USACE Civil Works Update

National Waterways Conference
Annual Meeting
Norfolk, VA

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Edward E. Belk, Jr  PE
Directorate of Civil Works
HQ, U.S. Army Corps of Engineers

September 22, 2016
Securing Our Nation’s Future Through Water

**Navigation - Moving Goods to Market**

USACE Operates 13,000 miles of Commercial Inland Waterways; Generates $18 B / 500,000 Jobs, Annually

**Flood and Disaster Risk Reduction**

USACE Prevents > $8 in Flood Damages for Every $1 Invested

**Hydropower - Inexpensive and Sustainable**

USACE is the Nation’s Largest Renewable Energy Producer

**Drinking Water**

USACE Produces 6.5 Billion Gallons per Day

**Quality of Life**

USACE is the No. 1 Federal Provider of Outdoor Recreation, Contributing >$16 B to Local Economies
Delivering Civil Works Programs

U.S. Army Corps of Engineers

Workforce Size Varies with Workload
Workforce = 821 Military + 33,000 Civilians
Making A Difference is What We Do
The United States Is A Maritime Nation

Inland Marine Transportation System + Ports: Vital to U.S. Trade and National Economy

Over 2 Billion Tons of Domestic and Import/Export Cargo Annually
USACE Navigation System Assets

INLAND NAVIGATION
27 Inland River Systems
228 Lock Chambers @ 186 Lock Sites
12,000 Miles of Inland River Channels

COASTAL NAVIGATION
1,067 Navigation Projects
13 Lock Chambers
929 Navigation Structures
13,000 Miles of Channels
844 Bridges
Navigation Facts

- 99.6% of U.S. overseas trade volume moves through coastal channels maintained by USACE.
- The U.S. marine transportation industry supports ~ $2 trillion in commerce.
- Panama Canal new locks opening in 2016 - Worldwide numbers of post-Panamax vessels to increase.
- More than 60% of farm exports move on inland waterways to downstream ports.
- One barge can carry as much freight as 15 rail cars or 58 trucks. This reduces traffic congestion and air pollution.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Capacity</th>
<th>Truck Equivalency</th>
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<tbody>
<tr>
<td>Barge</td>
<td>1500 Tons</td>
<td>57.7 (655.4 for 15 barges in tow)</td>
</tr>
<tr>
<td></td>
<td>52,500 Bushels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>453,600 Gallons</td>
<td></td>
</tr>
<tr>
<td>Hopper car</td>
<td>100 Tons</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>3,500 Bushels</td>
<td></td>
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<tr>
<td></td>
<td>30,240 Gallons</td>
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</table>
Challenges and Opportunities

- Infrastructure Investment = Global Challenge

- Corps Civil Works Portfolio: 3,000+ Operational Projects, with Replacement Value of Approx $268B

- Corps Civil Works Asset Classes are Diverse
  - Flood & Coastal Storm Damage
  - Coastal and Inland Harbors
  - Inland Waterways
  - Hydropower
  - Dam & Levee Safety Programs
  - Water Storage
  - Aquatic Ecosystems
  - Water-Based Recreation

- Demands for CW Infrastructure Maintenance, Operations, and Capital Investment are Expanding
  - Civil Works New Construction Backlog \( \rightarrow \$ 60B \)
  - ASCE: Dams, Levees, IWW’s = “D” \( \rightarrow \$140B \)

- CW Infrastructure Systems Aging, Experiencing Negative Performance Trends Across Portfolio (Serviced by \( \sim \$4.6B \) Annual Budget Nationally....)
Investment Levels Correlate to Infrastructure Performance Trends
United States Relative to Other Nations

US Treasury, April 2015 Report:
“....years of underinvestment in our public infrastructure have imposed massive costs on our economy.”

Low Investment in Infrastructure
The World Economic Forum ranks US infrastructure behind that of most other comparable advanced nations.

### Overall infrastructure quality index, 2012–13

**Top 15 of 144 countries**

Scale: 1 = Extremely underdeveloped; 7 = Extensive and efficient by international standards

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hong Kong</td>
<td>6.7</td>
</tr>
<tr>
<td>2</td>
<td>Singapore</td>
<td>6.5</td>
</tr>
<tr>
<td>3</td>
<td>Germany</td>
<td>6.4</td>
</tr>
<tr>
<td>4</td>
<td>France</td>
<td>6.3</td>
</tr>
<tr>
<td>5</td>
<td>Switzerland</td>
<td>6.2</td>
</tr>
<tr>
<td>6</td>
<td>United Kingdom</td>
<td>6.2</td>
</tr>
<tr>
<td>7</td>
<td>Netherlands</td>
<td>6.2</td>
</tr>
<tr>
<td>8</td>
<td>United Arab Emirates</td>
<td>6.1</td>
</tr>
<tr>
<td>9</td>
<td>South Korea</td>
<td>5.9</td>
</tr>
<tr>
<td>10</td>
<td>Spain</td>
<td>5.9</td>
</tr>
<tr>
<td>11</td>
<td>Japan</td>
<td>5.9</td>
</tr>
<tr>
<td>12</td>
<td>Luxembourg</td>
<td>5.8</td>
</tr>
<tr>
<td>13</td>
<td>Canada</td>
<td>5.8</td>
</tr>
<tr>
<td>14</td>
<td>United States</td>
<td>5.8</td>
</tr>
<tr>
<td>15</td>
<td>Austria</td>
<td>5.8</td>
</tr>
</tbody>
</table>

**Sector-specific indexes, 2012–13**

- **Ports**
  - United States: #19
- **Roads**
  - United States: #20
- **Power and telephony**
  - United States: #21

**SOURCE:** World Economic Forum; McKinsey Global Institute analysis
Our nation's inland waterways and rivers are the hidden backbone of our freight network – they carry the equivalent of about $1 million truck trips each year. In many cases, the inland waterways system has not been updated since the 1950s, and more than half of the locks are over 50 years old. Bergecs are stopped for hours each day with unscheduled delays, preventing goods from getting to market and driving up costs. There is an average of 62 service interruptions a day throughout the system. Projects to repair and replace aging locks and dredge channels take decades to approve and complete, exacerbating the problem further.

### Infrastructure and Economic Impact

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Add'l Total Investment by 2020</th>
<th>Protects $B in Exports</th>
<th>Protects $B in GDP</th>
<th>Protects Jobs</th>
<th>Protects Personal Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterways</td>
<td>$16B</td>
<td>$270B</td>
<td>$697B</td>
<td>738,000</td>
<td>$872B</td>
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<tr>
<td>Airports</td>
<td>$39B</td>
<td>$54B</td>
<td>$313B</td>
<td>350,000</td>
<td>$361B</td>
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<tr>
<td>Electricity</td>
<td>$107B</td>
<td>$51B</td>
<td>$496B</td>
<td>529,000</td>
<td>$656B</td>
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<tr>
<td>Water/Wastewater</td>
<td>$84B</td>
<td>$20B</td>
<td>$416B</td>
<td>669,000</td>
<td>$541B</td>
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<tr>
<td>Roads</td>
<td>$846B</td>
<td>$114B</td>
<td>$897B</td>
<td>877,000</td>
<td>$930B</td>
</tr>
</tbody>
</table>
Comparison of Gross Domestic Product

GDP (2014 USD)

Billions

United States

China

Japan

Germany

United Kingdom

Brazil

Russian Federation

### CW Economic Benefits, Revenues to Treasury
(2010-2013 Average)

<table>
<thead>
<tr>
<th>Program</th>
<th>NED Benefits (Billions of Dollars)</th>
<th>Net NED Benefits (Billions of Dollars)</th>
<th>U.S. Treasury Revenues (Billions of Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood Risk Management</td>
<td>$79.83</td>
<td>$79.19</td>
<td>$25.30</td>
</tr>
<tr>
<td>Coastal Navigation</td>
<td>$9.47</td>
<td>$9.07</td>
<td>$3.88</td>
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<tr>
<td>Inland Navigation</td>
<td>$8.84</td>
<td>$8.24</td>
<td>$2.27</td>
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<tr>
<td>Water Supply</td>
<td>$7.61</td>
<td>$7.59</td>
<td>$0.08</td>
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<tr>
<td>Hydropower</td>
<td>$2.92</td>
<td>$2.73</td>
<td>$1.43</td>
</tr>
<tr>
<td>Recreation</td>
<td>$3.31</td>
<td>$3.01</td>
<td>$1.17</td>
</tr>
<tr>
<td>Leases and Sales</td>
<td></td>
<td>$0.03</td>
<td></td>
</tr>
<tr>
<td><strong>Total Annual NED</strong></td>
<td><strong>$112.38</strong></td>
<td><strong>$109.83</strong></td>
<td><strong>$34.16</strong></td>
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</tbody>
</table>

**Notes:**

1. Net NED benefits are defined as NED benefits less the costs of operations, maintenance, and investigations. Since the costs associated with expenses and oversight by the Assistant Secretary of the Army (ASA) serve all Corps programs, including those we did not calculate benefits for in this report, this report does not account for those costs.
2. The Benefits and Revenues numbers are not additive.
Civil Works Budget Trends

Historic Budget Trends

<table>
<thead>
<tr>
<th>Year</th>
<th>Investigations</th>
<th>OPER &amp; MAINT</th>
<th>MR&amp;T</th>
<th>FC&amp;CE</th>
<th>HISTORIC APPROPRIATIONS</th>
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<tr>
<td>2001</td>
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<td>2016</td>
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<tr>
<td>2017</td>
<td></td>
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</table>

Legend:
- INVESTIGATIONS
- OPER & MAINT
- MR&T
- FC&CE
- ASA(CW)
- CONSTRUCTION
- REGULATORY
- GENERAL EXPENSE
- FUSRAP
- HISTORIC APPROPRIATIONS
Civil Works FY 2016 Funding *
$ Millions
Total: $5.989 Billion

by Account
- Construction $1,862 M
- Operation & Maintenance $3,137 M
- Flood & Coastal Emergencies $28 M
- Investigations $121 M
- Miss. R. & Tribs. $345 M
- FUSRAP $112 M
- Regulatory $200 M
- Expenses ** $134 M

by Business Line
- Navigation $2,610 M
- Flood Damage Reduction $1,703 M
- Water Supply $67 M
- Hydropower $216 M
- Regulations $580 M
- Environmental $200 M
- Recreation $284 M
- Emergency Management $35 M
- Expenses ** $184 M

* Does not include supplemental appropriations
** Includes Office of Asst. SecArmy (Civil Works)
Major Construction Projects
($5 M or More in FY16 Work Plan)

Numbers in circles = $million appropriated
President's FY 2017 Budget

$ Millions
Total: $4.620 Billion

by Account

Construction $1,090 M
Operation & Maintenance $2,705 M
Flood & Coastal Emergencies $30 M

by Business Line

Navigation, Ports $1,011 M
Flood Damage Reduction $1,214 M
Navigation, Inland $923 M
Hydropower $719 M
Recreation $261 M
Emergency Management $35 M
Water Supply $7 M

** Includes Office of Asst. SecArmy (Civil Works)
Future Budgets

- FY18 Budget Outlook
  - Probable Release Early 2017
  - Allows New Administration to Influence Budget Priorities

- FY17 Workplan Outlook
  - Districts and MSC Submittals Under Development
  - Expect HQ National Ranking to be Wrapped Up Before Christmas
Civil Works Transformation
Infrastructure Strategy Components

- **Asset Management**: Assets identification, assessment of conditions/reliability, categorization

- **Life Cycle Portfolio Management**: Ensure future systems’ viability through risk assessment and management, funding prioritization in a systems decision making process

- **Alternative Financing**: Identify alternative financing mechanism and options to leverage funding to increase infrastructure investments
**Investment Metric: Risk to Performance**

Risk = Probability of Failure x Consequences → Investment Priority

<table>
<thead>
<tr>
<th>Condition</th>
<th>Consequence</th>
<th>F (1) Failed</th>
<th>D (2) Poor</th>
<th>C (3) Fair</th>
<th>B (4) Good</th>
<th>A (5) Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>10</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Medium High</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>14</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>4</td>
<td>8</td>
<td>13</td>
<td>18</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>7</td>
<td>12</td>
<td>17</td>
<td>21</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Minimal</td>
<td>11</td>
<td>16</td>
<td>20</td>
<td>23</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- High Relative Risk
- Med-High Relative Risk
- Medium Relative Risk
- Low Relative Risk
- Minimal Relative Risk
Lifecycle Portfolio Management

Fig. 1

Report of PIANC Working Group 25 InCom

8
Inland Marine Transportation System Capital Investment Strategy (CIS)

A Risk-Informed Portfolio Investment Approach, Focused on Maximizing System Performance

- Nationally Consistent and Repeatable Approach Across Entire IMTS
- Buys Down Risk, Improves System Reliability
- Mitigates Economic Impacts to Marine Stakeholders
GOAL: Reduce Risk Profile with Best Mix of Construction and O&M Investment

CIS - Major Rehab/ Modernize

Life-Cycle Asset Management Strategy
Regional Sediment Management (RSM) Operating Principles

- Recognize sediment as a regional resource
- Balanced, economically viable, environmentally sustainable solutions
- Improve economic performance by linking multiple projects
- Optimize operational efficiencies & natural exchange of sediments
- Apply/develop technology & tools to optimize system
- Share information & data, reduce data duplication
- Coordinate, Communicate, Collaborate
Olmsted Locks and Dam

- Ahead of Schedule and Under Budget, Operational Oct 17
- Result of Consistent Application of Efficient Funding
Flooding Challenges

- Unprecedented Flooding Across Central and Southern US
- Generated Extensive Shoaling at Southwest Pass and Inland Waterways
- Levee and Other Infrastructure Repairs
- Full Extent of Damages not Yet Revealed, Could Impact Current Priorities
Alternative Financing

- P3
- WIFIA
- Contributed Funds
- ESPC
- Advanced Funds
- P4
- Accelerated Funds
- Divestiture
- Others?
Key P3/P4 Principles

- Federal P3/P4 Background and Operating Context
  - P3/P4 Not as Mature in US: Municipal Bond Market, Unique US Risk Profile
  - P3/P4 is Essentially Another Acquisition Tool, Though Complex & Longer Term
  - P3/P4 Cost of Money and Investor ROI, and Primacy of Federal/Taxpayer Equities
  - P3/P4 Application in Water Resources Context Presents Challenges

- P3/P4 Can Help the Corps/Sponsors Address Two Critical National CW Infrastructure Challenges
  - Existing Infrastructure: Sustain Performance, Extend Service Life, and/or Buy Down Risk for the Nation
  - New Infrastructure: Accelerate Delivery, Reduce Life Cycle Costs and Achieve Earlier Accrual of Project Benefits to the Nation

- Three Primary P3 Revenue Generation Mechanisms
  - User Payments
  - Availability Payments (Federal Budget)
  - Commercial/Ancillary Revenues
Federal P3/P4 Challenges

- Payment Mechanisms, Availability Payments
  - Inability to Make Commitments on Future Appropriations

- Budget Scoring
  - Scores Full Federal Project Cost Up Front in First Year

- Revenue Generation and Ring-Fencing
  - Ability to Collect, Retain and Reinvest Fees/Charges

- Budgetability
  - Prioritization of Projects Within Current Budget Policy (Benefit-Cost Ratio)
Future Opportunities & Demands

• U.S. Population Projected to Increase by 110M in 30 Years
• Over 50% of US Population Located within 50 Miles of Coastline
• U.S. Imports and Exports Projected to Increase Significantly
• Panama Canal New Locks Now Opening - Worldwide Fleet of Post-Panamax Vessels to Increase
• Opportunities for Economically Justified Port Expansions Greatest Along Atlantic and Gulf coasts
• Improving Grain Yield Trends and Improved Panama Canal Efficiencies ➔ Increased Grain Exports
• Environmental Mitigation Activities Likely Significant
• Future P3 Opportunities, Where They Make Sense
Closing Thoughts

- Addressing the Nation’s Infrastructure Investment Gap is a Shared Federal, State and Local Responsibility

- The Corps Doesn’t Deliver Anything by Itself… Critical that We Not Lose Focus on Our Partners and Our Commitments

- Navigation Investment is Essential for the Nation’s Global Trade and International Competitiveness

- Economically Justified FRM Investment Reduces Risk to Economic Activity, Lives, Livelihoods and Quality of Life

• Infrast Investment: Financial (and Generational…) Challenge
• Elevated Priority Afforded to Infrastructure Investment?

What are YOUR ideas?
Thank You!