

Introduction

This is the 11th in a series of combined documents the U.S. Department of Transportation (DOT) has prepared to satisfy requirements for reporting to Congress on the condition, performance, and future capital investment needs of the Nation's highway and transit systems. This report incorporates highway, bridge, and transit information required by 23 United States Code (U.S.C.) §503(b)(8) and transit system information required by 49 U.S.C. §308(e). Beginning in 1993, the Department combined two separate existing report series that covered highways and transit to form this report series; before then, 11 reports had been issued on the condition and performance of the Nation's highway systems, starting in 1968. Five separate reports on the Nation's transit systems' performance and conditions were issued beginning in 1984.

This *2015 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* report to Congress (C&P report) draws primarily on 2012 data. The 2013 C&P report, transmitted on January 14, 2014, was based largely on 2010 data.

In assessing recent trends, many of the exhibits presented in this report present statistics for the 10 years from 2002 to 2012. Other charts and tables cover different periods, depending on data availability and years of significance for particular data series. The prospective analyses presented in this report generally cover the 20-year period ending in 2032.

Report Purpose

This document is intended to provide decision makers with an objective appraisal of the physical conditions, operational performance, and financing mechanisms of highways, bridges, and transit systems based on both their current state and their projected future state under a set of alternative future investment scenarios. This report offers a comprehensive, data-driven background context to support the development and evaluation of legislative, program, and budget options at all levels of government. It also serves as a primary source of information for national and international news media, transportation associations, and industry.

This C&P report consolidates conditions, performance, and financial data provided by States, local governments, and public transit operators to present a national-level summary. Some of the underlying data are available through DOT's regular statistical publications. The future investment scenario analyses are developed specifically for this report and provide projections at the national level only.

Report Organization

This report begins with a Highlights section that summarizes key findings of the overall report, which is followed by an Executive Summary that summarizes the key findings in each individual chapter.

The main body of the report is organized into four major sections. The six chapters in Part I, *Description of Current System*, contain the core retrospective analyses of the report. Chapters 2 through 6 each include separate highway and transit sections discussing each mode in depth. This structure is intended to accommodate report users who might be interested primarily in only one of the two modes. Chapter 1 follows a similar approach, except that the two sections focus on personal travel and freight movement.

The Introduction to Part I provides background information on DOT strategic goals and issues pertaining to transportation performance management, both of which relate closely to the material presented in Part I.

- Chapter 1 discusses selected topics relating to personal travel and highway freight movement.
- Chapter 2 presents information on recent trends in highway and transit system characteristics.
- Chapter 3 describes the current physical conditions of highways, bridges, and transit systems.
- Chapter 4 discusses issues relating to the safety of highways and transit.
- Chapter 5 presents information on various aspects of current system performance for highways and transit, including operational performance, quality of life, and environmental sustainability.
- Chapter 6 discusses highway and transit revenue sources and expenditure patterns for all levels of government.

The four chapters in Part II, *Investment/Performance Analysis*, contain the core prospective analyses of the report, including 20-year future capital investment scenarios. The Introduction to Part II provides critical background information and caveats that should be considered while interpreting the findings presented in Chapters 7 through 10.

- Chapter 7 projects the potential impacts of different levels of future highway, bridge, and transit capital investment on the future performance of various components of the system.
- Chapter 8 describes selected capital investment scenarios in more detail and relates these scenarios to the current levels of capital investment for highways, bridges, and transit.
- Chapter 9 provides supplemental analysis relating to the primary investment scenarios, comparing the findings of the future investment scenarios to findings in previous reports and discussing scenario implications.
- Chapter 10 discusses how changing some of the underlying technical assumptions would affect the future highway and transit investment scenarios.

Part III, *Special Topics*, explores topics related to the primary analyses in the earlier sections of the report.

- Chapter 11 discusses issues pertaining to pedestrian and bicycle transportation.
- Chapter 12 examines the transportation systems serving Federal and Tribal lands.

Part IV, *Recommendations for HPMS Changes*, provides information on the status and planned direction of the Highway Performance Monitoring System (HPMS).

The C&P report contains three technical appendices that describe the investment/performance methodologies used in the report for highways, for bridges, and for transit. A fourth appendix describes an ongoing research effort for *Reimagining the C&P Report in a Performance Management-Based World*.

Highway Data Sources

Highway characteristics and conditions data are derived from HPMS, a cooperative data/analytical effort dating from the late 1970s that involves the Federal Highway Administration (FHWA) and State and local governments. HPMS includes a statistically drawn sample of more than 100,000 highway sections containing data on current physical and operating characteristics and projections of future travel growth on a highway section-by-section basis. All HPMS data are provided to FHWA through State DOTs from existing State or local government databases or transportation plans and programs, including those of metropolitan planning organizations.

FHWA annually collects bridge inventory and inspection data from the States, Federal agencies, and Tribal governments and incorporates the data into the National Bridge Inventory (NBI). NBI contains information from all bridges covered by the National Bridge Inspection Standards (Title 23, Code of Federal Regulations, Part 650, Subpart C) located on public roads throughout the United States and Puerto Rico. Inventory information for each bridge includes descriptive identification data, functional characteristics, structural design types and materials, location, age and service, geometric characteristics, navigation data, and functional classifications; condition information includes inspectors' evaluations of the primary components of a bridge, such as the deck, superstructure, and substructure.

State and local finance data are derived from the financial reports States provide to FHWA in accordance with *A Guide to Reporting Highway Statistics*. These data are the same as those used in compiling the annual Highway Statistics report. Highway safety performance data are drawn from the Fatality Analysis Reporting System.

Highway operational performance data are drawn primarily from the National Performance Management Research Data Set (NPMRDS). This database compiles observed average travel times, date and time, and direction and location for freight, passenger, and other traffic. The data cover the period after the Moving Ahead for Progress in the 21st Century Act (MAP-21) for the National Highway System plus arterials at border crossings. The dataset is made available to States and

metropolitan planning organizations (MPOs) monthly to assist them in performance monitoring and target setting. Because NPMRDS data are available only for 2012 onward, historic time series data are drawn from the Texas Transportation Institute's *Urban Mobility Scorecard*.

Under MAP-21, the FHWA was charged with establishing a national tunnel inspection program. In 2015, development began on the National Tunnel Inventory database system, and inventory data were collected for all highway tunnels reported. Concurrently, the FHWA implemented an extensive program to train inspectors nationwide on tunnel inspection and condition evaluation. Complete inventory and condition data for all tunnels will be collected annually, beginning in 2018, and will be available for use in subsequent C&P reports.

Transit Data Sources

Transit data are derived from the National Transit Database (NTD) and transit agency asset inventories. NTD comprises comprehensive data on the revenue sources, capital and operating expenses, basic asset holdings, service levels, annual passenger boardings, and safety data for the more than 800 urban and 1,770 rural transit operators that receive annual funding support through the Federal Transit Administration's (FTA's) Section 5307 (Urbanized Area) and Section 5311 (Rural Area) Formula Programs. Except for fleet vehicle holdings (for which NTD provides data on the composition and age of transit fleets), however, NTD provides no data required to assess the current physical condition of the Nation's transit infrastructure.

To meet this need, FTA collects transit asset inventory data from a sample of the Nation's largest rail and bus transit operators. In direct contrast to the data in NTD and HPMS—which local and State funding grantees must report to FTA and FHWA, respectively, and which are subject to standardized reporting procedures—the transit asset inventory data used to assess current transit conditions are provided to FTA in response to direct requests submitted to grantees and are subject to no reporting requirements. Although asset inventory data are subject to no current reporting requirements or reporting standards, MAP-21 requires that grantees begin submitting this information to NTD. Once rules for collecting these data are formalized in regulation and grantees begin submittals, FTA will have improved data on which to base its forecasts.

In recent practice, data requests primarily have been made to the Nation's 20 to 30 largest transit agencies because they account for roughly 85 percent of the Nation's total transit infrastructure by value. Considering the slow rate of change in asset holdings of transit agencies over time (excluding fleet vehicles and major expansion projects), FTA has requested these data from any given agency only every 3 to 5 years. The asset inventory data collected through these requests document the age, quantity, and replacement costs of the grantees' asset holdings by asset type. The nonvehicle asset holdings of smaller operators have been estimated using a combination of the (1) fleet-size and facility-count data reported to NTD and (2) actual asset age data of a sample of smaller agencies that responded to previous asset inventory requests. This method of obtaining asset data has served FTA well in the past (and the quality of the reported data has improved over

time), but the accuracy and comprehensiveness of FTA's estimates of current asset conditions and capital reinvestment needs will benefit from the standardized reporting requirements to be developed through MAP-21.

Multimodal Data Sources

Personal travel data are derived primarily from the National Household Travel Survey, which collects details of travel by all modes for all purposes for each household member. The survey has collected data intermittently since 1969 using a national sample of households in the civilian noninstitutionalized population. The survey was last conducted in 2009. The survey obtains demographic characteristics of households and people and information about all vehicles in the household.

Freight data are primarily derived from the Freight Analysis Framework version 3.4, which includes all freight flows to, from, and within the United States. The framework is built from a variety of datasets, such as the Census Bureau's Commodity Flow survey and HPMS.

Investment/Performance Analytical Procedures

The earliest versions of the reports in this combined series relied exclusively on engineering-based estimates for future investment/performance analysis, which considered only the costs incurred by transportation agencies. This approach failed to consider another critical dimension of transportation programs adequately—the impacts of transportation investments on the costs users of the transportation system incur. Executive Order 12893, Principles for Federal Infrastructure Investments, dated January 1994, directs each executive department and agency with infrastructure responsibilities to base investments on “systematic analysis of expected benefits and costs, including both quantitative and qualitative measures.” New approaches have been developed to address the deficiencies in earlier versions of this report and to meet this Executive Order. The analytical tools used in this report now have an added economic component.

The highway investment scenarios presented in this report are developed in part from the Highway Economic Requirements System (HERS), which models highway investment using benefit-cost analysis. The HERS model quantifies user, agency, and societal costs for various types and combinations of capital improvements. HERS considers costs associated with travel time, vehicle operation, safety, routine maintenance, and emissions, including greenhouse gases. Bridge investment scenario estimates are developed from the National Bridge Investment Analysis System (NBIAS) model. Unlike earlier bridge models (and similar to HERS), NBIAS incorporates benefit-cost analysis into the bridge investment/performance evaluation.

The transit investment analysis is based on the Transit Economic Requirements Model (TERM). TERM consolidates older engineering-based evaluation tools and uses a benefit-cost analysis to ensure that investment benefits exceed investment costs. TERM identifies the investments needed

to replace and rehabilitate existing assets, improve operating performance, and expand transit systems to address the growth in travel demand.

HERS, NBIAS, and TERM have not yet evolved to the point that they can be used for direct multimodal analysis. Although the three models use benefit-cost analysis, their methods for implementing this analysis are very different. Each model is based on a separate, distinct database. Each model uses data applicable to its specific part of the transportation system and addresses issues unique to each mode. For example, HERS assumes that adding lanes to a highway causes highway user costs to decline, which results in additional highway travel. Under this assumption, some of this increased traffic would be newly generated travel and some could be the result of travel shifting from transit to highways. HERS, however, does not distinguish between different sources of additional highway travel. Similarly, TERM's benefit-cost analysis assumes that some travel shifts from automobile to transit because of transit investments, but the model cannot project the effect of such investments on highways.

In interpreting the findings of this report, recognizing the limitations of these analytical tools and the potential impacts of different assumptions made for the analyses is essential. The technical appendices and the Introduction to Part II contain information critical to contextualizing the future investment scenarios. These issues are also discussed in Q&A boxes presented in Chapters 7 through 10.

Changes to C&P Report Scenarios from 2013 Edition

The 2013 C&P Report presented two versions of each highway and bridge scenario in Chapter 8: (1) a set based on modeled projections of future vehicle miles traveled (VMT) for individual highway sections that States provided to HPMS ("Forecast-Based") and (2) a set based on the historic trend in VMT growth over the past 15 years ("Trend-Based"). This edition of the C&P report reverts to the traditional approach of presenting only one set of highway and bridge scenarios; however, the process used for developing the VMT forecasts for use in the analysis is new. For this edition, a modified version of the "Trend-Based" procedure was applied in which the State-provided VMT projections for individual highway sections were each reduced proportionally to match a national-level VMT forecast developed by the Volpe National Transportation Systems Center for FHWA.

The Low-Growth and High-Growth scenarios for transit presented in the 2013 C&P Report were based on growth in passenger miles traveled (PMT) applied at the urbanized area level. For this edition, both scenarios draw on the trend-based growth rates stratified by FTA region, urbanized area size, and type of transit mode. The Low-Growth scenario assumes an annual PMT growth rate of 0.5 percent less than the 15-year trend, while the High-Growth scenario assumes an annual PMT growth rate of 0.5 percent more than the 15-year trend.

The 2013 C&P Report presented Sustain 2010 Spending scenarios for both highways and transit, which projected the impacts of sustaining spending at base year 2010 levels in constant-dollar

terms over 20 years. Because the base year for the current report is 2012, the scenarios have been renamed Sustain 2012 Spending.

The Maintain Conditions and Performance scenario for highways and bridges presented in the 2013 C&P Report used average pavement roughness, average delay per VMT, and the average bridge sufficiency rating as primary indicators. This edition substitutes the percentage of deck area on bridges classified as deficient for the average bridge sufficiency rating in defining this scenario and applies the pavement roughness and delay indicators in a somewhat different manner.

Cautionary Notes on Using This Report

To interpret the analyses presented in this report correctly, understanding the framework in which they were developed and recognizing their limitations are critical. This document is not a statement of Administration policy, and the future investment scenarios presented are illustrative.

The report does not endorse any particular level of future highway, bridge, or transit investment. It neither addresses how future Federal programs for surface transportation should look, nor identifies the level of future funding for surface transportation that could or should be provided by the Federal, State, or local governments; the private sector; or system users. Making recommendations on such policy issues is beyond the legislative mandate for this report and furthermore would violate its objectivity. Analysts outside FHWA can and do use the statistics presented in the C&P report to draw their own conclusions, but any analysis attempting to use the information presented in this report to determine a target Federal program size would require a series of additional policy and technical assumptions that are well beyond what is reflected here.

The investment scenario results presented in this report are estimates of the performance that **could** be achieved with a given level of funding, not necessarily what **would** be achieved. The analytical tools used in developing these estimates combine engineering and economic procedures that determine deficiencies based on engineering standards while applying benefit-cost analysis procedures to identify potential capital improvements to address deficiencies that might have positive net benefits. The models generally assume that projects are prioritized based on their benefit-cost ratios, but that assumption deviates somewhat from actual patterns of project selection and funding distribution that occur in the real world. Consequently, the level of investment identified as the amount required for achieving a certain performance level should be viewed as illustrative only—not as a projection or prediction of an actual condition and performance outcome likely to result from a given level of national spending.

As in any modeling process, simplifying assumptions have been made to make analysis practical and to report within the limitations of available data. Because operators at the State and local levels primarily make the ultimate decisions concerning highways, bridges, and transit systems, they have a much stronger business case for collecting and retaining detailed data on individual system components. The Federal government collects selected data from States and transit operators to support this report and several other Federal activities, but these data are not sufficiently robust to make definitive recommendations concerning specific transportation

investments in specific locations. Improvements are evaluated based on benefit-cost analysis, but not all external costs (such as noise pollution or construction-related loss of wildlife habitat) or external benefits (such as productivity gains that might result from transportation improvements that open markets to competition) are fully considered. Across a broad program of investment projects, such external effects might cancel each other; but, to the extent that they do not, the true “needs” could be either higher or lower than the models predict.