The Panama Canal Expansion Program

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Administrator
Autoridad del Canal de Panamá
February 1, 2011
1915 - 2010
Transits: 1,000,972
Cargo: 8,587,711,605 LT
Transits vs. PC/UMS Tonnage
FY 1915 - FY 2010

PC/UMS Tonnage for Commercial Transits

FY 1955: 4,832
FY 1975: 9,931
FY 1995: 18,940
FY 2010: 23,889

Transits vs. PC/UMS Tonnage over Fiscal Years 1915 to 2010.
Panamax Transits of 100’ (30.5m) + of Beam
FY 2001 – FY 2010

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Percentage Panamax transits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>36.3%</td>
</tr>
<tr>
<td>2002</td>
<td>38.5%</td>
</tr>
<tr>
<td>2003</td>
<td>40.4%</td>
</tr>
<tr>
<td>2004</td>
<td>42.6%</td>
</tr>
<tr>
<td>2005</td>
<td>44.5%</td>
</tr>
<tr>
<td>2006</td>
<td>47.6%</td>
</tr>
<tr>
<td>2007</td>
<td>47.10%</td>
</tr>
<tr>
<td>2008</td>
<td>46.3%</td>
</tr>
<tr>
<td>2009</td>
<td>46.8%</td>
</tr>
<tr>
<td>2010</td>
<td>49.5%</td>
</tr>
</tbody>
</table>
Average Canal Waters Time
FY 2001 – FY 2010

Fiscal Year
Average Canal Waters Time

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Hours

23.9 27.4 22.7 26.7 30.1 27.8 31.6 23.1 21.1
Main Routes - FY 2010

Total (long tons) 204.8 M
East Coast US -- Asia 83.2M
West Coast South America -- East Coast US 23.8M
West Coast South America -- Europe 13.3M
West Coast Central America – East Coast US 10.3M
West Coast US – Europe 7.7M
The Panama Canal Trade and Main Users

In the relevant routes (Asia-east coast of the United States) the Panama Canal transported 41.0% of the Panama Canal trade cargo in 2010.

66% of Canal cargo traffic originates in or is destined to the United States.

Total Cargo Movement FY 2010

<table>
<thead>
<tr>
<th>USERS</th>
<th>FY 2009*</th>
<th>FY 2010*</th>
<th>2010 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>132.6</td>
<td>135.4</td>
<td>66</td>
</tr>
<tr>
<td>China</td>
<td>46.5</td>
<td>43.6</td>
<td>21</td>
</tr>
<tr>
<td>Chile</td>
<td>25.5</td>
<td>26.7</td>
<td>13</td>
</tr>
<tr>
<td>European Union</td>
<td>26.1</td>
<td>26.8</td>
<td>12</td>
</tr>
<tr>
<td>Japan</td>
<td>20.5</td>
<td>22.7</td>
<td>11</td>
</tr>
<tr>
<td>South Korea</td>
<td>16.6</td>
<td>19.1</td>
<td>9</td>
</tr>
<tr>
<td>Ecuador</td>
<td>12.5</td>
<td>14.6</td>
<td>7</td>
</tr>
</tbody>
</table>

*Measured in Million of Long Tons
These customers are accountable for 64% of tolls revenue in FY 2010.

**Panama Canal Customer Ranking - FY 2010**

(Weighted average: 40% Transits, 60% Tolls)

<table>
<thead>
<tr>
<th>Rango</th>
<th>Compañía</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NIPPON YUSEN KAISHA (NYKLINE)</td>
</tr>
<tr>
<td>2</td>
<td>MAERSK LINE</td>
</tr>
<tr>
<td>3</td>
<td>EVERGREEN MARINE</td>
</tr>
<tr>
<td>4</td>
<td>MITSUI O.S.K.</td>
</tr>
<tr>
<td>5</td>
<td>CSAV-COMPAÑÍA SURAMERICANA DE VAPORES</td>
</tr>
<tr>
<td>6</td>
<td>HAPAG LLOYD</td>
</tr>
<tr>
<td>7</td>
<td>MEDITERRANEAN SHIPPING COMPANY</td>
</tr>
<tr>
<td>8</td>
<td>COSCO</td>
</tr>
<tr>
<td>9</td>
<td>HAMBURG-SUD</td>
</tr>
<tr>
<td>10</td>
<td>CMA CGM</td>
</tr>
<tr>
<td>11</td>
<td>HANJIN SHIPPING CO.</td>
</tr>
<tr>
<td>12</td>
<td>ZIM AMERICAN INTEGRATED SHIPPING SERVICES CO. INC.</td>
</tr>
<tr>
<td>13</td>
<td>SEATRADE REEFER CHRTERING NV</td>
</tr>
<tr>
<td>14</td>
<td>SONAP</td>
</tr>
<tr>
<td>15</td>
<td>WALLENIUS-WILHEMSEN</td>
</tr>
<tr>
<td>16</td>
<td>KAWASAKI KISEN (K LINE)</td>
</tr>
<tr>
<td>17</td>
<td>STX PAN OCEAN COMPANY LTD.</td>
</tr>
<tr>
<td>18</td>
<td>DAMPSKIBSSELSKABET NORDEN AS</td>
</tr>
<tr>
<td>19</td>
<td>YANGMING MAR. TRANS.</td>
</tr>
<tr>
<td>20</td>
<td>CARGILL INTERNATIONAL</td>
</tr>
</tbody>
</table>
Modernization and Investment Program

Accumulated Investment
(in million of US Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>113</td>
<td>142</td>
<td>126</td>
<td>207</td>
<td>115</td>
<td>144</td>
<td>233</td>
<td>92</td>
<td>347</td>
<td>51</td>
<td>69</td>
</tr>
</tbody>
</table>

- Dredging
- Locomotives
- Technology
- Tugboats
- Tow track system
- Hydraulic system
## Expansion Program Components

<table>
<thead>
<tr>
<th>Project</th>
<th>Volume in Mm³</th>
<th>Current Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Pacific Access Channel Excavation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- PAC 1</td>
<td>7.3</td>
<td>100%</td>
</tr>
<tr>
<td>- PAC 2</td>
<td>7.5</td>
<td>100%</td>
</tr>
<tr>
<td>- PAC 3</td>
<td>8.0</td>
<td>94%</td>
</tr>
<tr>
<td>- PAC 4</td>
<td>26.0</td>
<td>23%</td>
</tr>
<tr>
<td><strong>2. Dredging Projects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widening and deepening of the navigational channel</td>
<td>54.9</td>
<td></td>
</tr>
<tr>
<td>- Pacific entrance</td>
<td>8.7</td>
<td>56%</td>
</tr>
<tr>
<td>- Pacific access channel</td>
<td>4.0</td>
<td>3.8%</td>
</tr>
<tr>
<td>- Gaillard Cut and Gatun Lake</td>
<td>19.7</td>
<td>41%</td>
</tr>
<tr>
<td>- Northern reaches of Gatun Lake</td>
<td>4.6</td>
<td>22%</td>
</tr>
<tr>
<td>- Atlantic entrance</td>
<td>17.9</td>
<td>68%</td>
</tr>
<tr>
<td><strong>3. Elevation of Gatun Lake’s maximum operational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4. Design and construction of the new locks</strong></td>
<td>40.0</td>
<td>9%</td>
</tr>
</tbody>
</table>
Canal Expansion Components

- Design and construction of Atlantic Locks
- Widening and deepening of Atlantic entrance
- Deepening of Gaillard Cut navigational channels
- Design and construction of Pacific Locks
- Widening and deepening of Pacific entrance
- Deepening and widening of Gatun Lake navigational channel
- Elevation of Gatun Lake’s maximum operational channel
- Pacific access channel excavation

- 15.8 M $m^3$
- 46 M $m^3$
- 26.7 m → 27.1 m

Elevation of Gatun Lake’s maximum operational channel
Canal Expansion Components

Pacific Access Channel Excavation
49 Mm3 dry excavation
Pacific Access Channel

Phase 1 - 7.3 Mm$^3$ excavated

Phase 2 - 7.5 Mm$^3$ excavated

2009 - 2010

COMPLETED
Pacific Access Channel – Phase 3

Total volume: 8 Mm3, cleaning 190 hectares in T6 area
Current progress: 94%
8.09 Mm3 excavated
Pacific Access Channel – Phase 3
Looking south
Pacific Access Channel Phase 4 – Dry Excavation

**Total volume:** 26 M m³  dry excavation, construction of Borinquen Dam, cleaning of 80 hectares of UXOs

**Current progress:** 23%  2.24 Mm³ excavated
Pacific Access Channel Phase 4 – Dry Excavation
Borinquen Dam
Canal Expansion Components

Dredging projects: 54.9 Mm³

- Atlantic entrance deepening and widening
- Deepening and widening of Gatun Lake
- Deepening of Gaillard Cut
- Pacific entrance deepening and widening
Pacific entrance deepening and widening

Total volume: 8.7 Mm3
Current progress: 64%  5.6 Mm3 dredged
Dredging at the North Entrance to the Pacific Access Channel

Scope:
- Dredging volume: 4 Mm^3
- Deepening from 27.5m to 9.14m PLD
- Channel width: 218m
- Length: 1.6km
Dredging areas in Gatun Lake and Gaillard Cut
Executed by ACP

De Lesseps Island

Total volume: 19.7 Mm3
Current progress: 41% 9.5 Mm3 dredged
Dredging areas in Gatun Lake and Gaillard Cut
Executed by ACP
Atlantic entrance deepening and widening

- **Width**: 225m (740´)
- **Total volume**: 17.9 M m³
- **Current progress**: 68%  12.2 Mm³ dredged
- **Company**: Jan de Nul NV
Atlantic entrance deepening and widening
Canal Expansion Components

Design and construction of new locks

Design and construction of Atlantic locks

Design and construction of Pacific locks
Size of Locks and Vessels

Existing locks’ maximum vessel size: 4,400 TEU

New locks’ maximum vessel size: 12,600 TEU
7% less water than the existing locks
Design and Construction of Pacific Locks
Industrial Park – Pacific Side
Design and Construction of Pacific Locks
Design and Construction of Pacific Locks
Design and Construction of Atlantic Locks
Industrial Park – Atlantic side
Design and Construction of Atlantic Locks
Volumes of Dry Excavation and Dredging used for the construction of the locks

Existing locks: 200 Mm³

New locks: 155 Mm³
Volume of Concrete Used for the Locks Construction

Existing locks: 3.4 Mm3

New locks: 4.7 Mm3
### Bid price behavior of principal Expansion Program projects

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Bidder</th>
<th>Bid Amount</th>
<th>Price Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dredging the Northern Entrance to the Pacific Access Channel</td>
<td>Jan De Nul</td>
<td>$54,550,647</td>
<td>-3%</td>
</tr>
<tr>
<td>Dredging Gatun Lake’s Northern Reaches</td>
<td>Dredging International</td>
<td>$39,983,822.82</td>
<td>-37%</td>
</tr>
<tr>
<td>Pacific Access Channel - 4</td>
<td>ICA-FCC-MECO</td>
<td>$267,798,795.99</td>
<td>-11%</td>
</tr>
<tr>
<td>Atlantic Entrance Dredging</td>
<td>JAN DE NUL, NV</td>
<td>$89,817,317</td>
<td>-15%</td>
</tr>
<tr>
<td>Locks</td>
<td>GUPC</td>
<td>$3,221,631,384</td>
<td>-7%</td>
</tr>
<tr>
<td>Pacific Access Channel- 3</td>
<td>Constructora MECO, S.A.</td>
<td>$36,659,852.28</td>
<td>-46%</td>
</tr>
<tr>
<td>Pacific Entrance Dredging</td>
<td>Dredging International</td>
<td>$177,500,678.78</td>
<td>-2%</td>
</tr>
<tr>
<td>Pacific Access Channel - 2</td>
<td>CILSA - MINERA MARIA</td>
<td>$25,489,200.30</td>
<td>-47%</td>
</tr>
<tr>
<td>Pacific Access Channel - 1</td>
<td>Constructora Urbana S.A.</td>
<td>$41,094,000</td>
<td>-33%</td>
</tr>
</tbody>
</table>
Direct employment generated during Canal Expansion

<table>
<thead>
<tr>
<th>Contract</th>
<th># Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed contracts (December 2010)</td>
<td>1,801</td>
</tr>
<tr>
<td>Contracts under execution (December 2010)</td>
<td>10,688</td>
</tr>
<tr>
<td>ACP (December 2010)</td>
<td>889</td>
</tr>
<tr>
<td><strong>Subtotal (December 2010)</strong></td>
<td>13,378</td>
</tr>
<tr>
<td>Employment estimates:</td>
<td></td>
</tr>
<tr>
<td>Design and construction of locks</td>
<td>2,194</td>
</tr>
<tr>
<td><strong>Employment estimates subtotal</strong></td>
<td>2,194</td>
</tr>
<tr>
<td>Projected total cumulative direct employment</td>
<td>15,172</td>
</tr>
</tbody>
</table>
Panama Canal MOUs

UNITED STATES EAST COAST
• GEORGIA PORTS AUTHORITY
• PORT OF MIAMI
• THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
• MASSACHUSETTS PORT AUTHORITY
• SOUTH CAROLINA STATE PORTS AUTHORITY
• VIRGINIA PORT AUTHORITY
• MARYLAND PORT ADMINISTRATION
• PHILADELPHIA REGIONAL PORT AUTHORITY
• BROWARD COUNTY S PORT EVERGLADES DEPARTMENT
• PORT OF PALM BEACH
• JACKSONVILLE PORT AUTHORITY
• PORT OF NORTH CAROLINA

UNITED STATES GULF COAST
• PORT OF HOUSTON AUTHORITY
• PORT OF NEW ORLEANS
• TAMPA PORT AUTHORITY
• MANATEE COUNTY PORT AUTHORITY
• ALABAMA STATE PORT AUTHORITY
• PORT OF GALVESTON
• TENNESSEE-TOMBIGBEE WATERWAY DEVELOPMENT AUTHORITY
• MISSISSIPPI STATE PORT AUTHORITY AT GULFPORT

UNITED STATES WEST COAST
• PORT OF LONG BEACH

CARIBBEAN PORTS
• CURACAO PORTS AUTHORITY

EUROPEAN PORTS
• AUTORIDAD PORTUARIA BAHIA DE ALGECIRAS
• PORT OF ANTWERP
**Fleet Capacity and Vessel Size Composition**

Containership Fleet 2000

(4.79 Million TEU)

- 15% Pmax and Below
- 85% Pmax and Below

371 Panamax vessels
134 Post Panamax vessels

Containership Fleet 2010

(13.78 Million TEU)

- 40.4% Total Pmax
- 3.2% Pmax and Below

949 Panamax vessels
775 Post Panamax vessels

Containership Fleet 2014

(16.8 Million TEU)

- 48.1% Total Pmax
- 12.5% Pmax and Below

956 Panamax vessels
804 Post Panamax vessels

Source: Clarkson’s Research Studies 2011
Impact of Expansion on Container Services (Lines Perspective)

For an expanded Canal, the costs per one way slot for a container service would reduce by $26 for 8,000 TEU vessels, and by a further $48 for 10,000 TEU vessels.

- Cost Based on:
  - 4000 TEU Vessel
  - Canal Tolls proposal January 2011
  - $ 467/ MT Bunker (HFO)
  - Actual Charter Rate

- Cost Based on:
  - 8000 TEU Vessel
  - Canal Tolls proposal January 2011
  - $ 467/ MT Bunker (HFO)
  - Actual Charter Rate
The Impact of Canal Expansion on Dry Bulks

1. The USG-Asia grain trade will take advantage of expansion, but probably only to vessels of under 100,000 dwt. Likely to benefit Canal routes to remain lower cost than the WCUS gateway.

2. Potential for increased trade in coal and iron ore to China from Colombia and Venezuela
The Impact of Canal Expansion on Liquid Bulks

1. Canal expansion will make Ecuador – USG crude shipments more competitive vs. alternative sources (e.g., ex Nigeria).

2. New trade between Venezuela – China could develop, and trade flows between Asia and USG/ECSA should also increase.

3. The expanded Canal will be the first route choice for LNG trades between Trinidad-Chile and Peru-USG should these develop. The ability of 200,000+ cbm LNG tankers to transit will be crucial.
Liner Services Deployed at Panama Canal Route

Source: Compair Data, October 2010
Port Development in Panama

1996: 235 Thousand TEUs
2010: 5.6 Million TEUs
2015: 7.4 Million TEUs

Panama Ports Company – Cristobal
Colon Container Terminal
Manzanillo International Terminal (MIT)
Panama Ports Company - Balboa
Total TEU handled by Panamanian Ports
2000-2010

Source: Panama Maritime Authority
Panama provides easy access to consumers located in Latin America, the Caribbean, North America, Asian and European markets.

Main markets today comprise the east coast of the United States, Latin America, the Caribbean and Asia.
The expansion will provide for economies of scale that will make the route more competitive, and will enhance the benefits of doing transshipment in the country.

The expansion will extend the Canal's area of influence.
Routes, ports and betweenness centralities in the GCSN. (a) The trajectories of all cargo ships bigger than 10 000 GT during 2007. The colour scale indicates the number of journeys along each route. Ships are assumed to travel along the shortest (geodesic) paths on water. (b) A map of the 50 ports of highest betweenness centrality and a ranked list of the 20 most central ports.

Global Cargo Ship Network
Panama: only port of the world with terminals in two oceans

Source: ACP and ComPairData