

# BENEFIT/COST ANALYSIS FOR THE DEEPENING PROJECT OF THE ST. JOHNS RIVER



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# Elements of the B/C Analysis

- Projection of incremental container moves/tonnage under 47 ft. channel assumption
- Transportation cost savings – Based on total logistic cost savings with and without the 47 ft. channel project
  - Voyage cost
  - Surface (rail, truck)
  - Marine terminal costs
  - Inventory carrying costs

# Elements of B/C Analysis

- Reduction in emission costs due to savings in ton miles
- Economic impact to Florida measured as direct business revenue to JAXPORT and service providers generated by the incremental with project cargo throughput
- Negative benefits due to environmental emissions during the project
- Cost of the project
  - Dredging costs
  - Environmental mitigation costs
  - Berth/infrastructure costs
- Annual operating and maintenance costs associated with the project

# Incremental Cargo Throughout Assumptions Assumptions

- Incremental Cargo Projected with 47 ft. Channel based on Port Strategic Plan using the Aggressive and Moderate Growth Scenarios. High intermodal scenario is not included in B/C analysis

# Container Forecasts for JAXPORT

- Baseline- relationships with GDP and Container throughput:
  - Puerto Rico: Low and High growth – Flat
  - Latin America/Caribbean: Low growth - 2% CAGR; High growth - 4% CAGR
  - Asian: Low growth - 3%; High growth - 6% through 2020, 4.5% 2021-2025, 3% 2025 and thereafter

# Container Projections for JAXPORT

- Capture of Florida containers moving via non-Florida ports – 3.1 million TEUs of potential:
  - 1 million TEUs of warehoused cargo now trucked into Florida from Atlanta, Savannah, and West Coast DC's (transloaded cargo)
  - 160,000 TEUs of Asian imports directly from West Coast and South Atlantic ports now consumed in Florida
  - 107,300 TEUs of non-Asian Cargo now moving via other non-Florida ports and consumed in Florida
  - Plus 1.8 million empty and loaded TEUs from Florida using other ports
- 25% of the potential captured by Florida ports and 1/3 of that moves via JAXPORT – with 47 ft. and moderate marketing – **Moderate Scenario**
- 50% of potential captured by Florida ports and 1/3 moves via JAXPORT – with 47 ft. and aggressive marketing – **Aggressive Scenario**

# Container Projections for JAXPORT

- With 47 ft. of water and development of ICTF, JAXPORT has potential to capture 25% share of TEUs moving intermodally via other South Atlantic ports - about 126,000 TEUs - Aggressive High Scenario- Not Used in BC Analysis
- Without 47 ft. of water, JAXPORT will be handicapped to compete for this intermodal market

# INCREMENTAL TEUS AND ECONOMIC IMPACTS UNDER MODERATE GRWOTH RATE

TEU Projections Scenarios	2020	2025	2030	2035
Low and No Deepening	732,816	762,889	796,093	832,752
Moderate Penetration with 47ft.	1,379,800	1,566,364	1,769,642	2,010,604
Aggressive Penetration with Deepening to 47ft.	1,713,294	1,952,976	2,217,831	2,530,178
Aggressive with 47ft. + Intermodal Penetration	1,877,695	2,143,562	2,438,772	2,786,309
<b>Moderate Opportunity Cost (TEUs)</b>	<b>646,984</b>	<b>803,475</b>	<b>973,549</b>	<b>1,177,852</b>
<b>Opportunity Cost in Terms of Lost Economic Impacts</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
<b>Jobs</b>				
Direct	2,248	2,675	3,149	3,778
Induced	2,291	2,686	3,129	3,752
Indirect	<u>1,135</u>	<u>1,351</u>	<u>1,590</u>	<u>1,908</u>
Total	5,675	6,711	7,868	9,438
<b>Personal Income (1,000)</b>				
Direct	\$112,471	\$131,266	\$152,449	\$182,748
Re-spending/Local Consumption	\$251,338	\$293,339	\$340,679	\$408,387
Indirect	<u>\$54,572</u>	<u>\$64,928</u>	<u>\$76,434</u>	<u>\$91,721</u>
Total	\$418,381	\$489,533	\$569,562	\$682,856
<b>Business Revenue (1,000)</b>	\$452,410	\$561,525	\$681,420	\$824,418
<b>Local Purchases (1,000)</b>	\$131,169	\$156,059	\$183,713	\$220,458
<b>State/Local Taxes (1,000)</b>	\$38,491	\$45,037	\$52,400	\$62,823



# INCREMENTAL TEUS AND ECONOMIC IMPACTS UNDER AGGRESSIVE GRWOTH RATE

TEU Projections Scenarios	2020	2025	2030	2035
Low and No Deepening	732,816	762,889	796,093	832,752
Moderate Penetration with 47ft.	1,379,800	1,566,364	1,769,642	2,010,604
Aggressive Penetration with Deepening to 47ft.	1,713,294	1,952,976	2,217,831	2,530,178
Aggressive with 47ft. + Intermodal Penetration	1,877,695	2,143,562	2,438,772	2,786,309
<b>Aggressive Opportunity Cost</b>	<b>980,478</b>	<b>1,190,087</b>	<b>1,421,738</b>	<b>1,697,425</b>
<b>Opportunity Cost in Terms of Lost Economic Impacts</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
<b>Jobs</b>				
Direct	3,341	3,894	4,530	5,379
Induced	3,399	3,903	4,495	5,334
Indirect	<u>1,687</u>	<u>1,967</u>	<u>2,288</u>	<u>2,717</u>
<b>Total</b>	<b>8,427</b>	<b>9,763</b>	<b>11,312</b>	<b>13,429</b>
<b>Personal Income (1,000)</b>				
Direct	\$166,740	\$190,676	\$218,895	\$259,737
Re-spending/Local Consumption	\$372,614	\$426,104	\$489,164	\$580,435
Indirect	<u>\$81,095</u>	<u>\$94,514</u>	<u>\$109,959</u>	<u>\$130,565</u>
<b>Total</b>	<b>\$620,448</b>	<b>\$711,295</b>	<b>\$818,018</b>	<b>\$970,737</b>
<b>Business Revenue (1,000)</b>	<b>\$685,616</b>	<b>\$831,734</b>	<b>\$995,124</b>	<b>\$1,188,087</b>
<b>Local Purchases (1,000)</b>	<b>\$194,917</b>	<b>\$227,171</b>	<b>\$264,293</b>	<b>\$313,822</b>
<b>State/Local Taxes (1,000)</b>	<b>\$57,081</b>	<b>\$65,439</b>	<b>\$75,258</b>	<b>\$89,308</b>

# Transportation Cost Savings

- Transportation cost savings based on:
  - Development of total logistics costs to serve the Orlando/I-4 Corridor market via:
    - Jaxport
    - Savannah
    - West Coast ports
    - Atlanta distribution centers for the share of cargo now moving into Florida from DC's in Atlanta

# Total Logistics Cost Analysis – Hong Kong Routing

Hong Kong to: Orlando	Voyage	Terminal	Inland	Total	Days	Inventory Carrying Cost	Total Cost/Move
Los Angeles	\$1,990	\$406	\$3,660	\$6,057	28.5	\$1,423	\$7,479
Jacksonville	\$3,993	\$216	\$446	\$4,655	30.6	\$1,530	\$6,185
Savannah	\$4,005	\$216	\$660	\$4,881	30.8	\$1,539	\$6,419

**Truck cost Atlanta to Orland - \$1025/box based on Martin Associates**

**Truck Cost Model**

**Truck cost Jacksonville to Orlando - \$422/box based on Martin**

**Associates Truck Cost Model**

# Transportation Cost Savings

- Total logistics cost savings applied to share of container moves under each forecast scenario that would be captured by JAXPORT with 47 ft.
  - From Savannah and Los Angeles/Long Beach
  - From SC's in Atlanta
- This calculation results in transportation cost savings
- Projected through 2035

# Emission Cost Reduction

- Savings of ton miles developed from reduced rail and truck mileage used in transportation cost savings
- Apply emission costs per ton mile as provided to Martin Associates by FDOT to savings in ton miles by rail and truck
- Also include added emission cost of all water from Hong Kong to LA/LB and intermodal to I-4 Corridor vs. all-water to JAXPORT

# Emission Cost During Project Cost

Table: Total Emission Load from all Equipment Used in Dredging the Jacksonville Harbor for year 2020

Emission Load (tons/year)							
Dredging Depth	NOX	CO	HC	PM10	PM2.5	SO2	CO2
44ft	733.02	64.30	27.11	33.37	32.37	0.37	39,124.39
45ft	800.03	70.22	29.58	36.41	35.31	0.40	42,709.87
47ft	955.17	83.88	35.30	43.45	42.15	0.48	51,004.94
48ft	1,050.70	92.28	38.83	47.79	46.36	0.53	56,109.02

These tons of emissions were expanded to total 5 year construction period and multiplied by appropriate emission costs per ton of specific types of emissions

# Project Capital Cost 11 miles- Updated Costs:11-16-2015

<b>Cost of Project -11 Miles</b>	<b>\$619,800,000</b>
Dredging Cost	\$481,400,000
Environmental Cost	\$33,400,000
Berth Cost	\$105,000,000
<b>Discounted Value of M&amp;R</b>	<b>\$12,817,525</b>
<b>Total PV of Costs</b>	<b>\$632,617,525</b>

Source: JAXPORT and USACE

# Project Capital Cost 13 miles- Updated Costs:11-16-2015

<b>Cost of Project -13 Miles</b>	<b>\$750,600,000</b>
Dredging Cost	\$612,200,000
Environmental Cost	\$33,400,000
Berth Cost	\$105,000,000
<b>Discounted Value of M&amp;R</b>	<b>\$12,817,525</b>
<b>Total PV of Costs</b>	<b>\$763,417,525</b>

Source: JAXPORT and USACE



# Benefits Include

- Reduced Shipping Costs over the use of non-Florida Ports
- Reduced emission costs due to reduced truck operations from non-Florida ports
- Increased throughput at JAXPORT measured as economic impact to the state of Florida
  - Based on Martin Associates economic impact for JAXPORT, 2014 and **measures direct business revenue impact to state of Florida** –no multiplier impact
  - Scenario 2 is run without economic benefits (direct business revenue impact) to the state
- Reduced waiting time for vessels – not measured
- Increased emissions during dredging project (this is a negative benefit and subtracted from the total benefits)
- Benefits are then projected over 15 year period and discounted using 4% discount rate

# Costs Include

- Direct Deepening costs - one time costs, including:
  - Dredging (for an 11 mile project and a 13 mile project)
  - Environmental mitigation
  - Land side/berth improvements to accommodate deeper channel and paid by the Port
- Present value of annual increase in channel maintenance and repair costs over a 15 year period, using a 4% discount rate

# Benefit Cost Ratio Estimated Under 8 Scenarios

- With Economic Impact to the State of Florida (throughput impact measured in terms of direct business revenue impact to the state)
  - Moderate assumes 25% capture rate of identified potential market due to 47 ft., and JAXPORT captures 1/3 of that market
  - Aggressive assumes 50% capture rate of identified potential market due to 47 ft. and JAXPORT captures 1/3 of that market
- Without Economic Impact to State of Florida scenario excludes the throughput (direct revenue impact to the state)
  - Moderate assumes 25% capture rate of identified potential market due to 47 ft., and JAXPORT captures 1/3 of that market
  - Aggressive assumes 50% capture rate of identified potential market due to 47 ft. and JAXPORT captures 1/3 of that market
- Project Costs for an 11mile project and a 3 mile project
- B/C ratio is the discounted benefits ÷discounted costs

# B/C Ratio With Revised Costs 11-16-2015 Including Direct Business Revenue Impact to the State 11 Mile Project

**15 years, 4% Discount Rate**

	Moderate	Aggressive
<b>Discounted Benefits</b>	<b>\$10,989,110,640</b>	<b>\$16,265,512,348</b>
Reduction in Shipping Costs (Truck, Rail, and Water)	\$3,647,925,722	\$5,375,209,562
Reduction in Externalities (Truck, Rail, and Water)	\$438,202,400	\$645,571,436
Increased Throughput at the Port (Business Revenue)	\$7,057,537,608	\$10,399,286,440
Wait Time Reduction	Not Estimated	Not Estimated
Emissions Cost During Construction	-\$154,555,090	-\$154,555,090
<b>Discounted Costs</b>	<b>-\$632,617,525</b>	<b>-\$632,617,525</b>
Capital Costs	\$619,800,000	\$619,800,000
Incremental Maintenance Costs	\$12,817,525	\$12,817,525
<b>BCA Metrics</b>		
Net Present Value (NPV)	<b>\$10,356,493,115</b>	<b>\$15,632,894,823</b>
Benefit/Cost Ratio (BCR)	<b>17.4</b>	<b>25.7</b>

# B/C Ratio With Revised Cost (11-16-2015) Excluding Direct Business Revenue Impact to the State 11 Mile Project

**15 years, 4% Discount Rate**

	Moderate	Aggressive
<b>Discounted Benefits</b>	<b>\$3,931,573,032</b>	<b>\$5,866,225,908</b>
Reduction in Shipping Costs (Truck, Rail, and Water)	\$3,647,925,722	\$5,375,209,562
Reduction in Externalities (Truck, Rail, and Water)	\$438,202,400	\$645,571,436
Increased Throughput at the Port (Business Revenue)	Not Included	Not Included
Wait Time Reduction	Not Estimated	Not Estimated
Emissions Cost During Construction	-\$154,555,090	-\$154,555,090
<b>Discounted Costs</b>	<b>-\$632,617,525</b>	<b>-\$632,617,525</b>
Capital Costs	\$619,800,000	\$619,800,000
Incremental Maintenance Costs	\$12,817,525	\$12,817,525
<b>BCA Metrics</b>		
Net Present Value (NPV)	<b>\$3,298,955,507</b>	<b>\$5,233,608,383</b>
Benefit/Cost Ratio (BCR)	<b>6.2</b>	<b>9.3</b>

# B/C Ratio With Revised Costs 11-16-2015 Including Direct Business Revenue Impact to the State 13 Mile Project

**15 years, 4% Discount Rate**

	Moderate	Aggressive
<b>Discounted Benefits</b>	<b>\$10,989,110,640</b>	<b>\$16,265,512,348</b>
Reduction in Shipping Costs (Truck, Rail, and Water)	\$3,647,925,722	\$5,375,209,562
Reduction in Externalities (Truck, Rail, and Water)	\$438,202,400	\$645,571,436
Increased Throughput at the Port (Business Revenue)	\$7,057,537,608	\$10,399,286,440
Wait Time Reduction	Not Estimated	Not Estimated
Emissions Cost During Construction	-\$154,555,090	-\$154,555,090
<b>Discounted Costs</b>	<b>-\$763,417,525</b>	<b>-\$763,417,525</b>
Capital Costs	\$750,600,000	\$750,600,000
Incremental Maintenance Costs	\$12,817,525	\$12,817,525
<b>BCA Metrics</b>		
Net Present Value (NPV)	<b>\$10,225,693,115</b>	<b>\$15,502,094,823</b>
Benefit/Cost Ratio (BCR)	<b>14.4</b>	<b>21.3</b>

# B/C Ratio With Revised Cost (11-16-2015) Excluding Direct Business Revenue Impact to the State 13 Mile Project

**15 years, 4% Discount Rate**

	Moderate	Aggressive
<b>Discounted Benefits</b>	<b>\$3,931,573,032</b>	<b>\$5,866,225,908</b>
Reduction in Shipping Costs (Truck, Rail, and Water)	\$3,647,925,722	\$5,375,209,562
Reduction in Externalities (Truck, Rail, and Water)	\$438,202,400	\$645,571,436
Increased Throughput at the Port (Business Revenue)	Not Included	Not Included
Wait Time Reduction	Not Estimated	Not Estimated
Emissions Cost During Construction	-\$154,555,090	-\$154,555,090
<b>Discounted Costs</b>	<b>-\$763,417,525</b>	<b>-\$763,417,525</b>
Capital Costs	\$750,600,000	\$750,600,000
Incremental Maintenance Costs	\$12,817,525	\$12,817,525
<b>BCA Metrics</b>		
Net Present Value (NPV)	<b>\$3,168,155,507</b>	<b>\$5,102,808,383</b>
Benefit/Cost Ratio (BCR)	<b>5.1</b>	<b>7.7</b>

# ROI Measure

- Defined as the return on investment –  
(Total discounted benefits-total discounted project cost)÷discounted cost
- Measured under the four scenarios
  - Benefits including economic impact (direct revenue) to the state under an aggressive and moderate scenario
  - Benefits excluding economic impact (direct revenue) to the state under an aggressive and moderate scenario
  - For an 11 mile project and a 13 mile project
- Describes the dollar return on the project for each dollar invested



# 11- Mile Project ROI

<b>(Discounted Benefits - Discounted Costs)/Discounted Costs With Economic Impact to State (Direct Business Revenue)</b>	
Moderate 16.37	Aggressive 24.71
<b>Without Economic Impact to State</b>	
Moderate 5.21	Aggressive 8.27

# 13- Mile Project ROI

**(Discounted Benefits - Discounted Costs)/Discounted Costs  
With Economic Impact to State (Direct Business Revenue)**

Moderate  
13.39

Aggressive  
20.31

**Without Economic Impact to State**

Moderate  
4.15

Aggressive  
6.68