Automated Container Terminal Design at the Port of Los Angeles

Facilities Engineering Seminar
Vancouver, BC

Tony Gioiello, P.E.
Chief Harbor Engineer

November 7, 2013
AUTOMATED CARGO TERMINALS
The San Pedro Bay Port Complex

Port of Los Angeles

Port of Long Beach
Port of Los Angeles at a Glance

- Founded in 1907
- Non-taxpayer supported
- Landlord business model
- 7,500 acres land and water
- 43 miles of waterfront
- 270 berths and 27 cargo terminals
Diversity at the Port

- Cruise
- Fishing
- Marinas
- Containerized cargo
- Non-containerized cargo
- Commercial/Retail

TOP TRADING PARTNERS

1. China ($92.5 billion)
2. Japan ($22.3 billion)
3. Taiwan ($7.4 billion)
4. South Korea ($5.7 billion)
5. Thailand ($5.2 billion)
2013 Port of Los Angeles Container Terminals

Current Container Terminal Area = approx. 1700 acres
Why Automate?

- Efficient (High Productivity)
- Maximizes the Utilization of Yard Capacity
- Cost Effective
- Environmental Friendly
- Helps the West Coast Stay Competitive
**SCOPE:**
- 134 Acres
- Project Cost = $303 M
- 21 Automated Stacking Rows
- On-Dock Rail Yard
- 5 Construction Phases
- Phase 1C Complete 2014

**Total Equipment:**
- 39 – 8 Wide Automated Stacking Cranes (ASCs)
- 1 – 10 Wide ASC
- 17 – Automated Shuttle Carriers
- 2 Rail Mounted Gantry Cranes

**Throughput:** 1.6 M TEU
Site Constraints

- Operating Terminal
- Irregular Shape
- Existing Utilities
- Chemically Impacted Soil
- Precise Manufacturer Parameters
- Phasing (7 Adjacent Construction Projects)
Automated Operations

Waterside

Vessel Operation
Automated Horizontal Transport (Shuttle Carriers)

Stacking
Automated Stacking Area/ Block (ASC)

Landside Service
Manual / Automated Landside Service (Trucks & Rail)
Automated Operations
Horizontal Transport
Automated Shuttle Carrier

Stacking Ability:
1 over 2 High

Speed: 18 MPH

Cost: $1.7 M

TraPac: 16 Shuttle Carriers Arrived 11/12
Shuttle Carrier Operations:

- Preprogrammed Routes
- GPS
- Magnets: 1000 per Acre
- Counter Tire

Horizontal Transport
Automated Stacking Cranes (ASC)

Core of Stacking Operation:

Stacking Ability:
1 over 5 containers (Stack 6 High)

Specifications:
Dimensions – 78’ H X 84’ W
Weight – 230 Tons
Cost – $3 M

Operated by:
TOS/TLS
Design Elements

Crane Rail Supported on Concrete Tie & Ballast System

Sand Filter

ASC

BLOCK 1

BLOCK 2
Grading & Paving Design

Shuttle Carrier Travel Way: 2% max. slope (1% preferred)
Stacking Blocks: 0.25% max. slope
Drainage Design

Objective:
1) Compliance with City of Los Angeles Standard Urban Stormwater Mitigation Plan (SUSMP)
2) Drain site without affecting precision of ASC equipment
3) No infiltration due to chemically impacted soil

Implementation:
- SAND FILTERS (81,820 SF)
- Subdrains (~50,000 LF)
- Trench Drains (5200 LF)
- Overflow Trenches
- Filtration Vaults (5)
Drainage Design
Electrical Design
Designation of conduits between Owner (P), Operator (T), and Crane Manufacturer (C) is imperative.

Snapshot represents connection between reefer plugs, landside truck booths, and ASC vaults.
• Service Lanes (4’)

• Maintenance Lanes (9’-6”)
Access for mechanics and emergency vehicles only

• Standpipes with valves along service and maintenance lanes every 150’

• Heat sensor cameras placed at each 100’ HMP along perimeter
Lessons Learned

- Paradigm Shift in Container Terminal Design
- Early Expectations from ALL Stakeholders
- Crane Equipment, Operations & Civil Design are Integrated
- Development of New Standards
- Communication is Key!
Thank you !!