

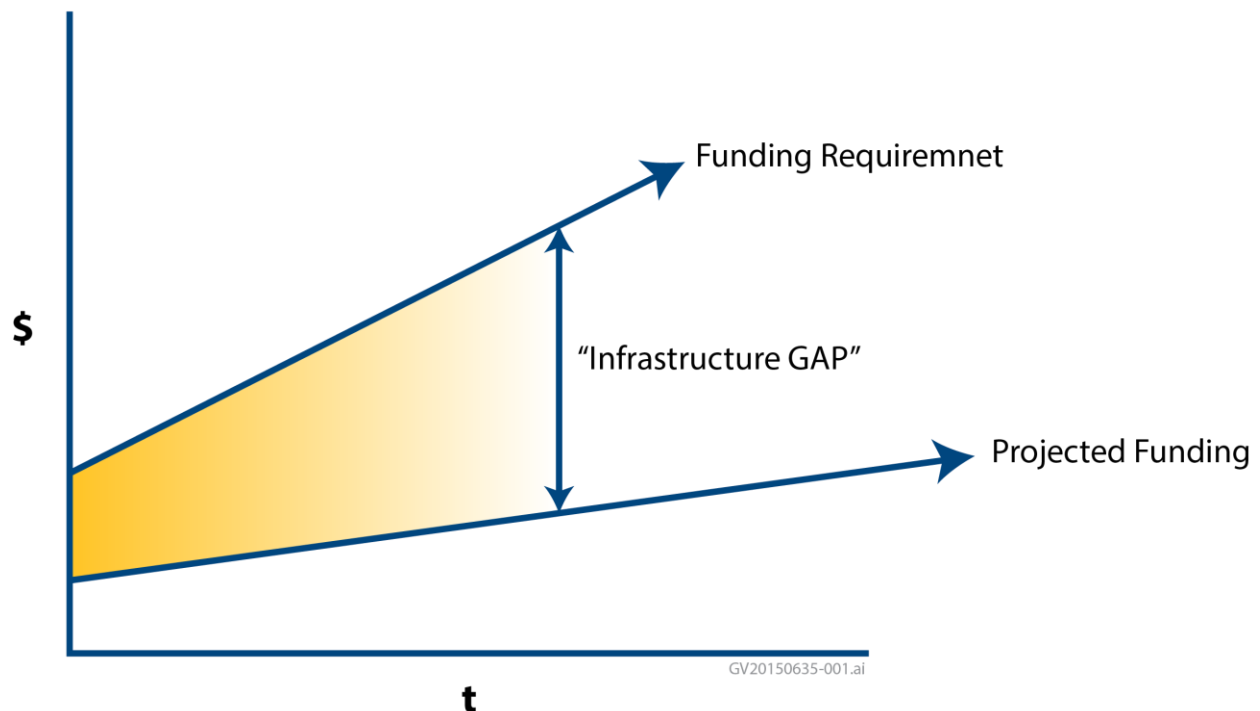
Meeting Tomorrow's Infrastructure Needs

Bob Prieto

The US Congress seems unable to come up with a comprehensive implementable solution for delivering the infrastructure that the nation requires to be economically competitive and efficient over the coming decades. While the focus and debate over funding is necessary it is not sufficient for meeting these needs. Rather a three part solution is required, one which frames the problem, provides for its financing but most importantly fixes key elements of this problem.

This paper looks at the comprehensive approach this national scale program requires and for the aid of those on the Hill, provides a convenient recap in tabular form.

Infrastructure GAP



Framing the Problem

The challenge the nation is facing with respect to meeting its future infrastructure needs is significant with all shortfalls denominated in trillions of dollars. But the problem is not just money but rather encompasses how we plan, execute and sustain those infrastructure investments we so make.

Project prioritization methodologies are weak and in some cases essentially non-existent. Politically selected projects, focused on ribbon cuttings often squeeze out the most essential infrastructure investments that must be made. Assumptions in many cases are suspect and the planning fallacy, driven by expertly posed framing questions, is readily evident.

Our approach to the largest of these projects results in significant cost and schedule delays to such an extent that “failure” is an expected outcome. In fact, two out of three large projects “fail”.

Significantly, construction productivity is essentially unchanged over the last 40 years with improvements in design, means and methods offset by extended processes, requirements and paperwork. Not enough has been done to address many of the barriers to improved delivery which persist.

Time, a key value creation point for our economy and a cost factor driven by delay, is not valued. Perceived senses of urgency are rarely shared throughout the entire stakeholder community, manifesting themselves only in the aftermath of disaster, and not even always then.

The significant infrastructure assets we do put in place and the ones that already exist are not well or consistently maintained. We depreciate without reinvestment; deteriorate rather than sustain. Life cycle performance is not a guiding principle and as such resilience to respond to a changing future is significantly lacking.

While our exposure to emergent vulnerabilities is growing, we have done little to put in place the policy, legal and institutional frameworks to more readily perform in the post disaster environment.

Finally, systemic innovation in the infrastructure industry is largely absent with the incremental innovations we do see unable to close an ever widening gap.

While I have attempted to frame the problem the nation's infrastructure faces, some will likely judge it harsh while others will judge it as incomplete. Either way, we must define the challenges to be overcome if we are to fix them and that fix will take not only money,

but as we will see in the next section, significant improvements to the ways we fund and finance infrastructure.

Funding & Financing the Problem

Funding and financing are regularly confused in money related discussions related to infrastructure and it is not unusual to hear the two terms used interchangeably in the same conversation. In simplest terms, any infrastructure investment must ultimately be paid for by someone. It may be paid for broadly by society through general taxes borne by essentially all taxpayers; more narrowly by “benefiting” taxpayers; or directly by users or other beneficiaries. Financing deals with where the money comes from in the first instance and what are the conditions placed on its use, protection (of the underlying asset), and ultimate repayment.

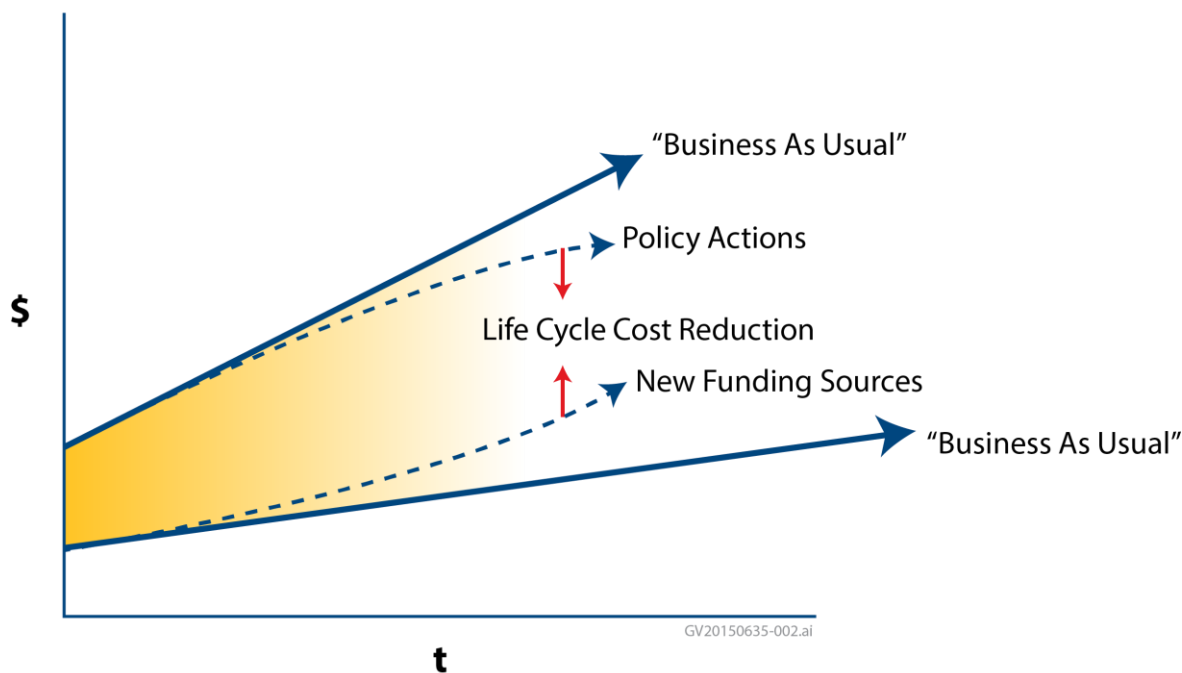
In the United States today the tax exempt debt preference limits capital and will likely pose real constraints to meeting our massive infrastructure needs. It cannot finance the burden alone. Additionally, when we compare tax exempt debt typically associated with traditional municipal bonds with senior taxable debt often associated with Public Private Partnerships we see a disparity of covenants. PPPs requirements focus on sustainment of the asset while most municipal tax exempt debt is essentially silent. This drives two distinct asset types. The more traditional infrastructure asset where deterioration carries no financing penalty and PPPs where sustaining a state of good repair in a condition of finance. Something is clearly broken here.

Infrastructure assets are by their very nature long lived assets, really generational in character and tenor. Tax policy today does not encourage or reward these extremely long term ownership needs, driving investors to focus on shorter term cash flows. Combined with the typical tax exempt structures it discourages mobilization of our longest term investors, pension funds, from more aggressive participation in the funding of these broad societal needs.

While there have been many improvements in the Federal tools available to support infrastructure delivery they are not sufficient. Even worse some are looking to roll back or otherwise limit those that have had some of the best use and impact. Financing secondary markets for infrastructure finance are immature at best and are essential to a more robust investment regime.

Limitations on use of post disaster funding to build back better persist.

Closing Infrastructure GAP

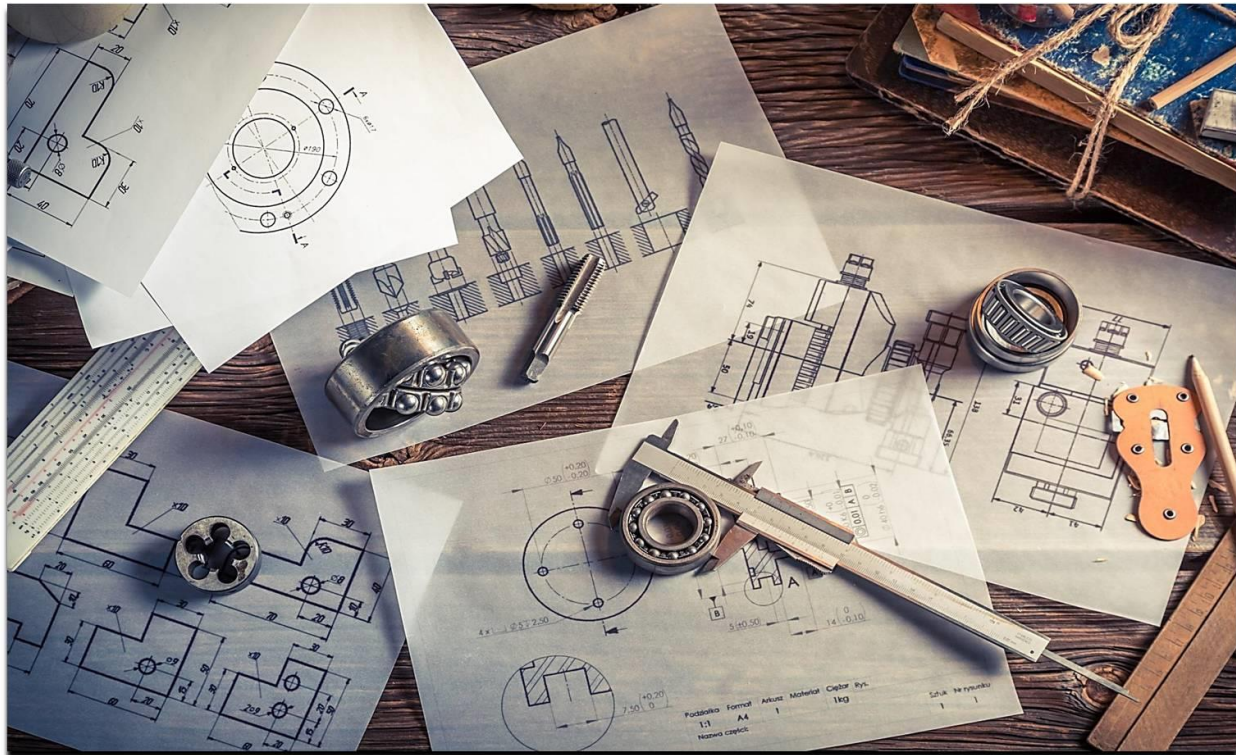


Fixing the Problem

Funding of projects in a resource constrained world require us to spend our money where it will do the most good. While the definition of “good” may vary the process for prioritization must be strengthened. We require a robust standard on infrastructure prioritization. This standard must be built on an outcomes focused vision, consistent methodology, structured around broad classes of factors to be considered. It cannot be undertaken project by project but rather must adopt a portfolio approach.

The consistent methodology required must be focused on doing the right things; doing enough of them; and doing them right. It requires design of an appropriate project portfolio reflecting local and regional needs balancing investments in maintenance (state of good repair), productivity, growth (added capacity) and innovation.

Our approach to management of the planning, delivery and maintenance of infrastructure projects requires a strengthened management approach, one which is more strategic in focus and recognizes the need for strengthened owner and project foundations and the limitations of current approaches to execution and management of the largest projects.



These strengthened foundations must encompass increased owner's readiness not just project readiness; check optimism bias through the use of reference class forecasting; and recognize, address and measure complexity

More realistic risk registers, models and modeling must consider white space risks; fat tail distributions; assumption migration; and constraint coupling

The management of the largest infrastructure projects must consider new approaches recognizing that these projects have semi-permeable boundaries and emergent outcomes. The traditional transformative model of project management must as a minimum be complemented with a focus on flows – transformational, influencing and induced.

Stakeholders play a huge part in determining infrastructure project success and as such must be engaged not merely managed. Precedences in project schedules need to be decoupled to the extent possible and management approaches must recognize that many aspects of infrastructure project execution are dependent on factors outside the project team's direct control. There is a contingent element to managing these projects and it must be recognized and provided for.

The infrastructure needs and the existing gap are huge and investments must be made with a comprehensive life cycle view. We must build for the lifecycle. This requires expanding our basis of design such that we both design to build and design to operate, maintain and replace. Our traditional largely prescriptive design standards must be replaced by life cycle performance based standards. We must standardize, optimize, automate, and build lean, increasingly “manufacturing” modules that support economies of scale.

The long duration of infrastructure projects and the assets subsequently created calls for recognition of the importance of optionality as a resilience strategy.

Many of the obstacles to efficient delivery of infrastructure projects are of our own making and increasingly we must remove these handcuffs. Innovation must be encouraged and supported whether it is contractual or related to means, methods and materials. Supportive policies such as the Safety Act after 9/11 provide good analogs for reducing the risks of innovation.

Time matters and must be valued. Our estimates and budgets must include escalation and the cost of schedule risks. A life cycle view encompassing the economic value of time – revenue and costs – can help drive projects forward. A need exists for a one stop permitting process for critical infrastructure that limits the period for filing lawsuits. Streamlining efforts to date show what is possible but these need to become the norm not the exception. Attention must be paid to squeezing out time by consolidating procurement steps and redoubled efforts on scope control will highlight the true impacts of disruption.

Fixing our infrastructure problem requires us to recognize the impacts of disasters striking our increasingly urbanized world. Post disaster the framework for repairing and rebuilding infrastructure is changed. Labor, materials and equipment are in short supply. Logistics is challenged both by higher construction flows but also damaged infrastructure essential for construction. Regulatory and administrative agencies are overwhelmed and traditional contracting frameworks must be modified. If we are to build back better codes and standards must efficiently and timely evolve.

Systemic innovation will require both industry consolidation and global leadership. Both must be encouraged through increased emphasis on competition of supply chains and a supportive international tax policy.

New financial constructs and multi-infrastructure infrastructure paradigms are required. We will need to consider policy changes such as eliminating tax exempt infrastructure financing in order to open the broader capital markets (pension funds) for infrastructure

investment. Long term infrastructure investments need to be encouraged and rewarded, perhaps reducing capital gains on 15 year or longer investments.

The power of subordinated debt demonstrated by TIFIA can lead to the creation of a subordinated debt infrastructure bank with public and private shareholders. Such a facility would not only support and facilitate needed investment but also improve longer term infrastructure performance by requiring life cycle maintenance and debt service coverage ratio covenants

Meeting Tomorrow's Infrastructure Needs

Meeting tomorrow's infrastructure needs is a challenge but one within our grasp if we can but unlock our thinking. We need to assure that we are doing the right things, the right way and that we are doing enough of them. We need to recognize that business as usual has failed us and that change is not an option.

The special problems of managing a programmatic challenge of this scale are daunting but within our capabilities if we begin by carefully framing and understanding the problem.

Checklist for Meeting Tomorrow's Infrastructure Needs

Framing the Problem

- Project prioritization methodologies are weak
- Two out of three large projects “fail”
- Construction productivity unchanged
- Barriers to improved delivery persist
- Time is not valued
- Assets are not well or consistently maintained
- Life cycle performance not a guiding principle
- Resilience to respond to a changing future lacking
- Post disaster environment not provided for
- Systemic innovation absent

Financing the Problem

- Funding and Financing confused
- Tax exempt debt preference limits capital
- Disparity of covenants
- Tax policy does not reward longest term ownership
- Federal tools good but not sufficient
- Secondary markets immature
- Post disaster funding requires building back better

Fixing the Problem

- Robust standard on infrastructure prioritization
 - Outcomes focused vision
 - Consistent methodology
 - Doing the right things
 - Doing enough of the right things
 - Doing right things right
 - Classes of factors to be considered
 - Portfolio approach
 - Maintenance
 - Productivity
 - Growth
 - Innovation

- Strategic Management
 - Strengthened Foundations
 - Owner's readiness not just project readiness
 - Optimism bias addressed by reference class forecasting
 - Realistic risk registers, models and modeling
 - White space risk; fat tail distributions; assumption migration; constraint coupling
 - Recognize, address and measure complexity
 - New theory of large complex projects
 - Semi-permeable boundary; emergent outcomes
 - Focus on Flows – transformational, influencing, induced
 - Engage, not manage - Sentries, scouts, ambassadors
 - Decouple by minimizing precedences
 - Contingency management
- Build for the lifecycle
 - BOD^x – Expanded Basis of Design (BOD)
 - CBOD – design to build
 - O&MBOD – design to operate, maintain and replace
 - Life cycle performance based standards
 - Manufacture vs construct
 - Standardize, optimize, automate, build lean
 - Optionality as a resilience strategy
- Remove the handcuffs
 - Facilitate contractual innovation
 - Federal \$\$\$ = No preclusions by law or regulation
 - Facilitate means, methods, materials innovations
 - SAFETY Act equivalent
- Value time
 - Include escalation and cost of schedule risk in all estimates and budgets
 - include economic value of time – revenues, costs
 - Life cycle view
 - One stop permitting process for critical infrastructure
 - Limit period for filing lawsuits
 - Consolidate procurement steps
 - Recognize the true cost of disruption
- Post disaster construction framework changed
 - Labor, materials, equipment
 - Logistics

- Damaged construction infrastructure
- Extensive temporary works
- Overwhelmed regulatory and administrative agencies
- Changed contracting frameworks
- Good Samaritan challenges
- Bonding requirements
- Evolving codes and standards
- Encourage industry consolidation and global leadership
 - Horizontal and vertical
 - Competition of supply chains
 - Essential for systemic innovation
 - Supportive international tax policy
 - Personal and business
- New financial construct
 - Eliminate tax exempt infrastructure financing
 - Opens broader capital markets (pension funds)
 - Reward long term infrastructure investment
 - Reduced capital gains on 15 year or longer investments
 - Create a subordinated debt infrastructure bank with public and private shareholders
 - Require life cycle maintenance and debt service coverage ratio covenants
 - Funding mechanisms must be pre-established to support
- Post disaster requires improving resilience of urban environments
 - Government funding and insurance typically focused on in kind restoration
 - Pre-existing long term plans required to provide context and minimize delayed decision making
 - Improvements must carry a life cycle covenant
- New infrastructure paradigm
 - Consolidate
 - Multi-infrastructure framework required
 - ROW as an increasingly valuable asset
 - Prioritize
 - Security/ Resilience
 - Discretionary
 - System Enhancements
 - State of Good Repair
 - Manage
 - Enterprise or portfolio management approaches

- Improve
 - Incentivize R&D and provide liability protection for initial deployments of innovations
- Monetize
 - What is the value of the nation's infrastructure assets?
 - Trillion \$\$\$ example
 - Create secondary financial markets

About the Author



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Bob Prieto is a senior vice president of Fluor, one of the largest, publicly traded engineering and construction companies in the world. He focuses on the development and delivery of large, complex projects worldwide. Bob consults with owners of large capital construction programs across all market sectors in the development of programmatic delivery strategies encompassing planning, engineering, procurement, construction and financing. He is author of “Strategic Program Management”, “The Giga Factor: Program Management in the Engineering and Construction Industry”, “Application of Life Cycle Analysis in the Capital Assets Industry” and “Capital Efficiency: Pull All the Levers” published by the Construction Management Association of America (CMAA) and “Topics in Strategic Program Management” as well as over 500 other papers and presentations.

Bob is a member of the ASCE Industry Leaders Council, National Academy of Construction, a Fellow of the Construction Management Association of America, a member of the World Economic Forum Global Agenda Council and several university departmental and campus advisory boards. Bob served until 2006 as a U.S. presidential appointee to the Asia Pacific Economic Cooperation (APEC) Business Advisory Council (ABAC), working with U.S. and Asia-Pacific business leaders to shape the framework for trade and economic growth and had previously served as both as Chairman of the Engineering and Construction Governors of the World Economic Forum and co-chair of the infrastructure task force formed after September 11th by the New York City Chamber of Commerce. Previously, he served as Chairman at Parsons Brinckerhoff (PB). Bob can be contacted at Bob.Prieto@fluor.com.

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