Manzanillo Container Terminal Redevelopment: Maximizing Throughput in a Limited Space

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Location Plan

BAY OF MANZANILLO

EXISTING CHANNEL AND TURNING BASIN

EXISTING NAVAL FACILITY

FUTURE TURNING BASIN

FUTURE FISHING TERMINAL

BERTH 10/11 EXPANSION

BERTH 12

BERTH 13

BERTH 14

SSAM CONTAINER TERMINAL

LAGUNA DE TAPEIXTLES

LOCATION PLAN

Building on the Past, Respecting the Future

PORTS TM 2010
Prior to Wharf and Yard Expansion

>15% Growth required re-evaluation of development plan
Redevelopment Objectives

- Mitigate liquefaction risk in uncontrolled upland fill
- Improve pavement performance
- Optimize container yard layout
- Make provision for electric RTG (ERTG) operation
- Upgrade wharf for larger cranes
- Repair existing concrete piling
- Deepen berth (future)
Mitigate Risk of Liquefaction

200 mm Yard Subsidence during 2003 Earthquake
Improve Pavement Performance

Rutting and Deformation in Top-Pick Area
Ground Improvement and Paving

• Remove existing pavement and undercut poor base materials
• Install 800 mm stone columns at 2.5 meter triangular spacing
• Regrade and place 900 mm of crushed rock ballast (CBR > 90)
• Place bedding sand and 55 MPa block pavers
• Provide non-woven geotextile between crushed rock base and bedding sand)
Stone Columns – Wet Top Feed Method

Stone columns installed to 20 meters depth
Typical in-situ properties improved from N=15 to N=25
Common Paving System

Eliminate RTG runways for 16-wheel machines and provide continuous pavers in stacking areas and aisles.

Construction phased to minimize disruption of operations.
Yard Layout Optimization –
Existing Yard Section
Yard Layout Optimization – Expansion Area Yard Section

New High-Mast Light Pole

16-Wheel eRTG

eRTG Cables

Bypass Lane, Typ.

Trench Drain

Loading Lane, Typ.

Redeveloped Berths 10 and 11
Back to Back ERTG Detail

ERTG Cable Paths

High-Mast Light Pole Foundation
ERTG Cable Path Layout
Wharf Improvements

- Provide for 30.48 m (100’ Gauge Cranes)
- Shift cable slots to waterside (requiring relocation of existing bollards)
- Reconstruct deteriorated crane rails
- Concrete pile repairs
- Berth deepening (future)
16.76 m (55’’) Existing Gauge
Third Rail for 100’ Gauge Cranes

- Hatch Cover Zone
- New High-mast Light Pole
- 15m distance
- 11m distance
- Crane Rail Beam
- Link Structure

Building on the Past, Respecting the Future
New Landside Crane Rail

- Existing Landside Crane Rail
- Structural Connection
- New Landside (Third) Rail
- Pavers
- Concrete Tie Beam
- Approx. Limit of Existing Rock Dike
- Steel H-Pile
- Existing Concrete Piles, Typ.
- Concrete Crane Beam
Crane Cable Relocation – Existing Condition
Bollard Relocation and New Cable Slot

- Relocated Bollard
- Original Bollard Location
- New Cable Slot Cut into Existing Deck
- Non-Structural Topping
- Waterside Crane Rail
- Slot Drains
- Structural Reinforcement to Remain
- Crane Tie-Down (Beyond)
Completed Retrofit
Final Condition – Back of Wharf

Crane Rail Reconstruction in Progress
Concrete Pile Repairs
Future Berth Deepening

New Continuous Cap

Relocated Fender

H-Pile

Sheet Pile Toe Wall

EL. -14.0

EL. -16.0

Dredge Elevation

4000

30 480

New Crane Gauge

Link Structure

Existing Rock Dike

Pavers

PORTS 2010
Conclusions

• Making the most of a small terminal footprint requires careful coordination between operators, planners, and designers
• Maximizing throughput requires attention to the smallest details
• It is never too late to make a change for the better, but
• Implementation of proposed changes requires close coordination to ensure that interruption to existing operation is minimized
Acknowledgements

• Ing. Daniel Ingram, Facilities Engineer, SSA Mexico
• Arq. Ricardo Cheng, Director of Engineering SSA International
• Billy Camp, P.E. and Aaron Goldberg, PE, S&ME Inc.
• Paul Smith, P.E., PhD and George Sheng, PE, PhD, BergerABAM