Design For The Future Transportation Infrastructure

A Risk-Based Approach

PRESENTED BY
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Why Plan?

- Predictable changes in the climate will increase the stress on our transportation infrastructure
- Stresses on system will result in decreased capacity
- Decreased capacity will impact congestion
- Transportation infrastructure impacts every part of our lives
Cost of Routine Delay

- $121 billion
- 5.5 billion extra hours
- 2.9 billion gallons of extra fuel
- 56 billion pounds of additional carbon dioxide
- Reductions in capacity

Source: 2012 Urban Mobility Report, Texas A&M Transportation Institute
Gap Analysis Process

**Step 1**
Identify Threats and Hazards
- Natural
- Technological
- Human Caused
- Based on historical occurrences and probability models.
- Assess Probability and Impact of each threat/hazard

**Step 2**
Identify Critical Infrastructure and Key Resources (CI/KR)
- What the CI/KR is required to do
- Identify dependencies and interrelationships

**Step 3**
Assess Vulnerabilities
- Functionality
- Structural Integrity
- Environmental Considerations
- Accessibility

**Step 4**
Current and Planned Activities
- Vulnerabilities already being addressed
- Improvement plans

**Step 5**
Gap Analysis
- Gap between CI/KR requirement and existing or planned capability

**Step 6**
Findings
- Identify resolutions to minimize or eliminate the gap
  - Resiliency
  - Redundancy
  - Development
Vulnerability Assessment

- Identify Hazards
- Provide Context
- Identify Critical Infrastructure
- Assess Probability
- Assess Consequences
- Prioritize Efforts
# Identify the Hazards

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Billion Dollar Weather Disasters 1980-2010

NOAA's
National Climatic Data Center

Dollar amounts shown are approximate damages/costs in $ billions.
Location shown is the general area for the regional event. Several hurricanes made multiple landfalls.

Additional information for these events is available at NCDC WWW site www.ncdc.noaa.gov/cdr/reports/billionz.html

The U.S. has sustained 99 weather related disasters over the last 30 years with overall damages/costs exceeding $1.0 billion for each event. Total costs for the 99 events exceed $725 billion using a GNP inflation index.
Components of Transportation Infrastructure

- Fixed Node
- Fixed Route
- Vehicles
- People
Lifecycle Management – Planning Horizon

- Roads built with 20-50 year lifespan
- Bridges built with 30-75 year lifespan
- Rail built with 25 year* lifespan
Assessing Vulnerabilities

- Capacity
- Materials
- Functionality
U.S. National Climate Assessment
Transportation Key Messages

- Reliability & Capacity at Risk
  - Systems not designed for extreme weather events

- Coastal Impacts
  - Increased temporary and permanent flooding

- Weather Disruptions
  - Increased frequency

- Costs & Adaptation Options
  - Land use planning
  - Risk assessment
  - New Design
  - Asset Management
  - Response
Addressing the Problem Consequences

- Adapt existing infrastructure
- Eliminate unnecessary infrastructure
- Replace existing infrastructure
- Design for the future