2013 Status of the Nation’s Highways, Bridges, and Transit: Conditions and Performance Report to Congress

Overview & Key Interstate Highway Findings

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Federal Highway Administration
C&P Report Highway Findings

- Overview
  - Purpose & History
  - Report Structure

- 2013 C&P Key Retrospective Findings

- 2013 C&P Key Prospective Findings
Report Background

- Biennial report series dates back to 1968
  - 11 Highway-only Reports (1968 – 1991)
  - 4 Transit-only Reports (1984 – 1990)
  - 10 Combined Reports (1993 – 2013)

- **2013 edition** transmitted to Congress in January 2014
  - Based primarily on 2010 data
  - Used 2008 HPMS sample data

- 2015 edition in clearance - Based primarily on 2012 data

- 2017 edition underway - Based primarily on 2014 data
Report Purpose

- To provide Congress and other decision makers with an objective appraisal of highway, bridge and transit physical conditions, operational performance, and financing mechanisms
  - Retrospective: current state of the system
  - Prospective: projected state of the system under alternative 20-year future capital investment scenarios
  - Does not say how big the Federal program should be!

- Meets Requirements of
  - 23 USC 23 U.S.C. 503(b)(8); 49 U.S.C. 308(e)
Report Structure

- Introduction, Executive Summary, Chapter Overviews
- Part I: Description of Current System
- Part II: Investment/Performance Analysis
- Part III: Special Topics
  - (11-Transportation Serving Federal and Tribal Lands, 12-Center for Accelerating Innovation, 13-National Fuel Cell Bus Program)
- Part IV: Recommendations for the HPMS
  - (HPMS = Highway Performance Monitoring System)
- Part V: Appendices (Analysis Methodology)
C&P Report Highway Findings

- Overview

- **2013 C&P Key Retrospective Findings**
  (Part I: Description of Current System)
  - 1-Household Travel and Freight Movement
  - 2-System Characteristics
  - 3-System Conditions
  - 4-Safety
  - 5-System Performance
  - 6-Finance

- 2013 C&P Key Prospective Findings
### Miles, Bridges, and VMT - 2010

<table>
<thead>
<tr>
<th></th>
<th>All Public Roads</th>
<th>Federal-Aid Highways</th>
<th>National Highway System</th>
<th>Interstate System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Miles</td>
<td>4.08 million</td>
<td>1.01 million</td>
<td>162,698</td>
<td>47,182</td>
</tr>
<tr>
<td>Lane Miles</td>
<td>8.62 million</td>
<td>2.45 million</td>
<td>573,744</td>
<td>215,919</td>
</tr>
<tr>
<td>Vehicle Miles Traveled</td>
<td>2.99 trillion</td>
<td>2.53 trillion</td>
<td>1.30 trillion</td>
<td>0.72 trillion</td>
</tr>
<tr>
<td>Bridges</td>
<td>604,493</td>
<td>319,108*</td>
<td>116,669</td>
<td>55,339</td>
</tr>
</tbody>
</table>

* Off-system bridges are eligible for Federal-aid.
### Percent of travel (VMT) on Interstate Pavements with Good or Acceptable Ride Quality

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>2000</th>
<th>2002</th>
<th>2004</th>
<th>2006</th>
<th>2008</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Interstate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Good Ride Quality</td>
<td>70%</td>
<td>72%</td>
<td>74%</td>
<td>79%</td>
<td>79%</td>
<td>79%</td>
</tr>
<tr>
<td>Percent Acceptable</td>
<td>97%</td>
<td>97%</td>
<td>98%</td>
<td>98%</td>
<td>97%</td>
<td>91%</td>
</tr>
<tr>
<td>Urban Interstate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Good Ride Quality</td>
<td>44%</td>
<td>45%</td>
<td>49%</td>
<td>54%</td>
<td>56%</td>
<td>65%</td>
</tr>
<tr>
<td>Percent Acceptable</td>
<td>91%</td>
<td>90%</td>
<td>90%</td>
<td>93%</td>
<td>92%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Ride quality is measured in inches of pavement roughness per mile via the International Roughness Index (IRI). IRI < 95 is considered “Good”; IRI <= 170 is considered “Acceptable” (which includes “Good”).
Findings: Chapter 3

System Conditions: Interstate Bridges

<table>
<thead>
<tr>
<th>Percent of Structurally Deficient or Functionally Obsolete Interstate Bridges</th>
<th>2000</th>
<th>2002</th>
<th>2004</th>
<th>2006</th>
<th>2008</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Interstate Bridges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structurally Deficient</td>
<td>4.0%</td>
<td>4.1%</td>
<td>4.3%</td>
<td>4.3%</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Functionally Obsolete</td>
<td>13.2%</td>
<td>12.9%</td>
<td>12.8%</td>
<td>12.0%</td>
<td>11.8%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Total Deficient</td>
<td>17.2%</td>
<td>17.0%</td>
<td>17.1%</td>
<td>16.3%</td>
<td>16.3%</td>
<td>16.1%</td>
</tr>
<tr>
<td>Urban Interstate Bridges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structurally Deficient</td>
<td>6.7%</td>
<td>6.5%</td>
<td>6.3%</td>
<td>6.0%</td>
<td>5.9%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Functionally Obsolete</td>
<td>23.8%</td>
<td>23.0%</td>
<td>23.3%</td>
<td>23.6%</td>
<td>23.9%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Total Deficient</td>
<td>30.5%</td>
<td>29.5%</td>
<td>29.6%</td>
<td>29.6%</td>
<td>29.8%</td>
<td>28.4%</td>
</tr>
</tbody>
</table>
Safety Performance:

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Interstate</td>
<td>1.21</td>
<td>1.18</td>
<td>1.21</td>
<td>1.12</td>
<td>1.00</td>
<td>0.86</td>
</tr>
<tr>
<td>Urban Interstate</td>
<td>0.61</td>
<td>0.61</td>
<td>0.57</td>
<td>0.56</td>
<td>0.48</td>
<td>0.44</td>
</tr>
</tbody>
</table>

- Annual number of rural Interstate highway fatalities was reduced by 34.9 percent from 3,254 in 2000 to 2,119 in 2010.
- Annual number of urban Interstate highway fatalities was reduced by 12.8 percent from 2,419 in 2000 to 2,110 in 2010.
Findings Chapter 6:

Revenue Sources for Highways

Total Federal, State and Local Government Revenue in 2010: $221.0 Billion

- Motor-Fuel Taxes: 26.0%
- Motor-Vehicle Taxes: 12.2%
- Tolls: 4.3%
- General Funds: 26.5%
- Bonds: 14.9%
- Other: 16.1%

General Funds reflect $11.9 billion of Recovery Act funds spent in 2010 and $14.7 billion transferred to the Highway Account of the Highway Trust Fund in 2010.
Findings: Chapter 6

Highway Expenditures

Total Federal, State and Local Government Expenditures in 2010: $205.3 Billion

- Capital Outlay: 48.8%
- Maintenance and Traffic Services: 23.8%
- Highway Patrol and Safety: 8.8%
- Administration: 7.9%
- Bond Retirement: 6.0%
- Interest on Debt: 4.8%
- Bond Retirement: 6.0%
- Administration: 7.9%
- Highways: 23.8%
### Capital Outlay Trends

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Capital Outlay ($Billions)</td>
<td>$61.3</td>
<td>$68.2</td>
<td>$70.3</td>
<td>$80.2</td>
<td>$90.4</td>
<td>$100.2</td>
</tr>
<tr>
<td>Portion Funded by Federal Government</td>
<td>42.6%</td>
<td>46.1%</td>
<td>43.8%</td>
<td>43.1%</td>
<td>41.6%</td>
<td>44.3%</td>
</tr>
<tr>
<td>Capital Outlay on the Interstate System ($B)</td>
<td>$13.8</td>
<td>$15.3</td>
<td>$13.7</td>
<td>$16.5</td>
<td>$20.0</td>
<td>$20.2</td>
</tr>
<tr>
<td>Portion Used for System Rehabilitation</td>
<td>53.7%</td>
<td>52.1%</td>
<td>50.8%</td>
<td>49.9%</td>
<td>53.9%</td>
<td>66.7%</td>
</tr>
<tr>
<td>Portion Used for System Expansion</td>
<td>39.6%</td>
<td>38.5%</td>
<td>40.9%</td>
<td>42.6%</td>
<td>38.9%</td>
<td>26.3%</td>
</tr>
<tr>
<td>Portion Used for System Enhancements</td>
<td>6.7%</td>
<td>9.4%</td>
<td>8.3%</td>
<td>7.4%</td>
<td>7.1%</td>
<td>6.9%</td>
</tr>
</tbody>
</table>
C&P Report Highway Findings

- Overview
- 2013 C&P Key Retrospective Findings
- **2013 C&P Key Prospective Findings**
  (Part II: Investment/Performance Analysis)
  - Introduction
  - 7-Potential Capital Investment Impacts
  - 8-Selected Capital Investment Scenarios
  - 9-Supplemental Scenario Analysis
  - 10-Sensitivity Analysis
Investment/Performance Models

- **Highway Economic Requirements System**
  - Investment in highway widening and preservation on Federal-Aid highways
  - Including bridge widening as part of highway widening projects

- **National Bridge Investment Analysis System**
  - Investment in bridge rehabilitation on all highway classes.

- HERS and NBIAS evaluate investment needs using a combination of:
  - Technical adequacy (engineering) criteria
  - Benefit-cost (economic) criteria

- Scenarios adjusted to account for other types of capital spending
Highway Economic Requirements System

- Utilizes HPMS sample section data (100,000+ samples)
  - Identifies deficient sections based on engineering criteria
  - Evaluates potential improvements to deficient sections on the basis of economic benefits and project costs
  - Considers impacts of deployments of operations strategies and ITS
  - Consider travel demand elasticity (impact of user costs on future VMT)
- Benefits estimated by HERS are based on reductions in
  - User costs (travel time costs, vehicle operating costs, and crash costs)
  - Agency costs (maintenance costs)
  - Emissions costs (now includes greenhouse gas impacts)
National Bridge Investment Analysis System

- Analysis conducted for individual bridges, at the bridge element level.
  - Software can process element level data but typically synthesizes it.
  - Bridge characteristic and condition data reported in the National Bridge Inventory feeds a set of synthesis, quantity and condition models.

- Evaluates potential Maintenance, Repair & Rehabilitation actions to be applied on the basis of benefits and project costs

- Evaluates functional improvement needs
  - Widening, raising, strengthening
  - Considers replacement if functional improvement is infeasible
Chapter 8
Future Capital Investment Scenarios

- **Sustain 2010 Spending**
  - Projects impacts of sustaining spending at base year 2010 levels for 20 years in constant dollar terms

- **Maintain Conditions and Performance**
  - Maintains overall system conditions and performance at base year 2010 levels through 2030.

- **Improve Conditions and Performance**
  - Implements all potential improvements with a benefit-cost ratio (BCR) of 1.0 or higher by 2030.
  - Addresses the current backlog of $808.2 billion ($189.4 billion Interstate)
## Findings: Chapter 8
### Interstate Highway Investment Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Assuming Forecast-Based Future VMT Growth (From HPMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustain 2010 Spending</td>
<td>$20.2</td>
</tr>
<tr>
<td>Maintain Conditions and Performance</td>
<td>$17.4</td>
</tr>
<tr>
<td>Improve Conditions and Performance</td>
<td>$33.1</td>
</tr>
</tbody>
</table>

Amounts shown represent combined investment by all levels of government, not just the Federal portion.
Findings: Chapter 8

Forecast-Based Interstate Scenarios: Projected Changes in 2030 Interstate System Performance Indicators Compared with 2010

<table>
<thead>
<tr>
<th>Scenario (Assuming Forecast-Based VMT Growth)</th>
<th>Average Annual Investment</th>
<th>Percent Change in:</th>
<th>Average Bridge Sufficiency Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Billions of $2010)</td>
<td>Difference Relative to 2010 (%)</td>
<td>Average IRI</td>
</tr>
<tr>
<td>Sustain 2010 Spending</td>
<td>$20.2</td>
<td>0.0%</td>
<td>-12.7%</td>
</tr>
<tr>
<td>Maintain Conditions and Performance</td>
<td>$17.4</td>
<td>-14.1%</td>
<td>-6.5%</td>
</tr>
<tr>
<td>Improve Conditions and Performance</td>
<td>$33.1</td>
<td>64.0%</td>
<td>-32.9%</td>
</tr>
</tbody>
</table>

(2010=82.3)
Findings: Chapters 10

Sensitivity Analysis

- Tested sensitivity of HERS model projections to changes in certain model inputs:
  - Values of travel time and safety
  - Growth in the value of time
  - Discount rate
  - Alternative future fuel price assumptions

- Alternative Investment Strategies
  - Alternative bridge maintenance, repair and rehabilitation (MR&R) strategies (sustain steady state, minimize MR&R, maximize average returns and state of good repair)
  - Impacts of accelerating Operations/ITS deployments (aggressive deployment, full immediate deployment)
Findings: Chapter 10

**Sensitivity Analysis on Highway Scenarios**

<table>
<thead>
<tr>
<th>Parameter Change</th>
<th>Improve C&amp;P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>$145.9</td>
</tr>
<tr>
<td>Lower Value of Time</td>
<td>$134.9</td>
</tr>
<tr>
<td>Higher Value of Time</td>
<td>$153.3</td>
</tr>
<tr>
<td>Lower Value of Statistical Life</td>
<td>$142.4</td>
</tr>
<tr>
<td>Higher Value of Statistical Life</td>
<td>$148.9</td>
</tr>
<tr>
<td>3 Percent Discount Rate</td>
<td>$177.3</td>
</tr>
<tr>
<td>Higher Future Fuel Prices</td>
<td>$124.5</td>
</tr>
<tr>
<td>Aggressive ITS/Operations</td>
<td>$151.5</td>
</tr>
</tbody>
</table>
# Systemwide Highway Investment Scenarios

## Average Annual Spending ($B 2010) for 2011 to 2030

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Forecast-Based VMT Growth (1.85%/Year)</th>
<th>Trend-Based VMT Growth (1.36%/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustain 2010 Spending</td>
<td>$100.2</td>
<td>$100.2</td>
</tr>
<tr>
<td>Maintain Conditions and Performance</td>
<td>$86.3</td>
<td>$65.3</td>
</tr>
<tr>
<td>Improve Conditions and Performance</td>
<td>$145.9</td>
<td>$123.7</td>
</tr>
</tbody>
</table>

Amounts shown represent combined investment by all levels of government, not just the Federal portion.
Questions?