

“Overview of the Terminal Design”



Prevention First 2006

September, 2006

Long Beach, CA



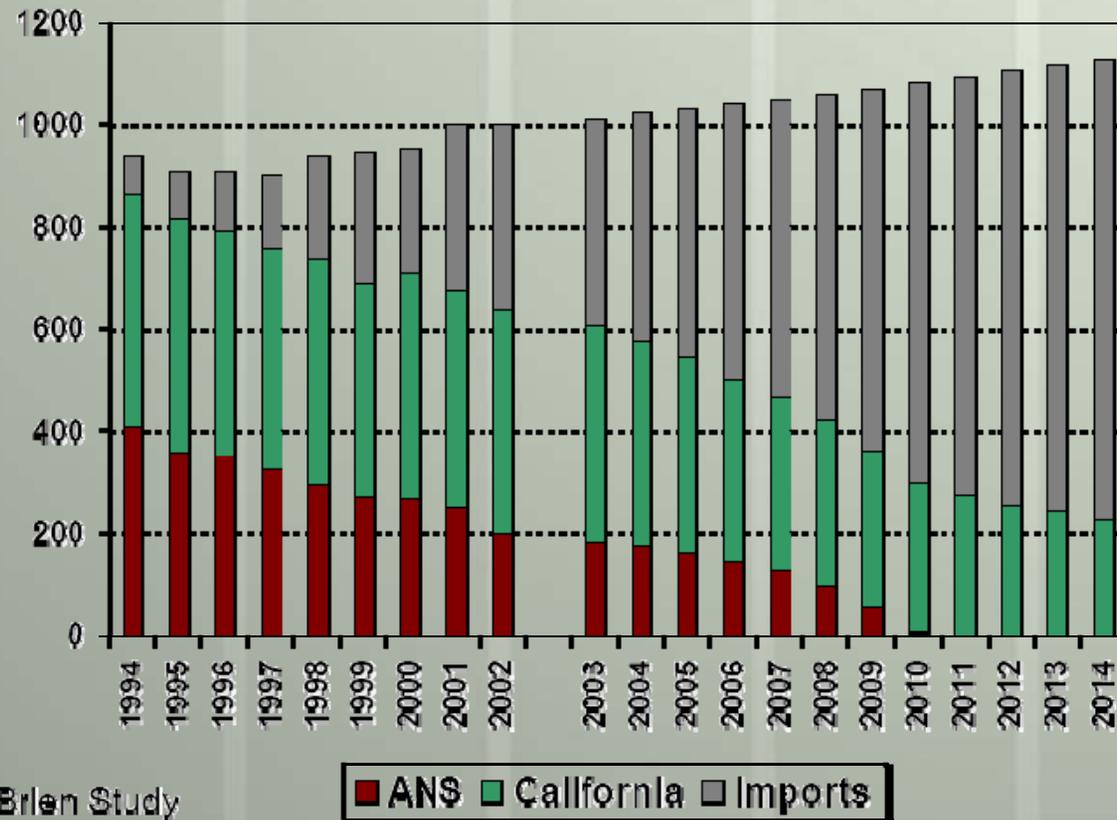
Topics to be Covered

- *The Need for the Terminal*
- *Full Project Flyover*
- *Design Criteria*
- *State-of-the-Art Systems and Features*
- *State-of-the-Art Analyses Performed*
- *Challenges and Hurdles to Overcome*



The Need for the Terminal

Los Angeles Regional Demand



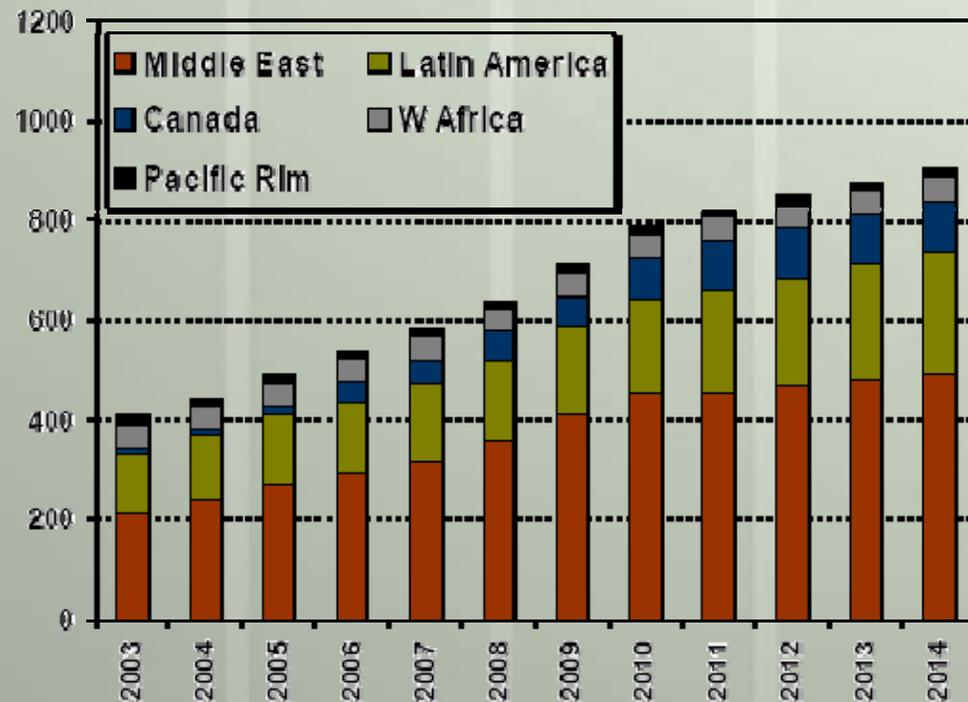
From Baker & O'Brien Study



The Need for the Terminal

Foreign Imports Drive Demand

- Significant increase in marine imports over next ten years— 460,000 bbls/day or 100% increase
- Crude oil demand and decline of California crude oil productions drives the need for Pier 400 project
- Addresses petroleum import needs for the Los Angeles area
- Imports will be important to the continued economic development of the Los Angeles area economy



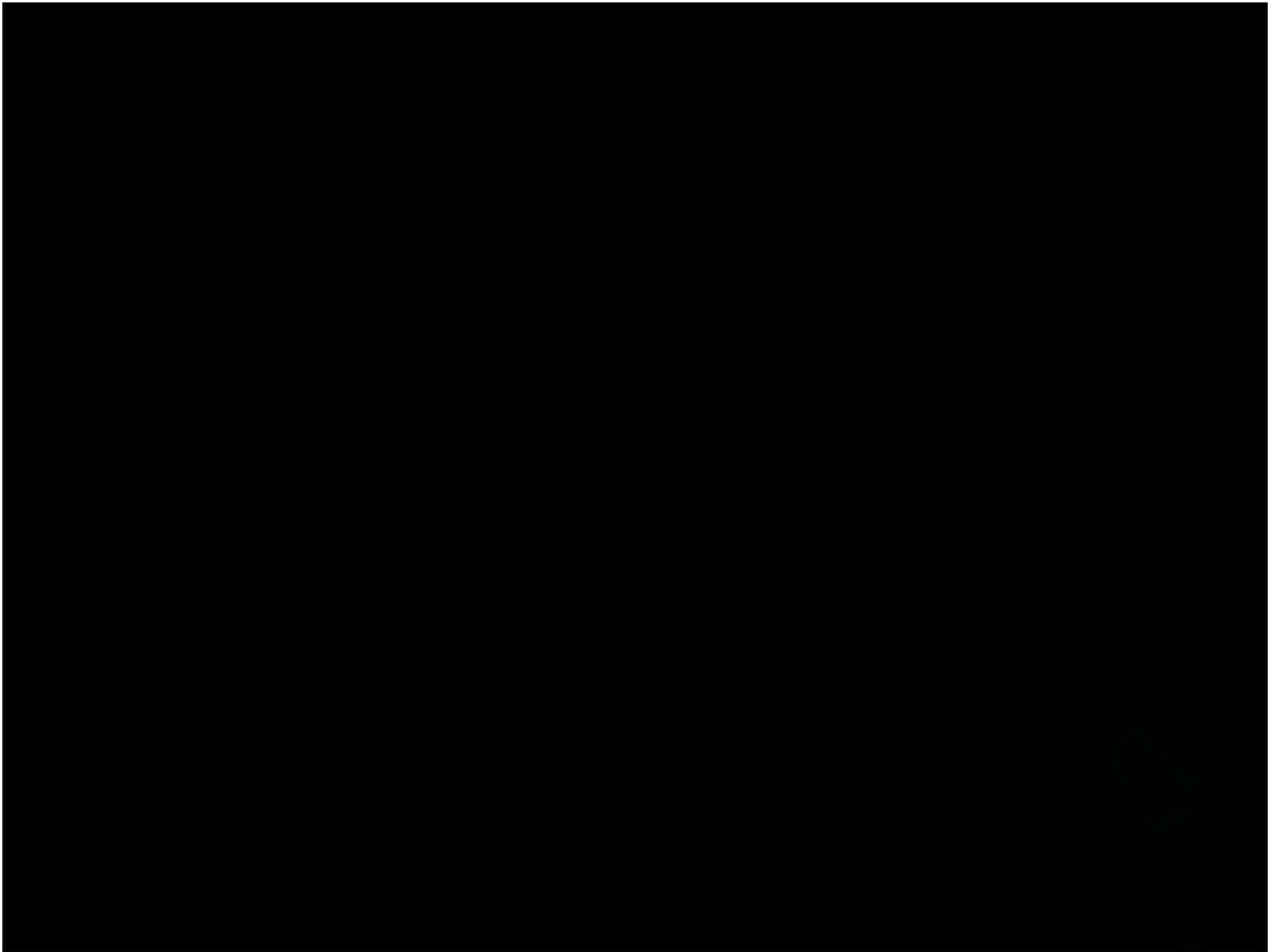
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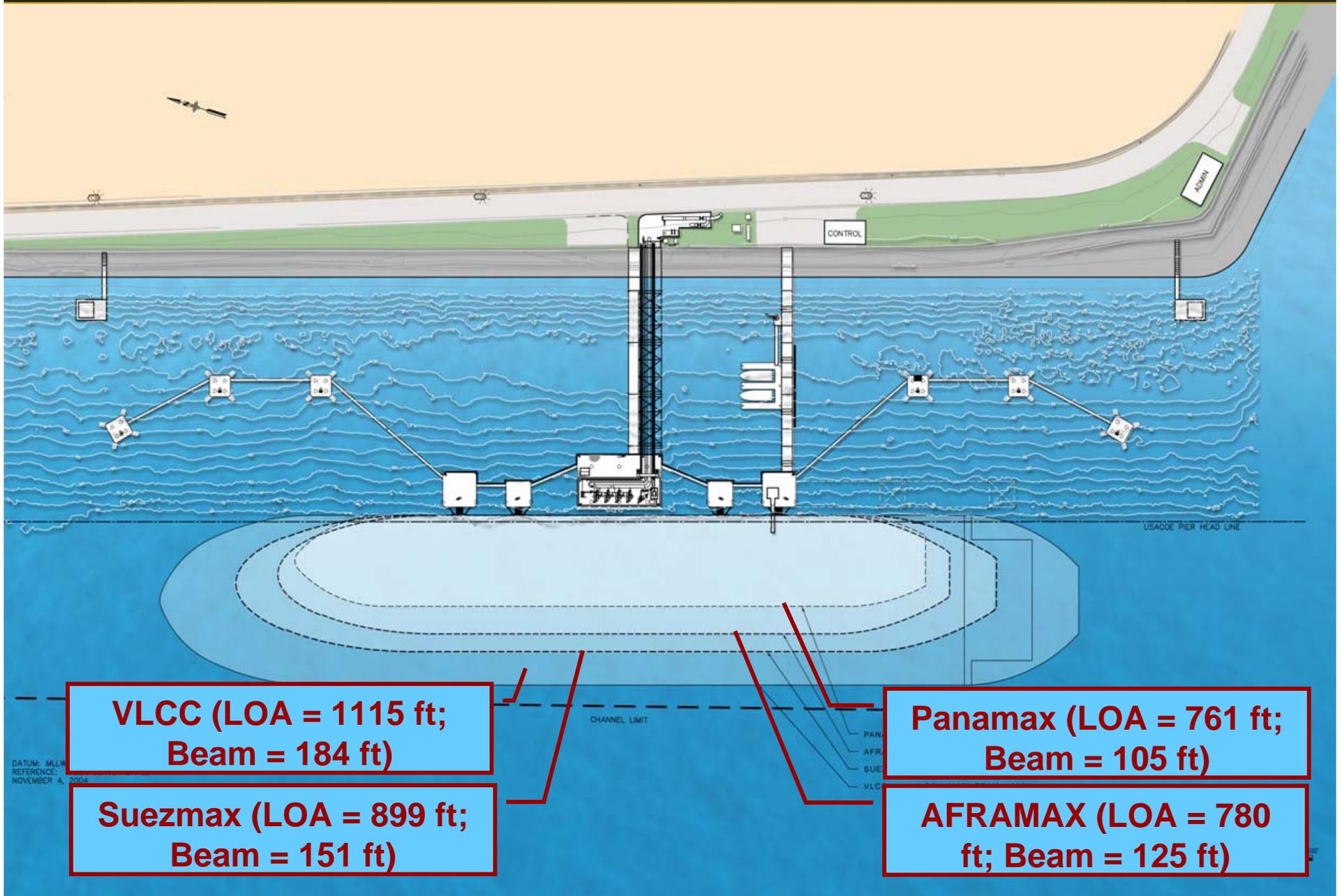
Design Criteria – Big Picture

- ***Import Capacity = 250,000 bbl/day***
- ***Pier 400, Berth 408 Site Chosen***
 - ❖ ***Deep Draft (-81 ft) Requires No Additional Dredging***
 - ❖ ***Original Driver Behind Pier 400 Landfill***
 - ❖ ***Relatively Isolated From San Pedro Community***
- ***Accommodate Panamax up to VLCC***
- ***Four 16-inch Unloading Arms***
- ***One 8-inch Fueling Arm for Distillate Loading/Unloading***
- ***State-of-the-Art Safety Features***



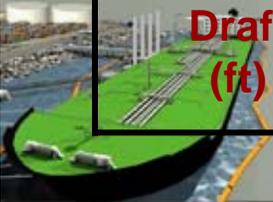


Design Criteria – Terminal Layout

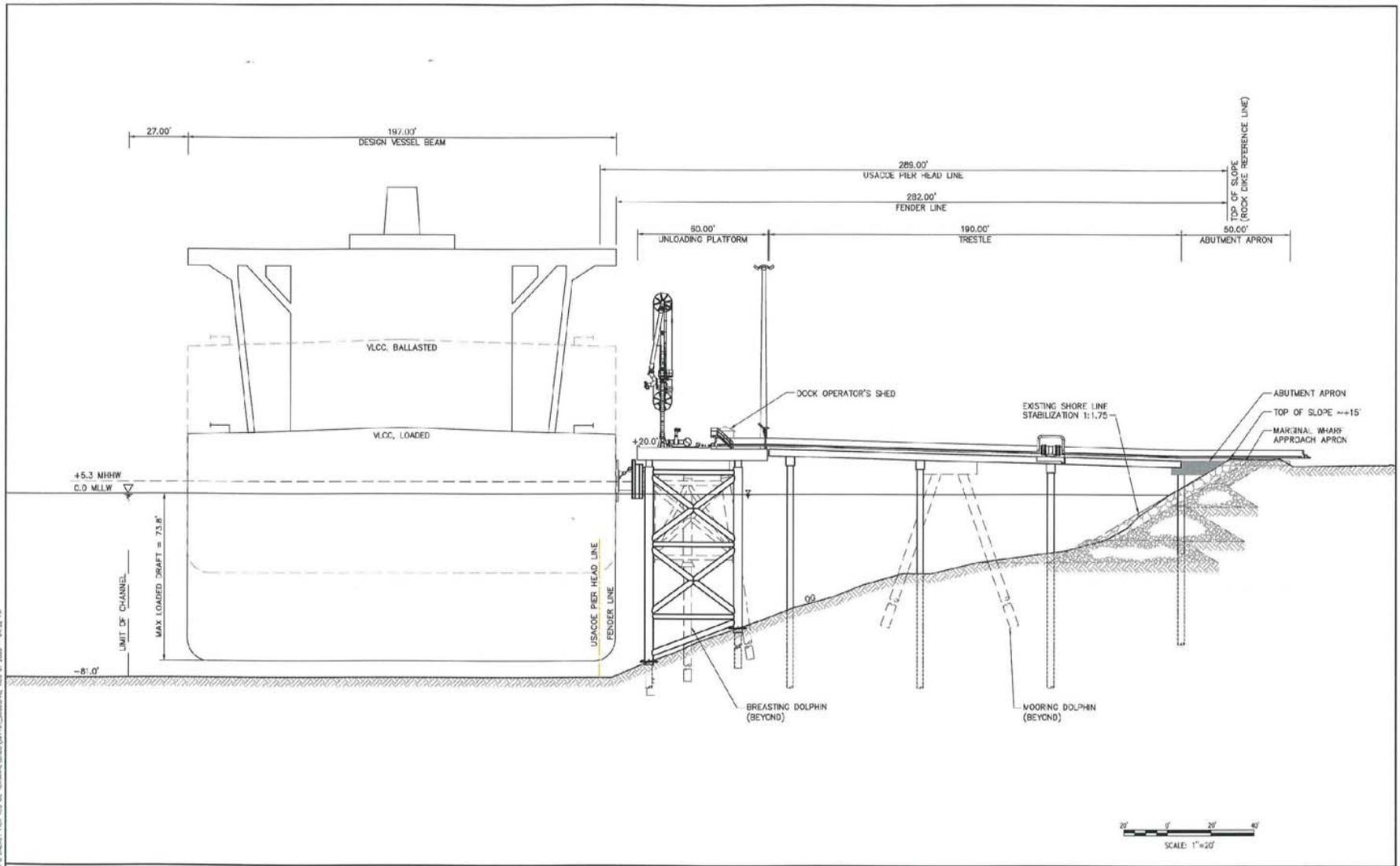


Design Criteria – Design Vessel Parameters

PARAMETER	VLCC	SUEZMAX	AFRAMAX	PANAMAX	FUEL BARGE
DWT (tonnes)	325,000	149,000	105,000	70,000	1,400
Displacement (tonnes)	370,000	172,400	125,000	85,000	~1,800
LOA / Beam (ft)	1,115 / 184	899 / 151	780 / 125	761 / 105	170 / 44
Loaded Draft (ft)	74	56	48.5	44.6	~7



Design Criteria – Cross Section



DATE: 05-02-05
 PROJECT: PACIFIC ENERGY PARTNERS L.P. TERMINAL UPGRADE/RECONSTRUCTION, A/E/C OF 2005 - 04-02-05



Pacific Energy Partners, L.P.

PIER 400, BERTH 408
MARINE OIL TERMINAL

CONCEPTUAL DESIGN

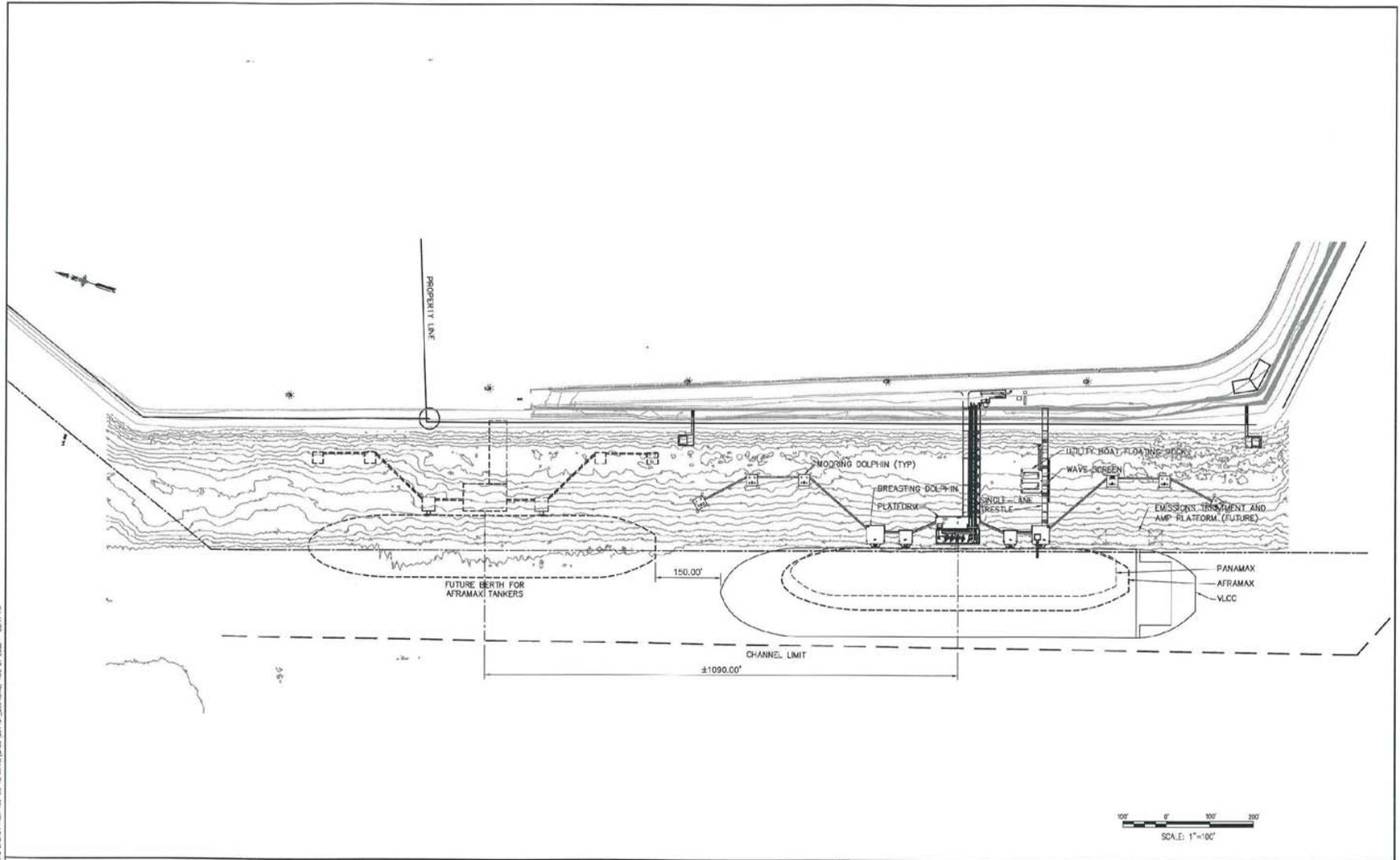
MOFFATT & NICHOL
 3780 KILROY AIRPORT WAY, #600
 LONG BEACH, CALIFORNIA, 90806
 562-428-5551

PROFILE THROUGH BERTH
PLATFORM AND TRESTLE

DATE 05-02-05

SHEET 6 OF 27

Design Criteria – Allowing for the Future



DWS 100 2/15/11-01 PACIFIC ENERGY PARTNERS, L.P. TERMINAL LAYOUT/GENERAL ARRANGEMENT, AUG 29 2005 - 05:11 PM



Pacific Energy Partners, L.P.

PIER 400, BERTH 408
MARINE OIL TERMINAL

CONCEPTUAL DESIGN

MOFFATT & NICHOL
3750 KILROY AIRPORT WAY, #600
LONG BEACH, CALIFORNIA, 90806
562-426-9551

GENERAL ARRANGEMENT
SINGLE BERTH WITH FUTURE BERTH

DATE: 06-07-05

SHEET 4 OF 27

Design Criteria – Fueling System



Design Criteria

● *MOTEMS Structural Criteria*

- ❖ *Seismic Criteria*
- ❖ *Mooring Loads*
- ❖ *Berthing Loads*
- ❖ *Wave Loads*
- ❖ *Passing Vessel Loads*
- ❖ *Seiche*
- ❖ *Tsunamis*
- ❖ *Wind Loads*
- ❖ *Current Loads*
- ❖ *Load Combinations*
- ❖ *Safety Factors*



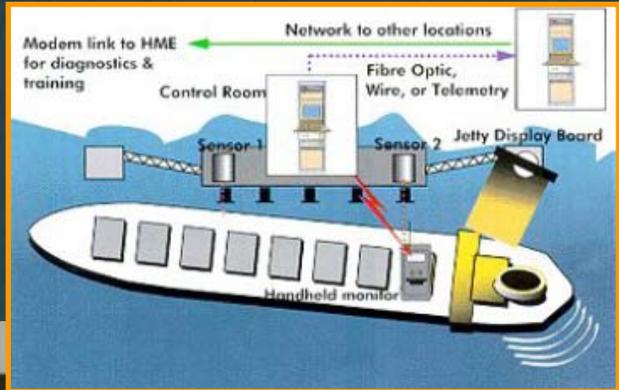
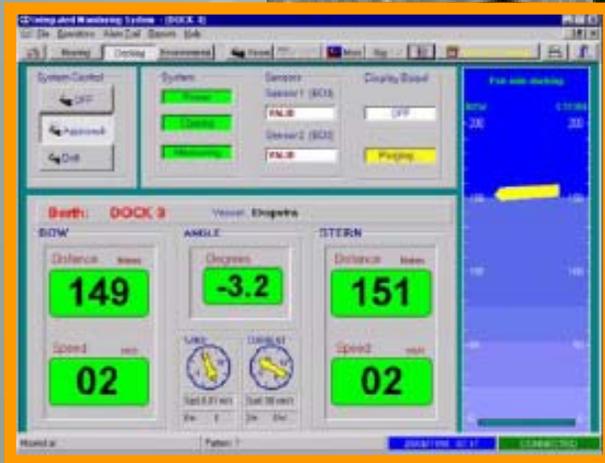
Design Criteria

- *MOTEMS Fire Prevention, Detection and Suppression Criteria*
- *MOTEMS Piping, Mechanical and Electrical Systems Criteria*
- *Seismic Sensors*
- *Environmental Monitoring*
- *Security*



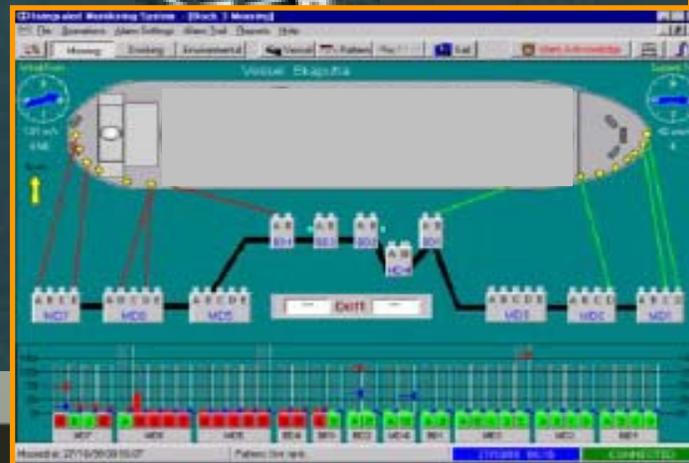
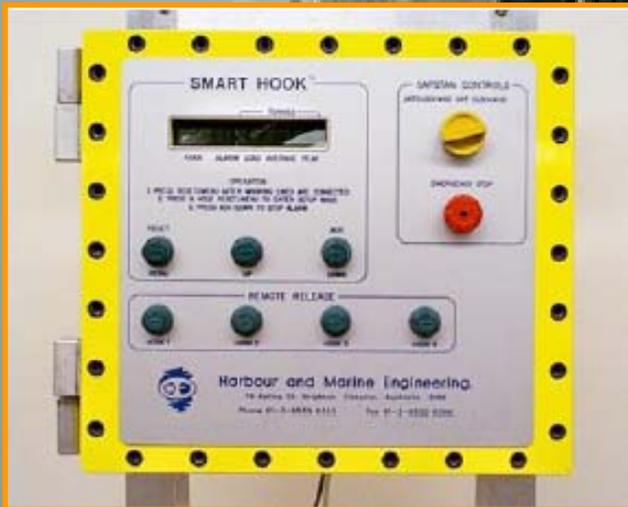
State-of-the-Art Systems and Features

● *Laser-Assisted Docking Aid System*



State-of-the-Art Systems and Features

- **Quick Release Mooring Hooks with Integral load Monitoring and Staged Alarm**

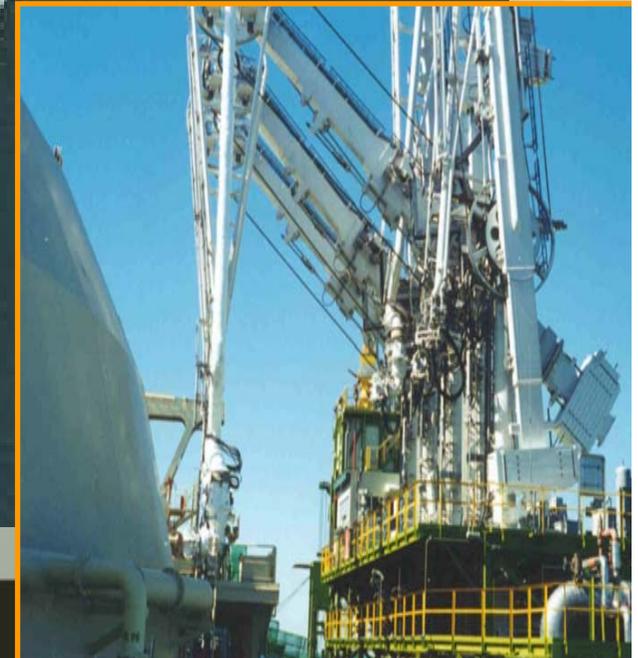
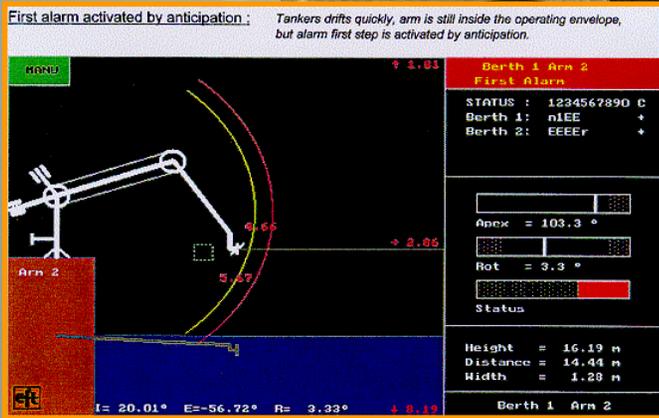


Load Cell in Hook



State-of-the-Art Systems and Features

● Unloading Arms with Quick Connect/Disconnect Couplers



State-of-the-Art Systems and Features

- **Real-time Environmental and Seismic Sensor Monitoring**

The collage illustrates various components of a real-time environmental and seismic sensor monitoring system. It features:

- A 3D rendering of a sensor mounted on a ship's deck.
- A photograph of a sensor mounted on a ship's hull.
- A photograph of a sensor on a ship's deck.
- A 3D rendering of a ship.
- A screenshot of the 'Integrated Monitoring System - [Environmental Data]' software interface.

The software interface displays the following data:

WIND		CURRENT	
Speed	70 m/s	Speed	100 cm/s
Inst: 0.94 m/s		Inst: 51 cm/s	
Avg: 0.5 m/s		Avg: 51 cm/s	
Direction		Direction	
Inst: SE		Inst: SW	
Avg: ESE		Avg: NE	

The interface also includes four line graphs showing data over time:

- Wind Speed over Time:** Wind Speed (0 to 70 m/s) vs. Time (10:35 to 10:40). Averages calculated each 5 Seconds.
- Current Speed over Time:** Current Speed (0 to 100 cm/s) vs. Time (10:35 to 10:40). Averages calculated each 3 Seconds.
- Wind Direction over Time:** Wind Direction (N, NE, E, SE, S, SW, W, NW) vs. Time (10:35 to 10:40). Averages calculated each 2 Seconds.
- Current Direction over Time:** Current Direction (N, NE, E, SE, S, SW, W, NW) vs. Time (10:35 to 10:40). Averages calculated each 4 Seconds.

At the bottom of the interface, it shows: Moored at: Portm: ? 20/06/99 10:29 CONNECTED

State-of-the-Art Systems and Features

- *Gangway Tower with Integral Position Monitoring and Staged Alarm*



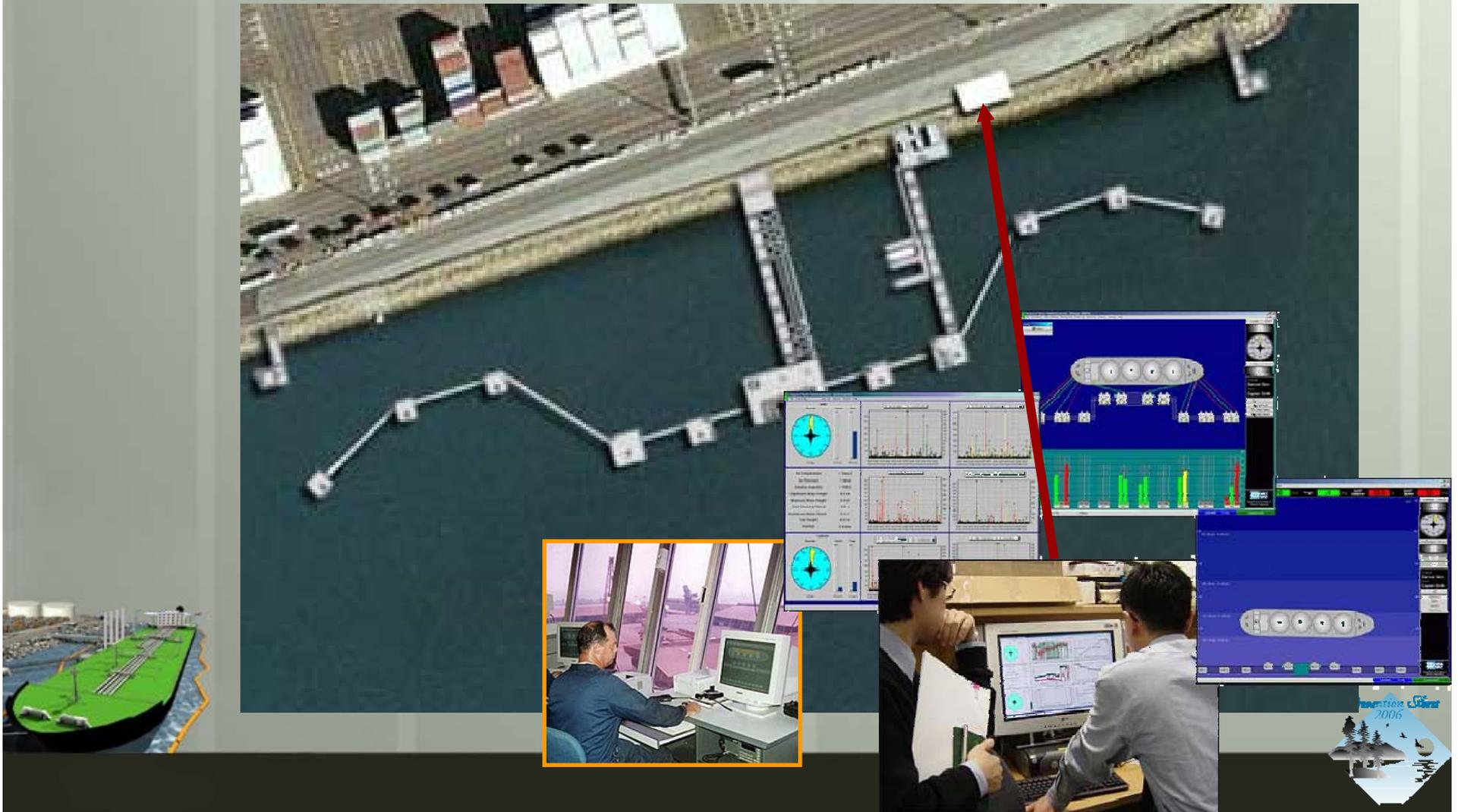
State-of-the-Art Systems and Features

- *Fire Protection System with Redundancies – Based on Hazard Analysis and Fire Plan*



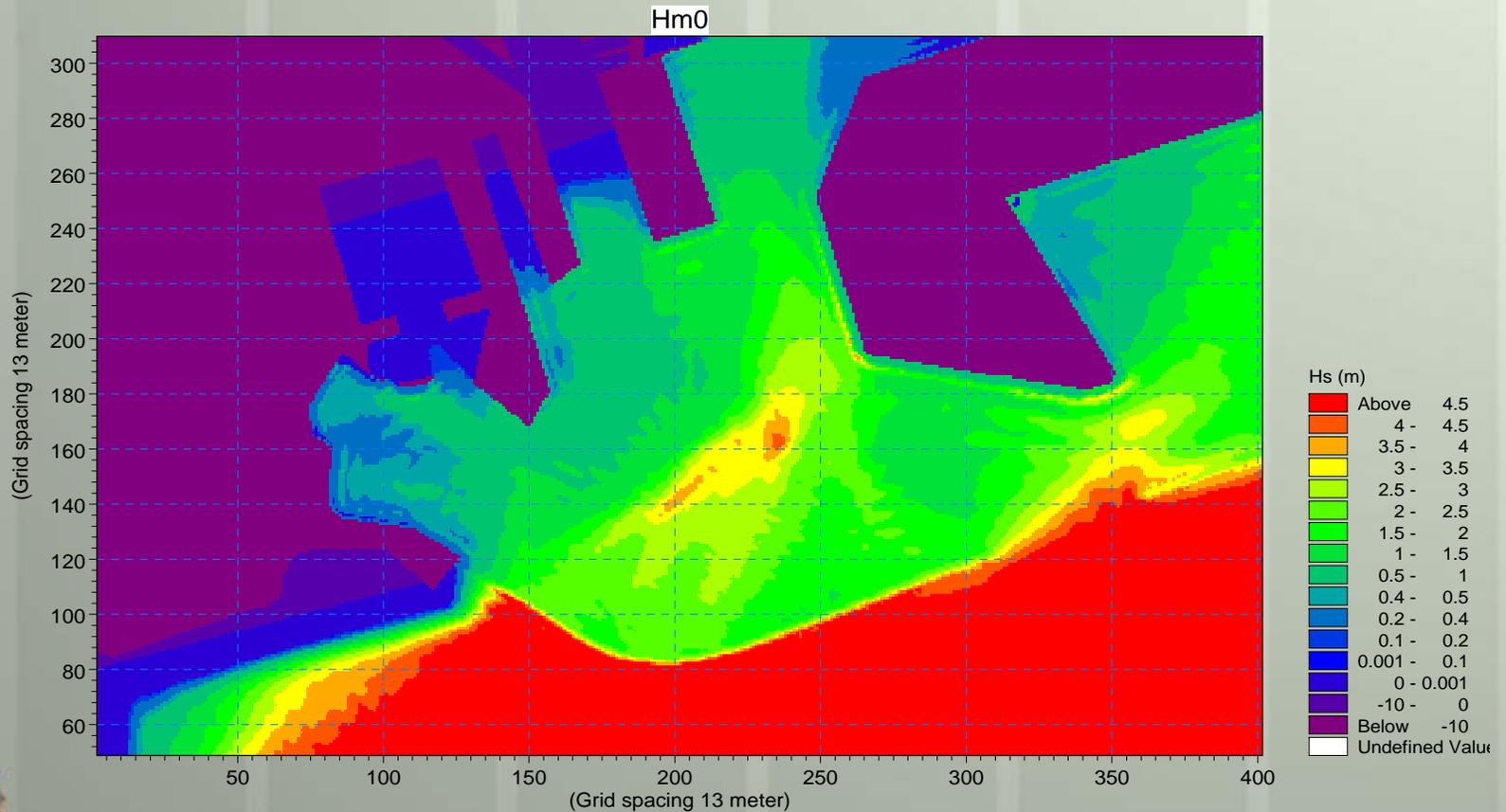
State-of-the-Art Systems and Features

- *Integrated Control System for Effective Operator Control*



State-of-the-Art Analyses Performed

● *Berth Operational Downtime Analysis*

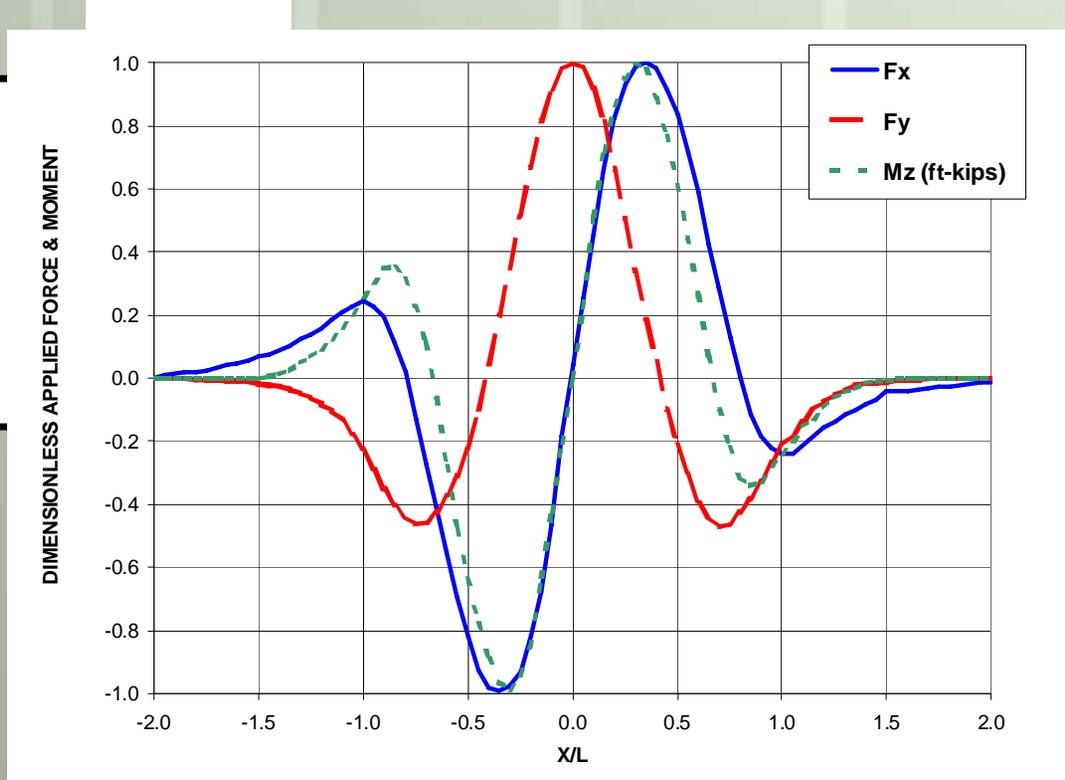
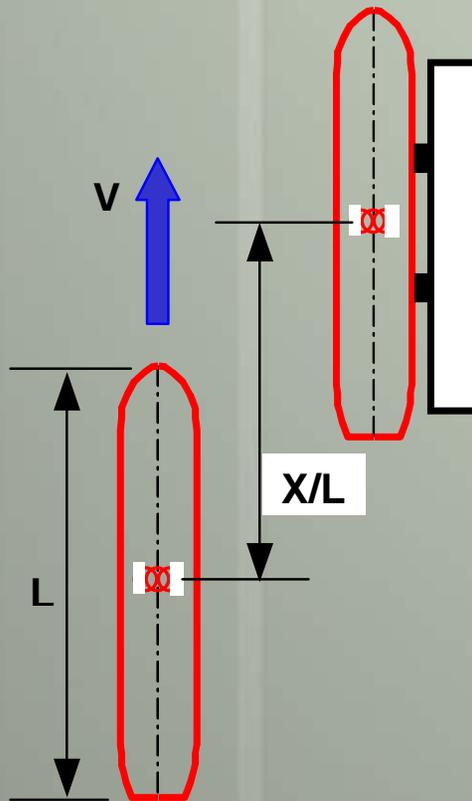


1/1/1990 12:33:50 PM, Time step: 11, Layer: 0



State-of-the-Art Analyses Performed

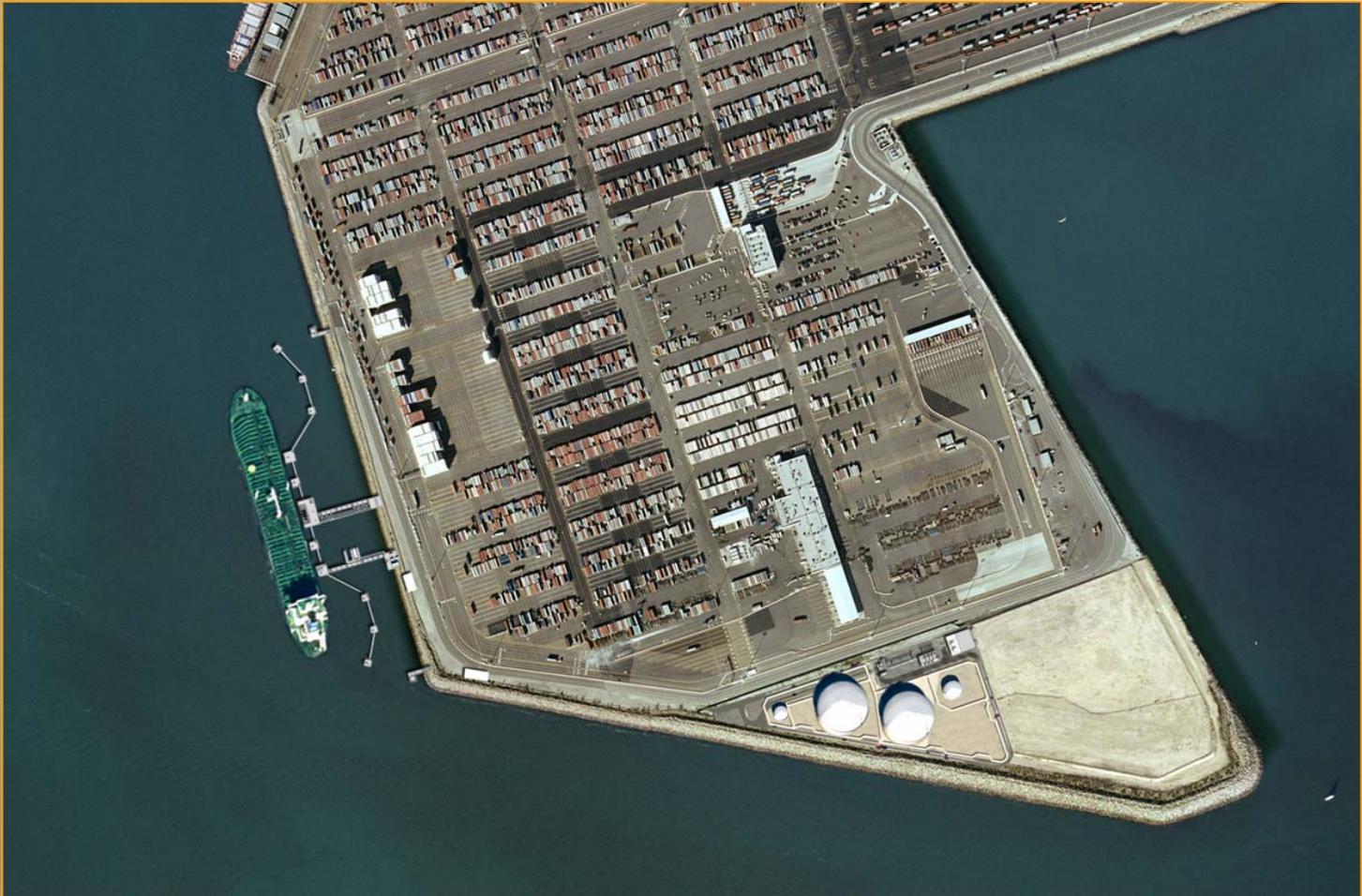
● *Passing Vessel Motion Analysis*



2006

State-of-the-Art Analyses Performed

- *Tsunami Hazard Analysis*



State-of-the-Art Analyses Performed

● *Seismic Structural Analysis Per MOTEMS*

❖ *Level 1 Seismic Performance*

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

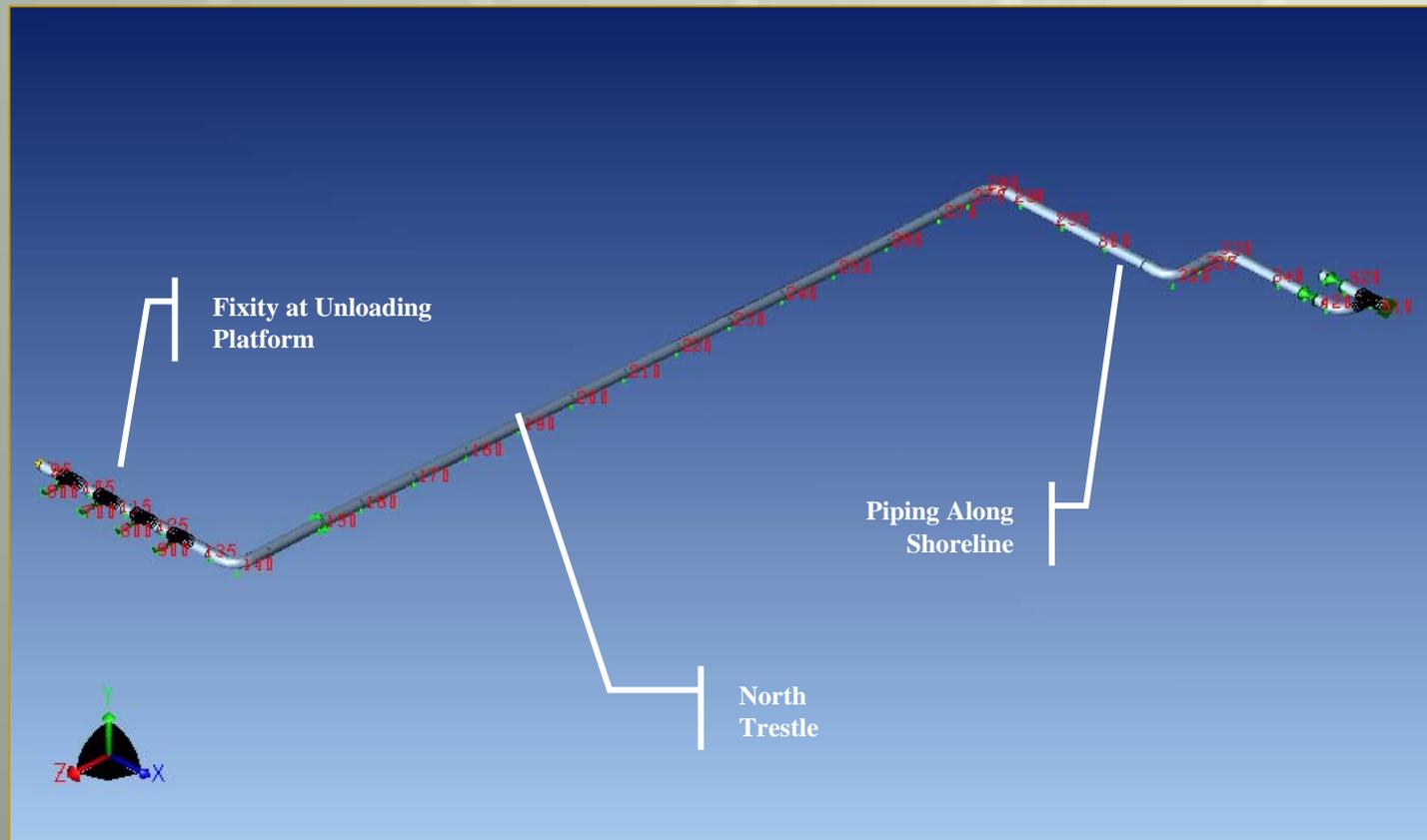
❖ *Level 2 Seismic Performance*

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



State-of-the-Art Analyses Performed

- **Structural and Piping Stress Analysis**



Challenges and Hurdles Overcome

● *Regulatory and Permitting Hurdles*

- ❖ *Over 25 agency approvals*
- ❖ *Over 80 individual permits required*

● *Political Challenges*

- ❖ *Effective Outreach*
- ❖ *Citizens and Community Organizations*
- ❖ *Interest Groups*
- ❖ *Neighborhood Groups*
- ❖ *Politicians*

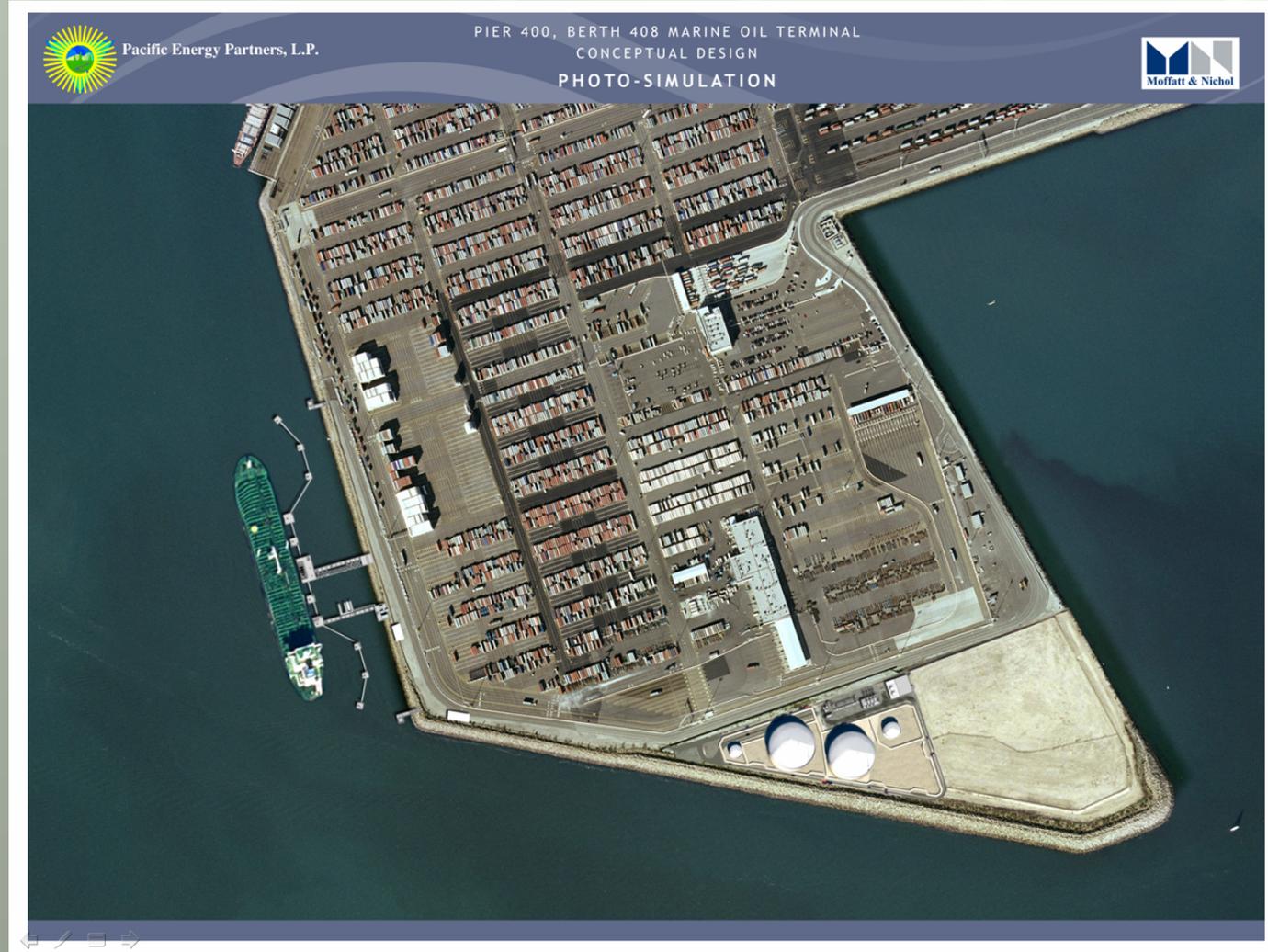
● *Alternative Marine Power Requirement*

- ❖ *Shore side infrastructure Challenges*
- ❖ *Ship Conversion Challenges*



Conclusions

- ***Next Generation Marine Oil Terminal***
- ***First New CA MOT in 25+ Years***
- ***First CA MOT to be Designed to New MOTEMS Requirements***
- ***Precedent-Setting Solutions to Technical, Environmental and Political Challenges***



**POLA / Pacific Energy Berth 408
Crude Oil Import Terminal Design**

“Overview of the Terminal Design”



Thank You!

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