Transportation Infrastructure: Bridge Conditions, 2005 to 2014

Briefing for Congressional Staff
Committee on Transportation and Infrastructure
United States House of Representatives
September 22, 2015

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Objective

- What do available federal bridge data indicate about the current conditions of the nation's bridges, and changes in the condition of bridges over the last 10 years?

Scope and Methodology

- Reviewed applicable laws and other guidance, including the Moving Ahead for Progress in the 21st Century Act (MAP-21) and relevant Federal Highway Administration (FHWA) program documents.
- Reviewed and analyzed FHWA's published National Bridge Inventory (NBI) data from calendar years 2005 to 2014.
  - Analyzed data by number of bridges and total deck area, which accounts for differences in the size of bridges.
  - Key data elements include deficient status, location on or off the National Highway System* (NHS), and bridge owner.
  - We assessed the reliability of the data we used by reviewing documentation and conducting electronic testing. We found the data to be reliable for our purposes.
- Interviewed FHWA officials on bridge conditions.

*The NHS includes those highways important to the nation's economy, defense, and mobility.

Background: National Bridge Inventory

- The NBI, the primary source of information on the nation's bridges, contains over 100 data elements that describe each bridge's age, condition, inspection dates, ownership, and size, among other things.
- Each year, states submit inspection information on all public bridges located within the state to FHWA to update the NBI, with the exception of bridges that are federally or tribally owned.

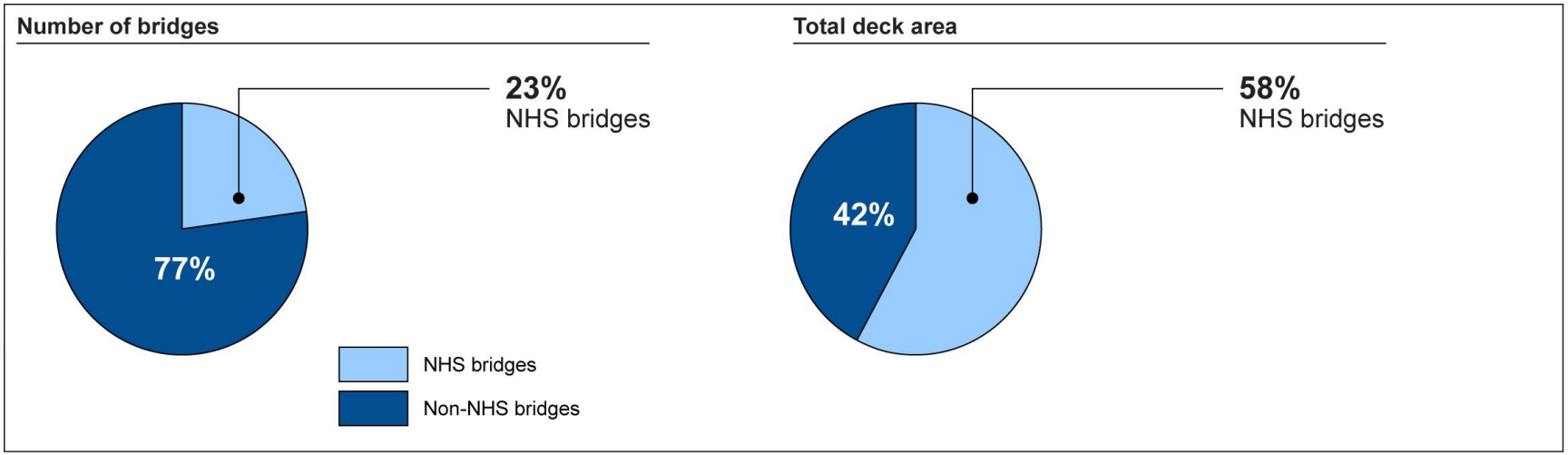
Background: Bridge Condition Indicators

- Bridges rated by inspectors as acceptable in condition, geometric configuration, and design are classified as not deficient.
- Bridges that receive low ratings on structural or functional bridge elements are classified as deficient. Bridges may be classified as deficient for one of two reasons:
  - a **structurally deficient** bridge has one or more structural components, such as the deck that carries vehicles, in poor condition;
  - a **functionally obsolete** bridge has a poor configuration or design that may no longer be adequate for the traffic it serves, such as being too narrow or having inadequate overhead clearance.
- A bridge that is both structurally deficient and functionally obsolete is listed as structurally deficient in the NBI.

The Nation has Over 600,000 Bridges

- The nation has 610,749 bridges.
  - 23 percent of these bridges (143,165) are on the NHS.
  - NHS bridges comprise 58 percent of total deck area.

Figure 1: Percentages of National Highway System (NHS) and Non-NHS Bridges by Number of Bridges and by Total Deck Area, 2014



Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Accessible Data Table

Data Table for Figure 1: Percentages of National Highway System (NHS) and Non-NHS Bridges by Number of Bridges and by Total Deck Area, 2014

	NHS bridges	Non-NHS bridges
Number of bridges	23%	77%
Total deck area	58%	42%

Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Nearly a Quarter of the Nation's Bridges Are Deficient

- 10 percent of all bridges are structurally deficient, while 4 percent of NHS bridges are structurally deficient.
- 14 percent of all bridges are functionally obsolete, while 17 percent of NHS bridges are functionally obsolete.

Table 1: Percentages of Deficient Bridges Overall and on the National Highway System (NHS) by Number of Bridges and by Total Deck Area, 2014

	All bridges	Total deck area	NHS bridges	NHS deck area
Structurally deficient	10%	7%	4%	6%
Functionally obsolete	14%	20%	17%	22%
Total deficient	**24%**	**27%**	**21%**	**28%**

Source: GAO analysis of Department of Transportation data. | GAO-16-72R

State Agencies Own About Half of All Bridges and Over 90 Percent of NHS Bridges

- State agencies own 48 percent of all bridges, although these comprise 76 percent of total deck area.
- State agencies own 94 percent of NHS bridges.

Table 2: Percentages of Bridges Owned by State and Local Agencies Overall and on the National Highway System (NHS) by Number of Bridges and by Total Deck Area, 2014

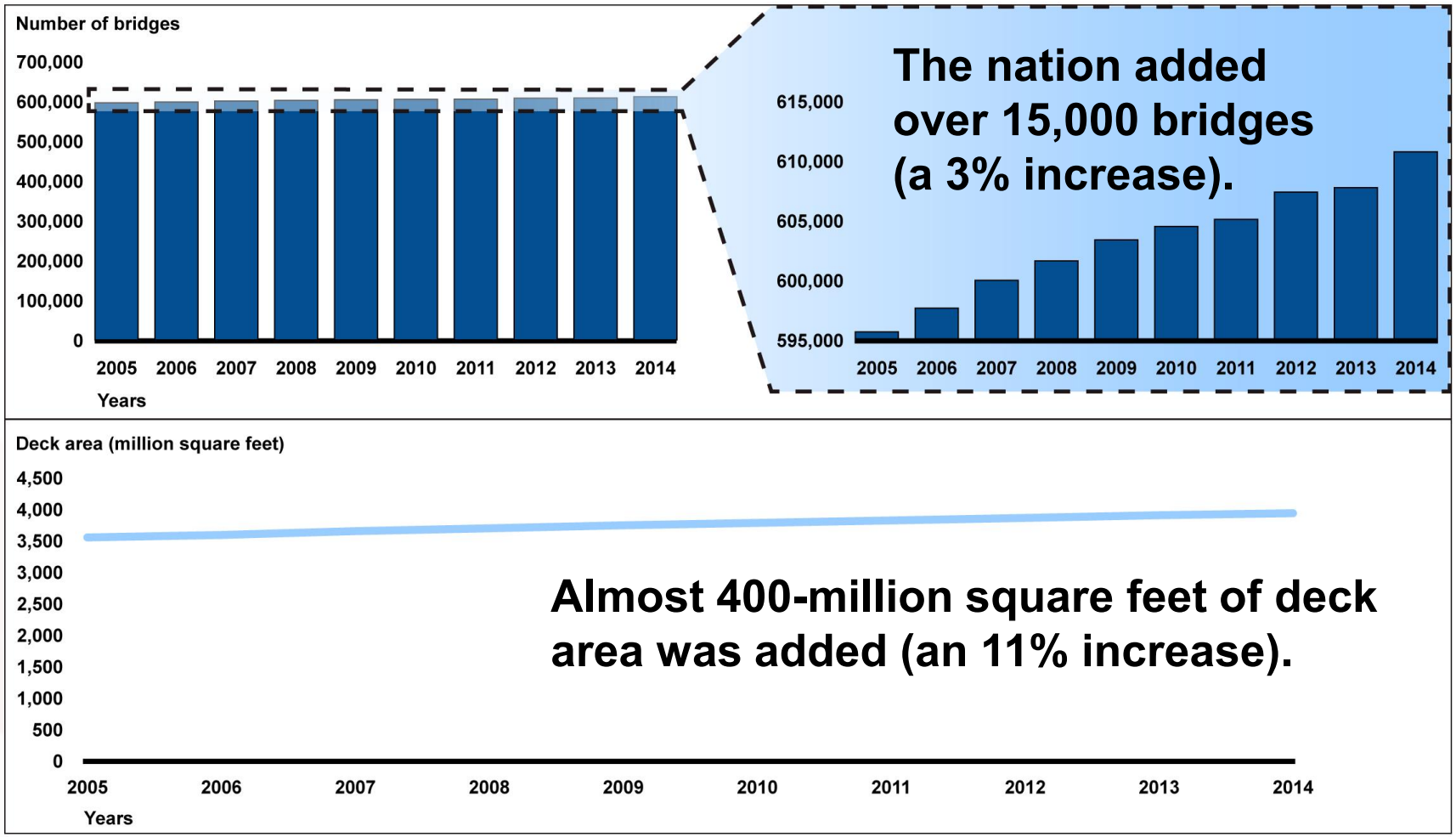
	All bridges	Total deck area	NHS bridges	NHS deck area
State agencies	48%	76%	94%	93%
Local agencies	50%	23%	5%	7%

Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Note: Figures do not total 100 percent because federal agencies and other entities also own some bridges.

The Number of Bridges Increased from 2005 to 2014

Figure 2: Increase in Number and Deck Area of Bridges, 2005 to 2014



Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Accessible Data Table

Data Table for Figure 2: Increase in Number and Deck Area of Bridges, 2005 to 2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of bridges	595,668	597,652	599,989	601,616	603,379	604,493	605,103	607,380	607,751	610,749
Total deck area (million square feet)	3,664	3,703	3,764	3,809	3,857	3,895	3,934	3,974	4,017	4,049

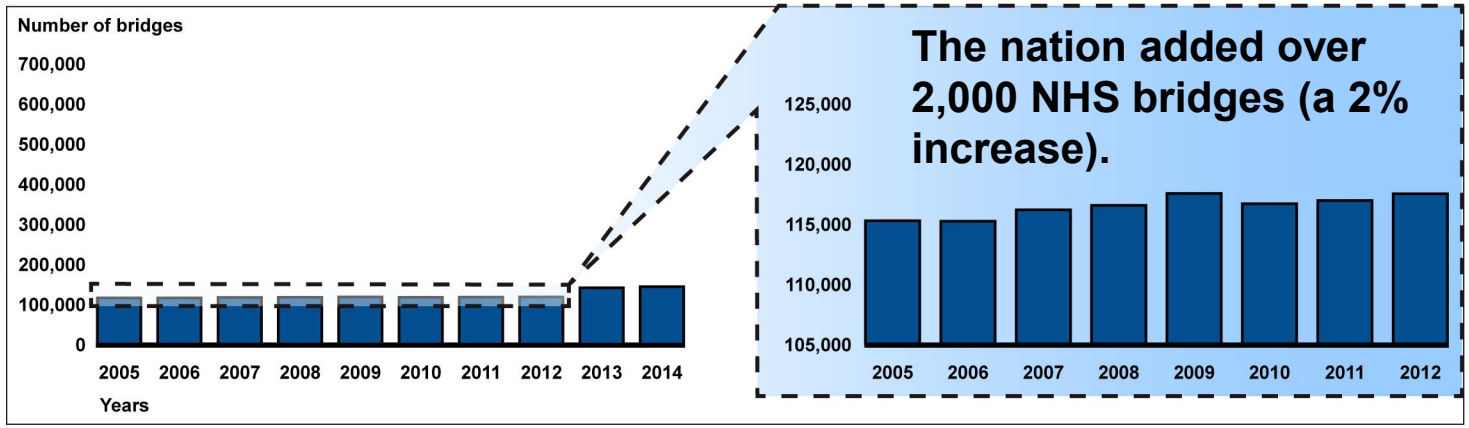
Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Note: The nation added over 15,000 bridges (a 3% increase). Almost 400-million square feet of deck area was added (an 11% increase).

The Number of NHS Bridges Increased from 2005 to 2012

- Between 2005 and 2012, the nation added 2,238 NHS bridges.
- Legislative changes in MAP-21 expanded the NHS, which reclassified some existing bridges.
- According to FHWA officials, most of these bridges are reflected as NHS bridges in 2014 data; 2013 was an interim year when some changes were first included.

Figure 3: Increase in National Highway System (NHS) Bridges, 2005 to 2012



Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Accessible Data Table

Data Table for Figure 3: Increase in National Highway System (NHS) Bridges, 2005 to 2012

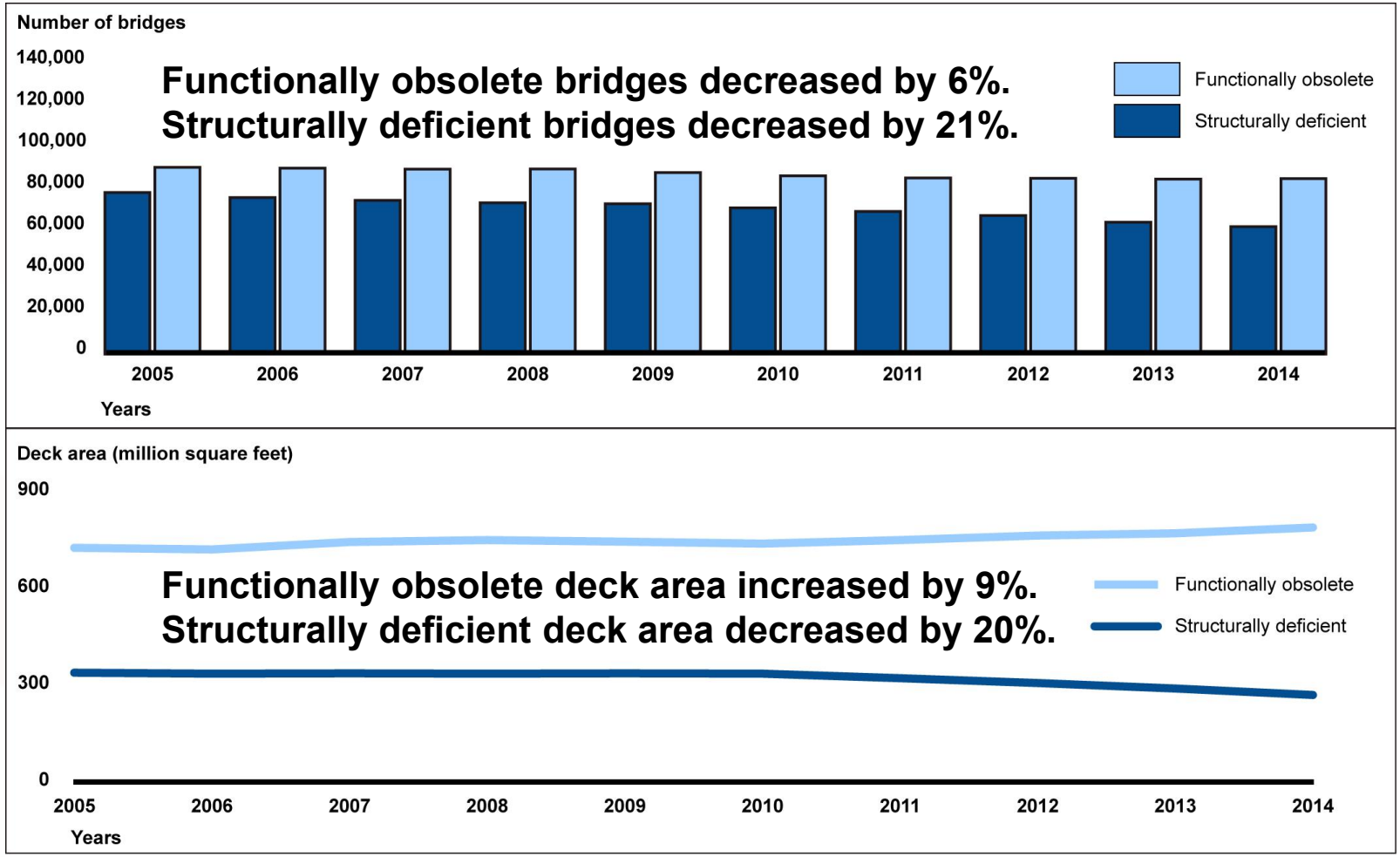
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of bridges	115,247	115,211	115,153	116,529	117,516	116,669	116,929	117,485	140,238	143,165

Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Note: The nation added over 2,000 NHS bridges (a 2% increase).

The Number of Deficient Bridges Decreased from 2005 to 2014

Figure 4: Change in Number and Deck Area of Structurally Deficient and Functionally Obsolete Bridges, 2005 to 2014



Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Accessible Data Table

Data Table for Figure 4: Change in Number and Deck Area of Structurally Deficient and Functionally Obsolete Bridges, 2005 to 2014

Years	Number of functionally obsolete bridges	Number of structurally deficient bridges	Functionally obsolete deck area (million square feet)	Structurally deficient deck area (million square feet)
2005	90,011	77,862	738	351
2006	89,615	75,429	733	348
2007	89,114	74,077	756	349
2008	89,217	72,897	762	348
2009	87,479	72,412	757	349
2010	85,858	70,431	751	348
2011	84,832	68,759	762	334
2012	84,748	66,749	776	319
2013	84,348	83,522	783	302
2014	84,525	61,365	801	282

Source: GAO analysis of Department of Transportation data. | GAO-16-72R

Note: Functionally obsolete bridges decreased by 6%. Structurally deficient bridges decreased by 21%. Functionally obsolete deck area increased by 9%. Structurally deficient deck area decreased by 20%.

The Number of Deficient NHS Bridges Decreased from 2005 to 2012

- Structurally deficient NHS bridges decreased by 20 percent.
- Functionally obsolete NHS bridges decreased by 2 percent.
  - However, functionally obsolete NHS deck area increased by 6 percent.
- We did not include 2013 and 2014 data on NHS bridges in our conditions trend analysis due to the reclassification of some bridges as NHS bridges and the resulting change in deficient numbers of NHS bridges.

The Number of Deficient Bridges Owned by Local and State Agencies Decreased from 2005 to 2014

- Between 2005 and 2014, among all bridges owned by local agencies, the number of structurally deficient bridges has decreased by 20 percent, while functionally obsolete bridges has decreased by 9 percent.
- In comparison, among all bridges owned by state agencies, the number of structurally deficient bridges has decreased by 24 percent, while functionally obsolete bridges has decreased by 3 percent.
  - Functionally obsolete deck area on state-owned bridges has increased by 12 percent.

Improvement of Deficient Bridges Varied by State

- Between 2005 and 2014, the number of structurally deficient bridges decreased in 43 states and the District of Columbia (D.C.), ranging from a 3 percent (New Hampshire) to a 63 percent decrease (Hawaii).
  - However, the number of structurally deficient bridges increased in 7 states and Puerto Rico, from a 1 percent (Wyoming) to a 52 percent increase (Arizona).
- The number of functionally obsolete bridges decreased in 33 states and D.C., ranging from a less than 1 percent (Idaho) to a 36 percent decrease (South Dakota).
  - However, the number of functionally obsolete bridges increased in 17 states and Puerto Rico, from a 1 percent (South Carolina) to a 27 percent increase (Nevada).

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