“Restore & Improve Urban Infrastructure”

April 5, 2011

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Outline

• What is infrastructure?
• Current State
• Maintaining Infrastructure
• How can we improve transportation systems?
• How can we build a better infrastructure?
• Conclusion
What is infrastructure?

- Systems that support a community
- Facilitates production of goods and services
- Hard vs. Soft
  - Roads, railways
  - Power, water, natural gas, hydrogen?
  - Financial, education, health care, government
The Current State (TCS)

• ASCE Infrastructure Report in 2005
  – Dams
  – Bridges
  – Roads

<table>
<thead>
<tr>
<th>Grade Definitions</th>
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<tbody>
<tr>
<td>A = Exceptional</td>
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<tr>
<td>B = Good</td>
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<tr>
<td>C = Mediocre</td>
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<tr>
<td>D = Poor</td>
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<tr>
<td>F = Failing</td>
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<td>I = Incomplete</td>
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2005 Report Card for America’s Infrastructure

- Aviation: D+
- Bridges: C
- Dams: D
- Drinking Water: D-
- Energy: D
- Hazardous Waste: D
- Navigable Waterways: D-
- Public Parks & Recreation: C-
- Rail: C-
- Roads: D
- Schools: D
- Security: I
- Solid Waste: C+
- Transit: D+
- Wastewater: D-

America’s Infrastructure G.P.A. = D

Total Investment Needs = $1.6 Trillion (estimated 5 year need)
TCS Dams

• America has over 3,500 unsafe dams

• If they break: Millions of dollars in damages and lost lives

Johnstown Flood (1889), Pennsylvania
TCS Bridges

- ~600,000 bridges
- +27% are rated structurally deficient or functionally obsolete
TCS Roads

• Poor road conditions cost motorists $54 Billion annually

• Americans Spend 3.5 Billion hours in traffic

Maintaining Infrastructure

• Provide Water
  – Annual $11 billion shortfall
  – Replace Aging Facilities

• Transmit Information/Power
  – Telecommunication Systems:
    cable TV, cell phones, internet

• Find Buried Infrastructure
Maintaining Infrastructure

- **Aviation**
  - Larger Jets and Increased Use
  - At least $12 billion over 10 years
- **Bridges and Dams**
  - Bridges: $9.4 billion annually for 20 years
  - Dams: $10.1 billion over 12 years
- **Roads**
  - Currently spend $59.4 billion of $94 billion annually needed
Maintaining Infrastructure

- **Hazardous Waste**
  - 1237 contaminated and up to $250 billion
  - Brownfield Sites to generate jobs and revenue

- **Navigable Waterways**
  - 50% are functionally obsolete
  - $125 billion to replace present system

- **Rail**
  - Freight Rail Tonnage up 50% by 2020
  - $185 billion over next 20 years
How can we improve transportation systems?

- **Improving Efficiency**
  - Individual vehicle travel, mass transit, bicycling, and walking
- **Transportation Hubs**
  - rail, bus, taxi, walking and bicycle paths, parking lots
  - Hong Kong
    - Smart Card
- **Elderly and Disabled?**

http://www.krugerfan.com/projects_malaysia_ciq.php
How can we build a better infrastructure?

- New materials
- New construction methods
  - Move away from manual labor
- Problem
  - $$$
How can we build a better infrastructure?

- **Main Area of Focus**
  - Paved areas


Paved Areas

• “Green Infrastructure”
  – Landscape design to manage runoff water
  – Better storm drainage
  – Cleaner water
  – Recharge water table
Paved Areas

• Bioretention
  – “rain gardens”

• Porous Pavement
  – Infiltration with light traffic
  – Restricted by structural design

• Rain Barrels
  – Not direct infiltration

• Wet Detention Pond
  – Large, >10 acres

http://www.dmgov.org/Departments/Parks/Pages/RainGardens.aspx
Conclusion

- Infrastructure affects everyone, so as engineers we need to:
  - Improve existing problems
  - Maintain current infrastructure
  - Develop new technology
    - New materials/methods
    - Green technologies to manage pavement and rainfall
Questions are guaranteed in life; Answers aren't.