WHITE PAPER

A Blueprint for Transformative US Infrastructure

October 2022
By Patt Talvanna, Matt Kalmus, Tina Zuzek-Arden, Mel Wolfgang, Jeff Hill, Danny Acosta, and Brandon Lang

Boston Consulting Group partners with leaders in business and society to tackle their most important challenges and capture their greatest opportunities. BCG was the pioneer in business strategy when it was founded in 1963. Today, we work closely with clients to embrace a transformational approach aimed at benefiting all stakeholders—empowering organizations to grow, build sustainable competitive advantage, and drive positive societal impact.

Our diverse, global teams bring deep industry and functional expertise and a range of perspectives that question the status quo and spark change. BCG delivers solutions through leading-edge management consulting, technology and design, and corporate and digital ventures. We work in a uniquely collaborative model across the firm and throughout all levels of the client organization, fueled by the goal of helping our clients thrive and enabling them to make the world a better place.

A Blueprint for Transformative US Infrastructure

State governments across the US need to integrate their planning and development of public infrastructure if they are to deploy funds from the new Bipartisan Infrastructure Law (BIL) effectively, future-proof their communities, and maximize the value of the capital they employ. The case for integration is strong from both a financial and a social perspective, with the potential to help the country meet a number of infrastructure-related challenges.

We offer eight short-term strategic and tactical initiatives for integration—allowing states to upgrade their infrastructure faster, better, and more cheaply than with traditional approaches. Pursuing these initiatives will help states and other public entities optimize coordination and alignment among stakeholders, maximize efficiency, and realize a transformative vision for their infrastructure.

Efficiency Is Essential When Deploying BIL Funds

This is a pivotal year in the US for public infrastructure, with a "once-in-a-generation" inflow of new state funds from the BIL—also known as the Infrastructure Investment and Jobs Act, or IIJA. States and other entities should use this unprecedented investment as efficiently and effectively as possible, especially since funds must be procured and allocated by fiscal year 2026.

Yet the infrastructure arena is missing out on a major source of efficiency and effectiveness today: the integration of public infrastructure projects—the development of infrastructure services or utility corridors through joint planning, procurement, construction, and maintenance, including road and rail, broadband, utilities, and energy transmission and distribution systems.

In fact, the various public and private organizations that manage state infrastructure sectors rarely collaborate. And the BIL framework only reinforces these silos by distributing funds specifically to projects within each individual sector. This siloed approach creates inefficiencies in infrastructure development and maintenance, including:

- A lack of a total cost of ownership (TCO) approach, as various entities with competing incentives own different stages of infrastructure development
- Differing technical standards, with materials, clearance, and depth requirements varying across sectors, preventing the cross-sector development of infrastructure
- Duplicative repairs and maintenance resulting from misaligned planning and maintenance timelines, leading to delays and service disruptions.

In contrast, integrated infrastructure development would incentivize joint planning and coordinated execution, facilitate cross-sector development, and reduce delays and service disruptions to the public.

Integration Brings Tremendous Value

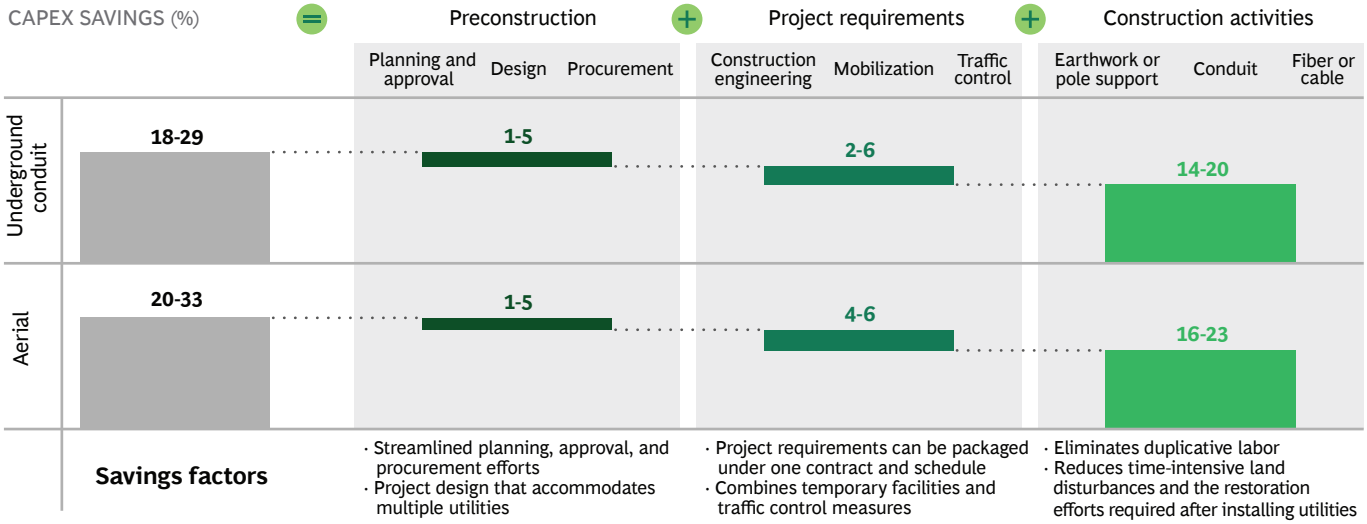
The case for integration is particularly clear from a financial perspective, not only for governments but for private industry and taxpayers. It can boost savings in both capex and operations and maintenance (O&M) by streamlining project designs, unifying procurement, generating construction efficiencies, and reducing the burden of maintenance.

While there are some technical and procedural limits to integration, such as the challenges of integrating wet and dry utilities in rights of way (ROW), isolated cases exist in which integration has driven remarkable cost savings. Perhaps best exemplifying these are "dig once" practices for broadband or electricity installation. According to our analysis, the integration of a broadband or electricity installation with an existing road or rail project can create 18% to 33% savings, depending on the use of conduit, direct bury, or aerial installation. (See Exhibit.)

From a cost-savings perspective alone, in fact, our analysis of BIL funding suggests that $240 billion in utility infrastructure spending could be optimized through integration, with $15 billion to $27 billion in incremental value possible for broadband, EV networks, and grid resiliency projects.

Integrated infrastructure development can also generate new recurring revenue streams to support further maintenance and upgrades. For example, many states are not yet charging private entities for accessing and utilizing their ROW, in part due to the fragmented nature of use and the difficulty of valuation. West Virginia has even passed legislation allowing ROW leases at fair market value, yet fails to charge for access, according to the state's Broadband Enhancement Council.

Exhibit - Integrating a Broadband or Electricity Project with Ongoing Road or Utilities Construction Can Generate 18% to 33% Capex Savings



Source: RS Means, Columbia Telecom Corporation, Federal Highway Administration, expert interviews, BCG analysis.

Note: Administrative cost savings are distributed across cost buckets. Cost savings can vary greatly depending on project size, type, and scope. Percentages may not total 100 due to rounding.

An integrated infrastructure perspective can allow state governments and departments of transportation (DoTs) to centrally manage their portfolio of ROW resources and identify which assets should be monetized and which can be employed as shared-use incentives to support public-private partnerships. Central management can also allow states to take advantage of existing infrastructure projects when they upgrade, thereby reducing costs and unlocking new revenue opportunities. For example, Utah has successfully used cooperative fiber and conduit trades with broadband service providers to obtain permission to use of 1,000 miles of fiber for telecommunications and intelligent transportation systems ("ITS"), valued at over $90 million in 2015.

Changing Societal Needs Call for a Shift

Integrated projects bring not only financial benefits, but societal benefits as well. In fact, any effective deployment of BIL funding should consider today's rapidly changing landscape of public infrastructure needs—including five contemporary challenges faced by the US and its infrastructure:

- **Digitization and access.** The transition to digital solutions—from online retail and telemedicine to hybrid learning and remote work—requires the expansion of broadband access, particularly for rural and underserved communities.
- **Electrification and automation of transport.** The transition from internal combustion engines to electric vehicles, automation, and ITS requires the rollout of nationwide EV charging, smart assets (such as sensors), and EV communications infrastructure.
- **Workforce and economic development.** Supply chain issues and labor shortages mean the efficient use of scarce resources is more important than ever, and partnerships with construction companies, engineering firms, material suppliers, labor unions, and other stakeholders are critical to expanding planning and development capacity.
- **Sustainability.** Reducing emissions will depend on a shift toward circular construction and the development of decentralized and renewable energy generation, transmission, storage, and distribution systems.
- **Environmental resilience.** Growing climate risk requires greater infrastructure resilience in order to mitigate potential disruptions from wildfires, storms, flooding, drought, and other extreme climate events.

The integration of infrastructure planning, development, and maintenance can help address these contemporary challenges in four primary ways.

More efficient use of resources. Integrated projects can save time and money on carbon-efficient infrastructure upgrades, such as projects that boost climate resilience or help future-proof EVs or autonomous vehicles. For instance, the Boston Smart Utilities Program was created in 2018 to develop a new model for integrated planning among energy, transportation, water, and telecommunications utilities. The program introduced requirements for infrastructure project proposals, including a preference for site plans with two or more utilities or services and a smart-utilities checklist to help future-proof infrastructure. It also focused on innovations such as decentralized renewable-energy microgrids, green infrastructure, smart traffic signals, intelligent sensors and traffic lights, and telecom "utilidors" that consolidate cable, internet, and other telecom wires in underground duct banks, according to the Boston Planning and Development Agency.

Reduced disruptions due to duplicative work or climate events. Elenia, the second-largest Finnish electricity distribution system operator, has been converting overhead lines to underground cabling since 2009, jointly installing fiber and streetlight cables, according to Climate Adapt. In doing so, Elenia sought to reduce power outages caused by extreme weather events while reaping additional benefits such as prolonged materials lifecycles, lower O&M costs due to weatherproofing, and cost savings via collaborations with telecom companies and municipal authorities. As of 2018, 41% of the company's cabling had been placed underground, with a goal of 75% by 2028.

Faster expansion to underserved communities. Extending critical infrastructure to underserved communities creates jobs, supports education, and attracts new businesses; it even results in shortened timelines for subsequent projects. Wabash Communications and EJ Water launched Illinois Fiber Connect in 2020, a joint venture to expand high-speed internet access to rural communities in Illinois. By running fiber alongside water pipelines in the same trench, Illinois Fiber Connect lowered the costs of last-mile broadband installation by up to two-thirds—while helping to close the digital divide.

Greater industry growth and workforce skills. A burgeoning demand for integrated capabilities and practices can drive industry growth and support the upskilling of the local workforce. The BUILDUP Skills initiative, for example, sponsored by the European Commission's Intelligent Energy Europe Program since 2011, provides construction education and training on the integration of smart energy assets into future infrastructure projects. As noted on its website, the initiative has not only established national workforce competency standards and integration goals for future projects but has developed qualification and training schemes to increase the supply of skilled workers and promote energy efficient practices in the building sector.

> Integrated infrastructure development would incentivize joint planning and coordinated execution, facilitate cross-sector development, and reduce delays and service disruptions to the public.

Tactical Recommendations for the Move to Integrated Infrastructure

Given the size of the opportunity, how can state governments move toward integrating their public infrastructure projects in the near term? We provide eight tactical recommendations for the planning and implementation of integrated infrastructure today, based on an assessment of current pain points in infrastructure development as well as best practices applied to date by specific municipalities, states, and countries. Together, they provide a roadmap to an integrated infrastructure approach for policymakers and state DoTs that can unlock benefits for state agencies, industry, businesses, and households.

Recommendations are listed in order of complexity and risk, ranging from no-regrets moves to complete commitments.

1. **Build a common business case linked to state objectives and societal impact.** Policymakers should build a common business case on the benefits of integrated infrastructure for all stakeholders, then use it to develop a narrative explaining why an integrated approach is imperative, framing it within state-specific priorities.

2. **Engage key private partners.** Once the business case is developed, policymakers should prioritize the identification of leading private partners, as these partners will be essential to the success of the program. In addition, they should establish communication channels between stakeholders in advance of all new project planning.

3. **Establish a central point of contact.** Central coordination is critical to the successful implementation of integrated infrastructure. Whether it is a person, team, or organization, a centralized point of contact should provide guidance for infrastructure funding, coordinate project design, and develop implementation plans for similar projects where overlap exists. Cooperative planning and oversight will enable innovative project-delivery mechanisms and public-private partnerships.

4. **Share information.** Communication is a key component of infrastructure integration. The creation of a real-time database of all information about public-use infrastructure, such as utility and fiber maps, land ownership, and present and planned land uses, will facilitate effective planning.

5. **Form a committee on workforce development.** Given their technical complexity in design, engineering, and construction, integrated projects typically require workforce development. Initiatives such as the upskilling of existing workers, cross-sector conferences, and lifetime training, will support the construction value chain by developing the capabilities required to implement these projects and utilize scarce resources effectively.

6. **Rethink procurement.** The evaluation of projects and proposals must incentivize the use of integrated, future-proof infrastructure planning. In this sense, establishing new procurement principles can help states transition from a "low bid" to a "best value" contracting approach—one that supports qualitative evaluations that look beyond cost to broader societal impact.

7. **Set top-down goals and KPIs.** Defining goals and KPIs that consider both fiscal and socioeconomic perspectives will reinforce the upfront commitment of stakeholders to project obligations and support accountability and governance.

8. **Align stakeholder incentives.** The most challenging step in the shift to integrated infrastructure is the alignment of conflicting stakeholder incentives. Redefining objectives and deal structures for stakeholders across infrastructure sectors will be critical to galvanizing joint planning and development. Monetary tools such as shared resource and cost agreements, tax incentives, and long-term revenue agreements (based on shared usage or future revenue streams) should be evaluated, tested, and if successful, implemented.

These short-term tactical recommendations can help states across the US move toward more efficient and effective infrastructure development, and advance a transformative vision, coordination, and stakeholder alignment. In the longer term, however, much more work will be required if we are to achieve the genuine integration of the country's infrastructure development—not only across infrastructure sectors but across regions and agencies.

The ultimate goal? The "infrastructure agency of the future," a government entity able to coordinate US infrastructure efforts in a way that boosts efficiencies, shortens timelines, aligns agendas and objectives, and effectively deploys the resulting savings in time and money on a national scale—generating a broad array of societal benefits.

About the Authors

Patt Talvanna is a Partner and Associate Director in BCG's Washington D.C. office. You may contact her by email at Talvanna.Patt@bcg.com.

Matt Kalmus is a Managing Director and Partner in BCG's New York office, You may contact him by email at Kalmus.Matt@bcg.com.

Tina Zuzek-Arden is a Managing Director and Partner in BCG's Washington D.C. office. You may contact her by email at Zuzek-Arden.Tina@bcg.com.

Mel Wolfgang is a Managing Director and Senior Partner in BCG's Boston office. You may contact him by email at Wolfgang.Meldon@bcg.com.

Jeff Hill is a Managing Director and Senior Partner in BCG's Los Angeles office. You may contact him by email at Hill.Jeff@bcg.com.

Danny Acosta is a Managing Director and Senior Partner in BCG's Los Angeles office. You may contact him by email at Acosta.Daniel@bcg.com.

Brandon Lang is a Principal in BCG's Los Angeles office. You may contact him by email at Lang.Brandon@bcg.com.

For Further Contact

If you would like to discuss this report, please contact the authors.


bcg.com

A BLUEPRINT FOR TRANSFORMATIVE US INFRASTRUCTURE

BCG