2015 Status of the Nation’s Highways, Bridges, and Transit: Conditions and Performance Report to Congress

Highway Overview & Use of 500 Series Data

Investment & Economic Analysis Team, Office of Transportation Policy Studies

Ross Crichton, Team Leader
C&P Report Highway Findings

- Overview
  - Purpose
  - Background
  - Structure

- 2015 C&P Key Retrospective Findings

- 2015 C&P Key Prospective Findings
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 Background

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

- 2015 edition delivered to Congress in December 2016
  - Based primarily on 2012 data

- 23rd (2017) and 24th (2019) editions underway
  - 23rd to be based primarily on 2014 data
  - 24th to be based primarily on 2016 data
Report Structure

- Introduction, Highlights, Executive Summary
- Part I: Description of Current System
- Part II: Investment/Performance Analysis
- Part III: Special Topics
  - 11-Pedestrian and Bicycle Transportation
  - 12-Transportation Serving Federal and Tribal Lands
- Part IV: Recommendations for the HPMS
- Part V: Appendices (Analysis Methodology)
C&P Report Highway Findings

- Overview

- **2015 C&P Key Retrospective Findings**
  (Part I: Description of Current System)
  - Introduction
  - 1-Household Travel and Freight Movement
  - 2-System Characteristics
  - 3-System Conditions
  - 4-Safety
  - 5-System Performance
  - 6-Finance

- **2015 C&P Key Prospective Findings**
2012 Extent of the Highway System

United States Road and Bridge System

Interstate System

National Highway System

Federal-aid Highways

Systemwide (All Roads)

**Extent** (Miles and Bridges per System)
- 1%: 47,714 miles, 55,999 bridges
- 5%: 223,257 miles, 117,485 bridges
- 24%: 1,065,978 miles, 321,724 bridges
- 100%: 4,109,418 miles, 607,380 bridges

**VMT** (Vehicle Miles Traveled)
- 25%: 0.736 trillion VMT
- 55%: 1.644 trillion VMT
- 85%: 2.527 trillion VMT

You drive 85% of your VMT on Federal-aid Highways.

*Reflects bridge count prior to expansion of the NHS under MAP-21.
2014 Extent of the Highway System

United States Road System

- Interstate System
  - 1% 47,944 miles
- National Highway System
  - 5% 226,355 miles
- Federal-aid Highways
  - 24% 1,016,963 miles
- Systemwide (All Roads)
  - 100% 4,177,074 miles

EXTENT (Miles per System)

- 1%
- 5%
- 24%
- 100%

VMT (Vehicle Miles Traveled)

- 47,944
- 226,355
- 1,016,963
- 4,177,074

- 0.751 trillion
- 1.661 trillion
- 2.572 trillion
- 3.040 trillion

CAPITAL SPENDING ($ Billions)

- 24% $25.3 billion
- 55% $56.3 billion
- 85% $79.3 billion
- 100% $105.4 billion

You drive 85% of your VMT on Federal-aid Highways.
Composition of Highway Revenues - 2012

- Motor-Fuel Taxes: 28.6%
- Motor-Vehicle Taxes: 13.7%
- Tolls: 6.2%
- General Funds: 20.4%
- Bonds: 9.8%
- Other: 21.2%
Composition of Highway Spending

Highway Expenditure by Type, 2012

- Capital Outlay: 47.5%
- Maintenance: 15.9%
- Highway and Traffic Services: 5.8%
- Administration: 7.2%
- Highway, Patrol and Safety: 8.1%
- Interest on Debt: 5.2%
- Bond Retirement: 10.2%

Highway Capital Spending

- System Expansion: 35.8%
- System Enhancement: 15.1%
- System Rehabilitation: 59.0%

Highway Expenditure by Type, 2012
### Highway Spending Trends, 2002 to 2012

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>Annual % Change 2002-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Highway Spending</td>
<td>$221.3B</td>
<td>5.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.6% Constant $)</td>
</tr>
<tr>
<td>Highway Capital Spending</td>
<td>$105.2B</td>
<td>4.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.1% Constant $)</td>
</tr>
<tr>
<td>Federally-Funded Highway Capital Spending</td>
<td></td>
<td>3.7%</td>
</tr>
<tr>
<td>Capital Spending Funded By State &amp; Local</td>
<td></td>
<td>5.0%</td>
</tr>
</tbody>
</table>

Federally-Funded Share of Highway Capital Spending Decreased from 46.1% in 2002 to 43.1% in 2012.
2002–2012 Highway System Trends

**Spending**
On Capital Improvements (Billions of Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>$68.2</td>
</tr>
<tr>
<td>2012</td>
<td>$105.2</td>
</tr>
</tbody>
</table>

23.5% increase

**Fatalities**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>43,005</td>
</tr>
<tr>
<td>2012</td>
<td>33,782</td>
</tr>
</tbody>
</table>

21.4% decrease

**Delay**
Experienced by Travelers (Billions of Hours)

<table>
<thead>
<tr>
<th>Year</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>5.6</td>
</tr>
<tr>
<td>2012</td>
<td>6.7</td>
</tr>
</tbody>
</table>

19.6% increase

**Structurally Deficient Bridges**
(Percent of Total Bridges)

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>14.2%</td>
</tr>
<tr>
<td>2012</td>
<td>11.0%</td>
</tr>
</tbody>
</table>

3.2% decrease

**Functionally Obsolete Bridges**
(Percent of Total Bridges)

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>15.4%</td>
</tr>
<tr>
<td>2012</td>
<td>14.0%</td>
</tr>
</tbody>
</table>

1.4% decrease

**Poor Ride Quality**
(Share of Travel on Federal-aid Highway Pavements Rated Poor)

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>14.7%</td>
</tr>
<tr>
<td>2012</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

2.0% increase
Highway Safety Has Improved Overall, but Nonmotorist Fatalities Are on the Rise

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2012</th>
<th>Change</th>
<th>2002 Rate*</th>
<th>2012 Rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatalities</td>
<td>43,005</td>
<td>33,782</td>
<td>-21%</td>
<td>1.51</td>
<td>1.14</td>
</tr>
<tr>
<td>Injuries</td>
<td>2.9M</td>
<td>2.4M</td>
<td>-19%</td>
<td>102</td>
<td>80</td>
</tr>
</tbody>
</table>

*Rate per 100 Million VMT

<table>
<thead>
<tr>
<th></th>
<th>2002-2012 Change</th>
<th>2012 Share of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway departure fatalities</td>
<td>-31.0%</td>
<td>52.2%</td>
</tr>
<tr>
<td>Intersection-related fatalities</td>
<td>-21.5%</td>
<td>21.7%</td>
</tr>
<tr>
<td>Non-motorist fatalities**</td>
<td>+1.1%</td>
<td>14.1%</td>
</tr>
</tbody>
</table>

**Pedestrian/Pedacyclist Fatalities Up 15.6% Since 2009
Operational Performance Has Slowly Worsened

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average commuter delay (hours)</td>
<td>39</td>
<td>41</td>
</tr>
<tr>
<td>Total delay (Billions of hours)</td>
<td>5.6</td>
<td>6.7</td>
</tr>
<tr>
<td>Total cost of time and fuel ($B)</td>
<td>$124</td>
<td>$154</td>
</tr>
</tbody>
</table>

- Transitioning to measures based on NPMRDS but rely on Texas Transportation Institute data for time series.
- Progress is being made on measuring other aspects of system performance relating to quality of life and sustainability.
Bridge Conditions Have Improved

- **Percent Structurally Deficient By Count**
  - 2002: 14.2%
  - 2012: 11.0%

- **Percent Structurally Deficient By Deck Area**
  - 2002: 10.4%
  - 2012: 8.2%

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<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>NHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Bridge Geometry Has Slightly Improved

**Percent Functionally Obsolete By Count**

- 2002: Total 17.2%, NHS 15.4%
- 2012: Total 16.2%, NHS 14.0%

**Percent Functionally Obsolete By Deck Area**

- 2002: Total 21.1%, NHS 20.4%
- 2012: Total 21.0%, NHS 20.1%
# Pavement Condition Trends Mixed

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2012</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal-aid Highways – Mixed results</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMT on pavement w/ good ride quality</td>
<td>43.8%</td>
<td>44.9%</td>
<td>+</td>
</tr>
<tr>
<td>Mileage w/ good ride quality</td>
<td>46.6%</td>
<td>36.4%</td>
<td>-</td>
</tr>
<tr>
<td>VMT w/ poor ride quality</td>
<td>14.7%</td>
<td>16.7%</td>
<td>-</td>
</tr>
<tr>
<td>Mileage w/ poor ride quality</td>
<td>12.6%</td>
<td>19.7%</td>
<td>-</td>
</tr>
<tr>
<td><strong>NHS – Improved despite MAP-21 Expansion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMT on pavement w/ good ride quality*</td>
<td>50.0%</td>
<td>57.1%</td>
<td>+</td>
</tr>
</tbody>
</table>

*Rose from 50% in 2002 to 60% in 2010 based on the pre-expansion NHS, and from 54.7% (estimated) in 2010 to 57.1% in 2012 based on the post-expansion NHS.
C&P Report Highway Findings

- Overview
- 2015 C&P Key Retrospective Findings
- 2015 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 (includes greenhouse gas impacts)
Investment/Performance Analysis

- Simulate impact of investment by all levels of government combined for the 20 years from 2012 to 2032.
  - Funding levels stated in constant 2012 dollars.
  - Analyses assume spending grows/shrinks by a uniform rate of increase in constant dollar terms using 2012 spending level as starting point.

- Report explores multiple funding levels, and presents more detail for selected illustrative scenarios

- Report focusses on results for the overall road system,
  - Separate results shown for Federal-aid highways, NHS, and Interstate
# 2012–2032 Future Highway Capital Investment Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Spending Needed (Billions of Dollars)</th>
<th>Average Roughness</th>
<th>Average Delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain Conditions and Performance at 2012 Levels</td>
<td>$89.9</td>
<td>No Change 0.0%</td>
<td>Improve 12.2%</td>
</tr>
<tr>
<td>Sustain Spending at 2012 Level by All Levels of Government, Adjusted for Inflation</td>
<td>$105.2</td>
<td>Improve 4.5%</td>
<td>Improve 13.4%</td>
</tr>
<tr>
<td>Improve Conditions and Performance (BCR 1.0 or Higher)</td>
<td>$142.5</td>
<td>Improve 14.0%</td>
<td>Improve 16.5%</td>
</tr>
</tbody>
</table>
Improve C&P Scenario ($142.5B/Year)

- Requires highway spending to grow by 2.81% annually above the rate of inflation.

- Eliminates the $836 billion estimated backlog of unmet capital investment needs for highways and bridges as of 2012.

- Includes $85.3 Billion devoted to the physical condition of existing assets (the State of Good Repair Benchmark)
  - Only improves pavements and bridges when cost-beneficial to do so.
Questions?

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