Alternative Maritime Power Conference

Pier T Berth T121, BP
Cold Ironing Project

THE PORT OF LONG BEACH

Agenda

- Project Location
- Project Background
- Project Overview
- Project Challenges
- Lessons Learned

Project Location

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BP T121 Terminal Location

Terminal T121 Is Important to Region

- BP's No. 1 asset in this region
- Feeds oil to SOCAL refineries
  - BP
  - Conoco
  - Valero
- T121 operates 24/7 to maintain refinery output

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Project Background

- Initiated to reduce air emissions in support of the POLB Green Port program
- T121 terminal considered good candidate for cold ironing
- Alaska Class Tankers are diesel electric
- T121 electrical infrastructure already upgraded
- Cooperative agreement between Port of Long Beach & BP
- POLB landside improvements
- BP shipside improvements

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Project Overview

Project Challenges

- Determine electrical design requirements
- Design cable management system (CMS)
- Integration of cold ironing into terminal operations
- Construction constraints
- Compliance with regulatory agency requirements

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Determine Electrical Design Requirements

- Coordination meetings to identify, understand and resolve issues
- Project team coordination
  - Port Of Long Beach
    - ✓ Staff
    - ✓ Consultant
  - BP
    - ✓ Local Staff
    - ✓ Alaska Tanker Company
    - ✓ Consultant
- Interface between ship and shore

Electrical Design Requirements

- Determine total required ship power
  - Detailed study was required
  - Breakdown ship electrical load

    7.78 MW @ .8 PF = 9.73 MVA
- Limit voltage drops
  - LTC Transformer
- Bumpless power transfer
- Control cable
  - Ship control of electrical supply
- Existing infrastructure
  - Electrical service (SCE) meets cold ironing requirements

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Cable Management Design

- Integrate with terminal operations
- Accommodate a range of ships
  - Cold Ironed
  - Non Cold Ironed
- Various methods to handle power & control cables
  - Cable reel and crane on barge
  - Cable reel on ship
  - Cable reel on platform/crane on ship
  - Cable reel and crane on platform

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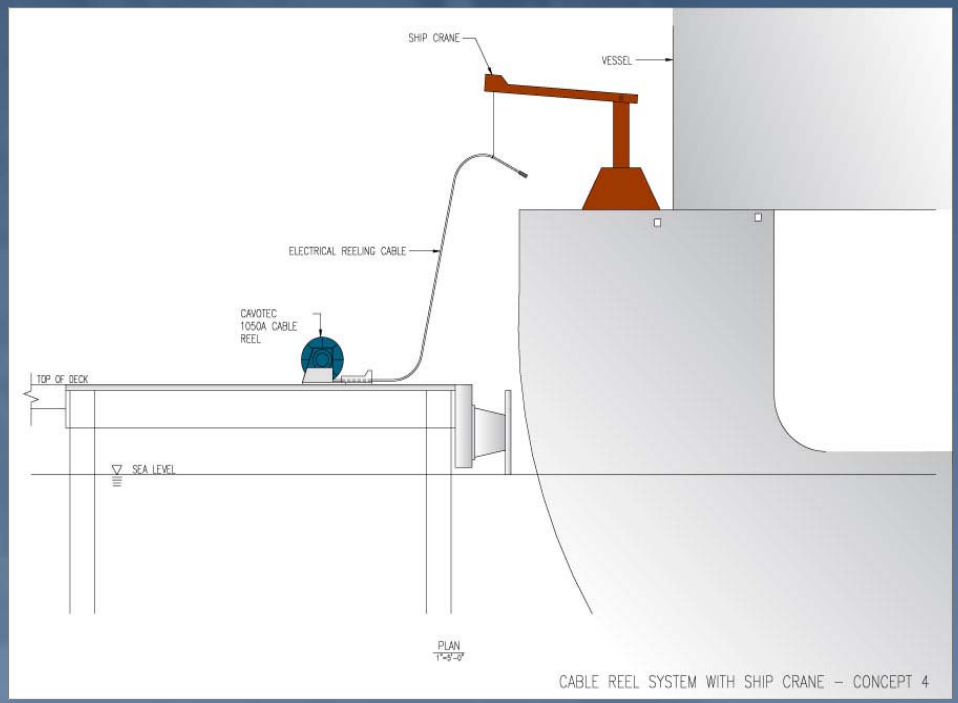
Cable Management Design

- Selected Option
  - Cable reel on platform crane on ship



CMS Platform Design

- CMS Platform Positioning
  - Position within reach of ships crane
  - Mooring lines, berthing and fendering
  - Circulation and gangways
- CMS Interface Considerations
  - Vertical requirements based on:
    - ✓Tidal fluctuations
    - ✓Deep to light draft range of ship
    - ✓Shipside cable tray
- Vessel Movement
  - Passing vessel
  - Currents
  - Winds

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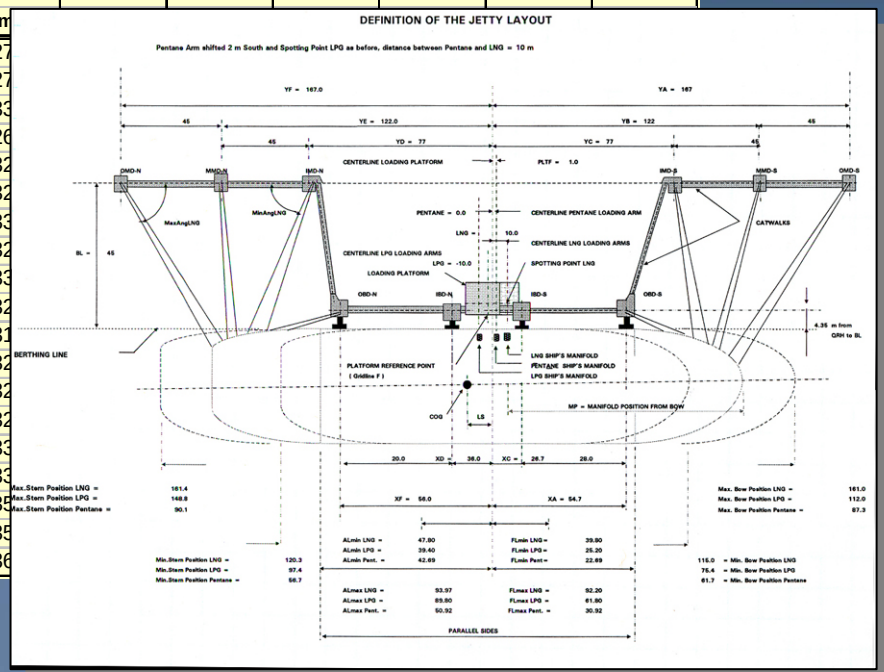
CMS Platform Design - Mooring

COMPREHENSIVE TANKER DATA BASE

Nr.	Vessel Name	DWT * (TONS)	DISPLACEMENT LADEN (TONS)	DISPLACEMENT See Note BALLAST (TONS)	LOA * m	LBP * m	BEAM *	MOULDED DEPTH	DRAUGHT * LADEN	TPC	FREEBOARD LADEN	Manifold from Bow
2398	Nan Hai Xi Wang	174,015	204,026	30,011	293.24	27						
2399	Enalios Ethra	151,973	179,078	27,105	290.69	27						
2400	Nan Hai Fa Xian	254,642	294,382	39,740	348.91	33						
2401	Agip Marche	254,650	294,390	39,740	285.79	26						
2402	Arco Spirit	266,586	307,667	41,081	335.26	32						
2403	Arco Independence	266,586	307,667	41,081	335.26	32						
2404	Agios Nikolaos	263,394	304,119	40,725	343.51	33						
2405	Chevron Edinburgh	268,334	309,610	41,276	338.63	32						
2406	Alamoot	317,825	364,424	46,599	351.45	33						
2407	Tonbridge	267,911	309,140	41,229	339.15	32						
2408	Acquila Trader	260,849	301,289	40,440	338.10	31						
2409	Saudi Splendour	280,579	323,204	42,625	340.79	32						
2410	Myrtos Bay	257,099	297,116	40,017	337.06	32						
2411	World Champion	273,150	314,959	41,809	337.01	32						
2412	Africa	274,479	316,435	41,956	348.77	33						
2413	Lyria	277,553	319,847	42,294	343.01	33						
2414	Mare Discovery	515,700	580,816	65,116	354.55	35						
2415	Bridgeton	407,823	463,323	55,500	365.99	35						
2416	Acropolis	554,999	623,381	68,382	381.92	36						



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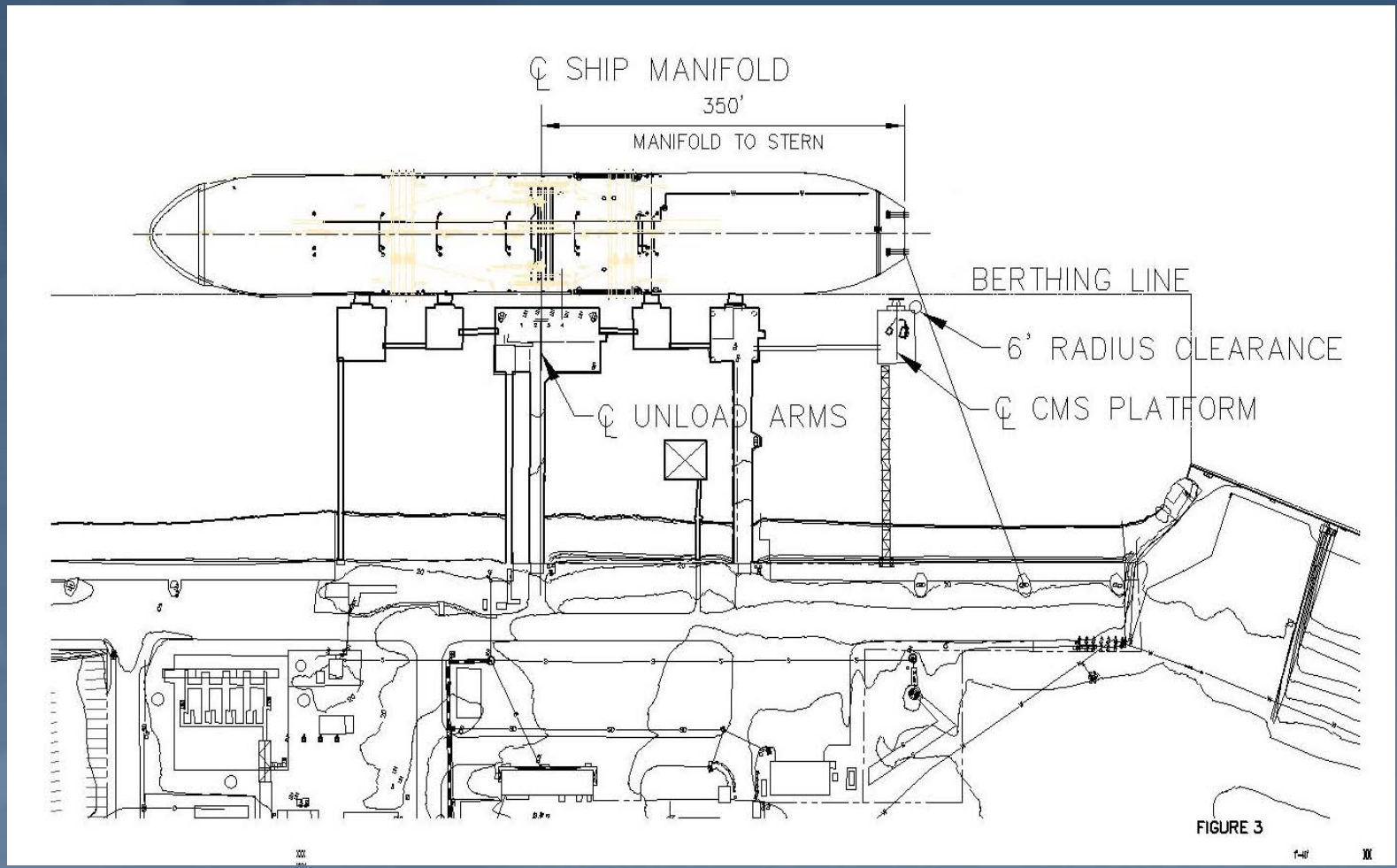
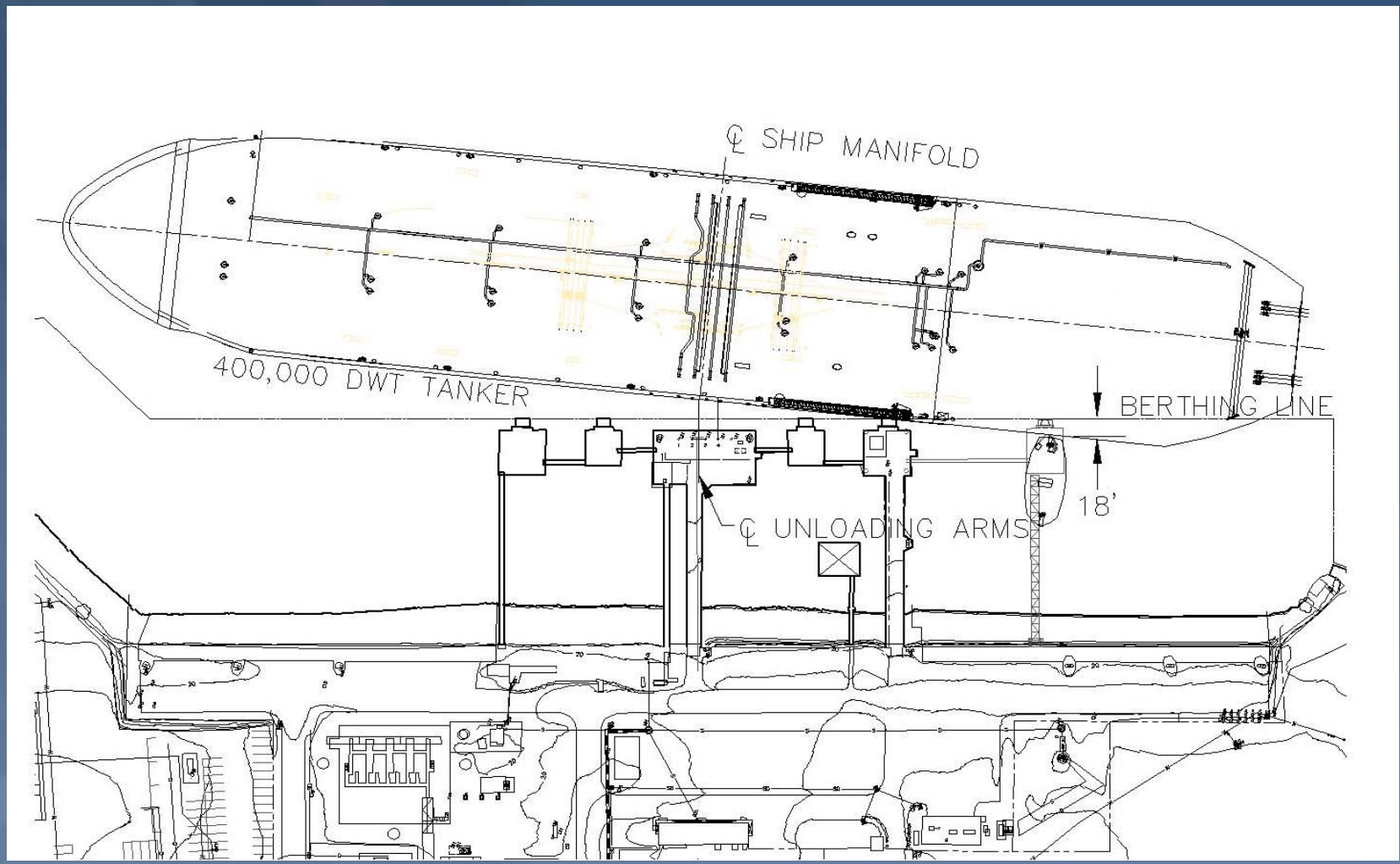
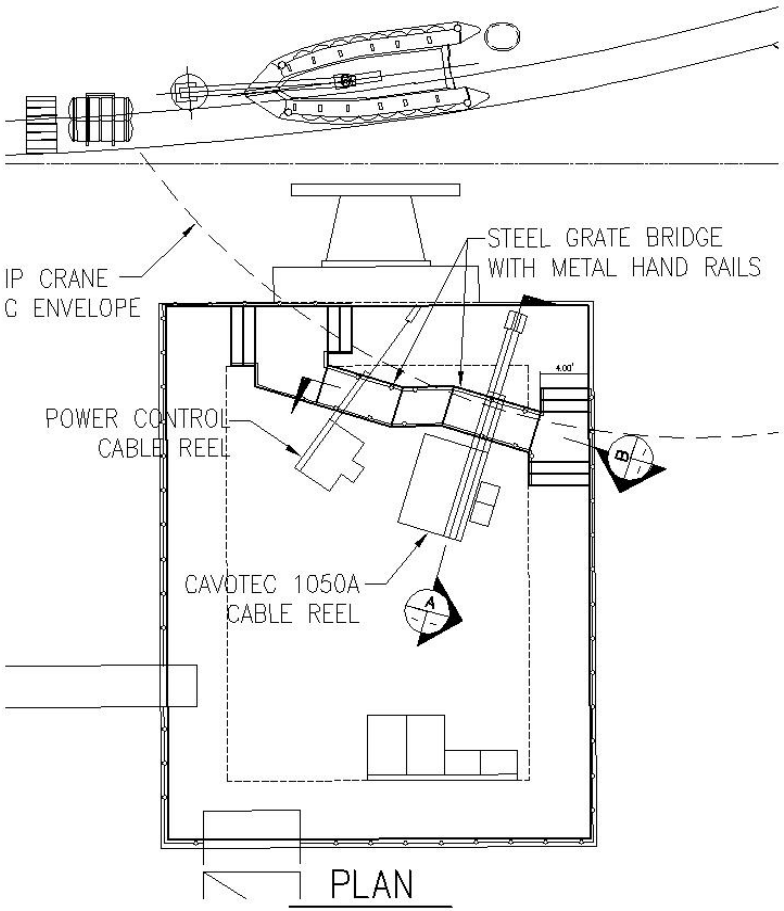
CMS Platform Design - Mooring

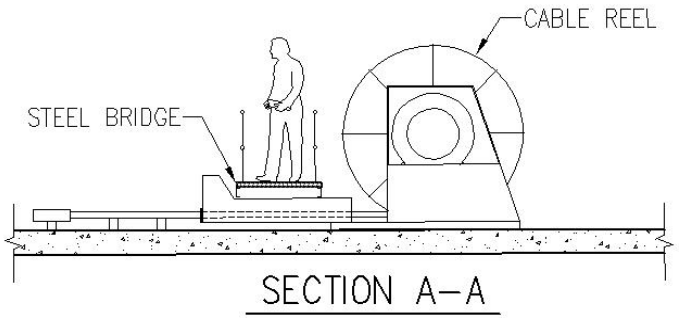


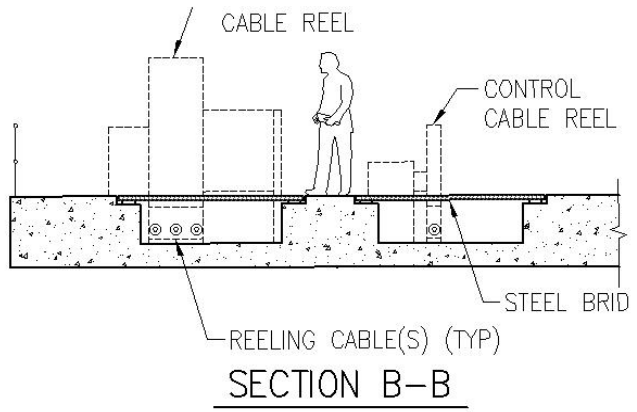
CMS Platform Design - Berthing



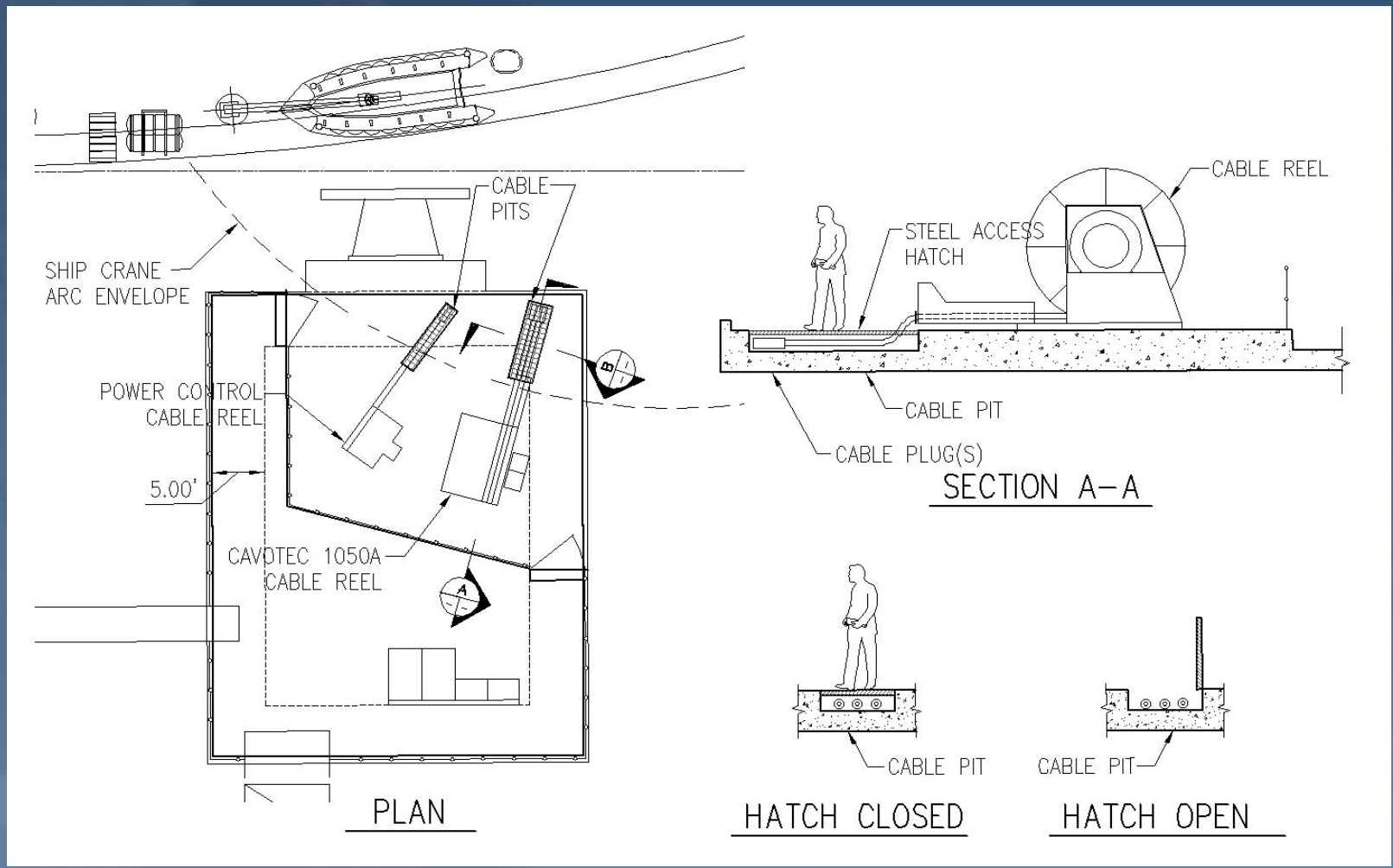
CMS Platform - Circulation



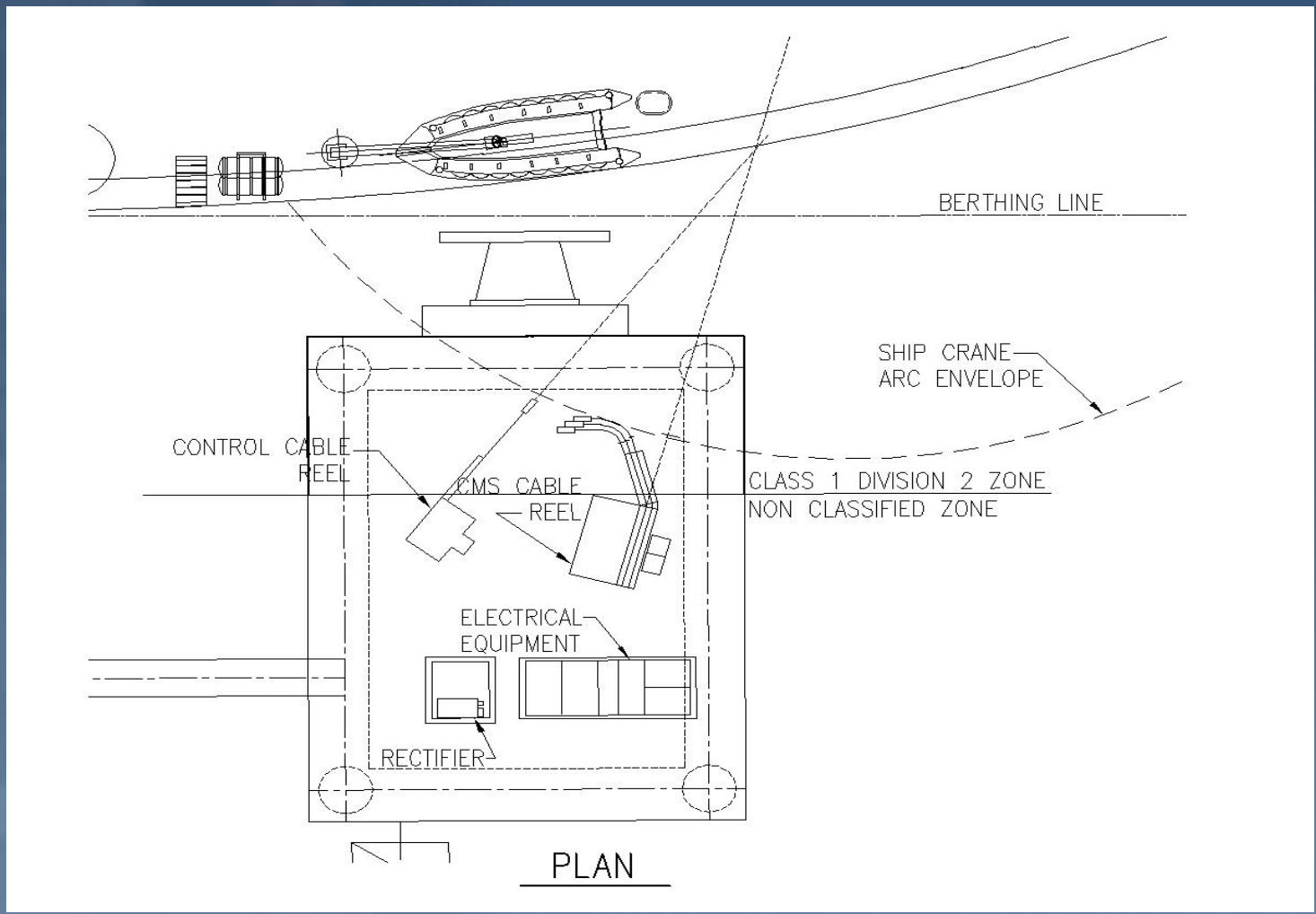




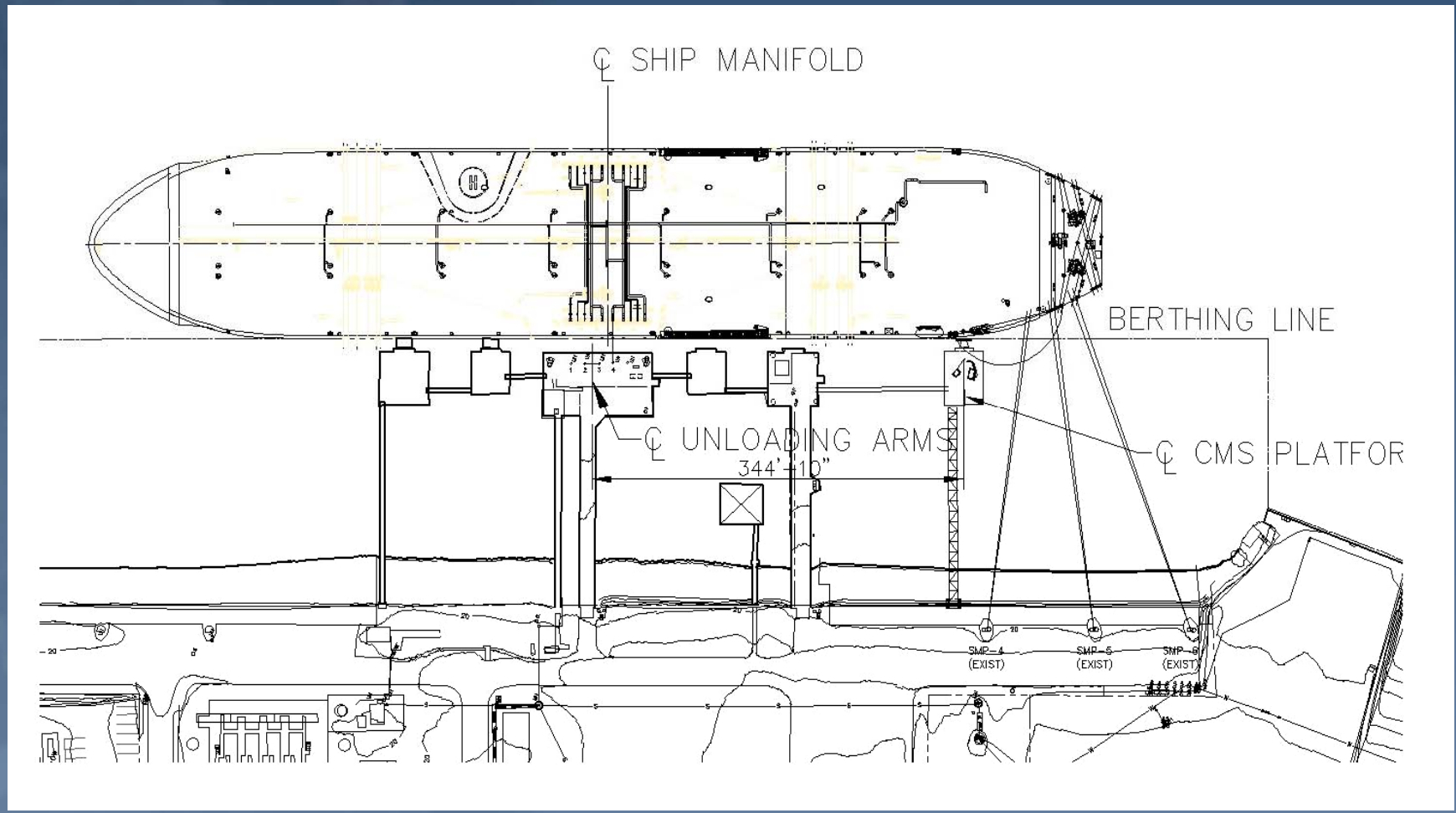
CMS Platform - Circulation



CMS Platform - Circulation



CMS Platform Design - Final Layout



Construction Constraints

- Limited site access & stringent safety requirements
- Site constraint & safety solutions
  - Specified access requirements based on BP's shipping schedule
  - Specified safety requirements for hazardous area
  - Split project into two construction contracts
  - Provided offsite construction area fabricate and assemble:
    - ✓ piles platform, access trestle, catwalk

Construction Constraints

- Site constraint & safety solutions (continued)
  - Identified anticipated work windows
  - Specified Multiple Mobs & Demobs
- Enhanced geotechnical investigation
  - Investigated previous studies
  - Performed additional boring program
  - Side scan sonar
  - Diving survey

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Regulatory Agency Compliance

- Unique type of project
- Several Agencies Involved
  - CA State Lands Commission
    - ✓Compliance with MOTEMS
  - City of Long Beach Planning & Building
    - ✓Codes Requirements
  - USACOE
    - ✓Eel grass, Cleurpa Taxifolia
  - USCG
    - ✓Emergency action plan
  - Ship Classification Agencies
    - ✓Ship side modifications

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Lessons Learned

- Unique challenges of cold ironing on liquid bulk terminals
  - Safety in a hazardous environment
  - Single berth limits construction access
  - Ship control of shore side equipment
  - Additional deep water structures
  - Cable must be lifted to ship
  - Intensive coordination required

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