The Port of Virginia

Norfolk International Terminals
South Wharf Renovation

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Virginia Port Authority

and

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Cargo Trends – The Big Picture

Introduction to NIT South History, Infrastructure & Operations

How the NIT South Renovation Project Met the VPA’s Goals

Summary
National Cargo Trends

- U.S. Cargo Will Double in Volume by 2020
- Panama Canal Commission Forecast East Coast Cargo to Triple by 2020
- Latin American Trade and Transportation Study (2001)
  - 13 Southern US States Will Reach Capacity Between 2008 and 2012
The “China Factor”

- The Nation’s Ports as a Whole are Experiencing a 12.2% Increase in Container Trade with Asia
- East Coast Ports are Seeing a 31.7% Increase in Container Trade with Asia
  - All-Water Shipping Routes Both Inexpensive and Stable
Projected Cargo Demand and Planned Capacity

Source: VPA Master Plan. Forecast numbers represent average increase over the forecast period.
Projected Cargo Demand and Planned Capacity

Source: VPA Master Plan. Forecast numbers represent average increase over the forecast period.
Growth in Container Ship Sizes

The *MSC Pamela* is Currently One of the Largest Container Ships in the World

- 9,200 TEUs
- 1,053 Feet Long
- 150 Feet Wide
- 49-Foot Draft
Container Ship Evolution

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<tr>
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<tr>
<td>1,700 TEUs</td>
<td>2,300 TEUs</td>
<td>4,800 TEUs</td>
<td>8,000+ TEUs</td>
<td>13,000+ TEUs</td>
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<td>&lt;10 Boxes Wide</td>
<td>10 Boxes Wide</td>
<td>13-16 Boxes Wide</td>
<td>17 Boxes Wide</td>
<td>21 Boxes Wide</td>
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<tr>
<td>&lt;30' Draft</td>
<td>33' Draft</td>
<td>44' Draft</td>
<td>48' Draft</td>
<td>44' Draft</td>
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<tr>
<td>450' Length</td>
<td>620' Length</td>
<td>900' Length</td>
<td>1,150' Length</td>
<td>1,350' Length</td>
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Cargo Trends – The Big Picture

Introduction to NIT South History, Infrastructure & Operations

How the NIT South Renovation Project Met the VPA’s Goals

Summary
1918 – Site Was a U.S. Army Quartermaster Depot
1964 – Site Declared Surplus by Federal Government
1965 – Acquired by City of Norfolk
1967 – First Container Crane On Site (CB1)
1969 – Two More Cranes Added (CB2)
1972 – Site Acquired by VPA & Another Crane Purchased (CB3)
1989 – VPA Purchased 3 More Cranes (CB4)
NIT South

NIT Container Terminal Opened in 1967

- **Container Berth 1**
  - Built in 1918
  - 740-feet (226 m)

- **Crane #1**
  - Purchased in 1967
  - 50-ft Gage (15.2 m)
  - 13-wide Container Reach
  - Operating Wheel Loads (kips/ft)
    - LS: 14
    - WS: 16
NIT South

Terminal & Wharf Expansion in 1969

- **Cranes #2 & #3**
  - Purchased in 1969
  - 50-ft Gage (15.2 m)
  - 13-wide Container Reach
  - Operating Wheel Loads (kips/ft)
    - LS: 17
    - WS: 19

- **Container Berth 2**
  - Built in 1969
  - 849-feet (259 m)
NIT South

Terminal & Wharf Expansion in 1978

- **Container Berth 3**
  - Built in 1978
  - 1,104-feet (336 m)

- **Crane #4**
  - Purchased in 1978
  - 50-ft Gage (15.2 m)
  - 13-wide Container Reach
  - Operating Wheel Loads (kips/ft)
    - LS: 22
    - WS: 20
NIT South

Terminal & Wharf Expansion in 1989

- Container Berth 4
  - Built in 1989
  - 1,540-feet (469 m)
- Cranes #5, #6 & #7
  - Purchased in 1989
  - 50-ft Gage (15.2 m)
  - 17-wide Container Reach
  - Operating Wheel Loads (kips/ft)
    - LS: 23
    - WS: 30
NIT North
Straddle Carrier Operations
NIT South Existing Conditions
Operations

- Overhead Busbars Not Compatible With Straddle Carrier Operations
NIT South Existing Conditions Operations

- Yard Hustlers Moved Containers From the Wharf

The Virginia Port Authority
NIT South Existing Conditions
Operations

➢ RTGs Stacked
Grounded
Containers
Valet System Required Large Amounts of Space
NIT South Existing Conditions
Infrastructure

- Some Sections of Wharf Over 80 Years Old
- Oldest Container Crane Dated Back to 1967
Cargo Trends – The Big Picture

Introduction to NIT South History, Infrastructure & Operations

How the NIT South Renovation Project Met the VPA’s Goals

Summary
NIT South Renovation
Overall Project Goals

- Keep Pace With Containerized Cargo Forecasts
- Accommodate Increasing Container Ship Sizes
- Allow for Operational Conversions (Rubber-Tire Gantry v. Straddle Carrier)
- Full Renovation of NIT South Terminal
  - 4,230 Feet (1,289 Meters) of Wharf
  - 8 New Suez-Class Container Cranes
  - 140 Acres (57 Hectares) of Container Yard
NIT South Renovation
Specific Project Goals

1. Increase the Width of the New Wharf Structure to Accommodate 100-Ft Gage Cranes
2. Accommodate Dredge Depths to 60-Ft
3. Minimize and Mitigate Environmental Impacts
4. Re-Use Existing Structures Where Possible
5. Accommodate Stormwater Run-Off with No Impacts to Container Operations
6. Address Community Concerns About Noise and Pollution
7. Maintain Three Operational Berths at All Times During Construction
Wharf Structure

- Face of New Wharf Placed 66 Feet Waterward of Original Structure
  - Minimize Impacts to Yard Operations
  - Flexibility in Meeting Dredge Depths
Wharf Structure

- Flat Plate Concrete Structure with Pile Capitals
  - Keep Structure Out of Tide Zone
- Open Pile Layout
  - Flexibility in Pile Driving Tolerances (2-Ft. in Any Direction)
NIT South Renovation
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Dredge Depths

Pile Sizes and Spacing

- 36” Inch Cylinder Piles
- 20’ On Center

Existing Mudline EL. – 45.0
Current Dredge Line EL. – 50.0
Future Dredge Line EL. – 60.0
NIT South Renovation
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The Virginia Port Authority
Environmental Impacts

- Open Pile Structure on Same Alignment as Original Structure
  - Minimized Need to Fill Additional River Bottom
  - Created Only Additional “Shadowing”
  - Under-Wharf Detention Basin Impounded Portion of River

- Environmental Impacts Requiring Compensatory Mitigation
  - 5.1 Acres of River Bottom
  - .02 Acres of Vegetated Tidal Wetlands
Compensatory Mitigation

- VPA Believed NIT Renovation Project Deserved High-Profile Mitigation Project
- “Landscape Approach” Convinced Regulatory Agencies of Project Benefits

<table>
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<tr>
<th>Proposed Mitigation Type</th>
<th>Compensatory Mitigation Ratio</th>
<th>Required Mitigation for NIT Renovation Impact</th>
<th>Proposed Plum Point Compensation</th>
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<tbody>
<tr>
<td>Tidal Wetlands</td>
<td>2:1</td>
<td>10 acres</td>
<td>1 acre creation</td>
</tr>
<tr>
<td>Submerged Lands</td>
<td>1:1</td>
<td>5 acres</td>
<td>1 acre restored</td>
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<tr>
<td>Open Space Preservation</td>
<td>20:1</td>
<td>100 acres</td>
<td>5 acres preserved and enhanced</td>
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</table>
Plum Point Park
Environmental Restoration

- 5-Acre Tract of Unused Land Along Norfolk’s Urban Waterfront
- Eroding Shoreline
- Low Valued Vegetation
- Adjacent Waterway Littered With Debris

Plum Point - April 2002
Plum Point Park
Environmental Restoration

Timber Piles
(Future River Clean-Up Area)
South Side of Plum Point
March 2002

Eroding Shoreline
(Future Wetlands Restoration Area)
North Side of Plum Point
March 2002
Plum Point Park
Environmental Restoration

LEGEND:
- large shade tree
- small flowering tree
- wildflowers
- shrub bed
- existing trees

MASTER PLAN
Plum Point
Virginia Port Authority, Norfolk, Virginia
Moffatt & Nichol Engineers / WPL Landscape Architects

The Virginia Port Authority
Plum Point Park
Environmental Restoration

- 1 Acre of Spartina Grass Wetlands Creation
- 1 Acre of Submerged Bottom Land Restoration
- 5 Acres of Open Space Preservation and Enhancement

Plum Point – November 2005
Plum Point Park
Environmental Restoration

Rip Rap Shoreline Protection
(River Clean-Up Area)
South Side of Plum Point
May 2004

Wetlands Planting
(Wetlands Restoration Area)
North Side of Plum Point
May 2004
Plum Point Park
Environmental Restoration
NIT South Renovation
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Reuse & Recycle

- Fourth Berth Incorporated into New Structure
  - Select Demo
  - Phase 4 Completed Quickly

- Demo Materials from Berths 1, 2 & 3 Used as Subbase Elsewhere on Terminal
NIT South Renovation
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Treatment Options Considered

- Conventional Pond
  - Loss of 7 to 9 Acres of Container Handling Area

- Underground Collection Pipes
  - Concerns About Collapse Due to Heavy Wheel Loads at Terminal

- Under-Wharf Detention Basin
  - Located in Unused Area Below Wharf

- Supplemental Stormwater Treatment Devices
  - Vortechnics® Units
Pre-Project Conditions
Hodgepodge Stormwater Drainage Areas

36 Drainage Areas Equipped With Untreated Outfalls to Adjacent Rivers

The Virginia Port Authority
Under-Wharf Detention Basin
Section View

- Wharf
- Weir & Outlet Structure
- Water In From Drainage System
- Elizabeth River
- Sheetpile Wall
- Sediment Collection

The Virginia Port Authority
Under-Wharf Detention Basin

- Met Treatment Requirements
- Located in Unused, Available Space Under Wharf
- Installation Concurrent with Wharf Construction
- Can Accommodate Sediment Volumes Anticipated Over the Life of the Structure
- Obviated Need for a Conventional Storm Water Treatment Pond
NIT South Renovation
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Proximity to Lochhaven
Community Concerns

- Open Dialogue Between VPA, M&N & Community Leaders
- Construction Noise Concerns
  - Specifications Prevented Night Time/Early Morning Pile Driving
- Environmental Concerns Regarding Health of Adjacent Waterway
  - Educate Citizens About VPA’s Stormwater Treatment System and Pollution Prevention Program
NIT South Renovation
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NIT South Wharf

Berth 1 Under Construction
Berths 2, 3 & 4 Operational
NIT South Wharf

Berth 1 Complete
Berth 2 Under Construction
Berths 1, 3 & 4 Operational
NIT South Wharf

Berths 1 & 2 Complete
Berth 3 Under Construction
Berths 1, 2 & 4 Operational
NIT South Wharf

Berths 1, 2 & 3 Complete
Berth 4 Under Construction
Berths 1, 2 & 3 Operational
NIT South Wharf

All Berths Complete and Operational
NIT South Operations

Straddle Carriers in Use
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Summary

NIT South Wharf Renovation Can Serve as an Example to the Port Industry
- Upgrade Aging Port Infrastructure
- No Negative Impacts to Operations
- Innovative Approach to Addressing Environmental Concerns

VPA Now Has a State-of-the-Art Container Wharf Capable of Service the Industry for the Next 50 Years