

Marine Oil Terminals at POLA

IMPLEMENTING MOTEMS ON EXISTING & NEW OIL TERMINALS AT
THE PORT OF LOS ANGELES



Prevention First 2008

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Long Beach, CA



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IMPLEMENTING MOTEMS ON EXISTING & NEW OIL TERMINALS AT THE PORT OF LOS ANGELES

Part 1: Existing Marine Oil Terminals

Part II: New Marine Oil Terminal



PART I: EXISTING MARINE OIL TERMINALS

MOTEMS-Marine Oil Terminal Engineering and Maintenance Standards

- a) MOTEMS attempts to “...prevent oil spills and to protect public health, safety, and the environment...”
- b) 2001 California Building Code Chapter 31F (MOTEMS)
- c) Effective February 6, 2006



MOTEMS CHAPTER 31 F

- Structural Loading Criteria POLA 70%; Tenant 30%
- Seismic Analysis & Structural Performance POLA 80%; Tenant 20%
- Mooring and Berthing Analysis and Design POLA 80%; Tenant 20%
- Geotechnical Hazards POLA 80%; Tenant 20%
- Structural Analysis & Design of Components POLA 80%; Tenant 20%

- Audit & Inspection POLA 50%; Tenant 50%

- Fire Protection Detection and Suppression Tenant 85%; POLA 15%
- Piping and Pipelines Tenant 85%; POLA 15%
- Mechanical and Electrical Equipment Tenant 85%; POLA 15%
- Electrical Systems Tenant 85%; POLA 15%



PORT OF LOS ANGELES GROUND MOTION STUDY

- What is important about the study?
 - Unified set of ground motions and recommendations
 - Provide consistency and standardization
 - Everyone is on the same page



PART I: EXISTING MARINE OIL TERMINALS

POLA MARINE OIL TERMINALS

- 
- | | | | |
|----|-------------------------------|----------|----------------------------|
| 1 | Berths 70-71, Moderate Risk | - Earnie | → URS |
| 2 | Berths 118-120, Moderate Risk | - Edwin | → DMJM + Harris |
| 3 | Berths 148-151, High Risk | - John | → PBS&J / Moffatt & Nichol |
| 4 | Berth 163, Moderate Risk | - Hugo | → Halcrow Inc. / BCG |
| 5 | Berth 164, Moderate Risk | - Lily | → Halcrow Inc. / BCG |
| 6 | Berths 167-169, Moderate Risk | - Ron | → DMJM + Harris |
| 7 | Berths 187-191, Moderate Risk | - Chuong | → PBS&J / Moffatt & Nichol |
| 8 | Berths 238-240C, High Risk | - Angel | → Halcrow Inc. / BCG |
| 9 | Berth 74, Low Risk | - Chinh | → TBD |
| 10 | Berths 408-409, High Risk | - John | → PBS&J / Moffatt & Nichol |

Peer review BCG

BERTHS 118-120

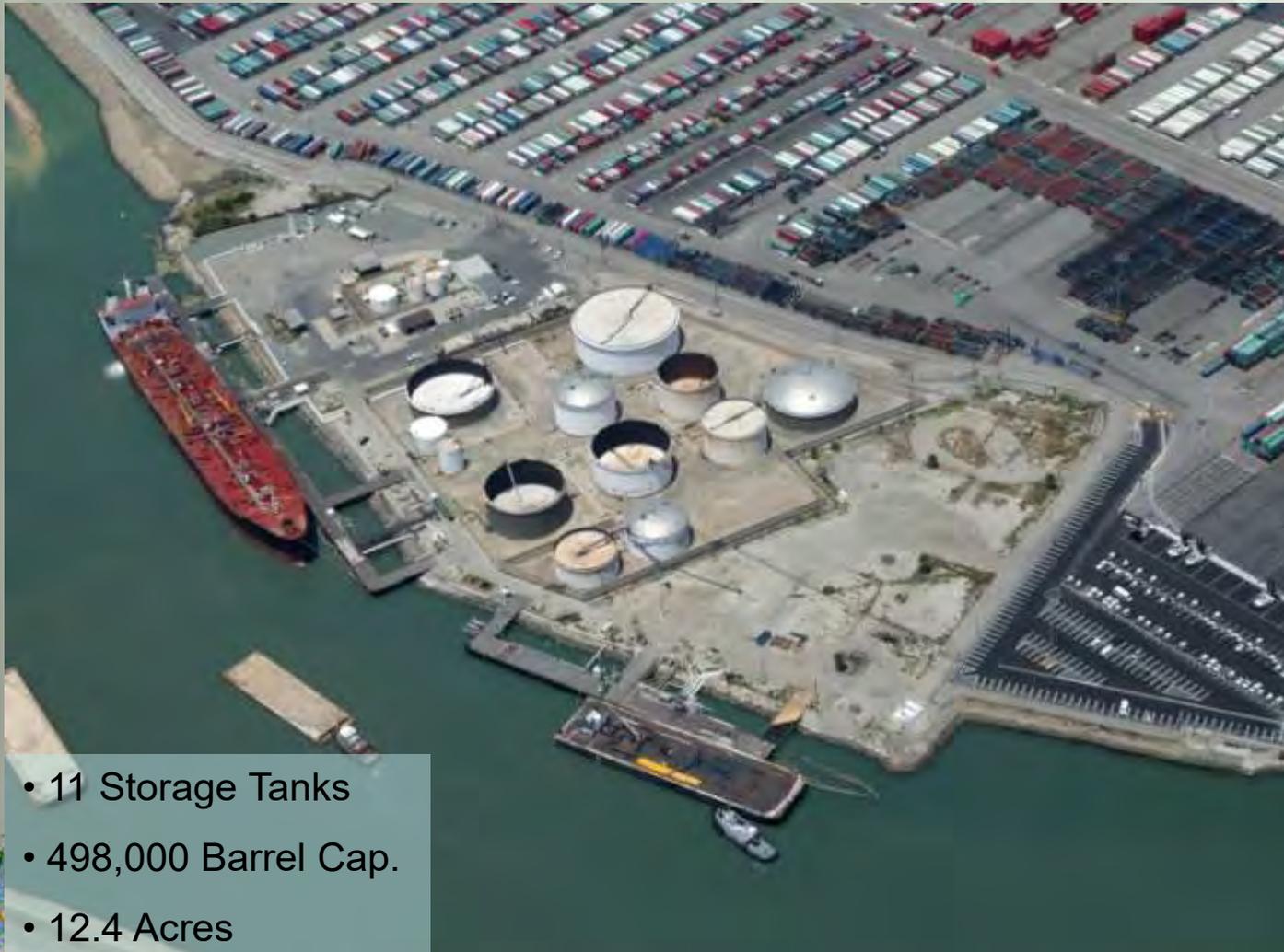
- Built 1959
- 825 ft 2 Berths
- Timber Deck
- Timber Piles
- 13.0 ft Height
- 35.0 ft Water Depth

Moderate Risk

Initial Audit Due
2/6/2009



BERTHS 118-120



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



BERTHS 148-151

High Risk

Initial Audit Due
8/6/2008

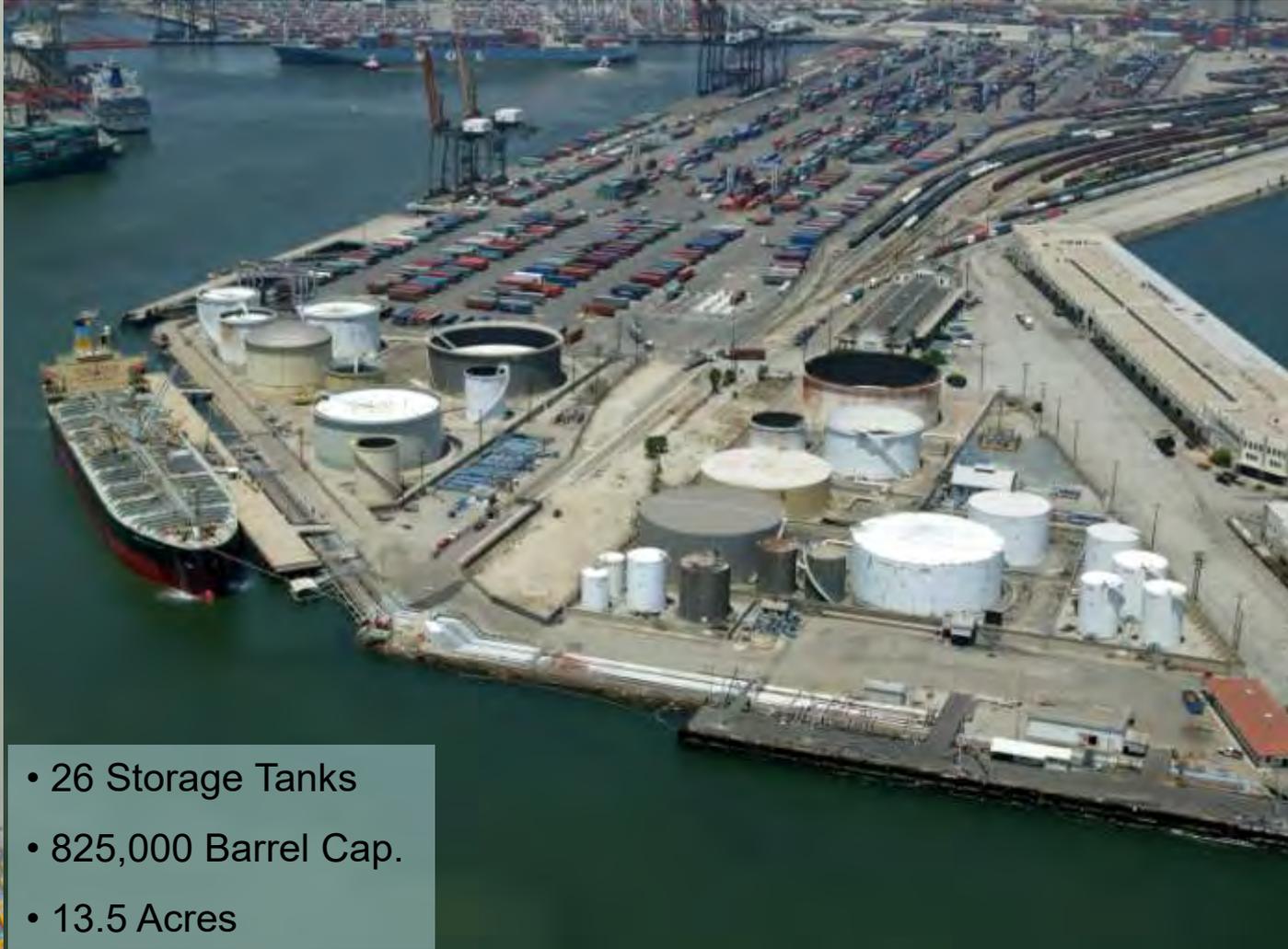


- Built 1955
- 2-1328 ft Berths
- Concrete Deck
- 18" Concrete Piles
- 15.2 ft Height
- 35.0 ft Water Depth

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



BERTHS 148-151



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



BERTHS 163 & 164

Berth 163

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

Berth 164

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



Moderate Risk

Initial Audit Due
2/6/2009



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



BERTHS 187 - 191

Berths 187-191

- 2,336 ft Total Length
- 15.0 ft Height
- 38.0 ft Water Depth

- B187 Built 1920
- Concrete Deck & Piles

- B188 Built 1921
- Concrete Deck & Piles

- B189-191 Built 1922
- Timber Deck & Piles

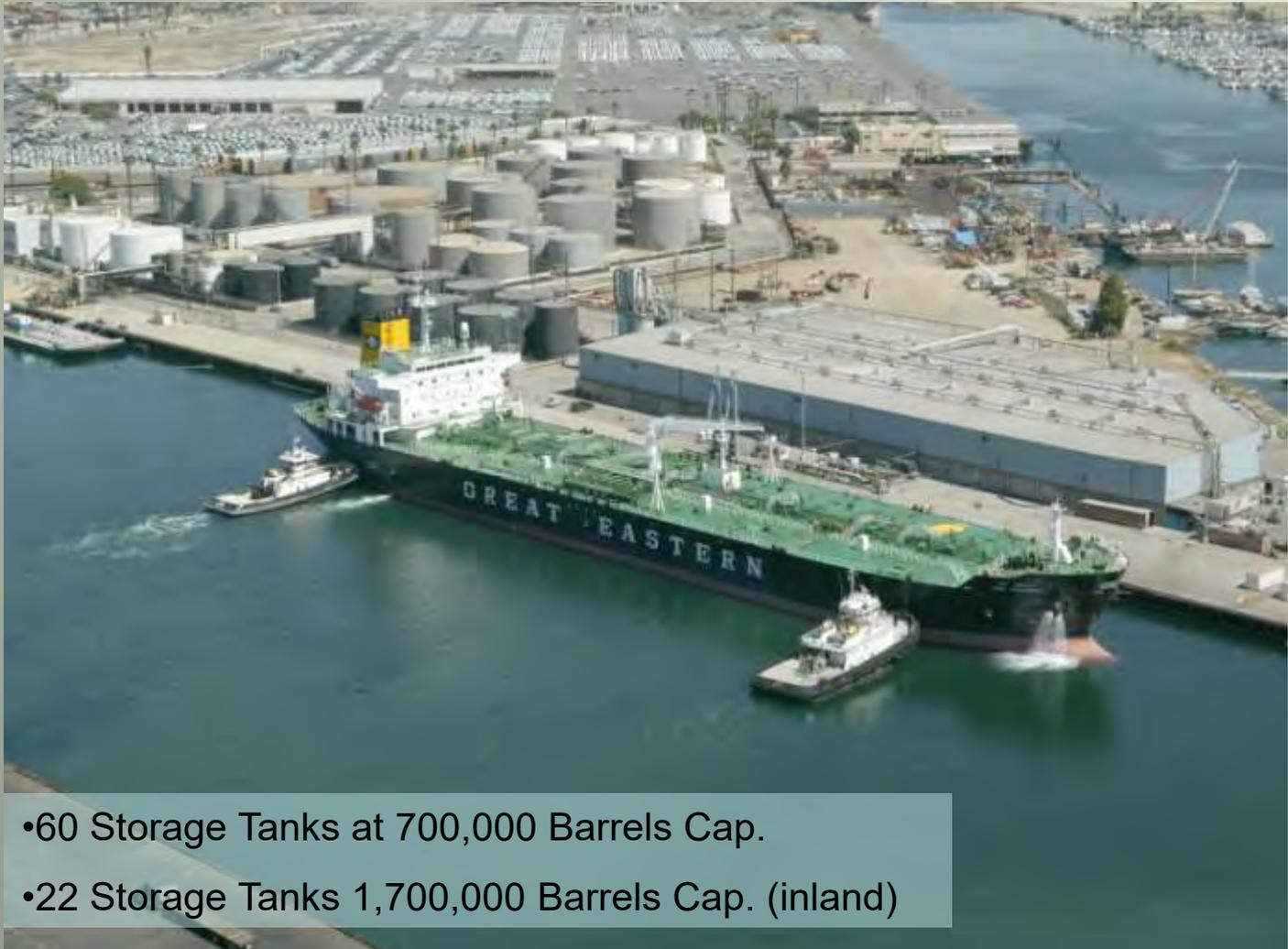


Moderate Risk

Initial Audit Due
2/6/2009



BERTHS 187 - 191

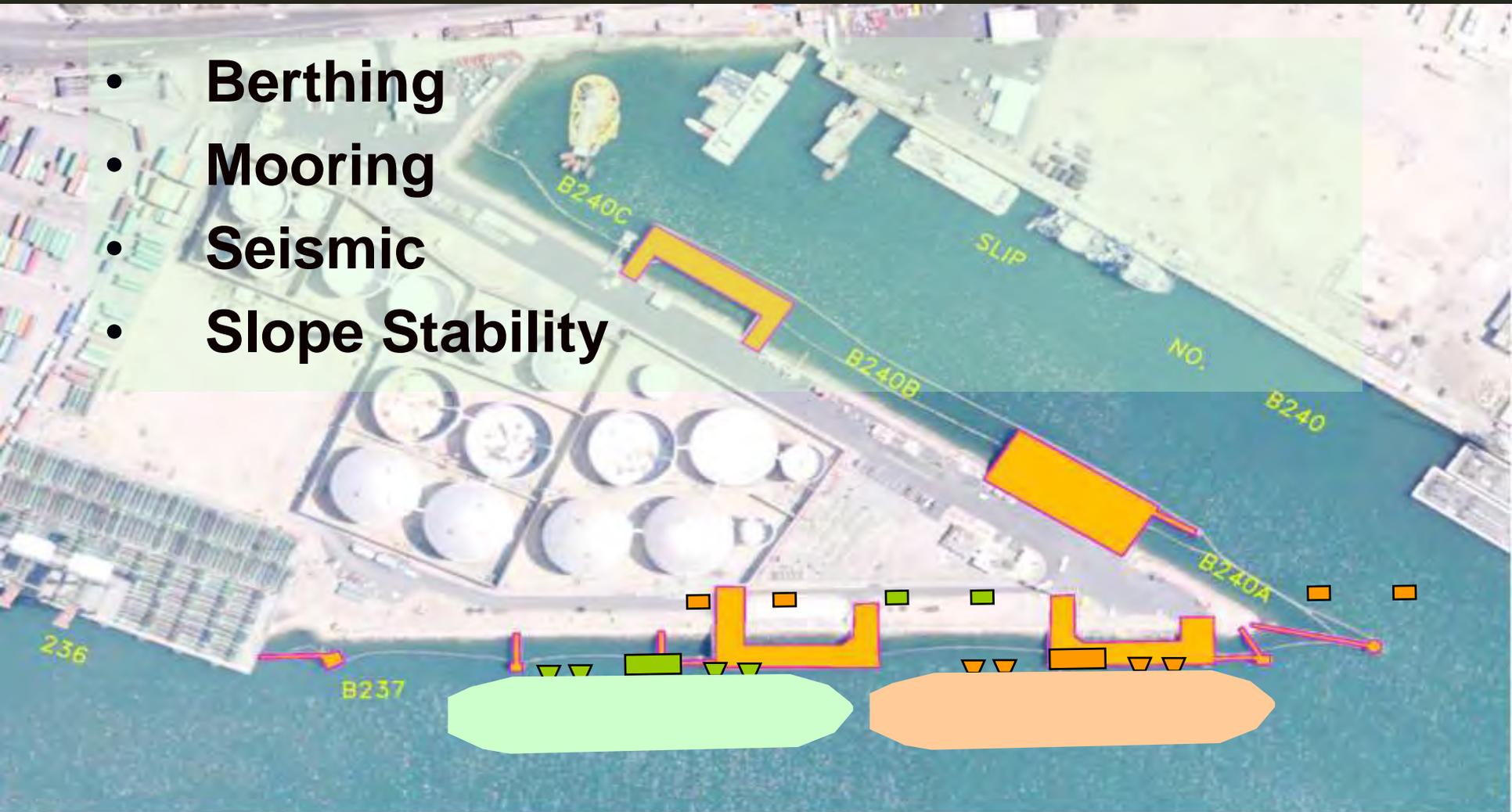


- 60 Storage Tanks at 700,000 Barrels Cap.
- 22 Storage Tanks 1,700,000 Barrels Cap. (inland)

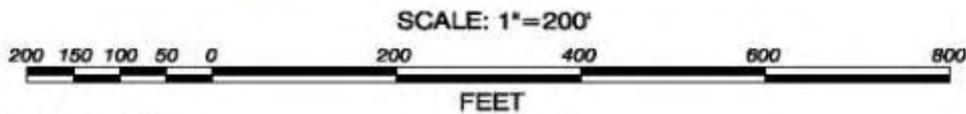


MOTEMS Plan

- Berthing
- Mooring
- Seismic
- Slope Stability



 EXISTING TO BE STRENGTHENED / REPAIRED / RETROFIT

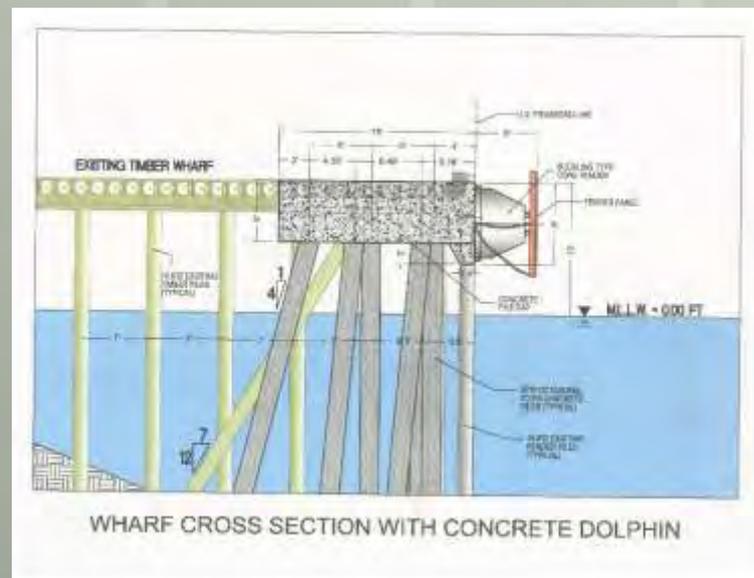
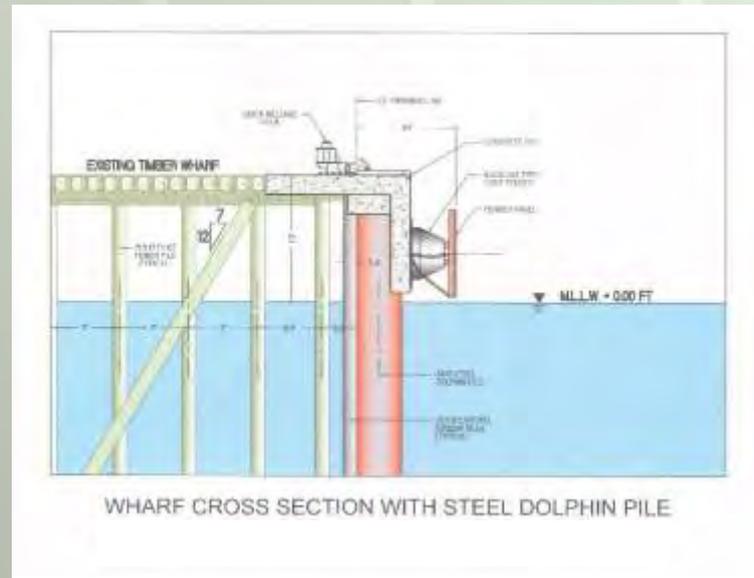
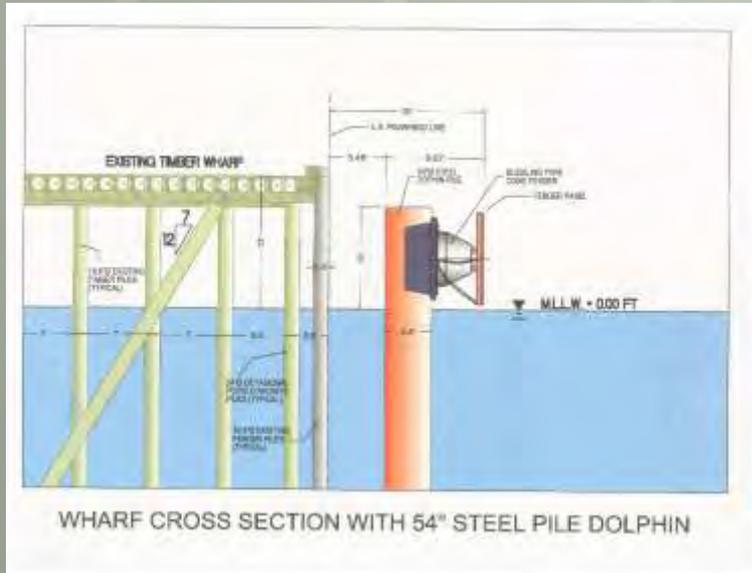


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PART I: EXISTING MARINE OIL TERMINALS

BERTHING STRUCTURE

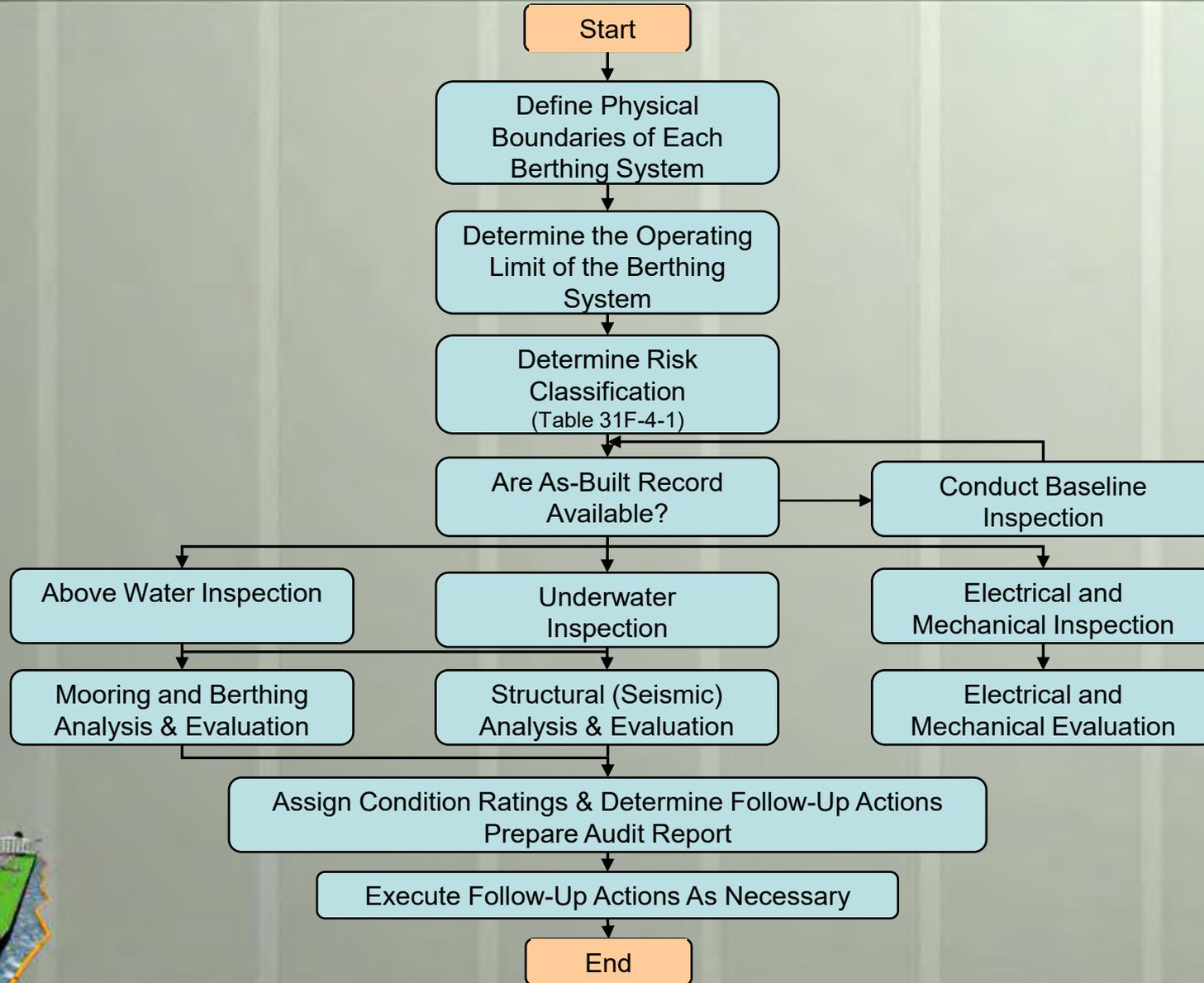


MOTEMS Outline

	<u>Months</u>
• Initial Audit & Inspection	6 to 10
• Conceptual Plans	2 to 4
• Plans, Specifications & Estimates (PS&E)	6 to 18
• Bid & Award	5
• Construction NTP	12 to 24
• Future Maintenance Program	On Going



INITIAL AUDIT PROCEDURE



Stage 1 – Initial Assessment

Stage 2 – Audit

Stage 3 – Action



INITIAL AUDIT REPORT

- Executive Summary
- Introduction
- Existing Conditions
- Evaluation & Assessment
- Follow Up Actions
- Path Forward
- Appendices: Site Plan, Global Structural CAR, Component Deficiency RAP, Team Organizational Chart Deficiency Tables, CSLC Check Lists, and supporting attachments
- Along with: Mooring, Berthing, Seismic, Geotechnical Reports
- Chapter 3102 F.3.8
- Table 31F-2-5 (ES-1)
- Table 31F-2-6 (ES-2)
- Table 31F-2-7



CONCEPTUAL PLAN

- **Interim Phase:**
 - Keep Tenant in Operations
 - Accommodate vessel traffic with operating restrictions
- **Final Phase:**
 - Improvements to existing terminal to bring it to MOTEMS compliance
- **Items to think about:**
 - EIR / EIS Impacts
 - Permitting Process
 - Lease Negotiations
 - Multiple Tenants at Site
 - Future Improvements of Facility



PS&E

- Comply with MOTEMS
- Prepare Plans, Specifications, and Estimates:
 - New Mooring and Berthing Structures
 - Independent Structural Systems
 - Slope Stability
 - MEP components compatible with Structural System Displacements



FUTURE MAINTENANCE PROGRAM

- On-Going Process
- Data Management System
- GIS
- Coordinate with POLA Concrete Maintenance Program
- Coordinate with POLA Construction Maintenance Division

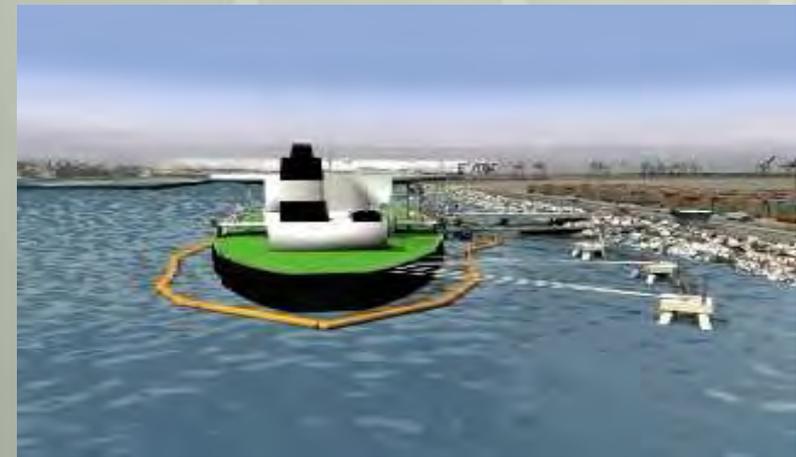


Part II

New Marine Oil Terminal Structural Design of the Pier 400 Crude Oil Marine Terminal



STRUCTURAL DESIGN PIER 400 MARINE OIL TERMINAL



STRUCTURAL DESIGN

PIER 400 MARINE OIL TERMINAL

- Unique Features
- Facility Description
- Engineering Design per MOTEMS
- Mooring & Berthing per MOTEMS
- Engineering Details
- Design Innovation



UNIQUE FEATURES

- ❑ 1st New Oil Terminal Designed to MOTEMS
- ❑ Designed to meet new MOTEMS & POLA Seismic Code
- ❑ 81 ft of water depth to accommodate VLCC's
- ❑ Material selection & modular construction
- ❑ New technology to mitigate spills
- ❑ Designed to ensure Green/Blue Initiatives



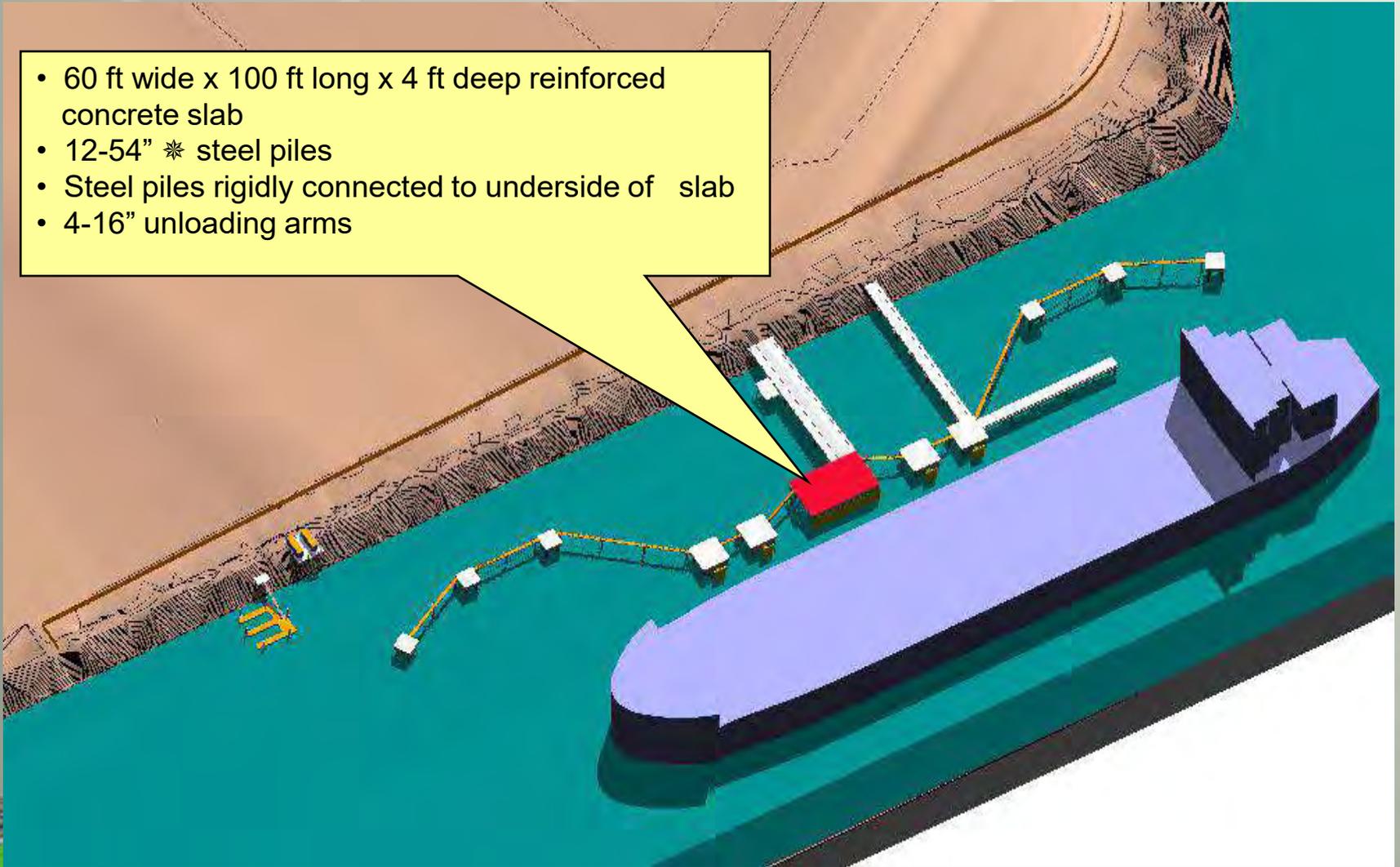
FIRST NEW OIL TERMINAL DESIGNED TO MOTEMS

- MOTEMS mandated by Lempert-Keene-Seastrand Oil Spill Prevention & Response Act of 1990
- California to comply with MOTEMS per 2001 CBC Chapter 31F
- MOTEMS attempts to “...prevent oil spills and to protect public health, safety, and the environment...”
- Uses Performance Based Design



STRUCTURAL COMPONENT UNLOADING PLATFORM

- 60 ft wide x 100 ft long x 4 ft deep reinforced concrete slab
- 12-54" * steel piles
- Steel piles rigidly connected to underside of slab
- 4-16" unloading arms



DESIGN TO MOTEMS

- ❑ MOTEMS Risk Classification
- ❑ Seismic Performance Criteria
- ❑ Minimum Required Analytical Procedure
- ❑ Structural Loading
- ❑ Design Optimization



MOT RISK CLASSIFICATION

TABLE 31F-4-1

MOT RISK CLASSIFICATION

<i>Risk Classification</i>	<i>Exposed Oil (bbls)</i>	<i>Transfers per Year per Berthing System</i>	<i>Maximum Vessel Size (DWTx1000)</i>
<i>High</i>	≥ 1200	N.A.	N.A.
<i>Moderate</i>	< 1200	≥ 90	≥ 30
<i>Low</i>	< 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 SEISMIC PERFORMANCE CRITERIA

TABLE 31F-4-2
SEISMIC PERFORMANCE CRITERIA

<i>Risk Classification</i>	<i>Seismic Performance Level</i>	<i>Probability of Exceedance</i>	<i>Return Period</i>
High	<i>Level 1</i>	<i>50% in 50 years</i>	<i>72 years</i>
	<i>Level 2</i>	<i>10% in 50 years</i>	<i>475 years</i>
Moderate	<i>Level 1</i>	<i>65% in 50 years</i>	<i>48 years</i>
	<i>Level 2</i>	<i>15% in 50 years</i>	<i>308 years</i>
Low	<i>Level 1</i>	<i>75% in 50 years</i>	<i>36 years</i>
	<i>Level 2</i>	<i>20% in 50 years</i>	<i>224 years</i>

Design Earthquake Motions:

Level 1

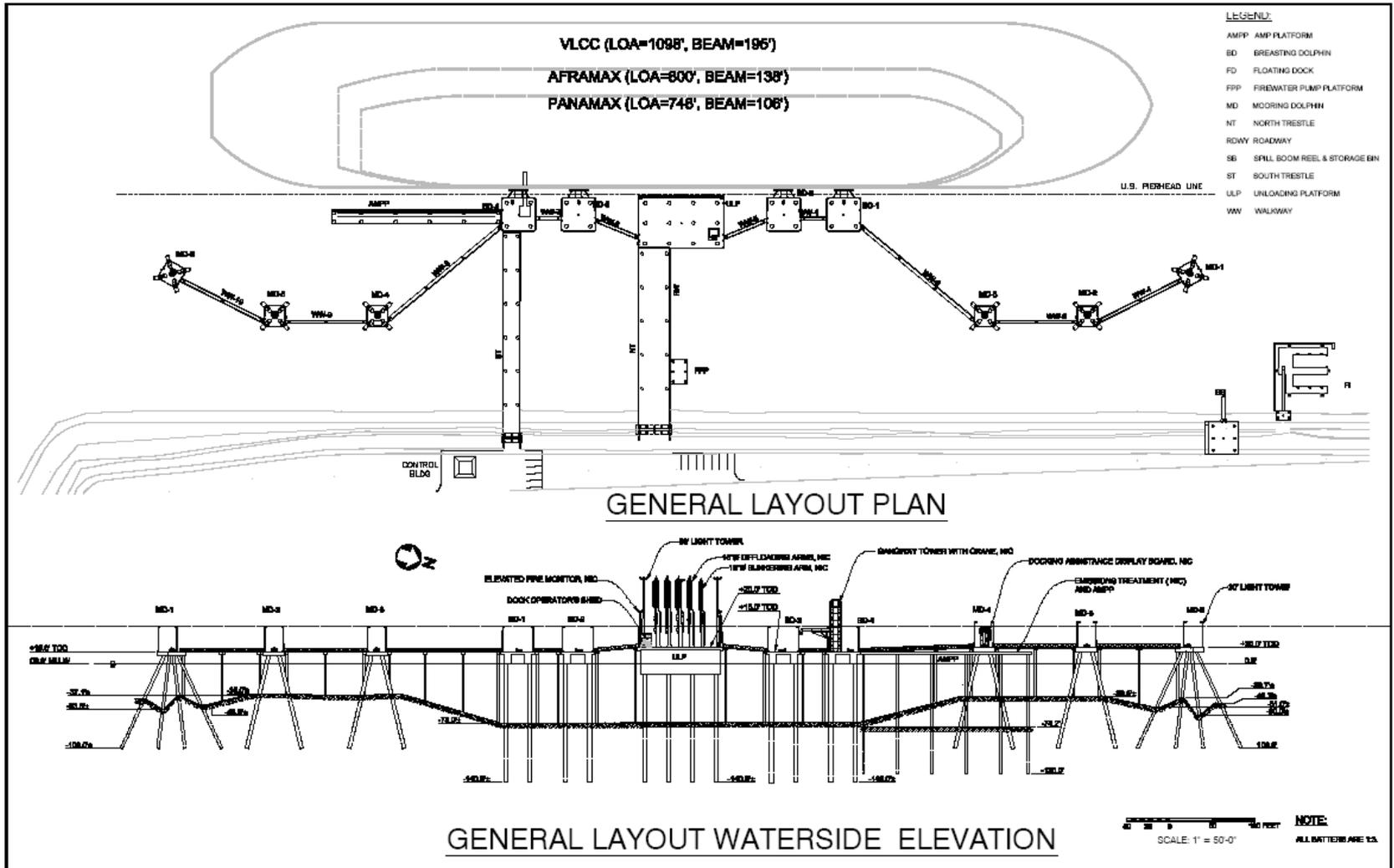
- Minor or no structural damage
- Temporary or no interruption in operations

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)

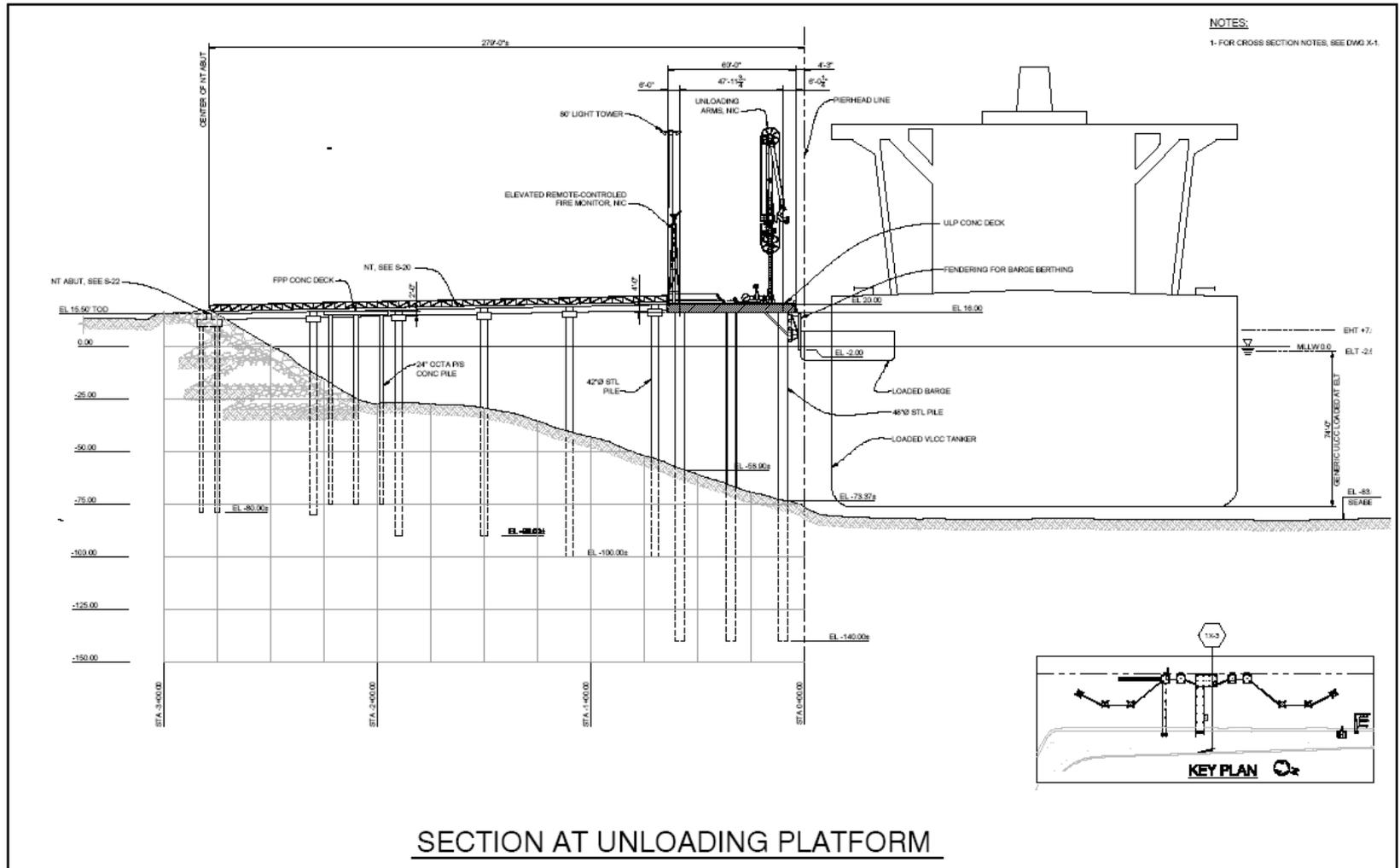


GENERAL PLAN & ELEVATION

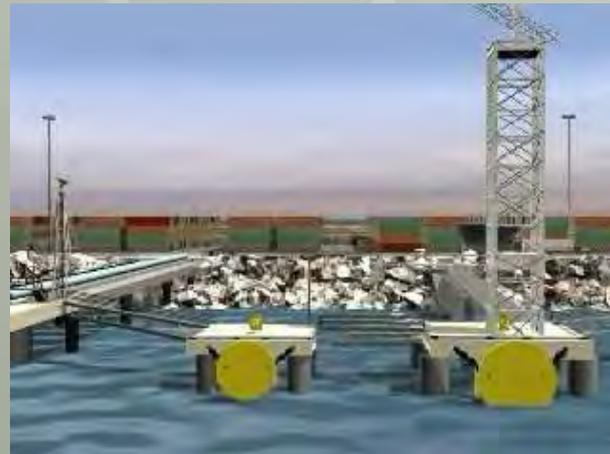


PART II: NEW MARINE OIL TERMINAL

SECTION AT UNLOADING PLATFORM



PROJECT VIEWS



IMPLEMENTING MOTEMS AT THE PORT OF LOS ANGELES



Questions?

Thank You!

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