
“Restore & Improve Urban Infrastructure”

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Nate Mentzer

Hunter Palmer

Bryce Peterman

Kevin Unietis

Toby Williams

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)



TEXAS A&M
UNIVERSITY

- ASCE Infrastructure Report in 2005
 - Dams
 - Bridges
 - Roads

Grade Definitions

A = Exceptional
B = Good
C = Mediocre
D = Poor
F = Failing
I = Incomplete

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)

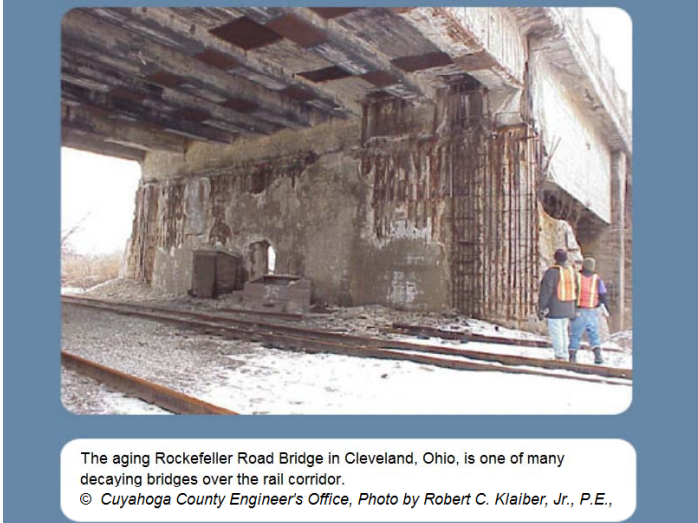
TCS Dams



Johnstown Flood (1889), Pennsylvania

- America has over 3,500 unsafe dams
- If they break: Millions of dollars in damages and lost lives

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



<http://www.optimallyorganic.com/WaterDistiller.htm>



<http://www2.econ.iastate.edu/classes/econ458/tesfatsion/syl458.htm>

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



<http://hereinlondon.wordpress.com/>

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

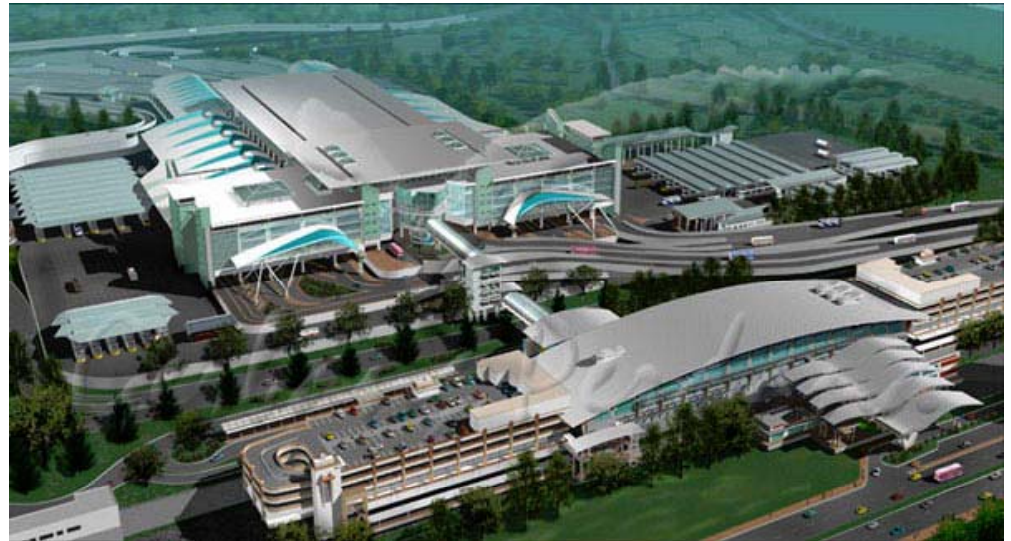


<http://www.tgs2000.kz/en/zd.php>

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



http://www.123rf.com/photo_1821340_aerial-view-of-suburban-neighborhood-urban-sprawl-in-las-vegas-nevada.html



<http://www.etftrends.com/2010/07/5-infrastructure-etfs-room-grow/>

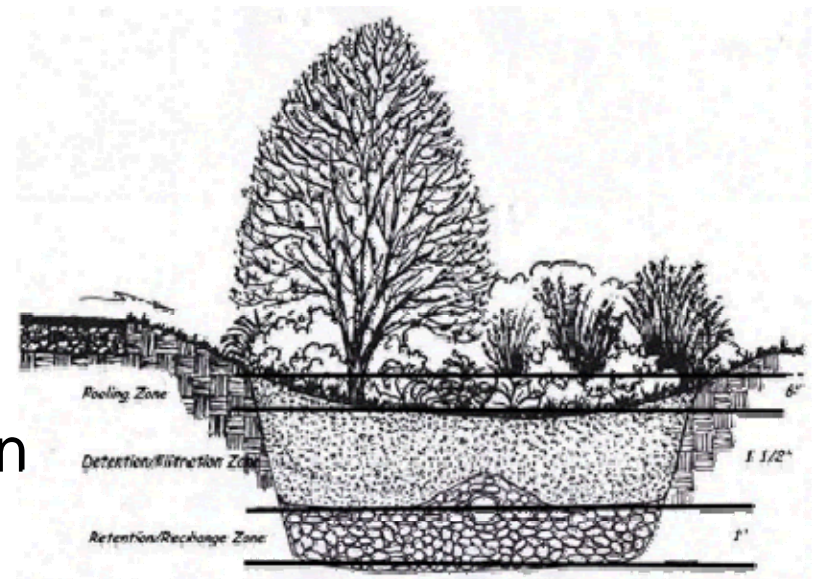
Paved Areas

- “Green Infrastructure”
 - Landscape design to manage runoff water
 - Better storm drainage
 - Cleaner water
 - Recharge water table

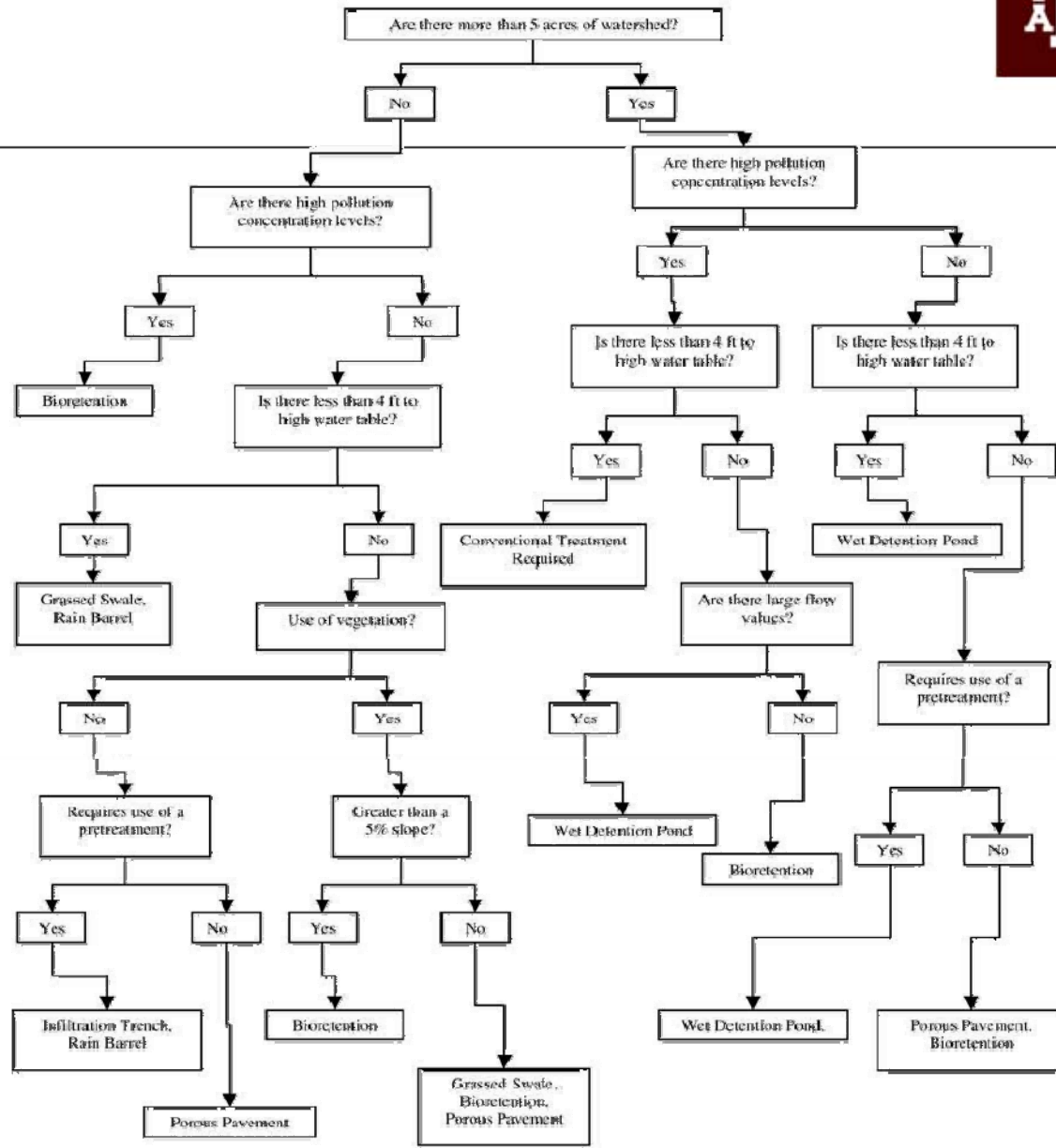


Paved Areas

- 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?



Questions
are
guaranteed in
life;
Answers
aren't.

Reference



[1] Larson A. Rebecca ; Safferman I. Steven. “STORM WATER BEST MANAGEMENT PRACTICES THAT MAXIMIZE AQUIFER RECHARGE”. *Journal of Green Building* p. 126-138
