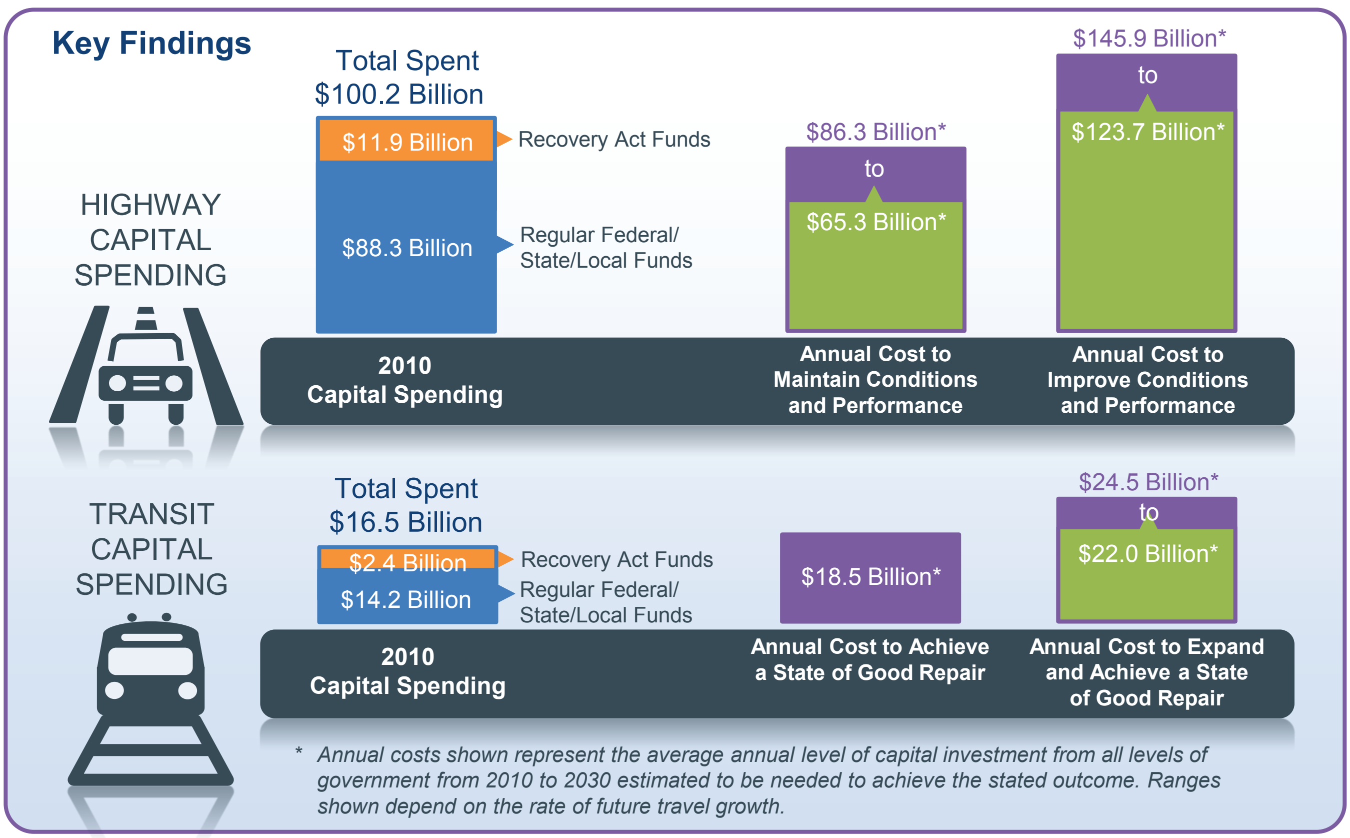
Executive Summary

This edition of the C&P report is based primarily on data through the year 2010; consequently, the system conditions and performance measures presented should reflect effects of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which authorized Federal highway and transit funding for Federal fiscal years 2005 through 2009 (and extended through fiscal year 2012), as well as some of the impact of the funding authorized under the American Recovery and Reinvestment Act of 2009 (Recovery Act). None of the impact of funding authorized under the Moving Ahead for Progress in the 21st Century Act (MAP-21) is reflected. In assessing recent trends, this report generally focuses on the 10-year period from 2000 to 2010. The prospective analyses generally cover the 20-year period ending in 2030; the investment levels associated with these scenarios are stated in constant 2010 dollars.

In 2010, all levels of government spent a combined $205.3 billion for highway-related purposes, of which $11.9 billion was a direct impact of the Recovery Act. All levels of government spent a combined $54.3 billion for transit-related purposes, including $2.4 billion of expenditures supported by one-time funding under the Recovery Act.

The average annual capital investment level needed to maintain the conditions and performance of highways and bridges at 2010 levels through the year 2030 is projected to range from $65.3 billion to $86.3 billion per year, depending on the future rate of growth in vehicle miles traveled (VMT). Improving the conditions and performance of highways and bridges by implementing all cost-beneficial investments would cost an estimated $123.7 billion to $145.9 billion per year. (Note that these projections are much lower than those presented in the 2010 C&P report, driven in part by an 18 percent reduction in highway construction prices



between 2008 and 2010). In 2010, all levels of government spent a combined $100.2 billion for capital improvements to highways and bridges.

Bringing existing transit assets up to a state of good repair would require an annualized investment level of $18.5 billion through the year 2030. The estimated combined costs associated with accommodating future increases in transit ridership and addressing system preservation needs when it is cost-beneficial to do so, would range from $22.0 billion to $24.5 billion per year. In 2010, all levels of government spent a combined $16.5 billion for transit capital improvements.

Highlights: Highways and Bridges

Extent of the System

- The Nation's road network includes more than 4,083,768 miles of public roadways and more than 604,493 bridges. In 2010, this network carried almost 2.985 trillion vehicle miles traveled (VMT).
- The 1,007,777 miles of Federal-aid highways (25 percent of total mileage) carried 2.525 trillion VMT (85 percent of total travel) in 2010.
- While the 162,698 miles on the National Highway System (NHS) make up only 4 percent of total mileage, the NHS carried 1.305 trillion VMT in 2010, just under 44 percent of total travel.
- The 47,182 miles on the Interstate System carried 0.731 trillion VMT in 2010, constituting a bit over 1 percent of mileage and just over 24 percent of total VMT.

Highway System Terminology

"Federal-aid Highways" are roads that are generally eligible for Federal funding assistance under current law. (Note that certain Federal programs do allow the use of Federal funds on other roadways.)

The "National Highway System" (NHS) includes those roads that are most important to interstate travel, economic expansion, and national defense. It includes the entire Interstate System. MAP-21 directed that the NHS system be expanded. The statistics presented for 2010 reflect the NHS as it existed then. The 20-year scenarios have been adjusted to approximate the NHS after expansion.

Spending on the System

- All levels of government spent a combined $205.3 billion for highway-related purposes in 2010. About half of total highway spending ($100.2 billion) was for capital improvements to highways and bridges; the remainder included expenditures for physical maintenance, highway and traffic services, administration, highway safety, and debt service.
- In nominal dollar terms, highway spending increased by 67.3 percent between 2000 and 2010; adjusting for inflation this equates to a 35.9 percent increase. Highway capital expenditures increased by 63.4 percent between 2000 and 2010, equaling a 36.6 percent increase when adjusted for inflation.
- The portion of total highway capital spending funded by the Federal government increased from 42.6 percent in 2000 to 44.3 percent in 2010. The average annual increase in Federally funded highway capital outlay grew by 5.4 percent per year over this period, compared to a 4.7 annual increase in capital spending funded by State and local governments.

Constant Dollar Conversions for Highway Expenditures

This report uses the Federal Highway Administration's (FHWA's) National Highway Construction Cost Index (NHCCI) and its predecessor, the Composite Bid Price Index (BPI), for inflation adjustments to highway capital expenditures and the Consumer Price Index (CPI) for adjustments to other types of highway expenditures.

- The composition of highway capital spending shifted from 2000 to 2010, particularly from 2008 to 2010, which was partially attributable to the Recovery Act. The percentage of highway capital spending directed toward system rehabilitation rose from 52.7 percent in 2000 to 59.9 percent in 2010. Over the same period, the percentage directed toward system enhancement rose from 9.9 percent to 12.8 percent, while the percentage directed toward system expansion fell from 37.4 percent to 27.4 percent.

Highway Capital Spending Terminology

This report splits highway capital spending into three broad categories. "System Rehabilitation" includes resurfacing, rehabilitation, or reconstruction of existing highway lanes and bridges. "System Expansion" includes the construction of new highways and bridges and the addition of lanes to existing highways. "System Enhancement" includes safety enhancements, traffic control facilities, and environmental enhancements.

Conditions and Performance of the System

- Work is under way to establish metrics and data collection systems to capture information on attaining sustainable transportation systems, both in terms of fostering livable communities and advancing environmental sustainability.

Highway Safety Has Improved

- The annual number of highway fatalities was reduced by 21.6 percent between 2000 and 2010, dropping from 41,945 to 32,885. The fatality rate per 100 million VMT declined from 1.53 in 2000 to 1.11 in 2010.
- Between 2000 and 2010, the number of pedestrians killed by motor vehicle crashes decreased by 10.1 percent, from 4,763 to 4,282, and the number of pedalcyclists (such as bicyclists) killed has decreased almost 10.8 percent, from 693 to 618. While these are positive trends, they also reflect that less progress has been made in reducing nonmotorist fatalities than in reducing overall highway fatalities.
- The number of traffic-related injuries decreased by almost 32 percent from 3.1 million to 2.1 million between 2000 and 2010. The injury rate per 100 million VMT declined from 112 in 2000 to 71 in 2010.

Pavement Conditions Have Improved in Many Areas

- The percentage of VMT on NHS pavements with "good" ride quality rose from 48 percent in 2000 to 60 percent in 2010. The share of VMT on NHS pavements with "acceptable" ride quality increased from 91 percent to 93 percent.
- The percentage of Federal-aid Highway VMT on pavements with "good" ride quality rose from 42.8 percent in 2000 to 50.6 percent in 2010, while the share of VMT on pavements with "acceptable" or better ride quality declined from 85.5 percent to 82.0 percent.
- The improvement in the percentage of VMT on pavements with "good" ride quality has not been uniform across the system. For lower-volume urban roadways classified as urban minor arterials, or urban collectors, the percent of VMT on pavements with "good" ride quality and "acceptable" ride quality both declined between 2000 and 2010. This result appears consistent with a change in philosophy among

Pavement Condition Terminology

This report uses the International Roughness Index (IRI) as a proxy for overall pavement condition. Pavements with an IRI value of less than 95 inches per mile are considered to have "good" ride quality. Pavements with an IRI value less than or equal to 170 inches per mile are considered to have "acceptable" ride quality. (Based on these definitions "good" is a subset of the "acceptable" category.) These metrics are typically VMT weighted, so the report refers to the percent of VMT on pavements with good ride quality. (Note that the NHS pavement statistics presented in this report are based on calendar year data, consistent with the annual Highway Statistics publication; in other DOT publications presented on a fiscal year basis, these calendar 2010 NHS statistics appear as Fiscal Year 2011 data.)

many transportation agencies leading them to move away from a simple strategy of addressing assets on a "worst first" basis toward more comprehensive strategies aimed at targeting investment where it will benefit the most users.

Bridge Conditions Have Improved

- Based directly on bridge counts, the share of NHS bridges classified as structurally deficient declined from 6.0 percent in 2000 to 5.1 percent in 2010. Over this period, the share classified as functionally obsolete declined from 17.7 percent to 16.3 percent, so the total share classified as deficient declined from 23.7 percent to 21.4 percent.
- Weighted by deck area, the share of NHS bridges classified as structurally deficient declined from 8.7 percent in 2000 to 8.3 percent in 2010. Over this period, the share classified as functionally obsolete declined from 22.0 percent to 20.3 percent, so the total share classified as deficient declined from 30.7 percent to 28.7 percent.
- Systemwide, based on bridge counts, the share of bridges classified as structurally deficient declined from 15.2 percent to 11.7 percent from 2000 to 2010, the functionally obsolete share declined from 15.5 percent to 14.2 percent, and the total percentage of deficient bridges declined from 30.7 percent to 25.9 percent.
- The reductions in bridge deficiencies have not been uniform across the system. The share of rural interstate bridges classified as structurally deficient rose from 4.0 percent in 2000 to 4.5 percent in 2010; over the same period, the share of urban collector bridges classified as functionally obsolete was not reduced below the 2000 level of 28.1 percent.

Bridge Condition Terminology

Bridges are considered "structurally deficient" if significant load-carrying elements are found to be in poor or worse condition due to deterioration and/or damage, or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing intolerable traffic interruptions due to high water. That a bridge is deficient does not imply that it is likely to collapse or that it is unsafe.

Functional obsolescence is a function of the geometrics (i.e., lane width, number of lanes on the bridge, shoulder width, presence of guardrails on the approaches, etc.) of the bridge in relation to the geometrics required by current design standards. As an example, a bridge designed in the 1930s would have shoulder widths in conformance with the design standards of the 1930s, but could be deficient relative to current design standards, which are based on different criteria and require wider bridge shoulders to meet current safety standards. The magnitude of these types of deficiencies determines whether a bridge is classified as "functionally obsolete."

These classifications are often weighted by bridge deck area, in recognition of the fact that bridges are not all the same size and, in general, larger bridges are more costly to rehabilitate or replace to address deficiencies. They are also sometimes weighted by annual daily traffic (ADT).

Future Capital Investment Scenarios – Systemwide

The scenarios that follow pertain to spending by all levels of government combined for the 20-year period from 2010 to 2030 (reflecting the impacts of spending from 2011 through 2030); the funding levels associated with all of these analyses are stated in constant 2010 dollars. Rather than assuming an immediate jump to a higher (or lower) investment level, each of these analyses assume that spending will grow by a uniform annual rate of increase (or decrease) in constant dollar terms using combined highway capital spending by all levels of government in 2010 as the starting point. As noted in the Introduction, caution should be taken in evaluating the scenario findings, given the impact of the Recovery Act funding on 2010 spending.

Sustain 2010 Spending Scenario

- The **Sustain 2010 Spending scenario** assumes that capital spending by all levels of government is sustained in constant dollar terms at the 2010 level ($100.2 billion systemwide) through 2030.
- At this level of spending, the average sufficiency rating for the Nation's bridges is projected to improve from 81.7 to 84.1 (on a scale of 0 to 100).
- Assuming a higher forecast-based future VMT growth (of 1.85 percent per year), average pavement ride quality on Federal-aid highways is projected to improve by 11.5 percent while average delay per VMT on Federal-aid highways worsens by 1.9 percent. Assuming lower trend-based VMT growth (of 1.36 percent per year), average pavement ride quality is projected to improve by 17.7 percent, while average delay improves by 7.8 percent.
- **Note that 2010 capital spending was supplemented by one-time funding under the Recovery Act, which would make it more challenging to sustain this level of spending in the future.**

Highway Investment/Performance Analyses

In order to provide an estimate of the costs that might be required to maintain or improve system performance, this report includes a series of investment/performance analyses that examine the potential impacts of alternative levels of future combined investment levels by all levels of government on highways and bridges for different subsets of the overall system.

Drawing upon these investment/performance analyses, a series of illustrative scenarios were selected for further exploration and presentation in more detail. The scenario criteria were applied separately to the Interstate System, the NHS, all Federal-aid highways, and the overall road system.

Recognizing that one of the major factors influencing future highway investment needs will be future travel demand, two sets of illustrative scenarios are presented for Federal-aid Highways and the overall system. One set incorporates travel forecasts provided by the States for individual highway sections (averaging to 1.85 percent growth per year), while the other assumes lower travel growth based on a continuation of national trends over the last 15 years (1.36 percent growth per year).

Maintain Conditions and Performance Scenario

- The **Maintain Conditions and Performance scenario** assumes that capital investment gradually changes in constant dollar terms over 20 years to the point at which selected measures of future conditions and performance in 2030 are maintained at 2010 levels.
- The average annual level of investment associated with this scenario is $86.3 billion systemwide assuming higher future VMT growth and $65.3 billion systemwide assuming lower future VMT growth.
- The annual investment levels for both versions of this systemwide scenario fall below the base year (2010) spending level. In previous editions of this report, the estimated costs of this scenario have typically been higher than base year spending, under most or all alternative versions of the scenario presented.

Improve Conditions and Performance Scenario

- The **Improve Conditions and Performance scenario** assumes that capital investment gradually rises to the point at which all potential highway and bridge investments that are estimated to be cost-beneficial (i.e., those with a benefit-cost ratio of 1.0 or higher) could be funded by 2030.
- Assuming higher future VMT growth, the average annual level of systemwide investment associated with this scenario is $145.9 billion. This is 45.7 percent higher than actual 2010 spending; a gap that could be closed if spending rose by 3.46 percent per year faster than the rate of future inflation.
- Assuming lower future VMT growth brings the annual cost of this systemwide scenario down to $123.7 billion, 23.4 percent higher than 2010 spending; a 1.96 percent annual increase in constant dollar spending would be sufficient to close this gap.
- The **State of Good Repair benchmark** represents the subset of this scenario that is directed toward addressing deficiencies of existing highway and bridge assets. The average annual investment level associated with this benchmark is $78.3 billion, assuming higher future VMT growth, and $72.9 billion, assuming lower future VMT growth.

Intermediate Improvement Scenario

- The highway component of the **Intermediate Improvement scenario** assumes that combined spending gradually rises to a point at which potential highway investments with a benefit-cost ratio of 1.5 or higher can be implemented; the bridge component represents the cost of achieving half of the gains in bridge sufficiency computed under the **Improve Conditions and Performance scenario**.
- The average annual level of systemwide investment associated with this scenario is $111.9 billion (11.7 percent higher than 2010 spending, which was 10.8 percent higher than 2008 spending due to the Recovery Act), assuming higher future VMT growth, and $93.9 billion (6.3 percent lower than 2010 spending), assuming lower future VMT growth.

Highlights: Transit

Extent of the System

- Of the transit agencies that submitted data to the National Transit Database (NTD) in 2010, 728 provided service to urbanized areas and 1,582 provided service to rural areas. Urban agencies operated 612 bus systems, 587 demand response systems, 18 heavy rail systems, 30 commuter rail systems, and 33 light rail systems. There were also 70 transit vanpool systems, 20 ferryboat systems, 5 trolleybus systems, 3 automated guideway systems, 3 inclined plane systems, and 1 cable car system.
- Bus and heavy rail modes continue to be the largest segments of the industry, providing 35.6 percent and 51.6 percent of all transit trips, respectively. Commuter rail supports a relatively high share of passenger miles (20.0 percent). Light rail is the fastest-growing rail mode (with passenger miles growing at 5.0 percent per year between 2000 and 2010) but it still provides only 4.1 percent of transit passenger miles. Vanpool growth during that period was 10.3 percent per year, with vanpools accounting for only 2.1 percent of all transit passenger miles.
- Urban transit operators reported 9.9 billion unlinked passenger trips on 3.9 billion vehicle revenue miles. Rural transit operators reported 123 million unlinked passenger trips on 570 million vehicle revenue miles.

Bus, Rail, and Demand Response: Transit Modes

Public transportation is provided by several different types of vehicles that are used in different operational *modes*. The most common is *fixed-route bus* service, which uses different sizes of rubber-tired buses that run on scheduled routes. *Commuter bus* service is similar but uses over-the-road buses and runs longer distances between stops. *Bus rapid transit* is high-frequency bus service that emulates light rail service. *Publicos and jitneys* are small owner-operated buses or vans that operate on less-formal schedules along regular routes.

Larger urban areas are often served by one or more varieties of *fixed-guideway* (rail) service. These include *heavy rail* (often running in subway tunnels) which is primarily characterized by third-rail electric power and exclusive dedicated guideway. Extended urban areas may have *commuter rail*, which often shares track with freight trains and usually uses overhead electric power (but may also use diesel power). *Light rail* systems are common in large- and medium-sized urban areas; they feature overhead electric power and run on track that is entirely or in part on city streets that are shared with pedestrian and automobile traffic. *Streetcars* are small light rail systems, usually with only one or two cars per train. *Cable cars*, *trolley buses*, *monorail*, and *automated guideway* systems are less-common rail variants.

Demand response transit service is usually provided by vans, taxicabs, or small buses that are dispatched to pick up passengers upon request. This mode is mostly used to provide *paratransit* service as required by the Americans with Disabilities Act. They do not follow a fixed schedule or route.

Spending on the System

- All levels of government spent a combined $54.3 billion to provide public transportation and maintain transit infrastructure. Of this, 26.1 percent was system-generated revenue, of which most came from passenger fares. 19 percent of revenues came from the Federal government while the remaining funds came from State and local sources.

- Public transit agencies spent $16.6 billion on capital investments in 2010. Annually authorized Federal funding made up 26.6 percent of these capital expenditures. One-time funds from the Federal American Recovery and Reinvestment Act provided another 14.5 percent.
- Federal funding is primarily targeted for capital assistance; however, Federal funding for operating expenses at public transportation agencies has increased from 19 percent of all Federal funding in 2000 to 35 percent in 2010. Virtually all of the increase is due to the 2004 change making "preventative maintenance" eligible for reimbursement from 5307 grant funds. Maintenance is an operating expense. Meanwhile, farebox recovery ratios, representing the share of operating expenses that come from passenger fares, have remained close to the 2000 value of 35.5 percent throughout this period.
- Recent investments in system expansion have been adequate to keep pace with ridership growth (the average number of passengers per vehicle has not increased). Furthermore, continuing these investment levels will support projected growth in demand that falls between the low- and high-growth projections in this report. Investments in system preservation, however, still fall short of current and projected needs.

Federal Transit Funding Urban and Rural

Federal Transit Administration (FTA) Urbanized Area Formula Funds are apportioned to *urbanized areas* (UZAs), as defined by the Census Bureau. UZAs in this report were defined by the 2000 census. Data from the 2010 census will be used in the 2013 apportionment and beyond. Each UZA has a designated recipient, usually a Metropolitan Planning Organization (MPO) or large transit agency, which then sub-allocates FTA funds in its area according to local policy. In small urban and rural areas, FTA apportions funds to the State, which allocates them according to State policy. Indian tribes receive their funds directly. All funds then become available, on a reimbursement basis, through application to the FTA.

Conditions and Performance of the System

Transit Remains Safe

- There has been no significant increase in the rate of transit fatalities since 2004. Excluding suicides, that fatality rate hovers around one fatality for each 250 million passenger miles traveled (0.4 per 100 million).
- In 2010, one in four transit-related fatalities was classified as a suicide. In 2002, the rate was just one in 13. The rate of suicides on transit facilities has gone up every year since 2005.

Some Aspects of System Performance Have Improved

- Between 2000 and 2010, transit agencies have provided substantially more service. The annual rate of growth in route miles ranged from 0.4 percent for heavy rail to 6.0 percent for light rail. This has resulted in 21 percent more route miles available to the public.
- Between 2000 and 2010, the number of annual service miles per vehicle (vehicle productivity) increased steadily and the average number of miles between breakdowns (mean distance between failures) decreased by 14 percent. Thus, transit operators are getting more use out of their vehicles.

Unlinked Passenger Trips, Passenger Miles, Route Miles, and Revenue Miles

Unlinked passenger trips (UPT), also called boardings, count every time a person gets on an in-service transit vehicle. Each transfer to a new vehicle or route is considered another unlinked trip, so a person's commute to work may count as more than one trip if that person transferred between routes.

Passenger miles traveled (PMT) simply count how many miles a person travels. UPT and PMT are both commonly used measures of transit *service consumed*.

Directional route miles (DRM) measure the number of miles of transit route available to customers. They are directional because each direction counts separately; thus, a one-mile-out and one-mile-back bus route would be two DRM. *Vehicle Revenue Miles* (VRM) count the miles of revenue service, and are typically much greater than the DRM because many trips are taken over each route (and each DRM). These are commonly used measures of *transit service provided*.

- Growth in service offered was nearly in accordance with growth in service consumed. In spite of steady growth in route miles and revenue miles, average vehicle occupancy levels did not decrease. Passenger miles traveled grew at a 1.6-percent annual pace while the number of trips grew at a 1.3-percent annual pace. This is significantly faster than the growth in the U.S. population during this period (0.93 percent), suggesting that transit has been able to attract riders who previously used other modes of travel. Increased availability of transit service has undoubtedly been a factor in this success.

Future Capital Investment Scenarios – Systemwide

As in the highway discussion, the transit investment scenarios that follow pertain to spending by all levels of government combined for the 20-year period from 2010 to 2030 (reflecting the impacts of spending from 2011 through 2030); the funding levels associated with all of these analyses are stated in constant 2010 dollars. Unlike the highway scenarios, these transit scenarios assume an immediate jump to a higher (or lower) investment level that is maintained in constant dollar terms throughout the analysis period.

Included in this section for comparison purposes is an assessment of the investment level needed to replace all assets that are currently past their useful life or that will be over the forecast period. This would be necessary to achieve and maintain a state of good repair (SGR) but would not address any increases in demand during that period. Although not a realistic scenario, this does provide a benchmark for infrastructure preservation.

Sustain 2010 Spending Scenario

- The **Sustain 2010 Spending scenario** assumes that capital spending by all levels of government is sustained in constant dollar terms at the 2010 level ($16.5 billion systemwide), including Recovery Act funds, through 2030. Assuming that the current split between expansion and preservation investments is maintained, this will allow for enough expansion to meet medium growth expectations but will fall far short of meeting system preservation needs. By 2030, this will result in roughly $142 billion in deferred system preservation projects.

Low-Growth Scenario

- The **Low-growth scenario** assumes that transit ridership will grow at an annual rate of 1.4 percent between 2010 to 2030, as projected by the Nation's metropolitan planning organizations. During that period, it also attempts to pay down the current $85.9 billion system preservation backlog (subject to a cost-benefit constraint). The annualized cost of this scenario is $22.0 billion. In 2010, all levels of government spent a combined $16.5 billion for transit capital improvements.

High-Growth Scenario

- The **High-growth scenario** assumes that transit ridership will grow at an annual rate of 2.2 percent between 2010 and 2030, the average annual rate of growth experienced between 1995 and 2010. It also attempts to pay down the current $85.9-billion system preservation backlog (subject to the same cost-benefit constraint). The annualized cost of this scenario is $24.5 billion.

State of Good Repair – Expansion vs. Preservation

State of Good Repair (SGR) is defined in this report as all transit capital assets being within their average service life. This is a general construct that allows FTA to estimate *system preservation* needs. The analysis looks at the age of all transit assets and adds the value of those that are past the age at which that type of asset is usually replaced to a total reinvestment needs estimate. Some assets may continue to provide reliable service well past the average replacement age and others will not; over the large number of assets nationally, the differences average out. Some assets will need to be replaced, some will just get refurbished. Both types of cost are included in the reinvestment total. SGR is a measure of system preservation needs, and failure to meet these needs results in increased operating costs and poor service.

Expansion needs are treated separately in this analysis. They result from the need to add vehicles and route miles to accommodate more riders. Estimates of future demand are, by their nature, speculative. Failure to meet this type of need results in crowded vehicles and represents a lost opportunity to provide the benefits of transit to a wider customer base.