Welcome to the USACE Civil Works Program

Moderator:
• Col. David Anderson, P.E., F.SAME, USA (Ret.), Jones Lang LaSalle

Speaker:
• Maj. Gen. John Peabody, P.E., USA, Deputy Commanding General for Civil and Emergency Operations, HQ USACE
Army Civil Works Program: Tremendous Value Demanding Vision

Society of American Military Engineers

MG John Peabody, P.E.
Deputy Commanding General,
Civil and Emergency Operations

U.S. Army Corps of Engineers

10 March 2015
Each dollar spent on the USACE Civil Works program generated ~ $16 in economic benefits and $5 in revenues to the U.S. Treasury.

<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>$59.47</td>
<td>$58.84</td>
<td>$18.90</td>
</tr>
<tr>
<td>Coastal Navigation</td>
<td>$9.47</td>
<td>$8.70</td>
<td>$3.70</td>
</tr>
<tr>
<td>Inland Navigation</td>
<td>$8.10</td>
<td>$7.51</td>
<td>$2.07</td>
</tr>
<tr>
<td>Water Supply</td>
<td>$7.00</td>
<td>$6.98</td>
<td>$0.09</td>
</tr>
<tr>
<td>Hydropower</td>
<td>$2.30</td>
<td>$2.11</td>
<td>$1.37</td>
</tr>
<tr>
<td>Recreation</td>
<td>$3.20</td>
<td>$2.91</td>
<td>$1.13</td>
</tr>
<tr>
<td>Leases and Sales</td>
<td></td>
<td></td>
<td>$0.03</td>
</tr>
<tr>
<td><strong>Total Annual NED</strong></td>
<td><strong>$89.54</strong></td>
<td><strong>$87.05</strong></td>
<td><strong>$27.29</strong></td>
</tr>
</tbody>
</table>

Notes:
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."

The Benefits and Revenues numbers are not additive.
The United States: The Inevitable Empire?
U.S. Ports and Inland Waterways: Vital to our National Economy

2 Billion Tons of domestic and import/export cargo annually

Annual Freight Tonnage by Mode
- National Highway System
- U.S. Class I Railroad
- Inland Waterways

Volume Scale (Tons/Year)
- 250,000,000
- 125,000,000
- 62,500,000
The American Society of Civil Engineers (ASCE) awarded USACE’s Inner Harbor Navigation Canal Surge Barrier, part of the Hurricane & Storm Damage Risk Reduction System, New Orleans, LA, the 2014 Outstanding Civil Engineering Achievement (OCEA) Award on March 20, 2014.

First Corps project winner in the award’s 54 year history!

$1.35 B design-build project is a credit to our team: the Corps, State of Louisiana, industry, academia, and community we serve.
Changing Perspectives on Infrastructure

Resilience & Recapitalization

Driving Forces
- Agriculture - Food
- Industrial - Manufacturing
- Transportation
- Energy - Hydrocarbon
- Technology

United States

Environmental Enlightenment

Other Emerging Powers

Economic Efficiency

Investments

Nation Building

Wear and Tear

Hierarchy of Public Works Needs

- 75% of the US population was born after 1960.
- Less than 25% of the population experienced the building of our nation’s key infrastructure.

Today
- 2010s
- 2000s
- 1980s
- 1960s
- 1940s
- 1920s
- 1900s
- 1800s

~75% of the US population was born after 1960.

Less than 25% of the population experienced the building of our nation’s key infrastructure.
1a) Nation Building: Starting the Task

Analysis
• 1808 Gallatin Report

Key Legislation
• 1826 Omnibus Rivers & Harbors Act

Institutions Formed
• 1802 US Army Corps of Engineers
• 1871 US Commission on Fish and Fisheries
• 1879 Mississippi River Commission

Key Events
• Westward expansion - Value of navigation: interior river systems
• 1817 Start construction of the Erie Canal
• 1828 Start Construction of the Chesapeake and Ohio Canal
1) Nation-Building: 19th Century

1a: Nation Building: Starting the Task
- 1802 US Army Corps of Engineers formed
- 1808 Gallatin Report
- 1817 Start construction of the Erie Canal
- 1826 Omnibus Rivers and Harbors Act
- 1828 Start Construction of Chesapeake & Ohio Canal
- 1862 Homestead Act and Westward expansion (Value of navigation: interior river systems)
- 1871 US Commission on Fish and Fisheries
- 1879 Mississippi River Commission

1b: Nation Building: Completing the Phase
- 1902 Reclamation Act
- 1902 Reclamation Service
- 1905 National Forest Service
- 1909 National Conservation Commission
- 1912 National Waterways Commission
- 1914 Panama Canal completed
- 1916 National Park Service
- 1917 Flood Control Act (first)
- 1920 Federal Water Power Act
- 1920 Federal Power Commission
- 1927 Rivers and Harbors Act
- 1927 Great Mississippi River Flood
- 1928 Boulder Canyon Project Act
2) Economic Efficiency: Early-Mid 20th Century

2a: Economic Efficiency: Harnessing Nature

- 1928, 1936, and 1938 Flood Control Acts
- 1933 Tennessee Valley Authority
- 1933 National Planning Board and multi-purpose plans for ten rivers
- 1935 National Resources Committee
- 1936 Flood Control act with benefit-cost language
- 1939 Bureau of the Budget
- 1939 Public Works Administration
- 1940 National Fish and Wildlife Service
- 1942 Gilbert White’s analysis adjustments to floods
- 1944, 1956, 1965 Flood Control Act
- 1947 River of Grass
- 1948 and 1956 Water Pollution Control Acts
- 1950 Presidential Water Resources Policy Cmsn
- 1952 House Subcommittee to Study Civil Works
- 1952 Circular A-47 Economic Analysis
- 1955 and 1965 Rivers and Harbors Act
- 1955 Pres. Cmsn on Water Resources Policy
- 1956 Federal Aid Highway (Interstate) Act
- 1958 Multiple-Purpose River Development
- 1962 Design of Water Resources Systems
- 1965 Water Resources Planning Act
- 1965 Water Resources Council
- 1966 Clean Rivers Restoration Act
- 1968 Wild and Scenic Rivers Act
- 1968 Flood Insurance Act

2b: Economic Efficiency: System Build-Out
3) Environmental Awakening: Late 20th Century

- 1962 “Silent Spring” published
- 1969 Cuyahoga River Catches Fire - again
- 1969 National Environmental Policy Act
- 1970 Rivers and Harbors Act, Section 209
- 1970 Council on Environmental Quality
- 1970 Environmental Protection Agency
- 1973 National Water Commission report
- 1973 Endangered Species Act
- 1977 Clean Water Act
- 1980 CERCLA
- 1986 Federal Power Act
- 1986 Water Resources Development Act
- 1986 FEMA takes over Interagency Flood Management TF
- 1989 Escalating Federal involvement in Everglades Rest’n

4: Emerging Refocus: Adaptation, Sustainability, & Resilience

- Building a 21st Century Infrastructure & Infrastructure TF
- “We Can’t Wait” Port Modernization
- Build America Investment
- Building a Clean Energy Economy
- Climate Action Plan
- Federal Sustainability
- Strengthen Global Resilience to Climate Change
- Climate Change Adaptation Task Force
- Task Force on Climate Preparedness and Resilience
- Hurricane Sandy Rebuilding Task Force
- Gulf Coast Restoration Task Force
1927 vs. 2011 Mississippi River Record Flood: From “Levees Only” to “Room for the River”

- 1927 Flood = 16.8 M acres (Challenge)
- 2011 Flood = 6.35 M acres (Response)
- $230 B damages prevented
  - $612 B since 1928
  - 44 to 1 ROI
- $7 B in crop damages prevented
- 4.5 million people protected
- $3B Annual Transportation Rate Savings
Historical Investments by USACE Functional Category
1928 to 2011

Billions of FY 2011 Dollars

~$70.00 per person in the US!

~$56.00 per person in the US!

$500 Billion Construction Investment

~$18.00 per person in the US!
From System Build-Out to Benign Neglect

Coasting on Past Investments Approx $87B NED Annual Benefits
Long Term Civil Works Funding Trends: Changing the Character of the Corps

Appropriation ($Million in 2012 $)

- O&M
- Constr
- Invest
Civil Works FY 2015 Funding *

$ Millions
Total: $5.482 Billion
(+ $921.5 Million)

by Account

- Construction $1,639 M
- Operation & Maintenance $2,909 M
- Miss. R. & Tribs. $302 M
- Investigations $122 M
- Flood & Coastal Emergencies $28 M

by Business Line

- Navigation, Ports $1,243 M
- Navigation, Inland $1,088 M
- Flood Damage Reduction $1,599 M
- Emergency Management $35 M
- Water Supply $44 M
- Water Supply $44 M
- Investigation $122 M
- Investigation $122 M
- Flood & Coastal Emergencies $28 M

* Does not include supplemental appropriations
** Includes Office of Asst. SecArmy (Civil Works)
President’s FY 2016 Budget

$ Millions
Total: $4.732 Billion

by Account

Construction $1,172 M
Operation & Maintenance $2,710 M
Miss. R. & Tribs. $225 M
FUSRAP $104 M
Regulatory $205 M
Expenses $185 M

by Business Line

Navigation, Ports $973 M
Navigation, Inland $974 M
Flood Damage Reduction $1,271 M
Emergency Management $39 M
Hydropower $272 M
Recreation $261 M
Water Supply $7 M
Environmental $501 M
Regulatory $205 M

** Includes Office of Asst. SecArmy (Civil Works)
Flood Risk Management
Aquatic Ecosystem Restoration
Navigation
Multipurpose

Numbers in circles = $million budgeted
Links

The FY16 Civil Works budget press book may be found at http://www.usace.army.mil/Missions/CivilWorks/Budget.aspx, under the heading Program Budget: Press Books

The FY 15 work plan for each appropriation listing the amounts provided to various programs, projects, and activities may be found at http://www.usace.army.mil/Missions/CivilWorks/Budget.aspx
Water Infrastructure Spending

Between 1962 & 2010...

Total funding increased % GDP decreased

Greater burden on state and local funding sources as infrastructure ages.

Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis. For details, see the appendix.
INFRASTRUCTURE CONSEQUENCES
## 2013 Report Card for America’s Infrastructure

*by the American Society of Civil Engineers*

<table>
<thead>
<tr>
<th>Category</th>
<th>Grade</th>
<th>Category</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aviation</td>
<td>D</td>
<td>Ports</td>
<td>C</td>
</tr>
<tr>
<td>Bridges</td>
<td>C+</td>
<td>Public Parks &amp; Recreation</td>
<td>C-</td>
</tr>
<tr>
<td>Dams</td>
<td>D</td>
<td>Rail</td>
<td>C+</td>
</tr>
<tr>
<td>Drinking Water</td>
<td>D</td>
<td>Roads</td>
<td>D</td>
</tr>
<tr>
<td>Energy</td>
<td>D+</td>
<td>Schools</td>
<td>D</td>
</tr>
<tr>
<td>Hazardous Waste</td>
<td>D</td>
<td>Solid Waste</td>
<td>B-</td>
</tr>
<tr>
<td>Inland Waterways</td>
<td>D-</td>
<td>Transit</td>
<td>D</td>
</tr>
<tr>
<td>Levees</td>
<td>D-</td>
<td>Wastewater</td>
<td>D</td>
</tr>
</tbody>
</table>

*America’s Cumulative G.P.A.*

- A = Exceptional
- B = Good
- C = Mediocre
- D = Poor
- F = Failing

**Estimated investment needed by 2020 = $3.6 Trillion**

---

U.S. Army

Army Strong®

BUILDING STRONG®
Relative Quality of US 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

1. Hong Kong
2. Singapore
3. Germany
4. France
5. Switzerland
6. United Kingdom
7. Netherlands
8. United Arab Emirates
9. South Korea
10. Spain
11. Japan
12. Luxembourg
13. Canada
14. United States
15. Austria

Port-specific indexes, 2012–13
Out of all 144 countries

United States #19

Roads
United States #20

Power and telephony
United States #21

SOURCE: World Economic Forum; McKinsey Global Institute analysis
Gross Fixed Investment (Public & Private Sectors): United States Relative to Other Nations

One Step Ahead of Greece!
EMERGING GAME CHANGERS:

FIVE UPHEAVALS
Upheaval #1: Emerging Competition

Gateways & Corridors Initiative –
Result: BC Port Traffic + 50%, 6 Yrs

CN Joliet, IL Intermodal Facility

Washington and British Columbia Port Volume Trends

BC Port Traffic Up ~ 50%
Yangtze River Planned Investment
2011-2015: $32 Billion USD
Upheaval #2: Explosive Growth in US Agricultural Productivity

- 15-25 bushels per acre growing to 100 bushels per acre
  - Wheat, rice, soybeans, cotton
- Growing to 200 bushel per acre – corn
  - Some cases 300 bushels per acre
- Second “Green Revolution” now
  - First – 1970s “Borlaug” Revolution
Upheaval #3: Hydrocarbon Production

- **US Oil Production:**
  - Grew 18% in last year alone
  - US will be World #1 producer in 2015

- **US Natural Gas Production:**
  - US is World #1 producer as of 2013 (more than Russia)

- **Cascading Effect** on Other Industries --- Chemical, Plastics, all Manufacturing
Upheaval #4: Resurgence of Manufacturing to the US & Heartland

$975M Steel Mill at Port of Caddo-Bossier on Red River in NW LA expected to be complete by 2015

Construction begins Jul 14 on $1.1B Steel Mill

Seversal Steel Mill Columbus MS
Upheaval #5: U.S. Trade Projected to Double

2008 - 2028

Millions of TEUs

Source: IHS Global Insight World Trade Service
Ever Larger Containerships

Pre-1970
1,700 TEU
<10 Containers Wide

1970-1980
2,305 TEU
10-11 Containers Wide

1985
3,220 TEU
11-13 Containers Wide

1986-2000
4,848 TEU
13-17 Containers Wide

2000-2005
8,600+ TEU
17-22 Containers Wide

Existing locks’ maximum vessel: 4,800 TEU

New locks’ maximum vessel size: 12,600 TEU
President’s “We Can’t Wait” Initiative
Advancing key infrastructure projects at 5 East Coast ports:
• NY / NJ
• Charleston
• Savannah
• Jacksonville
• Miami
Panama Canal Expansion – Opportunity for increased efficiency, or are we shifting the bottleneck?
Upheaval #5: Accelerating Impacts of Climate Change

- Changes to Weather
  - Precipitation more Intense – More Volume in Less Time
  - Increased Runoff from this and development
  - Significant Storm events of high intensity
    - Record number of >$1B events in 2013 (41 - 7 in US)
    - Increasing High Damage weather events 151 since 1980

Observed Change in Very Heavy Precipitation

Percent changes in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012 for each region. There is a clear national trend toward a greater amount of precipitation being concentrated in very heavy events, particularly in the Northeast and Midwest. (Figure source: updated from Karl et al. 2009)

Observed U.S. Precipitation Change

The colors on the map show annual total precipitation changes for 1991-2012 compared to the 1901-1960 average, and show wetter conditions in most areas. The bars on the graph show average precipitation differences by decade for 1901-2012 (relative to the 1901-1960 average). The far right bar is for 2001-2012. (Figure source: NOAA NCDC / CICS-NC)
Global Temperature and Carbon Dioxide

The Vostok (Antarctica) Ice Core Record.
Carbon Dioxide versus Temperature for the last 420,000 years.
Depth of Ice (metres)

*Graphic courtesy of NOAA Paleoclimatology, National Climatic Data Center

Measurements of Surface Temperature and Sun’s Energy

The full record of satellite measurements of the sun’s energy received at the top of the Earth’s atmosphere is shown in red, following its natural 11-year cycle of small ups and downs, without any net increase. Over the same period, global temperature relative to 1961-1990 average (shown in blue) has risen markedly. This is a clear indication that changes in the sun are not responsible for the observed warming over recent decades. (Figure source: NOAA NCDC / CICS-NC).

Climate Change Impacts in the United States: Highlights, U.S. Global Change Research Program, p. 23
http://nca2014.globalchange.gov/highlights
Impacts from Climate Change - Coastal Risk

Sea Level Trends
mm/yr (feet/century)

- 15 to 21 (5 to 7)
- 12 to 15 (4 to 5)
- 9 to 12 (3 to 4)
- 6 to 9 (2 to 3)
- 3 to 6 (1 to 2)
- 0 to 3 (0 to 1)
- -3 to 0 (-1 to 0)
- -6 to -3 (-2 to -1)
- -9 to -6 (-3 to -2)
- -12 to -9 (-4 to -3)
- -15 to -12 (-5 to -4)
- -18 to -15 (-6 to -5)
National Academy of Sciences Report

- From 2008-2012:
  - $493M for Risk Reduction,
  - $12.8B for Relief
  - = 26 x More REACTIVE!

- Misaligned Economic Incentives
  - Local Zoning vs. Federal Relief

- Strategic National Vision Required
  - Economically Justifiable Solutions Constrained by Acceptable Risk
  - Should Consider a Wider Range of Costs and Benefits
  - Federal Leadership in Collaboration with State and Local Agencies
4) Emerging Focus: Adaptation, Recapitalization, & Resilience?

**White House Initiatives:**

- “We Can’t Wait” Port Permitting
- Build America Investment
- Infrastructure Task Force
- Building a 21st Century Infrastructure
- Climate Action Plan
- Federal Flood Risk Management Standard
- Strengthen Global Resilience to Climate Change
WRRDA 2014

- Water Supply and Reservoirs
- Regulatory (including 408)
- Non-Federal Implementation
- Credits
- Deauthorizations & Backlog Prevention
- Alternative Financing
- Navigation
- Project Development and Delivery (Including Planning): Dam Safety, Levee Safety, and Non-Federal Implementation
The Current Situation

- A No-Earmark environment
- We fund too many studies/projects at less than capability
- Projects and Studies take too long to complete and cost too much!

- Sponsors and Stakeholders are frustrated by the lack of progress, increased time and costs all (and infuriates)

- We under-emphasize quality assurance and quality products
- In a budget constrained era, we must do what it takes to Be RELEVANT!!

... All of which adds up to ...
An Imperative
To Change!
Transforming Civil Works

Deliver enduring & essential water resource solutions through a balanced and sustainable program – … Run the Business that is the Corps.
Some “Inevitable” Empires

- British Empire
- Ottoman Empire
- Roman Empire
- Charlemagne
- Aztec Empire
- Philip of Macedon
- Napoleon’s French Empire
- Ming Dynasty
- Soviet Union
John F. Kennedy: 
*The Last Great Positivist?*

We are a great and strong country ... but greatness and strength are not ... gifts which are automatically ours forever. It took toil and courage and determination to build this country - and *it will take those same qualities if we are to maintain it.* For, although a country may stand still, history never stands still. Thus, if we do not soon begin to move forward again, we will inevitably be left behind. ... But effort and courage are not enough without purpose and direction.