Business Roundtable℠

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Road to GROWTH

THE CASE FOR Investing in America's Transportation Infrastructure

SEPTEMBER 2015

JUST THE FACTS

U.S. Economy Would Benefit from Rebuilding America's Transportation Infrastructure

In *Road to Growth: The Case for Investing in America's Transportation Infrastructure,* Business Roundtable outlines the economic cost of neglecting the nation's transportation infrastructure and the positive effects of rebuilding it for the 21st century:

- **America Is No. 16:** The United States' overall infrastructure quality ranks 16th, behind Germany, France and Japan.
- **Highways and Bridges:** Urban highway congestion cost the economy more than $120 billion in 2011, and nearly one in four bridges in the national highway system is structurally deficient or functionally obsolete.
- **Waterways and Ports:** Lock delays, port congestion and lack of facilities for larger ships added $33 billion to the cost of U.S. products in 2010.
- **Aviation:** The United States is home to just four of the world's top 50 airports, and aviation congestion and delays cost the economy $24 billion in 2012.
- **Transit Rail:** Only 25 percent of transit rail station infrastructure is rated "good" or "excellent."

Increased investment in public infrastructure leads to significant economic benefits:

- Up to **$320 billion in economic output** would be generated in 2020 if U.S. infrastructure investment were boosted by 1 percent of GDP per year.
- **1.7 million jobs** would be created over the first three years by an $83 billion infrastructure package.
- As much as **$3 in economic activity** is created by every $1 invested in infrastructure.

The nation's leaders can change course and rebuild this vital national asset. It's time to strengthen our economic foundation by reinvesting in transportation infrastructure.

Learn more about how investment in America's transportation infrastructure will pay off for all of us at brt.org/road-to-growth.

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Road to Growth

The Case for Investing in America's Transportation Infrastructure

September 2015

DEAR BUSINESS LEADERS AND POLICYMAKERS:

On behalf of the members of Business Roundtable, I am proud to share this new, informative report with you: *Road to Growth: The Case for Investing in America's Transportation Infrastructure*.

With detailed research and facts, this report outlines both the economic benefits of infrastructure investment and the economic costs of neglect.

We can create jobs and strengthen U.S. competitiveness and productivity through infrastructure investment. We hope this report contributes to achieving these important goals.

Sincerely,

Doug Oberhelman
Chairman and Chief Executive Officer, Caterpillar Inc.
Chair, Infrastructure Initiative, Business Roundtable

Contents

Executive Summary

Transportation infrastructure is the backbone of a modern, competitive and productive economy. Interrelated and mutually reinforcing transportation infrastructure systems facilitate the efficient movement of goods and services, promote trade and commerce, connect supply chains, and reduce operating costs across a diverse set of industries. In the United States, these systems are both sprawling — covering a vast physical geography — and complex — owned, operated and funded by a diverse set of entities and jurisdictions.

This complexity makes the task of maintaining the nation's critical infrastructure a difficult one. And yet, the need for modernization and reinvestment in these systems cannot be overstated. The highways, bridges, railways, airports, transit systems and waterways that once represented the best of modern architecture and engineering are deteriorating, inevitably worn down by age and stretched beyond capacity by the shifting demands of a modern economy and growing population.

Following a strong public commitment to investing in world-class physical infrastructure in the mid-20th century, public investment in most infrastructure systems has tapered off or flatlined, while demand for high-performing, high-capacity systems has grown. Current levels of funding are far below what is needed to properly maintain, improve and expand system capacity to accommodate future demand and avoid the economic costs and inefficiencies associated with system underperformance. Today, public investment in transportation infrastructure accounts for just 1.6 percent of gross domestic product (GDP) — a reduction from peak investment levels of 2.2 percent in the 1960s.[1] The cumulative impact of this underinvestment in the nation's transportation infrastructure, the natural aging process and accelerating demand pressures is a massive gap between projected investment needs and projected investment levels over the next several years, on the order of $1 trillion by 2020.[2]

Reinvesting in infrastructure presents policymakers with a unique opportunity to revitalize American growth. If efficiently targeted and strategically deployed, even modest additional investment would generate significant benefits to the U.S. economy over the long term. For example:

- Investing in transportation infrastructure would create jobs. A 2014 study conducted by University of Maryland economists concluded that an $83 billion infrastructure investment package — the equivalent of approximately 0.6 percent of GDP — would create 1.7 million jobs in the first three years, accounting for both direct and indirect employment effects.[3] Another recent report by the Brookings Institution found that more than 14 million American workers were directly employed in infrastructure jobs in 2012, more than 10 percent of total national employment.[4]

- Investing in transportation infrastructure would increase productivity, as new efficiencies in transporting goods and services boost the productive capacity of businesses. In turn, increased productivity drives economic growth — every dollar spent on public transportation infrastructure investment is estimated to increase U.S. GDP by roughly $3 via job creation, system improvements and stimulated aggregate demand.[5]

- Finally, investing in America's transportation infrastructure would increase the country's international competitiveness by attracting foreign direct investment and giving U.S.-owned businesses more reasons to create jobs and expand operations at home.

Although the challenges of maintaining such a complex and expansive system are significant, strengthening America's transportation infrastructure presents a crucial opportunity for policymakers to prioritize and reinvest in the critical drivers of future economic growth and competitiveness. The members of Business Roundtable believe that strategic public-sector leadership is indispensable to reversing the underperformance and deterioration of the nation's transportation infrastructure, which provides a critical foundation for U.S. economic growth and sustained international competitiveness.

I. Introduction

Transportation infrastructure is the backbone of a modern, competitive and productive economy. Specifically, interrelated and mutually reinforcing transportation infrastructure systems facilitate the efficient movement of goods and services, promote trade and commerce, connect supply chains, and reduce operating costs across a diverse set of industries. In the United States, these systems are both sprawling and complex. Vast physical geography, continuous population growth and a $17 trillion economy drive the need for extensive transportation infrastructure to connect demand centers with manufacturing hubs as well as move people and goods around the country. At the same time, the country's federal system of government has created a uniquely complex transportation infrastructure network — one that is owned, operated and funded by a diverse set of entities and jurisdictions ranging from city, county, state and federal governments to private companies.

This complexity makes the task of maintaining the nation's critical transportation infrastructure a difficult one. And yet, the need for modernization and reinvestment in these systems cannot be overstated, as economic and demographic trends are set to drive increased demand for passenger and freight transportation in the coming years. Specifically, rising incomes boost demand for passenger road and air travel; the growing importance of trade — both imports and exports — to the U.S. economy increases traffic at ports and along freight transportation corridors; and innovative business practices, such as just-in-time manufacturing, require increasingly efficient and reliable transportation systems.[6]

Despite these drivers, following a period of strong public commitment to investing in world-class physical infrastructure in the mid-20th century, public investment has tapered off or flatlined in most transportation systems at the same time that demand for high-performing, high-capacity systems has grown. In fact, the U.S. population has more than doubled since 1960, when many of the nation's most critical public infrastructure systems were being designed and constructed.[7] As a result, much of the nation's infrastructure has fallen victim to neglect, underfunding, underappreciation and the natural erosion that comes with age. Deteriorating bridges and highways, crowded transit systems, congested airport runways and terminals, and aging ports and inland waterways all suffer from a concerning lack of public leadership and vision, the cumulative effects of which threaten U.S. productivity growth and undermine the economy's international competitiveness.

In the early 21st century, a public recommitment to the nation's transportation infrastructure is desperately needed, including not only improved financial investment, but also decisive leadership, creative problem-solving and strategic direction-setting. The economic benefits of such a commitment would be extensive and self-sustaining. Efficient and resilient transportation systems touch every community, business and household in America through job creation, productivity enhancements and improved U.S. competitiveness.

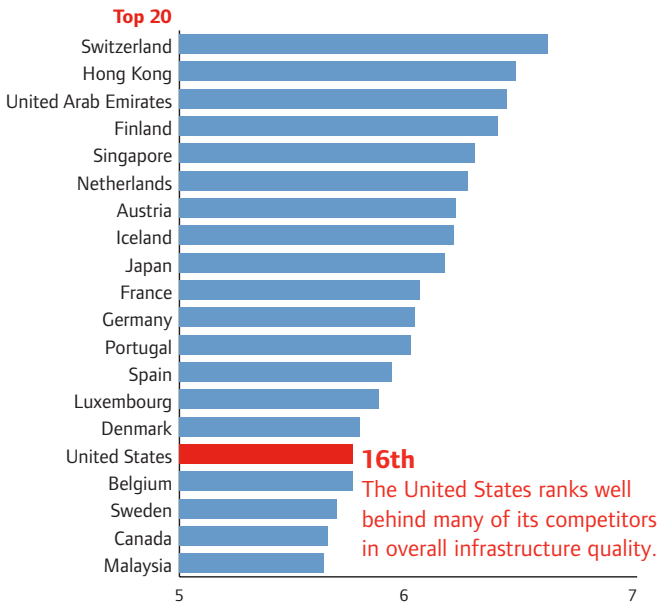
II. An Aging System: U.S. Transportation Infrastructure Is Underperforming

America's transportation infrastructure systems are underperforming. The highways, bridges, railways, airports, transit systems and waterways that once represented the best of modern architecture and engineering are deteriorating, inevitably worn down by age and stretched beyond capacity by the shifting demands of a modern economy and growing population. Bridges are weakening, roads are congested, airport delays are becoming more frequent and ports are too shallow to accommodate the next generation of ships.

Figure 1

Quality of Overall Infrastructure, 2014–15

Index Values 1–7, 7 Is Best



Source: World Economic Forum, "Global Competitiveness Report 2014–2015."

The fact that the nation's infrastructure has deteriorated is reflected in both domestic and international measures of infrastructure adequacy and performance. The American Society of Civil Engineers (ASCE) gave U.S. infrastructure a dismal D+ rating in its latest 2013 assessment, a marginal but uninspiring improvement over its D rating in 2009.[8] In 2014, the World Economic Forum's Global Competitiveness Index ranked the United States just 16th in the world in terms of the "quality of overall infrastructure," down from ninth overall before the onset of the deep recession of 2008–09 and below international peers such as France, Germany and Japan.[9] Even more concerning than these retrospective "report card" evaluations is the fact that — in the absence of significant reinvestment and capacity expansion — the ability of the nation's infrastructure to provide a sufficient and supportive foundation for economic growth and productivity is set to further diminish over time. This is a major concern for the business sector. In fact, according to a 2013 survey, fully 65 percent of U.S. manufacturers believe that American infrastructure will be unable to meet the demands of a growing economy over the next 10 to 15 years.[10]

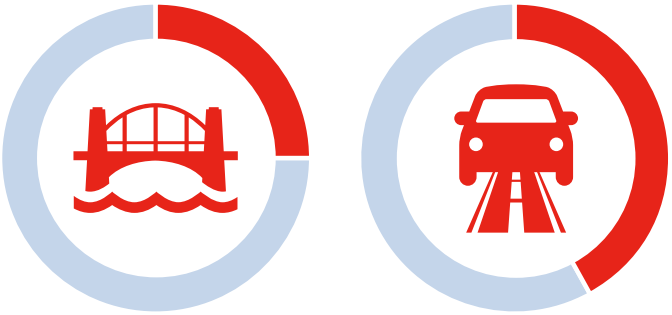
The "snapshots" on the following pages provide insights into the component systems that make up the nation's critical transportation infrastructure. Overall, the picture they paint is one of underperformance, mounting costs and continued deterioration in the absence of additional investment. The challenges associated with creating an infrastructure that is able to support America's interconnected economy and growing population are great — but the need is critical.

Roads and Bridges

A robust, well-maintained system of highways, roads and bridges is an essential building block of any dynamic and thriving economy. With the launch of the national Interstate Highway System in the 1950s, President Eisenhower and Congress recognized this imperative by directing public investment toward modern interstate roads that linked America's cities, commercial hubs and ports and opened the country to more efficient flows of people and goods. Since the 1990s, however, public spending to maintain and improve the nation's roads and bridges has been far outstripped by demand,[11] to the point that increased economic activity and population growth have pushed demand for roads 43 percent higher than current road capacity.[12] The unsurprising result is a network of aging roads and bridges that have grown congested and unreliable. In fact, the ASCE estimates that nearly one-third of American roads are in poor or mediocre condition.[13] The U.S. Department of Transportation (DOT) reports that 42 percent of major urban highways are congested[14] and nearly one out of every four bridges in the national highway system is either structurally deficient or functionally obsolete.[15, 16] These deficiencies can create serious safety risks for drivers, a fact that was acknowledged by former Transportation Secretary Ray LaHood in a recent "60 Minutes" segment, wherein he referred to the 70,000 structurally deficient bridges in America as "dangerous."[17] In fact, there have been 600 bridge failures in the United States since 1989, several of which — such as the tragic I-35 bridge collapse in Minnesota — have been deadly.[18]

Figure 2

Condition of U.S. Highway Infrastructure



1 in 4
bridges in the national highway system is structurally deficient or functionally obsolete

42%
of major urban highways are congested

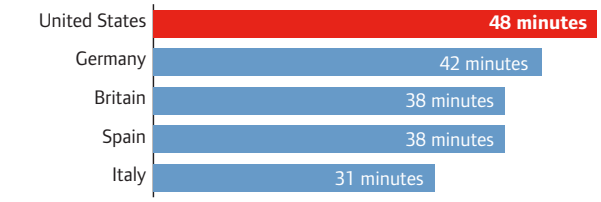
Sources: American Society of Civil Engineers, "2013 Report Card for Infrastructure — Roads"; U.S. Department of Transportation. (2014). "Deficient Bridges by State and Highway System." Federal Highway Administration.

From the perspective of American businesses, underperforming road and bridge infrastructure translates into higher production and shipping costs, which are often passed on to consumers through higher retail and finished goods prices. The impact of bridge deterioration on commercial trucking is particularly significant; aging bridges reduce load limits, which forces companies to use smaller vehicles to transport goods or take roundabout routes, thereby increasing the time and cost associated with maintaining supply chains. From the perspective of American workers, this translates into burdensome and costly commutes. The

Figure 3

Average Commuting Time

Minutes per Day



Source: The Economist, *"America's Transport Infrastructure: Life in the Slow Lane," April 28, 2011.*

annual on-road delay experienced by the average commuter in this country has steadily increased over the last two decades,[19] with *The Economist* reporting that the average American spends nearly one-third more time commuting than their peers in Organisation for Economic Co-operation and Development (OECD) countries.[20] (According to the Census Bureau's Annual Community Survey, approximately 85 percent of Americans commute by car.[21])

All told, these delays and inefficiencies impose a significant cost on the U.S. economy and the environment. In 2011 alone, urban highway congestion resulted in 2.9 billion gallons of wasted motor fuel and 5.5 billion hours of delays, the effect of which was 56 billion pounds of additional carbon dioxide (CO_2) emissions and more than $120 billion in costs to households and businesses.[22, 23] Moreover, these costs are likely to increase going forward as the share of National Highway System miles experiencing recurring congestion due to passenger cars and freight truck traffic is expected to grow significantly over the next several decades.[24]

Public Transit

Public transit systems have been instrumental in building American cities into hubs of job creation and economic opportunity — connecting businesses to sources of labor and a wider customer base and linking households to employment opportunities and expanded retail, restaurant and entertainment options. In fact, recent years have seen an increased interest on the part of Americans — particularly younger Americans — in moving to urban areas for the job opportunities, connectivity and convenience that they afford.[25] The relative benefits of public transit systems are also becoming more apparent. For instance, in 2011 alone the nation's public transit systems avoided an estimated 450 million gallons of gasoline consumption and $20.8 billion in congestion-related costs.[26]

And yet, public transit infrastructure is aging while ridership is growing, contributing to accidents and costly delays and frustrating urban dwellers.[27] Specifically, although public transit use has grown at a faster rate than the population or highway travel since 2004,[28] the share of urban buses rated "marginal or poor" has risen to about 50 percent (accounting for asset replacement value).[29] The infrastructure of urban rail transit systems is little better: A DOT report concluded that 17 percent of the underlying structures of urban rail transit (e.g., tracks, ties, switches and tunnels) are in poor condition, as are 19 percent of rail transit systems (e.g., power, communication and train control equipment).[30] Worse, the underperformance of U.S. public transit infrastructure appears to be an outlier among the nation's international peers and competitors: American satisfaction with the country's public transit systems ranked just 25th out of 32 OECD member nations in 2010.[31]

Absent a renewed investment in America's public transit systems, further erosion of asset quality and continued poor performance can be expected in the face of growing demand: Bus, subway and commuter rail use rates grew by 37 percent between 1995 and 2013 and are projected to grow by a similar amount over the next decade.[32] In all, subpar performance and declining reliability across the country's public transit systems are estimated to have cost the U.S. economy $90 billion in 2010 alone, and that cost is estimated to reach $570 billion in 2020 and more than $1 trillion in 2040 if current funding trends continue.[33]

Rail

Railroads are the backbone of the country's freight transportation system. In fact, approximately 43 percent of all intercity freight transport and one-third of U.S. exports are moved by rail.[34] And while the traditional role of America's freight rail network has been to provide a low-cost and energy-efficient means of transporting energy, agricultural and other commodities across the country, a key function of today's system is to provide intermodal transport for consumer goods.

Notably, although it is integrated with and integral to the country's broader transportation infrastructure system, the freight rail system is also unique. First, nearly all freight rail assets are privately owned. Second, freight rail companies have invested heavily in maintaining and improving those assets over the past several decades, including renewing rails, straightening curves that require lower speeds and expanding tunnel heights to accommodate larger trains.[35] In fact, investment in freight rail infrastructure has been on an upward trajectory since the 1980s, totaling $575 billion between 1980 and 2014.[36] In 2014 alone, spending on the freight rail system equaled $28 billion.[37]

Looking forward, maintaining and even increasing this robust rate of investment will be critical to keep up with expanding demand for freight rail as a source of intermodal transportation and to address capacity constraints. Specifically, the Federal Highway Administration forecasts that total freight shipments will increase by 45 percent by 2040, which will drive up demand for freight rail, particularly as a source of intermodal transportation.[38] Moreover, high-capacity nodes along the rail system are already turning into choke points, particularly where major freight lines and heavy passenger rail traffic cross paths (e.g., Chicago).

Unfortunately, the condition of America's passenger rail infrastructure lags far behind its freight system. For instance, the DOT reports that the share of transit rail station infrastructure rated "good" or "excellent" fell from 57 percent to just 25 percent during the decade from the mid-1990s to the mid-2000s. Over that same period, the share of train control systems rated "good" or "excellent" fell from 61 percent to 39 percent.[39] And while it is true that investment in passenger train infrastructure picked up during the recession of 2008–09, when material costs were lower and expanded federal funding was available, current investment levels are insufficient not only to improve and maintain current system assets, but also to support projected demand growth. Specifically, the ASCE projects that $10 billion in additional investments will be needed over the next 15 years to meet accelerating demand in the Northeast region alone, a significant portion of which is expected to come from federal and state government sources.[40]

Aviation

The United States' extensive aviation infrastructure system — 139 hub airports, 239 nonhub primary airports and 121 nonprimary commercial service airports — is earning itself an unfavorable reputation, both at home and abroad, for underperformance and crumbling infrastructure.[41] The feelings of many Americans regarding the nation's air infrastructure were famously summed up by Vice President Biden last year when he was quoted in the *New York Daily News* as saying, "… if I blindfolded you and took you to LaGuardia Airport in New York, you [would] think, 'I must be in some third world country.'"[42]

Unfortunately, ample evidence across the country's airports and runways supports the Vice President's remarks. Passenger enplanements and freight activity have risen significantly in the past 30 years — the systems now carry 728 million passengers and $562 billion in cargo per year — which means that many airports are supporting travel and freight volumes far in excess of what they were built to handle.[43] Terminals and runways are crowded,

facilities are outdated, and wait times in security and customs lines can be extensive.[44] The DOT estimates that 20 percent of all U.S. arrivals and departures are delayed[45] and that approximately one-quarter of these delays are attributable to the "national aviation system" (e.g., the effect of nonextreme weather on aviation infrastructure, inefficient airport operations, heavy traffic volumes and air traffic control).[46] Given the number of passengers and the amount of freight that travels by air, the costs of aging and poorly maintained airports can add up quickly. Specifically, the ASCE estimates that aviation congestion and delays cost the United States $24 billion in 2012 alone.[47] However, with freight shipments by air set to grow by 200 percent and passenger enplanements set to reach 1 billion by 2040, if investment in air infrastructure remains at current levels, annual costs could reach up to $63 billion by that year.[48]

As significant as they are, the upfront economic costs associated with lost time and reduced business efficiency may not even be the heaviest penalty imposed upon the United States by its underperforming air infrastructure. Rather, the nation's now famously poor airports damage U.S. competitiveness, as the nation's international peers and competitors are investing in new terminals, runway maintenance and capacity expansion while the United States continues to underinvest. According to Skytrax, an organization that publishes a survey-based ranking of international airports each year, only four American airports are considered among the world's top 50, with the top-ranked U.S. airport (Cincinnati) coming in at No. 30.[49] Not only does the United States rely on its airports for important trade links with the rest of the world — 30 percent of U.S. exports and 20 percent of imports travel by air — but airports also often provide a first impression of the country to travelers, foreign exchange students, international business executives and world leaders.[50] If the United States is to not only maintain but also strengthen its status as a globally competitive destination for education, research, business activity and production, reinvesting in a world-class aviation infrastructure is an imperative.

Ports and Waterways

Ports and inland waterways are unique among the United States' transportation infrastructure in that their networks are almost exclusively dedicated to commercial transportation. One-fourth of the country's freight value is shipped via inland waterways,[51] and 35 percent of its export value (more than three-quarters when measured by tonnage) is shipped through its ports.[52] However, America's water transportation infrastructure, particularly its inland waterways, is one of its oldest and worst-performing transportation infrastructure systems, according to the ASCE, which gave waterways a D- grade on its latest report card.[53] Moreover, the lack of frequent interaction between the average American household and waterborne freight transportation has made it easier for the system's infrastructure assets to fall into disrepair with relatively little notice or vocal public concern.

The underperformance prevalent throughout the United States' water transport infrastructure is attributable to issues that are similar to those exhibited in its road and bridge infrastructure system: aging assets, the need for frequent maintenance and growing functional obsolescence. Specifically, the average age of inland waterway locks in this country is greater than 50 years, which contributes to mounting maintenance delays.[54] According to the DOT, maintenance and other unexpected delays along waterways have resulted in more than 150,000 hours annually in lock shutdowns, nearly twice the number of delay hours in 1990.[55] Neither ports nor locks have been designed to handle new generations of larger cargo ships; the Industrial Canal Lock in New Orleans, connecting the Mississippi River to the Gulf Intracoastal Waterway, is so small that barges traveling in convoy must be broken up and moved individually through the lock.[56] Many of the nation's busiest ports are able to use only 50 percent of their channel space 95 percent of the time because their remaining channel capacity is not deep enough to accommodate most ships,[57] and an estimated $2 billion in backlogged capital improvement projects is needed to

align U.S. port capacity with the latest international norms and standards.[58] These deficiencies will only become more acute when the expansion of the Panama Canal is completed in 2016, which will allow a new generation of larger cargo ships to pass through. Currently, only two of the East Coast's 14 major ports are deep enough to accommodate these new ships.[59]

Finally, given the reliance of U.S. energy producers and consumers, farmers, manufacturers, exporters, and other businesses on smoothly functioning ports and inland waterways to maintain supply chains and hold down transportation costs, underinvestment and aging water transportation infrastructure impose significant costs on the U.S. economy. For instance, lock delays, port congestion and the penalty associated with not having the infrastructure in place to handle larger ships made American products an estimated $33 billion more expensive in 2010 than they would have been otherwise,[60] penalizing American consumers and disadvantaging U.S. exports. In the absence of significant reinvestment and capital improvements, this "inefficiency penalty" is expected to reach $49 billion by 2020.[61]

III. An Underfunded System: The Challenge of Investing in America's Infrastructure

Declining performance metrics, population growth, rising commercial demand and inadequate funding levels over the past several decades form a compelling case for increased public investment in America's transportation infrastructure systems. However, doing so effectively and efficiently will not be easy. The ownership of fixed assets throughout the system is complex, with responsibility for operation, maintenance and capital expenditures shared across state and local governments, the federal government, and in some cases, the private sector. The reliance on federal versus state and local government resources for critical infrastructure upgrades also varies by system, as do the mechanisms through which public funding is delivered. Finally, while the federal government has a critical and indispensable role to play in reinvesting in America's transportation infrastructure and while more funding is certainly needed, federal spending alone will not be sufficient to fix the nation's underperforming transportation systems. Rather, this task will require committed and sustained federal leadership — leadership in making investment in infrastructure a national priority; leadership in thinking strategically and long term about the services and benefits that U.S. transportation infrastructure should provide; and leadership in mobilizing, facilitating and coordinating resource deployment across the various levels of government.

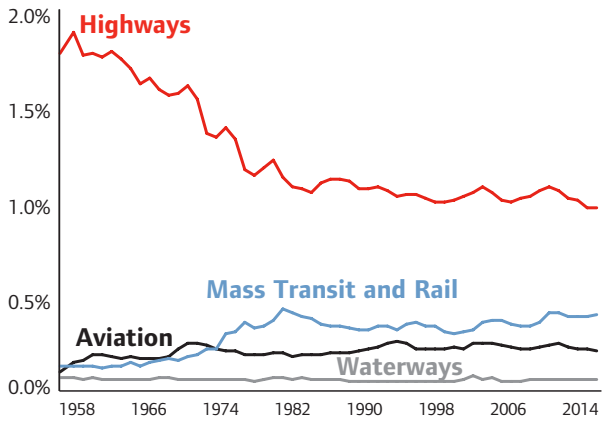
The Rate of Public Investment

The rate of public investment in transportation infrastructure in the United States is insufficient to properly maintain, improve and expand capacity — which is necessary to accommodate future demand and avoid the economic costs and inefficiencies associated with system underperformance. In general, public spending on all U.S. infrastructure systems was just 2.4 percent of gross domestic product (GDP) in 2014,[62] down from its peak in the early 1960s and significantly below the rate of public infrastructure investment by America's international peers and competitors.[63] While China's public sector spends a staggering 9 percent of GDP on infrastructure investment, it is in a different stage of economic development than the United States.[64] Europe's public sector, which spends 5 percent of GDP — more than double the U.S. rate of public investment — provides a more appropriate point of comparison.[65]

Figure 4

Public Spending on Infrastructure, by Transportation System

Share of GDP



Source: Congressional Budget Office, "Public Spending on Transportation and Water Infrastructure, 1956 to 2014."

More specifically, the U.S. rate of public investment in transportation infrastructure is particularly poor. In 2014, public investment in the nation's transportation infrastructure systems equaled just 1.6 percent of GDP — a reduction from peak investment levels of 2.2 percent in the 1960s.[66] A pronounced and sustained reduction in public highway expenditures — which account for more than one-half of all public spending on transportation systems — is largely

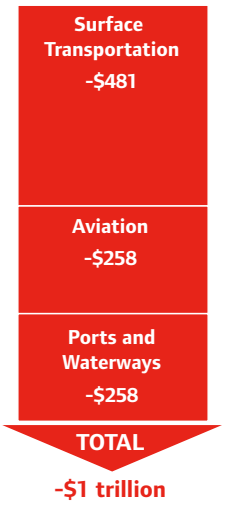
responsible for this decline, while public investment in other transportation systems has flatlined over the same period.[67, 68]

The cumulative impact of sustained underinvestment in the nation's transportation infrastructure, natural aging and wear and tear, and growing demand pressures is a massive shortfall between projected investment needs and projected investment levels over the next several years. Specifically, the estimated gap between capital investment needs and projected funding is $481 billion for surface transportation by 2020 and $258 billion for the aviation sector and ports and inland waterways by 2020.[69]

Figure 5

Transporation Infrastructure Investment Gap by 2020

Billions of Dollars



Source: American Society of Civil Engineers, "Failure to Act: The Impact of Current Infrastructure Investment on America's Economic Future."

The Shape of Public Investment

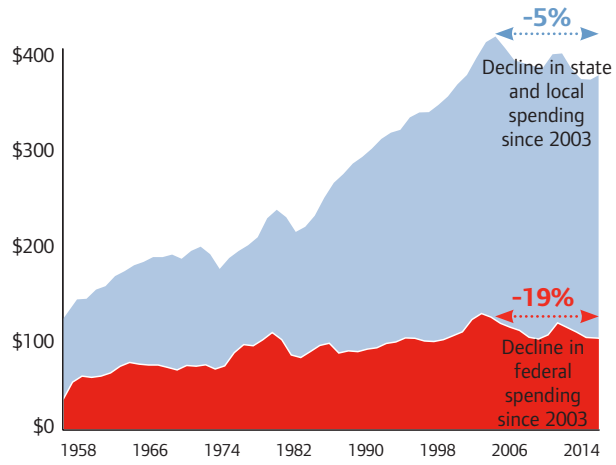
The United States is relatively unique among its international peers in terms of how it invests in its critical transportation infrastructure. While the public sector as a whole owns slightly more than one-half of transportation infrastructure assets in the United States (worth nearly $4 trillion)[70] — and provides more than 90 percent of the funding for roads and bridges, ports and waterways, air transportation, and mass transit systems[71] — the country's federal system of governance has shaped how it invests in critical infrastructure.[72] Specifically, state and local spending accounts for fully three-quarters of public infrastructure investment.[73]

It is important to note, however, that the federal government's share of public infrastructure has not always been as small as it is today. In fact, while federal spending makes up less than 25 percent of total public investment today, it peaked at 38 percent in 1977. One trend that helps explain this decline in federal infrastructure spending is the divergence between major capital expenditures and spending on operations and maintenance (i.e., basic system upkeep). Specifically, public spending on infrastructure operation and maintenance has been rising steadily since the 1960s, while spending on capacity expansions, major upgrades or new construction projects has grown at a much slower rate and has been in decline since the 2000s. Because federal spending accounts for only 12 percent of total public spending on infrastructure operation and maintenance but nearly 40 percent of capital expenditures, the gap between spending on basic upkeep versus major system improvements is consistent with the growing gap between federal versus state and local infrastructure spending.[74, 75]

Figure 6

Public Infrastructure Investment, 1958–2014

Billions of Dollars



Source: Congressional Budget Office, "Public Spending on Transportation and Water Infrastructure, 1956 to 2014."

Unfortunately, these trends are indicative of the federal government's shortsighted approach to the nation's infrastructure systems. While public-sector spending on system upkeep, basic repairs and

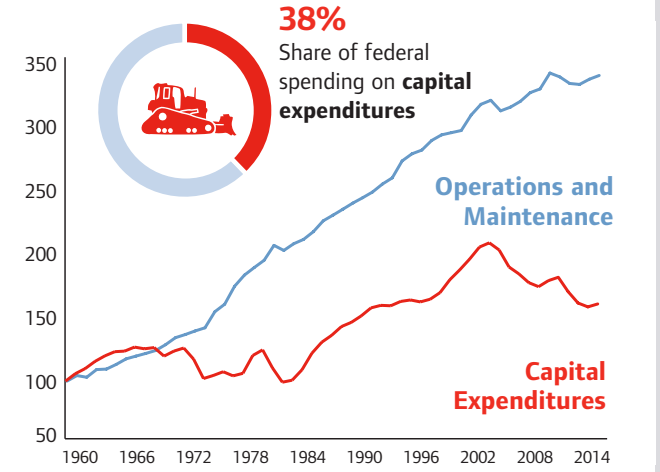
temporary fixes has in most cases been adequate to avoid catastrophic system failures or major disrupting events, falling capital expenditures suggest that the federal government is failing to invest in the long-term durability and high-quality performance of America's critical transportation infrastructure.

Regarding investment in infrastructure paid for by the federal government, the majority is composed of direct grants to state and local governments, financed by mechanisms such as the Federal Highway Trust Fund. In spite of the degree to which state and local governments rely on federal dollars to fund critical infrastructure projects, federal grants programs often lack strategic vision and discrimination in how they deploy government resources. Specifically, many of the federal grants — particularly grants for waterways, ports and airports — are awarded to states based on arguably outdated formulas, which result in scarce resources being spent on small or underused infrastructure assets as opposed to prioritizing the most heavily used facilities to maximize the impact of federal dollars. For example, the Equity Bonus Program for highway and bridge infrastructure often allocates funds based on factors that are delinked from states' specific repair and capacity needs.[76]

Figure 7

Public Infrastructure Spending by Type, Index

(1960 = 100)



Source: Congressional Budget Office, "Public Spending on Transportation and Water Infrastructure, 1956 to 2014."

As an alternative to direct grants, the federal government is increasingly leveraging loan and loan guarantee programs for infrastructure investment as a means of providing state and local governments with a more flexible and efficient source of funding and as a way of multiplying the impact of federal spending on infrastructure. For instance, the Transportation Infrastructure Financing and Innovation Act (TIFIA), administered by the DOT, selects large capital investment projects undertaken at the state and local levels to receive federally subsidized loans and loan guarantees.[77] The temporary Build America Bonds, launched in 2009, aimed to reduce state and local borrowing costs by paying a slice of the bond issuer's interest costs.[78]

Questions regarding the efficiency and effectiveness of federal grants programs, as well as growing interest in the potential of loan guarantee programs to support major infrastructure projects, serve as an important reminder that the call for public reinvestment in the nation's infrastructure must be a call for smarter investment, not just more investment.

Barriers to Public Investment

In the context of aging and underperforming transportation infrastructure systems, the federal government must collaborate with and provide reliable support to state and local governments to ensure that targeted and efficient investments are made in the nation's critical infrastructure systems. And yet, perhaps because the deterioration of America's transportation infrastructure has been diffuse and somewhat gradual, the investment

imperative has largely escaped public notice. Strong leadership — particularly by the federal government — is needed to re-establish infrastructure as a national priority and overcome the barriers to achieving the necessary commitment, funding and coordination across the different levels of government.

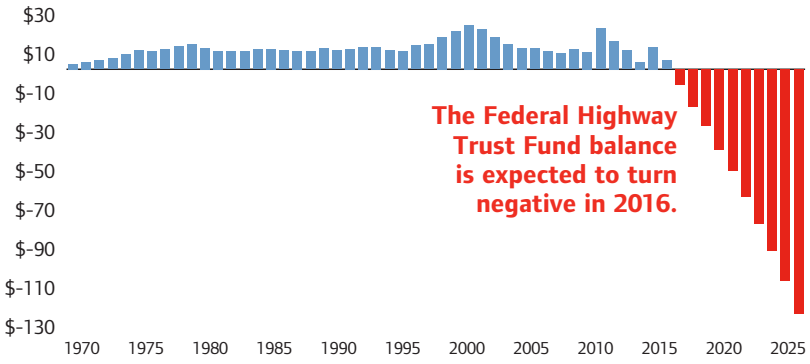
First, constrained fiscal positions across all levels of government, particularly after the recession of 2008–09, have created a challenging environment for advocates of increased spending on virtually any policy priority. At the state and local levels, public budgets overextended in the wake of the recession have made it difficult to undertake major infrastructure investments without significant federal support. In fact, the level of debt financing required to fund major infrastructure projects is legally prohibited in those states and local jurisdictions that have self-imposed statutory debt levels. Moreover, even for those state and local governments that wish to increase spending on infrastructure, credit conditions are far from favorable — municipal bond issuance by state and local governments declined by 68 percent in the years following the recession while borrowing costs doubled.[79]

At the federal level, Congress has failed to take the steps necessary to provide effective support and partnership for state and local governments seeking to invest in infrastructure upgrades. One example of Congress' lack of long-term vision regarding the nation's infrastructure is the automatic spending cuts, or "sequestration," imposed in 2013. These deep cuts to federal spending on nondefense discretionary items have left little room for new transportation infrastructure projects and, in many cases, have reduced existing funding levels. For example, sequester-imposed cuts to the Federal Aviation Administration's budget in 2013 prompted furloughs of air traffic controllers, which caused major air delays across the country. To find the funding necessary to end the furloughs, Congress used funds allocated for airport improvements to pay the salaries of furloughed air traffic controllers, thereby reducing an important source of federal spending on aviation infrastructure. Budget cuts also reduced the flow of funds to state and local governments for infrastructure investments through Build America Bonds by nearly 9 percent.[80]

Figure 8

Federal Highway Trust Fund, Highway Account Balance and Cumulative Shortfall

Billions of Dollars



Note: The balance reported for 2015 is year to date as of July 2015.
Sources: U.S. Department of Transportation, Federal Highway Administration Highway Statistics; Congressional Budget Office.

Finally, the task of reinvesting in America's transportation infrastructure systems appears to have declined as a priority for many congressional lawmakers. Cost pressures from other policy areas — national security and entitlements, particularly — have shifted the public spotlight away from infrastructure, while entrenched congressional gridlock has prevented key legislation on infrastructure from moving forward. Specifically, Congress has been unable to pass a long-term surface transportation bill — the largest source of federal infrastructure

spending— since 2009, resorting instead to short-term patches that create costly uncertainty for state and local agencies. The Senate's passage of such a bill in late July reopens the possibility that constructive action might soon be taken to shore up and stabilize federal infrastructure spending, although the bill's fate remains uncertain given Congress' packed fall schedule. In the meantime, a short-term funding bill is intended to support ongoing road and bridge construction through October, primarily through a last-minute infusion of general funds into the Federal Highway Trust Fund.

The dismal fiscal position of the Federal Highway Trust Fund is perhaps the most infamous example of Congress' inability to provide an adequate and predictable source of funding for the nation's transportation infrastructure systems. Last raised 22 years ago, the 18.4 cent gas tax intended to finance the Trust Fund has lost 35 percent of its purchasing power since 1993 due to the combined effects of inflation, rising construction and materials costs, and increasingly stringent fuel efficiency standards.[81] The chronic mismatch between gas tax receipts and Trust Fund outlays has resulted in the need for periodic cash infusions and last-minute "patches" to prevent the Trust Fund from going insolvent. In fact, including the latest short-term patch passed at the end of July, Congress has passed 34 stop-gap funding measures to shore up the Highway Trust Fund in the last six years.[82] Unfortunately, these short-term fixes do nothing to solve the underlying misalignment between Highway Trust Fund resources and the need for federal investment in the nation's roads, highways and transit systems. Moreover, relying on the Treasury's general fund for highway and transportation funding adds to the budget deficit and undermines the United States' general fiscal outlook. In the absence of a long-term solution, the CBO estimates that the Trust Fund's highway account alone will experience a funding shortfall of $125 billion over the next decade and that the combined highway and mass transit account deficit will reach $168 billion over that same period.[83]

International Examples of Public Investment

While the United States struggles to develop the political will, resources and long-term vision necessary to reinvest in its transportation infrastructure, programs and initiatives launched by other countries provide compelling examples of what a stronger national commitment to infrastructure could look like.

In 2007, Canada initiated its National Policy Framework for Strategic Gateways and Trade Corridors, a long-term infrastructure funding plan designed to advance the competitiveness of the Canadian economy. The program served as a systematic funding guide for the $2.1 billion Building Canada infrastructure effort included in the country's 2007 budget and prioritized projects that promised to increase exports and boost economic output. The Canadian government subsequently passed its Atlantic Gateway and Trade Corridor Strategy in 2009, dedicated to achieving an integrated, secure and efficient multimodal infrastructure system to support trade along the Atlantic corridor. The Strategy was extended in 2013 under a new 10-year funding plan, further demonstrating Canada's commitment to prioritizing a robust, internationally competitive infrastructure system.

Australia's National Ports and National Freight strategies provide another useful blueprint for an effective model of public-sector leadership and investment in infrastructure. Launched in 2010 and 2011, these programs aim to coordinate planning and funding across all levels of government for key transportation infrastructure systems, improve quality, and attract additional private-sector investment. In addition to articulating an overarching national infrastructure strategy, these initiatives also lay out targeted plans to address specific shortcomings of various transportation infrastructure systems. For example, as in the United States, Australian freight and

passenger trains travel on the same railways, which can cause delays in both systems. To mitigate those delays, the National Freight Strategy proposed a plan to make special rail lines available for the slower cargo trains.

Other countries — including the United Kingdom, Denmark, Sweden and France — have also launched similar infrastructure programs, demonstrating that strong public investment and strategic leadership is a prerequisite for modernizing and strengthening national transportation infrastructure in the context of the highly competitive global economy. The success of these and other countries in making infrastructure investment a national priority can provide several lessons for the United States.

Lessons Learned from Other Countries

- **Provide vision and facilitate action.** Given the United States' federal system of governance and the extent to which public-sector investment in infrastructure relies on state and local governments, federal spending alone will be inadequate to drive the necessary structural change in the country's transportation infrastructure systems. However, regional bottlenecks and system deficiencies "trickle up" to impose heavy costs on the overall U.S. economy. As is borne out by the examples of Canada and Australia, the U.S. federal government must provide leadership in reinvesting in infrastructure by outlining a strategic vision for the country's infrastructure systems; by facilitating action across the levels of government and jurisdictions; and by providing state and local governments with stable, targeted and innovative funding mechanisms.

- **Rationalize and prioritize investments.** Countries such as Australia and Canada have implemented strategic infrastructure plans that focus on addressing gaps in high-volume, high-impact transportation systems first. In assessing the country's infrastructure needs, it would be important to evaluate which projects are likely to have the greatest impact on productivity and safety and make the greatest contribution to America's economic growth and competitiveness.

- **Invest in the future.** A smart infrastructure strategy must take into account changing demographic, environmental and economic trends. For example, Australia directed the majority of its infrastructure funding efforts to its National Ports and National Freight strategies, acknowledging the future needs associated with the country's changing international trade patterns. Similarly, Turkey is currently building a third international airport as well as an underwater rail service in Istanbul to accommodate the city's booming population.

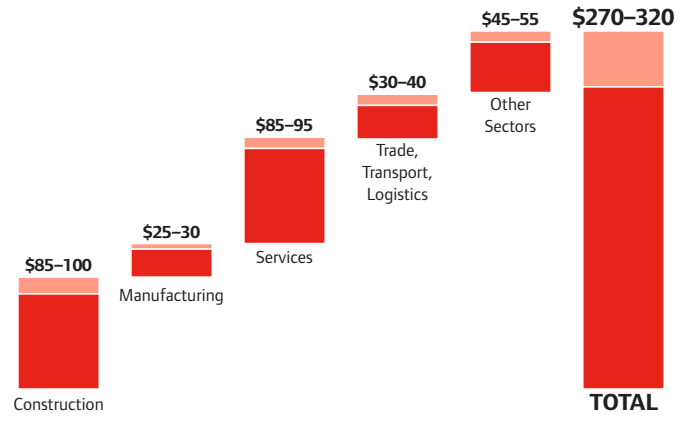
IV. A Revitalized System: The Benefits of Investing in America's Infrastructure

Reinvesting in infrastructure presents the United States with a unique opportunity. While the challenges are great, the economic benefits associated with infrastructure investment can be powerful and sustainable. Increased infrastructure investment can bring a wide range of long-lasting and mutually reinforcing benefits. In the short term, spending on infrastructure projects can create jobs and increase real GDP growth, while the ongoing maintenance and repair activities that are necessary to support infrastructure systems can create permanent and well-paying jobs for middle-class Americans. Over the medium term, better infrastructure can improve safety, unlock gains in private-sector productivity across a range of industries and support rising living standards for all Americans. Over the long term, improved transportation infrastructure can help boost America's international competitiveness, attracting foreign direct investment to U.S. shores and giving U.S.-owned businesses more reasons to create jobs and expand operations at home. Overall, given the degree of the shortfall between needed and actual investment in infrastructure, increasing investment has the potential to have a significant and positive impact on the U.S. economy. According to a study conducted by the McKinsey Global Institute, increasing U.S. infrastructure investment by the equivalent of 1 percent of GDP per year could boost annual output across a range of industries by up to $320 billion.[84]

Figure 9

Annual Economic Impact of Increasing Infrastructure Investment by an Additional 1 Percent of GDP by 2020, by Industry

Billions of Dollars



Note: McKinsey estimates a range of potential economic impacts from increased infrastructure investment. The light red segments represent the upper end of that range.

Source: McKinsey Global Institute, Game Changers: Five Opportunities for U.S. Growth and Renewal, Exhibit 27.

Employment

Proponents of public infrastructure investment often tout its ability to boost employment and contribute directly to economic growth, emphasizing for example, the fact that construction jobs are created when a road or new airport terminal is built. Indeed, the short-term employment implications of a renewed public commitment to infrastructure investment would be significant. A 2014 study commissioned by the National Association of Manufacturers (NAM) and conducted by economists at the University of Maryland concluded that an $83 billion infrastructure investment package — the equivalent of approximately 0.6 percent of GDP — would create 1.7 million jobs in the first three years, accounting for both the direct employment impacts of the investments and the indirect effects stemming from the boost to aggregate demand. Another study estimated that increased investment in just the nation's highways could produce as many as 800,000 new jobs.[85]

However, as appealing as the prospect of short-term job creation may be, the longer-term advantage of public investment in infrastructure from an employment perspective is the fact that infrastructure systems support permanent, well-paying middle-class jobs. According to a Brookings analysis of U.S. Census Bureau statistics, more than 14 million American workers were directly employed in infrastructure jobs in 2012 (a greater number than is employed in the manufacturing sector), accounting for more than 10 percent of total national employment.[86] The same study found that the vast majority of long-term jobs supported by the country's infrastructure systems are in operation (e.g., electrical engineers, technicians and truck drivers) rather than construction — jobs that tend to be high paying, require less education and provide more on-the-job training than many other jobs available to middle-class Americans.

Productivity

Infrastructure investment is unique among the various avenues for public spending in that it is a critical enabler of productivity growth, which drives overall economic growth and lifts U.S. living standards. Highly performing, modern infrastructure systems lower the cost of doing business by reducing fuel expenditures, unproductive labor costs (e.g., wages paid to a driver to idle in traffic for several hours instead of making more deliveries), the time needed to transport inputs and final products from one place to another, and the costly effects of uncertainty. In other words, well-maintained, smoothly functioning transportation systems make supply chains more efficient. In turn, this allows businesses to increase production while holding down costs. The resulting income from increased business activity, as well as the avoided costs associated with navigating deteriorating infrastructure systems, frees up more cash to be spent on productive investment opportunities.[87] On the other hand, the costs of "doing nothing" are also significant. Already, the estimated impact of underperforming infrastructure on U.S. households is an average annual loss of $3,100 in disposable personal income, which is associated with a roughly $2.4 trillion reduction in aggregate consumer spending.[88]

The positive relationship between public infrastructure spending and productivity gains, as measured by multipliers in economic output, is widely accepted by economists. While estimates vary regarding the impact on growth from infrastructure spending, the recent NAM/University of Maryland study put it as high as $3 in new economic activity for every $1 spent.[89] The return to infrastructure investment can be even higher during economic downturns. According to the Congressional Budget Office, every $1 of federal money spent on infrastructure as part of the American Recovery and Reinvestment Act increased economic activity by between $1 and $2.50 via job creation, system improvements and stimulated aggregate demand.[90] Highway investment in particular provides a significant boost to productivity. For example, a study by the Federal Reserve Bank of San Francisco estimated that every $1 spent on federal highway grants increases the recipient state's GDP by $2 over 10 years, although the multiplier can be as high as $8, depending upon the specific characteristics of the project.[91]

International Competitiveness

Finally, infrastructure investment offers an opportunity for America to secure its long-term competitive edge. In an increasingly interconnected and highly mobile global economy, multinational corporations (MNCs) face a growing number of viable options for where they might locate their operations. They evaluate siting decisions based on a number of critical factors, including not only the availability of low-wage labor and cheap commodity inputs, but also business-friendly tax policies; fair and predictable regulations; the presence of a highly skilled workforce; and reliable, efficient infrastructure systems.

Unfortunately, evidence suggests that the United States could do more to attract and retain internationally competitive business activity. Specifically, foreign subsidiaries comprise a growing share of the sales, employment, research and development spending, and production of U.S.-based MNCs. In fact, fully one-third of U.S.-based MNC jobs are currently located abroad — up from 25 percent 10 years ago.[92] Infrastructure investment provides a key opportunity for American governments to attract and retain business and manufacturing activity; where the United States cannot compete on wages, it can and should endeavor to compete by offering multinationals access to high-quality, well-maintained infrastructure systems. Indeed, countries with higher-quality infrastructure systems tend to outperform those with lower-quality systems in terms of international competitiveness.[93] America's competitors have recognized the infrastructure imperative; Germany, France and Japan all offer state-of-the-art transportation systems that introduce efficiencies into their economies and lower the cost of doing business. To keep up, the United States must do the same.

Figure 10

Economic Benefits of Increased Public Infrastructure Investment

1.7 million

Potential new jobs created in the first three years following an $83 billion infrastructure investment package

$3

Estimated new economic activity created for every $1 invested in infrastructure

-$3,100

The average annual loss in household income associated with underperforming U.S. infrastructure

Sources: University of Massachusetts, "How Infrastructure Investments Support the U.S. Economy: Employment, Productivity and Growth"; National Association of Manufacturers, "Catching Up: Greater Focus Needed to Achieve a More Competitive Infrastructure"; American Society of Civil Engineers. (2013). "Failure to Act: The Impact of Current Infrastructure Investment on America's Economic Future."

V. Conclusion

Transportation infrastructure is the backbone of a modern, competitive and productive economy. Although the challenges of maintaining such a complex and expansive system are significant, strengthening America's transportation infrastructure presents a crucial opportunity for policymakers to prioritize and reinvest in the critical drivers of future economic growth and competitiveness. The benefits of doing so are substantial: Infrastructure creates and sustains middle-class jobs, boosts productivity, and helps the United States attract and retain business investment. The members of Business Roundtable believe that strategic public-sector leadership is indispensable to reversing the underperformance and deterioration of the nation's transportation infrastructure, which provides a critical foundation for U.S. economic growth and sustained international competitiveness.

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