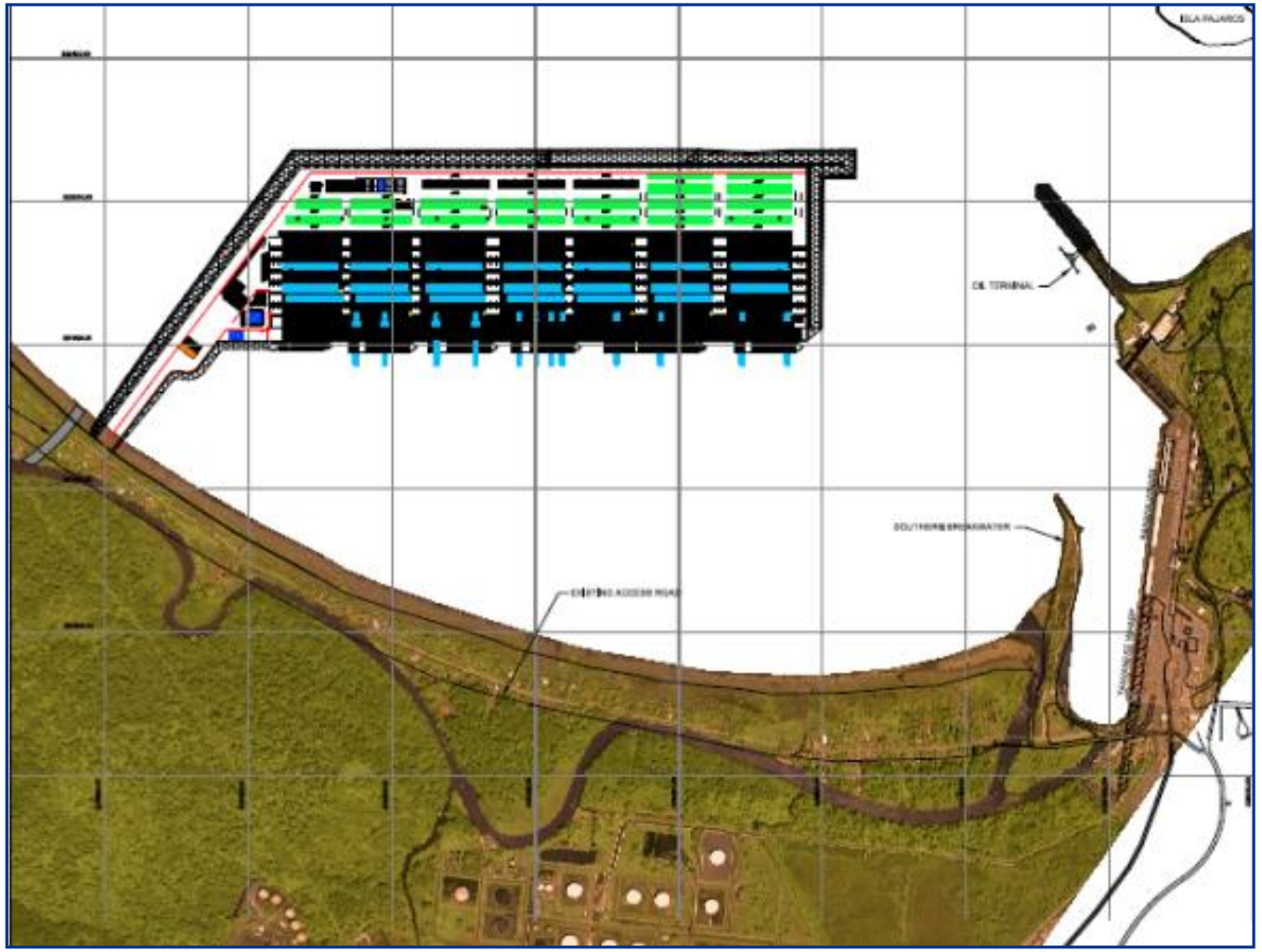
Moin Container Terminal Development

Moin Container Terminal

- New “bluewater” container terminal in Limon Province
- Limon / Moin port complex services 80% of the country´s international commerce.
- Over the next 15 years, reefer container shipments from Costa Rica are projected to double
- Concept conceived to
  - Raise productivity to industry standards
  - Reducing wait-time and turnaround time
  - Accommodate larger vessels
  - Address anticipated rise in international throughput over next 30 years



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Moin Container Terminal

- In 2009, Cost Rica solicited public bids for concession to design, build, and operate a new container terminal on the Caribbean Coast at Moin

- Terminal will handle all Costa Rican Cellular Container Traffic on the Caribbean Coast

- In 2011, APM Terminals, S.A. (APMT) was successful in the bid tender for building a container terminal at the Port of Moín, Costa Rica.

cnc Concesiones

Lifting Global Trade..
APM TERMINALS

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Development Phases

- Concept Design and Bid Tender
- Investigations and Basic Design Studies
- Design
- ECI/Procurement
- Construction

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Bid Tender Preparation

- Bid Package included commercial terms, but also a conceptual design
- Concept design included:
  - Phasing
  - Facility layout
  - Concept level details
  - Breakwater and Revetment
  - Wharf
  - Vertical Facilities

- In 2011, APMT Awarded 33 Year Concession to be developed in 3 Phases

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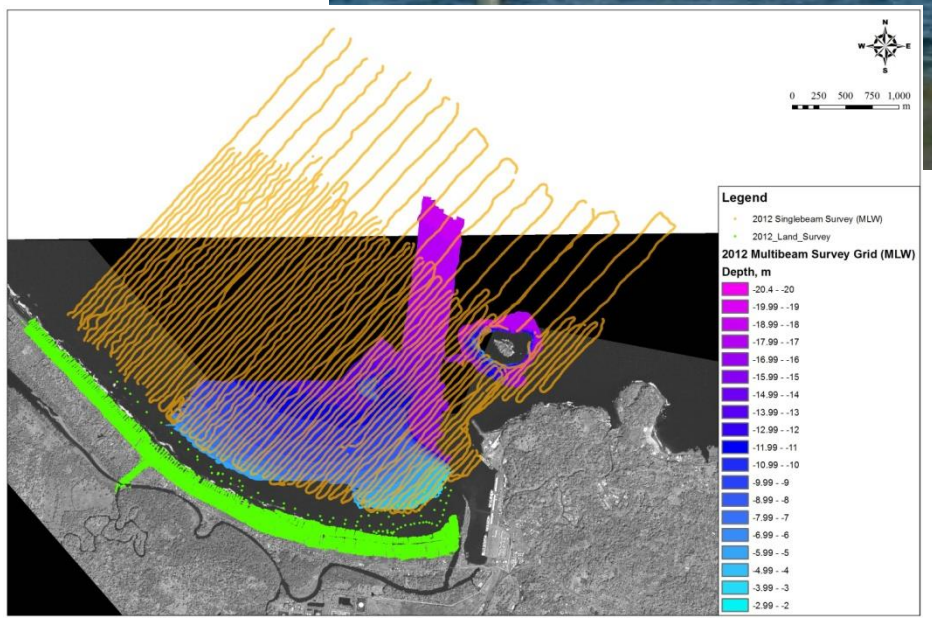
Basic Design Studies

Initial Tasks –
Investigations and Basic Design Studies

- Site is 500 M off coast
- Literally no data available for site (or within 2 km of site)
- Extensive Investigation Program required

Initial Tasks –
Investigations and Basic Design Studies

- Marine and Geophysical Surveys
- Offshore Geotechnical Boring Program (137 Borings/SPTs)
- Regional and Site Geology and Seismic Hazard Study
- Quarry Investigation



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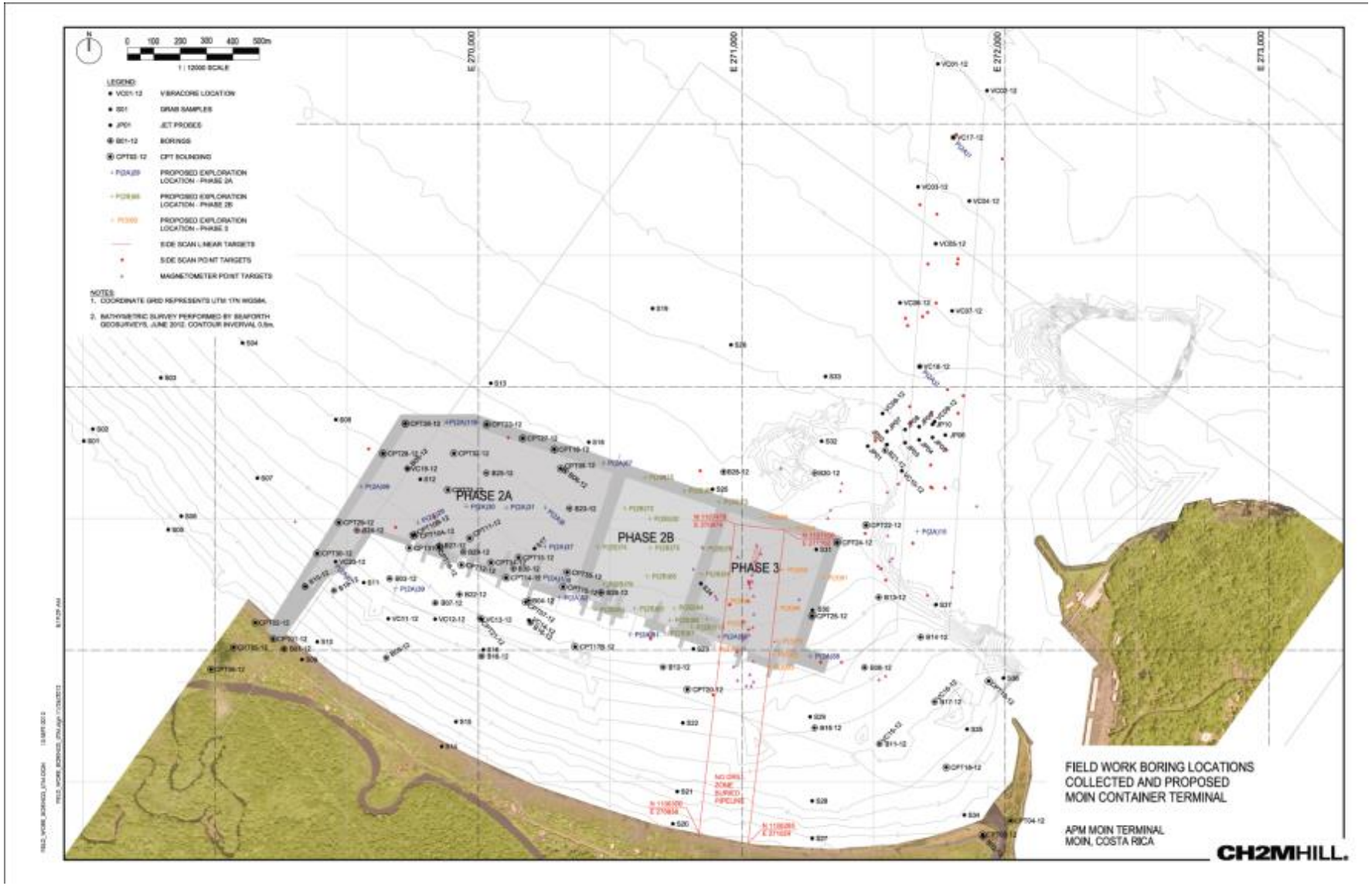
Geotechnical Field Exploration



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Initial Tasks –
Investigations and Basic Design Studies

- Coastal and Meteorological Criteria Summary
- Wave Climate and Modeling
- Site Hydrodynamics and Sediment Transport
- Spill Modeling
- Breakwater Design Study
- Marine Operability Study
- Ship Navigation Simulation

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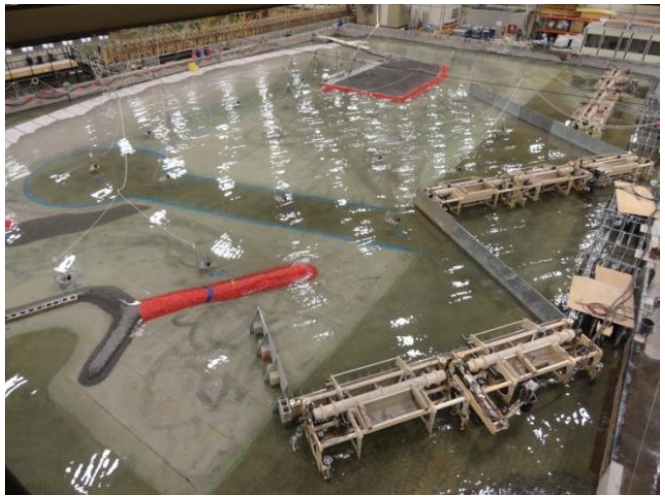
Physical Modeling

- Canadian Hydraulics Centre
  - Demonstrate stability under 570 year RP condition
  - Assess Overtopping
  - Evaluate Marine Operation Impacts



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Some Resulting Surprises

Findings
“Mudstone” Layer at -40 to -45 meters
Soft clay layer was encountered below the land reclamation and under dike foundations. Settlement must be addressed and Ground Stabilized at Embankments
Less than ½ of the channel dredge material is suitable for use as fill. The suitable material is marginal (20-30% fines)
Largely rounded stone not suitable due to seismic conditions

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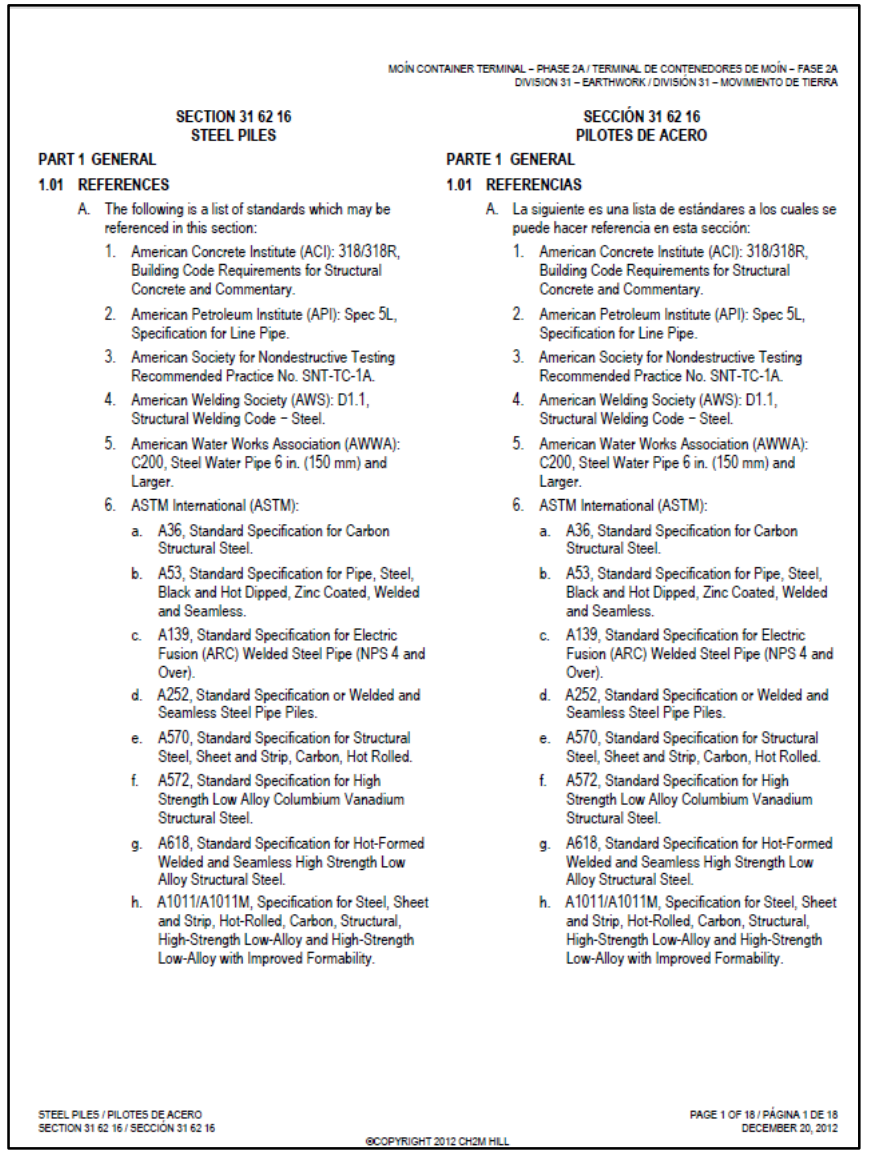
Planning and Design

Design

- Design prepared for both agency approvals as well as procurement
  - Fully Bilingual Plans and Specifications
  - All land reclamation, coastal, site development and buildings
  - Completed in 9 months
    - Concurrent with Design Studies and Planning



MOÍN CONTAINER TERMINAL – PHASE 2A / TERMINAL DE CONTENEDORES DE MOÍN – FASE 2A
DIVISION 31 – EARTHWORK / DIVISIÓN 31 – MOVIMIENTO DE TIERRA

SECTION 31 62 16
STEEL PILES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Concrete Institute (ACI): 318/318R, Building Code Requirements for Structural Concrete and Commentary.
2. American Petroleum Institute (API): Spec 5L, Specification for Line Pipe.
3. American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A.
4. American Welding Society (AWS): D1.1, Structural Welding Code − Steel.
5. American Water Works Association (AWWA): C200, Steel Water Pipe 6 in. (150 mm) and Larger.
6. ASTM International (ASTM):
   a. A36, Standard Specification for Carbon Structural Steel.
   b. A53, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
   c. A139, Standard Specification for Electric Fusion (ARC) Welded Steel Pipe (NPS 4 and Over).
   d. A252, Standard Specification or Welded and Seamless Steel Pipe Piles.
   e. A570, Standard Specification for Structural Steel, Sheet and Strip, Carbon, Hot Rolled.
   f. A572, Standard Specification for High Strength Low Alloy Columbium Vanadium Structural Steel.
   g. A618, Standard Specification for Hot-Formed Welded and Seamless High Strength Low Alloy Structural Steel.
   h. A1011/A1011M, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

SECCIÓN 31 62 16
PILOTES DE ACERO

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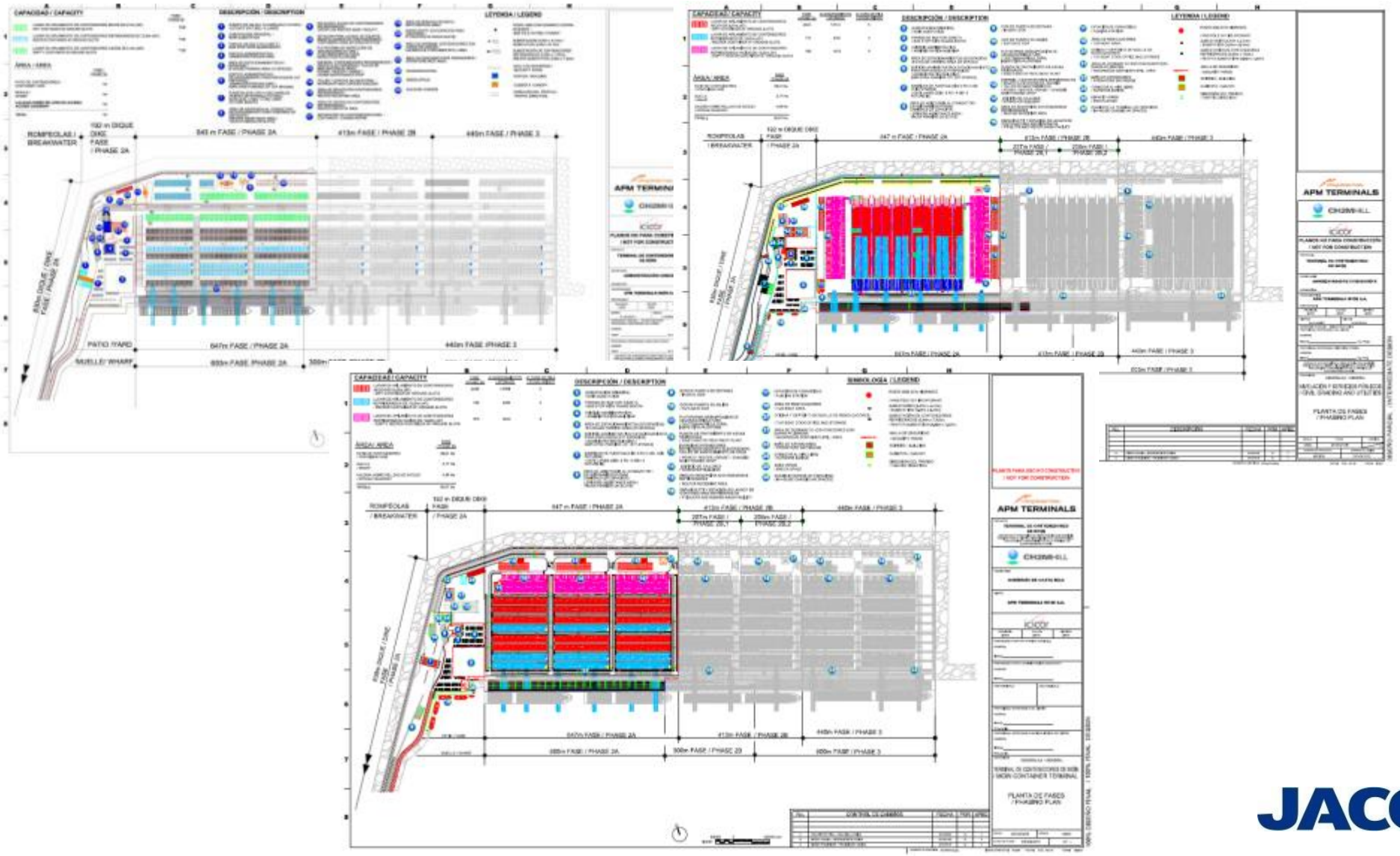
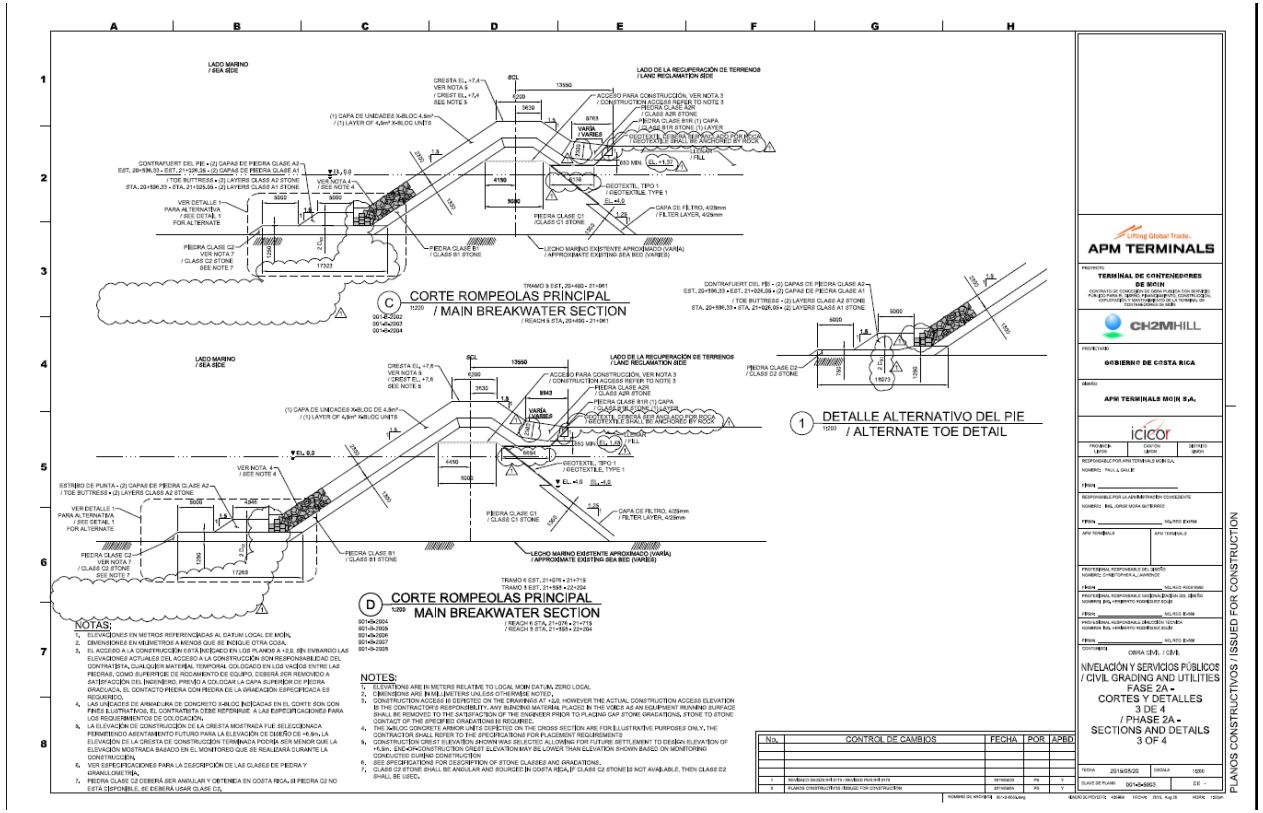
Terminal Planning



Land Reclamation Elements

- Rock Revetment protected with Concrete Armor Units
- Dredge Sand used for Fill
- Wick Drains and Surcharging to Consolidate underlying Soft Clay
- Vibroreplacement and DSM to maintain wharf stability
- Wharf was concrete deck on steel piles



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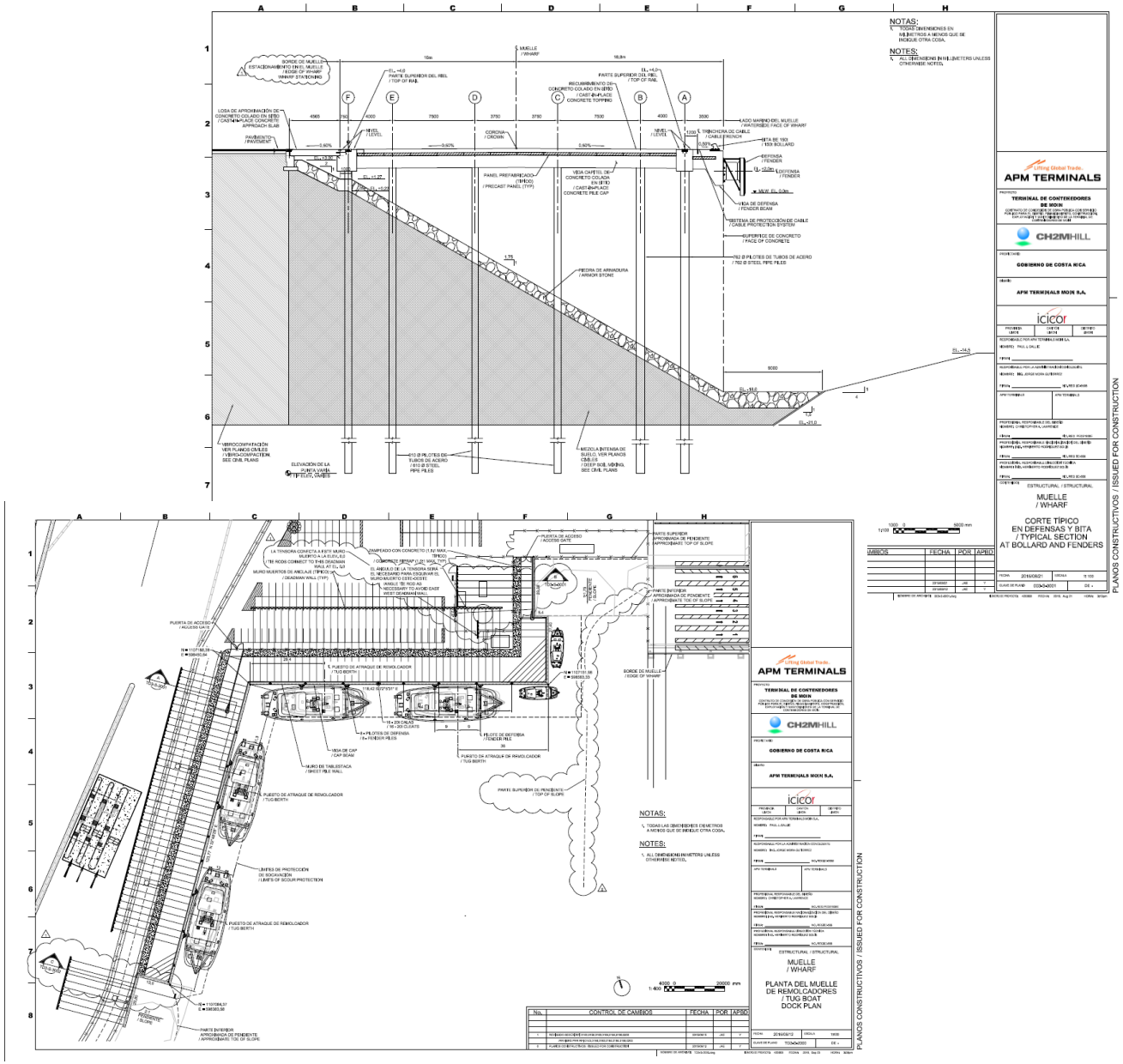
Wharf Design Elements

- Wharf is concrete deck on steel piles
- 650 M pile supported Quay in Phase 2A.
  - *1500 M by Phase 3*
- Tug Dock
- 30.4M gage STS cranes
- 24” and 30” Piles, 6 meter bent spacing



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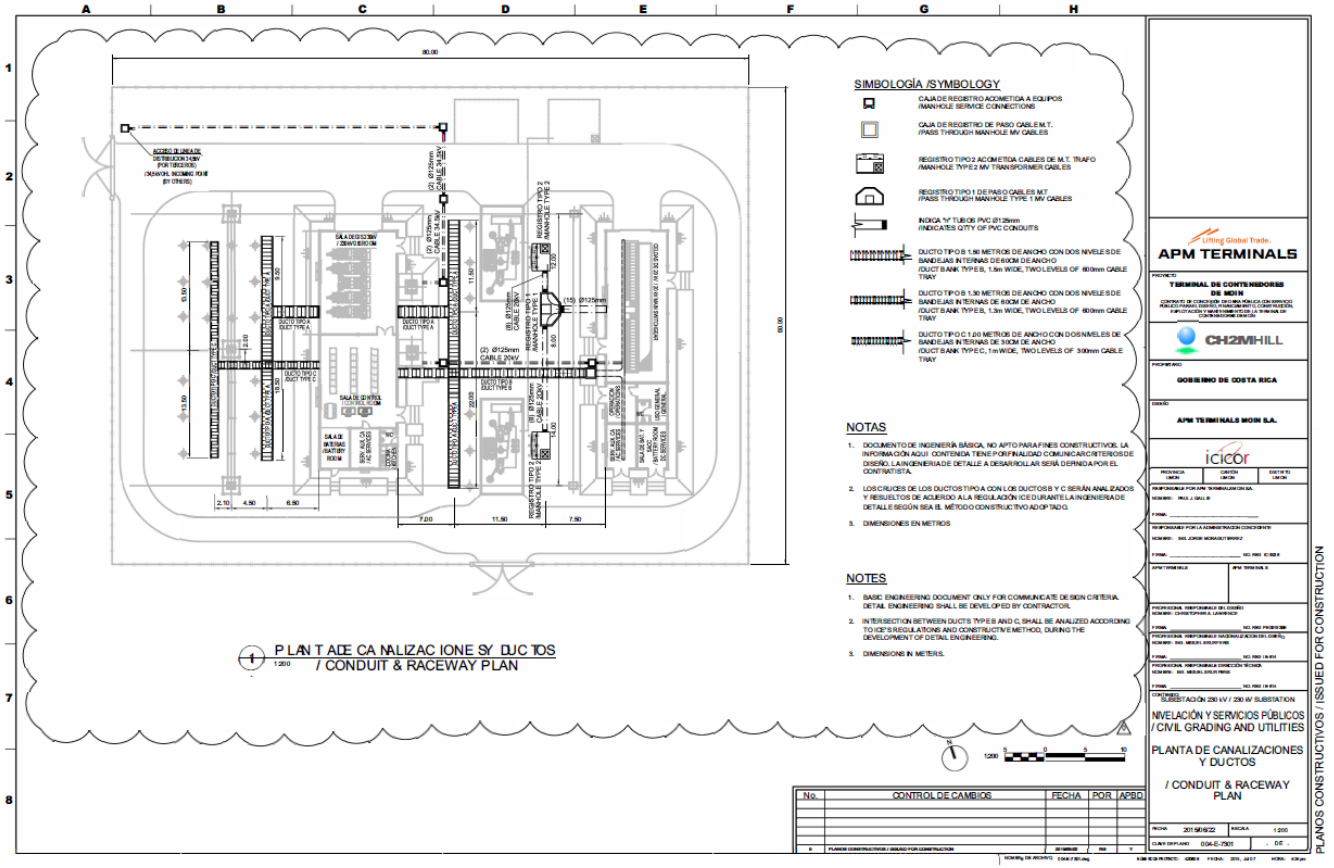
Terminal Design

- Storm and Sanitary Sewers
  - Sanitary Pump Stations
  - Wastewater Treatment Plant
- Potable Water Distribution Loops
  - Human Consumption
  - Service water (Reefer Wash)
  - Fire Protection
  - Tank and Booster Pump
- Pavement
  - Concrete Pavers in Yard
  - CIP Concrete for Gate Lanes
  - Asphalt for POV and Service Roads
- MV/LV/C distribution
  - Main Substation
  - High mast light poles
  - Crane/Reefer Substations



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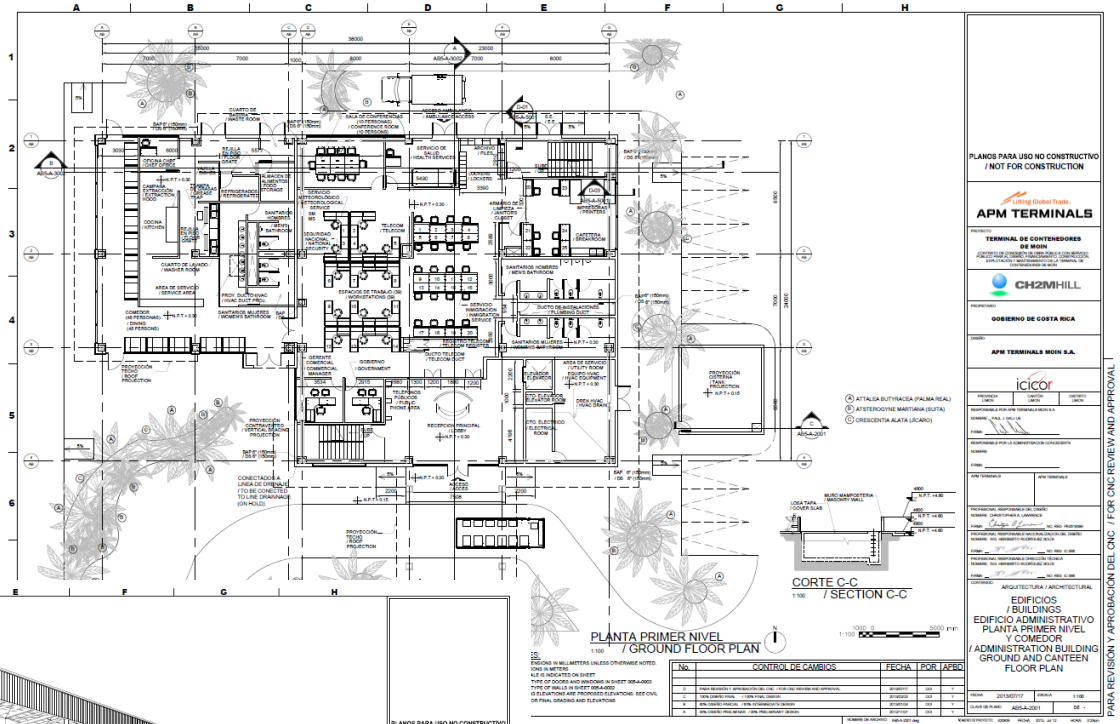
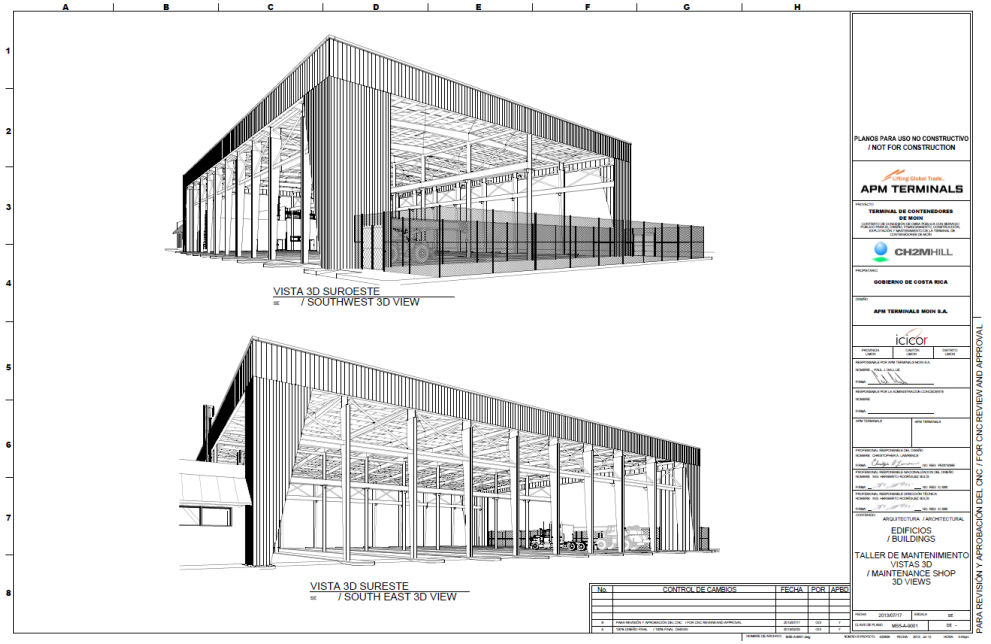
Other Design Elements

- OCR Portals and unmanned gate
- Administration Building and Canteen
- Workshop/Maintenance Facility
- Customs Platform
- Reefer Dispatch
- Various Small Offices and Break Rooms





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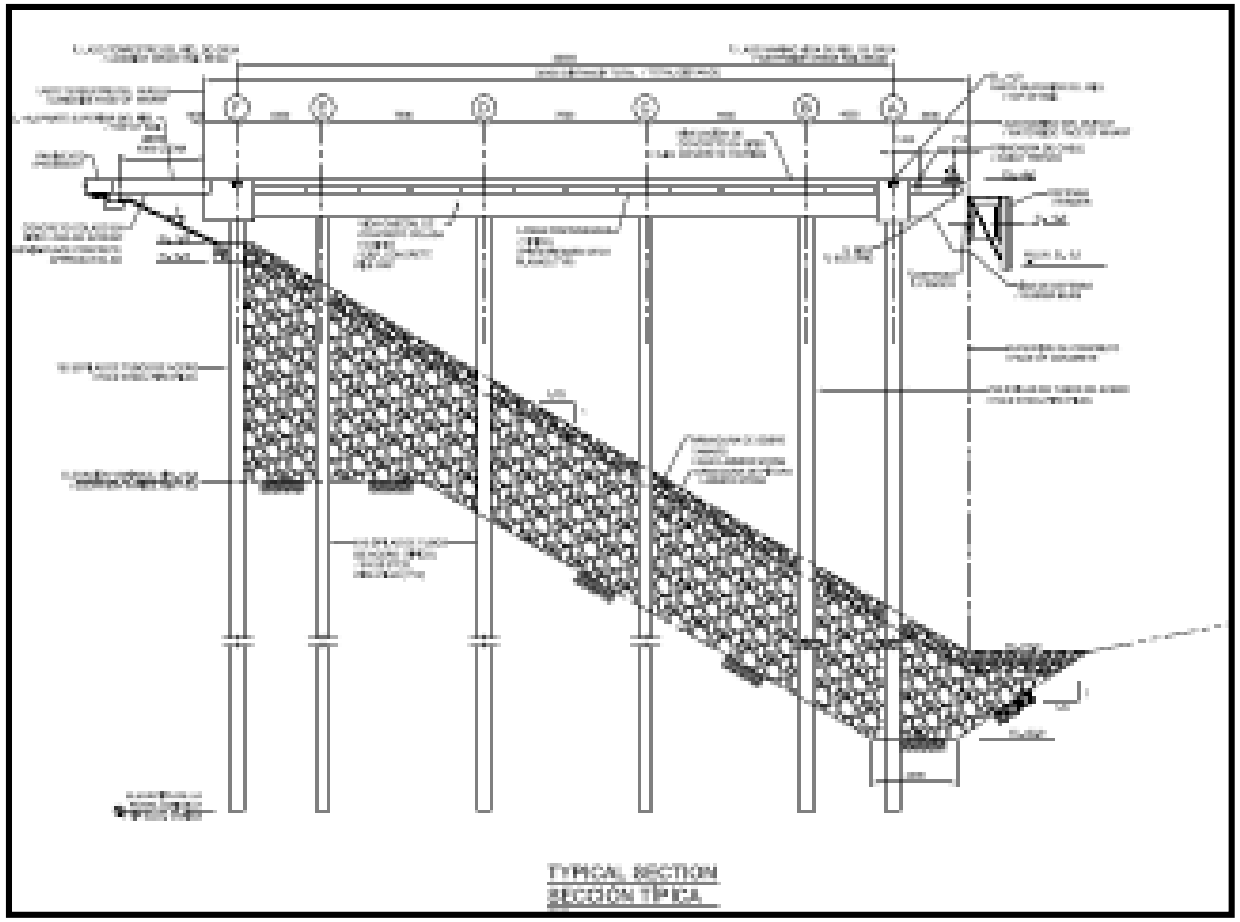
ECI Process

- Contractor Long-list Developed
- Shortlist Developed and Interviews conducted
- 2 Shortlisted Contractors provided with effectively final designs to suggest innovations and provide associated development cost
  - Worked with collaboratively with design teams on innovations
- Contractors provided bids on their proposed designs
- Van Oord/BAM JV selected as low bidder with best approach
  - *One main differentiator was approach for wharf construction*



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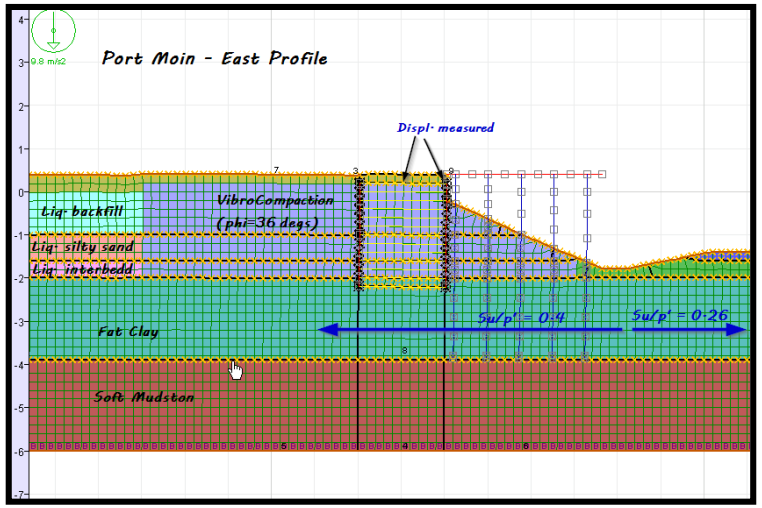
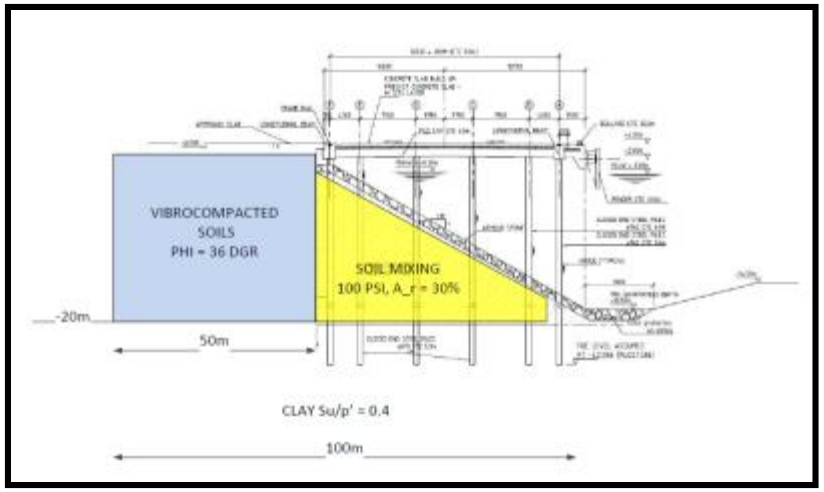
ECI Process

Final Wharf approach developed collaboratively

- Contractor proposed to build wharf in-the-dry
- CH2M HILL developed solution to stabilize underlying clay (overconsolidation)
- Van Oord provided methodology to construct
- Refined through iterative FLAC analysis





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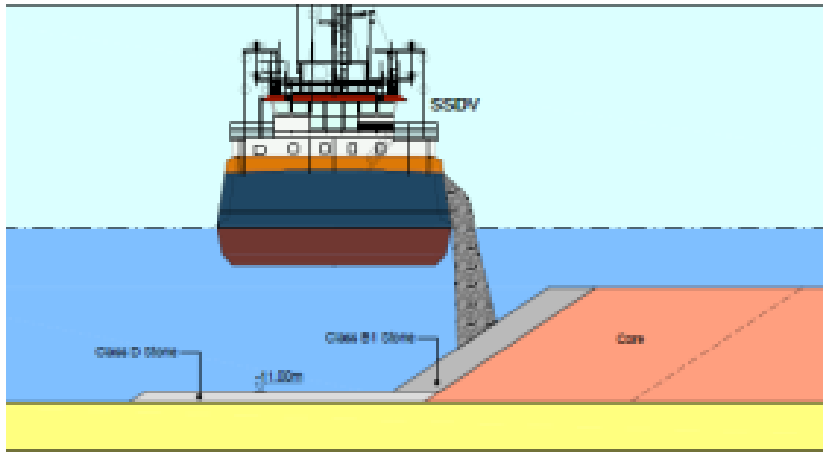
Construction Phase

Land Reclamation

- Revetment Construction with Side Stone Dumping Vessel (SSDV)



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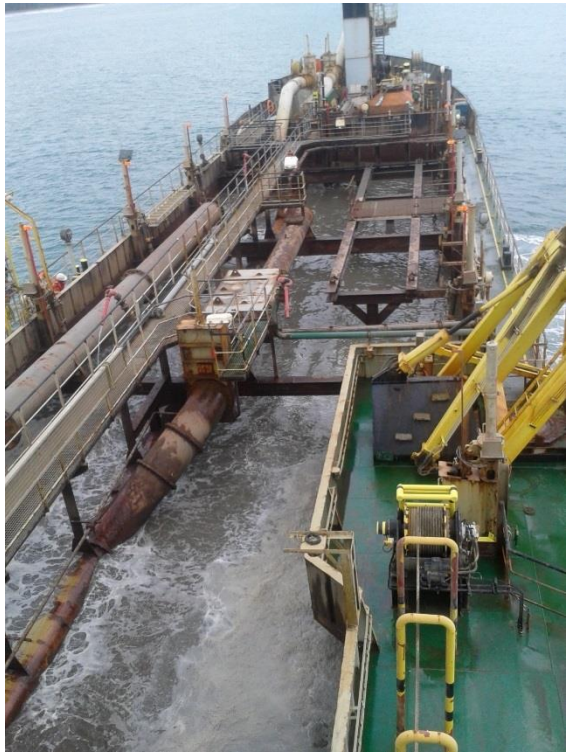
Land Reclamation

- Land Reclamation using Dredge Fill
  - Trailer Suction Hopper Dredge
  - Cutter Head Dredge



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Land Reclamation

- 2200M Stone Revetment
  - Local Core Stone from River Quarries
  - Underlayer imported from Norway
- Protected with 4.3CM Concrete Armor Units (CAUs)

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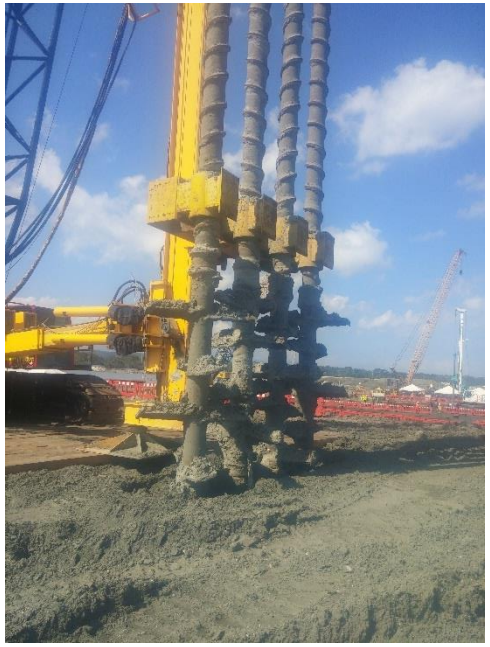
Land Reclamation

- Ground Improvement
  - PVDs and Surcharge
  - Vibroreplacement
  - Deep Soil Mixing
  - Dynamic Roller



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Wharf Construction

- 600 M pile supported Quay plus tug berths in Phase 2A. 1500 M by Phase 3
- 30.4M gage STS cranes
- 24” and 30” Piles, 6 meter bent spacing
- Constructed “in the dry”

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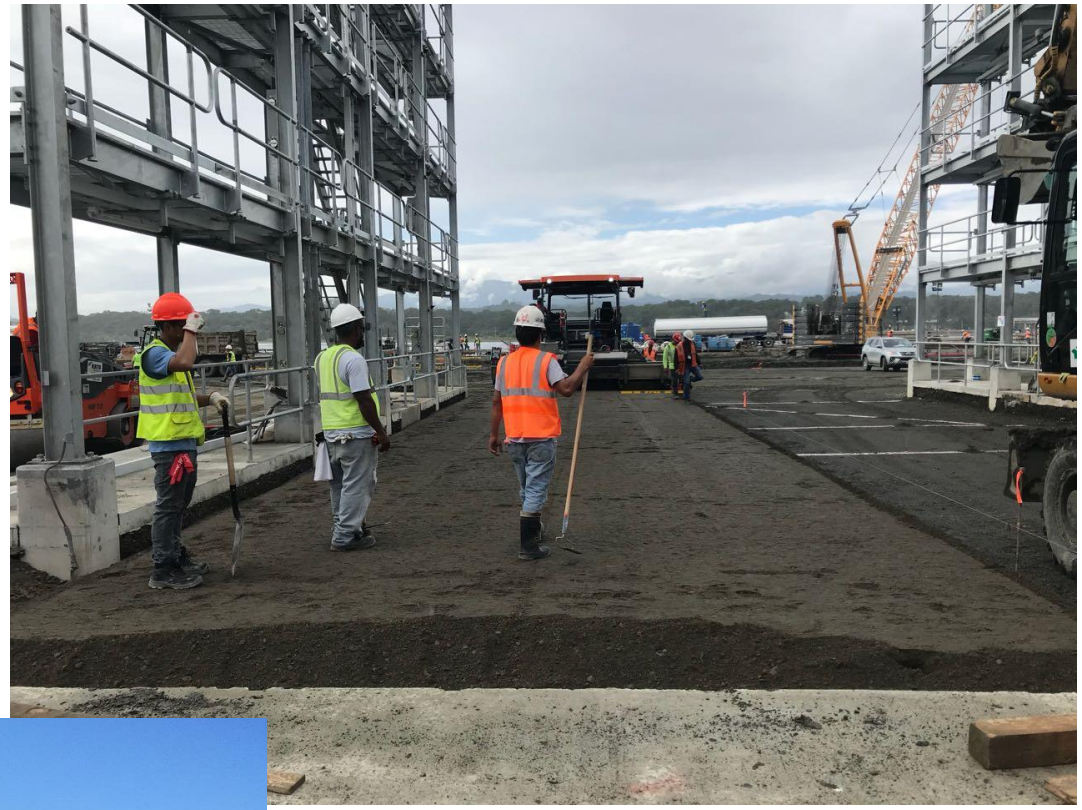
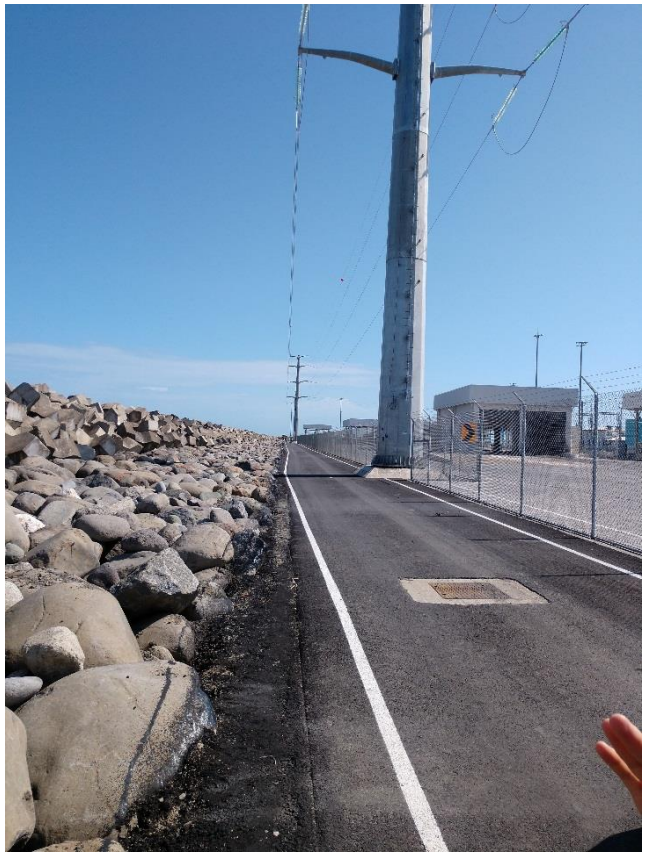
Civil and Utility Construction

- Storm and Sanitary Sewers
- Potable Water Distribution Loops
- Pavement



Civil and Utility Construction

- Gas Insulated Substation
- MV/LV/C distribution
- Reefer Racks
- Vertical Structures



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August 2014

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December 2015

June 2016

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October2016

February 2018

19-February-2018 – Crane Arrivals

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October 2018

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Grand Opening (February 2019)

3 Administrations

By The Numbers

- Largest Transportation Infrastructure Project in history of Costa Rica
- 2.2 km breakwater
- 15,0000 4.3-m3 CAUs
- 6M m3 of Fill
- 650 M Quay (Phase 1)
- Six Ship-to-Shore Cranes can reach up to 22 containers wide (Super Post Panamax)
- 3,500 refrigerated container plugs on 108 Reefer Racks (Phase 1)
- Expected 2.5x increase in productivity
- 650 employees at startup
- 147,000 Indirect Jobs over next 15 years

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Delivery Summary

- 2009: Concept Design
- 2012: Basic Studies
- 2013: Final Design
- 2015: Construction NTP
- 2019: Grand Opening

- Disciplines:
  - Geotechnical
  - Structural
  - Civil
  - Electrical
  - Fire Protection
  - Mechanical
  - Architectural
  - Coastal

- Strong Local Partner icicor

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Questions?