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
Moin Container Terminal

• In 2009, Costa 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.
Development Phases

- Concept Design and Bid Tender
- Investigations and Basic Design Studies
- Design
- ECI/Procurement
- Construction
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
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
Geotechnical Field Exploration
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
Physical Modeling

• Canadian Hydraulics Centre
  – Demonstrate stability under 570 year RP condition
  – Assess Overtopping
  – Evaluate Marine Operation Impacts
### Findings

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

- Revetment Construction with Side Stone Dumping Vessel (SSDV)
Land Reclamation

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

• 2200M Stone Revetment
  – Local Core Stone from River Quarries
  – Underlayer imported from Norway

• Protected with 4.3CM Concrete Armor Units (CAUs)
Land Reclamation

• Ground Improvement
  – PVDs and Surcharge
  – Vibroreplacement
  – Deep Soil Mixing
  – Dynamic Roller
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”
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
August 2014
December 2015
19-February-2018 – Crane Arrivals
Grand Opening (February 2019)

3 Administrations
By The Numbers

- Largest Transportation Infrastructure Project in history of Costa Rica
- 2.2 km breakwater
- 15,000 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
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
Questions?