A VISION OF AMERICAN STRENGTH:
HOW TRANSPORTATION INFRASTRUCTURE BUILT THE UNITED STATES

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Introduction

The arguments of this history of American Strength can be summed up simply, in 10 points.

First, transportation infrastructure is a core foundation of America’s economic, political, military, strategic, and social strength. That is, robust infrastructure enabled 2.5 million Americans, huddled along the Atlantic coastline in the late 18th century, to expand and become some 320 million free Americans, filling up a continent and leading the world. All this, we might observe, was achieved in barely more than two centuries.

Second, some important and enduring rules of statecraft have guided America to success. In particular, if a nation expands its territory, it must also expand its national strength, including military strength to protect that territory. Territory gained must also be territory defended, and that territory must be populated and developed—with citizens, commerce, and military power. It is not logical, and certainly not sustainable, to make political commitments that cannot be militarily maintained. That’s a lesson that America has had to learn, and re-learn.

Third, in the competitive tournament of nations and power politics, it is not enough for any nation, including the United States, simply to improve its national strength, including infrastructure; it must also improve itself at a rate that keeps pace with rival nations. If a nation falls behind in international strategic competition, it faces the prospect of diminishment and defeat.

Fourth, the argument can be stated even more simply: *Infrastructure is vision.* It is a vision of modernity, progress, and, yes, economic growth. The guiding vision is not one of mere dollars and cents, but rather of national expansion, national experimentation, national unity, and national progress.

Fifth, the American story is a remarkable story, and it can be told through some of its key builders. The great builders of the United States—Washington, Hamilton, Lincoln, the Roosevelts, and Eisenhower—all started from their vision of a stronger, greater America.
Sixth, infrastructure and superstructure are co-dependent. That is, the
economic superstructure of the economy—everything from manufacturing to
services, from human capital to software—rests on infrastructure.

Seventh, the story of American Strength is the story of networks. Indeed,
upon reflection, we can see that networks and infrastructure are the same thing.
Networks convey different things: goods, electricity, and information. The issue is
conveyance; things need to move. Without movement, even the digital economy
would grind to halt. In other words, a network is infrastructure, and infrastructure is
a network.

Eighth, when a nation keeps infrastructure front and center, that
commitment generates manufacturing and construction jobs for middle-class
Americans. It’s no coincidence that our retreat from large-scale public-works
projects since the 1970s has occurred simultaneously with the stagnation of median
wages and the waning of Middle America.

Ninth, infrastructure means wealth creation. In recent decades,
Americans have been led to believe that a rising stock market and real estate values
would lift all boats. Yet 25 years of bubbles and crashes and recessions have made
for neither a strong economy nor a strong nation. Wealth needs to be grown, mined,
drilled, manufactured, or otherwise produced in tangible form, and each of these
productive acts involves physical realities that presuppose a substantial base of
transportation infrastructure.

And finally, infrastructure is the antidote to America’s political woes. As
we all know, for more than 20 years, this country has suffered electoral and political
gridlock. We have had divided government, in which bitter partisanship undercuts
the common good. Yet infrastructure, for which there is more common ground than
any other domestic or foreign policy issue, is a game-changer. The sooner that
leaders recognize the promise of infrastructure and recover the triumphant legacy
of our past, the sooner we can restore American Strength.
PART I: THE NATURE OF INFRASTRUCTURE

1. Infrastructure and Civilization

The history of civilization is the history of infrastructure.

It’s fair to say that before there were paths of some kind, there was no real civilization—that is, no civilization in the sense of a settled, permanent place where food could be stored, buildings could be clustered, defenses could be built, religious structures could be made accessible, official documents could be preserved, capital could be accumulated, artisanal production could be cultivated, and art could be created and displayed.

So from the dawn of time, humanity has sought to adjust the natural environment, seeking to make the human condition more physically safe, more agriculturally fruitful, more economically productive, and more politically secure. And by definition, that progress requires means of transportation—and an infrastructure that supports transportation.

The English historian Arnold Toynbee, in his monumental *A Study of History*, begins his chronicle by detailing the pioneering civilizations of the Egyptians and Sumerians, ancient peoples who managed to survive and flourish by implementing another form of infrastructure: the means to manage flood control and irrigation.

In other words, the story of these ancient civilizations is the story of creating a secure physical environment. As Toynbee explains:

*The wantonness of Nature was subdued by the works of Man; the formless swamp made way for a pattern of ditches and embankments and fields; the Lands of Egypt and Shinar [Sumeria] were reclaimed from the wilderness; the Egyptiac and Sumeric civilizations were created.*

The “pattern of ditches and embankments and fields” was neither a miracle nor an accident. It was a conscious choice—and a lot of hard work. Indeed, one could say that it took vision to see how a “formless swamp” could become an economically productive agricultural landscape.
Toynbee praises those "heroic pioneers" who chose to settle by a river, often finding, at first, nothing but a morass of swamps. Nevertheless, Toynbee added admiringly, "The venture succeeded beyond the most sanguine hopes in which the pioneers can ever have indulged."¹

Toynbee’s overall idea is that history has been a matter of “challenge and response.” That is, when a people were confronted with a challenge—from harnessing natural phenomena to defending against predatory warfare—the basic question was: Could they manage an adequate response? Could they marshal the resources that were needed for survival? If they could, their civilization would flourish. If they could not, they fell by the wayside of history.

History, in other words, is dominated by those who could adequately respond to challenges, who could effectively instantiate themselves somewhere, settling into a fixed habitation. Moreover, settlement implies permanence, and that means permanent transportation routes, including roads. Permanent roads and settlement, in turn, lead to more construction. And the more construction, the more need for roads. That’s the essence of human progress.

Archaeologists believe they have found the oldest paved road in the world, dating from around 2600 B.C.E. at Giza, Egypt. Paved with slabs of limestone and flagstone, the Giza Road is six-and-a-half feet wide and stretches for some seven miles, connecting the basalt quarries along the cliffs overlooking the Nile all the way to the pyramids.

Other great civilizations, too, saw the vital importance of roads. In 221 B.C.E. the warrior Qin Shi Huang united much of what is now China into a single empire; immediately, he launched a road building effort, aimed at connecting up his vast territory. Many of the world’s oldest roads actually originated with a military or strategic function; the historic main artery of Denmark, for example, is known as the Haervejen—the military road.

And nothing, really, has changed since. Transportation is still vital to military strength, and always will be.

Moreover, as the world globalizes, transportation becomes yet more important. International commerce and the exploitation of comparative advantage: These economic and strategic goals can fully flourish only with a reliable infrastructure.

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In addition, we can easily open up this intellectual model to include means of communication. Any technology that facilitates communication—from roads and bridges that carry goods, from dredged harbors and ports that ease international shipments, from copper wires and cell-phone towers that enable voice transmission—can also be described as infrastructure.

In other words, most of the infrastructure ever built has supported transportation, or communication, or both. From the first road to the Interstate highways, from canals to railroads, from airports to fiber optic cables—they are all on a continuum of human progress.

Moreover, this progress usually involves a sequential process of layering. Only rarely does one mode of transportation or communication completely replace an earlier form; more typically, the newer mode simply layers over the earlier mode. People still walk and ride bicycles, for example, despite the existence of motorized vehicles. And people still use passenger vehicles—indeed, the motor vehicle population of the United States is rising, as is highway mileage—even as aviation continues to grow.

Meanwhile, it would be neglectful not to emphasize, once again, the military and national-security value of infrastructure. Since ancient times, polities have built infrastructure for their defense—from walls and moats for protection, to road and transport systems for enabling the rapid movement of forces.

As we have seen, the first emperor of China built roads to consolidate his domain. Half a world away, the Romans, too, consciously built strategic roads, starting with the fabled Via Appia, or Appian Way, which helped connect their empire in the fourth century B.C.E. Here in America, the Transcontinental Railroad, built in the 19th century, and the Interstates, constructed in the 20th century, were both the product of wise leaders who saw the strategic value of maximally efficient movement.

We might also note the catastrophic consequences that can occur when infrastructure systems collapse. Europe’s collapse into the Dark Ages, beginning in the fifth century, can be seen as a dire cycle of political, economic, and infrastructural decline. That is, as the Roman Empire faded away, the capacity to build and maintain roads in far-flung territories also faded away. In turn, political units further dissipated, and economic activity withered. This decline led to yet further decay of roads, to the point that each polity became a forlorn island, mostly isolated and certainly poor.

Eventually, after many bleak centuries, Europe revived, as not only political organization improved, but also the infrastructure-dependent flow of trade resumed—a trade not only of goods, but also of ideas. The German historian Ernst Robert Curtius described this brightening situation in his 1948 book, European
Literature and the Latin Middle Ages; as he explained, better transportation made it possible for itinerant scholars to travel and lecture, while also enabling more students to move to urban centers and attend universities.

Out of those hopeful glimmerings came the Renaissance. And in the centuries that followed, improved postal delivery systems made possible the flowering of the Respublica literaria, the Republic of Letters—the virtual community of intellectuals and savants across Europe that ultimately spawned the Enlightenment.

Moreover, the Scientific and Industrial Revolutions were soon born—as we will examine in the next chapter. A further benefit of economic and infrastructural growth was the emergence both of representative government and of personal freedom. In those crucial centuries, the ability to travel and communicate became truly “democratized.”

Indeed, toward the end of 18th century, one of the great champions of liberty, Adam Smith, was able to articulate the essentials of a rich and free society. In The Wealth of Nations, published in 1776, Smith, the founder of free-market economics, declared that infrastructure was a necessary part of a functioning market system:

According to the system of natural liberty, the sovereign has only three duties to attend to . . . . First, the duty of protecting the society from violence and invasion . . . . secondly, the duty of protecting, as far as possible, every member of society from the injustice or oppression of every other member of it . . . . and, thirdly, the duty of erecting and maintaining certain public works and certain public institutions, which it can never be for the interest of any individual, or small number of individuals, to erect and maintain; because the profit would never repay the expense to any individual or small number of individuals, though it may frequently do much more than repay it to a great society.  

In that same year, across the Atlantic, the American revolutionaries resolved to build a new democratic republic. As we will see in chapter 5, they specifically incorporated federal responsibility for infrastructure into the Constitution; provisions for “post Roads” appear in Article I, Section 8.

In this brief discussion of infrastructure’s key role in the development of civilization, we can see the enduring wisdom of Toynbee’s “challenge and response”

sequence. By overcoming the challenge of geographical void formlessness, by building an infrastructure that promoted commerce and industry, certain societies have surged ahead of others in recent centuries.

We can hope, to be sure, that all societies are able fully to advance, even as we observe that if they do advance, they will need more infrastructure. There is simply no road to economic prosperity that does not involve, well, roads.

Finally, we can note that just as a civilization’s infrastructure can crumble, so can its economic dynamism. It’s not a good sign for the United States, for instance, that its infrastructure in 2013 was graded as a failing “D+” by the American Society of Civil Engineers.

Americans who worry about slow economic growth, as well as stubbornly high unemployment, might give some thought to the Toynbeean challenge and response of our own era.

Just as ancient civilizations fell when they could no longer respond to challenges, so Americans should be mindful that wealth and status in the world are never guaranteed. In our time, America must once again prove itself an economic and strategic power in a world of ever-intensified competition—or else face the sad fate of many past civilizations.
2. The Ingredients of Wealth Creation

The wealth that Americans enjoy today derives from the remarkable fusion of technological development, entrepreneurial freedom, and enlightened government. It was in England that many of these positive traditions began; Albion’s history is America’s pre-history.

According to the economic historian Angus Maddison, in the year 1000, the annual per-capita GDP of England stood at $1,349 (dollar figures have been calculated in 2013 U.S. dollars). At the time, England—a lonely island on the periphery of Europe—was poorer than many lands on the continent.

Half a millennium later, in 1500, a modicum of improvement had taken place: English per-capita GDP had risen about 28 percent, to $1,886. Yet the compounded annual growth rate for those 500 years, to put those data another way, was only a glacial 0.07 percent.

Over the subsequent 300 years, as the Scientific and Industrial Revolutions began to stir, new inventions—notably the steam engine and mechanized weaving—dramatically improved English incomes. The per-capita GDP more than doubled in those three centuries, from $1,886 to $3,739; the realm’s compounded annual growth rate more than tripled, to 0.22 percent.

England was indeed hugely benefiting from this rapid economic growth. The main driver was innovation, followed by mass production and mass distribution. And infrastructure, of course, was central to this process; raw materials had to come in, and finished goods had to go out.

In the two centuries since 1800, economic growth accelerated even faster. In 2010, U.K. per-capita GDP totaled $23,777; the compounded annual growth rate more than quintupled, to 1.16 percent.¹

It’s not surprising, then, to learn that from 1800 to 2010, more than 10,000 miles of railroad and more than 200,000 miles of paved roads were built on

the island of Great Britain (England, Scotland, and Wales). We might note that the British landmass is barely larger than the state of Minnesota and smaller than the state of Michigan.

**The American Experience**

This English experience defined and shaped the early American experience. Due to the similarities of language, law, and culture, the positive breakthroughs of the Scientific and Industrial Revolutions of the 17th and 18th centuries echoed loudly in American politics—indeed, perhaps more loudly than in the Mother Country. The reason? Perhaps it’s because Americans, living across the Atlantic, already felt more distinct from London; perhaps Americans in the new world were simply more willing to embrace new ideas.

Harvard professor I. Bernard Cohen, in his 1987 volume *Revolution in Science*, makes the supremely powerful point that revolutions in science often lead to political revolutions. It’s the scientific revolution—as well as the economic revolution that comes along with it—that makes the political revolution permanent. Cohen quotes Hannah Arendt: “The modern concept of revolution is inextricably bound up with the notion that the course of history suddenly begins anew.” In other words, revolution suggests “that an entirely new story, a story never known or told before, is about to unfold.” That, to be sure, is the American story.

Yet for the first few decades of American history, it was not obvious that the new United States republic would be able to retain its full independence from Britain. The War of 1812 was an embarrassment to the United States; the British burned Washington D.C., even the White House, in 1814.

In the wake of the disappointments of that war, the United States, at least parts of it, launched a policy of faster industrialization and mobilization, aimed at making the new nation militarily secure. Along the way, as a predictable by-product, came economic prosperity.

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As the Yale historian David M. Potter wrote in 1954, we are indeed a “People of Plenty.”\textsuperscript{4} Despite enormous American population growth, or perhaps because of it—Americans numbered a mere 2.5 million souls in 1776, and more than 76.2 million in 1900—the United States surpassed Great Britain in per-capita income in 1901. Today, in a country that has continued to grow rapidly, to more than 317 million people in 2014, America’s per-capita income is nearly a fourth greater than that of the United Kingdom.

Other countries, too, have enjoyed spectacular growth. Indeed, in 2012, according to the World Bank, the United States ranked no better than seventh in the world per-capita income, adjusted for purchasing power.

So once again, we are reminded of Toynbee’s wisdom: Every civilization, including this one, faces an endless cycle of challenge and response; no civilization is ordained to be forever preeminent. Wealth and leadership in the world must be earned by doing the right thing in response to grave challenges.

And so now we must consider, more closely, a fundamental question: Where does national wealth come from? How do nations get rich?

In recent years, many Americans were bewitched by the idea that “financial innovation” could solve our economic problems. That is, a rising tide of the stock market and real estate prices would raise all boats. This financialist vision proved to be incorrect: An economy of bubbles—including, as it must, the inevitable crashes and recessions—is not a strong economy, and it does not make for a strong nation.

Instead of zero-sum financial \textit{transactionalism}, America needs positive-sum economic \textit{transformationalism}—that is, real economic growth that produces and so transforms the nation, not just bubbles that pop and go away. Economic speculation is zero-sum; by contrast, actual economic growth, based on productivity increases, is most definitely positive-sum.

Such productivity-based economic growth is positive-sum because the process of industrialization, incorporating mass production, generates ever-increasing returns. The economist Joseph Schumpeter, who devoted his life to studying closely the process of industrial development, wrote of the value of innovation in his 1939 book \textit{Business Cycles, A Theoretical, Historical, And Statistical Analysis of the Capitalist Process}: “Without innovations, no entrepreneurs; without entrepreneurial achievement, no capitalist returns and no capitalist propulsion.”

\textsuperscript{4} \url{http://www.amazon.com/People-Plenty-Abundance-Character-Foundation/dp/0226676331}
Such economic and industrial development, resting, as it does on transportation infrastructure, is, indeed, the foundation of prosperous societies.

No Infrastructure, No Wealth

Indeed, Schumpeterian capitalist propulsion inevitably includes transportation. We might start with a simple example of an economic-productivity booster: a road. So we might ask: What’s the economic rate-of-return on a road that carries raw materials, goods, and people? Answer: the rate of return for a long-lasting road borders on the incalculable.

In other words, infrastructure is inherently a key part of the pro-growth industrial vision. As noted, all wealth needs to be grown, mined, drilled, manufactured, otherwise produced, or imported, and each of those tangible acts requires a substantial base of transportation infrastructure. Exports, of course, also require infrastructure of ports and transportation.

Fortunately for the U.S. economy, leaders all through our history have seen this reality—and emphasized production at home. On November 14, 2013, for example, President Obama, visiting the ArcelorMittal Steel Factory in Cleveland, declared:

We should do everything we can to revitalize American manufacturing. Manufacturing is—that’s the hub of our economy. When our manufacturing base is strong, the entire economy is strong. A lot of service jobs depend on servicing manufacturing jobs. And, typically, manufacturing jobs pay a little bit better. So that’s been a path, a ticket to the middle class. So when we make steel and cars, make them here in America, that helps. Like I said, the work may be hard but it gives you enough money to buy a home and raise a kid, retire and send your kids to school.5

For their part, Republicans, too, have expressed support for producing and making tangibles. The 2012 Republican platform expressed the GOP’s determination to advance manufacturing, in conjunction with greater domestic energy production:

When our energy industry is revitalized, millions more Americans will find work in manufacturing, food production, metals, minerals, packaging, transportation and other fields.⁶

And Republican Tom Ridge, former governor of Pennsylvania, later the first secretary of homeland security for President George W. Bush has added these notes of urgency to the discussion, because, as we have noted, the goal of a fully competitive economy is a constantly moving target:

The United States, once seen as the leader in global manufacturing, has fallen behind other countries that are experiencing unprecedented growth, oftentimes through artificial government advantages and trade policy inequities. The attendant outsourcing manufacturing processes and products take away from American jobs, hurts the economy and unjustly promotes our international competitors. Moreover, this dependence on other countries for critical manufacturing capacity leaves the United States less safe and less secure in the context of truly catastrophic disasters.

Ridge continued:

To successfully navigate our way through this 21st century risk environment, we must avail ourselves of creative and adaptive solutions on many fronts. One of these prospective solutions—rebuilding our dilapidated infrastructure base and reestablishing a strong, diversified domestic manufacturing capacity—seems intuitively obvious.⁷

In these Democratic words and these Republican words, we can see new hope for an infrastructure renaissance.

The key variable is vision—the ability to see clearly a future in which Americans make real things, consume real things, transport real things, and export real things. In other words, what's needed is the fuller realization of the basic economic imperatives of the Scientific and Industrial Revolutions. As for the more recent Information Age, it should be seen as a further layering on top of earlier

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technological advances—because humans are corporeal beings, and they need to be able to go places and move things. Ones and zeroes do not supersede the need for mileage and tonnage.

This wisdom applies to all countries: To be rich, a country must apply its best minds to the continuously improving process of innovation, production, transportation, distribution, and consumption.

Today, in the midst of slow growth, we are reminded that we face our own “rendezvous with destiny”—to apply the favored phrase of both Franklin D. Roosevelt and Ronald Reagan. That is, a nation either mobilizes to respond and surmount its challenges, or it doesn’t. If it doesn’t, it becomes a case study in a history book, a cautionary tale of failed response—the sort of cautionary tale that a future Toynbee might tell.

Here at home, as we shall see in subsequent chapters, the domestic infrastructure industry is at the edge of a new era of energy efficiency and traffic safety—even as it continues to undergird the wealth and power of our nation.
PART II: AMERICAN FOUNDATIONS

3. Washington, Hamilton, and American Strength

Even before the American Revolution, Americans understood that the future of the North American continent would be determined by geopolitics. Who would control the continent? Which European power would determine North America’s destiny? Each of the major maritime empires—Britain, Holland, France, and Spain—had its own ambitions for our continent.

Americans, both when they were English subjects and when they were independent, understood that a “great game” was being played out in the New World. In particular, English-speakers were vehemently opposed to being ruled by French-speakers. So Benjamin Franklin, to name one wily Anglophone, was clever enough to help incite the British to eject the French from Canada and Louisiana during the French and Indian War, which continued until 1763. Then, once the French were eliminated, Franklin was free to incite his fellow Americans to rise up against the British.

Yet Americans knew that political and military victories would be transitory if not bolstered by American Strength. The continent would be theirs only if they filled it up—and if they could defend it. Just as nature abhors a vacuum, so does geopolitics.

In addition, Americans knew that if they could populate the land, and if they could defend it, they would not only be free, but would also become wealthy.

George Washington shared both of these ambitions—to be free and to be rich. Born in the colony of Virginia in 1732, Washington spent much of his early life surveying the colonial frontier, looking for routes to the West. Among the prospects that tantalized him were routes for roads between Virginia and the confluence of the Allegheny, Monongahela, and Ohio rivers—at present-day Pittsburgh. Later, as an officer in the Virginia militia, he was tasked with constructing a military road to this same strategically important area.

Meanwhile, as an entrepreneur, Washington formed the Patowmack Company, a joint-stock corporation, chartered to find a way to make the Potomac
River a navigable waterway westward. His business model would be based on the charging of tolls.

In 1770, he wrote that the prospect ahead was so obviously lucrative that there could be no argument as to its value:

Of the immense advantages which Virginia and Maryland might derive (and at a very small comparative Expence) by making Potomack the Channel of Commerce between Great Britain and that immense Territory Tract of Country which is unfolding to our view, the advantages . . . are too great, and too obvious I should think to become the Subject of serious debate.

At the same time, up and down the Eastern seaboard, other entrepreneurs of similar ambition were also looking for ways to finance roads and dig canals, so that they, too, could gain access to the riches of the interior, including inexpensive fertile land and valuable furs.

Indeed, in his entrepreneurial zeal, Washington was not shy about touting his projects, emphasizing the need for immediate investment: he warned against “ill tim’d Parsimony and supineness” on the part of his investors. Any unwillingness to pursue boldly new ventures, he added, could mean that opportunity would be lost to competitors building “other Channels.” In present-day terminology, a channel, of course, is a canal.¹

As historian Peter L. Bernstein has written, Washington wanted more than to build a successful company—he wanted also to build a successful country:

The Appalachian mountain range posed a formidable barricade between the narrow line of states touching the Atlantic Ocean and the almost boundless lands on the other side of the mountains. While rivers often lead the people on opposites sides of the banks to join in forming one community, populations divided by mountains tend to become separate nations unless easy means of communication exists between the two.

George Washington was keenly aware of this risk: Even before the Revolution, in 1775, he had expressed his concerns about the peril of losing the lands on the western side of the Appalachian Mountains to

either France or Canada, or both, unless the mountain barrier could be pierced—and soon. The pioneers moving west had little allegiance to the lands they left behind. If nothing were done, the young United States would be left squeezed between the mountains and the sea, a constricted minor-league nation compared with the growth and power developing on the other side of the mountains.2

In other words, the nation could never develop its potential greatness unless it could expand geographically. Moreover, such expansion, Washington ascertained, would require transportation and communication.

After winning the American Revolution, Washington continued to speak up for infrastructure as vital to the wellbeing of the young republic. In particular, he focused on roads, declaring not only the importance of roads, but also the importance of national leadership in overseeing their construction; local jurisdictions, if need be, would have to be bypassed. In a November 30, 1785, letter to Governor Patrick Henry of Virginia, he declared:

The credit, the saving, and convenience of this country all require that our great roads leading from one public place to another should be straightened and established by law, and the power in the county courts to alter them be withdrawn.

We might pause over those last words, suggesting that the power of local authorities might, in some cases, need to be “withdrawn.” Although local control was desirable, national supremacy in transportation held greater importance.

Thus Washington stood as an early advocate of American infrastructure. As for that specific term “infrastructure,” we might note that it dates from 1927; before then, the common phrase was “internal improvements.”

The goal for Washington was both strong nation building and national economic development, including private gain. As Bernstein observes, “Ink on the peace treaty declaring American independence was barely dry before Washington was organizing the Patowmack Company to convert the Potomac River into a canal,” connecting Alexandria, Virginia, to the interior.3

On April 30, 1789, Washington was inaugurated as the nation’s first president, and he immediately set about building yet another form of


3. Ibid., p. 23.
infrastructure—lighthouses. These were structures vital both to commercial navigation and to national security. Barely more than four months into his first term, Washington signed the Lighthouses Act of 1789. As the U.S. Senate Historical Office notes:

The Lighthouses Act of 1789, one of several laws that the First Congress passed to regulate and encourage the trade and commerce of the new nation, extended federal control and funding of lighthouses that states had previously administered.4

In other words, this Lighthouses Act established an important precedent, signaling that the federal government would play a substantial role in national infrastructure development.

Alexander Hamilton on American Industry

Now we come to perhaps the most important figure in Washington’s Cabinet, Alexander Hamilton, the nation’s first secretary of the Treasury. Hamilton was particularly focused on military issues, seeing industrial production as a key aspect of national grand strategy.

Hamilton is typically remembered, of course, not for his military thinking, but rather for his economic and political thinking. Yet to Hamilton, economic and political thinking was just strategic military thinking of a different kind. It’s worth recalling that at the age of 20, he dropped out of college to join a pro-independence militia. Soon thereafter, he became George Washington’s aide-de-camp in the American Continental Army; so as we can see, Hamilton’s early career was mostly military.

Indeed, the young Hamilton thirsted for the glory of combat. Toward the end of the Revolutionary War, in 1781, after years at Washington’s side as a staff officer, Hamilton left headquarters to take command of an American battalion on the front line. At Yorktown, on October 14, 1781, he led a daring nighttime attack that captured a British redoubt; it was a turning point in the battle. The British army under Cornwallis surrendered five days later, and the Revolution was won.

Even though Hamilton had personally proven that physical bravery was a key part of winning the war, he also understood that technological mastery was similarly critical. The rebellious colonies, he realized, had been at a distinct

disadvantage throughout the war, lagging in the production of such vital military wares as naval artillery, muskets, and gunpowder.

Hamilton knew, too, that if the United States remained merely an agrarian country, it would inevitably be at a disadvantage compared to the rising industrial powers of Europe. He was, to be sure, a profit-oriented financier and businessman, but he also, until his dying day, believed that military strength, deriving from industrial might, would be the key to America’s long-term success. So it’s worth examining Hamilton’s career through the prism of his ambition—for a militarily strong America.

As one of the authors of the highly influential Federalist Papers, arguing for America to achieve its destiny as a strong country with—of necessity—a strong central government, Hamilton helped push the ratification of the U.S. Constitution.

Article I, Section 8, of the U.S. Constitution, ratified on March 4, 1789, is replete with Hamiltonian enumerated powers assigned to the central government: “To regulate commerce,” “To fix the standards of weights and measures,” and “To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.”

Each of these enumerated powers indeed offers Congress broad authority. The same article also includes the sweeping power “to make all laws which shall be necessary and proper for carrying into execution the foregoing powers.” In other words, according to the original language of our founding document, Congress has all the power it needs to carry out its enumerated missions.

In particular, though, we might dwell on Clause 7, the so-called postal clause, which outlines the federal power of road building; the precise language is, “To establish Post Offices and post Roads.”

Later that same year, President Washington appointed Hamilton to the treasury, and one of the young secretary’s principal missions was to strategize the advancement of American industry for the sake of both national wealth and national defense.

In his January 8, 1790, Message to Congress, drafted with the help of Hamilton, President Washington declared:

A free people ought not only to be armed, but disciplined; to which end, a uniform and well digested plan is requisite: and their safety and interest
require that they should promote such manufactories as tend to render them independent on others for essential, particularly for military supplies.5

In other words, to cut through the ornate 18th century language, our first president was making our national strategy clear to all: America must always be able to make its own defense capacity, and must never be dependent on other countries for military wares. This, Washington believed, was the key to American Strength.

Obedient to Washington’s strategic vision, Hamilton went to work. On December 5, 1791, he submitted his “Report on Manufactures” to Congress and, in the very first paragraph, made his intentions clear—that the United States must industrialize in order to insure its independence:

The Secretary of the Treasury . . . has applied his attention . . . to the subject of Manufactures; and particularly to the means of promoting such as will tend to render the United States independent on foreign nations, for military and other essential supplies.

Those are profound words: Hamilton is saying, yet again, that for the acquisition of military supplies, the United States must be “independent” of foreign nations; it must be able to manufacture its own, within its own borders.

Always the businessman, Hamilton indeed favored expanded foreign trade—including buying items from abroad—but not if such trade came at the expense of U.S. national security:

Every nation ought to endeavour to possess within itself all the essentials of national supply. These comprise the means of subsistence habitation clothing and defence. The possession of these is necessary to the perfection of the body politic, to the safety as well as to the welfare of the society.

Hamilton then summoned up a painful reminder:

The extreme embarrassments of the United States during the late War, from an incapacity of supplying themselves, are still a matter of keen recollection.

That is to say, for want of needed war materiel, America almost lost its Revolution. So Hamilton’s Report was intended, first and foremost, as a national security document. The treasury secretary, who had fought at Washington’s side during the Revolution, saw that America could never be fully secure if it was, in fact, reliant on Britain, or any other foreign power, for vital war materiel.

Nor was military preparedness ever far from Washington’s mind as well. As Washington had asserted in a 1781 letter to the Marquis de Lafayette, “It follows then as certain as that night succeeds the day, that without a decisive naval force we can do nothing definitive.” And, to state the issue of a powerful naval positively, Washington added, “With it, [we can do] everything honorable and glorious.”

In other words, Hamilton’s document emphasized all the elements of national security: military preparedness, as well as the commercial and industrial capacity needed to undergird such preparedness.

We might also note that Hamilton continuously emphasized the infrastructure needed to facilitate these necessities; an entire section of the Report was entitled, “The facilitating of the transportation of commodities.”

As he explained, solid infrastructure had been particularly helpful to manufacturers in England; now it was time to provide the same help to American manufacturers:

There is perhaps scarcely any thing, which has been better calculated to assist the manufactures of Great Britain, than the meliorations of the public roads of that kingdom, and the great progress which has been of late made in opening canals. Of the former, the United States stand much in need.

Therefore, the United States is in great need of “public roads.” Such infrastructure would enrich and empower America:

Good roads, canals, and navigable rivers, by diminishing the expense of carriage, put the remote parts of a country more nearly upon a level with those in the neighborhood of the town. They are, upon that account, the greatest of all improvements.


And while Hamilton supported state and local efforts, he suggested that such efforts would not be sufficient; the federal government would need to step in:

**There can certainly be no object more worthy of the cares of the local administrations; and it were to be wished that there was no doubt of the power of the National Government to lend its direct aid on a comprehensive plan.**

In other words, infrastructure was one of those issues where the federal government could and should step in.

Moreover, the modernizing capitalist in Hamilton couldn’t resist putting in the pitch for yet more industry. Wealth, he observed in his *Report*, is “materially connected with the prosperity of manufactures.” He added, “The States in which manufactures have most increased, have recovered fastest from the injuries of the late war.” Agricultural life might have its charms, but the path to national riches was mass production.

Hamilton further argued for the virtues of “machinery”:

**The employment of machinery forms an item of great importance in the general mass of national industry. . . . The prodigious effect of such a machine is easily conceived.**

But of course, production by machinery—what we now call “mass production”—was useless if the products could not be sold and distributed, and so transportation infrastructure, too, was vital.

Yet for all of Hamilton’s paeans to prosperity, his greater focus remained on national strength—on national survival. The treasury secretary was fully aware that America would have to defend itself against enemies in the future.

The new nation, he argued, must develop what we would now call a defense-industrial base. It was a project that, he wrote, “merits all the attention of and all the zeal of our public councils.” He concluded with an exhortation: “Tis the next great work to be accomplished.”

To be sure, Hamilton’s ideas confronted plenty of opposition. His great rival in the 1790s was a fellow member of President Washington’s Cabinet, Secretary of State Thomas Jefferson, who, at least at that time, was skeptical, even hostile, to the idea of industrialization.

Still, it’s worth remembering that Hamilton’s *Report* was one of the most important originating documents of the new American nation. It was written by the
first treasury secretary and endorsed by the first president. Truly, that’s about as inherently and authentically American as one can get.

Washington and almost every U.S. president since has understood the importance of an explored, settled, unified, and fortified America.

Still, some might ask: Were the actions of President Washington and Secretary Hamilton fully in keeping with the Constitution? Was Washington’s endorsement of national leadership in transportation appropriate? The answer to both of those questions is “yes,” as we shall see in the next chapter.
4. The Constitutional Basis of American Strength

In the preceding chapter, we saw that our first president, George Washington, enthusiastically embraced not only infrastructure, but also a strong national role for infrastructure development.

So it would seem that infrastructure, as part of the nation’s heritage, is a well-established concept. Yet some might ask: What about the Constitution? Is infrastructure firmly grounded in the Constitution?

The answer is yes: Infrastructure is fully constitutional. To demonstrate that point, we can go right to the source, to the beginning of the effort to draft our founding document. Chaired by Washington himself, the Constitutional Convention convened in Philadelphia on May 25, 1787; the document was formally adopted, after nearly four months of debate, on September 17, 1787.

Earlier, we noted that Article I, Section 8, Clause 7, of the Constitution includes the authorization for Congress “to establish Post Offices and post Roads.” Since the essence of a post-office system is service to the widest possible area of a nation, we can immediately see that this is a broad-ranging power.

Indeed, the origins of the post office in America dated back more than a century earlier, and the service had always been intended to be broad-ranging. The English Postal Act of 1660 had set up a postal system in England, Scotland, Ireland, and “other of his majesty’s dominions”—that is, including the American colonies. The postal system was declared to reach “to and from all and every the kingdoms and countries where he [his majesty] shall settle or cause to be settled posts or running messengers for that purpose.”

In 1672, the English government authorized Governor Francis Lovelace of New York to establish a post road from New York to Boston.

Twenty years later, in 1692, the English government went yet further. The co-regents of the realm, William and Mary, granted letters patent—a public legal

instrument—to Thomas Neale, to serve, in effect, as America’s first postmaster general. Neale’s mandate:

To erect, settle and establish within the chief parts of their majesties’ colonies and plantations in America, an office or offices for the receiving and dispatching letters and pacquets, and to receive, send and deliver the same.²

Benjamin Franklin, we might note, was appointed in 1737 as a deputy postmaster at Philadelphia; he would serve the English postal service for the next 37 years, until the Crown dismissed him because of his revolutionary sympathies. Indeed, in 1774, the same year that Franklin was fired, a Maryland publisher, William Goddard, established a private postal service, known as “constitutional,” to distinguish it from the English system. The idea soon spread to 10 of the 13 American colonies.

The following year, on July 25, 1775, the Second Continental Congress designated Ben Franklin as the first postmaster-general of the United States; he was to be paid a salary of $1,000 a year, plus $340 a year for an assistant. Franklin, in turn, appointed William Goddard to be the surveyor of posts. As the Virginia Gazette reported on September 1, 1775, Goddard’s mission was “to establish offices in the principal towns and other commercial places under the authority of Benjamin Franklin, esq.” The Post Office functions would commence, the Gazette continued, “as soon as the officers are commissioned and the routes fixed.”³

On October 18, 1782, the Continental Congress authorized a postmaster-general to establish posts from New Hampshire to Georgia.

The Federalist Papers

In the late 1780s, the much-needed U.S. Constitution still had to be ratified.

As we know, The Federalist Papers were a series of 85 essays written by Hamilton, John Jay, and James Madison, all aimed at persuading Americans to ratify the Constitution. Constitutional scholars routinely study The Federalist Papers to gain insight into what the Founders were thinking as they debated ratification in particular and the future of the nation in general.

2. Ibid., p. 128.
3. Ibid., p. 137, emphasis added.
As we have seen, the Founders strongly believed that a national postal system—including postal roads—was a good idea. They also strongly believed that a national system aimed at promoting economic development, including infrastructure, was an equally good idea.

James Madison, the chief architect of the Constitution, as well as our fourth president, wrote in praise of “internal improvements,” i.e. infrastructure, in the *Federalist Paper*, No. 14, published on November 30, 1787:

*The intercourse throughout the Union will be facilitated by new improvements. Roads will everywhere be shortened, and kept in better order; accommodations for travelers will be multiplied and meliorated; an interior navigation on our eastern side will be opened throughout, or nearly throughout, the whole extent of the thirteen States. The communication between the Western and Atlantic districts, and between different parts of each, will be rendered more and more easy by those numerous canals with which the beneficence of nature has intersected our country, and which art finds it so little difficult to connect and complete.*

And in the *Federalist Paper*, No. 42, published the following year, on January 22, 1788, Madison emphasized the specific national responsibility to “establish post offices and post roads”:

*The power of establishing post roads, must, in every view, be a harmless power; and may, perhaps, by judicious management, become productive of great public conveniency. Nothing, which tends to facilitate the intercourse between the states, can be deemed unworthy of the public care.*

In other words, Madison saw clearly the political and economic value of national authority to connect the nation though an infrastructure of communication and transportation. Indeed, all the Founders had the issue of roads well in mind when they drafted and ratified the Constitution.

Greatly bolstered by the arguments of Madison, Hamilton, and Jay, the Constitution was ratified on March 4, 1789. On September 26 of that year, Samuel Osgood, a longtime patriot who had led a company of militiamen at Lexington and Concord in 1775, was appointed to be the first Postmaster General of the United States.

Thus the idea of a post office—and of postal roads—is as much a legitimate part of the Constitution as any other part of our immortal founding document. After all, a strong nation rests on a strong economy, and a strong economy rests on strong infrastructure—just as the Constitution intended.
The Constitutional Text

And as we have noted, Article I, Section 8, Clause 7, authorizes Congress to “To establish Post Offices and post Roads.” As with virtually every other aspect of the Constitution, these words were not without controversy; some observers at the time argued that the Constitution authorized Congress merely to designate post office and post roads, not actually to fund them. Still, the precise word used in the Constitution, “establish” was plain enough to most contemporaries: Congress had the power both to build post offices and to build the roads that connected them—the roads needed for carrying the mail.

This issue was settled once and for all in 1833, when Justice Joseph Story, a major intellectual force during his 34 years on the Supreme Court, declared that the words of Section I, Article 8, “to establish,” identified a congressional power actually to build roads, not simply to designate them. In his magisterial *Commentaries on the Constitution of the United States*, Story argued:

The received general meanings, if not the only meanings of the word “establish,” are, to settle firmly, to conform, to fix, to form or modify, to found, to build firmly, to erect permanently.

Noting that every administration since Washington’s “has repudiated the strict and narrow construction of the words,” the Justice Story maintained:

Nobody doubts, that the words ‘establish post-roads,’ may, without violating their received meaning in other cases, be constructed so, as to include the power to lay out and construct roads.”

Consequently, Story construed this congressional authority broadly: “If it be the right and duty of Congress to provide adequate means for the transportation of the mails . . . what limit is there to these means, other than that they are appropriate to the end?”

Story cited, as one of his guiding authorities, the English conservative Edmund Burke, who had declared, “Government is a contrivance of human Wisdom to provide for human wants.” It’s that spirit of law-abiding pragmatism, we might note, that has always guided constitutional nations forward.

Indeed, at the time of the debate over the ratification of the Constitution, the reality that America already possessed an extensive network of post offices and

post roads was well known and well accepted. As David F. Forte, writing for the Heritage Foundation, a conservative Washington, D.C., research institution, notes:

Following the adoption of the Constitution, the Act of September 22, 1789 (1 Stat. 70), established (at first temporarily) a post office and created the Office of the Postmaster General. By that time, seventy-five post offices and over 2000 miles of post roads already existed.5

The English Inheritance

So we can see a clear continuity on the matter of post offices and post roads: Americans, led by Franklin, simply carried on what the English had begun. As the eminent English legal scholar Sir Henry Maine declared in his 1885 volume, Popular Government:

The American Constitution is distinctively English; this might be proved alone . . . by its taking two Houses, instead of one, or three, or more, as the normal structure of a legislative assembly.6

An American scholar, the late James McClellan, in his 2000 book, Liberty, Order, and Justice: An Introduction to the Constitutional Principles of American Government, strongly agreed. He noted that the English Magna Carta, from 1215,

Is often regarded as the foundation of Anglo-American liberties, because it established the principle that all Englishmen, not just the Lords, are entitled to personal liberty, and that no man, including the King himself, is above the law.

McClellan elaborated on this point:

Many of the individual rights guaranteed in these documents, as we shall later observe, reappear in our first State constitutions, in our Federal Constitution, and in our Bill of Rights. The “law of the land” clause in Magna Carta, for example, which later came to be known as “due process of law,” will be found in the Fifth and Fourteenth amendments of the United States Constitution.


Still, some might wonder: If the Americans had rebelled against the English, would they really wish to keep faith with so much of the English constitutional tradition? After all, the Founders had declared that the United States would build a *novus ordo seclorum*—“a new order for the ages.” Could such a “new order” really exist on the foundation of the old order from across the Atlantic Ocean?

In his book, McClellan took up this question, posing it rhetorically: “Why should the Americans of 1787, so recently at war with Britain, have drawn up a constitution incorporating among its principal features institutions and principles long established in England?” His answer:

> **Because they, like their ancestors, were familiar with those British constitutional features and found them desirable; also because colonial charters and the constitutions of the Thirteen States had been framed on the British model, for the most part, and Americans had grown accustomed to their operation. Besides, the great majority of American citizens were British citizens who spoke English, read English books, enjoyed “the rights of Englishmen,” and participated in a culture basically English.**

McClellan earned both a Ph.D. and J.D. from the University of Virginia—the school founded by Thomas Jefferson—and, in the early 1980s, when Republicans controlled the Senate, he served as chief counsel and staff director of the Subcommittee on Separation of Powers of the Senate Judiciary Committee. So if McClellan—and virtually every other scholar—sees profound linkages between English history and American constitutionalism, then we too, should see the topical relevance of tracing the lineage connecting the precedents of the 17th century, the language of the 18th century, and the policies of the 21st century.

5. **Jefferson: Paradoxical Champion of American Strength**

Thomas Jefferson stands as a paradoxical figure in the history of American infrastructure. On the one hand, early in his career, he was often skeptical of "internal improvements" and industrialization. Yet later in his life, he strongly advocated expansionist American policies, further acknowledging that internal improvements were necessary components of such expansion.

In particular, as president from 1801 to 1809, Jefferson consistently sought to defend American interests against foes and potential foes; he realized that internal improvements were vital for American economic and military strength. Indeed, toward the end of his long life—he died in 1826—Jefferson’s evolving views caused him to embrace many of the ideas once advanced by his erstwhile rival, Alexander Hamilton, who had died decades earlier.

Moreover, Jefferson’s forceful and ambitious policies made it far more likely that his presidential successors would also pursue pro-growth, pro-expansion policies, if for no other reason than to maintain and defend Jefferson’s earlier accomplishments.

In other words, Jefferson traversed a broad intellectual course during his 83 years. Born on a plantation, the young man had instinctively championed the agrarian way of life; in *Notes on the State of Virginia*, first written in 1781, he extolled agricultural virtues, declaring, “Cultivators of the earth are the most virtuous and independent citizens.” Continuing in that vein, he added:

> Those who labour in the earth are the chosen people of God, if ever He had a chosen people, whose breasts He has made His peculiar deposit for substantial and genuine virtue. It is the focus in which He keeps alive that sacred fire, which otherwise might escape from the face of the earth.

Jefferson was not simply a rural romantic; he feared that cities and industry would steal away the natural self-reliance of rural folk. As he asserted in the same *Notes*, “Dependence begets subservience and venality, suffocates the germ
of virtue, and prepares fit tools for the designs of ambition”—that is, tools for the ambitious designs of demagogues and dictators.¹

Indeed, in 1781, he speculated that America, having not yet clinched its independence from Britain, might be better off even without sea power:

Perhaps, to remove as much as possible the occasions of making war, it might be better for us to abandon the ocean altogether, that being the element whereon we shall be principally exposed to jostle with other nations.

Yet just three years later, in 1784, Jefferson had abandoned such isolationism, realizing the necessity of overseas trade: “We ought to begin a naval power, if we mean to carry on our commerce.”²

Thus we see Jefferson pondering the myriad issues and controversies associated with the new nation, reaching different conclusions at different times—although as we can see, he settled, ultimately, strongly on the side of greater national power.

Indeed, because naval power was so important to the young republic—a nation then confined to the Eastern seaboard—we might pause to take note of the views of his rival, Alexander Hamilton, who addressed, at great length, the vital importance of naval power.

In Federalist Paper No. 11, published on November 23, 1787, Hamilton began by pronouncing on the importance of ocean-going commerce—and on the need for a strong naval force to protect it. The importance of commerce, both domestic and international, “is one of those points about which there is least room to entertain a difference of opinion.”

Hamilton then explained that only a strong America, boasting a strong navy, could adequately defend American commercial interests:

Under a vigorous national government, the natural strength and resources of the country, directed to a common interest, would baffle all


the combinations of European jealousy to restrain our growth. This situation would even take away the motive to such combinations, by inducing an impracticability of success. An active commerce, an extensive navigation, and a flourishing marine would then be the offspring of moral and physical necessity.

Continuing his argument, Hamilton outlined the opposite prospect: An America without a strong Navy would be too weak to stop other maritime nations—he used the word “combinations,” as in, hostile alliances—from damaging or even destroying our economic interests:

**But in a state of disunion, these combinations might exist and might operate with success. It would be in the power of the maritime nations, availing themselves of our universal impotence, to prescribe the conditions of our political existence. . . . They would in all probability combine to embarrass our navigation in such a manner as would in effect destroy it, and confine us to a PASSIVE COMMERCE.**

And such an outcome, he concluded, would be disastrous:

**We should then be compelled to content ourselves with the first price of our commodities, and to see the profits of our trade snatched from us to enrich our enemies and persecutors. That unequaled spirit of enterprise, which signalizes the genius of the American merchants and navigators, and which is in itself an inexhaustible mine of national wealth, would be stifled and lost, and poverty and disgrace would overspread a country which, with wisdom, might make herself the admiration and envy of the world.**

In other words, Hamilton warned, a militarily inferior United States would also be a poor United States.

**President Jefferson Expands America**

Hamilton, of course, never ascended to the presidency. But Jefferson did. On his path to the presidency, he had occasion to think more about the importance of national unity as the source not only national strength, but also of national liberty, as he wrote in 1795:

3. [http://avalon.law.yale.edu/18th_century/fed11.asp](http://avalon.law.yale.edu/18th_century/fed11.asp)
To obtain a just republic (and it is to secure our just rights that we resort to government at all) it must be so extensive as that local egoisms may never reach its greater part. . . . The smaller the societies, the more violent and more convulsive their schisms.⁴

In other words, Jefferson could see the value of a greater America, one that would subsume local differences and prejudices.

In 1801, the Virginian was inaugurated as our third president. And within a few months of his inauguration, he faced a challenge not of internal discord, but of foreign threat. He felt compelled to go to war to protect American seafaring against the depredations of the Barbary Pirates.

In fact, it was Jefferson who launched the greatest overseas military operation up to that point, projecting American power all the way to the Mediterranean—“to the shores of Tripoli,” in the words of the Marine hymn. The fighting, which lasted from 1801 to 1805, involved some 20 U.S. warships. The result was an American victory, although it would take a second war, a decade later, finally to subdue the pirates and to completely safeguard American shipping.

Perhaps even more ominously, in 1801, Napoleon’s France had seized possession of the Louisiana Territory from Spain. That was a vast stretch of some 828,000 square miles, reaching from the Gulf of Mexico to the Canadian border. The French leader had even sent troops to reinforce his grip on New Orleans, potentially threatening the full range of Southern American states, perhaps the entire United States. After all, Napoleon’s armies had overrun the whole of the European continent—could they do the same to North America?

Jefferson could see what a grave threat this new foreign occupation posed to the United States:

This little event, of France’s possessing herself of Louisiana, is the embryo of a tornado which will burst on the countries on both sides of the Atlantic and involve in its effects their highest destinies.⁵

The following year, 1802, Jefferson established the U.S. Military Academy at West Point. (The U.S. Naval Academy would come much later, in 1845.)

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The year after that, in 1803, Jefferson undertook to solve the impending continental crisis in a creative and imaginative way: He bought out the French. Working through Robert R. Livingston, America’s minister to France, he bought the entirety of the Louisiana Territory. Livingston was moved to exult, “The United States take rank this day among the first powers of the world.”

Indeed, the massive expansion of American dominion established the United States as the dominant power in North America—but only, of course, if it could hold on to all this new territory.

That following year, 1804, Jefferson dispatched the explorers Meriwether Lewis and William Clark to survey the newly purchased territory, as well as the land extending all the way to the Pacific shore. This expedition lasted two years, but when Lewis and Clark returned with their reports of the tantalizing bounty and plenty awaiting out west, observers agreed that the United States needed a plan for getting to it—and thus connecting the vast new country.

So just as President Jefferson had come to abandon his isolationist views on naval fleets, so, too, he began to rethink his indifference to land-based infrastructure. As we have seen, the United States, by the 1780s, had developed a substantial network of post roads, some 2,000 miles. And that network had continued to expand throughout the 1790s, during the presidencies of both George Washington and John Adams.

Paul Chen, a political scientist at Western Washington University, outlines the situation that America confronted in 1800, the year that Jefferson was first elected to the presidency:

By 1800, Americans recognized that infrastructural links between the Atlantic coast and the North American interior were essential for both the long-term economic and political development of the fledgling nation. Internal improvements—as the building of infrastructure, such as roads and canals, was called in early America—was an issue that constituted one of the great political debates in that era. In characterizing its political salience during that period, one scholar described internal improvements as “one of the most persistent and contentious issues of antebellum American politics,” and ‘a key point of contention in inter-branch rivalries’ between the executive and Congress.6

Indeed, infrastructure was a controversial issue at that time. And Jefferson's own views on the subject continued to evolve. In a famous passage from his first inaugural address in 1801, the new president had declared that the national model should be minimal government and minimal government activity:

*A wise and frugal Government, which shall restrain men from injuring one another, shall leave them otherwise free to regulate their own pursuits of industry and improvement, and shall not take from the mouth of labor the bread it has earned.*

To be sure, nobody wants an unwise or non-frugal government, and once the new commander-in-chief took office, the imperatives of actually leading the nation weighed heavily upon him. As we have seen, the need to defend the United States—now grown to 16 states—in the face of strategic challenges from European power had forced Jefferson to expand the United States even further; the lands of the Louisiana Territory would ultimately be apportioned among 15 new American states.

Jefferson was thus proving himself to be an outstanding champion of nationalized American Strength. The historian Henry Adams—great-grandson of President John Adams, whom Jefferson had defeated in the 1800 presidential election—wrote, in his *History of the United States of America During the Administrations of Thomas Jefferson*, that the Sage of Monticello “gave up his Virginia dogmas” during this time. That is, Jefferson abandoned the traditionally pro-agriculture, anti-industrial views of the planter class.

**Jefferson Adopts the Gallatin Plan**

Meanwhile, as America moved westward, the issue of promoting transportation and commerce was becoming increasingly important. In those days, the mere building of a road through the wilderness—cutting down trees, building bridges, maintaining the roadway—meant the incurring of a great expense. America was still, after all a poor country.

So the politics of building what would become known as the National Road, connecting the East to the ever-lengthening frontier, was bound to be fraught with controversy.

Yet Jefferson boldly stepped into that controversy. In 1802, at the urging of his Treasury Secretary, Albert Gallatin, the president signed the Ohio Enabling Act, which stipulated that five percent of the revenues from the sale of public land in Ohio would be saved for the future construction of the National Road. Indeed, as that fund accumulated, Jefferson called upon Congress to devote future budget
surpluses “to rivers, canals, roads, arts, manufactures, education, and other great objects within each state.”

In 1806, Jefferson signed legislation actually to begin building the National Road. The first step was a 130-mile artery to connect the Potomac River at Cumberland, Maryland, to the Ohio River at Wheeling, Virginia (now West Virginia). We might note that this project was the realization of George Washington’s youthful dream of using the Potomac to foray westward.

This first portion of the National Road was completed in 1818. The Road was also notable because its builders made use of the new technique developed by the Scotsman John Loudon Macadam: a road surface of crushed stones, slightly convex to allow for drainage off to the sides, resting on a road bed of large stones. Later, tar was added; this method, and material, came to be known as “macadam.” Today, the path of the National Road is known as U.S. Route 40, stretching from New Jersey to Utah.

Meanwhile, Treasury Secretary Gallatin—a thinker and strategist in the Washington-Hamilton tradition, who had first met Washington decades earlier, when they were both land surveyors—prepared a report to Congress, entitled, Report on Roads, Canals, Harbors, and Rivers. In ambitious and visionary terms, Gallatin described both what he thought needed to be done and also the benefits of doing it:

> The early and efficient aid of the Federal Government is recommended by still more important considerations. The inconveniences, complaints, and perhaps dangers, which may result from a vast extent of territory, cannot otherwise be radically removed or prevented than by opening speedy and easy communications through all its parts. Good roads and canals will shorten distances, facilitate commercial and personal intercourse, and unite, by a still more intimate community of interests, the most remote quarters of the United States. No other single operation, within the power of Government, can more effectually tend to strengthen and perpetuate that Union which secures external independence, domestic peace, and internal liberty.

Gallatin’s report was without a doubt ambitious: He suggested another national road, this one stretching from Maine to Georgia. In addition, he advocated new canals across the country, including, most presciently, a canal across New York State, linking the Hudson River to the Great Lakes.

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To achieve these goals, Gallatin argued the necessity of federal leadership:

The national legislature alone, embracing every local interest, and superior to every local consideration, is competent to the selection of such national objects.

Only Uncle Sam, Gallatin continued, could help the nation by “opening speedy and easy communication through all its parts.” Such efforts, Gallatin concluded, would provide the “cement of interest” for the nation.

By the time of his Eighth Annual Message to Congress, delivered in 1808, Jefferson had seen the value of the Hamiltonian program as a way of defending the nation and so guaranteeing American Strength. Addressing the issue of arms and munitions, Jefferson noted “the difficulty of procuring them from abroad”—a difficulty, he continued, that has “induced us to direct our whole efforts to the means of internal supply.” That is, President Jefferson saw clearly the need to develop a robust domestic military-industrial base.

In the same message, Jefferson enlarged his vision of American strength to include what was then called, as we have noted, “internal improvements.” If the United States wanted to expand its industrial might, the third president declared, it had no choice other than to expand its infrastructure:

The situation into which we have thus been forced, has impelled us to apply a portion of our industry and capital to internal manufactures and improvements. The extent of this conversion is daily increasing, and little doubt remains that the establishments formed and forming will—under the auspices of cheaper materials and subsistence, the freedom of labor from taxation with us, and of protecting duties and prohibitions—become permanent.

In addition, President Jefferson signaled his preference for using surplus federal revenues for public investments—that is, for “roads, canals, rivers, education, and other great foundations of prosperity and union.”8 This was a major intellectual change for the Commander in Chief, wrought during his time in the White House. Unfortunately, many historians have not provided a full understanding of this modification—or evolution—of Jefferson’s views.

Jefferson’s eventful presidency concluded in 1809, but this Founding Father’s thinking on industry continued to evolve. In a letter dated January 9, 1816, the former president, now in his 70s, explained that his views had changed considerably in the three-and-a-half decades since he wrote *Notes on the State of Virginia*. Addressing one Benjamin Austin, he wrote:

> You tell me I am quoted by those who wish to continue our dependence on England for manufactures. There was a time when I might have been so quoted with more candor. But within the 30 years, which have since elapsed, how are circumstances changed!

Jefferson explained that in peacetime, it was acceptable to rely on other countries for manufactured goods:

> We were then in peace; our independent place among nations was acknowledged. A commerce which offered the raw material, in exchange for the same material after receiving the last touch of industry, was worthy of welcome to all nations.

But such trade depended on free international commerce:

> This was the state of things in 1785, when the “Notes on Virginia” were first published; when, the ocean being open to all nations, and their common right in it acknowledged and exercised under regulations sanctioned by the assent and usage of all.

But then, Jefferson lamented, circumstances changed:

> But who, in 1785, could foresee the rapid depravity which was to render the close of that century a disgrace to the history of man? Who could have imagined that the two most distinguished in the rank of nations, for science and civilization, would have suddenly descended from that honorable eminence.

Jefferson was referring here to both England and France, both of which, he sighed, had sought to “cover earth and sea with robberies and piracies.” Meanwhile, he added, referring to the Barbary Wars that he had fought, American ships had been “despoiled,” and “thousands of our citizens reduced to Algerine slavery.”

He concluded that full American independence from Europe, to say nothing of freedom from piracy, required economic independence, as well as military strength:
Shall we make our own comforts, or go without them at the will of a foreign nation? He, therefore, who is now against domestic manufacture, must be for reducing us either to dependence on that foreign nation, or to be clothed in skins, and to live like wild beasts in dens and caverns. I am not one of these. Experience has taught me that manufactures are now as necessary to our independence as to our comfort.⁹

In other words, Jefferson was now advocating industrial development—which could never be possible, of course, without infrastructural development. And without infrastructure, it would never be possible to imagine a future urbanized, industrial, powerful America.

Jefferson might have been a believer in small government, but as his presidency proved, he was also a believer in a government capable of expanding and protecting the nation. And so, of necessity, the Jefferson of the 18th century proved to be a far different figure from the later Jefferson, the man of the 19th century.

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6. Madison and DeWitt Clinton’s Canal to the Future

Thomas Jefferson’s presidency created a strategic paradox for the United States: The nation was expanding faster geographically than it was strategically. If America was to expand throughout the length and breadth of the continent, it had to be able to consolidate and defend its new territory. Jefferson had the vision to double the size of the United States; subsequent presidents would have to show the vision needed to keep the nation both intact and sovereign, even as they yet further expanded the country's size.

After all, the imperatives of great-power politics had not changed; virtually all the major European powers coveted new lands in North America. So if the United States wanted to be alone in its continental dominion, it would need the strength to fend off rivals. Britain, in particular, was enjoying a remarkable economic boom in the late 18th and early 19th centuries; the Industrial Revolution—including steam, textiles, and iron — had been launched in the British Midlands. Yes, Britain had lost the Revolutionary War to the Americans, but in the following decades, the Empire was growing ever more powerful.

And so we can introduce two important themes to our chronicle:

First, if a nation expands its territory, it must also expand its national strength. Territory gained must also be territory defended, and that territory must be filled in and developed—with people, commerce, and military strength. It is not logical, and certainly not sustainable, to make commitments that cannot be maintained. The United States is not exempt from that reality.

Second, in the competitive tournament of nations, it's not enough for the United States, or any nation, simply to improve its national strength, including infrastructure; it must also improve itself at a rate that keeps pace with international rivals. If a nation falls behind in international strategic competition, it faces the prospect of diminishment and defeat.

As we have seen, America gained strength during the early decades of the republic. And yet the unfortunate reality, that the nation was still at risk, was made plain during the presidency of Jefferson’s successor, James Madison. During the War of 1812, no less than the U.S. Capitol was put to the torch by invading British forces. And while America managed to fight its way to a draw in 1815, the disappointment
of the war forced U.S. leaders to grapple more resolutely with the challenge of keeping America strong and secure.

Yet before we get to the war, we might look at some of the progress that had been made in the previous decades. In the wake of American independence, road building continued, as the U.S. population grew from 3.1 million in 1783 to 6.8 million 25 years later.

During those years, road building continued apace. Yet most of the roads in the young United States were simply dirt paths, connecting farms and villages, sustained by local taxes.

Other, more ambitious, roads were financed by tolls. The Lancaster Turnpike, connecting Lancaster, Pennsylvania, to Philadelphia, proved to be a signal success when it opened in 1794. Many other similar toll-charging turnpikes were built soon after.

One significant “roadpreneneur” was Ebenezer Zane. Having successfully petitioned Congress for a grant of land stretching across what later became south-central Ohio, Zane built a road connecting Wheeling (then in Virginia, now in West Virginia) to Maysville, Kentucky. That road, finished in 1797, was crude—not suitable, for example, for wagons. Still, it was a significant improvement over wild forest and swampland.

Indeed, for several years, “Zane’s Trace” was the only road in the Northwest Territory. Yet in 1803, after Ohio became a state, the legislature, aided by the federal government, set about making further improvements. The Ohio town of Zanesville is named in Zane’s honor.

Meanwhile, our fourth president, James Madison, inaugurated in 1809, had mixed feelings about infrastructure, as well as about the financing of national projects in general. As we have seen, Madison wrote in favor of national infrastructure during the Federalist debate of the late 1780s, and the Constitution that he authored clearly makes provision for “post roads” as part of a larger network. Yet once in the White House, he maintained his doubts about the propriety of national infrastructure projects.

Another hot issue during his presidency was the Bank of the United States. The bank, based in Philadelphia, was viewed with suspicion in much of the rural South. In 1811, the Virginia-born President Madison allowed the charter for the bank to expire, denying the nation a modern financial system.

In the meantime, foreign threats loomed large. Tensions with Britain culminated in the War of 1812, and the disappointments of that conflict finally
convinced Madison that the country needed to change. As political scientist Paul Chen observes:

The war revealed even more poignantly to Madison of the importance of an efficient system of internal transportation and communication, as well as raising interest in finding ways to promote domestic commercial markets so as to decrease the nation’s dependency on imports... Madison wasted no time in addressing the critical need for national roads and canals, among other domestic issues, in his last two annual addresses before Congress, appealing to lawmakers to implement a federal program of internal improvements.¹

On December 5, 1815, delivering his State of the Union message to Congress, Madison asserted:

Among the means of advancing the public interest the occasion is a proper one for recalling the attention of Congress to the great importance of establishing throughout our country the roads and canals which can best be executed under the national authority.

We might pause over the great significance of canals during these years. In the past, traffic along canals was moved either by being towed by animals, or by being poled along by boatmen. Yet the introduction of steam power opened up a new vista of faster and cheaper transportation, fueled by internal-combustion engines. On August 17, 1807, the inventor-entrepreneur Robert Fulton chugged his steamboat 150 miles up the Hudson River, from New York City to Albany, in just 32 hours. Immediately, Americans could see the heightened value of steam-powered water transport.

**Governor DeWitt Clinton Builds the Erie Canal**

Another great American, DeWitt Clinton, amplified Fulton’s invention through politics—and so profoundly changed the nation. Elected governor of New York in 1817, Clinton took note of the bustling traffic along the Hudson River, and then looked further into the future: He envisioned a canal that would connect the Hudson in the east with Lake Erie and the rest of the Great Lakes in the west. If such a waterway could be developed, Clinton reasoned, New York State would become the major thoroughfare for east-west commerce in the United States. Thus Clinton stands as a figure to rival Madison in the economic annals of early 19th century America.

Indeed, Clinton harbored a far-reaching political goal, to be achieved by his canal: a nation united by the easy flow of transportation. As he put it,

The people should be habituated to frequent intercourse and beneficial inter-communication, and the whole republic ought to be bound together by the golden ties of commerce and the adamantine chains of interest.2

Some were skeptical of Clinton’s idea. Former President Thomas Jefferson derided the effort as “little short of madness,” asserting that it would take a century before the canal could be realized;3 other critics scoffed at “Clinton’s Ditch.” Yet the New York governor pressed ahead, and Erie Canal was completed, at a cost of $7 million, in 1825. It stood as an engineering marvel; 83 locks helped the canal rise 566 feet, as it stretched along for a total of 363 miles.

The opening ceremony, including the iconic mixing of fresh water from Lake Erie and salt water from the Atlantic, was held at Sandy Hook in New York Harbor on November 4, 1825. No less a figure than the Marquis de Lafayette, the great French ally of liberty during the American Revolution, joined in the celebration.

In the words of historian Gerard Koeppel, author of Bond of Union: Building the Erie Canal and the American Empire, the ceremony was “the most exhilarating civic event in the early history of the United States.” It was, he adds, “jubilation on a scale with the canal itself, choreographed on land and water . . . unsurpassed for the sheer totality of civic involvement.”4

As one poet of the day wrote:

‘Tis done! ‘tis done!—The mighty chain
Which joins bright Erie to the Main,
For ages, shall perpetuate
The glory of our native State.5

According to Peter Bernstein in Wedding of the Waters: The Erie Canal and the Making of a Great Nation, it had once taken a month to travel from Albany to

3. Ibid., p. 15.
5. Cited by Koeppel, Bond of Union, p. 381.
Buffalo. And yet now, thanks to the canal, the trip could be made in just five days; the total cost of shipping on that route fell by 90 percent.

Such falling costs helped many Americans make the shift from a subsistence economy to a market economy. In a subsistence economy, people make virtually everything for themselves, at great relative cost; in a market economy, people buy and sell in the marketplace, reaping the gains of specialization. In the new market economy of the 19th century, farmers could go west, cultivate land, sow crops, and carry these crops through new ports such as Cleveland; from there, the produce made its way to Buffalo and east along the Erie Canal. In the two decades after the waterway opened, the tonnage of grain reaching Buffalo grew tenfold. And in return for their produce, farmers could now buy manufactured goods from the East. It was a win-win for all Americans.

Thus the modern productive economy was expanded into the interior of the United States. The population of the whole region swelled with new pioneers; it’s little wonder that many American jurisdictions, including eight American counties, are named after DeWitt Clinton.

It’s little wonder, too, that the canal paid for itself many times over. Annual revenues from tolls immediately totaled some $500,000, or five times the cost of interest on the outstanding bonds; the entire construction debt was repaid in 1837, just a dozen years after the canal opened. Indeed, by 1882, canal revenues had totaled some $121 million; the costs of construction, finance, and repairs, by contrast, were a mere $80 million—thus leaving a profit on the canal of $41 million.6

Of course, none of these dollar figures account for the overall economic and political benefit to New York State, or to the nation. The great American author Nathaniel Hawthorne, riding along the Erie Canal in 1835, was moved to write:

I was inclined to be poetical about the Grand Canal. In my imagination, DeWitt Clinton was an enchanter, who had waved his magic wand from the Hudson to Lake Erie, and united them by a watery highway, crowded with the commerce of two worlds, till then inaccessible to each other.7

In contrast to Hawthorne’s lyrical “magic wand,” a contemporary economist, Kenneth Sokoloff of UCLA, has added some hard data. Sokoloff found that innovation—as measured by patents issued—surged near cities and navigable waterways:

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The construction of the Erie Canal (and most other major public works projects of the era) appears to have been well conceived and executed; it not only paid off more than its costs through tolls, but also generated substantial welfare improvements for the residents of the state of New York in the form of producer and consumer surplus and a wide range of positive externalities.\(^8\)

To be sure, the Erie Canal was just one of many American canals. As historian Gerard Koeppel has noted, “Before Erie there were roughly 100 miles of American canals. By 1860 there were 4,200 miles.” Yet none of these other canals were as spectacularly successful as Erie. Indeed, that particular waterway continued to be a useful trade route into the 1950s, when it was superseded by the Saint Lawrence Seaway and also, we might note, by the New York State Thruway. And even today in New York, the remnant of the Erie Canal is a popular resource for recreation and tourism.

So let us summarize the early results of our nation’s ambitious infrastructure building: We can start by studying the U.S. Census figures for population growth: In 1790, Virginia boasted a population of 747,000, the largest of any state. By contrast, New York was a distant fourth, with just 340,000 souls. Yet looking ahead half a century, to 1840, we see that Virginia’s population had grown to 1.22 million, a 50 percent increase. That might sound impressive—until we see that New York’s population had ballooned to 2.428 million, an increase of 552 percent, more than 11 times faster. Indeed, New York was now the largest state in the union, a distinction that it would hold for more than a century. Moreover, the population of states in New York’s economic orbit, such as the important Great Lakes states of Ohio, Indiana, and Michigan, increased by millions.

DeWitt Clinton had not just accomplished a great feat for his home state of New York; he had greatly augmented American Strength.

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7. Clay, Monroe, and Jackson

The aftermath of the War of 1812 left most Americans divided into two camps: those who thought that American Strength was important—and those who thought it was very important. On the importance of infrastructure, however, there was greater division: Some, especially in the South, preferred to champion the values of a rural, non-industrial America; to these folks, infrastructure development was still of little importance.

Yet to many, an emerging majority, it was obvious that American Strength and infrastructure went hand in hand. Interestingly, perhaps the greatest and most famous advocate of industry and infrastructure was himself from the South: Henry Clay. Born in Virginia, Clay made his long political career as a statesman representing the Commonwealth of Kentucky in Washington, D.C.

Not born rich, Clay was the first “self-made man”—having himself coined that phrase. Elected to the U.S. House in 1811, he was so esteemed by his colleagues that they chose him as Speaker of the House on his first day in Congress. Later, he served as a U.S. senator and as secretary of state; he also ran for president three separate times. And during his decades in public life, he crafted two historic Union-preserving accords, the Missouri Compromise, in 1820, and the Compromise of 1850. In the words of historian David S. Reynolds, “Few dominated the political landscape of early 19th century America more than Clay.”

As a young man, Clay shared the South’s low regard for industry and infrastructure. As Speaker of the House in 1811, for instance, he had supported President Madison in his decision to allow the charter of the modernizing Bank of the United States to expire.

Yet at the same time, Clay was part of the “war hawk” faction, seething with indignation over British violations of American sovereignty—violations that had led to the War of 1812. Yet, as we know, for the most part, the fighting went poorly, and one might say that it’s only because the English were preoccupied with Napoleon in Europe that the United States managed to negotiate an honorable end to the fighting, leaving the status quo ante bellum in place.

So Clay, and others, were confronted with a genuine crisis of American Strength. The young nation had been growing, but not fast enough to guarantee its survival in a world of great powers growing even greater.

Clay resolved to change that untenable situation, realizing that America needed to be strong both economically and militarily. As a result, he swung toward the ideas of Alexander Hamilton, who had died in 1804. In the wake of the unfortunate results of the War of 1812, Clay declared that the United States needed a new policy, which he dubbed the “American System.” Along with then-President James Madison, he called for the nation to develop industry, as well to develop the infrastructure needed to support that industry. One early post-war project, advocated by both Clay and Madison, was the establishment of the Second Bank of the United States, taking the place of the expired national bank.

The next president, James Monroe, shared these beliefs in infrastructure development. In his first inaugural address, on March 4, 1817, the fifth president chose to focus on “the improvement of our country by roads and canals.” Monroe also emphasized that the federal government needed to encourage domestic manufacturing, lest the nation fall into military disadvantage:

**Our manufacturers will likewise require the systematic and fostering care of the Government.** Possessing as we do all the raw materials, the fruit of our own soil and industry, we ought not to depend in the degree we have done on supplies from other countries. While we are thus dependent, the sudden event of war, unsought and unexpected, can not fail to plunge us into the most serious difficulties.

Continuing, Monroe dwelt on the need to develop methods of domestic finance, as well as to maintain a large internal market for production and consumption:

**It is important, too, that the capital which nourishes our manufacturers should be domestic, as its influence in that case instead of exhausting, as it may do in foreign hands, would be felt advantageously on agriculture and every other branch of industry.** Equally important is it to provide at home a market for our raw materials, as by extending the competition it will enhance the price and protect the cultivator against the casualties incident to foreign markets.2

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In other words, Monroe laid out a comprehensive approach not for only defending America, but also for strengthening America; he was determined not to see a repeat of the War of 1812.

America prospered and expanded during Monroe’s presidency: Mississippi, Illinois, Alabama, Maine, and Missouri all joined the Union. Late in his presidency, in 1823, Monroe felt sufficiently confident in American Strength to boldly expand America’s geopolitical influence: He propounded the Monroe Doctrine. That declaration put Europe and the world on notice that the United States would oppose any effort to re-colonize the newly independent nations of South America.

Implicit in the Monroe Doctrine, of course, was the idea that America had the muscle to back it up. Could the United States really prevent a European power from occupying South America? Could it draw upon the necessary economic and military capacity? The will and the force behind the Monroe Doctrine would be tested many times in the coming centuries.

Meanwhile, the partisan political system of the era was coming undone. Having started out in politics as a member of the Democratic-Republican Party—the party of Jefferson, the party that had dominated American politics from 1800 to 1824—Clay, in the early 1830s, helped to found the new Whig Party.

Interestingly, the origins of that name, which might seem affected to the modern ear, were, in fact, hard and strong and tough: “Whig” was short for “Whiggamore,” a reference to the insurgent cattle drovers of old Scotland who demanded that the king be held accountable to the people’s legislative house, Parliament.

In America, the signature Whig policy was “internal improvements”—that is, infrastructure, mostly to develop the economy of the frontier. The Whigs had supported roads and canals, but soon a new technology, railroads, caught their interest as well. In 1826, the first U.S. railroad opened in Massachusetts; the Bay State was then a citadel of hard-nosed Whiggish thinking.

Still, the late 1820s and early 1830s were dominated by Andrew Jackson, our seventh president. Born in South Carolina, Jackson had carved out a successful political career for himself in Tennessee—at least when he wasn’t dueling or fighting. Indeed, to a country acutely conscious of its relative lack of power in the world, the charismatic “Old Hickory” was a national hero; he had been the victor at the Battle of New Orleans, America’s greatest military success in the War of 1812. And so in the 1828 presidential election, Jackson led the so-called “revolt of the rustics” as he rallied the swelling political power of the frontier states; Jackson swept all of the 13 states west of Maryland on his way to the White House.
Re-elected in an even bigger landslide in 1832, Jackson proved to be a populist paradox. Although a strong proponent of American power and expansion, he was yet, at the same time, suspicious of federal efforts to encourage pro-strength policies. As we have seen, some states, such as New York in the north, were racing ahead, but in the absence of national leadership, other states had been lagging behind. The nationally comprehensive pro-infrastructure Gallatin Plan of the Jefferson administration, for example, was but a distant memory by the 1830s.

Once in the White House, Jackson continued to expand the U.S. domain; Arkansas and Michigan joined the Union during his presidency. Yet interestingly, at the same time, he viewed the national government with mistrust so he let the charter of the Second Bank of the United States expire in 1836.

Once again, as Jefferson had discovered three decades earlier, when a large realm is established, the challenge is to keep it—and the problem was that President Jackson seemed less interested than President Jefferson had proved to be in developing the necessary tools of American Strength.

The historian David S. Reynolds captured this paradox—that the seventh president supported national enlargement, yet opposed the tools needed to sustain such enlargement—when he wrote that the Age of Jackson might be defined as an “unfettered, individualistic spirit fostered by small government and a zest for expansion.”

This paradox—the desire for small government coexisting with the desire for a large nation—continued even after the conclusion of Jackson’s presidency in 1837. John Tyler, the Virginia Democrat who succeeded to the presidency in 1841 upon the death of his Whig predecessor, William Henry Harrison, was also an expansionist; Tyler spent much of his presidency agitating to gain Texas, which had won its independence from Mexico in 1836. Our 10th president also propounded the Tyler Doctrine, a kind of Pacific codicil to the Monroe Doctrine, aimed at stopping the British, or any other foreign power, from dominating Hawaii. Such was a good policy; the challenge was actually making it work.

The next president after Tyler, James K. Polk, also a member of Jackson’s party—by now known simply as the Democratic Party—completed Tyler’s proposed annexation of Texas at the end of 1845; that act then led to war with Mexico from 1846 to 1848, which led to even further national expansion. The territories gained represented all or part of seven new states, including California.

3. Reynolds, Waking Giant, p. 3.
So we can see: The ambitions and reach of the United States continued to expand during the first half of the 19th century. Yet the nation's overall capacity continued to lag, as some parts grew faster than others; the North, powered by industry and infrastructure, was particularly gaining in muscle and might. Indeed, the skew between fast-developing areas and slow-developing areas would prove to be a major flashpoint in the tumultuous decades to come.
8. The American System and the Great Divide

In the years between end of the War of 1812 and the beginning of the Civil War, a journalist named John L. O'Sullivan captured the exuberant national mood. O'Sullivan described continued American expansion as historically inevitable, proclaiming “our manifest destiny to overspread the continent,” thus justifying the annexation of Texas and Oregon.

Although he coined the often-misunderstood phrase “manifest destiny” in an 1845 article in the Democratic Review, O'Sullivan—a Democrat in the era of the expansionist hawk Andrew Jackson—had first articulated this early understanding of American Exceptionalism in 1839, outlining the contours of the new nation:

Its floor shall be a hemisphere—its roof the firmament of the star-studded heavens, and its congregation an Union of many Republics, comprising hundreds of happy millions, calling, owning no man master, but governed by God’s natural and moral law of equality, the law of brotherhood—of “peace and good will amongst men.”

The title that O'Sullivan gave his piece was prescient: “The Great Nation of Futurity.” For the United States, it was never really an option not to push west; had the United States not stepped up to the expansionary challenge, some other nation would have filled the void. Russia, for example, after first exploring Alaska in the 17th century, had established a permanent settlement there in 1784. We'll never know how much further the Russians would have expanded their reach into North America if they'd had more time.

Yet the fulfillment of America’s “manifest destiny” would never have happened without American infrastructure. More precisely, our expansion would never have happened apart from the Hamiltonian, or “Northern,” view of ambitious infrastructure building—best exemplified by New York Governor DeWitt Clinton and the construction of the Erie Canal. This “Northern” view was more conducive to

economic growth than the “Southern” view; the Hamiltonian vision of nation building from east to west required, in particular, a railroad that would span the continent. As Asa Whitney, a New York-born railroad champion during the 1830s and 1840s, foresaw, a transcontinental rail system would “revolutionize the entire commerce of the world, putting America at the center of all.”

The first U.S. railroad—the “locomotive” was actually a horse—was built outside of Philadelphia in 1810. And once steam power arrived, the idea took off; more than 9,000 miles of track would be laid across the growing republic by 1850. We might note that these miles of track increased by more than 14-fold in the 40 years that followed. Indeed, whole new industries were made possible and prosperous because of those rails, confirming the truism that applied technology, plus mass production, equals prosperity, as well as strength.

Of course, profound economic growth creates profound consequences, including large-scale increases in energy consumption; annual oil production in America, for example, rose from 2,000 barrels to 126 million barrels between 1859 and 1906.

The American System in Practice

Although often forgotten in the historically oblivious times of today, the “American System” of Henry Clay—as the next chapter on the transcontinental railroad will demonstrate in more detail—relied on a profound fusion of private enterprise and public leadership. The goal was to generate infrastructure and technology, in ways that would develop the United States as rapidly as possible. This pattern involved either the states, the federal government, or both, initially supporting and funding technological innovation, then seeking support from the private sector to refine and develop those innovations on a large scale. And of course, the goal was accomplished; by the end of the 19th century, America was the world’s leading economic superpower.

Aside from President Washington’s Lighthouses Act of 1789, most of America’s early infrastructure networks were built or chartered by the states. The leading example was New York’s initiative to dig the Erie Canal, which helped more than quadruple manufacturing sales in the Empire State, from $59 million in 1835 to $237 million in 1850.

And as optimum transportation technology shifted from canals to railroads, the states shifted their emphasis, too; Maryland, for example, chartered the Baltimore and Ohio Railroad in 1827. A year later, Pennsylvania authorized the funding and building of the Main Line of Public Works, a canal and rail system—the beginning of the great Pennsylvania Railroad connecting Philadelphia and Pittsburgh.

By 1850, the federal government was once again seeing the clear need to lead on infrastructure. Congress passed, and President Millard Fillmore signed, the Illinois Central Land Grant Act of 1850, legislation that chartered the Illinois Central Railroad to build a line across Illinois, from Cairo in the south to Galena in the north. A branch of the line would connect to the rising new city of Chicago, whose population would increase tenfold over the next 20 years, soaring from 30,000 to 300,000 between 1850 and 1870. More such legislation followed, including the Pacific Railroad Act of 1862, which authorized government bonds and land grants going directly to railroad companies, in order to construct rail lines from the Missouri River to the Pacific Ocean—more on the epochal Transcontinental Railroad in the next chapter.

In the meantime, this increasingly ambitious pattern of federal development applied to other kinds of infrastructure as well, including the new telegraph network. Beginning in 1843, Congress appropriated $30,000 to fund an experimental telegraph line from Washington, D.C., to Baltimore. Nearly 20 years later, Congress ensured that the wiring of an intercontinental telegraph system would accompany the construction of the intercontinental railroad. In Congress’ mind, the development of roads, canals, railroads, and telegraph networks were all vitally intertwined. Each of these endeavors proved to be a key ingredient of American Strength; all these new technologies were demonstrably worthy of the federal support that guided them.

The Southern States Lag Behind

Although South Carolina was among the first states to charter a canal and railroad company, the South for the most part followed a different pattern of infrastructure development than the rest of the country. Unlike the North and Midwest, where railroads connected every major city by 1860, the South’s infrastructure networks remained limited; they tended to be local in nature and were designed, not to knit a people together socially and economically, but rather, simply, to move cotton to nearby waterways and ports.

Such failure to seize the full promise of infrastructure might have been the result of the lingering influence of a certain kind of reactionary Virginia thinking; the Old Dominion was home to such ardent “anti-federalists” as Patrick Henry, George Mason, and John Randolph.

By contrast, as we have seen, while George Washington was also a Virginia planter, our first president nonetheless saw that the new nation needed more than just agriculture. Yet as we have seen, subsequent presidents from Virginia, including Jefferson and Monroe, entertained a more doubtful relationship with the infrastructure issue.

As a result, in the early 19th century, while the North had been busy building canals and then railroads—achievements that delivered economic benefits for all—the South, as economic historian Michael Lind chronicles in *Land of Promise: An Economic History of the United States*, was moving in the opposite direction. Indeed, when the French economist Michel Chevalier visited America in the mid-19th century, he was moved to make geographical distinctions in his assessment of the nation’s wealth: “There are no poor people here, at least not in the Northern and Western states” [emphasis added].

Indeed, the more the North built infrastructure to promote a diversified and growing economy based on manufacturing, the more the South clung to the view that “King Cotton” was all that was needed. On March 4, 1858, Senator John Henry Hammond of South Carolina outlined the overly optimistic case for cotton in a ringing speech on the Senate floor:

> **What would happen if no cotton was furnished for three years? I will not stop to depict what every one can imagine, but this is certain: England would topple headlong and carry the whole civilized world with her, save the South. No, you dare not make war on cotton. No power on earth dares to make war upon it. Cotton is king.**

The South, in fact, was so committed to an agrarian economy centered on the slave system that the seceding states, in establishing the Confederate States of America, actually wrote and ratified a new constitution for themselves that proscribed the rebel legislature from appropriating money for most “internal improvements intended to facilitate commerce.” In other words, Dixie affirmatively


6. Ibid., p. 347.

did not want the Northern, Hamiltonian system of broad-based economic development.

As economic historian Lind further observes, that short-lived political charter specifically prohibited the Confederate government from such “Yankee” policies as promoting manufacturing and imposing tariffs on imported goods.\(^8\) We must note that a century-and-a-half later, it’s possible to debate the merits of these policies in our own time, and yet in the context of the mid-19th century, the disparate economic results, North vs. South, speak for themselves: The North was doing far better and growing stronger.

It’s impossible, of course, to argue the merits of the Southern system based on slavery. But at the time, even while slavery degraded the South, some Southerners took a kind of perverse pride in that degradation. For example, Louis T. Wigfall, a former U.S. senator from Texas—and future Confederate Army officer—embraced Dixie’s economic and social disadvantage, wearing it like a badge of honor. He defiantly declared in 1861:

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\text{We are a peculiar people, sir! ... We are an agricultural people; we are a primitive but a civilized people. We have no cities—we don't want them. We have no literature—we don't need any yet. ... We want no manufactures; we desire no trading, no mechanical or manufacturing classes. ... As long as we have our rice, our sugar, our tobacco, and our cotton, we can command wealth to purchase all we want from those nations with which we are in amity, and to lay up money besides.}
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Yet not all Southerners echoed Wigfall’s confidence; some feared that the over-celebration of King Cotton, at the expense of broader economic development, translated into a weakness and vulnerability for the whole region. James D. B. DeBow, a pro-industry Confederate journalist from Louisana, lamented the South’s dependence on the North for its tools and instruments:

\[
\text{Our slaves work with Northern hoes, ploughs, and other implements. The slaveholder dresses in Northern goods, rides in a Northern saddle... reads Northern books... In Northern vessels his products are carried to market... and on Northern-made paper, with a Northern pen, with Northern ink, he resolves and re-resolves in regard to his rights.}\(^9\)
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\(^8\) Lind, *Land of Promise*, p. 131.

The lesson we can draw from DeBow’s lament is clear: The same Northern factories that were producing tools and instruments could also produce the weapons that would help guarantee a Union victory.

Quantifying the enormous price the South paid for specializing in export agriculture, Lind captures the contrast between the two regions: “Northern industry produced 10 times as much industry as the South; the manufactured products of the entire Confederacy added up to less than one-fourth of New York State’s manufacturing by value added.” Lind noted also that the North mined 38 times as much coal, and forged 15 times as much iron.10

So, as we consider the economic and industrial condition of the two regions—regions that had developed so very differently—we might ask: Which side was poised to win the coming war between the regions?

One Southerner who saw the future—and feared its unfolding—was Sam Houston, hero of the Texas War of Independence against Mexico, who in 1836 became the first president of the Republic of Texas. A quarter-century later, Houston was opposed to secession; on April 19, 1861, he warned an audience that the North would certainly prevail in a battle of industrial and military quantity:

Let me tell you what is coming. After the sacrifice of countless millions of treasure and hundreds of thousands of lives, you may win Southern independence if God be not against you, but I doubt it. I tell you that, while I believe with you in the doctrine of states rights, the North is determined to preserve this Union. They are not a fiery, impulsive people as you are, for they live in colder climates. But when they begin to move in a given direction, they move with the steady momentum and perseverance of a mighty avalanche; and what I fear is, they will overwhelm the South.

That avalanche that Houston was referring to, of course, was military materiel and firepower. Lest anyone mistake his point, the statesman-soldier added:

If you go to war with the United States, you will never conquer her, as she has the money and the men. If she does not whip you by guns, powder, and steel, she will starve you to death.

10. Lind, Land of Promise, pp. 133–34.
The coming war, Houston bleakly prophesied, "Will take the flower of the country—the young men."11 After that, Houston was exiled to his ranch in Huntsville, Texas, where he died in 1863.

Of course, we know which side prevailed; Houston’s tragic forecast was vindicated. The Civil War can be summed up as follows: The North would lose a battle and yet still move forward, while the South would win the exchange and yet have to retreat because of inferior logistics and supply. Eventually, that retreat ended up at Appomattox.

For these and other reasons, most historians consider the American Civil War to be the first large-scale conflict of the industrial age—in which both sides made use of the railroad and telegraph as best they could, although the North had an enormous advantage.

The Civil War proved the value of American Strength, even when confined to merely one region. Fortunately for America, in future conflicts, the United States would fight as a fully unified nation. In the meantime, the nation continued to industrialize, building economic power upon a base of rapidly expanding infrastructure.

In “Federalist #42,” published in January 1788, James Madison emphasized the specific national responsibility to “establish post offices and post roads,” writing: “The power of establishing post roads, must, in every view, be a harmless power; and may, perhaps, by judicious management, become productive of great public conveniency. Nothing, which tends to facilitate the intercourse between the states, can be deemed unworthy of the public care.”
In his famous 1791 “Report on Manufactures,” Alexander Hamilton wrote: “Good roads, canals, and navigable rivers, by diminishing the expense of carriage, put the remote parts of a country more nearly upon a level with those in the neighborhood of the town. They are, upon that account, the greatest of all improvements.”
In an 1808 message to Congress, Thomas Jefferson talked about the importance of “internal improvements,” as transportation projects were called in those days. If the U.S. wanted to expand its industrial might, it had no choice other than to expand its infrastructure. Jefferson said: “The situation into which we have thus been forced, has impelled us to apply a portion of our industry and capital to internal manufactures and improvements. The extent of this conversion is daily increasing, and little doubt remains that the establishments formed and forming will—under the auspices of cheaper materials and subsistence, the freedom of labor from taxation with us, and of protecting duties and prohibitions—become permanent.”
While Abraham Lincoln did not live to see the completion of the transcontinental railroad in 1869, he considered infrastructure projects among his most important legislative achievements. Rich Lowry, editor of “The National Review,” and author of “Lincoln Unbound: How an Ambitious Young Railsplitter Saved the American Dream—and How We Can Do it Again,” noted in 2013: “Wherever canals and railroads touched, they brought the competitive pressure of the market with them; the tariff was a support to the growth of industry; the banks produced a reliable paper currency necessary for a cash economy. They all tended to create a vibrant, diverse economy open to men of various talents. Here is where Lincoln is guilty as charged: The agrarians are right that he sought to end the simpler, agricultural America in favor of a modern commercial and industrial economy.”
Shortly after becoming president, Teddy Roosevelt talked about the importance of the Panama Canal in a speech to Congress. “No single great material work which remains to be undertaken on this continent,” Roosevelt said, “is as of such consequence to the American people.” Roosevelt quickly reached an agreement in 1902 for the U.S. to take over control of the canal’s construction from the French. At the time, it was the most expensive and complex public works project in American history.
In 1935, President Franklin Delano Roosevelt signed the legislation creating Works Progress Administration, an agency that would spend $13.4 billion over the next eight years, constructing a wide range of infrastructure projects and creating eight million jobs.
President Harry Truman, who joined the American Road Builders Association in 1936, signed the "Federal-Aid Highway Act of 1952," the first piece of federal legislation that specifically authorized funds—$25 million—for the construction of the interstates. By using a "50-50" matching formula, the federal government would pay half the cost, and the states the other.
June 1956: President Dwight D. Eisenhower signed the law authorizing construction of the Interstate Highway System and the creation of the Highway Trust Fund to finance it. Eisenhower explained: "Together, the united forces of our communication and transportation system are dynamic elements in the very name we bear—United States. Without them, we would be a mere alliance of many separate parts."
Ronald Reagan was the last U.S. president to sign legislation increasing the federal gasoline tax for the sole purpose of financing new transportation improvements. In a 1982 radio address to the nation, Reagan said: “The time has come to preserve what past Americans spent so much time and effort to create, and that means a nationwide conservation effort in the best sense of the word. America can’t afford throwaway roads or disposable transit systems. The bridges and highways we fail to repair today will have to be rebuilt tomorrow at many times the cost.”
June 1998: As members of Congress look on, President Bill Clinton signs the Transportation Equity Act for the 21st Century (TEA-21) at a White House signing ceremony.
August 2005: President George W. Bush signs the Safe, Accountable, Flexible and Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU) at a Caterpillar facility in Illinois.
July 2012: President Barack Obama signs the Moving Ahead for Progress in the 21st Century (MAP-21) into law at the White House.
PART III: A NATION IS BUILT

9. Lincoln’s Transcontinental Railroad and the Making of America

At its first national convention in Philadelphia in 1856, the Republican Party drafted a platform that strongly opposed, on constitutional grounds, the extension of slavery into the territories. That same platform supported federal leadership on another key issue: the economic importance of internal “improvements.” It included the building of a railroad across the nation. It also called for an “emigrant road,” to be built alongside the railroad, for use by pioneers:

Resolved: That a railroad to the Pacific Ocean by the most central and practicable route is imperatively demanded by the interests of the whole country, and that the Federal Government ought to render immediate and efficient aid in its construction, and as an auxiliary thereto, to the immediate construction of an emigrant road on the line of the railroad.¹

The Republicans lost the 1856 presidential election, and yet key elements of its platform carried over to the next election. The platform of 1860, which helped elect Abraham Lincoln to the presidency, echoed the earlier document:

That a railroad to the Pacific Ocean is imperatively demanded by the interests of the whole country; that the federal government ought to render immediate and efficient aid in its construction; and that, as preliminary thereto, a daily overland mail should be promptly established.²

Indeed, the imperative of a transcontinental railroad was so obvious that it garnered bipartisan support. The 1860 Democratic platform also argued:

That one of the necessities of the age, in a military, commercial, and postal point of view, is speedy communications between the Atlantic and Pacific States; and the Democratic party pledge such Constitutional

Government aid as will insure the construction of a Railroad to the Pacific coast, at the earliest practicable period.³

In those days, party platforms were brief. The Democrats’ railroad plank numbered a mere 52 words, but the entire platform was just 371 words. To put it another way, the railroad portion consumed one-seventh of the entire document; that ratio is a good indicator of just how important the issue was at the time.

Yet the Republican platform of that year included a further plank in support of infrastructure, resolving:

That appropriations by Congress for river and harbor improvements of a national character, required for the accommodation and security of an existing commerce, are authorized by the Constitution, and justified by the obligation of Government to protect the lives and property of its citizens.⁴

In other words, transportation by water, facilitating commerce, was important as well.

As for the Transcontinental Railroad, that was the goal Lincoln outlined in 1859 when meeting with one Grenville Dodge in Council Bluffs, Iowa. As recounted by historian Stephen Ambrose in Nothing Like It in the World: The Men Who Built the Transcontinental Railroad, 1863–1869, Lincoln’s first question to the young railroad engineer was, “Dodge, what’s the best route for a Pacific railroad to the West?” Dodge instantly replied, “From this town out Platte Valley”—that is, from here in Council Bluffs, going west through the Platte Valley, all the way to the Pacific. Sensing the two were of like mind, Lincoln told Dodge that there was nothing more important for the nation than the building of a railroad to the Pacific.⁵

Yet by some reckonings, the transcontinental project could have been construed as a “railroad to nowhere,” since there was seemingly little to nothing in the Western territories. But American public opinion sided with Lincoln and the Republicans, seeing the railroad as the path to future prosperity, especially after its completion.

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³ “Democratic Party Platform of 1860,”
http://avalon.law.yale.edu/19th_century/dem1860.asp.
⁴ “Republican Party Platform of 1860.”
Lincoln was elected in November 1860 and inaugurated in March 1861. Once in the White House, he followed through on his party’s campaign promise by signing the first of several railroad bills. The Central Pacific Railroad Company started laying track eastward from Sacramento in January 1863, and after Lincoln signed the Pacific Railroad Act of 1863, the Union Pacific Company started building westward from Omaha. All this activity was accomplished even as the Civil War raged.

Subsequent legislation for the transcontinental railroad followed in 1864, 1865, and 1866. The overall project was enormous; the federal government effectively funded the railroad, including land grants and bonds, for a total of nearly a half-a-billion dollars.6

While the 16th president did not live to see the completion of the railroad in 1869, he considered the infrastructure project among his most important legislative achievements. And other, sympathetic observers shared that view; in 1877, for example, a Chicago Tribune editorial, “The Value of Railroad Transportation,” declared that the railroad was “the very heart and life of the modern system of commercial existence.”7

Ambrose has also concluded that the railroad, next to winning the Civil War and abolishing slavery, was “the greatest achievement of the American people in the 19th century.” Moreover, “not until the completion of the Panama Canal in the early 20th century was it rivaled as an engineering feat.”8

Clay as Forerunner of Lincoln’s Vision

Lincoln, born in Kentucky in 1809, may have grown up poor, but he inherited his vision for the country—and for national infrastructure—from another Kentuckian, Henry Clay, the tireless advocate, as we have seen, of the “American System.” From the time he won his first seat in the Illinois General Assembly in 1834 at the age of 25, the young Lincoln strongly identified with Clay’s new Whig Party. He campaigned for Clay when the latter ran for president; when the

8. Ambrose, Nothing Like It in the World, p. 17.
Kentuckian died in 1852, Lincoln eulogized him as that “truly national man” at a huge Whig gathering in Springfield.⁹

And so when the Whig Party disintegrated in the growing sectional strife of the 1850s, out of its fractured fragments arose the new Republican Party. Nevertheless, Lincoln never lost sight of his roots. During his 1858 debates with Senator Stephen Douglass that made Lincoln a national figure, he exalted Clay as “my beau ideal of a statesman, the man for whom I fought all my humble life.”¹⁰ Even after ascending to the White House—which, as we have seen, Clay could never win—the 16th president declared, “I have always been an old-line Henry Clay Whig.”

As late as 1865, when seeking congressional votes for the passage of the 13th Amendment, Lincoln spoke to holdouts with an appeal to their common teacher: “You and I were old Whigs, both of us followers of that great statesman, Henry Clay.”¹¹ As the two-time Lincoln Prize-winning historian Allen Guelzo observes, the Great Emancipator “was as much the last Whig president as the first Republican one, and his presidency marked the triumph of most of Henry Clay’s old ‘American System.’”¹²

And without that American System—emphasizing government support for infrastructure—the America we know today would not have been possible. While some Southerners feared that a government strong enough to intervene in the economy could interfere with slavery as well, supporters of what Clay also called the “American Way” mostly saw infrastructure as a catalyst for economic growth.

As for Lincoln himself, he believed that the American System facilitated the very economic self-improvement and social mobility that he himself had experienced relative to his father, who had struggled as a subsistence farmer all his life. As National Review’s Rich Lowry has noted recently,

Wherever canals and railroads touched, they brought the competitive pressure of the market with them . . . Here is where Lincoln is guilty as charged: The agrarians are right that he sought to end the simpler,

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Lincoln, who was, of course, a strong Abolitionist, also saw the railroad as a hammer against the Southern slave system, and also, as a needle that would knit the Union together, creating a thriving middle-class republic after the war. As noted by historian Steven Hahn, the president was well aware of Confederate sympathies in the West. He had won only a third of the vote in California and Oregon in 1860—and he considered the railroad to be vital to his political coalition, as well as national unity, to specifically linking the Pacific states to the rest of the country:

For Lincoln, the transcontinental railroad was the centerpiece of a larger policy to bind the trans-Mississippi West to the Union; lay claim to the gold and silver mines of New Mexico, Colorado, and the Sierra Nevadas; and keep hold of the California gateways to the trade of the Pacific.14

Interestingly, Lincoln won clear majorities in both California and Oregon in the 1864 presidential election. In other words, weighing national objectives for a nation still at war, the 16th president saw the new railway as a pathway to his own political strength, as well as to a new, inclusive American Strength.

The Economic Impact of Lincoln’s Vision

The impact of the transcontinental railroad, once built, was even greater than its champions envisioned. Ambrose checks off a list of “unknowns” before the Civil War that became commonplace, almost taken granted, once the railroad was built:

A nationwide stock market, for example. A continent-wide economy in which people, agricultural products, coal, and minerals moved wherever someone wanted to send them, and did so cheaply and quickly. A continent-wide culture [was formed] in which mail and popular magazines and books . . . could move from one city to another.15

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In addition to supporting a robust defense-industrial base, who can calculate the economic rate of return, over the last century-and-a-half, on the railroad? But in truth, who can count that high?

Indeed, nothing succeeded in cutting time and costs of travel like the transcontinental railroad. Ambrose notes that before the railroad, “it took a person months and might cost more than $1,000 to go from New York to San Francisco.” Yet once the railroad was completed, “one could travel across the country in a week, for as little as $65.” Ambrose added, “Mail that once cost dollars per ounce and took forever now cost pennies and got from Chicago to California in a few days.”

Moreover, like any infrastructure advancement of such dimension, the railroad also introduced new, wide-ranging risks to public safety and life, creating a need for regulation and further innovation to reduce those dangers. The development of the railroads raised safety issues to a whole new level, as noted by historian Thomas McCraw:

*The loading of numerous passengers aboard wood and metal cars weighing hundreds of tons, the movement of those cars at great speed, propelled by huge portable furnaces generating high-pressure steam, and the swift passage of the whole train along unfenced tracks that crossed numerous horse and pedestrian rights of way—all this added up to a spectacular range of hazards. From the very beginning, grisly accidents were the inevitable price of railroad development.*

Nevertheless, the benefits surely outweighed the risks. Henry Varnum Poor, the financial analyst who founded the firm that became Standard and Poor’s, argued that railroads were responsible for feeding the entire U.S. population. They also delivered what all Americans wanted—namely, jobs. Ambrose’s describes the employment boost created by the project:

*Whether they came from Ireland or China or Germany or England or Central America or Africa or elsewhere, they were all Americans. Their chief characteristic was how hard they worked.*

16. Ibid., p. 369.
That, of course, was always the Republican argument: Industry and infrastructure were good for workers.

**Lincoln, Technology, and Growth**

Lincoln’s vision extended to other areas. As a Hamilton-Clay-type Republican, Lincoln believed in railroads and industry, of course, but he also understood the importance of other kinds of innovation. Indeed, Lincoln was an inventor himself: On May 22, 1849, the U.S. Patent Office issued him a patent for a new way to buoy vessels over sandbars and shoals; he is the only president to have earned a patent.20

That inventiveness was not wasted. As the historian Robert V. Bruce wrote in his 1989 masterpiece, *Lincoln and the Tools of War*, President Lincoln applied his knowhow to the mechanical and material challenges of winning the Civil War. He spearheaded the invention or improvement of many weapons, including breech-loading rifles and cannons, as well as early machine guns. In addition, he championed ironclad warships, incendiary devices, and even aerial reconnaissance from balloons. Not all these ideas for weapons immediately found their application during the Civil War, but the benefits to U.S. armed forces in subsequent wars have been lasting and profound.

Yet the relationship between the Civil War and Northern industry was reciprocal. Just as its penchant for industry and infrastructure helped the Union prevail, the war itself boosted demand for that very industry and infrastructure. As noted by reviewer John Steele Gordon, the historian H. W. Brands observes in *American Colossus: The Triumph of Capitalism, 1865–1900*, that the Civil War “had greatly fostered American industry with its unprecedented demands for guns, powder, railroad rails and rolling stock, blankets, uniforms and a thousand other industrial products.” That very demand guaranteed “a booming industrial base and a rapidly expanding capital market on Wall Street” that “provided the synergy that produced the colossus of the book’s title.”21

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Because of Lincoln’s role in creating that colossus, Lincoln scholar Lew Lehrman believes the 16th president not only transformed American history but also enabled the United States to prevail against every foe of the 20th century:

Without his leadership and resolve, separate slave and free countries might have competed as neighbors on the same continent. Thus, there might have been no integrated, continental American economy, and without a united industrial power, the means would not have existed to contain Imperial Germany as it reached for European hegemony in 1914. Neither would there have been a national power strong enough to destroy Hitler’s Nazi Reich, nor to crush the aggressions of imperial Japan. And in the end, there would have been no unified, continental American power to oppose and overcome the communist empire of the second half of the 20th century.22

The Pathway to American Strength

While it was surely beneficial to have visionary pamphleteers prophesying “manifest destiny” in the 1830s and 1940s, the development of the United States into what the most influential of those pamphleteers, John O’Sullivan, considered “the great nation of futurity” was far less historically inevitable than he suggested. It took leadership—ratified, of course, by the voters—to make it happen.

Indeed, America’s economic development in this era required a strong federal government, capable of implementing difficult and costly public policies, and, of course the persistent voices of such thoughtful public leaders, across the decades, as Alexander Hamilton, DeWitt Clinton, Henry Clay, and Abraham Lincoln to set the new nation on the right course. As the Scottish historian Andro Linklater has observed, the nation made deliberate and conscious choices to achieve that greatness: “There were many, many paths that might have been taken that would have led to an entirely different evolution.”23

So Americans today can be thankful that their leaders and their government, in the 19th century, scored one geopolitical success after another, starting with President Jefferson’s shrewd decision in 1803 to make the Louisiana Purchase; as we have seen, that acquisition likely kept Napoleon’s forces from overrunning North America as they had once overrun the European continent. As


the historian Linklater said, it’s easy to see how U.S. history could have turned out much different—and much worse for America.

That path to greatness for America continued with the annexation of Texas as a state in 1845, in the wake of our victory in the Mexican War. That win helped secure the entire North American continent, further sealed with the admission of California as a state in 1850. Then after winning the Civil War and freeing the slaves, the Union purchased the Territory of Alaska in 1867; a generation later, in 1897, the United States formally annexed Hawaii. These last two territorial acquisitions were both valuable strategic components of the American Strength narrative, pushing our power out into the Pacific.

In gaining Alaska and Hawaii, American protected its West Coast, blessed with all its natural resources, from being threatened by Russia and Japan—or even, potentially, by Germany and Britain. Those two territorial acquisitions put new teeth into the Monroe Doctrine, helping to establish the United States as the preeminent nation in the Western hemisphere. Yet none of this would have been possible, of course, had it not been for the Transcontinental Railroad and other infrastructure advances—thanks to the collective vision of Abraham Lincoln, as well as Alexander Hamilton, DeWitt Clinton, and Henry Clay.
10. Theodore Roosevelt Launches the American Century

The 19th century can be seen as a critical era in the growth of important new infrastructure networks. First, canals were constructed, then railroads, then the telegraph, and then the telephone. All were vital components of American Strength.

The United States had always had roads and trails, of course, but a new push for “good roads” and “improved highways” occurred as the country’s population and economy expanded dramatically in the decades after the Civil War. The number of Americans more than doubled in the last three decades of the 19th century, rising from 38.6 million in 1870 to 76.2 million by 1900; the per-capita GDP more than doubled in real terms during the same time. These trends translated into demand for yet more and better roads.

Moreover, the introduction of the bicycle, along with the pneumatic tire, turned bicycling into a new national pastime. By 1890, more than one million bicycles were being manufactured annually in America. Their popularity inspired the so-called “Good Roads” movement and the creation of the National League for Good Roads, which petitioned governments at all levels for infrastructure improvements. The efforts of urban bicyclists—and later motorists—were joined by farmers, eager to have the best possible routes to transport their crops to market.

In this era, New Jersey and Massachusetts became the first two states to assume responsibility for improving roads, forming their respective state highway departments in 1891 and 1892. The federal government saw the need as well, and in 1893, Republican President Benjamin Harrison signed legislation for the U.S. Agriculture Department (USDA) to create the Office of Road Inquiry. Its mandate was to examine road construction and management, with a specific eye toward the needs of farmers. Over the next two decades, the USDA’s role in national road building would expand.

In 1900, the Republican platform of William McKinley and Theodore Roosevelt pledged “a permanent improvement of the roads and highways of the
country, and such was the infrastructure focus that Theodore Roosevelt inherited when he became president in 1901. Indeed, over the next two decades, the federal role in road building further expanded; in 1905, for example, Congress upgraded the Office of Road Inquiry into the Office of Public Roads in 1905 to “furnish expert advice on road building; to make investigations in regard to the best methods of road making, and the best kinds of road-making.”

Meanwhile, important advocacy groups were created, including, in 1902, American Road Makers, the predecessor organization to the American Road & Transportation Builders Association. Founded in New York City by Michigan public official Horatio S. Earle, the organization sought to gain federal support for construction of a “Capital Connecting Government Highway System”—a paved road network that would “connect every state capital with every other state capital and with the United States’ capital, Washington.” (That vision began to come to fruition in 1956, when Congress authorized funding and construction of the Interstate Highway System.)

Theodore Roosevelt’s Nation-building Vision

Infrastructure networks, including roads, continued to expand under our 26th president. Teddy Roosevelt (TR) fully grasped the imperatives of nation building. The challenges he faced were different from those faced by Lincoln, and yet he shared Lincoln’s passion for building a strong, cohesive nation with a modern industrial economy whose building blocks of industry and infrastructure fostered “improvement of condition” of all the people.

TR consciously thought of American Strength in terms of the challenges of the 20th century, a time when the country was leaving its frontier stage and moving on to the international stage. Indeed, his “large” approach to life, reflected in his famed admonition—“Speak softly and carry a big stick”—served him well as president, preparing the country to accept the responsibilities of what would be called the American Century.

TR actually carried many big sticks that elevated America’s standing in the world. In the wake of French abandonment of the project, he took over the construction the Panama Canal in 1904, at the time the most expensive and complex public works project in U.S. history. When the Panama Canal finally opened in 1914, it expedited the swift movement of cargo and goods between East and West; even more than the Transcontinental Railroad, the Canal put America at the center of

1. “Republican Party Platform of 1900,”
world. Whether through railroad or canal, European shippers would have to go through territory under American control to reach Asia, for example.²

Late in his presidency, in 1908, TR sent out the Great White Fleet, showcasing to the world America’s promise, power, and prestige. Since his college days, when he began writing *The Naval War of 1812*, as well as during his tenure as assistant secretary of the Navy under President McKinley, TR had envisioned upgrading and expanding the U.S. Navy fleet to protect America’s growing international interests, especially to prevent would-be threats from even reaching the Western hemisphere.

The fleet of 16 gleaming battleships—all commissioned since the end of the Spanish-American War, including 11 built by American shipyards between 1904 and 1907—represented the military build-up Roosevelt had championed. Manned by 14,000 sailors and Marines, the 14-month 43,000-mile circumnavigation of the globe was the first of its kind in history, making 20 ports-of-call on six continents.³

We might note that TR’s vision was essentially peace through strength: America remained at peace through his presidency. Moreover, Roosevelt was a peacemaker; he was the first American to win the Nobel Peace Prize for his work in mediating an end to the 1904–05 Russo-Japanese War.

Still, all these achievements required a robust industrial-infrastructure base at home, a foundation that TR first attended to when governor of New York in the last years of the 19th century. At the time, the Erie Canal was in disrepair, and failure to upgrade this vital infrastructure would have meant a huge loss to the state and national economy. TR embraced the challenge: “We [New Yorkers] cannot afford to rest idle while our commerce is taken away from us, and we must act . . . if we wish to retain the State’s supremacy.”⁴ He pushed for a complete modernization of the entire canal system, a $100 million project that took place between 1905 and 1918.⁵

TR’s industry-infrastructure vision embraced an emerging issue as well: the rise of electricity generation. Just as Lincoln understood the role of railroads in national development, Roosevelt saw the potential of electricity to power-up a new

2. Hawley, *Theodore Roosevelt*, p. 82.
era of American Strength. At the same time, he knew that this wondrous fusion of science and the needs of industry required significant updating; the new power depended on the construction of hydroelectric dams, requiring the same public resources as used for the rebuilding of the Erie Canal: rivers and waterways.

Moreover, as a conservationist, TR favored public protection of the nation’s inland waterways, a policy set in motion by the Rivers and Harbors Act of 1899, giving the U.S. Army Corps of Engineers a prominent role in maintaining these waterways. He also advocated national parks, which delineated nature preserves, while at the same leaving the rest of the country available for commercial development. TR firmly believed that public oversight of the nation’s water resources would yield multiple benefits, including electricity generation, which would ultimately be a boon to all national stakeholders.

According to the business historian Thomas McCraw, progressives in the Rooseveltian tradition believed in integrated growth, which went under the overall term of “wise use.” Progressives of that era felt that single-purpose private developments, such as hydroelectric dams that blocked river traffic and increased flood hazards, made poor economic sense.

“To develop a river for navigation alone, or power alone, or irrigation alone,” declared Gifford Pinchot, TR appointed the first chief of the U.S. Forest Service, is like using a sheep for mutton, or a steer for beef, and throwing away the leather or the wool.” TR and his allies believed that public oversight of the nation’s waterways was necessary in order to optimize the long-term benefits of these important resources.

The Roosevelt-Pinchot vision, according to McCraw, would be “government coordinated development of the nation’s rivers as systems”—and while river traffic continued to be a vital part of the program, it was electricity generation that remained the most significant overall focus:

Electricity was the keystone of unified resource development, because it would furnish the money to pay for it. . . . The construction of a dam creates a power potential whether or not the builder so intends, and it would be a waste of resources . . . not to use the power so developed.

This public harnessing of natural resources for electricity represents a forgotten corner of TR’s Square Deal, a policy legacy where everyone gains and benefits are shared, a true harmony of interests. As McCraw notes,

> It is improbable that all the laws enacted since the days of Caesar have had so great effects upon the living conditions of the average as had the electrical developments which have taken place entirely within the memory of many men now living.\(^8\)

We might add that the creation, in 1933, of the Tennessee Valley Authority, can be seen as a culmination of the TR-Pinchot vision of America’s infrastructure future.

**World War I and Federal Highway Funding**

Although the United States did not enter World War I until 1917, the outbreak of European hostilities in July 1914 forced America to upgrade and expand its highway network. According to the Congressional Research Service, as the Allies started purchasing large quantities of supplies from the United States, the nation’s railroad system became overloaded. As a result, the increasing demand for the movement of goods led to a greater need for the use of roadways—and ultimately to the development of the trucking industry.

The American Association of State Highway Officials was formed quickly after the start of the war, for the purpose of providing assistance to the federal government on legislative, technical, and economic subjects relating to highway construction. Soon the legislation it promoted, the Federal-Aid Road Act of 1916, was signed into law by President Woodrow Wilson.

The legislation had many purposes. While appropriating funds for the construction of rural post roads, it also made clear that the authority initiating projects was reserved to the states, but subject to federal approval. The Act also provided policy for the development of main roads serving federally-owned lands and reservations. As the first federal highway funding law, it anticipated the 1918 renaming of the Office of Public Roads as the Bureau of Public Roads (BPR), an agency specifically charged with administering federal funding of road construction.

This conscious expansion of the road network continued after World War I. The Federal-Aid Highway Act of 1921 divided highways into two categories: primary, or interstate, and secondary, or inter-county. The Act also provided federal

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8. Ibid., p. 2.
matching funds for a system of highways to be designated by each state, not to exceed seven percent of a state’s total mileage.9

The same pro-infrastructure sentiment was soon to be manifested in other major projects as well. President Calvin Coolidge authorized Boulder Dam, later Hoover Dam, in 1928. In that same year, the California legislature authorized the construction of the Golden Gate Bridge across the San Francisco Bay.

**Technological and Industrial Origins of America Strength**

As the mathematician and philosopher Alfred North Whitehead observed in 1926, “The greatest invention of the 19th century was the invention of the method of invention.” And the United States in the 19th century provided multiple proofs of Whitehead’s wisdom.

After the Civil War, the U.S. Patent Office received a surge of applications; the number of patents issued annually, according to technology historian Thomas P. Hughes, “more than doubled between 1866 and 1896.”10 Among the most significant inventions of that era, of course, was the telephone, leading to the expansion of telecommunications that has not since abated. In 1876, Alexander Graham Bell, who was Canadian, had the only telephone anywhere in the world; 24 years later, the United States alone had 1.3 million phones.

Hughes recounts that in 1896, *Scientific American* was effusive in reporting the “remarkable outpouring of U.S. patents since the Civil War,” declaring that America was experiencing “an epoch of invention and progress unique in the history of the world” a “gigantic tidal wave of human ingenuity and resource” is “so stupendous in its magnitude, so complex in its diversity, so profound in its thought, so fruitful in its wealth, so beneficent in its results, that the mind is strained and embarrassed in its effort to expand or a full appreciation of it.”11

And at the core of that revolution were the great inventors of the Edisonian period, who “persuaded [many] of us that we were involved in a second creation of the world.”12 “The Edisonian style,” as Hughes dubbed it, was “centered

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11. Ibid.

12. Ibid.
around the ‘invention factory,’ a laboratory. It was commanded by a master inventor who envisions big ideas and defines new directions but where the day-to-day experimentation and innovation is performed by a staff of young, well-trained, hard-driving craft persons and engineers.”

Daniel Boorstin, the historian and 12th Librarian of Congress, also explores the same period of innovation, dubbing it the “American System of Inventing,” recalling the language of Henry Clay:

All the resources which had been used to lay tracks across the continent, to develop an American System of Manufacturing in its several versions, now went into American Systems of Inventing.

In other words, what had come together in the late 19th century was a Hamiltonian convergence of ingenuity, entrepreneurship, capital, infrastructure, and a talented labor force, along with the steady rule of law. The nation—and the world, as seen in the 20th century—have greatly benefited from this convergence.

As was the case with Clay and Lincoln, it takes capital—not simply ingenuity—to fully utilize any significant invention. In political terms, people must reach a minimum personal and social threshold before they feel they can spare money for other causes or things, or else attract capital from overseas. Thanks to the Whigs and their political legatees, the United States did both.

The Constructive Role of Government

When Henry Ford incorporated the Ford Motor Company in 1903, he invested a total of $28,000. That year, his firm made a total of 1,708 cars. Ford’s vision was grand; as he proclaimed,

I will build a motorcar for the great multitude. . . . It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise. But it will be so low in price that no

A man making a good salary will be unable to own one — and enjoy with his family the blessing of hours of pleasure in God's great open spaces.\(^{15}\)

And it was rapidly improving assembly-line techniques—that is, technological advances—that enabled the engineer to make nearly two million automobiles annually just 20 years later. Auto prices fell as a result, and also, just as importantly, autoworker wages rose substantially. This new concept of steadily higher and higher wages made the American auto industry truly a miracle for America. This win-win proposition—higher wages coupled with mass production—came to be known as “Fordism.” Meanwhile, the GDP of the United States, not coincidentally, grew by 82 percent during those same two decades.

In the words of automotive historian David Farber: “As much as any other single act, Ford’s historic realignment of the wage rate of the auto industry, the industry that was to lead the nation for much of the 20th century, helped to usher in the age of mass consumer society.”\(^{16}\) It might also be noted that Ford’s sweeping act helped to make possible one signature aspect of the American Dream: The romance of the open road, the idea of finding greater freedom in personal mobility.

Yet another point must be emphasized as well: Government patronage was a significant factor in this unprecedented social and economic progress. Yale historian Daniel J. Kevles has closely chronicled this era of federal leadership, going back into 19th century; Kevles cites myriad examples that justify his conclusion, including the 1870 creation of the federal weather service by the U.S. Army Signal Corps and the 1878 renaming of the Coast Survey—established by the Jefferson administration—as the Coast and Geodetic Survey. Within 12 years, the new weather service, based in Washington, D.C., was soon telegraphing reports of local weather across the country, using those reports to predict weather patterns; physicists studied meteorology, making weather forecasting into a true science. The renaming of the Coast Survey reflected an expanded mission; no longer simply mapping the shoreline, the Coast and Geodetic Survey studied the earth’s magnetic field throughout the United States as well; once again the goal was rigorous science. As Kevles explains, “Beginning in the post-Civil War years, the earth and certain branches of the life sciences were pursued in the United States with considerable distinction and no small degree of government patronage.”

It might seem fair to observe that this vision of the federal government—as an activist player in scientific and economic development—might seem


unfamiliar to a contemporary audience. If so, that just serves to remind us that times, and governments, do change. In fact, as we have seen, the Party of Lincoln had carefully laid a federal base supporting inventions and technology during and after the Civil War and kept it going in the decades that followed. This overlooked aspect of American history might challenge popular thinking that the government was not significantly involved in matters of economic development and scientific discovery until World War II.

Perhaps most important was the U.S. Geological Survey, created in 1879, whose world-class work in both pure and applied geology led all other federal scientific agencies in scope and prominence. Kevles credits that to “the energy, imagination, and political skills” of John Wesley Powell, its director:

**Between 1881 and 1884, Powell’s budget jumped fivefold, reaching $500,000 a year. The sum was by no means inconsiderable, since it took up a manyfold greater fraction of the federal budget than the Geological Survey commands today, and in any case, was enough to make a significant difference in the science of the time.**"\(^{17}\)

Kevles also credits the then-dominant Republican Party, which, since the days of Lincoln had considered federal patronage of science a priority. Citing Republican “enthusiasm” for fostering “national economic development,” Kevles notes that this aspect of the Hamiltonian-Clay-Lincoln tradition included not only the Transcontinental Railroad, but also patronage of science in connection to exploration and settlement, particularly in the frontier west:

**[The Republican] commitment translated munificent support for the construction of the transcontinental railroad through subsidies in the form of vast land grants given to the states and, in the territories, the railroad companies directly. Its patronage of science, part of the same devotion to nation building, was directed primarily to the disciplines relevant to exploration, settlement, and economic development, especially in the far West.**\(^{18}\)

That Republican commitment to science lasted well into the 1920s, as reflected in the work of George Ellery Hale, a prominent astrophysicist, and his interactions with Elihu Root, who served as secretary of war and secretary of state for two GOP presidents. Indeed, Kevles cites a revealing 1918 exchange, in which Hale laments the difficulty in obtaining "any Congressional assistance for scientific

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17. Daniel J. Kevles, "What’s New about the Politics of Science?" *Social Research* 73 (Fall 2006).

18. Ibid.
projects outside of the Government Departments, and then only under a Republican administration.”

And Kevles, recalling Hale’s words from nearly a century ago, further details Hale’s frustration with the Democrats of that era:

The Democratic Senators spoke eloquently against all such organizations [as the American Academy in Rome] for research and advanced study and . . . demanded that attention be concentrated on the needs of the “the Little Red School House on the hill,” standing for light and leading to the lowly of the land! . . . The National Academy [of Sciences] would never dream of going to a Democratic Congress for funds, as it would be sure to lose rather than gain by doing so.19

Yet as the next chapter will illustrate, the Democratic Party, under the leadership of Franklin D. Roosevelt, would fix the era. The Democrats would reverse themselves and commit to science, making federal support for inventions and technology a truly bipartisan cause.

Nonetheless, we must remember that the foundation of this forgotten element of nation building was laid early by the Party of Lincoln, and then, when coupled with Theodore Roosevelt’s bullishness on American leadership in the world, projected a new level of American Strength, fortified with new industry and infrastructure networks for the new century.

19. Ibid.
11. FDR Consolidates American Strength to Win World War II

In the previous chapter, we saw that our first “modern” president, Theodore Roosevelt (TR), understood that meeting the responsibilities of a new century—particularly defending American interests in an increasingly dangerous world—required a robust industrial-infrastructure base. The unfolding of the 20th century, where a resourceful America would have to rise to many challenges, not only proved TR prescient, but also confirmed the trajectory of American history set by Presidents Washington, Jefferson, and Lincoln.

While railroads were the focus of that industrial-infrastructure foundation in the 19th century, it was roads and highways—and later the interstate system—that would increasingly become a focus of the 20th century. Even in the Roaring Twenties, when the world was at peace and the nascent automobile industry was transforming the American economy and enlarging the middle class, government investments in road building were a key part of the growth formula, including the upsurge in car sales.

That connection was not missed by Alfred P. Sloan, president of General Motors from 1923 to 1937 and chairman of the board until 1956. In his 1964 memoir, Sloan proudly revisited how his company “rose to a new high level in the twenties,” pointing to a number of “firsts” that transformed and expanded the auto market, including “installment selling, the used-car trade-in, the closed body, and the annual model.” Sloan also recalled a key point about the importance of infrastructure: “I would add improved roads if I were to take into account the environment of the automobile.”¹ And of course, he should have taken into account the environment of the automobile—that is, the nation’s roads.

This fusion of private enterprise and public infrastructure was such an accepted American pattern that in 1929, when the economy first started to shrink during the Depression, a Republican Congress increased funding for highway and road construction, seeking to stimulate job creation. The following year, the same Congress amended the Federal-Aid Highway Act of 1916; the new 1930 legislation appropriated $50 million for road construction, in addition to the $75 million

¹ Alfred P. Sloan, My Years with General Motors (New York: Doubleday, 1963), p. 150.
already appropriated for fiscal year 1931. Congress also provided $125 million for road construction in fiscal years 1932 and 1933.2

After his election in 1932, President Franklin D. Roosevelt (FDR) looked to public works—that is, the building of roads, tunnels, and bridges—as part of his plan for bringing the country out of the slump that had become the Great Depression. While some critics sniped that his infrastructure strategy was a waste of resources, the 32nd president vigorously defended massive public-works projects as a key to combatting the “demoralization caused by vast unemployment,” which he considered “the greatest menace to our social order.”

On September 30, 1934, facing an unemployment rate that had been reduced but was still in the double digits, FDR warned:

No country, however rich, can afford the waste of its human resources. . . . Some people try to tell me that we must make up our minds that for the future we shall permanently have millions of unemployed just as other countries have had them for over a decade. . . . But as for this country, I stand or fall by my refusal to accept as a necessary condition of our future a permanent army of unemployed.

Moreover, Roosevelt expressed a clear preference for creating jobs over expanding the public-welfare rolls:

We must make it a national principle that we will not tolerate a large army of unemployed and that we will arrange our national economy to end our present unemployment as soon as we can and then to take wise measures against its return. I do not want to think that it is the destiny of any American to remain permanently on relief rolls.3 [emphasis added]

Consequently, FDR signed legislation in 1935 creating the Works Progress Administration (WPA), an agency that would spend $13.4 billion over the next eight years, constructing a wide range of infrastructure projects and creating eight million jobs. As much as FDR saw the WPA as a tool to fight unemployment, he envisioned other strength-building benefits as well. As New Dealer Robert Sherwood wrote, “Despite the prohibitions against any military activities which had been written into the Work Relief Bill, W.P.A. accomplished a great deal of


construction—airports, highways, bridges, etc.—that had deliberately strategic importance."

Indeed, even during the 1930s, national defense was always on Roosevelt’s internationalist mind. His Federal-Aid Highway Act of 1938 called for a study of the feasibility of a national network of superhighways aimed, in part, to facilitate defense production. And in April 1941, before official American involvement in World War II began, the president appointed the National Interregional Highway Committee to study the possibility of creating a unique system of highways, including connections through and around cities, that would meet not only traffic needs but also the requirements of the War Department.

While the demands, fiscal and material, of World War II left no room for the construction of interstate highways, the president’s committee released a report in 1943, calling for the postwar construction of a 40,000-mile system. A year later, Roosevelt signed the Federal-Aid Highway Act of 1944, which provided for the formal designation of an Interstate System “so located, as to connect by routes, direct as practical, the principal metropolitan areas, cities, and industrial centers, to serve the National Defense.” According to the Federal Highway Administration, Roosevelt “wanted the program ready for construction after World War II so there would be lots of jobs for soldiers when they came home.”

No federal funds were specifically authorized for the new interstate system; and yet, according to a Congressional Research Service history, “The act appropriated $225 million for primary roads in each of the first three post-war years, $150 million for secondary and feeder road projects, and $125 million for urban federal-aid highway construction.”

The Arsenal of Democracy

Roosevelt was a popular and effective governor of New York in the 1920s and a popular and effective president in the 1930s, and yet he will be best remembered for leading the United States to victory in World War II. Nevertheless, that epochal achievement would not have materialized without FDR’s tapping into the same alliance of public leadership and private enterprise that Abraham Lincoln and Theodore Roosevelt had both championed.

One might note that as a young assistant secretary of the Navy during World War I, FDR had learned a hard lesson: that state owned-and-operated weapons factories did not always work well. For that reason, U.S. pilots during that war had to fly English Sopwith Camels and French SPADs—not American-made aircraft, because there were none.

The future president was then realizing that in any future conflict, a close partnership of private industry and government would be necessary in the war effort. Indeed, Roosevelt had been thinking about the possibilities of greater coordination between the public and private sectors since the 1920s, when he served as president of the American Construction Council, a cooperative association of business, labor, and government.

So in 1939, when World War II broke out in Europe, American private industry was already involved in providing supplies and war materiel to our allies, even as the federal government remained officially neutral.

Yet in May 1940, when Hitler’s blitzkrieg had burst into France and reached the English Channel, FDR was prompted into action by telegraphs from the new prime minister of Great Britain. Fearful of a German invasion, Winston Churchill was seeking the full engagement of the “voice and force of the United States.” Very shortly thereafter, FDR realized that only the mobilization of private industry into the “Arsenal of Democracy,” as he called it, could stop the Nazi menace.9

As skillfully retold by Arthur Herman in Freedom’s Forge: How American Business Produced Victory in World War II, FDR invited William Knudsen of General Motors—a titan of Detroit, and a Republican—to the White House. In that critical meeting on May 30, the two men forged “the most extraordinary alliance,” one that

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would transform an unprepared and economically still-depressed America into not only a military but also an industrial and economic superpower.10

That mobilization of American industry yielded unprecedented results. Between 1940 and 1945, the United States produced $183 billion worth of arms:

_Aircraft and ships accounted for half that total. . . . American shipyards had launched 141 aircraft carriers, eight battleships, 807 cruisers, destroyers, and destroyer escorts, 203 submarines, and . . . almost 52 million tons of merchant shipping. Its factories turned out 88,410 tanks and self-propelled guns, 247,000 artillery pieces, 2.4 million trucks, 2.6 million machine guns—and 41 billion _rounds_ of ammunition._11

The output was also impressive from a comparative standpoint. As noted in a PBS documentary,

_America launched more vessels in 1941 than Japan did in the entire war. Shipyards turned out tonnage so fast that by the autumn of 1943 all Allied shipping sunk since 1939 had been replaced. In 1944 alone, the United States built more planes than the Japanese did from 1939 to 1945. By the end of the war, more than half of all industrial production in the world would take place in the United States_.12

Because the country as yet had little munitions capacity when the European war broke out in 1939, FDR’s leadership also included direct government efforts; munitions manufacturing required specialized equipment, and no existing plants could be easily converted. The solution was the creation a large network of interlocking ammunition plants, government-owned, but contractor-operated. And so a new acronym was born for the new era of war: GOCO.

Among the 60 plants that would be constructed between June 1940 and December 1942 were the Ellwood Ordnance Plant and Kankakee Ordnance Plant in Illinois, which were combined into the Joliet Army Ammunition Plant in 1945. While the Kankakee plant produced more than 450 million metric tons of TNT for the war effort, the Elwood facility made more than 926 million bombs, shells, mines,

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10. Ibid., p. 70.
11. Ibid., pp. 335–36.
detonators, fuses, and boosters.\textsuperscript{13} And at the height of the war, these two plants created good jobs at good wages, employing more than 10,000 people.

FDR pursued a similar public-private arrangement when Japan cornered the world's natural rubber supply, leaving the United States with dwindling reserves and no commercial process to produce synthetic rubber. The solution was the formation the Rubber Reserve Company, making it a subsidiary of the Reconstruction Finance Corporation. By the summer of 1942, when the shortage was acute, a committee pushed for the immediate construction of more than 50 synthetic rubber plants. Government was to supply the capital and retain ownership, while private companies were to build and operate the facilities.

William Galston of the Brookings Institution notes that a “massive research program” was among the positive byproducts when FDR established this Rubber Reserve Company. Speaking personally about the initiative—as his father was involved in it as a newly minted biology Ph.D.—Galston writes that the research-and-development component of the project led to a number of long-term gains:

\textit{By 1945, the annual production of synthetic rubber reached 920,000 tons, about 50 percent higher than yearly U.S. rubber consumption in the pre-war period. Ten years later, in 1955, the government sold its synthetic rubber plants to private firms. Today, according to industry sources, synthetic rubber is widely used for transportation, aerospace, energy, electronics, and consumer products.\textsuperscript{14}}

The same creative partnership materialized after the emergence of the German U-boat threat, which jeopardized all sea-bound tankers transporting oil from Texas oil fields to the Northeast. To secure an interior route far removed from the danger of German submarines—and to free up the tankers for other purposes—the government pushed for the construction of an emergency infrastructure measure: the Big Inch and Little Inch pipelines, which ran from Texas to New Jersey, at the time, the longest of all petroleum pipelines. The federal Defense Plant Corporation owned the pipelines, and a consortium of the largest U.S. oil companies, known as War Emergency Pipelines, Inc., built and operated them.

\textbf{Innovation: Key to Victory}

\textsuperscript{13} “Joliet Army Ammunition Plant,” Wikipedia, no date, \url{http://en.wikipedia.org/wiki/Joliet_Army_Ammunition_Plant}.

\textsuperscript{14} Ibid.
In the previous chapter, we saw how an unknown engineer, Henry Ford, rapidly improved assembly-line techniques in the early 1900s, increasing the production of automobiles by more than 1,000 percent within 20 years. In the same way, technology and productivity advances proved to be keys to victory in the 1940s. At its peak in World War II, Ford’s Willow Run plant, for instance, was assembling six hundred B-24 Liberator bombers a month.

British historian Paul Kennedy makes the case that it was the genius of a great many little-heralded engineers that delivered the breakthroughs, giving the Allies the edge during the war. Among those breakthroughs was “Fido,” the acoustic-homing torpedo built to chase down German and Japanese submarines, not to mention the simple-yet-profound idea of replacing a bomb bay in the B-24 with an extra fuel tank, enabling long-range and strategic bombing deep into enemy territory. Kennedy also notes the role of World War I flying ace Tommy Hitchcock, who cut through Washington red tape to insist the United States license the use of the British-made “Merlin” engine to power the P-51 Mustang. The Merlin engine gave the new American fighter-bomber a performance edge, often exceeding the Luftwaffe’s fighters.15

President Roosevelt fully valued these innovations. Although neither an engineer nor a scientist, FDR possessed an intuitive technological sense that enabled him to oversee the creation of a whole new level of warfare.

And so FDR had the capacity to absorb even profound new information: On August 2, 1939, for example, Albert Einstein wrote to inform him of the possibility of an atomic weapon:

> It may become possible to set up a nuclear chain reaction in a large mass of uranium. . . . This new phenomenon would also lead to the construction of bombs, and it is conceivable . . . that extremely powerful bombs of a new type may thus be constructed.16

Almost immediately, the Roosevelt administration began researching the issues raised by Einstein’s letter; the Manhattan Project was underway. In October 1941, FDR approved the program actually to build an atomic weapon. We all know what happened. Less than four years later, the first atomic bomb was exploded in New Mexico, and, soon thereafter, two were exploded over Japan, ending the war immediately.

It’s not coincidental that most of the uranium enrichment for the Manhattan Project was carried out in Oak Ridge, Tennessee. Why Tennessee? A major reason for choosing the Volunteer State was its abundant electricity, thanks to the development of the Tennessee Valley Authority in the previous decade. Indeed, the nuclear works at Oak Ridge consumed fully a fifth of all the electricity produced in the country.

It was these federal efforts to foster innovation that enabled America not only to win the war against fascism abroad, but also to win the war against economic decline at home. These initiatives were expensive, of course: The U.S. government spent a trillion dollars (adjusted for inflation) building war plants, including the aforementioned synthetic rubber plants. And then, after the war, the federal government sold them off to private industry for just pennies on the dollar. Who today would second-guess that massive sell-off as a grandly successful investment strategy?

Technology also enabled the United States to limit the number of American lives the war claimed to “only” 418,000 deaths. Nearly half-a-million lives lost, is of course, a tragic and staggering number, but it was tiny in comparison to the losses suffered by other countries, even the victors; China and the Soviet Union, for example, each suffered more than 20 million fatalities. Total deaths in the war: 72 million.

FDR: The Master Strategist

That the United States won the war with such a relatively light loss of life is not an accident. As recorded by Eric Larrabee in Commander in Chief: Franklin Delano Roosevelt, His Lieutenants, and Their War, the young FDR had visited the World War I trenches as an assistant secretary of the navy in the Wilson administration; he resolved to avoid that sort of blood-bogged combat in any future war.

Those experiences led Roosevelt as president to embrace air power as the key to less-costly victory. In 1938, he revealed his top-secret vision to congressional leaders—to defend the Western Hemisphere almost entirely through air power. Most of those around him, including his own top staff, were skeptical; Army Major General Hugh Drum, for example, told the president that aircraft would never be more than an adjunct to infantry. But FDR had his own ideas, and he stuck to them—and made them work. As a result, not coincidentally, Gen. Drum’s role in World War II was limited to mostly home-duty assignments before his retirement in 1943.

In 1939, when the new Army chief of staff, General George C. Marshall, presented Roosevelt with a plan to create 265 army divisions in the event of major
war, FDR directed him to think again. The United States would need only 60 divisions, the president insisted; what the war effort would really need was the construction of 50,000 warplanes. That figure seemed absurdly ambitious at a time, as the nation was building only 3,000 military planes a year.

But Roosevelt prevailed, and with the help of war-production chief William Knudsen, he mobilized the enormous productive capacity of General Motors, Ford, and all the other masters of mass production. The same manufacturing capacity that generated economic wealth, in other words, also generated military strength. By 1945, America had built an astonishing 304,000 military aircraft. At peak production, the nation was building a plane every five minutes, and a ship every day.

As the war raged, FDR applied the same pro-science vision to home-front concerns. The master strategist saw that some of the machinery of military progress could be converted to domestic progress. In his November 17, 1944, letter to Vannevar Bush, director of the Office of Scientific Research and Development at the Pentagon, the president outlined a bold plan for postwar America:

> The information, the techniques, and the research experience developed by the Office of Scientific Research and Development and by the thousands of scientists in the universities and in private industry, should be used in the days of peace ahead for the improvement of the national health, the creation of new enterprises bringing new jobs, and the betterment of the national standard of living.

That is, the same scientific knowhow that gave us the atomic bomb could now bring valuable tools of peace. Among the points Roosevelt made to Bush was that of subordinating “big science” to the service of a healthier America. We might note, in particular, that FDR saw the battle against disease as just that—a battle. He asked specifically, “With particular reference to the war of science against disease, what can be done now to organize a program for continuing in the future the work which has been done in medicine and related sciences?” Science ought to mobilize yet again, FDR continued, to win the war against disease:

> The fact that the annual deaths in this country from one or two diseases alone are far in excess of the total number of lives lost by us in battle during this war should make us conscious of the duty we owe future generations.17

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FDR died less than five months after writing this remarkable letter. Winston Churchill delivered the last word on great American president. Speaking to the House of Commons on April 17, 1945, the great Churchill said:

He had broadened and stabilized in the days of peace the foundations of American life and union.

In war he had raised the strength, might and glory of the great Republic to a height never attained by any nation in history. With her left hand she was leading the advance of the conquering Allied Armies into the heart of Germany and with her right, on the other side of the globe, she was irresistibly and swiftly breaking up the power of Japan. And all the time ships, munitions, supplies, and food of every kind were aiding on a gigantic scale her Allies, great and small, in the course of the long struggle.

But all this was no more than worldly power and grandeur, had it not been that the causes of human freedom and of social justice to which so much of his life had been given, added a lustre to all this power and pomp and warlike might, a lustre which will long be discernible among men. . . . In Franklin Roosevelt there died the greatest American friend we have ever known and the greatest champion of freedom who has ever brought help and comfort from the new world to the old.18

The beloved Prime Minister certainly had that right. Roosevelt was a great president who raised a compelling vision of American Strength—"the might and glory of the great Republic"—to her highest levels in history. A vision that not only won World War II, but also laid the foundation of U.S. achievements in infrastructure, technology, medicine, and health that would fuel on unprecedented postwar boom.

FDR’s vision of American Strength set a new and high standard of greatness.

12. Truman, Eisenhower, the Interstates, and the American Dream

While the demands of World War II left little opportunity for the construction of superhighways across the American continent, President Roosevelt’s comprehensive vision of American Strength anticipated such a vital road network.

FDR not only appointed a committee to study the idea but also signed into law the Federal-Aid Highway Act of 1944. That legislation created, although it did not fund, “a National System of Interstate Highways.”¹ The actual funding would have to wait until the troops came home to “the New America,” as the iconic Life magazine captured it in 1947, a country enjoying an unprecedented boom in housing-construction, auto sales, suburbanization, and population growth.

Subsequent presidents Harry S. Truman and Dwight D. Eisenhower would build upon Roosevelt’s infrastructure vision. Truman and Eisenhower were of different political parties, but they shared a love of roads and foresaw the potential of interstate highways to fortify and strengthen America during the ensuing Cold War.

Truman—the only president to have been a member of the American Road Builders Association (today’s American Road & Transportation Builders Association)—had championed highways during his 10 years in the U.S. Senate. He had also once headed the National Old Trails Road Association, which promoted a 3,000-mile route across the country, much of it following U.S. Route 66. As a senator, he drove back and forth between Missouri and Washington, D.C., on U.S. Route 40, a two-lane road that was also a part of the National Old Trails Road.² Truman was an active user of the roads, as well as an active advocate.

As president, Truman signed the Federal-Aid Highway Act of 1952, the first piece of federal legislation that specifically authorized funds ($25 million) for

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the construction of the interstates. By using a 50-50 matching formula, the federal government would pay one half the cost, and the states the other.³

Yet it would fall to Eisenhower, the Supreme Allied Commander in the European Theater of World War II—and the first Republican to be elected president in 24 years—to deliver the marvel of mid-20th century engineering and construction that helped to fuel the postwar boom: the Interstate Highway System.

The Development of Eisenhower’s Vision

Eisenhower’s military experiences, both at home and abroad, helped strengthen his resolve as president to build the system; his life-long service career was not only a preparation for national leadership but also a lesson in the imperatives of a modern highway network. Shortly after World War I, as a 28-year-old major in the U.S. Army, Ike volunteered to join the first-ever Transcontinental Motor Convoy, a truck train of some 80 army vehicles manned by nearly 300 military personnel; the convoy traveled from the White House to San Francisco following the route of a mostly dirt road, the Lincoln Highway.⁴

The 62-day excursion was designed so that the Army could test the mobility of its vehicles and the viability of U.S. roads and bridges. It also proved to be good public relations; some 3.2 million Americans came out to cheer the convoy on its strenuous journey. As recounted by Richard F. Weingroff in the journal Public Roads:

On the way west, the convoy experienced all the woes known to motorists and then some—an endless series of mechanical difficulties; vehicles stuck in mud or sand; trucks and other equipment crashing through wooden bridges; roads as slippery as ice or dusty or the consistency of “gumbo”; extremes of weather from desert heat to Rocky Mountain freezng; and, for the soldiers, worst of all, speeches, speeches, and more speeches in every town along the way.⁵

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In his 1967 book, *At Ease: Stories I Tell to Friends*, Eisenhower devotes an entire chapter to the 1919 experience, crediting the trip with exposing him to the difficulties that the military faced in traveling great distances in America. It also prepared him, when called upon in the 1930s, to map and assess the military value of the roads in France.

Later in World War II, the Supreme Commander saw first-hand the military advantages that Hitler’s Germany had reaped from its *Autobahn* system, which at that time featured the best highways in the world, and which the Allies used, in the closing days of the conflict, to move into Germany in order to force a surrender. As Eisenhower recounts in *At Ease*:

> The old convoy had started me thinking about good, two-lane highways, but Germany had made me see the wisdom of broader ribbons across the land. This was one of the things that I felt deeply about, and I made a personal and absolute decision to see that the nation would benefit by it."

And so when seeking the presidency in 1952, Ike campaigned on a platform that included this plank: “The Federal Government and State and local governments should continuously plan programs of economically justifiable public works.”

Once in office, the 34th president fulfilled his pledge. He signed the Federal-Aid Highway Act of 1954, authorizing $175 million for the interstate system to be spent annually during the fiscal years of 1956 and 1957—although he also realized that these relatively small amounts of money for transportation infrastructure fell short. In his 1955 State of Union Address, he declared that this effort “will not itself assure our people” of a modern highway system that would “meet the needs of our growing population, our expanding economy, and our national security.”

A month later, Eisenhower unveiled his bold solution: a 10-year push to accelerate construction of the 40,000-mile interstate system, at a federal cost of $25 billion. And by June 1956, the president signed the legislation that he had long

envisioned, creating, at that time, the largest public-works project in American history. A departure from previous federal-aid highway legislation, the 1956 Act increased the federal commitment; Congress would now be paying 90 percent of construction costs, with states picking up the remaining 10 percent. Congress also set up the Highway Trust Fund to receive federal taxes on fuel, automobiles, trucks, and tires, in order to finance the new federal mission.\textsuperscript{10}

Although it took 35 years and $114 billion to build what would become a 46,876-mile system, the overall effectiveness of the mega-project was due to Eisenhower’s insistence that highway infrastructure must be a unified whole, much like the way Theodore Roosevelt viewed the nation’s inland waterways.

Perhaps pointing to shortcomings of earlier highway legislation, Eisenhower understood the highway system as a \textit{national} responsibility. As he stated in his 1956 State of the Union Address:

\begin{quote}
The whole interstate system must be authorized as one project, to be completed approximately within the specified time. Only in this way can industry efficiently gear itself to the job ahead. Only in this way can the required planning and engineering be accomplished without the confusion and waste unavoidable a piecemeal approach.\textsuperscript{11}
\end{quote}

We might pause to note Eisenhower’s reference to the interstate system as “one project.” That “one project,” of course, included a national \textit{defense} dimension. As Ike had always maintained, a highway system is “as necessary to our defense as it is to our national economy and personal safety.” Explaining the need for a coherent system, he added:

\begin{quote}
Together, the united forces of our communication and transportation systems are dynamic elements in the very name we bear—United States. Without them, we would be a mere alliance of many separate parts.\textsuperscript{12}
\end{quote}

So what Eisenhower foresaw as “a mighty network of highways [spreading] across our country” became a reality in postwar America. The transportation-infrastructure project proved such an overwhelming success, so woven into the fabric of American life, that on the eve of its completion, both

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\textsuperscript{10} Weingroff, “Federal-Aid Highway Act of 1956.”

\textsuperscript{11} Dwight D. Eisenhower, State of the Union Address, January 6, 1956, \url{http://www.pbs.org/wgbh/amERICANexperience/features/primary-resources/eisenhower-state56/}.

\textsuperscript{12} Ibid.
political parties paid tribute to the great American most responsible for the achievement. In 1990, Republican President George H. W. Bush joined with the Democratic leaders of Congress to formally designate the system as the Dwight D. Eisenhower National System of Interstate and Defense Highways.

In June 2006, the Republican Senate Majority Leader, Bill Frist of Tennessee, and the Republican Speaker of the House, Dennis Hastert of Illinois, enacted a joint resolution applauding the Eisenhower Interstate Highway System on the 50th anniversary of the landmark legislation. These great highways, the resolution declared, have "facilitated trade both within our national borders and globally and helped create unprecedented economic expansion and opportunities for millions of Americans."

The resolution noted that the system "has made it easier and often more enjoyable to travel to long-distance destinations and spend time with family members and friends who live far away." Moreover, the resolution continued, the Interstate system "is a pivotal component in our national system of defense and emergency preparedness efforts" and "remains one of our country’s paramount assets as well as a symbol of human ingenuity and freedom."

**Ike's Other Infrastructure Priorities**

As much as Eisenhower is revered as the "Father of the Interstate System," equating his legacy with only the U.S. highway network would be as shortsighted as equating Lincoln’s legacy with only the transcontinental railroad. Indeed, Eisenhower’s vision of American Strength extended far beyond divided, limited-access thruways with multiple 12-foot-wide lanes, underpasses and overpasses; it embraced other scientific and technological innovations that would preserve America’s status as the world’s leading superpower.

In 1954, the Eisenhower administration worked with Congress to pass the Wiley-Dondero Act, authorizing funding for U.S. participation in the construction of the Saint Lawrence Seaway, jointly with Canada; the commerce-spurring waterway was completed in 1959.13

And when the Soviets launched Sputnik 1 in 1958, Eisenhower responded with military precision, establishing the Advanced Research Project Agency (ARPA) in the Department of Defense. Ike intended this agency, known today as the Defense

Advanced Research Projects Agency (DARPA), to create new technologies for the military.

Following the pattern of the Manhattan Project, ARPA’s scientists and engineers collaborated with their counterparts, working in research labs of private industry and universities, to create stunning breakthroughs, including those in computer and networking technology. ARPANET, the precursor to the Internet, was among those innovations. Vice President Al Gore may have suggested that he had invented the information highway of the 21st century, but Eisenhower deserves more credit for his work on its behalf in the 20th century.

Engaging the highest levels of government and business, this public-private partnership marked the beginning of “the big integration” that historian Thomas P. Hughes explores in Rescuing Prometheus: Four Monumental Projects that Changed the Modern World. No longer confined to small “invention shops” run by entrepreneurs such as Thomas Edison or Henry Ford; American innovation would now be carried out through large and complex systems.

Eisenhower further bolstered American Strength by establishing the National Aeronautics and Space Administration (NASA). NASA pioneered U.S. space exploration, including the Apollo project, which landed a man on the moon and then returned him safely to earth. Ike also championed the enhancement of science education needed to help sustain “the big integration” by signing the National Defense Education Act of 1958.

Under Ike’s leadership, the United States remained the Arsenal of Democracy while under GOP management. Indeed, ARPA functioned much like the Roosevelt’s Office of Scientific Research and Development under Vannevar Bush; Eisenhower would have found Bush’s assessment in 1945 supportive of his own “big science” agenda 13 years later:

Today, it is truer than ever that basic research is the pacemaker of technological progress. In the nineteenth century, Yankee mechanical ingenuity, building largely upon the basic discoveries of European scientists, could greatly advance the technical arts. Now the situation is different.

A nation which depends upon others for its new basic scientific knowledge will be slow in its industrial progress and weak in its competitive position in world trade, regardless of its mechanical skill.14

In other words, Eisenhower drew inspiration from the triumphs of other great American presidents, projecting a vision of American Strength through national expansion, national experimentation, national unity, and national progress. For all these reasons—including, of course, the Interstate Highway System—Americans today can fully appreciate the appeal of Eisenhower’s memorable 1952 campaign motto, “I like Ike.”

Only in the recent past have historians come to fully appreciate the achievements of President Eisenhower. The 34th president’s steady hand of leadership ensured that the great postwar era would not be short-lived, but would extend into the 1970s.

Even as Soviet Communism was still strong—it had yet to decay and be tossed into the ash heap of history—during his eight years in the White House, Ike and his allies in Congress, in both parties, bequeathed a bipartisan legacy that enabled the United States to rise to her peak of economic, political, military, industrial, technological, strategic, and social strength.

The Eisenhower Fifties represented a remarkable chapter in American history, in keeping with the best of the Hamiltonian tradition. Projecting national unity and purpose, the America of that era benefited from a robust spirit of economic development made possible because the federal government had, for many years, made the necessary infrastructure investments needed to promote growth.

During Ike’s tenure, Uncle Sam further improved the single national market of the United States; being able now to transcend geographic distance, American business could enjoy huge efficiencies and economies of scale. Indeed, the nation boomed: The GDP of the country grew 23 percent in real terms between 1953 and 1961. During the same period, a net of 4.6 million new jobs were created while American families saw their median income jump from $32,990 to $40,551, using 2012 dollars.15

It might not have always seemed that way at the time, but relative to the present day, leaders of government and business at mid-century did not consider each other as rivals or adversaries but as stakeholders committed to the same goal: nation building. Alfred P. Sloan, the longtime president and the chairman of the board of General Motors, recounted in his 1964 memoir how his company—then the largest in the world—proved itself to be an enormous asset to the nation, not just its shareholders:

In World War I, we were one of the important manufacturers of aircraft engines for the army. During World War II, we produced an incredible $12 billion of military goods. Most of this production was compressed into a few years, during which we were fully mobilized for war. Between February 1942 and September 1945 we did not make a single passenger car in the United States. During the Korean War, our military products accounted for . . . 19 percent of our business.

In other words, GM was truly an American institution—and American asset.

Moreover, Sloan made it clear that for reasons of patriotism, GM could be counted on in the future as a critical asset in the defense of America during the Cold War:

And today, military technology has become so advanced as to require new modes of production and new kinds of research. The corporation is looking forward to the production of even newer products which are now under development in the divisions and in the recently organized GM Defense Research Laboratories. General Motors will no doubt continue to play a prominent role in the national defense program. Should we be called upon, we stand ready to be of service to national defense to the maximum.16

In the meantime, Uncle Sam continued to provide leadership to secure that military-industrial-infrastructure base. After all, the millions of vehicles that GM and the other automakers were producing needed roads on which to run.

16. Sloan, My Years with General Motors, p. 150.
Eisenhower's Democratic successor, John F. Kennedy (JFK), continued, in bipartisan fashion, to carry out the advancement of American infrastructure. In his second year in office, JFK signed the Federal-Aid Highway Act of 1962, which required states and cities to implement a “continuing, comprehensive, and cooperative” planning process, developing long-term plans for highways in coordination with other modes of travel.

Kennedy’s successor, Lyndon B. Johnson (LBJ), signed the Federal-Aid Highway Act of 1966, requiring each state to set up a highway-safety program to reduce deaths, injuries, and property damage. Also under LBJ, Congress passed legislation in 1966 to create the U.S. Department of Transportation (DOT) effective April 1967; updating the name of the Bureau of Public Roads to the Federal Highway Administration (FHWA), it moved that agency into the new DOT.¹

The End of an Era

Although the postwar building boom remained strong through the 1960s, everything changed in the 1970s, when the widely shared consensus supporting big infrastructure projects—dating back to Lincoln—deteriorated rapidly. As Adam J. White notes in the conservative scholar’s journal New Atlantis, projects such as the Interstate System “marked the end of an era in which the federal government could swiftly plan, fund, and execute major infrastructure programs.”²

An early signal that the era of bipartisan nation building—which had lasted more than a century—was coming to an end was seen in 1971. That’s when both houses of Congress voted to cancel funding for the development of the Boeing

Supersonic Transport (SST), even as the Seattle manufacturer, which had been working on the SST since 1958, had 115 unfulfilled orders for the plane from 25 different airlines. Although not the sole factor, the SST decision played a role in Boeing’s downsizing its workforce by more than 43,000 employees in the Seattle area in 1970 and 1971. Travelers also lost out, as the commercial jets introduced in the late 1950s—and newer jets that flew no faster—would remain the standard of transcontinental and international air travel to this day.

The prime opposition to the Boeing project came from a new force: the emerging environmental movement. That growing effort spurred a phalanx of federal laws and regulations that had the meritorious effect of cleaning the environment, and yet also the deleterious effect of significantly slowing down, even stopping, various important development projects. These laws included the National Environmental Policy Act of 1970, the Clean Air Act of 1970, the Clean Water Act of 1972, the Coastal Zone Management Act of 1972, and the Endangered Species Act of 1973. These new statutes would stand in the way of many large-scale nation building infrastructure projects, not just federal support of the next-generation airplane.

As Adam White observes, this “fast-growing, wide-ranging body of federal environment laws . . . effectively eliminated the government’s capacity to quickly roll out public or private infrastructure programs.” Rather than simply establishing common-sense environment standards that all Americans could agree to, the tidal wave of legislation set up a myriad of procedural roadblocks, including endless cycles of public-comment and agency response, tying up projects for years before the first construction crew could be hired.

Perhaps the major instigator of a procedural revolution has been the National Environmental Policy Act of 1970 (NEPA). As Adam White notes, the legislation was a boon to litigators and consultants, if not to infrastructure builders and users:

NEPA’s requirements are, in the Supreme Court’s words, “essentially procedural”: they prohibit federal agencies from approving infrastructure projects without first undertaking lengthy environmental reviews, culminating in a comprehensive environmental impact


statement outlining not just a project’s possible environmental impacts, but also the comparative impacts of hypothetical alternative projects.

Yet it wasn’t just procedures or bureaucratic red tape that would undermine nation building. NEPA also enabled a well-heeled adversarial class—a whole new industry, in fact—to fight vigorously against any public-works project:

**By setting requirements generally rather than specifically, it creates a stifling uncertainty by empowering opponents of an infrastructure project—especially environmentalists—to file lawsuits arguing that the relevant agency’s review was not sufficiently thorough.**

Meanwhile, as the environmental movement was influencing legislation, it was also changing the Democratic Party. Whereas once the party of FDR and Truman had been eager to pour concrete, lay asphalt, and build dams—a tradition that many pro-growth Democrats continued to uphold—a new and different ideology was sprouting up within the party: “green” and anti-growth; it must be noted that a fair number of Republicans adopted these views as well. The eco-activists and litigators also proved themselves skilled at winning over the academic, journalistic, and judicial elites. As a result, they have blocked not only the construction of needed highways and bridges, but also energy-exploration projects in much of the country, from Alaska to Florida.

So the greens, who are on the political left, have also had help, from a much different group, on the right. Also starting in the 1970s, a new libertarian standpoint took hold in the Republican Party. Reacting to the economic “stagflation” of the decade, this pro-free-market sentiment was spearheaded by the Nobel Prize-winning economist Milton Friedman. As the main domestic focus of these new-style Republicans was tax and spending cuts, they found infrastructure commitments easier to challenge than, say, Social Security. In the view of this ideological *avant-garde*, federal money for infrastructure was often derided as mere “pork barrel” funding for unionized blue-collar workers and entrenched political machines.

Consequently, the libertarian school advanced the notion of “starving the beast” of Big Government by cutting government spending. Their logic also stipulated that “public works” should become privatized works. In other words, the market decides if we need, say, a new port, as well as who should own it. These libertarians were thus hostile to the earlier Republican tradition: that of the Federalists of Alexander Hamilton, the Whigs of Henry Clay, and the Republicans of Abraham Lincoln, who were all proponents of “internal improvements”—that is, turnpikes, canals, railroads. They were skeptical, too, of the sort of national-

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5. White, "Infrastructure Policy: Lessons from American History."
security-based spending priorities, such as Eisenhower and his interstates, or Nixon and his SST.

Reagan’s Attempt to Save Conservative Nation-building

While the libertarians have grown more influential in the GOP, their favorite president, Ronald Reagan, was actually like Ike on the subject of infrastructure. By the time the former California governor moved into the White House in 1981, the deferred maintenance and outright neglect of Eisenhower’s Interstate System could no longer be ignored, even as infrastructure had lost favor with the political class. Consequently, in a November 1982 radio address, the same president who, a year earlier, had boldly cut income-tax rates, now saw no contradiction in calling for a modest increase of the dedicated gas tax to pay for repairing the nation’s highways and bridges:

The time has come to preserve what past Americans spent so much time and effort to create, and that means a nationwide conservation effort in the best sense of the word. America can’t afford throwaway roads or disposable transit systems. The bridges and highways we fail to repair today will have to be rebuilt tomorrow at many times the cost.6

Later that same year, when pushing for legislation that would not only bolster the depleted highway trust fund but also support the nation’s economic recovery, our 40th president declared:

The primary objective of this legislation is to provide renewed investment to help rebuild our nation’s deteriorating infrastructure. In addition to supporting economic recovery by providing an effective transportation network that is crucial to commerce, this bill sets the framework for several other beneficial effects on the economy. For example, this legislation would create an estimated 320,000 jobs, 170,000 direct and indirect in construction industries and 150,000 more jobs “induced” by the construction.7

Reagan reiterated his understanding that “the state of our transportation system affects our commerce, our economy, and our future,” when he signed the Surface Transportation Assistance Act on January 6, 1983:

Clearly this program is an investment in tomorrow that we must make today. It will allow us to complete the interstate system [and make]—the interstate repairs and strengthen and improve our bridges, make all of us safer, and help our cities meet their public transit needs.

Reagan continued:

When we first built our highways, we paid for them with a gas tax, a highway user fee that charged those of us who benefited most from the system. It was a fair concept then, and it is today. But that levy has not been increased in more than 23 years. And it no longer covers expenses. The money for today’s improvements will come from increasing the gas tax, or the highway user fee, by the equivalent of a nickel a gallon—about $30 a year for most motorists.

In other words, Reagan was saying, the new tax was a bargain. This first-term achievement did not go unnoticed by Reagan’s party, whose 1984 platform placed the popular president squarely in the tradition of his predecessor of the 1950s. The platform equated the fortieth president’s “massive modernization of America’s transport systems” with “the same vision that marked President Eisenhower’s beginning of the Interstate Highway System,” adding:

An expanded highway program is rebuilding the nation’s roads and bridges and creating several hundred thousand jobs in construction and related fields. Driving mileage has increased by eight percent, but greater attention to safety has led to a 17 percent reduction in fatalities, saving more than 8,000 lives yearly.8

Yet infrastructure was not the only Hamiltonian priority that the Gipper had inherited from Ike. During his final year in the White House, Reagan, in a national radio address, expressed concern that budget pressures might put funding for science in jeopardy. Echoing Ike’s rationale for ARPA and NASA in the 50s—which presaged John F. Kennedy’s epic “moon shot” program in the following decade—Reagan maintained that “basic research” is “one of the most practical things that government does,” and without such investments, “Major industries, including television, communications, and computer industries, couldn’t be where they are today.”

Reagan urged Congress to maintain this “indispensable investment in America’s future,” to ensure that we would not fall behind other nations. As his
party declared in its 1984 platform—the document that helped Reagan win 49 states in the general election that year:

Some say that we can't afford it, that we're too strapped for cash. Well, leadership means making hard choices, even in an election year. We've put our research budget under a microscope and looked for quality and cost effectiveness. We've put together the best program for the taxpayers’ dollars. After all, the American tradition of hope is one we can't afford to forget.9

In other words, Congress and the country must strive to maintain these, as Reagan called them, “indispensable investments in America’s future.”

The Information Age

Other forces would also distract the nation’s attention from the pressing needs of the “built environment.” When the Internet soared into usage during the 1990s, the left-right ideological fusion undermining physical infrastructure was further powered by a new ideology, based on the most recent technology. The whole reality of the physical world seemed to be challenged by the newer, fashionable allure of cyberspace and virtual reality. If Microsoft and Google could remake the future online, why worry about “boring” old bridges in Minnesota and Washington state, or dusty old levees in New Orleans? The big issues in think-tank conversation, both left and right, were spectrum and the “digital divide,” not asphalt and waterworks.

The net effect: The New and Green Left worked together with the New and Libertarian Right to erode the traditional support system for American Strength. The Green disdain for factories, production, and capitalism found itself allied with Libertarian disdain for the government doing anything. As a result, big projects were “green-scissored”—to use the phrase popularized by a coalition of libertarian and environmental advocacy groups, the Green Scissors Campaign, formed in 199410—and, in many cases, these projects were terminated.

Liberals and libertarians may have their differences, but they have often been able to agree that government should not do anything—beyond the bare and

10. See the website of the Green Scissors Campaign, http://greenscissors.com/about/.
decaying minimum—that involves bolstering productivity or expanding infrastructure.

**The Collapse of Infrastructure Investment**

As much as Reagan worked to keep the atavistic anti-growth forces at bay, his infrastructure revival was nevertheless short-lived. As the Congressional Budget Office reports, capital spending on transport and water infrastructure, relative to GDP, would resume its negative arc after he left office. Although the decline between 1980 and 2007 may seem relatively modest, falling from about 1.75 percent to about 1.1 percent, the drop in capital expenditures from the early-1960s peak of more than three percent of GDP is, in fact, ominous, as this chart makes clear.11 Yes, it’s clear: a two-thirds reduction will have severe consequences.

![Glory days](chart)

Fiscal and demographic realities, related to an aging population created by falling birthrates since the 1970s, also helped to shift priorities away from infrastructure. Lamenting that “the U.S. government has gradually changed from an investment engine to an insurance company,” the *Atlantic’s* Derek Thompson notes that while the federal budget has grown, “government” in its strategic nation building capacity has actually shrunk:

**In 1969, direct payments to individuals and investments (i.e.: education and training, scientific research, and infrastructure) each made up one-third of the federal budget . . . . In the last half-century, wars have ended**

(the defense budget includes investment, too), and infrastructure has languished, while entitlements have grown.

Now payments to individuals have doubled their share of the budget to 65 percent. Investments have fallen to 14 percent.\(^\text{12}\)

The real-world effects of this reversal have been severe and dangerous, resulting in inadequate and crumbling infrastructure, including highway bridge collapses and congested airports—as described by former New Mexico Governor Bill Richardson, a “Third World energy grid.”\(^\text{13}\) Recent vulnerabilities in the Northeast and the Gulf Coast, as revealed by Hurricane Katrina and Superstorm Sandy, are the product of such inadequate infrastructure.

The deterioration of our transportation networks is a highly visible indicator of this decline. In its “report card,” the American Society of Civil Engineers (ASCE) awarded the U.S. aviation system a grade D; the rail system, a C+; public transit, D; bridges, C+; and the highway system, D. Its cumulative GPA for all infrastructure and its affects, including solid and hazardous waste, drinking water, power grids, levees, waterways, and ports, was D+. This overall near-failing grade has remained largely the same in every report card since 1989, a pattern the civil engineers believe is “due to delayed maintenance and underinvestment across most categories.” The engineers estimate that it would cost $3.6 trillion to bring U.S. infrastructure up to “good condition.”\(^\text{14}\)

Moreover, just days after the ASCE released its 2013 report, the Interstate-5 bridge over the Skagit River in Washington State collapsed after being hit by a truck. While no one was injured, the incident brought to mind the tragedy six years earlier in Minneapolis, when the more heavily traveled Interstate-35W bridge over the Mississippi River collapsed during rush hour, killing 13 people.

Confirming the ASCE ratings, an analysis by the Associated Press (AP) found that nearly 11 percent of all bridges listed in the most recent National Bridge Inventory, a total of 65,605, were classified as “structurally deficient”—the same


rating that the Minnesota bridge earned in 2006, a year before it gave way. Furthermore, some 20,808 bridges were classified as “fracture critical.” Focusing on the 7,795 bridges that received both red flags, the AP study found that these structures, located in all 50 states, carry more than 29 million drivers a day. Many of them handle more vehicles, and heavier trucks, than they were originally designed to carry, and many are well past their prime, having been built more than 60 years ago.\textsuperscript{15}

We might note, too that bridges represent just one component of infrastructure. When Hurricane Katrina engulfed New Orleans in 2005 and Hurricane Sandy slammed New York City in 2012, the vulnerabilities of these cities’ entire infrastructure networks were revealed for all to see.

While not all devastation from acts of nature is preventable, public officials of these metropolitan centers recognized that 40 years of infrastructure neglect greatly intensified the ensuing damage. Consequently, both Louisiana and New York City have drafted extensive blueprints to fortify themselves from the next big storm and climate-related challenges. New York’s $19.5-billion, 438-page plan, released in 2013, involved surveying neighborhoods along its 520-mile coastline. For the Louisiana Gulf Coast, a $50-billion proposal was released in 2012. Both agendas, according to the Washington Post, would put their respective regions in the forefront of U.S. resilience efforts.\textsuperscript{16}

\section*{The Waning of the Middle Class}

Perhaps the most far-reaching consequence of the collapse of U.S. infrastructure has been the corresponding loss of manufacturing jobs—the subsequent waning of America’s middle class. When a country scrimps on infrastructure, or kills major public projects, it also sidelines its manufacturing sector. That often overlooked side effect has weakened America by marginalizing the 65 percent of the U.S. workforce without college degrees whose livelihoods, since the days of Henry Ford, have largely depended on making material things.

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As the Associated Press reports, these Americans have far fewer prospects than a generation ago. They are forced to compete in the global job market with three billion people in China, India, Eastern Europe, and elsewhere, making products for multinational companies. “These trends have contributed to a ‘hollowed out’ labor market, with more jobs at the higher and lower ends of the pay scale and fewer in the middle.”\(^{17}\)

And as these average citizens have fewer advocates looking out for their interests than do minorities and the highly educated, the plight of Middle America—as seen in the flat-lining of median wages since the 1970s—only grows more acute with every passing year. As University of Manitoba academic Vaclav Smil notes, that a country falls apart when it outsources manufacturing:

**In every society, manufacturing builds the lower middle class. If you give up manufacturing, you end up with have and have-nots and you get social polarization. The whole lower middle class sinks.**

Smil further asserts that a country can’t continue to innovate without manufacturing and, we might add, the infrastructure needed to support such manufacturing. This vacuum saps a country of its creative and intellectual prowess, because innovation is more likely to arise out of manufacturing and construction processes than from research institutions or national laboratories:

**[Innovation] comes from manufacturing—from companies that want to extend their product reach, improve their costs, increase their returns. What’s very important is in-house research. Innovation usually arises from somebody taking a product already in production and making it better: better glass, better aluminum, a better chip. Innovation always starts with a product.**\(^{18}\)

Smil’s insights may seem counter-intuitive to a rising generation that adores tech companies and their “cool” products and eccentric moguls, but demographer Joel Kotkin agrees that dismissing the bourgeois manufacturing sector, including agribusiness, energy, consumer products, and housing, is wrought with danger. He warns:


[Both sectors] need each other; innovation can help make Detroit competitive, but society really benefits if that car is designed and made in the United States. Tech can drive the economy, but it is simply not enough by itself. Living on the creative edge cannot create sufficient employment, opportunities or an overall positive impact on day-to-day life. A generation hooked on Facebook—and working at Starbucks—is not likely to be terribly productive or successful.\textsuperscript{19}

Even Robert Mundell, the Nobel Prize-winning economist and a founding eminence of the supply-side school—which has often been seen as dismissive of Hamiltonian concerns about manufacturing—as well as a long-time trade-liberalization advocate, now seems to agree with Kotkin that cars ought to be designed and made—and not just assembled—in the United States. In an interview with \textit{Forbes}, Mundell expressed his belief that outsourcing has gone too far, and has left America vulnerable:

\textbf{It has been a mistake to let U.S. manufacturing run down so low. While other nations have industrial policies to maximize their trade benefits, the United States leaves itself open like a naked woman. A big problem is with nations that may prove to be future enemies.}\textsuperscript{20}

Mundell’s warning that the hollowing out of America’s industrial base creates a “big problem” with “future enemies” brings to mind Alexander Hamilton, who warned in 1791 that the United States had to be “independent of foreign nations for military and other essential supplies.” While the country heeded the first treasury secretary’s advice for 180 years, the trashing of his legacy in our time has left America vulnerable not only at home but also in a dangerous world.

This is the crisis of American Strength.


14. The United States Falls Behind

As we saw in chapter six, it’s not enough for any nation simply to keep its infrastructure up to date or in good condition. It must also improve and strengthen itself at a rate that keeps pace with other nations, especially, of course, potentially hostile nations. If the United States falls behind internationally, it faces the prospect of diminishment, or defeat, if challenged by enemies.

Indeed, infrastructural weakness seems to be a coincident indicator with economic and strategic weakness. The 2012–13 Global Competitiveness Report of the World Economic Forum details extensively, using key infrastructure metrics, how the United States has fallen behind other Western democracies and Japan. In terms of the “quality of overall infrastructure,” the report ranks the United States in the 25th spot, behind France (No. 5), Germany (No. 9), Canada (No. 15), Japan (No. 16), Spain (No. 18), and the United Kingdom (No. 24).

Looking at specific categories, the United States ranks 30th in “quality of airport infrastructure,” 20th in “quality of roads,” 19th in “quality of port infrastructure,” and 18th in “quality of railroad infrastructure.” Even on a measure as basic as “quality of electrical supply,” defined as “lack of interruptions and lack of voltage fluctuations,” the United States came in at the 33rd spot.¹

Yet, the World Economic Forum is not the only authority to document weakened American leadership when it comes to highway systems, airports, and ports. After surveying the state of U.S. transportation in 2011, the Economist concluded that highway traffic is significantly more congested in the United States than in Western Europe, with the exception of London:

Average delays in America’s largest cities exceed those in cities like Berlin and Copenhagen. Americans spend considerably more time commuting than most Europeans; only Hungarians and Romanians take longer to get to work.

The Economist also warned that the nation’s lower-quality highways translate into a “deadlier transport” system: “With some 15 deaths a year for every 100,000 people, the road fatality rate in America is 60 percent above the OECD average; 33,000 Americans were killed on roads in 2010.”

Nor are our airports “world class.” In 2013, Skytrax, the airport data service, identified the “World’s Top 100 Airports.” The top 10, in ascending order, started with London’s Heathrow; then came Tokyo, Vancouver, Zurich, Munich, Beijing, Hong Kong, Amsterdam, and Incheon in South Korea. The top honor went to Singapore’s Changi Airport.

In other words, what’s missing from the international top 10: any airport in America. As for the ranking of American facilities, highest on the list was Cincinnati/Northern Kentucky, at No. 30. More prominent U.S. airports included Atlanta’s Hartsfield at No. 48, Dallas-Fort Worth at No. 54, New York City’s JFK at No. 63, and Chicago’s O’Hare at No. 84. Other big U.S. airports failed even make the Top 100, including Los Angeles’ International Airport.

Moreover, besides our airports—and everybody agrees that quality of airports is a major consideration in business decisions—one might also consider the significance of seaports. A new generation of supertankers is cruising the world, bigger than ever, making sea-commerce more efficient than ever, and yet they won’t be able to dock at existing U.S. ports. The Maersk Triple E—more than 400 meters long, 59 meters wide, and more than 73 meters high—is the world’s largest ship. With a loading capacity for some 18,000 20-foot containers, this new supertanker can carry 36,000 automobiles, or 111 million pairs of shoes, or 182 million iPads.

Yet this new Maersk ship is sailing only to Europe, Africa, and Asia. It’s too wide for the Panama Canal, and too tall for any U.S. port. One might note, too, that Maersk is headquartered in Denmark, and that its Triple E ships are being built in South Korea.

Even when it comes to high-speed access to the Internet, the critical information network of the 21st century—and an infrastructure invented in the

United States—the nation is struggling to keep up. The World Economic Forum ranked America 35th out of 138 countries in Internet bandwidth capacity,⁵ and the *New York Times* reports that “other studies rank the United States anywhere from 14th to 31st in average connection speed.”⁶

**Emerging Economies Are Showing the Way**

Meanwhile, the competition is only getting tougher. America’s competitors are no longer simply Germany or Japan, but also the “rising economies” of the developing nations. In particular, China, India, and Brazil have invested heavily in infrastructure, launching 21st century building booms, phenomena that once were the pride of the United States, from railroads in the late 19th century to freeways in the mid-20th century.

Under the revealing headline “U.S. Infrastructure Spending Falling Far Behind China, Emerging Economies,” the Huffington Post Business reports that America spends just two percent of its GDP on infrastructure construction; Europe, five percent; and China, nine percent.⁷

Similarly, the Business Insider posts a stunning array of graphs and charts illustrating “The Alarming Collapse of U.S. Infrastructure Spending,” quantifying how other nations are making infrastructure a top priority. India, for example, is spending $1 trillion over 12 years on public works—half of the total on transportation. In our own hemisphere, Brazil is embarked on a three-year, $900 billion plan to upgrade its transportation system in preparation for the 2016 Summer Olympics.

While not shortchanging the ambitious plans being rolled out in the United Kingdom, Australia, and Canada, the Business Insider feature carries a bold subtitle: “No One Is Spending like China.” Indeed, the story indicates that China is investing more than $1 trillion over five years to upgrade transit, water-supply, and electricity networks; the total includes a 10,000-mile high-speed rail system to be

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completed by 2020. That spending also supports the construction of the longest undersea tunnel in the world, a 76-mile tunnel under China’s Bohai Strait. The $42 billion project will link the port city of Dalian in the northeastern province of Liaoning to the city of Yantai in the country’s eastern region.

Moreover, China is rapidly developing its energy capacity—following the template that the United States established long ago—by building dams at an aggressive pace, including the $25 billion Three Gorges Dam on the Yangtze River it became the largest hydroelectric power plant in the world when completed in 2008. China’s progress isn’t just at home. According to David Biello, an editor of Scientific American, China “has taken over a role once reserved for international development banks, such as the World Bank” by funding or building more than 200 dams in developing countries from Asia to Africa.

Is America Up to the Challenge?

All these developments abroad illustrate Arnold Toynbee’s construct of history as “challenge and response.” Our competitors and adversaries are harnessing natural phenomena and marshaling the resources they need not only to survive but also to thrive.

The question remains: Does the United States grasp what these other countries clearly understand—that the physical environment matters? Or that infrastructure, in the words of D. Wayne Klotz, president of the ASCE, is “the cathedral of modern civilization”? From canals to railroads, and highways to airports, our infrastructure systems stand at the very heart of America; they have built our country and make it work. We depend on them for our safety and quality of life. They represent and facilitate progress, growth, and strength.

Moreover, the built environment matters a lot more than Americans have been willing to acknowledge, or pay for, since the 1970s. Responding to ASCE’s


sober 2013 assessment of the state of U.S. infrastructure, Henry Petroski, professor of civil engineering and history at Duke University, warns of the consequences if we don’t maintain a secure physical environment:

The physical foundations of our civilization will crumble under the weight of our complaints about it and our neglect of it. It will happen so fast that it will be impossible to keep up with its repair.

Echoing Toynbee, Petroski adds:

If we do not recognize the urgency of maintaining it, we can expect the deterioration of our infrastructure to be a defining idea of what it means to be a citizen in a declining civilization.\textsuperscript{11}

In other words, the United States has no choice: We must recover and reclaim our former leadership role in preserving the cathedral of modern civilization. Indeed, if there were ever an issue that leaders of both parties should be able to agree upon, it’s rebuilding America so that we can remain, as Ronald Reagan memorably phrased it, “A shining city on the hill.”

15. Three Myths of Infrastructure

Previously, we noted the cultural and political forces that came together beginning in the 1970s, and—with the help of both political parties—weakened America’s infrastructure system to the point of crisis. Reversing this 40-year erosion of that foundation of growth will not be easy, even though an infrastructure agenda that rebuilds and strengthens America has enormous appeal to the American electorate, especially among the working and middle classes that have been hurt the most.

Many contemporary decision makers and opinion leaders have come to embrace, perhaps unknowingly, certain notions that downplay, or deny the imperatives that our country’s leaders had acted upon throughout most of our history. Unless these notions—these myths—are debunked and exposed, America will remain on its present course of stagnation, even decline.

We can focus on three specific notions, or myths: that infrastructure is low-tech; that the “virtual economy” can flourish without physical infrastructure; and that infrastructure is bad for the environment.

Infrastructure Is Low-Tech

In a burst of rhetorical enthusiasm, Ron Wyden, senior U.S. senator from Oregon, declared at the 2013 International Consumer Electronics Show in Las Vegas: “The Internet is the shipping lane of the 21st century.” One must note that while speaking to techie at a technological extravaganza, Wyden nevertheless used an old-fashioned infrastructure metaphor to make his point.

Indeed, everything that was once said about “solid” infrastructure is now being said about “virtual” infrastructure. And for good reason: it’s not that bridges or the shipping lanes of canals, railroads, or highways will disappear any time soon—they’re still needed—but, the elite understanding of transportation and economics has shifted. A closer look reveals that, in fact, nothing has shifted; the story of infrastructure has always been about progress, both technological and economic.
As we saw in chapter one, infrastructure consists of structural pathways that allow for the safe and efficient transportation of people and goods. Infrastructure is thus a catchall term for any kind of pathway that allows individuals and their commerce to interact and communicate with one another. It is not just about roads and bridges but also about pipes, wires, air lanes, sea lanes, and spectrum space.

Because infrastructure systems help people do what they want to do, all components of infrastructure—physical or virtual—are necessary, and any one piece is not worth much if not connected to, and embedded within, a larger system. One form of infrastructure layers over, but does not replace, the other.

This is how “high-tech” fits into the infrastructure picture. The Internet first connected everybody, and now, of course, it has the potential to connect everything. For example, the emerging vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communication networks aim to improve our use of physical infrastructure and make it safer and more efficient.

While talk of driverless “smart” cars may be a prime example of opportunity, it’s also, of course, fraught with liability. The future “Internet of Things,” which these systems will use, is basically WiFi, and WiFi is easy to hack. Thus everything in the Internet of Things—for which the Federal Communications Commission has already reserved developmental “white space” from the unused broadcast-television spectrum1—will have to be encrypted; the security issues alone are enormous, as is the potential for sabotage and terrorism.

These risks of the high-tech sector lead to the larger, more important context: No infrastructure system exists apart from a culture, a way of life that includes customs, mores, and habits, as well as a political framework that includes laws, contracts, and contract-enforcement. Consequently, the Internet of Things will need both political buy-in and political cover to succeed. It will need to be engineered with an eye toward making the whole system—that is, the entire country—hack proof. If and when that happens, infrastructure, too, will be even more high tech than it already is.

From this vantage point, we can see why there is no such thing as a “dumb” road, a “dumb” car, or a “dumb” pipe. When synergistically connected, all become pieces of a system with its own genius. That’s why no infrastructure will be “low-tech” in the future—because nothing will be low-tech.

The Virtual Economy Can Flourish Without Physical Infrastructure

The false notion that infrastructure is low-tech dovetails with another myth, that the information economy can flourish without physical infrastructure. The truth is just the opposite: The physical environment is the very reason that the virtual world exists, as the virtual world is nothing more than an attempt to replicate, or at least represent, the real world in a new way.

Common sense reminds us that the physical remains extremely important to Americans; for example, commuting times and traffic congestion in and around major population centers are a major quality-of-life variable. That’s why the American Road & Transportation Builders Association’s (ARTBA) proposal calling for the development of “Critical Commerce Corridors”—the full upgrading of major limited-access highways across the country into dual configurations, separating truck from automobile traffic, an innovation that the New Jersey Turnpike pioneered in 1966—offers promise for all sectors of our economy as well as all highway users.

Moreover, cyberspace depends on physical realities—from the equipment itself, to its installation, to its power supply, and to its maintenance.

This continued dependence on physical reality explains why high-tech companies always locate their operations geographically where old-style infrastructure networks are most developed: in metropolitan centers rather than in rural areas. That’s why new tech firms are often clustered in places such as the San Francisco Bay Area, New York City, and the built-up suburbs of Northern Virginia. These highly populated regions are not virtual creations at all, but depend heavily on existing “hard” forms of infrastructure, from water and sewage, to freeways and railways, to airports and electricity lines. We might pause to consider, for example, the vital importance of rights-of-way; that’s an ancient concept, but it’s just as important today as it ever was.

This false dichotomy between the physical and the virtual also overlooks the close relationship between the “smart” systems that the tech world is creating—another layer of infrastructure—and the older physical entities, including cars and transportation networks that these new systems will enhance and improve.

At a 2013 “Smart Transportation Showcase” conference on Capitol Hill, members of Congress and their staffs learned about intelligent-transportation systems being developed by high-tech firms. These systems apply computer and information technology to a wide-range of transportation issues, from providing drivers with real-time traffic, parking, and navigation information, thus reducing
traffic congestion and incident-response times, as well as facilitating highway-funding alternatives, including dynamic pricing and mileage-based user fees.  

Among the companies participating in the conference was Airbiquity, a cloud-platform firm in Seattle that offers connectivity between cars and roadways. While rooted in the virtual world, these innovations will work to improve the physical world, as driving will become more utilitarian—and safer.

Moreover, the tech sector has already enhanced both manufacturing and services with the application of automation and use of robots, and some industry observers predict that robots may some day farm our lands and even fight our wars. The possibilities, then, of a tighter integration of the virtual and the real world—and not a divide between—debunk any notion that the former can flourish without the latter.

Infrastructure is Bad for the Environment

The most-stubborn myth of all is that infrastructure is bad for the environment—an ideology that continues to captivate many educated Americans, especially the bicoastal elites. Of course, these affluent Americans might not consider that their footprints, creations, and livelihoods threaten a different kind of natural order—the need of ordinary Americans to enjoy the benefits of big projects that would rebuild America’s military-industrial base and physical-infrastructure networks.

We might ask: If the greens and their allies had been alive in Lincoln’s time, would they have opposed the transcontinental railroad? In all likelihood, yes. And they would have similarly fought against TR’s Panama Canal, Calvin Coolidge’s Boulder Dam, FDR’s Tennessee Valley Authority, and Ike’s Interstate System.

By contrast, Theodore Roosevelt and Franklin D. Roosevelt, a Republican and a Democrat, believed that nation building and conservation go hand-in-hand. That is, infrastructure is not bad for environment; it enables a civilization to respond to nature’s challenges, survive, and flourish. Neither highways nor airports, automobiles nor jets, have caused irreparable damage to our natural resources; these innovations have enabled us to use them effectively and efficiently.

For example, new innovations are enabling us to think about carbon dioxide. There are now fascinating ways to sequester carbon. A firm called

2. Sponsored by the Intelligent Transportation Society of America, the agenda of the conference can be reviewed at this website: http://www.itsa.org/technologyshowcase.
Novomer, in Waltham, Massachusetts, has discovered that we can cheaply transform industrial carbon into a wide variety of industrial products, from landfill to plastic to landfill. And Silicon Valley legend Vinod Khosla founded Calera to turn power-plant exhaust into cement.

Yet as long as many continue to pay homage to these reigning myths, which misrepresent the nature, purpose, and importance of infrastructure, America will not free itself from the thinking that has diminished economic development and job growth over the last four decades.
16. Vision vs. Bean-Counting

It’s perhaps no coincidence that the Congressional Budget Office (CBO) was established at the same time that two centuries of the Hamiltonian project were grinding to a halt—and when financialization was beginning to shift the center of the U.S. economy away from the Heartland to Wall Street.

The legislation that created CBO, the Congressional Budget and Impoundment Control Act of 1974, was driven by two large impulses: first, the backlash against the kind of executive power wielded by unpopular presidents Richard Nixon and Lyndon Johnson; and second, the rise of new financial tools presuming that all government endeavors could be counted, quantified, and thus controlled. While cost-benefit analysis of systems theory could be promising, the CBO has focused on forecasting only the costs—but never the long-term benefits—of legislative proposals, including infrastructure initiatives. In other words, it’s a legislative agency that measures only the downside, not the upside, and it’s easy to see why Uncle Sam has thus chosen to de-emphasize infrastructure.

So just as the greens and the libertarians contributed to the ratcheting down of infrastructure, as seen in chapter 13, the CBO became a third force militating against the expansiveness of American Strength. From yet another angle, then, one can see why the last 40 years have seen Uncle Sam substantially withdrawing from traditional nation building imperatives.

The bean-counters’ job in any enterprise, public or private, is to quantify the costs of any proposed course of action, not quantify the costs of inaction—that is, the cost of not understating a beneficial enterprise. So the burden of proof has thus fallen on the visionaries, the creators, and the engineers who want to think big, not those who want to maintain the status quo—which of course, demands no significant allocation of new resources. In this context, the known reality trumps the unknown—and the potentially beneficial.

As the French political economist Frédéric Bastiat observed in his frequently quoted 1850 essay, “That Which Is Seen, and That Which Is Unseen,” it’s
easy for the “seen”—that is, what’s right in front of us—to be more regarded more seriously than the “unseen”—that is, what’s over the horizon, or in the future.\(^1\)

Consequently, by examining only what is seen and familiar and quantifiable, CBO has functioned, in effect, as the guardian of the status quo. In the case of infrastructure, this factor has meant not deviating from the downward path that the United States has followed since the 1970s. Yet even today, figures on both sides of the aisle hail the agency as necessary, as an authority whose experts help the political class track all the expenditures in the nation’s $3.8 trillion federal budget.

That proceduralist mindset, however, has reduced our national vision to counting things, not building things. Costs have seemingly become the only metric that the politicians consider; they often rely upon CBO analysis to supplement, even replace, their own judgment, common sense, intuition, and, yes, vision.

That narrow focus is reflected in CBO’s methodology. From the get-go, the agency’s cost projections assume stasis, or no change, meaning that recent experience, or what has been, will continue in the future. These assumptions form the foundation of the agency’s coveted “baseline,” its gold standard, by which it not only “scores” proposed legislation but also evaluates fiscal and economic trends.

For example, CBO’s 2013 “Long-Term Budget Outlook,” carries the standard explanation included in almost all of its reports: “*If current laws governing taxes and spending were generally unchanged*”—an assumption that underlines CBO’s 10-year baseline budget—“the deficit would continue to drop over the next few years” (emphasis added).

A baseline surely has merit. But as much as the CBO seeks to stay with that which is known, it concedes that there is much that we don’t know—and that’s important. The same 2013 report includes an entire chapter cautioning about the “uncertainty” of CBO projections beyond the 10-year window. The 10-page chapter begins:

> **Budget projections are inherently uncertain. . . . Even if future spending and tax policies match what is assumed in the Congressional Budget Office’s (CBO’s) extended baseline, budgetary outcomes will undoubtedly**

differ from the projections in this report owing to unexpected changes in the economy, demographics, and other factors.²

In other words, shocks, or unexpected disturbances to the status quo, aren’t factored into CBO’s models, and its acknowledged uncertainties are by no means limited to its “long-term” estimates. Indeed, the CBO failed to foresee, during the first term of President Bill Clinton, the budget surpluses that would accumulate in his second term. More recently, the agency was blindsided by the Great Recession, the economic slowdown that started in December 2007 and whose effects still linger.

We might call this the Malthusian fallacy, named after Thomas Malthus, the gloomy British essayist and would-be economist. Fearing that robust birthrates within two generations would outstrip natural resources or the ability of an economy to sustain an expanding population, Malthus presumed that only what he could see and measure at the time—a population that was increasing geometrically while food production was supposedly increasing merely arithmetically—would continue.

Adopting a static-scoring methodology rather than a dynamic one, Malthus never considered that an unexpected factor, such as human creativity or technological innovation, would increase the food supply. As Robert Zubrin explains in his 2012 book Merchants of Despair:

All predictions based on Malthusian theory have proven false. . . . The more people there are, the greater the potential for innovation. Every human mouth comes not just with a pair of hands, but with a brain. That is why as the world’s population has increased, the standard of living has also increased, and at an accelerating rate.³

A certain measure of scarcity is not a permanent, unchanging factor. Life can improve, grow, expand.

Single-Entry Accounting

Yet it isn’t simply the unknown that the CBO overlooks; its allegedly sophisticated, multivariate scoring methodology masks the reality that the agency’s
scoring remains a single-entry system that is preoccupied on only one variable (costs)—as if all the gains since Franciscan Friar Luca Pacioli created the science of accounting in the 15th century have been washed away. Without a double-entry system that shows both costs and benefits, we never see the outputs that could vindicate the inputs.

For example, the CBO’s July 2012 report, “Infrastructure Banks and Surface Transportation,” acknowledges the existence of both negative and positive externalities, but the report nowhere calls for scoring the negative factors of having an inadequate transportation system—including time lost in congestion, repair of broken axles that can be attributed to deteriorating highways, or even damage to the overall business climate. Nor does the report suggest that quantifying the positive externalities of an improved transportation infrastructure—that is, less congestion, or a better overall business climate—might be in order. The 16-page report confirms that the only factor of interest to the CBO is actual outlays.

This doesn’t mean that the CBO ignores how changes in federal law and policy might affect the equation. Its website identifies several variables that the agency routinely factors into its scoring, including changes in crop production, resulting from new farm policies, or changes in number of healthcare services provided when Medicare’s payment rates are changed.

Nonetheless, the legislative agency admits that its basic cost estimates rely more on static than dynamic analysis:

CBO’s cost estimates generally do not reflect changes in behavior that would affect total output in the economy, such as changes in labor supply or private investment resulting from changes in fiscal policy. That is, CBO’s cost estimates generally do not include what is sometimes known as “dynamic scoring.”

In other words, its focus remains on quantifying only the costs of a certain proposed change, not the economic benefits that would accrue from a proposed change, or initiative, that would put those costs in perspective.

We might note that the CBO has never claimed to be an agenda-setting agency. Indeed, it prides itself in being an impartial accounting and analytics shop. Unfortunately, in an era in which financialism has reigned supreme, CBO-type

thinking has become not just an accounting tool, but also national policy. That is, the bold vision of the history-making champions of American Strength has been reduced to bloodless static analysis, to scoring outlays to the penny. CBO may have contributed a valuable focus on numbers, but it has nevertheless turned bean-counting into a cramped and inadequate version of a national vision—and has influenced national leaders to do the same.

One might imagine if the CBO had been set up a century earlier and had scored every federal infrastructure project, from the transcontinental railroad to the Interstate Highway System. It would have elaborately scored all these foundations of American Strength as a “cost,” and they would never have been built. And the America of today, of course, would be a far different country.
17. Rebuilding America

When the financial markets melted down in September 2008, many observers believe that Republican presidential nominee John McCain doomed his White House aspirations by proclaiming that “the fundamentals of our economy are sound.” Although the Great Recession had started almost a year earlier, every American grasped a reality that the Republican senator from Arizona did not: The U.S. economic system was, and remains, weak.

In reviewing the historical precedents that have brought the United States to this point, this study indicts the 1970s as the turning point, the decade when American leaders rejected—consciously or unconsciously—the proven tradition of Hamiltonian nation building, a decision that has diminished American Strength by almost every measure.

Meanwhile, the enormous advances of the high-tech sector have distracted us from issues of growth and strength. According to former World Chess Champion Garry Kasparov and Silicon Valley investor Peter Thiel, the nation’s technological feats since the 1970s represent a “dangerous illusion” that has “masked the relative stagnation of energy, transportation, space, materials, agriculture and medicine.” They continued:

*We can now use our phones to send cute kitten photos around the world or watch episodes of The Jetsons while riding a century-old subway; we can programme software to simulate futuristic landscapes. But the actual landscape around us is almost identical to the 1960s. Our ability to do basic things such as protect ourselves from earthquakes and hurricanes, to travel and to extend our lifespans is barely increasing.*

Nevertheless, one might argue that the physical landscape today is not “almost identical to the 1960s.” In many ways, it’s much worse, considering the

stagnation of the built environment relative to the growth in the U.S. population, per-capital travel miles, and commerce.

Indeed, a new and comprehensive infrastructure vision is needed now, more than ever. We must reapply our best minds to the continuously improving process of innovation, production, transportation, distribution, and consumption. The key variable is vision: the ability to see a future in which Americans make real things, consume real things, travel over physical distances in real things, transport real things, and export real things.

Moreover, we need more infrastructure, not less, because there is no road to economic prosperity, or American Strength, that does not involve, well, more roads. The information age has not diminished our need to go places, to travel, or to ship things. As we saw in chapter 15, the Internet actually boosts demand for transportation and commerce, as well as physical infrastructure. That’s because human beings are corporeal creatures who cannot escape their bodies, time, or space; they live in a very physical world. We aren’t the “ones” and “zeros” to be transmitted through a wire over a frequency. We need to get to places, and things need to get to us.

A Vision Democrats and Republicans Support

None of these points should be politically controversial. There is more common ground between the parties on transportation infrastructure than on most other domestic or foreign policy issues. Democrats, as well as Republicans, often cite the correlation between prudent infrastructure investment and economic growth. President Obama, for example, regularly makes the case for infrastructure spending. When he invited transportation secretaries of both parties to a 2010 White House function, he cited the historic pattern of public-works projects paving the way to a better future for all Americans:

Our future has never been predestined. It has been built on the hard work and sacrifices of previous generations. They invested yesterday for what we have today. That’s how we built canals, and railroads, and highways, and ports that allowed our economy to grow by leaps and bounds. That’s how we led the world in the pursuit of new technologies and innovations. That’s what allowed us to build the middle class and lead the global economy in the 20th century.²

President Obama is also fond of quoting Ronald Reagan’s pro-transportation views that we highlighted in chapter 13, as he did when seeking support for an infrastructure bill in 2011.³

On the Republican side, a number of practical-minded governors are equally bullish on infrastructure, including North Carolina Gov. Pat McCrory, who proudly told the Wall Street Journal that he’s an “Eisenhower Republican,” because Ike “was the president who built the interstate highway system.”⁴ Similarly, the former two-term Indiana governor known for austere budget-cutting, Mitch Daniels, nonetheless identifies with the Whig political tradition of Henry Clay and Abraham Lincoln. In 2010, he told the Washington Post, “Building excellent public infrastructure is an appropriate role for government.” Such public construction, he added, “enables the private sector to thrive.”⁵ He likewise told the New York Times in 2011 that “the nation really needs to rebuild.”⁶

Meanwhile, on Capitol Hill, the GOP has Rep. Bill Shuster of Pennsylvania, chairman of the House Transportation and Infrastructure Committee, who, according to the Philadelphia Inquirer, “champions transportation for all its benefits.”⁷ On the Senate side, the party can count on Jim Inhofe of Oklahoma, the chairman of the Senate Environment and Public Works Committee; a prominent conservative who has always advocated for limited government, he nonetheless declares his sturdy support for infrastructure:

I believe the development, construction, and maintenance of infrastructure is an inherently governmental function. In addition to providing for the national defense, I believe the single greatest service

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we as the federal government can provide our citizens is the necessary infrastructure to enable the United States to remain the economic engine that drives the world’s economy.  

And even in the face of the country’s looming fiscal challenges, the majority report of the bipartisan Bowles-Simpson Commission has insisted that any long-term deficit reduction won’t be effective unless it involves investing in “education, infrastructure, and high-value research and development to help our economy grow, keep us globally competitive, and make it easier for businesses to create jobs.”  

Moreover, the consensus of voices from the left, right, and center also includes those who really count—the voters. An overwhelming 95 percent of Americans express concern about the state of our infrastructure, while 84 percent support greater public investment to address those problems. In another survey, four out of five Americans concur with this statement: “In order for the United States to remain the world’s top economic superpower, we need to modernize our transportation infrastructure and keep it up to date.”  

A Vexing Impasse  

Unfortunately, the widespread support for rebuilding American infrastructure has neither captured the imagination of the political parties at the national level, nor translated into a major legislative agenda of the House or Senate leadership. Ray LaHood, who served as U.S. transportation secretary from 2009 until 2013, faulted President Obama’s $831 billion stimulus package of 2009 for shortchanging transportation projects. “Rather than $48 billion,” he declared, “it should have been $480 billion.”  

8. Cited by the “Weekly Closer” of the U.S. Senate Committee on Environment & Public Works, February 8, 2008,  
Unfortunately, the budget deal brokered in late 2013 for fiscal year 2014 also reflects the incomplete priorities of the leadership of the respective parties. According to Benjamin H. Harris of the Brookings Institution, the resulting compromise “does almost nothing to mitigate a decades-long decline in public investment and discretionary spending.”

This impasse is all the more vexing in the face of an astute economic analysis which ties years of infrastructure neglect to our current declining strength. When McKinsey and Company identified five “game changers” for U.S. growth and renewal, the international consulting firm highlighted infrastructure as one of the top two factors that could deliver the greatest impact by 2030:

**The backlog of maintenance and upgrades for U.S. roads, highways, bridges, and transit and water systems is reaching critical levels. The United States must increase its annual infrastructure investment by one percentage point of GDP to erase this competitive advantage.**

Measuring the impact by 2020, McKinsey research projects that upping such annual spending by one-percentage point of GDP would “create up to 1.8 million jobs and boost annual GDP by up to $320 billion.”

Another respected authority, Michael E. Porter of the Harvard Business School, echoes the McKinsey analysis. Porter fears that the United States has lost its competitive edge, with massive job losses to countries overseas. This negative impact, Porter warns, “is not a business cycle. This is structural, long-term decline.” And among the steps needed to reverse this trend, he believes, are lowering corporate taxes, streamlining regulations, and investing in infrastructure. “Recent deficit-cutting, “he laments, “has discouraged more infrastructure investment.”

We might make one last point: Porter is a well-known figure in business circles for his expertise on international competitiveness. Yet, his advice is not regularly tapped in discussions of U.S. national economics, even though Porter, has

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written extensively on competitiveness—that is, the process by which countries bring wealth and wealth-creation within their borders. This wealth-acquisition, obviously, is a vital process for a nation, and yet, all too often in the policy discourse, “competitiveness” is seen as somehow different from “economics.” Unlike many of the ideologues and theoreticians who overly influence both political parties at the national level, Porter has a specific interest in how things work in the real world—making his insights more valuable than those of many economists.

Yet, as we elaborated in chapter 13, both parties have been overrun by their own set of problems, captive to their respective ideological bases: the Democrats from the green-tinged Malthusians and neo-aristocratic NIMBY-ism; the Republicans from the libertarian school that confuses conservative nation building with big-government liberalism.

The irony is that GOP leaders now think that Jeffersonian policies—at least those the Virginian espoused before he became president and saw things differently, as noted in chapter five—will yield Hamiltonian success. As a result, important factions in both parties are in a sense reactionary in their approach to contemporary problems, and the middle class—what’s left of it—pays the price.

Yet the ultimate price of American weakness isn’t paid by the middle class, but rather, by the nation as a whole. What we need are effective leaders who can cut through ideological dead ends and articulate a plan of action, meaning presidential leadership—“energy in the executive,” as Hamilton called it—as well as new voices in Congress. And we might add that such endeavors would be popular. Gallup reports that 72 percent Americans support spending public money to put people to work on urgent infrastructure repairs. Considering party affiliation, we see that 91 percent of Democrats, 76 percent of independents, and a nearly two thirds of Republicans support greater infrastructure spending.15

What might that plan look like? What are some elements of a bold infrastructure vision for the United States in the 21st century? Three components are indispensable for building America: the development of “Critical Commerce Corridors,” the creation of infrastructure banks, and openness to new ideas for the built environment.

Critical Commerce Corridors

Given that most of our existing surface transportation systems were built more than a generation ago, and that the interstates were intended to last only about 50 years, the immediate need is a full transformation and expansion of the country’s aging network of highways and bridges. Because of its huge proportions, on the scale of the original highway system, this task may seem foreboding. Yet American Road & Transportation Builders Association (ARTBA) has proposed the most feasible and strategic enhancement to date: the creation of “Critical Commerce Corridors” (3C) into a cohesive system that seamlessly connects interstate highways to all major U.S. water ports, airports, and rail hubs.

The key objective of the 3C initiative is to expand the capacity of the transportation system to serve the trucking industry and facilitate the safer and more efficient movement of freight. But the call for upgrading key limited-access highways, implementing “dual configurations” that separate truck from automobile traffic, would benefit travelers and commuters, an innovation that has already proven itself on the New Jersey Turnpike. These corridors would also quickly evacuate Americans in times of national emergencies or natural disasters, a glaring weakness of existing road networks.

ARTBA’s flagship project, the “3C” plan, should not be confused with the association’s ongoing campaign for improving regional mobility and preserving public investments of existing highway and transit systems. To fund both components of its surface-transportation vision, ARTBA is working to put all options on the table—which include levying protected-and-dedicated user fees on freight shipments, allowing states to impose tolls on all portions of the interstate system, increasing existing federal motor-fuels excise taxes, transitioning to motor-vehicle mileage taxes (VMTs), and using public-private partnerships as well as debt financing.

By utilizing existing right-of-ways to the greatest extent possible, incorporating “smart” technology, as well as relying on “best-of-class” environmental protection/mitigation design-and-construction techniques, we can envision whole new kinds of highways: cheaper, faster, and safer. These proposals are realistic and practical. So how to pay for them? Perhaps the ideal synthesis is better and more infrastructure paid for by a mix of taxes (operating costs) and borrowing (investments). Other ideas, like infrastructure banks, should be considered as well.

Infrastructure Banks

Previously, we noted that the American Society of Civil Engineers (ASCE) estimated that it would cost $3.6 trillion to bring U.S. infrastructure up to “good
condition” over seven years. That translates into more than $200 billion a year, in addition to the $253 billion a year that ASCE estimates will be spent on infrastructure at all levels of government between 2013 and 2020.

Because the needs are great, many infrastructure advocates have suggested the creation of massive infrastructure banks, which states would be free to draw upon; these would be used to fund new projects and major renovations independently of the federal budget, under the assumption that most infrastructure projects represent capital expenditures, not operations. The idea of a capital budget, to be sure, is not new. Capital budgets are routine in business, in the nonprofit sector, and at the municipal level of government.

Indeed, corporations use capital budgeting for allocating resources for long-term projects and investments, in part as a tool to increase the value of the entire enterprise. Likewise, nonprofit institutions—whether educational, medical, or religious—usually have two budgets, one for operations and one for capital needs. Municipalities also employ capital budgeting to help allocate scarce resources in the midst of competing demands. A more pro-business/pro-jobs/pro-growth United States of America would not shy away from adopting the same long-horizon idea.

These infrastructure banks could be capitalized in a variety of ways—by selling conventional federal bonds; by tapping a portion of existing federal user fees and motor-fuel taxes; by diverting a portion of the Federal Reserve’s quantitative easing program, now benefiting all the big banks on Wall Street, into these new banks; or by allowing U.S. corporations to pay their income-tax obligations into these banks instead of the U.S. Treasury, perhaps matched one-for-one by federal tax dollars.

In setting up an infrastructure bank system, we might follow the pattern of the Federal Reserve, setting up not one central bank but many regional banks. Some observers will argue that the nation would not trust a single bank in Washington, D.C., to allocate monies fairly to urban areas versus rural areas, or to the bicoastal power centers versus to the often-ignored Heartland.

Yet any successful infrastructure bank would likely be an historically-proven system of regional banks, a necessary conduit for resuscitating the infrastructure sector.

**New Ideas for the Built Environment**

As much as the rebuilding of America will require major and ambitious projects of national importance—highways, the railroads, and the airports—we can’t overlook the importance of infrastructure at the local and community level.
While we want to be able to travel and ship goods easily to far-away places, we still also want to be able to return to neighborhoods, towns, and cities that make everyday life pleasant and enjoyable. So our vision of American infrastructure—our American Strength at the most basic level—must include the quotidian and the pedestrian. Literally, the pedestrian.

Yet, that challenge to an optimum built-environment has been more difficult in the years since World War II, as the federal government has forced localities to follow a strict “zoning” approach to development—an approach that, in essence, has prohibited the re-creation of the towns and older suburban communities to which Americans have shown a centuries-long attachment. In contrast to “Main Street” communities built on symmetrical and integrated grid-pattern street systems, American suburbs built since the 1950s represent, in most cases, a patchwork of remote subdivisions, often without sidewalks or street lights, isolated from public places like schools, churches, parks, and stores.

For instance, in Fairfax County, Virginia, one-third of the housing stock represents what builders have branded as townhouses, and yet these houses have not been built in a town or near a town. Other examples of sub-optimum development are large “homeowner associations” of “planned communities” that attempt to integrate housing and shopping—but are crisscrossed with freeway-sized boulevards and feature inaccessible “open spaces” rather than functional, usable parks. Only in rare situations can children walk or bike to school; they all have to be bused, contributing to carbon emissions and traffic.

So yes, perhaps we need to re-think our built environment. Many observers might propose, for example, to only construct smaller elementary and middle schools, complete with abundant playgrounds and athletic fields, in neighborhoods built to human—not truck—scale so that the vast majority of students could walk or ride their bikes not only to school but to also to after-school activities.

Much groundwork for these refreshing ideas has been plowed by the “new urbanists” and proponents of “smart growth,” including the husband-and-wife team, Andrés Duany and Elizabeth Plater-Zyberk. Their architectural firm, DPZ in Miami, has sought to return old-world charm to suburban development. One does not have to be an anti-“sprawl” crusader, or insist that everyone use mass transit or drive tiny hybrid vehicles, to appreciate all that this movement offers in terms of recovering a better way to construct and inhabit our built environment—including what we need for our automobiles.

Those better ways, however, must include making neighborhoods and towns accessible to both pedestrians and bicyclists. Anyone who has tried to ride a bike in a congested area knows full well that bicyclists also need better infrastructure. Former Republican House Majority Leader Eric Cantor was once a
close and highly placed ally to these folks; he spoke to the League of American Bicyclists at the U.S. Capitol in 2013, promising support for building more bikeable and walkable communities. Perhaps some other lawmaker will soon pick up Cantor’s torch of humane and human-scaled leadership.

Cities such as Seattle have shown that bicycle buffers can be built easily, and work well, on regular streets. *The Seattle Times* reports that in some cases, bike activists have taken matters into their own hands, building and installing flexible plastic pylons on their own. The city had initially thought about taking the buffers down, then thought better of it; the barriers remain, keeping motorists and bicyclists separate and safe.

Yes, America needs more of that kind of positive new infrastructure, and that kind of new thinking about infrastructure, aimed at making all modes of travel as safe, efficient, and sustainable as possible. After all, bicyclists will be—and deserve to be—an inevitable part of any future pro-infrastructure coalition.

Indeed, it’s not hard to imagine whole new visions of exciting cities—why not enchanting “emerald cities,” as seen in, say, *The Wizard of Oz*?—that would inspire, and necessitate, new infrastructure construction to support these glamorous green metropolises.

These three components of a new national infrastructure strategy—Critical Commerce Corridors, infrastructure banks, and new ideas for the built environment—form an outline for rebuilding America Strength in the 21st century.

Yet the vision needs to be embraced by inspirational leaders who can step up to the plate—against all the odds, and the naysayers—to lead America forward. That’s exactly what the great builders of American history did. Abraham Lincoln, Theodore Roosevelt, Franklin Roosevelt, Dwight Eisenhower, and Ronald Reagan all saw the challenge to our nation and responded.

Placing ourselves in that constructive historical context, we must do the same today.


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