete Deck with Concrete Piles

Loading Platform



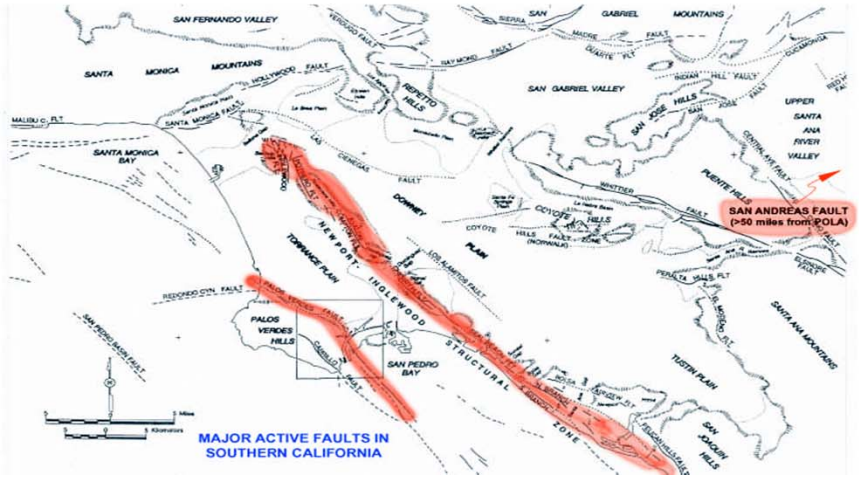
Concrete Deck with Concrete Piles Integrated into the Existing Timber Wharf

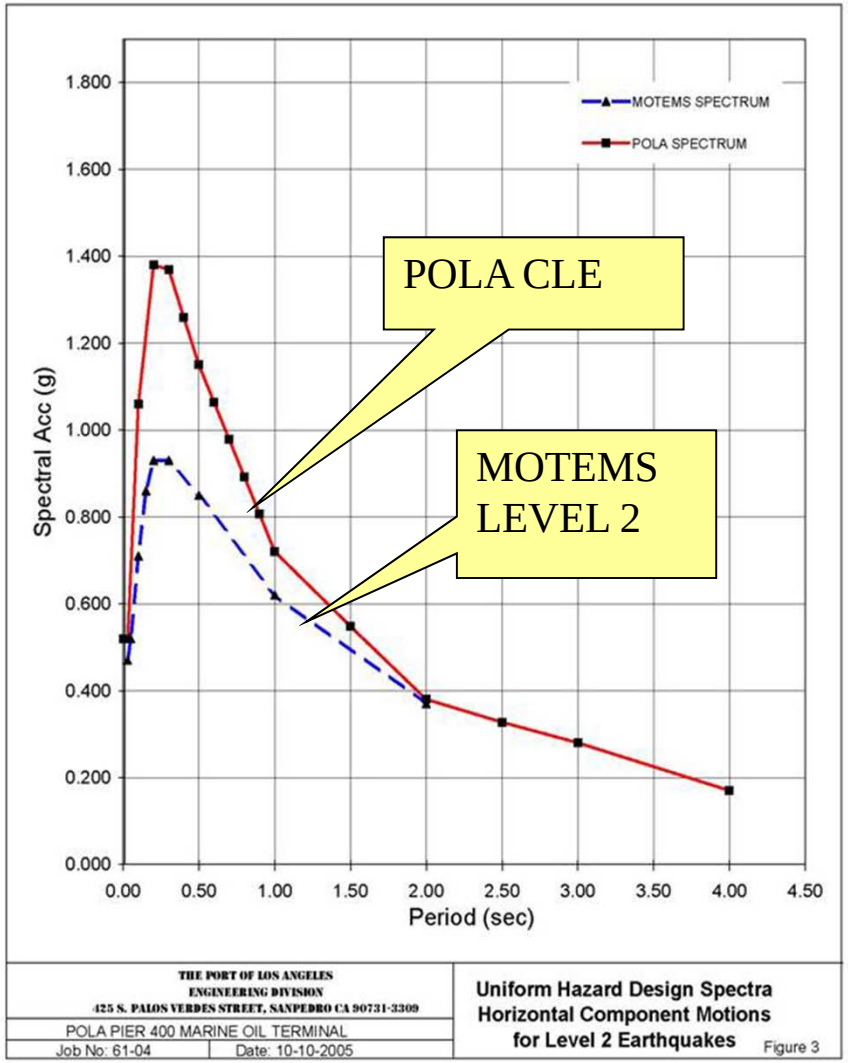
MOTEMS compliance options for:

- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring

Seismic

- Design consistency at POLA
- Palos Verdes fault
- Site-specific design spectra and seven sets of orthogonal time history records
- POLA Port-wide Ground Motion Study produced site-specific OLE and CLE spectra





Seismic

TABLE 31F-4-1 MOT RISK CLASSIFICATION			
Risk Classification	**Exposed Oil (bbls)**	**Transfers per Year per Berthing System**	**Maximum Vessel Size (DWTx1000)**
High	≥1200	N.A.	N.A.
Moderate	<1200	≥90	≥30
Low	<1200	<90	<30

Purpose is to establish minimum seismic analysis and structural performance.
Performance is evaluated at a two level criteria:
Level 1 and Level 2
MOTEMS risk classification (Table 31-F-4-1)
All new MOTS are classified as high risk.

1. Exposed oil ≥ 1200 bbls

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

TABLE 31F-4-2 SEISMIC PERFORMANCE CRITERIA			
Risk Classification	**Seismic Performance Level**	**Probability of Exceedance**	**Return Period**
High	Level 1	50% in 50 years	72 years
	Level 2	10% in 50 years	475 years
Moderate	Level 1	65% in 50 years	48 years
	Level 2	15% in 50 years	308 years
Low	Level 1	75% in 50 years	36 years
	Level 2	20% in 50 years	224 years

Design Earthquake Motions:

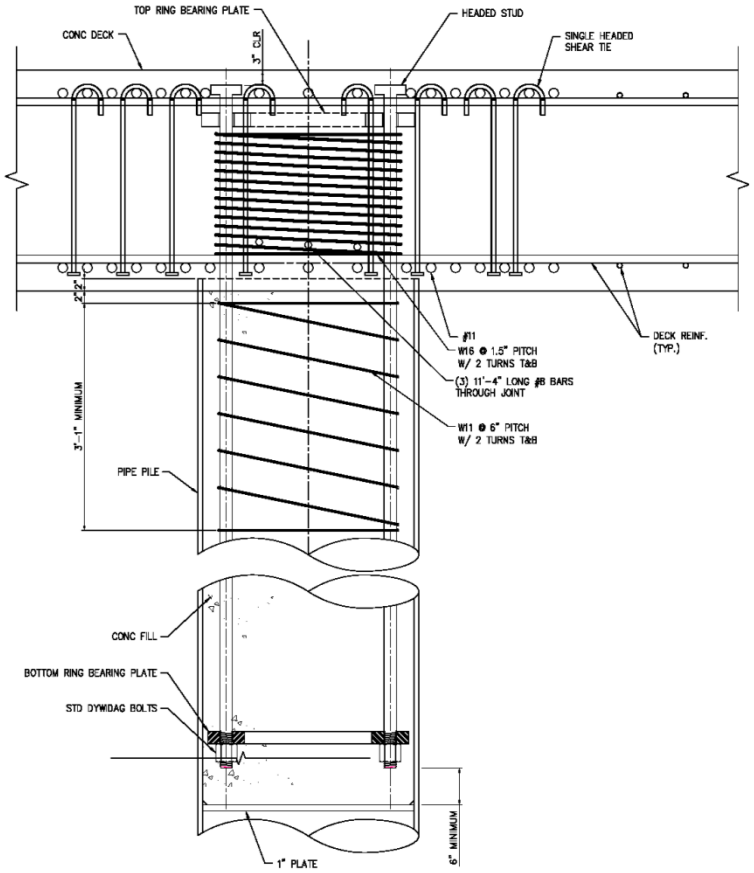
Level 1

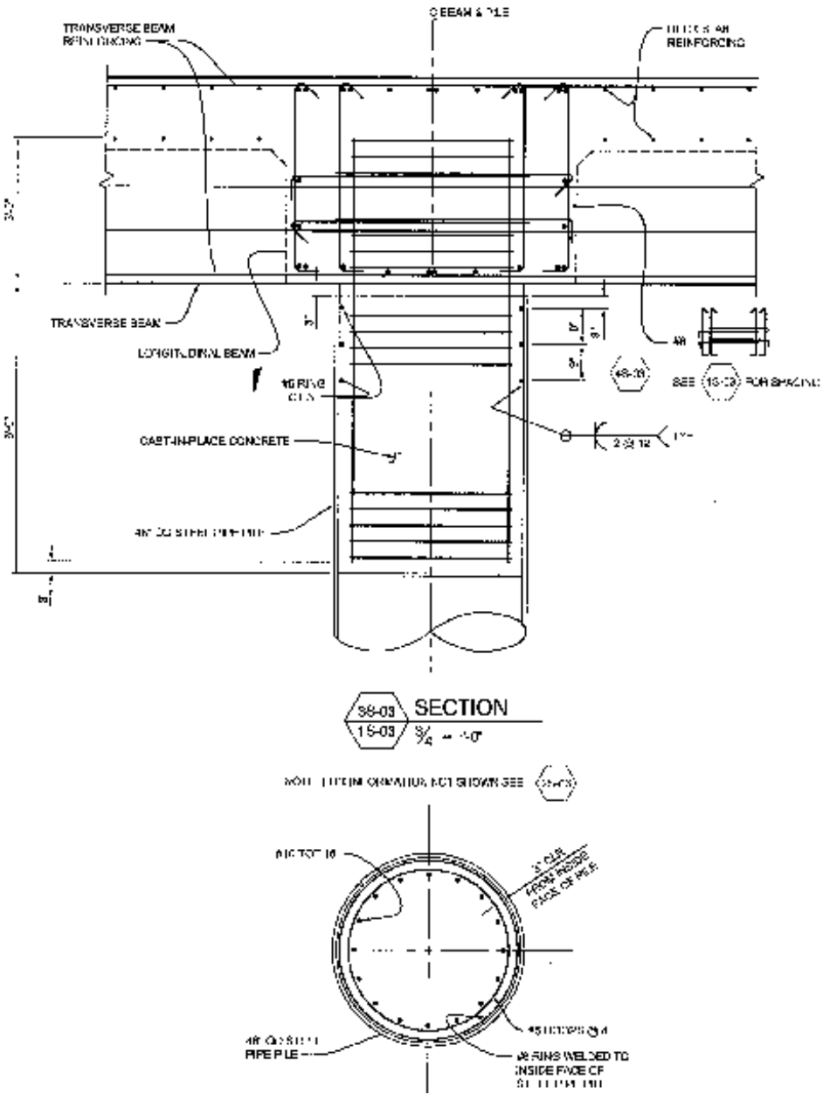
- Minor or no structural damage
- Temporary or no interruption in operations

Level 2

- Controlled inelastic structural behavior with repairable damage
- Prevention of structural collapse
- Temporary loss of operations, restorable within months
- Prevention of major spill (≥ 1200 bbls)

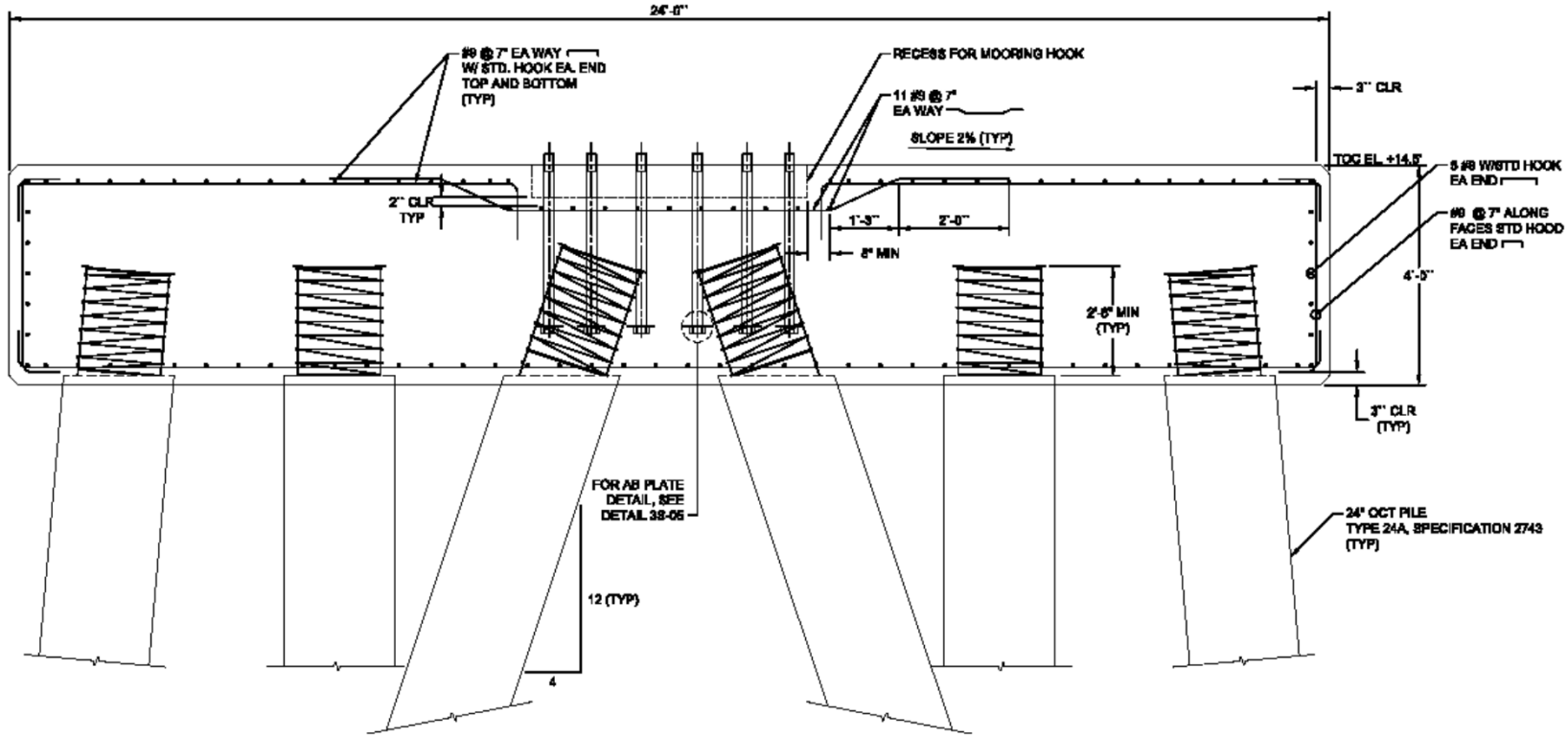
Seismic





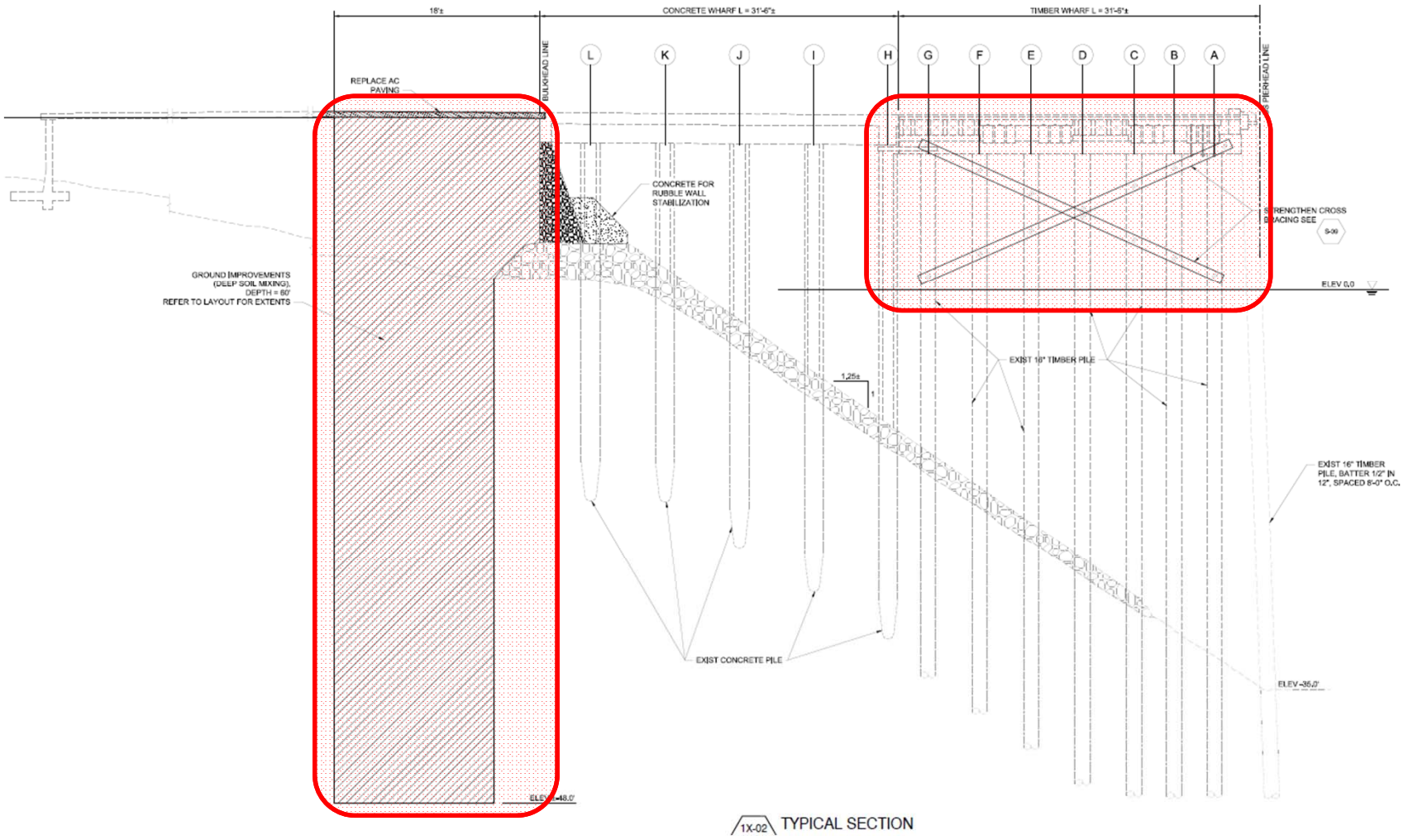
Steel Piles with Seismic Connection into Concrete Caps

Seismic



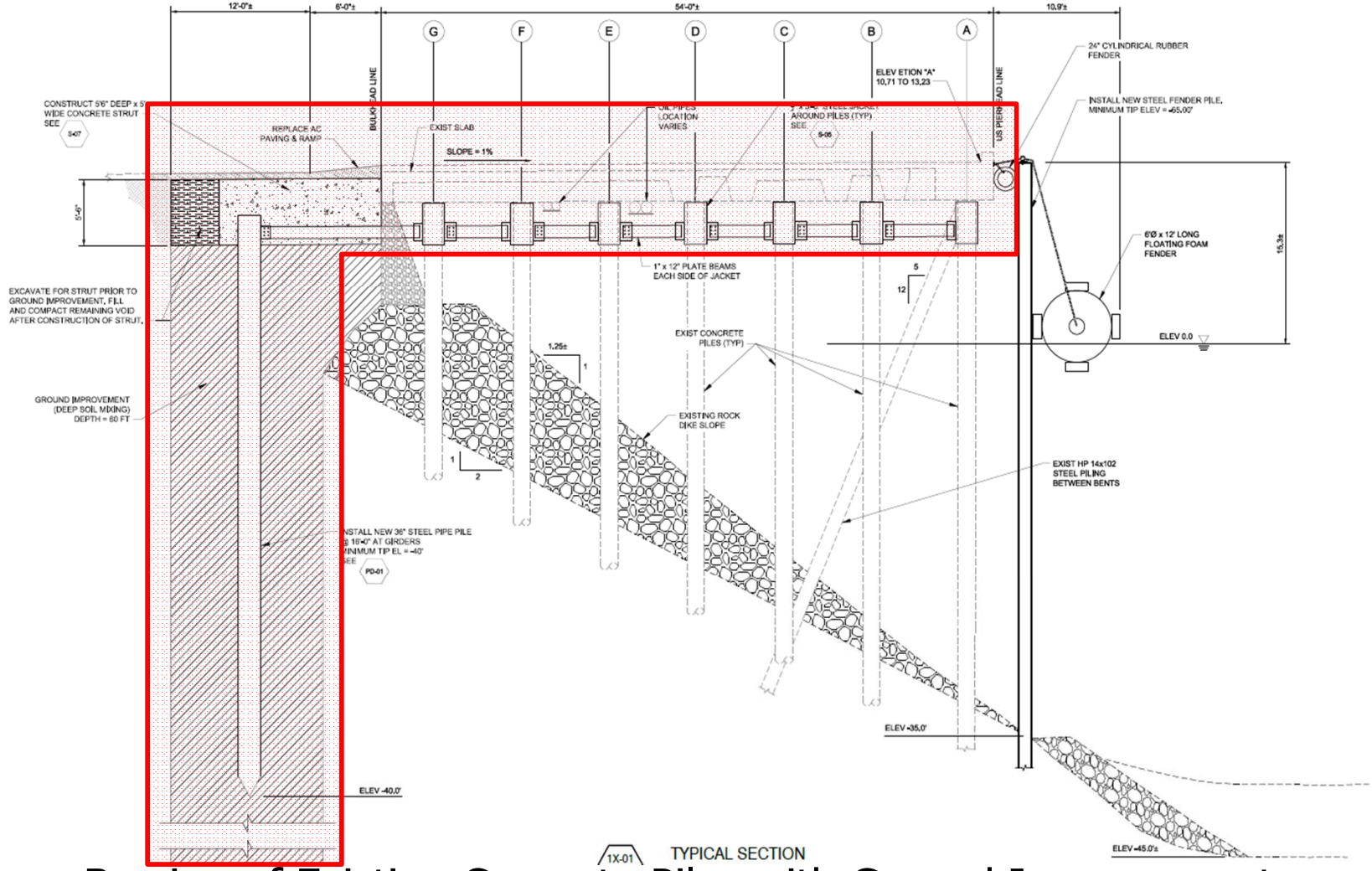
Concrete Piles with Seismic Connection into a Concrete Deck

Seismic



Bracing of Existing Timber Wharf with Ground Improvements

Seismic



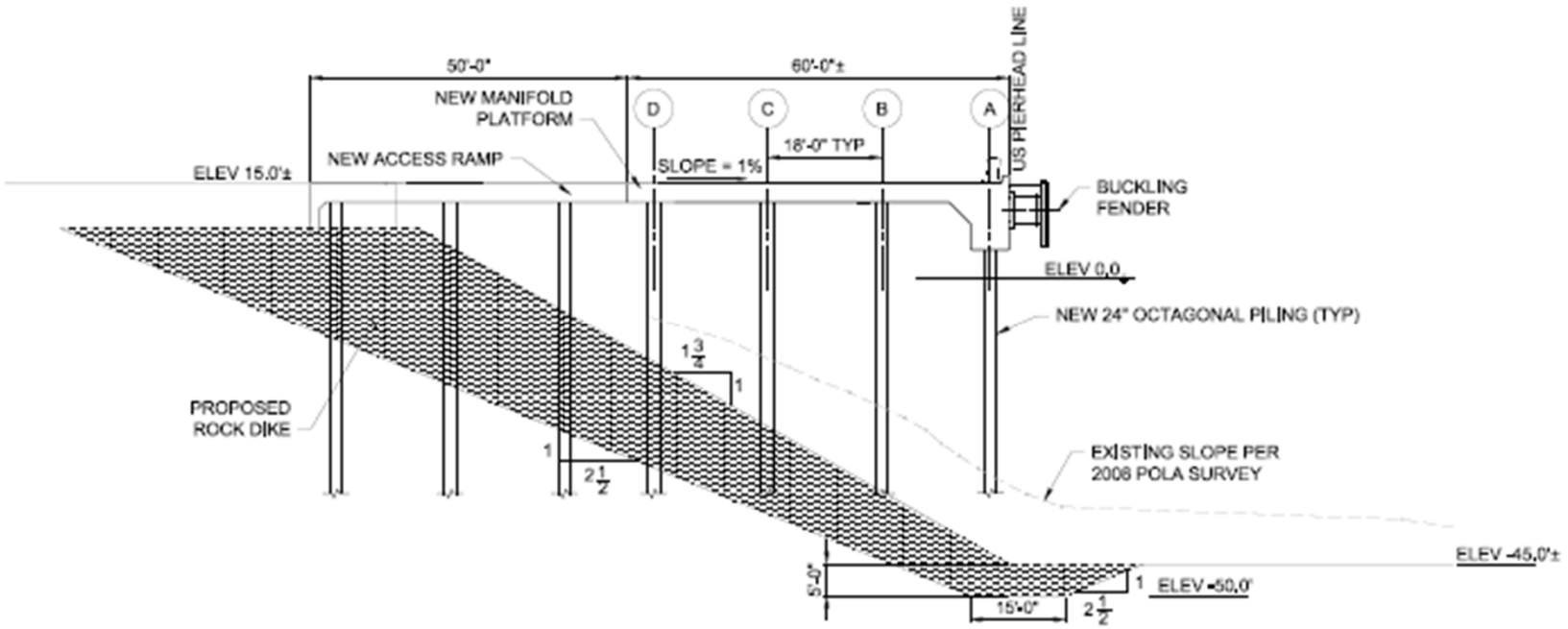
Bracing of Existing Concrete Piles with Ground Improvements

THE PORT OF LOS ANGELES

MOTEMS compliance options for:

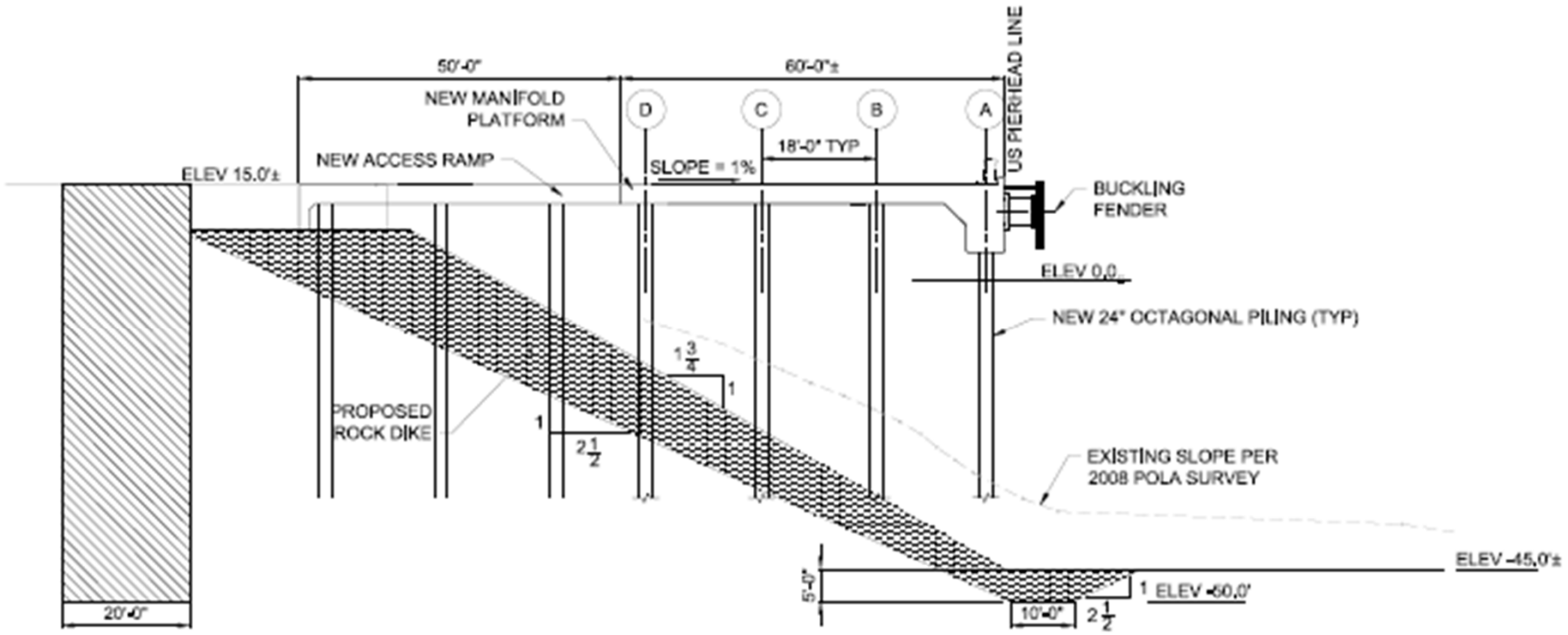
- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring

Slope Stability (Geotechnical)



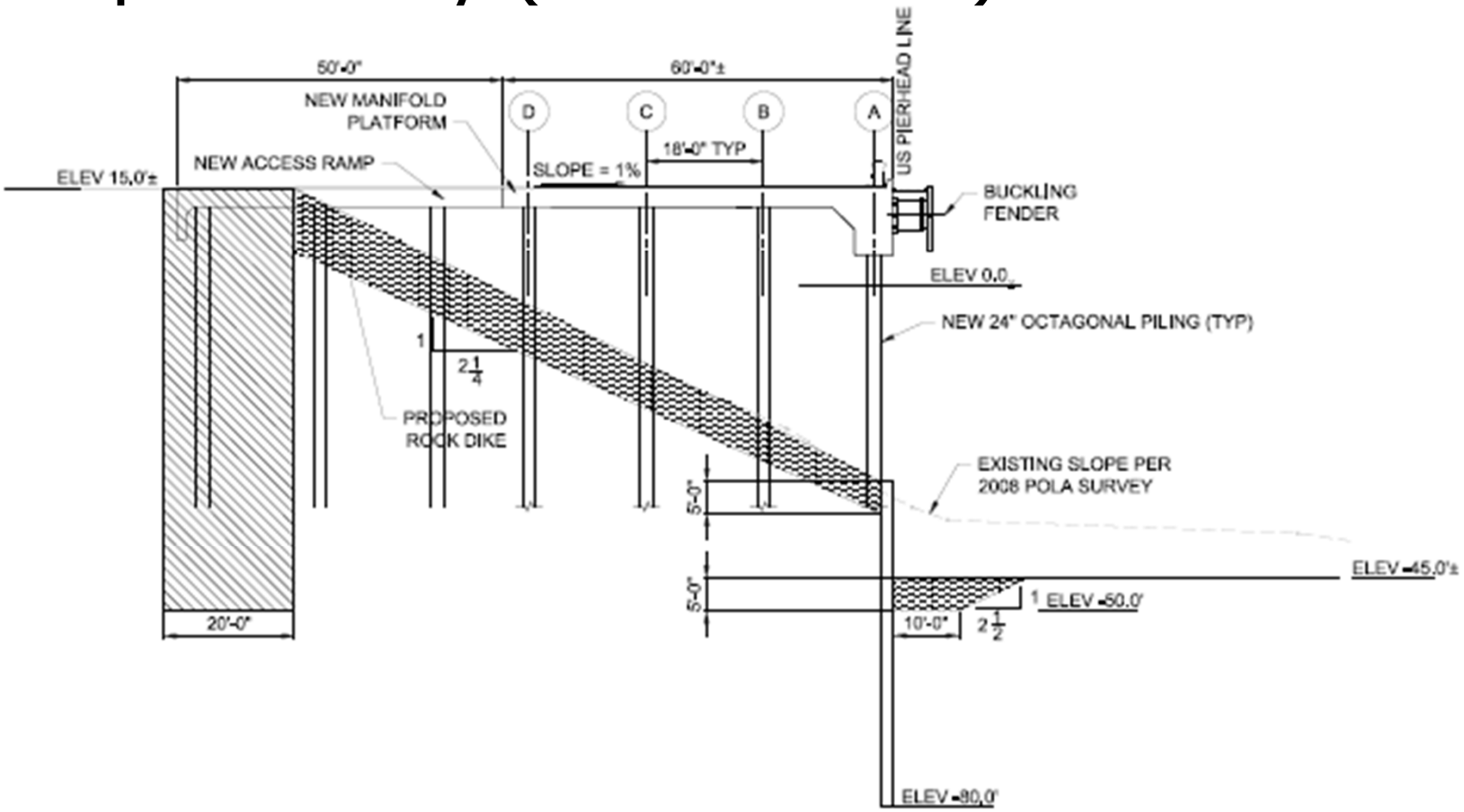
New Dike (New Wharf)

Slope Stability (Geotechnical)



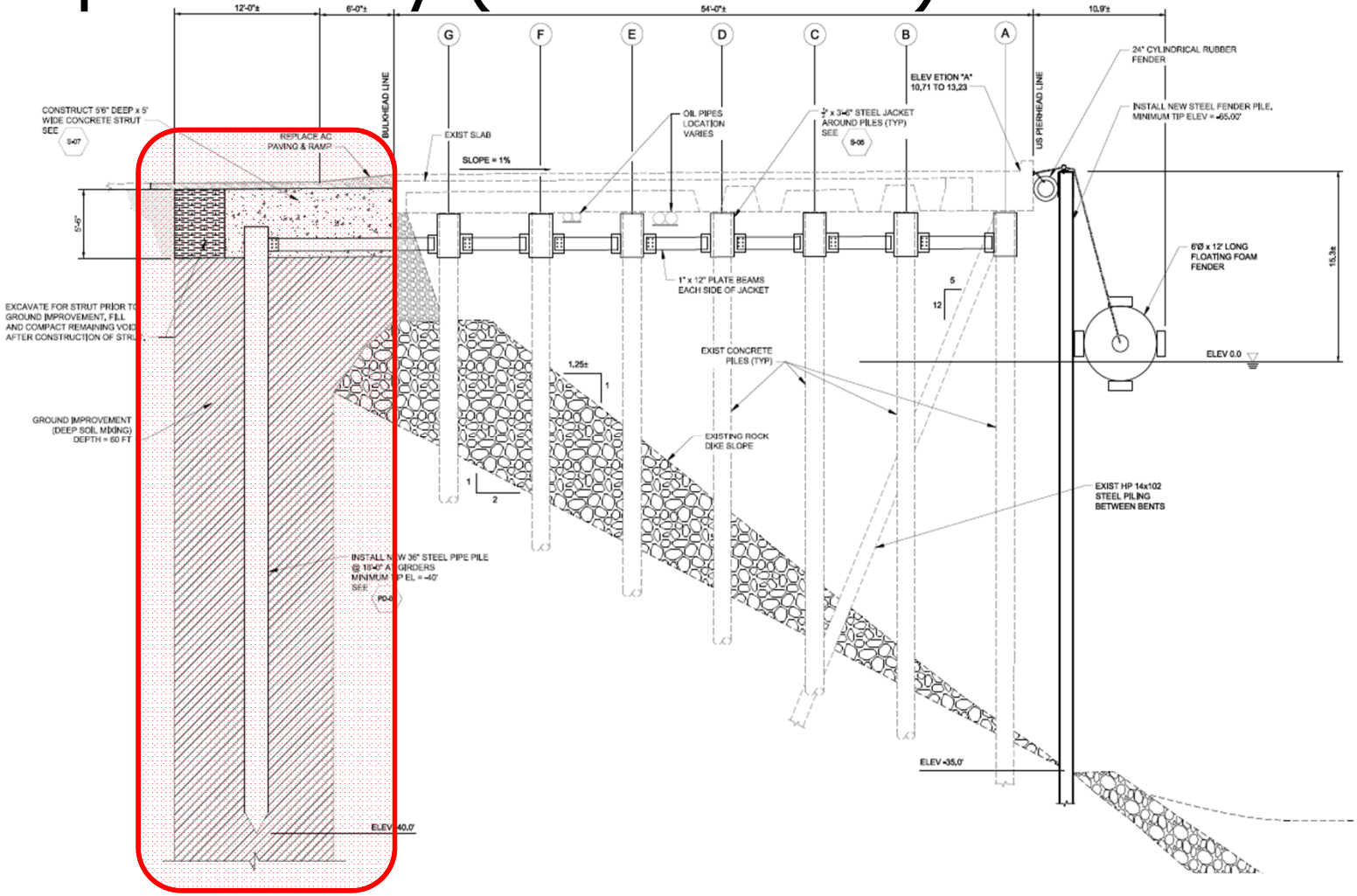
Dike Improvements with Ground Improvements (New Wharf)

Slope Stability (Geotechnical)



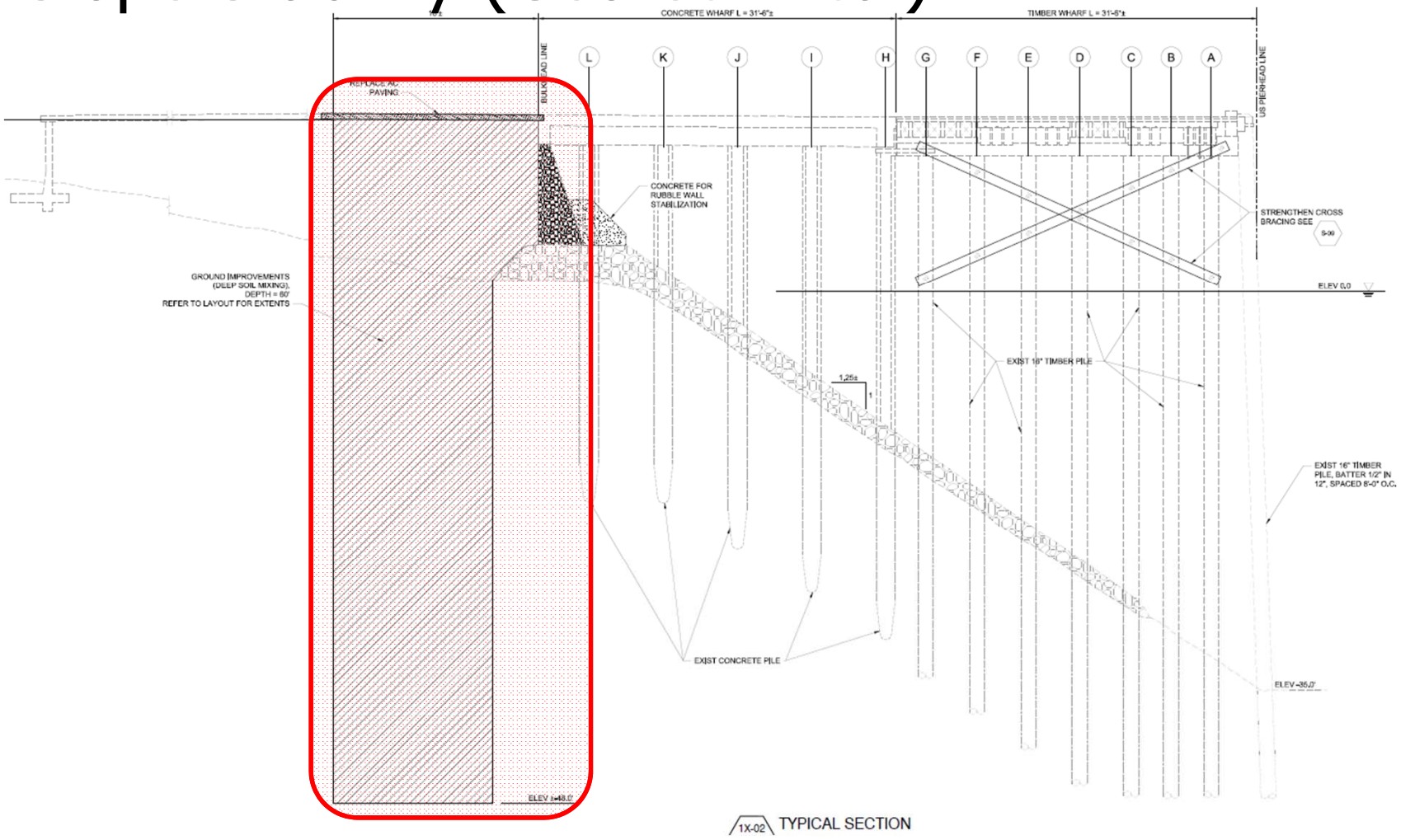
Integrated Piles with Ground Improvements and Underwater Bulkhead (New Wharf)

Slope Stability (Geotechnical)



Integrated Piles with Ground Improvements at Existing Wharf

Slope Stability (Geotechnical)

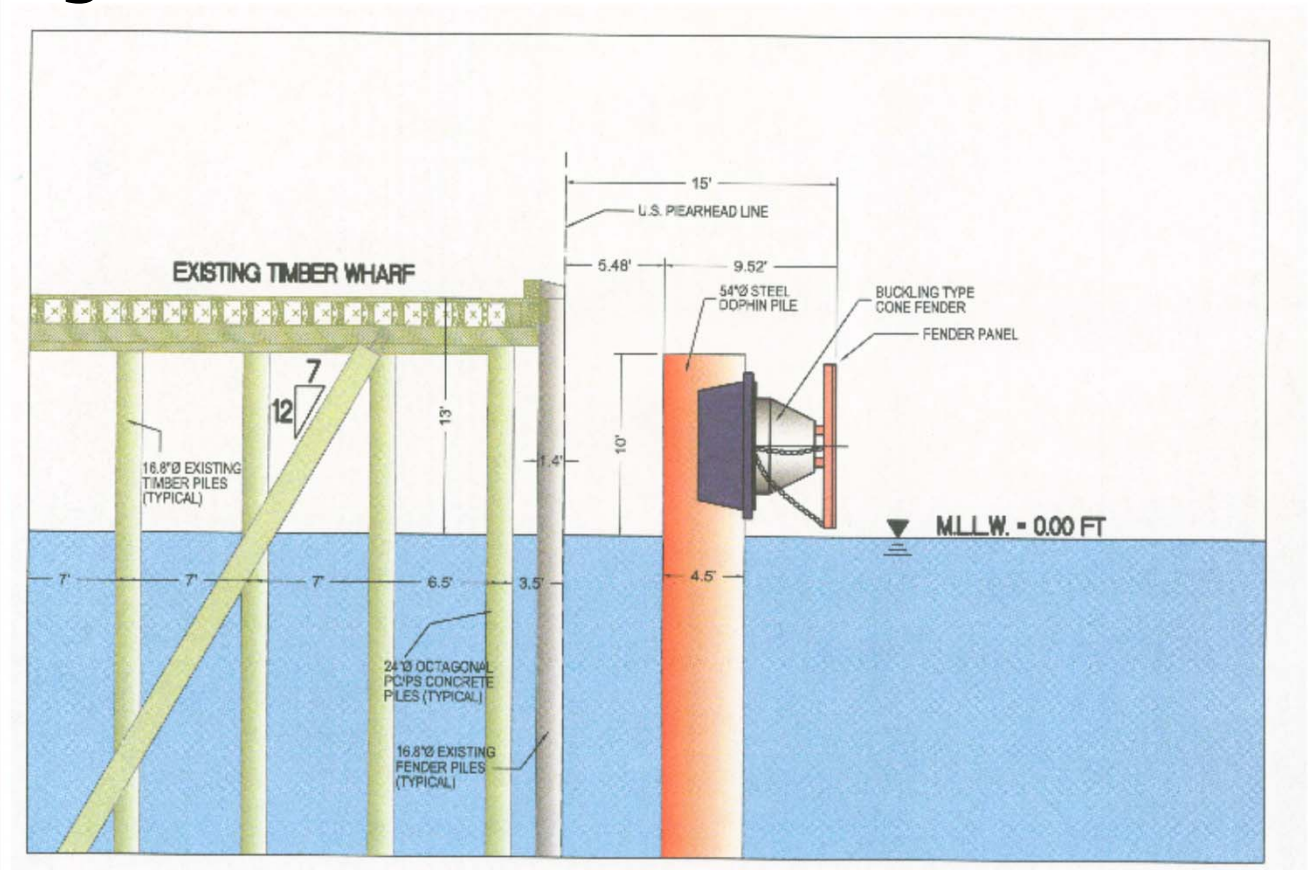


Ground Improvements at Existing Wharf

MOTEMS compliance options for:

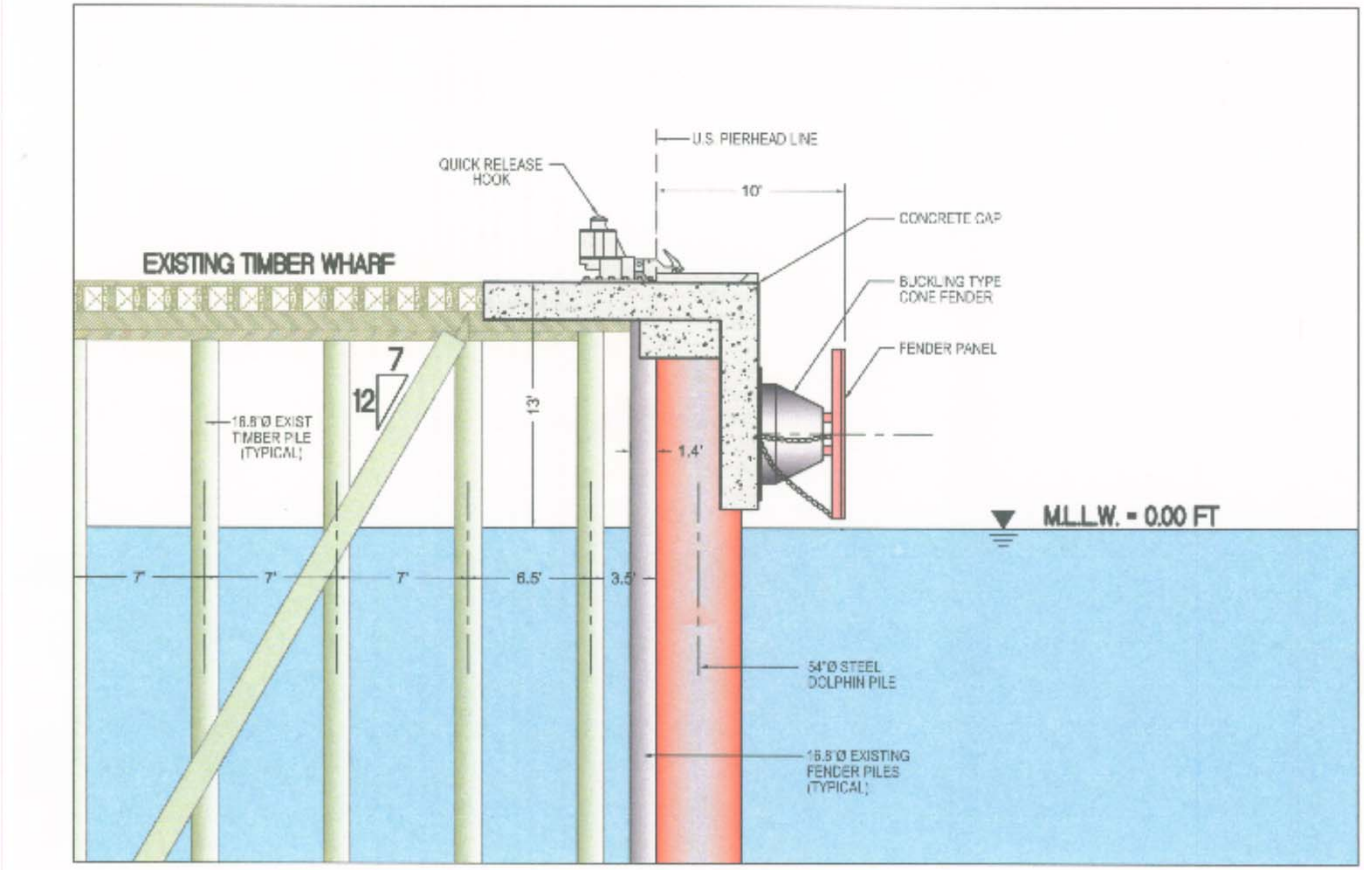
- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring

Berthing



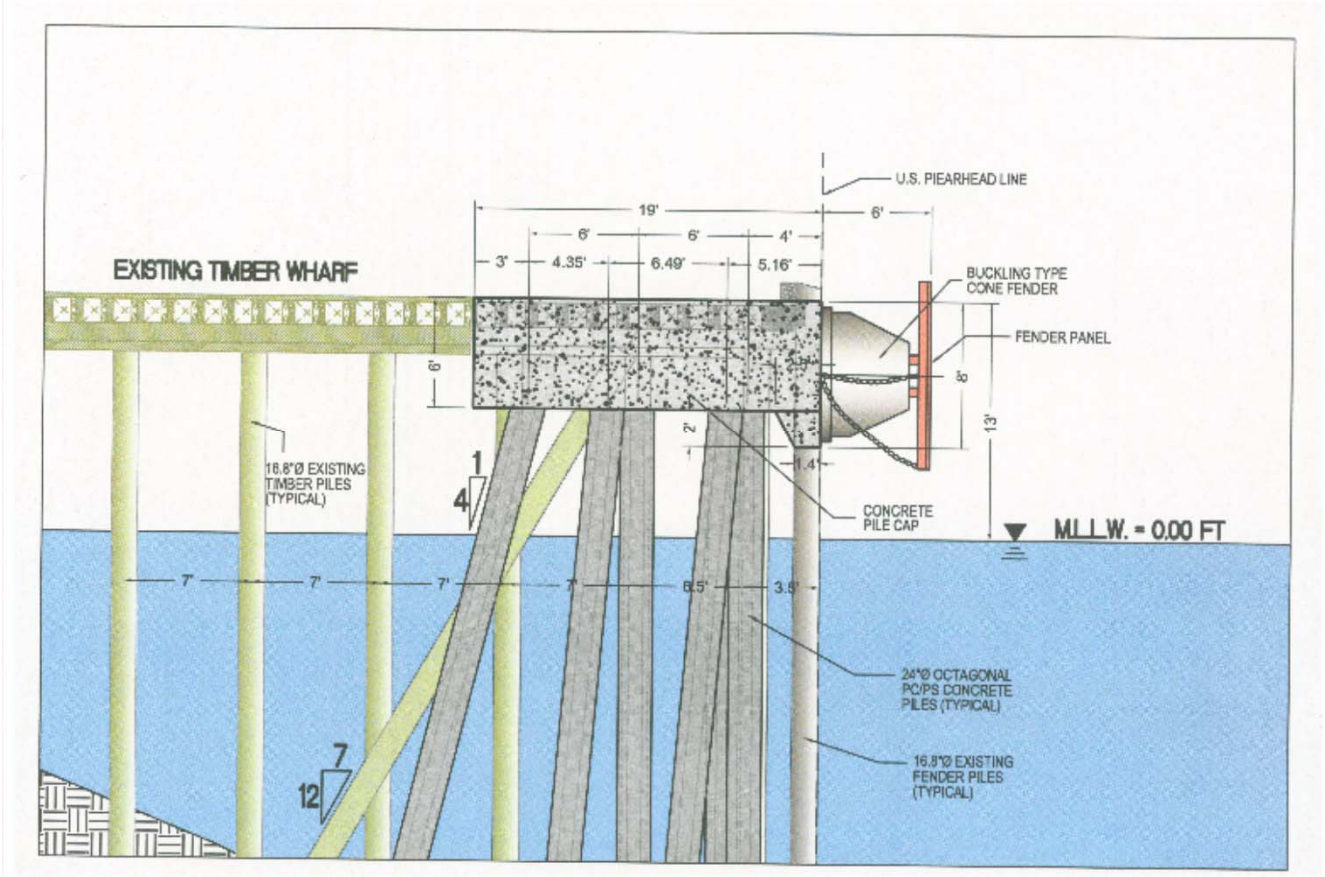
Steel Mono-Pile Berthing System

Berthing



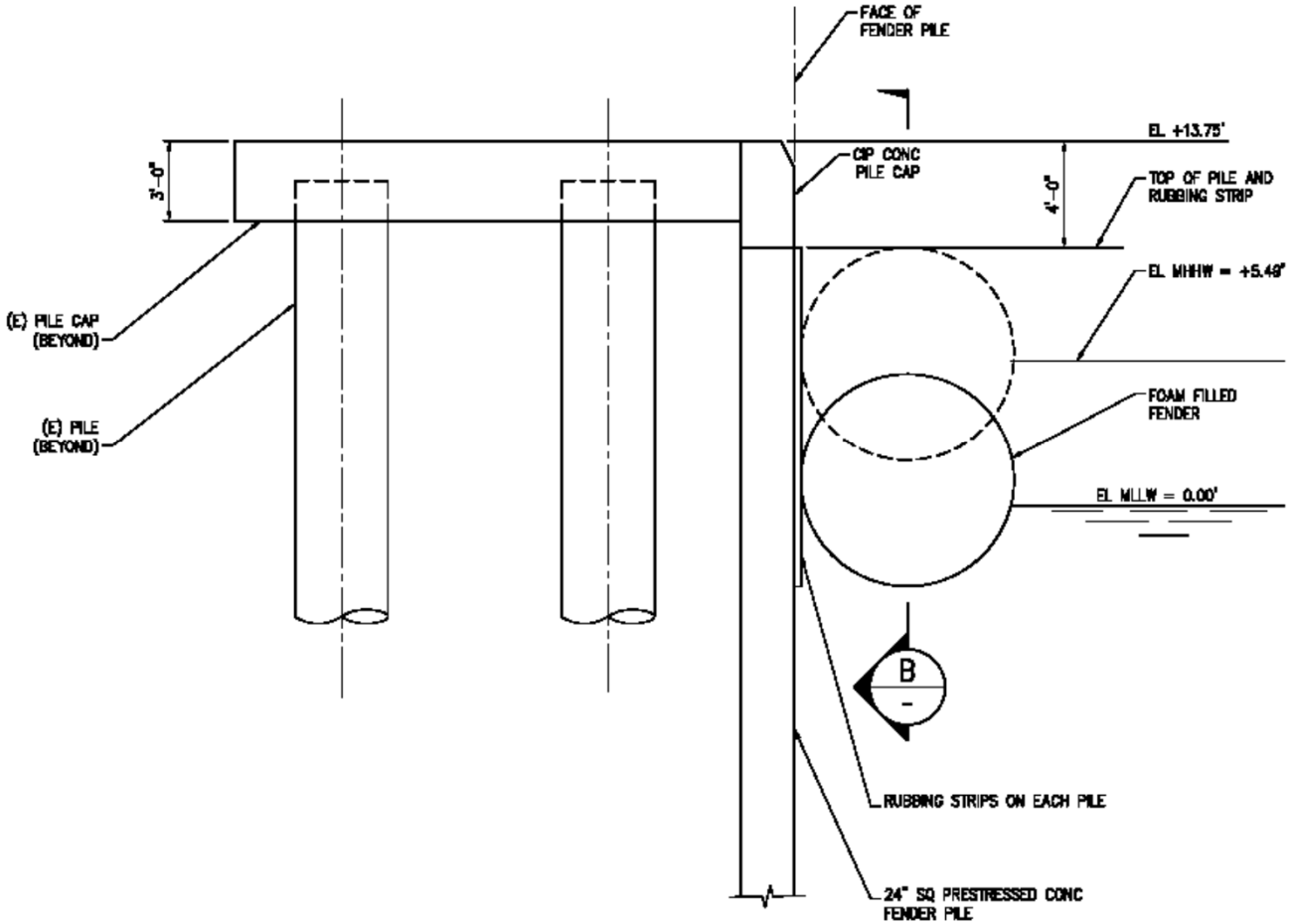
Integrated Steel Pipe Pile Berthing System

Berthing



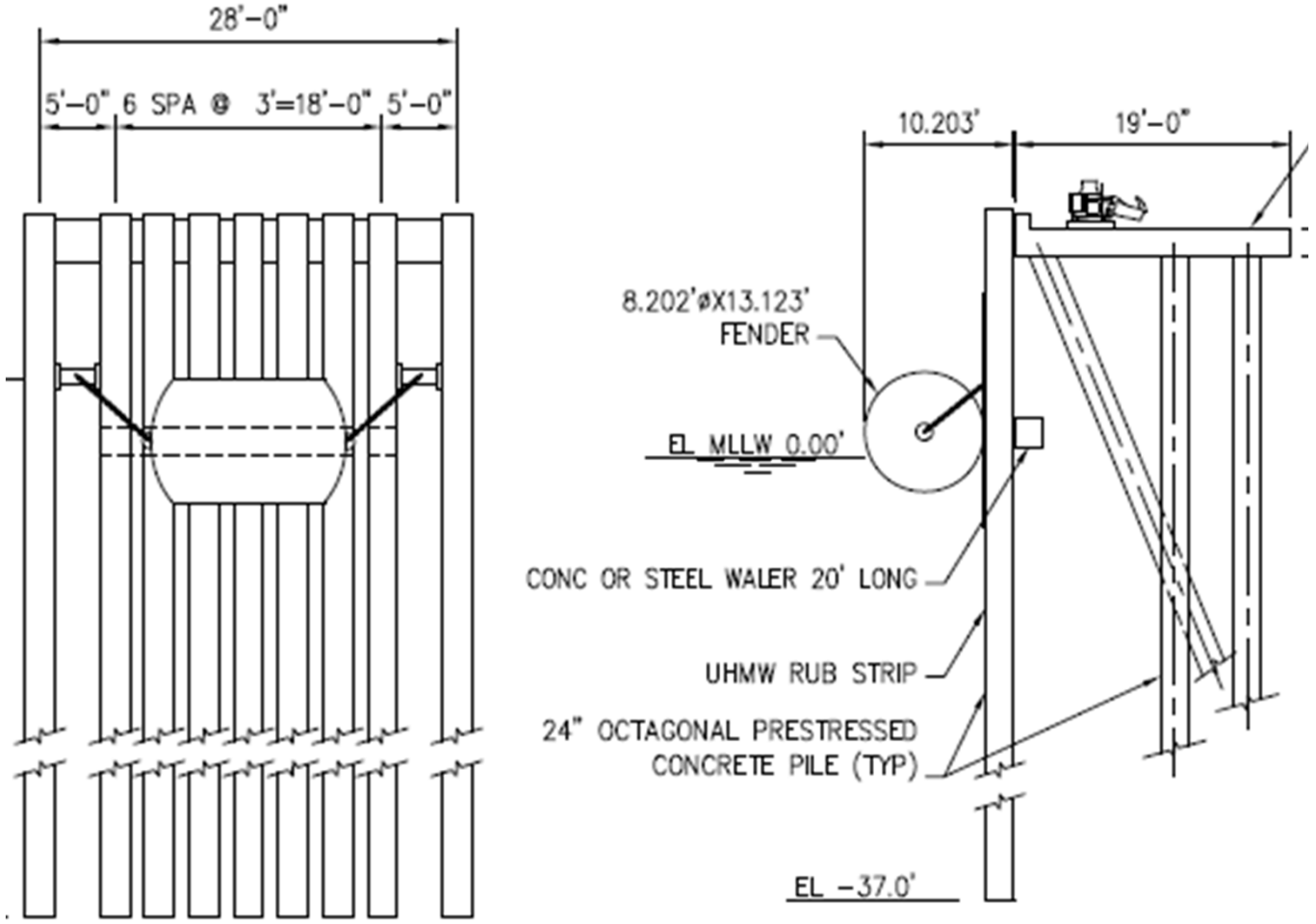
Integrated Concrete Berthing System

Berthing



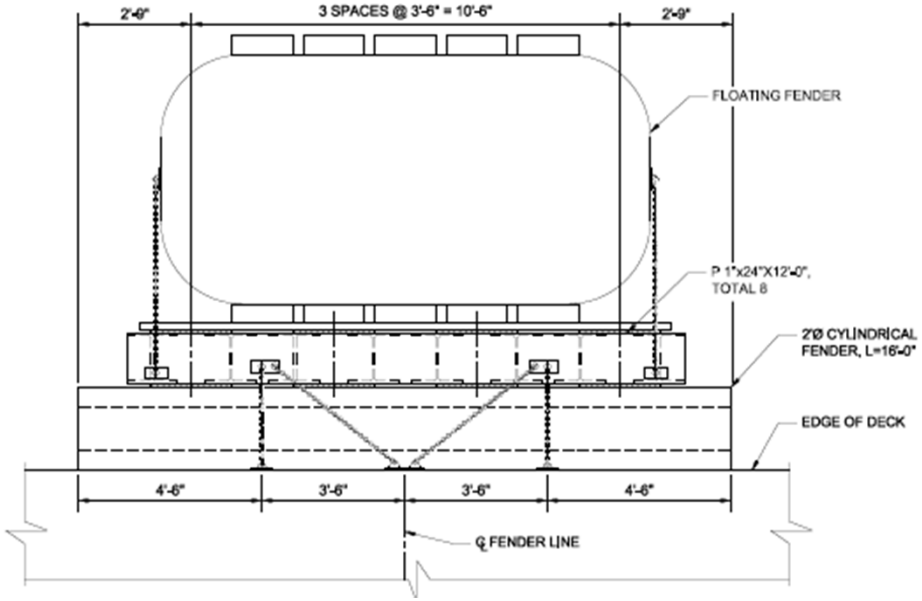
Foam Filled Fender with Concrete Fender Piles

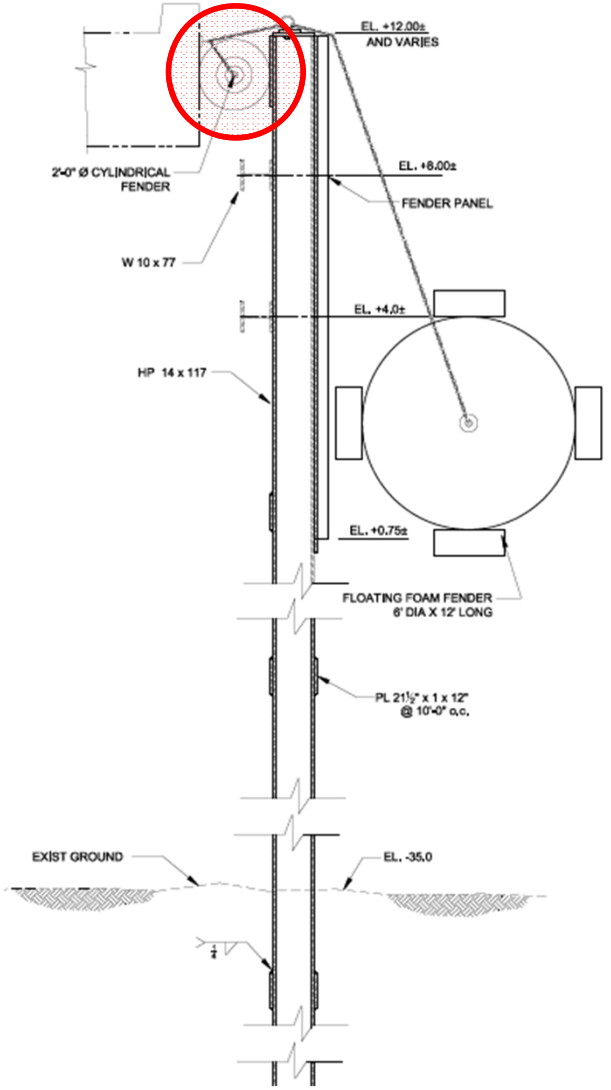
Berthing



Foam Filled Fender with Concrete Fender Piles & Battered Concrete Piles

Berthing



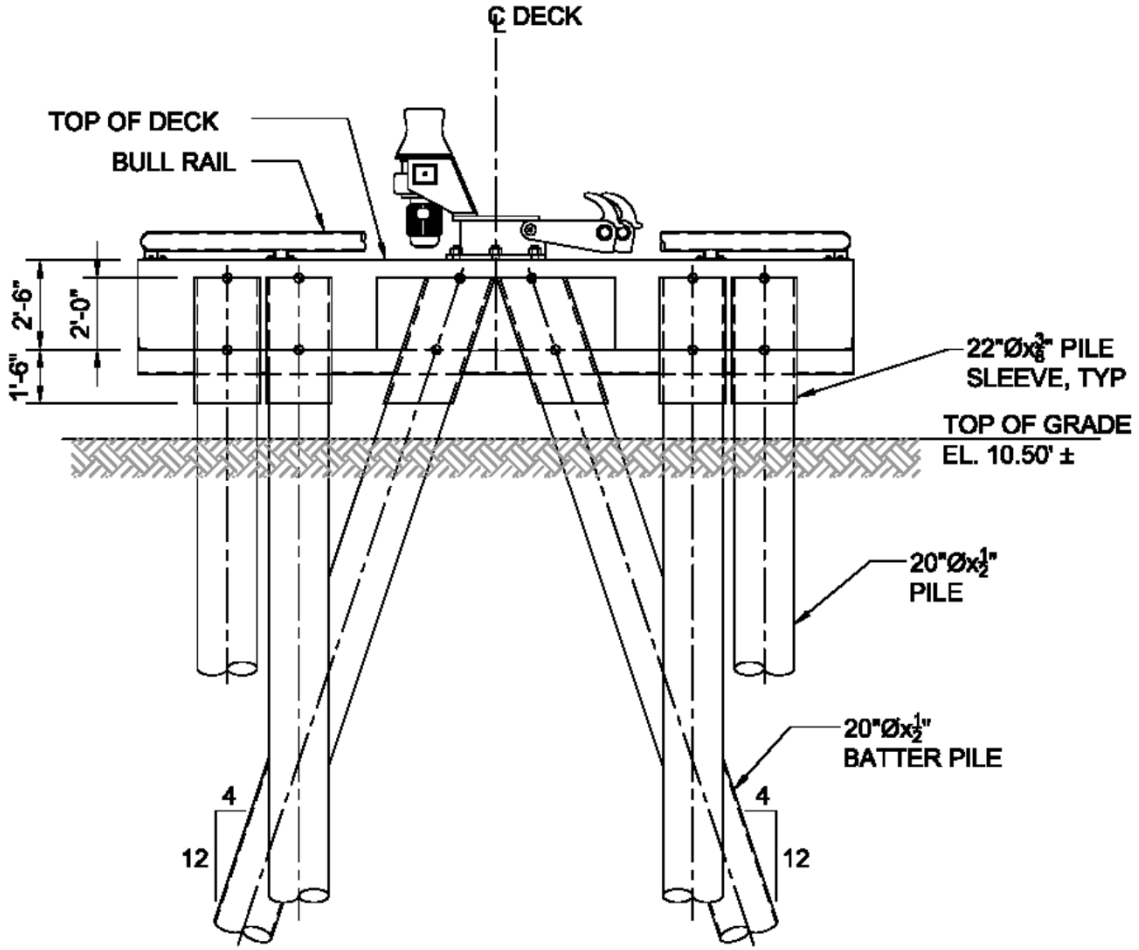


Foam Filled Fender with Steel Pile Panel and Cylindrical Fender

MOTEMS compliance options for:

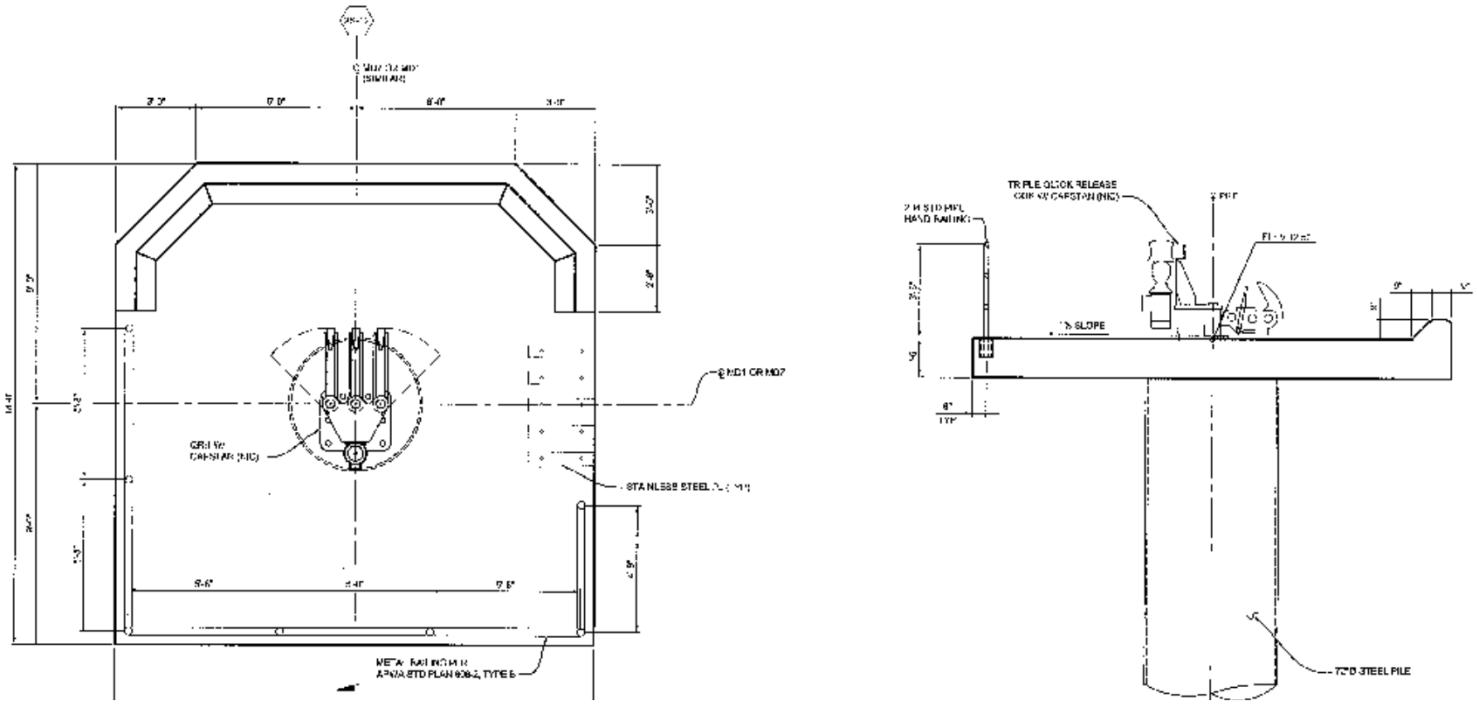
- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring

Mooring



Mooring Dolphin with Steel Plumb Piles and Steel Batter Piles

Mooring



Mooring Dolphin with Steel Mono-Pile

MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

THE PORT OF LOS ANGELES