A Unique Program

Cutting a new channel through hills to a new set of Locks

Dredging through the Continental Divide
Expansion Program Dredging Scope

- Entrance Channels
  - Pacific
  - Atlantic

- Freshwater Dredging
  - Gatun Lake
  - Pacific Access Channel/Dry Excavation
  - Gaillard/Culebra Cut

Lessons
Total dredging volume = 9.1 M m³

Pacific southern approach channel = 2.5 M m³

Pacific entrance deepening and widening = 6.6 M m³
PACIFIC ENTRANCE CHANNEL

DESCRIPTION

- Widening from 192 m to a minimum 225 m
- Deepening from -14.2 m to -15.5 m MLWS
- Total est. volume: 9.1 M m³
- Length 14.4 Km
- Award: 31 March 2008
- Estimated Start: July 2008
- Duration: 4 years
PACIFIC SOUTH APPROACH CHANNEL
PACIFIC ENTRANCE DREDGING
NORTHERN SECTOR
## PACIFIC ENTRANCE CHANNEL
### DREDGED MATERIAL DISPOSAL

<table>
<thead>
<tr>
<th>Area/Type</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>VELASQUEZ (Upland)</td>
<td>2,294,000</td>
</tr>
<tr>
<td>FARFAN (Upland)</td>
<td>3,657,280</td>
</tr>
<tr>
<td>PALO SECO (Open Water)</td>
<td>1,492,811</td>
</tr>
<tr>
<td>TORTOLITA (Open Water)</td>
<td>7,313,678</td>
</tr>
<tr>
<td>TORTOLITA SOUTH (Open Water)</td>
<td>8,652,588</td>
</tr>
</tbody>
</table>
Total estimated Atlantic Dredging volume 26.6 to 30.7 M m³

Atlantic Northern Anchorage deepening 12.6 to 16.7 M m³

Atlantic Northern access channel = 7 M m³

Atlantic Entrance deepening and widening = 7 M m³
Atlantic Entrance
1 Contract
• Widening from 192 m to a minimum 225 m
• Deepen: -14.2 m MLW. to -15.5 m MLW.
• Dredging = 14 M m³
• Dry excavation = 1 M m³
• Total: 15 M m³ (Million cubic meters)
• Material: mud, silt, clay and sand
  • Approach Channel: Hardness <15 Mpa.

Width: 225m (740´)
## ATLANTIC ENTRANCE

<table>
<thead>
<tr>
<th>SECTION</th>
<th>LENGTH (km)</th>
<th>CHANNEL WIDTH (m)</th>
<th>DESIGN DEPTH (m)</th>
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</thead>
<tbody>
<tr>
<td>ATLANTIC ENTRANCE</td>
<td>9.80</td>
<td>225 / 260</td>
<td>15.5</td>
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<tr>
<td>NORTH APPROACH CHANNEL</td>
<td>4</td>
<td>218</td>
<td>15.5</td>
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</table>
Freshwater Dredging

- Gatun Lake
- Pacific Access Channel Dredging
- Gaillard/Culebra Cut
FRESHWATER DREDGING VOLUMES

<table>
<thead>
<tr>
<th>ACP RESOURCES</th>
<th>M $m^3$</th>
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<tbody>
<tr>
<td>Gatún Lake</td>
<td>10.7</td>
</tr>
<tr>
<td>Gaillard Cut</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>14 M</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTRACTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gatún Lake North (FFP contract)</td>
<td>5.1</td>
</tr>
<tr>
<td>Charter Option (Equipment Rental)</td>
<td>3.8</td>
</tr>
<tr>
<td>Pacific Access Channel (FFP contract)</td>
<td>3.2</td>
</tr>
<tr>
<td>North Plug (Pacific Locks)</td>
<td>0.5</td>
</tr>
<tr>
<td>Intermediate Plug (Pacific Locks)</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>13 M</strong></td>
</tr>
</tbody>
</table>

**Grand Total Freshwater Dredging**  

27 M $m^3$
Gatún Lake
Gatún Lake

Fixed Price Contract:

• 5 M m³ from Gatún to Buena Vista Reach.
• Option: 2.5M m³ Mechanical Dredging in other reaches
• Includes island removal, drilling & blasting, dry excavation

Estimated Award : February 2009
Estimated Start: June 2009
Estimated Completion: October 2013
Pacific Access Channel
Dry Excavation
Fixed Price Contract:

- 3.2 M m³, north end of the Access Channel to the Pacific Locks
- Estimated Award: Feb 2009
- Est. Start: June 2009
- Est Completion: May 2011
The Gaillard/ Culebra Cut
Dredging in the Cut

- Significant operating restrictions
- Limited disposal areas for hydraulic dredging: ACP’s New Cutter Suction Dredge maximum operating range
- Disposal Elevation above water level ranges from 10 to 130 m.
- ANAM (Environmental Requirements)
- Cycle times for mechanical dredging range from 2 to 6 hours

[Map showing Bas Obispo and UXO Cucaracha]
Slides
Dredging Lessons

- Programs must be viewed as Programs – Not a collection of independent Projects
  - Master Program Schedule

- Dredged Material Disposal Areas are not the sexiest part of an Authority’s portfolio

Nevertheless, a competent party must be assigned the responsibility to survey, permit, maintain, and manage these resources
Dredging Lessons

- Marshalling the resources to execute a major program takes time. Start early acquiring:
  - Geophysical investigations/Surveys
  - Dredging Equipment
  - Support Equipment and Personnel (Pilots, tug captains)
  - Contract Scopes of Work, Bidding Time, Mobilization
- Partnering with Pilots, Port Interests, Environmental Agencies, Contractors can have significant beneficial impacts to a dredging program. Interference = Risk
- Impacts of Fuel Prices, Foreign Exchange, and the world dredging market can pose significant risks
CONCLUSION
QUESTIONS?